ABO Wind Oy

Purmo vindkraftsprojekt

Buller- och skuggmodelleringsrapport

Innehållsförteckning

Purmo vindkraftsprojekt

1 BULLER- OCH SKUGGMODELLERINGENS MÅL

Projektägaren för Purmo vindkraftsprojekt, ABO Wind Oy, planerar byggandet av 43 kraftverk i alternativ 1 (ALT1), 37 kraftverk i alternativ 2 (ALT2) och 9 kraftverk i alternativ 3 (ALT3) i Pedersöre. Vid modelleringarna beaktades Salo–Ylikoski vindkraftspark, som ligger på under fem kilometers avstånd söder om Purmoprojektet eftersom projektet i fråga har en delgeneralplan som vunnit laga kraft. I närheten av Purmoprojektet, på under 5 kilometers avstånd, ligger också det planerade vindkraftsprojektet i Kaitsar. I modelleringsskedet fanns det inga tillgängliga uppgifter om kraftverkslayouten eller -modellen i Kaitsar och det var därför inte möjligt att modellera de sammantagna konsekvenserna tillsammans med Kaitsarprojektet. Denna rapport över buller- och skuggmodelleringen har utarbetats baserat på layoutplanen i Purmoprojektets MKB-skede.

De bullerkonsekvenser som vindkraftverken orsakar har bedömts med WindPRO-programmets DECIBEL-modul. Vindkraftverkens skuggeffekter har modellerats med hjälp av WindPRO-programmets SHADOW-modul. Buller- och skuggmodelleringarna har gjorts av Henna-Riikka Rintamäki och kvalitetsgranskningen har gjorts av Johanna Harju från FCG Finnish Consulting Group Oy.

2 UTGÅNGSUPPGIFTER OCH METODER

2.1 Buller

2.1.1 Bullermodellering ISO 9613-2

De ljudtrycksnivåer som vindkraftverken orsakar har modellerats med WindPRO-programmets Decibel-modul enligt standarden ISO 9613-2. I enlighet med miljöförvaltningens anvisning för modellering av buller från vindkraftverk användes en vindhastighet på 8 m/s mätt på 10 meters höjd, en lufttemperatur på 15 °C, ett lufttryck på 101,325 kPa, en relativ luftfuktighet på 70 % och en markhårdhet på 0,4. Beräkningen har gjorts 4,0 meter över markytan.

Ljudtrycksnivåerna för vindkraftverken i Purmo har i alla alternativ modellerats med kraftverkstypen Vestas V150-6,0MW och ett 225 meter högt torn. Kraftverken har därmed en total höjd på 300 meter. Utgångsbullernivån för kraftverket V150-6,0 MW är 107,7 dB(A) utan bullerdämpande sågtandade vingar. Enligt kraftverkstillverkaren motsvarar bullernivån för V150-6,0MW ett högre konfidensintervall på 95 % och är enligt tillverkaren ett garantivärde för bullret.

Planen för Salo–Ylikoski vindkraftsprojekt i närheten av Purmoprojektet har vunnit laga kraft och de buller- och skuggkonsekvenser som projektet orsakar i området för Purmoprojektet har behandlats i modelleringarna av områdets nuläge. Ljudtrycksnivåerna för vindkraftverken i Salo–Ylikoski har modellerats med kraftverkstypen V136-3,45 MW och ett 169 meter högt torn. Kraftverken har en total höjd på 237 meter. Utgångsbullernivån för kraftverken i Salo–Ylikoski är 105,5 dB(A). Kraftverkens ljudeffektsnivå motsvarar garantivärdet, men 2 dB har lagts till i utgångsbullernivån.

Beräkningsresultaten från bullermodelleringarna har åskådliggjorts med hjälp av s.k. kartor över medeljudnivåer. På kartorna över medelljudnivåer presenteras kurvor över bullrets medelljudnivå, dvs. ekvivalensljudnivå (LAeq) med 5 dB:s mellanrum.

Tabell 1. Modelleringsprogram och ljudeffektsnivåer för vindkraftverken samt bullrets särdrag för Purmo vindkraftsprojekt med kraftverket V150-6,0MW samt bullrets särdrag.

UPPGIFTER OM MODELLERINGSPROGRAMMET							
Modelleringsprogram och version: WindPRO version 3.5.576				Modelleringsmetod: ISO 9613-2			
UPPGIFTER OM VINDKRAFTVERKET							
Vindkraftverkets tillverkare: Vestas				Typ: V150-6,0MW		Serienummer: -	
Nominell effekt: 6,0 MW		Navhöjd: 225 m		Rotorns diameter: 150 m		Torntyp: stål/hybrid	
Möjligheter att påverka vindkraftverkets bullerutsläpp under driften och dess inverkan på bullret							
Reglering av bladvinkeln		Rotationshastighet		Annat, vad			
Ja	- dB	Ja	- dB	Noise mode-reglering:			
~~Nej~~		~~Nej~~		Noise mode, utgångsljudnivå		107,7 dB	
AKUSTISKA UPPGIFTER/UTGÅNGSUPPGIFTER FÖR KALKYLERINGEN							
Third octave noise emission DMS no.: 0095-3747_01, Date 2020-11-03 Enligt kraftverkstillverkaren motsvarar bullernivån för V150-6,0MW ett högre konfidensintervall på 95 % och är enligt tillverkaren garantivärde för bullret.							

Per oktav [Hz],dB(A)		1/3-oktavvis [Hz] LWA dB					
		20	57,9	200	94,0	1600	95,2
63	86,1	25	63	250	95,6	2000	93,5
125	94,8	31,5	67,9	315	96,8	2500	91,5
250	100,4	40	72,6	400	97,7	3150	89,1
500	102,8	50	76,6	500	98,2	4000	86,2
1000	102,2	63	80,5	630	98,3	5000	83,2
2000	98,4	80	84	800	98,1	6300	79,6
4000	91,6	100	87	1000	97,5	8000	75,6
8000	81,5	125	89,6	1250	96,6	10000	71,5
107,7 dB(A)		160	92,1				

Mätning och observationer av bullrets särdrag:							
Smalbandighet/Tonalitet		Impulsartat buller		Amplitudmodulering		Annat, vad:	
~~Ja~~	Nej	~~Ja~~	Nej	~~Ja~~	Nej	~~Ja~~	Nej

Tabell 2. Modelleringsprogram och ljudeffektsnivåer för vindkraftverken samt bullrets särdrag för Purmo vindkraftsprojekt med kraftverket V136-3,45 MW .

UPPGIFTER OM MODELLERINGSPROGRAMMET							
Modelleringsprogram och version: WindPRO version 3.5.576				Modelleringsmetod: ISO 9613-2			
UPPGIFTER OM VINDKRAFTVERKET							
Vindkraftverkets tillverkare: Vestas				Typ: V136-3.45MW		Serienummer: -	
Nominell effekt: 3.45 MW		Navhöjd: 169,0 m		Rotorns diameter: 136 m		Torntyp: stål/hybrid	
Möjligheter att påverka vindkraftverkets bullerutsläpp under driften och dess inverkan på bullret							
Reglering av bladvinkeln		Rotationshastighet		Annat, vad			
Ja	- dB	Ja	- dB	Noise mode-reglering: STE			
~~Nej~~		~~Nej~~		Noise mode, utgångsljudnivå		105,5 dB	

AKUSTISKA UPPGIFTER/UTGÅNGSUPPGIFTER FÖR KALKYLERINGEN							
Third octave noise emission DMS no.: 0055-9919_01, Date 2016-03-02 Enligt kraftverkstillverkaren motsvarar bullernivån för V150-6,0MW ett högre konfidensintervall på 95 % och är enligt tillverkaren garantivärde för bullret. Vid modelleringen för Salo–Ylikoski användes en säkerhetskoefficient på 2 dB som tillägg till bullrets utgångsvärden.							
Per oktav [Hz],dB(A)		1/3-oktavvis [Hz] LWA dB					
		20	64,6	200	90,7	1600	96,8
63	93,1	25	73,9	250	92,3	2000	93,8
125	99,8	31,5	80,1	315	94,1	2500	91,4
250	97,4	40	83,0	400	95,1	3150	88,6
500	100,6	50	85,4	500	95,6	4000	90,2
1000	102,1	63	88,5	630	96,7	5000	80,6
2000	99,3	80	89,9	800	97,2	6300	74,0
4000	92,8	100	90,7	1000	97,6	8000	68,2
8000	75,3	125	98,0	1250	97,3	10000	63,2
107,5 dB(A)		160	93,2				

Mätning och observationer av bullrets särdrag:							
Smalbandighet/Tonalitet		Impulsartat buller		Amplitudmodulering		Annat, vad:	
~~Ja~~	Nej	~~Ja~~	Nej	~~Ja~~	Nej	~~Ja~~	Nej

2.1.2 Lågfrekvent buller

Det lågfrekventa bullret beräknades med metoder enligt Miljöministeriets anvisning 2/2014 och med uppskattningar av de ljudeffektsnivåer för kraftverken som erhållits från kraftverkstillverkaren.

Anvisningen 2/2014 erbjuder en metod för beräkning av lågfrekvent buller utanför byggnader. I social- och hälsoministeriets förordning om boendehälsa fastställs åtgärdsbegränsningar för lågfrekvent buller i bostadsrum. Ljudnivån som sprids till insidan av byggnaderna kalkylerades med hjälp av ljudisoleringsresultat från Åbo yrkeshögskolas Anojanssi-projekt (Keränen, Hakala och Hongisto 2017) och resultaten jämfördes med åtgärdsgränserna.

Tabell 3. Närmevärde för ljudnivåskillnad för fasaden till ett finländskt småhus i enlighet med resultaten från Anojanssi-projektet.

f [Hz]	20	25	31.5	40	50	63	80	100	125	160	200
DLσ [dB]	7.6	8.3	9.2	10.3	11.5	13.0	14.8	16.8	18.8	21.1	22.8

Vid beräkningen av lågfrekvent buller beaktades effekten av markytans form enligt anvisningen 4/2014. Resultaten har presenterats i form av en tabell enligt frekvens vid bostads- och fritidsbyggnaderna i projektområdets omgivning.

Tabell 4. Använda modelleringsparametrar vid ISO 9613-2-kalkylerna samt objekt som är utsatta för buller.

AKUSTISKA UPPGIFTER/UTGÅNGSUPPGIFTER FÖR KALKYLERINGEN			
Beräkningshöjd		Beräkningsrutans storlek [m·m]	
ISO 9613-2: 4,0 m		25x25 m	
Relativ fuktighet		Temperatur	
70 %	Annat, vad och varför:	ISO 9613-2: 15 C°	
Terrängmodellens källa och noggrannhet			
Terrängmodellens källa: LMV terrängdatabas		Horisontell resolution: 1,0	Vertikal resolution: 0,5
Beaktande av mark- och vattenytans absorption och reflektion, använda koefficienter			
ISO 9613-2	0,4		Obs
Atmosfärens stabilitet vid beräkningen/meteorologisk korrigering			
Neutral, (0): Neutral		Annat, vad och varför:	
Beaktande av väderförhållanden; vindriktningar och hastighet som använts vid beräkningen			
Vindens riktning: 0-360°		Vindhastighet: 8 m/s uppmätt på 10 meters höjd	
Riktning för kraftverkets ljud och dämpning			
Fri rymd: ja		Annat, vad och varför:	

2.2 Skuggmodellering

Tabell 5. Modelleringsprogram och vindkraftverkens storlek i skuggmodelleringarna för Purmo vindkraftsprojekt.

UPPGIFTER OM MODELLERINGSPROGRAMMET			
Modelleringsprogram och version: WindPRO version 3.5.576		Modelleringsmetod: ISO 9613-2	
UPPGIFTER OM VINDKRAFTVERKET			
Vindkraftverkets tillverkare: Generic		Typ: RD200	Serienummer: -
Total höjd: 300 m	Navhöjd: 200 m	Rotorns diameter: 200 m	Torntyp: stål/hybrid

Tabell 6. Modelleringsprogram och vindkraftverkens storlek i skuggmodelleringarna för Salo–Ylikoski vindkraftsprojekt.

UPPGIFTER OM MODELLERINGSPROGRAMMET			
Modelleringsprogram och version: WindPRO version 3.5.576		Modelleringsmetod: ISO 9613-2	
UPPGIFTER OM VINDKRAFTVERKET			
Vindkraftverkets tillverkare: Generic		Typ: RD180	Serienummer: -
Total höjd: 240 m	Navhöjd: 150 m	Rotorns diameter: 180 m	Torntyp: stål/hybrid

De skuggeffekter som vindkraftverken i Purmo orsakar har modellerats med ett kraftverk med en rotordiameter på 200 meter och ett 200 meter högt torn. Vid modelleringarna har kraftverken i Purmo en total höjd på 300 meter. Vindkraftverken i Salo–Ylikoski har modellerats med kraftverk med en rotordiameter på 150 meter och ett 180 meter högt torn. Vid modelleringen av skuggeffekterna har kraftverken i Salo–Ylikoski en total höjd på 240 meter.

Skuggeffekterna modellerades med hjälp av WindPRO-programmets Shadow-modul. Vid beräkningen beaktas skuggor som bildas då solen ligger över 3 grader ovanför horisonten. Som skugga räknas en situation där bladet täcker minst 20 % av solen.

Vid modelleringen av skuggeffekter beaktas den maximala bredden av vingens blad samt bredden av vingens spets på 90 procents avstånd från turbinen. Vid modelleringen antas vingen avsmalna lineärt mot spetsens breddvärde.
Vid modelleringen av skuggeffekter för Purmo användes en maximal bredd på 4,71 meter för vingens blad och 1,44 meter som bredd på vingens spets. Vid modelleringen av skuggeffekter för Salo–Ylikoski

användes en maximal bredd på 5,07 meter för vingens blad och 1,59 meter som bredd på vingens spets.

Vid beräkningen för skuggningsmodellen beaktades projektområdets höjduppgifter, vindkraftverkens lägen, vindkraftverkens navhöjd och rotordiameter samt projektområdets tidszon. Vid modelleringen beaktades solens läge vid horisonten vid olika klockslag och årstider, molnighet per månad (med andra ord hur mycket solen lyser då den står ovanför horisonten) samt den uppskattade driftstiden för vindkraftverken per år.

Som granskningshöjd för skuggningen på gårdsplanen för bostads- eller fritidsbyggnaderna i närheten användes 1,0 meter. Beräkningsområdet storlek var 5,0 x 5,0 meter. Beräkningsfönstren riktades mot kraftverken i s.k. ”greenhous mode”.

De genomsnittliga soltimmarna baserar sig på långvariga väderuppgifter som uppmätts vid Jockis väderstation under åren 1981–2010. Som vindriktning och hastighetsfördelning vid beräkningarna användes Nasas MERRA-data (Modern Era Retrospective-analysis for Research and Applications) från närheten av projektområdet.

Vid skuggmodelleringarna som beaktar träd (Luke forest) beaktades trädens skyddande inverkan genom att använda Naturresursinstitutets material över trädens medelhöjd från 2019.

Resultaten från skuggmodelleringen åskådliggörs med hjälp av en karta. Skuggeffektens omfattning (1, 8 och 20 timmar i året) framgår av kartan. I modelleringen har också effekterna för känsliga objekt i omgivningen runt området för vindkraftsparken beräknats separat.

2.3 Gräns- och riktvärden

2.3.1 Buller

I Statsrådets förordning (1107/2015) fastställs planeringsvärden för maximalvärdet för medelljudnivåerna dag- och nattetid för vindkraftverk. Om bullret från vindkraftverket innehåller tonala, smalbandiga eller impulsliknande komponenter eller om det är tydligt amplitudmodulerat, bör det enligt anvisningarna läggas till fem decibel till modelleringsresultaten innan de jämförs med riktvärdet. Eftersom riktvärdet redan omfattar de typiska dragen för buller från vindkraftverk, bör de ovan nämnda typiska dragen för ljud vara ovanligt kraftiga för att fem decibels tillägg i ljudstyrkan skulle behöva beaktas i modelleringsresultaten.

Tabell 7. Riktvärden för buller från vindkraftverk enligt Statsrådets förordning (27.8.2015).

Objekt som utsätts för konsekvenser	Dagtid (7–22)	Nattetid (22–7)
Fast bebyggelse	45 dB	40 dB
Fritidsbebyggelse	45 dB	40 dB
Vårdanstalter	45 dB	40 dB
Läroanstalter	45 dB	—
Rekreationsområden	45 dB	—
Campingområden	45 dB	40 dB
Nationalparker	40 dB	40 dB

I social- och hälsoministeriets förordning (545/2015) fastställs åtgärdsbegränsningar för lågfrekvent buller. Åtgärdsgränserna berör bostadsrum och de har fastställts som icke-frekvensvägda medelljudnivåer under en timme tersvis. Åtgärdsgränserna berör buller nattetid och under dagen tillåts 5 dB högre värden.

Tabell 8. Åtgärdsgränser för medelljudnivån under en timme för lågfrekvent inomhusbuller i sovutrymmen.

Tersband Hz	20	25	31,5	40	50	63	80	100	125	160	200
Medelljudnivå LZeq,1h, dB	74	64	56	49	44	42	40	38	36	34	32
Medelljudnivå beräknat utifrån föregående med A-vägning LAeq,1h, dB	24	19	17	14	14	16	18	19	20	21	21

Dessutom får buller under natten som eventuellt orsakar sömnstörningar och som tydligt skiljer sig från bakgrundsbuller inte överskrida 25 dB som medelljudnivå under en timme LAeq, 1 h uppmätt i sovutrymmen.

2.3.2 Skuggeffekter

I Finland finns inga allmänna myndighetsbestämmelser om den maximala varaktigheten för skuggning som orsakas av vindkraftverk eller bedömningsgrunder för skuggbildning. I miljöministeriets anvisningar för planering av vindkraftbyggande föreslås att man bör använda andra länders rekommendationer om begränsning av reflexer (Miljöministeriet 2012).

I flera länder har riktvärden eller rekommendationer för den godkända mängden av blinkeffekter utfärdats. Till exempel i Sverige är motsvarande rekommendation åtta timmar per år och 30 minuter per dag.

Vid bedömningen granskades konsekvenserna i ett område där skuggor eller blinkeffekter i en verklig situation enligt modelleringen (”real case”) förekommer under minst 8 timmar per år.

3 BULLER- OCH SKUGGMODELLERINGARNAS RESULTAT

3.1 Buller

3.1.1 Nuläge

Söder om Purmo planerade vindkraftspark ligger Salo–Ylikoski vindkraftspark vars delgeneralplan vunnit laga kraft. Detta innebär att buller som driften av Salo–Ylikoski vindkraftspark orsakar kan anses beskriva nuläget beträffande vindkraftsbuller. Det buller som orsakas av vindkraftverken i Salo–Ylikoski vindkraftspark presenteras på Bild 1 nedan och bullernivåerna i nuläget vid modelleringspunkterna A–AA i Purmo presenteras i Tabell 9.

Mer detaljerade beräkningsresultat för bullermodelleringen för nuläget finns i bilaga 1.

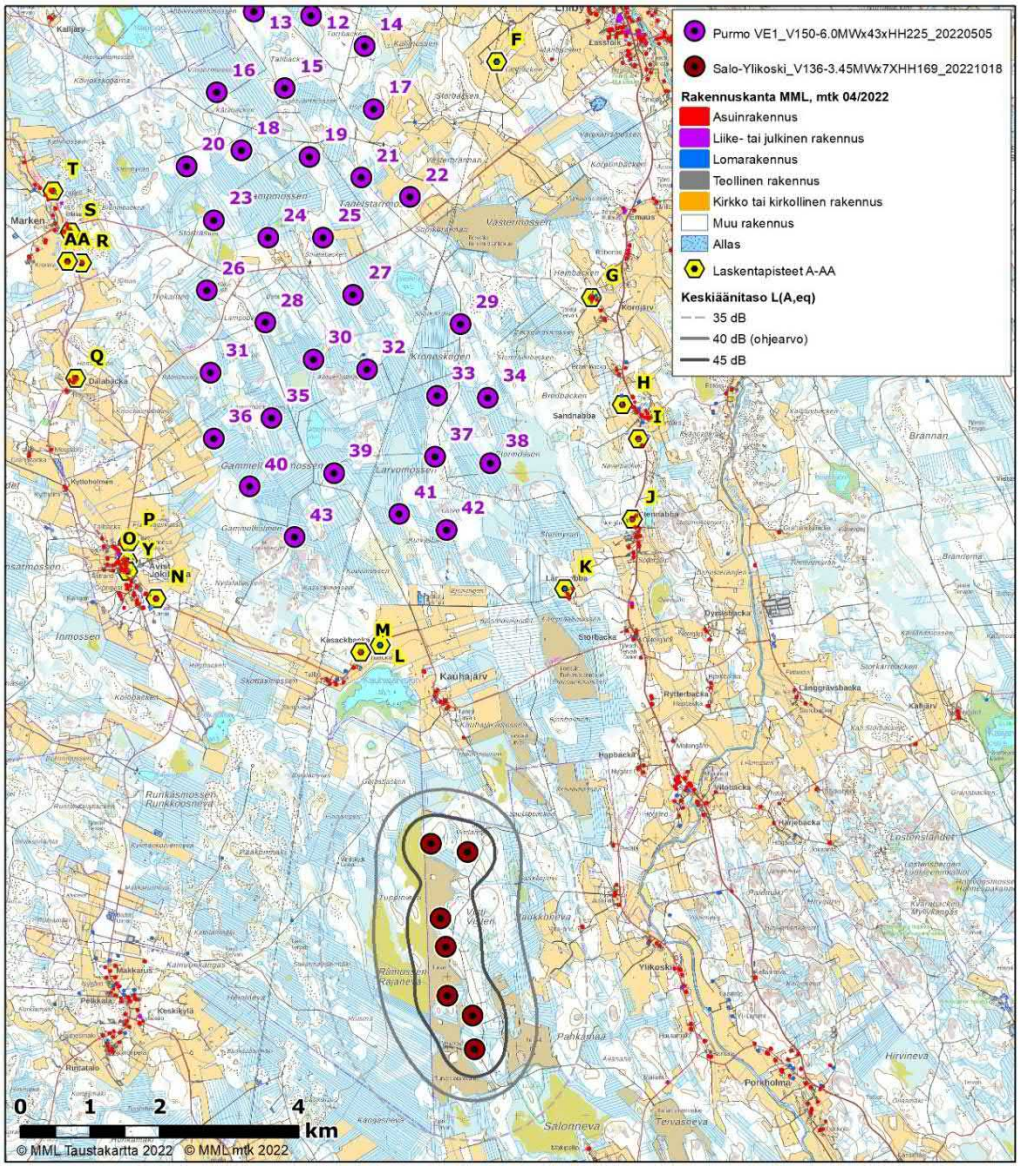


Bild 1. Kalkylerade bullernivåer som uppstår i närheten av Purmo vindkraftsprojekt i nuläget genom Salo–Ylikoski vindkraftsproduktion i enlighet med standarden ISO 9613-2.

*Tabell 9.*De kalkylerade bullernivåer som orsakas av vindkraftsproduktionen i omgivningen av Purmo vindkraftsprojekt i nuläget enligt standarden ISO 9613-2.

Beräkningspunkt	ETRS89-TM35 Öst	ETRS89-TM35 Norr	Z (m)	Kalkyleringshöjd (m)	Bullernivå dB(A)
Bostadsbyggnad A (Lillkvist)	296866	7052328	25,9	4,0	9,1
Bostadsbyggnad B (Dallberga)	297952	7051163	25	4,0	9,9
Bostadsbyggnad C (Tormbacka)	298274	7049757	28,2	4,0	10,8
Bostadsbyggnad D (Kallträskvägen)	298556	7048421	35,6	4,0	11,7
Jaktstuga E (Kejsarbacken)	298663	7047017	33,9	4,0	12,7
Fritidsbyggnad F (Källbacken)	299710	7044165	37,5	4,0	15,1
Bostadsbyggnad G (Kornjärv)	301071	7040772	55	4,0	18,3
Bostadsbyggnad H (Sandnabba)	301519	7039228	51,9	4,0	20,0
Bostadsbyggnad I (Asp)	301749	7038736	54,4	4,0	20,5
Bostadsbyggnad J (Stennabba)	301661	7037581	55	4,0	22,1
Bostadsbyggnad K (Långnabba)	300689	7036583	55	4,0	24,7
Fritidsbyggnad L (Åvistvägen)	298031	7035773	52,4	4,0	27,5
Bostadsbyggnad M (Stenbacka)	297753	7035671	53,9	4,0	27,6
Bostadsbyggnad N (Adler)	294812	7036441	45	4,0	22,2
Bostadsbyggnad O (Åvistvägen)	294394	7036982	40,2	4,0	21,1
Bostadsbyggnad P (Finnabbavägen)	294415	7037260	40	4,0	20,9
Bostadsbyggnad Q (Dalabacka)	293652	7039610	40	4,0	17,9
Bostadsbyggnad R (Kronkvist)	293736	7041267	32,5	4,0	16,5
Bostadsbyggnad S (Tallbacka)	293575	7041715	32,1	4,0	16,1
Bostadsbyggnad T (Norrgård)	293326	7042304	31	4,0	15,5
Bostadsbyggnad U (Nåpi)	294326	7045578	35	4,0	13,3
Bostadsbyggnad V (Skutas)	293741	7047247	32,1	4,0	11,9
Bostadsbyggnad W (Åbrännan)	293782	7049981	22,5	4,0	10,2
Fritidsbyggnad X (Dalbacka)	296008	7052686	20,5	4,0	8,8
Bostadsbyggnad Y (Åvist)	294403	7036830	41,6	4,0	21,3
Bostadsbyggnad Z (Nabba)	294257	7045675	35	4,0	13,2
Bostadsbyggnad AA (Kronkvist)	293533	7041290	31,6	4,0	16,4

3.1.2 Kalkylresultat från bullermodelleringen för Purmo vindkraftsprojekt (ALT 1, ALT 2 och ALT 3)

I projektalternativ 1 (ALT1) underskrider bullervärdena vid de bostads- och fritidsbyggnader som ligger närmast Purmoprojektet 40 dB. Bullernivåer som orsakas av Purmo vindkraftspark i alternativ 1 har presenterats på bild 2 och bullernivåerna vid modelleringspunkterna A–AA i tabell 10.

Vid modelleringen beaktades även vindkraftverken i Salo–Ylikoski vindkraftspark, som har en lagakraftvunnen plan.

Mer detaljerade beräkningsresultat för bullermodelleringen i projektalternativ 1 finns i bilaga 2.

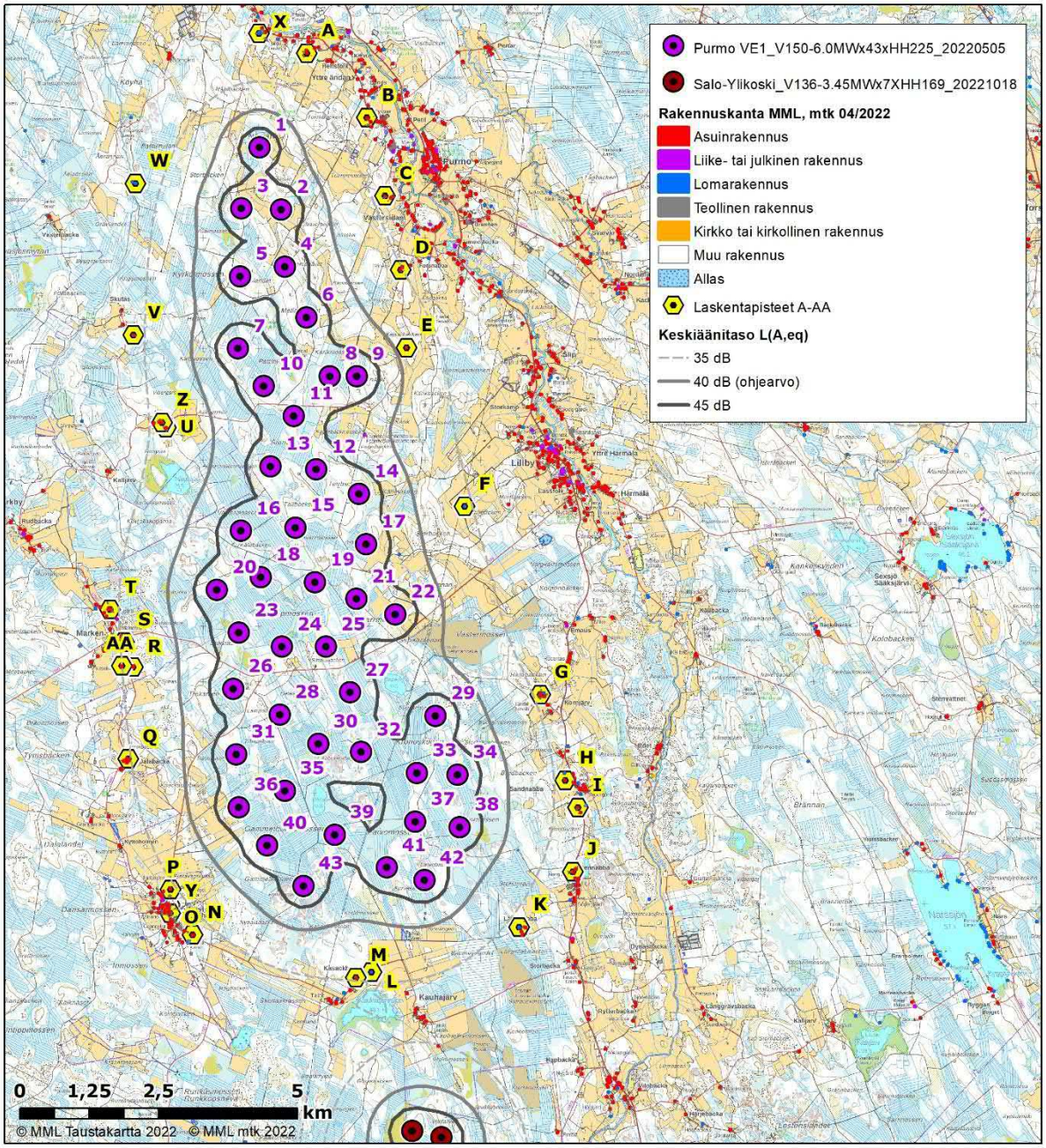


Bild 2. Resultat av bullermodellering ISO 9613-2. Purmo ALT1 tillsammans med projektet i Salo–Ylikoski.

Tabell 10. Kalkylerade bullernivåer i närheten av Purmo vindkraftspark med kraftverket *V150 - 6,0 MW - ALT1 tillsammans projektet i Salo–Ylikoski.*

Beräkningspunkt	ETRS89-TM35 Öst	ETRS89-TM35 Norr	Z (m)	Kalkyle-ringshöjd (m)	Bullernivå dB(A)
Bostadsbyggnad A (Lillkvist)	296866	7052328	25,9	4,0	30,8
Bostadsbyggnad B (Dallberga)	297952	7051163	25	4,0	32,0
Bostadsbyggnad C (Tormbacka)	298274	7049757	28,2	4,0	33,9
Bostadsbyggnad D (Kallträskvägen)	298556	7048421	35,6	4,0	35,1
Jaktstuga E (Kejsarbacken)	298663	7047017	33,9	4,0	38,4
Fritidsbyggnad F (Källbacken)	299710	7044165	37,5	4,0	35,5
Bostadsbyggnad G (Kornjärv)	301071	7040772	55	4,0	34,4
Bostadsbyggnad H (Sandnabba)	301519	7039228	51,9	4,0	34,0
Asuinrakennus I (Asp)	301749	7038736	54,4	4,0	33,1
Bostadsbyggnad J (Stennabba)	301661	7037581	55	4,0	32,5
Bostadsbyggnad K (Långnabba)	300689	7036583	55	4,0	34,0
Fritidsbyggnad L (Åvistvägen)	298031	7035773	52,4	4,0	35,6
Bostadsbyggnad M (Stenbacka)	297753	7035671	53,9	4,0	35,2
Bostadsbyggnad N (Adler)	294812	7036441	45	4,0	33,5
Bostadsbyggnad O (Åvistvägen)	294394	7036982	40,2	4,0	33,7
Bostadsbyggnad P (Finnabbavägen)	294415	7037260	40	4,0	34,5
Bostadsbyggnad Q (Dalabacka)	293652	7039610	40	4,0	34,8
Bostadsbyggnad R (Kronkvist)	293736	7041267	32,5	4,0	35,8
Bostadsbyggnad S (Tallbacka)	293575	7041715	32,1	4,0	35,3
Bostadsbyggnad T (Norrgård)	293326	7042304	31	4,0	34,3
Bostadsbyggnad U (Nåpi)	294326	7045578	35	4,0	36,1
Bostadsbyggnad V (Skutas)	293741	7047247	32,1	4,0	34,1
Bostadsbyggnad W (Åbrännan)	293782	7049981	22,5	4,0	32,7
Fritidsbyggnad X (Dalbacka)	296008	7052686	20,5	4,0	29,8
Bostadsbyggnad Y (Åvist)	294403	7036830	41,6	4,0	33,4
Bostadsbyggnad Z (Nabba)	294257	7045675	35	4,0	35,9
Bostadsbyggnad AA (Kronkvist)	293533	7041290	31,6	4,0	34,9

I projektalternativ 2 (ALT2) underskrider bullervärdena vid de bostads- och fritidsbyggnader som ligger närmast Purmoprojektet 40 dB. Bullernivåer som orsakas av Purmo vindkraftspark i projektalternativ 2 har presenterats på bild 3 och bullernivåerna vid modelleringspunkterna A–AA i tabell 11.

Vid modelleringen beaktades även vindkraftverken i Salo–Ylikoski vindkraftspark, som har en lagakraftvunnen plan.

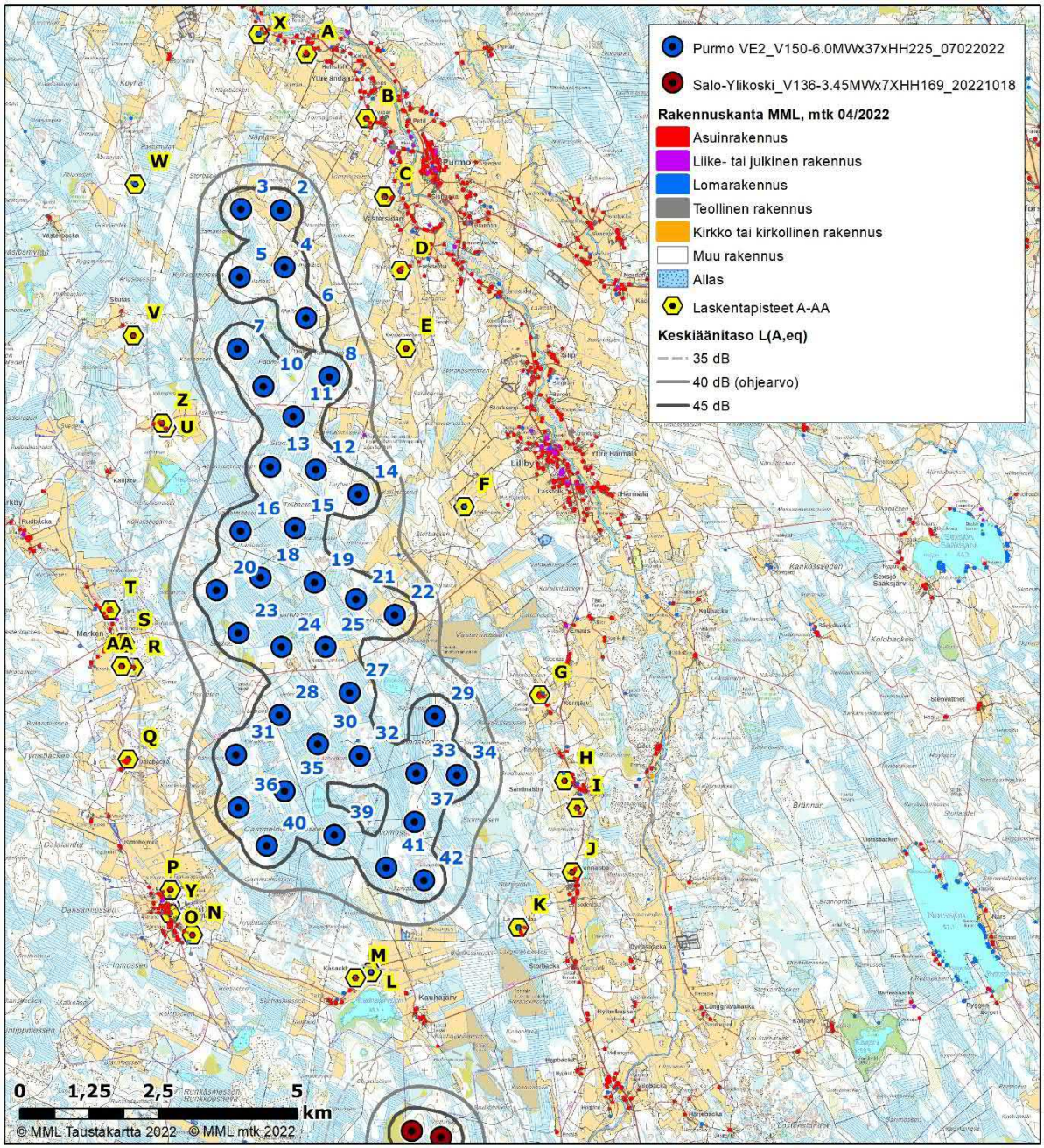


Bild 3. Resultat av bullermodellering ISO 9613-2. Purmo ALT2 tillsammans med projektet i Salo–Ylikoski.

Tabell 11. Kalkylerade bullernivåer i närheten av Purmo vindkraftspark med kraftverket V150 - 6,0 MW - ALT2 tillsammans projektet i Salo–Ylikoski (V136-3.45MW HH169).

Beräkningspunkt	ETRS89-TM35 Öst	ETRS89-TM35 Norr	Z (m)	Kalkyle-ringshöjd (m)	Bullernivå dB(A)
Bostadsbyggnad A (Lillkvist)	296866	7052328	25,9	4,0	27,8
Bostadsbyggnad B (Dallberga)	297952	7051163	25	4,0	30,2
Bostadsbyggnad C (Tormbacka)	298274	7049757	28,2	4,0	33,1
Bostadsbyggnad D (Kallträskvägen)	298556	7048421	35,6	4,0	34,2
Jaktstuga E (Kejsarbacken)	298663	7047017	33,9	4,0	35,8
Fritidsbyggnad F (Källbacken)	299710	7044165	37,5	4,0	34,4
Bostadsbyggnad G (Kornjärv)	301071	7040772	55	4,0	34,0
Bostadsbyggnad H (Sandnabba)	301519	7039228	51,9	4,0	33,1
Bostadsbyggnad I (Asp)	301749	7038736	54,4	4,0	32,0
Bostadsbyggnad J (Stennabba)	301661	7037581	55	4,0	31,3
Bostadsbyggnad K (Långnabba)	300689	7036583	55	4,0	33,1
Fritidsbyggnad L (Åvistvägen)	298031	7035773	52,4	4,0	34,7
Bostadsbyggnad M (Stenbacka)	297753	7035671	53,9	4,0	34,1
Bostadsbyggnad N (Adler)	294812	7036441	45	4,0	32,5
Bostadsbyggnad O (Åvistvägen)	294394	7036982	40,2	4,0	33,0
Bostadsbyggnad P (Finnabbavägen)	294415	7037260	40	4,0	33,9
Bostadsbyggnad Q (Dalabacka)	293652	7039610	40	4,0	34,1
Bostadsbyggnad R (Kronkvist)	293736	7041267	32,5	4,0	34,9
Bostadsbyggnad S (Tallbacka)	293575	7041715	32,1	4,0	34,6
Bostadsbyggnad T (Norrgård)	293326	7042304	31	4,0	33,8
Bostadsbyggnad U (Nåpi)	294326	7045578	35	4,0	35,9
Bostadsbyggnad V (Skutas)	293741	7047247	32,1	4,0	33,8
Bostadsbyggnad W (Åbrännan)	293782	7049981	22,5	4,0	31,8
Fritidsbyggnad X (Dalbacka)	296008	7052686	20,5	4,0	26,8
Bostadsbyggnad Y (Åvist)	294403	7036830	41,6	4,0	32,6
Bostadsbyggnad Z (Nabba)	294257	7045675	35	4,0	35,7
Bostadsbyggnad AA (Kronkvist)	293533	7041290	31,6	4,0	34,1

I projektalternativ 3 (ALT3) underskrider bullervärdena vid de bostads- och fritidsbyggnader som ligger närmast Purmoprojektet 40 dB. Bullernivåer som orsakas av Purmo vindkraftspark i alternativ 3 har presenterats på bild 4 och bullernivåerna vid modelleringspunkterna A–AA i tabell 12.

Vid modelleringen beaktades även vindkraftverken i Salo–Ylikoski vindkraftspark, som har en lagakraftvunnen plan.

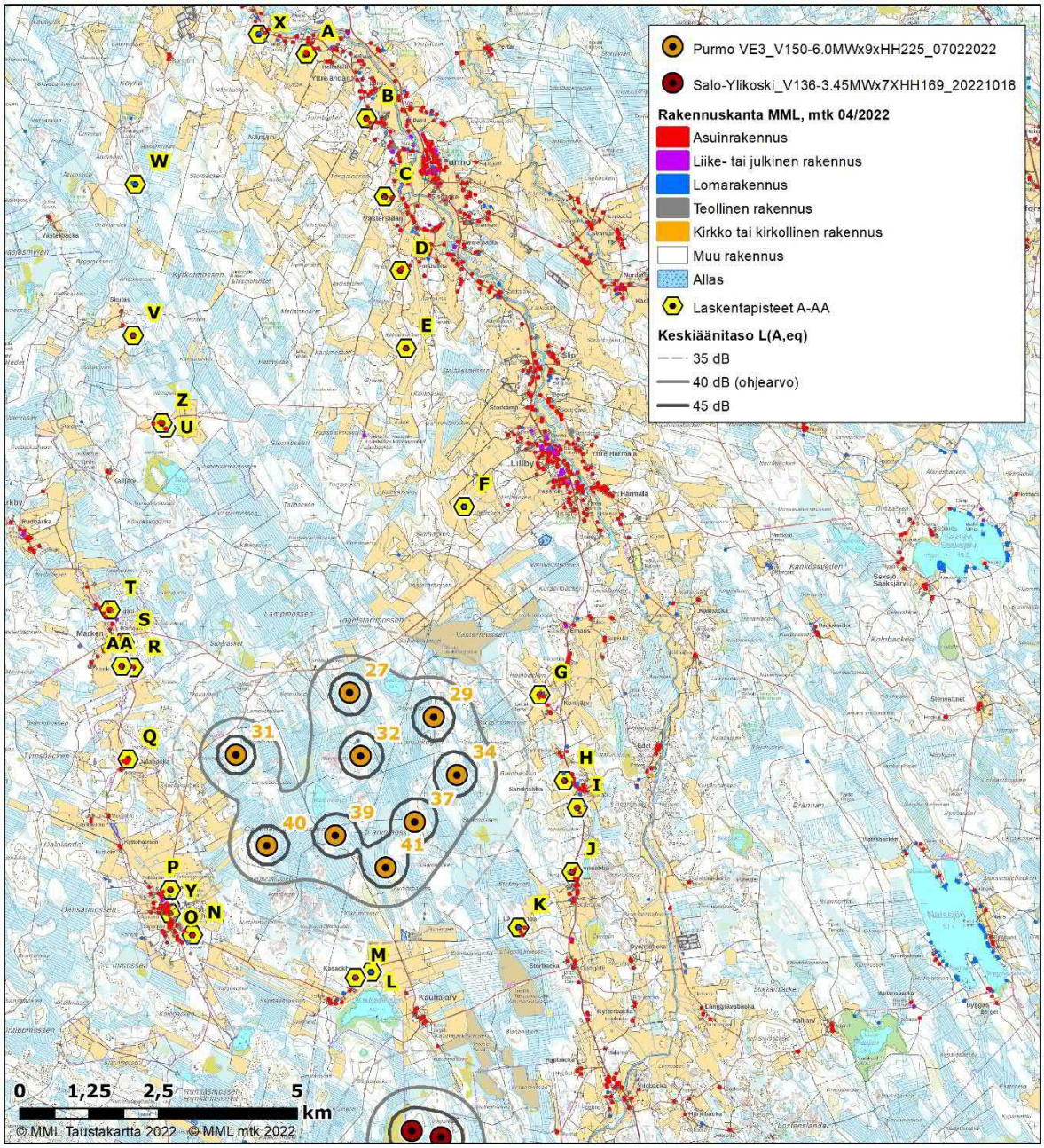


Bild 4. Resultat av bullermodellering ISO 9613-2. Purmo ALT3 tillsammans med projektet i Salo–Ylikoski.

Tabell 12. Kalkylerade bullernivåer i närheten av Purmo vindkraftspark med kraftverket V150 - 6,0 MW - ALT3 tillsammans projektet i Salo–Ylikoski (V136-3.45MW HH169).

Beräkningspunkt	ETRS89-TM35 Öst	ETRS89-TM35 Norr	Z (m)	Kalkyle-ringshöjd (m)	Bullernivå dB(A)
Bostadsbyggnad A (Lillkvist)	296866	7052328	25,9	4,0	12,8
Bostadsbyggnad B (Dallberga)	297952	7051163	25	4,0	13,9
Bostadsbyggnad C (Tormbacka)	298274	7049757	28,2	4,0	15,4
Bostadsbyggnad D (Kallträskvägen)	298556	7048421	35,6	4,0	16,9
Jaktstuga E (Kejsarbacken)	298663	7047017	33,9	4,0	18,9
Fritidsbyggnad F (Källbacken)	299710	7044165	37,5	4,0	24,5
Bostadsbyggnad G (Kornjärv)	301071	7040772	55	4,0	31,8
Bostadsbyggnad H (Sandnabba)	301519	7039228	51,9	4,0	31,3
Bostadsbyggnad I (Asp)	301749	7038736	54,4	4,0	30,0
Bostadsbyggnad J (Stennabba)	301661	7037581	55	4,0	29,2
Bostadsbyggnad K (Långnabba)	300689	7036583	55	4,0	30,5
Fritidsbyggnad L (Åvistvägen)	298031	7035773	52,4	4,0	32,9
Bostadsbyggnad M (Stenbacka)	297753	7035671	53,9	4,0	32,5
Bostadsbyggnad N (Adler)	294812	7036441	45	4,0	30,2
Bostadsbyggnad O (Åvistvägen)	294394	7036982	40,2	4,0	30,2
Bostadsbyggnad P (Finnabbavägen)	294415	7037260	40	4,0	30,9
Bostadsbyggnad Q (Dalabacka)	293652	7039610	40	4,0	30,0
Bostadsbyggnad R (Kronkvist)	293736	7041267	32,5	4,0	27,7
Bostadsbyggnad S (Tallbacka)	293575	7041715	32,1	4,0	26,2
Bostadsbyggnad T (Norrgård)	293326	7042304	31	4,0	24,4
Bostadsbyggnad U (Nåpi)	294326	7045578	35	4,0	19,9
Bostadsbyggnad V (Skutas)	293741	7047247	32,1	4,0	17,2
Bostadsbyggnad W (Åbrännan)	293782	7049981	22,5	4,0	14,4
Fritidsbyggnad X (Dalbacka)	296008	7052686	20,5	4,0	12,5
Bostadsbyggnad Y (Åvist)	294403	7036830	41,6	4,0	29,9
Bostadsbyggnad Z (Nabba)	294257	7045675	35	4,0	19,7
Bostadsbyggnad AA (Kronkvist)	293533	7041290	31,6	4,0	27,0

3.2 Lågfrekvent buller

3.2.1 Nuläge

De kalkylerade resultaten för buller inomhus har jämförts med åtgärdsgränser som fastställts i Social- och hälsovårdsministeriets förordning om boendehälsa (545/2015). Dessa är maximala värden som fastställts för buller nattetid i sovutrymmen. Åtgärdsgränsen har även jämförts med ljudnivån utanför de undersökta byggnaderna.

Vid modellering av lågfrekventa bullernivåer i närheten av Purmo vindkraftsprojekt med Salo–Ylikoskis kraftverkstyp V136-3.45MW HH169 överskrider det lågfrekventa bullret inte social- och hälsovårdsministeriets riktvärde för boendehälsa vid beräkningspunkterna. I tabellerna framkommer i vilken mån åtgärdsgränsen har underskridits (negativt värde) eller överskridits (positivt värde). I byggnadernas inomhusutrymmen ligger bullret högst 10,2 dB under åtgärdsgränsen med frekvensen 50 Hz (Fritidsbyggnad L och bostadsbyggnad M).

Tabell 13. Kalkyleringsresultat för lågfrekvent buller i nuläget vid Purmoprojektets beräkningspunkter A–AA, vid modellering med kraftverkstypen V136-3.45MW HH169 som används för Salo–Ylikoski.

Byggnad	Ljudnivå utomhus		Ljudnivå inomhus	
	L eq,1h – Anvisningar om boendehälsa inomhus	Hz	L eq,1h – Anvisningar om boendehälsa inomhus	Hz
Bostadsbyggnad A (Lillkvist)	-14,1	50	-25,6	50
Bostadsbyggnad B (Dallberga)	-13,5	50	-25,0	50
Bostadsbyggnad C (Tormbacka)	-12,7	50	-24,2	50
Bostadsbyggnad D (Kallträskvägen)	-12,0	63	-23,5	50
Jaktstuga E (Kejsarbacken)	-11,0	63	-22,6	50
Fritidsbyggnad F (Källbacken)	-8,9	63	-20,6	50
Bostadsbyggnad G (Kornjärv)	-5,6	125	-17,8	50
Bostadsbyggnad H (Sandnabba)	-3,7	125	-16,4	50
Bostadsbyggnad I (Asp)	-3,1	125	-15,9	50
Bostadsbyggnad J (Stennabba)	-1,3	125	-14,4	50
Bostadsbyggnad K (Långnabba)	1,3	125	-12,3	50
Fritidsbyggnad L (Åvistvägen)	3,7	125	-10,2	50
Bostadsbyggnad M (Stenbacka)	3,7	125	-10,2	50
Bostadsbyggnad N (Adler)	-1,2	125	-14,4	50
Bostadsbyggnad O (Åvistvägen)	-2,4	125	-15,3	50

Bostadsbyggnad P (Finnabbavägen)	-2,7	125	-15,6	50
Bostadsbyggnad Q (Dalabacka)	-6,0	125	-18,2	50
Bostadsbyggnad R (Kronkvist)	-7,6	63	-19,4	50
Bostadsbyggnad S (Tallbacka)	-8,1	63	-19,8	50
Bostadsbyggnad T (Norrgård)	-8,6	63	-20,3	50
Bostadsbyggnad U (Nåpi)	-10,6	63	-22,2	50
Bostadsbyggnad V (Skutas)	-11,8	63	-23,3	50
Bostadsbyggnad W (Åbrännan)	-13,3	50	-24,8	50
Fritidsbyggnad X (Dalbacka)	-14,3	50	-25,8	50
Bostadsbyggnad Y (Åvist)	-2,2	125	-15,2	50
Bostadsbyggnad Z (Nabba)	-10,7	63	-22,3	50
Bostadsbyggnad AA (Kronkvist)	-7,8	63	-19,5	50

3.2.2 Lågfrekvent buller i Purmo vindkraftsprojekt (ALT1, ALT2 och ALT3)

De kalkylerade resultaten för buller inomhus har jämförts med åtgärdsgränser som fastställts i Social- och hälsovårdsministeriets förordning om boendehälsa (545/2015). Dessa är maximala värden som fastställts för buller nattetid i sovutrymmen. Åtgärdsgränsen har även jämförts med ljudnivån utanför de undersökta byggnaderna.

Vid modellering av lågfrekventa bullernivåer i samband med Purmo vindkraftspark med Salo–Ylikoskis kraftverkstyp V150 - 6,0 MW (107,7 dB) i alternativ 1 (ALT1) överskrider det lågfrekventa bullret inte social- och hälsovårdsministeriets riktvärde för boendehälsa vid beräkningspunkterna. I tabellerna framkommer i vilken mån åtgärdsgränsen har underskridits (negativt värde) eller överskridits (positivt värde). I byggnadernas inomhusutrymmen ligger bullret högst 7,9 dB under åtgärdsgränsen med frekvensen 50 Hz (Fritidsbyggnad L).

Tabell 14. Beräkningsresultat av lågfrekvent buller i ALT1 tillsammans med Salo–Ylikoski-projektet.

Byggnad	Ljudnivå utomhus		Ljudnivå inomhus	
	L eq,1h – Anvisningar om boendehälsa inomhus	Hz	L eq,1h – Anvisningar om boendehälsa inomhus	Hz
Bostadsbyggnad A (Lillkvist)	-0,7	100	-14,6	50
Bostadsbyggnad B (Dallberga)	0,4	100	-13,6	50
Bostadsbyggnad C (Tormbacka)	2,0	100	-12,2	50
Bostadsbyggnad D (Kallträskvägen)	3,0	125	-11,2	50

Jaktstuga E (Kejsarbacken)	5,4	200	-9,4	50
Fritidsbyggnad F (Källbacken)	3,9	125	-10,3	50
Bostadsbyggnad G (Kornjärv)	3,3	125	-10,7	50
Bostadsbyggnad H (Sandnabba)	3,2	125	-10,7	50
Bostadsbyggnad I (Asp)	2,7	125	-11,1	50
Bostadsbyggnad J (Stennabba)	2,9	125	-10,8	50
Bostadsbyggnad K (Långnabba)	4,5	125	-9,5	50
Fritidsbyggnad L (Åvistvägen)	6,2	125	-7,9	50
Bostadsbyggnad M (Stenbacka)	6,1	125	-8,0	50
Bostadsbyggnad N (Adler)	3,4	125	-10,4	50
Bostadsbyggnad O (Åvistvägen)	3,3	125	-10,6	50
Bostadsbyggnad P (Finnabbavägen)	3,6	125	-10,3	50
Bostadsbyggnad Q (Dalabacka)	3,5	125	-10,6	50
Bostadsbyggnad R (Kronkvist)	4,1	125	-10,1	50
Bostadsbyggnad S (Tallbacka)	3,7	125	-10,4	50
Bostadsbyggnad T (Norrgård)	3,1	125	-11,0	50
Bostadsbyggnad U (Nåpi)	4,1	125	-10,2	50
Bostadsbyggnad V (Skutas)	2,5	100	-11,7	50
Bostadsbyggnad W (Åbrännan)	1,0	100	-13,1	50
Fritidsbyggnad X (Dalbacka)	-1,3	100	-15,2	50
Bostadsbyggnad Y (Åvist)	3,1	125	-10,7	50
Bostadsbyggnad Z (Nabba)	3,9	125	-10,3	50
Bostadsbyggnad AA (Kronkvist)	3,6	125	-10,5	50

Vid modellering av lågfrekventa bullernivåer i samband med Purmo vindkraftspark med kraftverkstypen V150 - 6,0 MW (107,7 dB) i alternativ 2 (ALT2) överskrider det lågfrekventa bullret inte social- och hälsovårdsministeriets riktvärde för boendehälsa vid beräkningspunkterna. I tabellerna framkommer i vilken mån åtgärdsgränsen har underskridits (negativt värde) eller överskridits (positivt värde). I byggnadernas inomhusutrymmen ligger bullret högst 8,3 dB under åtgärdsgränsen med frekvensen 50 Hz (Fritidsbyggnad L).

Tabell 15. Beräkningsresultat av lågfrekvent buller i ALT2 tillsammans med Salo–Ylikoski-projektet.

Byggnad	Ljudnivå utomhus	Ljudnivå inomhus

	L eq,1h – Anvisningar om boendehälsa inomhus	Hz	L eq,1h – Anvisningar om bo-endehälsa inomhus	Hz
Bostadsbyggnad A (Lillkvist)	-2,5	100	-16,1	50
Bostadsbyggnad B (Dallberga)	-0,9	100	-14,8	50
Bostadsbyggnad C (Tormbacka)	1,2	100	-13,0	50
Bostadsbyggnad D (Kallträskvägen)	2,3	125	-12,0	50
Jaktstuga E (Kejsarbacken)	3,5	125	-10,8	50
Fritidsbyggnad F (Källbacken)	3,1	125	-11,1	50
Bostadsbyggnad G (Kornjärv)	2,8	125	-11,1	50
Bostadsbyggnad H (Sandnabba)	2,5	125	-11,3	50
Bostadsbyggnad I (Asp)	2,1	125	-11,6	50
Bostadsbyggnad J (Stennabba)	2,3	125	-11,3	50
Bostadsbyggnad K (Långnabba)	4,0	125	-9,9	50
Fritidsbyggnad L (Åvistvägen)	5,8	125	-8,3	50
Bostadsbyggnad M (Stenbacka)	5,7	125	-8,4	50
Bostadsbyggnad N (Adler)	2,9	125	-10,9	50
Bostadsbyggnad O (Åvistvägen)	2,7	125	-11,1	50
Bostadsbyggnad P (Finnabbavägen)	3,1	125	-10,8	50
Bostadsbyggnad Q (Dalabacka)	2,9	125	-11,1	50
Bostadsbyggnad R (Kronkvist)	3,4	125	-10,7	50
Bostadsbyggnad S (Tallbacka)	3,1	125	-11,0	50
Bostadsbyggnad T (Norrgård)	2,6	125	-11,4	50
Bostadsbyggnad U (Nåpi)	3,8	125	-10,5	50
Bostadsbyggnad V (Skutas)	2,1	100	-12,1	50
Bostadsbyggnad W (Åbrännan)	0,2	100	-13,8	50
Fritidsbyggnad X (Dalbacka)	-3,1	100	-16,6	50
Bostadsbyggnad Y (Åvist)	2,6	125	-11,2	50
Bostadsbyggnad Z (Nabba)	3,6	125	-10,7	50
Bostadsbyggnad AA (Kronkvist)	2,9	125	-11,1	50

Vid modellering av lågfrekventa bullernivåer i samband med Purmo vindkraftspark med kraftverkstypen V150 - 6,0 MW (107,7 dB) i alternativ 3 (ALT3) överskrider det lågfrekventa bullret inte social- och hälsovårdsministeriets riktvärde för boendehälsa vid beräkningspunkterna. I tabellerna framkommer i vilken mån åtgärdsgränsen har underskridits (negativt värde) eller överskridits (positivt värde). I byggnadernas inomhusutrymmen ligger bullret högst 9,1 dB under åtgärdsgränsen med frekvensen 50 Hz (Fritidsbyggnad L).

Tabell 16. Beräkningsresultat av lågfrekvent buller i ALT3 tillsammans med Salo–Ylikoski-projektet.

Byggnad	Ljudnivå utomhus		Ljudnivå inomhus	
	L eq,1h – Anvisningar om boendehälsa inomhus	Hz	L eq,1h – Anvisningar om boendehälsa inomhus	Hz
Bostadsbyggnad A (Lillkvist)	-12,1	63	-23,9	50
Bostadsbyggnad B (Dallberga)	-11,4	63	-23,2	50
Bostadsbyggnad C (Tormbacka)	-10,4	63	-22,3	50
Bostadsbyggnad D (Kallträskvägen)	-9,3	63	-21,3	50
Jaktstuga E (Kejsarbacken)	-8,1	63	-20,2	50
Fritidsbyggnad F (Källbacken)	-4,4	125	-17,3	50
Bostadsbyggnad G (Kornjärv)	0,4	125	-13,5	50
Bostadsbyggnad H (Sandnabba)	0,7	125	-13,1	50
Bostadsbyggnad I (Asp)	0,3	125	-13,3	50
Bostadsbyggnad J (Stennabba)	0,9	125	-12,7	50
Bostadsbyggnad K (Långnabba)	2,8	125	-11,0	50
Fritidsbyggnad L (Åvistvägen)	4,9	125	-9,1	50
Bostadsbyggnad M (Stenbacka)	4,9	125	-9,2	50
Bostadsbyggnad N (Adler)	1,2	125	-12,4	50
Bostadsbyggnad O (Åvistvägen)	0,7	125	-13,0	50
Bostadsbyggnad P (Finnabbavägen)	0,8	125	-12,9	50
Bostadsbyggnad Q (Dalabacka)	-0,8	125	-14,4	50
Bostadsbyggnad R (Kronkvist)	-2,4	125	-15,8	50
Bostadsbyggnad S (Tallbacka)	-3,3	125	-16,4	50
Bostadsbyggnad T (Norrgård)	-4,4	125	-17,2	50
Bostadsbyggnad U (Nåpi)	-7,5	63	-19,6	50

Bostadsbyggnad V (Skutas)	-9,1	63	-21,1	50
Bostadsbyggnad W (Åbrännan)	-11,0	63	-22,9	50
Fritidsbyggnad X (Dalbacka)	-12,4	63	-24,2	50
Bostadsbyggnad Y (Åvist)	0,6	125	-13,0	50
Bostadsbyggnad Z (Nabba)	-7,6	63	-19,7	50
Bostadsbyggnad AA (Kronkvist)	-2,8	125	-16,0	50

3.3 Skuggeffekter

3.3.1 Nuläge

Söder om Purmo planerade vindkraftspark ligger Salo–Ylikoski vindkraftsprojekt vars delgeneralplan vunnit laga kraft. Detta innebär att den skuggning som driften av Salo–Ylikoski vindkraftspark orsakar kan anses beskriva nuläget beträffande skuggning. Den skuggning som uppstår genom driften av Salo–Ylikoski vindkraftspark visas på bilden nedan (Bild 5) och skuggningstimmarna vid modelleringspunkterna A–AA i Purmo i nuläget i tabell 17.

I det område i närheten av Purmoprojektet, där skuggeffekterna överskrider 8 timmar per år, finns inga bostads- eller fritidsbyggnader. Mer detaljerade beräkningsresultat för modelleringen av skuggningen i nuläget finns i bilaga 9.

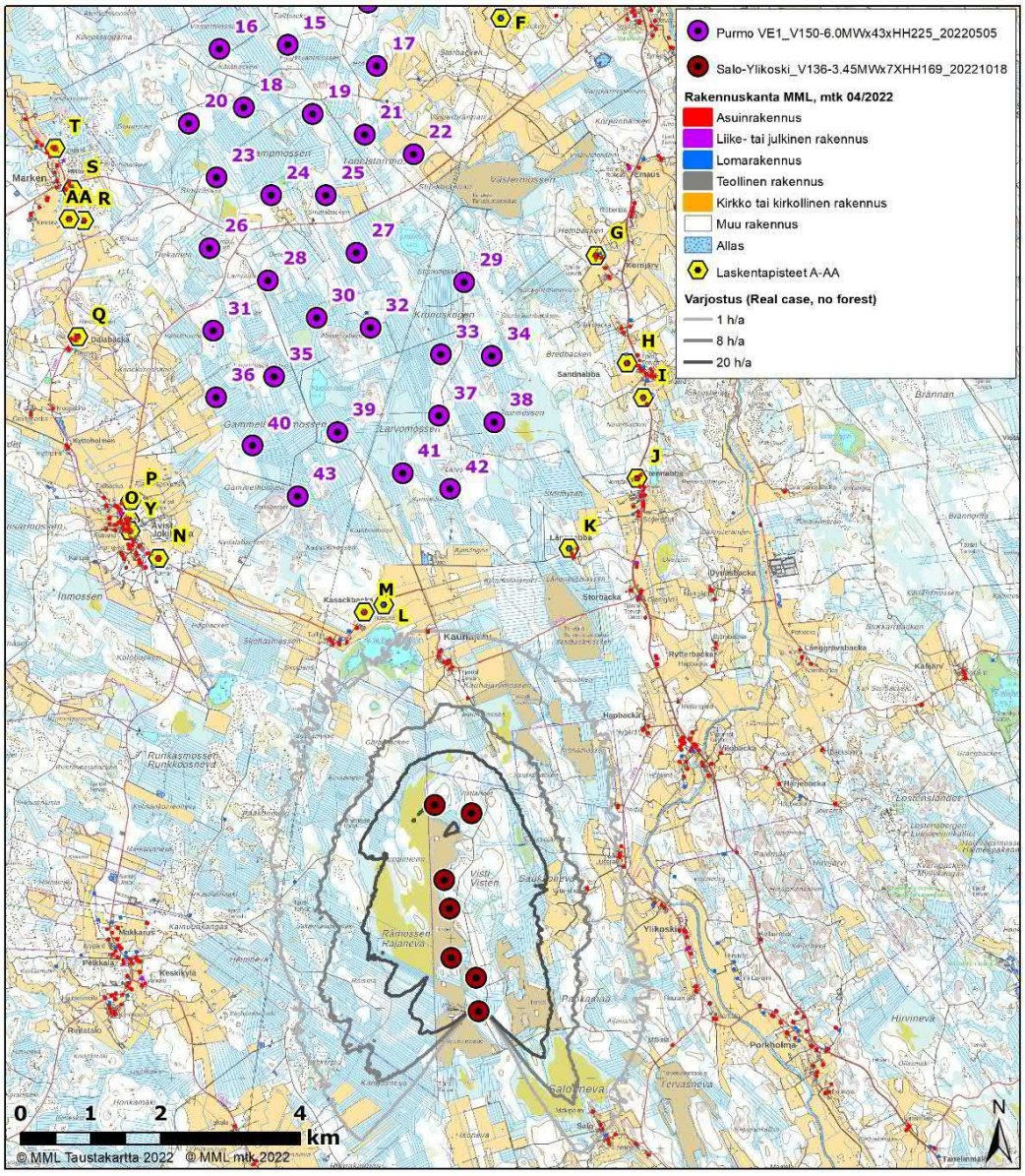


Bild 5. Kalkylerade resultat av skuggningsmodelleringen för nuläget. *Modelleringen har gjorts enligt den verkliga situationen utan skyddande effekt från träd.*

Tabell 17. De kalkylerade skuggningstimmarna per år i nuläget vid beräkningspunkterna i närheten då trädens skyddande effekt inte har beaktats.

	ETRS89-TM35 Öst	ETRS89-TM35 Norr	Z (m)	Beräkningsfönster (m)	Skuggefekter (h/a)
Bostadsbyggnad A (Lillkvist)	296866	7052328	25,9	5,0 x 5,0	0:00
Bostadsbyggnad B (Dallberga)	297952	7051163	25	5,0 x 5,0	0:00
Bostadsbyggnad C (Tormbacka)	298274	7049757	28,2	5,0 x 5,0	0:00
Bostadsbyggnad D (Kallträskvägen)	298556	7048421	35,6	5,0 x 5,0	0:00
Jaktstuga E (Kejsarbacken)	298663	7047017	33,9	5,0 x 5,0	0:00
Fritidsbyggnad F (Källbacken)	299710	7044165	37,5	5,0 x 5,0	0:00
Bostadsbyggnad G (Kornjärv)	301071	7040772	55	5,0 x 5,0	0:00
Bostadsbyggnad H (Sandnabba)	301519	7039228	51,9	5,0 x 5,0	0:00
Bostadsbyggnad I (Asp)	301749	7038736	54,4	5,0 x 5,0	0:00
Bostadsbyggnad J (Stennabba)	301661	7037581	55	5,0 x 5,0	0:00
Bostadsbyggnad K (Långnabba)	300689	7036583	55	5,0 x 5,0	0:00
Fritidsbyggnad L (Åvistvägen)	298031	7035773	52,4	5,0 x 5,0	0:00
Bostadsbyggnad M (Stenbacka)	297753	7035671	53,9	5,0 x 5,0	0:00
Bostadsbyggnad N (Adler)	294812	7036441	45	5,0 x 5,0	0:00
Bostadsbyggnad O (Åvistvägen)	294394	7036982	40,2	5,0 x 5,0	0:00
Bostadsbyggnad P (Finnabbavägen)	294415	7037260	40	5,0 x 5,0	0:00
Bostadsbyggnad Q (Dalabacka)	293652	7039610	40	5,0 x 5,0	0:00
Bostadsbyggnad R (Kronkvist)	293736	7041267	32,5	5,0 x 5,0	0:00
Bostadsbyggnad S (Tallbacka)	293575	7041715	32,1	5,0 x 5,0	0:00
Bostadsbyggnad T (Norrgård)	293326	7042304	31	5,0 x 5,0	0:00
Bostadsbyggnad U (Nåpi)	294326	7045578	35	5,0 x 5,0	0:00
Bostadsbyggnad V (Skutas)	293741	7047247	32,1	5,0 x 5,0	0:00
Bostadsbyggnad W (Åbrännan)	293782	7049981	22,5	5,0 x 5,0	0:00
Fritidsbyggnad X (Dalbacka)	296008	7052686	20,5	5,0 x 5,0	0:00
Bostadsbyggnad Y (Åvist)	294403	7036830	41,6	5,0 x 5,0	0:00
Bostadsbyggnad Z (Nabba)	294257	7045675	35	5,0 x 5,0	0:00
Bostadsbyggnad AA (Kronkvist)	293533	7041290	31,6	5,0 x 5,0	0:00

3.3.2 Skuggmodellering

I närheten av Purmo vindkraftsprojekt ligger en bostadsbyggnad (Bostadsbyggnad R, 8 h 35 min/år) utan skyddande effekt från träd i ett område där skuggeffekterna är över 8 timmar per år. De skuggtimmar som uppstår har presenterats på bild 6 och skuggtimmarna vid modelleringspunkterna A–AA i tabell 18.

Vid modelleringen beaktas även Salo–Ylikoski vindkraftsprojekt.

Mer detaljerade beräkningsresultat för modelleringen av skuggningen i nuläget i projektalternativ 1 finns i bilaga 10.

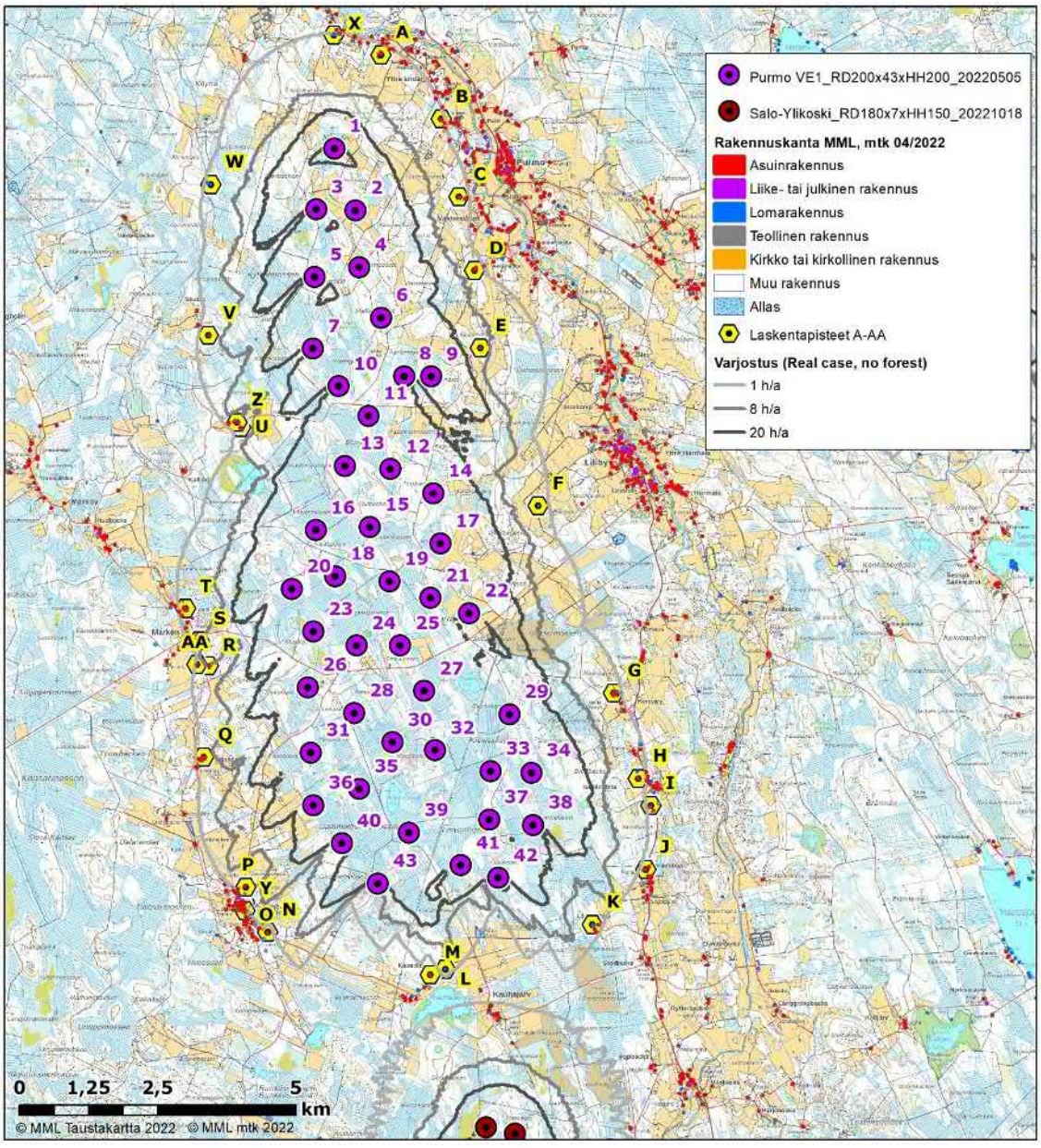


Bild 6. Skuggmodelleringens resultat när den skyddande effekten från träd inte beaktas. Purmoprojektet ALT1 tillsammans med Salo–Ylikoski-projektet.

Tabell 18. Skuggmodelleringens resultat i ALT1 tillsammans med Salo–Ylikoski-projektet, när den skyddande effekten från träd inte beaktas "real case, no forest".

	ETRS89-TM35 Öst	ETRS89-TM35 Norr	Z (m)	Beräk-ningsföns-ter (m)	Skuggef-fekter (h/a)
Bostadsbyggnad A (Lillkvist)	296866	7052328	25,9	5,0 x 5,0	2:17
Bostadsbyggnad B (Dallberga)	297952	7051163	25	5,0 x 5,0	1:34
Bostadsbyggnad C (Tormbacka)	298274	7049757	28,2	5,0 x 5,0	1:42
Bostadsbyggnad D (Kallträskvägen)	298556	7048421	35,6	5,0 x 5,0	4:01
Jaktstuga E (Kejsarbacken)	298663	7047017	33,9	5,0 x 5,0	11:36
Fritidsbyggnad F (Källbacken)	299710	7044165	37,5	5,0 x 5,0	3:53
Bostadsbyggnad G (Kornjärv)	301071	7040772	55	5,0 x 5,0	3:27
Bostadsbyggnad H (Sandnabba)	301519	7039228	51,9	5,0 x 5,0	3:25
Bostadsbyggnad I (Asp)	301749	7038736	54,4	5,0 x 5,0	0:00
Bostadsbyggnad J (Stennabba)	301661	7037581	55	5,0 x 5,0	0:00
Bostadsbyggnad K (Långnabba)	300689	7036583	55	5,0 x 5,0	2:49
Fritidsbyggnad L (Åvistvägen)	298031	7035773	52,4	5,0 x 5,0	3:34
Bostadsbyggnad M (Stenbacka)	297753	7035671	53,9	5,0 x 5,0	0:00
Bostadsbyggnad N (Adler)	294812	7036441	45	5,0 x 5,0	0:00
Bostadsbyggnad O (Åvistvägen)	294394	7036982	40,2	5,0 x 5,0	4:30
Bostadsbyggnad P (Finnabbavägen)	294415	7037260	40	5,0 x 5,0	3:43
Bostadsbyggnad Q (Dalabacka)	293652	7039610	40	5,0 x 5,0	1:58
Bostadsbyggnad R (Kronkvist)	293736	7041267	32,5	5,0 x 5,0	8:35
Bostadsbyggnad S (Tallbacka)	293575	7041715	32,1	5,0 x 5,0	6:39
Bostadsbyggnad T (Norrgård)	293326	7042304	31	5,0 x 5,0	2:05
Bostadsbyggnad U (Nåpi)	294326	7045578	35	5,0 x 5,0	5:56
Bostadsbyggnad V (Skutas)	293741	7047247	32,1	5,0 x 5,0	1:49
Bostadsbyggnad W (Åbrännan)	293782	7049981	22,5	5,0 x 5,0	1:36
Fritidsbyggnad X (Dalbacka)	296008	7052686	20,5	5,0 x 5,0	2:49
Bostadsbyggnad Y (Åvist)	294403	7036830	41,6	5,0 x 5,0	0:00
Bostadsbyggnad Z (Nabba)	294257	7045675	35	5,0 x 5,0	6:28
Bostadsbyggnad AA (Kronkvist)	293533	7041290	31,6	5,0 x 5,0	1:28

Modelleringen ”Real Case, No Forest” beaktar inte den skyddande effekten från träd, vilket innebär att effekterna i verkligheten blir betydligt mindre än i modelleringen. På Bild 7 visas skuggeffekterna i en situation där den skyddande effekten från träd har beaktats. I tabell 19 visas de årliga skuggtimmarna vid modelleringspunkterna A–AA när den skyddande effekten från träd beaktas. Vid modelleringen beaktas även Salo–Ylikoski vindkraftsprojekt.

Vid beaktande av den skyddande effekten från träd orsakar projektalternativ 1 inte skuggeffekter på över 8 h/a i närheten av Purmoprojektet.

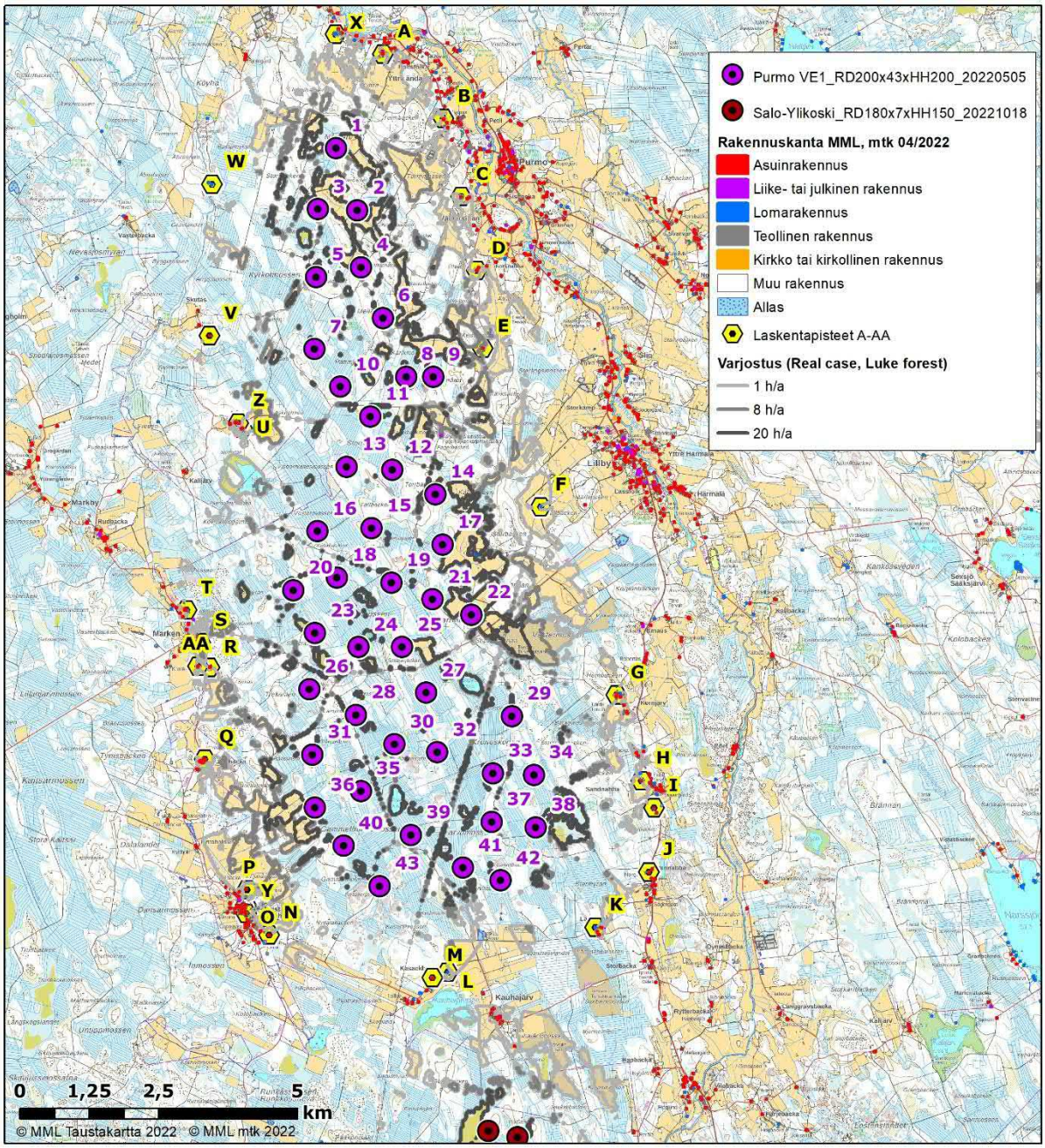


Bild 7. Skuggmodelleringens resultat när den skyddande effekten från träd inte beaktas. Purmoprojektet ALT1 tillsammans med Salo–Ylikoski-projektet.

Tabell 19. Skuggmodelleringens resultat i ALT1 tillsammans med Salo–Ylikoski-projektet, när den skyddande effekten från träd beaktas "real case, luke forest".

	ETRS89-TM35 Öst	ETRS89-TM35 Norr	Z (m)	Beräk-ningsföns-ter (m)	Skuggef-fekter (h/a)
Bostadsbyggnad A (Lillkvist)	296866	7052328	25,9	5,0 x 5,0	2:17
Bostadsbyggnad B (Dallberga)	297952	7051163	25	5,0 x 5,0	1:34
Bostadsbyggnad C (Tormbacka)	298274	7049757	28,2	5,0 x 5,0	1:42
Bostadsbyggnad D (Kallträskvägen)	298556	7048421	35,6	5,0 x 5,0	4:01
Jaktstuga E (Kejsarbacken)	298663	7047017	33,9	5,0 x 5,0	8:33
Fritidsbyggnad F (Källbacken)	299710	7044165	37,5	5,0 x 5,0	3:53
Bostadsbyggnad G (Kornjärv)	301071	7040772	55	5,0 x 5,0	3:27
Bostadsbyggnad H (Sandnabba)	301519	7039228	51,9	5,0 x 5,0	3:25
Bostadsbyggnad I (Asp)	301749	7038736	54,4	5,0 x 5,0	0:00
Bostadsbyggnad J (Stennabba)	301661	7037581	55	5,0 x 5,0	0:00
Bostadsbyggnad K (Långnabba)	300689	7036583	55	5,0 x 5,0	0:00
Fritidsbyggnad L (Åvistvägen)	298031	7035773	52,4	5,0 x 5,0	0:00
Bostadsbyggnad M (Stenbacka)	297753	7035671	53,9	5,0 x 5,0	0:00
Bostadsbyggnad N (Adler)	294812	7036441	45	5,0 x 5,0	0:00
Bostadsbyggnad O (Åvistvägen)	294394	7036982	40,2	5,0 x 5,0	4:30
Bostadsbyggnad P (Finnabbavägen)	294415	7037260	40	5,0 x 5,0	0:00
Bostadsbyggnad Q (Dalabacka)	293652	7039610	40	5,0 x 5,0	1:58
Bostadsbyggnad R (Kronkvist)	293736	7041267	32,5	5,0 x 5,0	1:52
Bostadsbyggnad S (Tallbacka)	293575	7041715	32,1	5,0 x 5,0	6:39
Bostadsbyggnad T (Norrgård)	293326	7042304	31	5,0 x 5,0	0:00
Bostadsbyggnad U (Nåpi)	294326	7045578	35	5,0 x 5,0	5:56
Bostadsbyggnad V (Skutas)	293741	7047247	32,1	5,0 x 5,0	1:49
Bostadsbyggnad W (Åbrännan)	293782	7049981	22,5	5,0 x 5,0	1:36
Fritidsbyggnad X (Dalbacka)	296008	7052686	20,5	5,0 x 5,0	2:49
Bostadsbyggnad Y (Åvist)	294403	7036830	41,6	5,0 x 5,0	0:00
Bostadsbyggnad Z (Nabba)	294257	7045675	35	5,0 x 5,0	2:45
Bostadsbyggnad AA (Kronkvist)	293533	7041290	31,6	5,0 x 5,0	1:28

Utan skyddande effekt från träd uppstår inga skuggeffekter som överskrider 8 timmar per år i närheten av bostads- eller fritidsbyggnaderna i Purmo vindkraftsprojekt ALT 2. De skuggeffekter som uppstår har presenterats på bild 8 och skuggtimmarna vid modelleringspunkterna A–AA i tabell 20.

Vid modelleringen beaktas även Salo–Ylikoski vindkraftsprojekt.

Mer detaljerade beräkningsresultat för modelleringen av skuggningen i nuläget i projektalternativ 2 finns i bilaga 12.

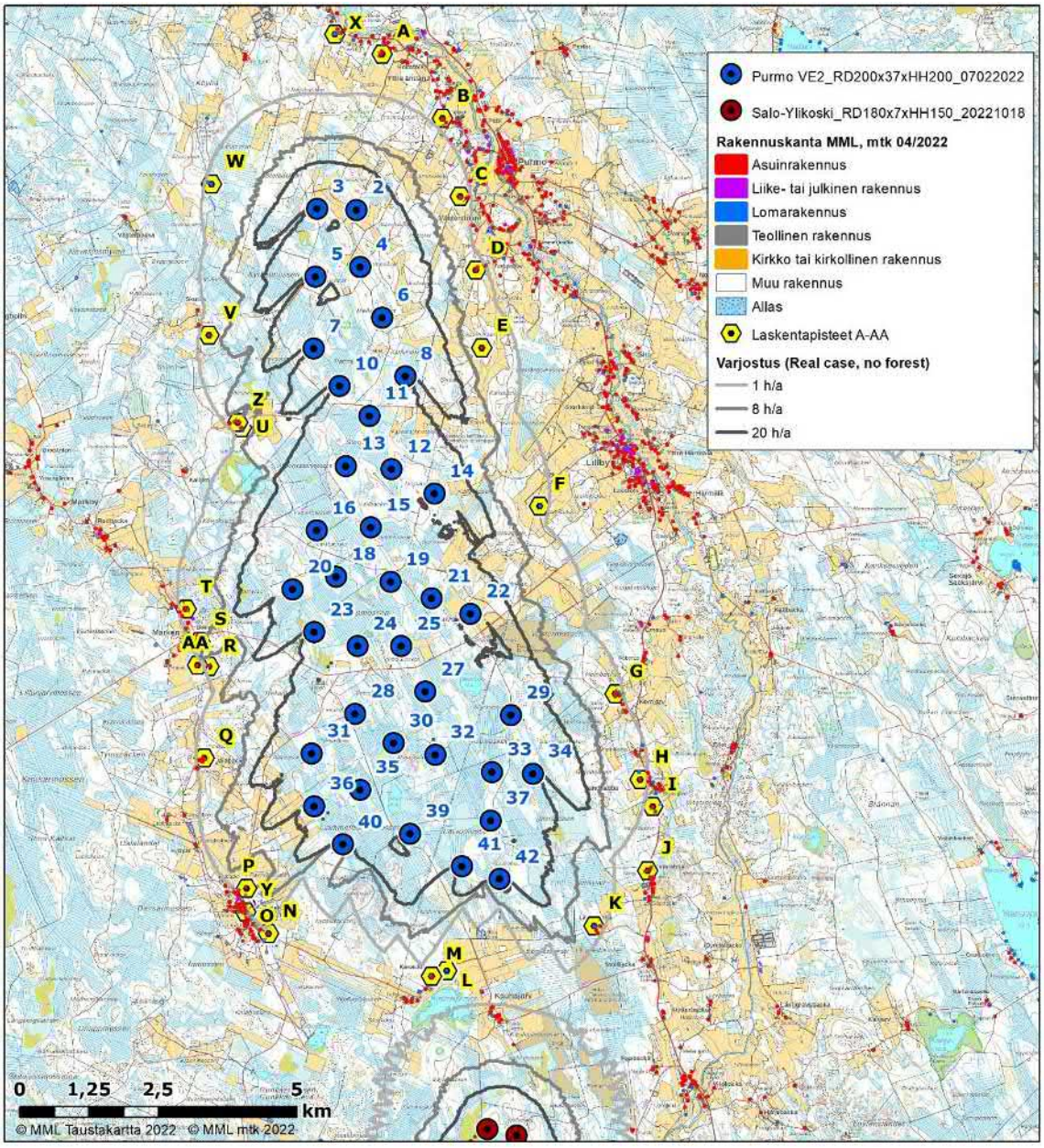


Bild 8. Skuggmodelleringens resultat när den skyddande effekten från träd inte beaktas. Purmoprojektet ALT2 tillsammans med Salo–Ylikoski-projektet.

Tabell 20. Resultat av skuggmodelleringen. Skuggmodelleringens resultat för Purmoprojektet, ALT2 tillsammans med Salo–Ylikoski-projektet, när den skyddande effekten från träd inte beaktas "real case, no forest".

	ETRS89-TM35 Öst	ETRS89-TM35 Norr	Z (m)	Beräkningsfönster (m)	Skuggeffekter (h/a)
Bostadsbyggnad A (Lillkvist)	296866	7052328	25,9	5,0 x 5,0	0:00
Bostadsbyggnad B (Dallberga)	297952	7051163	25	5,0 x 5,0	0:00
Bostadsbyggnad C (Tormbacka)	298274	7049757	28,2	5,0 x 5,0	1:42
Bostadsbyggnad D (Kallträskvägen)	298556	7048421	35,6	5,0 x 5,0	1:58
Jaktstuga E (Kejsarbacken)	298663	7047017	33,9	5,0 x 5,0	5:17
Fritidsbyggnad F (Källbacken)	299710	7044165	37,5	5,0 x 5,0	2:01
Bostadsbyggnad G (Kornjärv)	301071	7040772	55	5,0 x 5,0	3:27
Bostadsbyggnad H (Sandnabba)	301519	7039228	51,9	5,0 x 5,0	1:51
Bostadsbyggnad I (Asp)	301749	7038736	54,4	5,0 x 5,0	0:00
Bostadsbyggnad J (Stennabba)	301661	7037581	55	5,0 x 5,0	0:00
Bostadsbyggnad K (Långnabba)	300689	7036583	55	5,0 x 5,0	2:49
Fritidsbyggnad L (Åvistvägen)	298031	7035773	52,4	5,0 x 5,0	0:00
Bostadsbyggnad M (Stenbacka)	297753	7035671	53,9	5,0 x 5,0	0:00
Bostadsbyggnad N (Adler)	294812	7036441	45	5,0 x 5,0	0:00
Bostadsbyggnad O (Åvistvägen)	294394	7036982	40,2	5,0 x 5,0	4:30
Bostadsbyggnad P (Finnabbavägen)	294415	7037260	40	5,0 x 5,0	3:43
Bostadsbyggnad Q (Dalabacka)	293652	7039610	40	5,0 x 5,0	1:58
Bostadsbyggnad R (Kronkvist)	293736	7041267	32,5	5,0 x 5,0	6:45
Bostadsbyggnad S (Tallbacka)	293575	7041715	32,1	5,0 x 5,0	6:39
Bostadsbyggnad T (Norrgård)	293326	7042304	31	5,0 x 5,0	2:05
Bostadsbyggnad U (Nåpi)	294326	7045578	35	5,0 x 5,0	5:56
Bostadsbyggnad V (Skutas)	293741	7047247	32,1	5,0 x 5,0	1:49
Bostadsbyggnad W (Åbrännan)	293782	7049981	22,5	5,0 x 5,0	1:36
Fritidsbyggnad X (Dalbacka)	296008	7052686	20,5	5,0 x 5,0	0:00
Bostadsbyggnad Y (Åvist)	294403	7036830	41,6	5,0 x 5,0	0:00
Bostadsbyggnad Z (Nabba)	294257	7045675	35	5,0 x 5,0	6:28
Bostadsbyggnad AA (Kronkvist)	293533	7041290	31,6	5,0 x 5,0	0:00

Utan skyddande effekt från träd uppstår inga skuggeffekter som överskrider 8 timmar per år i närheten av bostads- eller fritidsbyggnaderna i Purmo vindkraftsprojekt ALT 3. De skuggeffekter som uppstår har presenterats på bild 9 och skuggtimmarna vid modelleringspunkterna A–AA i tabell 21.

Vid modelleringen beaktas även Salo–Ylikoski vindkraftsprojekt.

Mer detaljerade beräkningsresultat för modelleringen av skuggningen i nuläget i projektalternativ 3 finns i bilaga 13.

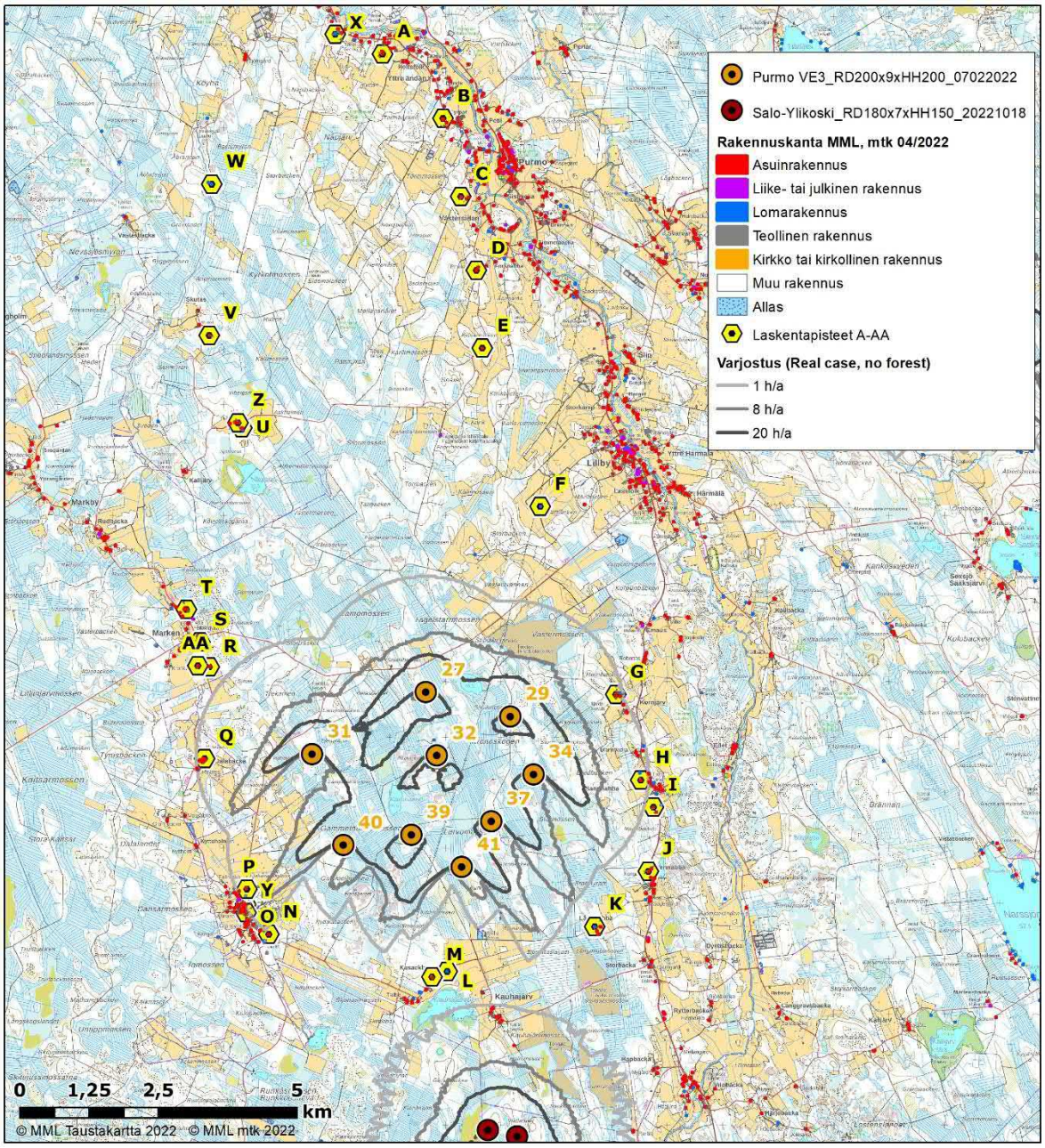


Bild 9. Skuggmodelleringens resultat när den skyddande effekten från träd inte beaktas. Purmoprojektet ALT3 tillsammans med Salo–Ylikoski-projektet.

Tabell 21. Skuggmodelleringens resultat för ALT3 när den skyddande effekten från träd inte beaktas "real case, no forest".

	ETRS89-TM35 Öst	ETRS89-TM35 Norr	Z (m)	Beräkningsfönster (m)	Skuggeffekter (h/a)
Bostadsbyggnad A (Lillkvist)	296866	7052328	25,9	5,0 x 5,0	0:00
Bostadsbyggnad B (Dallberga)	297952	7051163	25	5,0 x 5,0	0:00
Bostadsbyggnad C (Tormbacka)	298274	7049757	28,2	5,0 x 5,0	0:00
Bostadsbyggnad D (Kallträskvägen)	298556	7048421	35,6	5,0 x 5,0	0:00
Jaktstuga E (Kejsarbacken)	298663	7047017	33,9	5,0 x 5,0	0:00
Fritidsbyggnad F (Källbacken)	299710	7044165	37,5	5,0 x 5,0	0:00
Bostadsbyggnad G (Kornjärv)	301071	7040772	55	5,0 x 5,0	3:25
Bostadsbyggnad H (Sandnabba)	301519	7039228	51,9	5,0 x 5,0	1:51
Bostadsbyggnad I (Asp)	301749	7038736	54,4	5,0 x 5,0	0:00
Bostadsbyggnad J (Stennabba)	301661	7037581	55	5,0 x 5,0	0:00
Bostadsbyggnad K (Långnabba)	300689	7036583	55	5,0 x 5,0	0:00
Fritidsbyggnad L (Åvistvägen)	298031	7035773	52,4	5,0 x 5,0	0:00
Bostadsbyggnad M (Stenbacka)	297753	7035671	53,9	5,0 x 5,0	0:00
Bostadsbyggnad N (Adler)	294812	7036441	45	5,0 x 5,0	0:00
Bostadsbyggnad O (Åvistvägen)	294394	7036982	40,2	5,0 x 5,0	4:30
Bostadsbyggnad P (Finnabbavägen)	294415	7037260	40	5,0 x 5,0	3:43
Bostadsbyggnad Q (Dalabacka)	293652	7039610	40	5,0 x 5,0	1:58
Bostadsbyggnad R (Kronkvist)	293736	7041267	32,5	5,0 x 5,0	0:00
Bostadsbyggnad S (Tallbacka)	293575	7041715	32,1	5,0 x 5,0	0:00
Bostadsbyggnad T (Norrgård)	293326	7042304	31	5,0 x 5,0	0:00
Bostadsbyggnad U (Nåpi)	294326	7045578	35	5,0 x 5,0	0:00
Bostadsbyggnad V (Skutas)	293741	7047247	32,1	5,0 x 5,0	0:00
Bostadsbyggnad W (Åbrännan)	293782	7049981	22,5	5,0 x 5,0	0:00
Fritidsbyggnad X (Dalbacka)	296008	7052686	20,5	5,0 x 5,0	0:00
Bostadsbyggnad Y (Åvist)	294403	7036830	41,6	5,0 x 5,0	0:00
Bostadsbyggnad Z (Nabba)	294257	7045675	35	5,0 x 5,0	0:00
Bostadsbyggnad AA (Kronkvist)	293533	7041290	31,6	5,0 x 5,0	0:00

FCG Finnish Consulting Group Oy

Henna-Riikka Rintamäki, ing. YH
Utarbetad av

Johanna Harju, ing. YH
Granskad av

Bilaga 1. Purmo vindkraftspark i nuläget. Resultat från modelleringen av spridningen av buller ISO 9613-2, YM 2 /2014

Project:
Purmon tuulivoimahanke

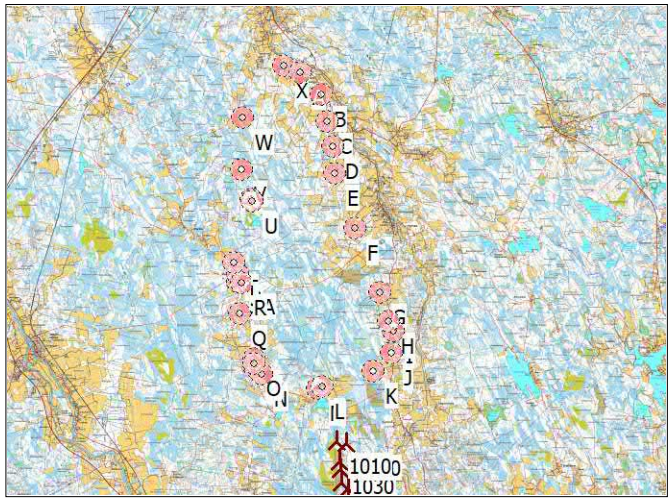
Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
23.1.2023 16.21/3.5.584

DECIBEL - Main Result

Calculation: Purmon hanke YV (Salo-Ylikoski)_nykytilanne

Calculation is done according to Finnish guideline " Ympäristöhallinnon ohjeita 2 | 2014 " from the Ministry of the Environment of Finland

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000

New WTG Noise sensitive area

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Noise data Creator	Name	Wind speed	LwA,ref
			[m]					[kW]	[m]	[m]			[m/s]	[dB(A)]
1010	298 762	7 032 913	58,6	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1020	299 290	7 032 796	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1030	298 900	7 031 842	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1040	298 977	7 031 430	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1050	299 000	7 030 729	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1060	299 358	7 030 441	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1070	299 389	7 029 959	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4

Calculation Results

Sound level

Noise sensitive area No.	Name	East	North	Z	Immission height	Demands Noise	Sound level From WTGs	Distance to noise demand	2 dB penalty applied for one or more WTGs
				[m]	[m]	[dB(A)]	[dB(A)]	[m]	
A	Asuinrakennus A (Lillkvist)	296 866	7 052 328	26,8	4,0	40,0	9,1	18 740	No
B	Asuinrakennus B (Dallberga)	297 952	7 051 163	25,0	4,0	40,0	9,9	17 493	No
C	Asuinrakennus C (Tormbacka)	298 274	7 049 757	28,2	4,0	40,0	10,8	16 074	No
D	Asuinrakennus D (Kalltrdskvdgen)	298 556	7 048 421	35,5	4,0	40,0	11,7	14 730	No
E	Metsästysmaja E (Kejsarbacken)	298 663	7 047 017	33,8	4,0	40,0	12,7	13 324	No
F	Lomarakennus F (Kdllbacken)	299 710	7 044 165	37,5	4,0	40,0	15,1	10 497	No
G	Asuinrakennus G (Kornjdrv)	301 071	7 040 772	55,0	4,0	40,0	18,3	7 347	No
H	Asuinrakennus H (Sandnabba)	301 519	7 039 228	51,6	4,0	40,0	20,0	6 007	No
I	Asuinrakennus I (Asp)	301 749	7 038 736	55,0	4,0	40,0	20,5	5 639	No
J	Asuinrakennus J (Stennabba)	301 661	7 037 581	55,0	4,0	40,0	22,1	4 559	No
K	Asuinrakennus K (Lengnabba)	300 689	7 036 583	55,0	4,0	40,0	24,7	3 242	No
L	Lomarakennus L (Evistvdgen)	298 031	7 035 773	52,3	4,0	40,0	27,5	2 201	No
M	Asuinrakennus M (Stenbacka)	297 753	7 035 671	53,9	4,0	40,0	27,6	2 192	No
N	Asuinrakennus N (Adler)	294 812	7 036 441	44,0	4,0	40,0	22,2	4 564	No
O	Asuinrakennus O (Evistvdgen)	294 394	7 036 982	41,2	4,0	40,0	21,1	5 237	No
P	Asuinrakennus P (Finnabbavdgen)	294 415	7 037 260	40,0	4,0	40,0	20,9	5 415	No
Q	Asuinrakennus Q (Dalabacka)	293 652	7 039 610	40,2	4,0	40,0	17,9	7 690	No
R	Asuinrakennus R (Kronkvist)	293 736	7 041 267	32,5	4,0	40,0	16,5	9 013	No
S	Asuinrakennus S (Tallbacka)	293 575	7 041 715	32,2	4,0	40,0	16,1	9 480	No
T	Asuinrakennus T (Norrgerd)	293 326	7 042 304	30,9	4,0	40,0	15,5	10 114	No
U	Asuinrakennus U (Nepi)	294 326	7 045 578	35,0	4,0	40,0	13,3	12 673	No
V	Asuinrakennus V (Skutas)	293 741	7 047 247	32,3	4,0	40,0	11,9	14 442	No
W	Asuinrakennus W (Ebrdnnan)	293 782	7 049 981	22,5	4,0	40,0	10,2	17 030	No
X	Lomarakennus X (Dalbacka)	296 008	7 052 686	21,2	4,0	40,0	8,8	19 201	No
Y	Asuinrakennus Y (Evist)	294 403	7 036 830	41,9	4,0	40,0	21,3	5 128	No
Z	Asuinrakennus Z (Nabba)	294 257	7 045 675	35,0	4,0	40,0	13,2	12 788	No
AA	Asuinrakennus AA (Kronkvist)	293 533	7 041 290	31,7	4,0	40,0	16,4	9 140	No

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
23.1.2023 16.21/3.5.584

DECIBEL - Main Result

Calculation: Purmon hanke YV (Salo-Ylikoski)_nykytilanne

Distances (m)

	WTG						
NSA	1010	1020	1030	1040	1050	1060	1070
A	19500	19674	20579	20996	21696	22020	22502
B	18261	18409	19337	19752	20453	20762	21245
C	16845	16985	17919	18334	19035	19339	19822
D	15503	15636	16576	16990	17691	17991	18474
E	14099	14229	15171	15584	16285	16584	17067
F	11288	11373	12345	12751	13450	13723	14204
G	8188	8169	9187	9570	10251	10468	10939
H	6888	6805	7834	8199	8861	9046	9507
I	6542	6427	7457	7811	8463	8630	9085
J	5493	5338	6366	6709	7348	7499	7951
K	4144	4036	5065	5428	6091	6282	6748
L	2951	3231	4024	4443	5134	5493	5968
M	2936	3259	3996	4412	5095	5469	5939
N	5294	5772	6151	6513	7080	7525	7932
O	5967	6439	6833	7196	7763	8208	8615
P	6145	6607	7031	7400	7977	8419	8831
Q	8421	8841	9371	9757	10363	10795	11223
R	9745	10125	10743	11142	11775	12194	12637
S	10213	10589	11213	11613	12248	12666	13110
T	10847	11219	11850	12250	12886	13303	13748
U	13414	13707	14472	14887	15561	15945	16413
V	15182	15474	16239	16655	17328	17713	18180
W	17773	18039	18840	19257	19939	20312	20784
X	19956	20151	21036	21454	22151	22487	22968
Y	5858	6334	6713	7074	7636	8082	8486
Z	13528	13822	14586	15001	15674	16059	16526
AA	9871	10257	10862	11259	11887	12309	12750

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
23.1.2023 16.21/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmon hanke YV (Salo-Ylikoski)_nykytilanne

Noise calculation model:
ISO 9613-2 Finland
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (vesistöt): (14)
Area type with hard ground: Vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in NSA has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)
Octave data required
Frequency dependent air absorption

63	125	250	500	1 000	2 000	4 000	8 000
[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]
0,10	0,38	1,12	2,36	4,08	8,78	26,60	95,00

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTG: VESTAS V136-3.45 HH169 3450 136.0 !O!

Noise: Level 0- Calculated- Mode 0 - 11.02.2016

Source	Source/Date	Creator	Edited
HH: Vestas; 10 m: calculated by EMD	13.7.2016	USER	23.1.2023 16.21

Document no.: DMS 0053-3713 V02
Blades with serrated trailing edge.
Hub height wind speed noise data from Vestas. Wind speed at hub height is converted to 10 m height using the IEC 61400-11 wind profile (5 cm roughness). Noise levels are interpolated at integer wind speeds.

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	169,0	8,0	107,4	No	93,1	99,8	97,4	100,6	102,1	99,3	92,8	75,3

Noise sensitive area: A Asuinrakennus A (Lillkvist)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: B Asuinrakennus B (Dallberga)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
23.1.2023 16.21/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmon hanke YV (Salo-Ylikoski)_nykytilanne

Noise sensitive area: C Asuinrakennus C (Tormbacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: D Asuinrakennus D (Kalltrdskvdgen)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: E Metsästysmaja E (Kejsarbacken)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: F Lomarakennus F (Kdllbacken)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: G Asuinrakennus G (Kornjdrv)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: H Asuinrakennus H (Sandnabba)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: I Asuinrakennus I (Asp)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: J Asuinrakennus J (Stennabba)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
23.1.2023 16.21/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmon hanke YV (Salo-Ylikoski)_nykytilanne

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: K Asuinrakennus K (Lengnabba)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: L Lomarakennus L (Evistvdgen)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: M Asuinrakennus M (Stenbacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: N Asuinrakennus N (Adler)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: O Asuinrakennus O (Evistvdgen)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: P Asuinrakennus P (Finnabbavdgen)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Q Asuinrakennus Q (Dalabacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
23.1.2023 16.21/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmon hanke YV (Salo-Ylikoski)_nykytilanne

Noise sensitive area: R Asuinrakennus R (Kronkvist)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: S Asuinrakennus S (Tallbacka)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: T Asuinrakennus T (Norrgerd)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: U Asuinrakennus U (Nepi)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: V Asuinrakennus V (Skutas)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: W Asuinrakennus W (Ebrdnnan)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: X Lomarakennus X (Dalbacka)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Y Asuinrakennus Y (Evist)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
23.1.2023 16.21/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmon hanke YV (Salo-Ylikoski)_nykytilanne

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Z Asuinrakennus Z (Nabba)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: AA Asuinrakennus AA (Kronkvist)

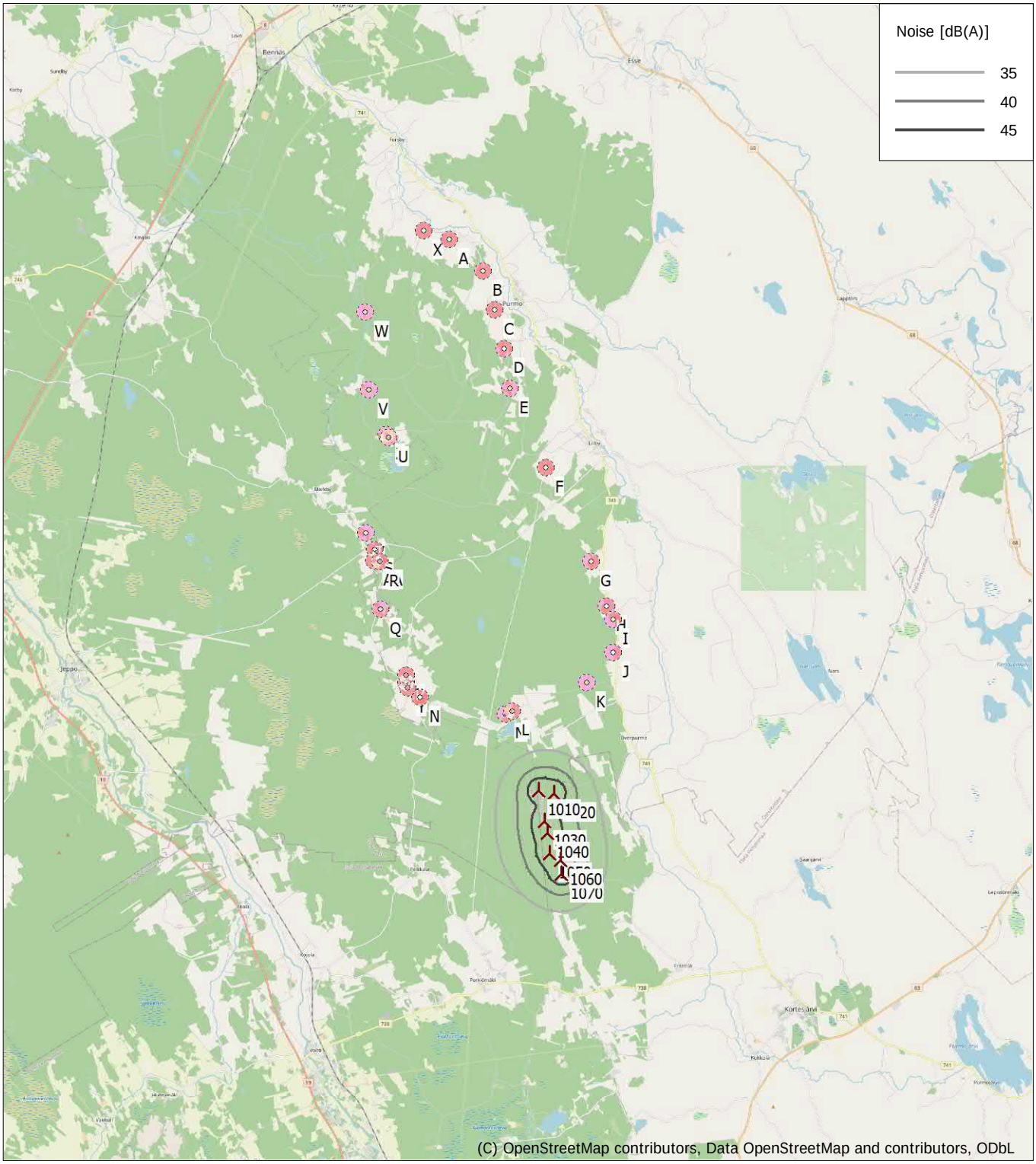
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
23.1.2023 16.21/3.5.584

DECIBEL - Map 8,0 m/s

Calculation: Purmon hanke YV (Salo-Ylikoski)_nykytilanne



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 297 858 North: 7 039 822

New WTG Noise sensitive area

Noise calculation model: ISO 9613-2 Finland. Wind speed: 8,0 m/s
Height above sea level from active line object

Bilaga 2. Purmo vindkraftsprojekt - Resultat av modelleringen av spridningen av buller ISO 9613-2, YM 2 /2014 (ALT1) V150 – 6.0 MW tillsammans med Salo–Ylikoski-projektet.

Project:

Purmon tuulivoimahanke

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi

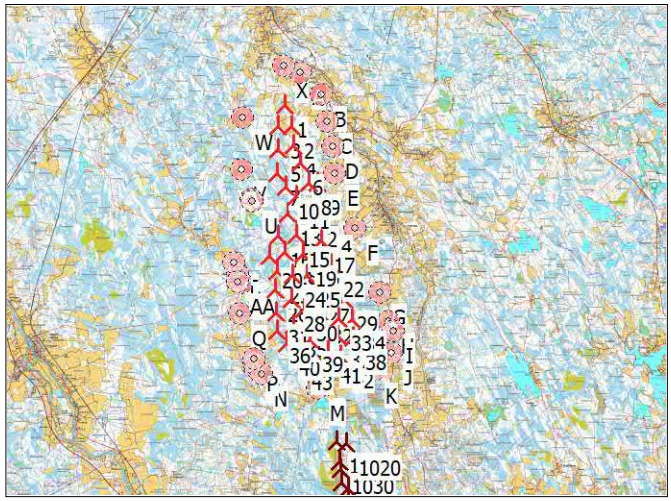
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Main Result

Calculation: Purmo VE1_V150-6.0MWx43xHH225_20220505 + YV (Salo-Ylikoski)_

Calculation is done according to Finnish guideline " Ympäristöhallinnon ohjeita 2 | 2014 " from the Ministry of the Environment of Finland

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000

New WTG Noise sensitive area

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Noise data Creator	Name	Wind speed	LwA,ref
			[m]					[kW]	[m]	[m]			[m/s]	[dB(A)]
1	296 015	7 050 633	25,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
2	296 402	7 049 512	28,1	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
3	295 688	7 049 533	26,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
4	296 468	7 048 488	31,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
5	295 661	7 048 308	32,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
6	296 860	7 047 573	35,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
7	295 626	7 047 011	32,3	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
8	297 281	7 046 511	32,8	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
9	297 768	7 046 509	35,8	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
10	296 092	7 046 333	36,1	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
11	296 633	7 045 796	35,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
12	297 035	7 044 833	36,9	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
13	296 211	7 044 887	37,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
14	297 806	7 044 390	40,6	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
15	296 659	7 043 785	40,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
16	295 680	7 043 726	37,7	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
17	297 935	7 043 485	36,3	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
18	296 033	7 042 892	40,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
19	297 013	7 042 799	42,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
20	295 245	7 042 663	37,3	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
21	297 759	7 042 500	40,9	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
22	298 459	7 042 222	42,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
23	295 640	7 041 888	35,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
24	296 420	7 041 637	37,1	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
25	297 207	7 041 637	45,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
26	295 536	7 040 877	38,9	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
27	297 642	7 040 813	45,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
28	296 377	7 040 414	45,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
29	299 185	7 040 392	48,4	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
30	297 071	7 039 884	45,8	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
31	295 591	7 039 696	41,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
32	297 841	7 039 740	47,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
33	298 849	7 039 361	49,7	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
34	299 581	7 039 334	53,6	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
35	296 466	7 039 042	47,3	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
36	295 637	7 038 744	41,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
37	298 820	7 038 484	53,1	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
38	299 616	7 038 389	54,3	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
39	297 367	7 038 248	47,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
40	296 154	7 038 055	45,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
41	298 305	7 037 659	50,9	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
42	298 984	7 037 431	54,8	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
43	296 802	7 037 326	47,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
1010	298 762	7 032 913	58,6	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1020	299 290	7 032 796	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1030	298 900	7 031 842	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1040	298 977	7 031 430	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1050	299 000	7 030 729	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1060	299 358	7 030 441	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1070	299 389	7 029 959	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4

Calculation Results

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Main Result

Calculation: Purmo VE1_V150-6.0MWx43xHH225_20220505 + YV (Salo-Ylikoski)_

Sound level

Noise sensitive area No.	Name	East	North	Z	Immission height	Demands Noise	Sound level From WTGs	Distance to noise demand	2 dB penalty applied for one or more WTGs
				[m]	[m]	[dB(A)]	[dB(A)]	[m]	
A	Asuinrakennus A (Lillkvist)	296 866	7 052 328	26,8	4,0	40,0	30,8	1 219	No
B	Asuinrakennus B (Dallberga)	297 952	7 051 163	25,0	4,0	40,0	32,0	1 270	No
C	Asuinrakennus C (Tormbacka)	298 274	7 049 757	28,2	4,0	40,0	33,9	1 041	No
D	Asuinrakennus D (Kalltrdskvdgen)	298 556	7 048 421	35,5	4,0	40,0	35,1	933	No
E	Metsästysmaja E (Kejsarbacken)	298 663	7 047 017	33,8	4,0	40,0	38,4	201	No
F	Lomarakennus F (Kdllbacken)	299 710	7 044 165	37,5	4,0	40,0	35,5	874	No
G	Asuinrakennus G (Kornjdrv)	301 071	7 040 772	55,0	4,0	40,0	34,4	1 030	No
H	Asuinrakennus H (Sandnabba)	301 519	7 039 228	51,6	4,0	40,0	34,0	1 027	No
I	Asuinrakennus I (Asp)	301 749	7 038 736	55,0	4,0	40,0	33,1	1 246	No
J	Asuinrakennus J (Stennabba)	301 661	7 037 581	55,0	4,0	40,0	32,5	1 350	No
K	Asuinrakennus K (Lengnabba)	300 689	7 036 583	55,0	4,0	40,0	34,0	1 042	No
L	Lomarakennus L (Evistvdgen)	298 031	7 035 773	52,3	4,0	40,0	35,6	893	No
M	Asuinrakennus M (Stenbacka)	297 753	7 035 671	53,9	4,0	40,0	35,2	1 036	No
N	Asuinrakennus N (Adler)	294 812	7 036 441	44,0	4,0	40,0	33,5	1 175	No
O	Asuinrakennus O (Evistvdgen)	294 394	7 036 982	41,2	4,0	40,0	33,7	1 123	No
P	Asuinrakennus P (Finnabbavdgen)	294 415	7 037 260	40,0	4,0	40,0	34,5	941	No
Q	Asuinrakennus Q (Dalabacka)	293 652	7 039 610	40,2	4,0	40,0	34,8	991	No
R	Asuinrakennus R (Kronkvist)	293 736	7 041 267	32,5	4,0	40,0	35,8	820	No
S	Asuinrakennus S (Tallbacka)	293 575	7 041 715	32,2	4,0	40,0	35,3	920	No
T	Asuinrakennus T (Norrgerd)	293 326	7 042 304	30,9	4,0	40,0	34,3	1 053	No
U	Asuinrakennus U (Nepi)	294 326	7 045 578	35,0	4,0	40,0	36,1	837	No
V	Asuinrakennus V (Skutas)	293 741	7 047 247	32,3	4,0	40,0	34,1	1 057	No
W	Asuinrakennus W (Ebrdnnan)	293 782	7 049 981	22,5	4,0	40,0	32,7	1 155	No
X	Lomarakennus X (Dalbacka)	296 008	7 052 686	21,2	4,0	40,0	29,8	1 383	No
Y	Asuinrakennus Y (Evist)	294 403	7 036 830	41,9	4,0	40,0	33,4	1 212	No
Z	Asuinrakennus Z (Nabba)	294 257	7 045 675	35,0	4,0	40,0	35,9	874	No
AA	Asuinrakennus AA (Kronkvist)	293 533	7 041 290	31,7	4,0	40,0	34,9	1 022	No

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	1896	2007	2421	3367	4480	7446	11077	12658	13201	14215	14801	14990	15056	14237	13741	13463	11269	9635	9242	8749	5327	4077
2	2853	2263	1887	2413	3366	6285	9905	11482	12025	13034	13616	13830	13901	13162	12685	12407	10273	8662	8291	7834	4447	3493
3	3032	2789	2595	3075	3895	6705	10279	11836	12377	13356	13877	13952	14009	13116	12612	12334	10125	8490	8095	7602	4181	3001
4	3859	3058	2206	2088	2641	5401	8981	10544	11086	12075	12626	12805	12876	12155	11687	11409	9310	7717	7362	6933	3612	2995
5	4195	3659	2987	2896	3266	5790	9273	10801	11339	12286	12752	12752	12804	11892	11392	11113	8923	7296	6912	6439	3037	2193
6	4753	3751	2601	1895	1886	4441	7996	9554	10095	11081	11633	11853	11931	11314	10870	10595	8581	7035	6714	6342	3224	3135
7	5458	4758	3814	3251	3036	4976	8278	9759	10290	11192	11588	11488	11533	10597	10100	9822	7656	6044	5677	5236	1934	1899
8	5829	4698	3393	2295	1471	3376	6875	8423	8964	9943	10493	10760	10846	10364	9953	9681	7794	6328	6059	5772	3098	3614
9	5886	4656	3286	2067	1029	3043	6617	8187	8730	9736	10343	10735	10834	10489	10103	9834	8030	6610	6366	6114	3564	4093
10	6042	5174	4058	3228	2659	4216	7461	8937	9468	10369	10775	10732	10786	9970	9500	9223	7149	5585	5257	4885	1920	2522
11	6534	5525	4286	3253	2368	3481	6700	8183	8715	9628	10062	10116	10182	9527	9090	8816	6864	5374	5098	4807	2317	3235
12	7494	6394	5076	3896	2724	2756	5723	7175	7704	8598	9019	9111	9186	8677	8279	8010	6220	4855	4655	4487	2808	4082
13	7467	6511	5287	4240	3247	3571	6366	7756	8273	9111	9431	9290	9340	8557	8107	7832	5862	4383	4122	3870	2007	3415
14	7990	6772	5385	4098	2762	1917	4872	6357	6891	7822	8320	8617	8716	8491	8153	7892	6330	5128	5004	4940	3676	4966
15	8542	7488	6184	5007	3802	3074	5341	6660	7167	7966	8250	8125	8184	7569	7167	6897	5143	3856	3712	3645	2941	4526
16	8680	7773	6563	5504	4440	4052	6145	7368	7854	8572	8721	8290	8314	7334	6863	6586	4587	3133	2910	2749	2293	4018
17	8904	7675	6279	4973	3605	1900	4145	5563	6089	6979	7428	7710	7813	7702	7401	7148	5773	4747	4704	4756	4170	5632
18	9469	8487	7218	6075	4890	3890	5464	6595	7065	7736	7838	7392	7421	6563	6131	5858	4053	2813	2724	2769	3181	4919
19	9527	8414	7069	5828	4528	3023	4535	5747	6238	6985	7219	7096	7163	6725	6376	6115	4631	3615	3603	3718	3864	5520
20	9796	8917	7710	6639	5533	4709	6122	7150	7594	8181	8158	7429	7425	6235	5742	5464	3442	2055	1920	1952	3055	4822
21	9865	8662	7273	5972	4605	2564	3734	4982	5483	6276	6600	6730	6826	6735	6460	6213	5020	4206	4255	4435	4609	6217
22	10227	8952	7535	6198	4798	2310	2986	4279	4791	5636	6061	6461	6586	6833	6629	6399	5469	4817	4908	5132	5322	6890
23	10508	9555	8295	7152	5952	4662	5543	6451	6872	7400	7321	6563	6564	5507	5060	4785	3022	2001	2071	2350	3915	5683
24	10697	9645	8326	7110	5827	4148	4729	5637	6065	6624	6613	6078	6110	5436	5074	4812	3429	2708	2845	3164	4461	6215
25	10692	9551	8186	6914	5571	3556	3959	4938	5388	6022	6136	5920	5989	5719	5437	5190	4090	3489	3631	3936	4879	6591
26	11524	10562	9289	8123	6888	5311	5533	6203	6569	6952	6705	5679	5656	4493	4057	3785	2270	1841	2132	2630	4853	6616
27	11536	10350	8962	7659	6285	3937	3428	4187	4601	5156	5212	5054	5142	5206	5021	4798	4166	3930	4164	4564	5802	7521
28	11919	10860	9530	8295	6985	5016	4706	5275	5626	5993	5766	4925	4937	4268	3962	3713	2840	2774	3088	3588	5554	7321
29	12154	10837	9405	8050	6643	3808	1923	2607	3051	3745	4094	4759	4932	5892	5879	5704	5586	5517	5762	6161	7104	8750
30	12441	11309	9943	8662	7306	5028	4096	4494	4815	5133	4896	4220	4266	4116	3946	3732	3428	3609	3945	4457	6319	8078
31	12692	11703	10409	9212	7937	6076	5583	5944	6230	6425	5971	4618	4567	3345	2965	2704	1940	2430	2852	3453	6014	7772
32	12621	11419	10023	8707	7321	4802	3389	3712	4033	4386	4250	3970	4068	4477	4413	4228	4190	4379	4700	5191	6812	8551
33	13112	11831	10408	9061	7655	4878	2631	2672	2966	3327	3331	3679	3848	4980	5048	4905	5201	5454	5773	6255	7685	9392
34	13269	11936	10501	9141	7735	4831	2070	1940	2248	2719	2965	3883	4093	5576	5694	5565	5934	6154	6459	6922	8158	9831
35	13287	12207	10862	9605	8269	6061	4917	5054	5290	5394	4885	3623	3607	3081	2921	2716	2870	3521	3936	4526	6875	8642
36	13634	12628	11320	10104	8806	6778	5798	5900	6110	6133	5493	3814	3730	2445	2155	1921	2164	3157	3615	4242	6955	8708

To be continued on next page...

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Main Result

Calculation: Purmo VE1_V150-6.0MWx43xHH225_20220505 + YV (Salo-Ylikoski)_

...continued from previous page

WTG	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
37	13976	12704	11282	9936	8531	5748	3208	2798	2938	2980	2665	2823	3008	4497	4673	4571	5287	5794	6158	6689	8394	10124
38	14203	12877	11443	10084	8678	5775	2791	2079	2160	2198	2100	3057	3294	5182	5406	5320	6086	6544	6894	7406	8922	10625
39	14084	12924	11541	10239	8861	6362	4481	4264	4407	4344	3714	2561	2604	3128	3230	3112	3956	4721	5136	5724	7933	9699
40	14286	13226	11888	10637	9304	7067	5616	5490	5635	5526	4766	2954	2869	2098	2060	1911	2944	4019	4476	5102	7739	9500
41	14734	13504	12094	10761	9362	6654	4163	3576	3608	3356	2615	1905	2062	3697	3967	3909	5043	5820	6228	6807	8859	10615
42	15041	13765	12342	10994	9588	6771	3938	3106	3057	2681	1904	1912	2147	4286	4610	4570	5758	6498	6897	7464	9381	11124
43	14996	13879	12513	11228	9864	7428	5484	5084	5142	4863	3955	1980	1908	2178	2432	2387	3890	4991	5445	6069	8612	10378
1010	19500	18261	16845	15503	14099	11288	8188	6888	6542	5493	4144	2951	2936	5294	5967	6145	8421	9745	10213	10847	13414	15182
1020	19674	18409	16985	15636	14229	11373	8169	6805	6427	5338	4036	3231	3259	5772	6439	6607	8841	10125	10589	11219	13707	15474
1030	20579	19337	17919	16576	15171	12345	9187	7834	7457	6366	5065	4024	3996	6151	6833	7031	9371	10743	11213	11850	14472	16239
1040	20996	19752	18334	16990	15584	12751	9570	8199	7811	6709	5428	4443	4412	6513	7196	7400	9757	11142	11613	12250	14887	16655
1050	21696	20453	19035	17691	16285	13450	10251	8861	8463	7348	6091	5134	5095	7080	7763	7977	10363	11775	12248	12886	15561	17328
1060	22020	20762	19339	17991	16584	13723	10468	9046	8630	7499	6282	5493	5469	7525	8208	8419	10795	12194	12666	13303	15945	17713
1070	22502	21245	19822	18474	17067	14204	10939	9507	9085	7951	6748	5968	5939	7932	8615	8831	11223	12637	13110	13748	16413	18180

WTG	W	X	Y	Z	AA
1	2326	2053	13891	5258	9663
2	2661	3197	12834	4394	8705
3	1957	3168	12762	4113	8516
4	3072	4222	11834	3576	7770
5	2515	4390	11542	2983	7330
6	3907	5181	11016	3220	7107
7	3494	5686	10250	1912	6089
8	4926	6302	10096	3136	6425
9	5284	6421	10243	3607	6718
10	4316	6351	9648	1949	5653
11	5062	6916	9235	2378	5467
12	6087	7917	8421	2901	4979
13	5641	7799	8254	2106	4482
14	6885	8485	8288	3773	5277
15	6829	8921	7308	3055	3998
16	6534	8962	7010	2412	3246
17	7707	9397	7531	4279	4917
18	7434	9790	6275	3300	2968
19	7872	9934	6512	3982	3791
20	7460	10048	5891	3169	2194
21	8469	10332	6586	4725	4394
22	9056	10743	6745	5437	5012
23	8300	10800	5205	4030	2189
24	8748	11053	5210	4579	2907
25	9016	11109	5563	4998	3688
26	9268	11814	4201	4964	2045
27	9943	11980	5132	5921	4135
28	9909	12273	4090	5670	2975
29	11002	12693	5961	7222	5721
30	10615	12841	4053	6436	3806
31	10439	12992	3101	6124	2602
32	11012	13070	4503	6931	4577
33	11762	13619	5114	7804	5653
34	12119	13816	5750	8277	6354
35	11259	13646	3024	6988	3694
36	11384	13941	2276	7064	3301
37	12547	14472	4715	8513	5983
38	12973	14740	5439	9041	6737
39	12264	14497	3284	8049	4893
40	12155	14626	2135	7850	4162
41	13121	15196	3987	8977	5994
42	13580	15536	4618	9499	6676
43	13005	15374	2449	8725	5136
1010	17773	19956	5858	13528	9871
1020	18039	20151	6334	13822	10257
1030	18840	21036	6713	14586	10862
1040	19257	21454	7074	15001	11259
1050	19939	22151	7636	15674	11887
1060	20312	22487	8082	16059	12309
1070	20784	22968	8486	16526	12750

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE1_V150-6.0MWx43xHH225_20220505 + YV (Salo-Ylikoski)_

Noise calculation model:
ISO 9613-2 Finland
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (vesistöt): (14)
Area type with hard ground: Vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in NSA has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)
Octave data required
Frequency dependent air absorption

63	125	250	500	1 000	2 000	4 000	8 000
[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]
0,10	0,38	1,12	2,36	4,08	8,78	26,60	95,00

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTG: VESTAS V150-6.0 HH225 6000 150.0 !O!
Noise: Level 0 - Measured - Mode PO6000 - 10-2020

Source	Source/Date	Creator	Edited
Manufacturer	13.10.2020	USER	13.10.2022 14.09

Blades with serrated trailing edge.
Document nr. 0098-0749 V01.

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	225,0	8,0	107,7	No	86,1	94,8	100,4	102,8	102,2	98,4	91,6	81,5

WTG: VESTAS V136-3.45 HH169 3450 136.0 !O!
Noise: Level 0- Calculated- Mode 0 - 11.02.2016

Source	Source/Date	Creator	Edited
HH: Vestas; 10 m: calculated by EMD	13.7.2016	USER	23.1.2023 16.21

Document no.: DMS 0053-3713 V02
Blades with serrated trailing edge.
Hub height wind speed noise data from Vestas. Wind speed at hub height is converted to 10 m height using the IEC 61400-11 wind profile (5 cm roughness). Noise levels are interpolated at integer wind speeds.

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	169,0	8,0	107,4	No	93,1	99,8	97,4	100,6	102,1	99,3	92,8	75,3

Noise sensitive area: A Asuinrakennus A (Lillkvist)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE1_V150-6.0MWx43xHH225_20220505 + YV (Salo-Ylikoski)_

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: B Asuinrakennus B (Dallberga)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: C Asuinrakennus C (Tormbacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: D Asuinrakennus D (Kalltrdskvdgen)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: E Metsästysmaja E (Kejsarbacken)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: F Lomarakennus F (Kdllbacken)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: G Asuinrakennus G (Kornjdrv)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: H Asuinrakennus H (Sandnabba)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE1_V150-6.0MWx43xHH225_20220505 + YV (Salo-Ylikoski)_

Noise sensitive area: I Asuinrakennus I (Asp)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: J Asuinrakennus J (Stennabba)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: K Asuinrakennus K (Lengnabba)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: L Lomarakennus L (Evistvdgen)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: M Asuinrakennus M (Stenbacka)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: N Asuinrakennus N (Adler)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: O Asuinrakennus O (Evistvdgen)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: P Asuinrakennus P (Finnabbavdgen)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE1_V150-6.0MWx43xHH225_20220505 + YV (Salo-Ylikoski)_

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Q Asuinrakennus Q (Dalabacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: R Asuinrakennus R (Kronkvist)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: S Asuinrakennus S (Tallbacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: T Asuinrakennus T (Norrgerd)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: U Asuinrakennus U (Nepi)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: V Asuinrakennus V (Skutas)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: W Asuinrakennus W (Ebrdnnan)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE1_V150-6.0MWx43xHH225_20220505 + YV (Salo-Ylikoski)_

Noise sensitive area: X Lomarakennus X (Dalbacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Y Asuinrakennus Y (Evist)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Z Asuinrakennus Z (Nabba)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: AA Asuinrakennus AA (Kronkvist)

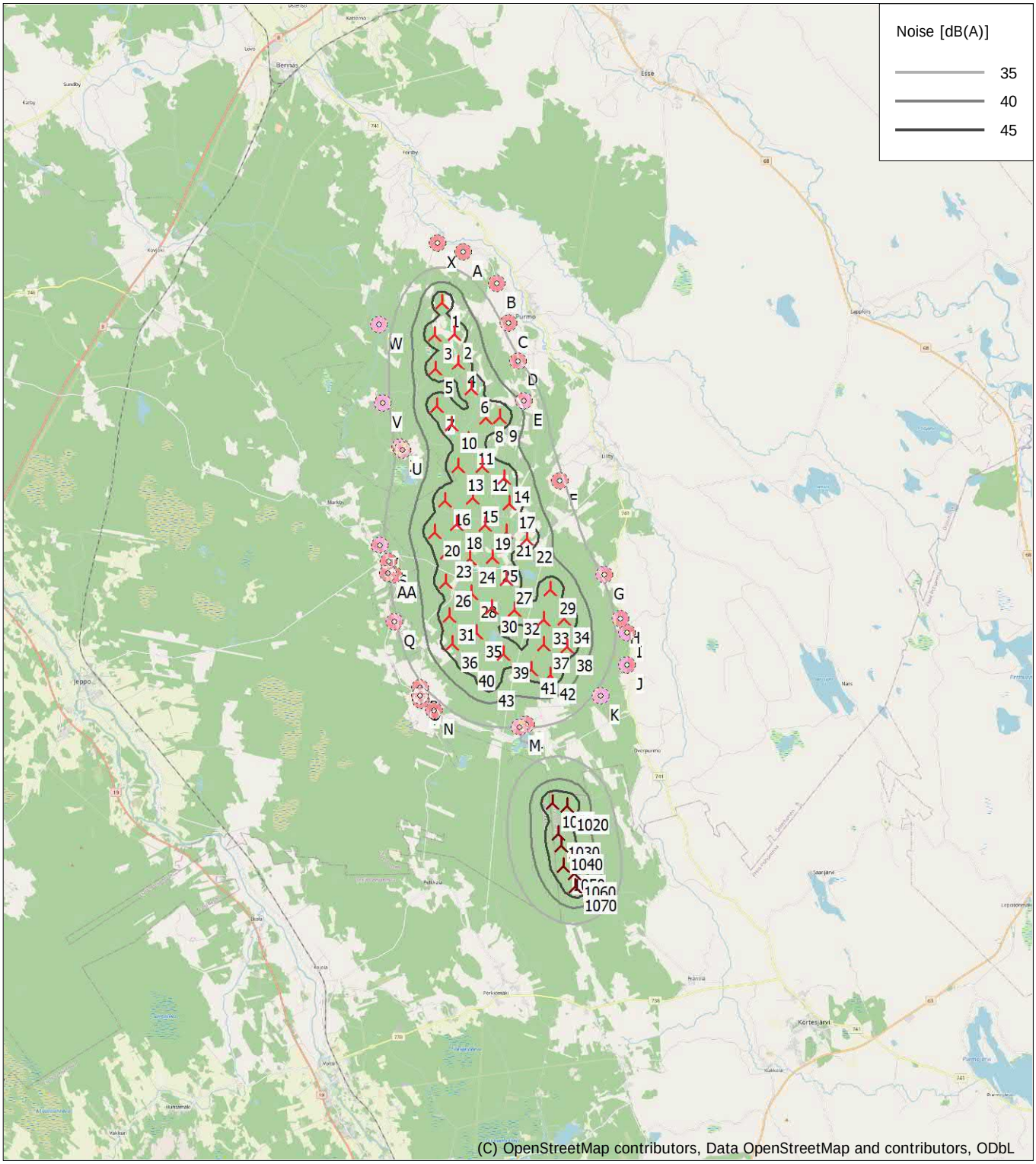
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Map 8,0 m/s

Calculation: Purmo VE1_V150-6.0MWx43xHH225_20220505 + YV (Salo-Ylikoski)_



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 297 431 North: 7 040 296

New WTG Noise sensitive area

Noise calculation model: ISO 9613-2 Finland. Wind speed: 8,0 m/s
Height above sea level from active line object

Bilaga 3. Purmo vindkraftsprojekt - Resultat av modelleringen av spridningen av buller ISO 9613-2, YM 2 /2014 (ALT2) V150 – 6.0 MW tillsammans med Salo–Ylikoski-projektet.

Project:

Purmon tuulivoimahanke

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi

Calculated:

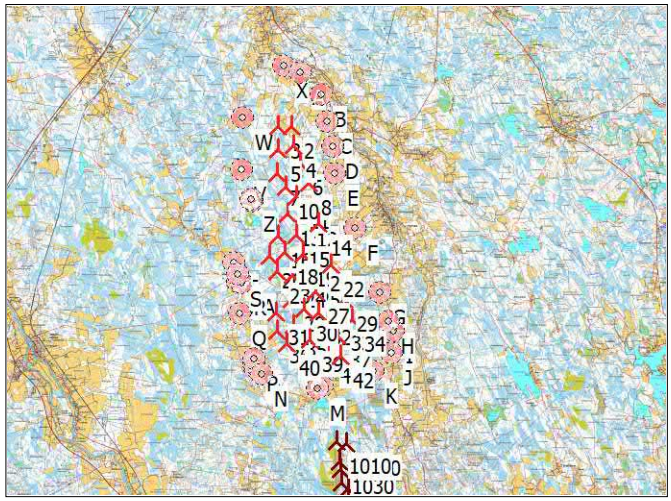
8.2.2023 14.37/3.5.584

DECIBEL - Main Result

Calculation: Purmo VE2_V150-6.0MWx37xHH225_20220207 + YV (Salo-Ylikoski)

Calculation is done according to Finnish guideline " Ympäristöhallinnon ohjeita 2 | 2014 " from the Ministry of the Environment of Finland

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000

New WTG Noise sensitive area

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Noise data Creator	Name	Wind speed	LwA,ref
			[m]					[kW]	[m]	[m]			[m/s]	[dB(A)]
2	296 402	7 049 512	28,1	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
3	295 688	7 049 533	26,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
4	296 468	7 048 488	31,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
5	295 661	7 048 308	32,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
6	296 860	7 047 573	35,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
7	295 626	7 047 011	32,3	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
8	297 281	7 046 511	32,8	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
10	296 092	7 046 333	36,1	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
11	296 633	7 045 796	35,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
12	297 035	7 044 833	36,9	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
13	296 211	7 044 887	37,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
14	297 806	7 044 390	40,6	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
15	296 659	7 043 785	40,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
16	295 680	7 043 726	37,7	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
18	296 033	7 042 892	40,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
19	297 013	7 042 799	42,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
20	295 245	7 042 663	37,3	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
21	297 759	7 042 500	40,9	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
22	298 459	7 042 222	42,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
23	295 640	7 041 888	35,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
24	296 420	7 041 637	37,1	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
25	297 207	7 041 637	45,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
27	297 642	7 040 813	45,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
28	296 377	7 040 414	45,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
29	299 185	7 040 392	48,4	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
30	297 071	7 039 884	45,8	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
31	295 591	7 039 696	41,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
32	297 823	7 039 673	47,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
33	298 849	7 039 361	49,7	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
34	299 581	7 039 334	53,6	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
35	296 466	7 039 042	47,3	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
36	295 637	7 038 744	41,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
37	298 820	7 038 484	53,1	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
39	297 367	7 038 248	47,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
40	296 154	7 038 055	45,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
41	298 305	7 037 659	50,9	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
42	298 984	7 037 431	54,8	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
1010	298 762	7 032 913	58,6	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1020	299 290	7 032 796	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1030	298 900	7 031 842	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1040	298 977	7 031 430	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1050	299 000	7 030 729	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1060	299 358	7 030 441	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1070	299 389	7 029 959	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4

Calculation Results

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.37/3.5.584

DECIBEL - Main Result

Calculation: Purmo VE2_V150-6.0MWx37xHH225_20220207 + YV (Salo-Ylikoski)

Sound level

Noise sensitive area No.	Name	East	North	Z	Immission height	Demands Noise	Sound level From WTGs	Distance to noise demand	2 dB penalty applied for one or more WTGs
				[m]	[m]	[dB(A)]	[dB(A)]	[m]	
A	Asuinrakennus A (Lillkvist)	296 866	7 052 328	26,8	4,0	40,0	27,8	2 074	No
B	Asuinrakennus B (Dallberga)	297 952	7 051 163	25,0	4,0	40,0	30,2	1 521	No
C	Asuinrakennus C (Tormbacka)	298 274	7 049 757	28,2	4,0	40,0	33,1	1 094	No
D	Asuinrakennus D (Kalltrdskvdgen)	298 556	7 048 421	35,5	4,0	40,0	34,2	1 012	No
E	Metsästysmaja E (Kejsarbacken)	298 663	7 047 017	33,8	4,0	40,0	35,8	647	No
F	Lomarakennus F (Kdllbacken)	299 710	7 044 165	37,5	4,0	40,0	34,4	1 095	No
G	Asuinrakennus G (Kornjdrv)	301 071	7 040 772	55,0	4,0	40,0	34,0	1 067	No
H	Asuinrakennus H (Sandnabba)	301 519	7 039 228	51,6	4,0	40,0	33,1	1 141	No
I	Asuinrakennus I (Asp)	301 749	7 038 736	55,0	4,0	40,0	32,0	1 446	No
J	Asuinrakennus J (Stennabba)	301 661	7 037 581	55,0	4,0	40,0	31,3	1 837	No
K	Asuinrakennus K (Lengnabba)	300 689	7 036 583	55,0	4,0	40,0	33,1	1 141	No
L	Lomarakennus L (Evistvdgen)	298 031	7 035 773	52,3	4,0	40,0	34,7	972	No
M	Asuinrakennus M (Stenbacka)	297 753	7 035 671	53,9	4,0	40,0	34,1	1 155	No
N	Asuinrakennus N (Adler)	294 812	7 036 441	44,0	4,0	40,0	32,5	1 294	No
O	Asuinrakennus O (Evistvdgen)	294 394	7 036 982	41,2	4,0	40,0	33,0	1 188	No
P	Asuinrakennus P (Finnabbavdgen)	294 415	7 037 260	40,0	4,0	40,0	33,9	997	No
Q	Asuinrakennus Q (Dalabacka)	293 652	7 039 610	40,2	4,0	40,0	34,1	1 063	No
R	Asuinrakennus R (Kronkvist)	293 736	7 041 267	32,5	4,0	40,0	34,9	1 013	No
S	Asuinrakennus S (Tallbacka)	293 575	7 041 715	32,2	4,0	40,0	34,6	997	No
T	Asuinrakennus T (Norrgerd)	293 326	7 042 304	30,9	4,0	40,0	33,8	1 091	No
U	Asuinrakennus U (Nepi)	294 326	7 045 578	35,0	4,0	40,0	35,9	863	No
V	Asuinrakennus V (Skutas)	293 741	7 047 247	32,3	4,0	40,0	33,8	1 068	No
W	Asuinrakennus W (Ebrdnnan)	293 782	7 049 981	22,5	4,0	40,0	31,8	1 216	No
X	Lomarakennus X (Dalbacka)	296 008	7 052 686	21,2	4,0	40,0	26,8	2 346	No
Y	Asuinrakennus Y (Evist)	294 403	7 036 830	41,9	4,0	40,0	32,6	1 284	No
Z	Asuinrakennus Z (Nabba)	294 257	7 045 675	35,0	4,0	40,0	35,7	900	No
AA	Asuinrakennus AA (Kronkvist)	293 533	7 041 290	31,7	4,0	40,0	34,1	1 189	No

Distances (m)

WTG	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
2	2853	2263	1887	2413	3366	6285	9905	11482	12025	13034	13616	13830	13901	13162	12685	12407	10273	8662	8291	7834	4447	3493
3	3032	2789	2595	3075	3895	6705	10279	11836	12377	13356	13877	13952	14009	13116	12612	12334	10125	8490	8095	7602	4181	3001
4	3859	3058	2206	2088	2641	5401	8981	10544	11086	12075	12626	12805	12876	12155	11687	11409	9310	7717	7362	6933	3612	2995
5	4195	3659	2987	2896	3266	5790	9273	10801	11339	12286	12752	12752	12804	11892	11392	11113	8923	7296	6912	6439	3037	2193
6	4753	3751	2601	1895	1886	4441	7996	9554	10095	11081	11633	11853	11931	11314	10870	10595	8581	7035	6714	6342	3224	3135
7	5458	4758	3814	3251	3036	4976	8278	9759	10290	11192	11588	11488	11533	10597	10100	9822	7656	6044	5677	5236	1934	1899
8	5829	4698	3393	2295	1471	3376	6875	8423	8964	9943	10493	10760	10846	10364	9953	9681	7794	6328	6059	5772	3098	3614
10	6042	5174	4058	3228	2659	4216	7461	8937	9468	10369	10775	10732	10786	9970	9500	9223	7149	5585	5257	4885	1920	2522
11	6534	5525	4286	3253	2368	3481	6700	8183	8715	9628	10062	10116	10182	9527	9090	8816	6864	5374	5098	4807	2317	3235
12	7494	6394	5076	3896	2724	2756	5723	7175	7704	8598	9019	9111	9186	8677	8279	8010	6220	4855	4655	4487	2808	4082
13	7467	6511	5287	4240	3247	3571	6366	7756	8273	9111	9431	9290	9340	8557	8107	7832	5862	4383	4122	3870	2007	3415
14	7990	6772	5385	4098	2762	1917	4872	6357	6891	7822	8320	8617	8716	8491	8153	7892	6330	5128	5004	4940	3676	4966
15	8542	7488	6184	5007	3802	3074	5341	6660	7167	7966	8250	8125	8184	7569	7167	6897	5143	3856	3712	3645	2941	4526
16	8680	7773	6563	5504	4440	4052	6145	7368	7854	8572	8721	8290	8314	7334	6863	6586	4587	3133	2910	2749	2293	4018
18	9469	8487	7218	6075	4890	3890	5464	6595	7065	7736	7838	7392	7421	6563	6131	5858	4053	2813	2724	2769	3181	4919
19	9527	8414	7069	5828	4528	3023	4535	5747	6238	6985	7219	7096	7163	6725	6376	6115	4631	3615	3603	3718	3864	5520
20	9796	8917	7710	6639	5533	4709	6122	7150	7594	8181	8158	7429	7425	6235	5742	5464	3442	2055	1920	1952	3055	4822
21	9865	8662	7273	5972	4605	2564	3734	4982	5483	6276	6600	6730	6826	6735	6460	6213	5020	4206	4255	4435	4609	6217
22	10227	8952	7535	6198	4798	2310	2986	4279	4791	5636	6061	6461	6586	6833	6629	6399	5469	4817	4908	5132	5322	6890
23	10508	9555	8295	7152	5952	4662	5543	6451	6872	7400	7321	6563	6564	5507	5060	4785	3022	2001	2071	2350	3915	5683
24	10697	9645	8326	7110	5827	4148	4729	5637	6065	6624	6613	6078	6110	5436	5074	4812	3429	2708	2845	3164	4461	6215
25	10692	9551	8186	6914	5571	3556	3959	4938	5388	6022	6136	5920	5989	5719	5437	5190	4090	3489	3631	3936	4879	6591
27	11536	10350	8962	7659	6285	3937	3428	4187	4601	5156	5212	5054	5142	5206	5021	4798	4166	3930	4164	4564	5802	7521
28	11919	10860	9530	8295	6985	5016	4706	5275	5626	5993	5766	4925	4937	4268	3962	3713	2840	2774	3088	3588	5554	7321
29	12154	10837	9405	8050	6643	3808	1923	2607	3051	3745	4094	4759	4932	5892	5879	5704	5586	5517	5762	6161	7104	8750
30	12441	11309	9943	8662	7306	5028	4096	4494	4815	5133	4896	4220	4266	4116	3946	3732	3428	3609	3945	4457	6319	8078
31	12692	11703	10409	9212	7937	6076	5583	5944	6230	6425	5971	4618	4567	3345	2965	2704	1940	2430	2852	3453	6014	7772
32	12686	11486	10090	8775	7389	4870	3428	3722	4035	4370	4213	3904	4001	4415	4357	4174	4170	4385	4711	5208	6860	8600
33	13112	11831	10408	9061	7655	4878	2631	2672	2966	3327	3331	3679	3848	4980	5048	4905	5201	5454	5773	6255	7685	9392
34	13269	11936	10501	9141	7735	4831	2070	1940	2248	2719	2965	3883	4093	5576	5694	5565	5934	6154	6459	6922	8158	9831
35	13287	12207	10862	9605	8269	6061	4917	5054	5290	5394	4885	3623	3607	3081	2921	2716	2870	3521	3936	4526	6875	8642
36	13634	12628	11320	10104	8806	6778	5798	5900	6110	6133	5493	3814	3730	2445	2155	1921	2164	3157	3615	4242	6955	8708
37	13976	12704	11282	9936	8531	5748	3208	2798	2938	2980	2665	2823	3008	4497	4673	4571	5287	5794	6158	6689	8394	10124
39	14084	12924	11541	10239	8861	6362	4481	4264	4407	4344	3714	2561	2604	3128	3230	3112	3956	4721	5136	5724	7933	9699
40	14286	13226	11888	10637	9304	7067	5616	5490	5635	5526	4766	2954	2869	2098	2060	1911	2944	4019	4476	5102	7739	9500
41	14734	13504	12094	10761	9362	6654	4163	3576	3608	3356	2615	1905	2062	3697	3967	3909	5043	5820	6228	6807	8859	10615

To be continued on next page...

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.37/3.5.584

DECIBEL - Main Result

Calculation: Purmo VE2_V150-6.0MWx37xHH225_20220207 + YV (Salo-Ylikoski)

...continued from previous page

WTG	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
42	15041	13765	12342	10994	9588	6771	3938	3106	3057	2681	1904	1912	2147	4286	4610	4570	5758	6498	6897	7464	9381	11124
1010	19500	18261	16845	15503	14099	11288	8188	6888	6542	5493	4144	2951	2936	5294	5967	6145	8421	9745	10213	10847	13414	15182
1020	19674	18409	16985	15636	14229	11373	8169	6805	6427	5338	4036	3231	3259	5772	6439	6607	8841	10125	10589	11219	13707	15474
1030	20579	19337	17919	16576	15171	12345	9187	7834	7457	6366	5065	4024	3996	6151	6833	7031	9371	10743	11213	11850	14472	16239
1040	20996	19752	18334	16990	15584	12751	9570	8199	7811	6709	5428	4443	4412	6513	7196	7400	9757	11142	11613	12250	14887	16655
1050	21696	20453	19035	17691	16285	13450	10251	8861	8463	7348	6091	5134	5095	7080	7763	7977	10363	11775	12248	12886	15561	17328
1060	22020	20762	19339	17991	16584	13723	10468	9046	8630	7499	6282	5493	5469	7525	8208	8419	10795	12194	12666	13303	15945	17713
1070	22502	21245	19822	18474	17067	14204	10939	9507	9085	7951	6748	5968	5939	7932	8615	8831	11223	12637	13110	13748	16413	18180

WTG	W	X	Y	Z	AA
2	2661	3197	12834	4394	8705
3	1957	3168	12762	4113	8516
4	3072	4222	11834	3576	7770
5	2515	4390	11542	2983	7330
6	3907	5181	11016	3220	7107
7	3494	5686	10250	1912	6089
8	4926	6302	10096	3136	6425
10	4316	6351	9648	1949	5653
11	5062	6916	9235	2378	5467
12	6087	7917	8421	2901	4979
13	5641	7799	8254	2106	4482
14	6885	8485	8288	3773	5277
15	6829	8921	7308	3055	3998
16	6534	8962	7010	2412	3246
18	7434	9790	6275	3300	2968
19	7872	9934	6512	3982	3791
20	7460	10048	5891	3169	2194
21	8469	10332	6586	4725	4394
22	9056	10743	6745	5437	5012
23	8300	10800	5205	4030	2189
24	8748	11053	5210	4579	2907
25	9016	11109	5563	4998	3688
27	9943	11980	5132	5921	4135
28	9909	12273	4090	5670	2975
29	11002	12693	5961	7222	5721
30	10615	12841	4053	6436	3806
31	10439	12992	3101	6124	2602
32	11067	13134	4446	6978	4582
33	11762	13619	5114	7804	5653
34	12119	13816	5750	8277	6354
35	11259	13646	3024	6988	3694
36	11384	13941	2276	7064	3301
37	12547	14472	4715	8513	5983
39	12264	14497	3284	8049	4893
40	12155	14626	2135	7850	4162
41	13121	15196	3987	8977	5994
42	13580	15536	4618	9499	6676
1010	17773	19956	5858	13528	9871
1020	18039	20151	6334	13822	10257
1030	18840	21036	6713	14586	10862
1040	19257	21454	7074	15001	11259
1050	19939	22151	7636	15674	11887
1060	20312	22487	8082	16059	12309
1070	20784	22968	8486	16526	12750

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.37/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE2_V150-6.0MWx37xHH225_20220207 + YV (Salo-Ylikoski)

Noise calculation model:
ISO 9613-2 Finland
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (vesistöt): (14)
Area type with hard ground: Vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in NSA has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)
Octave data required
Frequency dependent air absorption

63	125	250	500	1 000	2 000	4 000	8 000
[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]
0,10	0,38	1,12	2,36	4,08	8,78	26,60	95,00

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTG: VESTAS V150-6.0 HH225 6000 150.0 !O!
Noise: Level 0 - Measured - Mode PO6000 - 10-2020

Source	Source/Date	Creator	Edited
Manufacturer	13.10.2020	USER	13.10.2022 14.09

Blades with serrated trailing edge.
Document nr. 0098-0749 V01.

					Octave data							
Status	Hub height	Wind speed	LwA,ref	Pure tones	63	125	250	500	1000	2000	4000	8000
	[m]	[m/s]	[dB(A)]		[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
From Windcat	225,0	8,0	107,7	No	86,1	94,8	100,4	102,8	102,2	98,4	91,6	81,5

WTG: VESTAS V136-3.45 HH169 3450 136.0 !O!
Noise: Level 0- Calculated- Mode 0 - 11.02.2016

Source	Source/Date	Creator	Edited
HH: Vestas; 10 m: calculated by EMD	13.7.2016	USER	23.1.2023 16.21

Document no.: DMS 0053-3713 V02
Blades with serrated trailing edge.
Hub height wind speed noise data from Vestas. Wind speed at hub height is converted to 10 m height using the IEC 61400-11 wind profile (5 cm roughness). Noise levels are interpolated at integer wind speeds.

					Octave data							
Status	Hub height	Wind speed	LwA,ref	Pure tones	63	125	250	500	1000	2000	4000	8000
	[m]	[m/s]	[dB(A)]		[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
From Windcat	169,0	8,0	107,4	No	93,1	99,8	97,4	100,6	102,1	99,3	92,8	75,3

Noise sensitive area: A Asuinrakennus A (Lillkvist)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.37/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE2_V150-6.0MWx37xHH225_20220207 + YV (Salo-Ylikoski)

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: B Asuinrakennus B (Dallberga)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: C Asuinrakennus C (Tormbacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: D Asuinrakennus D (Kalltrdskvdgen)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: E Metsästysmaja E (Kejsarbacken)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: F Lomarakennus F (Kdllbacken)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: G Asuinrakennus G (Kornjdrv)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: H Asuinrakennus H (Sandnabba)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.37/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE2_V150-6.0MWx37xHH225_20220207 + YV (Salo-Ylikoski)

Noise sensitive area: I Asuinrakennus I (Asp)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: J Asuinrakennus J (Stennabba)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: K Asuinrakennus K (Lengnabba)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: L Lomarakennus L (Evistvdgen)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: M Asuinrakennus M (Stenbacka)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: N Asuinrakennus N (Adler)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: O Asuinrakennus O (Evistvdgen)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: P Asuinrakennus P (Finnabbavdgen)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.37/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE2_V150-6.0MWx37xHH225_20220207 + YV (Salo-Ylikoski)

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Q Asuinrakennus Q (Dalabacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: R Asuinrakennus R (Kronkvist)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: S Asuinrakennus S (Tallbacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: T Asuinrakennus T (Norrgerd)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: U Asuinrakennus U (Nepi)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: V Asuinrakennus V (Skutas)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: W Asuinrakennus W (Ebrdnnan)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.37/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE2_V150-6.0MWx37xHH225_20220207 + YV (Salo-Ylikoski)

Noise sensitive area: X Lomarakennus X (Dalbacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Y Asuinrakennus Y (Evist)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Z Asuinrakennus Z (Nabba)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: AA Asuinrakennus AA (Kronkvist)

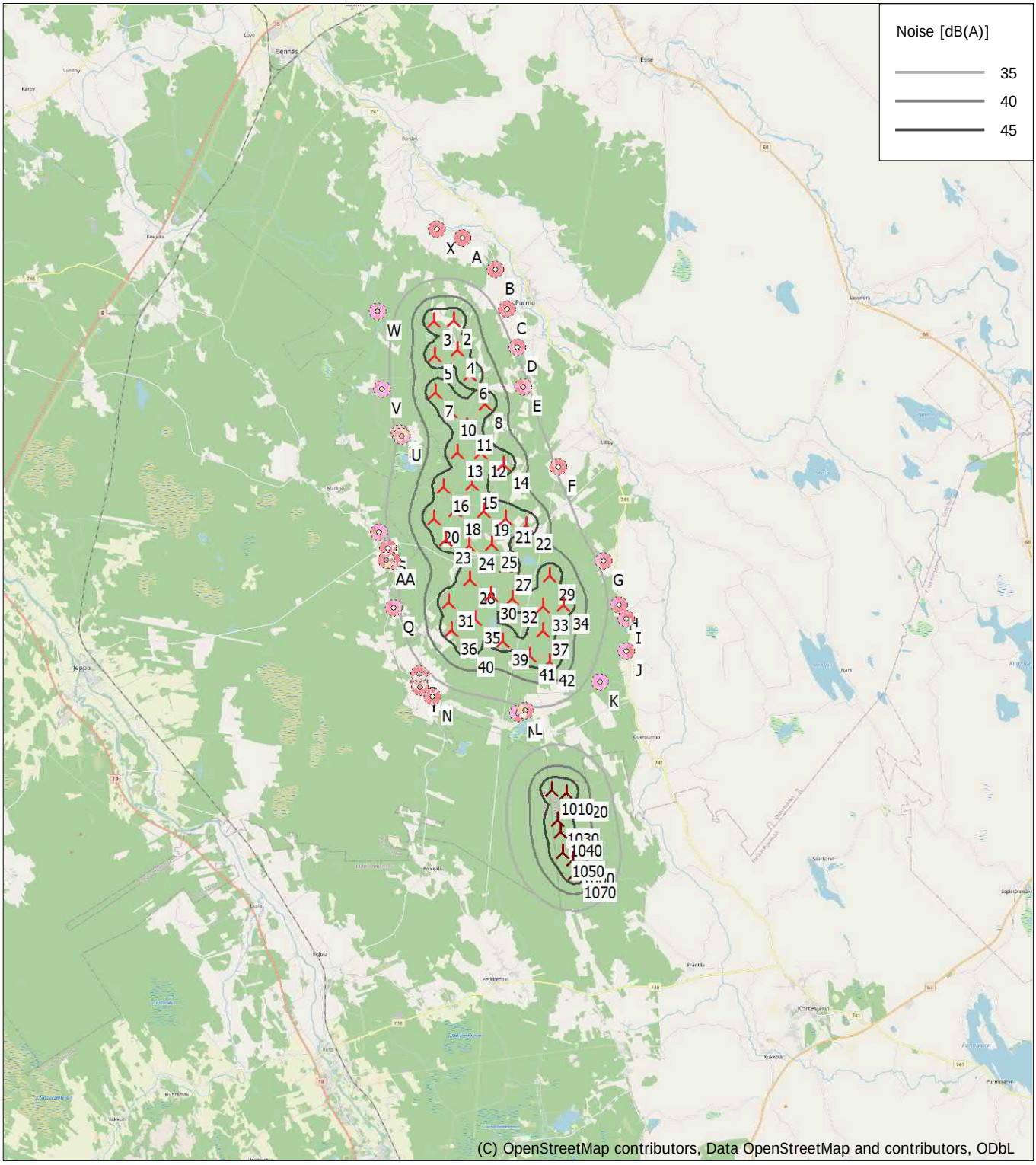
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.37/3.5.584

DECIBEL - Map 8,0 m/s

Calculation: Purmo VE2_V150-6.0MWx37xHH225_20220207 + YV (Salo-Ylikoski)



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 297 413 North: 7 039 822

New WTG Noise sensitive area

Noise calculation model: ISO 9613-2 Finland. Wind speed: 8,0 m/s
Height above sea level from active line object

Bilaga 4. Purmo vindkraftsprojekt - Resultat av modelleringen av spridningen av buller ISO 9613-2, YM 2 /2014 (ALT3) V150 – 6.0 MW tillsammans med Salo–Ylikoski-projektet.

Project:

Purmon tuulivoimahanke

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi

Calculated:

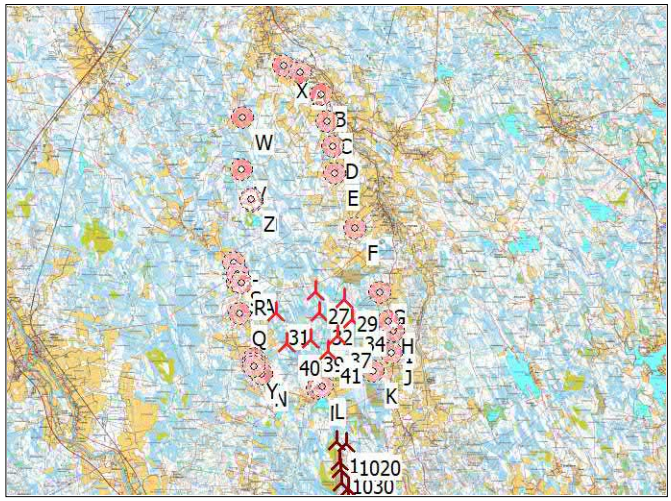
8.2.2023 14.38/3.5.584

DECIBEL - Main Result

Calculation: Purmo VE3_V150-6.0MWx9xHH225_20220207 + YV (Salo-Ylikoski)

Calculation is done according to Finnish guideline " Ympäristöhallinnon ohjeita 2 | 2014 " from the Ministry of the Environment of Finland

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000

New WTG Noise sensitive area

WTGs

	East	North	Z [m]	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Noise data Creator	Name	Wind speed [m/s]	LwA,ref [dB(A)]
27	297 642	7 040 813	45,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
29	299 163	7 040 378	48,1	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
31	295 591	7 039 696	41,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
32	297 843	7 039 671	47,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
34	299 581	7 039 334	53,6	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
37	298 820	7 038 484	53,1	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
39	297 381	7 038 242	47,5	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
40	296 154	7 038 055	45,0	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
41	298 289	7 037 664	50,4	VESTAS V150-6.0 HH225 600...	Yes	VESTAS	V150-6.0 HH225-6 000	6 000	150,0	225,0	USER	Level 0 - Measured - Mode PO6000 - 10-2020	8,0	107,7
1010	298 762	7 032 913	58,6	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1020	299 290	7 032 796	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1030	298 900	7 031 842	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1040	298 977	7 031 430	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1050	299 000	7 030 729	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1060	299 358	7 030 441	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4
1070	299 389	7 029 959	60,0	VESTAS V136-3.45 HH169 34...	Yes	VESTAS	V136-3.45 HH169-3 450	3 450	136,0	169,0	USER	Level 0- Calculated- Mode 0 - 11.02.2016	8,0	107,4

Calculation Results

Sound level

Noise sensitive area No.	Name	East	North	Z [m]	Immission height [m]	Demands Noise [dB(A)]	Sound level From WTGs [dB(A)]	Distance to noise demand [m]	2 dB penalty applied for one or more WTGs
A	Asuinrakennus A (Lillkvist)	296 866	7 052 328	26,8	4,0	40,0	12,8	10 867	No
B	Asuinrakennus B (Dallberga)	297 952	7 051 163	25,0	4,0	40,0	13,9	9 679	No
C	Asuinrakennus C (Tormbacka)	298 274	7 049 757	28,2	4,0	40,0	15,4	8 289	No
D	Asuinrakennus D (Kalltrdskvdgen)	298 556	7 048 421	35,5	4,0	40,0	16,9	6 984	No
E	Metsästysmaja E (Kejsarbacken)	298 663	7 047 017	33,8	4,0	40,0	18,9	5 610	No
F	Lomarakennus F (Kdllbacken)	299 710	7 044 165	37,5	4,0	40,0	24,5	3 125	No
G	Asuinrakennus G (Kornjdrv)	301 071	7 040 772	55,0	4,0	40,0	31,8	1 206	No
H	Asuinrakennus H (Sandnabba)	301 519	7 039 228	51,6	4,0	40,0	31,3	1 234	No
I	Asuinrakennus I (Asp)	301 749	7 038 736	55,0	4,0	40,0	30,0	1 540	No
J	Asuinrakennus J (Stennabba)	301 661	7 037 581	55,0	4,0	40,0	29,2	1 987	No
K	Asuinrakennus K (Lengnabba)	300 689	7 036 583	55,0	4,0	40,0	30,5	1 819	No
L	Lomarakennus L (Evistvdgen)	298 031	7 035 773	52,3	4,0	40,0	32,9	1 186	No
M	Asuinrakennus M (Stenbacka)	297 753	7 035 671	53,9	4,0	40,0	32,5	1 335	No
N	Asuinrakennus N (Adler)	294 812	7 036 441	44,0	4,0	40,0	30,2	1 430	No
O	Asuinrakennus O (Evistvdgen)	294 394	7 036 982	41,2	4,0	40,0	30,2	1 396	No
P	Asuinrakennus P (Finnabbavdgen)	294 415	7 037 260	40,0	4,0	40,0	30,9	1 241	No
Q	Asuinrakennus Q (Dalabacka)	293 652	7 039 610	40,2	4,0	40,0	30,0	1 294	No
R	Asuinrakennus R (Kronkvist)	293 736	7 041 267	32,5	4,0	40,0	27,7	1 790	No
S	Asuinrakennus S (Tallbacka)	293 575	7 041 715	32,2	4,0	40,0	26,2	2 210	No
T	Asuinrakennus T (Norrgerd)	293 326	7 042 304	30,9	4,0	40,0	24,4	2 812	No

To be continued on next page...

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Main Result

Calculation: Purmo VE3_V150-6.0MWx9xHH225_20220207 + YV (Salo-Ylikoski)

...continued from previous page

Noise sensitive area

No.	Name	East	North	Z	Immission height	Demands Noise	Sound level From WTGs	Distance to noise demand	2 dB penalty applied for one or more WTGs
				[m]	[m]	[dB(A)]	[dB(A)]	[m]	
U	Asuinrakennus U (Nepi)	294 326	7 045 578	35,0	4,0	40,0	19,9	5 133	No
V	Asuinrakennus V (Skutas)	293 741	7 047 247	32,3	4,0	40,0	17,2	6 851	No
W	Asuinrakennus W (Ebrdnnan)	293 782	7 049 981	22,5	4,0	40,0	14,4	9 277	No
X	Lomarakennus X (Dalbacka)	296 008	7 052 686	21,2	4,0	40,0	12,5	11 312	No
Y	Asuinrakennus Y (Evist)	294 403	7 036 830	41,9	4,0	40,0	29,9	1 469	No
Z	Asuinrakennus Z (Nabba)	294 257	7 045 675	35,0	4,0	40,0	19,7	5 252	No
AA	Asuinrakennus AA (Kronkvist)	293 533	7 041 290	31,7	4,0	40,0	27,0	1 962	No

Distances (m)

	WTG															
NSA	27	29	31	32	34	37	39	40	41	1010	1020	1030	1040	1050	1060	1070
A	11536	12164	12692	12690	13269	13976	14090	14286	14727	19500	19674	20579	20996	21696	22020	22502
B	10350	10849	11703	11488	11936	12704	12928	13226	13498	18261	18409	19337	19752	20453	20762	21245
C	8962	9417	10409	10092	10501	11282	11545	11888	12089	16845	16985	17919	18334	19035	19339	19822
D	7659	8063	9212	8776	9141	9936	10242	10637	10757	15503	15636	16576	16990	17691	17991	18474
E	6285	6655	7937	7389	7735	8531	8865	9304	9357	14099	14229	15171	15584	16285	16584	17067
F	3937	3825	6076	4865	4831	5748	6362	7067	6652	11288	11373	12345	12751	13450	13723	14204
G	3428	1947	5583	3409	2070	3208	4472	5616	4170	8188	8169	9187	9570	10251	10468	10939
H	4187	2620	5944	3701	1940	2798	4252	5490	3588	6888	6805	7834	8199	8861	9046	9507
I	4601	3062	6230	4015	2248	2938	4394	5635	3621	6542	6427	7457	7811	8463	8630	9085
J	5156	3749	6425	4351	2719	2980	4329	5526	3372	5493	5338	6366	6709	7348	7499	7951
K	5212	4089	5971	4198	2965	2665	3700	4766	2631	4144	4036	5065	5428	6091	6282	6748
L	5054	4741	4618	3901	3883	2823	2552	2954	1907	2951	3231	4024	4443	5134	5493	5968
M	5142	4912	4567	3999	4093	3008	2597	2869	2063	2936	3259	3996	4412	5095	5469	5939
N	5206	5866	3345	4427	5576	4497	3136	2098	3684	5294	5772	6151	6513	7080	7525	7932
O	5021	5853	2965	4371	5694	4673	3240	2060	3953	5967	6439	6833	7196	7763	8208	8615
P	4798	5679	2704	4189	5565	4571	3123	1911	3893	6145	6607	7031	7400	7977	8419	8831
Q	4166	5563	1940	4190	5934	5287	3970	2944	5027	8421	8841	9371	9757	10363	10795	11223
R	3930	5498	2430	4405	6154	5794	4735	4019	5804	9745	10125	10743	11142	11775	12194	12637
S	4164	5744	2852	4730	6459	6158	5150	4476	6213	10213	10589	11213	11613	12248	12666	13110
T	4564	6144	3453	5226	6922	6689	5737	5102	6792	10847	11219	11850	12250	12886	13303	13748
U	5802	7099	6014	6872	8158	8394	7943	7739	8848	13414	13707	14472	14887	15561	15945	16413
V	7521	8748	7772	8612	9831	10124	9709	9500	10603	15182	15474	16239	16655	17328	17713	18180
W	9943	11004	10439	11077	12119	12547	12273	12155	13111	17773	18039	18840	19257	19939	20312	20784
X	11980	12701	12992	13139	13816	14472	14503	14626	15189	19956	20151	21036	21454	22151	22487	22968
Y	5132	5935	3101	4460	5750	4715	3294	2135	3973	5858	6334	6713	7074	7636	8082	8486
Z	5921	7217	6124	6991	8277	8513	8059	7850	8965	13528	13822	14586	15001	15674	16059	16526
AA	4135	5702	2602	4602	6354	5983	4907	4162	5978	9871	10257	10862	11259	11887	12309	12750

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE3_V150-6.0MWx9xHH225_20220207 + YV (Salo-Ylikoski)

Noise calculation model:
ISO 9613-2 Finland
Wind speed (in 10 m height):
8,0 m/s
Ground attenuation:
General, terrain specific
Ground factor for porous ground: 0,4
Area object with hard ground: Area object (vesistöt): (14)
Area type with hard ground: Vesistöt
Ground factor for hard ground: 0,0
Meteorological coefficient, C0:
0,0 dB
Type of demand in calculation:
1: WTG noise is compared to demand (DK, DE, SE, NL etc.)
Noise values in calculation:
All noise values are mean values (Lwa) (Normal)
Pure tones:
Pure tones penalty is added to total noise impact at receptors
Noise sensitive area
Height above ground level, when no value in NSA object:
4,0 m; Don't allow override of model height with height from NSA object
Uncertainty margin:
0,0 dB; Uncertainty margin in NSA has priority
Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:
0,0 dB(A)
Octave data required
Frequency dependent air absorption

63	125	250	500	1 000	2 000	4 000	8 000
[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]
0,10	0,38	1,12	2,36	4,08	8,78	26,60	95,00

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89

WTG: VESTAS V150-6.0 HH225 6000 150.0 !O!
Noise: Level 0 - Measured - Mode PO6000 - 10-2020

Source	Source/Date	Creator	Edited
Manufacturer	13.10.2020	USER	13.10.2022 14.09

Blades with serrated trailing edge.
Document nr. 0098-0749 V01.

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	225,0	8,0	107,7	No	86,1	94,8	100,4	102,8	102,2	98,4	91,6	81,5

WTG: VESTAS V136-3.45 HH169 3450 136.0 !O!
Noise: Level 0- Calculated- Mode 0 - 11.02.2016

Source	Source/Date	Creator	Edited
HH: Vestas; 10 m: calculated by EMD	13.7.2016	USER	23.1.2023 16.21

Document no.: DMS 0053-3713 V02
Blades with serrated trailing edge.
Hub height wind speed noise data from Vestas. Wind speed at hub height is converted to 10 m height using the IEC 61400-11 wind profile (5 cm roughness). Noise levels are interpolated at integer wind speeds.

					Octave data							
Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]
From Windcat	169,0	8,0	107,4	No	93,1	99,8	97,4	100,6	102,1	99,3	92,8	75,3

Noise sensitive area: A Asuinrakennus A (Lillkvist)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE3_V150-6.0MWx9xHH225_20220207 + YV (Salo-Ylikoski)

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: B Asuinrakennus B (Dallberga)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: C Asuinrakennus C (Tormbacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: D Asuinrakennus D (Kalltrdskvdgen)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: E Metsästysmaja E (Kejsarbacken)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: F Lomarakennus F (Kdllbacken)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: G Asuinrakennus G (Kornjdrv)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: H Asuinrakennus H (Sandnabba)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE3_V150-6.0MWx9xHH225_20220207 + YV (Salo-Ylikoski)

Noise sensitive area: I Asuinrakennus I (Asp)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: J Asuinrakennus J (Stennabba)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: K Asuinrakennus K (Lengnabba)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: L Lomarakennus L (Evistvdgen)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: M Asuinrakennus M (Stenbacka)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: N Asuinrakennus N (Adler)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: O Asuinrakennus O (Evistvdgen)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: P Asuinrakennus P (Finnabbavdgen)
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE3_V150-6.0MWx9xHH225_20220207 + YV (Salo-Ylikoski)

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Q Asuinrakennus Q (Dalabacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: R Asuinrakennus R (Kronkvist)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: S Asuinrakennus S (Tallbacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: T Asuinrakennus T (Norrgerd)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: U Asuinrakennus U (Nepi)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: V Asuinrakennus V (Skutas)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: W Asuinrakennus W (Ebrdnnan)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Assumptions for noise calculation

Calculation: Purmo VE3_V150-6.0MWx9xHH225_20220207 + YV (Salo-Ylikoski)

Noise sensitive area: X Lomarakennus X (Dalbacka)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Y Asuinrakennus Y (Evist)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: Z Asuinrakennus Z (Nabba)

Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Noise sensitive area: AA Asuinrakennus AA (Kronkvist)

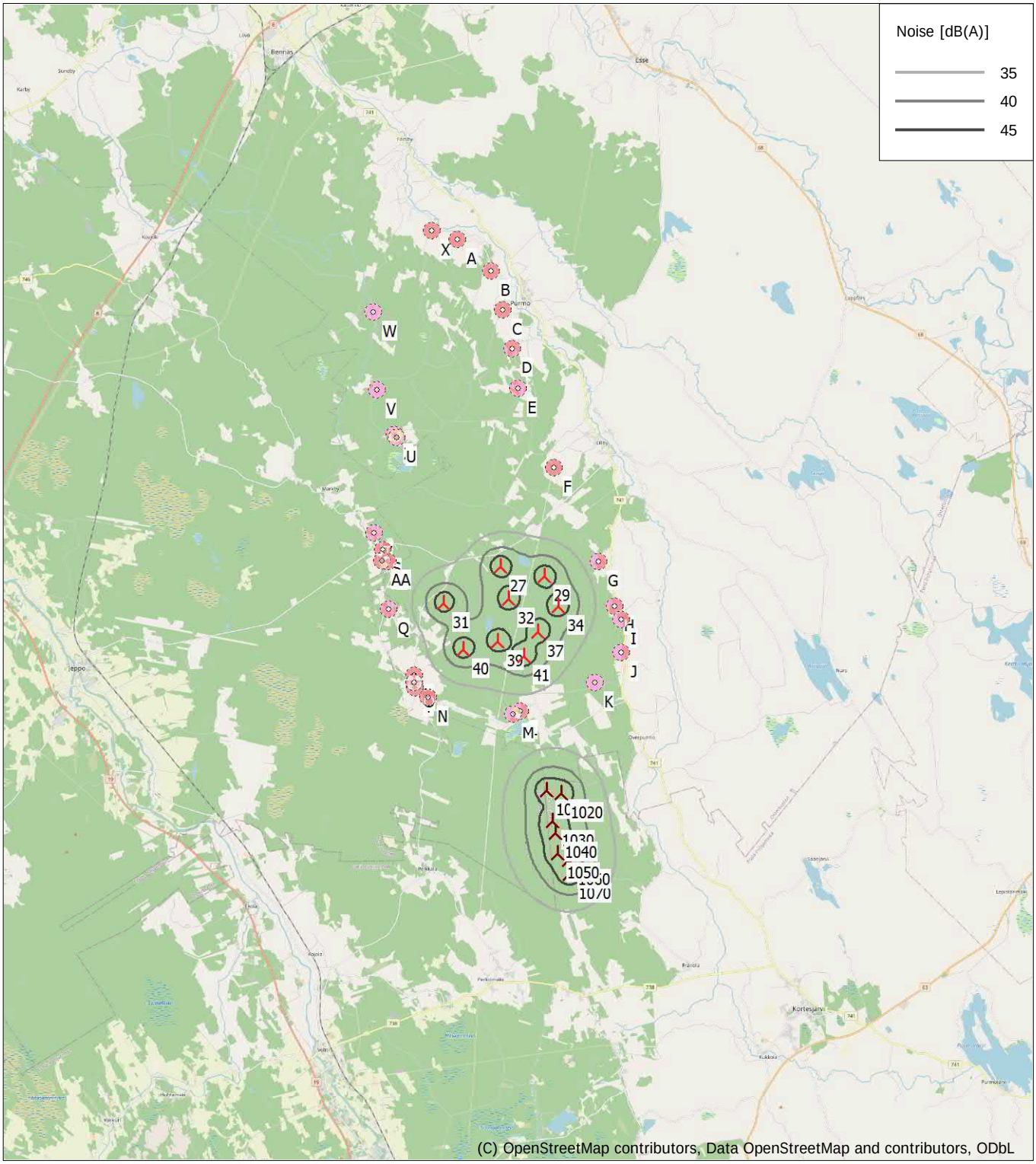
Predefined calculation standard:
Immission height(a.g.l.): Use standard value from calculation model
Uncertainty margin: Use default value from calculation model

Noise demand: 40,0 dB(A)
No distance demand
Pure tone penalty: 0 dB

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 14.38/3.5.584

DECIBEL - Map 8,0 m/s

Calculation: Purmo VE3_V150-6.0MWx9xHH225_20220207 + YV (Salo-Ylikoski)



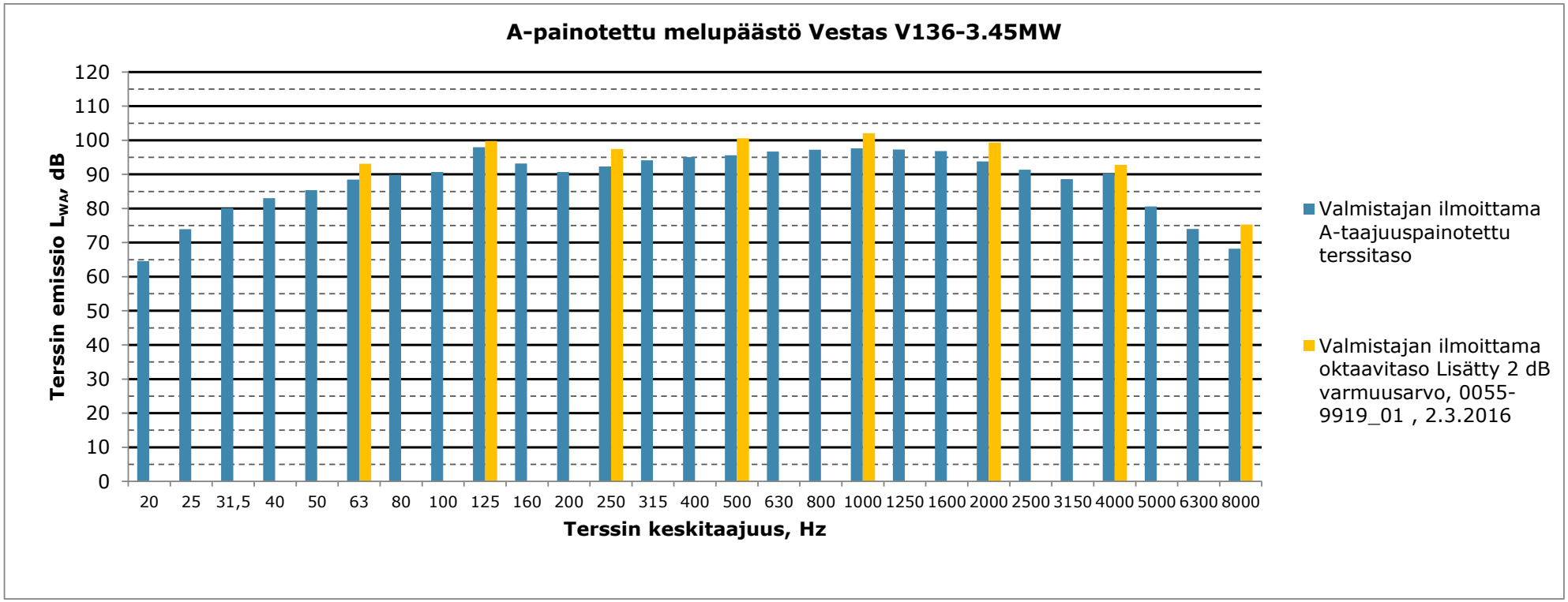
0 2,5 5 7,5 10km

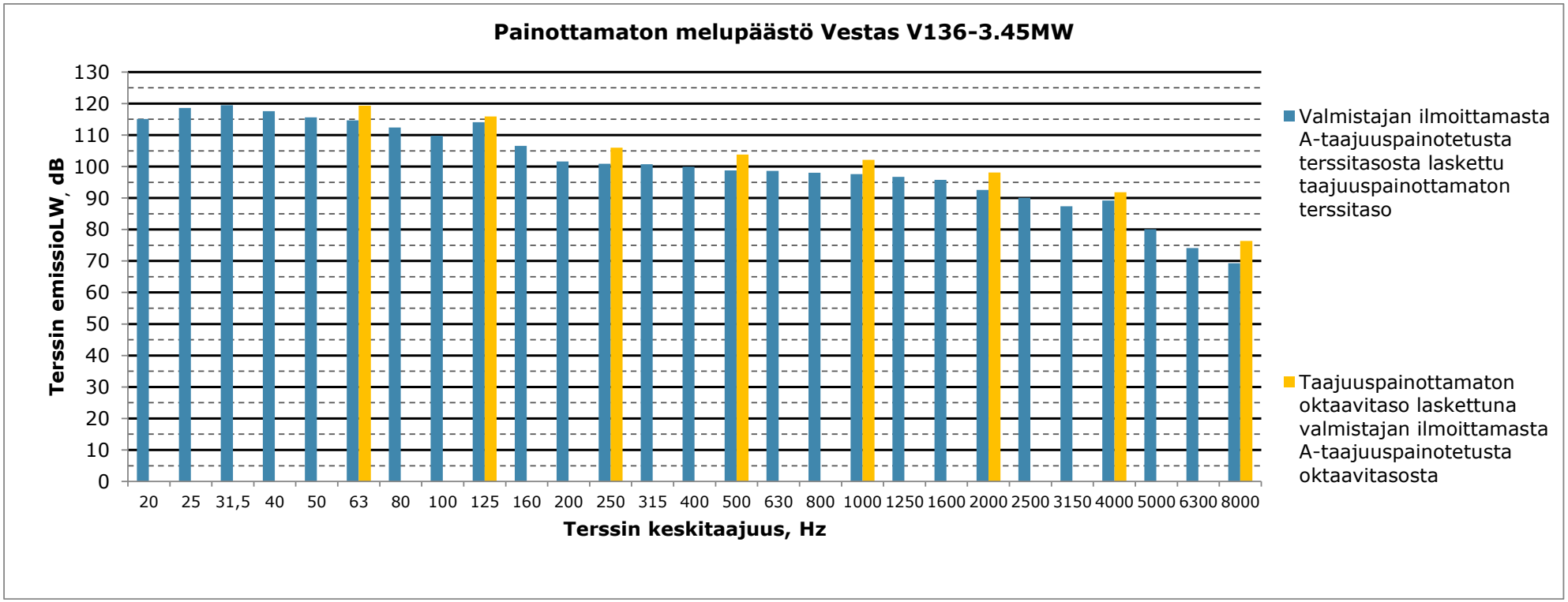
Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 297 586 North: 7 039 822

New WTG Noise sensitive area

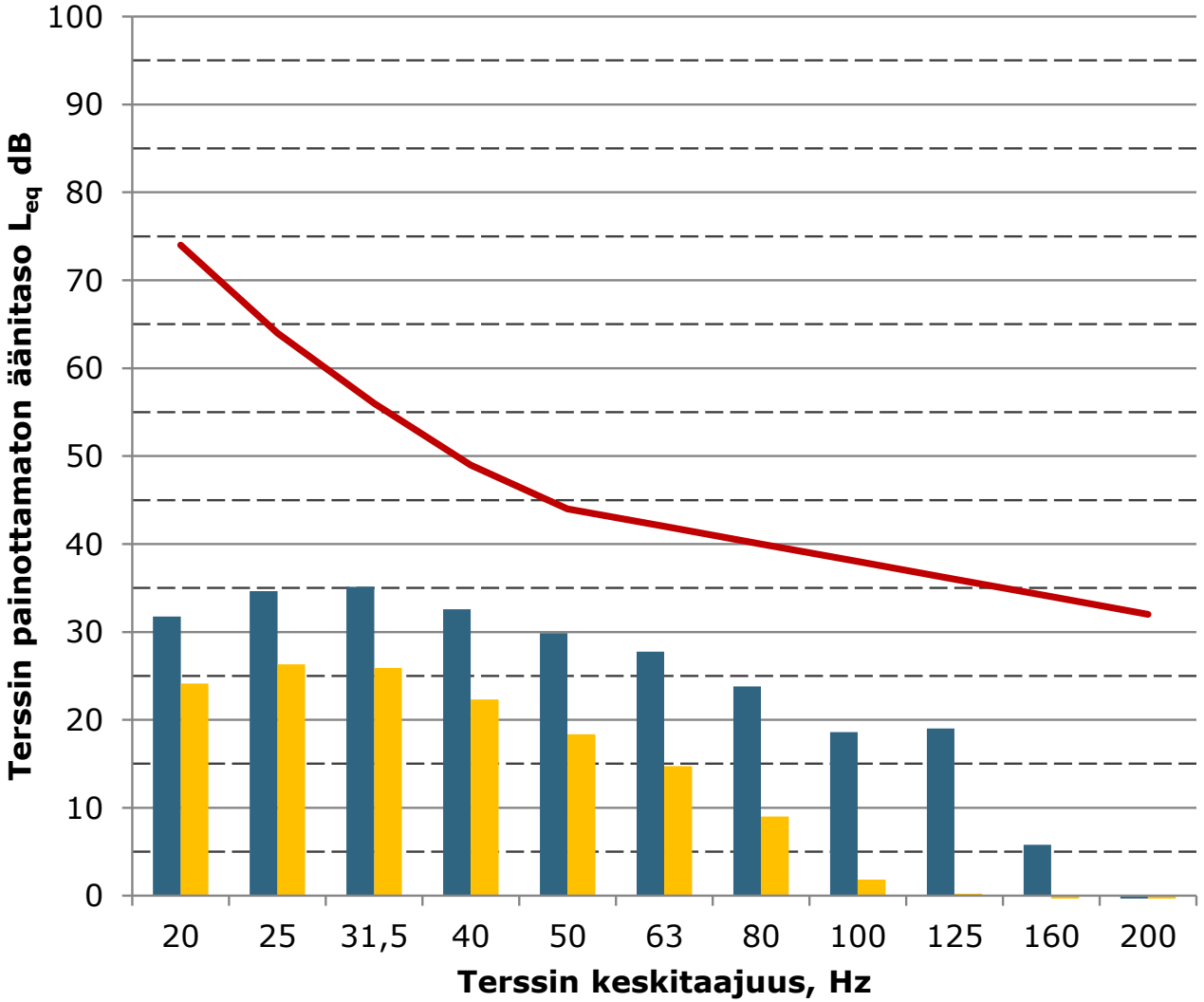
Noise calculation model: ISO 9613-2 Finland. Wind speed: 8,0 m/s
Height above sea level from active line object

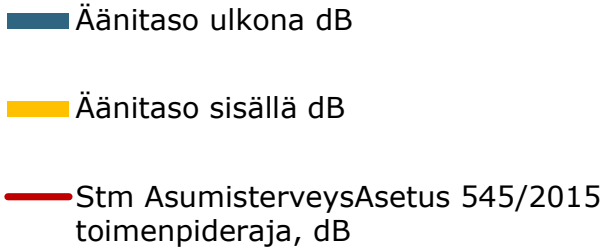
Bilaga 5. Purmo vindkraftspark i nuläget. Värden för lågfrekvent buller vid olika byggnader.


A-painotettu melupäästö Vestas V136-3.45MW
Terssin emissio L_{WA} dB
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittama A-taajuuspainotettu terssitaso
Valmistajan ilmoittama oktaavitaso Lisätty 2 dB varmuusarvo, 0055-9919_01 , 2.3.2016


Painottamaton melupäästö Vestas V136-3.45MW
Terssin emissioLW, dB
130
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittamasta A-taajuuspainotetusta terssitasosta laskettu taajuuspainottamaton terssitaso
Taajuuspainottamaton oktaavitaso laskettuna valmistajan ilmoittamasta A-taajuuspainotetusta oktaavitasosta

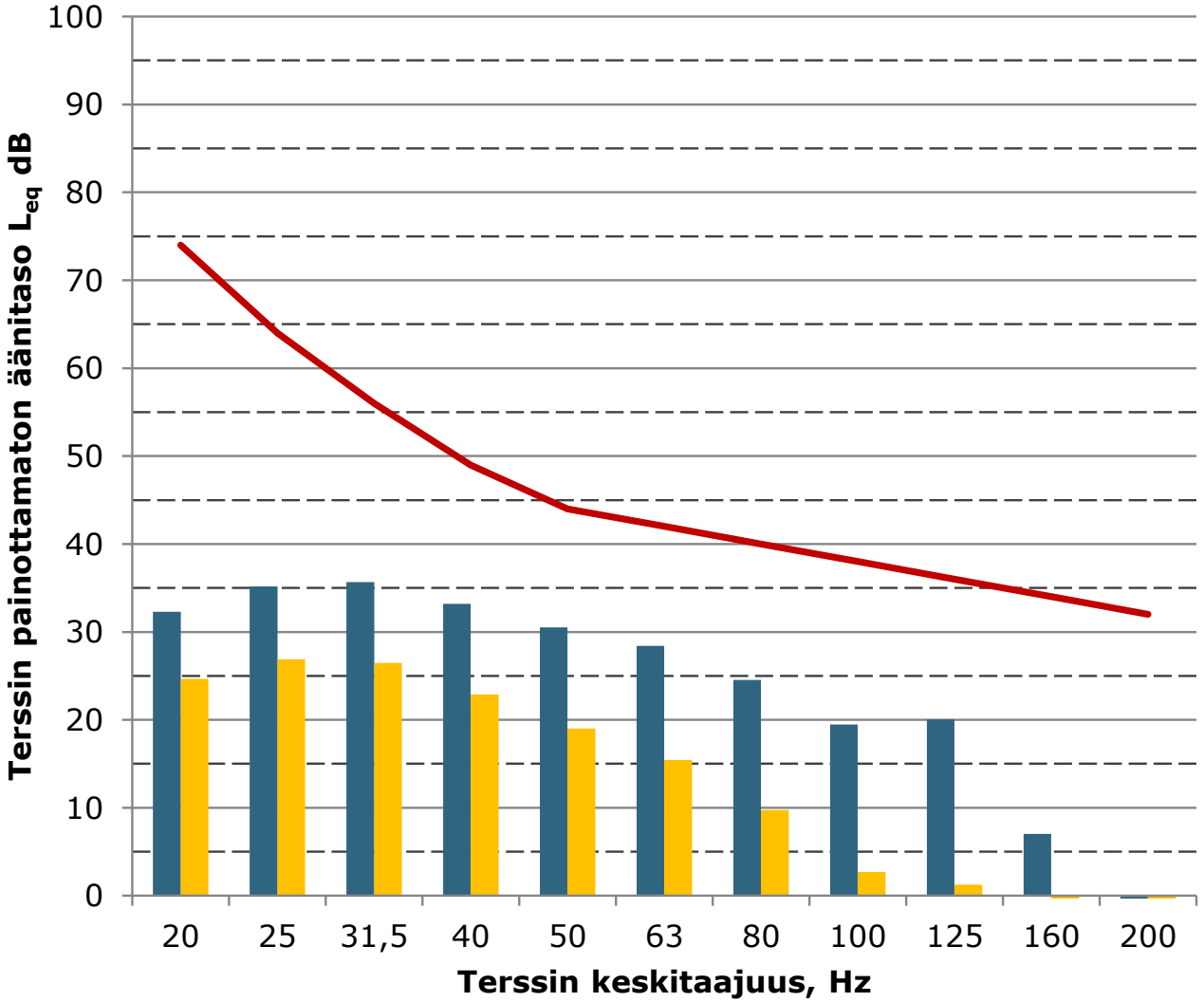
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus A (Lillkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

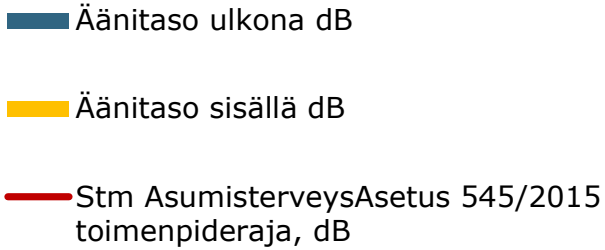




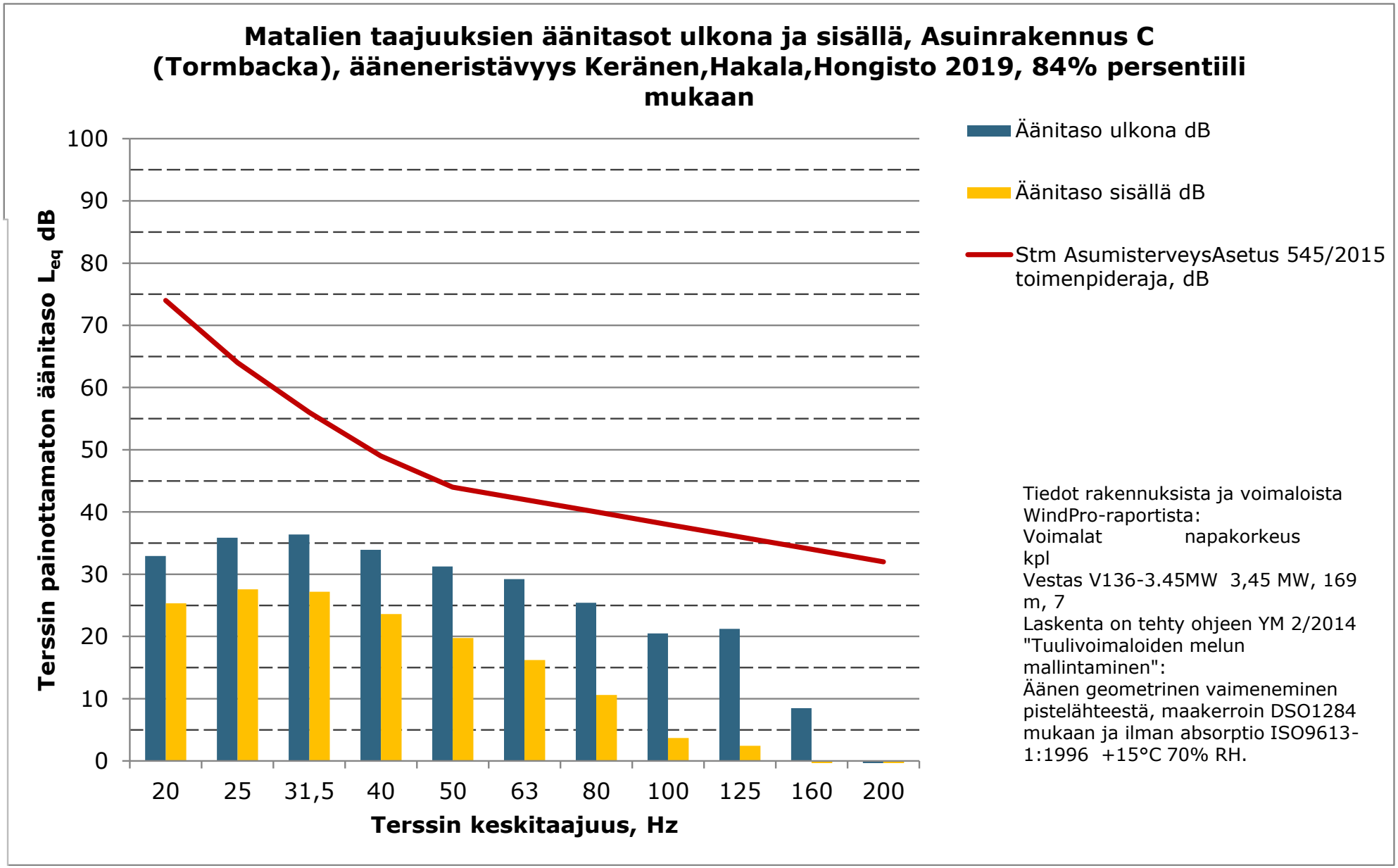
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus B (Dallberga), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

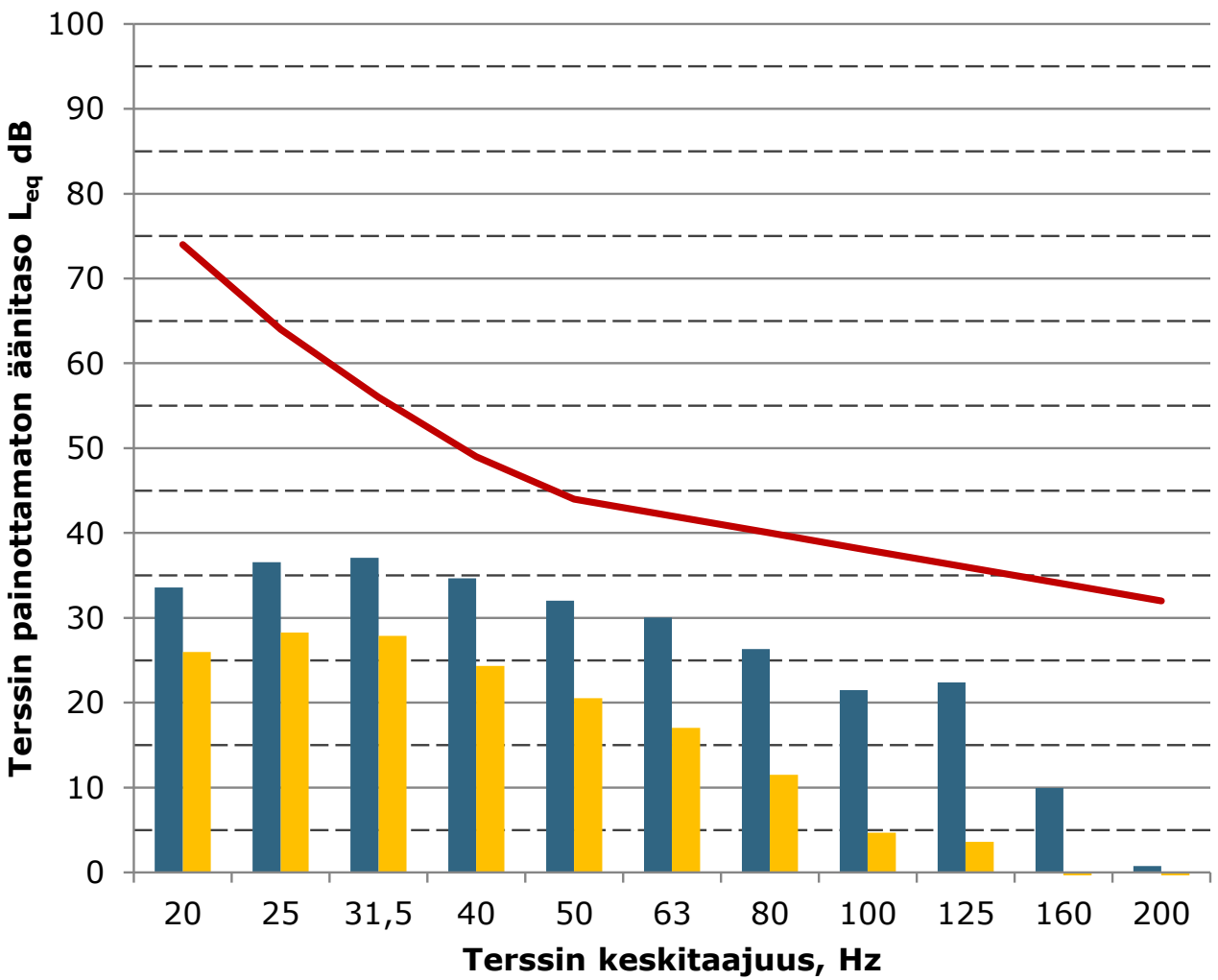


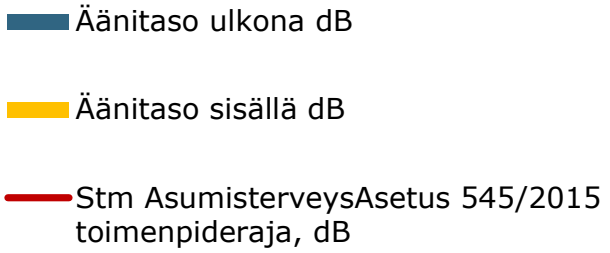


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus C (Tormbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

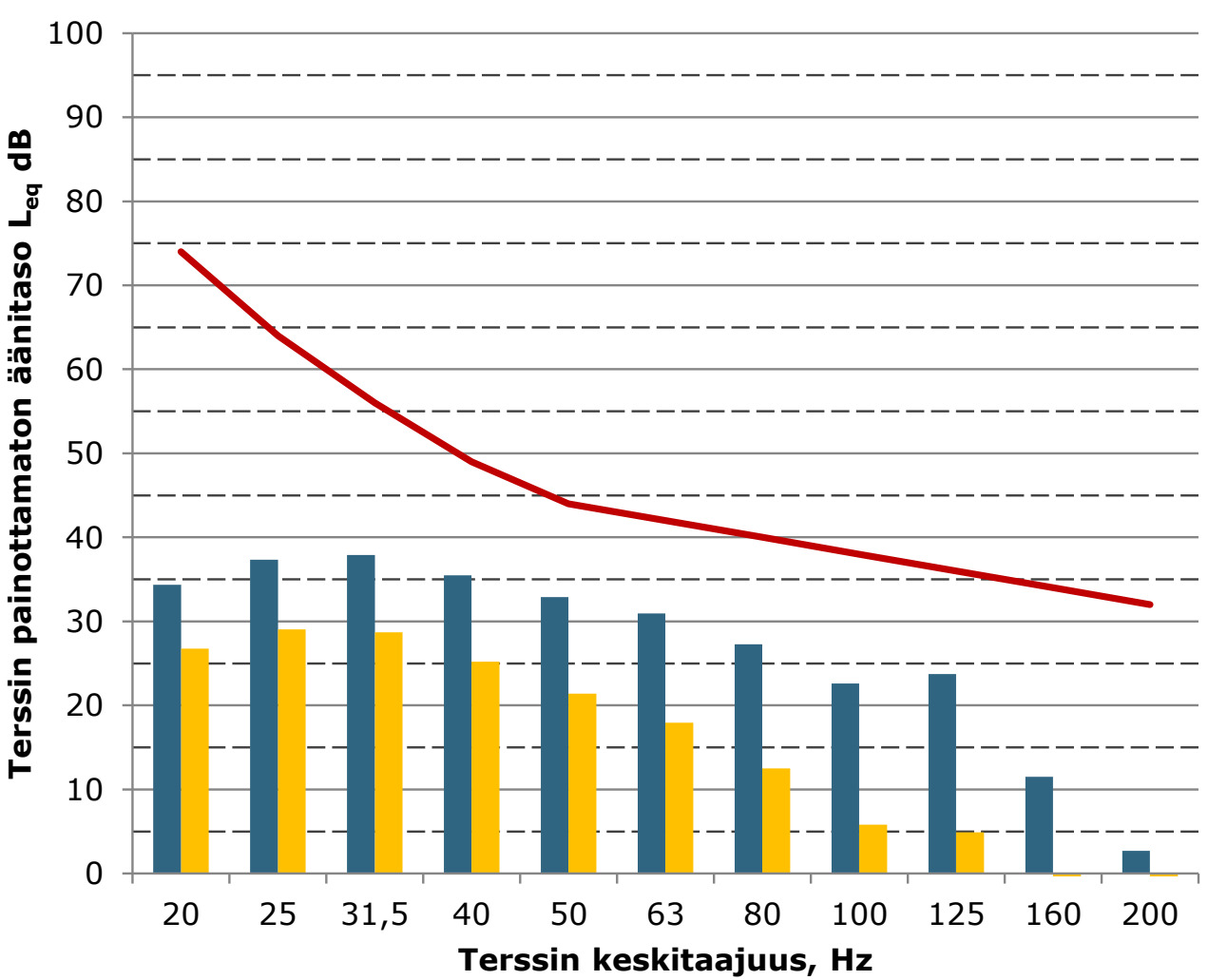
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus D (Kalltrdskvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Metsästysmaja E (Kejsarbacken), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



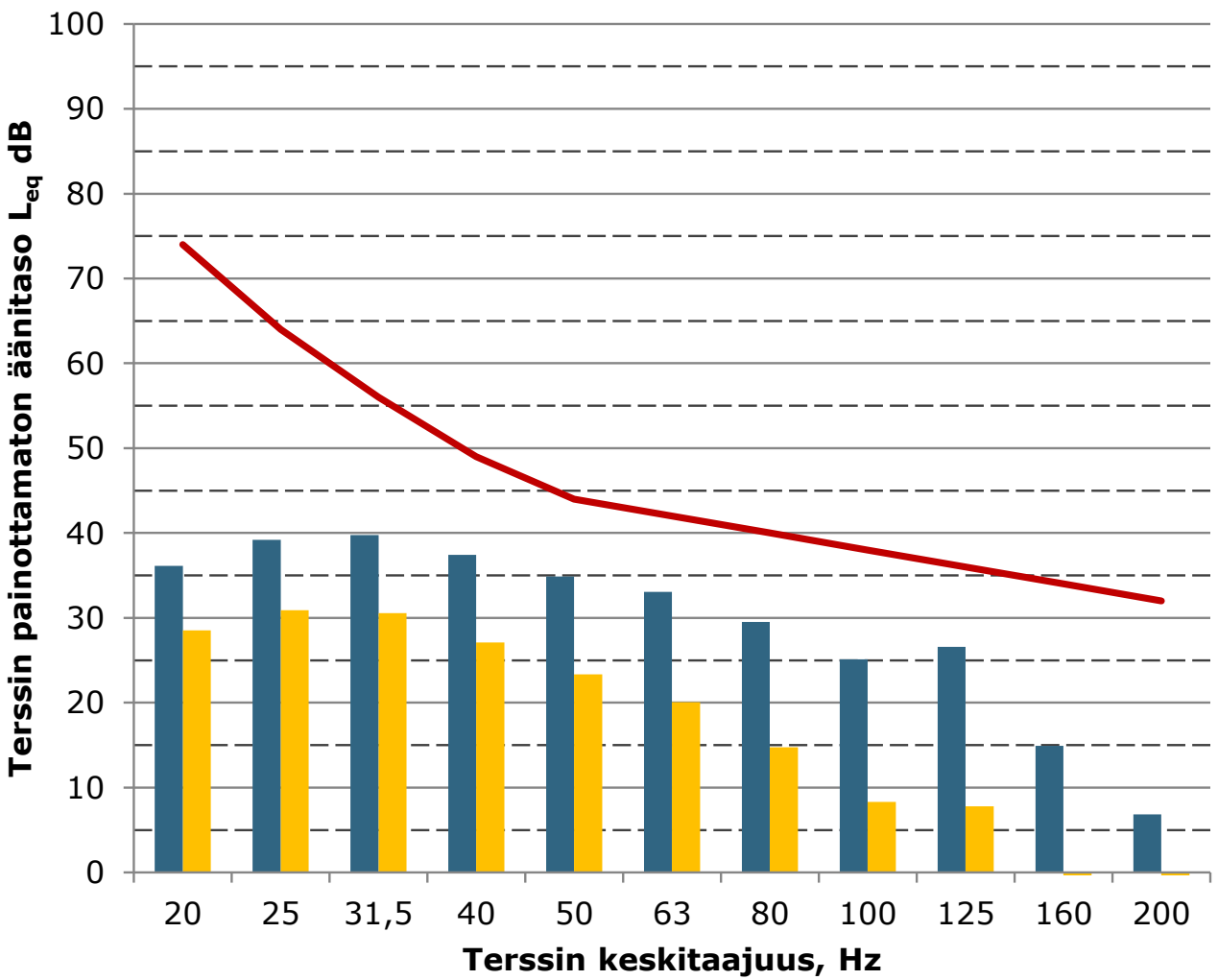
Äänitaso ulkona dB

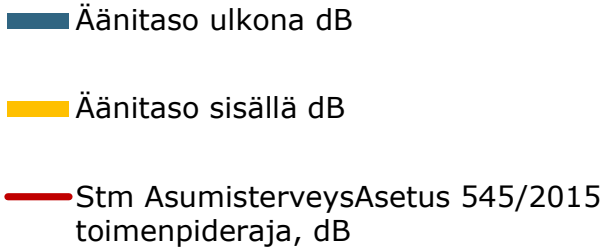
Äänitaso sisällä dB

Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

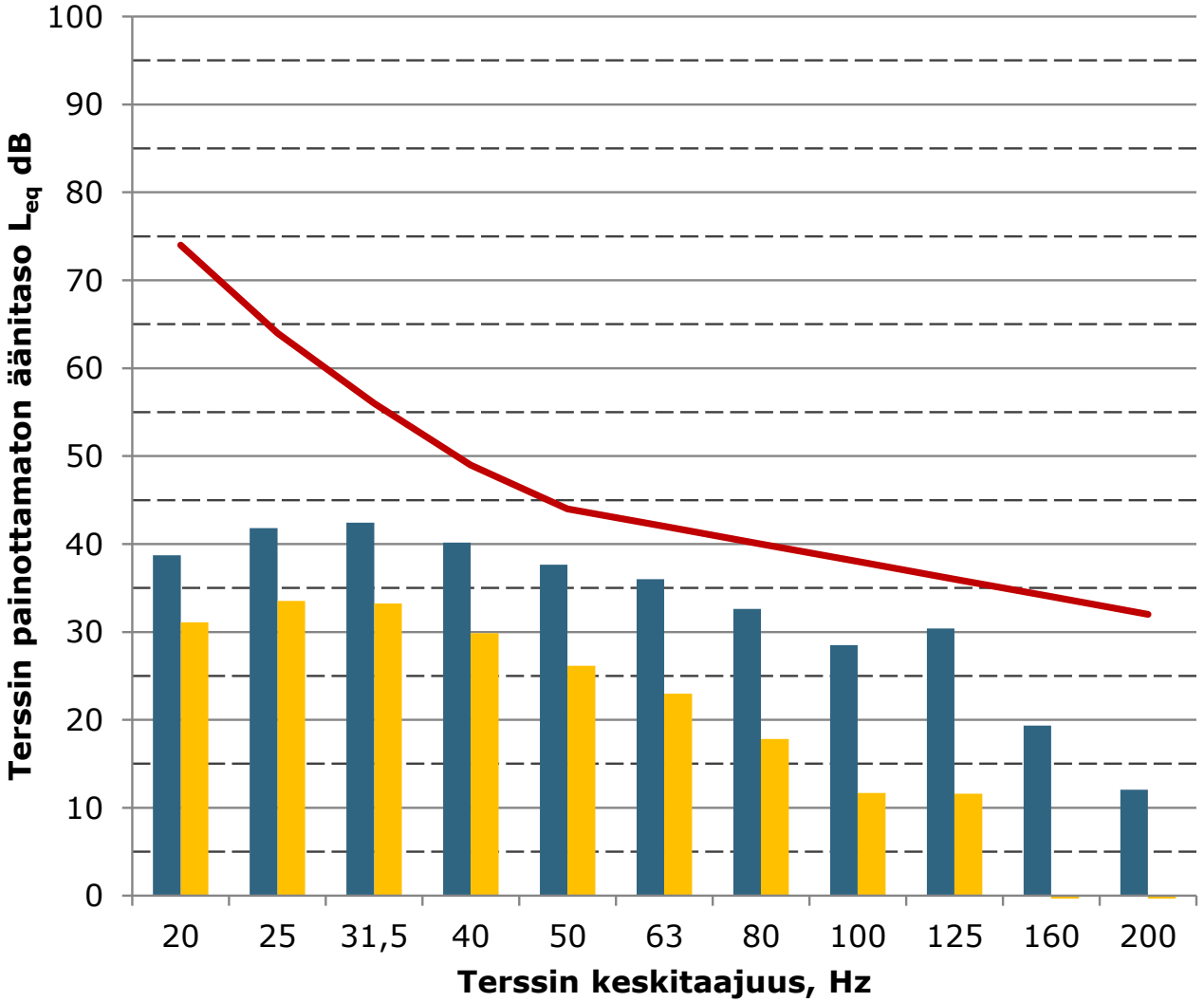
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus F (Kdllbacken), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus G (Kornjdrv), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



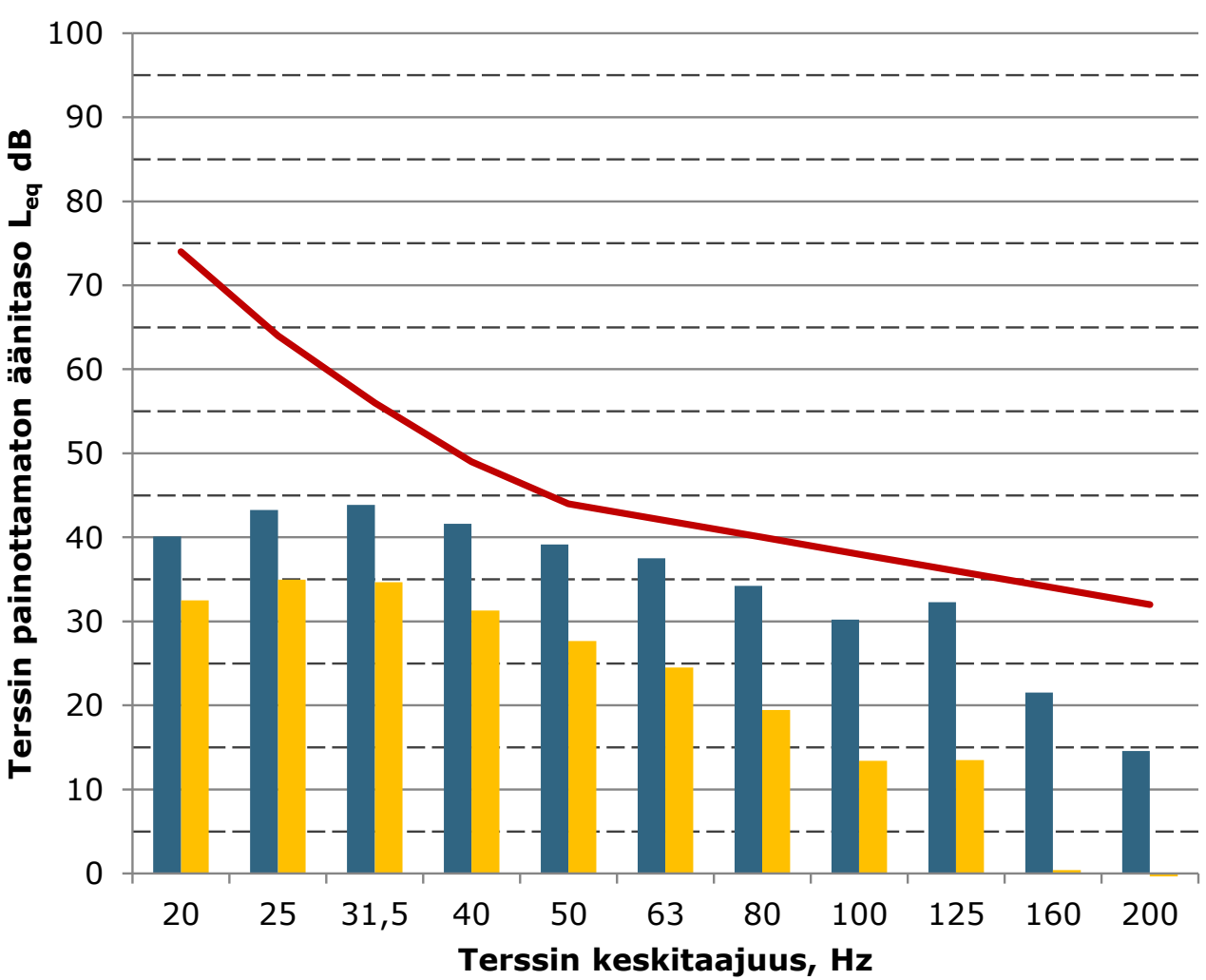
Äänitaso ulkona dB

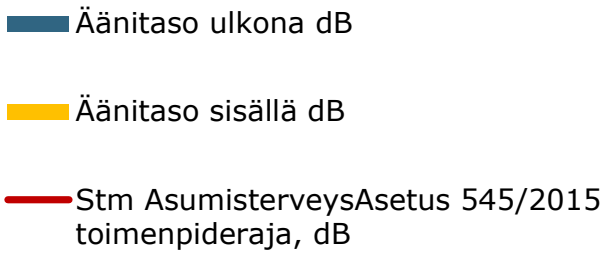
Äänitaso sisällä dB

Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

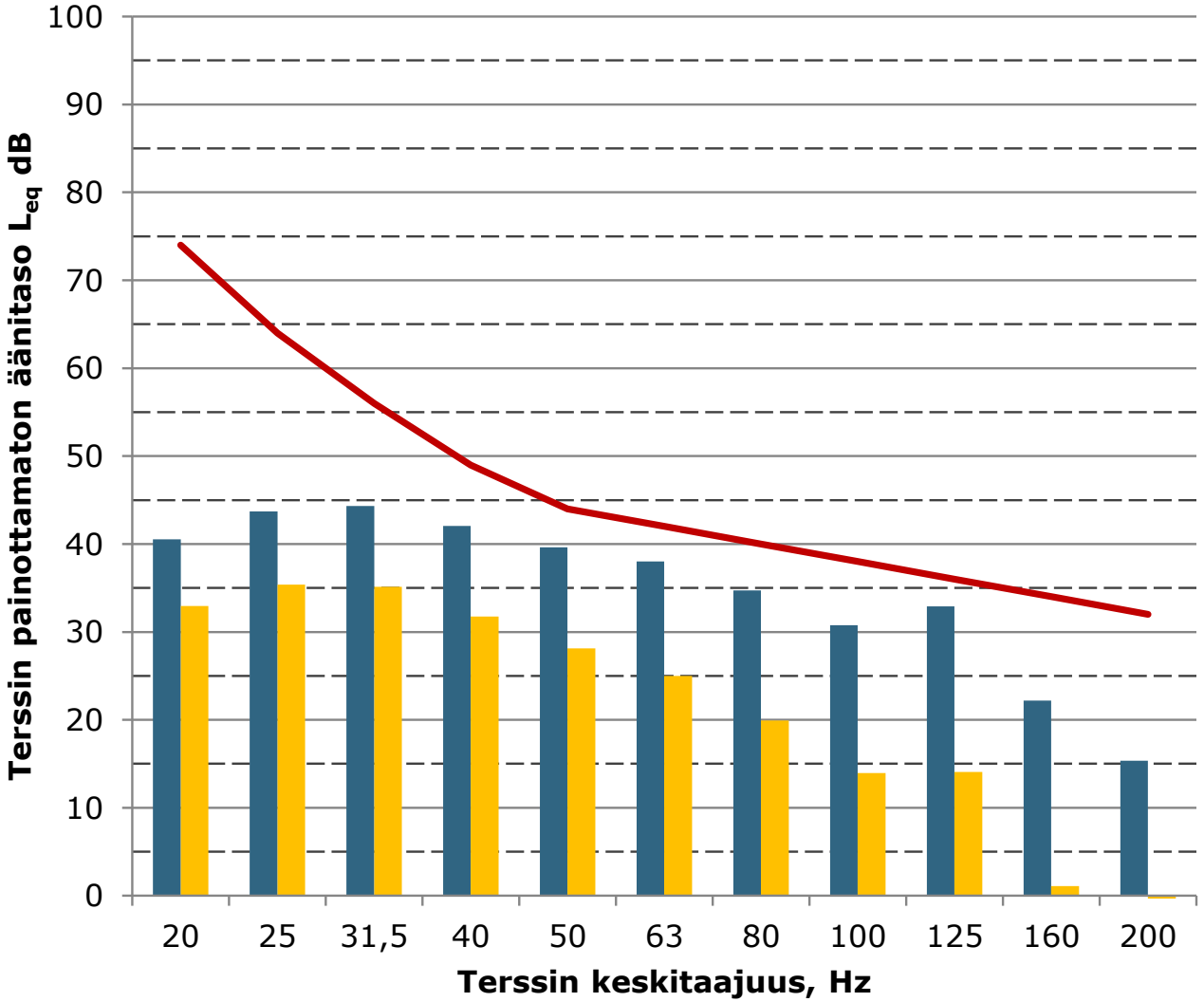
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus H (Sandnabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

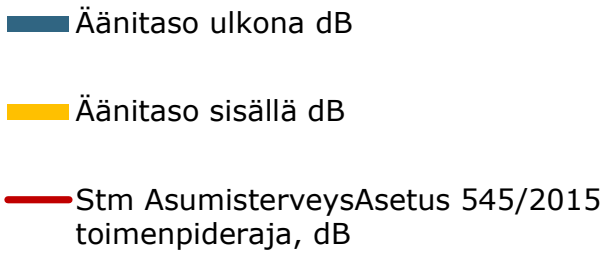




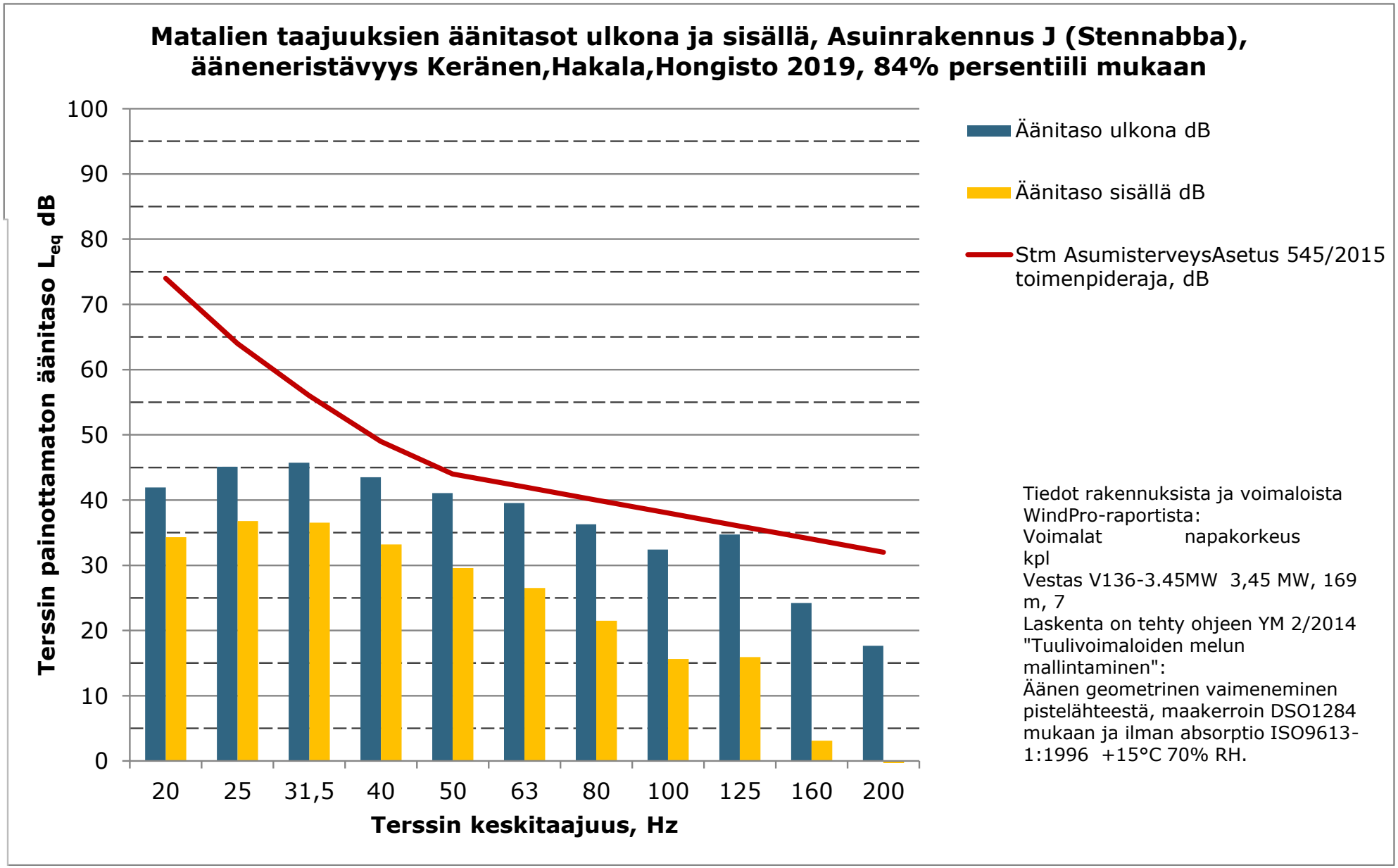
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus I (Asp), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

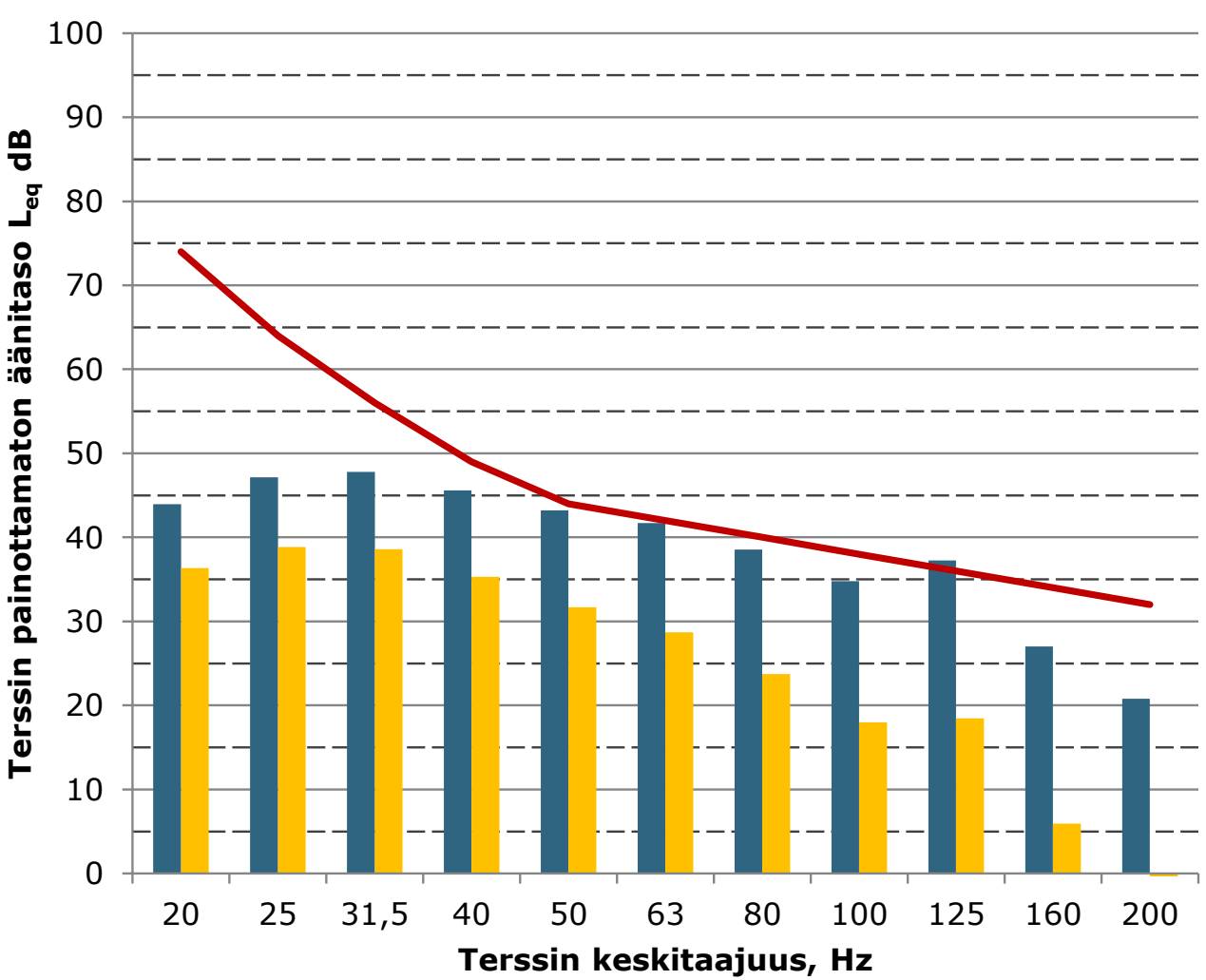


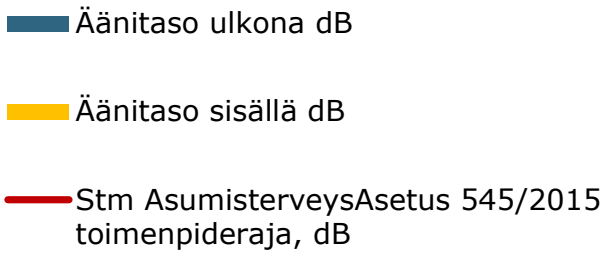


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus J (Stennabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

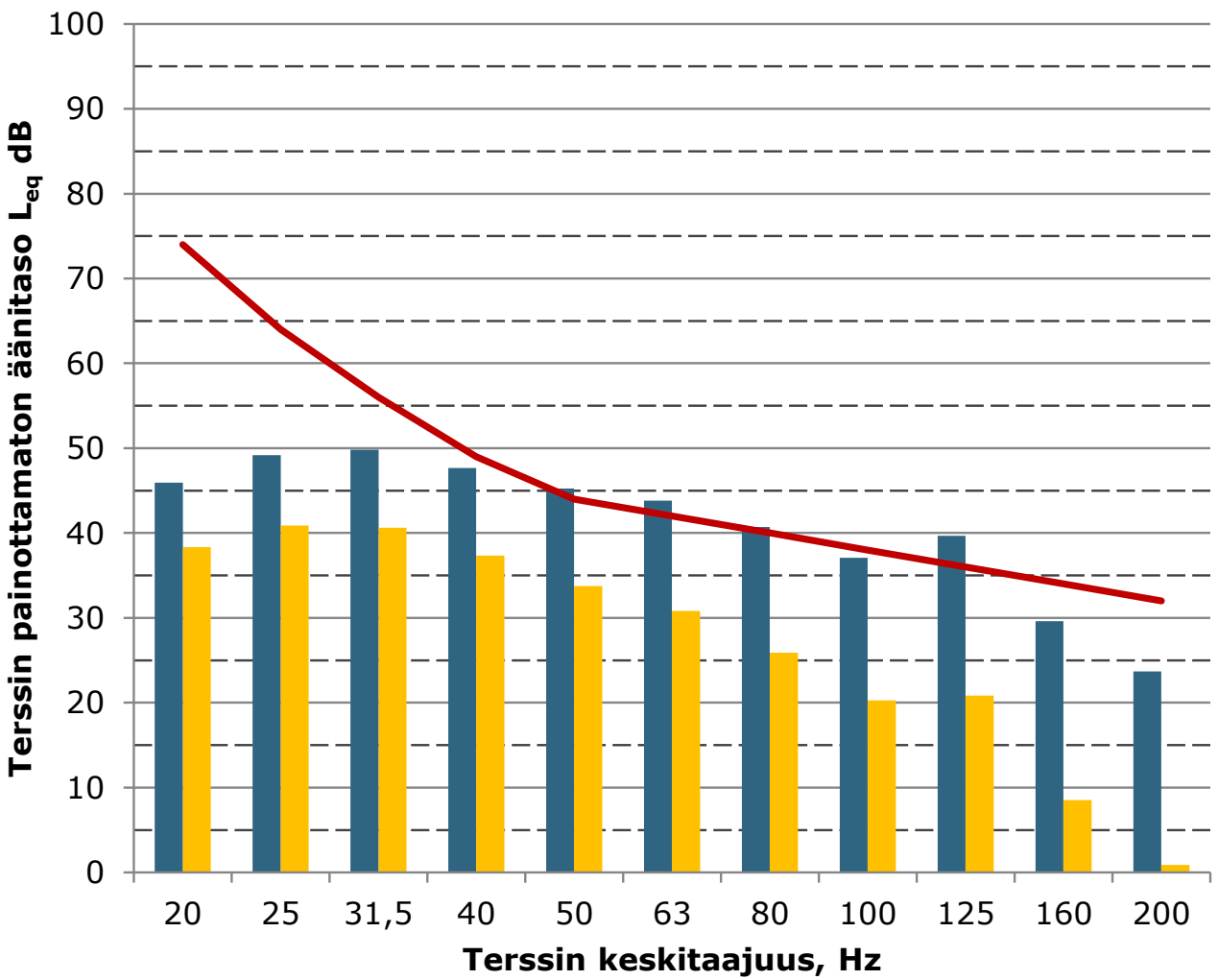
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus K (Lengnabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

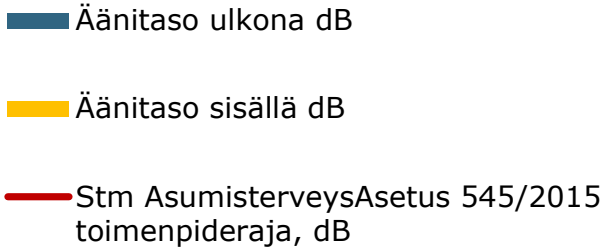




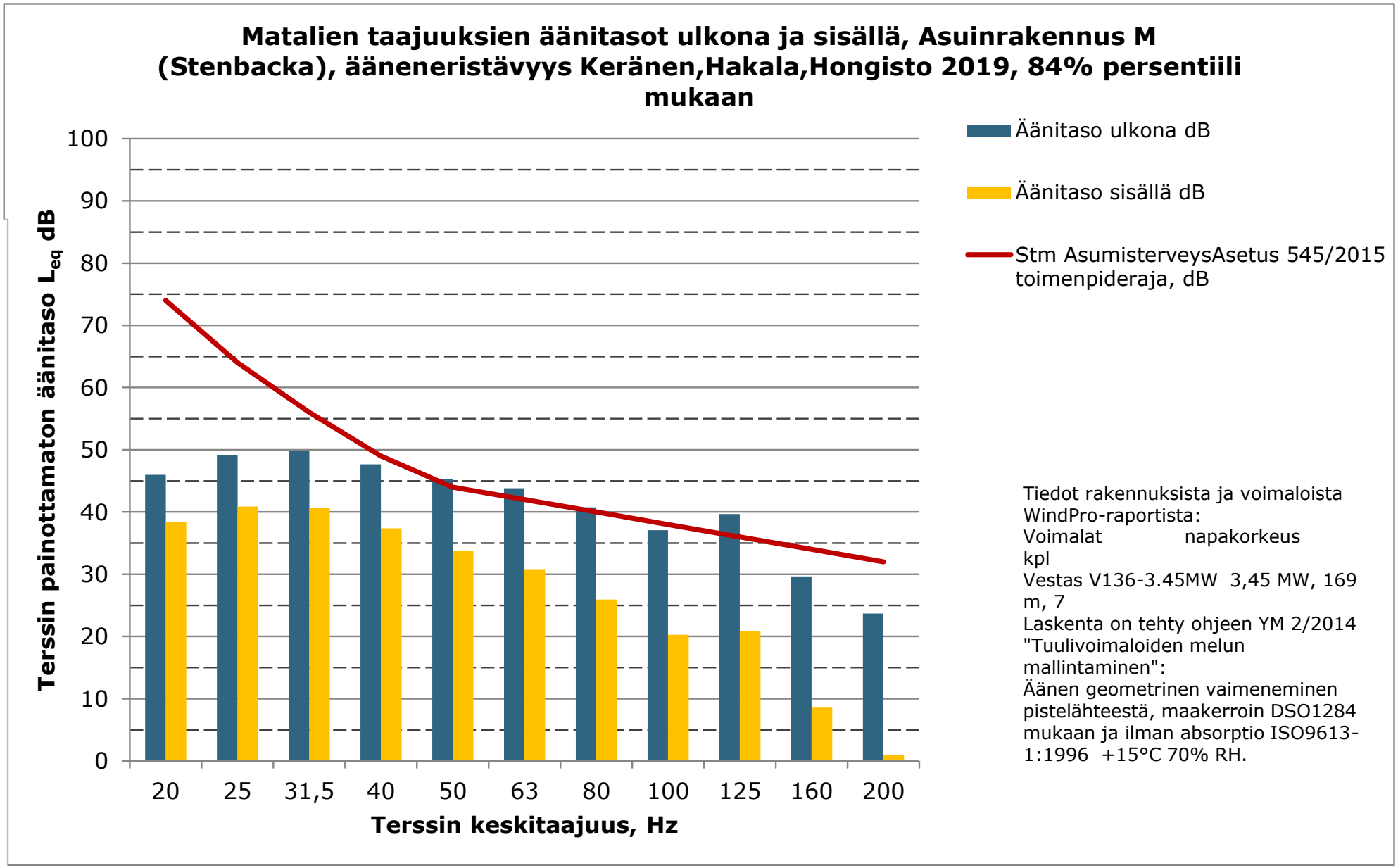
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus L (Evistvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

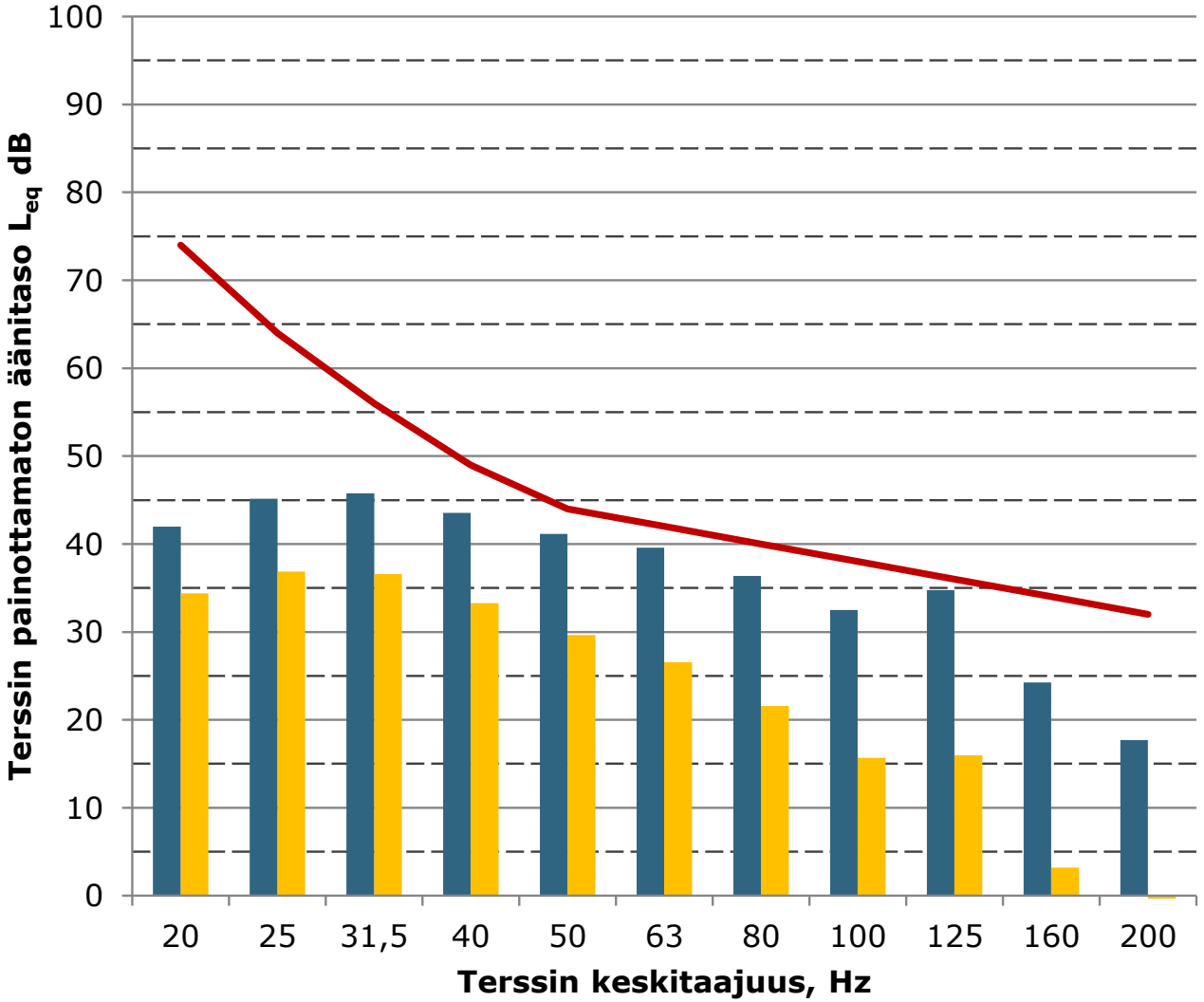


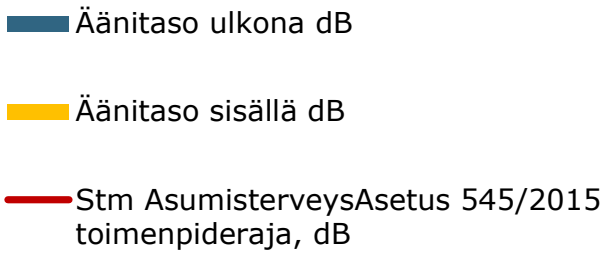


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus M (Stenbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

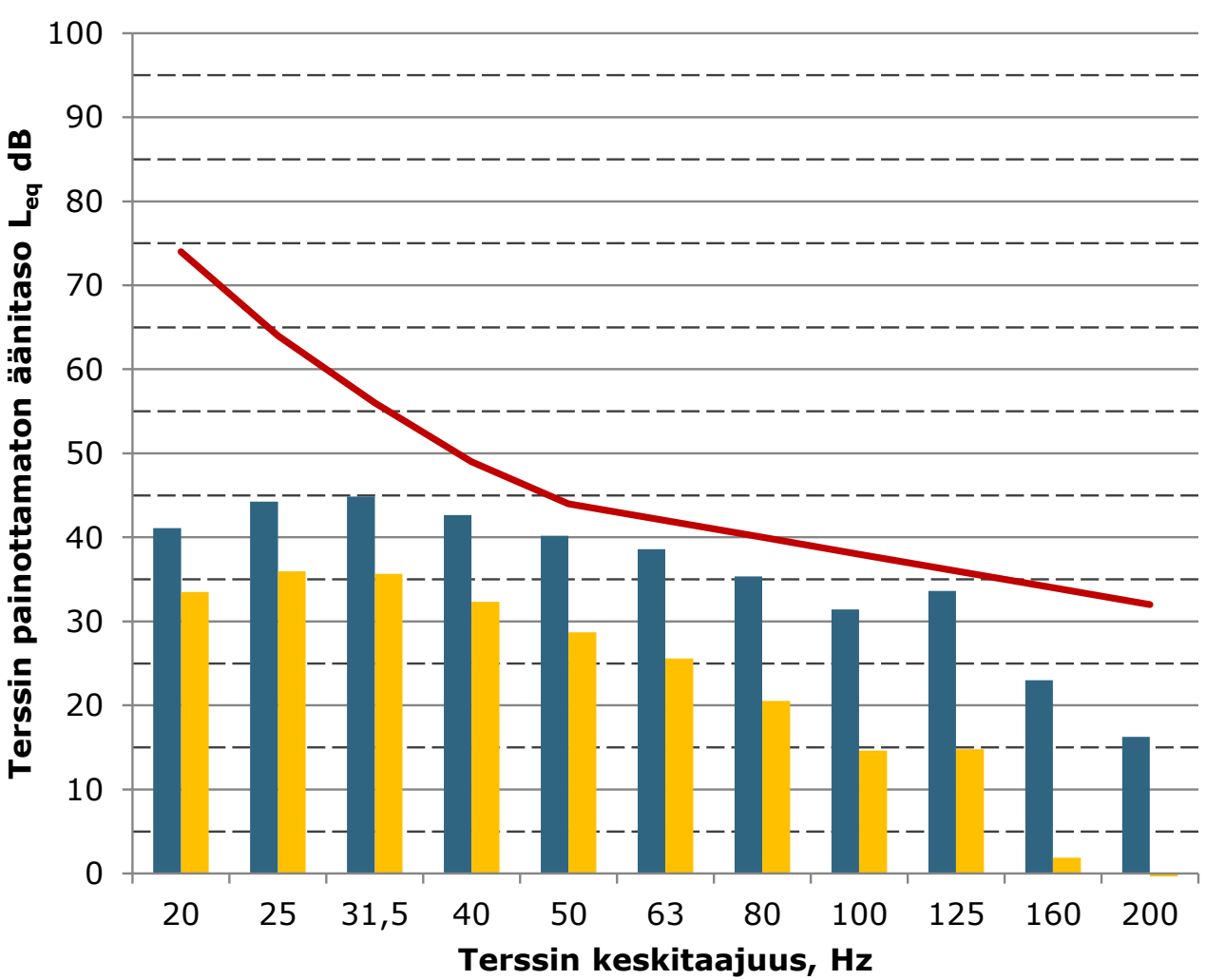
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus N (Adler), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

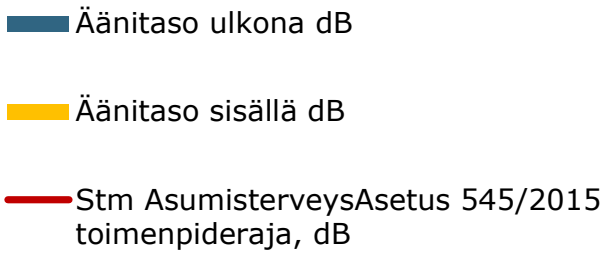




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

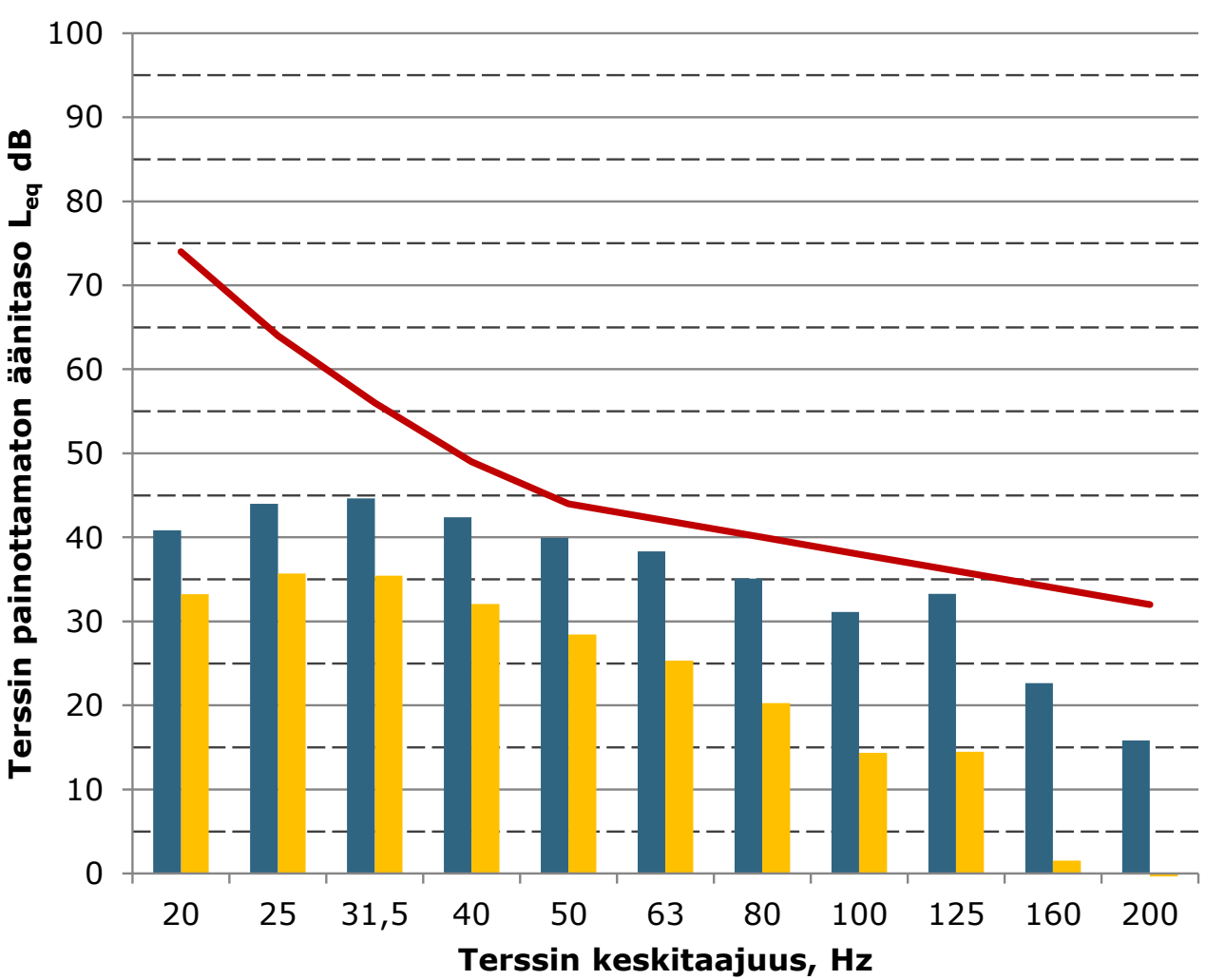
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus O (Evistvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus P (Finnabbavdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



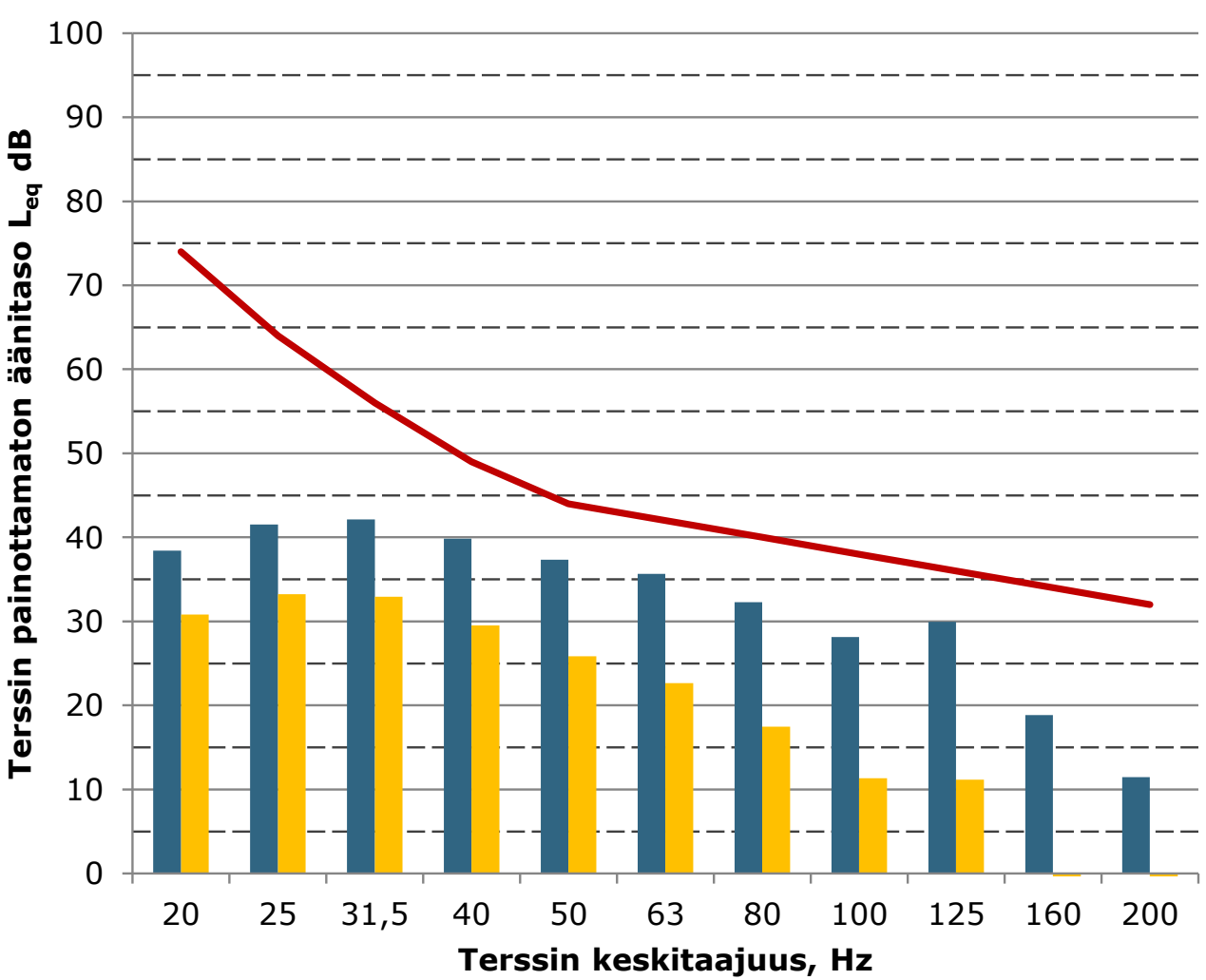
Äänitaso ulkona dB

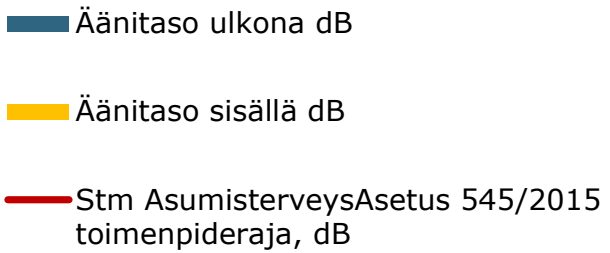
Äänitaso sisällä dB

Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

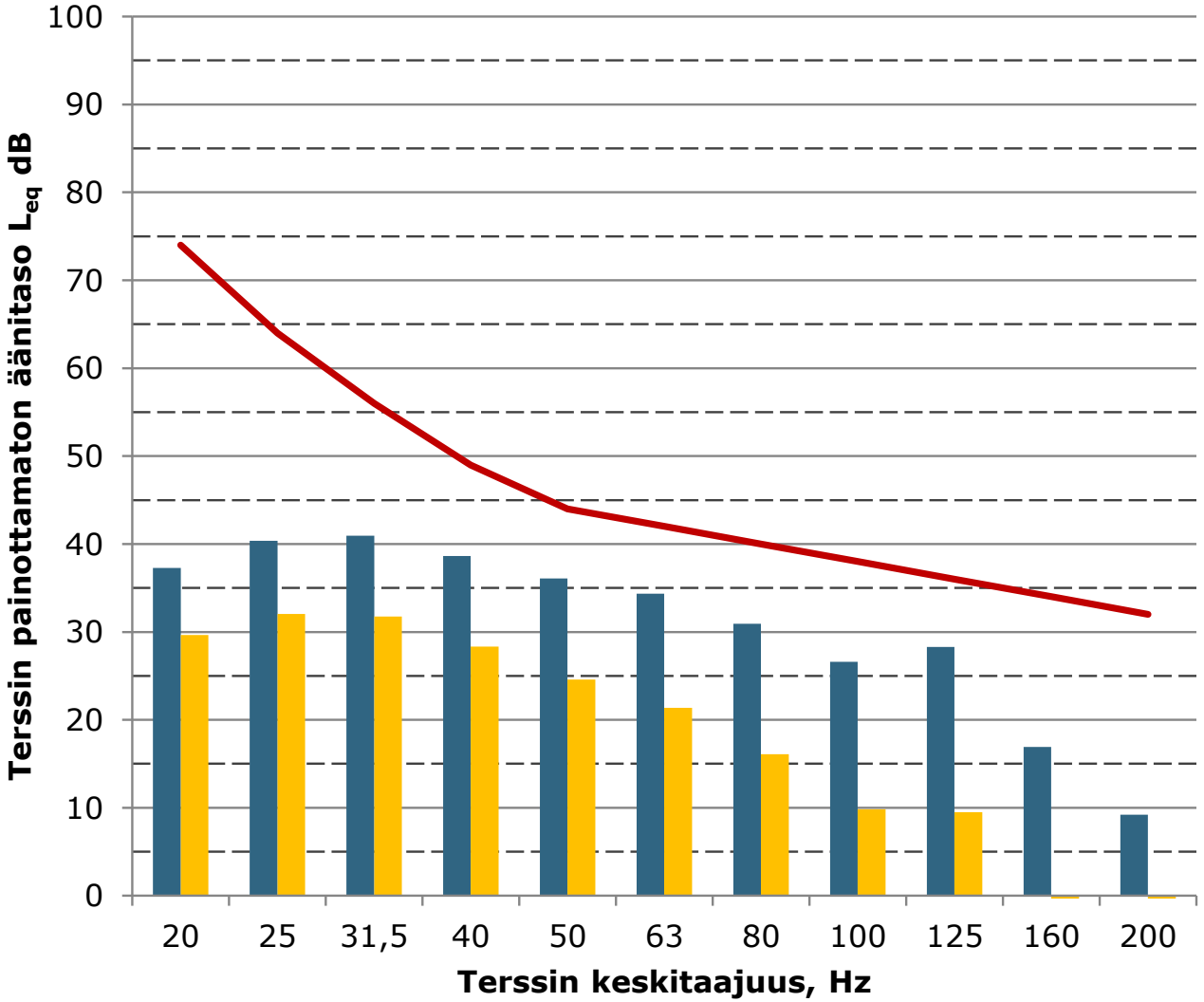
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Q (Dalabacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus R (Kronkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



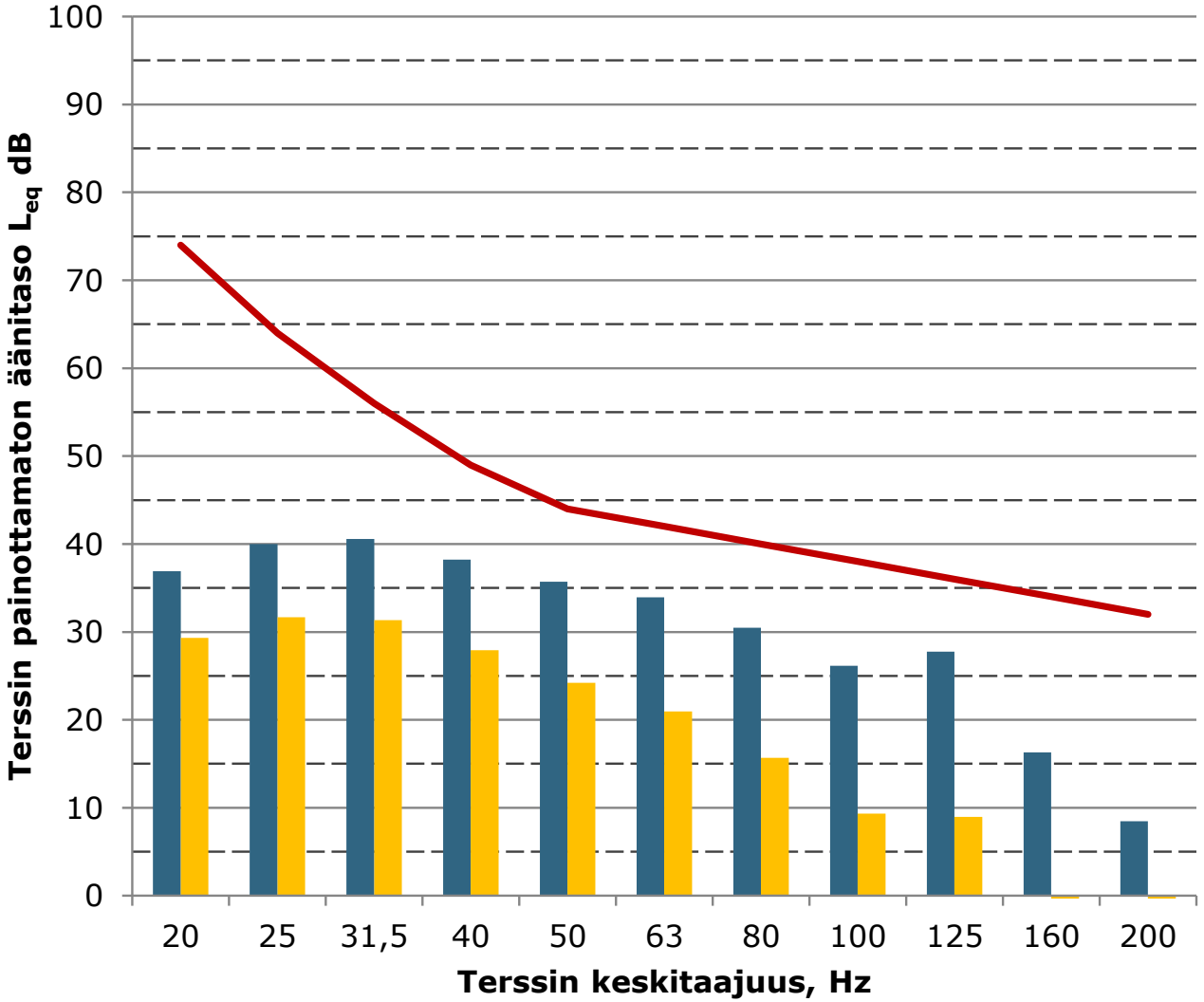
Äänitaso ulkona dB

Äänitaso sisällä dB

Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus S (Tallbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



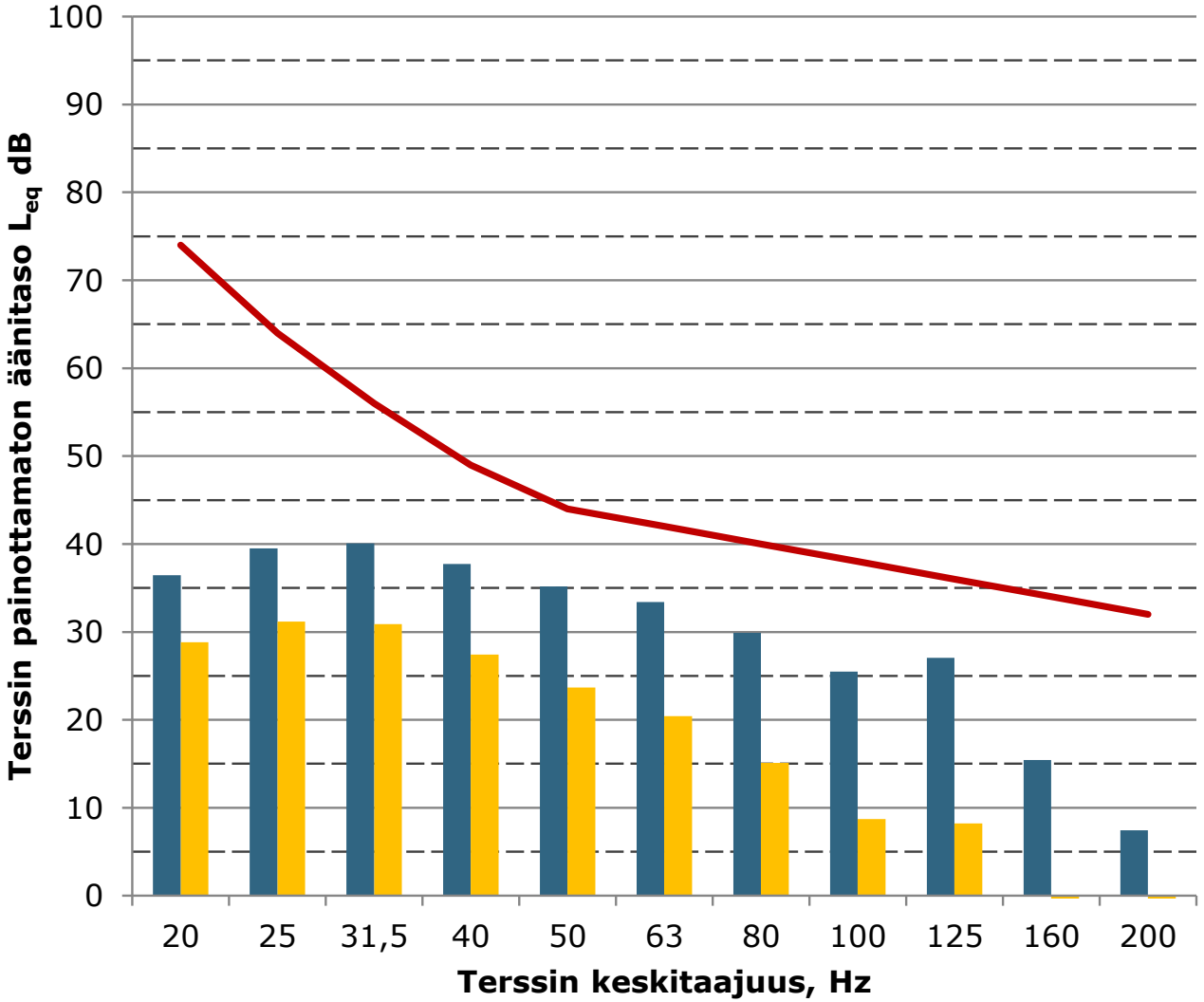
Äänitaso ulkona dB

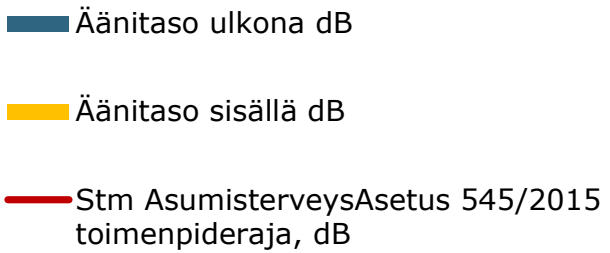
Äänitaso sisällä dB

Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus T (Norrgerd), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



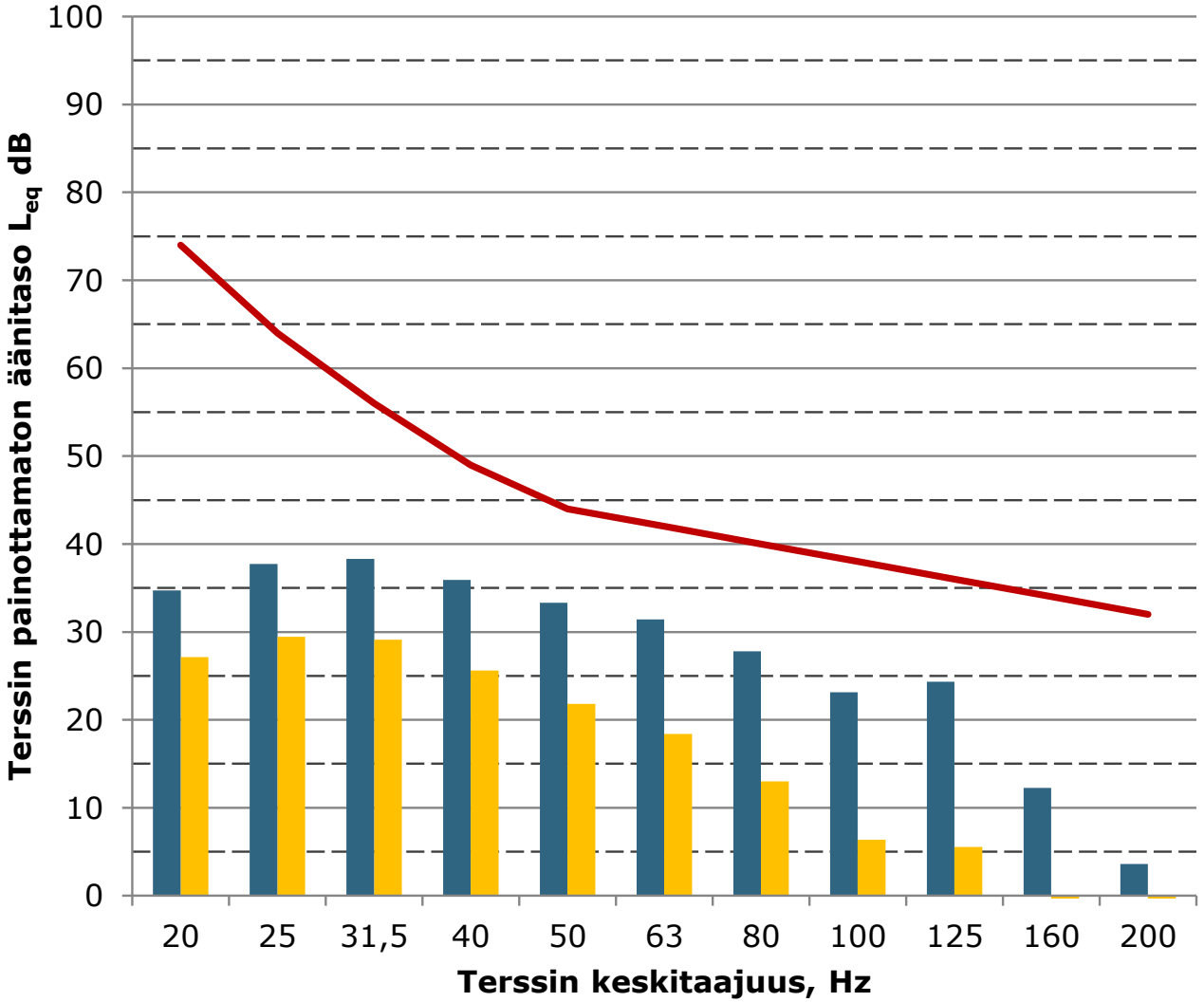


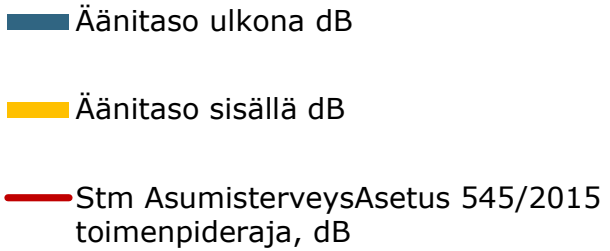
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V136-3.45MW	3,45 MW, 169 m,	7

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

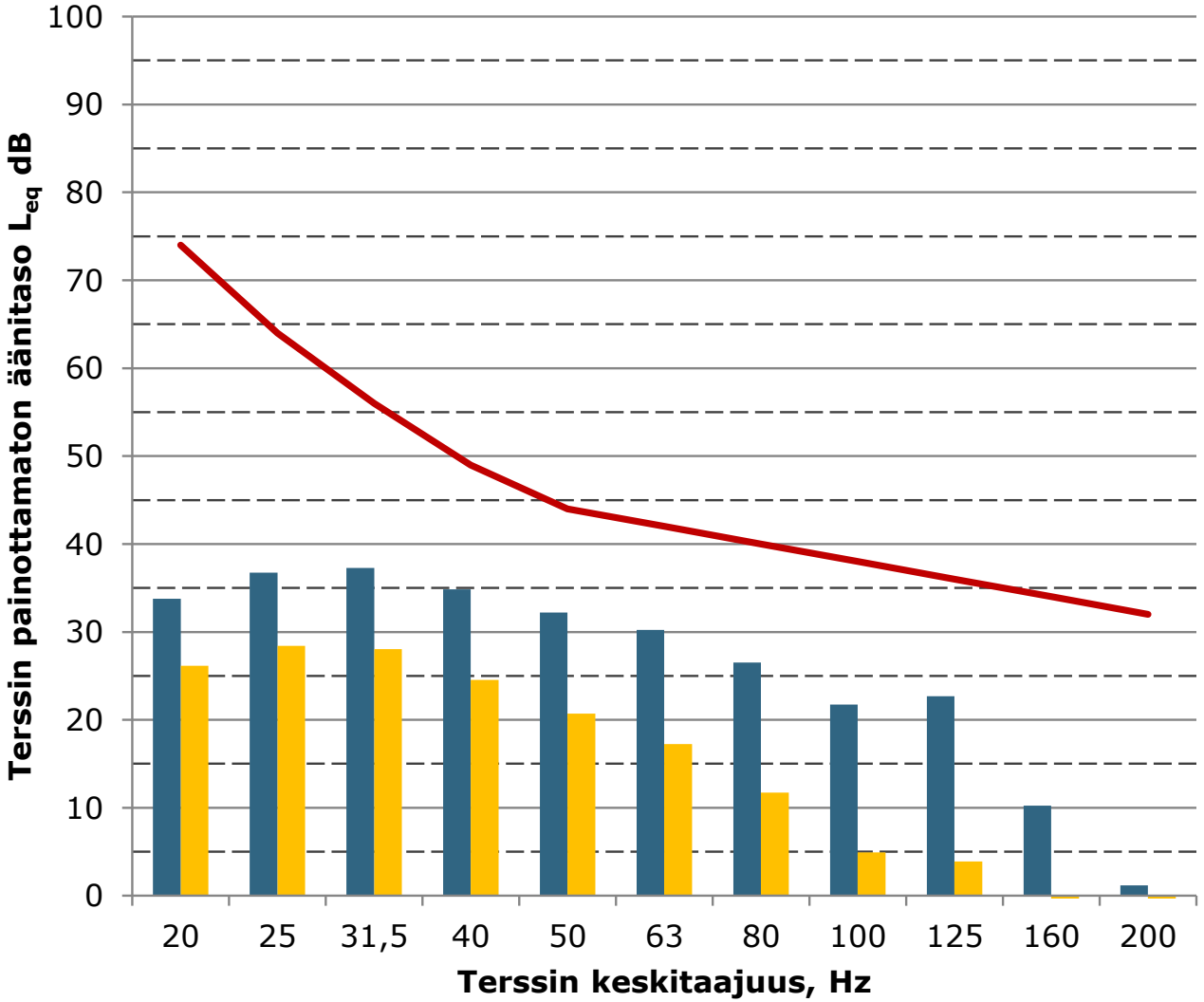
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus U (Nepi), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

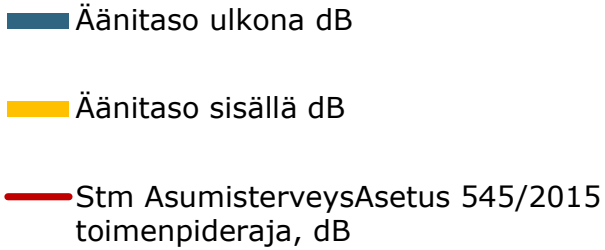




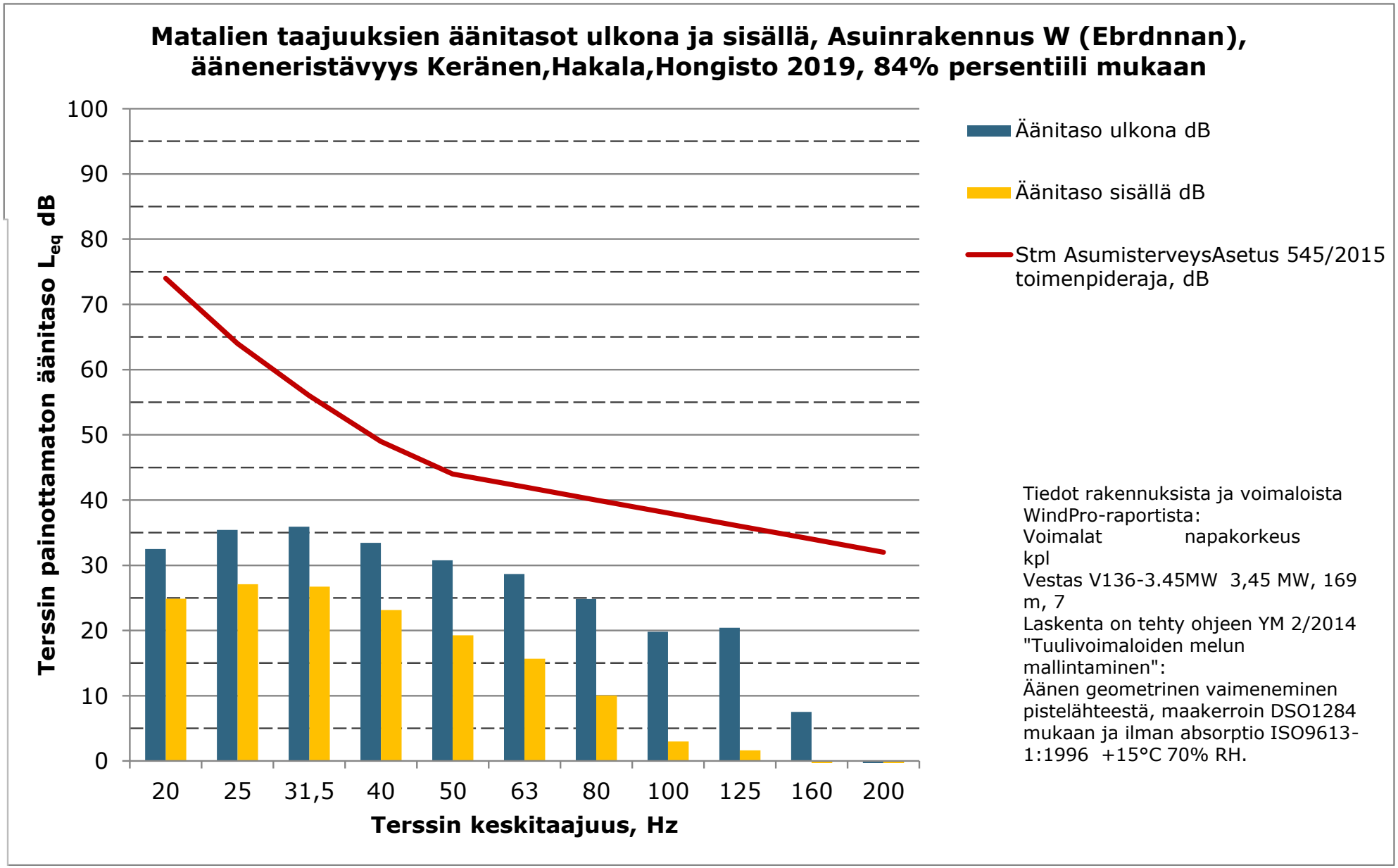
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus V (Skutas), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

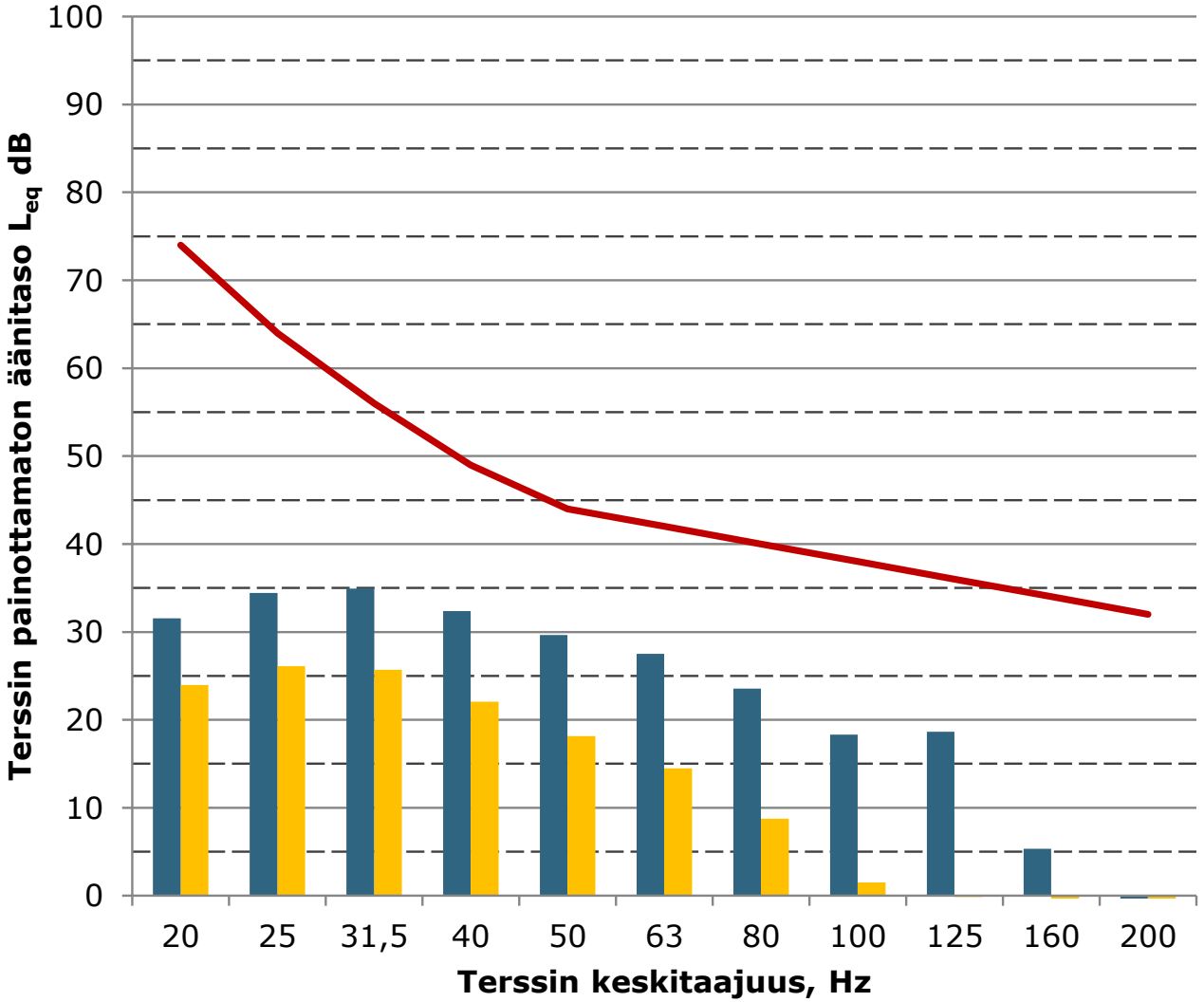


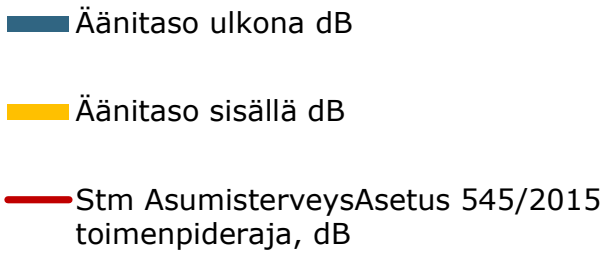


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus W (Ebrdnnan), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

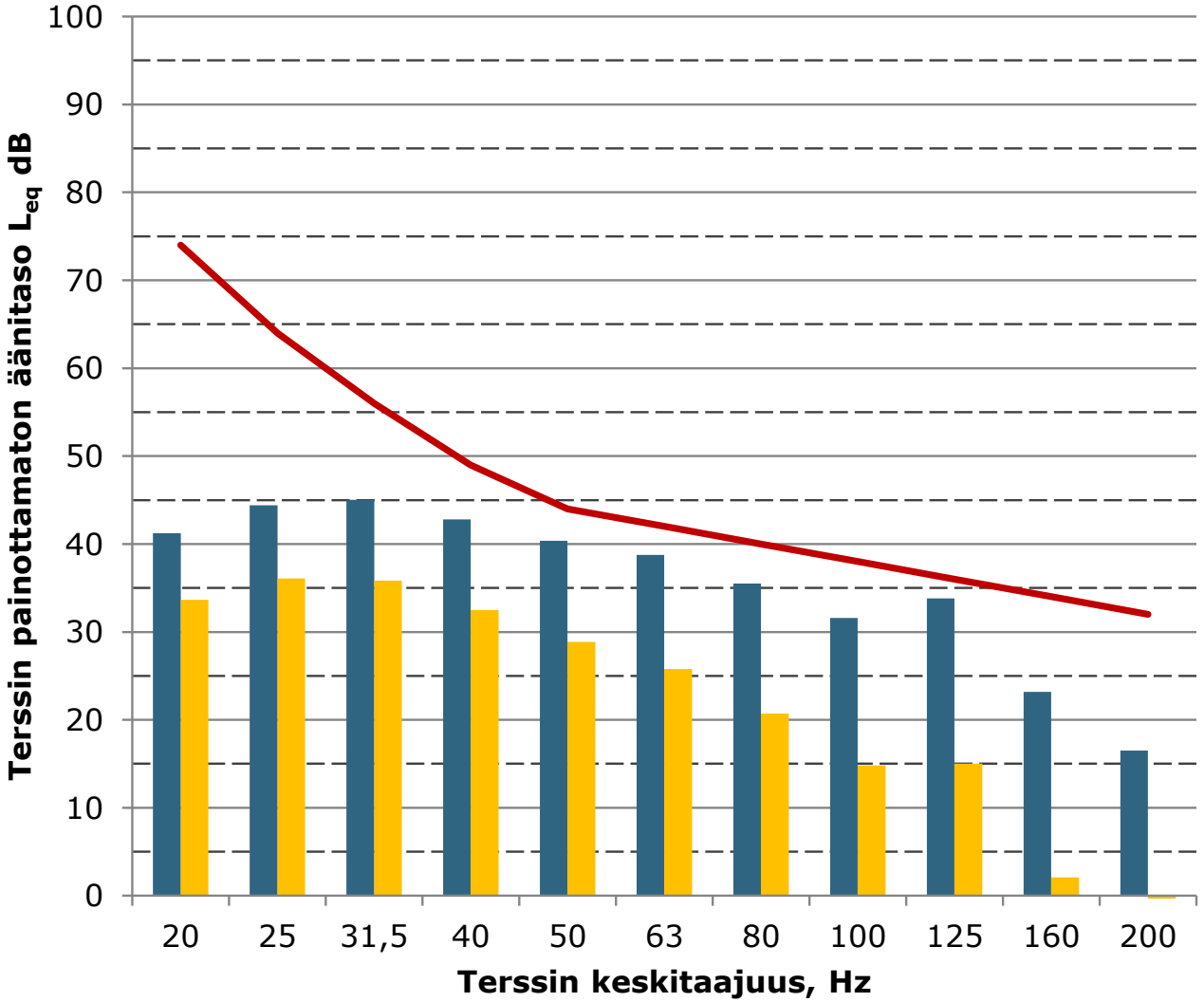
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus X (Dalbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

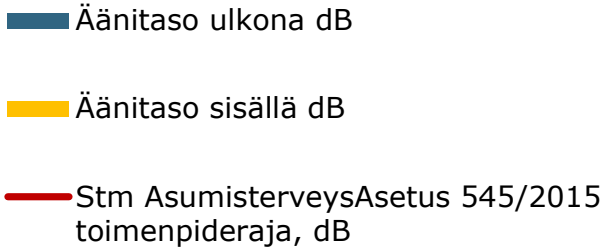




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

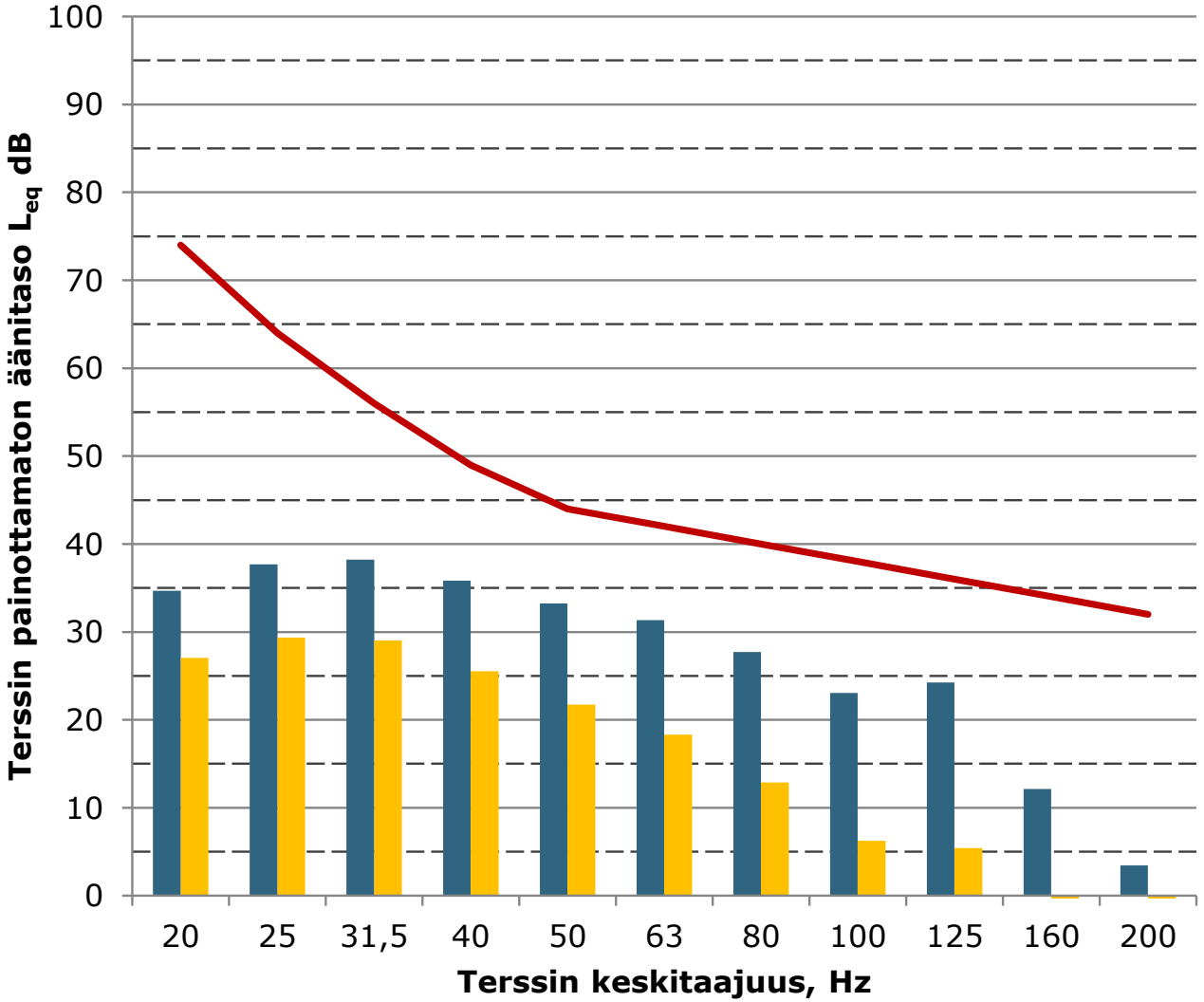
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Y (Evist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

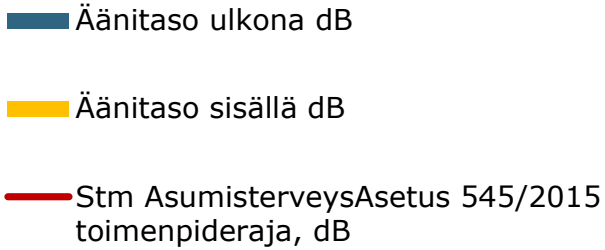




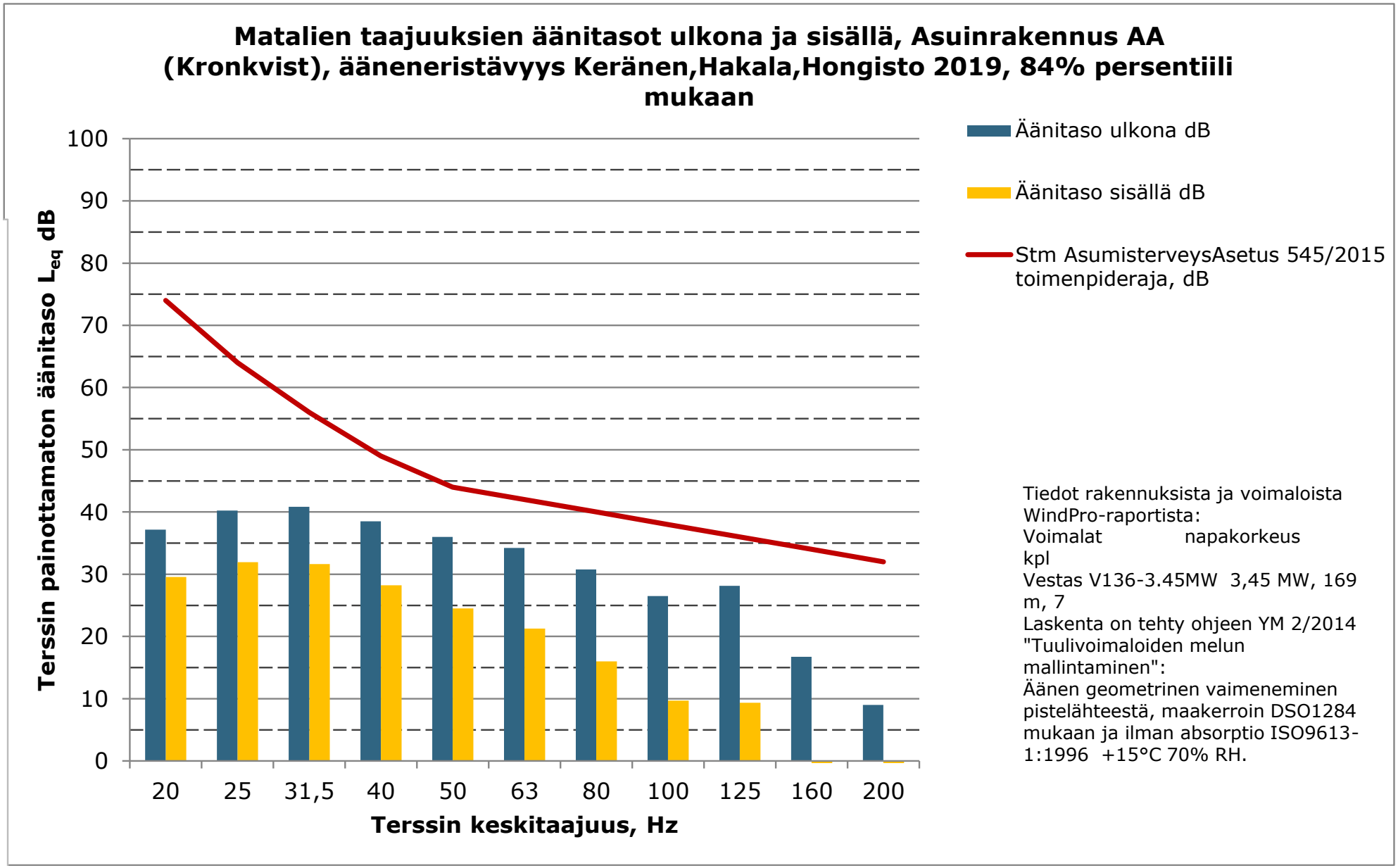
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Z (Nabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

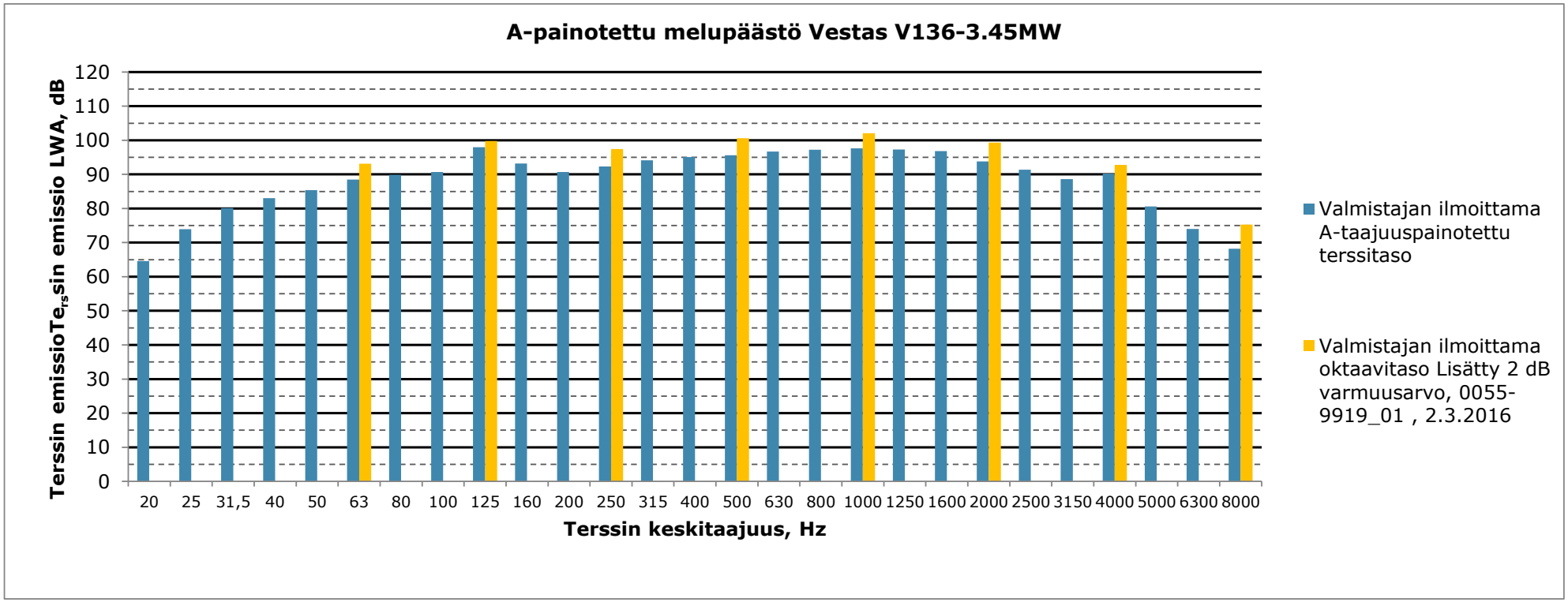


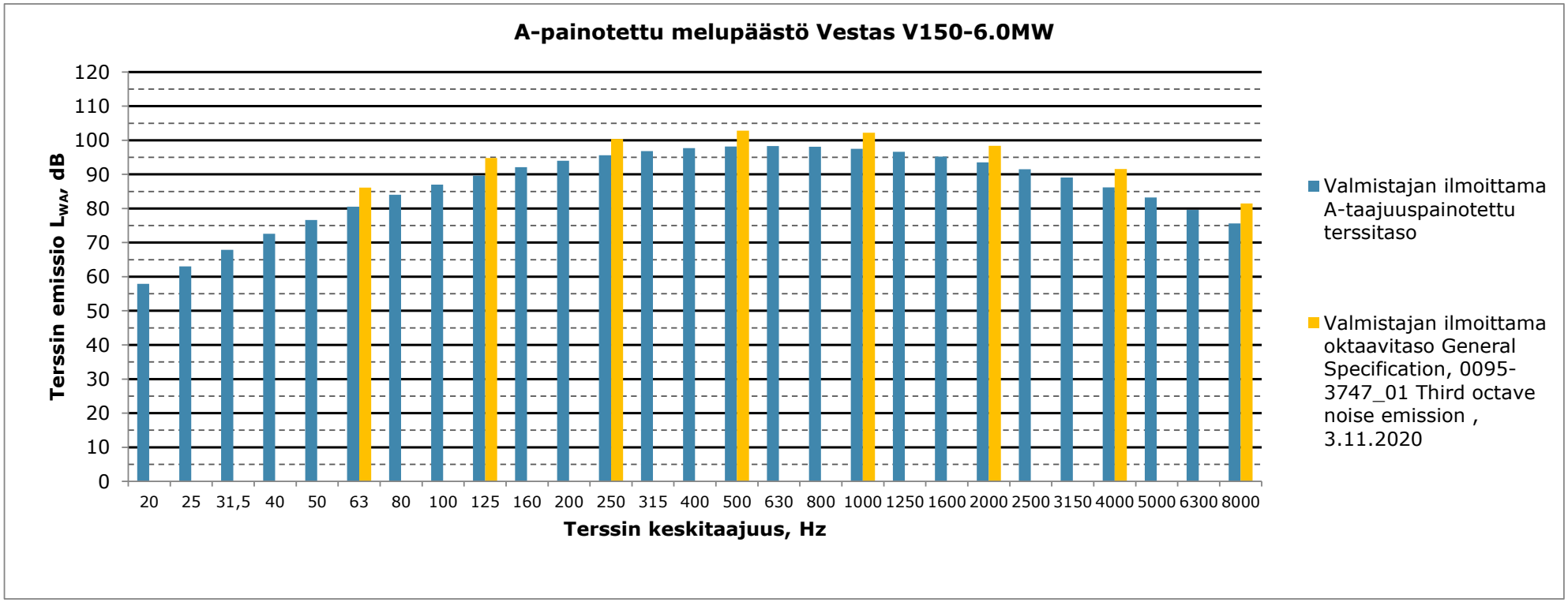


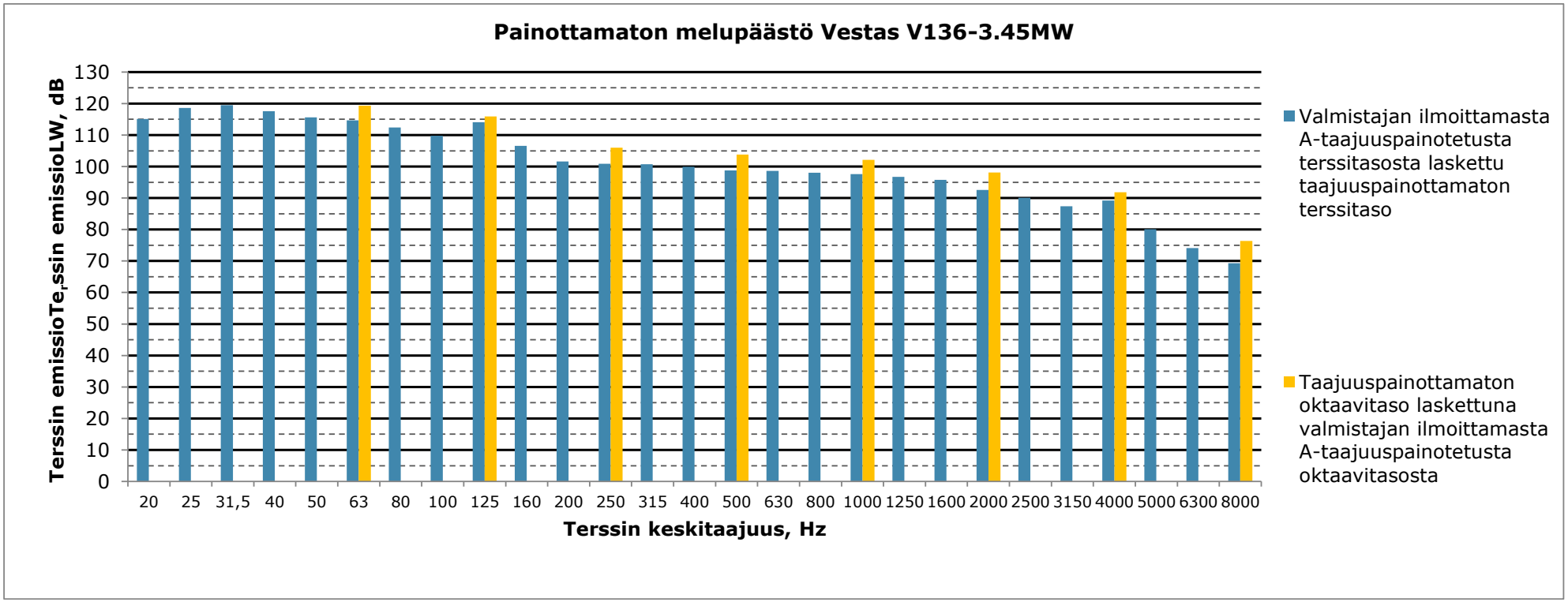
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

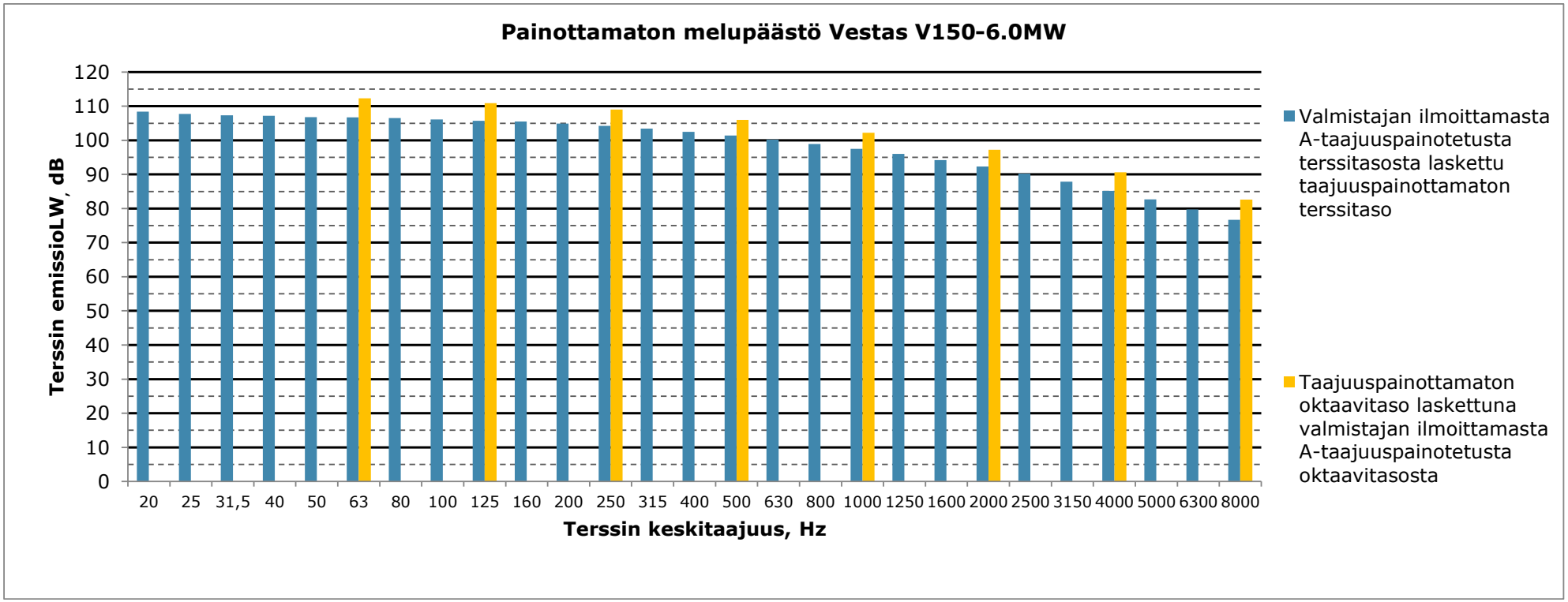

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus AA (Kronkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

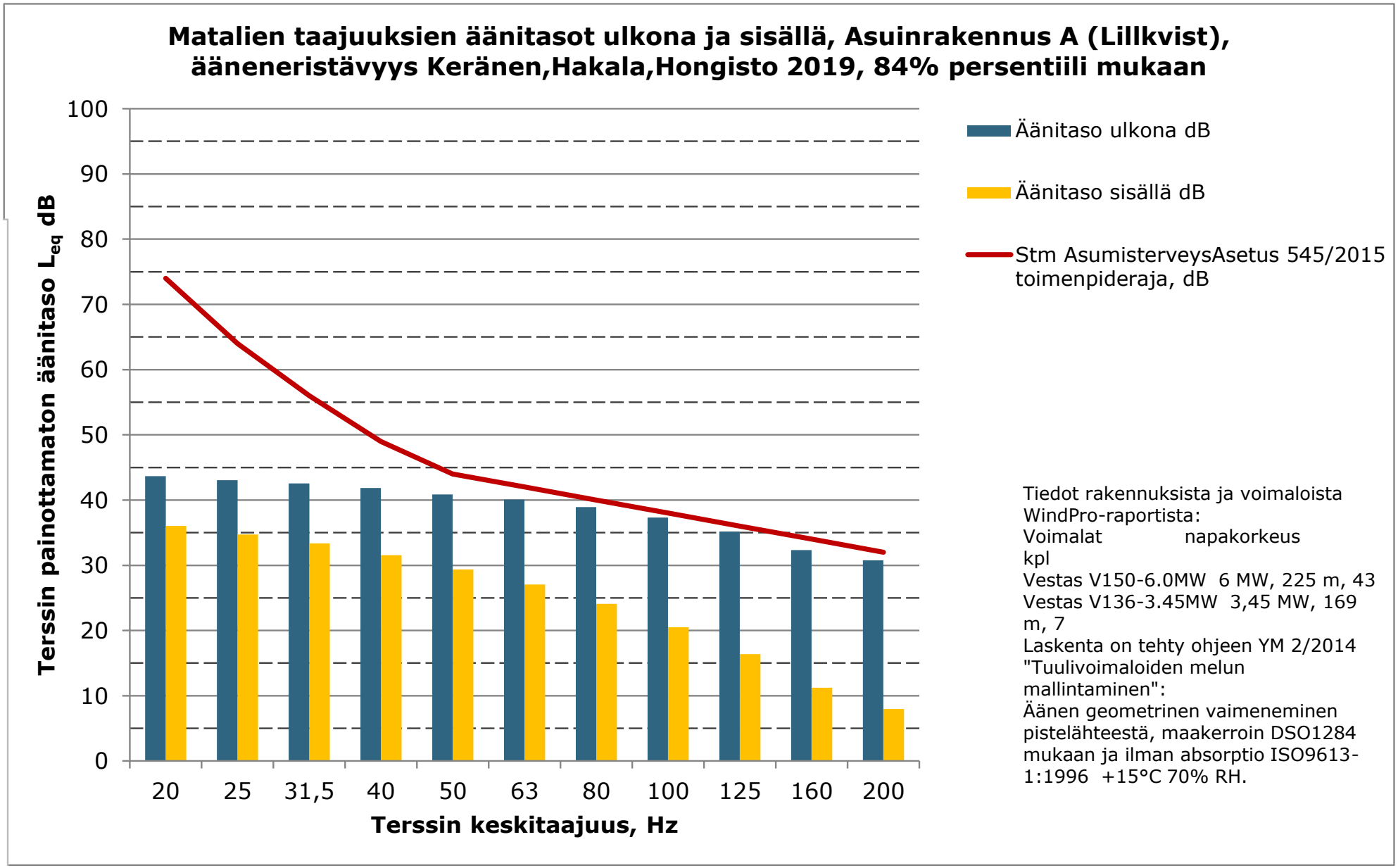
Bilaga 6. Purmo vindkraftsprojekt – värden för lågfrekvent buller vid olika byggnader ALT1 V150 – 6.0 MW tillsammans med Salo–Ylikoski-projektet.

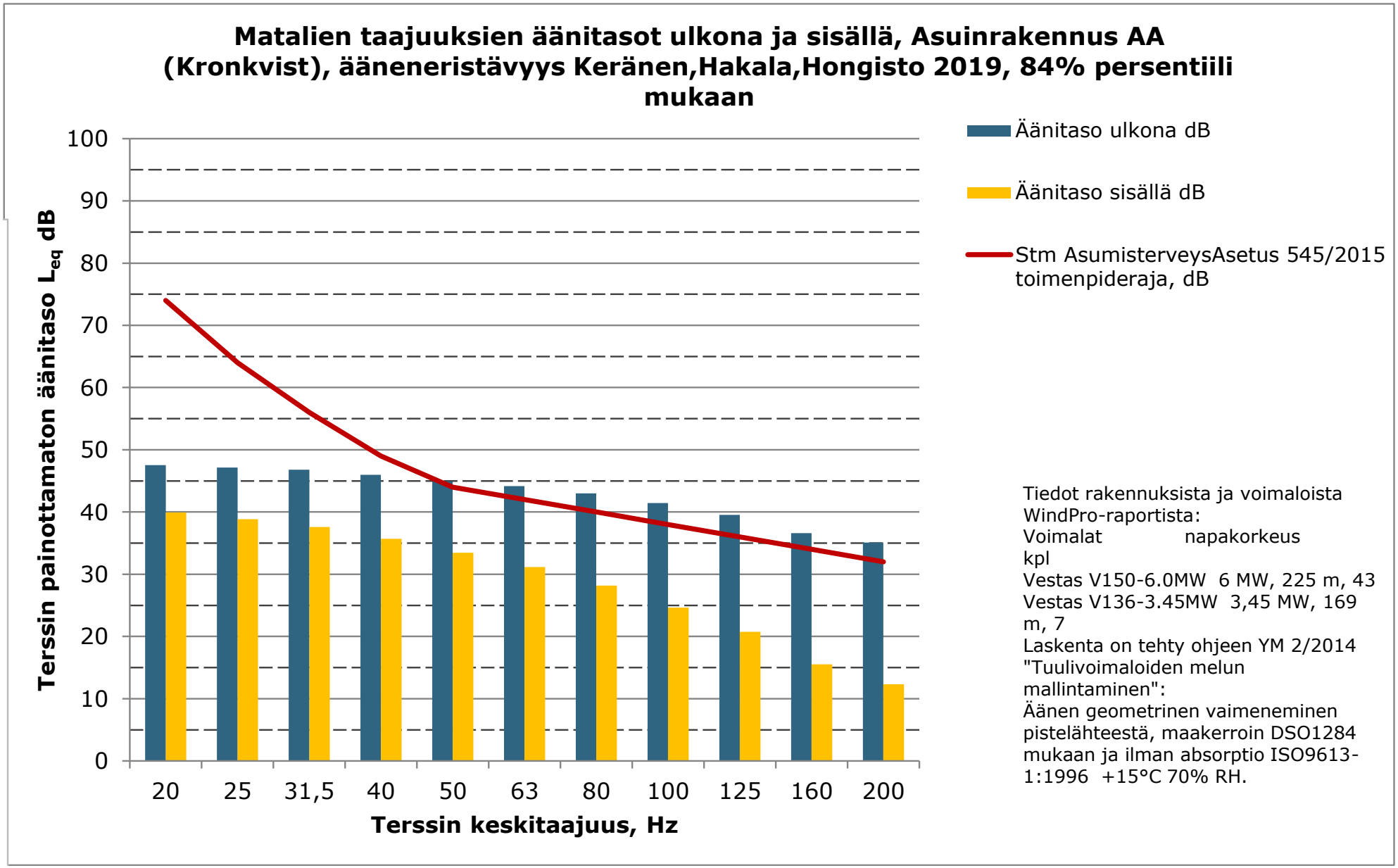

A-painotettu melupäästö Vestas V136-3.45MW
Terssin emissioTe$_{rs}$sin emissio LWA, dB
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittama A-taajuuspainotettu terssitaso
Valmistajan ilmoittama oktaavitaso Lisätty 2 dB varmuusarvo, 0055-9919_01 , 2.3.2016


A-painotettu melupäästö Vestas V150-6.0MW
Terssin emissio L_{WA} dB
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittama A-taajuuspainotettu terssitaso
Valmistajan ilmoittama oktaavitaso General Specification, 0095-3747_01 Third octave noise emission , 3.11.2020

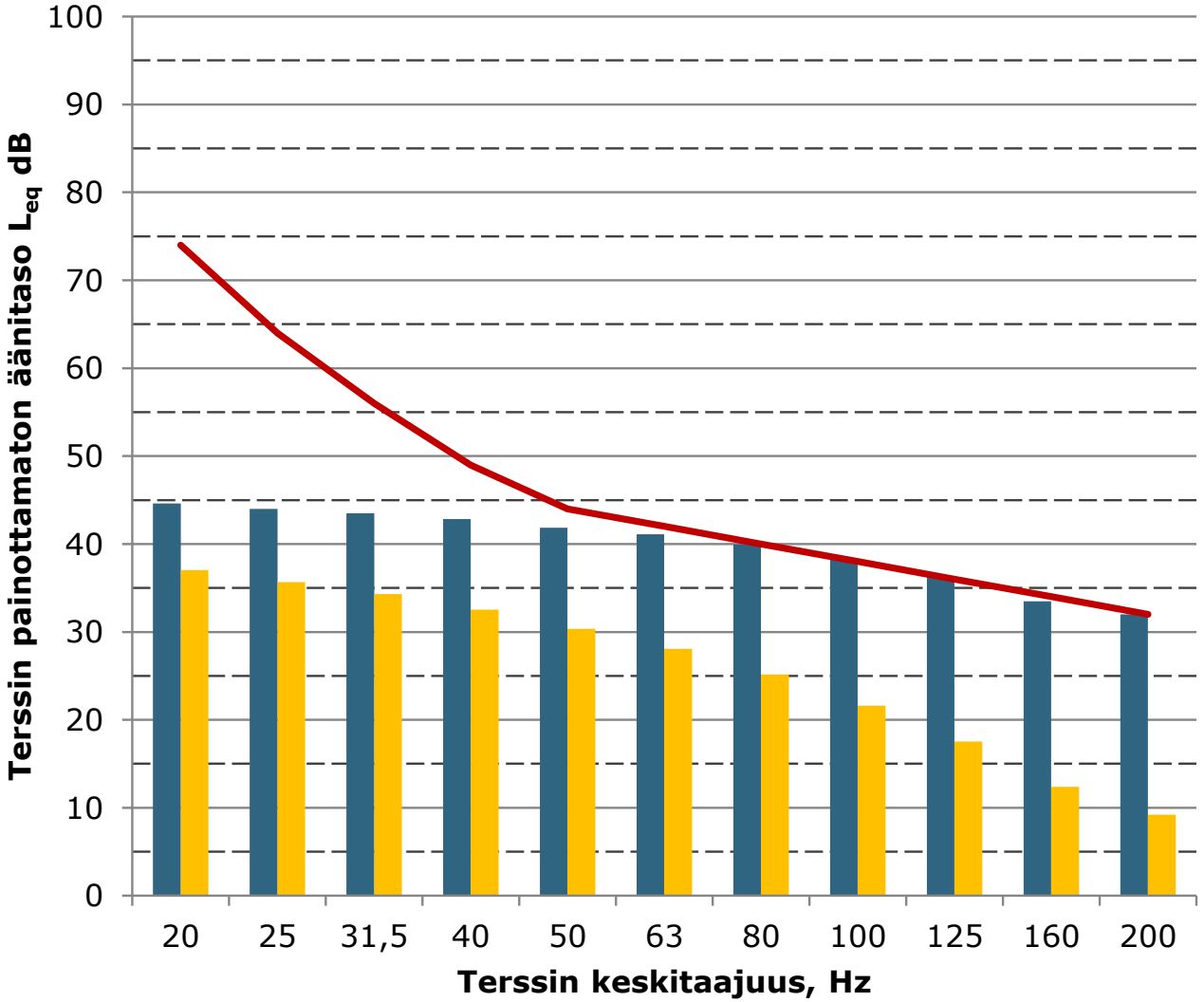

Painottamaton melupäästö Vestas V136-3.45MW
Terssin emissioTe,ssin emissioLW, dB
0
10
20
30
40
50
60
70
80
90
100
110
120
130
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittamasta A-taajuuspainotetusta terssitasosta laskettu taajuuspainottamaton terssitaso
Taajuuspainottamaton oktaavitaso laskettuna valmistajan ilmoittamasta A-taajuuspainotetusta oktaavitasosta


Painottamaton melupäästö Vestas V150-6.0MW
Terssin emissioLW, dB
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittamasta A-taajuuspainotetusta terssitasosta laskettu taajuuspainottamaton terssitaso
Taajuuspainottamaton oktaavitaso laskettuna valmistajan ilmoittamasta A-taajuuspainotetusta oktaavitasosta


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus A (Lillkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus AA (Kronkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus B (Dallberga), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



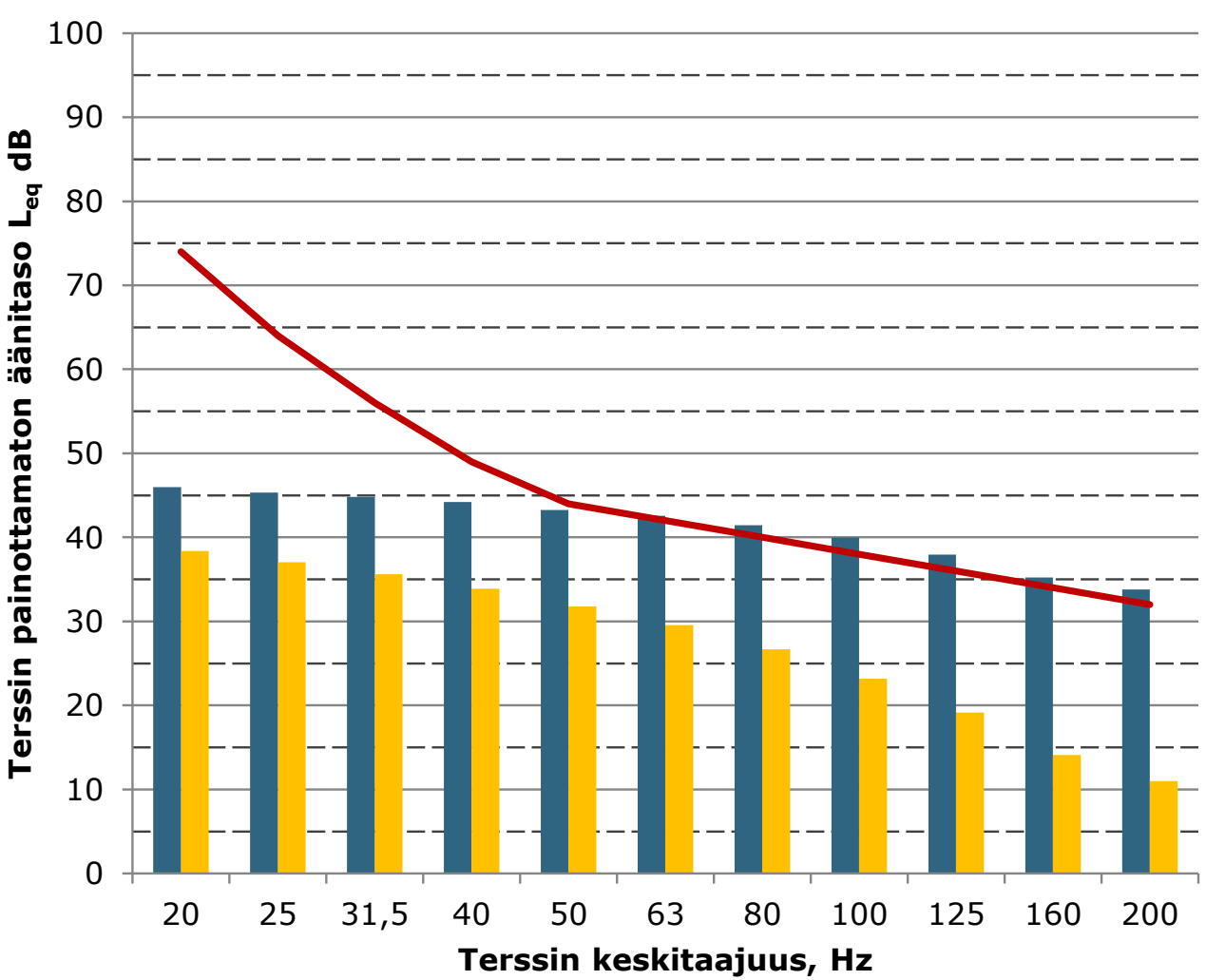
Äänitaso ulkona dB

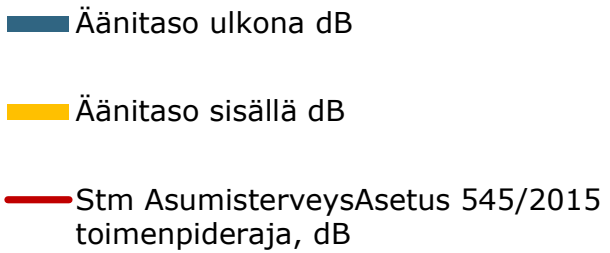
Äänitaso sisällä dB

Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

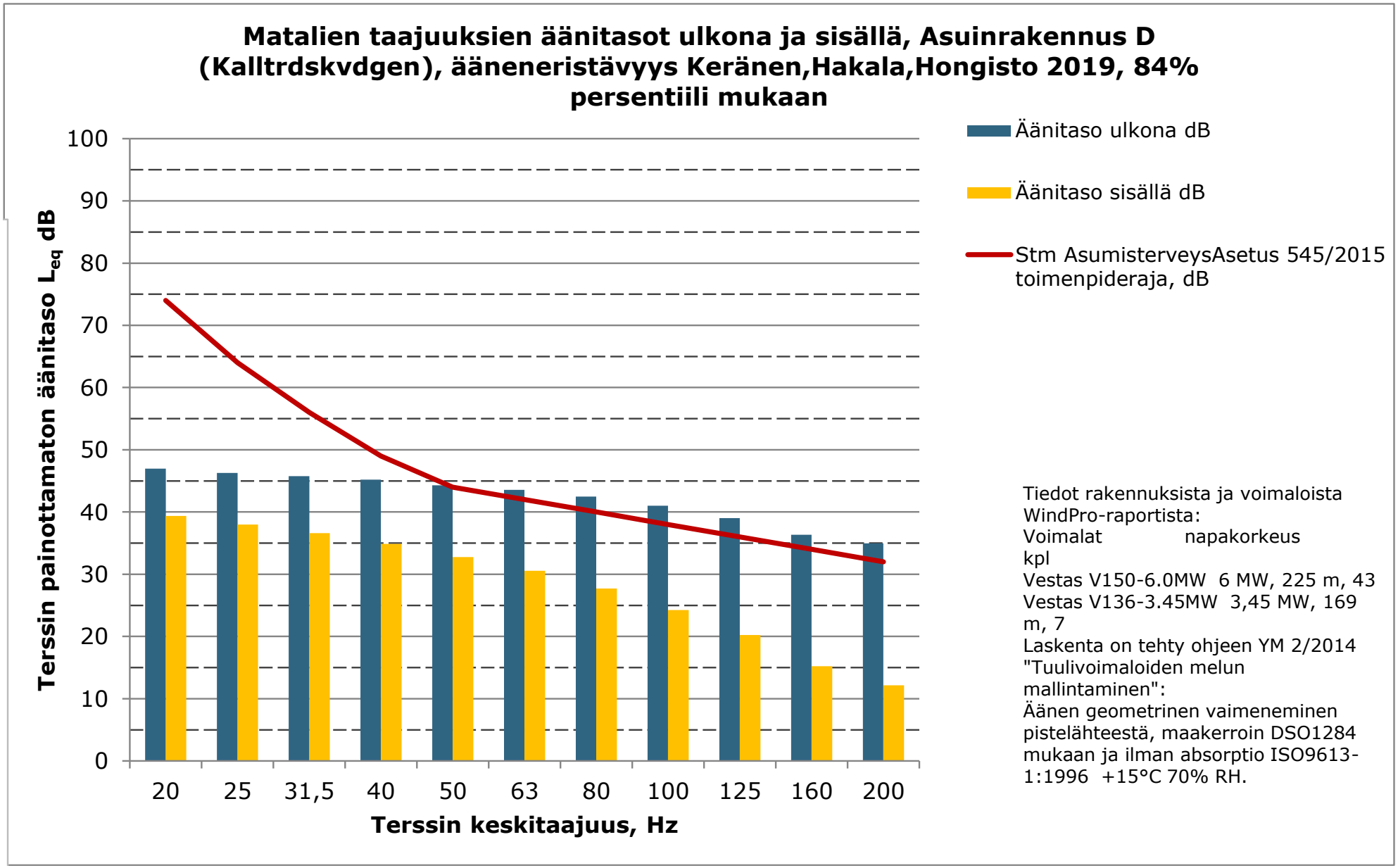
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

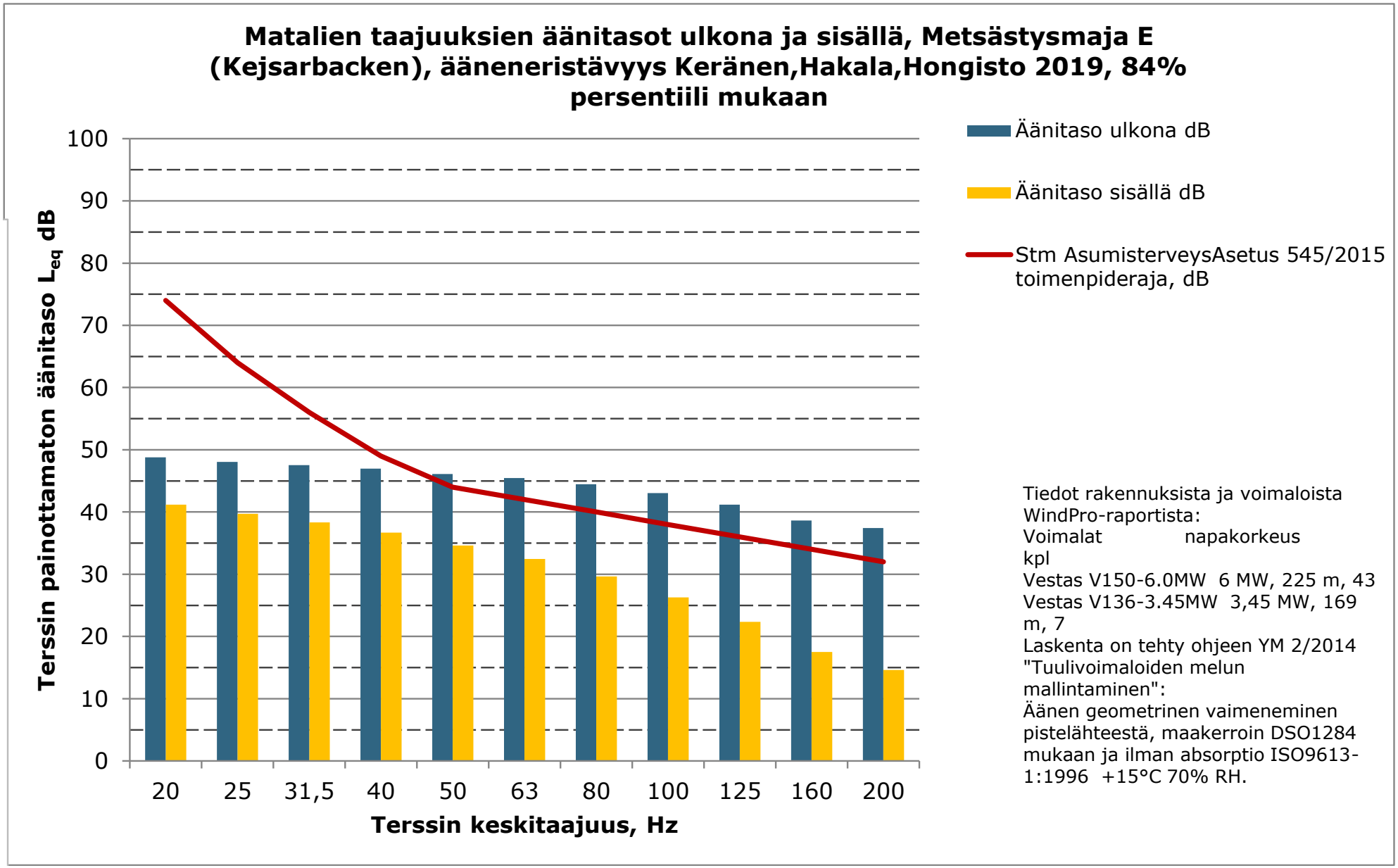
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus C (Tormbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

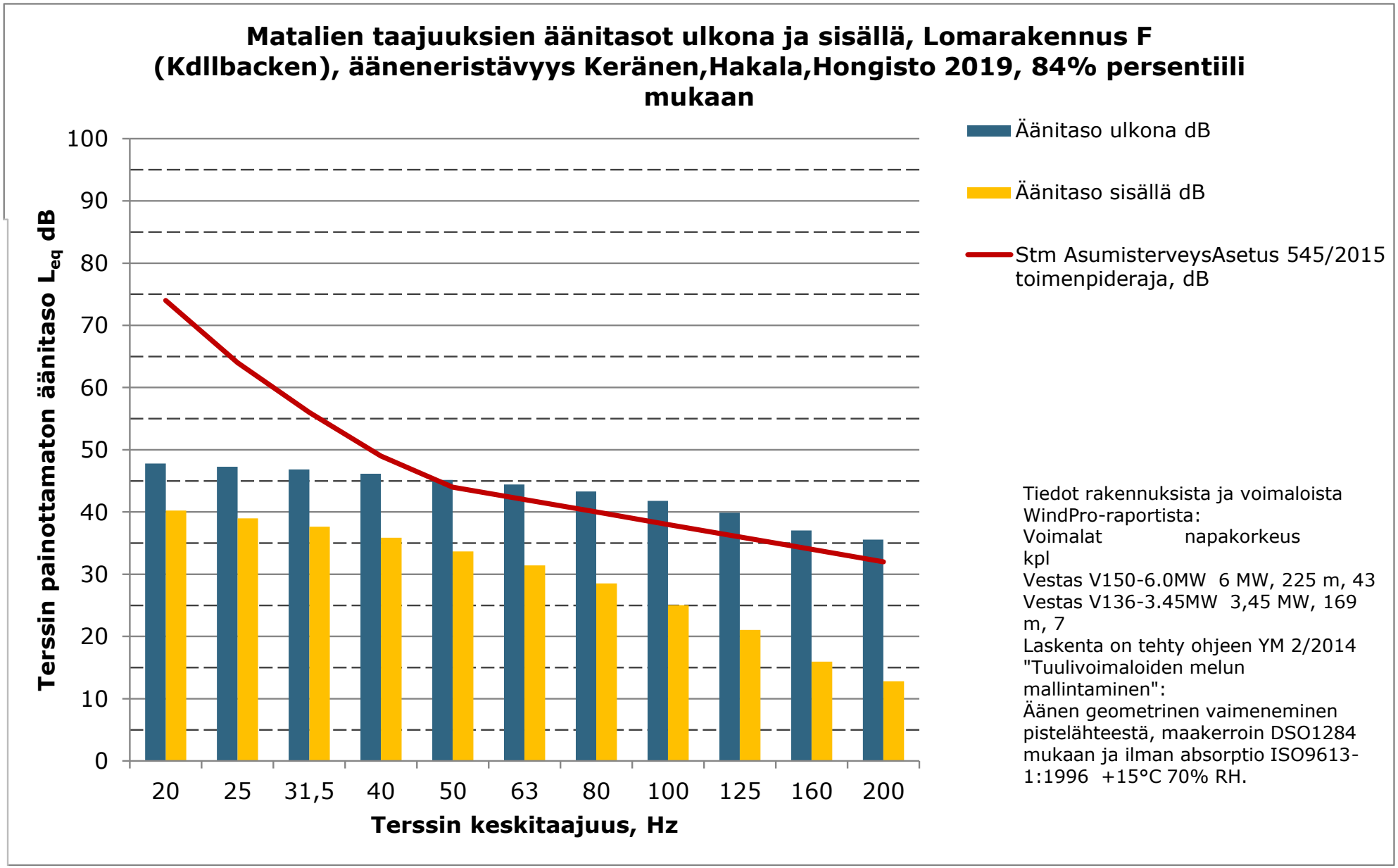


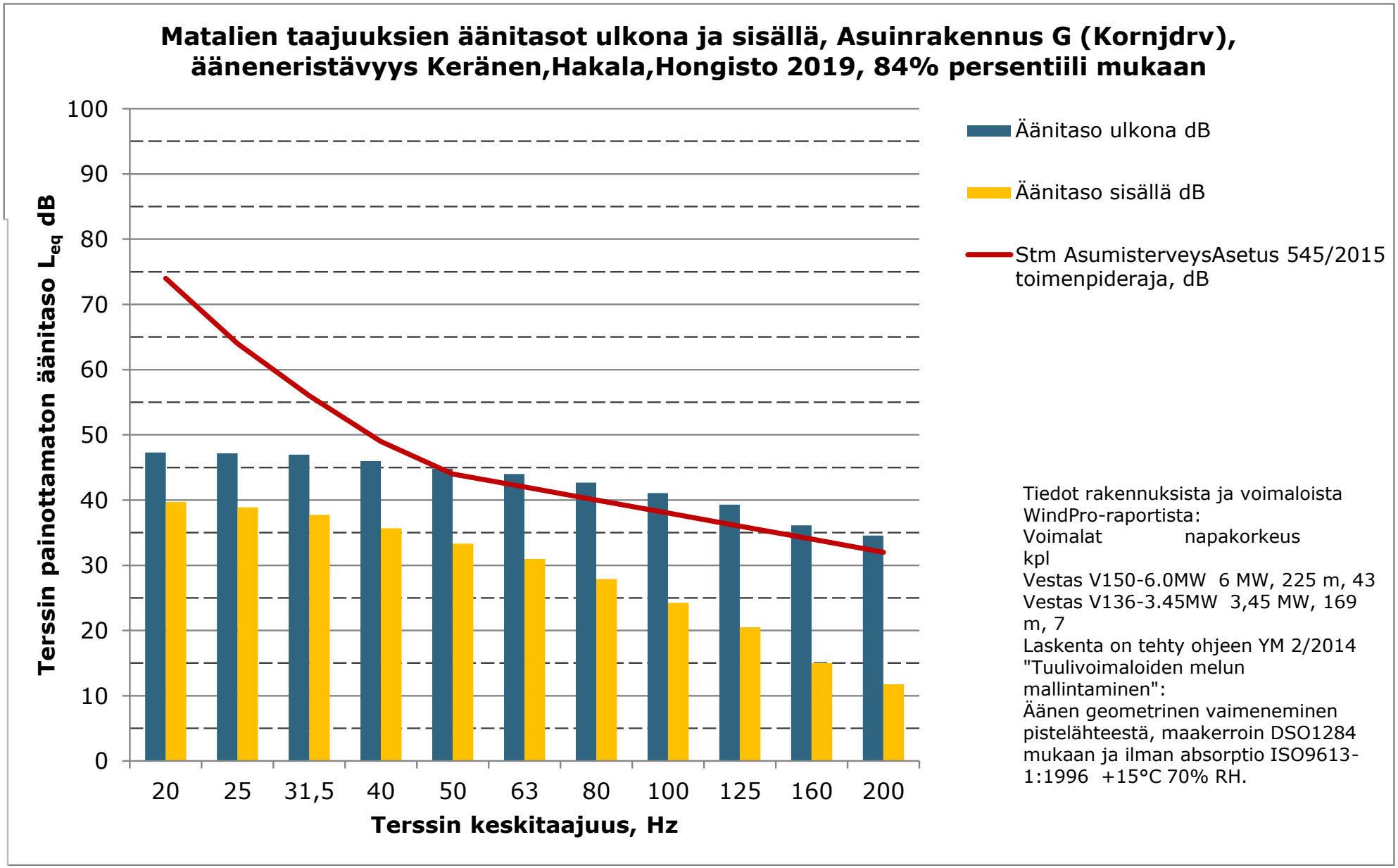


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

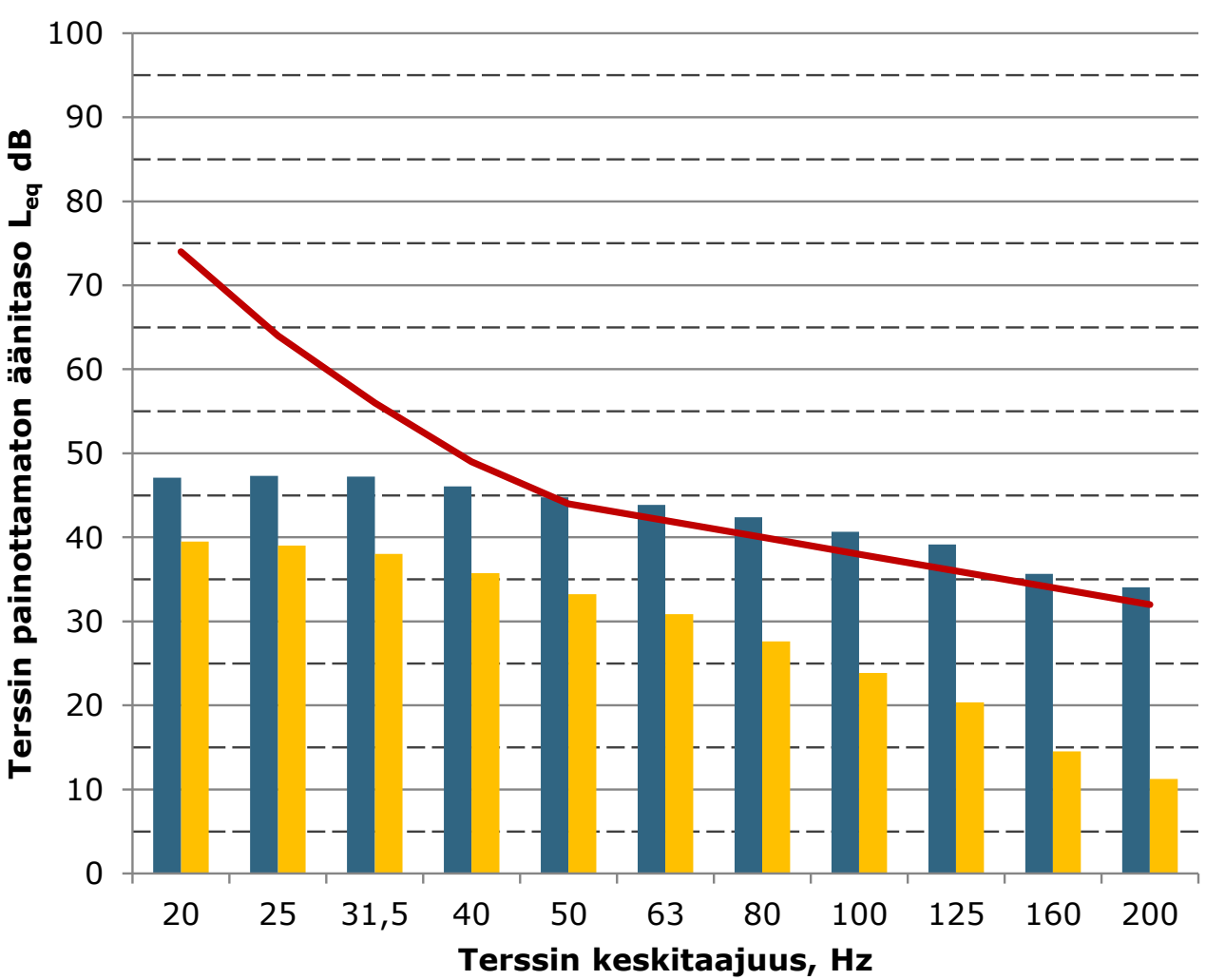

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus D (Kalltrdskvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

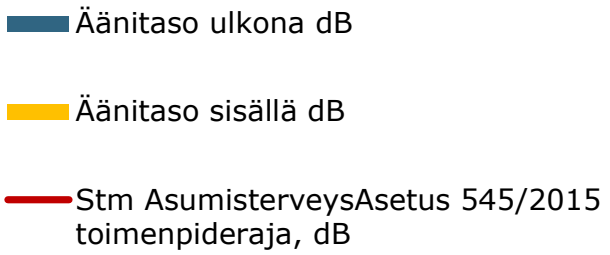

Matalien taajuuksien äänitasot ulkona ja sisällä, Metsästysmaja E (Kejsarbacken), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus F (Kdllbacken), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus G (Kornjdrv), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

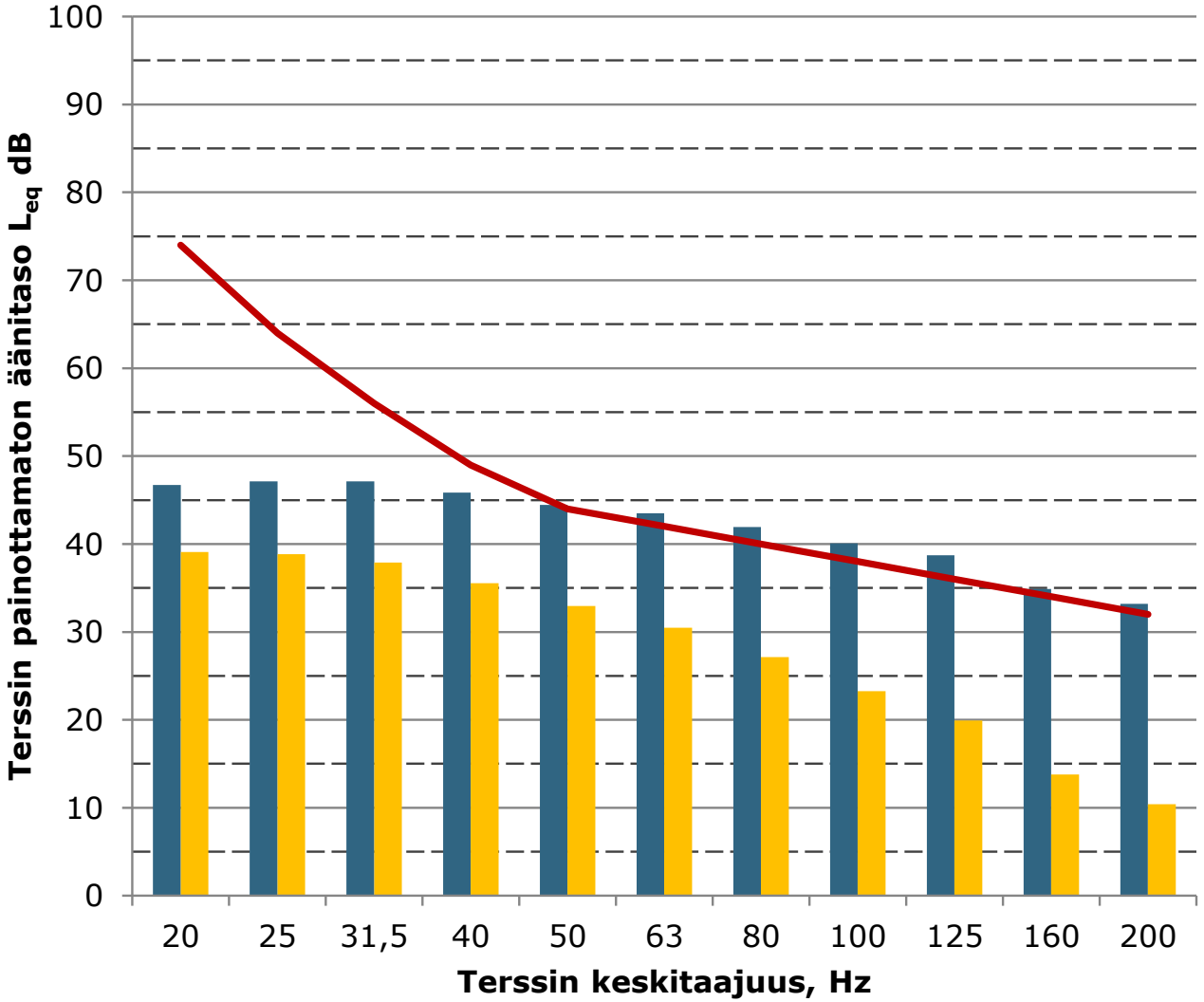
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus H (Sandnabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

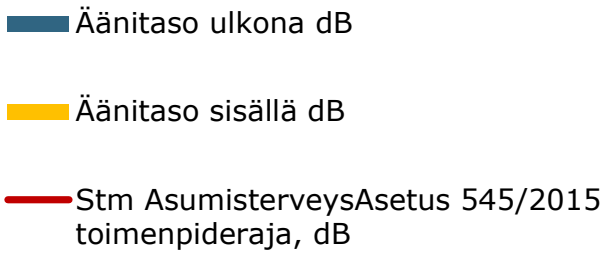




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

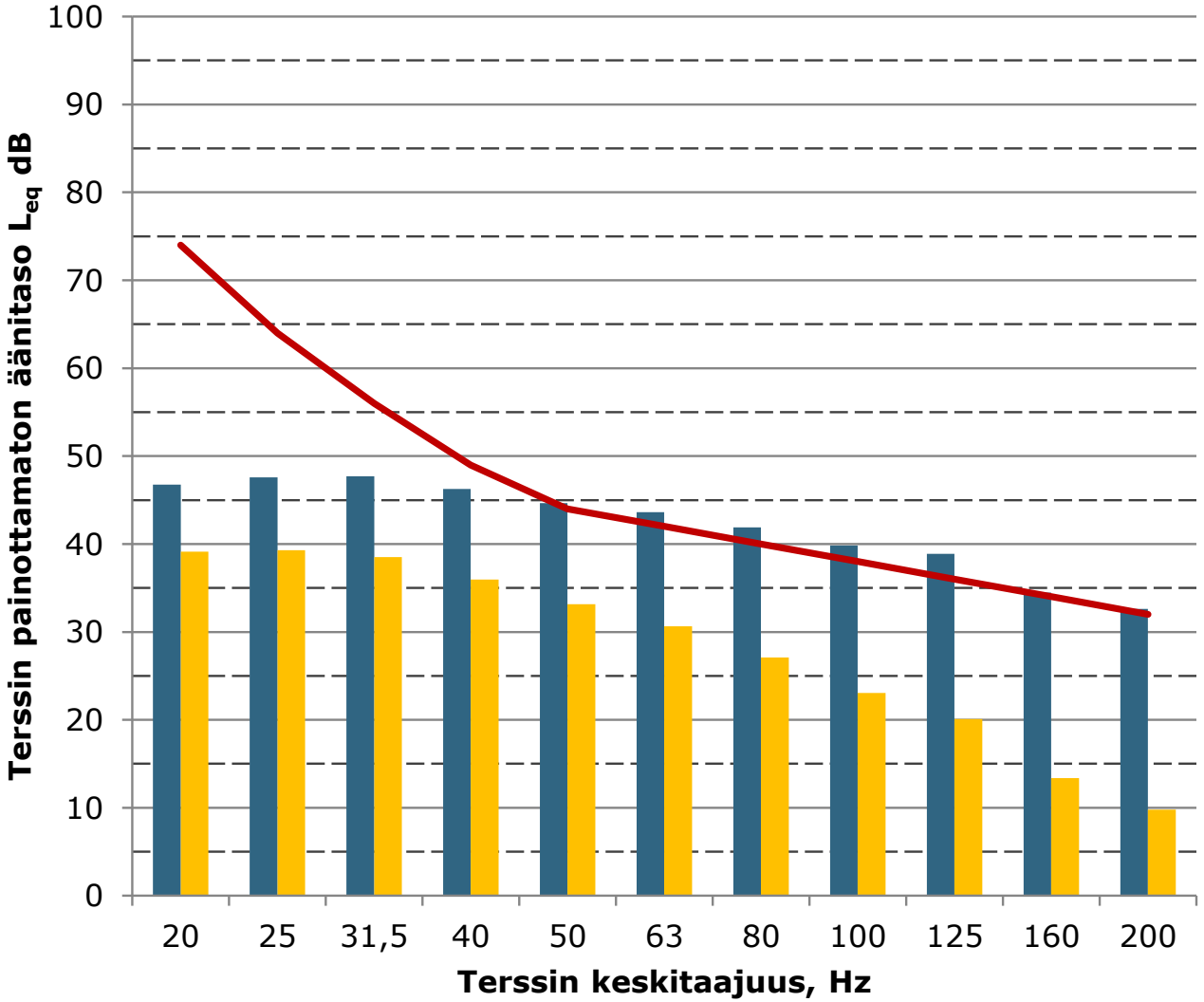
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus I (Asp), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

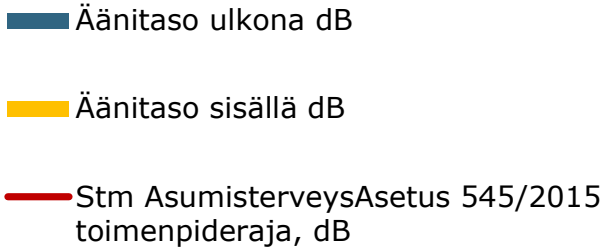




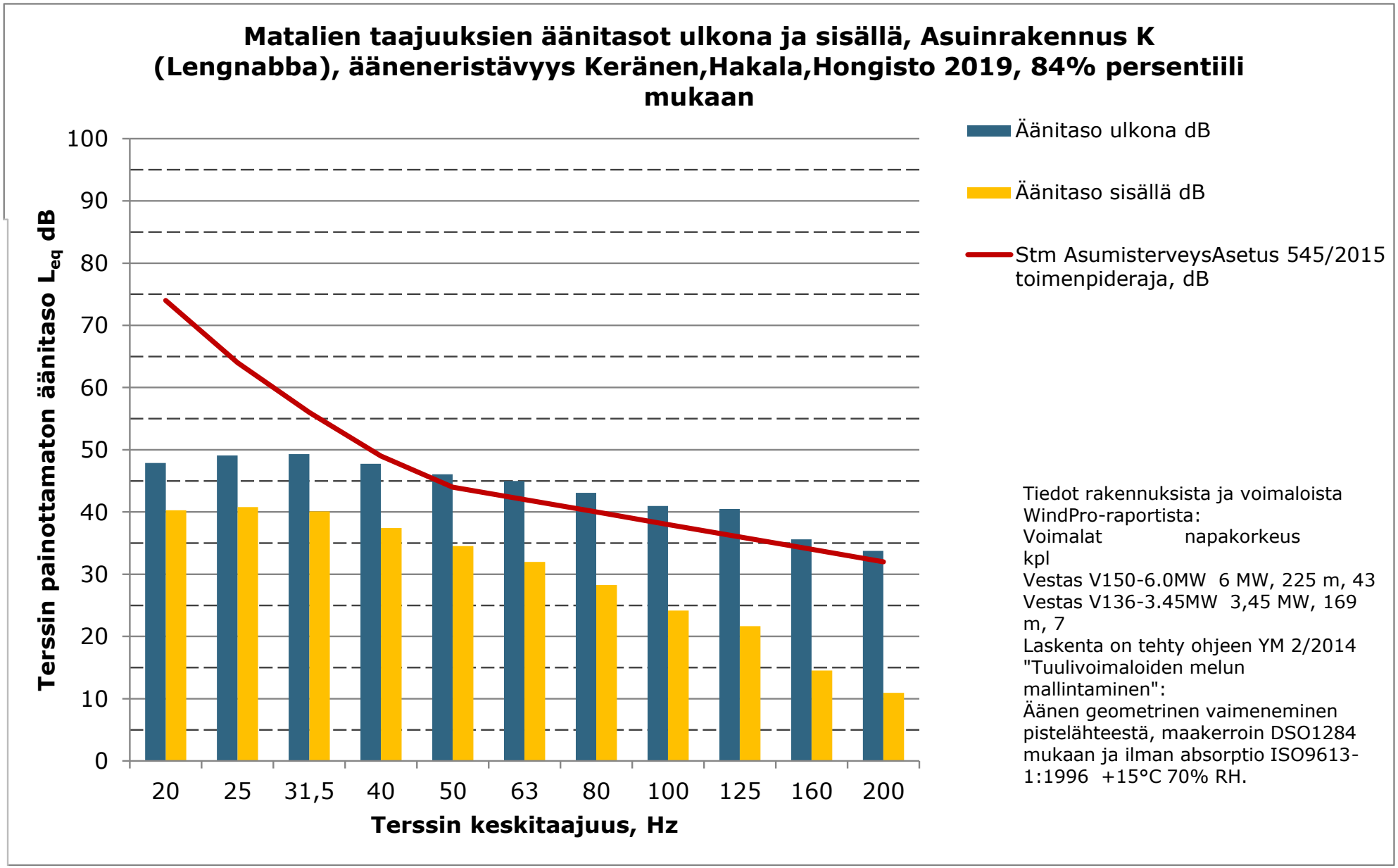
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus J (Stennabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

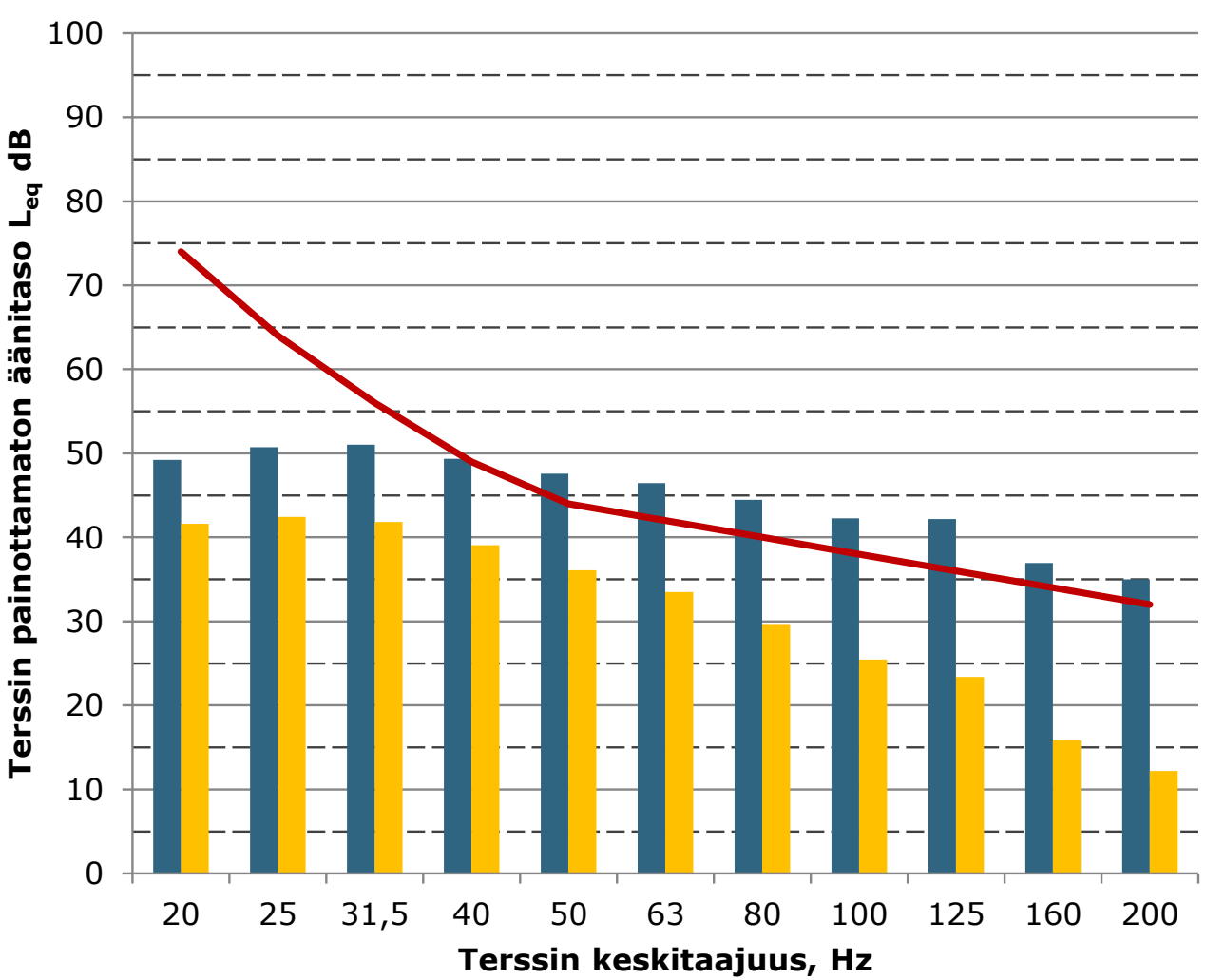


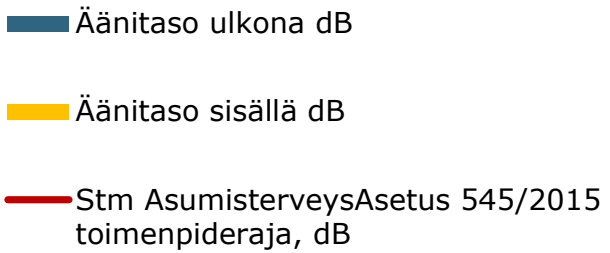


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus K (Lengnabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

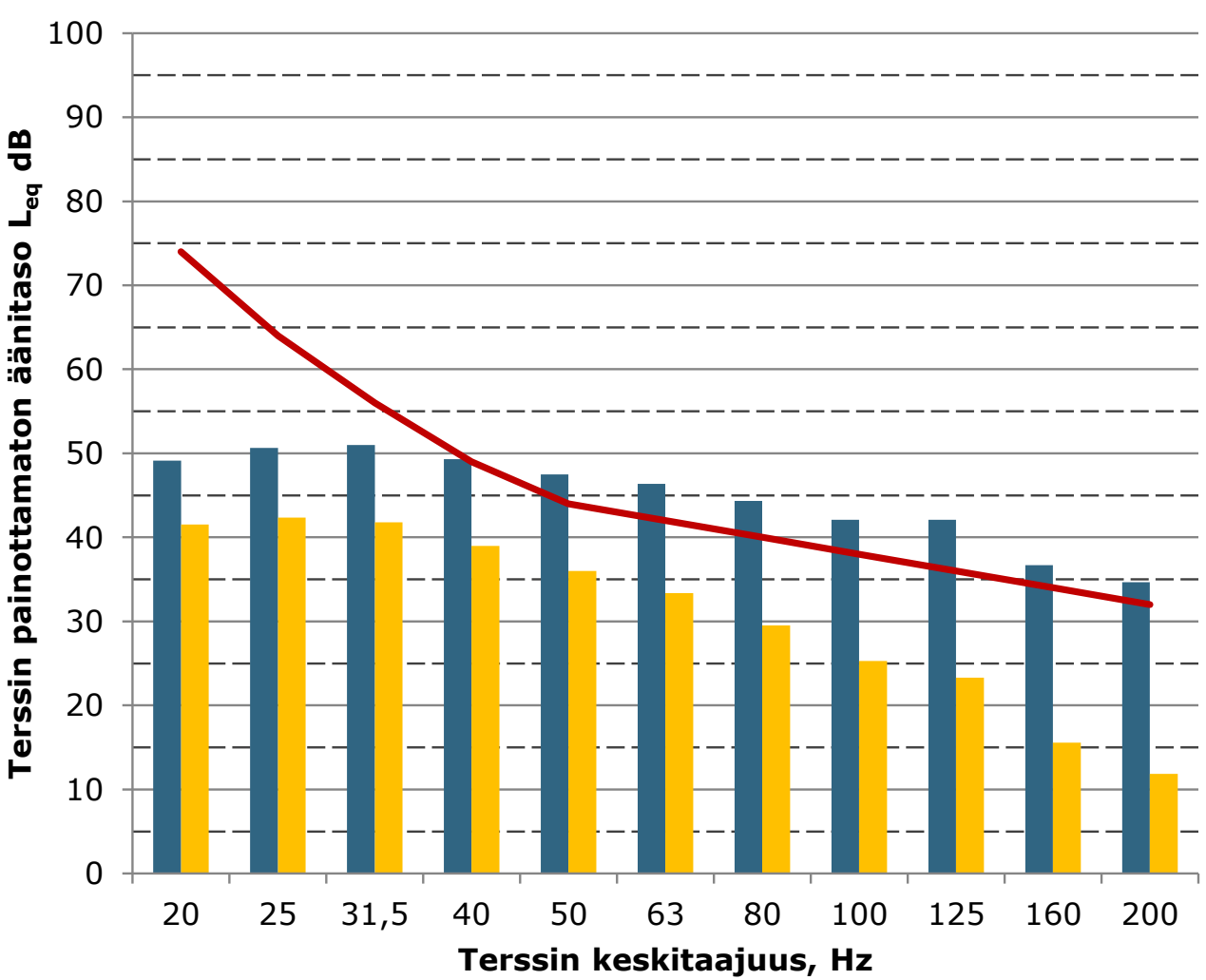
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus L (Evistvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

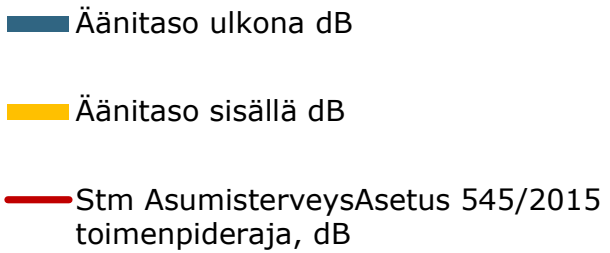




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

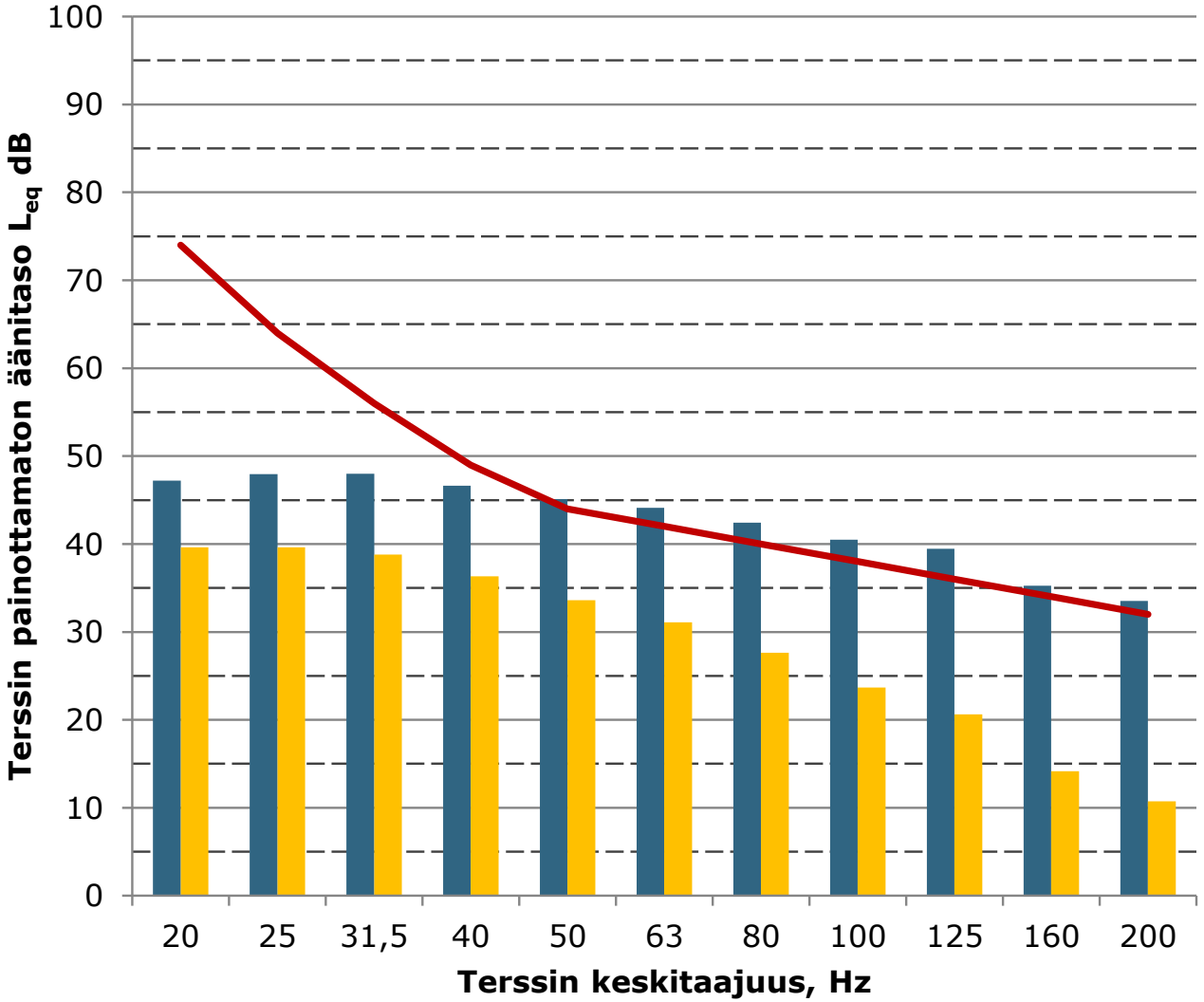
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus M (Stenbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus N (Adler), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

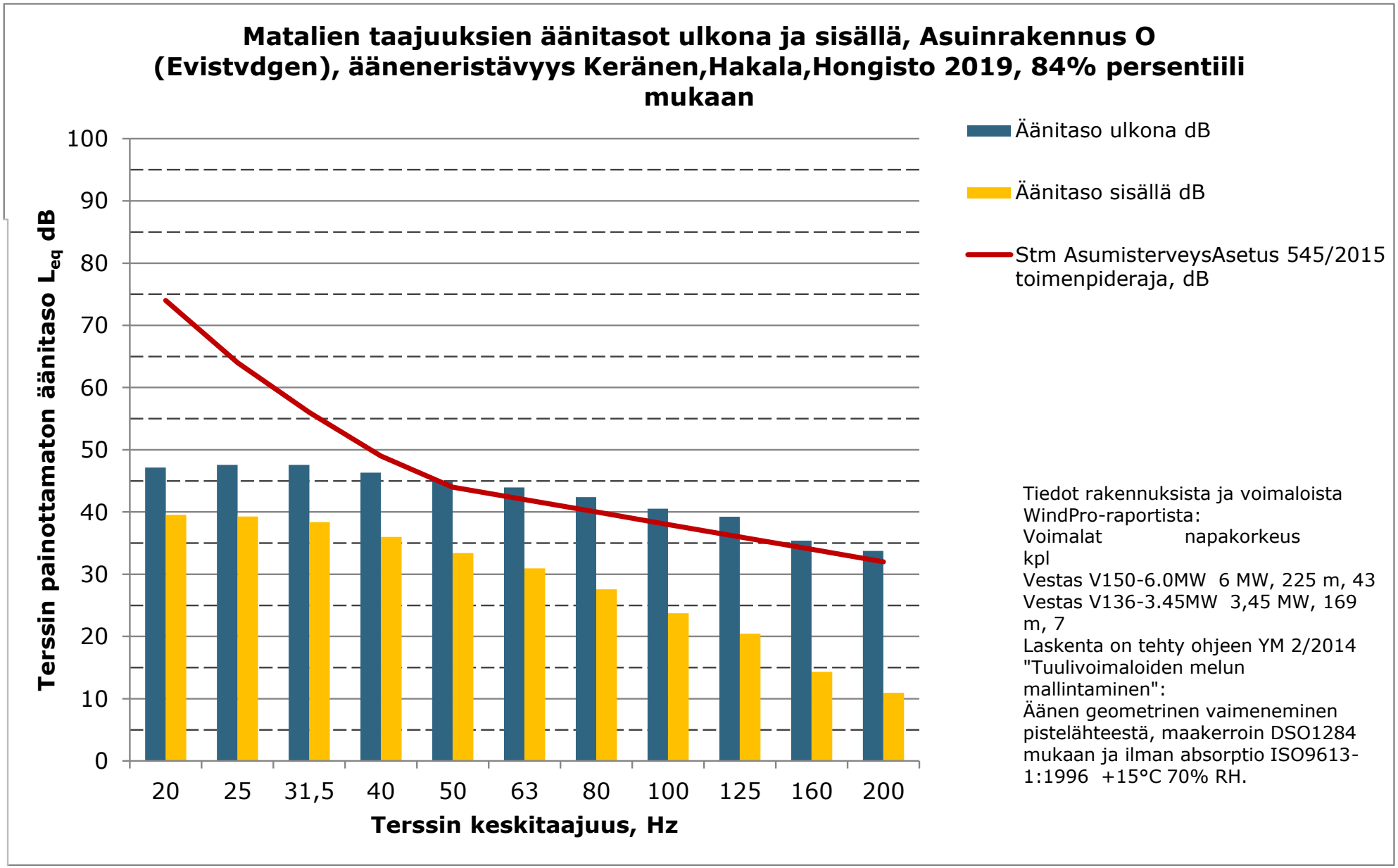


Äänitaso ulkona dB

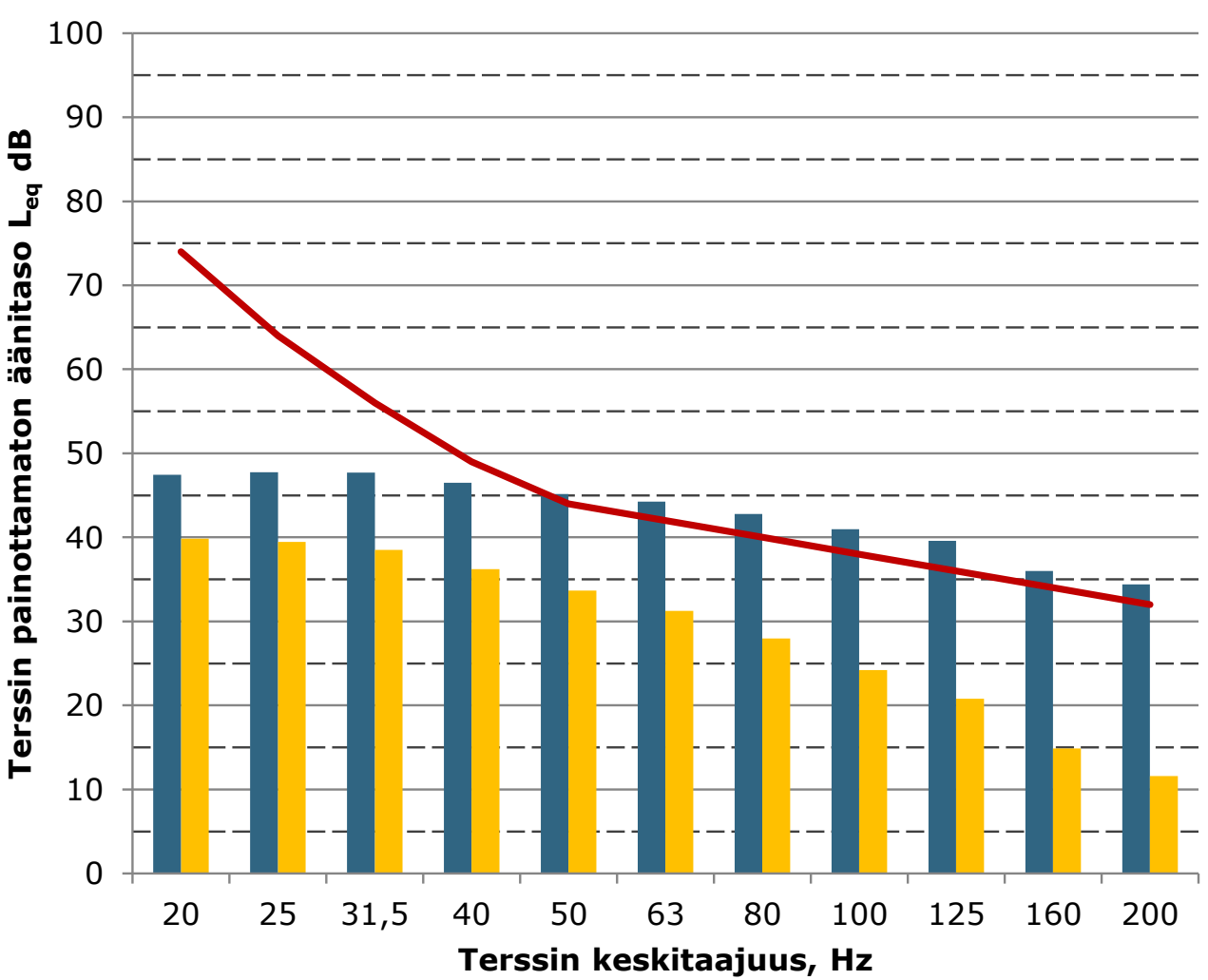
Äänitaso sisällä dB

Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus O (Evistvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus P (Finnabbavdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

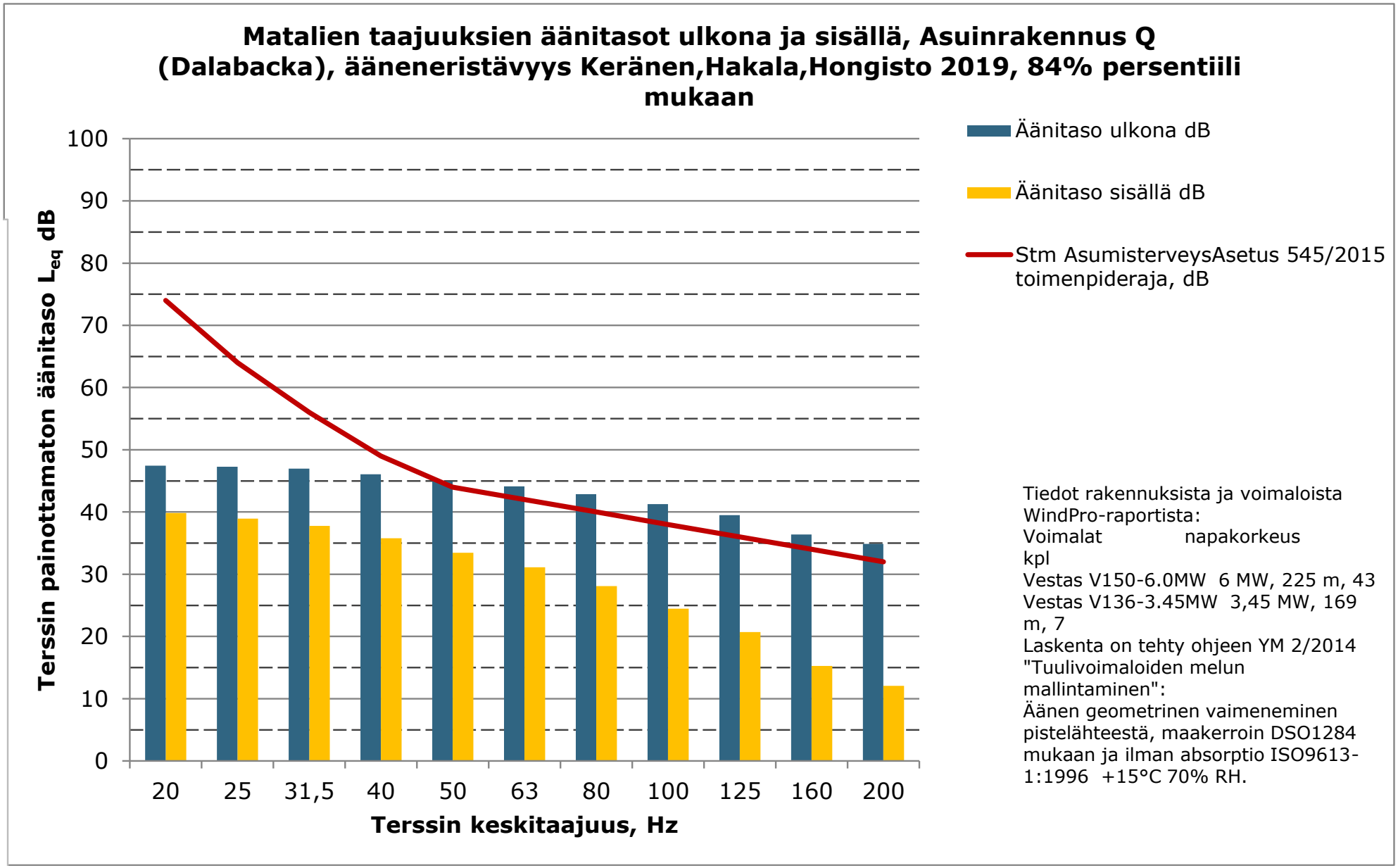


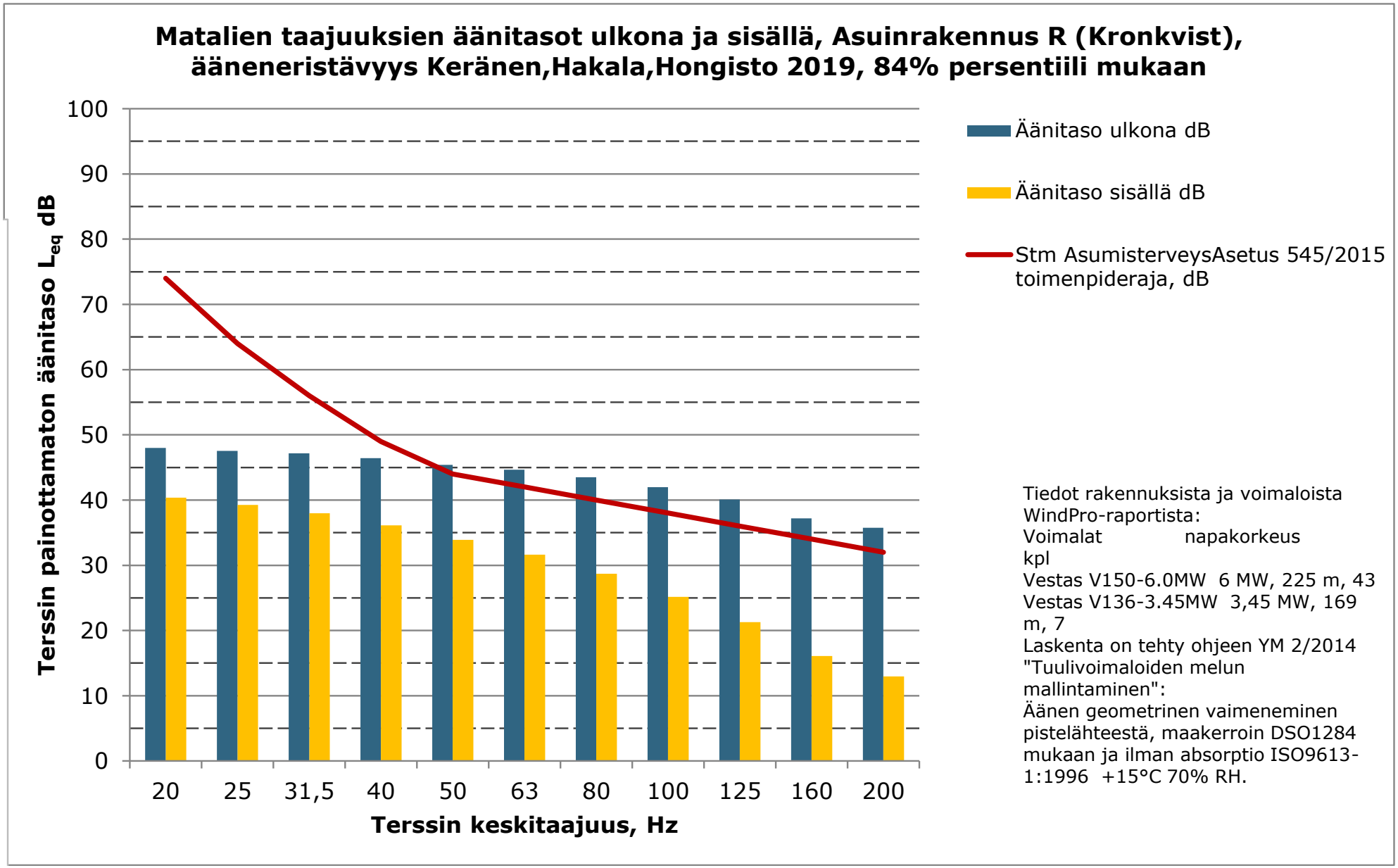
Äänitaso ulkona dB

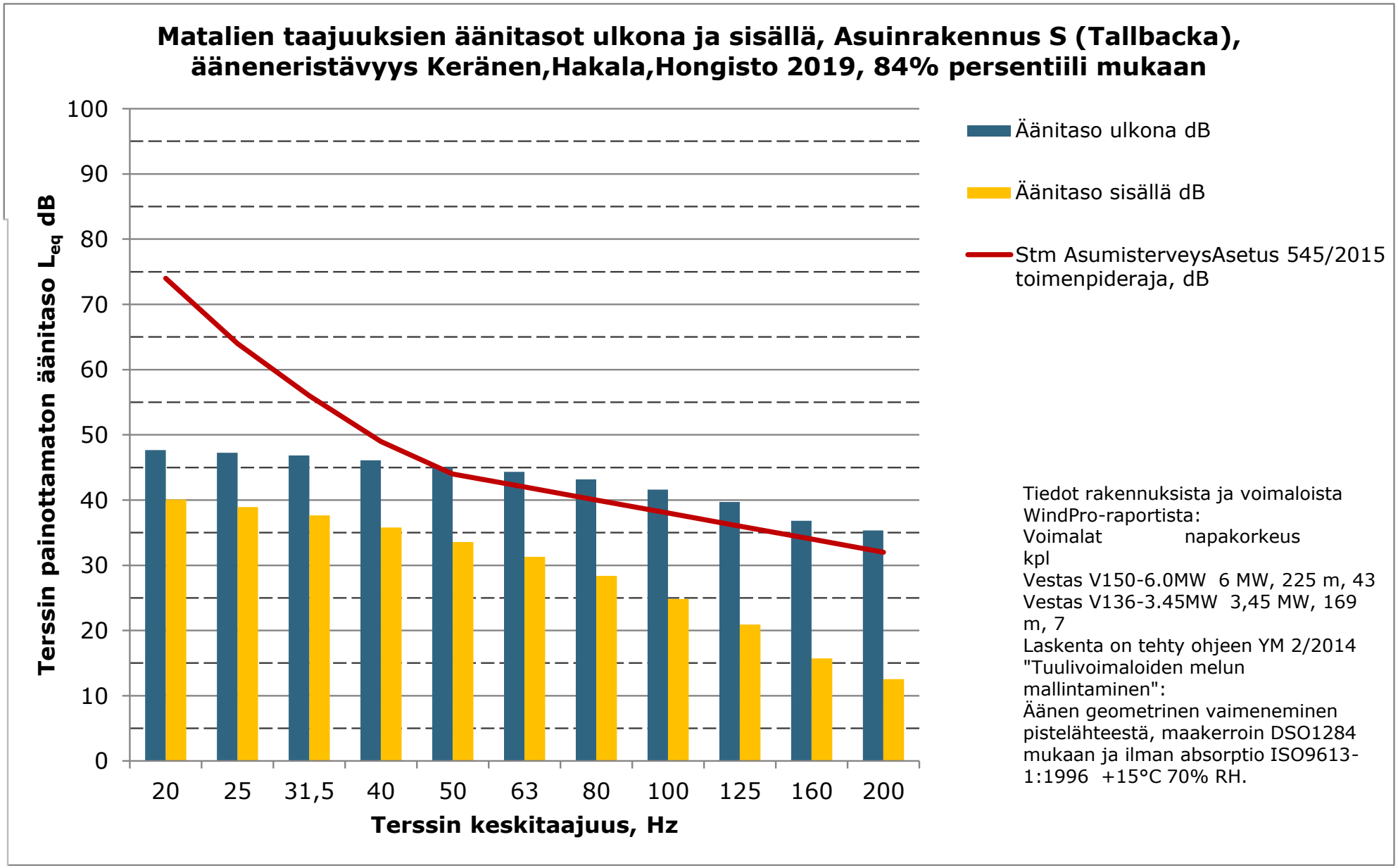
Äänitaso sisällä dB

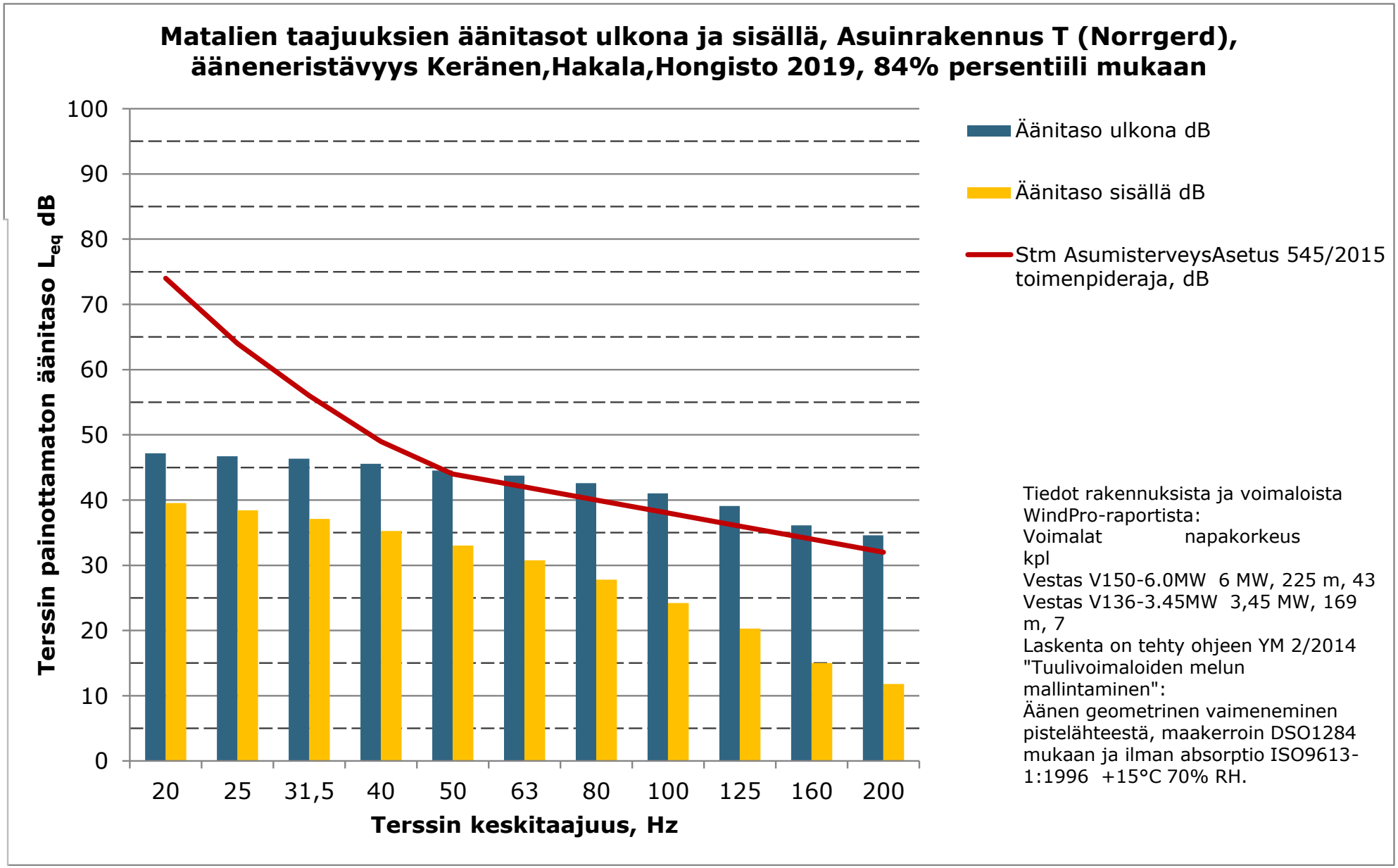
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

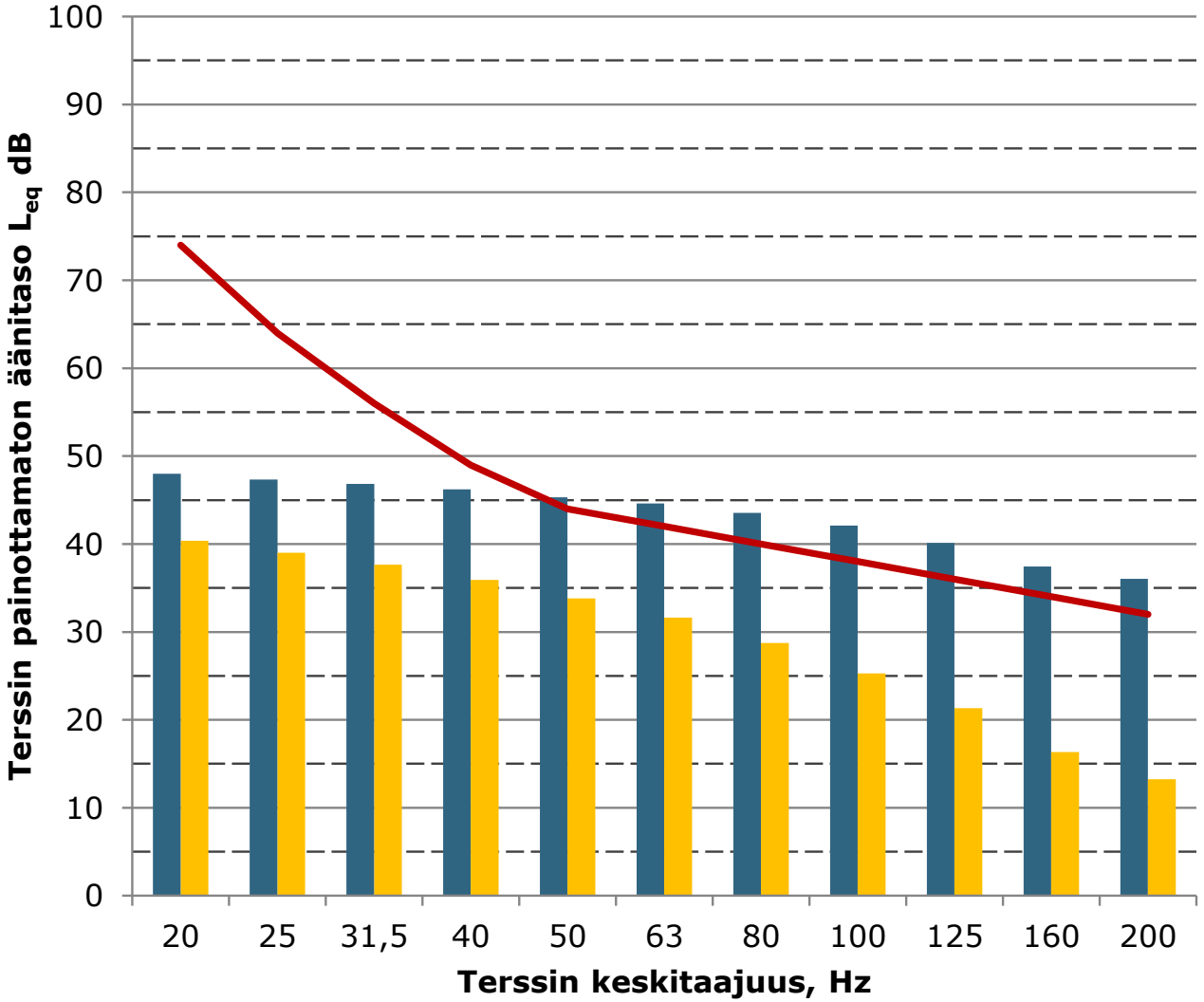

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Q (Dalabacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso Leq dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

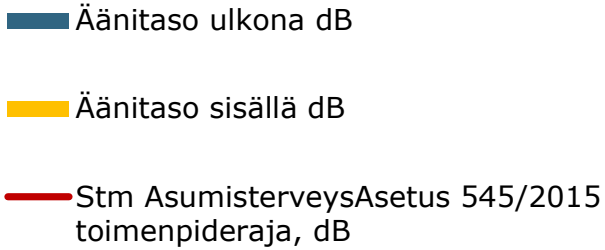

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus R (Kronkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus S (Tallbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

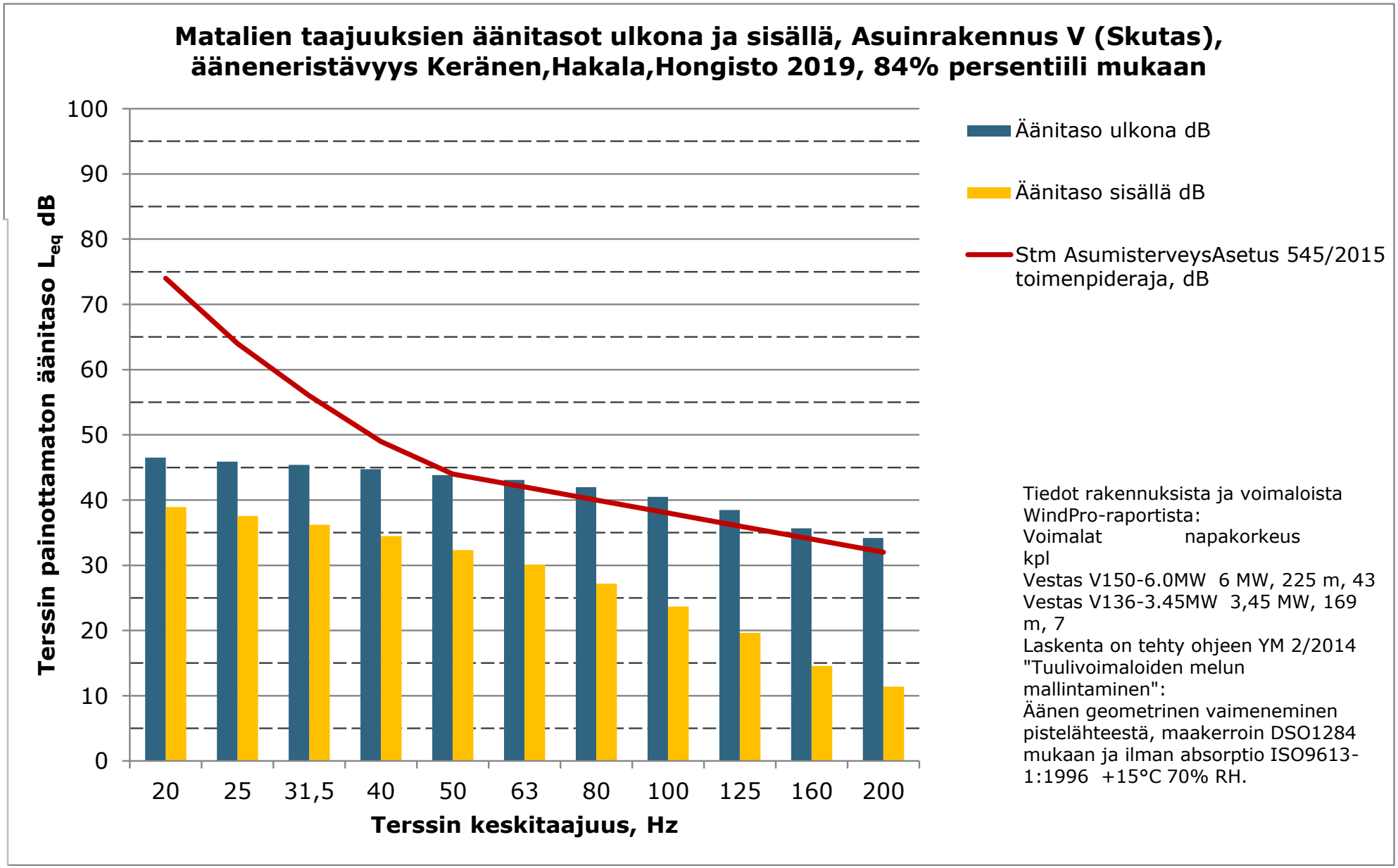

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus T (Norrgerd), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso Leq dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

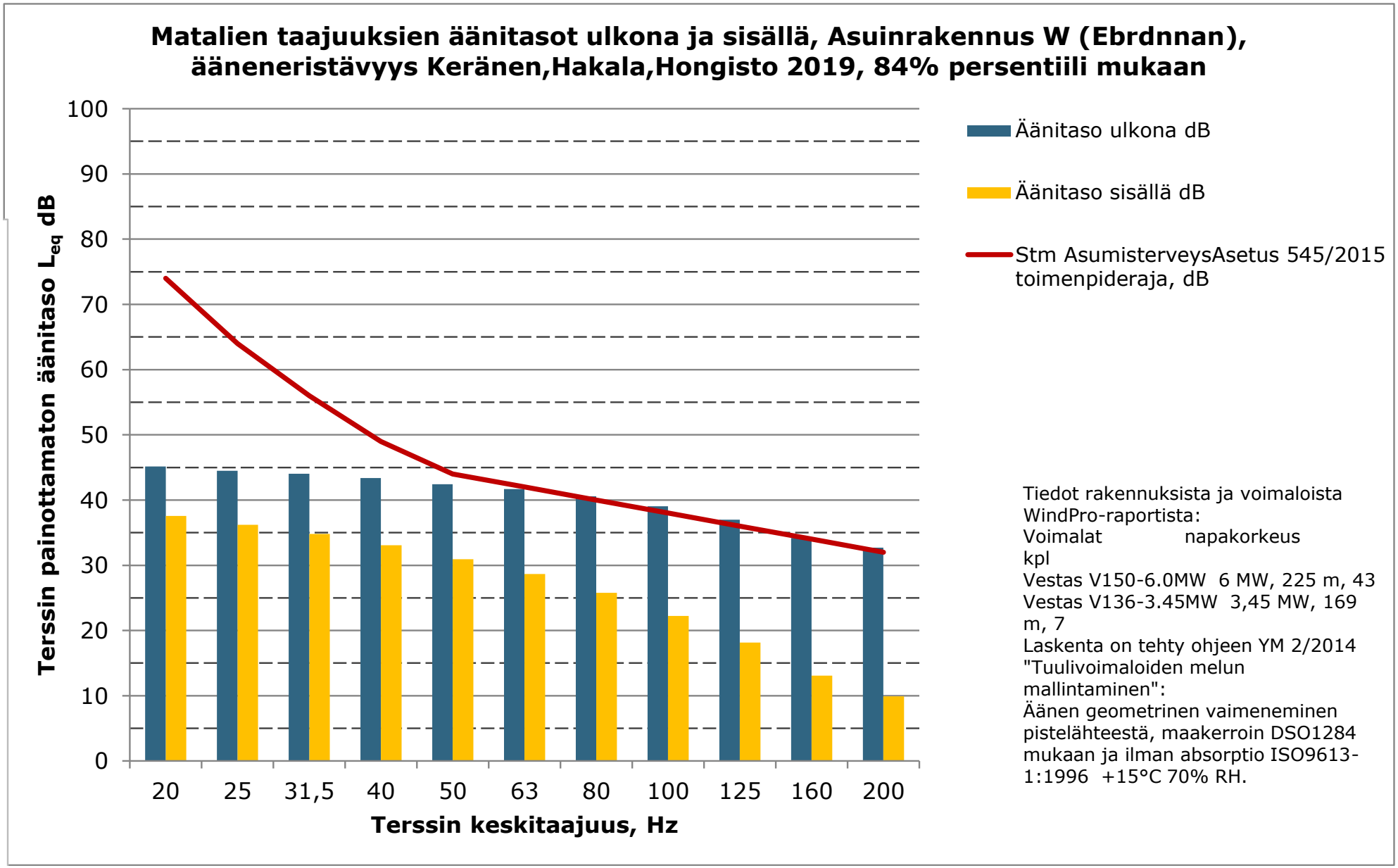
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus U (Nepi), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

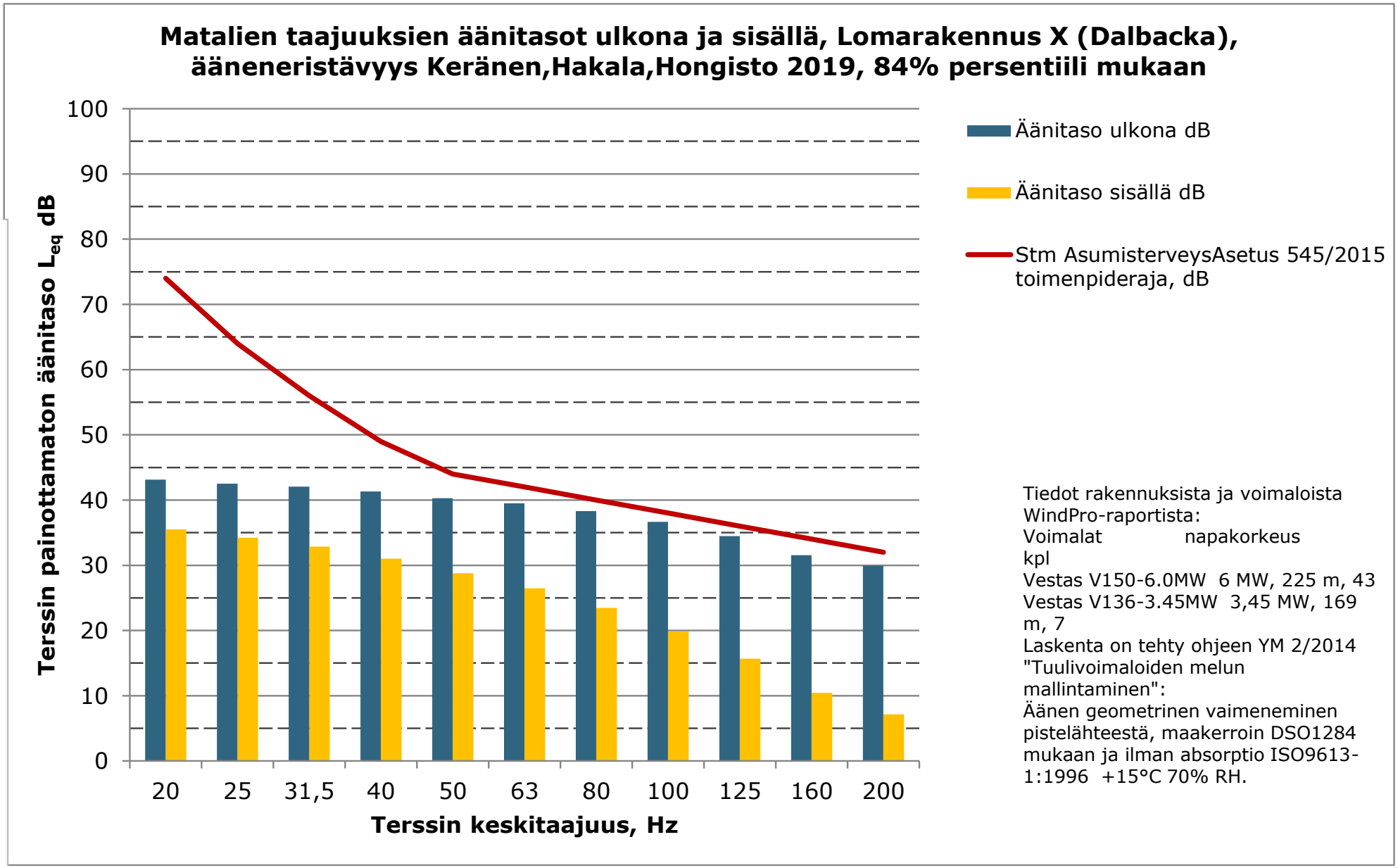


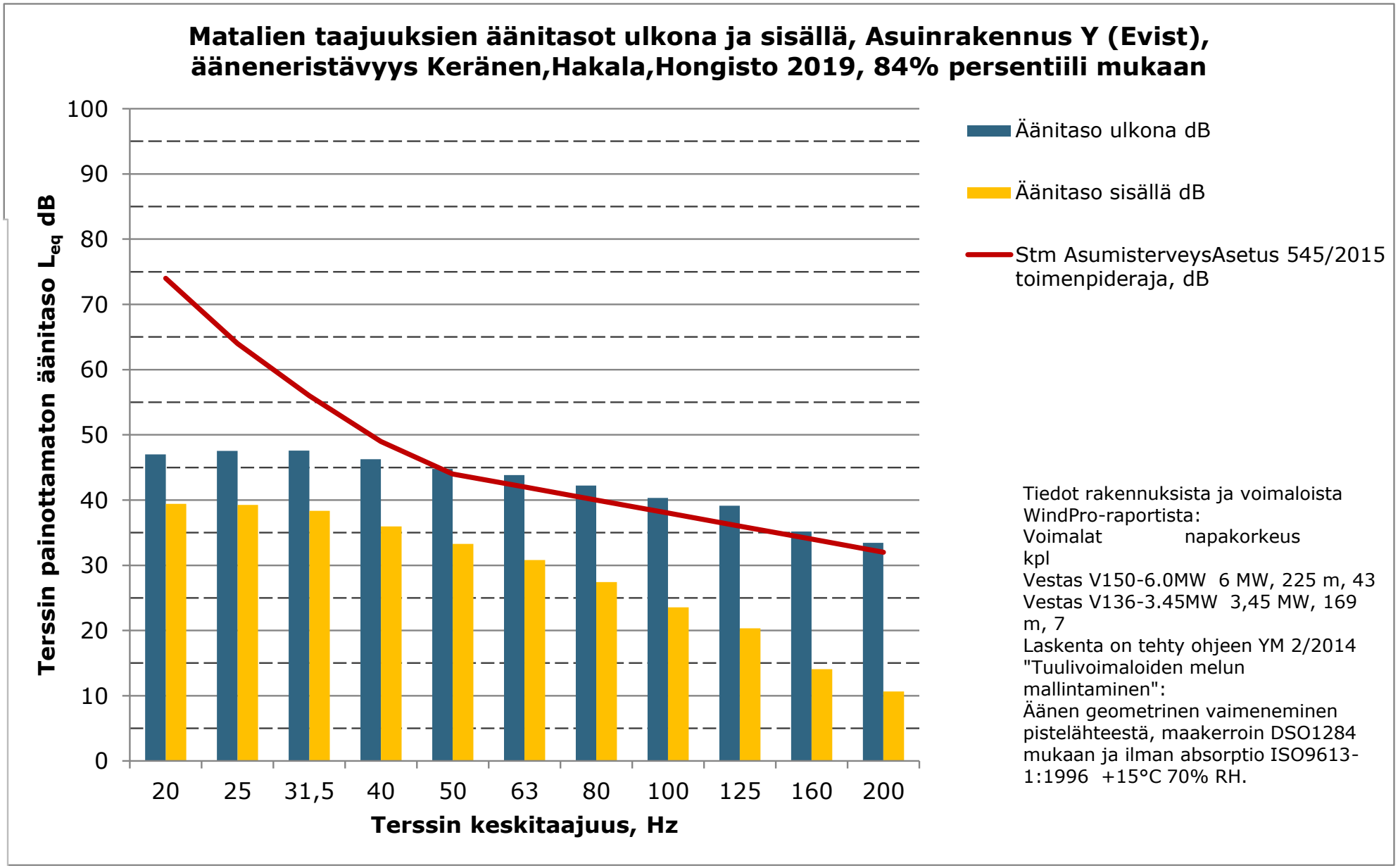


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

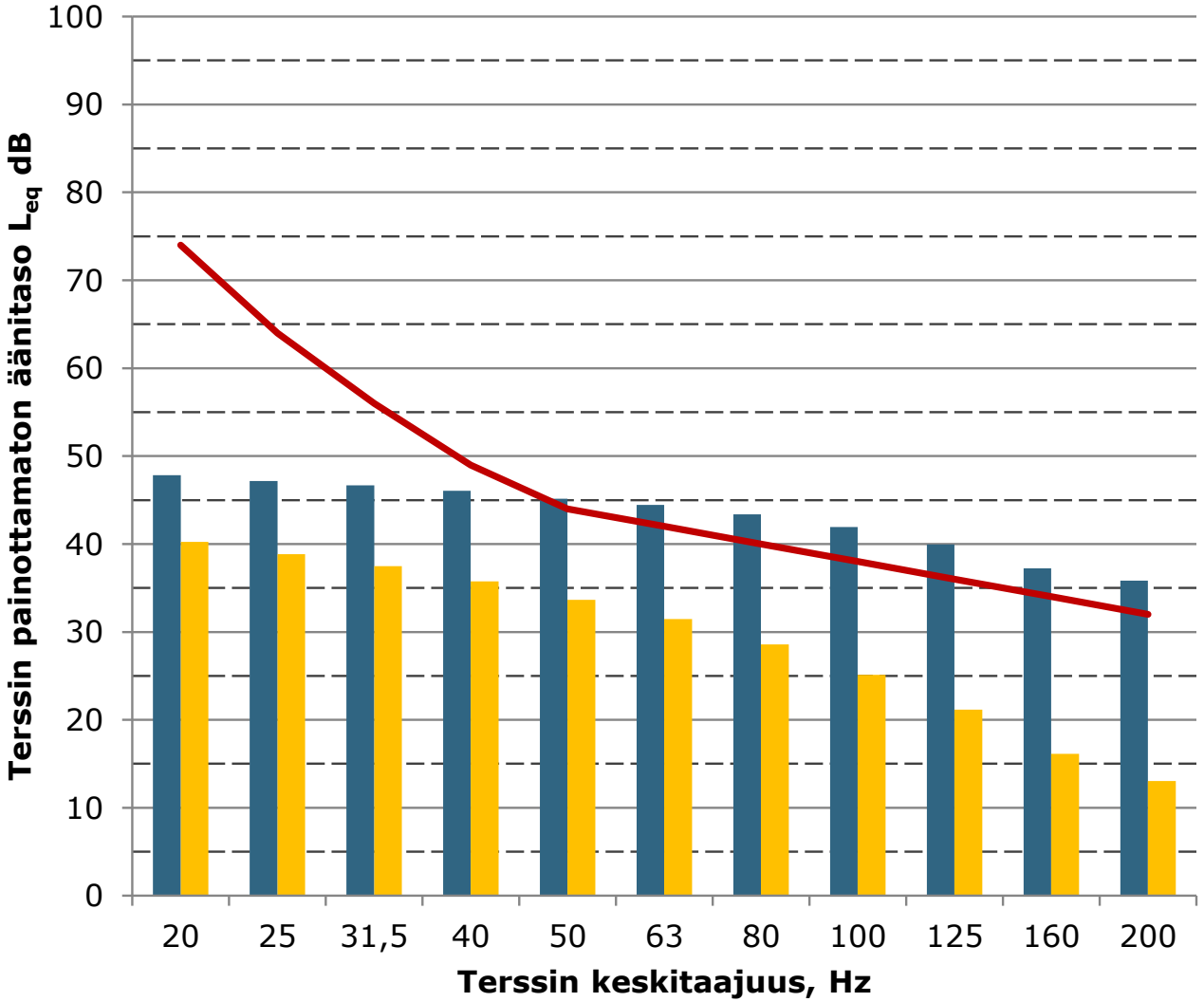

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus V (Skutas), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

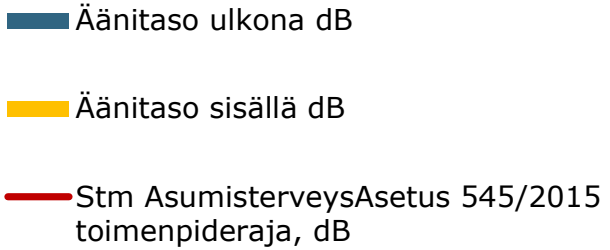

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus W (Ebrdnnan), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus X (Dalbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Y (Evist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

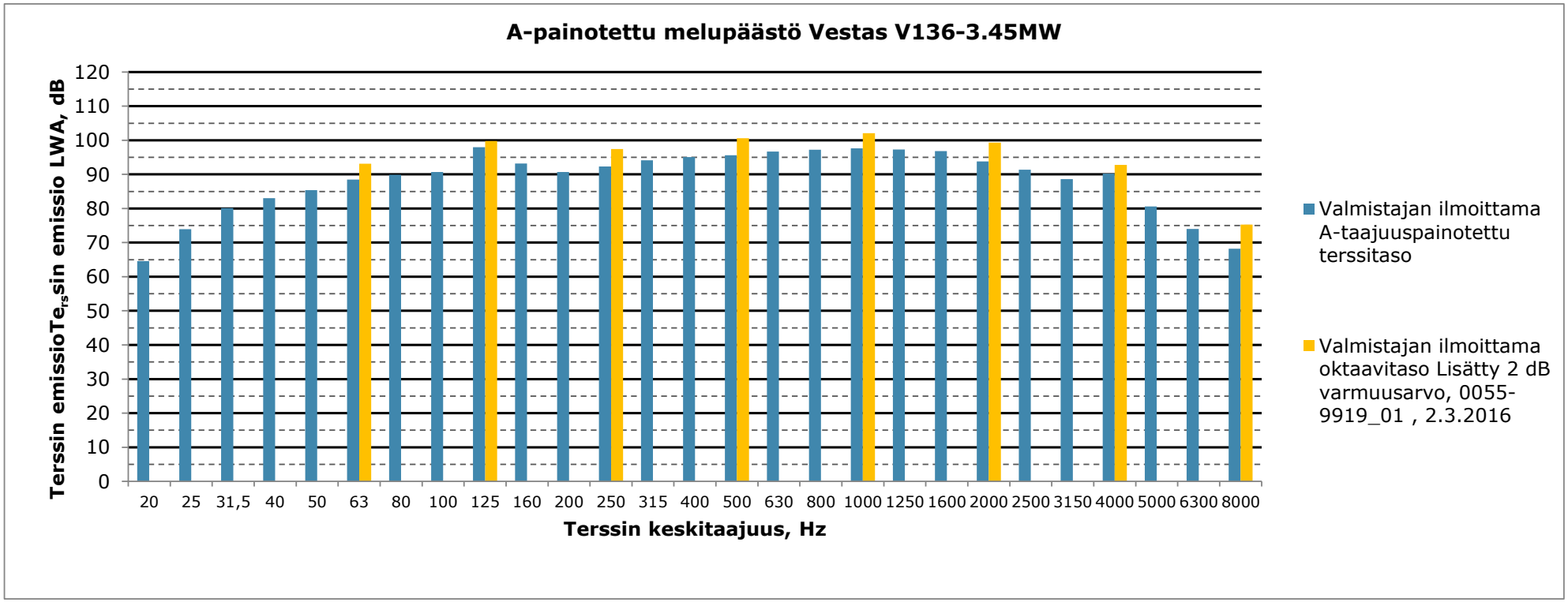
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Z (Nabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

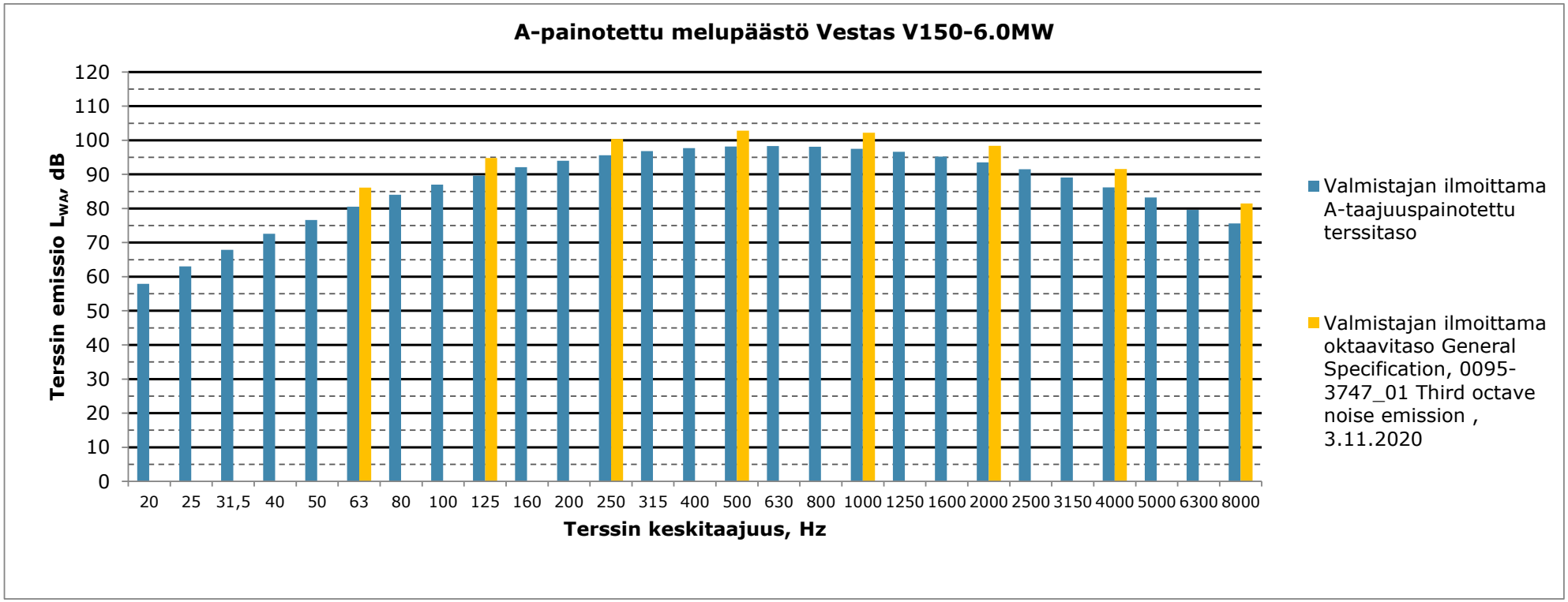


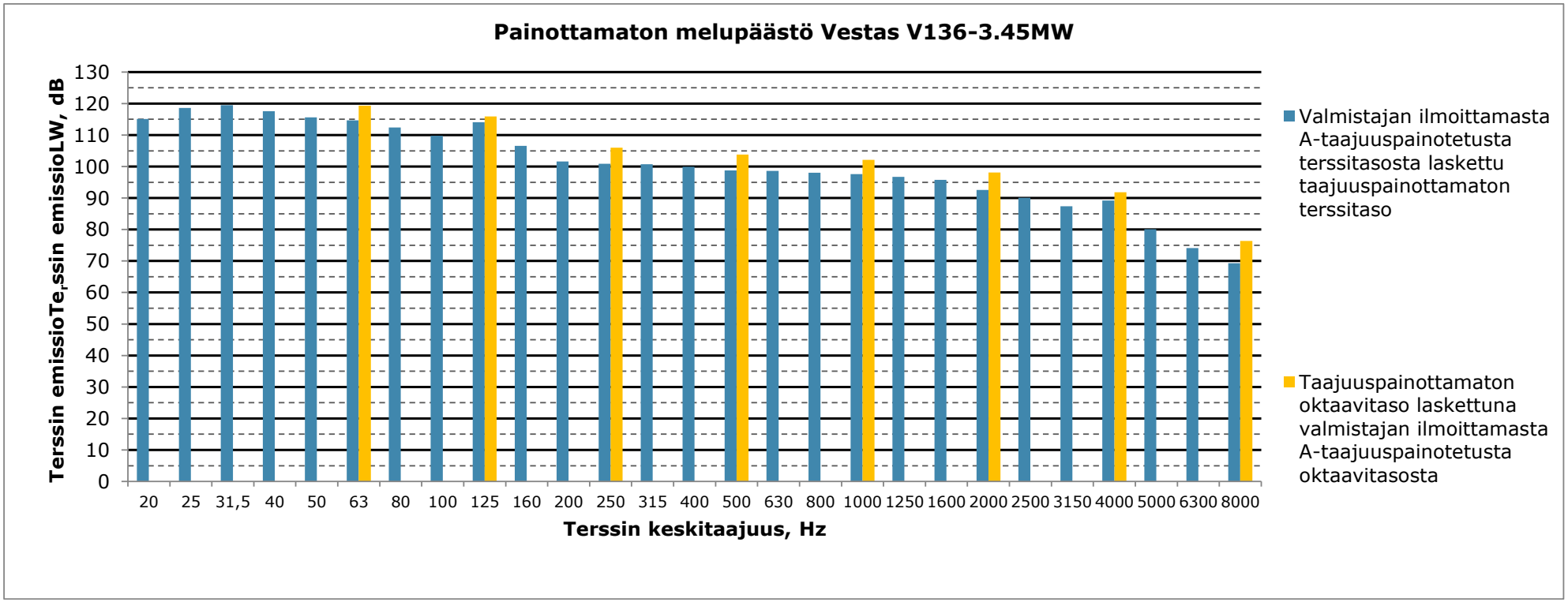


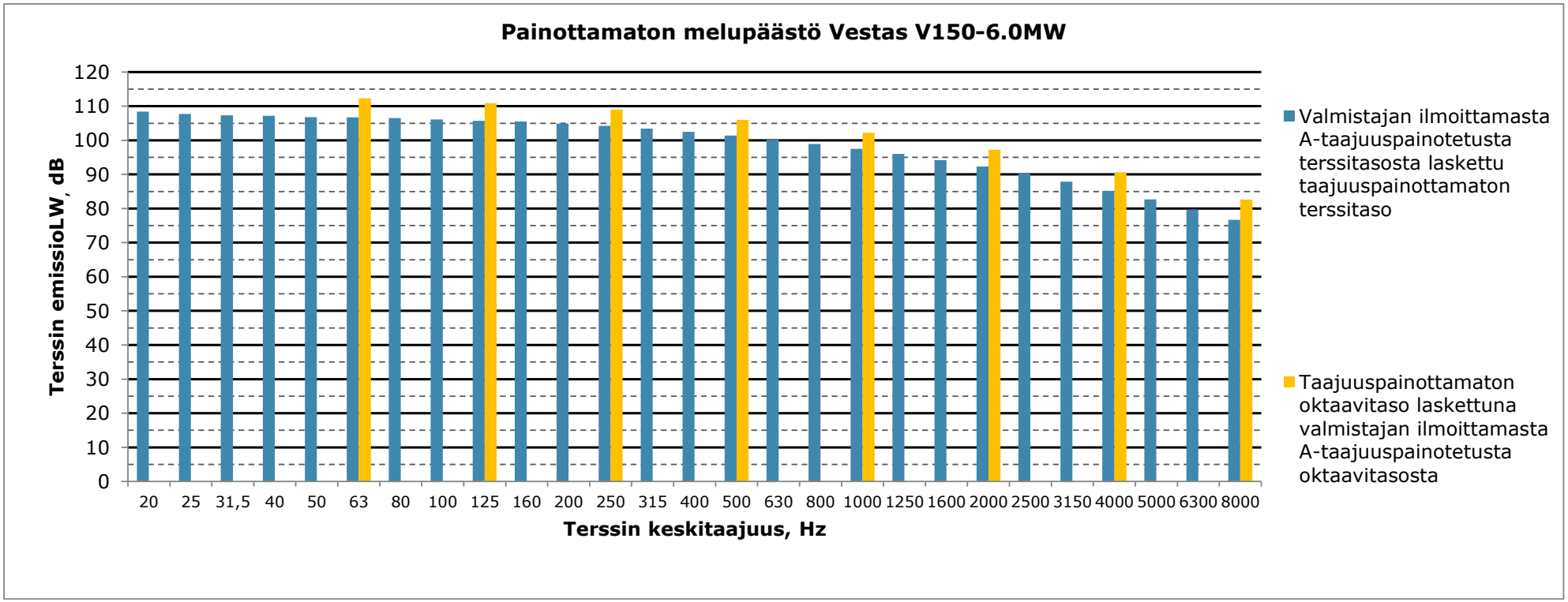
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 43
Vestas V136-3.45MW 3,45 MW, 169 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

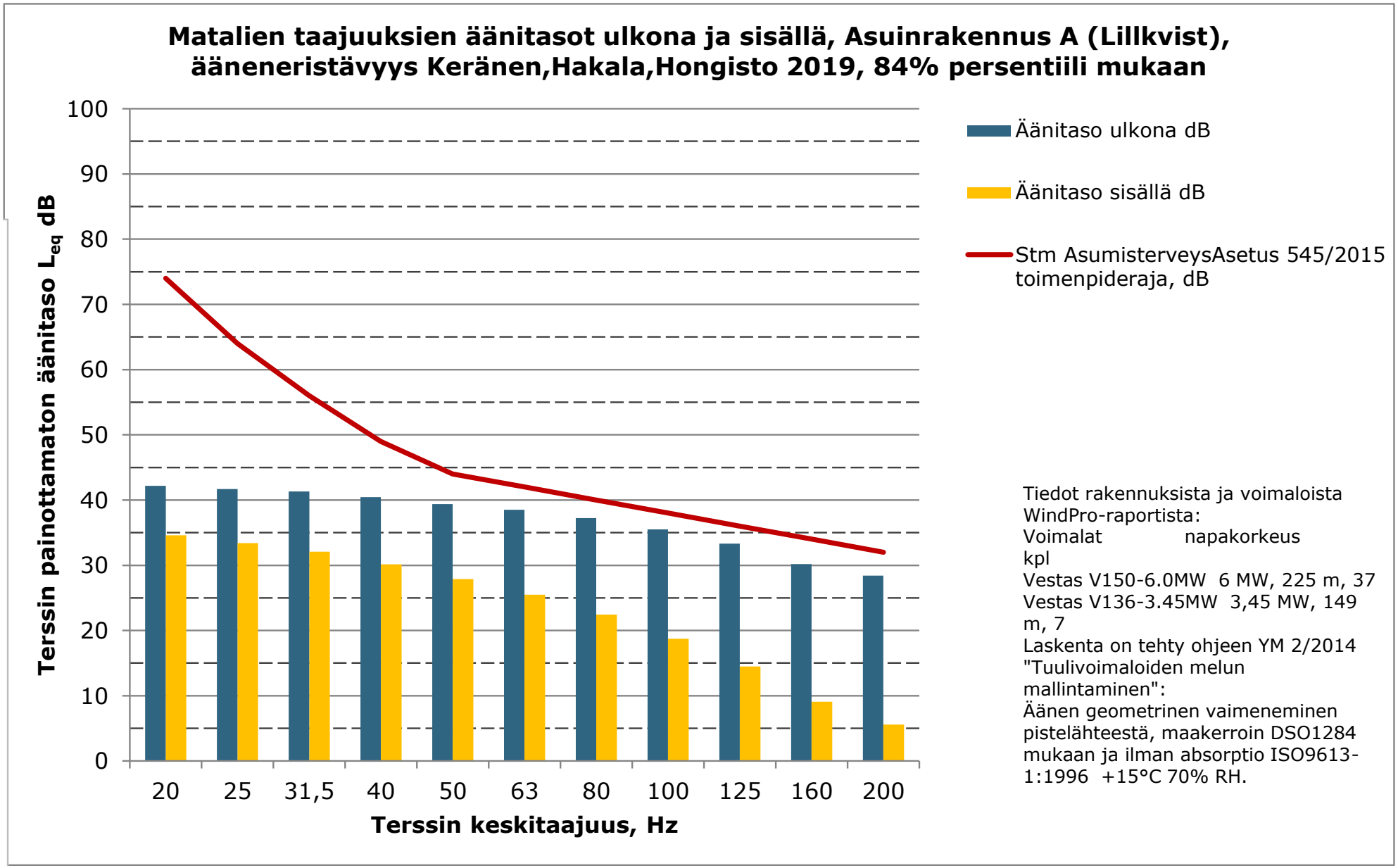
Bilaga 7. Purmo vindkraftsprojekt – värden för lågfrekvent buller vid olika byggnader ALT2 V150 – 6.0 MW tillsammans med Salo–Ylikoski-projektet.

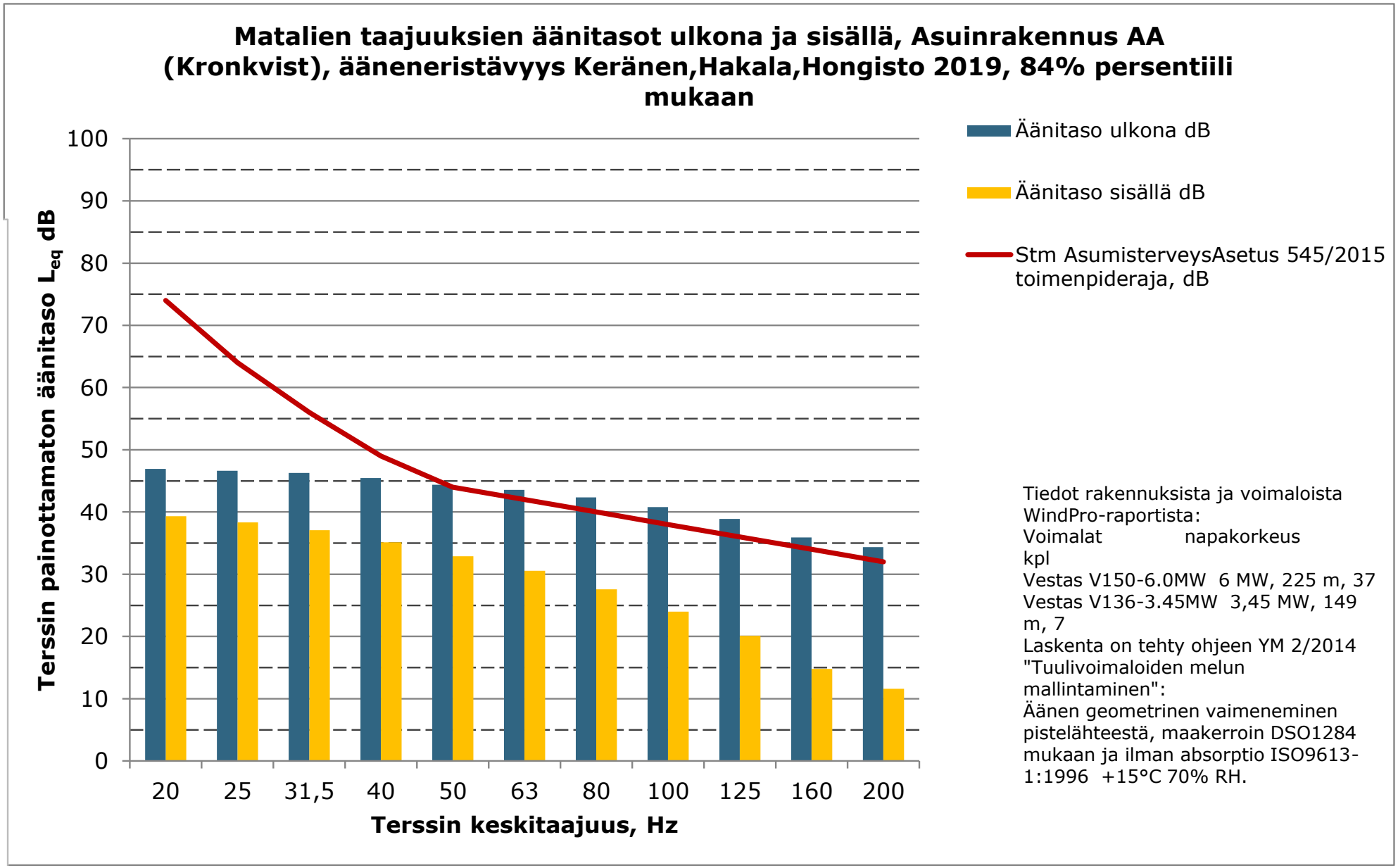

A-painotettu melupäästö Vestas V136-3.45MW
Terssin emissioTe$_{rs}$sin emissio LWA, dB
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittama A-taajuuspainotettu terssitaso
Valmistajan ilmoittama oktaavitaso Lisätty 2 dB varmuusarvo, 0055-9919_01 , 2.3.2016

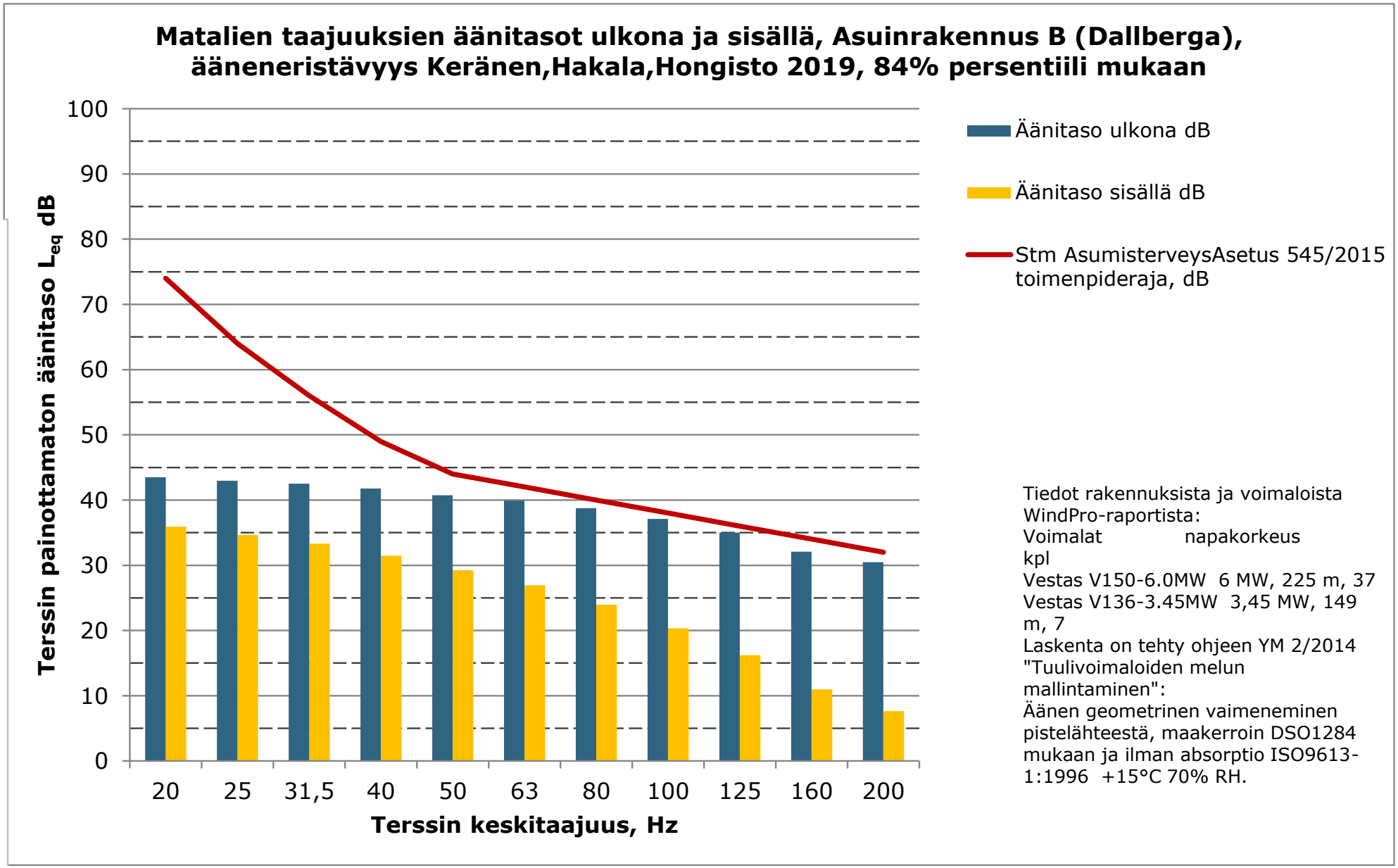

A-painotettu melupäästö Vestas V150-6.0MW
Terssin emissio L_{WA} dB
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittama A-taajuuspainotettu terssitaso
Valmistajan ilmoittama oktaavitaso General Specification, 0095-3747_01 Third octave noise emission , 3.11.2020

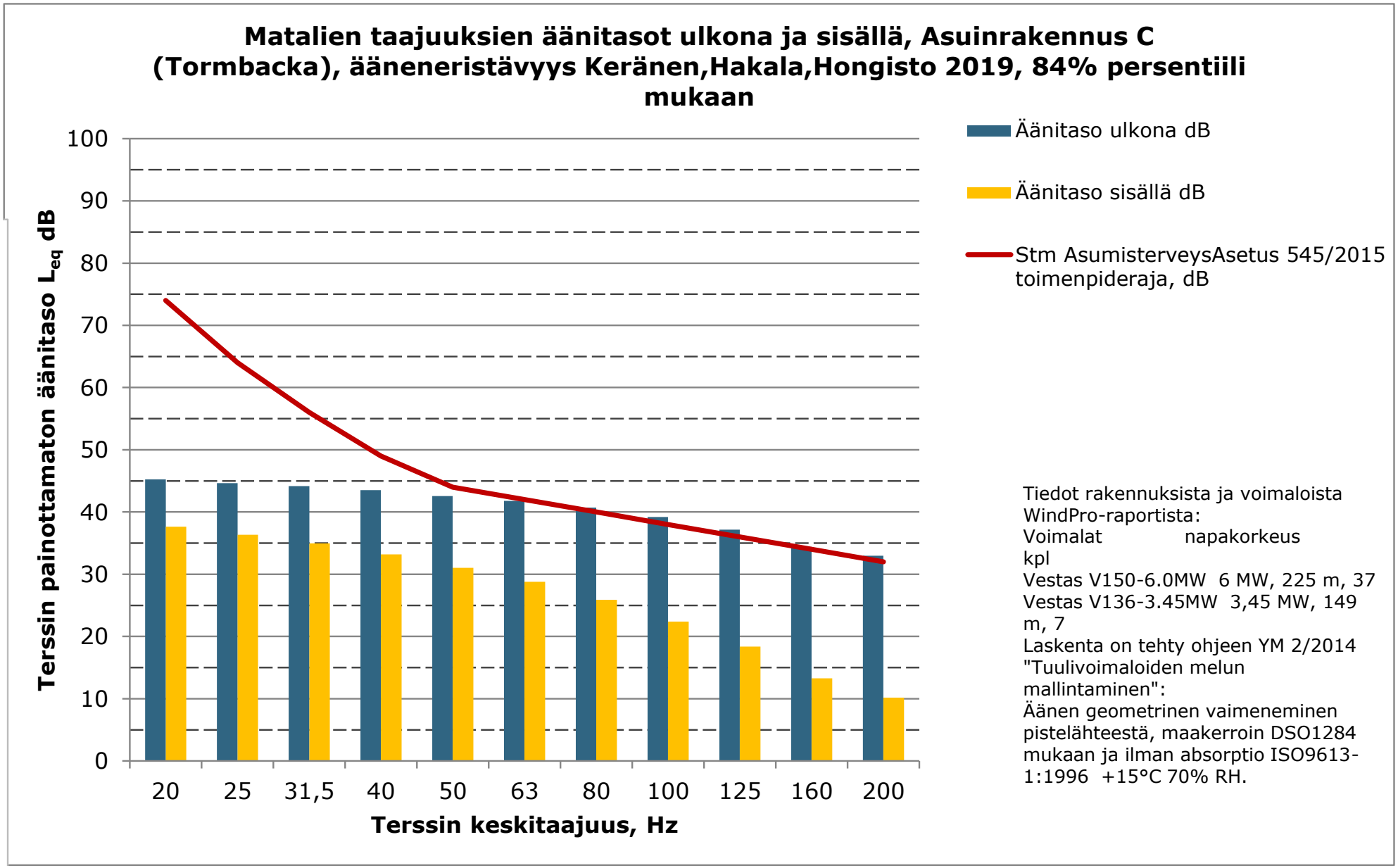

Painottamaton melupäästö Vestas V136-3.45MW
Terssin emissioTe,ssin emissioLW, dB
0
10
20
30
40
50
60
70
80
90
100
110
120
130
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittamasta A-taajuuspainotetusta terssitasosta laskettu taajuuspainottamaton terssitaso
Taajuuspainottamaton oktaavitaso laskettuna valmistajan ilmoittamasta A-taajuuspainotetusta oktaavitasosta


Painottamaton melupäästö Vestas V150-6.0MW
Terssin emissioLW, dB
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittamasta A-taajuuspainotetusta terssitasosta laskettu taajuuspainottamaton terssitaso
Taajuuspainottamaton oktaavitaso laskettuna valmistajan ilmoittamasta A-taajuuspainotetusta oktaavitasosta

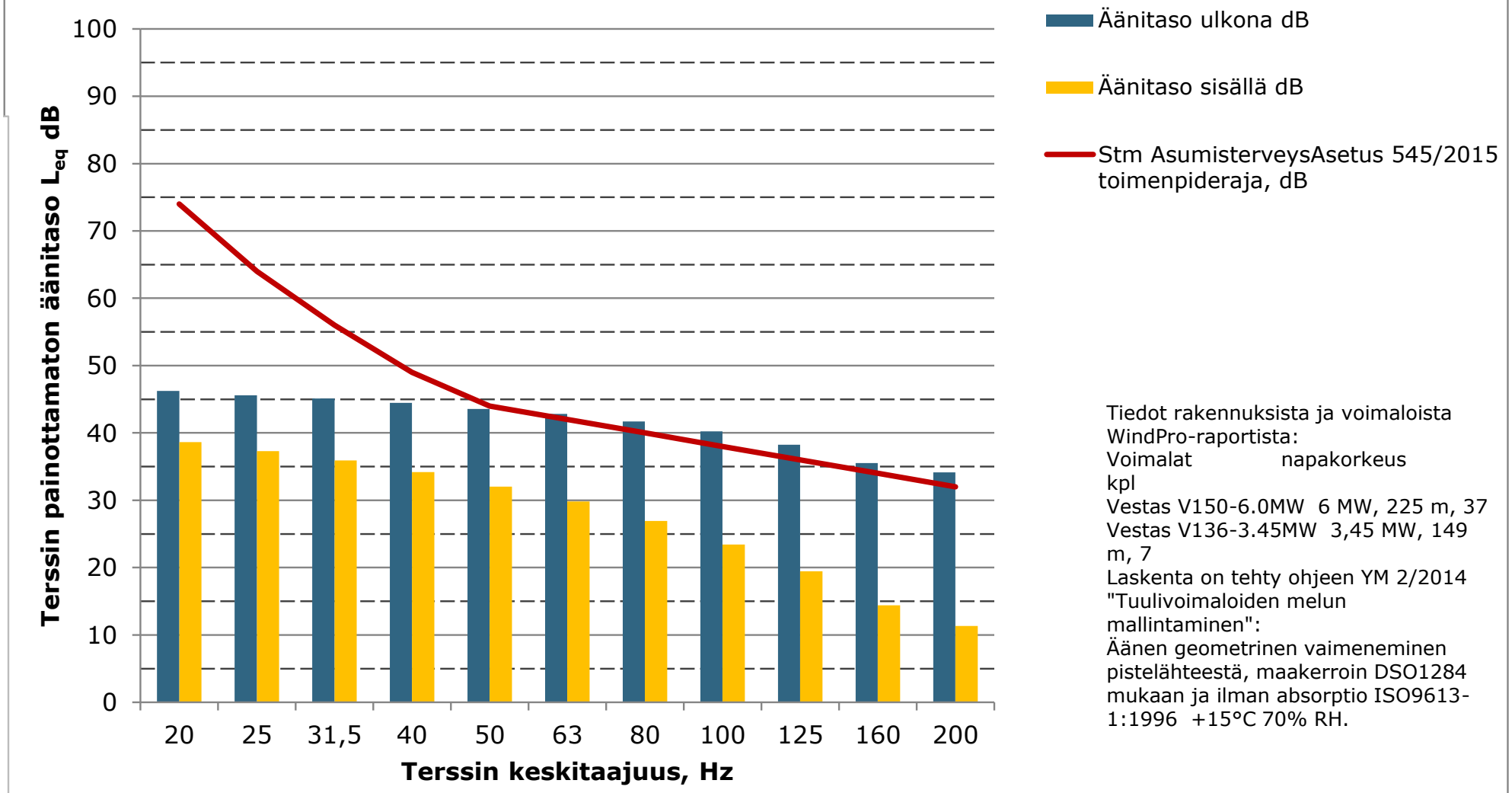

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus A (Lillkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus AA (Kronkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus B (Dallberga), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

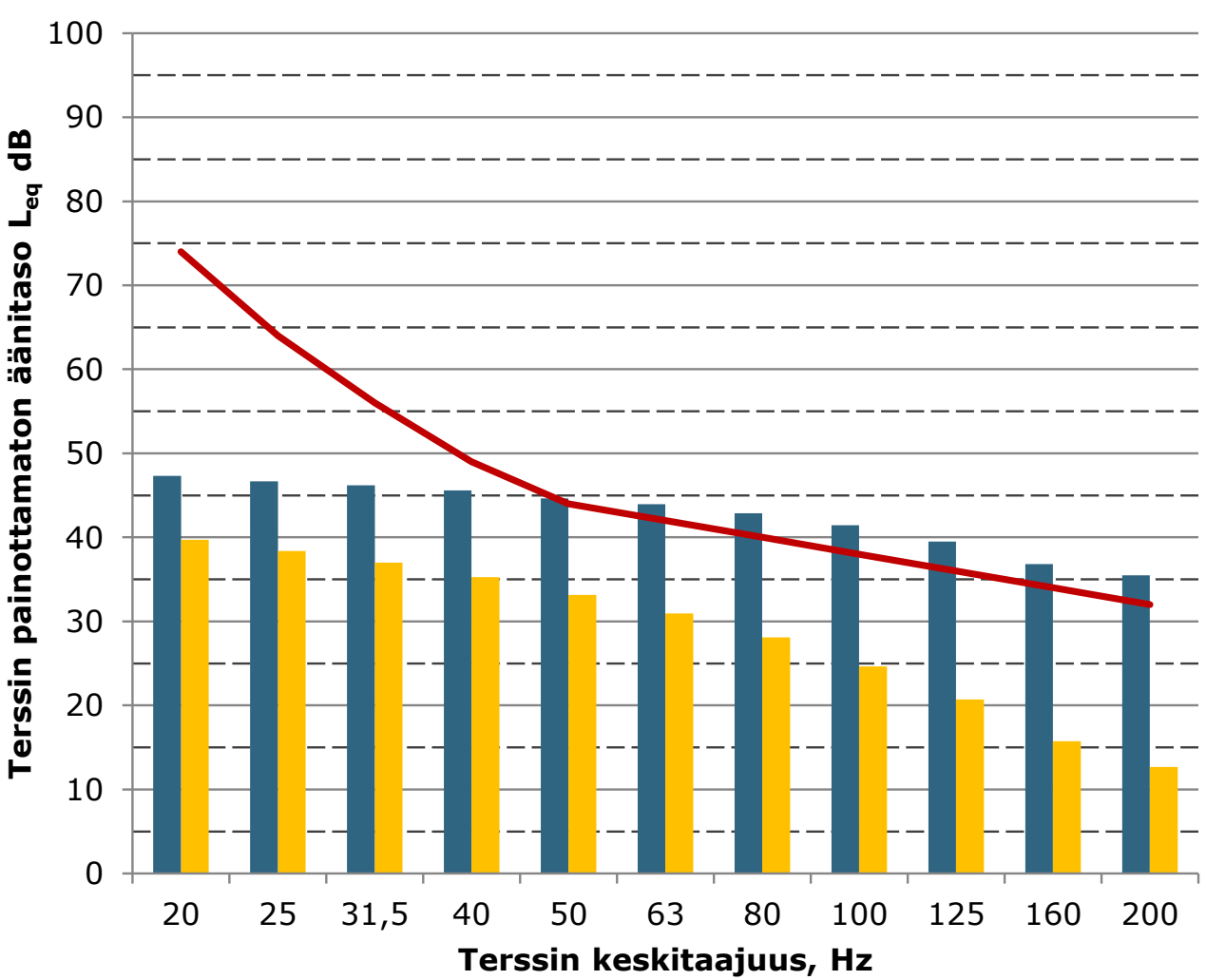

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus C (Tormbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

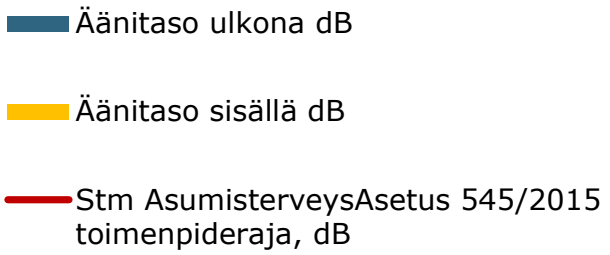
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus D (Kalltrdskvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



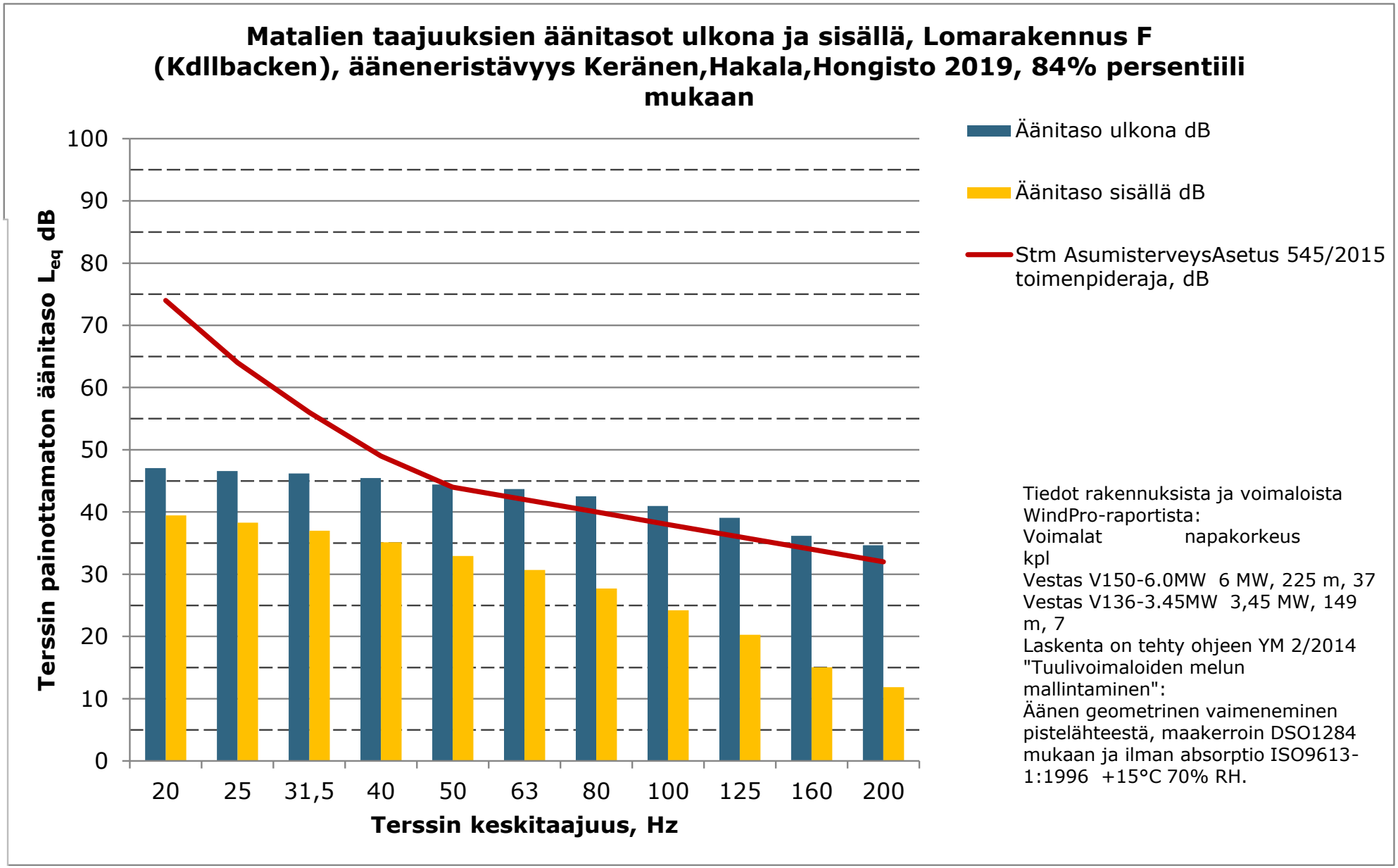
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

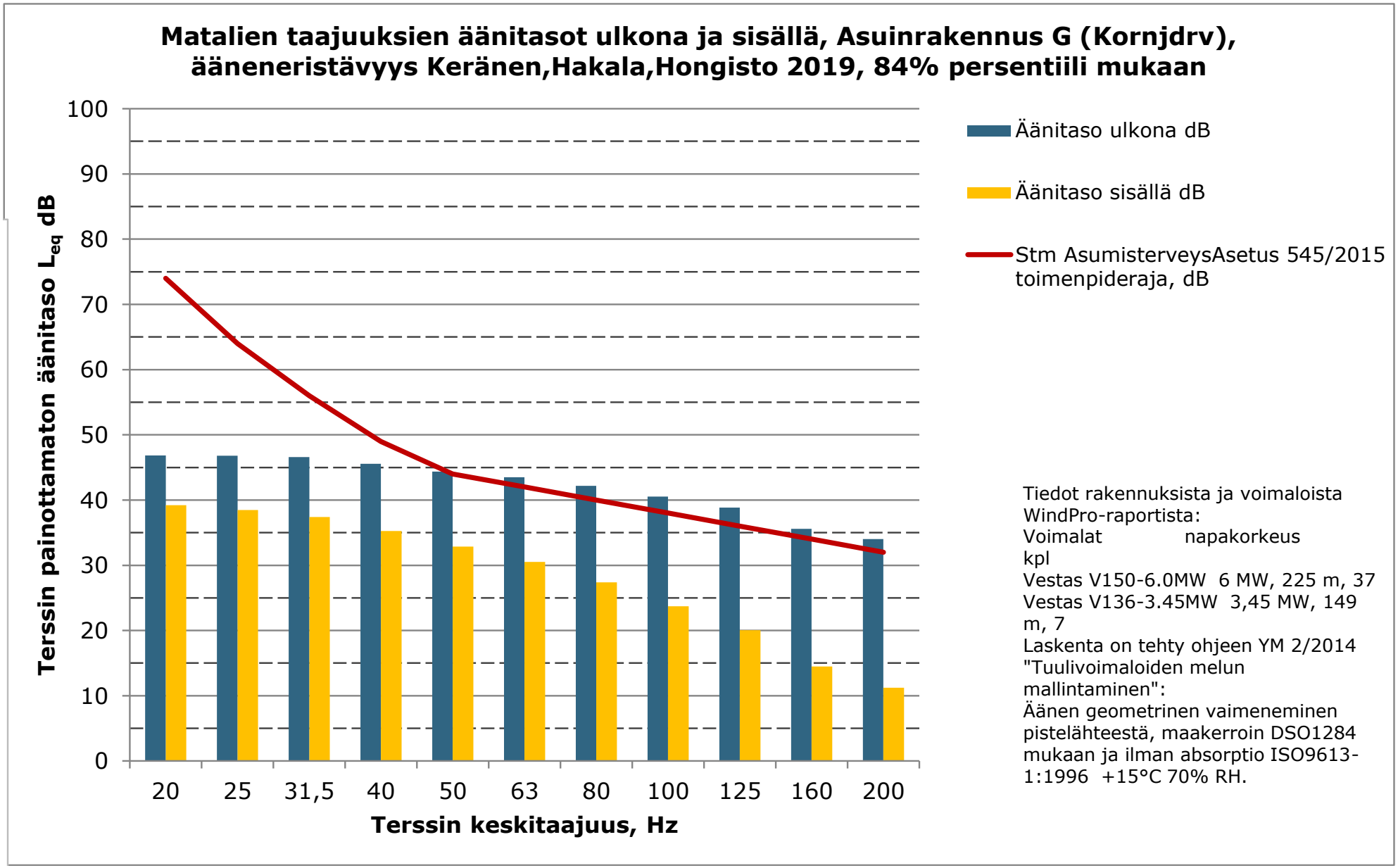
Matalien taajuuksien äänitasot ulkona ja sisällä, Metsästysmaja E (Kejsarbacken), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

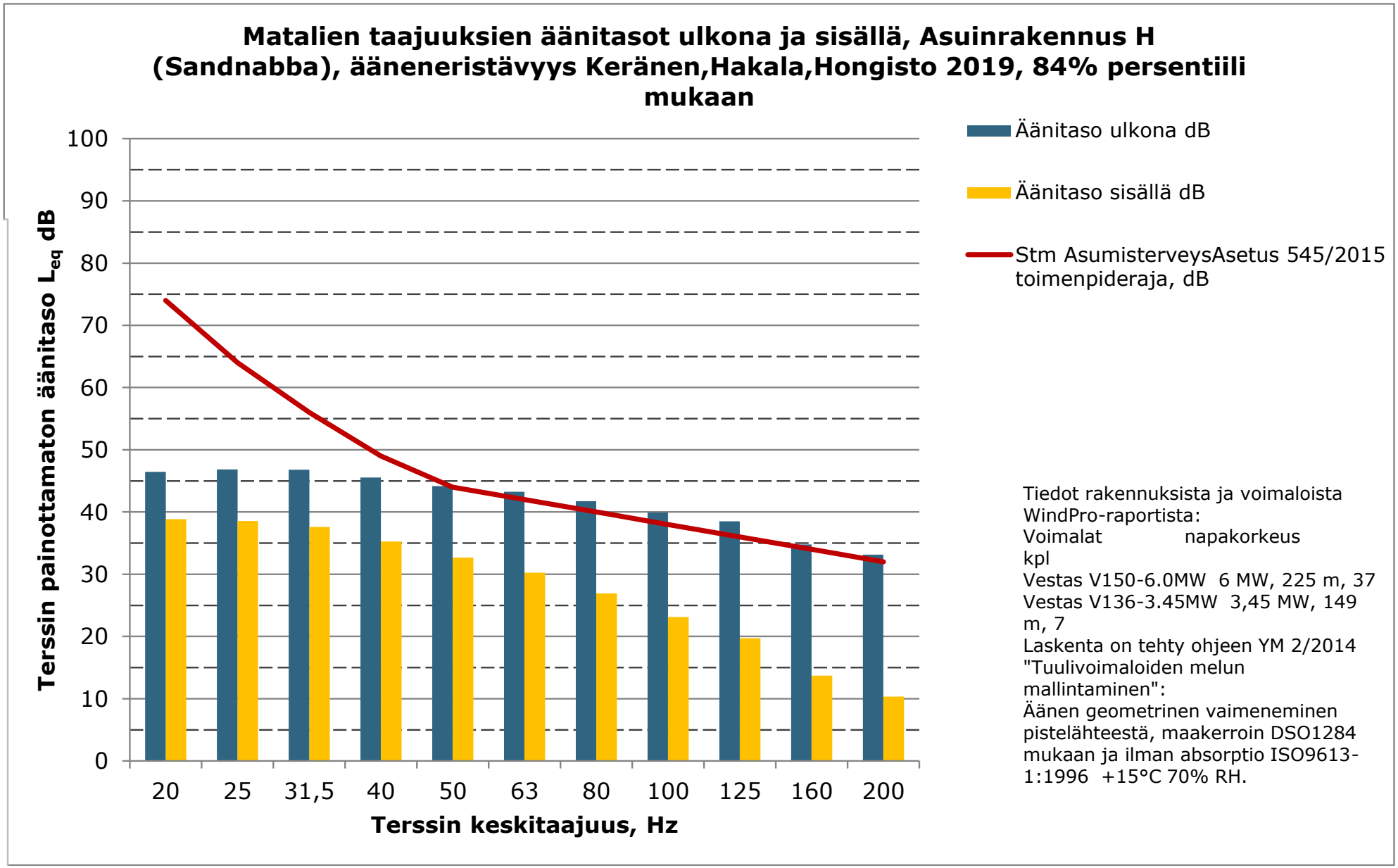




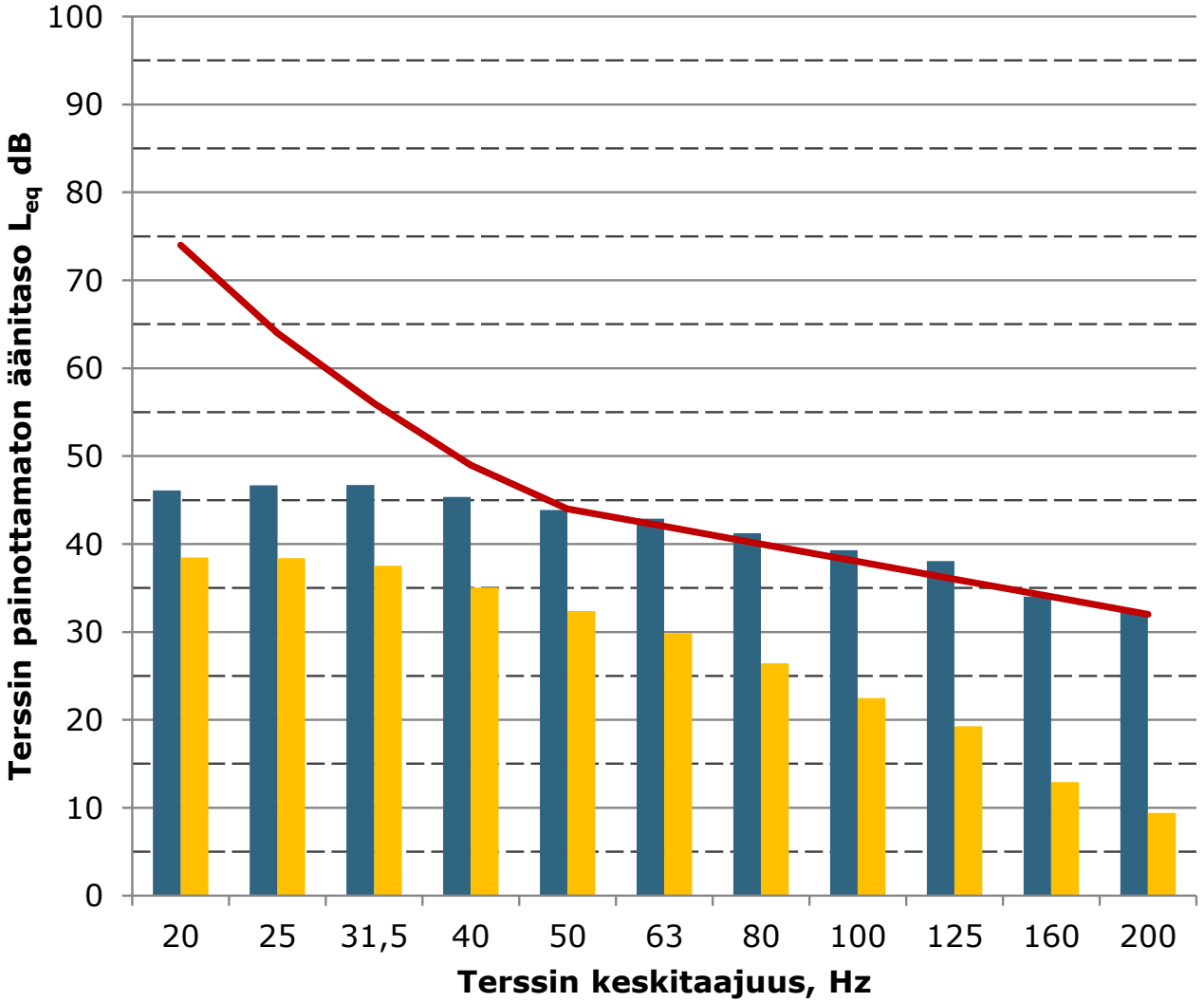
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus F (Kdllbacken), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus G (Kornjdrv), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus H (Sandnabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus I (Asp), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

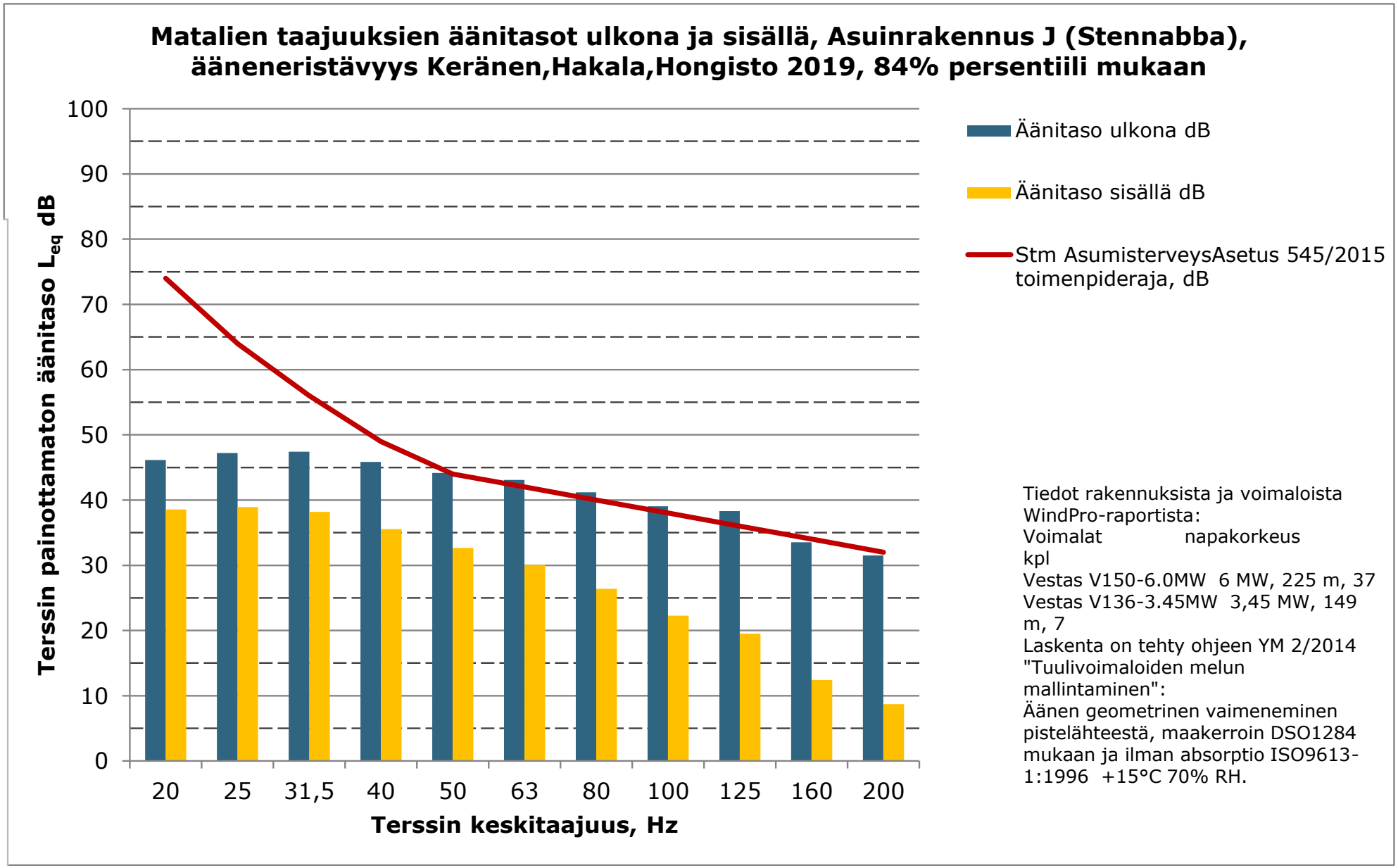


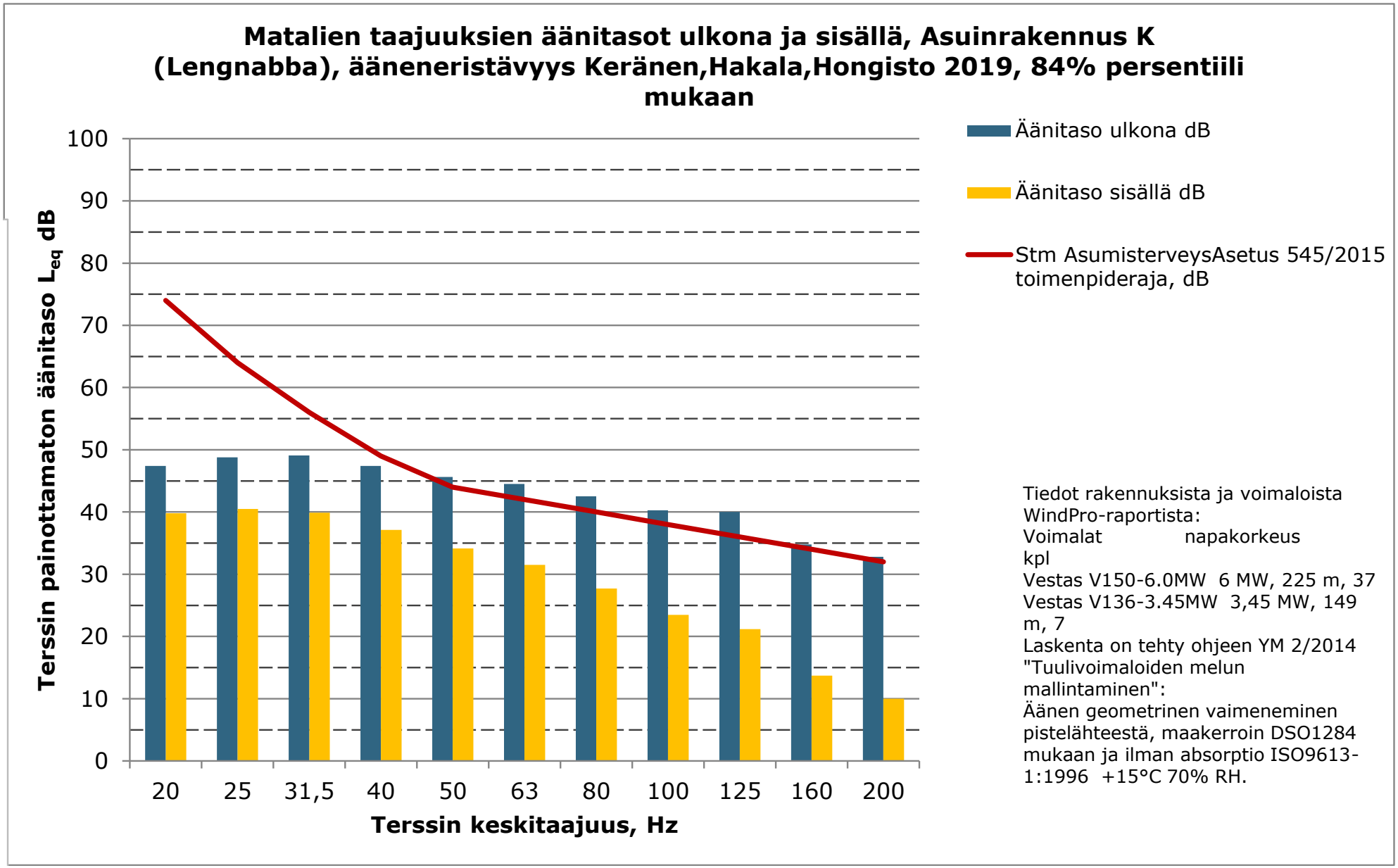
Äänitaso ulkona dB

Äänitaso sisällä dB

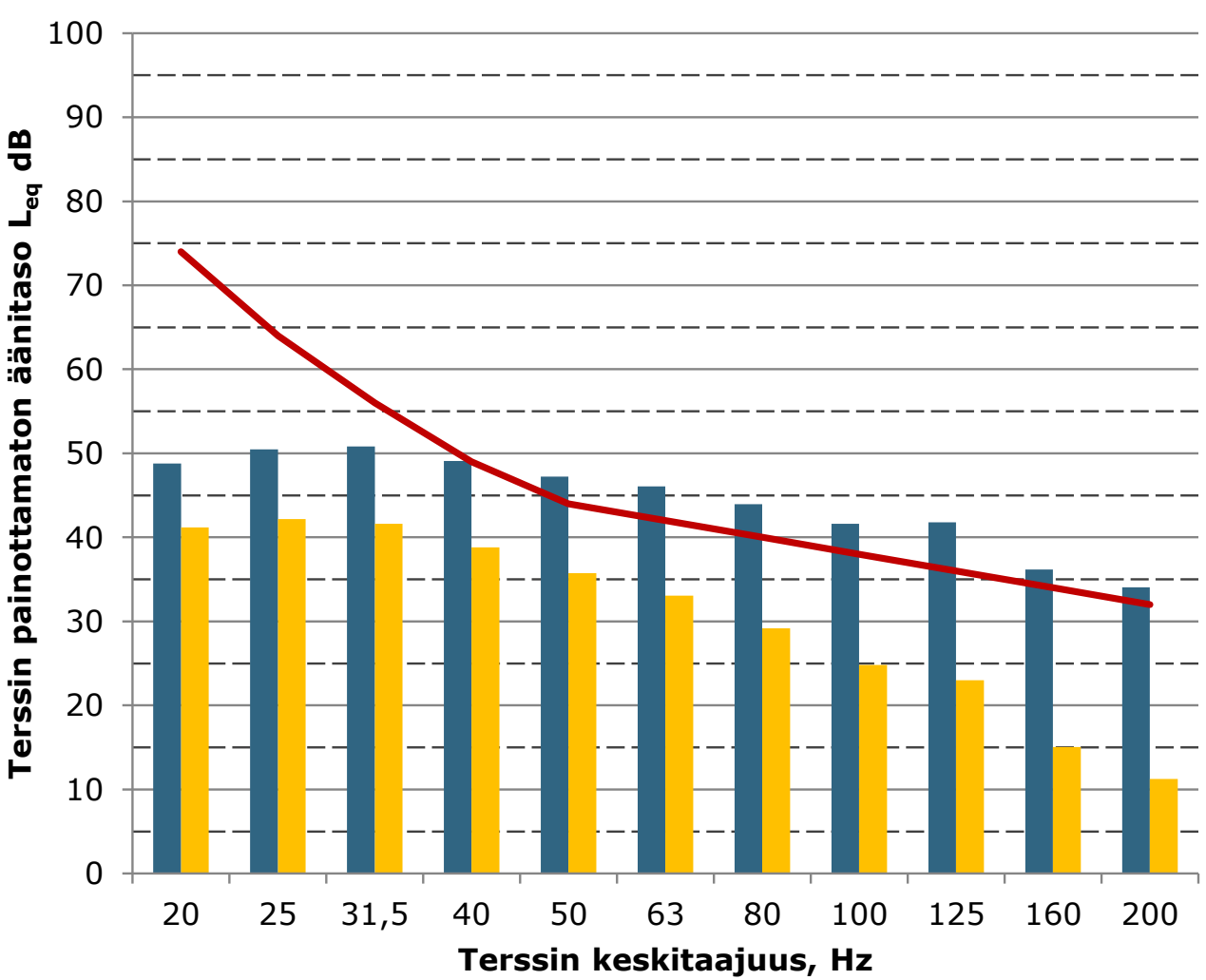
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

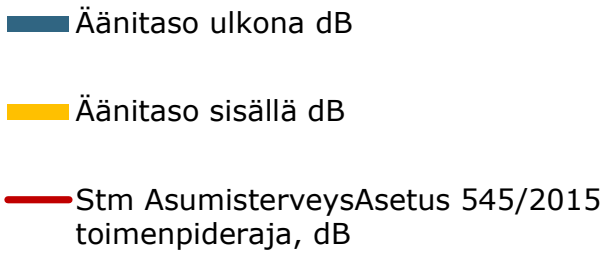
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus J (Stennabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus K (Lengnabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

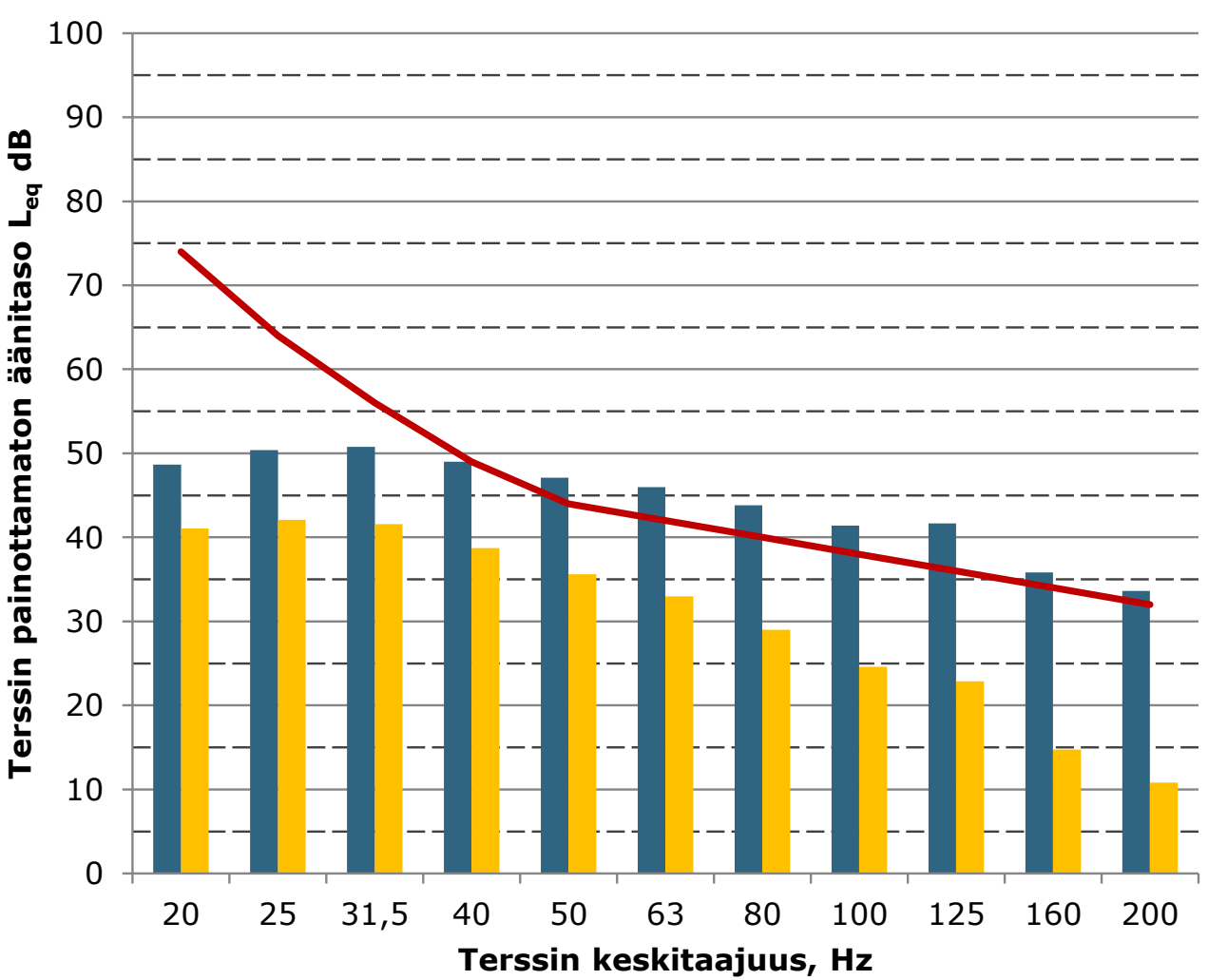
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus L (Evistvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

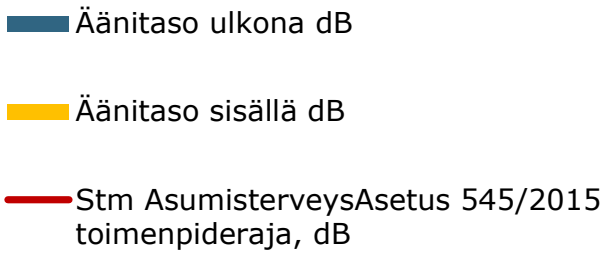




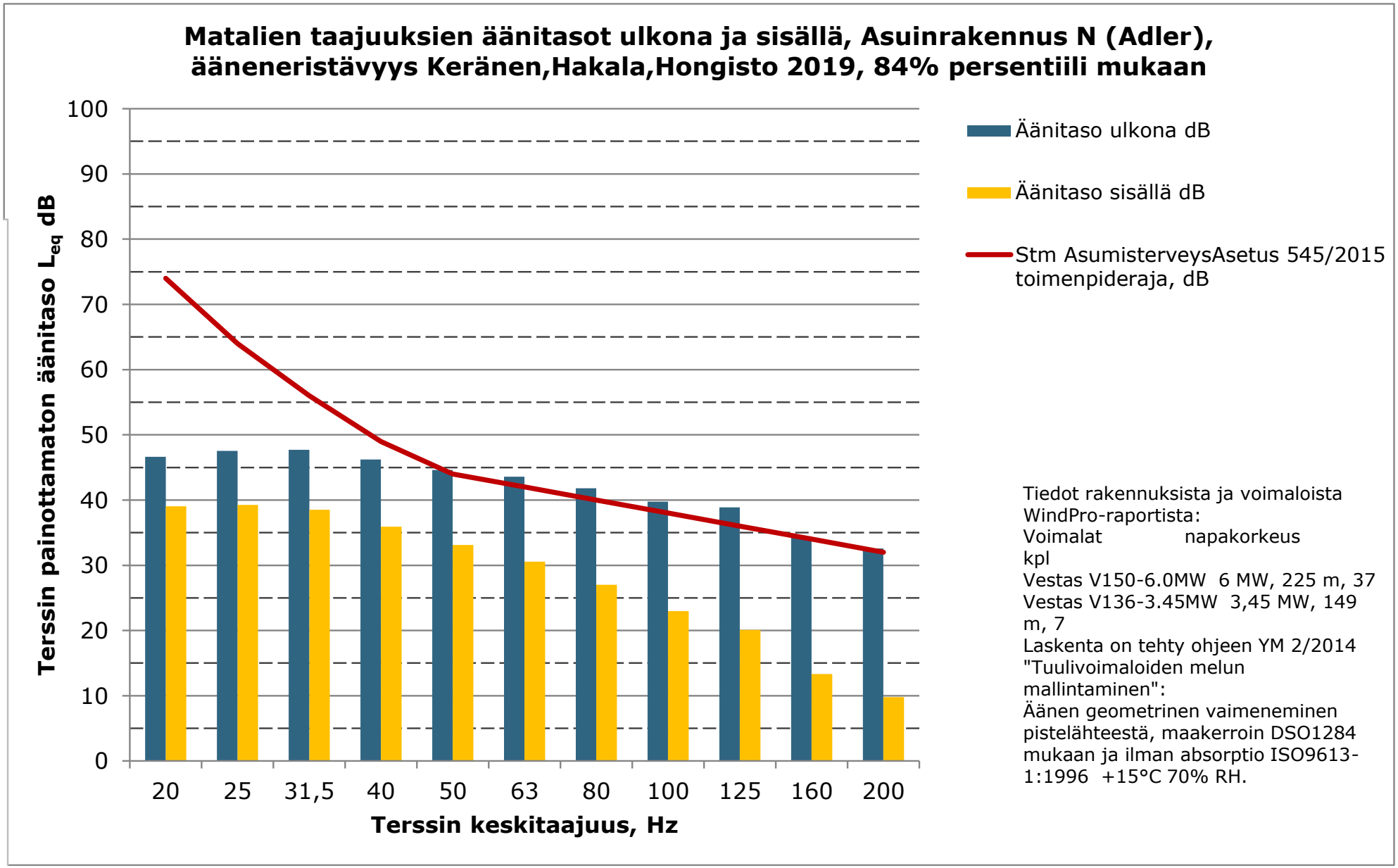
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus M (Stenbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

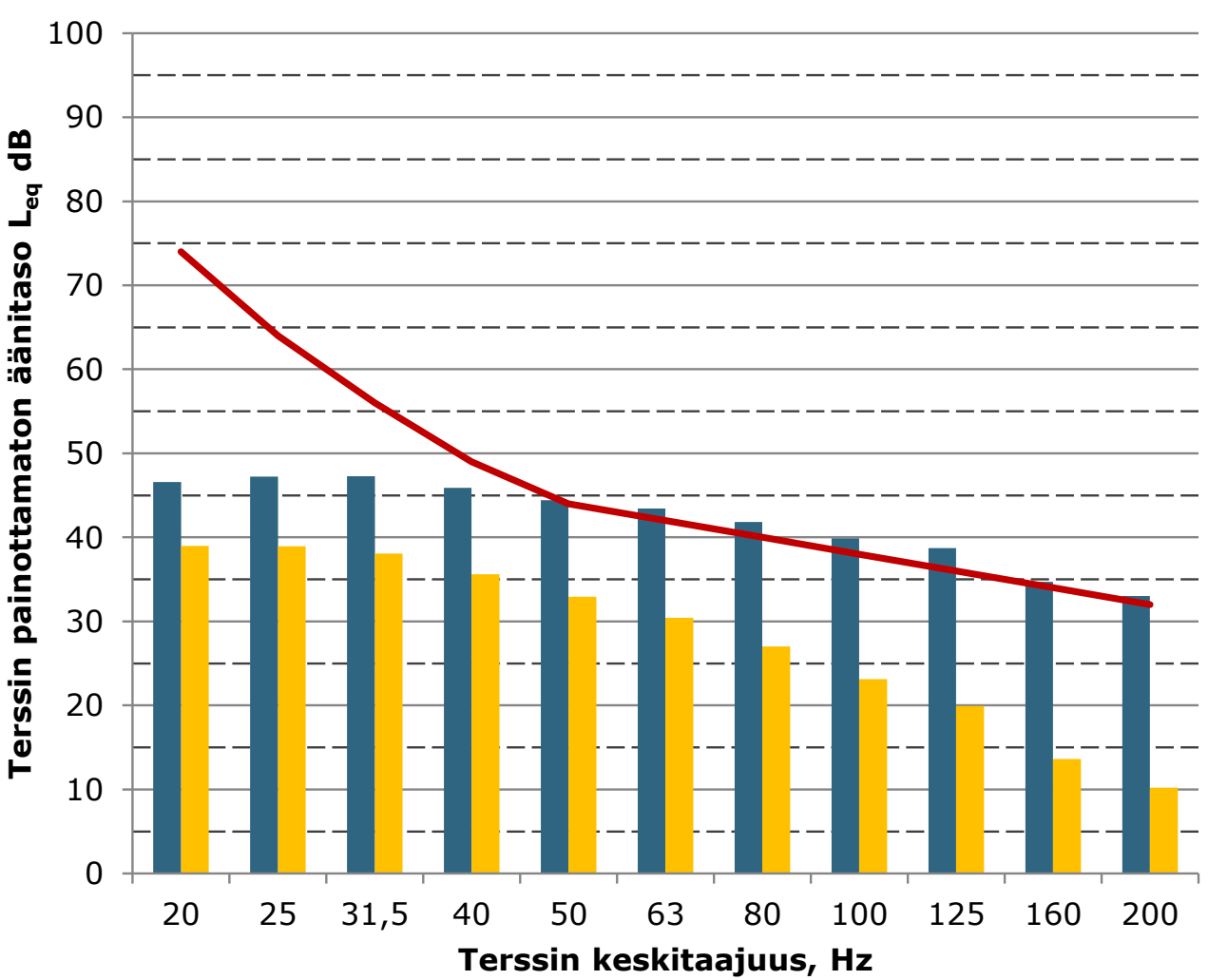


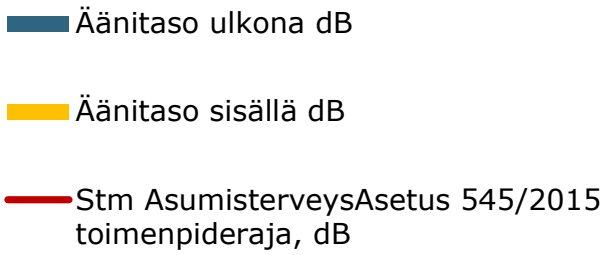


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

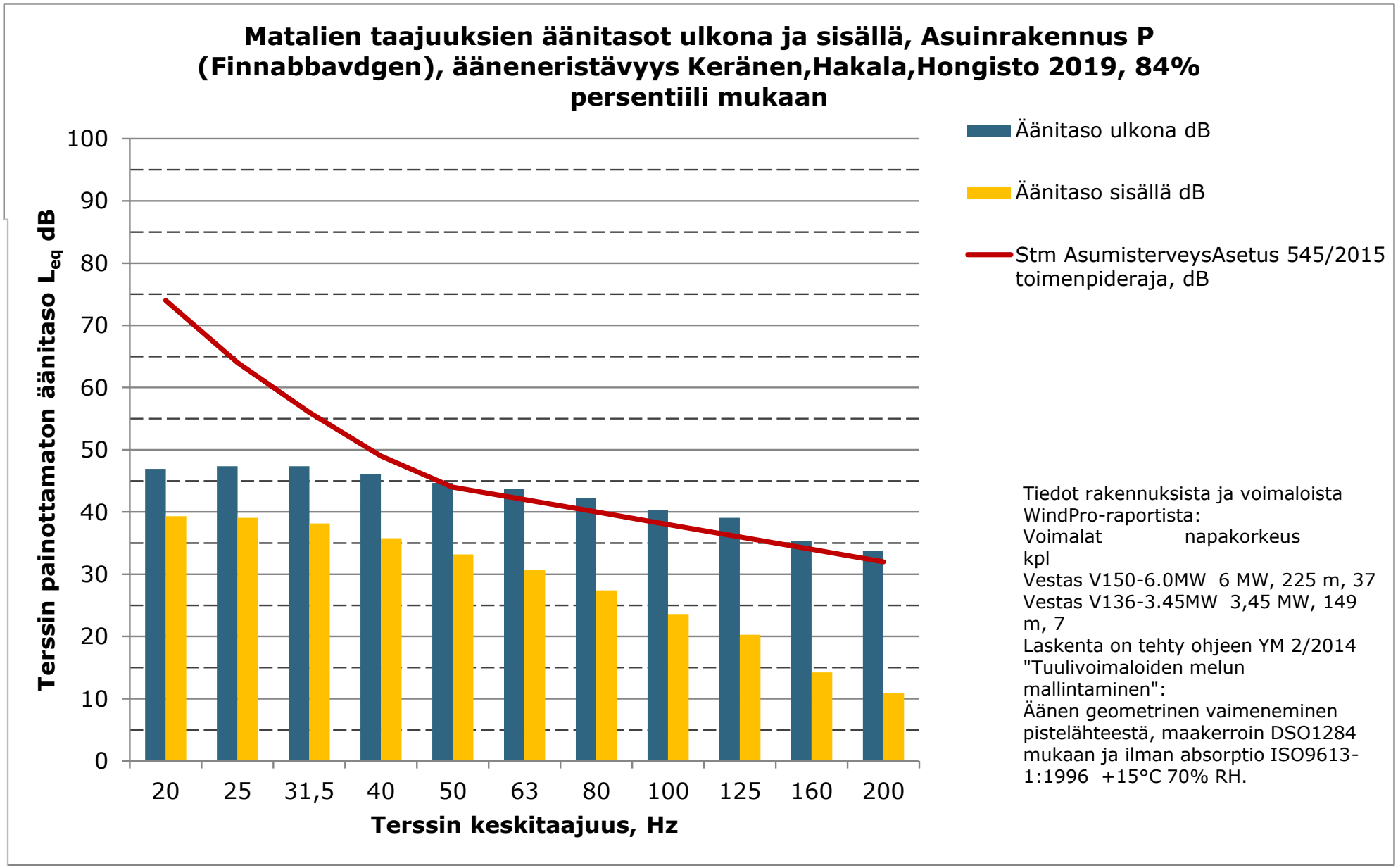

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus N (Adler), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

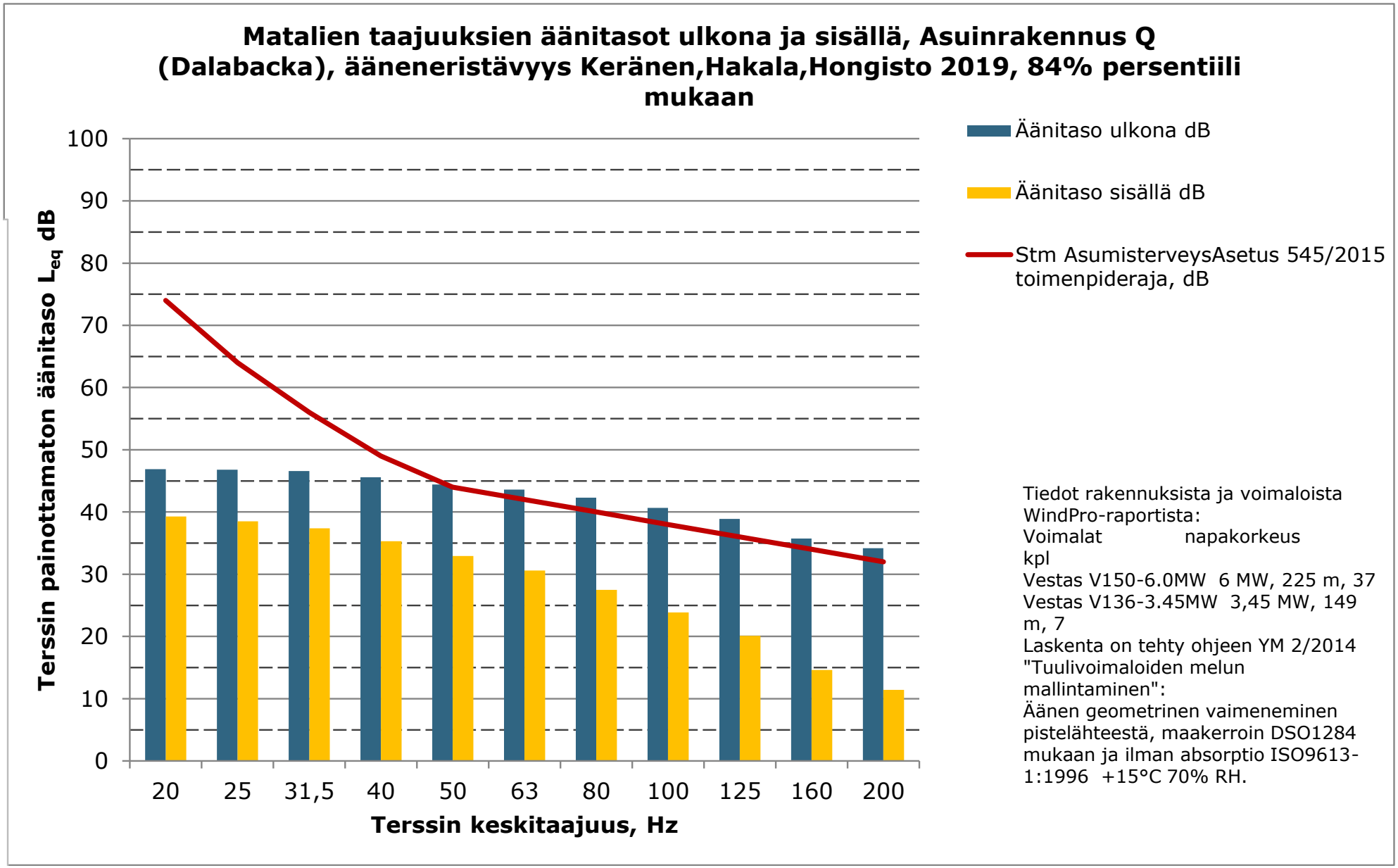
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus O (Evistvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

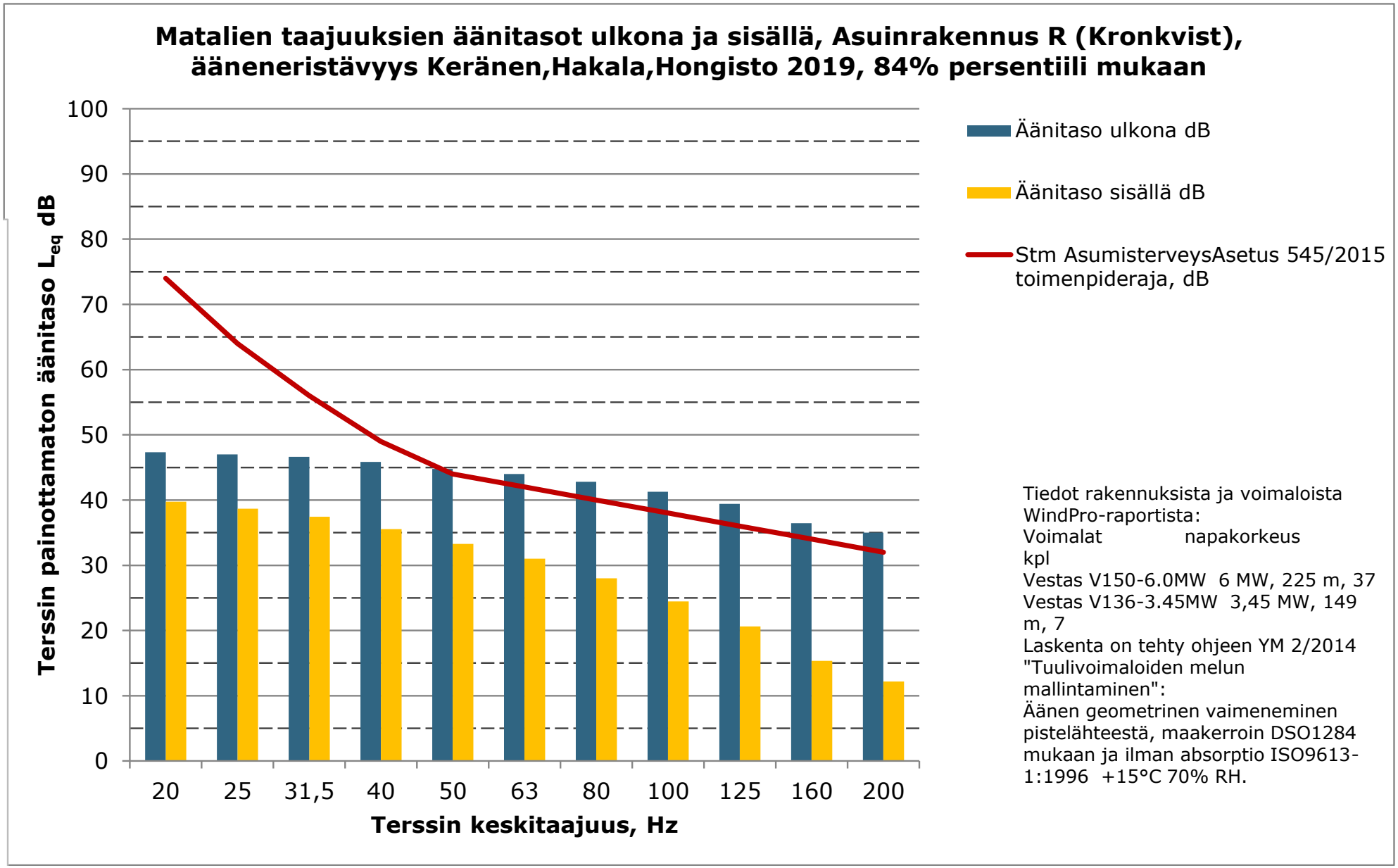


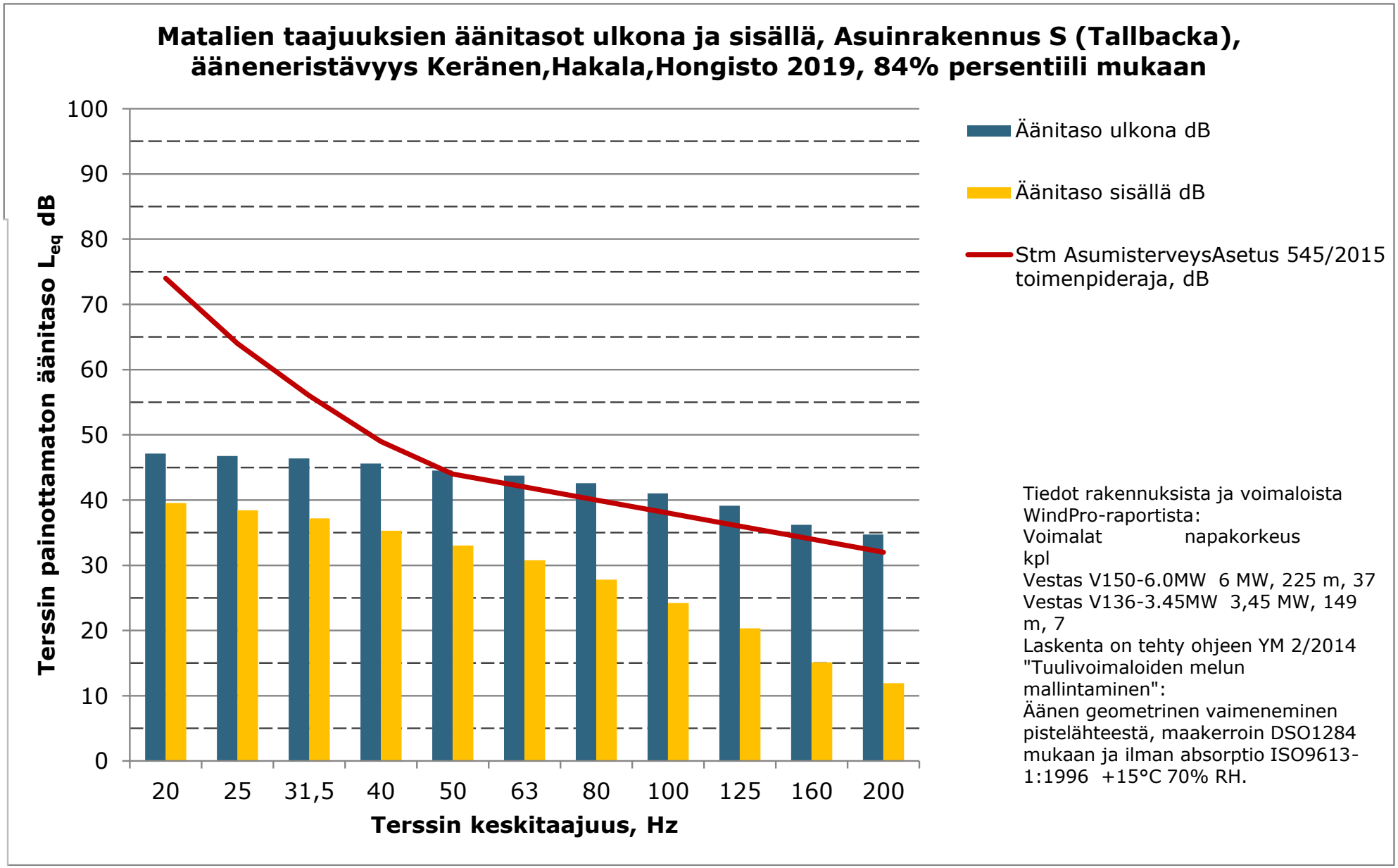


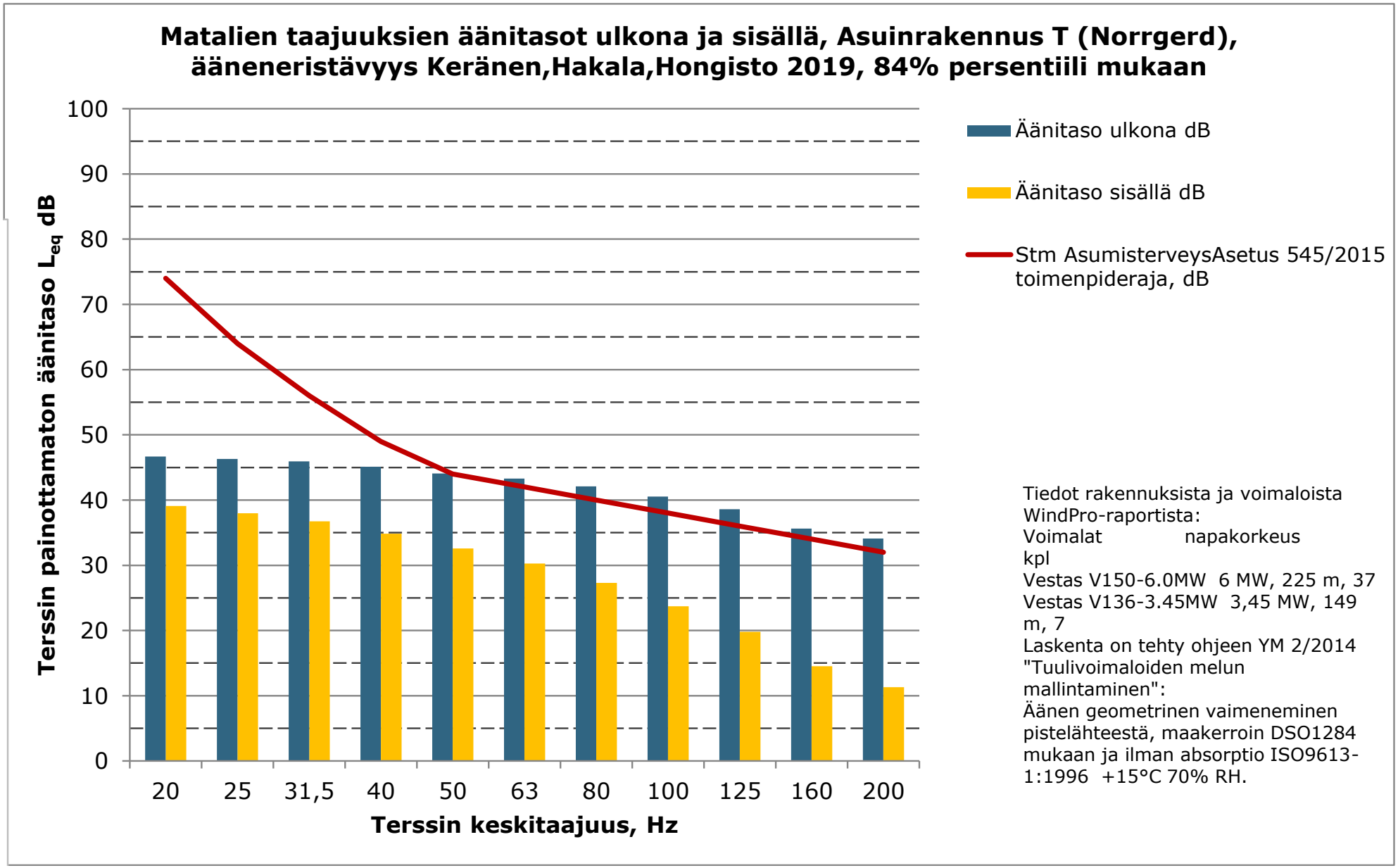
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus P (Finnabbavdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

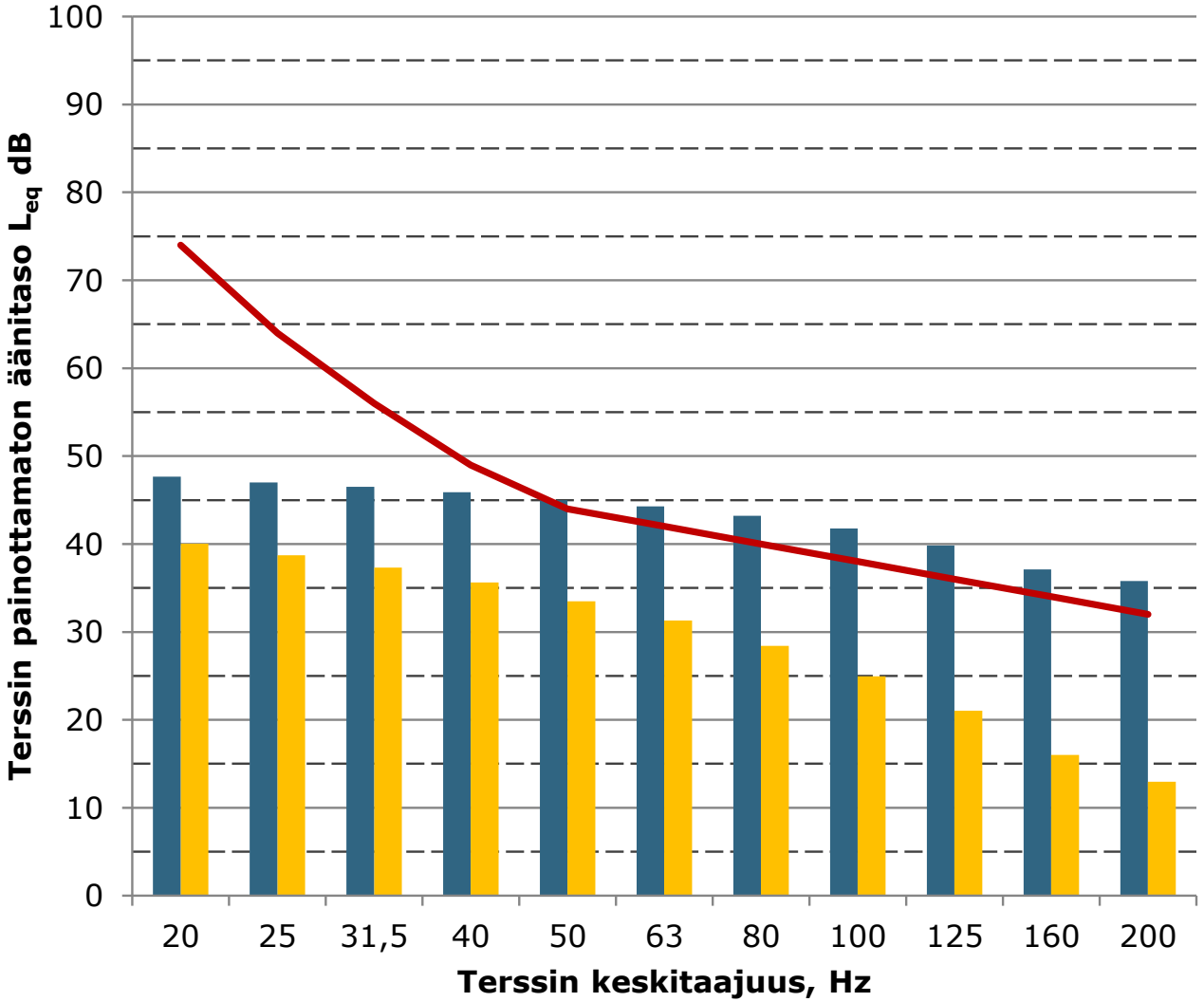

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Q (Dalabacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

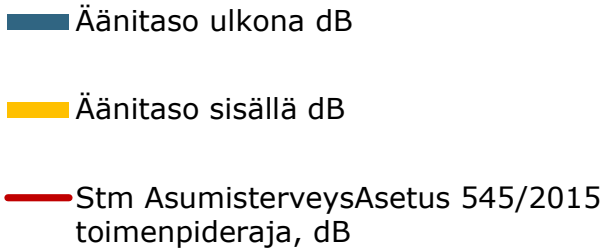

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus R (Kronkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus S (Tallbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus T (Norrgerd), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

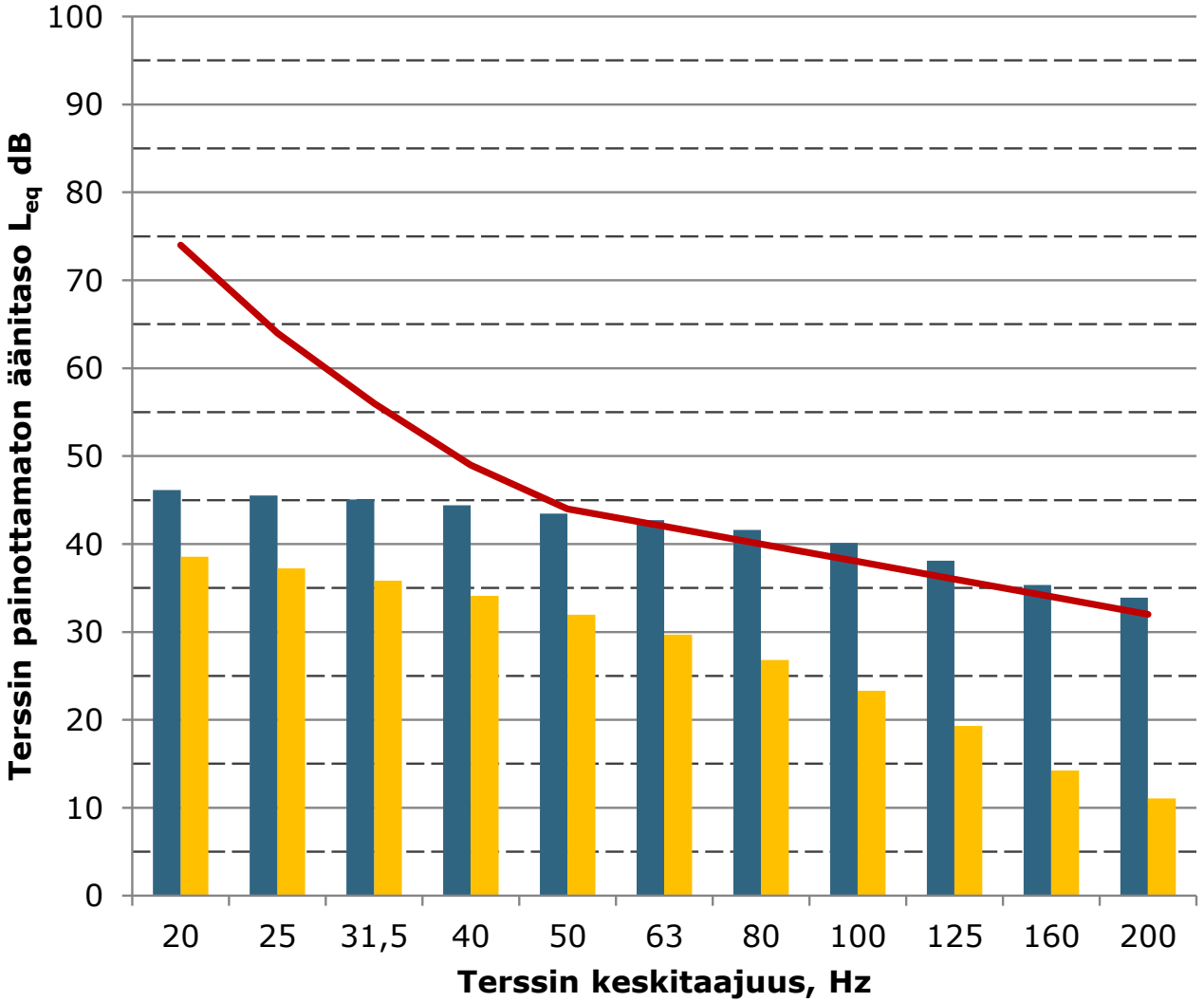
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus U (Nepi), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

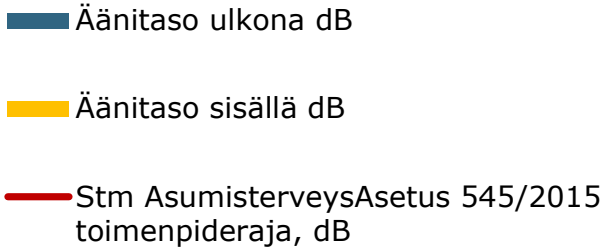




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus V (Skutas), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

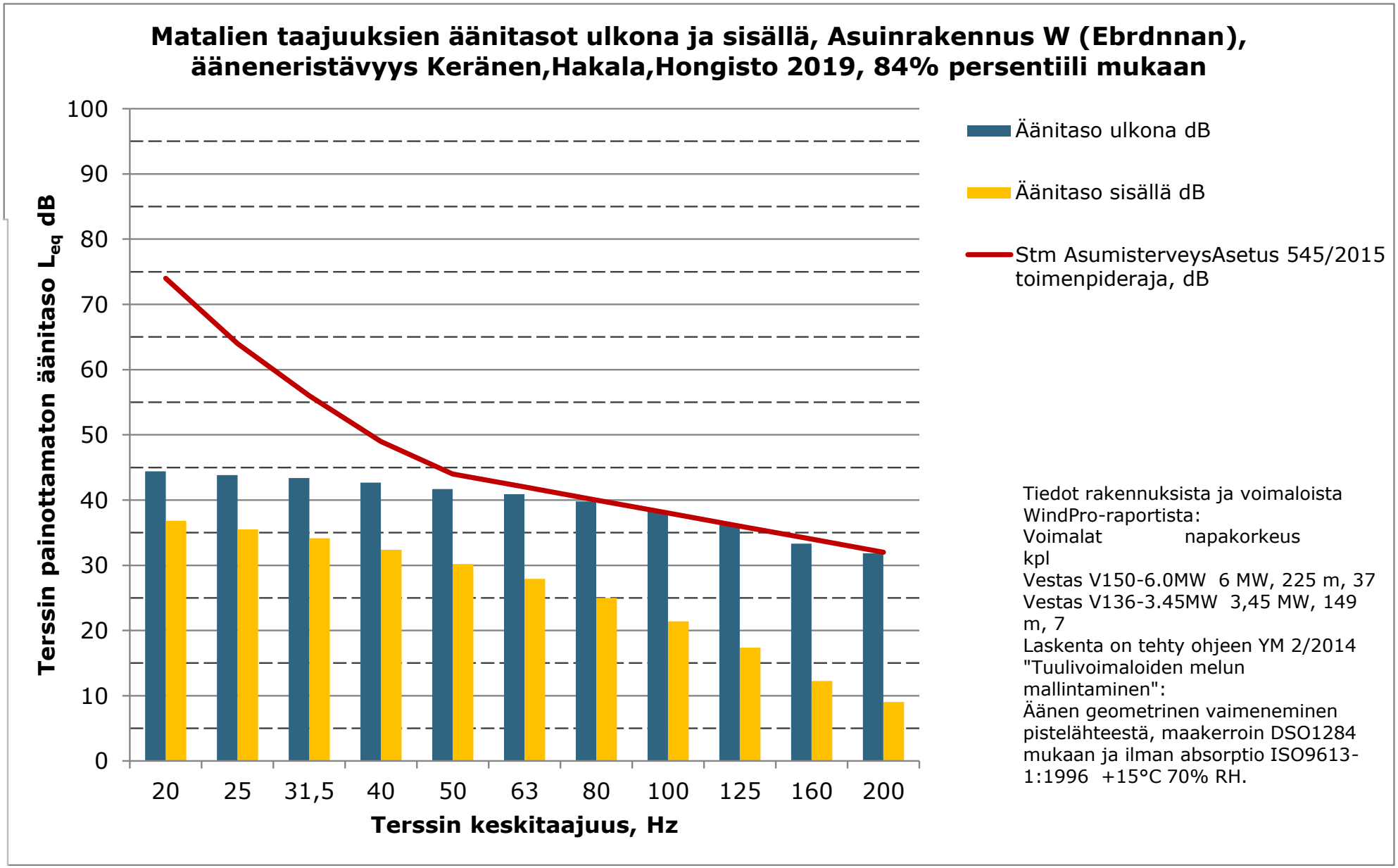




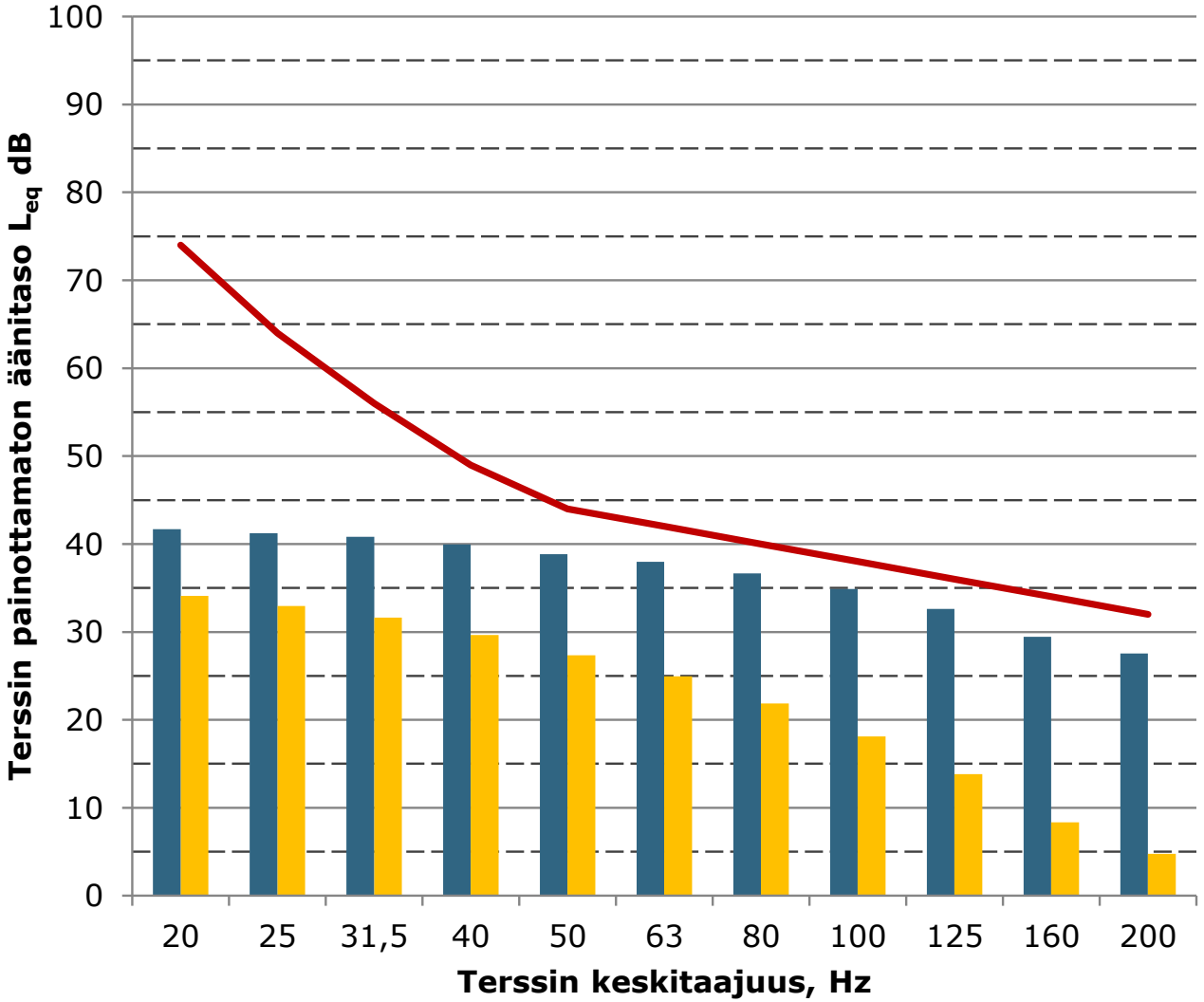
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V150-6.0MW	6 MW, 225 m,	37
Vestas V136-3.45MW	3,45 MW, 149 m,	7

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus W (Ebrdnnan), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus X (Dalbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



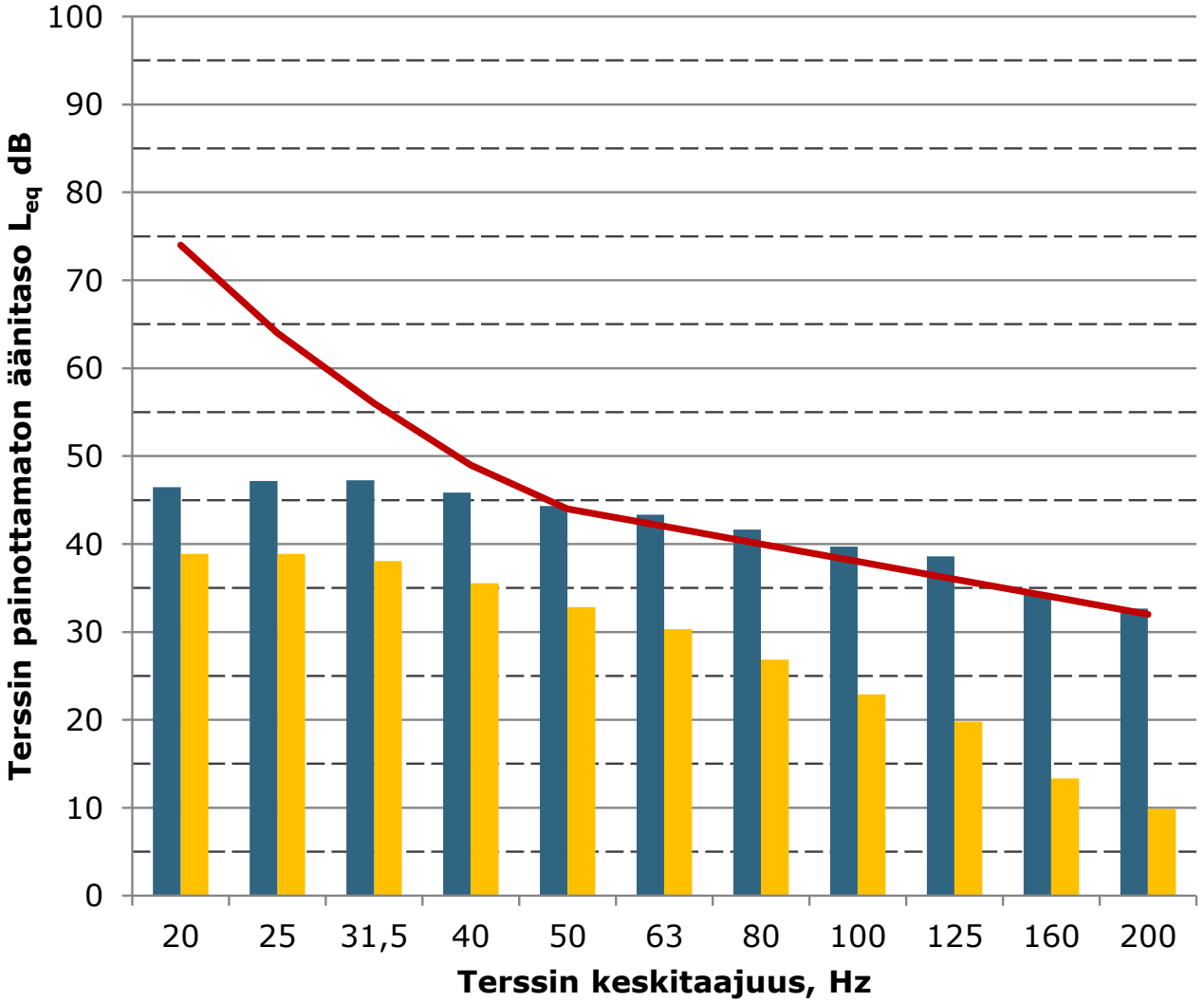
Äänitaso ulkona dB

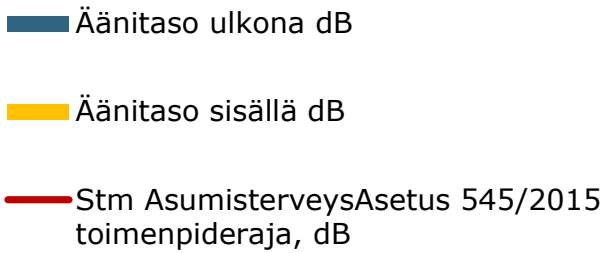
Äänitaso sisällä dB

Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

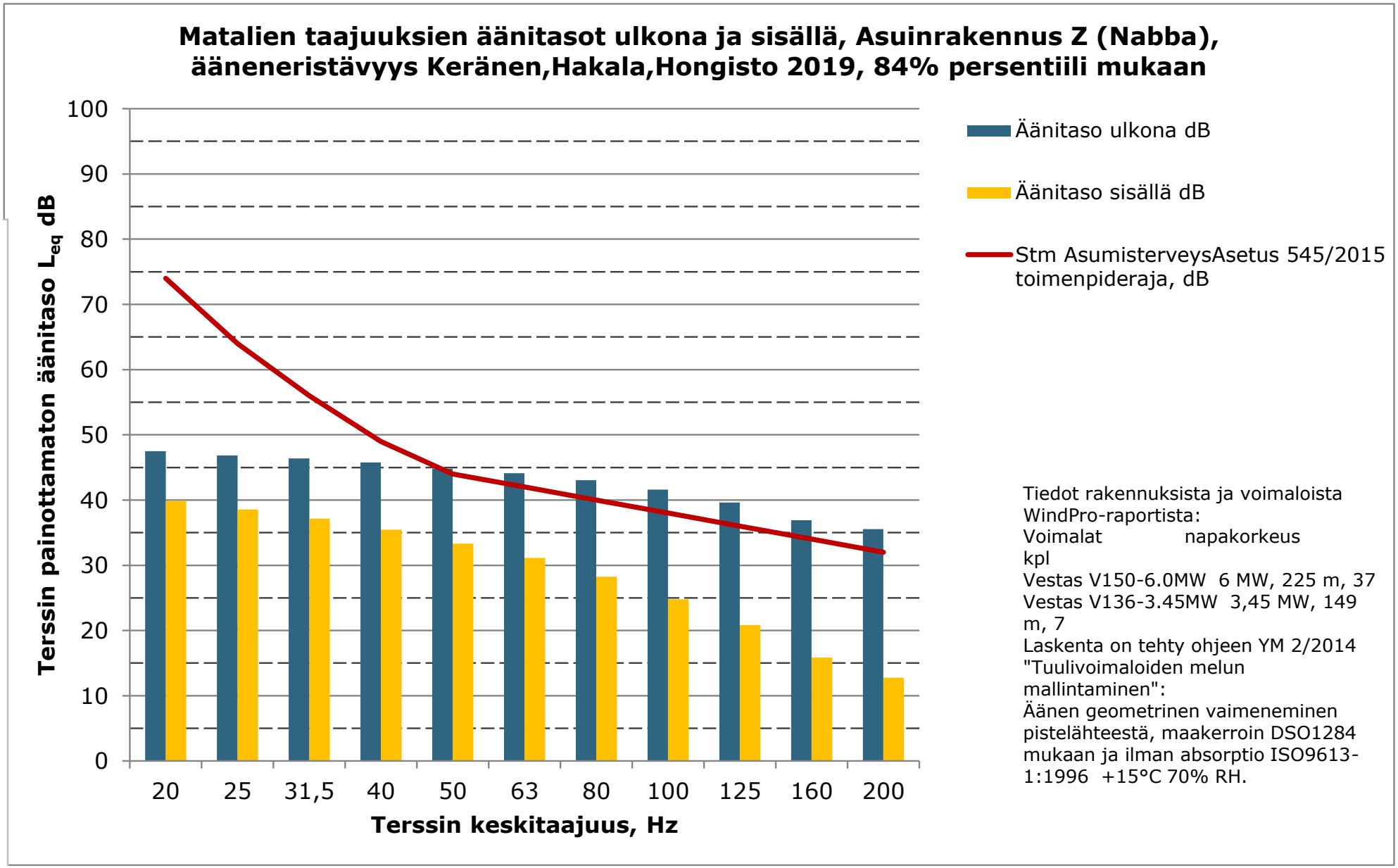
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Y (Evist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

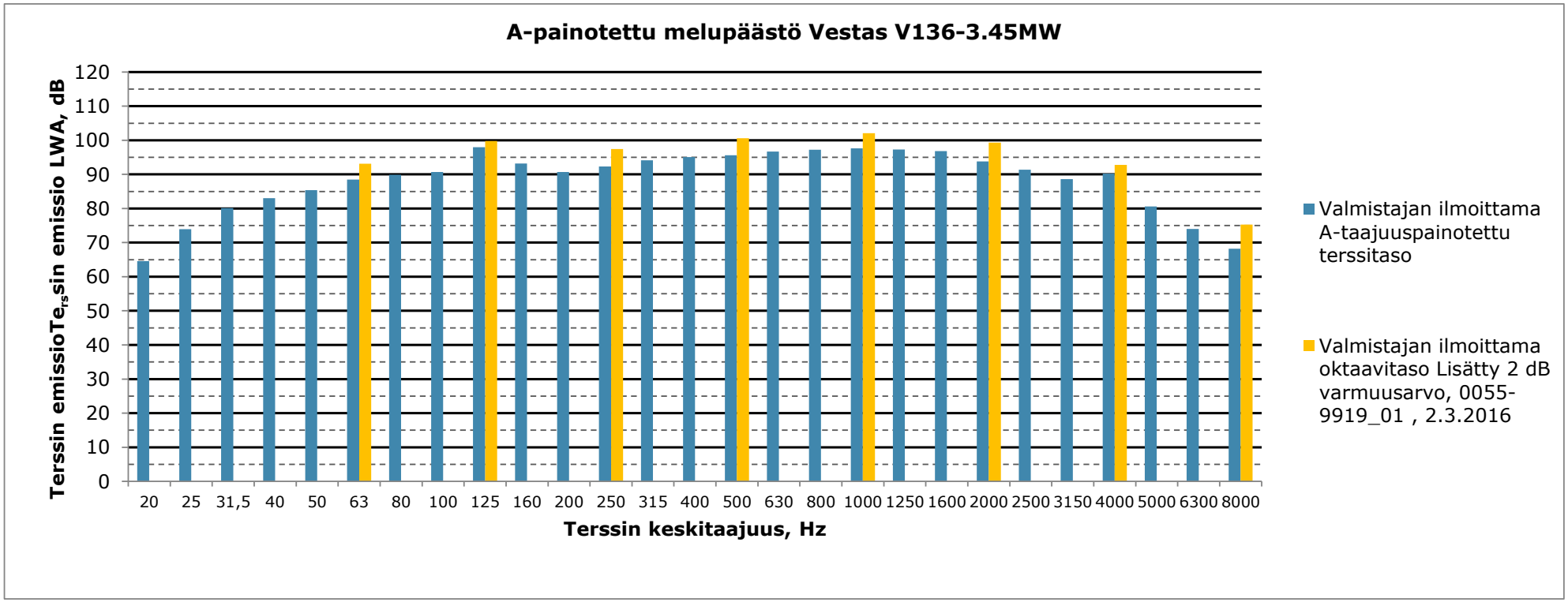


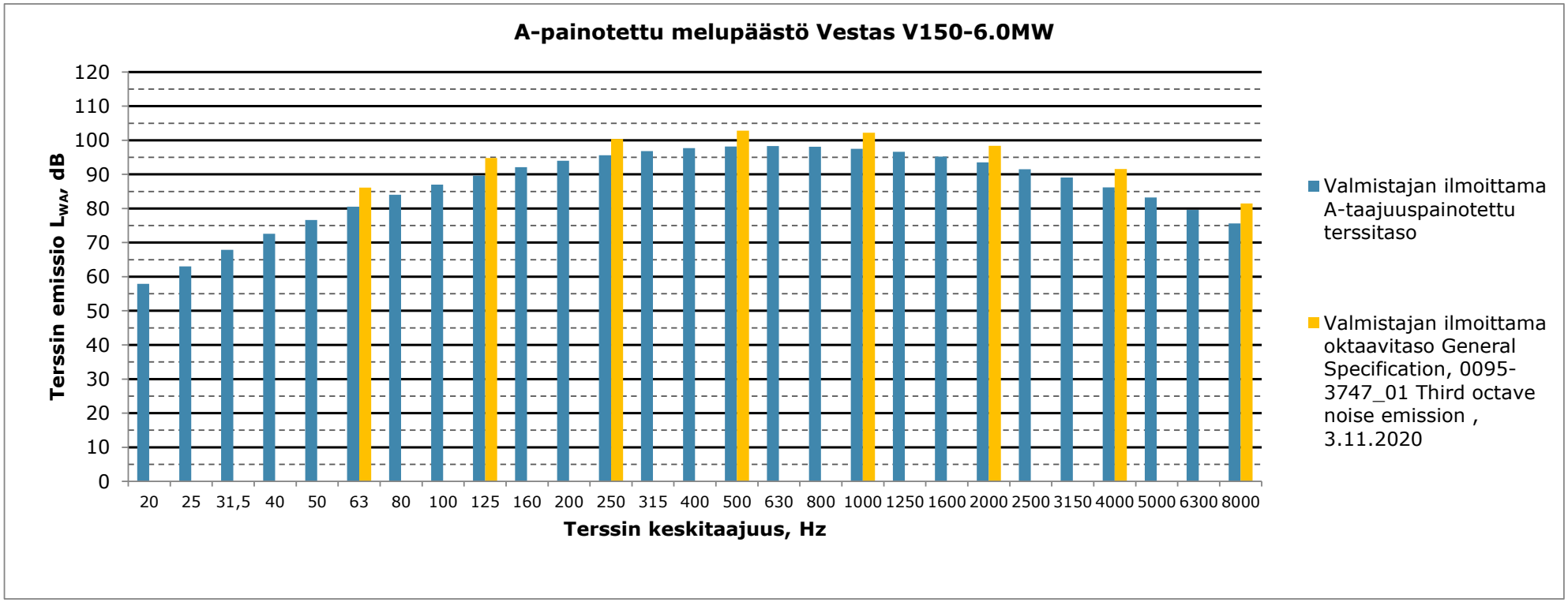


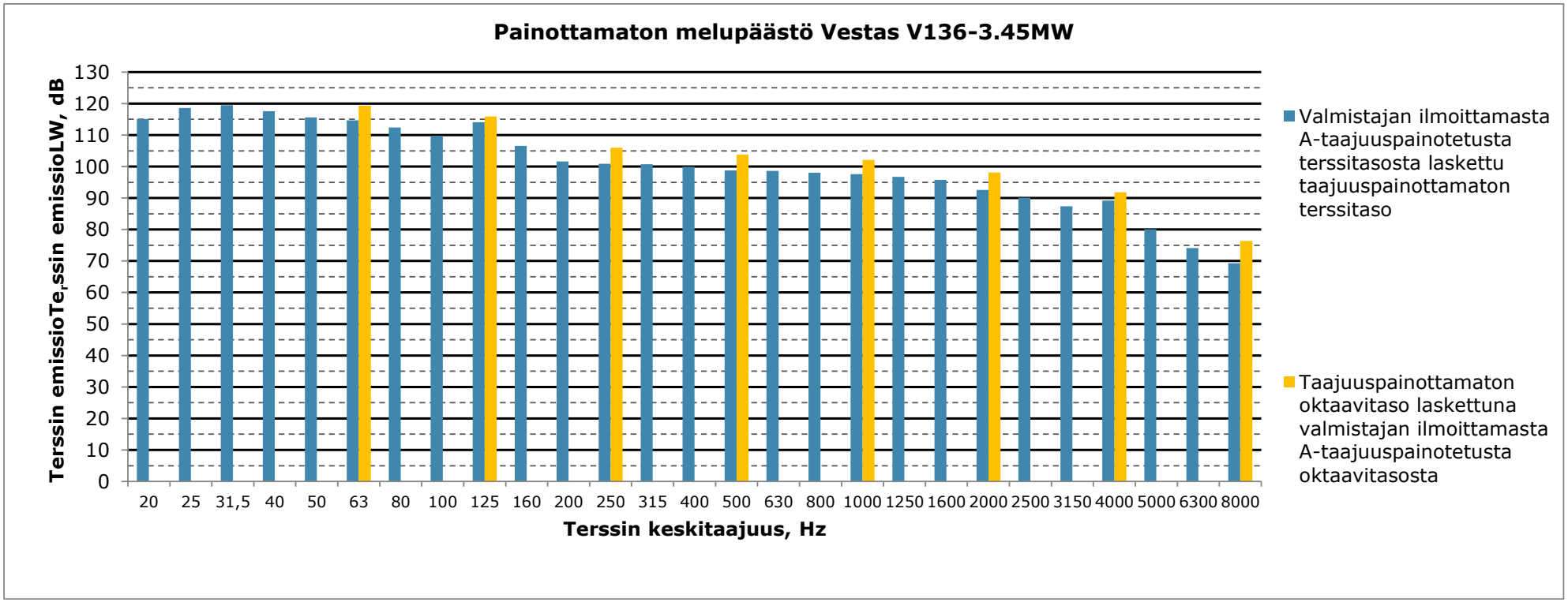
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

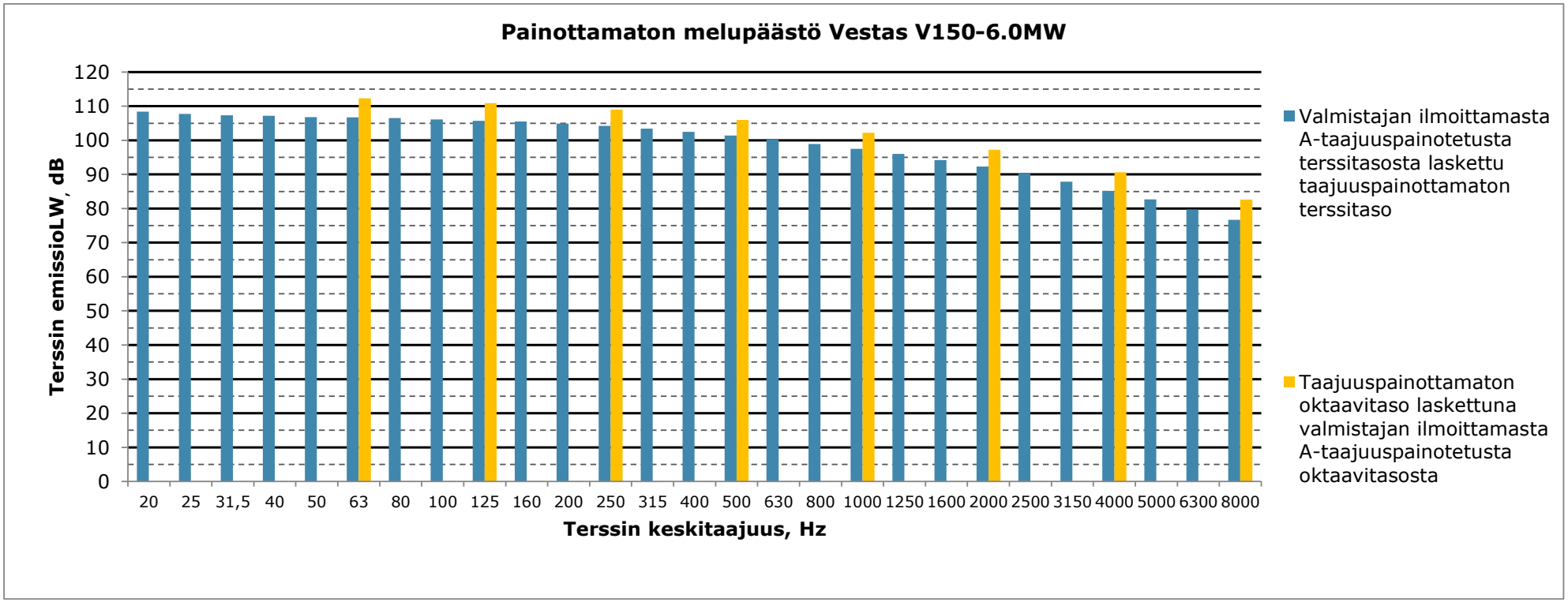

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Z (Nabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 37
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

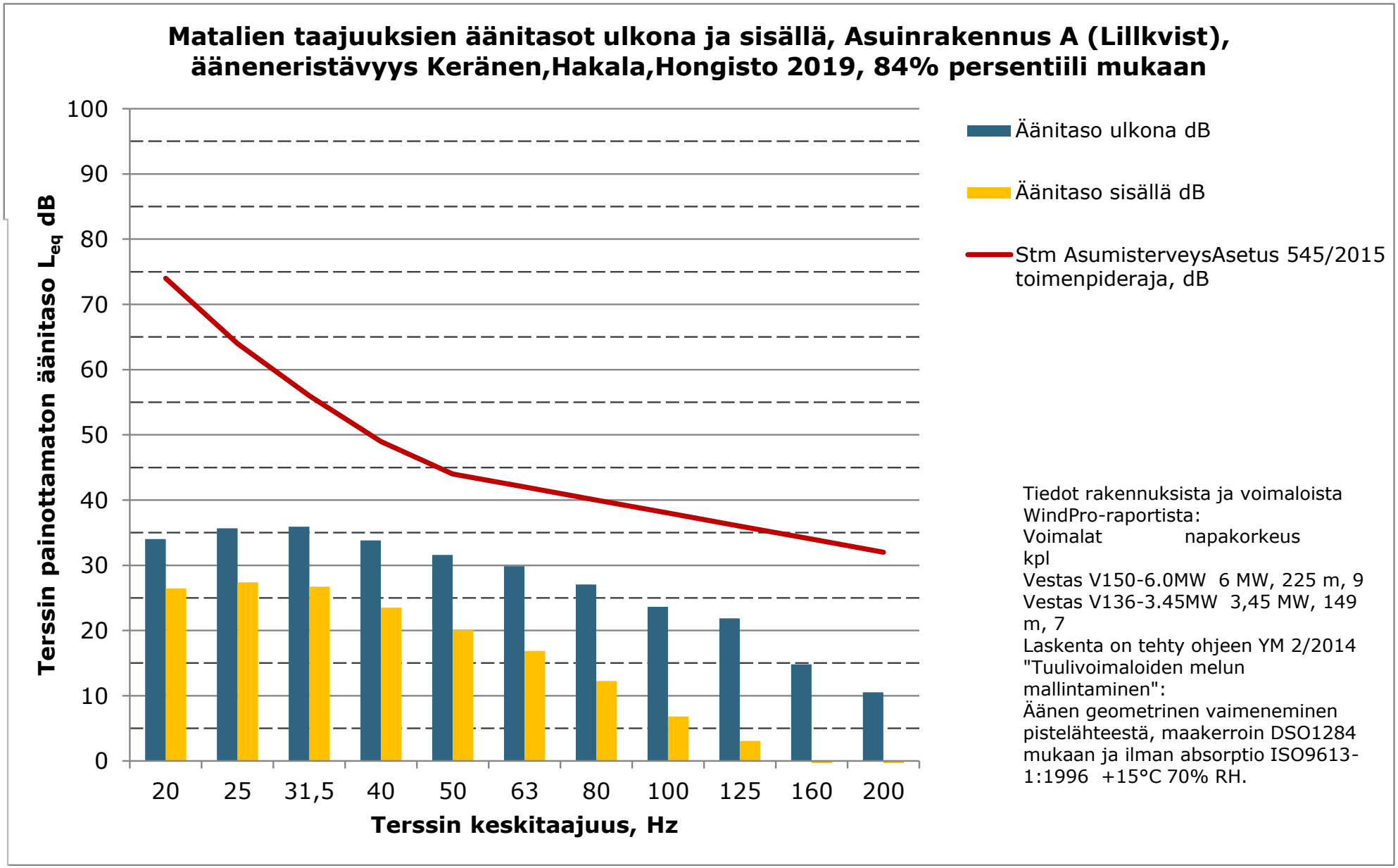
Bilaga 8. Purmo vindkraftsprojekt – värden för lågfrekvent buller vid olika byggnader ALT3 V150 – 6.0 MW tillsammans med Salo–Ylikoski-projektet.


A-painotettu melupäästö Vestas V136-3.45MW
Terssin emissioTe$_{rs}$sin emissio LWA, dB
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittama A-taajuuspainotettu terssitaso
Valmistajan ilmoittama oktaavitaso Lisätty 2 dB varmuusarvo, 0055-9919_01 , 2.3.2016

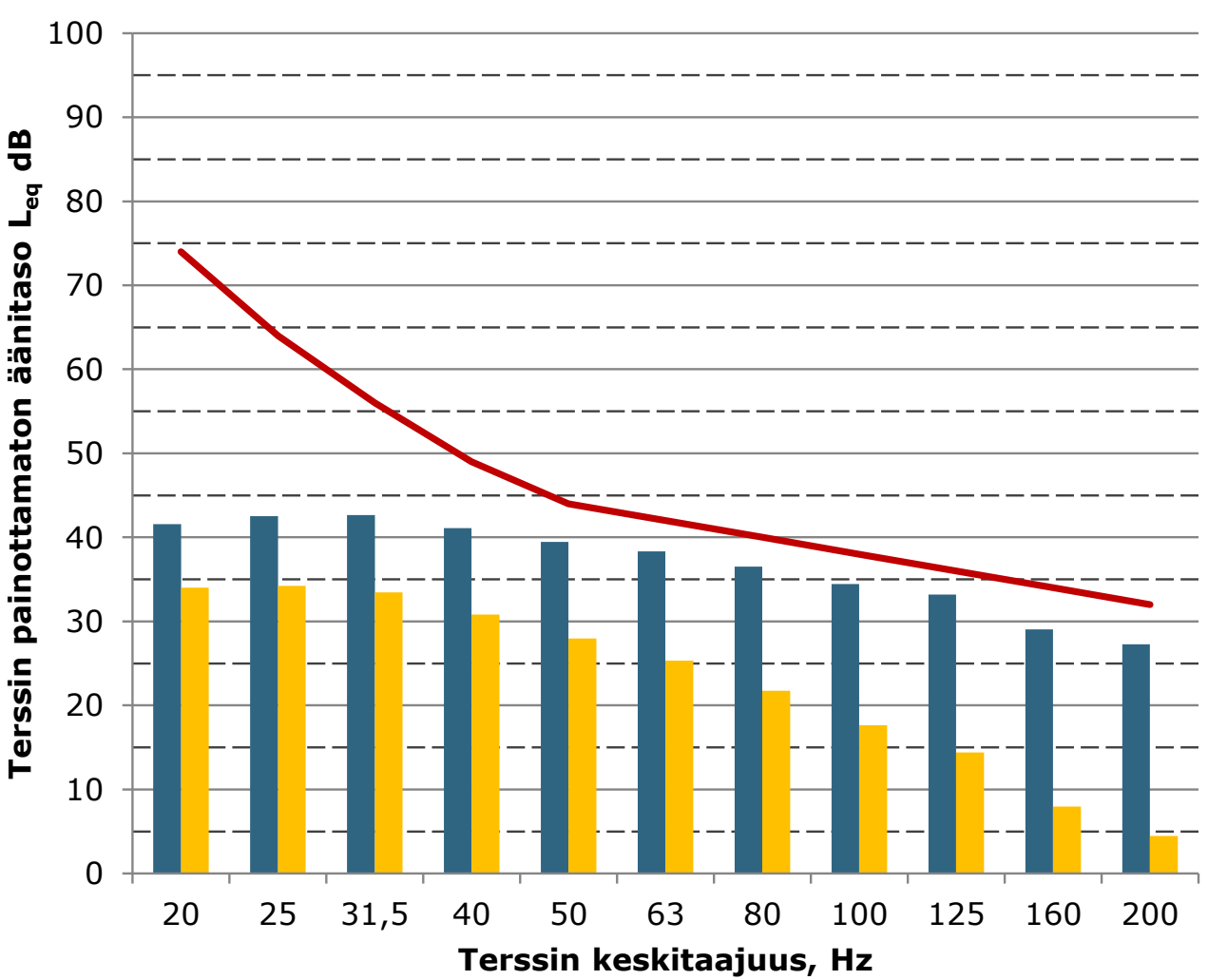

A-painotettu melupäästö Vestas V150-6.0MW
Terssin emissio L_{WA} dB
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittama A-taajuuspainotettu terssitaso
Valmistajan ilmoittama oktaavitaso General Specification, 0095-3747_01 Third octave noise emission , 3.11.2020

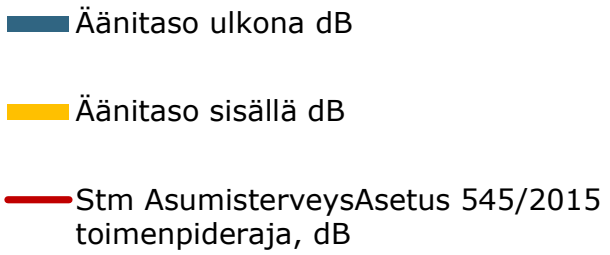

Painottamaton melupäästö Vestas V136-3.45MW
Terssin emissioTe,ssin emissioLW, dB
0
10
20
30
40
50
60
70
80
90
100
110
120
130
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittamasta A-taajuuspainotetusta terssitasosta laskettu taajuuspainottamaton terssitaso
Taajuuspainottamaton oktaavitaso laskettuna valmistajan ilmoittamasta A-taajuuspainotetusta oktaavitasosta


Painottamaton melupäästö Vestas V150-6.0MW
Terssin emissioLW, dB
120
110
100
90
80
70
60
50
40
30
20
10
0
20 25 31,5 40 50 63 80 100 125 160 200 250 315 400 500 630 800 1000 1250 1600 2000 2500 3150 4000 5000 6300 8000
Terssin keskitaajuus, Hz
Valmistajan ilmoittamasta A-taajuuspainotetusta terssitasosta laskettu taajuuspainottamaton terssitaso
Taajuuspainottamaton oktaavitaso laskettuna valmistajan ilmoittamasta A-taajuuspainotetusta oktaavitasosta


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus A (Lillkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus AA (Kronkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

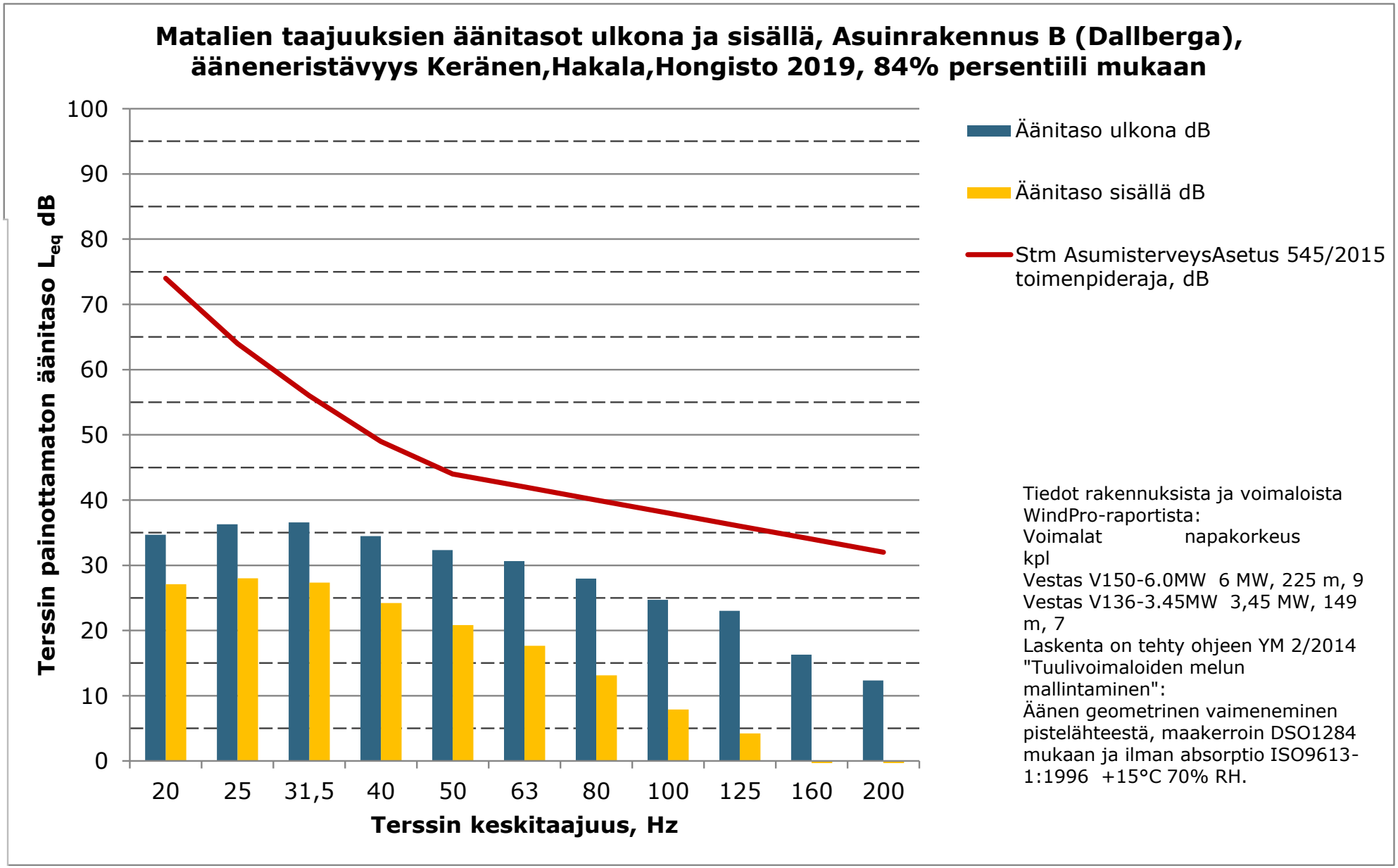


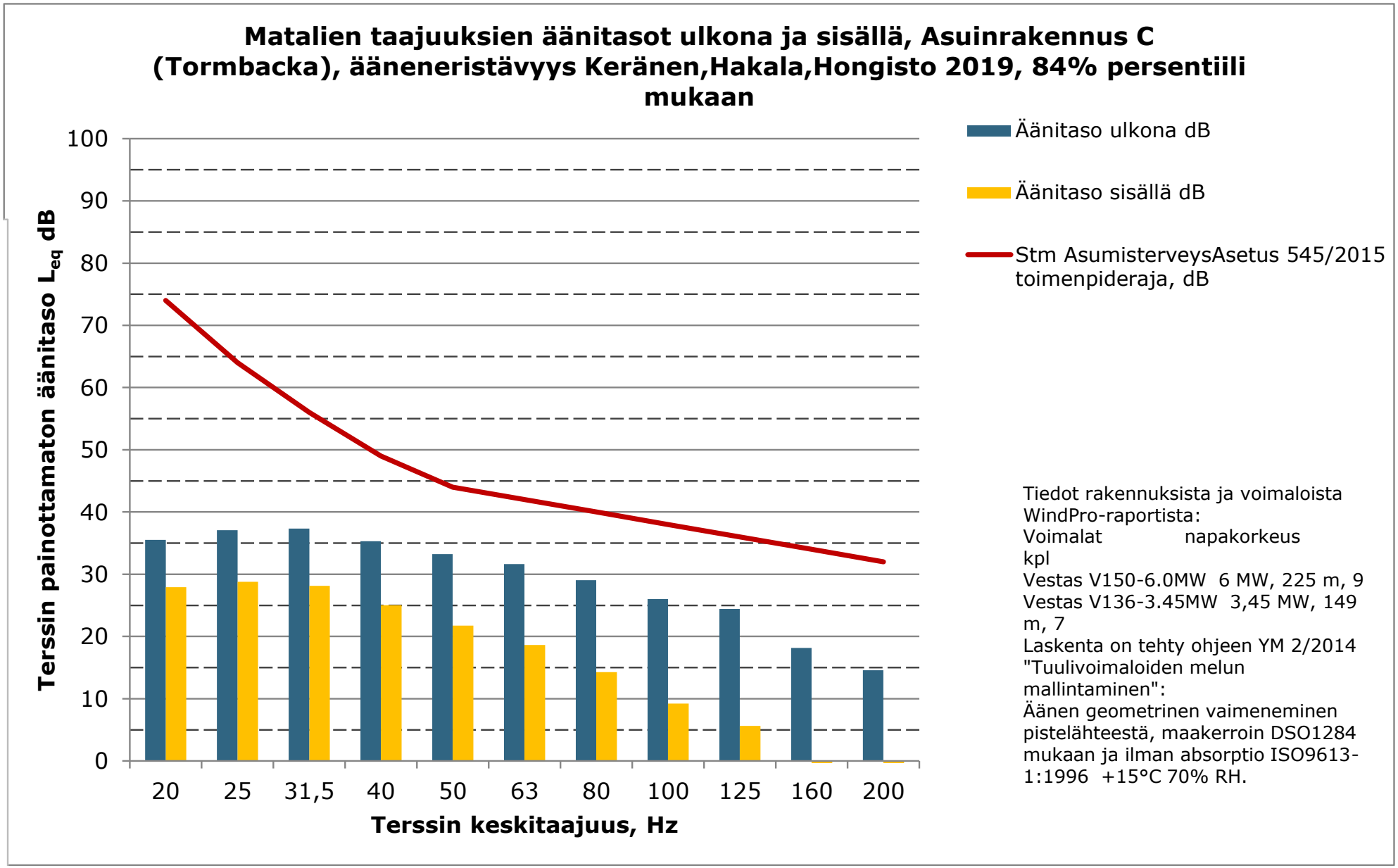


Tiedot rakennuksista ja voimaloista WindPro-raportista:

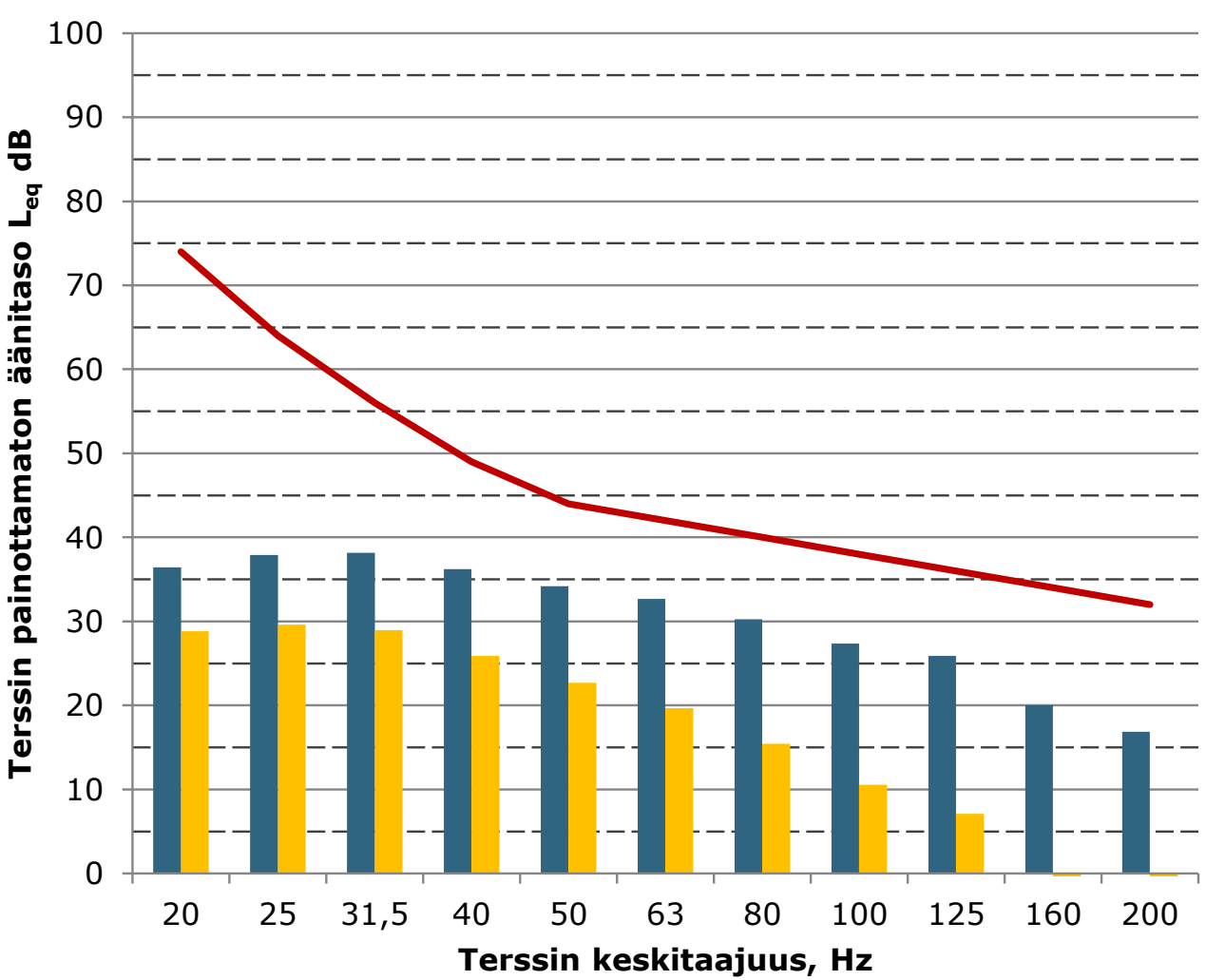
Voimalat	napakorkeus	kpl
Vestas V150-6.0MW	6 MW, 225 m,	9
Vestas V136-3.45MW	3,45 MW, 149 m,	7

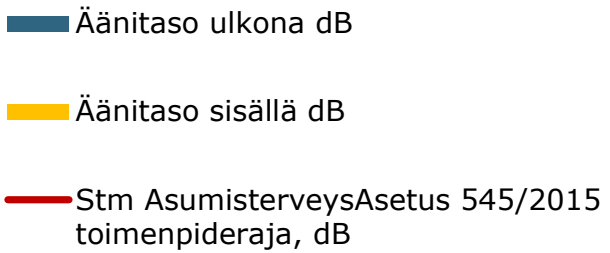
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus B (Dallberga), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus C (Tormbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

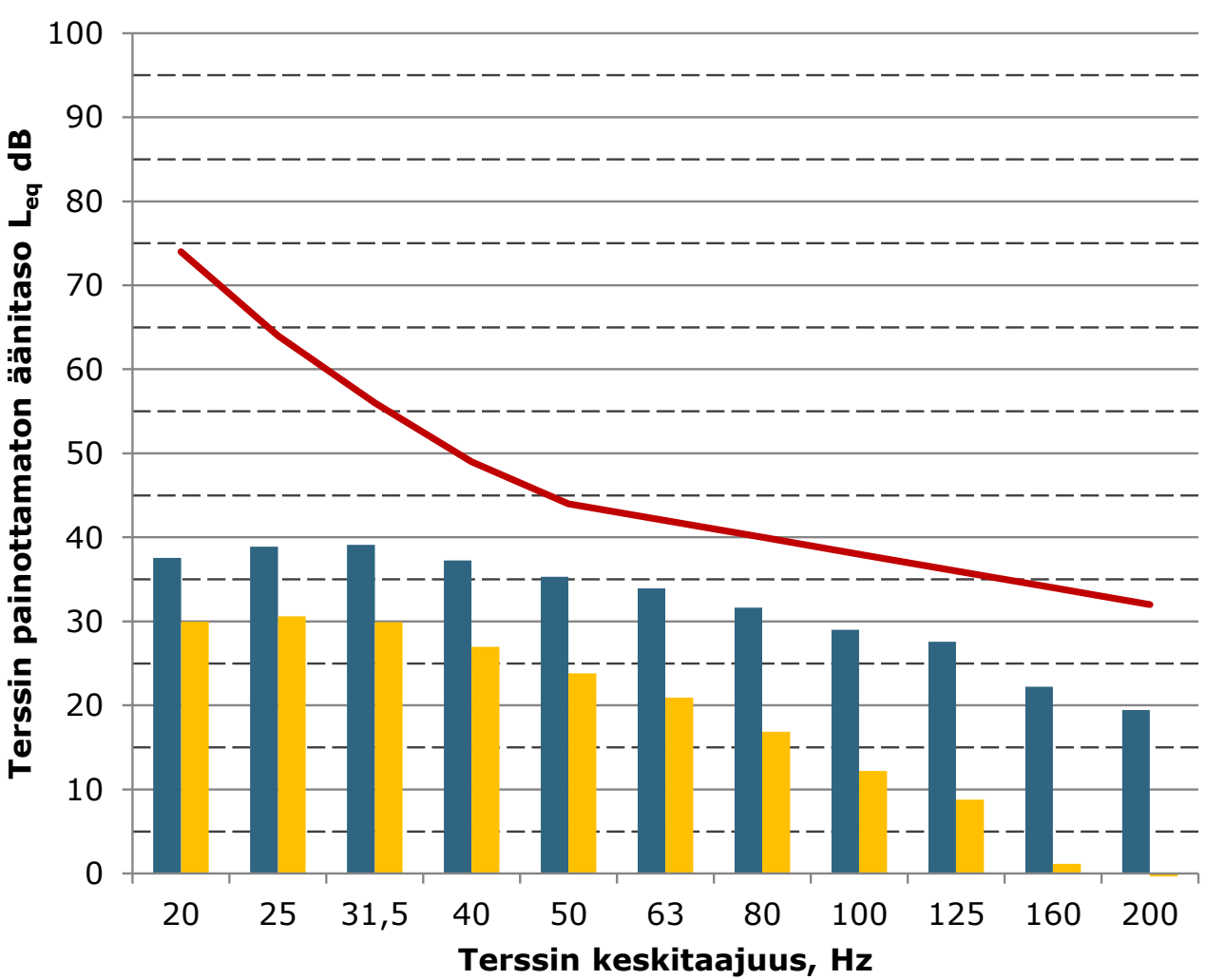
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus D (Kalltrdskvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

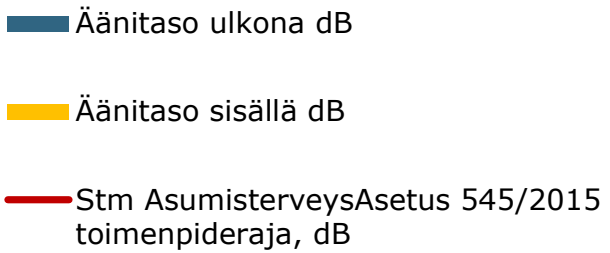




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

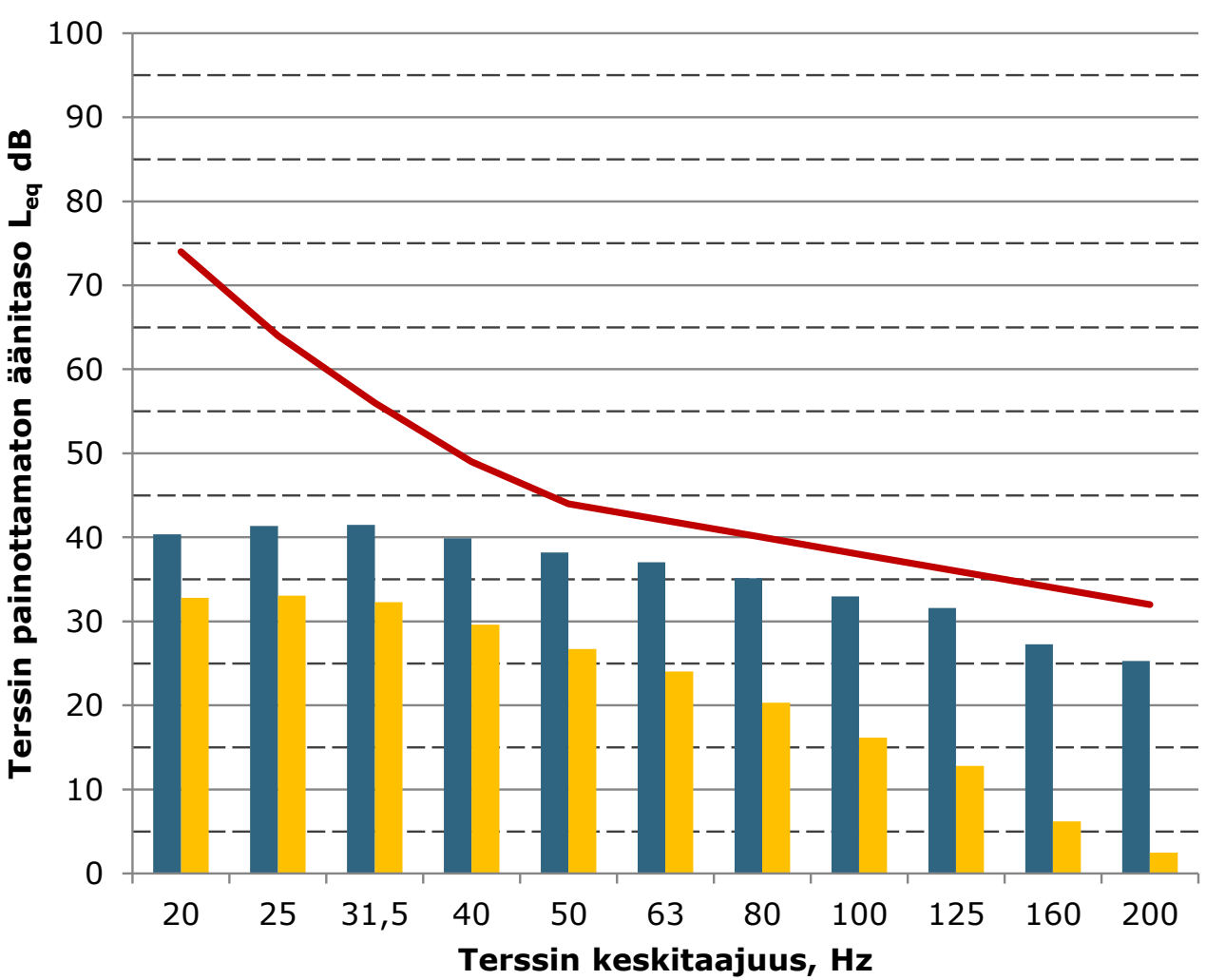
Matalien taajuuksien äänitasot ulkona ja sisällä, Metsästysmaja E (Kejsarbacken), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

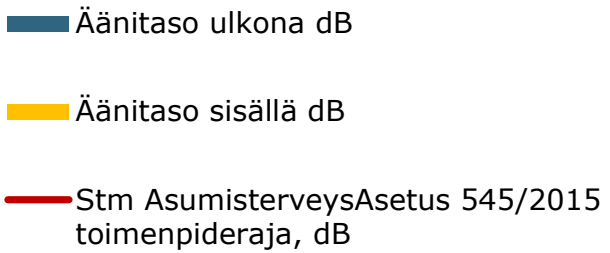




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

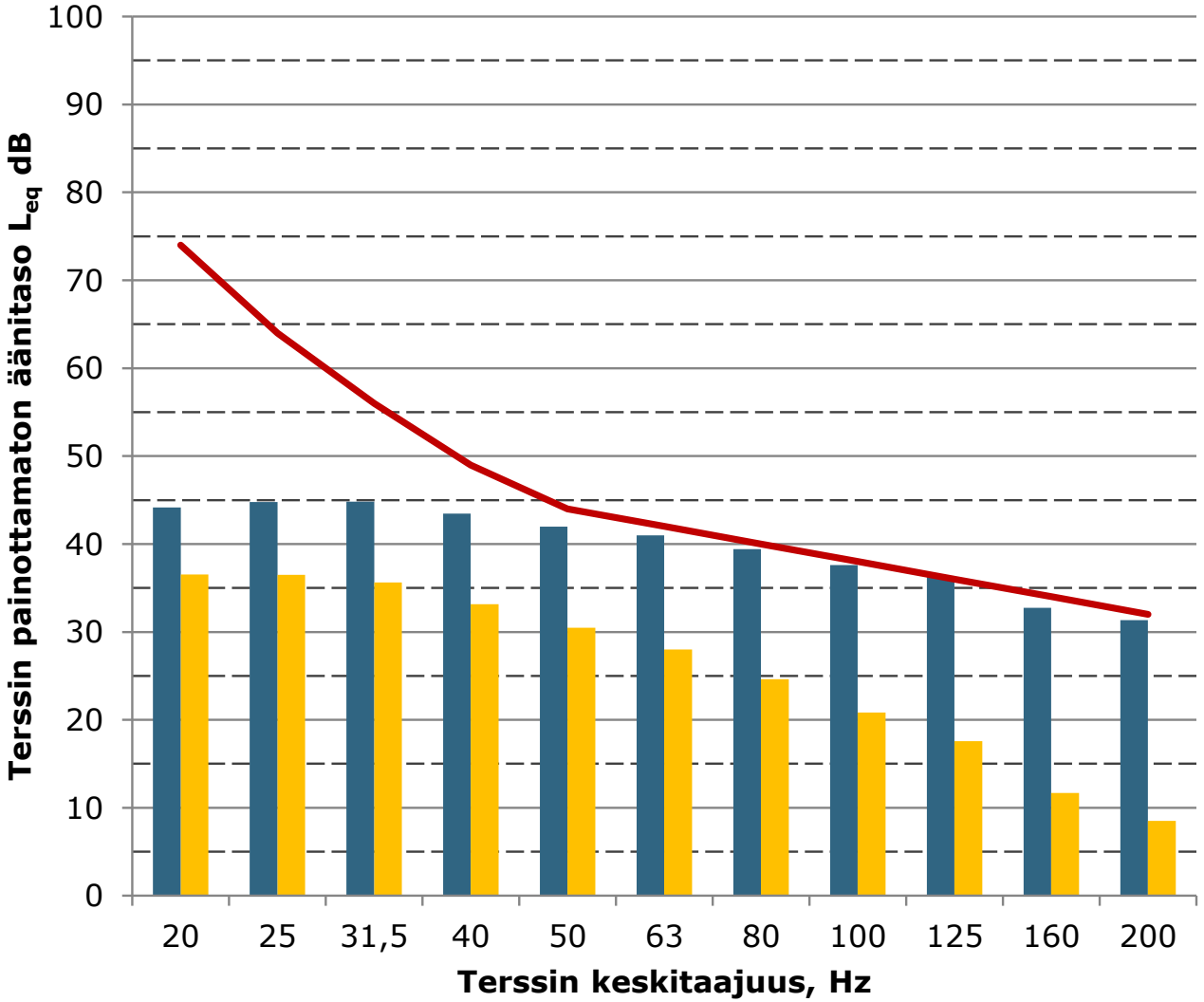
Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus F (Kdllbacken), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan





Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus G (Kornjdrv), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

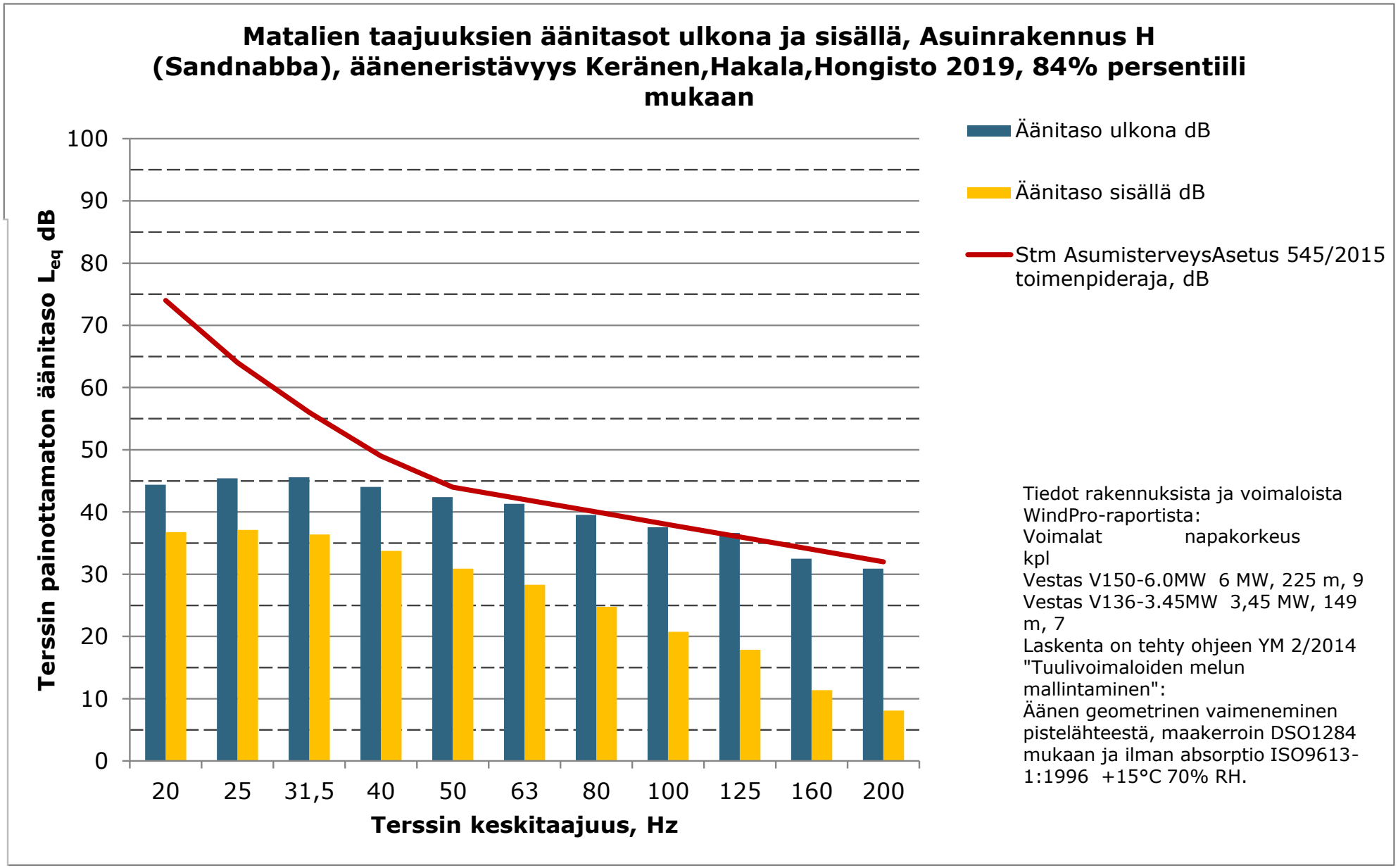


Äänitaso ulkona dB

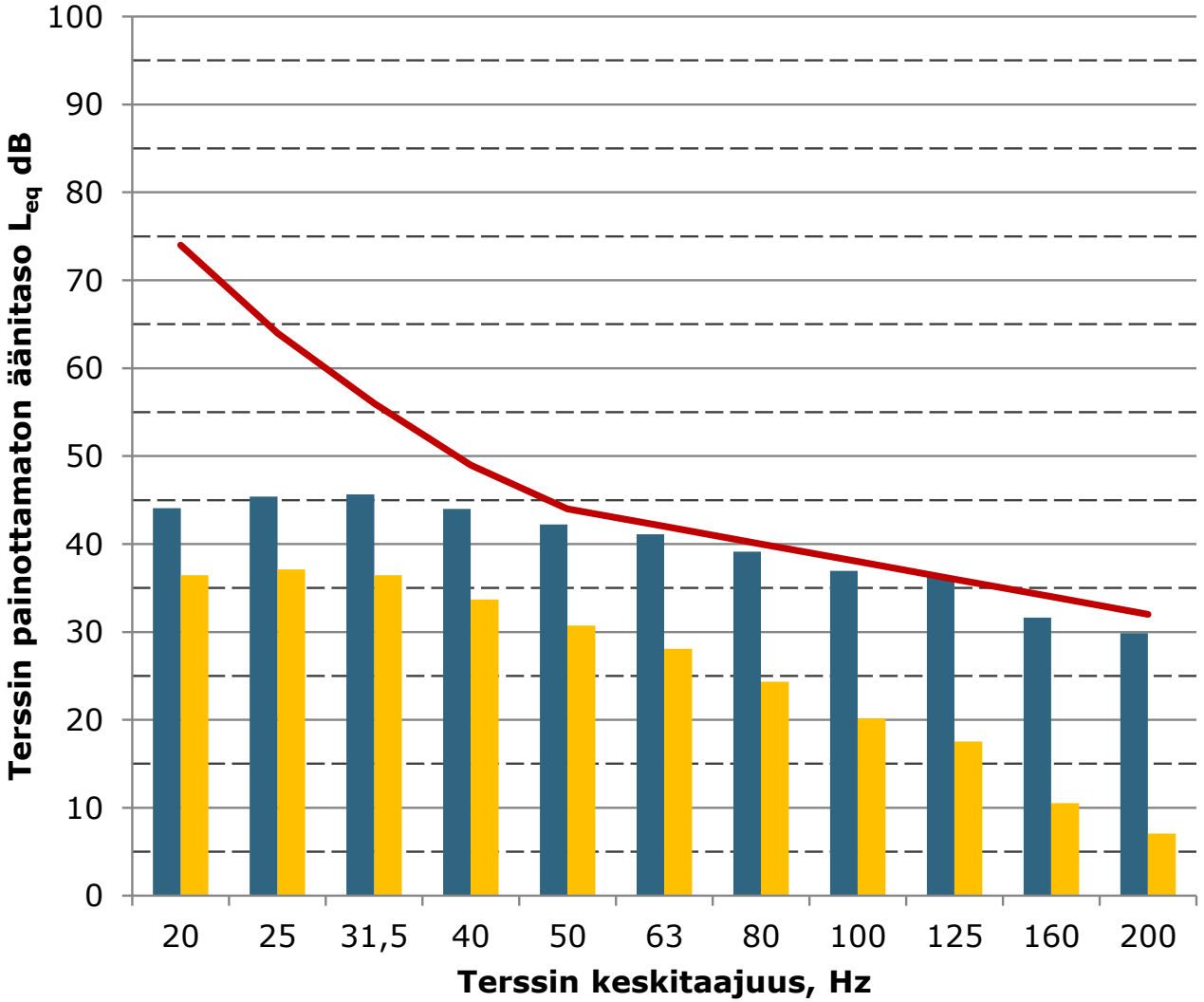
Äänitaso sisällä dB

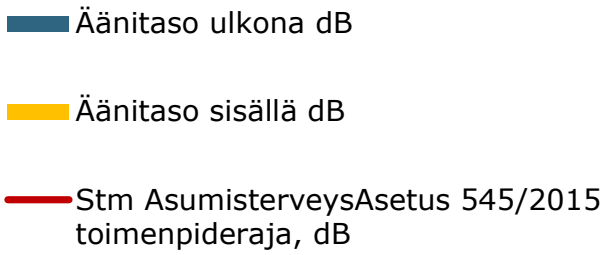
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB

Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

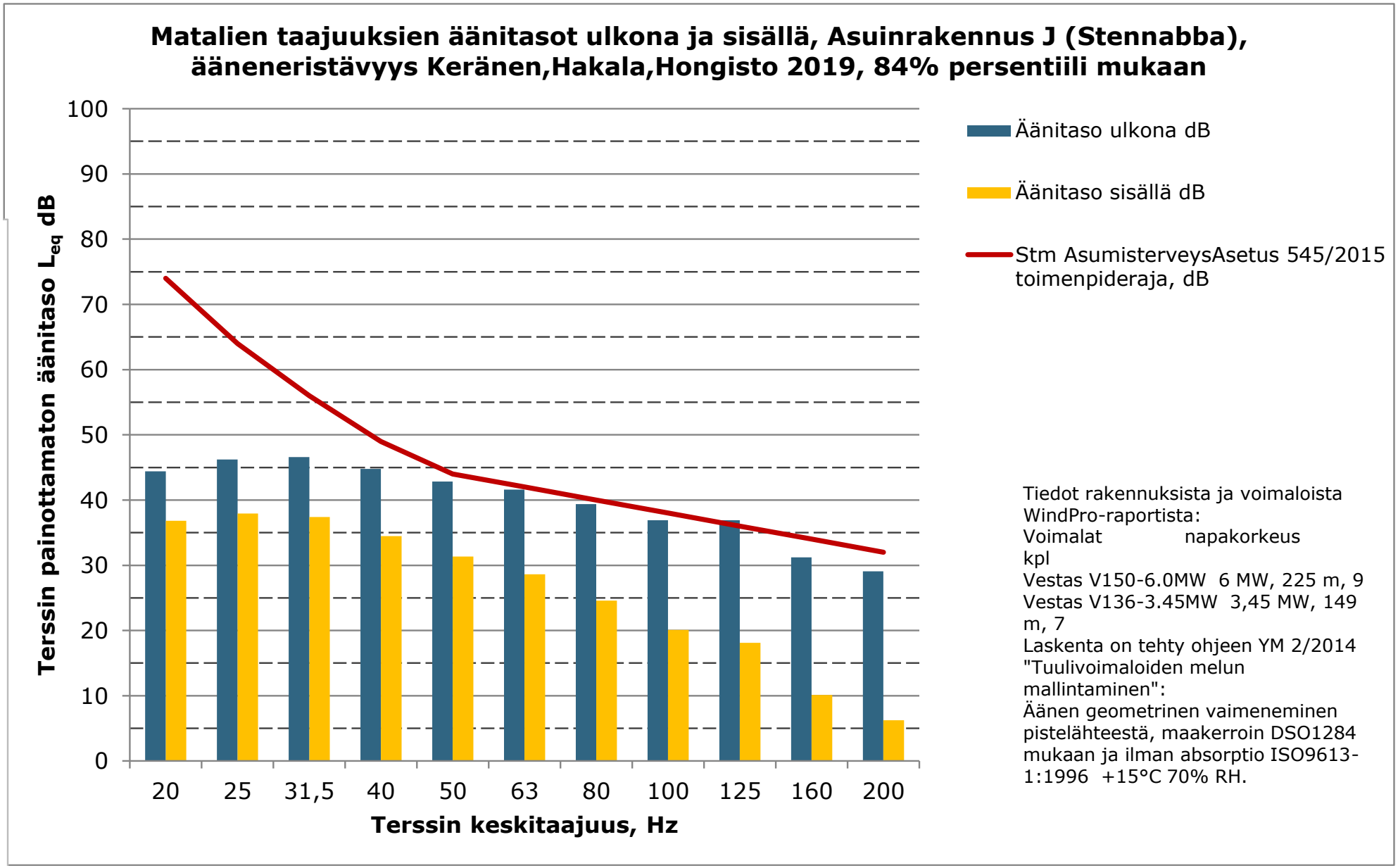

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus H (Sandnabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

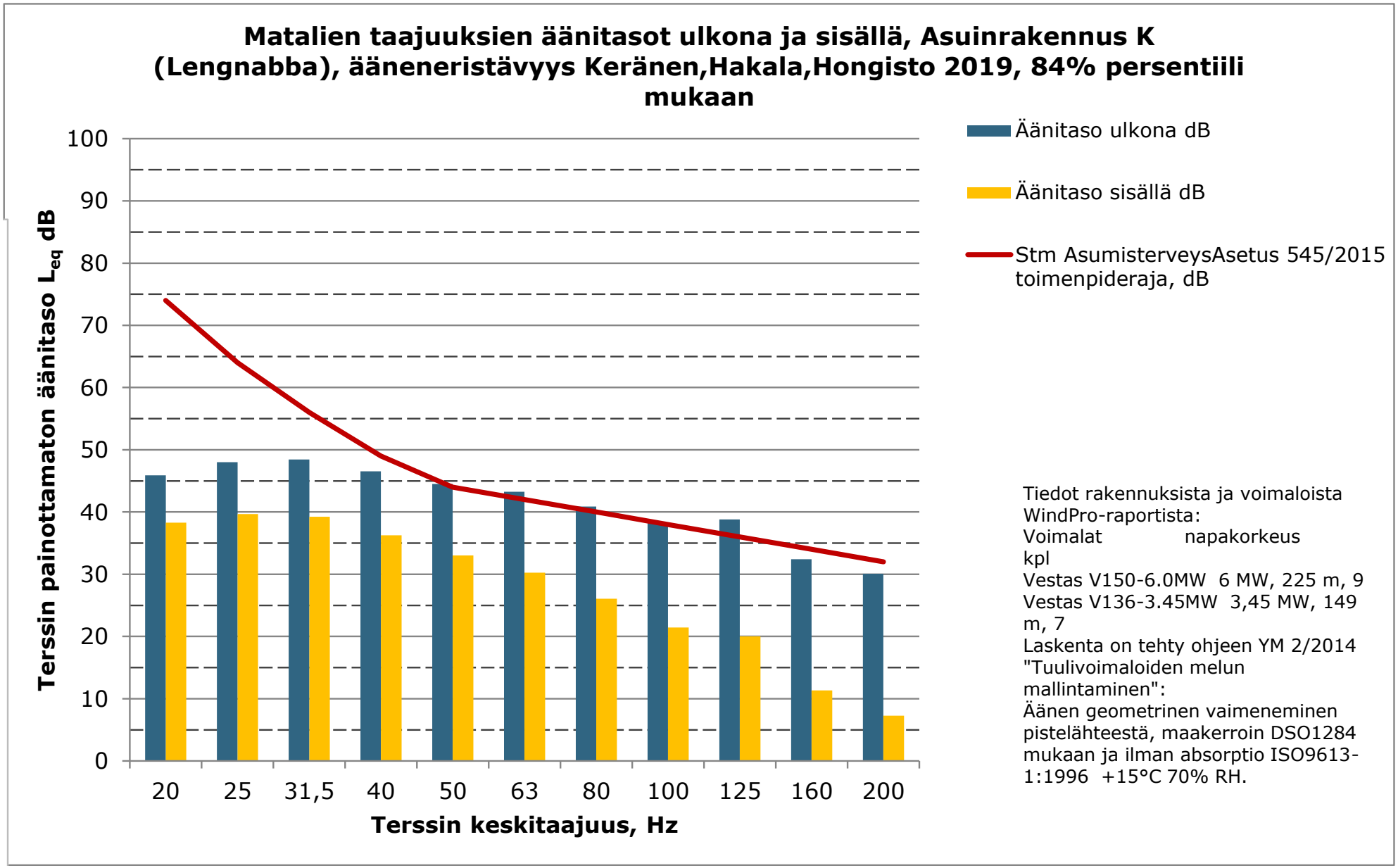
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus I (Asp), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

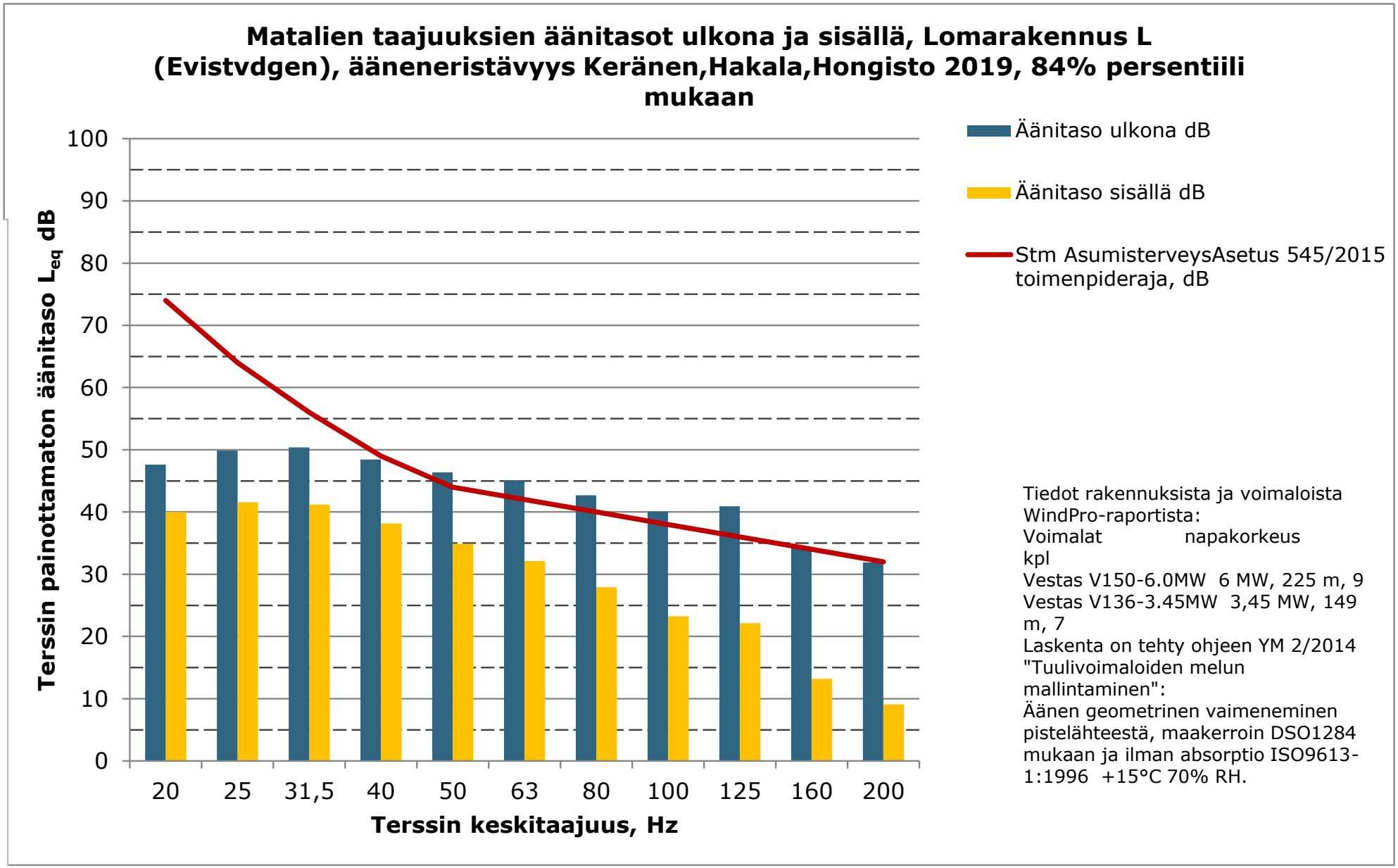




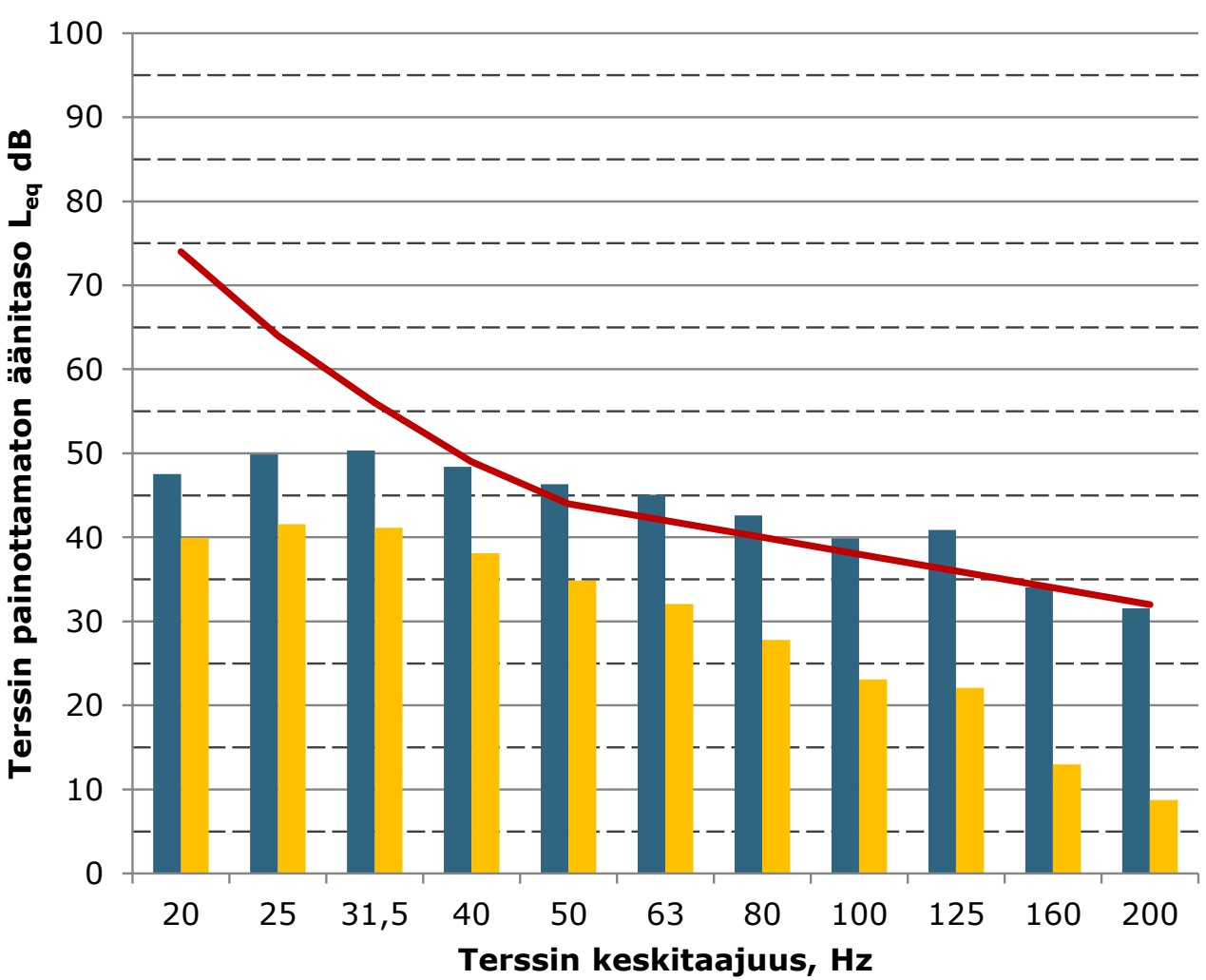
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

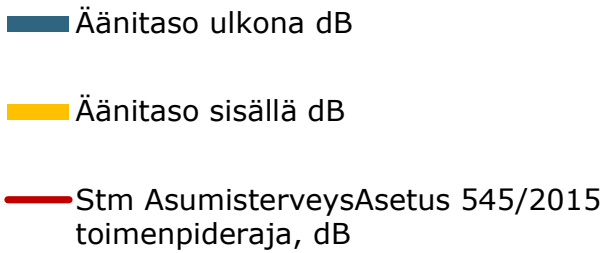

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus J (Stennabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus K (Lengnabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso Leq dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

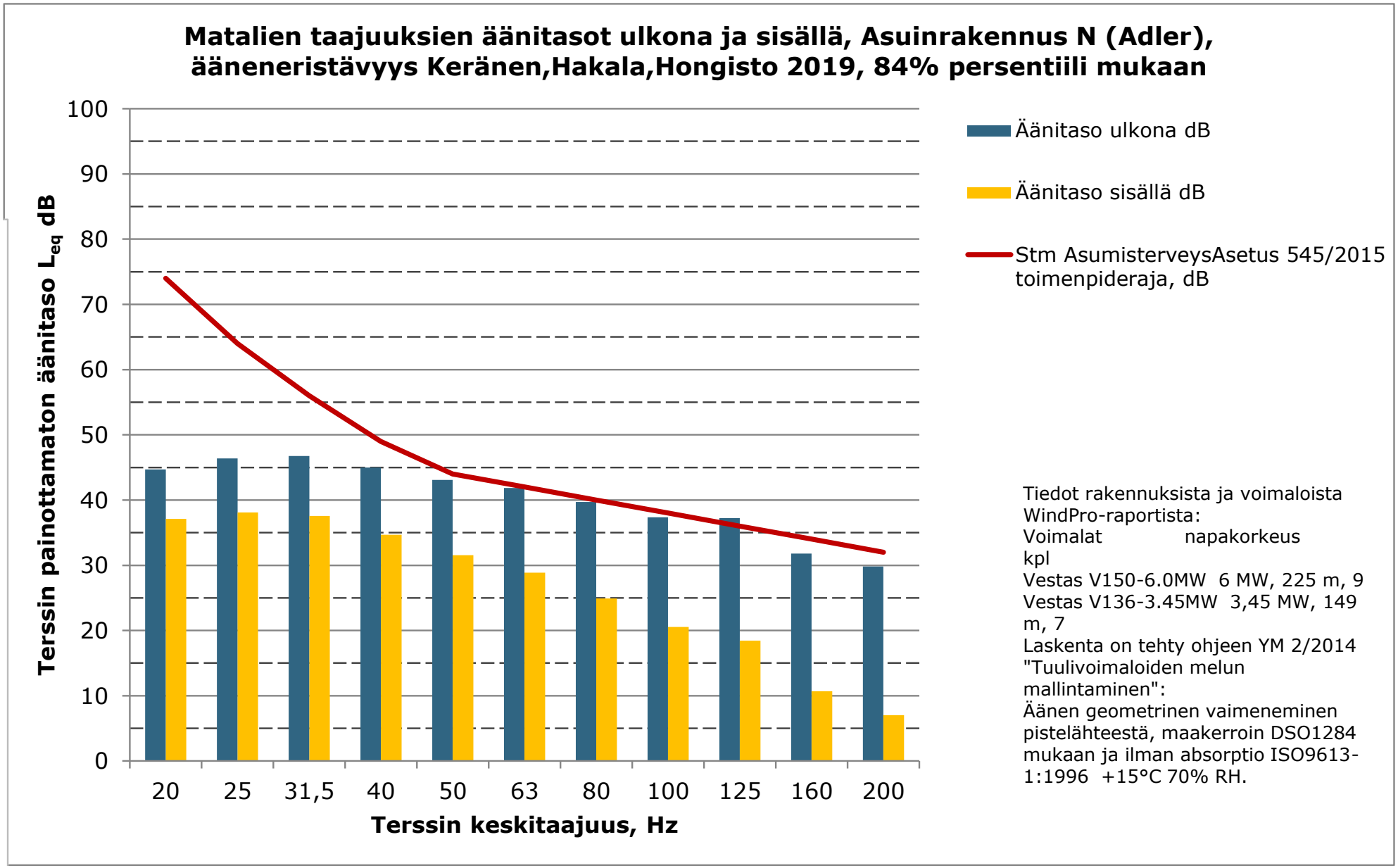

Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus L (Evistvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus M (Stenbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

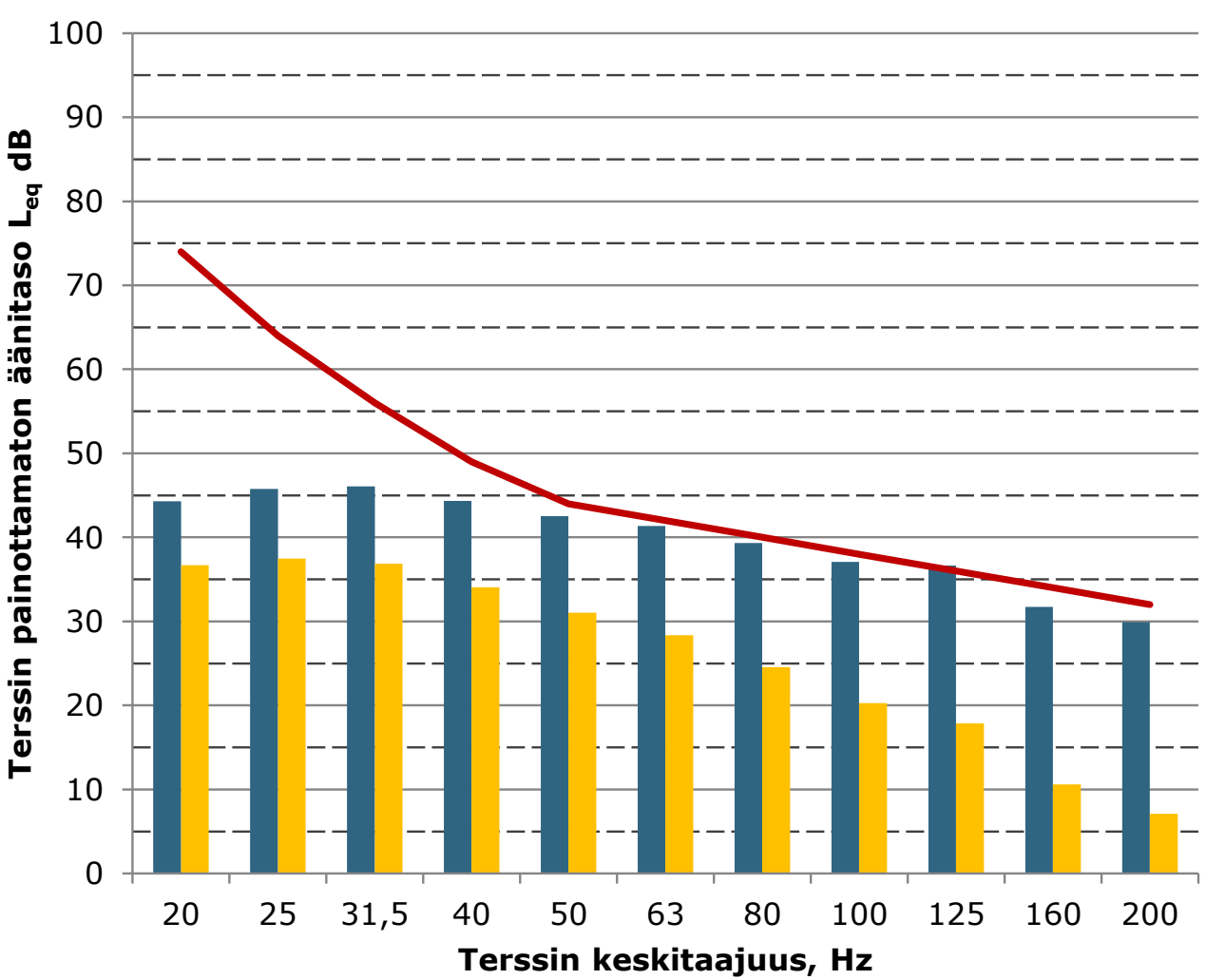


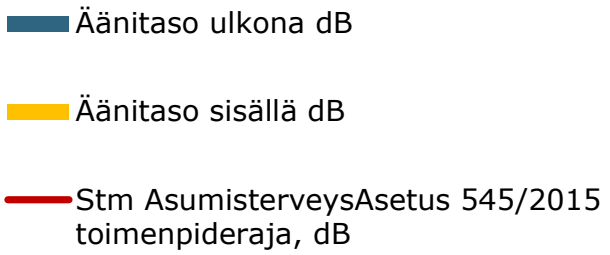


Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus N (Adler), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

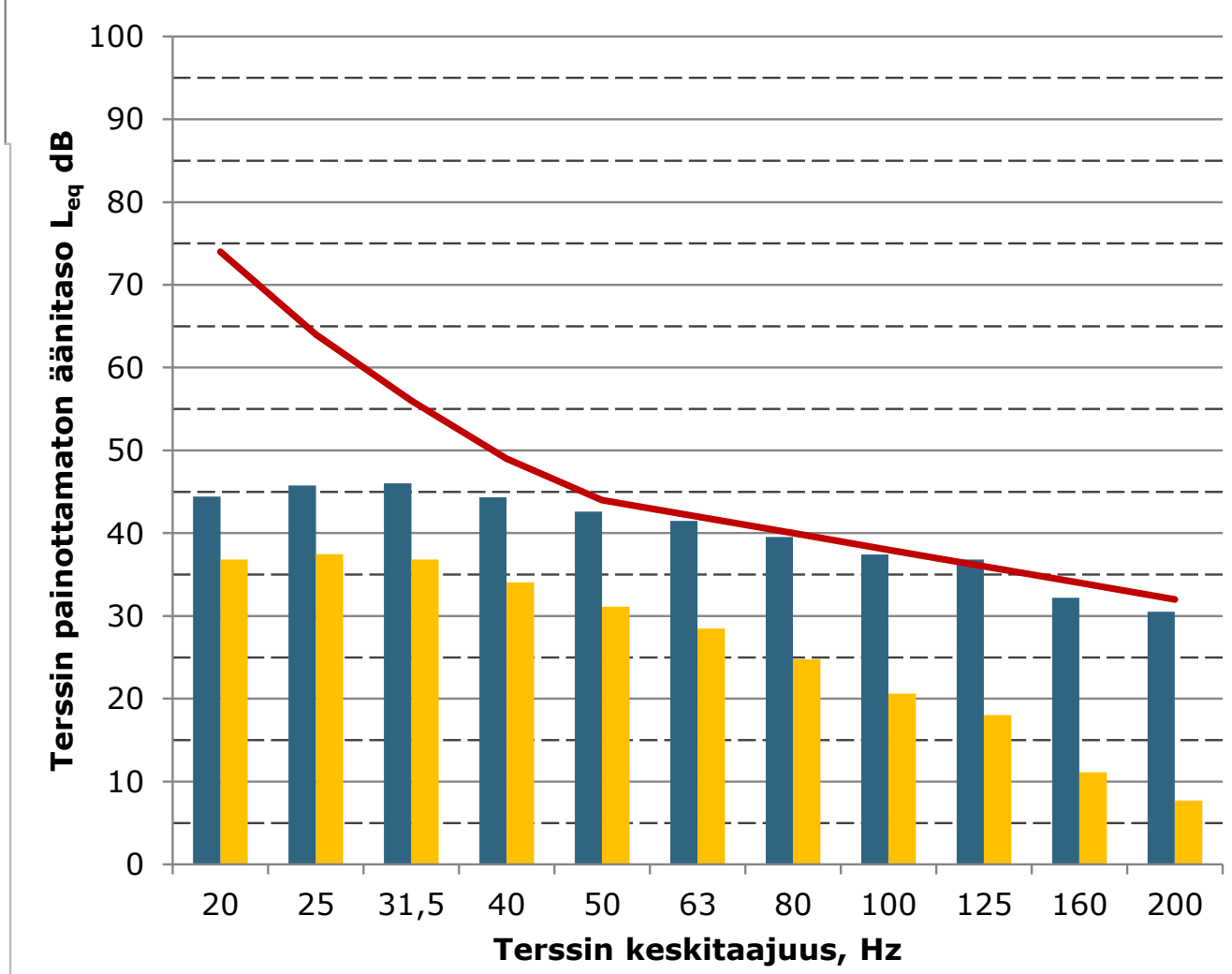
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus O (Evistvdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

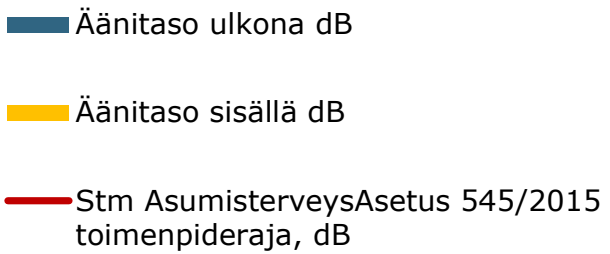




Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

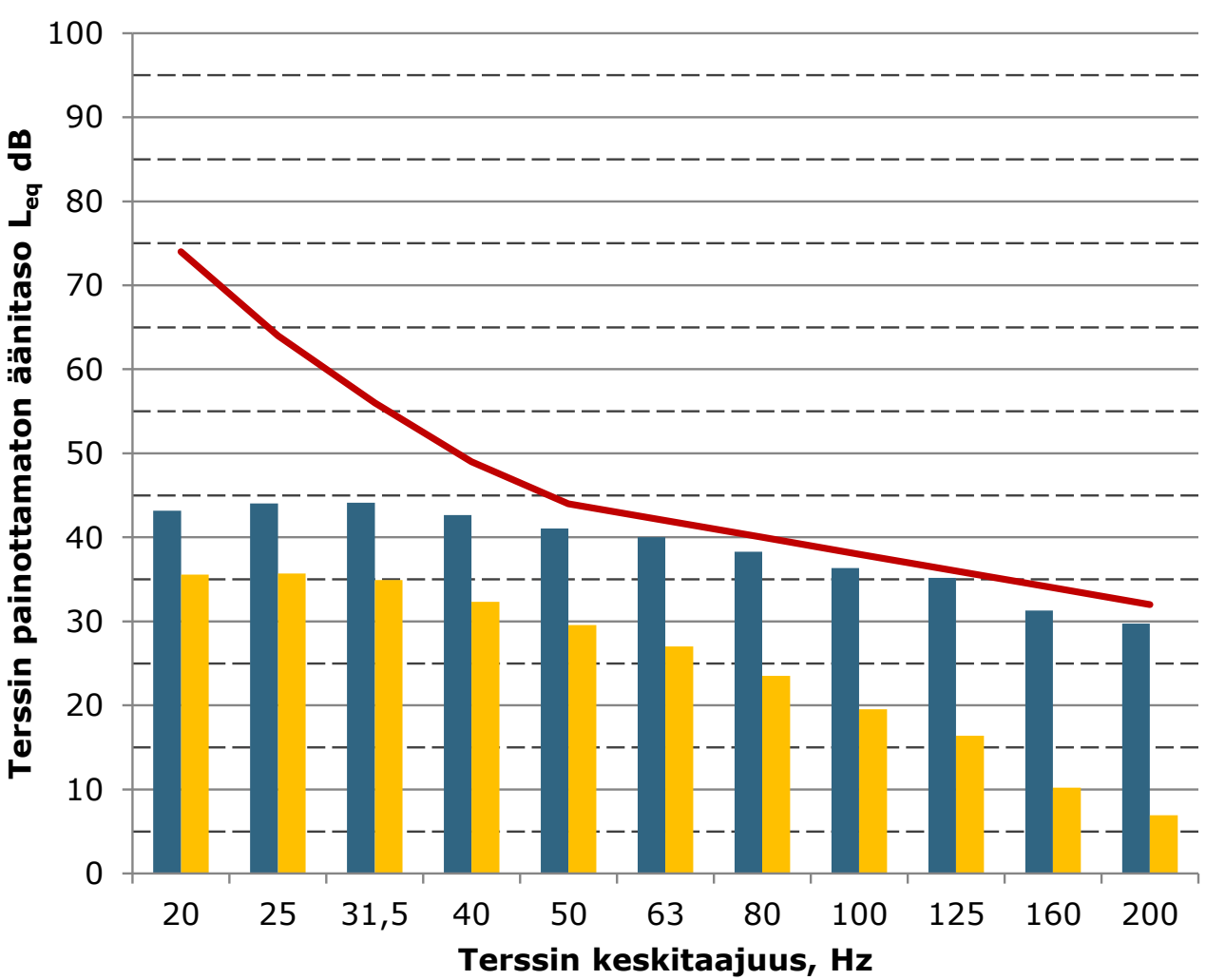
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus P (Finnabbavdgen), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

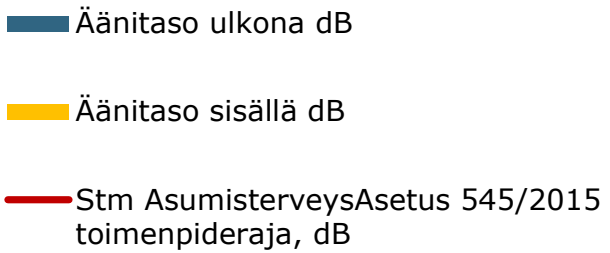




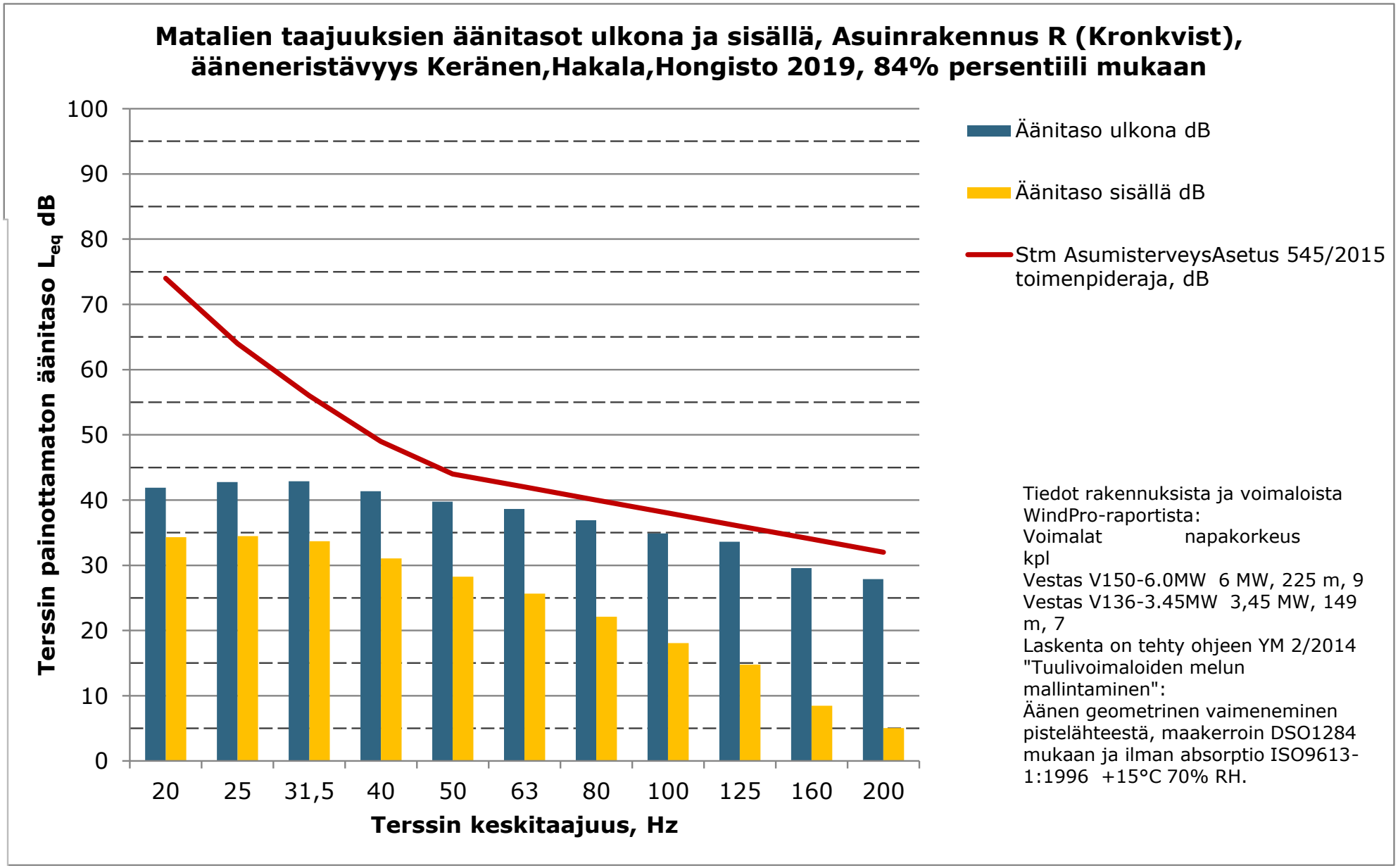
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

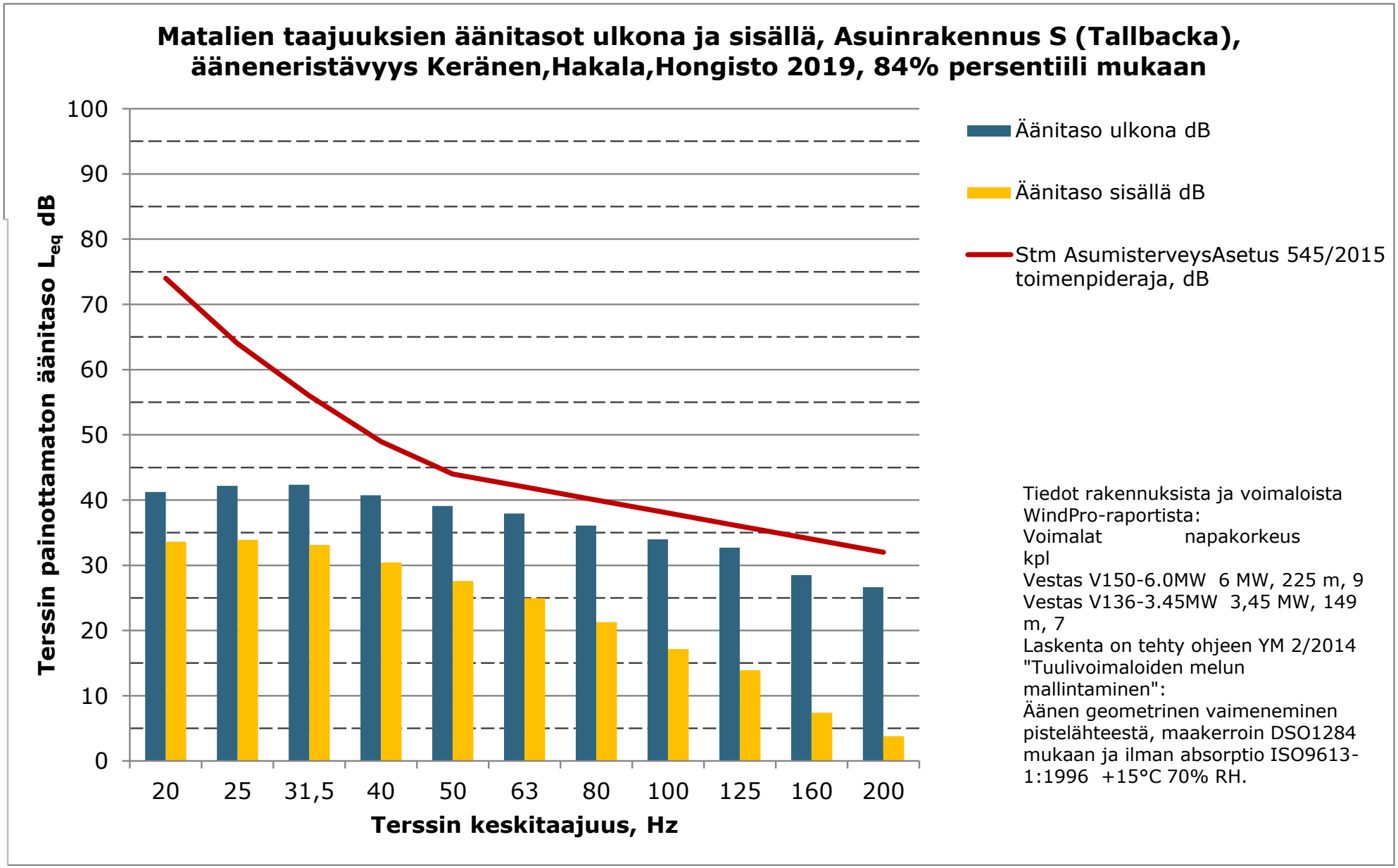
Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Q (Dalabacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

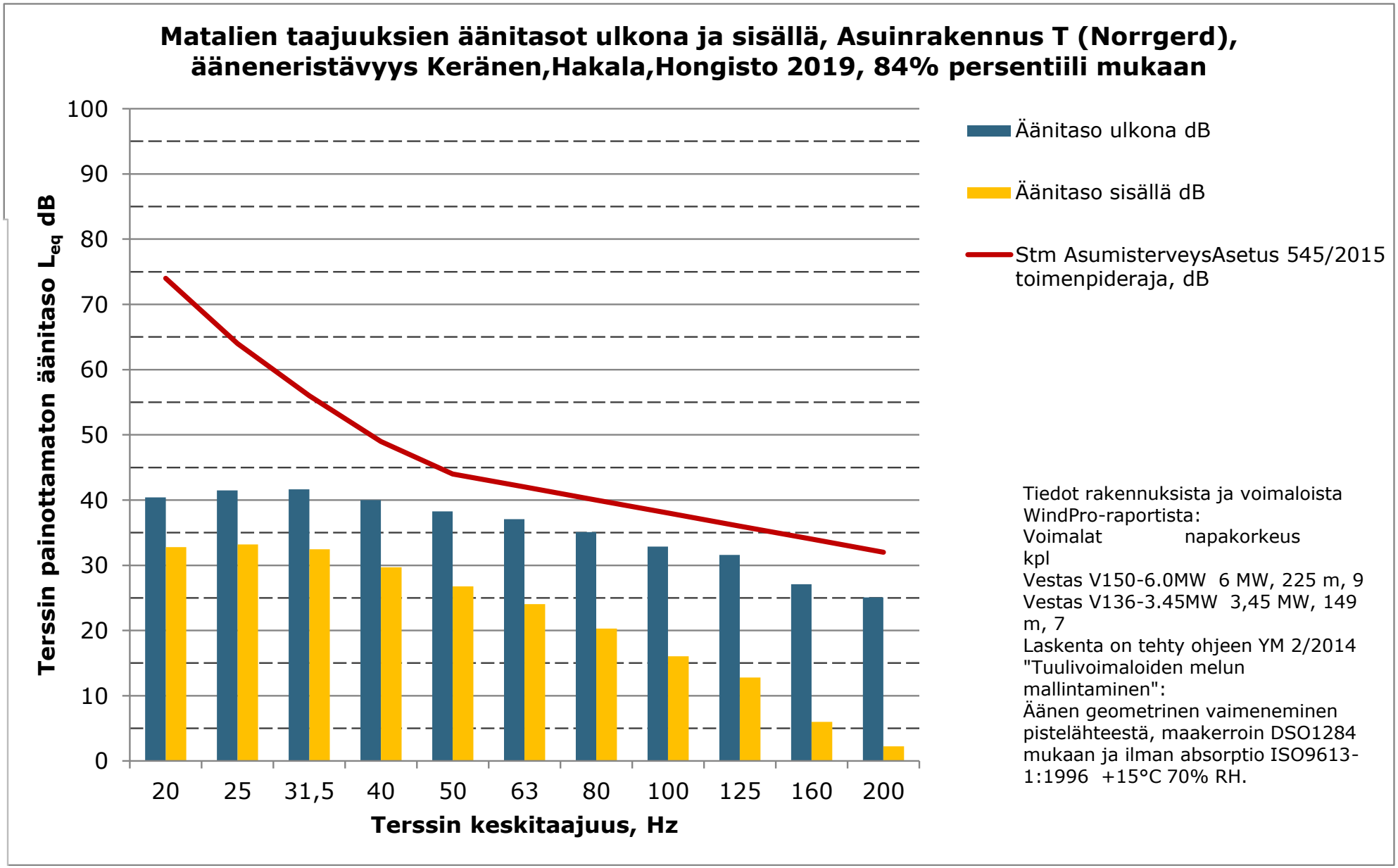




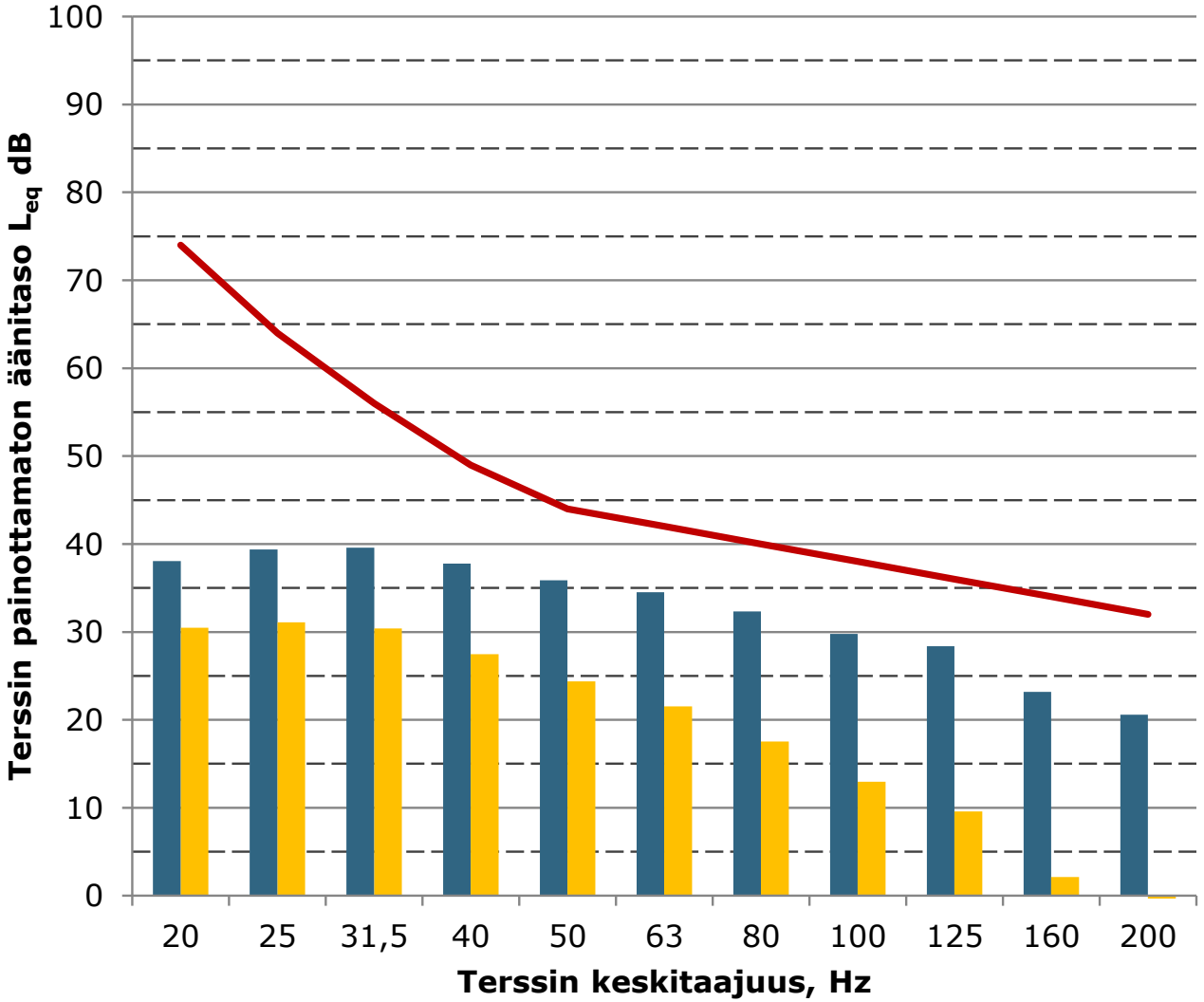
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

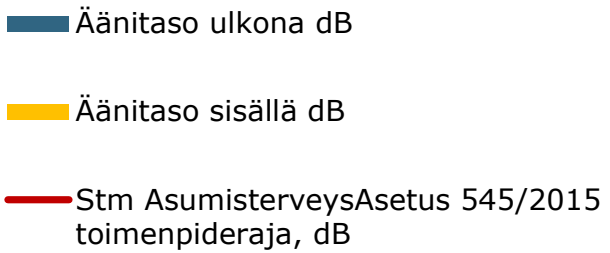

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus R (Kronkvist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso Leq dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus S (Tallbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso Leq dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus T (Norrgerd), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus U (Nepi), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan



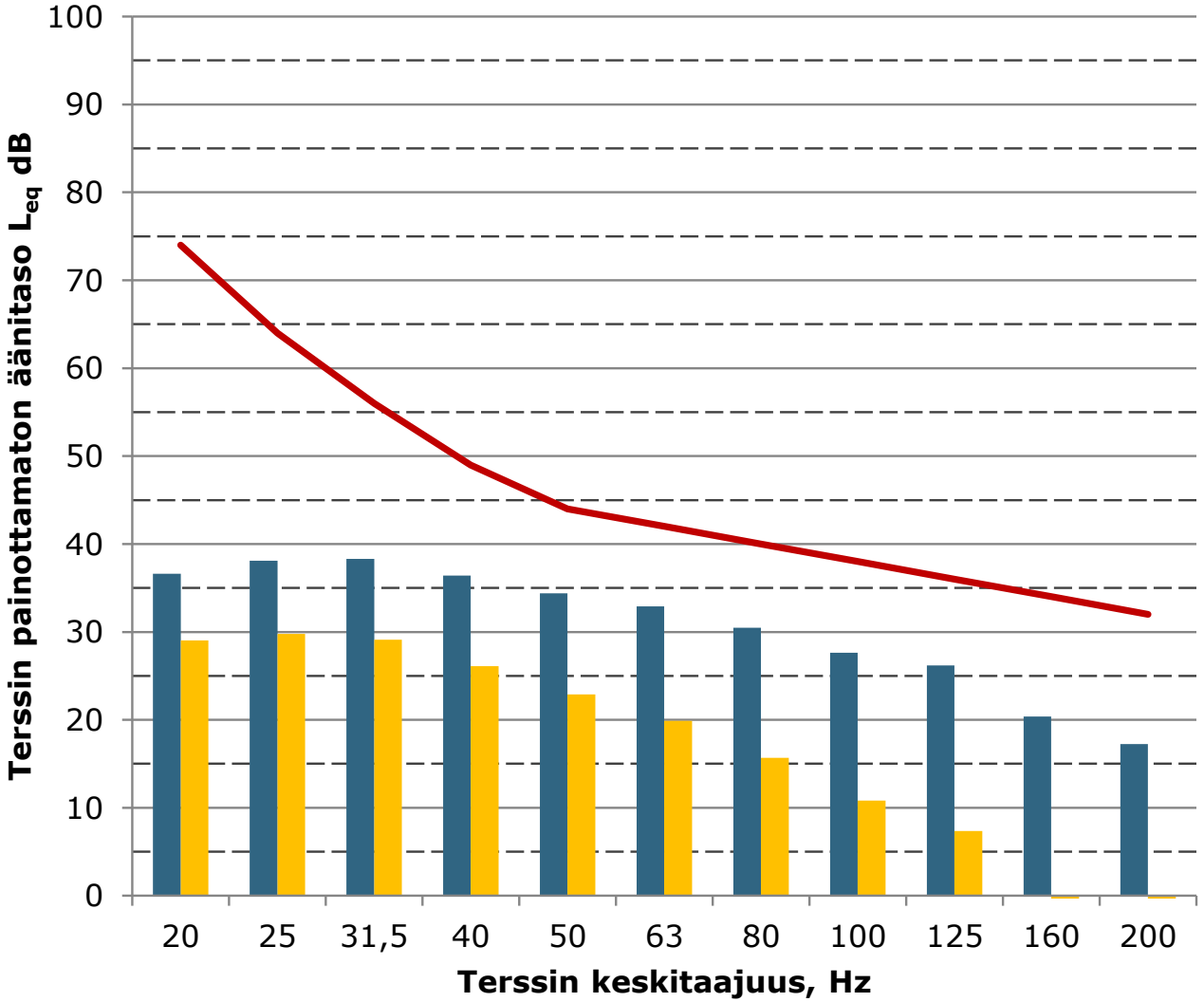


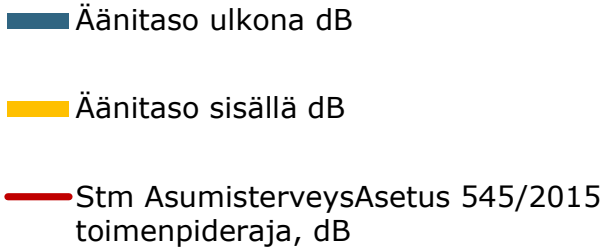
Tiedot rakennuksista ja voimaloista WindPro-raportista:

Voimalat	napakorkeus	kpl
Vestas V150-6.0MW	6 MW, 225 m,	9
Vestas V136-3.45MW	3,45 MW, 149 m,	7

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus V (Skutas), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan

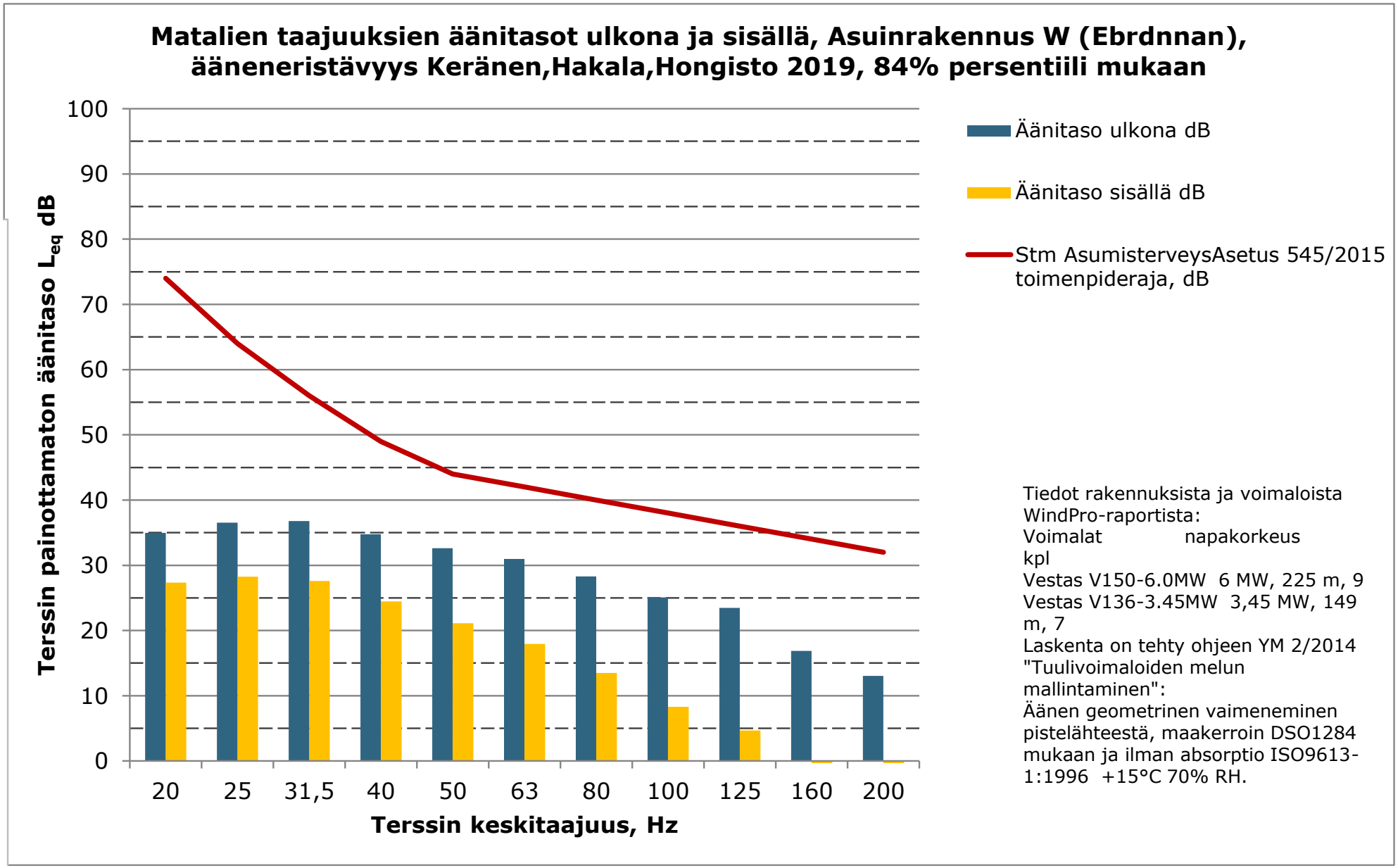


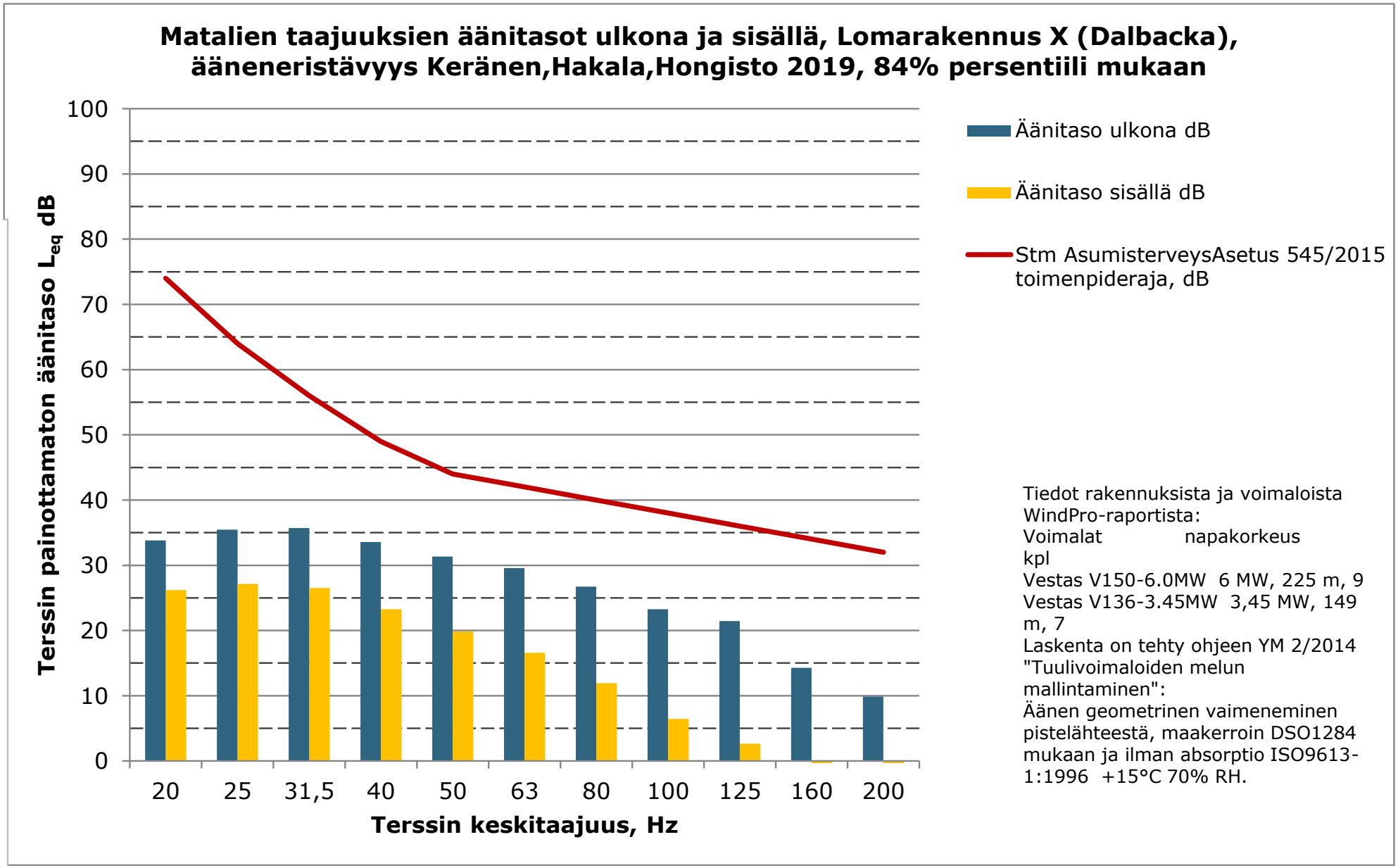


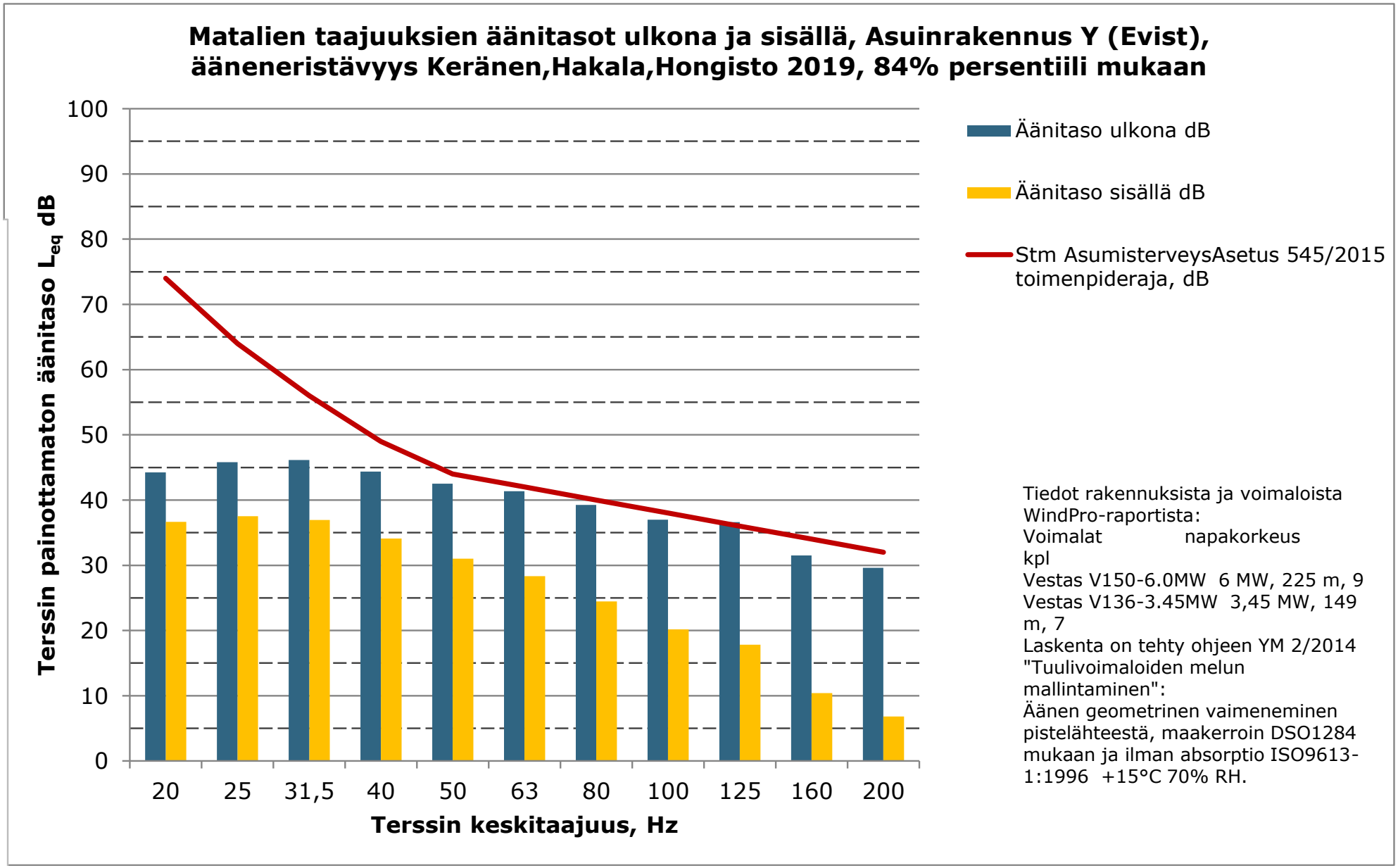
Tiedot rakennuksista ja voimaloista WindPro-raportista:

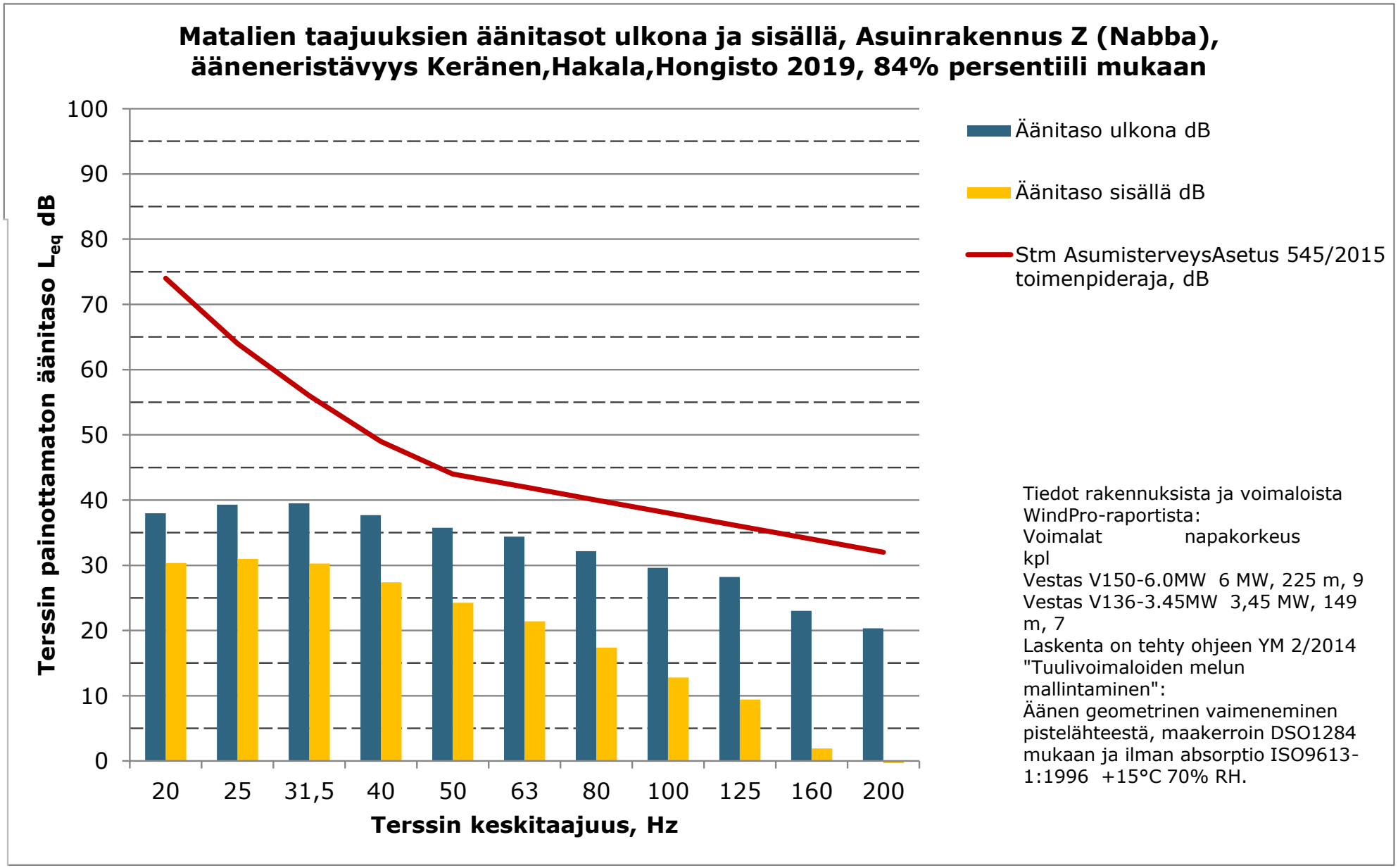
Voimalat	napakorkeus	kpl
Vestas V150-6.0MW	6 MW, 225 m,	9
Vestas V136-3.45MW	3,45 MW, 149 m,	7

Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus W (Ebrdnnan), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Lomarakennus X (Dalbacka), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus
kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Y (Evist), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.


Matalien taajuuksien äänitasot ulkona ja sisällä, Asuinrakennus Z (Nabba), ääneneristävyys Keränen,Hakala,Hongisto 2019, 84% persentiili mukaan
Terssin painottamaton äänitaso L_{eq} dB
100
90
80
70
60
50
40
30
20
10
0
20
25
31,5
40
50
63
80
100
125
160
200
Terssin keskitaajuus, Hz
Äänitaso ulkona dB
Äänitaso sisällä dB
Stm AsumisterveysAsetus 545/2015 toimenpideraja, dB
Tiedot rakennuksista ja voimaloista WindPro-raportista:
Voimalat napakorkeus kpl
Vestas V150-6.0MW 6 MW, 225 m, 9
Vestas V136-3.45MW 3,45 MW, 149 m, 7
Laskenta on tehty ohjeen YM 2/2014 "Tuulivoimaloiden melun mallintaminen":
Äänen geometrinen vaimeneminen pistelähteestä, maakerroin DSO1284 mukaan ja ilman absorptio ISO9613-1:1996 +15°C 70% RH.

Bilaga 9. Purmo vindkraftspark, nuläge. Skuggmodelleringens resultat ”real case, no forest”.

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
26.1.2023 17.45/3.5.584

SHADOW - Main Result

Calculation: Purmon hanke YV(Salo-Ylikoski)_nykytilanne

Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	1 minutes

Sunshine probability S (Average daily sunshine hours) []

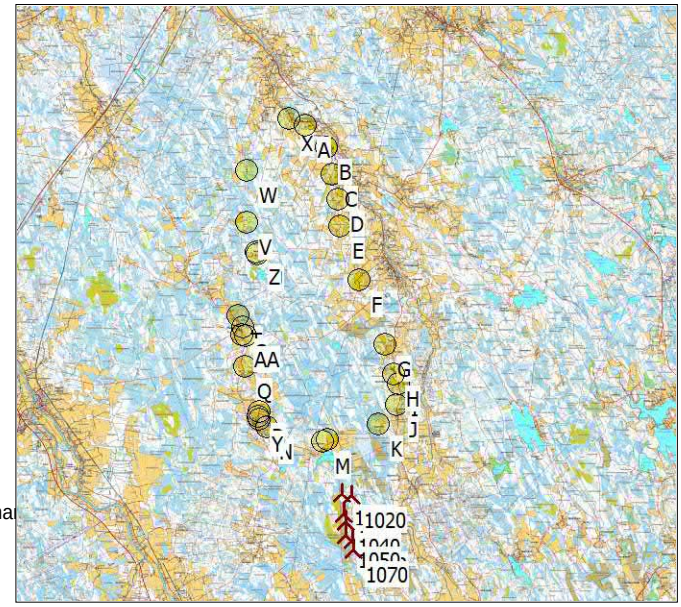
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_Purmon tuulivoimaha
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000
New WTG
Shadow receptor

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	298 762	7 032 913	58,6	Generic RD180 HH150 7000 180...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
2	299 290	7 032 796	60,0	Generic RD180 HH150 7000 180...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
3	298 900	7 031 842	60,0	Generic RD180 HH150 7000 180...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
4	298 977	7 031 430	60,0	Generic RD180 HH150 7000 180...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
5	299 000	7 030 729	60,0	Generic RD180 HH150 7000 180...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
6	299 358	7 030 441	60,0	Generic RD180 HH150 7000 180...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
7	299 389	7 029 959	60,0	Generic RD180 HH150 7000 180...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	Asuinrakennus A (Lillkvist)	296 866	7 052 328	26,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	Asuinrakennus B (Dallberga)	297 952	7 051 163	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	Asuinrakennus C (Tormbacka)	298 274	7 049 757	28,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	Asuinrakennus D (Kallträskvägen)	298 556	7 048 421	35,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	Metsästysmaja E (Kejsarbacken)	298 663	7 047 017	33,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	Lomarakennus F (Källbacken)	299 710	7 044 165	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	Asuinrakennus G (Kornjärv)	301 071	7 040 772	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	Asuinrakennus H (Sandnabba)	301 519	7 039 228	51,6	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	Asuinrakennus I (Asp)	301 749	7 038 736	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	Asuinrakennus J (Stennabba)	301 661	7 037 581	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	Asuinrakennus K (Långnabba)	300 689	7 036 583	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	Lomarakennus L (Åvistvägen)	298 031	7 035 773	52,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
M	Asuinrakennus M (Stenbacka)	297 753	7 035 671	53,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
N	Asuinrakennus N (Adler)	294 812	7 036 441	44,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
O	Asuinrakennus O (Åvistvägen)	294 394	7 036 982	41,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
P	Asuinrakennus P (Finnabbavägen)	294 415	7 037 260	40,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Q	Asuinrakennus Q (Dalabacka)	293 652	7 039 610	40,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
R	Asuinrakennus R (Kronkvist)	293 736	7 041 267	32,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
S	Asuinrakennus S (Tallbacka)	293 575	7 041 715	32,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
T	Asuinrakennus T (Norrgård)	293 326	7 042 304	30,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
U	Asuinrakennus U (Nåpi)	294 326	7 045 578	35,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
V	Asuinrakennus V (Skutas)	293 741	7 047 247	32,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
W	Asuinrakennus W (Åbrännan)	293 782	7 049 981	22,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0

To be continued on next page...

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
26.1.2023 17.45/3.5.584

SHADOW - Main Result

Calculation: Purmon hanke YV(Salo-Ylikoski)_nykytilanne

...continued from previous page

No.	Name	East	North	Z [m]	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode	Eye height (ZVI) a.g.l. [m]
X	Lomarakennus X (Dalbacka)	296 008	7 052 686	21,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Y	Asuinrakennus Y (Åvist)	294 403	7 036 830	41,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Z	Asuinrakennus Z (Nabba)	294 257	7 045 675	35,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
AA	Asuinrakennus AA (Kronkvist)	293 533	7 041 290	31,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values: Shadow hours per year [h/year]
A	Asuinrakennus A (Lillkvist)	0:00
B	Asuinrakennus B (Dallberga)	0:00
C	Asuinrakennus C (Tormbacka)	0:00
D	Asuinrakennus D (Kallträskvägen)	0:00
E	Metsästysmaja E (Kejsarbacken)	0:00
F	Lomarakennus F (Källbacken)	0:00
G	Asuinrakennus G (Kornjärv)	0:00
H	Asuinrakennus H (Sandnabba)	0:00
I	Asuinrakennus I (Asp)	0:00
J	Asuinrakennus J (Stennabba)	0:00
K	Asuinrakennus K (Långnabba)	0:00
L	Lomarakennus L (Åvistvägen)	0:00
M	Asuinrakennus M (Stenbacka)	0:00
N	Asuinrakennus N (Adler)	0:00
O	Asuinrakennus O (Åvistvägen)	0:00
P	Asuinrakennus P (Finnabbavägen)	0:00
Q	Asuinrakennus Q (Dalabacka)	0:00
R	Asuinrakennus R (Kronkvist)	0:00
S	Asuinrakennus S (Tallbacka)	0:00
T	Asuinrakennus T (Norrgård)	0:00
U	Asuinrakennus U (Nåpi)	0:00
V	Asuinrakennus V (Skutas)	0:00
W	Asuinrakennus W (Åbrännan)	0:00
X	Lomarakennus X (Dalbacka)	0:00
Y	Asuinrakennus Y (Åvist)	0:00
Z	Asuinrakennus Z (Nabba)	0:00
AA	Asuinrakennus AA (Kronkvist)	0:00

Total amount of flickering on the shadow receptors caused by each WTG

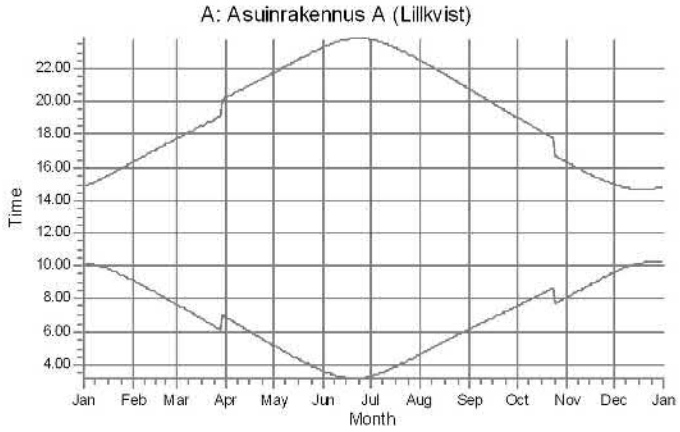
No.	Name	Expected [h/year]
1	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1454)	0:00
2	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1455)	0:00
3	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1456)	0:00
4	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1457)	0:00
5	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1458)	0:00
6	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1459)	0:00
7	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1460)	0:00

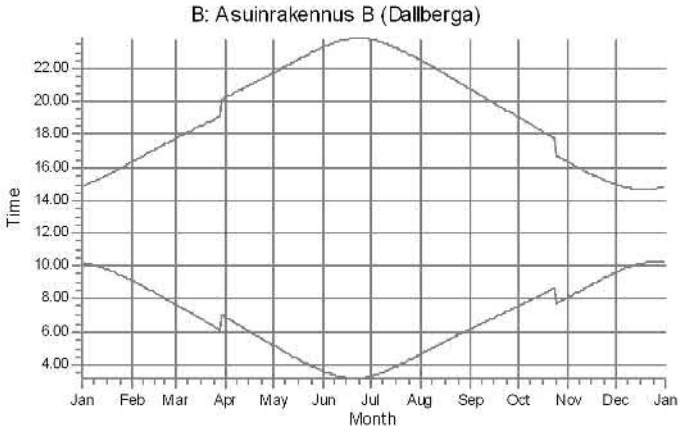
Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

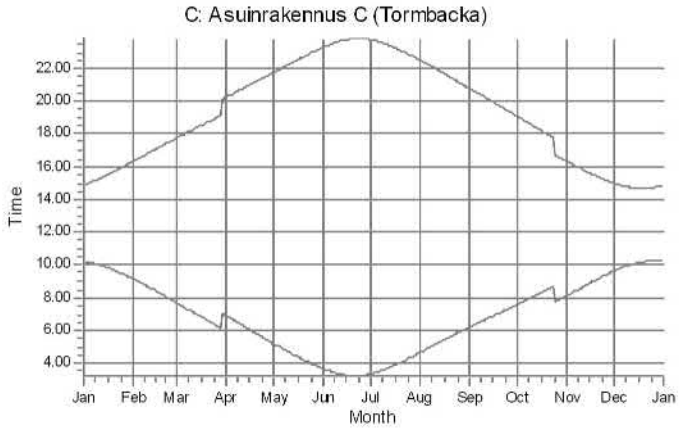
Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
26.1.2023 17.45/3.5.584

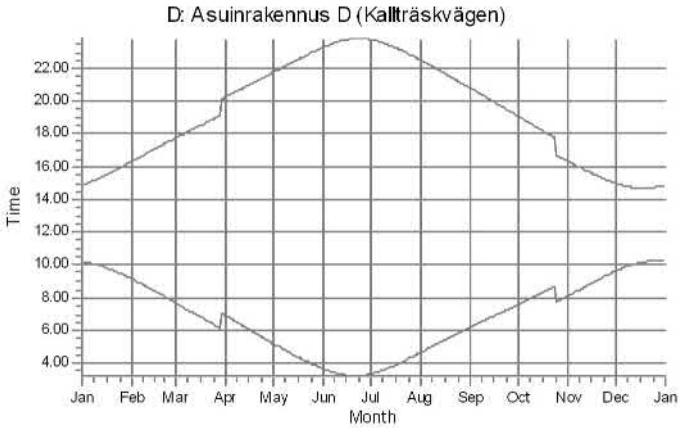
SHADOW - Calendar, graphical

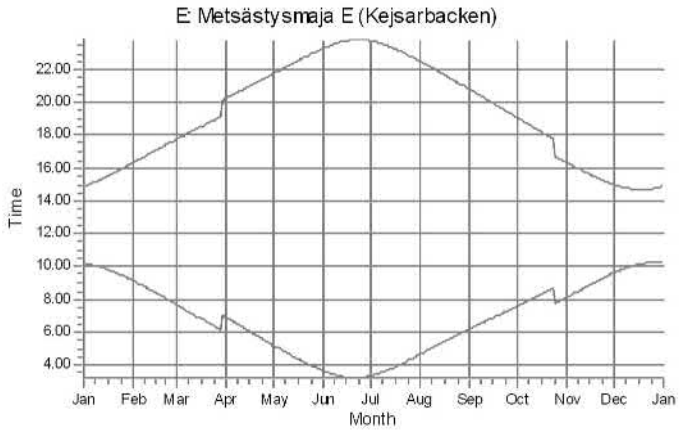
Calculation: Purmon hanke YV(Salo-Ylikoski)_nykytilanne

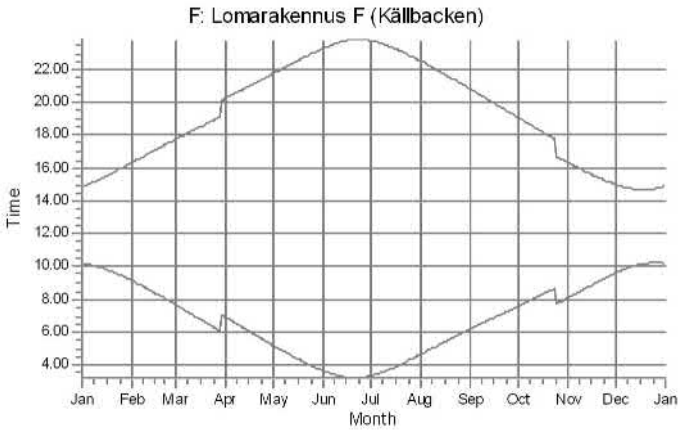












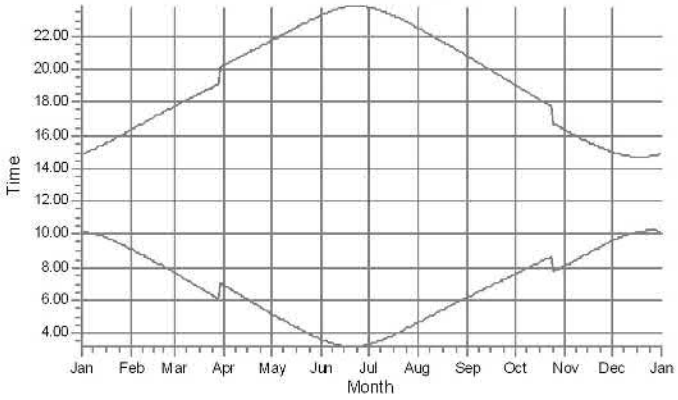
WTGs

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
26.1.2023 17.45/3.5.584

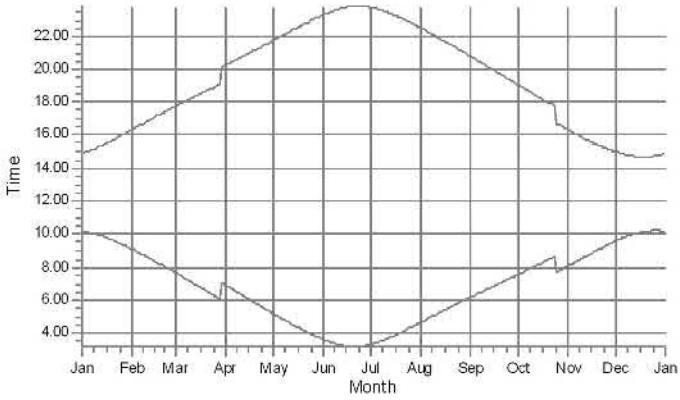
SHADOW - Calendar, graphical

Calculation: Purmon hanke YV(Salo-Ylikoski)_nykytilanne

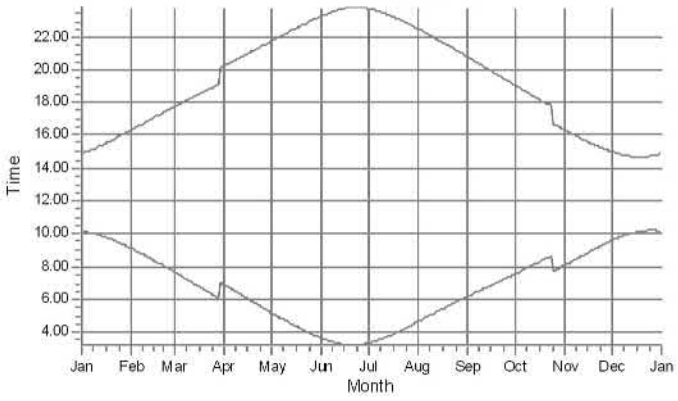
G: Asuinrakennus G (Kornjärv)



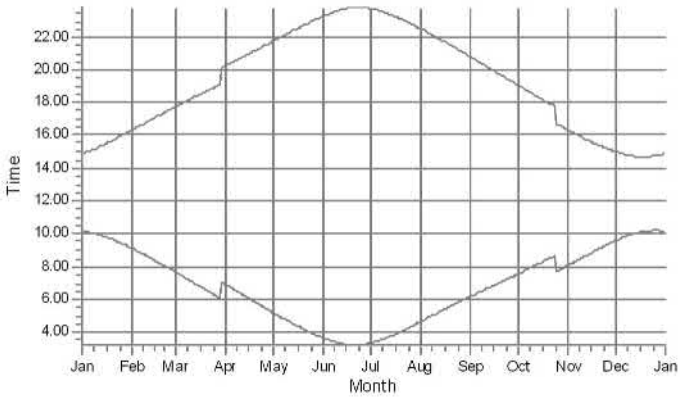
H: Asuinrakennus H (Sandnabba)



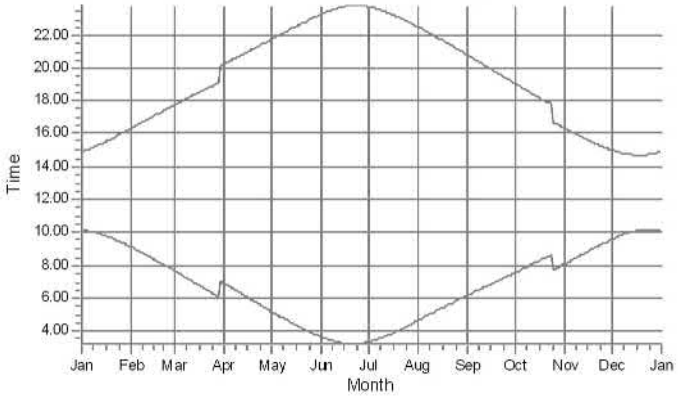
I: Asuinrakennus I (Asp)



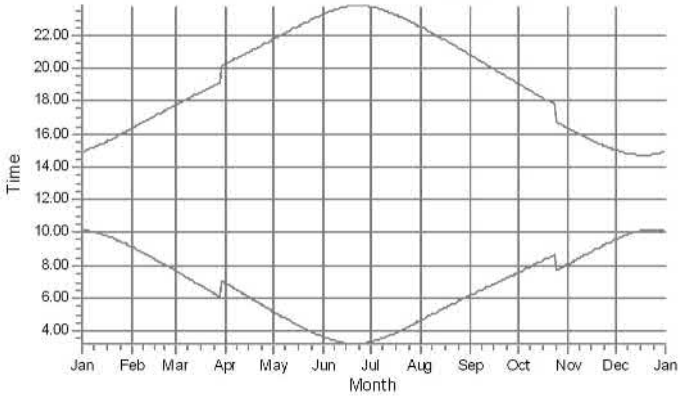
J: Asuinrakennus J (Stennabba)



K: Asuinrakennus K (Långnabba)



L: Lomarakennus L (Åvistvägen)



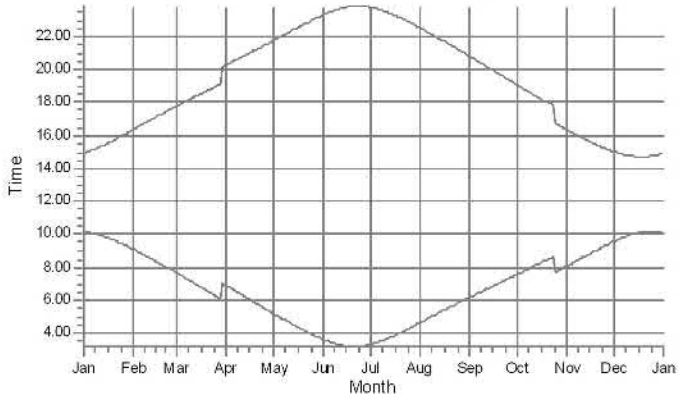
WTGs

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
26.1.2023 17.45/3.5.584

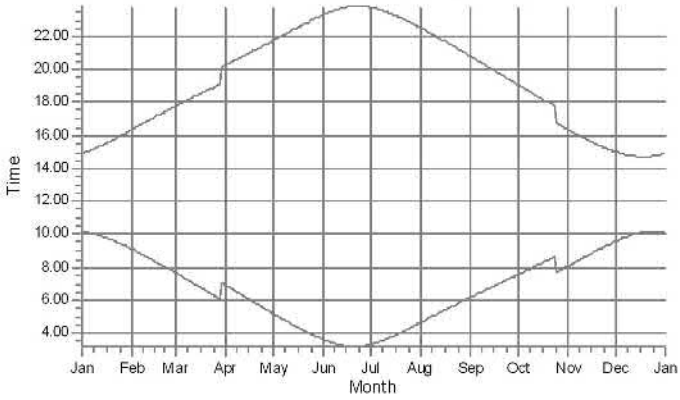
SHADOW - Calendar, graphical

Calculation: Purmon hanke YV(Salo-Ylikoski)_nykytilanne

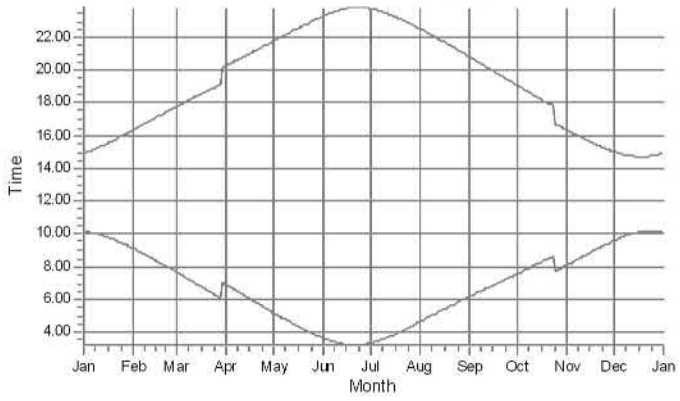
M: Asuinrakennus M (Stenbacka)



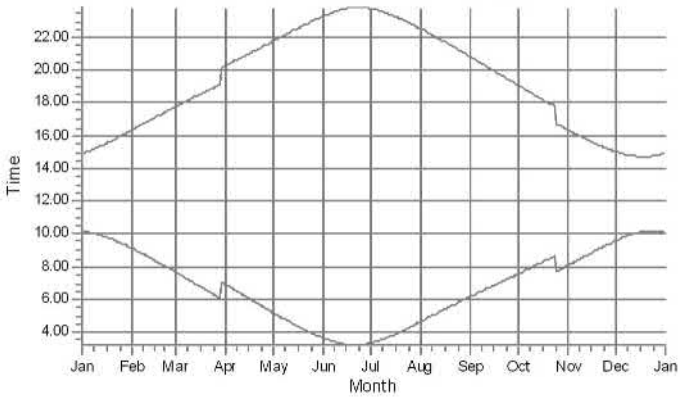
N: Asuinrakennus N (Adler)



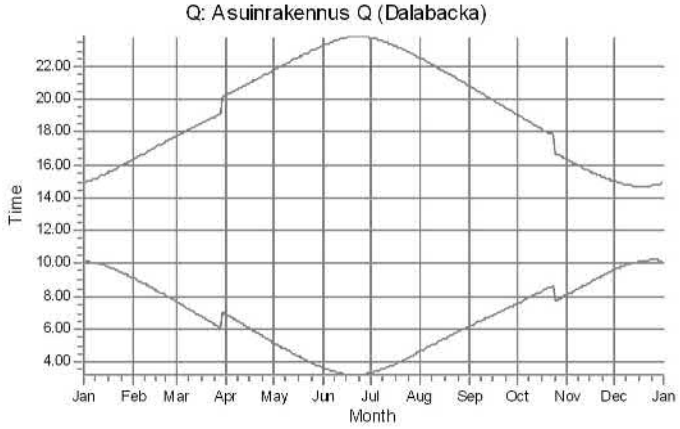
O: Asuinrakennus O (Åvistvägen)



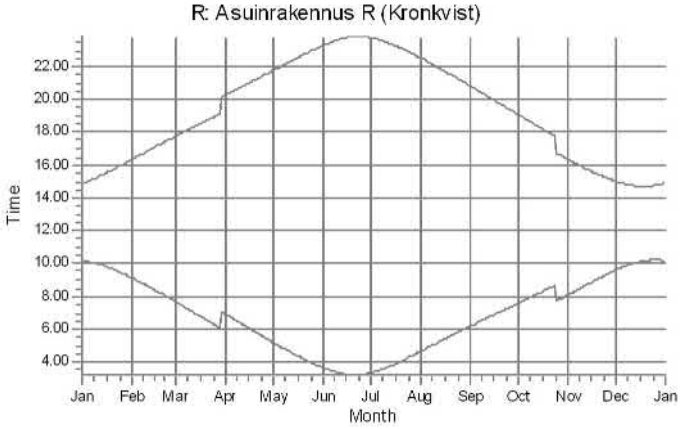
P: Asuinrakennus P (Finnabbavägen)



Q: Asuinrakennus Q (Dalabacka)



R: Asuinrakennus R (Kronkvist)



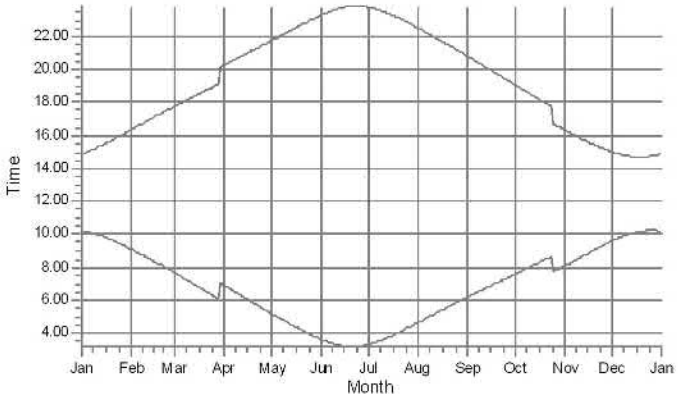
WTGs

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
26.1.2023 17.45/3.5.584

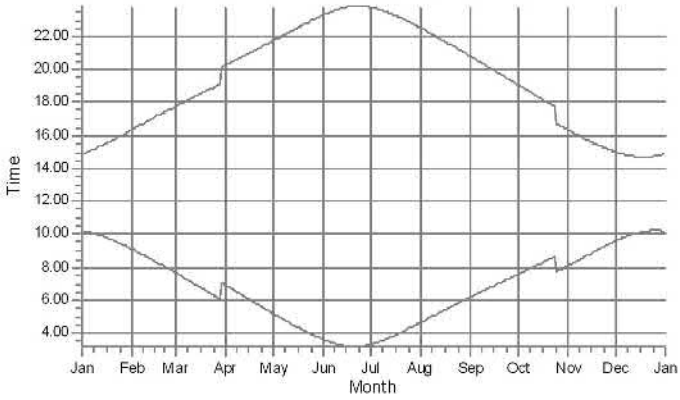
SHADOW - Calendar, graphical

Calculation: Purmon hanke YV(Salo-Ylikoski)_nykytilanne

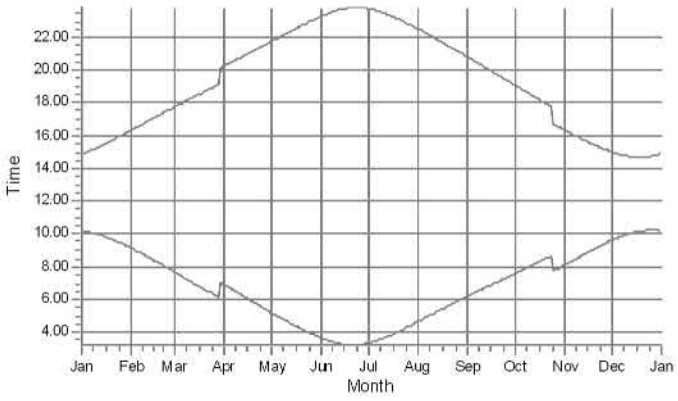
S: Asuinrakennus S (Tallbacka)



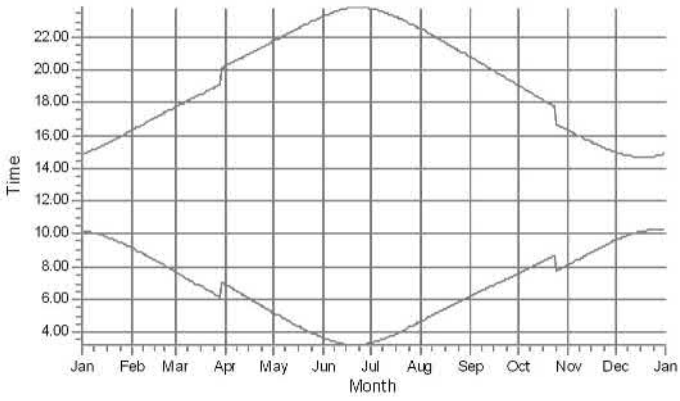
T: Asuinrakennus T (Norrgård)



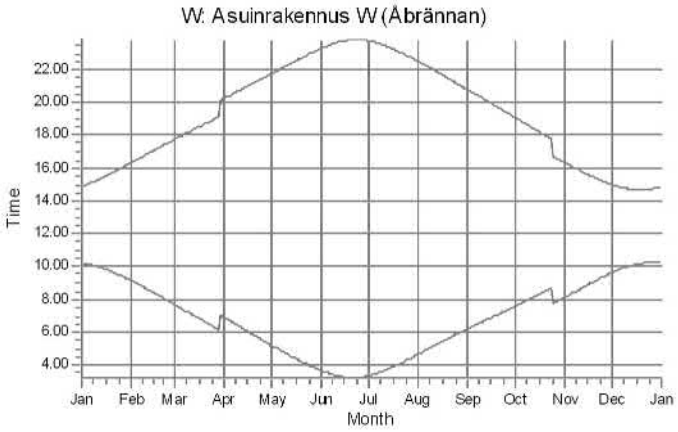
U: Asuinrakennus U (Näpi)



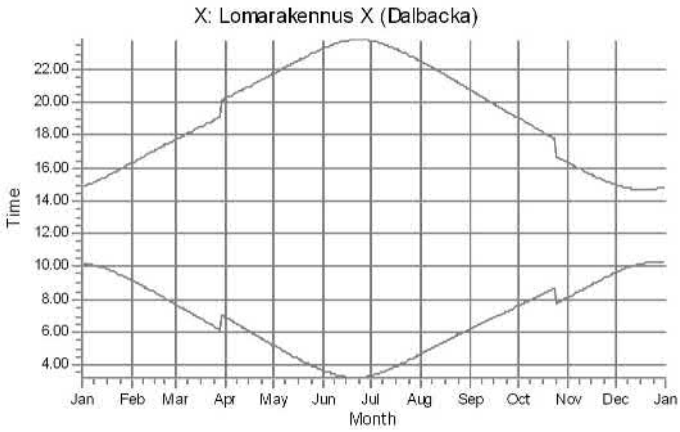
V: Asuinrakennus V (Skutas)



W: Asuinrakennus W (Åbrännan)



X: Lomarakennus X (Dalbacka)

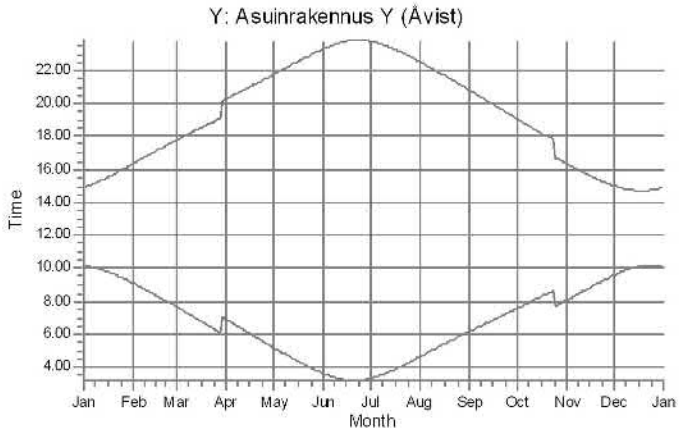


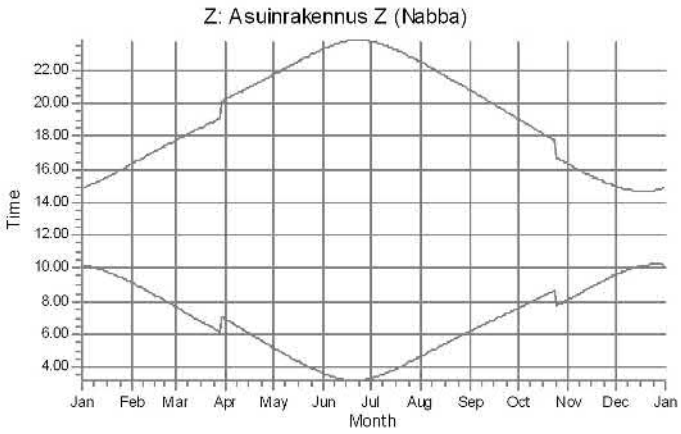
WTGs

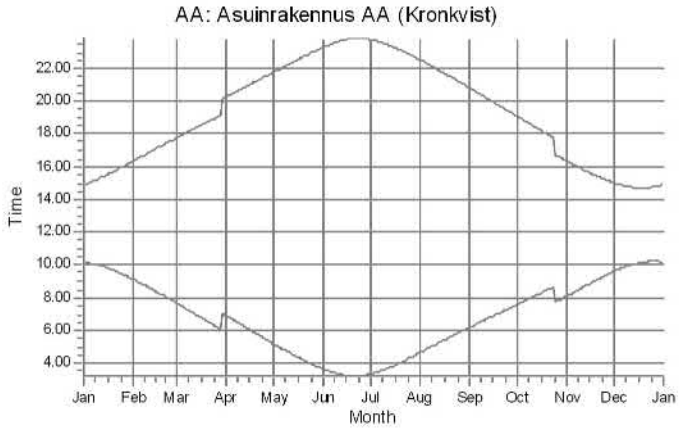
Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi

SHADOW - Calendar, graphical

Calculation: Purmon hanke YV(Salo-Ylikoski)_nykytilanne





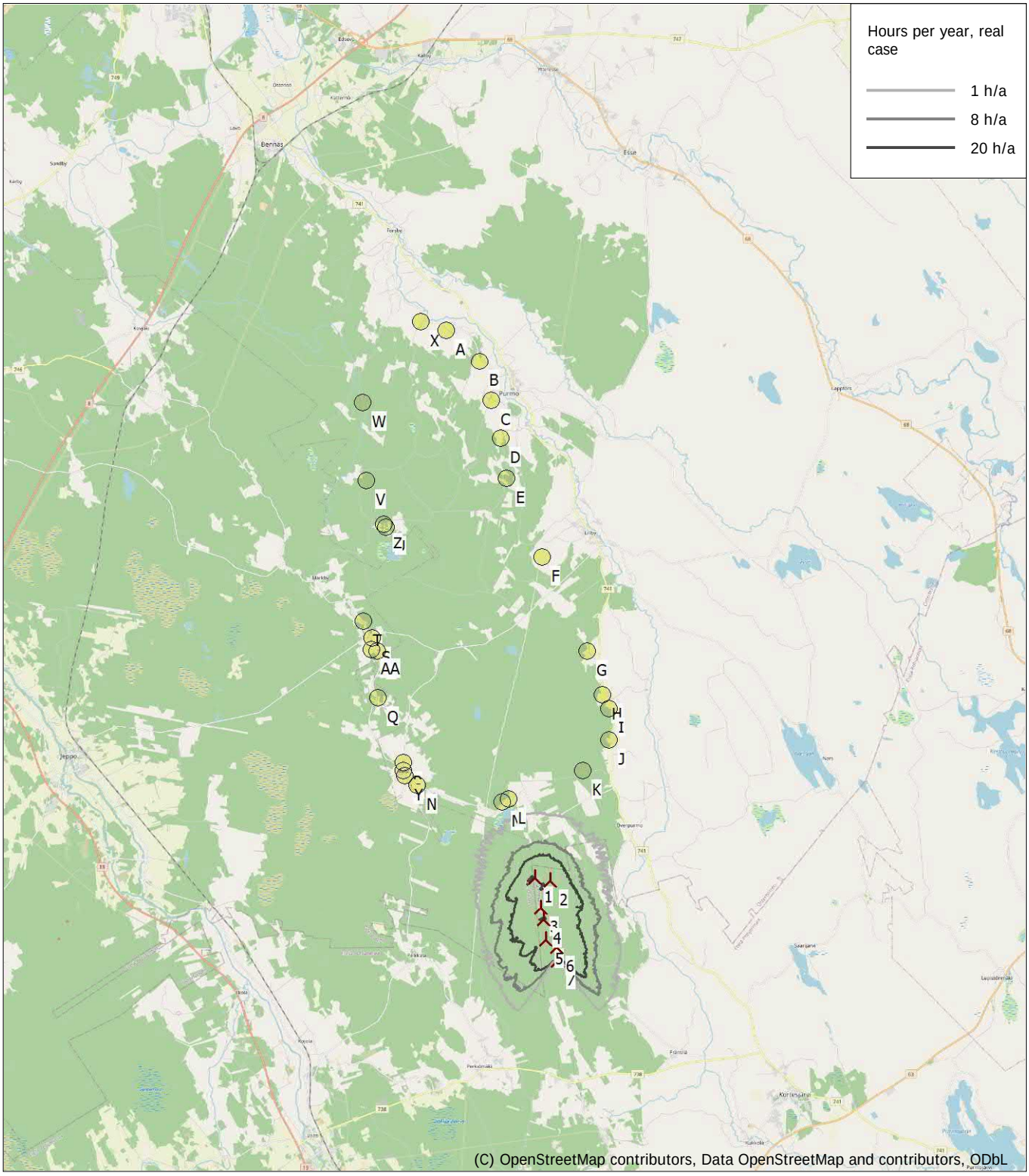


WTGs

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
26.1.2023 17.45/3.5.584

SHADOW - Map

Calculation: Purmon hanke YV(Salo-Ylikoski)_nykytilanne



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 298 050 North: 7 042 710

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Purmon tuulivoimahanke_0.wpo (4)

Time step: 4 minutes, Day step: 14 days, Map resolution: 30 m, Visibility resolution: 15 m, Eye height: 1,5 m

Bilaga 10. Purmo vindkraftsprojekt – skuggmodelleringens resultat ”real case, no forest” (ALT1) tillsammans med Salo–Ylikoski-projektet.

Project:
Purmon tuulivoimahanke

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Main Result

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)

Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	1 minutes

Sunshine probability S (Average daily sunshine hours) []

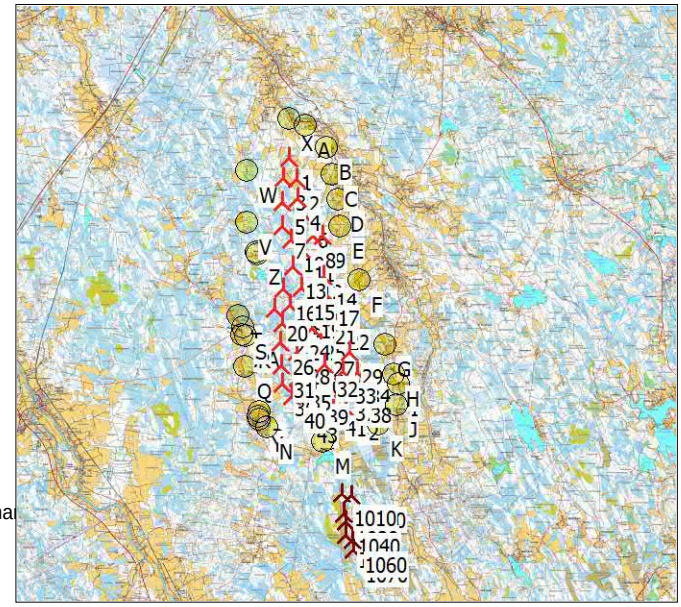
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_Purmon tuulivoimaha
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	296 015	7 050 633	25,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
2	296 402	7 049 512	28,1	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
3	295 688	7 049 533	26,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
4	296 468	7 048 488	31,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
5	295 661	7 048 308	32,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
6	296 860	7 047 573	35,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
7	295 626	7 047 011	32,3	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
8	297 281	7 046 511	32,8	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
9	297 768	7 046 509	35,8	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
10	296 092	7 046 333	36,1	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
11	296 633	7 045 796	35,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
12	297 035	7 044 833	36,9	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
13	296 211	7 044 887	37,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
14	297 806	7 044 390	40,6	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
15	296 659	7 043 785	40,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
16	295 680	7 043 726	37,7	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
17	297 935	7 043 485	36,3	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
18	297 013	7 042 799	42,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
19	296 033	7 042 892	40,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
20	295 245	7 042 663	37,3	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
21	298 459	7 042 222	42,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
22	297 759	7 042 500	40,9	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
23	295 640	7 041 888	35,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
24	297 207	7 041 637	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
25	296 420	7 041 637	37,1	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
26	297 642	7 040 813	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
27	295 536	7 040 877	38,9	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
28	299 185	7 040 392	48,4	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
29	296 377	7 040 414	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
30	297 071	7 039 884	45,8	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
31	295 591	7 039 696	41,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
32	298 849	7 039 361	49,7	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
33	299 581	7 039 334	53,6	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
34	296 466	7 039 042	47,3	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
35	297 841	7 039 740	47,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
36	295 637	7 038 744	41,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
37	299 616	7 038 389	54,3	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4

To be continued on next page...

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Main Result

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)

...continued from previous page

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
38	298 820	7 038 484	53,1	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
39	296 154	7 038 055	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
40	297 367	7 038 248	47,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
41	298 305	7 037 659	50,9	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
42	298 984	7 037 431	54,8	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
43	296 802	7 037 326	47,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
44	298 762	7 032 913	58,6	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
45	299 290	7 032 796	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
46	298 900	7 031 842	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
47	298 977	7 031 430	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
48	299 000	7 030 729	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
49	299 358	7 030 441	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
50	299 389	7 029 959	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	Asuinrakennus A (Lillkvist)	296 866	7 052 328	26,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	Asuinrakennus B (Dallberga)	297 952	7 051 163	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	Asuinrakennus C (Tormbacka)	298 274	7 049 757	28,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	Asuinrakennus D (Kallträskvägen)	298 556	7 048 421	35,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	Metsästysmaja E (Kejsarbacken)	298 663	7 047 017	33,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	Lomarakennus F (Källbacken)	299 710	7 044 165	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	Asuinrakennus G (Kornjärv)	301 071	7 040 772	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	Asuinrakennus H (Sandnabba)	301 519	7 039 228	51,6	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	Asuinrakennus I (Asp)	301 749	7 038 736	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	Asuinrakennus J (Stennabba)	301 661	7 037 581	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	Asuinrakennus K (Långnabba)	300 689	7 036 583	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	Lomarakennus L (Åvistvägen)	298 031	7 035 773	52,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
M	Asuinrakennus M (Stenbacka)	297 753	7 035 671	53,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
N	Asuinrakennus N (Adler)	294 812	7 036 441	44,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
O	Asuinrakennus O (Åvistvägen)	294 394	7 036 982	41,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
P	Asuinrakennus P (Finnabbavägen)	294 415	7 037 260	40,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Q	Asuinrakennus Q (Dalabacka)	293 652	7 039 610	40,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
R	Asuinrakennus R (Kronkvist)	293 736	7 041 267	32,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
S	Asuinrakennus S (Tallbacka)	293 575	7 041 715	32,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
T	Asuinrakennus T (Norrgård)	293 326	7 042 304	30,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
U	Asuinrakennus U (Nåpi)	294 326	7 045 578	35,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
V	Asuinrakennus V (Skutas)	293 741	7 047 247	32,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
W	Asuinrakennus W (Åbrännan)	293 782	7 049 981	22,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
X	Lomarakennus X (Dalbacka)	296 008	7 052 686	21,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Y	Asuinrakennus Y (Åvist)	294 403	7 036 830	41,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Z	Asuinrakennus Z (Nabba)	294 257	7 045 675	35,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
AA	Asuinrakennus AA (Kronkvist)	293 533	7 041 290	31,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	Asuinrakennus A (Lillkvist)	2:17
B	Asuinrakennus B (Dallberga)	1:34
C	Asuinrakennus C (Tormbacka)	1:42
D	Asuinrakennus D (Kallträskvägen)	4:01
E	Metsästysmaja E (Kejsarbacken)	11:36
F	Lomarakennus F (Källbacken)	3:53
G	Asuinrakennus G (Kornjärv)	3:27
H	Asuinrakennus H (Sandnabba)	3:25
I	Asuinrakennus I (Asp)	0:00

To be continued on next page...

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Main Result

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)

...continued from previous page

No.	Name	Shadow, expected values Shadow hours per year [h/year]
J	Asuinrakennus J (Stennabba)	0:00
K	Asuinrakennus K (Långnabba)	2:49
L	Lomarakennus L (Åvistvägen)	3:34
M	Asuinrakennus M (Stenbacka)	0:00
N	Asuinrakennus N (Adler)	0:00
O	Asuinrakennus O (Åvistvägen)	4:30
P	Asuinrakennus P (Finnabbavägen)	3:43
Q	Asuinrakennus Q (Dalabacka)	1:58
R	Asuinrakennus R (Kronkvist)	8:35
S	Asuinrakennus S (Tallbacka)	6:39
T	Asuinrakennus T (Norrgård)	2:05
U	Asuinrakennus U (Nåpi)	5:56
V	Asuinrakennus V (Skutas)	1:49
W	Asuinrakennus W (Åbrännan)	1:36
X	Lomarakennus X (Dalbacka)	2:49
Y	Asuinrakennus Y (Åvist)	0:00
Z	Asuinrakennus Z (Nabba)	6:28
AA	Asuinrakennus AA (Kronkvist)	1:28

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Expected [h/year]
1	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1279)	6:40
2	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1280)	1:42
3	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1281)	1:36
4	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1282)	0:00
5	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1283)	0:00
6	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1284)	4:13
7	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1285)	6:15
8	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1286)	3:02
9	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1287)	8:18
10	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1288)	5:06
11	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1289)	0:00
12	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1290)	0:00
13	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1291)	1:29
14	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1292)	2:01
15	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1293)	0:00
16	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1294)	0:00
17	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1295)	1:51
18	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1296)	0:00
19	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1297)	0:00
20	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1298)	11:21
21	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1299)	0:00
22	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1300)	0:00
23	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1301)	4:10
24	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1302)	0:00
25	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1303)	0:00
26	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1304)	0:00
27	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1305)	1:59
28	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1306)	1:37
29	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1307)	0:00
30	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1308)	0:00
31	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1309)	1:58
32	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1310)	0:00
33	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1311)	3:41
34	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1312)	0:00
35	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1313)	0:00
36	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1314)	0:00
37	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1315)	1:34
38	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1316)	0:00
39	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1317)	8:14
40	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1318)	0:00

To be continued on next page...

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Main Result

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)

...continued from previous page

No.	Name	Expected [h/year]
41	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1319)	0:00
42	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1320)	2:49
43	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1321)	3:34
44	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1454)	0:00
45	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1455)	0:00
46	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1456)	0:00
47	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1457)	0:00
48	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1458)	0:00
49	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1459)	0:00
50	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1460)	0:00

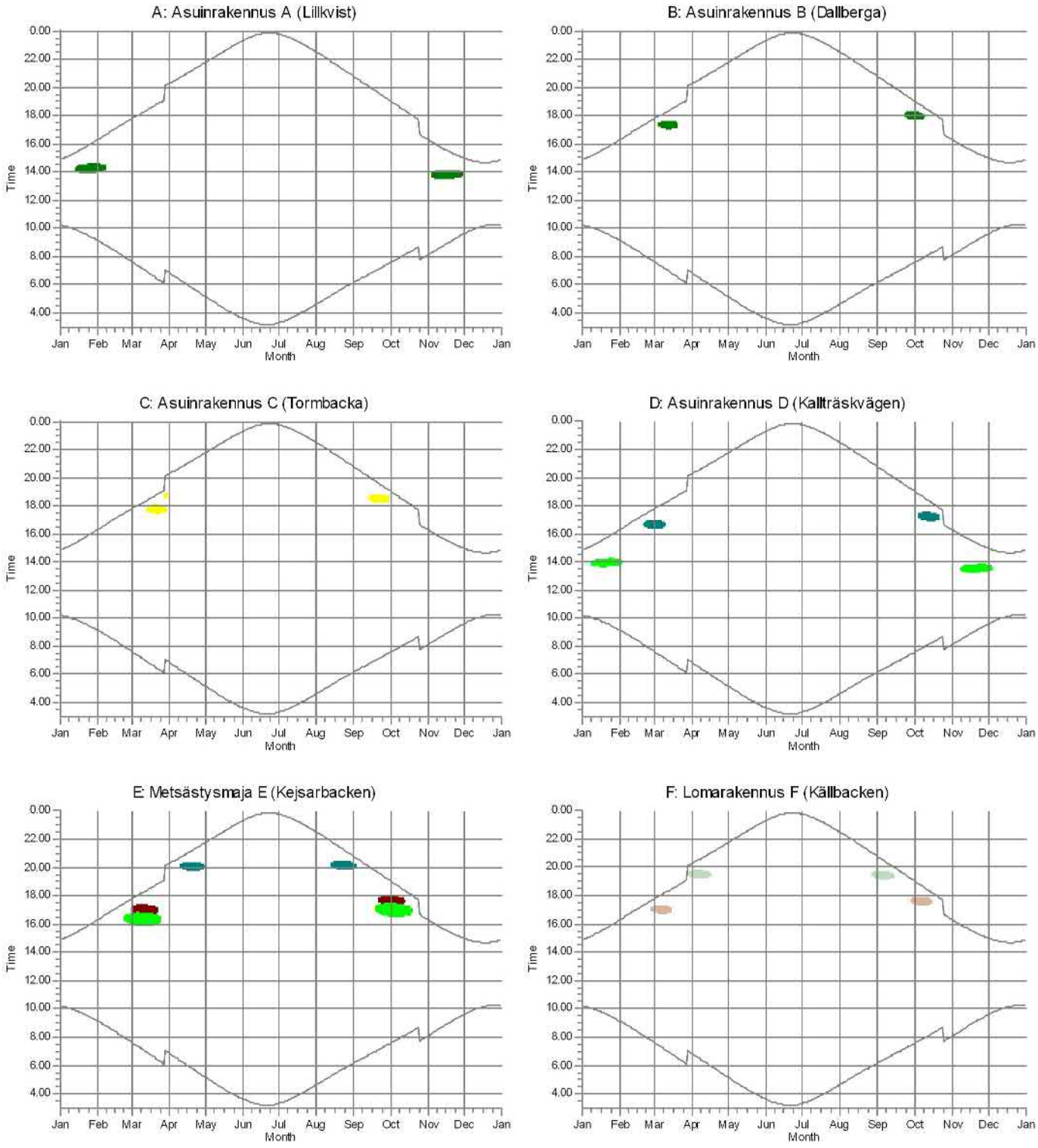
Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

The calculation of the total expected values for a given receptor assumes a weighted average directional reduction for all WTGs contributing to shadow flicker within the same day. In the case where shadow flicker from different WTGs is not concurrent within the day, the total expected time at a given receptor may deviate marginally from the individual flicker time caused by each turbine separately.

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar, graphical

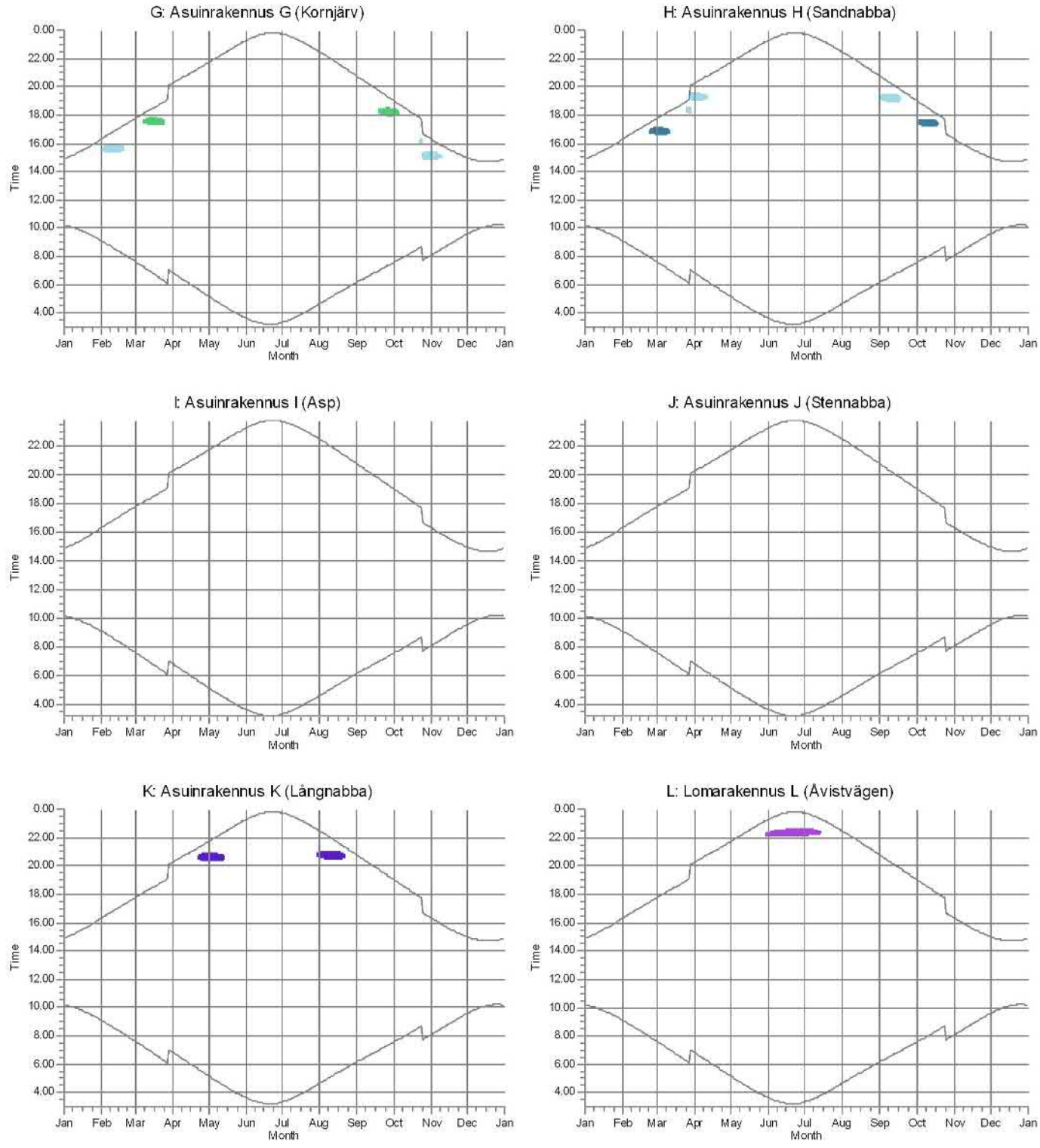
Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)



Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar, graphical

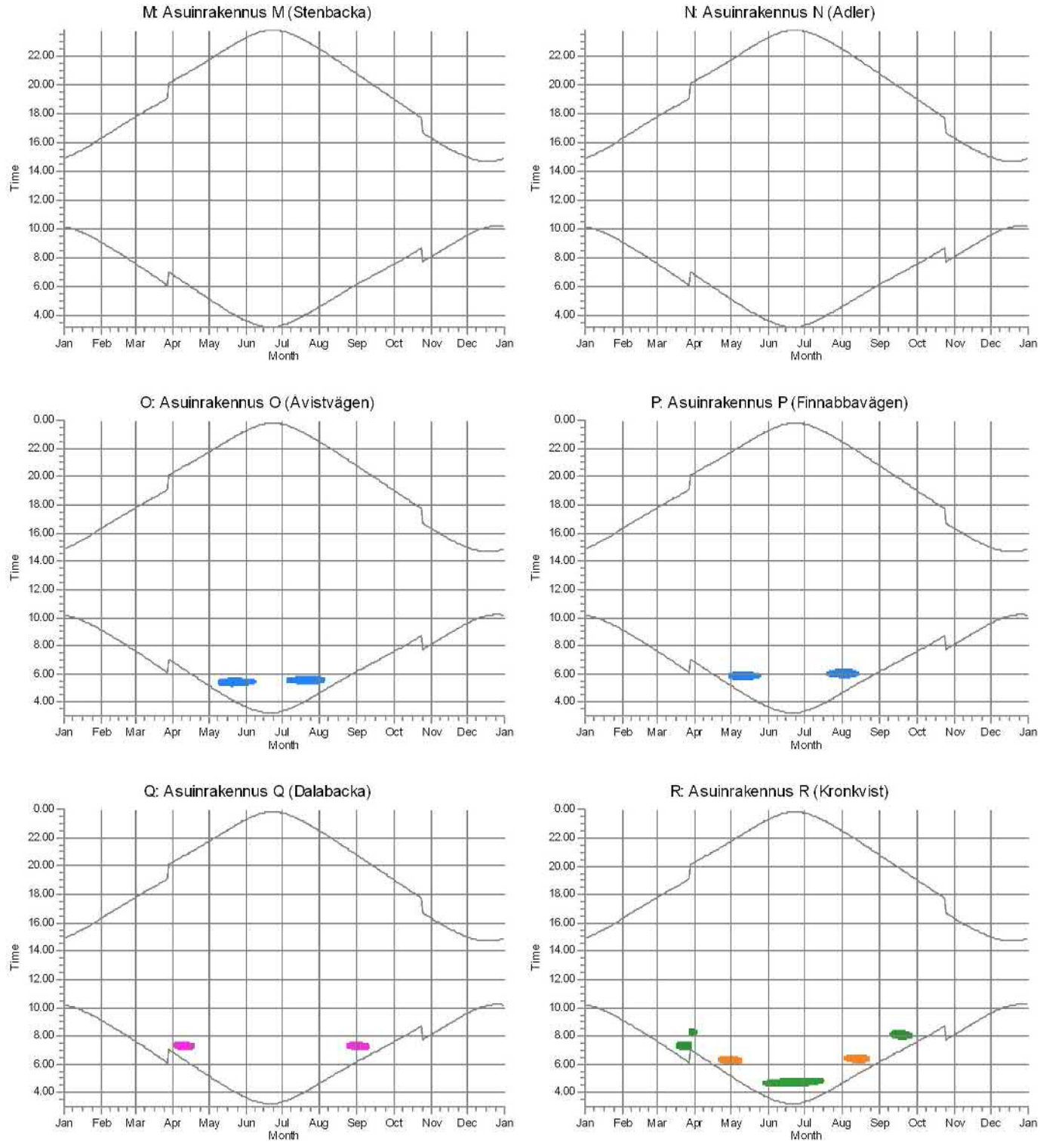
Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)



Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar, graphical

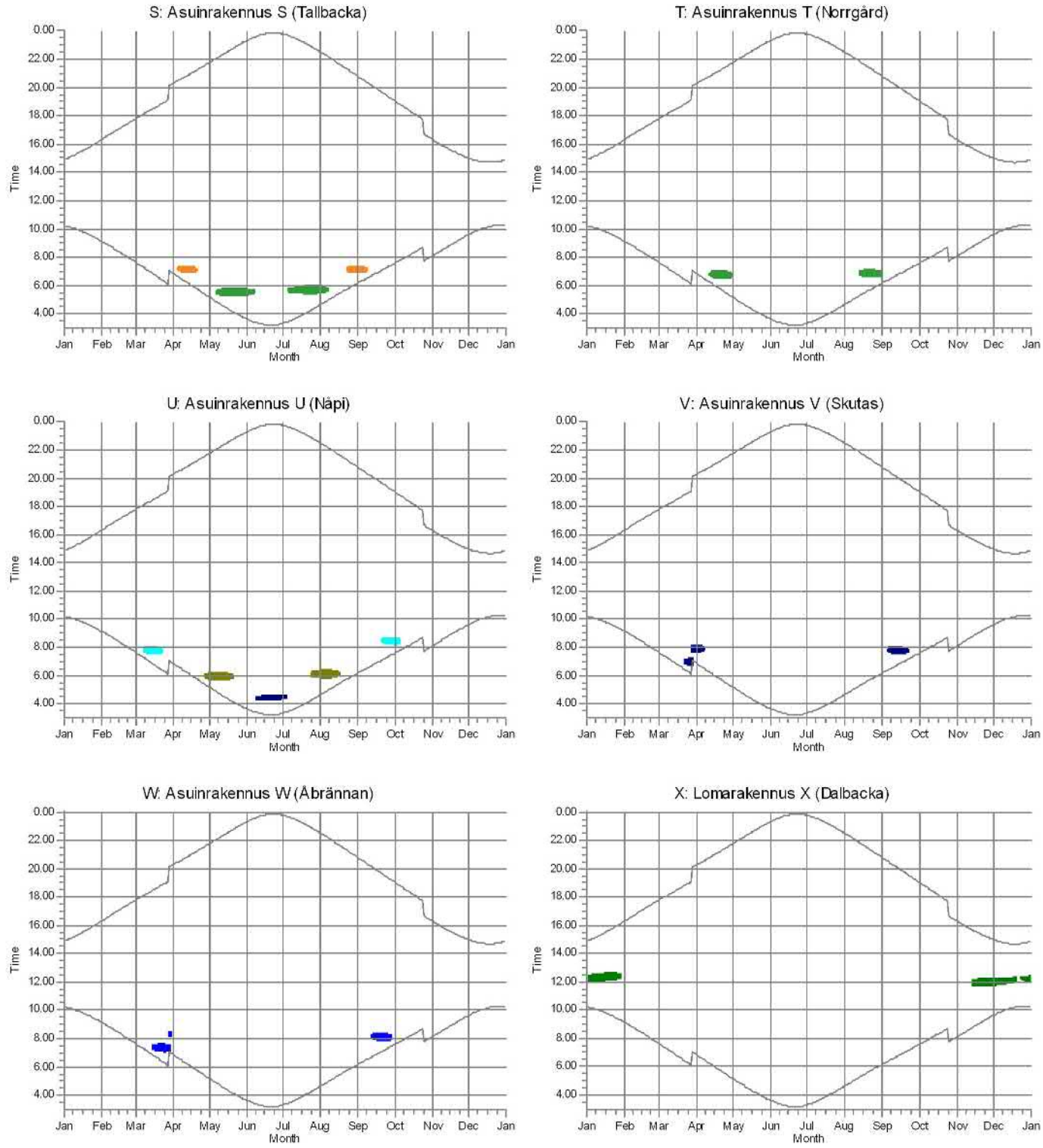
Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)



Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar, graphical

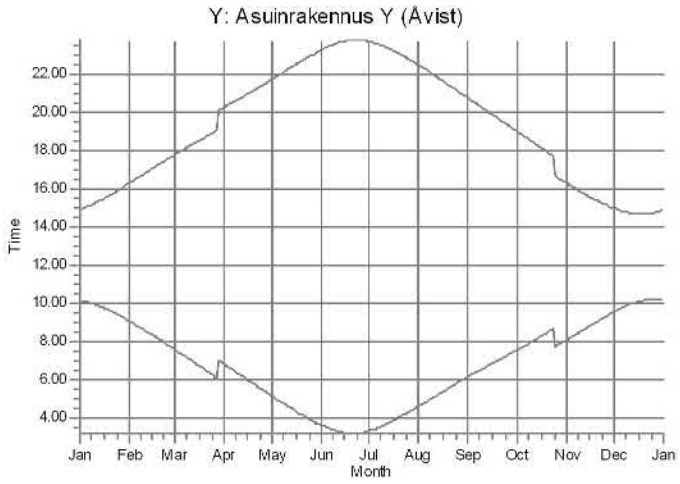
Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)

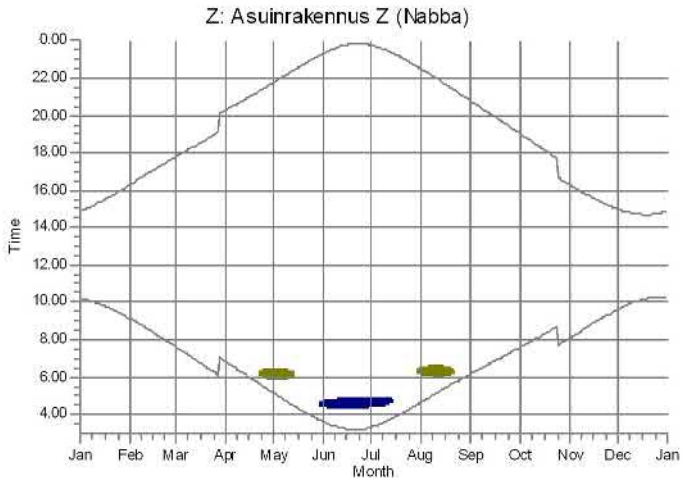


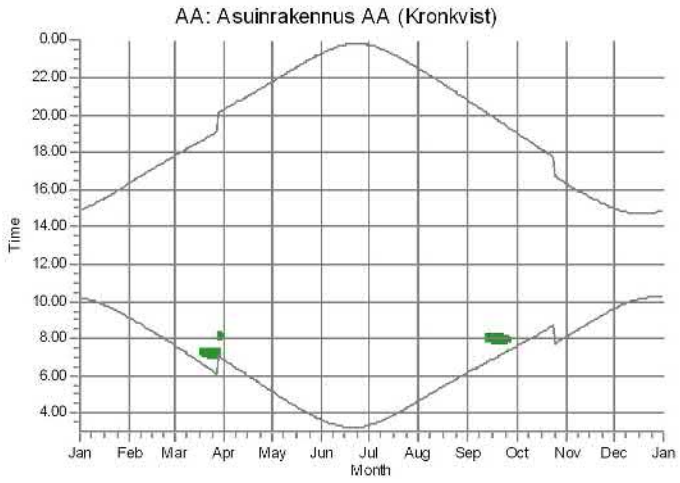
Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

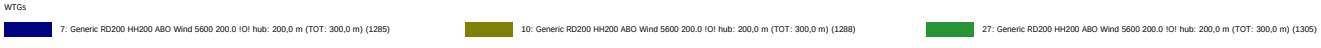
SHADOW - Calendar, graphical

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)









Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 1 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1279)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June
1	10.12 12.06-12.22/16	09.08 14.06-14.29/23	07.38	06.52	05.09	03.37
	14.52	16.18	17.46	20.16	21.46	23.18
2	10.11 12.06-12.23/17	09.05 14.07-14.29/22	07.35	06.48	05.06	03.34
	14.54	16.22	17.49	20.19	21.49	23.21
3	10.10 12.07-12.24/17	09.02 14.08-14.28/20	07.32	06.45	05.02	03.32
	14.56	16.25	17.52	20.22	21.52	23.24
4	10.09 12.06-12.25/19	08.59 14.10-14.28/18	07.28	06.41	04.59	03.30
	14.58	16.28	17.55	20.25	21.55	23.26
5	10.08 12.06-12.25/19	08.56 14.11-14.26/15	07.25 17.18-17.22/4	06.38	04.56	03.28
	15.00	16.31	17.58	20.28	21.58	23.28
6	10.07 12.07-12.27/20	08.53 14.13-14.23/10	07.21 17.15-17.25/10	06.34	04.52	03.26
	15.03	16.34	18.01	20.31	22.01	23.31
7	10.05 12.07-12.27/20	08.50	07.18 17.13-17.28/15	06.31	04.49	03.24
	15.05	16.38	18.04	20.34	22.04	23.33
8	10.04 12.06-12.28/22	08.47	07.15 17.12-17.31/19	06.27	04.46	03.22
	15.07	16.41	18.07	20.37	22.07	23.35
9	10.02 12.07-12.29/22	08.43	07.11 17.10-17.32/22	06.24	04.43	03.21
	15.10	16.44	18.10	20.40	22.10	23.37
10	10.01 12.07-12.30/23	08.40	07.08 17.10-17.33/23	06.20	04.40	03.19
	15.12	16.47	18.13	20.43	22.14	23.39
11	09.59 12.07-12.30/23	08.37	07.04 17.09-17.32/23	06.17	04.36	03.18
	15.15	16.50	18.16	20.45	22.17	23.40
12	09.57 12.08-12.31/23	08.34	07.01 17.08-17.32/24	06.14	04.33	03.16
	15.18	16.54	18.19	20.48	22.20	23.42
13	09.55 12.07-12.31/24	08.31	06.57 17.08-17.32/24	06.10	04.30	03.15
	15.20	16.57	18.21	20.51	22.23	23.44
14	09.53 12.07-12.32/25	08.28	06.54 17.08-17.31/23	06.07	04.27	03.14
	15.23 14.08-14.14/6	17.00	18.24	20.54	22.26	23.45
15	09.51 12.07-12.32/25	08.24	06.51 17.09-17.30/21	06.03	04.24	03.13
	15.26 14.06-14.18/12	17.03	18.27	20.57	22.29	23.46
16	09.49 12.08-12.33/25	08.21	06.47 17.09-17.29/20	06.00	04.21	03.12
	15.29 14.06-14.22/16	17.06	18.30	21.00	22.32	23.47
17	09.47 12.08-12.33/25	08.18	06.44 17.10-17.28/18	05.56	04.18	03.12
	15.32 14.05-14.23/18	17.09	18.33	21.03	22.35	23.48
18	09.44 12.09-12.34/25	08.15	06.40 17.11-17.26/15	05.53	04.15	03.11
	15.35 14.04-14.24/20	17.12	18.36	21.06	22.38	23.49
19	09.42 12.09-12.34/25	08.12	06.37 17.14-17.23/9	05.49	04.12	03.11
	15.38 14.04-14.25/21	17.16	18.39	21.09	22.41	23.50
20	09.40 12.10-12.33/23	08.08	06.33	05.46	04.09	03.11
	15.41 14.04-14.26/22	17.19	18.42	21.12	22.44	23.50
21	09.37 12.11-12.34/23	08.05	06.30	05.43	04.06	03.11
	15.44 14.03-14.26/23	17.22	18.45	21.15	22.47	23.51
22	09.35 12.11-12.34/23	08.02	06.26	05.39	04.03	03.11
	15.47 14.04-14.28/24	17.25	18.48	21.18	22.50	23.51
23	09.32 12.12-12.33/21	07.58	06.23	05.36	04.00	03.11
	15.50 14.03-14.28/25	17.28	18.50	21.21	22.53	23.51
24	09.30 12.13-12.33/20	07.55	06.19	05.32	03.57	03.11
	15.53 14.03-14.28/25	17.31	18.53	21.24	22.56	23.51
25	09.27 12.14-12.32/18	07.52	06.16	05.29	03.55	03.12
	15.56 14.04-14.29/25	17.34	18.56	21.27	22.59	23.50
26	09.24 12.15-12.31/16	07.48	06.12	05.26	03.52	03.13
	15.59 14.03-14.29/26	17.37	18.59	21.30	23.02	23.50
27	09.22 12.17-12.31/14	07.45	06.09	05.22	03.49	03.14
	16.02 14.04-14.30/26	17.40	19.02	21.33	23.05	23.49
28	09.19 12.19-12.28/9	07.42	06.06	05.19	03.47	03.15
	16.06 14.04-14.30/26	17.43	19.05	21.36	23.08	23.49
29	09.16 14.04-14.30/26		07.02	05.16	03.44	03.16
	16.09		20.08	21.39	23.10	23.48
30	09.13 14.05-14.30/25		06.59	05.12	03.42	03.17
	16.12		20.11	21.43	23.13	23.47
31	09.10 14.05-14.30/25		06.55		03.39	
	16.15		20.13		23.16	
Potential sun hours	178	241	363	449	563	612
Sum of minutes with flicker	973	108	270	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 1 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1279)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	July	August	September		October		November		December	
1	03.18	04.39	06.11		07.34	17.47-18.11/24	08.06		09.37	11.49-12.12/23
	23.46	22.30	20.46		19.02		16.18		14.58	
2	03.20	04.42	06.13		07.37	17.47-18.11/24	08.09		09.39	11.49-12.12/23
	23.44	22.27	20.42		18.58		16.15		14.56	
3	03.22	04.45	06.16		07.40	17.47-18.10/23	08.12		09.42	11.50-12.13/23
	23.43	22.23	20.39		18.55		16.12		14.54	
4	03.23	04.48	06.19		07.43	17.48-18.09/21	08.15		09.44	11.51-12.12/21
	23.41	22.20	20.36		18.51		16.09		14.53	
5	03.25	04.51	06.22		07.46	17.48-18.08/20	08.18	13.43-13.54/11	09.47	11.52-12.13/21
	23.40	22.17	20.32		18.48		16.06		14.51	
6	03.27	04.54	06.25		07.49	17.49-18.06/17	08.21	13.40-13.56/16	09.49	11.52-12.12/20
	23.38	22.14	20.29		18.45		16.03		14.50	
7	03.29	04.57	06.27		07.51	17.50-18.03/13	08.24	13.39-13.57/18	09.52	11.53-12.13/20
	23.36	22.10	20.25		18.41		16.00		14.48	
8	03.32	05.00	06.30		07.54	17.52-17.59/7	08.27	13.38-13.59/21	09.54	11.54-12.12/18
	23.34	22.07	20.22		18.38		15.57		14.47	
9	03.34	05.03	06.33		07.57		08.31	13.38-14.00/22	09.56	11.55-12.13/18
	23.32	22.04	20.18		18.34		15.54		14.46	
10	03.36	05.06	06.36		08.00		08.34	13.37-14.01/24	09.58	11.55-12.12/17
	23.30	22.01	20.15		18.31		15.51		14.45	
11	03.39	05.09	06.39		08.03		08.37	13.37-14.01/24	10.00	11.57-12.13/16
	23.28	21.57	20.11		18.28		15.48		14.43	
12	03.41	05.12	06.41		08.06		08.40	13.36-14.01/25	10.02	11.57-12.12/15
	23.26	21.54	20.08		18.24		15.45		14.43	
13	03.44	05.15	06.44		08.09		08.43	13.36-14.01/25	10.03	11.58-12.13/15
	23.23	21.51	20.04		18.21		15.42		14.42	
14	03.46	05.18	06.47		08.12		08.46	11.51-12.00/9	10.05	11.59-12.13/14
	23.21	21.47	20.01		18.17		15.39	13.36-14.02/26	14.41	
15	03.49	05.21	06.50		08.14		08.49	11.49-12.03/14	10.07	12.00-12.13/13
	23.19	21.44	19.57		18.14		15.37	13.36-14.02/26	14.41	
16	03.52	05.24	06.53		08.17		08.52	11.48-12.04/16	10.08	12.01-12.13/12
	23.16	21.41	19.54		18.11		15.34	13.36-14.02/26	14.40	
17	03.54	05.27	06.55		08.20		08.56	11.48-12.06/18	10.09	12.02-12.13/11
	23.13	21.37	19.50		18.07		15.31	13.36-14.02/26	14.40	
18	03.57	05.30	06.58		08.23		08.59	11.47-12.07/20	10.10	12.07-12.14/7
	23.11	21.34	19.47		18.04		15.28	13.37-14.02/25	14.40	
19	04.00	05.33	07.01		08.26		09.02	11.47-12.08/21	10.11	12.11-12.14/3
	23.08	21.31	19.43		18.01		15.26	13.38-14.03/25	14.40	
20	04.03	05.36	07.04		08.29		09.05	11.46-12.09/23	10.12	
	23.05	21.27	19.40		17.57		15.23	13.39-14.03/24	14.40	
21	04.06	05.39	07.07		08.32		09.08	11.46-12.09/23	10.13	
	23.03	21.24	19.36		17.54		15.21	13.39-14.02/23	14.40	
22	04.09	05.42	07.09		08.35		09.11	11.46-12.09/23	10.14	
	23.00	21.20	19.33		17.51		15.18	13.40-14.02/22	14.41	
23	04.12	05.45	07.12		08.38		09.14	11.46-12.10/24	10.14	
	22.57	21.17	19.30		17.47		15.16	13.40-14.01/21	14.41	
24	04.15	05.47	07.15	17.59-18.05/6	08.41		09.17	11.47-12.11/24	10.14	12.14-12.15/1
	22.54	21.13	19.26		17.44		15.13	13.42-14.02/20	14.42	
25	04.17	05.50	07.18	17.55-18.08/13	07.44		09.20	11.47-12.11/24	10.15	12.11-12.16/5
	22.51	21.10	19.23		16.41		15.11	13.43-14.01/18	14.43	
26	04.20	05.53	07.20	17.53-18.10/17	07.47		09.23	11.46-12.11/25	10.15	12.08-12.17/9
	22.48	21.07	19.19		16.38		15.09	13.44-14.00/16	14.44	
27	04.23	05.56	07.23	17.51-18.11/20	07.50		09.26	11.47-12.11/24	10.15	12.06-12.18/12
	22.45	21.03	19.16		16.34		15.06	13.45-13.57/12	14.45	
28	04.26	05.59	07.26	17.50-18.11/21	07.53		09.28	11.48-12.12/24	10.14	12.06-12.18/12
	22.42	21.00	19.12		16.31		15.04	13.48-13.54/6	14.46	
29	04.30	06.02	07.29	17.49-18.12/23	07.56		09.31	11.48-12.12/24	10.14	12.06-12.20/14
	22.39	20.56	19.09		16.28		15.02		14.47	
30	04.33	06.05	07.32	17.48-18.11/23	07.59		09.34	11.49-12.12/23	10.14	12.06-12.20/14
	22.36	20.53	19.05		16.25		15.00		14.49	
31	04.36	06.08			08.03				10.13	12.06-12.21/15
	22.33	20.49			16.22				14.50	
Potential sun hours	599	505	392		307		203		146	
Sum of minutes with flicker	0	0	123		149		861		392	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
Purmon tuulivoimahanke

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 2 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1280)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March		April	May	June	July	August	September		October	November	December
1	10.12	09.07	07.38		06.52	05.09	03.37	03.19	04.39	06.11		07.34	08.06	09.37
	14.53	16.18	17.46		20.16	21.46	23.18	23.45	22.30	20.46		19.02	16.18	14.58
2	10.11	09.04	07.35		06.48	05.06	03.35	03.20	04.42	06.13		07.37	08.09	09.39
	14.54	16.22	17.49		20.19	21.49	23.21	23.44	22.26	20.42		18.58	16.15	14.56
3	10.10	09.02	07.32		06.45	05.02	03.32	03.22	04.45	06.16		07.40	08.12	09.42
	14.56	16.25	17.52		20.22	21.52	23.23	23.43	22.23	20.39		18.55	16.12	14.55
4	10.09	08.59	07.28		06.41	04.59	03.30	03.24	04.48	06.19		07.43	08.15	09.44
	14.58	16.28	17.55		20.25	21.55	23.26	23.41	22.20	20.36		18.51	16.09	14.53
5	10.08	08.56	07.25		06.38	04.56	03.28	03.26	04.51	06.22		07.46	08.18	09.47
	15.00	16.31	17.58		20.28	21.58	23.28	23.40	22.17	20.32		18.48	16.06	14.51
6	10.07	08.53	07.21		06.34	04.52	03.26	03.28	04.54	06.25		07.49	08.21	09.49
	15.03	16.34	18.01		20.31	22.01	23.30	23.38	22.14	20.29		18.45	16.03	14.50
7	10.05	08.49	07.18		06.31	04.49	03.24	03.30	04.57	06.27		07.51	08.24	09.51
	15.05	16.38	18.04		20.34	22.04	23.33	23.36	22.10	20.25		18.41	16.00	14.48
8	10.04	08.46	07.15		06.27	04.46	03.23	03.32	05.00	06.30		07.54	08.27	09.54
	15.07	16.41	18.07		20.37	22.07	23.35	23.34	22.07	20.22		18.38	15.57	14.47
9	10.02	08.43	07.11		06.24	04.43	03.21	03.34	05.03	06.33		07.57	08.30	09.56
	15.10	16.44	18.10		20.40	22.10	23.37	23.32	22.04	20.18		18.34	15.54	14.46
10	10.01	08.40	07.08		06.20	04.40	03.19	03.36	05.06	06.36		08.00	08.34	09.58
	15.12	16.47	18.13		20.42	22.13	23.38	23.30	22.01	20.15		18.31	15.51	14.45
11	09.59	08.37	07.04		06.17	04.36	03.18	03.39	05.09	06.39		08.03	08.37	10.00
	15.15	16.50	18.16		20.45	22.17	23.40	23.28	21.57	20.11		18.28	15.48	14.44
12	09.57	08.34	07.01		06.14	04.33	03.17	03.41	05.12	06.41		08.06	08.40	10.02
	15.18	16.54	18.19		20.48	22.20	23.42	23.26	21.54	20.08		18.24	15.45	14.43
13	09.55	08.31	06.57		06.10	04.30	03.15	03.44	05.15	06.44		08.09	08.43	10.03
	15.20	16.57	18.21		20.51	22.23	23.43	23.23	21.51	20.04		18.21	15.42	14.42
14	09.53	08.28	06.54	17.43-17.49/6	06.07	04.27	03.14	03.46	05.18	06.47	18.31-18.37/6	08.11	08.46	10.05
	15.23	17.00	18.24		20.54	22.26	23.45	23.21	21.47	20.01		18.17	15.39	14.41
15	09.51	08.24	06.51	17.40-17.53/13	06.03	04.24	03.13	03.49	05.21	06.50	18.27-18.40/13	08.14	08.49	10.06
	15.26	17.03	18.27		20.57	22.29	23.46	23.18	21.44	19.57		18.14	15.37	14.41
16	09.49	08.21	06.47	17.38-17.55/17	06.00	04.21	03.13	03.52	05.24	06.53	18.24-18.41/17	08.17	08.52	10.08
	15.29	17.06	18.30		21.00	22.32	23.47	23.16	21.41	19.54		18.11	15.34	14.40
17	09.47	08.18	06.44	17.37-17.57/20	05.56	04.18	03.12	03.55	05.27	06.55	18.22-18.42/20	08.20	08.55	10.09
	15.32	17.09	18.33		21.03	22.35	23.48	23.13	21.37	19.50		18.07	15.31	14.40
18	09.44	08.15	06.40	17.35-17.57/22	05.53	04.15	03.11	03.57	05.30	06.58	18.21-18.43/22	08.23	08.59	10.10
	15.35	17.12	18.36		21.06	22.38	23.49	23.11	21.34	19.47		18.04	15.28	14.40
19	09.42	08.11	06.37	17.34-17.58/24	05.49	04.12	03.11	04.00	05.33	07.01	18.20-18.44/24	08.26	09.02	10.11
	15.38	17.16	18.39		21.09	22.41	23.49	23.08	21.30	19.43		18.01	15.26	14.40
20	09.40	08.08	06.33	17.33-17.58/25	05.46	04.09	03.11	04.03	05.36	07.04	18.19-18.43/24	08.29	09.05	10.12
	15.41	17.19	18.42		21.12	22.44	23.50	23.05	21.27	19.40		17.57	15.23	14.40
21	09.37	08.05	06.30	17.33-17.58/25	05.43	04.06	03.11	04.06	05.39	07.06	18.18-18.43/25	08.32	09.08	10.13
	15.44	17.22	18.45		21.15	22.47	23.50	23.02	21.24	19.36		17.54	15.21	14.40
22	09.35	08.02	06.26	17.32-17.57/25	05.39	04.03	03.11	04.09	05.42	07.09	18.18-18.43/25	08.35	09.11	10.13
	15.47	17.25	18.47		21.18	22.50	23.50	23.00	21.20	19.33		17.51	15.18	14.41
23	09.32	07.58	06.23	17.33-17.57/24	05.36	04.00	03.11	04.12	05.45	07.12	18.18-18.43/25	08.38	09.14	10.14
	15.50	17.28	18.50		21.21	22.53	23.50	22.57	21.17	19.29		17.47	15.16	14.41
24	09.30	07.55	06.19	17.32-17.56/24	05.32	03.57	03.12	04.15	05.47	07.15	18.17-18.41/24	08.41	09.17	10.14
	15.53	17.31	18.53		21.24	22.56	23.50	22.54	21.13	19.26		17.44	15.13	14.42
25	09.27	07.52	06.16	17.33-17.55/22	05.29	03.55	03.12	04.18	05.50	07.18	18.18-18.40/22	07.44	09.20	10.14
	15.56	17.34	18.56		21.27	22.59	23.50	22.51	21.10	19.23		16.41	15.11	14.43
26	09.24	07.48	06.12	17.33-17.54/21	05.26	03.52	03.13	04.21	05.53	07.20	18.18-18.39/21	07.47	09.23	10.14
	15.59	17.37	18.59		21.30	23.02	23.50	22.48	21.07	19.19		16.38	15.09	14.44
27	09.21	07.45	06.09	17.35-17.53/18	05.22	03.49	03.14	04.24	05.56	07.23	18.19-18.38/19	07.50	09.26	10.14
	16.02	17.40	19.02		21.33	23.05	23.49	22.45	21.03	19.16		16.34	15.06	14.45
28	09.19	07.42	06.05	17.36-17.50/14	05.19	03.47	03.15	04.27	05.59	07.26	18.21-18.35/14	07.53	09.28	10.14
	16.06	17.43	19.05		21.36	23.08	23.48	22.42	21.00	19.12		16.31	15.04	14.46
29	09.16		07.02	18.39-18.47/8	05.16	03.44	03.16	04.30	06.02	07.29	18.22-18.31/9	07.56	09.31	10.14
	16.09		20.08		21.39	23.10	23.48	22.39	20.56	19.09		16.28	15.02	14.47
30	09.13		06.59		05.12	03.42	03.17	04.33	06.05	07.32		07.59	09.34	10.13
	16.12		20.11		21.42	23.13	23.47	22.36	20.53	19.05		16.25	15.00	14.49
31	09.10		06.55			03.39		04.36	06.08			08.02		10.13
	16.15		20.13			23.16		22.33	20.49			16.22		14.50
Potential sun hours	178	241	363		449	563	612	599	505	392		307	203	146
Sum of minutes with flicker	0	0	308		0	0	0	0	0	310		0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 3 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1281)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March		April	May	June	July	August	September		October	November	December
1	10.12	09.07	07.38		06.52	05.09	03.37	03.19	04.39	06.11		07.34	08.06	09.37
	14.53	16.18	17.46		20.16	21.46	23.18	23.45	22.30	20.46		19.02	16.19	14.58
2	10.11	09.05	07.35		06.48	05.06	03.35	03.20	04.42	06.13		07.37	08.09	09.39
	14.54	16.22	17.49		20.19	21.49	23.21	23.44	22.26	20.42		18.58	16.15	14.56
3	10.10	09.02	07.32		06.45	05.02	03.32	03.22	04.45	06.16		07.40	08.12	09.42
	14.56	16.25	17.52		20.22	21.52	23.23	23.43	22.23	20.39		18.55	16.12	14.55
4	10.09	08.59	07.28		06.41	04.59	03.30	03.24	04.48	06.19		07.43	08.15	09.44
	14.58	16.28	17.55		20.25	21.55	23.26	23.41	22.20	20.36		18.52	16.09	14.53
5	10.08	08.56	07.25		06.38	04.56	03.28	03.26	04.51	06.22		07.46	08.18	09.47
	15.01	16.31	17.58		20.28	21.58	23.28	23.40	22.17	20.32		18.48	16.06	14.51
6	10.07	08.53	07.21		06.34	04.53	03.26	03.28	04.54	06.25		07.49	08.21	09.49
	15.03	16.35	18.01		20.31	22.01	23.30	23.38	22.14	20.29		18.45	16.03	14.50
7	10.05	08.50	07.18		06.31	04.49	03.24	03.30	04.57	06.28		07.51	08.24	09.51
	15.05	16.38	18.04		20.34	22.04	23.33	23.36	22.10	20.25		18.41	16.00	14.48
8	10.04	08.46	07.15		06.27	04.46	03.23	03.32	05.00	06.30		07.54	08.27	09.54
	15.07	16.41	18.07		20.37	22.07	23.35	23.34	22.07	20.22		18.38	15.57	14.47
9	10.02	08.43	07.11		06.24	04.43	03.21	03.34	05.03	06.33		07.57	08.31	09.56
	15.10	16.44	18.10		20.40	22.10	23.37	23.32	22.04	20.18		18.34	15.54	14.46
10	10.01	08.40	07.08		06.20	04.40	03.19	03.36	05.06	06.36		08.00	08.34	09.58
	15.12	16.47	18.13		20.43	22.13	23.38	23.30	22.01	20.15		18.31	15.51	14.45
11	09.59	08.37	07.04		06.17	04.36	03.18	03.39	05.09	06.39		08.03	08.37	10.00
	15.15	16.50	18.16		20.45	22.17	23.40	23.28	21.57	20.11		18.28	15.48	14.44
12	09.57	08.34	07.01		06.14	04.33	03.17	03.41	05.12	06.42		08.06	08.40	10.02
	15.18	16.54	18.19		20.48	22.20	23.42	23.26	21.54	20.08		18.24	15.45	14.43
13	09.55	08.31	06.57		06.10	04.30	03.15	03.44	05.15	06.44	08.05-08.13/8	08.09	08.43	10.03
	15.20	16.57	18.22		20.51	22.23	23.43	23.23	21.51	20.04		18.21	15.42	14.42
14	09.53	08.28	06.54		06.07	04.27	03.14	03.46	05.18	06.47	08.01-08.15/14	08.12	08.46	10.05
	15.23	17.00	18.24		20.54	22.26	23.45	23.21	21.47	20.01		18.17	15.40	14.41
15	09.51	08.24	06.51		06.03	04.24	03.13	03.49	05.21	06.50	07.59-08.17/18	08.14	08.49	10.06
	15.26	17.03	18.27		20.57	22.29	23.46	23.18	21.44	19.57		18.14	15.37	14.41
16	09.49	08.21	06.47	07.19-07.27/8	06.00	04.21	03.13	03.52	05.24	06.53	07.58-08.18/20	08.17	08.52	10.08
	15.29	17.06	18.30		21.00	22.32	23.47	23.16	21.41	19.54		18.11	15.34	14.40
17	09.47	08.18	06.44	07.15-07.29/14	05.56	04.18	03.12	03.55	05.27	06.55	07.56-08.18/22	08.20	08.56	10.09
	15.32	17.09	18.33		21.03	22.35	23.48	23.13	21.37	19.50		18.07	15.31	14.40
18	09.44	08.15	06.40	07.13-07.31/18	05.53	04.15	03.11	03.57	05.30	06.58	07.55-08.18/23	08.23	08.59	10.10
	15.35	17.12	18.36		21.06	22.38	23.49	23.11	21.34	19.47		18.04	15.29	14.40
19	09.42	08.12	06.37	07.11-07.31/20	05.50	04.12	03.11	04.00	05.33	07.01	07.55-08.18/23	08.26	09.02	10.11
	15.38	17.16	18.39		21.09	22.41	23.49	23.08	21.30	19.43		18.01	15.26	14.40
20	09.40	08.08	06.33	07.10-07.32/22	05.46	04.09	03.11	04.03	05.36	07.04	07.54-08.18/24	08.29	09.05	10.12
	15.41	17.19	18.42		21.12	22.44	23.50	23.05	21.27	19.40		17.57	15.23	14.40
21	09.37	08.05	06.30	07.09-07.32/23	05.43	04.06	03.11	04.06	05.39	07.07	07.53-08.17/24	08.32	09.08	10.13
	15.44	17.22	18.45		21.15	22.47	23.50	23.02	21.24	19.36		17.54	15.21	14.40
22	09.35	08.02	06.26	07.08-07.32/24	05.39	04.03	03.11	04.09	05.42	07.09	07.53-08.17/24	08.35	09.11	10.13
	15.47	17.25	18.48		21.18	22.50	23.51	23.00	21.20	19.33		17.51	15.18	14.41
23	09.32	07.58	06.23	07.08-07.32/24	05.36	04.00	03.11	04.12	05.45	07.12	07.54-08.16/22	08.38	09.14	10.14
	15.50	17.28	18.50		21.21	22.53	23.51	22.57	21.17	19.30		17.47	15.16	14.41
24	09.30	07.55	06.19	07.08-07.32/24	05.32	03.57	03.12	04.15	05.48	07.15	07.54-08.15/21	08.41	09.17	10.14
	15.53	17.31	18.53		21.24	22.56	23.50	22.54	21.13	19.26		17.44	15.13	14.42
25	09.27	07.52	06.16	07.07-07.31/24	05.29	03.55	03.12	04.18	05.50	07.18	07.55-08.14/19	07.44	09.20	10.14
	15.56	17.34	18.56		21.27	22.59	23.50	22.51	21.10	19.23		16.41	15.11	14.43
26	09.24	07.48	06.12	07.08-07.30/22	05.26	03.52	03.13	04.21	05.53	07.20	07.56-08.12/16	07.47	09.23	10.15
	15.59	17.37	18.59		21.30	23.02	23.50	22.48	21.07	19.19		16.38	15.09	14.44
27	09.22	07.45	06.09	07.08-07.28/20	05.22	03.49	03.14	04.24	05.56	07.23	07.59-08.09/10	07.50	09.26	10.14
	16.03	17.40	19.02		21.33	23.05	23.49	22.45	21.03	19.16		16.34	15.07	14.45
28	09.19	07.42	06.06	07.09-07.27/18	05.19	03.47	03.15	04.27	05.59	07.26		07.53	09.28	10.14
	16.06	17.43	19.05		21.36	23.08	23.48	22.42	21.00	19.12		16.31	15.04	14.46
29	09.16		07.02	08.10-08.25/15	05.16	03.44	03.16	04.30	06.02	07.29		07.56	09.31	10.14
	16.09		20.08		21.39	23.10	23.48	22.39	20.56	19.09		16.28	15.02	14.47
30	09.13		06.59	08.13-08.22/9	05.12	03.42	03.17	04.33	06.05	07.32		07.59	09.34	10.14
	16.12		20.11		21.42	23.13	23.47	22.36	20.53	19.05		16.25	15.00	14.49
31	09.10		06.55			03.39		04.36	06.08			08.03		10.13
	16.15		20.13			23.16		22.33	20.49			16.22		14.50
Potential sun hours	178	241	363		449	563	612	599	505	392		307	203	146
Sum of minutes with flicker	0	0	285		0	0	0	0	0	288		0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 4 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1282)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.12	09.07	07.38	06.52	05.09	03.37	03.19	04.39	06.11	07.34	08.05	09.36
	14.53	16.18	17.46	20.16	21.45	23.18	23.45	22.29	20.46	19.02	16.19	14.58
2	10.11	09.04	07.35	06.48	05.06	03.35	03.20	04.42	06.13	07.37	08.09	09.39
	14.55	16.22	17.49	20.19	21.49	23.21	23.44	22.26	20.42	18.58	16.15	14.56
3	10.10	09.01	07.31	06.45	05.02	03.32	03.22	04.45	06.16	07.40	08.12	09.42
	14.56	16.25	17.52	20.22	21.52	23.23	23.43	22.23	20.39	18.55	16.12	14.55
4	10.09	08.58	07.28	06.41	04.59	03.30	03.24	04.48	06.19	07.43	08.15	09.44
	14.58	16.28	17.55	20.25	21.55	23.26	23.41	22.20	20.35	18.51	16.09	14.53
5	10.08	08.55	07.25	06.38	04.56	03.28	03.26	04.51	06.22	07.46	08.18	09.47
	15.01	16.31	17.58	20.28	21.58	23.28	23.39	22.17	20.32	18.48	16.06	14.51
6	10.07	08.52	07.21	06.34	04.53	03.26	03.28	04.54	06.25	07.48	08.21	09.49
	15.03	16.35	18.01	20.31	22.01	23.30	23.38	22.14	20.29	18.45	16.03	14.50
7	10.05	08.49	07.18	06.31	04.49	03.24	03.30	04.57	06.27	07.51	08.24	09.51
	15.05	16.38	18.04	20.34	22.04	23.32	23.36	22.10	20.25	18.41	16.00	14.48
8	10.04	08.46	07.14	06.27	04.46	03.23	03.32	05.00	06.30	07.54	08.27	09.53
	15.07	16.41	18.07	20.37	22.07	23.34	23.34	22.07	20.22	18.38	15.57	14.47
9	10.02	08.43	07.11	06.24	04.43	03.21	03.34	05.03	06.33	07.57	08.30	09.56
	15.10	16.44	18.10	20.39	22.10	23.36	23.32	22.04	20.18	18.34	15.54	14.46
10	10.00	08.40	07.08	06.20	04.40	03.19	03.37	05.06	06.36	08.00	08.34	09.58
	15.12	16.47	18.13	20.42	22.13	23.38	23.30	22.00	20.15	18.31	15.51	14.45
11	09.59	08.37	07.04	06.17	04.36	03.18	03.39	05.09	06.39	08.03	08.37	10.00
	15.15	16.50	18.16	20.45	22.16	23.40	23.28	21.57	20.11	18.28	15.48	14.44
12	09.57	08.34	07.01	06.14	04.33	03.17	03.41	05.12	06.41	08.06	08.40	10.01
	15.18	16.54	18.19	20.48	22.20	23.42	23.25	21.54	20.08	18.24	15.45	14.43
13	09.55	08.31	06.57	06.10	04.30	03.15	03.44	05.15	06.44	08.09	08.43	10.03
	15.20	16.57	18.21	20.51	22.23	23.43	23.23	21.51	20.04	18.21	15.42	14.42
14	09.53	08.28	06.54	06.07	04.27	03.14	03.47	05.18	06.47	08.11	08.46	10.05
	15.23	17.00	18.24	20.54	22.26	23.44	23.21	21.47	20.01	18.17	15.40	14.41
15	09.51	08.24	06.50	06.03	04.24	03.13	03.49	05.21	06.50	08.14	08.49	10.06
	15.26	17.03	18.27	20.57	22.29	23.46	23.18	21.44	19.57	18.14	15.37	14.41
16	09.49	08.21	06.47	06.00	04.21	03.13	03.52	05.24	06.53	08.17	08.52	10.08
	15.29	17.06	18.30	21.00	22.32	23.47	23.16	21.41	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.56	04.18	03.12	03.55	05.27	06.55	08.20	08.55	10.09
	15.32	17.09	18.33	21.03	22.35	23.48	23.13	21.37	19.50	18.07	15.31	14.40
18	09.44	08.15	06.40	05.53	04.15	03.12	03.57	05.30	06.58	08.23	08.58	10.10
	15.35	17.12	18.36	21.06	22.38	23.49	23.10	21.34	19.47	18.04	15.29	14.40
19	09.42	08.11	06.37	05.49	04.12	03.11	04.00	05.33	07.01	08.26	09.02	10.11
	15.38	17.16	18.39	21.09	22.41	23.49	23.08	21.30	19.43	18.01	15.26	14.40
20	09.39	08.08	06.33	05.46	04.09	03.11	04.03	05.36	07.04	08.29	09.05	10.12
	15.41	17.19	18.42	21.12	22.44	23.50	23.05	21.27	19.40	17.57	15.23	14.40
21	09.37	08.05	06.30	05.43	04.06	03.11	04.06	05.39	07.06	08.32	09.08	10.13
	15.44	17.22	18.45	21.15	22.47	23.50	23.02	21.24	19.36	17.54	15.21	14.41
22	09.35	08.02	06.26	05.39	04.03	03.11	04.09	05.42	07.09	08.35	09.11	10.13
	15.47	17.25	18.47	21.18	22.50	23.50	22.59	21.20	19.33	17.51	15.18	14.41
23	09.32	07.58	06.23	05.36	04.00	03.11	04.12	05.45	07.12	08.38	09.14	10.14
	15.50	17.28	18.50	21.21	22.53	23.50	22.57	21.17	19.29	17.47	15.16	14.41
24	09.29	07.55	06.19	05.32	03.58	03.12	04.15	05.48	07.15	08.41	09.17	10.14
	15.53	17.31	18.53	21.24	22.56	23.50	22.54	21.13	19.26	17.44	15.13	14.42
25	09.27	07.52	06.16	05.29	03.55	03.12	04.18	05.50	07.18	07.44	09.20	10.14
	15.56	17.34	18.56	21.27	22.59	23.50	22.51	21.10	19.23	16.41	15.11	14.43
26	09.24	07.48	06.12	05.26	03.52	03.13	04.21	05.53	07.20	07.47	09.23	10.14
	15.59	17.37	18.59	21.30	23.02	23.49	22.48	21.07	19.19	16.38	15.09	14.44
27	09.21	07.45	06.09	05.22	03.49	03.14	04.24	05.56	07.23	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.05	23.49	22.45	21.03	19.16	16.34	15.07	14.45
28	09.19	07.42	06.05	05.19	03.47	03.15	04.27	05.59	07.26	07.53	09.28	10.14
	16.06	17.43	19.05	21.36	23.07	23.48	22.42	21.00	19.12	16.31	15.04	14.46
29	09.16		07.02	05.16	03.44	03.16	04.30	06.02	07.29	07.56	09.31	10.14
	16.09		20.08	21.39	23.10	23.47	22.39	20.56	19.09	16.28	15.02	14.48
30	09.13		06.59	05.12	03.42	03.17	04.33	06.05	07.32	07.59	09.34	10.13
	16.12		20.10	21.42	23.13	23.46	22.36	20.53	19.05	16.25	15.00	14.49
31	09.10		06.55		03.39		04.36	06.08		08.02		10.13
	16.15		20.13		23.16		22.33	20.49		16.22		14.51
Potential sun hours	178	241	363	449	563	611	599	504	392	307	203	146
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi

Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 5 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1283)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.12	09.07	07.38	06.52	05.09	03.37	03.19	04.39	06.11	07.34	08.06	09.36
	14.53	16.19	17.46	20.16	21.45	23.18	23.45	22.29	20.46	19.02	16.19	14.58
2	10.11	09.04	07.35	06.48	05.06	03.35	03.20	04.42	06.13	07.37	08.09	09.39
	14.55	16.22	17.49	20.19	21.49	23.21	23.44	22.26	20.42	18.58	16.15	14.57
3	10.10	09.02	07.32	06.45	05.02	03.33	03.22	04.45	06.16	07.40	08.12	09.42
	14.57	16.25	17.52	20.22	21.52	23.23	23.43	22.23	20.39	18.55	16.12	14.55
4	10.09	08.59	07.28	06.41	04.59	03.30	03.24	04.48	06.19	07.43	08.15	09.44
	14.59	16.28	17.55	20.25	21.55	23.26	23.41	22.20	20.36	18.52	16.09	14.53
5	10.08	08.56	07.25	06.38	04.56	03.28	03.26	04.51	06.22	07.46	08.18	09.47
	15.01	16.31	17.58	20.28	21.58	23.28	23.39	22.17	20.32	18.48	16.06	14.51
6	10.07	08.53	07.21	06.34	04.53	03.26	03.28	04.54	06.25	07.49	08.21	09.49
	15.03	16.35	18.01	20.31	22.01	23.30	23.38	22.14	20.29	18.45	16.03	14.50
7	10.05	08.49	07.18	06.31	04.49	03.25	03.30	04.57	06.28	07.51	08.24	09.51
	15.05	16.38	18.04	20.34	22.04	23.32	23.36	22.10	20.25	18.41	16.00	14.48
8	10.04	08.46	07.15	06.27	04.46	03.23	03.32	05.00	06.30	07.54	08.27	09.54
	15.08	16.41	18.07	20.37	22.07	23.34	23.34	22.07	20.22	18.38	15.57	14.47
9	10.02	08.43	07.11	06.24	04.43	03.21	03.34	05.03	06.33	07.57	08.30	09.56
	15.10	16.44	18.10	20.40	22.10	23.36	23.32	22.04	20.18	18.34	15.54	14.46
10	10.00	08.40	07.08	06.21	04.40	03.20	03.37	05.06	06.36	08.00	08.34	09.58
	15.13	16.47	18.13	20.42	22.13	23.38	23.30	22.01	20.15	18.31	15.51	14.45
11	09.59	08.37	07.04	06.17	04.37	03.18	03.39	05.09	06.39	08.03	08.37	10.00
	15.15	16.51	18.16	20.45	22.16	23.40	23.28	21.57	20.11	18.28	15.48	14.44
12	09.57	08.34	07.01	06.14	04.33	03.17	03.42	05.12	06.42	08.06	08.40	10.01
	15.18	16.54	18.19	20.48	22.20	23.42	23.25	21.54	20.08	18.24	15.45	14.43
13	09.55	08.31	06.57	06.10	04.30	03.16	03.44	05.15	06.44	08.09	08.43	10.03
	15.21	16.57	18.22	20.51	22.23	23.43	23.23	21.51	20.04	18.21	15.42	14.42
14	09.53	08.28	06.54	06.07	04.27	03.15	03.47	05.18	06.47	08.12	08.46	10.05
	15.23	17.00	18.24	20.54	22.26	23.44	23.21	21.47	20.01	18.17	15.40	14.42
15	09.51	08.24	06.51	06.03	04.24	03.14	03.49	05.21	06.50	08.14	08.49	10.06
	15.26	17.03	18.27	20.57	22.29	23.46	23.18	21.44	19.57	18.14	15.37	14.41
16	09.49	08.21	06.47	06.00	04.21	03.13	03.52	05.24	06.53	08.17	08.52	10.08
	15.29	17.06	18.30	21.00	22.32	23.47	23.16	21.41	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.56	04.18	03.12	03.55	05.27	06.55	08.20	08.55	10.09
	15.32	17.09	18.33	21.03	22.35	23.48	23.13	21.37	19.50	18.07	15.31	14.40
18	09.44	08.15	06.40	05.53	04.15	03.12	03.57	05.30	06.58	08.23	08.59	10.10
	15.35	17.13	18.36	21.06	22.38	23.49	23.11	21.34	19.47	18.04	15.29	14.40
19	09.42	08.11	06.37	05.50	04.12	03.11	04.00	05.33	07.01	08.26	09.02	10.11
	15.38	17.16	18.39	21.09	22.41	23.49	23.08	21.30	19.43	18.01	15.26	14.40
20	09.40	08.08	06.33	05.46	04.09	03.11	04.03	05.36	07.04	08.29	09.05	10.12
	15.41	17.19	18.42	21.12	22.44	23.50	23.05	21.27	19.40	17.57	15.23	14.40
21	09.37	08.05	06.30	05.43	04.06	03.11	04.06	05.39	07.07	08.32	09.08	10.13
	15.44	17.22	18.45	21.15	22.47	23.50	23.02	21.24	19.36	17.54	15.21	14.41
22	09.35	08.02	06.26	05.39	04.03	03.11	04.09	05.42	07.09	08.35	09.11	10.13
	15.47	17.25	18.48	21.18	22.50	23.50	23.00	21.20	19.33	17.51	15.18	14.41
23	09.32	07.58	06.23	05.36	04.00	03.11	04.12	05.45	07.12	08.38	09.14	10.14
	15.50	17.28	18.50	21.21	22.53	23.50	22.57	21.17	19.30	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.12	04.15	05.48	07.15	08.41	09.17	10.14
	15.53	17.31	18.53	21.24	22.56	23.50	22.54	21.13	19.26	17.44	15.13	14.42
25	09.27	07.52	06.16	05.29	03.55	03.12	04.18	05.50	07.18	07.44	09.20	10.14
	15.56	17.34	18.56	21.27	22.59	23.50	22.51	21.10	19.23	16.41	15.11	14.43
26	09.24	07.48	06.13	05.26	03.52	03.13	04.21	05.53	07.20	07.47	09.23	10.14
	15.59	17.37	18.59	21.30	23.02	23.49	22.48	21.07	19.19	16.38	15.09	14.44
27	09.21	07.45	06.09	05.22	03.50	03.14	04.24	05.56	07.23	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.05	23.49	22.45	21.03	19.16	16.35	15.07	14.45
28	09.19	07.42	06.06	05.19	03.47	03.15	04.27	05.59	07.26	07.53	09.28	10.14
	16.06	17.43	19.05	21.36	23.07	23.48	22.42	21.00	19.12	16.31	15.04	14.46
29	09.16		07.02	05.16	03.44	03.16	04.30	06.02	07.29	07.56	09.31	10.14
	16.09		20.08	21.39	23.10	23.47	22.39	20.56	19.09	16.28	15.02	14.48
30	09.13		06.59	05.12	03.42	03.17	04.33	06.05	07.32	07.59	09.34	10.13
	16.12		20.11	21.42	23.13	23.46	22.36	20.53	19.05	16.25	15.00	14.49
31	09.10		06.55		03.39		04.36	06.08		08.02		10.13
	16.15		20.13		23.16		22.33	20.49		16.22		14.51
Potential sun hours	178	241	363	449	563	611	599	504	392	307	203	146
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 6 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1284)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February		March		April		May	June
1	10.12	09.07		07.38	16.28-16.53/25	06.52		05.09	03.37
	14.53	16.19		17.46		20.16		21.45	23.18
2	10.11	09.04		07.35	16.29-16.54/25	06.48		05.06	03.35
	14.55	16.22		17.49		20.19		21.48	23.21
3	10.10	09.01		07.31	16.28-16.53/25	06.45		05.02	03.33
	14.57	16.25		17.52		20.22		21.52	23.23
4	10.09	08.58		07.28	16.29-16.52/23	06.41		04.59	03.30
	14.59	16.28		17.55		20.25		21.55	23.25
5	10.08	08.55		07.25	16.29-16.51/22	06.38		04.56	03.28
	15.01	16.31		17.58		20.28		21.58	23.28
6	10.06	08.52		07.21	16.31-16.51/20	06.34		04.53	03.26
	15.03	16.35		18.01		20.31		22.01	23.30
7	10.05	08.49		07.18	16.31-16.48/17	06.31		04.49	03.25
	15.05	16.38		18.04		20.34		22.04	23.32
8	10.04	08.46		07.14	16.34-16.47/13	06.27		04.46	03.23
	15.08	16.41		18.07		20.37		22.07	23.34
9	10.02	08.43		07.11	16.38-16.42/4	06.24		04.43	03.21
	15.10	16.44		18.10		20.39		22.10	23.36
10	10.00	08.40		07.08		06.20		04.40	03.20
	15.13	16.47		18.13		20.42		22.13	23.38
11	09.58	08.37		07.04		06.17	20.04-20.09/5	04.37	03.18
	15.15	16.50		18.16		20.45		22.16	23.40
12	09.57	08.34		07.01		06.14	20.01-20.12/11	04.33	03.17
	15.18	16.54		18.19		20.48		22.19	23.41
13	09.55	08.31		06.57		06.10	19.58-20.14/16	04.30	03.16
	15.21	16.57		18.21		20.51		22.22	23.43
14	09.53	08.27		06.54		06.07	19.56-20.16/20	04.27	03.15
	15.23	17.00		18.24		20.54		22.26	23.44
15	09.51	08.24		06.50		06.03	19.55-20.17/22	04.24	03.14
	15.26	17.03		18.27		20.57		22.29	23.46
16	09.49	08.21		06.47		06.00	19.54-20.17/23	04.21	03.13
	15.29	17.06		18.30		21.00		22.32	23.47
17	09.46	08.18		06.44		05.56	19.53-20.17/24	04.18	03.12
	15.32	17.09		18.33		21.03		22.35	23.48
18	09.44	08.15		06.40		05.53	19.53-20.18/25	04.15	03.12
	15.35	17.12		18.36		21.06		22.38	23.48
19	09.42	08.11		06.37		05.49	19.52-20.18/26	04.12	03.11
	15.38	17.16		18.39		21.09		22.41	23.49
20	09.39	08.08		06.33		05.46	19.52-20.18/26	04.09	03.11
	15.41	17.19		18.42		21.12		22.44	23.50
21	09.37	08.05	16.39-16.43/4	06.30		05.43	19.51-20.17/26	04.06	03.11
	15.44	17.22		18.45		21.15		22.47	23.50
22	09.34	08.01	16.35-16.46/11	06.26		05.39	19.52-20.16/24	04.03	03.11
	15.47	17.25		18.47		21.18		22.50	23.50
23	09.32	07.58	16.34-16.50/16	06.23		05.36	19.52-20.16/24	04.00	03.11
	15.50	17.28		18.50		21.21		22.53	23.50
24	09.29	07.55	16.32-16.51/19	06.19		05.32	19.53-20.15/22	03.58	03.12
	15.53	17.31		18.53		21.24		22.56	23.50
25	09.27	07.52	16.31-16.53/22	06.16		05.29	19.53-20.14/21	03.55	03.12
	15.56	17.34		18.56		21.27		22.59	23.50
26	09.24	07.48	16.30-16.53/23	06.12		05.26	19.54-20.13/19	03.52	03.13
	15.59	17.37		18.59		21.30		23.02	23.49
27	09.21	07.45	16.30-16.54/24	06.09		05.22	19.56-20.11/15	03.50	03.14
	16.03	17.40		19.02		21.33		23.04	23.49
28	09.19	07.42	16.29-16.54/25	06.05		05.19	19.58-20.09/11	03.47	03.15
	16.06	17.43		19.05		21.36		23.07	23.48
29	09.16			07.02		05.16	20.03-20.04/1	03.44	03.16
	16.09			20.08		21.39		23.10	23.47
30	09.13			06.59		05.12		03.42	03.17
	16.12			20.10		21.42		23.13	23.46
31	09.10			06.55				03.39	
	16.15			20.13				23.15	
Potential sun hours	178	241		363		449		563	611
Sum of minutes with flicker	0	144		174		361		0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 6 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1284)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	July	August		September		October		November	December
1	03.19	04.39		06.11	20.04-20.08/4	07.34		08.05	09.36
	23.45	22.29		20.46		19.02		16.19	14.58
2	03.20	04.42		06.13		07.37		08.09	09.39
	23.44	22.26		20.42		18.58		16.15	14.56
3	03.22	04.45		06.16		07.40		08.12	09.42
	23.42	22.23		20.39		18.55		16.12	14.55
4	03.24	04.48		06.19		07.43		08.15	09.44
	23.41	22.20		20.35		18.51		16.09	14.53
5	03.26	04.51		06.22		07.46	17.12-17.22/10	08.18	09.46
	23.39	22.17		20.32		18.48		16.06	14.51
6	03.28	04.54		06.25		07.48	17.09-17.24/15	08.21	09.49
	23.38	22.13		20.28		18.45		16.03	14.50
7	03.30	04.57		06.27		07.51	17.07-17.26/19	08.24	09.51
	23.36	22.10		20.25		18.41		16.00	14.48
8	03.32	05.00		06.30		07.54	17.05-17.26/21	08.27	09.53
	23.34	22.07		20.22		18.38		15.57	14.47
9	03.34	05.03		06.33		07.57	17.04-17.27/23	08.30	09.55
	23.32	22.04		20.18		18.34		15.54	14.46
10	03.37	05.06		06.36		08.00	17.03-17.27/24	08.33	09.57
	23.30	22.00		20.15		18.31		15.51	14.45
11	03.39	05.09		06.39		08.03	17.03-17.27/24	08.37	09.59
	23.27	21.57		20.11		18.28		15.48	14.44
12	03.42	05.12		06.41		08.06	17.02-17.27/25	08.40	10.01
	23.25	21.54		20.08		18.24		15.45	14.43
13	03.44	05.15		06.44		08.09	17.02-17.27/25	08.43	10.03
	23.23	21.50		20.04		18.21		15.42	14.42
14	03.47	05.18	20.08-20.14/6	06.47		08.11	17.02-17.26/24	08.46	10.05
	23.21	21.47		20.01		18.17		15.40	14.41
15	03.49	05.21	20.05-20.17/12	06.50		08.14	17.02-17.26/24	08.49	10.06
	23.18	21.44		19.57		18.14		15.37	14.41
16	03.52	05.24	20.03-20.19/16	06.53		08.17	17.02-17.25/23	08.52	10.07
	23.16	21.40		19.54		18.11		15.34	14.41
17	03.55	05.27	20.01-20.19/18	06.55		08.20	17.03-17.24/21	08.55	10.09
	23.13	21.37		19.50		18.07		15.31	14.40
18	03.57	05.30	20.00-20.21/21	06.58		08.23	17.04-17.23/19	08.58	10.10
	23.10	21.34		19.47		18.04		15.29	14.40
19	04.00	05.33	19.58-20.20/22	07.01		08.26	17.05-17.19/14	09.01	10.11
	23.08	21.30		19.43		18.01		15.26	14.40
20	04.03	05.36	19.57-20.21/24	07.04		08.29	17.07-17.16/9	09.05	10.12
	23.05	21.27		19.40		17.57		15.23	14.40
21	04.06	05.39	19.57-20.22/25	07.06		08.32		09.08	10.12
	23.02	21.24		19.36		17.54		15.21	14.41
22	04.09	05.42	19.56-20.21/25	07.09		08.35		09.11	10.13
	22.59	21.20		19.33		17.51		15.18	14.41
23	04.12	05.45	19.56-20.21/25	07.12		08.38		09.14	10.14
	22.56	21.17		19.29		17.47		15.16	14.42
24	04.15	05.48	19.56-20.21/25	07.15		08.41		09.17	10.14
	22.54	21.13		19.26		17.44		15.13	14.42
25	04.18	05.50	19.55-20.20/25	07.18		07.44		09.19	10.14
	22.51	21.10		19.22		16.41		15.11	14.43
26	04.21	05.53	19.56-20.20/24	07.20		07.47		09.22	10.14
	22.48	21.06		19.19		16.38		15.09	14.44
27	04.24	05.56	19.56-20.19/23	07.23		07.50		09.25	10.14
	22.45	21.03		19.16		16.34		15.07	14.45
28	04.27	05.59	19.56-20.18/22	07.26		07.53		09.28	10.14
	22.42	21.00		19.12		16.31		15.04	14.46
29	04.30	06.02	19.57-20.17/20	07.29		07.56		09.31	10.14
	22.39	20.56		19.09		16.28		15.02	14.48
30	04.33	06.05	19.59-20.15/16	07.32		07.59		09.34	10.13
	22.36	20.53		19.05		16.25		15.00	14.49
31	04.36	06.08	20.00-20.11/11			08.02			10.13
	22.32	20.49				16.22			14.51
Potential sun hours	599	504		392		307		203	146
Sum of minutes with flicker	0	360		4		320		0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 7 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1285)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March		April		May		June	
1	10.12	09.07	07.38		06.52	07.43-08.07/24	05.09		03.37	04.32-04.39/7
	14.53	16.19	17.46		20.16		21.45		23.18	
2	10.11	09.04	07.35		06.48	07.44-08.07/23	05.06		03.35	04.31-04.41/10
	14.55	16.22	17.49		20.19		21.48		23.21	
3	10.10	09.01	07.32		06.45	07.44-08.05/21	05.03		03.33	04.29-04.42/13
	14.57	16.25	17.52		20.22		21.52		23.23	
4	10.09	08.58	07.28		06.41	07.45-08.04/19	04.59		03.31	04.28-04.43/15
	14.59	16.28	17.55		20.25		21.55		23.25	
5	10.08	08.55	07.25		06.38	07.45-08.02/17	04.56		03.29	04.27-04.44/17
	15.01	16.31	17.58		20.28		21.58		23.28	
6	10.06	08.52	07.21		06.34	07.47-07.59/12	04.53		03.27	04.26-04.45/19
	15.03	16.35	18.01		20.31		22.01		23.30	
7	10.05	08.49	07.18		06.31	07.52-07.55/3	04.49		03.25	04.25-04.45/20
	15.05	16.38	18.04		20.34		22.04		23.32	
8	10.04	08.46	07.15		06.27		04.46		03.23	04.25-04.45/20
	15.08	16.41	18.07		20.37		22.07		23.34	
9	10.02	08.43	07.11		06.24		04.43		03.21	04.25-04.46/21
	15.10	16.44	18.10		20.40		22.10		23.36	04.22-04.23/1
10	10.00	08.40	07.08		06.21		04.40		03.20	04.22-04.47/25
	15.13	16.47	18.13		20.42		22.13		23.38	
11	09.59	08.37	07.04		06.17		04.37		03.18	04.21-04.47/26
	15.15	16.51	18.16		20.45		22.16		23.40	
12	09.57	08.34	07.01		06.14		04.34		03.17	04.20-04.47/27
	15.18	16.54	18.19		20.48		22.19		23.41	
13	09.55	08.31	06.57		06.10		04.30		03.16	04.19-04.47/28
	15.21	16.57	18.22		20.51		22.23		23.43	
14	09.53	08.28	06.54		06.07		04.27		03.15	04.19-04.48/29
	15.23	17.00	18.24		20.54		22.26		23.44	
15	09.51	08.24	06.51		06.03		04.24		03.14	04.19-04.49/30
	15.26	17.03	18.27		20.57		22.29		23.45	
16	09.49	08.21	06.47		06.00		04.21		03.13	04.18-04.48/30
	15.29	17.06	18.30		21.00		22.32		23.47	
17	09.46	08.18	06.44		05.56		04.18		03.12	04.18-04.49/31
	15.32	17.09	18.33		21.03		22.35		23.48	
18	09.44	08.15	06.40		05.53		04.15		03.12	04.18-04.49/31
	15.35	17.13	18.36		21.06		22.38		23.48	
19	09.42	08.11	06.37		05.50		04.12		03.12	04.18-04.50/32
	15.38	17.16	18.39		21.09		22.41		23.49	
20	09.39	08.08	06.33		05.46		04.09		03.11	04.18-04.50/32
	15.41	17.19	18.42		21.12		22.44		23.49	
21	09.37	08.05	06.30		05.43		04.06		03.11	04.18-04.50/32
	15.44	17.22	18.45		21.15		22.47		23.50	
22	09.34	08.02	06.26		05.39		04.03		03.11	04.18-04.50/32
	15.47	17.25	18.48		21.18		22.50		23.50	
23	09.32	07.58	06.23	06.54-07.04/10	05.36		04.01		03.12	04.19-04.51/32
	15.50	17.28	18.50		21.21		22.53		23.50	
24	09.29	07.55	06.19	06.51-07.06/15	05.33		03.58		03.12	04.19-04.51/32
	15.53	17.31	18.53		21.24		22.56		23.50	
25	09.27	07.52	06.16	06.48-07.07/19	05.29		03.55		03.13	04.20-04.51/31
	15.56	17.34	18.56		21.27		22.59		23.50	
26	09.24	07.48	06.13	06.47-07.08/21	05.26		03.52		03.13	04.20-04.51/31
	16.00	17.37	18.59		21.30		23.02		23.49	
27	09.21	07.45	06.09	06.45-07.08/23	05.22		03.50		03.14	04.21-04.51/30
	16.03	17.40	19.02		21.33		23.04		23.49	
28	09.19	07.42	06.06	06.45-07.09/24	05.19		03.47		03.15	04.22-04.51/29
	16.06	17.43	19.05		21.36		23.07		23.48	
29	09.16		07.02	07.44-08.08/24	05.16		03.45		03.16	04.23-04.52/29
	16.09		20.08		21.39		23.10		23.47	
30	09.13		06.59	07.44-08.08/24	05.12		03.42		03.18	04.24-04.52/28
	16.12		20.11		21.42		23.13		23.46	
31	09.10		06.55	07.43-08.07/24			03.40	04.34-04.38/4		
	16.15		20.13				23.15			
Potential sun hours	178	241	363		449		563		611	
Sum of minutes with flicker	0	0	184		119		4		770	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 7 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1285)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	July	August	September	October	November	December
1	03.19 04.25-04.52/27	04.39	06.11	07.34	08.05	09.36
	23.45	22.29	20.46	19.02	16.19	14.59
2	03.21 04.26-04.51/25	04.42	06.13	07.37	08.09	09.39
	23.44	22.26	20.42	18.58	16.16	14.57
3	03.22 04.30-04.51/21	04.45	06.16	07.40	08.12	09.42
	23.42 04.27-04.29/2	22.23	20.39	18.55	16.12	14.55
4	03.24 04.30-04.51/21	04.48	06.19	07.43	08.15	09.44
	23.41	22.20	20.35	18.52	16.09	14.53
5	03.26 04.31-04.51/20	04.51	06.22 07.49-07.50/1	07.46	08.18	09.47
	23.39	22.17	20.32	18.48	16.06	14.52
6	03.28 04.31-04.51/20	04.54	06.25 07.44-07.55/11	07.49	08.21	09.49
	23.38	22.13	20.29	18.45	16.03	14.50
7	03.30 04.33-04.51/18	04.57	06.28 07.41-07.57/16	07.51	08.24	09.51
	23.36	22.10	20.25	18.41	16.00	14.49
8	03.32 04.34-04.50/16	05.00	06.30 07.39-07.58/19	07.54	08.27	09.53
	23.34	22.07	20.22	18.38	15.57	14.47
9	03.34 04.36-04.50/14	05.03	06.33 07.38-07.59/21	07.57	08.30	09.55
	23.32	22.04	20.18	18.34	15.54	14.46
10	03.37 04.38-04.49/11	05.06	06.36 07.37-08.00/23	08.00	08.34	09.57
	23.30	22.00	20.15	18.31	15.51	14.45
11	03.39 04.39-04.48/9	05.09	06.39 07.36-08.00/24	08.03	08.37	09.59
	23.27	21.57	20.11	18.28	15.48	14.44
12	03.42 04.41-04.47/6	05.12	06.42 07.35-08.00/25	08.06	08.40	10.01
	23.25	21.54	20.08	18.24	15.45	14.43
13	03.44 04.43-04.45/2	05.15	06.44 07.35-08.00/25	08.09	08.43	10.03
	23.23	21.51	20.04	18.21	15.43	14.42
14	03.47	05.18	06.47 07.34-07.59/25	08.11	08.46	10.05
	23.21	21.47	20.01	18.18	15.40	14.42
15	03.49	05.21	06.50 07.34-07.58/24	08.14	08.49	10.06
	23.18	21.44	19.57	18.14	15.37	14.41
16	03.52	05.24	06.53 07.35-07.58/23	08.17	08.52	10.07
	23.16	21.40	19.54	18.11	15.34	14.41
17	03.55	05.27	06.55 07.34-07.56/22	08.20	08.55	10.09
	23.13	21.37	19.50	18.07	15.31	14.41
18	03.58	05.30	06.58 07.35-07.55/20	08.23	08.58	10.10
	23.10	21.34	19.47	18.04	15.29	14.40
19	04.00	05.33	07.01 07.37-07.53/16	08.26	09.01	10.11
	23.08	21.30	19.43	18.01	15.26	14.40
20	04.03	05.36	07.04 07.40-07.51/11	08.29	09.05	10.12
	23.05	21.27	19.40	17.57	15.23	14.41
21	04.06	05.39	07.07 07.42-07.46/4	08.32	09.08	10.12
	23.02	21.24	19.36	17.54	15.21	14.41
22	04.09	05.42	07.09	08.35	09.11	10.13
	22.59	21.20	19.33	17.51	15.18	14.41
23	04.12	05.45	07.12	08.38	09.14	10.14
	22.57	21.17	19.30	17.48	15.16	14.42
24	04.15	05.48	07.15	08.41	09.17	10.14
	22.54	21.13	19.26	17.44	15.14	14.42
25	04.18	05.51	07.18	07.44	09.20	10.14
	22.51	21.10	19.23	16.41	15.11	14.43
26	04.21	05.53	07.20	07.47	09.22	10.14
	22.48	21.07	19.19	16.38	15.09	14.44
27	04.24	05.56	07.23	07.50	09.25	10.14
	22.45	21.03	19.16	16.35	15.07	14.45
28	04.27	05.59	07.26	07.53	09.28	10.14
	22.42	21.00	19.12	16.31	15.05	14.46
29	04.30	06.02	07.29	07.56	09.31	10.14
	22.39	20.56	19.09	16.28	15.02	14.48
30	04.33	06.05	07.32	07.59	09.34	10.13
	22.36	20.53	19.05	16.25	15.00	14.49
31	04.36	06.08		08.02		10.13
	22.33	20.49		16.22		14.51
Potential sun hours	599	504	392	307	203	146
Sum of minutes with flicker	212	0	310	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 8 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1286)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.12	09.07	07.38	06.52	05.09	03.37	03.19	04.39	06.11	07.34 17.23-17.55/32	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.18	23.45	22.29	20.46	19.02	16.19	14.58
2	10.11	09.04	07.35 16.57-17.07/10	06.48	05.06	03.35	03.21	04.42	06.13	07.37 17.23-17.54/31	08.08	09.39
	14.55	16.22	17.49	20.19	21.48	23.20	23.44	22.26	20.42	18.58	16.15	14.57
3	10.10	09.01	07.31 16.53-17.10/17	06.45	05.02	03.33	03.22	04.45	06.16	07.40 17.22-17.54/32	08.12	09.41
	14.57	16.25	17.52	20.22	21.51	23.23	23.42	22.23	20.39	18.55	16.12	14.55
4	10.09	08.58	07.28 16.51-17.12/21	06.41	04.59	03.31	03.24	04.48	06.19	07.43 17.22-17.54/32	08.15	09.44
	14.59	16.28	17.55	20.25	21.54	23.25	23.41	22.20	20.35	18.51	16.09	14.53
5	10.08	08.55	07.25 16.49-17.13/24	06.38	04.56	03.29	03.26	04.51	06.22	07.46 17.23-17.53/30	08.18	09.46
	15.01	16.31	17.58	20.28	21.58	23.28	23.39	22.17	20.32	18.48	16.06	14.51
6	10.06	08.52	07.21 16.48-17.15/27	06.34	04.53	03.27	03.28	04.54	06.25	07.48 17.23-17.52/29	08.21	09.49
	15.03	16.35	18.01	20.31	22.01	23.30	23.37	22.13	20.28	18.45	16.03	14.50
7	10.05	08.49	07.18 16.47-17.15/28	06.31	04.49	03.25	03.30	04.57	06.27	07.51 17.24-17.51/27	08.24	09.51
	15.05	16.38	18.04	20.34	22.04	23.32	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14 16.45-17.15/30	06.27	04.46	03.23	03.32	05.00	06.30	07.54 17.24-17.50/26	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.34	23.34	22.07	20.21	18.38	15.57	14.47
9	10.02	08.43	07.11 16.45-17.16/31	06.24	04.43	03.21	03.34	05.03	06.33	07.57 17.25-17.48/23	08.30	09.55
	15.10	16.44	18.10	20.39	22.10	23.36	23.32	22.04	20.18	18.34	15.54	14.46
10	10.00	08.40	07.08 16.44-17.16/32	06.20	04.40	03.20	03.37	05.06	06.36	08.00 17.27-17.46/19	08.33	09.57
	15.13	16.47	18.13	20.42	22.13	23.38	23.29	22.00	20.15	18.31	15.51	14.45
11	09.58	08.37	07.04 16.44-17.16/32	06.17	04.37	03.18	03.39	05.09	06.39	08.03 17.29-17.43/14	08.36	09.59
	15.15	16.50	18.16	20.45	22.16	23.40	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.34	07.01 16.43-17.15/32	06.14	04.33	03.17	03.42	05.12	06.41	08.06 17.33-17.38/5	08.40	10.01
	15.18	16.54	18.18	20.48	22.19	23.41	23.25	21.54	20.08	18.24	15.45	14.43
13	09.55	08.31	06.57 16.44-17.15/31	06.10	04.30	03.16	03.44	05.15	06.44	08.08	08.43	10.03
	15.21	16.57	18.21	20.51	22.22	23.43	23.23	21.50	20.04	18.21	15.42	14.42
14	09.53	08.27	06.54 16.43-17.14/31	06.07	04.27	03.15	03.47	05.18	06.47	08.11	08.46	10.04
	15.23	17.00	18.24	20.54	22.25	23.44	23.20	21.47	20.01	18.17	15.40	14.42
15	09.51	08.24	06.50 16.44-17.14/30	06.03	04.24	03.14	03.49	05.21	06.50	08.14	08.49	10.06
	15.26	17.03	18.27	20.57	22.29	23.45	23.18	21.44	19.57	18.14	15.37	14.41
16	09.48	08.21	06.47 16.44-17.13/29	06.00	04.21	03.13	03.52	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.32	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44 16.45-17.12/27	05.56	04.18	03.12	03.55	05.27	06.55	08.20	08.55	10.09
	15.32	17.09	18.33	21.03	22.35	23.47	23.13	21.37	19.50	18.07	15.31	14.40
18	09.44	08.15	06.40 16.46-17.10/24	05.53	04.15	03.12	03.58	05.30	06.58	08.23	08.58	10.10
	15.35	17.12	18.36	21.06	22.38	23.48	23.10	21.34	19.47	18.04	15.29	14.40
19	09.42	08.11	06.37 16.47-17.09/22	05.49	04.12	03.11	04.00	05.33	07.01	08.26	09.01	10.11
	15.38	17.16	18.39	21.09	22.41	23.49	23.07	21.30	19.43	18.01	15.26	14.40
20	09.39	08.08	06.33 16.49-17.06/17	05.46	04.09	03.11	04.03	05.36	07.04	08.29	09.04	10.12
	15.41	17.19	18.42	21.12	22.44	23.49	23.05	21.27	19.40	17.57	15.23	14.40
21	09.37	08.05	06.30 16.52-17.03/11	05.43	04.06	03.11	04.06	05.39	07.06	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.47	23.50	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.03	03.11	04.09	05.42	07.09 17.38-17.47/9	08.35	09.10	10.13
	15.47	17.25	18.47	21.18	22.50	23.50	22.59	21.20	19.33	17.51	15.18	14.41
23	09.32	07.58	06.23	05.36	04.00	03.12	04.12	05.45	07.12 17.34-17.50/16	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.53	23.50	22.56	21.17	19.29	17.47	15.16	14.42
24	09.29	07.55	06.19	05.32	03.58	03.12	04.15	05.48	07.15 17.31-17.52/21	08.41	09.16	10.14
	15.53	17.31	18.53	21.24	22.56	23.50	22.53	21.13	19.26	17.44	15.13	14.42
25	09.27	07.51	06.16	05.29	03.55	03.13	04.18	05.50	07.18 17.29-17.53/24	07.44	09.19	10.14
	15.56	17.34	18.56	21.27	22.59	23.49	22.51	21.10	19.22	16.41	15.11	14.43
26	09.24	07.48	06.12	05.26	03.52	03.13	04.21	05.53	07.20 17.28-17.54/26	07.47	09.22	10.14
	15.59	17.37	18.59	21.30	23.01	23.49	22.48	21.06	19.19	16.38	15.09	14.44
27	09.21	07.45	06.09	05.22	03.50	03.14	04.24	05.56	07.23 17.26-17.55/29	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.04	23.48	22.45	21.03	19.16	16.34	15.07	14.45
28	09.18	07.41	06.05	05.19	03.47	03.15	04.27	05.59	07.26 17.26-17.55/29	07.53	09.28	10.14
	16.06	17.43	19.05	21.36	23.07	23.48	22.42	20.59	19.12	16.31	15.04	14.46
29	09.16		07.02	05.16	03.44	03.16	04.30	06.02	07.29 17.24-17.54/30	07.56	09.31	10.13
	16.09		20.08	21.39	23.10	23.47	22.39	20.56	19.09	16.28	15.02	14.48
30	09.13		06.59	05.12	03.42	03.18	04.33	06.05	07.31 17.23-17.55/32	07.59	09.33	10.13
	16.12		20.10	21.42	23.13	23.46	22.35	20.53	19.05	16.25	15.00	14.49
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.15		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	178	241	363	449	563	611	599	504	392	307	203	146
Sum of minutes with flicker	0	0	506	0	0	0	0	0	216	300	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 9 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1287)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January		February		March		April	May	June
1	10.12		09.07	13.55-14.06/11	07.38	16.04-16.40/36	06.52	05.09	03.37
	14.53		16.18		17.46		20.16	21.45	23.18
2	10.11		09.04	13.59-14.02/3	07.35	16.04-16.41/37	06.48	05.06	03.35
	14.55		16.22		17.49		20.19	21.48	23.20
3	10.10		09.01		07.31	16.02-16.41/39	06.45	05.02	03.33
	14.57		16.25		17.52		20.22	21.51	23.23
4	10.09		08.58		07.28	16.02-16.43/41	06.41	04.59	03.31
	14.59		16.28		17.55		20.25	21.54	23.25
5	10.07		08.55		07.25	16.00-16.43/43	06.38	04.56	03.28
	15.01		16.31		17.58		20.28	21.58	23.28
6	10.06		08.52		07.21	16.00-16.44/44	06.34	04.53	03.27
	15.03		16.35		18.01		20.31	22.01	23.30
7	10.05		08.49		07.18	15.59-16.43/44	06.31	04.49	03.25
	15.05		16.38		18.04		20.33	22.04	23.32
8	10.03		08.46		07.14	15.58-16.43/45	06.27	04.46	03.23
	15.08		16.41		18.07		20.36	22.07	23.34
9	10.02	13.47-13.52/5	08.43		07.11	15.58-16.43/45	06.24	04.43	03.21
	15.10		16.44		18.10		20.39	22.10	23.36
10	10.00	13.47-13.57/10	08.40		07.08	15.57-16.43/46	06.20	04.40	03.20
	15.13		16.47		18.13		20.42	22.13	23.38
11	09.58	13.46-14.01/15	08.37		07.04	15.58-16.43/45	06.17	04.37	03.18
	15.15		16.50		18.16		20.45	22.16	23.40
12	09.56	13.46-14.03/17	08.34		07.01	15.57-16.42/45	06.13	04.33	03.17
	15.18		16.54		18.18		20.48	22.19	23.41
13	09.55	13.46-14.05/19	08.31		06.57	15.58-16.42/44	06.10	04.30	03.16
	15.21		16.57		18.21		20.51	22.22	23.43
14	09.53	13.46-14.05/19	08.27		06.54	15.57-16.41/44	06.07	04.27	03.15
	15.23		17.00		18.24		20.54	22.25	23.44
15	09.50	13.46-14.07/21	08.24		06.50	15.58-16.41/43	06.03	04.24	03.14
	15.26		17.03		18.27		20.57	22.29	23.45
16	09.48	13.46-14.07/21	08.21		06.47	15.58-16.39/41	06.00	04.21	03.13
	15.29		17.06		18.30		21.00	22.32	23.46
17	09.46	13.45-14.07/22	08.18		06.43	15.59-16.39/40	05.56	04.18	03.12
	15.32		17.09		18.33		21.03	22.35	23.47
18	09.44	13.46-14.09/23	08.14		06.40	16.00-16.37/37	05.53	04.15	03.12
	15.35		17.12		18.36		21.06	22.38	23.48
19	09.42	13.46-14.09/23	08.11		06.37	16.01-16.36/35	05.49	04.12	03.11
	15.38		17.15		18.39		21.09	22.41	23.49
20	09.39	13.45-14.09/24	08.08		06.33	16.02-16.34/32	05.46	04.09	03.11
	15.41		17.19		18.42		21.12	22.44	23.49
21	09.37	13.46-14.10/24	08.05		06.30	16.04-16.32/28	05.43	04.06	03.11
	15.44		17.22		18.44		21.15	22.47	23.50
22	09.34	13.46-14.10/24	08.01		06.26	16.06-16.29/23	05.39	04.03	03.11
	15.47		17.25		18.47		21.18	22.50	23.50
23	09.32	13.46-14.10/24	07.58		06.23	16.10-16.26/16	05.36	04.00	03.12
	15.50		17.28		18.50		21.21	22.53	23.50
24	09.29	13.47-14.11/24	07.55	16.17-16.29/12	06.19	16.15-16.19/4	05.32	03.58	03.12
	15.53		17.31		18.53		21.24	22.56	23.50
25	09.27	13.47-14.10/23	07.51	16.13-16.33/20	06.16		05.29	03.55	03.13
	15.56		17.34		18.56		21.27	22.59	23.49
26	09.24	13.48-14.11/23	07.48	16.10-16.35/25	06.12		05.26	03.52	03.13
	15.59		17.37		18.59		21.30	23.01	23.49
27	09.21	13.48-14.10/22	07.45	16.07-16.37/30	06.09		05.22	03.50	03.14
	16.03		17.40		19.02		21.33	23.04	23.48
28	09.18	13.49-14.10/21	07.41	16.06-16.39/33	06.05		05.19	03.47	03.15
	16.06		17.43		19.05		21.36	23.07	23.48
29	09.16	13.50-14.10/20			07.02		05.16	03.44	03.16
	16.09				20.07		21.39	23.10	23.47
30	09.13	13.51-14.09/18			06.58		05.12	03.42	03.18
	16.12				20.10		21.42	23.13	23.46
31	09.10	13.52-14.07/15			06.55			03.40	
	16.15				20.13			23.15	
Potential sun hours	178		241		363		449	563	611
Sum of minutes with flicker	457		134		897		0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski) WTG: 9 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1287)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	July	August	September		October		November		December	
1	03.19	04.39	06.10		07.34	16.37-17.21/44	08.05		09.36	13.29-13.44/15
	23.45	22.29	20.46		19.02		16.18		14.58	
2	03.21	04.42	06.13		07.37	16.36-17.21/45	08.08		09.39	13.30-13.40/10
	23.43	22.26	20.42		18.58		16.15		14.57	
3	03.22	04.45	06.16		07.40	16.36-17.21/45	08.11		09.41	13.32-13.37/5
	23.42	22.23	20.39		18.55		16.12		14.55	
4	03.24	04.48	06.19		07.43	16.36-17.21/45	08.15		09.44	
	23.41	22.20	20.35		18.51		16.09		14.53	
5	03.26	04.51	06.22		07.46	16.36-17.20/44	08.18		09.46	
	23.39	22.16	20.32		18.48		16.06		14.51	
6	03.28	04.54	06.25		07.48	16.36-17.20/44	08.21		09.49	
	23.37	22.13	20.28		18.45		16.03		14.50	
7	03.30	04.57	06.27		07.51	16.36-17.19/43	08.24		09.51	
	23.35	22.10	20.25		18.41		16.00		14.48	
8	03.32	05.00	06.30		07.54	16.36-17.19/43	08.27		09.53	
	23.34	22.07	20.21		18.38		15.57		14.47	
9	03.34	05.03	06.33		07.57	16.36-17.18/42	08.30	13.29-13.33/4	09.55	
	23.32	22.04	20.18		18.34		15.54		14.46	
10	03.37	05.06	06.36		08.00	16.36-17.17/41	08.33	13.26-13.37/11	09.57	
	23.29	22.00	20.14		18.31		15.51		14.45	
11	03.39	05.09	06.39		08.03	16.37-17.16/39	08.36	13.24-13.39/15	09.59	
	23.27	21.57	20.11		18.27		15.48		14.44	
12	03.42	05.12	06.41		08.06	16.38-17.14/36	08.40	13.23-13.41/18	10.01	
	23.25	21.54	20.08		18.24		15.45		14.43	
13	03.44	05.15	06.44		08.08	16.38-17.13/35	08.43	13.22-13.42/20	10.03	
	23.23	21.50	20.04		18.21		15.42		14.42	
14	03.47	05.18	06.47		08.11	16.40-17.11/31	08.46	13.22-13.43/21	10.04	
	23.20	21.47	20.01		18.17		15.40		14.42	
15	03.49	05.21	06.50		08.14	16.41-17.09/28	08.49	13.21-13.43/22	10.06	
	23.18	21.44	19.57		18.14		15.37		14.41	
16	03.52	05.24	06.53		08.17	16.43-17.06/23	08.52	13.21-13.44/23	10.07	
	23.15	21.40	19.54		18.11		15.34		14.41	
17	03.55	05.27	06.55		08.20	16.46-17.03/17	08.55	13.21-13.44/23	10.08	
	23.13	21.37	19.50		18.07		15.31		14.40	
18	03.58	05.30	06.58		08.23	16.51-16.58/7	08.58	13.21-13.45/24	10.10	
	23.10	21.34	19.47		18.04		15.29		14.40	
19	04.00	05.33	07.01		08.26		09.01	13.21-13.45/24	10.11	
	23.07	21.30	19.43		18.01		15.26		14.40	
20	04.03	05.36	07.04	16.56-17.11/15	08.29		09.04	13.21-13.45/24	10.11	
	23.05	21.27	19.40		17.57		15.23		14.40	
21	04.06	05.39	07.06	16.52-17.14/22	08.32		09.07	13.21-13.45/24	10.12	
	23.02	21.23	19.36		17.54		15.21		14.41	
22	04.09	05.42	07.09	16.50-17.17/27	08.35		09.10	13.21-13.45/24	10.13	
	22.59	21.20	19.33		17.51		15.18		14.41	
23	04.12	05.45	07.12	16.46-17.17/31	08.38		09.13	13.23-13.46/23	10.13	
	22.56	21.17	19.29		17.47		15.16		14.42	
24	04.15	05.47	07.15	16.45-17.19/34	08.41		09.16	13.23-13.46/23	10.14	
	22.53	21.13	19.26		17.44		15.13		14.42	
25	04.18	05.50	07.17	16.43-17.20/37	07.44		09.19	13.23-13.46/23	10.14	
	22.50	21.10	19.22		16.41		15.11		14.43	
26	04.21	05.53	07.20	16.42-17.20/38	07.47		09.22	13.24-13.45/21	10.14	
	22.48	21.06	19.19		16.38		15.09		14.44	
27	04.24	05.56	07.23	16.41-17.21/40	07.50		09.25	13.25-13.46/21	10.14	
	22.45	21.03	19.15		16.34		15.07		14.45	
28	04.27	05.59	07.26	16.40-17.21/41	07.53		09.28	13.26-13.45/19	10.14	
	22.42	20.59	19.12		16.31		15.04		14.46	
29	04.30	06.02	07.29	16.38-17.21/43	07.56		09.31	13.26-13.45/19	10.13	
	22.38	20.56	19.09		16.28		15.02		14.48	
30	04.33	06.05	07.31	16.37-17.21/44	07.59		09.33	13.27-13.44/17	10.13	
	22.35	20.53	19.05		16.25		15.00		14.49	
31	04.36	06.08			08.02				10.12	
	22.32	20.49			16.22				14.51	
Potential sun hours	599	504	392		307		203		146	
Sum of minutes with flicker	0	0	372		652		443		30	

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
Purmon tuulivoimahanke

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 10 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1288)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.12	09.07	07.38	06.52	05.09 05.47-06.22/35	03.37	03.19	04.39 05.55-06.26/31	06.11	07.34	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.18	23.45	22.29	20.46	19.02	16.19	14.59
2	10.11	09.04	07.35	06.48	05.06 05.46-06.22/36	03.35	03.21	04.42 05.54-06.27/33	06.13	07.37	08.08	09.39
	14.55	16.22	17.49	20.19	21.48	23.20	23.44	22.26	20.42	18.58	16.15	14.57
3	10.10	09.01	07.31	06.45	05.03 05.45-06.22/37	03.33	03.22	04.45 05.54-06.29/35	06.16	07.40	08.12	09.41
	14.57	16.25	17.52	20.22	21.51	23.23	23.42	22.23	20.39	18.55	16.12	14.55
4	10.09	08.58	07.28	06.41	04.59 05.45-06.22/37	03.31	03.24	04.48 05.54-06.29/35	06.19	07.43	08.15	09.44
	14.59	16.28	17.55	20.25	21.55	23.25	23.41	22.20	20.35	18.52	16.09	14.53
5	10.08	08.55	07.25	06.38	04.56 05.45-06.22/37	03.29	03.26	04.51 05.54-06.30/36	06.22	07.46	08.18	09.46
	15.01	16.31	17.58	20.28	21.58	23.28	23.39	22.17	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53 05.45-06.22/37	03.27	03.28	04.54 05.54-06.31/37	06.25	07.48	08.21	09.49
	15.03	16.35	18.01	20.31	22.01	23.30	23.37	22.13	20.28	18.45	16.03	14.50
7	10.05	08.49	07.18	06.31	04.49 05.44-06.21/37	03.25	03.30	04.57 05.54-06.31/37	06.28	07.51	08.24	09.51
	15.05	16.38	18.04	20.34	22.04	23.32	23.36	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.46 05.44-06.20/36	03.23	03.32	05.00 05.54-06.32/38	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.37	22.07	23.34	23.34	22.07	20.22	18.38	15.57	14.47
9	10.02	08.43	07.11	06.24	04.43 05.44-06.19/35	03.21	03.35	05.03 05.54-06.31/37	06.33	07.57	08.30	09.55
	15.10	16.44	18.10	20.39	22.10	23.36	23.32	22.04	20.18	18.34	15.54	14.46
10	10.00	08.40	07.08	06.21	04.40 05.45-06.18/33	03.20	03.37	05.06 05.55-06.31/36	06.36	08.00	08.33	09.57
	15.13	16.47	18.13	20.42	22.13	23.38	23.30	22.00	20.15	18.31	15.51	14.45
11	09.58	08.37	07.04	06.17	04.37 05.44-06.17/33	03.18	03.39	05.09 05.56-06.32/36	06.39	08.03	08.37	09.59
	15.15	16.51	18.16	20.45	22.16	23.40	23.27	21.57	20.11	18.28	15.48	14.44
12	09.57	08.34	07.01	06.14	04.34 05.44-06.15/31	03.17	03.42	05.12 05.56-06.31/35	06.42	08.06	08.40	10.01
	15.18	16.54	18.19	20.48	22.19	23.41	23.25	21.54	20.08	18.24	15.45	14.43
13	09.55	08.31	06.57	06.10	04.30 05.45-06.12/27	03.16	03.44	05.15 05.58-06.31/33	06.44	08.09	08.43	10.03
	15.21	16.57	18.22	20.51	22.22	23.43	23.23	21.50	20.04	18.21	15.43	14.42
14	09.53	08.27	06.54	06.07	04.27 05.46-06.07/21	03.15	03.47	05.18 06.01-06.30/29	06.47	08.11	08.46	10.04
	15.23	17.00	18.24	20.54	22.26	23.44	23.20	21.47	20.01	18.17	15.40	14.42
15	09.51	08.24	06.50	06.03	04.24 05.47-06.07/20	03.14	03.49	05.21 06.03-06.29/26	06.50	08.14	08.49	10.06
	15.26	17.03	18.27	20.57	22.29	23.45	23.18	21.44	19.57	18.14	15.37	14.41
16	09.48	08.21	06.47	06.00	04.21 05.47-06.06/19	03.13	03.52	05.24 06.08-06.28/20	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.32	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.56	04.18 05.49-06.05/16	03.12	03.55	05.27 06.09-06.27/18	06.55	08.20	08.55	10.09
	15.32	17.09	18.33	21.03	22.35	23.47	23.13	21.37	19.50	18.07	15.31	14.41
18	09.44	08.15	06.40	05.53	04.15 05.49-06.03/14	03.12	03.58	05.30 06.11-06.25/14	06.58	08.23	08.58	10.10
	15.35	17.13	18.36	21.06	22.38	23.48	23.10	21.34	19.47	18.04	15.29	14.40
19	09.42	08.11	06.37	05.50	04.12 05.51-06.02/11	03.12	04.00	05.33 06.14-06.23/9	07.01	08.26	09.01	10.11
	15.38	17.16	18.39	21.09	22.41	23.49	23.08	21.30	19.43	18.01	15.26	14.40
20	09.39	08.08	06.33	05.46	04.09 05.54-05.59/5	03.11	04.03	05.36 06.17-06.18/1	07.04	08.29	09.04	10.12
	15.41	17.19	18.42	21.12	22.44	23.49	23.05	21.27	19.40	17.57	15.24	14.41
21	09.37	08.05	06.30	05.43	04.06	03.11	04.06	05.39	07.07	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.47	23.50	23.02	21.24	19.36	17.54	15.21	14.41
22	09.34	08.02	06.26	05.39	04.03	03.11	04.09	05.42	07.09	08.35	09.11	10.13
	15.47	17.25	18.47	21.18	22.50	23.50	22.59	21.20	19.33	17.51	15.18	14.41
23	09.32	07.58	06.23	05.36 06.11-06.15/4	04.01	03.12	04.12	05.45	07.12	08.38	09.14	10.13
	15.50	17.28	18.50	21.21	22.53	23.50	22.56	21.17	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33 06.07-06.17/10	03.58	03.12	04.15 06.03-06.11/8	05.48	07.15	08.41	09.16	10.14
	15.53	17.31	18.53	21.24	22.56	23.50	22.54	21.13	19.26	17.44	15.14	14.42
25	09.27	07.52	06.16	05.29 06.04-06.19/15	03.55	03.13	04.18 06.00-06.12/12	05.51	07.18	07.44	09.19	10.14
	15.56	17.34	18.56	21.27	22.59	23.50	22.51	21.10	19.23	16.41	15.11	14.43
26	09.24	07.48	06.12	05.26 06.01-06.20/19	03.52	03.13	04.21 06.00-06.15/15	05.53	07.20	07.47	09.22	10.14
	16.00	17.37	18.59	21.30	23.01	23.49	22.48	21.06	19.19	16.38	15.09	14.44
27	09.21	07.45	06.09	05.22 06.00-06.21/21	03.50	03.14	04.24 05.58-06.15/17	05.56	07.23	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.04	23.49	22.45	21.03	19.16	16.35	15.07	14.45
28	09.19	07.42	06.06	05.19 05.55-06.22/27	03.47	03.15	04.27 05.58-06.17/19	05.59	07.26	07.53	09.28	10.14
	16.06	17.43	19.05	21.36	23.07	23.48	22.42	21.00	19.12	16.31	15.05	14.46
29	09.16		07.02	05.16 05.52-06.22/30	03.45	03.16	04.30 05.56-06.17/21	06.02	07.29	07.56	09.31	10.13
	16.09		20.08	21.39	23.10	23.47	22.39	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.12 05.49-06.22/33	03.42	03.18	04.33 05.56-06.18/22	06.05	07.32	07.59	09.34	10.13
	16.12		20.10	21.42	23.13	23.46	22.36	20.53	19.05	16.25	15.01	14.49
31	09.10		06.55		03.40		04.36 05.55-06.24/29	06.08		08.02		10.12
	16.15		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	178	241	363	449	563	611	599	504	392	307	203	146
Sum of minutes with flicker	0	0	0	159	557	0	143	576	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi

Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 11 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1289)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.12	09.07	07.38	06.52	05.09	03.37	03.19	04.39	06.11	07.34	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.18	23.45	22.29	20.46	19.02	16.19	14.59
2	10.11	09.04	07.35	06.48	05.06	03.35	03.21	04.42	06.13	07.37	08.08	09.39
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.15	14.57
3	10.10	09.01	07.31	06.45	05.03	03.33	03.22	04.45	06.16	07.40	08.12	09.41
	14.57	16.25	17.52	20.22	21.51	23.23	23.42	22.23	20.39	18.55	16.12	14.55
4	10.09	08.58	07.28	06.41	04.59	03.31	03.24	04.48	06.19	07.43	08.15	09.44
	14.59	16.28	17.55	20.25	21.54	23.25	23.41	22.20	20.35	18.51	16.09	14.53
5	10.07	08.55	07.25	06.38	04.56	03.29	03.26	04.51	06.22	07.46	08.18	09.46
	15.01	16.31	17.58	20.28	21.58	23.27	23.39	22.17	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27	03.28	04.54	06.25	07.48	08.21	09.49
	15.03	16.35	18.01	20.31	22.01	23.30	23.37	22.13	20.28	18.45	16.03	14.50
7	10.05	08.49	07.18	06.31	04.49	03.25	03.30	04.57	06.28	07.51	08.24	09.51
	15.05	16.38	18.04	20.34	22.04	23.32	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.46	03.23	03.32	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.34	23.34	22.07	20.22	18.38	15.57	14.47
9	10.02	08.43	07.11	06.24	04.43	03.21	03.35	05.03	06.33	07.57	08.30	09.55
	15.10	16.44	18.10	20.39	22.10	23.36	23.32	22.04	20.18	18.34	15.54	14.46
10	10.00	08.40	07.08	06.20	04.40	03.20	03.37	05.06	06.36	08.00	08.33	09.57
	15.13	16.47	18.13	20.42	22.13	23.38	23.29	22.00	20.15	18.31	15.51	14.45
11	09.58	08.37	07.04	06.17	04.37	03.18	03.39	05.09	06.39	08.03	08.36	09.59
	15.15	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.34	07.01	06.14	04.34	03.17	03.42	05.12	06.41	08.06	08.40	10.01
	15.18	16.54	18.19	20.48	22.19	23.41	23.25	21.54	20.08	18.24	15.45	14.43
13	09.55	08.31	06.57	06.10	04.30	03.16	03.44	05.15	06.44	08.08	08.43	10.03
	15.21	16.57	18.21	20.51	22.22	23.43	23.23	21.50	20.04	18.21	15.43	14.42
14	09.53	08.27	06.54	06.07	04.27	03.15	03.47	05.18	06.47	08.11	08.46	10.04
	15.23	17.00	18.24	20.54	22.25	23.44	23.20	21.47	20.01	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.24	03.14	03.50	05.21	06.50	08.14	08.49	10.06
	15.26	17.03	18.27	20.57	22.29	23.45	23.18	21.44	19.57	18.14	15.37	14.41
16	09.48	08.21	06.47	06.00	04.21	03.13	03.52	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.32	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.03	22.35	23.47	23.13	21.37	19.50	18.07	15.31	14.41
18	09.44	08.15	06.40	05.53	04.15	03.12	03.58	05.30	06.58	08.23	08.58	10.10
	15.35	17.13	18.36	21.06	22.38	23.48	23.10	21.34	19.47	18.04	15.29	14.40
19	09.42	08.11	06.37	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.11
	15.38	17.16	18.39	21.09	22.41	23.49	23.07	21.30	19.43	18.01	15.26	14.40
20	09.39	08.08	06.33	05.46	04.09	03.11	04.03	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.44	23.49	23.05	21.27	19.40	17.57	15.24	14.41
21	09.37	08.05	06.30	05.43	04.06	03.11	04.06	05.39	07.06	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.47	23.50	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.03	03.12	04.09	05.42	07.09	08.35	09.10	10.13
	15.47	17.25	18.47	21.18	22.50	23.50	22.59	21.20	19.33	17.51	15.18	14.41
23	09.32	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.53	23.50	22.56	21.17	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.12	04.15	05.48	07.15	08.41	09.16	10.14
	15.53	17.31	18.53	21.24	22.56	23.50	22.53	21.13	19.26	17.44	15.14	14.42
25	09.27	07.52	06.16	05.29	03.55	03.13	04.18	05.50	07.18	07.44	09.19	10.14
	15.56	17.34	18.56	21.27	22.59	23.49	22.50	21.10	19.22	16.41	15.11	14.43
26	09.24	07.48	06.12	05.26	03.52	03.13	04.21	05.53	07.20	07.47	09.22	10.14
	16.00	17.37	18.59	21.30	23.01	23.49	22.48	21.06	19.19	16.38	15.09	14.44
27	09.21	07.45	06.09	05.22	03.50	03.14	04.24	05.56	07.23	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.04	23.48	22.45	21.03	19.16	16.35	15.07	14.45
28	09.18	07.41	06.05	05.19	03.47	03.15	04.27	05.59	07.26	07.53	09.28	10.14
	16.06	17.43	19.05	21.36	23.07	23.48	22.42	21.00	19.12	16.31	15.05	14.47
29	09.16		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.31	10.13
	16.09		20.08	21.39	23.10	23.47	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.12	03.42	03.18	04.33	06.05	07.32	07.59	09.33	10.13
	16.12		20.10	21.42	23.12	23.46	22.35	20.53	19.05	16.25	15.01	14.49
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.15		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	178	241	363	449	563	611	599	504	392	307	203	146
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 12 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1290)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.37	03.19	04.39	06.11	07.34	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.18	23.44	22.29	20.46	19.02	16.19	14.59
2	10.11	09.04	07.35	06.48	05.06	03.35	03.21	04.42	06.13	07.37	08.08	09.39
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.15	14.57
3	10.10	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.23	23.42	22.23	20.39	18.55	16.12	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.24	04.48	06.19	07.43	08.15	09.44
	14.59	16.28	17.55	20.25	21.54	23.25	23.40	22.20	20.35	18.51	16.09	14.53
5	10.07	08.55	07.25	06.38	04.56	03.29	03.26	04.51	06.22	07.46	08.18	09.46
	15.01	16.31	17.58	20.28	21.57	23.27	23.39	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27	03.28	04.54	06.25	07.48	08.21	09.49
	15.03	16.35	18.01	20.31	22.01	23.30	23.37	22.13	20.28	18.45	16.03	14.50
7	10.05	08.49	07.18	06.31	04.49	03.25	03.30	04.57	06.28	07.51	08.24	09.51
	15.05	16.38	18.04	20.34	22.04	23.32	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.46	03.23	03.32	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.34	23.33	22.07	20.21	18.38	15.57	14.47
9	10.02	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.55
	15.10	16.44	18.10	20.39	22.10	23.36	23.31	22.03	20.18	18.34	15.54	14.46
10	10.00	08.40	07.08	06.20	04.40	03.20	03.37	05.06	06.36	08.00	08.33	09.57
	15.13	16.47	18.13	20.42	22.13	23.38	23.29	22.00	20.15	18.31	15.51	14.45
11	09.58	08.37	07.04	06.17	04.37	03.19	03.39	05.09	06.39	08.03	08.36	09.59
	15.15	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.34	07.01	06.14	04.34	03.17	03.42	05.12	06.41	08.06	08.39	10.01
	15.18	16.54	18.19	20.48	22.19	23.41	23.25	21.54	20.08	18.24	15.45	14.43
13	09.54	08.30	06.57	06.10	04.30	03.16	03.44	05.15	06.44	08.08	08.43	10.03
	15.21	16.57	18.21	20.51	22.22	23.42	23.23	21.50	20.04	18.21	15.43	14.42
14	09.52	08.27	06.54	06.07	04.27	03.15	03.47	05.18	06.47	08.11	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.44	23.20	21.47	20.01	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.24	03.14	03.50	05.21	06.50	08.14	08.49	10.06
	15.26	17.03	18.27	20.57	22.28	23.45	23.18	21.44	19.57	18.14	15.37	14.41
16	09.48	08.21	06.47	06.00	04.21	03.13	03.52	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.31	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.03	22.35	23.47	23.13	21.37	19.50	18.07	15.31	14.41
18	09.44	08.14	06.40	05.53	04.15	03.12	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.38	23.48	23.10	21.34	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.41	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.09	03.12	04.03	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.44	23.49	23.05	21.27	19.40	17.57	15.24	14.41
21	09.37	08.05	06.30	05.43	04.06	03.12	04.06	05.39	07.06	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.47	23.49	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.03	03.12	04.09	05.42	07.09	08.35	09.10	10.13
	15.47	17.25	18.47	21.18	22.50	23.50	22.59	21.20	19.33	17.51	15.19	14.41
23	09.32	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.53	23.50	22.56	21.17	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.12	04.15	05.48	07.15	08.41	09.16	10.13
	15.53	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.55	03.13	04.18	05.50	07.18	07.44	09.19	10.14
	15.56	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.22	16.41	15.11	14.43
26	09.24	07.48	06.12	05.26	03.52	03.14	04.21	05.53	07.20	07.47	09.22	10.14
	16.00	17.37	18.59	21.30	23.01	23.49	22.47	21.06	19.19	16.38	15.09	14.44
27	09.21	07.45	06.09	05.22	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.16	16.35	15.07	14.45
28	09.18	07.41	06.05	05.19	03.47	03.16	04.27	05.59	07.26	07.53	09.28	10.14
	16.06	17.43	19.05	21.36	23.07	23.47	22.41	20.59	19.12	16.31	15.05	14.47
29	09.16		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.31	10.13
	16.09		20.08	21.39	23.10	23.47	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.12	03.42	03.18	04.33	06.05	07.31	07.59	09.33	10.13
	16.12		20.10	21.42	23.12	23.46	22.35	20.53	19.05	16.25	15.01	14.49
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.15		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	178	241	363	448	562	611	599	504	392	307	203	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 13 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1291)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.19	04.39	06.11	07.34 08.15-08.37/22	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.18	23.45	22.29	20.46	19.02	16.19	14.59
2	10.11	09.04	07.35	06.48	05.06	03.35	03.21	04.42	06.13	07.37 08.16-08.36/20	08.08	09.39
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.16	14.57
3	10.10	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40 08.16-08.35/19	08.12	09.41
	14.57	16.25	17.52	20.22	21.51	23.23	23.42	22.23	20.39	18.55	16.12	14.55
4	10.09	08.58	07.28	06.41	04.59	03.31	03.24	04.48	06.19	07.43 08.19-08.33/14	08.15	09.44
	14.59	16.28	17.55	20.25	21.54	23.25	23.40	22.20	20.35	18.52	16.09	14.53
5	10.07	08.55	07.25	06.38	04.56	03.29	03.26	04.51	06.22	07.46 08.22-08.31/9	08.18	09.46
	15.01	16.32	17.58	20.28	21.58	23.27	23.39	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27	03.28	04.54	06.25	07.48	08.21	09.49
	15.03	16.35	18.01	20.31	22.01	23.30	23.37	22.13	20.28	18.45	16.03	14.50
7	10.05	08.49	07.18	06.31	04.50	03.25	03.30	04.57	06.28	07.51	08.24	09.51
	15.06	16.38	18.04	20.34	22.04	23.32	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14 07.47-07.53/6	06.27	04.46	03.23	03.32	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.34	23.33	22.07	20.22	18.38	15.57	14.47
9	10.02	08.43	07.11 07.43-07.55/12	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.55
	15.10	16.44	18.10	20.39	22.10	23.36	23.31	22.04	20.18	18.34	15.54	14.46
10	10.00	08.40	07.08 07.40-07.57/17	06.21	04.40	03.20	03.37	05.06	06.36	08.00	08.33	09.57
	15.13	16.47	18.13	20.42	22.13	23.38	23.29	22.00	20.15	18.31	15.51	14.45
11	09.58	08.37	07.04 07.38-07.57/19	06.17	04.37	03.19	03.39	05.09	06.39	08.03	08.36	09.59
	15.15	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.34	07.01 07.37-07.58/21	06.14	04.34	03.17	03.42	05.12	06.42	08.06	08.40	10.01
	15.18	16.54	18.19	20.48	22.19	23.41	23.25	21.54	20.08	18.24	15.45	14.43
13	09.54	08.31	06.57 07.36-07.58/22	06.10	04.30	03.16	03.44	05.15	06.44	08.08	08.43	10.03
	15.21	16.57	18.21	20.51	22.22	23.42	23.23	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54 07.36-07.59/23	06.07	04.27	03.15	03.47	05.18	06.47	08.11	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.44	23.20	21.47	20.01	18.18	15.40	14.42
15	09.50	08.24	06.50 07.35-07.58/23	06.03	04.24	03.14	03.50	05.21	06.50	08.14	08.49	10.06
	15.26	17.03	18.27	20.57	22.28	23.45	23.18	21.44	19.57	18.14	15.37	14.41
16	09.48	08.21	06.47 07.35-07.58/23	06.00	04.21	03.13	03.52	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.32	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44 07.35-07.57/22	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.03	22.35	23.47	23.13	21.37	19.50	18.07	15.32	14.41
18	09.44	08.15	06.40 07.36-07.57/21	05.53	04.15	03.12	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.38	23.48	23.10	21.34	19.47	18.04	15.29	14.41
19	09.42	08.11	06.37 07.36-07.55/19	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.41	23.49	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33 07.37-07.54/17	05.46	04.09	03.12	04.03	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.44	23.49	23.05	21.27	19.40	17.57	15.24	14.41
21	09.37	08.05	06.30 07.38-07.51/13	05.43	04.06	03.12	04.06	05.39	07.06 08.28-08.32/4	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.47	23.49	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26 07.41-07.48/7	05.39	04.04	03.12	04.09	05.42	07.09 08.23-08.36/13	08.35	09.10	10.13
	15.47	17.25	18.47	21.18	22.50	23.50	22.59	21.20	19.33	17.51	15.19	14.41
23	09.32	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12 08.21-08.38/17	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.53	23.50	22.56	21.17	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.12	04.15	05.48	07.15 08.20-08.39/19	08.41	09.16	10.14
	15.53	17.31	18.53	21.24	22.56	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.27	07.52	06.16	05.29	03.55	03.13	04.18	05.51	07.18 08.18-08.39/21	07.44	09.19	10.14
	15.57	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.23	16.41	15.11	14.43
26	09.24	07.48	06.12	05.26	03.53	03.14	04.21	05.53	07.20 08.17-08.39/22	07.47	09.22	10.14
	16.00	17.37	18.59	21.30	23.01	23.49	22.47	21.06	19.19	16.38	15.09	14.44
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23 08.16-08.39/23	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.16	16.35	15.07	14.45
28	09.18	07.41	06.06	05.19	03.47	03.16	04.27	05.59	07.26 08.16-08.39/23	07.53	09.28	10.14
	16.06	17.43	19.05	21.36	23.07	23.48	22.41	21.00	19.12	16.31	15.05	14.47
29	09.16		07.02	05.16	03.45	03.17	04.30	06.02	07.29 08.16-08.39/23	07.56	09.31	10.13
	16.09		20.08	21.39	23.10	23.47	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.13	03.42	03.18	04.33	06.05	07.32 08.16-08.39/23	07.59	09.33	10.13
	16.12		20.10	21.42	23.12	23.46	22.35	20.53	19.05	16.25	15.01	14.49
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	178	241	363	448	562	611	599	504	392	307	203	147
Sum of minutes with flicker	0	0	265	0	0	0	0	0	188	84	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 14 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1292)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52 19.24-19.41/17	05.09	03.37	03.19	04.39	06.11 19.18-19.39/21	07.34	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48 19.22-19.42/20	05.06	03.35	03.21	04.42	06.13 19.17-19.40/23	07.37	08.08	09.39
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.15	14.57
3	10.09	09.01	07.31	06.45 19.21-19.43/22	05.02	03.33	03.23	04.45	06.16 19.16-19.39/23	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.42	22.23	20.39	18.55	16.12	14.55
4	10.08	08.58	07.28	06.41 19.20-19.43/23	04.59	03.31	03.24	04.48	06.19 19.15-19.40/25	07.43	08.14	09.44
	14.59	16.28	17.55	20.25	21.54	23.25	23.40	22.20	20.35	18.51	16.09	14.53
5	10.07	08.55	07.25	06.38 19.19-19.43/24	04.56	03.29	03.26	04.51	06.22 19.15-19.40/25	07.45	08.18	09.46
	15.01	16.31	17.58	20.28	21.57	23.27	23.39	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34 19.19-19.44/25	04.53	03.27	03.28	04.54	06.25 19.14-19.39/25	07.48	08.21	09.48
	15.03	16.35	18.01	20.31	22.00	23.29	23.37	22.13	20.28	18.45	16.03	14.50
7	10.05	08.49	07.18	06.31 19.18-19.43/25	04.49	03.25	03.30	04.57	06.27 19.14-19.39/25	07.51	08.24	09.51
	15.05	16.38	18.04	20.33	22.04	23.32	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27 19.18-19.43/25	04.46	03.23	03.32	05.00	06.30 19.15-19.38/23	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.34	23.33	22.07	20.21	18.38	15.57	14.47
9	10.01	08.43	07.11	06.24 19.19-19.42/23	04.43	03.22	03.35	05.03	06.33 19.15-19.37/22	07.57	08.30	09.55
	15.10	16.44	18.10	20.39	22.10	23.36	23.31	22.03	20.18	18.34	15.54	14.46
10	10.00	08.40	07.07	06.20 19.18-19.41/23	04.40	03.20	03.37	05.06	06.36 19.15-19.36/21	08.00	08.33	09.57
	15.13	16.47	18.13	20.42	22.13	23.37	23.29	22.00	20.14	18.31	15.51	14.45
11	09.58	08.37	07.04	06.17 19.19-19.40/21	04.37	03.19	03.39	05.09	06.39 19.17-19.34/17	08.03	08.36	09.59
	15.15	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.34	07.01	06.14 19.20-19.39/19	04.34	03.17	03.42	05.12	06.41 19.17-19.30/13	08.05	08.39	10.01
	15.18	16.54	18.18	20.48	22.19	23.41	23.25	21.53	20.07	18.24	15.45	14.43
13	09.54	08.30	06.57	06.10 19.21-19.37/16	04.30	03.16	03.44	05.15	06.44 19.20-19.27/7	08.08	08.43	10.02
	15.21	16.57	18.21	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.42
14	09.52	08.27	06.54	06.07 19.23-19.35/12	04.27	03.15	03.47	05.18	06.47	08.11	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.44	23.20	21.47	20.01	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03 19.28-19.30/2	04.24	03.14	03.50	05.21	06.50	08.14	08.49	10.06
	15.26	17.03	18.27	20.57	22.28	23.45	23.18	21.44	19.57	18.14	15.37	14.41
16	09.48	08.21	06.47	06.00	04.21	03.13	03.52	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.31	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.43	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.03	22.34	23.47	23.12	21.37	19.50	18.07	15.31	14.41
18	09.44	08.14	06.40	05.53	04.15	03.12	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.12	18.36	21.06	22.37	23.48	23.10	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.09	03.12	04.03	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.44	23.49	23.04	21.27	19.40	17.57	15.24	14.41
21	09.37	08.05	06.30	05.43	04.06	03.12	04.06	05.39	07.06	08.32	09.07	10.12
	15.44	17.22	18.44	21.15	22.47	23.49	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.03	03.12	04.09	05.42	07.09	08.35	09.10	10.13
	15.47	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.18	14.41
23	09.32	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.52	23.49	22.56	21.16	19.29	17.47	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.12	04.15	05.48	07.15	08.41	09.16	10.13
	15.53	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.55	03.13	04.18	05.50	07.17	07.44	09.19	10.14
	15.56	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.22	16.41	15.11	14.43
26	09.24	07.48	06.12	05.26	03.52	03.14	04.21	05.53	07.20	07.47	09.22	10.14
	16.00	17.37	18.59	21.30	23.01	23.49	22.47	21.06	19.19	16.38	15.09	14.44
27	09.21	07.45	06.09	05.22	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.15	16.34	15.07	14.45
28	09.18	07.41	06.05	05.19	03.47	03.16	04.27	05.59 19.28-19.32/4	07.26	07.53	09.28	10.13
	16.06	17.43	19.05	21.36	23.07	23.47	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02 19.24-19.36/12	07.29	07.56	09.30	10.13
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.58 19.30-19.35/5	05.12	03.42	03.18	04.33	06.05 19.22-19.38/16	07.31	07.59	09.33	10.13
	16.12		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.49
31	09.10		06.55 19.26-19.38/12		03.40		04.36	06.08 19.19-19.38/19		08.02		10.12
	16.15		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	611	599	504	392	307	203	147
Sum of minutes with flicker	0	0	17	297	0	0	0	51	270	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 15 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1293)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.35	03.21	04.42	06.13	07.37	08.08	09.39
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.42	22.23	20.39	18.55	16.12	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.43	08.15	09.44
	14.59	16.28	17.55	20.25	21.54	23.25	23.40	22.20	20.35	18.51	16.09	14.53
5	10.07	08.55	07.25	06.38	04.56	03.29	03.26	04.51	06.22	07.46	08.18	09.46
	15.01	16.32	17.58	20.28	21.57	23.27	23.39	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27	03.28	04.54	06.25	07.48	08.21	09.48
	15.03	16.35	18.01	20.31	22.01	23.29	23.37	22.13	20.28	18.45	16.03	14.50
7	10.05	08.49	07.18	06.31	04.50	03.25	03.30	04.57	06.28	07.51	08.24	09.51
	15.06	16.38	18.04	20.34	22.04	23.32	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.46	03.23	03.33	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.34	23.33	22.07	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.55
	15.10	16.44	18.10	20.39	22.10	23.36	23.31	22.03	20.18	18.34	15.54	14.46
10	10.00	08.40	07.08	06.21	04.40	03.20	03.37	05.06	06.36	08.00	08.33	09.57
	15.13	16.47	18.13	20.42	22.13	23.37	23.29	22.00	20.15	18.31	15.51	14.45
11	09.58	08.37	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.03	08.36	09.59
	15.16	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.34	07.01	06.14	04.34	03.17	03.42	05.12	06.42	08.06	08.39	10.01
	15.18	16.54	18.19	20.48	22.19	23.41	23.25	21.54	20.08	18.24	15.46	14.43
13	09.54	08.30	06.57	06.10	04.31	03.16	03.45	05.15	06.44	08.08	08.43	10.02
	15.21	16.57	18.21	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.27	03.15	03.47	05.18	06.47	08.11	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.44	23.20	21.47	20.01	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.24	03.14	03.50	05.21	06.50	08.14	08.49	10.06
	15.26	17.03	18.27	20.57	22.28	23.45	23.18	21.44	19.57	18.14	15.37	14.41
16	09.48	08.21	06.47	06.00	04.21	03.14	03.52	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.31	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.03	22.34	23.47	23.12	21.37	19.50	18.07	15.32	14.41
18	09.44	08.14	06.40	05.53	04.15	03.12	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.48	23.10	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.41	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.09	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.44	23.49	23.04	21.27	19.40	17.57	15.24	14.41
21	09.37	08.05	06.30	05.43	04.06	03.12	04.06	05.39	07.06	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.47	23.49	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.04	03.12	04.09	05.42	07.09	08.35	09.10	10.13
	15.47	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.32	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.52	23.49	22.56	21.17	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.41	09.16	10.13
	15.53	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.55	03.13	04.18	05.51	07.18	07.44	09.19	10.14
	15.57	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.22	16.41	15.11	14.44
26	09.24	07.48	06.12	05.26	03.53	03.14	04.21	05.53	07.20	07.47	09.22	10.14
	16.00	17.37	18.59	21.30	23.01	23.49	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.41	06.06	05.19	03.47	03.16	04.27	05.59	07.26	07.53	09.28	10.13
	16.06	17.43	19.05	21.36	23.07	23.47	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.31	10.13
	16.09		20.08	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.13	03.42	03.18	04.33	06.05	07.32	07.59	09.33	10.13
	16.12		20.10	21.42	23.12	23.45	22.35	20.53	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	611	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 16 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1294)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.18	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.35	03.21	04.42	06.14	07.37	08.08	09.39
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.16	14.57
3	10.10	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.42	22.23	20.39	18.55	16.13	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.43	08.15	09.44
	14.59	16.28	17.55	20.25	21.54	23.25	23.40	22.20	20.35	18.52	16.09	14.54
5	10.07	08.55	07.25	06.38	04.56	03.29	03.27	04.51	06.22	07.46	08.18	09.46
	15.01	16.32	17.58	20.28	21.57	23.27	23.39	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27	03.28	04.54	06.25	07.48	08.21	09.48
	15.03	16.35	18.01	20.31	22.01	23.29	23.37	22.13	20.28	18.45	16.03	14.50
7	10.05	08.49	07.18	06.31	04.50	03.25	03.31	04.57	06.28	07.51	08.24	09.51
	15.06	16.38	18.04	20.34	22.04	23.32	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.28	04.46	03.24	03.33	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.34	23.33	22.07	20.22	18.38	15.57	14.48
9	10.02	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.55
	15.11	16.44	18.10	20.39	22.10	23.36	23.31	22.03	20.18	18.34	15.54	14.46
10	10.00	08.40	07.08	06.21	04.40	03.20	03.37	05.06	06.36	08.00	08.33	09.57
	15.13	16.48	18.13	20.42	22.13	23.37	23.29	22.00	20.15	18.31	15.51	14.45
11	09.58	08.37	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.03	08.36	09.59
	15.16	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.34	07.01	06.14	04.34	03.18	03.42	05.12	06.42	08.06	08.40	10.01
	15.18	16.54	18.19	20.48	22.19	23.41	23.25	21.54	20.08	18.24	15.46	14.43
13	09.54	08.31	06.57	06.10	04.31	03.16	03.45	05.15	06.44	08.08	08.43	10.03
	15.21	16.57	18.22	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.15	03.47	05.18	06.47	08.11	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.44	23.20	21.47	20.01	18.18	15.40	14.42
15	09.50	08.24	06.51	06.03	04.24	03.14	03.50	05.21	06.50	08.14	08.49	10.06
	15.27	17.03	18.27	20.57	22.28	23.45	23.18	21.44	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.21	03.14	03.53	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.31	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.57	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.10	18.33	21.03	22.35	23.47	23.13	21.37	19.50	18.08	15.32	14.41
18	09.44	08.15	06.40	05.53	04.15	03.12	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.38	23.48	23.10	21.34	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.41	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.09	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.44	23.49	23.05	21.27	19.40	17.58	15.24	14.41
21	09.37	08.05	06.30	05.43	04.07	03.12	04.07	05.39	07.07	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.47	23.49	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.04	03.12	04.09	05.42	07.09	08.35	09.10	10.13
	15.47	17.25	18.47	21.18	22.50	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.32	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.53	23.49	22.56	21.17	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.52	06.16	05.29	03.55	03.13	04.18	05.51	07.18	07.44	09.19	10.14
	15.57	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.23	16.41	15.12	14.44
26	09.24	07.48	06.13	05.26	03.53	03.14	04.21	05.54	07.20	07.47	09.22	10.14
	16.00	17.37	18.59	21.30	23.01	23.49	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.42	06.06	05.19	03.47	03.16	04.27	05.59	07.26	07.53	09.28	10.13
	16.06	17.43	19.05	21.36	23.07	23.47	22.41	21.00	19.12	16.31	15.05	14.47
29	09.16		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.31	10.13
	16.09		20.08	21.39	23.10	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.13	03.42	03.18	04.33	06.05	07.32	07.59	09.33	10.13
	16.12		20.10	21.42	23.12	23.45	22.35	20.53	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	611	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Project:
Purmon tuulivoimahanke

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 17 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1295)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38 16.53-17.09/16	06.52	05.09	03.38	03.20	04.39	06.11	07.34 17.30-17.47/17	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35 16.52-17.12/20	06.48	05.06	03.35	03.21	04.42	06.13	07.37 17.28-17.48/20	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.15	14.57
3	10.09	09.01	07.31 16.51-17.12/21	06.45	05.03	03.33	03.23	04.45	06.16	07.40 17.27-17.49/22	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.42	22.23	20.39	18.55	16.12	14.55
4	10.08	08.58	07.28 16.50-17.13/23	06.41	04.59	03.31	03.24	04.48	06.19	07.43 17.26-17.50/24	08.14	09.43
	14.59	16.28	17.55	20.25	21.54	23.25	23.40	22.19	20.35	18.51	16.09	14.53
5	10.07	08.55	07.24 16.49-17.13/24	06.38	04.56	03.29	03.26	04.51	06.22	07.45 17.25-17.50/25	08.17	09.46
	15.01	16.31	17.58	20.28	21.57	23.27	23.38	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21 16.48-17.13/25	06.34	04.53	03.27	03.28	04.54	06.25	07.48 17.25-17.50/25	08.21	09.48
	15.03	16.35	18.01	20.30	22.00	23.29	23.37	22.13	20.28	18.45	16.03	14.50
7	10.04	08.49	07.18 16.48-17.13/25	06.31	04.49	03.25	03.30	04.57	06.27	07.51 17.25-17.50/25	08.24	09.51
	15.06	16.38	18.04	20.33	22.03	23.31	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14 16.48-17.12/24	06.27	04.46	03.23	03.33	05.00	06.30	07.54 17.25-17.49/24	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.33	23.33	22.07	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11 16.48-17.12/24	06.24	04.43	03.22	03.35	05.03	06.33	07.57 17.25-17.48/23	08.30	09.55
	15.10	16.44	18.10	20.39	22.10	23.35	23.31	22.03	20.18	18.34	15.54	14.46
10	10.00	08.40	07.07 16.48-17.11/23	06.20	04.40	03.20	03.37	05.06	06.36	08.00 17.25-17.48/23	08.33	09.57
	15.13	16.47	18.13	20.42	22.13	23.37	23.29	22.00	20.14	18.31	15.51	14.45
11	09.58	08.37	07.04 16.49-17.10/21	06.17	04.37	03.19	03.40	05.09	06.39	08.03 17.25-17.46/21	08.36	09.59
	15.15	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.34	07.01 16.50-17.09/19	06.14	04.34	03.17	03.42	05.12	06.41	08.05 17.26-17.45/19	08.39	10.01
	15.18	16.54	18.18	20.48	22.19	23.41	23.25	21.53	20.07	18.24	15.45	14.43
13	09.54	08.30	06.57 16.52-17.07/15	06.10	04.30	03.16	03.44	05.15	06.44	08.08 17.27-17.41/14	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54 16.54-17.04/10	06.07	04.27	03.15	03.47	05.18	06.47	08.11 17.29-17.38/9	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20	21.47	20.01	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.24	03.14	03.50	05.21	06.50	08.14	08.49	10.05
	15.26	17.03	18.27	20.57	22.28	23.45	23.17	21.43	19.57	18.14	15.37	14.41
16	09.48	08.21	06.47	06.00	04.21	03.13	03.52	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.31	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.43	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.03	22.34	23.47	23.12	21.37	19.50	18.07	15.31	14.41
18	09.44	08.14	06.40	05.53	04.15	03.12	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.12	18.36	21.06	22.37	23.47	23.10	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.09	03.12	04.03	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.43	23.49	23.04	21.27	19.40	17.57	15.24	14.41
21	09.36	08.05	06.30	05.43	04.06	03.12	04.06	05.39	07.06	08.32	09.07	10.12
	15.44	17.22	18.44	21.15	22.46	23.49	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.04	03.12	04.09	05.42	07.09	08.35	09.10	10.12
	15.47	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.41
23	09.31	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.52	23.49	22.56	21.16	19.29	17.47	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.41	09.16	10.13
	15.53	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.55	03.13	04.18	05.50	07.17	07.44	09.19	10.13
	15.56	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.22	16.41	15.11	14.43
26	09.24	07.48	06.12	05.26	03.53	03.14	04.21	05.53	07.20	07.47	09.22	10.14
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.44
27	09.21	07.45 16.59-17.03/4	06.09	05.22	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.13
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.15	16.35	15.07	14.45
28	09.18	07.41 16.56-17.06/10	06.05	05.19	03.47	03.16	04.27	05.59	07.26	07.53	09.28	10.13
	16.06	17.43	19.05	21.36	23.07	23.47	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.29 17.36-17.42/6	07.56	09.30	10.13
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.58	05.12	03.42	03.18	04.33	06.05	07.31 17.32-17.46/14	07.59	09.33	10.13
	16.12		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.49
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.15		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	611	598	504	392	307	204	147
Sum of minutes with flicker	0	14	290	0	0	0	0	0	20	291	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 18 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1296)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.35	03.21	04.42	06.13	07.37	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.42	22.23	20.39	18.55	16.12	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.43	08.14	09.43
	14.59	16.28	17.55	20.25	21.54	23.25	23.40	22.19	20.35	18.51	16.09	14.54
5	10.07	08.55	07.25	06.38	04.56	03.29	03.27	04.51	06.22	07.46	08.18	09.46
	15.01	16.32	17.58	20.28	21.57	23.27	23.38	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27	03.29	04.54	06.25	07.48	08.21	09.48
	15.03	16.35	18.01	20.31	22.00	23.29	23.37	22.13	20.28	18.45	16.03	14.50
7	10.04	08.49	07.18	06.31	04.50	03.25	03.31	04.57	06.28	07.51	08.24	09.51
	15.06	16.38	18.04	20.33	22.04	23.31	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.46	03.24	03.33	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.33	23.33	22.07	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.55
	15.11	16.44	18.10	20.39	22.10	23.35	23.31	22.03	20.18	18.34	15.54	14.46
10	10.00	08.40	07.08	06.21	04.40	03.20	03.37	05.06	06.36	08.00	08.33	09.57
	15.13	16.47	18.13	20.42	22.13	23.37	23.29	22.00	20.14	18.31	15.51	14.45
11	09.58	08.37	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.03	08.36	09.59
	15.16	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.34	07.01	06.14	04.34	03.18	03.42	05.12	06.41	08.05	08.39	10.01
	15.18	16.54	18.19	20.48	22.19	23.41	23.25	21.53	20.08	18.24	15.46	14.43
13	09.54	08.30	06.57	06.10	04.31	03.16	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.27	03.15	03.47	05.18	06.47	08.11	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20	21.47	20.01	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.24	03.14	03.50	05.21	06.50	08.14	08.49	10.05
	15.27	17.03	18.27	20.57	22.28	23.45	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.21	03.14	03.53	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.31	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.03	22.34	23.47	23.12	21.37	19.50	18.07	15.32	14.41
18	09.44	08.14	06.40	05.53	04.15	03.13	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.47	23.10	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.09	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.43	23.49	23.04	21.27	19.40	17.57	15.24	14.41
21	09.36	08.05	06.30	05.43	04.07	03.12	04.07	05.39	07.06	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.46	23.49	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.04	03.12	04.09	05.42	07.09	08.35	09.10	10.12
	15.47	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.52	23.49	22.56	21.16	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.41	09.16	10.13
	15.53	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.55	03.13	04.18	05.51	07.18	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.22	16.41	15.12	14.44
26	09.24	07.48	06.12	05.26	03.53	03.14	04.21	05.53	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.13
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.47	03.16	04.27	05.59	07.26	07.53	09.28	10.13
	16.06	17.43	19.05	21.36	23.07	23.47	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.30	10.13
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.13	03.42	03.18	04.33	06.05	07.31	07.59	09.33	10.12
	16.12		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 19 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1297)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36	03.21	04.42	06.14	07.37	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.42	22.23	20.39	18.55	16.13	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.43	08.15	09.44
	14.59	16.28	17.55	20.25	21.54	23.25	23.40	22.20	20.35	18.52	16.09	14.54
5	10.07	08.55	07.25	06.38	04.56	03.29	03.27	04.51	06.22	07.46	08.18	09.46
	15.01	16.32	17.58	20.28	21.57	23.27	23.39	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27	03.29	04.54	06.25	07.48	08.21	09.48
	15.03	16.35	18.01	20.31	22.00	23.29	23.37	22.13	20.28	18.45	16.03	14.50
7	10.04	08.49	07.18	06.31	04.50	03.25	03.31	04.57	06.28	07.51	08.24	09.51
	15.06	16.38	18.04	20.34	22.04	23.31	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.46	03.24	03.33	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.33	23.33	22.07	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.55
	15.11	16.44	18.10	20.39	22.10	23.35	23.31	22.03	20.18	18.34	15.54	14.47
10	10.00	08.40	07.08	06.21	04.40	03.20	03.37	05.06	06.36	08.00	08.33	09.57
	15.13	16.48	18.13	20.42	22.13	23.37	23.29	22.00	20.15	18.31	15.51	14.45
11	09.58	08.37	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.03	08.36	09.59
	15.16	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.34	07.01	06.14	04.34	03.18	03.42	05.12	06.42	08.06	08.39	10.01
	15.18	16.54	18.19	20.48	22.19	23.41	23.25	21.54	20.08	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.16	03.45	05.15	06.44	08.08	08.43	10.02
	15.21	16.57	18.22	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.15	03.47	05.18	06.47	08.11	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20	21.47	20.01	18.18	15.40	14.42
15	09.50	08.24	06.50	06.03	04.24	03.15	03.50	05.21	06.50	08.14	08.49	10.05
	15.27	17.03	18.27	20.57	22.28	23.45	23.17	21.44	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.21	03.14	03.53	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.31	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.57	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.10	18.33	21.03	22.34	23.47	23.12	21.37	19.50	18.08	15.32	14.41
18	09.44	08.14	06.40	05.53	04.15	03.13	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.48	23.10	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.10	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.43	23.49	23.04	21.27	19.40	17.58	15.24	14.41
21	09.37	08.05	06.30	05.43	04.07	03.12	04.07	05.39	07.07	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.46	23.49	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.40	04.04	03.12	04.09	05.42	07.09	08.35	09.10	10.12
	15.47	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.32	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.52	23.49	22.56	21.17	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.55	03.13	04.18	05.51	07.18	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.23	16.41	15.12	14.44
26	09.24	07.48	06.12	05.26	03.53	03.14	04.21	05.54	07.20	07.47	09.22	10.14
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.41	06.06	05.19	03.48	03.16	04.27	05.59	07.26	07.53	09.28	10.13
	16.06	17.43	19.05	21.36	23.07	23.47	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.30	10.13
	16.09		20.08	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.13	03.43	03.18	04.33	06.05	07.32	07.59	09.33	10.13
	16.12		20.10	21.42	23.12	23.45	22.35	20.53	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	611	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 20 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1298)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38 05.25-05.42/17	03.20 04.35-04.58/23	04.39 05.32-05.53/21	06.11	07.34	08.05	09.36
	14.54	16.19	17.46	20.16	21.45	23.17 04.33-04.49/16	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36 05.26-05.41/15	03.21 04.35-04.58/23	04.42 05.33-05.53/20	06.14	07.37	08.08	09.39
	14.55	16.22	17.49	20.19	21.48	23.20 04.31-04.49/18	23.43	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.33 05.27-05.41/14	03.23 04.35-04.57/22	04.45 05.33-05.51/18	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22 04.31-04.50/19	23.42	22.23	20.39	18.55	16.13	14.55
4	10.08	08.58	07.28	06.41	05.00	03.31 05.27-05.39/12	03.25 04.36-04.58/22	04.48 05.35-05.50/15	06.19	07.43	08.15	09.44
	14.59	16.29	17.55	20.25	21.54	23.25 04.31-04.51/20	23.40	22.20	20.35	18.52	16.10	14.54
5	10.07	08.55	07.25	06.38	04.56	03.29 05.29-05.38/9	03.27 04.36-04.58/22	04.51 05.37-05.48/11	06.22	07.46	08.18	09.46
	15.01	16.32	17.58	20.28	21.57	23.27 04.31-04.51/20	23.39	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27 05.31-05.38/7	03.29 05.38-05.43/5	04.54 05.40-05.45/5	06.25	07.48	08.21	09.48
	15.04	16.35	18.01	20.31	22.01	23.29 04.31-04.52/21	23.37 04.37-04.58/21	22.13	20.28	18.45	16.03	14.51
7	10.05	08.49	07.18	06.31	04.50 05.29-05.36/7	03.25 05.34-05.35/1	03.31 05.36-05.45/9	04.57	06.28	07.51	08.24	09.51
	15.06	16.38	18.04	20.34	22.04	23.31 04.31-04.52/21	23.35 04.37-04.58/21	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.28	04.47 05.26-05.39/13	03.24 04.31-04.53/22	03.33 05.36-05.46/10	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.33	23.33 04.38-04.58/20	22.07	20.22	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43 05.25-05.41/16	03.22 04.31-04.53/22	03.35 05.34-05.47/13	05.03	06.33	07.57	08.30	09.55
	15.11	16.44	18.10	20.39	22.10	23.35	23.31 04.38-04.57/19	22.03	20.18	18.35	15.54	14.47
10	10.00	08.40	07.08	06.21	04.40 05.23-05.42/19	03.21 04.30-04.53/23	03.37 05.34-05.48/14	05.06	06.36	08.00	08.33	09.57
	15.13	16.48	18.13	20.42	22.13	23.37	23.29 04.39-04.57/18	22.00	20.15	18.31	15.51	14.46
11	09.58	08.37	07.04	06.17	04.37 05.22-05.42/20	03.19 04.30-04.53/23	03.40 05.33-05.49/16	05.09	06.39	08.03	08.36	09.59
	15.16	16.51	18.16	20.45	22.16	23.39	23.27 04.40-04.57/17	21.57	20.11	18.28	15.49	14.45
12	09.56	08.34	07.01	06.14 06.47-06.49/2	04.34 05.22-05.44/22	03.18 04.31-04.54/23	03.42 05.33-05.51/18	05.12	06.42	08.06	08.39	10.01
	15.18	16.54	18.19	20.48	22.19	23.41	23.25 04.42-04.56/14	21.54	20.08	18.24	15.46	14.44
13	09.54	08.31	06.57	06.10 06.43-06.54/11	04.31 05.21-05.44/23	03.17 04.31-04.54/23	03.45 05.33-05.51/18	05.15	06.44	08.09	08.43	10.02
	15.21	16.57	18.22	20.51	22.22	23.42	23.22 04.44-04.56/12	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07 06.40-06.56/16	04.28 05.20-05.44/24	03.16 04.30-04.54/24	03.47 05.32-05.52/20	05.18 06.47-06.57/10	06.47	08.11	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20 04.46-04.55/9	21.47	20.01	18.18	15.40	14.42
15	09.50	08.24	06.51	06.03 06.38-06.57/19	04.25 05.20-05.45/25	03.15 04.31-04.55/24	03.50 05.32-05.53/21	05.21 06.44-06.59/15	06.50	08.14	08.49	10.05
	15.27	17.03	18.27	20.57	22.28	23.45	23.18 04.48-04.54/6	21.44	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00 06.37-06.58/21	04.22 05.19-05.44/25	03.14 04.31-04.55/24	03.53 05.32-05.53/21	05.24 06.43-07.01/18	06.53	08.17	08.52	10.07
	15.30	17.07	18.30	21.00	22.31	23.46	23.15 04.50-04.51/1	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.57 06.36-06.58/22	04.19 05.19-05.45/26	03.13 04.31-04.55/24	03.55 05.31-05.54/23	05.27 06.42-07.02/20	06.56	08.20	08.55	10.08
	15.32	17.10	18.33	21.03	22.34	23.47	23.12	21.37	19.50	18.08	15.32	14.41
18	09.44	08.15	06.40	05.53 06.35-06.59/24	04.16 05.20-05.46/26	03.13 04.31-04.55/24	03.58 05.31-05.54/23	05.30 06.40-07.02/22	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.48	23.10	21.34	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50 06.34-06.58/24	04.13 05.19-05.45/26	03.12 04.31-04.55/24	04.01 05.30-05.54/24	05.33 06.40-07.03/23	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46 06.34-06.58/24	04.10 05.19-05.45/26	03.12 04.32-04.56/24	04.04 05.30-05.55/25	05.36 06.39-07.03/24	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.44	23.49	23.04	21.27	19.40	17.58	15.24	14.41
21	09.37	08.05	06.30	05.43 06.34-06.58/24	04.07 05.20-05.46/26	03.12 04.32-04.56/24	04.07 05.29-05.55/26	05.39 06.38-07.03/25	07.07	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.46	23.49	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.40 06.34-06.58/24	04.04 05.20-05.46/26	03.12 04.33-04.57/24	04.10 05.30-05.56/26	05.42 06.38-07.03/25	07.09	08.35	09.10	10.12
	15.47	17.25	18.48	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.32	07.58	06.23	05.36 06.34-06.58/24	04.01 05.20-05.45/25	03.12 04.32-04.57/25	04.12 05.30-05.56/26	05.45 06.38-07.03/25	07.12	08.38	09.13	10.13
	15.51	17.28	18.50	21.21	22.52	23.49	22.56	21.17	19.30	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33 06.34-06.57/23	03.58 05.20-05.45/25	03.13 04.33-04.57/24	04.15 05.29-05.55/26	05.48 06.38-07.02/24	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.52	06.16	05.29 06.35-06.56/21	03.56 05.21-05.44/23	03.13 04.33-04.57/24	04.18 05.30-05.56/26	05.51 06.38-07.01/23	07.18	07.44	09.19	10.14
	15.57	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.23	16.41	15.12	14.44
26	09.24	07.48	06.13	05.26 06.35-06.54/19	03.53 05.21-05.44/23	03.14 04.34-04.58/24	04.21 05.30-05.55/25	05.54 06.39-07.01/22	07.20	07.47	09.22	10.14
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23 06.36-06.53/17	03.50 05.21-05.44/23	03.15 04.33-04.57/24	04.24 05.30-05.56/26	05.56 06.38-06.59/21	07.23	07.50	09.25	10.14
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.42	06.06	05.19 06.37-06.51/14	03.48 05.23-05.44/21	03.16 04.34-04.57/23	04.27 05.30-05.55/25	05.59 06.40-06.58/18	07.26	07.53	09.28	10.13
	16.06	17.43	19.05	21.36	23.07 04.40-04.44/4	23.47	22.41	20.59	19.12	16.32	15.05	14.47
29	09.16		07.02	05.16 06.39-06.48/9	03.45 05.23-05.44/21	03.17 04.34-04.58/24	04.30 05.31-05.55/24	06.02 06.41-06.57/16	07.29	07.56	09.30	10.13
	16.09		20.08	21.39	23.09 04.38-04.46/8	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.13	03.43 05.23-05.43/20	03.18 04.34-04.58/24	04.33 05.31-05.55/24	06.05 06.43-06.54/11	07.32	07.59	09.33	10.13
	16.13		20.10	21.42	23.12 04.36-04.47/11	23.45	22.35	20.53	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40 05.24-05.42/18		04.36 05.32-05.55/23	06.08		08.02		10.12
	16.16		20.13		23.15 04.34-04.47/13		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	338	585	754	807	432	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi

Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 21 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1299)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.45	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.35	03.21	04.42	06.13	07.37	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.15	14.57
3	10.09	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.41	22.22	20.39	18.55	16.12	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.43	08.14	09.43
	14.59	16.28	17.55	20.25	21.54	23.24	23.40	22.19	20.35	18.51	16.09	14.53
5	10.07	08.55	07.24	06.38	04.56	03.29	03.27	04.51	06.22	07.45	08.17	09.46
	15.01	16.31	17.58	20.28	21.57	23.27	23.38	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27	03.28	04.54	06.25	07.48	08.20	09.48
	15.03	16.35	18.01	20.30	22.00	23.29	23.37	22.13	20.28	18.45	16.03	14.50
7	10.04	08.49	07.18	06.31	04.50	03.25	03.31	04.57	06.27	07.51	08.24	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.46	03.23	03.33	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.06	23.33	23.33	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.55
	15.10	16.44	18.10	20.39	22.10	23.35	23.31	22.03	20.18	18.34	15.54	14.46
10	10.00	08.40	07.07	06.20	04.40	03.20	03.37	05.06	06.36	08.00	08.33	09.57
	15.13	16.47	18.13	20.42	22.13	23.37	23.29	22.00	20.14	18.31	15.51	14.45
11	09.58	08.37	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.02	08.36	09.59
	15.16	16.51	18.15	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.33	07.01	06.14	04.34	03.18	03.42	05.12	06.41	08.05	08.39	10.00
	15.18	16.54	18.18	20.48	22.19	23.40	23.24	21.53	20.07	18.24	15.45	14.43
13	09.54	08.30	06.57	06.10	04.31	03.16	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.27	03.15	03.47	05.18	06.47	08.11	08.45	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20	21.47	20.00	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.24	03.14	03.50	05.21	06.50	08.14	08.49	10.05
	15.26	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.21	03.14	03.52	05.24	06.52	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.31	23.45	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.17	06.43	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.03	22.34	23.46	23.12	21.37	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40	05.53	04.15	03.12	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.12	18.36	21.06	22.37	23.47	23.10	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.36	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.09	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.43	23.48	23.04	21.27	19.40	17.57	15.24	14.41
21	09.36	08.04	06.30	05.43	04.06	03.12	04.06	05.39	07.06	08.32	09.07	10.12
	15.44	17.22	18.44	21.15	22.46	23.49	23.01	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.04	03.12	04.09	05.42	07.09	08.35	09.10	10.12
	15.47	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.52	23.49	22.56	21.16	19.29	17.47	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.41	09.16	10.13
	15.53	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.55	03.13	04.18	05.50	07.17	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.22	16.41	15.11	14.44
26	09.23	07.48	06.12	05.26	03.53	03.14	04.21	05.53	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.22	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.13
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.15	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.47	03.16	04.27	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.04	21.36	23.06	23.47	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.30	10.13
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.12		06.58	05.12	03.42	03.18	04.33	06.05	07.31	07.59	09.33	10.12
	16.12		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.14		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi

Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 22 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1300)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.35	03.21	04.42	06.13	07.37	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.41	22.23	20.39	18.55	16.12	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.43	08.14	09.43
	14.59	16.28	17.55	20.25	21.54	23.25	23.40	22.19	20.35	18.51	16.09	14.53
5	10.07	08.55	07.24	06.38	04.56	03.29	03.27	04.51	06.22	07.45	08.17	09.46
	15.01	16.32	17.58	20.28	21.57	23.27	23.38	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27	03.28	04.54	06.25	07.48	08.21	09.48
	15.03	16.35	18.01	20.30	22.00	23.29	23.37	22.13	20.28	18.45	16.03	14.50
7	10.04	08.49	07.18	06.31	04.50	03.25	03.31	04.57	06.27	07.51	08.24	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.46	03.24	03.33	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.33	23.33	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.55
	15.10	16.44	18.10	20.39	22.10	23.35	23.31	22.03	20.18	18.34	15.54	14.46
10	10.00	08.40	07.07	06.20	04.40	03.20	03.37	05.06	06.36	08.00	08.33	09.57
	15.13	16.47	18.13	20.42	22.13	23.37	23.29	22.00	20.14	18.31	15.51	14.45
11	09.58	08.37	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.03	08.36	09.59
	15.16	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.33	07.01	06.14	04.34	03.18	03.42	05.12	06.41	08.05	08.39	10.00
	15.18	16.54	18.18	20.48	22.19	23.40	23.24	21.53	20.07	18.24	15.45	14.43
13	09.54	08.30	06.57	06.10	04.31	03.16	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.27	03.15	03.47	05.18	06.47	08.11	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20	21.47	20.01	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.24	03.14	03.50	05.21	06.50	08.14	08.49	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.21	03.14	03.53	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.31	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.43	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.03	22.34	23.47	23.12	21.37	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40	05.53	04.15	03.13	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.47	23.10	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.09	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.43	23.48	23.04	21.27	19.40	17.57	15.24	14.41
21	09.36	08.05	06.30	05.43	04.07	03.12	04.06	05.39	07.06	08.32	09.07	10.12
	15.44	17.22	18.44	21.15	22.46	23.49	23.01	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.04	03.12	04.09	05.42	07.09	08.35	09.10	10.12
	15.47	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.52	23.49	22.56	21.16	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.41	09.16	10.13
	15.53	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.55	03.13	04.18	05.51	07.17	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.22	16.41	15.11	14.44
26	09.24	07.48	06.12	05.26	03.53	03.14	04.21	05.53	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.13
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.15	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.47	03.16	04.27	05.59	07.26	07.53	09.28	10.13
	16.06	17.43	19.05	21.36	23.07	23.47	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.30	10.13
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.13	03.42	03.18	04.33	06.05	07.31	07.59	09.33	10.12
	16.12		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 23 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1301)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09 06.04-06.28/24	03.38	03.20	04.39	06.11 06.57-07.20/23	07.34	08.05	09.36
	14.54	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06 06.04-06.28/24	03.36	03.22	04.42	06.14 06.56-07.18/22	07.37	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03 06.05-06.28/23	03.33	03.23	04.45 06.22-06.28/6	06.16 06.57-07.18/21	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.41	22.23	20.39	18.55	16.13	14.55
4	10.08	08.58	07.28	06.41	05.00 06.05-06.27/22	03.31	03.25	04.48 06.20-06.31/11	06.19 06.58-07.17/19	07.43	08.14	09.43
	14.59	16.29	17.55	20.25	21.54	23.25	23.40	22.19	20.35	18.52	16.10	14.54
5	10.07	08.55	07.25	06.38 07.09-07.14/5	04.56 06.06-06.26/20	03.29	03.27	04.51 06.18-06.33/15	06.22 06.59-07.15/16	07.46	08.18	09.46
	15.01	16.32	17.58	20.28	21.57	23.27	23.38	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34 07.06-07.17/11	04.53 06.06-06.25/19	03.27	03.29	04.54 06.17-06.34/17	06.25 07.02-07.13/11	07.48	08.21	09.48
	15.04	16.35	18.01	20.31	22.00	23.29	23.37	22.13	20.28	18.45	16.03	14.51
7	10.04	08.49	07.18	06.31 07.03-07.19/16	04.50 06.07-06.24/17	03.26	03.31	04.57 06.16-06.36/20	06.28 07.05-07.11/6	07.51	08.24	09.51
	15.06	16.38	18.04	20.34	22.04	23.31	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.28 07.00-07.19/19	04.47 06.08-06.22/14	03.24	03.33	05.00 06.15-06.36/21	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.33	23.33	22.07	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24 06.59-07.20/21	04.43 06.11-06.21/10	03.22	03.35	05.03 06.14-06.37/23	06.33	07.57	08.30	09.55
	15.11	16.44	18.10	20.39	22.10	23.35	23.31	22.03	20.18	18.35	15.54	14.47
10	10.00	08.40	07.08	06.21 06.58-07.20/22	04.40	03.21	03.38	05.06 06.13-06.36/23	06.36	08.00	08.33	09.57
	15.13	16.48	18.13	20.42	22.13	23.37	23.29	22.00	20.15	18.31	15.52	14.46
11	09.58	08.37	07.04	06.17 06.57-07.20/23	04.37	03.19	03.40	05.09 06.13-06.37/24	06.39	08.03	08.36	09.59
	15.16	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.49	14.45
12	09.56	08.34	07.01	06.14 06.57-07.20/23	04.34	03.18	03.42	05.12 06.13-06.37/24	06.42	08.06	08.39	10.01
	15.18	16.54	18.19	20.48	22.19	23.40	23.25	21.53	20.08	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10 06.57-07.20/23	04.31	03.17	03.45	05.15 06.12-06.36/24	06.44	08.08	08.43	10.02
	15.21	16.57	18.22	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07 06.57-07.20/23	04.28	03.16	03.47	05.18 06.12-06.37/25	06.47	08.11	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20	21.47	20.01	18.18	15.40	14.42
15	09.50	08.24	06.50	06.03 06.57-07.18/21	04.25	03.15	03.50	05.21 06.12-06.36/24	06.50	08.14	08.49	10.05
	15.27	17.03	18.27	20.57	22.28	23.45	23.17	21.44	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00 06.57-07.17/20	04.22	03.14	03.53	05.24 06.12-06.35/23	06.53	08.17	08.52	10.07
	15.30	17.07	18.30	21.00	22.31	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.57 06.58-07.16/18	04.19	03.13	03.55	05.27 06.13-06.35/22	06.55	08.20	08.55	10.08
	15.32	17.10	18.33	21.03	22.34	23.47	23.12	21.37	19.50	18.08	15.32	14.41
18	09.44	08.14	06.40	05.53 07.00-07.15/15	04.16	03.13	03.58	05.30 06.13-06.33/20	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.47	23.10	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50 07.01-07.12/11	04.13	03.12	04.01	05.33 06.14-06.33/19	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46 07.04-07.08/4	04.10	03.12	04.04	05.36 06.17-06.31/14	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.43	23.48	23.04	21.27	19.40	17.58	15.24	14.41
21	09.36	08.05	06.30	05.43 06.17-06.21/4	04.07	03.12	04.07	05.39 06.19-06.29/10	07.07	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.46	23.49	23.02	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.40 06.14-06.24/10	04.04	03.12	04.10	05.42 06.22-06.25/3	07.09	08.35	09.10	10.12
	15.47	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36 06.11-06.26/15	04.01	03.13	04.13	05.45 07.08-07.13/5	07.12	08.38	09.13	10.13
	15.51	17.28	18.50	21.21	22.52	23.49	22.56	21.17	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33 06.08-06.27/19	03.58	03.13	04.15	05.48 07.04-07.16/12	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29 06.07-06.28/21	03.56	03.14	04.18	05.51 07.02-07.18/16	07.18	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.23	16.41	15.12	14.44
26	09.24	07.48	06.13	05.26 06.06-06.28/22	03.53	03.14	04.21	05.54 07.01-07.19/18	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23 06.05-06.28/23	03.50	03.15	04.24	05.56 06.59-07.19/20	07.23	07.50	09.25	10.13
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.41	06.06	05.19 06.04-06.28/24	03.48	03.16	04.27	05.59 06.59-07.20/21	07.26	07.53	09.28	10.13
	16.06	17.43	19.05	21.36	23.07	23.47	22.41	20.59	19.12	16.32	15.05	14.47
29	09.15		07.02	05.16 06.04-06.28/24	03.45	03.17	04.30	06.02 06.58-07.20/22	07.29	07.56	09.30	10.13
	16.09		20.08	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.13 06.04-06.28/24	03.43	03.19	04.33	06.05 06.57-07.20/23	07.32	07.59	09.33	10.12
	16.13		20.10	21.42	23.12	23.45	22.35	20.53	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08 06.57-07.20/23		08.02		10.12
	16.16		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	461	173	0	0	528	118	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 24 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1302)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.36
	14.53	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36	03.21	04.42	06.13	07.37	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.41	22.23	20.39	18.55	16.13	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.43	08.14	09.43
	14.59	16.28	17.55	20.25	21.54	23.24	23.40	22.19	20.35	18.51	16.09	14.54
5	10.07	08.55	07.24	06.38	04.56	03.29	03.27	04.51	06.22	07.45	08.17	09.46
	15.01	16.32	17.58	20.28	21.57	23.27	23.38	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27	03.29	04.54	06.25	07.48	08.21	09.48
	15.04	16.35	18.01	20.30	22.00	23.29	23.37	22.13	20.28	18.45	16.03	14.51
7	10.04	08.49	07.18	06.31	04.50	03.25	03.31	04.57	06.28	07.51	08.24	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.46	03.24	03.33	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.06	23.33	23.33	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.55
	15.11	16.44	18.10	20.39	22.10	23.35	23.31	22.03	20.18	18.34	15.54	14.47
10	10.00	08.40	07.07	06.21	04.40	03.21	03.37	05.06	06.36	08.00	08.33	09.57
	15.13	16.48	18.13	20.42	22.13	23.37	23.29	22.00	20.14	18.31	15.51	14.45
11	09.58	08.37	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.03	08.36	09.59
	15.16	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.48	14.44
12	09.56	08.33	07.01	06.14	04.34	03.18	03.42	05.12	06.41	08.05	08.39	10.00
	15.18	16.54	18.19	20.48	22.19	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.47	05.18	06.47	08.11	08.45	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20	21.47	20.01	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.24	03.15	03.50	05.21	06.50	08.14	08.49	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.21	03.14	03.53	05.24	06.53	08.17	08.52	10.07
	15.29	17.06	18.30	21.00	22.31	23.45	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.43	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.03	22.34	23.46	23.12	21.37	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40	05.53	04.15	03.13	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.47	23.10	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.10	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.43	23.48	23.04	21.27	19.40	17.57	15.24	14.41
21	09.36	08.05	06.30	05.43	04.07	03.12	04.07	05.39	07.06	08.32	09.07	10.12
	15.44	17.22	18.44	21.15	22.46	23.49	23.01	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.04	03.12	04.09	05.42	07.09	08.35	09.10	10.12
	15.47	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.12	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.52	23.49	22.56	21.16	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.55	03.13	04.18	05.51	07.18	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.14	04.21	05.53	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.13
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.48	03.16	04.27	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.05	21.36	23.06	23.47	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.30	10.13
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.12		06.59	05.13	03.43	03.18	04.33	06.05	07.31	07.59	09.33	10.12
	16.12		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 25 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1303)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.36
	14.54	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36	03.21	04.42	06.14	07.37	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.20	23.43	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.41	22.23	20.39	18.55	16.13	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.43	08.14	09.43
	14.59	16.28	17.55	20.25	21.54	23.25	23.40	22.19	20.35	18.52	16.09	14.54
5	10.07	08.55	07.25	06.38	04.56	03.29	03.27	04.51	06.22	07.46	08.18	09.46
	15.01	16.32	17.58	20.28	21.57	23.27	23.38	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.27	03.29	04.54	06.25	07.48	08.21	09.48
	15.04	16.35	18.01	20.31	22.00	23.29	23.37	22.13	20.28	18.45	16.03	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26	03.31	04.57	06.28	07.51	08.24	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.47	03.24	03.33	05.00	06.30	07.54	08.27	09.53
	15.08	16.41	18.07	20.36	22.07	23.33	23.33	22.07	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.55
	15.11	16.44	18.10	20.39	22.10	23.35	23.31	22.03	20.18	18.34	15.54	14.47
10	10.00	08.40	07.08	06.21	04.40	03.21	03.38	05.06	06.36	08.00	08.33	09.57
	15.13	16.48	18.13	20.42	22.13	23.37	23.29	22.00	20.14	18.31	15.51	14.46
11	09.58	08.37	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.03	08.36	09.59
	15.16	16.51	18.16	20.45	22.16	23.39	23.27	21.57	20.11	18.28	15.49	14.45
12	09.56	08.34	07.01	06.14	04.34	03.18	03.42	05.12	06.42	08.06	08.39	10.00
	15.18	16.54	18.19	20.48	22.19	23.40	23.24	21.53	20.08	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.47	05.18	06.47	08.11	08.46	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20	21.47	20.01	18.18	15.40	14.42
15	09.50	08.24	06.50	06.03	04.25	03.15	03.50	05.21	06.50	08.14	08.49	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.22	03.14	03.53	05.24	06.53	08.17	08.52	10.07
	15.30	17.06	18.30	21.00	22.31	23.46	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.18	06.44	05.57	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.10	18.33	21.03	22.34	23.46	23.12	21.37	19.50	18.08	15.32	14.41
18	09.44	08.14	06.40	05.53	04.16	03.13	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.47	23.10	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.13	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.10	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.43	23.48	23.04	21.27	19.40	17.58	15.24	14.41
21	09.36	08.05	06.30	05.43	04.07	03.12	04.07	05.39	07.06	08.32	09.07	10.12
	15.44	17.22	18.45	21.15	22.46	23.49	23.01	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.40	04.04	03.12	04.10	05.42	07.09	08.35	09.10	10.12
	15.47	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.12	05.45	07.12	08.38	09.13	10.13
	15.51	17.28	18.50	21.21	22.52	23.49	22.56	21.16	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.56	03.14	04.18	05.51	07.18	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.49	22.50	21.10	19.22	16.41	15.12	14.44
26	09.24	07.48	06.12	05.26	03.53	03.14	04.21	05.54	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.13
	16.03	17.40	19.02	21.33	23.04	23.48	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.41	06.06	05.19	03.48	03.16	04.27	05.59	07.26	07.53	09.28	10.13
	16.06	17.43	19.05	21.36	23.06	23.47	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.30	10.13
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.13		06.59	05.13	03.43	03.19	04.33	06.05	07.31	07.59	09.33	10.12
	16.13		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.15		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 26 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1304)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.36
	14.54	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.45	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36	03.22	04.42	06.13	07.37	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.19	23.42	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.41	22.22	20.39	18.55	16.13	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.43	08.14	09.43
	14.59	16.28	17.55	20.25	21.54	23.24	23.40	22.19	20.35	18.51	16.09	14.54
5	10.07	08.55	07.24	06.38	04.56	03.29	03.27	04.51	06.22	07.45	08.17	09.46
	15.01	16.32	17.58	20.28	21.57	23.27	23.38	22.16	20.32	18.48	16.06	14.52
6	10.05	08.52	07.21	06.34	04.53	03.27	03.29	04.54	06.25	07.48	08.20	09.48
	15.04	16.35	18.01	20.30	22.00	23.29	23.36	22.13	20.28	18.45	16.03	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26	03.31	04.57	06.28	07.51	08.24	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.46	03.24	03.33	05.00	06.30	07.54	08.27	09.52
	15.08	16.41	18.07	20.36	22.06	23.33	23.33	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.55
	15.11	16.44	18.10	20.39	22.09	23.35	23.31	22.03	20.18	18.34	15.54	14.47
10	09.59	08.40	07.07	06.21	04.40	03.21	03.38	05.06	06.36	08.00	08.33	09.57
	15.13	16.48	18.13	20.42	22.13	23.37	23.29	22.00	20.14	18.31	15.51	14.46
11	09.58	08.37	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.03	08.36	09.58
	15.16	16.51	18.16	20.45	22.16	23.39	23.26	21.57	20.11	18.28	15.48	14.45
12	09.56	08.33	07.01	06.14	04.34	03.18	03.42	05.12	06.41	08.05	08.39	10.00
	15.18	16.54	18.18	20.48	22.19	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.47	05.18	06.47	08.11	08.45	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20	21.47	20.00	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.25	03.15	03.50	05.21	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.21	03.14	03.53	05.24	06.53	08.17	08.52	10.06
	15.30	17.06	18.30	21.00	22.31	23.45	23.15	21.40	19.54	18.11	15.34	14.41
17	09.46	08.17	06.43	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.03	22.34	23.46	23.12	21.37	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40	05.53	04.15	03.13	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.47	23.09	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.13	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.10	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.43	23.48	23.04	21.26	19.40	17.57	15.24	14.41
21	09.36	08.04	06.30	05.43	04.07	03.12	04.07	05.39	07.06	08.32	09.07	10.11
	15.44	17.22	18.44	21.15	22.46	23.49	23.01	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.04	03.12	04.10	05.42	07.09	08.35	09.10	10.12
	15.47	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.12	05.45	07.12	08.38	09.13	10.13
	15.50	17.28	18.50	21.21	22.52	23.49	22.56	21.16	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.56	03.14	04.18	05.51	07.17	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.48	22.50	21.10	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.14	04.21	05.53	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.13
	16.03	17.40	19.02	21.33	23.04	23.47	22.44	21.03	19.15	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.48	03.16	04.27	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.05	21.36	23.06	23.47	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.30	10.13
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.48
30	09.12		06.59	05.13	03.43	03.19	04.33	06.05	07.31	07.59	09.33	10.12
	16.12		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.14		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 27 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1305)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March		April		May	June	July	August	September		October	November	December
1	10.11	09.07	07.38		06.52	08.07-08.21/14	05.09	03.38	03.20	04.39	06.11		07.34	08.05	09.36
	14.54	16.19	17.46		20.16		21.45	23.17	23.44	22.29	20.46		19.02	16.19	14.59
2	10.10	09.04	07.35		06.48	08.11-08.17/6	05.06	03.36	03.22	04.42	06.14		07.37	08.08	09.38
	14.56	16.22	17.49		20.19		21.48	23.20	23.43	22.26	20.42		18.58	16.16	14.57
3	10.09	09.01	07.31		06.45		05.03	03.34	03.23	04.45	06.16		07.40	08.11	09.41
	14.57	16.25	17.52		20.22		21.51	23.22	23.41	22.23	20.39		18.55	16.13	14.56
4	10.08	08.58	07.28		06.41		05.00	03.32	03.25	04.48	06.19		07.43	08.14	09.43
	14.59	16.29	17.55		20.25		21.54	23.24	23.40	22.19	20.35		18.52	16.10	14.54
5	10.07	08.55	07.25		06.38		04.56	03.29	03.27	04.52	06.22		07.46	08.18	09.46
	15.02	16.32	17.58		20.28		21.57	23.27	23.38	22.16	20.32		18.48	16.07	14.52
6	10.06	08.52	07.21		06.34		04.53	03.28	03.29	04.55	06.25		07.48	08.21	09.48
	15.04	16.35	18.01		20.31		22.00	23.29	23.37	22.13	20.28		18.45	16.03	14.51
7	10.04	08.49	07.18		06.31		04.50	03.26	03.31	04.58	06.28		07.51	08.24	09.50
	15.06	16.38	18.04		20.34		22.03	23.31	23.35	22.10	20.25		18.41	16.00	14.49
8	10.03	08.46	07.14		06.28		04.47	03.24	03.33	05.01	06.31		07.54	08.27	09.53
	15.08	16.41	18.07		20.36		22.07	23.33	23.33	22.07	20.21		18.38	15.57	14.48
9	10.01	08.43	07.11		06.24		04.43	03.22	03.35	05.04	06.33		07.57	08.30	09.55
	15.11	16.45	18.10		20.39		22.10	23.35	23.31	22.03	20.18		18.35	15.55	14.47
10	10.00	08.40	07.08		06.21		04.40	03.21	03.38	05.07	06.36	08.05-08.09/4	08.00	08.33	09.57
	15.13	16.48	18.13		20.42		22.13	23.37	23.29	22.00	20.15		18.31	15.52	14.46
11	09.58	08.37	07.04		06.17		04.37	03.19	03.40	05.10	06.39	08.00-08.13/13	08.03	08.36	09.59
	15.16	16.51	18.16		20.45		22.16	23.39	23.27	21.57	20.11		18.28	15.49	14.45
12	09.56	08.34	07.01		06.14		04.34	03.18	03.43	05.13	06.42	07.58-08.15/17	08.06	08.39	10.00
	15.19	16.54	18.19		20.48		22.19	23.40	23.24	21.53	20.08		18.24	15.46	14.44
13	09.54	08.30	06.57		06.10		04.31	03.17	03.45	05.16	06.44	07.56-08.16/20	08.08	08.42	10.02
	15.21	16.57	18.22		20.51		22.22	23.42	23.22	21.50	20.04		18.21	15.43	14.43
14	09.52	08.27	06.54		06.07		04.28	03.16	03.48	05.19	06.47	07.53-08.16/23	08.11	08.46	10.04
	15.24	17.00	18.24		20.54		22.25	23.43	23.20	21.47	20.01		18.18	15.40	14.42
15	09.50	08.24	06.50		06.03		04.25	03.15	03.50	05.21	06.50	07.52-08.17/25	08.14	08.49	10.05
	15.27	17.03	18.27		20.57		22.28	23.44	23.17	21.43	19.57		18.14	15.37	14.42
16	09.48	08.21	06.47		06.00		04.22	03.14	03.53	05.24	06.53	07.51-08.17/26	08.17	08.52	10.07
	15.30	17.07	18.30		21.00		22.31	23.45	23.15	21.40	19.54		18.11	15.35	14.42
17	09.46	08.18	06.44		05.57		04.19	03.13	03.56	05.27	06.55	07.50-08.17/27	08.20	08.55	10.08
	15.33	17.10	18.33		21.03		22.34	23.46	23.12	21.37	19.50		18.08	15.32	14.41
18	09.43	08.14	06.40	07.12-07.24/12	05.53		04.16	03.13	03.58	05.30	06.58	07.49-08.17/28	08.23	08.58	10.09
	15.36	17.13	18.36		21.06		22.37	23.47	23.10	21.33	19.47		18.04	15.29	14.41
19	09.41	08.11	06.37	07.08-07.27/19	05.50		04.13	03.13	04.01	05.33	07.01	07.49-08.17/28	08.26	09.01	10.10
	15.38	17.16	18.39		21.09		22.40	23.48	23.07	21.30	19.43		18.01	15.27	14.41
20	09.39	08.08	06.33	07.06-07.28/22	05.46		04.10	03.12	04.04	05.36	07.04	07.49-08.16/27	08.29	09.04	10.11
	15.41	17.19	18.42		21.12		22.43	23.48	23.04	21.27	19.40		17.58	15.24	14.41
21	09.36	08.05	06.30	07.04-07.29/25	05.43		04.07	03.12	04.07	05.39	07.07	07.48-08.15/27	08.32	09.07	10.12
	15.45	17.22	18.45		21.15		22.46	23.49	23.01	21.23	19.36		17.54	15.21	14.42
22	09.34	08.01	06.26	07.04-07.29/25	05.40		04.04	03.13	04.10	05.42	07.09	07.49-08.14/25	08.35	09.10	10.12
	15.48	17.25	18.47		21.18		22.49	23.49	22.59	21.20	19.33		17.51	15.19	14.42
23	09.31	07.58	06.23	07.02-07.29/27	05.36		04.01	03.13	04.13	05.45	07.12	07.50-08.13/23	08.38	09.13	10.13
	15.51	17.28	18.50		21.21		22.52	23.49	22.56	21.16	19.29		17.48	15.17	14.43
24	09.29	07.55	06.19	07.02-07.30/28	05.33		03.58	03.13	04.16	05.48	07.15	07.51-08.11/20	08.41	09.16	10.13
	15.54	17.31	18.53		21.24		22.55	23.49	22.53	21.13	19.26		17.45	15.14	14.43
25	09.26	07.51	06.16	07.02-07.29/27	05.29		03.56	03.14	04.18	05.51	07.18	07.53-08.08/15	07.44	09.19	10.13
	15.57	17.34	18.56		21.27		22.58	23.49	22.50	21.10	19.23		16.41	15.12	14.44
26	09.24	07.48	06.13	07.02-07.29/27	05.26		03.53	03.14	04.21	05.54	07.20	07.56-08.05/9	07.47	09.22	10.13
	16.00	17.37	18.59		21.30		23.01	23.48	22.47	21.06	19.19		16.38	15.10	14.45
27	09.21	07.45	06.09	07.02-07.28/26	05.23		03.50	03.15	04.24	05.57	07.23		07.50	09.25	10.13
	16.03	17.40	19.02		21.33		23.04	23.48	22.44	21.03	19.16		16.35	15.07	14.46
28	09.18	07.41	06.06	07.03-07.28/25	05.19		03.48	03.16	04.27	05.59	07.26		07.53	09.27	10.13
	16.06	17.43	19.05		21.36		23.06	23.47	22.41	20.59	19.12		16.32	15.05	14.47
29	09.15		07.02	08.03-08.26/23	05.16		03.45	03.17	04.30	06.02	07.29		07.56	09.30	10.13
	16.09		20.08		21.39		23.09	23.46	22.38	20.56	19.09		16.28	15.03	14.49
30	09.13		06.59	08.04-08.25/21	05.13		03.43	03.19	04.33	06.05	07.32		07.59	09.33	10.12
	16.13		20.10		21.42		23.12	23.45	22.35	20.53	19.05		16.25	15.01	14.50
31	09.10		06.55	08.05-08.23/18			03.40		04.36	06.08			08.02		10.12
	16.16		20.13				23.15		22.32	20.49			16.22		14.52
Potential sun hours	179	241	363		448		562	610	598	504	392		307	204	147
Sum of minutes with flicker	0	0	325		20		0	0	0	0	357		0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 28 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1306)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.51	05.09	03.38	03.20	04.39	06.11	07.34 18.03-18.24/21	08.05	09.35
	14.53	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.45	19.02	16.19	14.59
2	10.10	09.04	07.34	06.48	05.06	03.36	03.21	04.42	06.13	07.37 18.04-18.21/17	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.19	23.42	22.25	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.33	03.23	04.45	06.16	07.40 18.06-18.17/11	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.41	22.22	20.38	18.55	16.12	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.42 18.07-18.13/6	08.14	09.43
	14.59	16.28	17.55	20.25	21.54	23.24	23.39	22.19	20.35	18.51	16.09	14.54
5	10.07	08.55	07.24	06.38	04.56	03.29	03.27	04.51	06.22	07.45	08.17	09.45
	15.01	16.32	17.58	20.27	21.57	23.26	23.38	22.16	20.32	18.48	16.06	14.52
6	10.05	08.52	07.21	06.34	04.53	03.27	03.29	04.54	06.25	07.48	08.20	09.48
	15.03	16.35	18.01	20.30	22.00	23.29	23.36	22.13	20.28	18.44	16.03	14.50
7	10.04	08.49	07.18	06.31	04.50	03.25	03.31	04.57	06.27	07.51	08.23	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.34	22.09	20.25	18.41	16.00	14.49
8	10.02	08.46	07.14	06.27	04.46	03.24	03.33	05.00	06.30	07.54	08.27	09.52
	15.08	16.41	18.07	20.36	22.06	23.33	23.32	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11 17.32-17.35/3	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.54
	15.11	16.44	18.10	20.39	22.09	23.35	23.30	22.03	20.18	18.34	15.54	14.47
10	09.59	08.40	07.07 17.28-17.37/9	06.20	04.40	03.21	03.37	05.06	06.36	08.00	08.33	09.56
	15.13	16.47	18.13	20.42	22.12	23.37	23.28	22.00	20.14	18.31	15.51	14.45
11	09.58	08.36	07.04 17.27-17.41/14	06.17	04.37	03.19	03.40	05.09	06.39	08.02	08.36	09.58
	15.16	16.51	18.15	20.45	22.16	23.38	23.26	21.56	20.11	18.27	15.48	14.44
12	09.56	08.33	07.00 17.24-17.43/19	06.14	04.34	03.18	03.42	05.12	06.41	08.05	08.39	10.00
	15.18	16.54	18.18	20.48	22.19	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57 17.23-17.45/22	06.10	04.31	03.17	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.41	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54 17.22-17.45/23	06.07	04.27	03.16	03.47	05.18	06.47	08.11	08.45	10.03
	15.24	17.00	18.24	20.54	22.25	23.43	23.19	21.46	20.00	18.17	15.40	14.42
15	09.50	08.24	06.50 17.21-17.45/24	06.03	04.24	03.15	03.50	05.21	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47 17.21-17.46/25	06.00	04.21	03.14	03.53	05.24	06.52	08.17	08.51	10.06
	15.29	17.06	18.30	21.00	22.31	23.45	23.14	21.40	19.53	18.11	15.34	14.41
17	09.45	08.17	06.43 17.20-17.45/25	05.56	04.18	03.13	03.55	05.27	06.55	08.20	08.55	10.08
	15.32	17.09	18.33	21.02	22.34	23.46	23.12	21.36	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40 17.21-17.45/24	05.53	04.15	03.13	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.12	18.36	21.05	22.37	23.47	23.09	21.33	19.46	18.04	15.29	14.41
19	09.41	08.11	06.36 17.20-17.44/24	05.50	04.12	03.12	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.08	22.40	23.47	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33 17.21-17.43/22	05.46	04.10	03.12	04.04	05.36	07.03 18.12-18.24/12	08.29	09.04	10.11
	15.41	17.19	18.41	21.11	22.43	23.48	23.04	21.26	19.40	17.57	15.24	14.41
21	09.36	08.04	06.30 17.21-17.41/20	05.43	04.07	03.12	04.07	05.39	07.06 18.09-18.26/17	08.32	09.07	10.11
	15.44	17.22	18.44	21.14	22.46	23.48	23.01	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26 17.23-17.40/17	05.39	04.04	03.12	04.09	05.42	07.09 18.07-18.26/19	08.35	09.10	10.12
	15.47	17.25	18.47	21.17	22.49	23.49	22.58	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23 17.24-17.37/13	05.36	04.01	03.13	04.12	05.45	07.12 18.05-18.27/22	08.38	09.13	10.12
	15.50	17.28	18.50	21.20	22.52	23.49	22.56	21.16	19.29	17.47	15.16	14.42
24	09.29	07.54	06.19 17.28-17.34/6	05.33	03.58	03.13	04.15	05.48	07.15 18.05-18.27/22	08.40	09.16	10.13
	15.53	17.31	18.53	21.23	22.55	23.48	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.55	03.14	04.18	05.50	07.17 18.04-18.28/24	07.44	09.19	10.13
	15.57	17.34	18.56	21.26	22.58	23.48	22.50	21.09	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.14	04.21	05.53	07.20 18.03-18.28/25	07.47	09.21	10.13
	16.00	17.37	18.59	21.29	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.44	06.09	05.22	03.50	03.15	04.24	05.56	07.23 18.02-18.27/25	07.50	09.24	10.13
	16.03	17.40	19.02	21.32	23.03	23.47	22.44	21.03	19.15	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.48	03.16	04.27	05.59	07.26 18.02-18.26/24	07.53	09.27	10.13
	16.06	17.43	19.04	21.36	23.06	23.46	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.28 18.02-18.26/24	07.56	09.30	10.12
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.08	16.28	15.03	14.48
30	09.12		06.58	05.13	03.43	03.19	04.33	06.05	07.31 18.03-18.25/22	07.59	09.33	10.12
	16.12		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.09		06.55		03.40		04.36	06.08		08.02		10.11
	16.16		20.13		23.14		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	290	0	0	0	0	0	236	55	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 29 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1307)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.36
	14.54	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36	03.22	04.42	06.14	07.37	08.08	09.38
	14.56	16.22	17.49	20.19	21.48	23.19	23.42	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.34	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.41	22.22	20.39	18.55	16.13	14.56
4	10.08	08.58	07.28	06.41	05.00	03.32	03.25	04.48	06.19	07.43	08.14	09.43
	14.59	16.29	17.55	20.25	21.54	23.24	23.40	22.19	20.35	18.52	16.10	14.54
5	10.07	08.55	07.25	06.38	04.56	03.29	03.27	04.51	06.22	07.46	08.17	09.46
	15.02	16.32	17.58	20.28	21.57	23.27	23.38	22.16	20.32	18.48	16.06	14.52
6	10.06	08.52	07.21	06.34	04.53	03.28	03.29	04.54	06.25	07.48	08.21	09.48
	15.04	16.35	18.01	20.31	22.00	23.29	23.36	22.13	20.28	18.45	16.03	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26	03.31	04.58	06.28	07.51	08.24	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.35	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.28	04.47	03.24	03.33	05.01	06.30	07.54	08.27	09.52
	15.08	16.41	18.07	20.36	22.06	23.33	23.33	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.04	06.33	07.57	08.30	09.55
	15.11	16.44	18.10	20.39	22.10	23.35	23.31	22.03	20.18	18.34	15.54	14.47
10	09.59	08.40	07.08	06.21	04.40	03.21	03.38	05.07	06.36	08.00	08.33	09.57
	15.13	16.48	18.13	20.42	22.13	23.37	23.29	22.00	20.14	18.31	15.52	14.46
11	09.58	08.37	07.04	06.17	04.37	03.19	03.40	05.10	06.39	08.03	08.36	09.59
	15.16	16.51	18.16	20.45	22.16	23.39	23.26	21.57	20.11	18.28	15.49	14.45
12	09.56	08.33	07.01	06.14	04.34	03.18	03.43	05.13	06.42	08.05	08.39	10.00
	15.19	16.54	18.19	20.48	22.19	23.40	23.24	21.53	20.08	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.48	05.18	06.47	08.11	08.45	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20	21.47	20.01	18.18	15.40	14.42
15	09.50	08.24	06.50	06.03	04.25	03.15	03.50	05.21	06.50	08.14	08.49	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.22	03.14	03.53	05.24	06.53	08.17	08.52	10.06
	15.30	17.06	18.30	21.00	22.31	23.45	23.15	21.40	19.54	18.11	15.35	14.42
17	09.46	08.18	06.44	05.57	04.19	03.13	03.56	05.27	06.55	08.20	08.55	10.08
	15.33	17.10	18.33	21.03	22.34	23.46	23.12	21.37	19.50	18.08	15.32	14.41
18	09.43	08.14	06.40	05.53	04.16	03.13	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.47	23.09	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.13	03.13	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.27	14.41
20	09.39	08.08	06.33	05.46	04.10	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.43	23.48	23.04	21.27	19.40	17.58	15.24	14.41
21	09.36	08.05	06.30	05.43	04.07	03.12	04.07	05.39	07.06	08.32	09.07	10.11
	15.44	17.22	18.45	21.15	22.46	23.49	23.01	21.23	19.36	17.54	15.21	14.42
22	09.34	08.01	06.26	05.40	04.04	03.13	04.10	05.42	07.09	08.35	09.10	10.12
	15.48	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.13	05.45	07.12	08.38	09.13	10.13
	15.51	17.28	18.50	21.21	22.52	23.49	22.56	21.16	19.29	17.48	15.16	14.43
24	09.29	07.55	06.19	05.33	03.58	03.13	04.16	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.56	03.14	04.18	05.51	07.18	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.48	22.50	21.10	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.14	04.21	05.54	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.25	10.13
	16.03	17.40	19.02	21.33	23.04	23.47	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.41	06.06	05.19	03.48	03.16	04.27	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.05	21.36	23.06	23.47	22.41	20.59	19.12	16.32	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.30	10.13
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.49
30	09.12		06.59	05.13	03.43	03.19	04.33	06.05	07.31	07.59	09.33	10.12
	16.13		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.14		22.32	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 30 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1308)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.45	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36	03.22	04.42	06.14	07.37	08.08	09.38
	14.56	16.22	17.49	20.19	21.48	23.19	23.42	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.34	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.41	22.22	20.39	18.55	16.13	14.56
4	10.08	08.58	07.28	06.41	05.00	03.32	03.25	04.48	06.19	07.43	08.14	09.43
	14.59	16.29	17.55	20.25	21.54	23.24	23.40	22.19	20.35	18.51	16.10	14.54
5	10.07	08.55	07.24	06.38	04.56	03.30	03.27	04.51	06.22	07.45	08.17	09.46
	15.02	16.32	17.58	20.28	21.57	23.27	23.38	22.16	20.32	18.48	16.06	14.52
6	10.05	08.52	07.21	06.34	04.53	03.28	03.29	04.54	06.25	07.48	08.20	09.48
	15.04	16.35	18.01	20.30	22.00	23.29	23.36	22.13	20.28	18.45	16.03	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26	03.31	04.57	06.28	07.51	08.24	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.34	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.27	04.47	03.24	03.33	05.00	06.30	07.54	08.27	09.52
	15.08	16.41	18.07	20.36	22.06	23.33	23.33	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.54
	15.11	16.44	18.10	20.39	22.09	23.35	23.31	22.03	20.18	18.34	15.54	14.47
10	09.59	08.40	07.07	06.21	04.40	03.21	03.38	05.06	06.36	08.00	08.33	09.56
	15.13	16.48	18.13	20.42	22.13	23.37	23.28	22.00	20.14	18.31	15.52	14.46
11	09.58	08.37	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.03	08.36	09.58
	15.16	16.51	18.16	20.45	22.16	23.38	23.26	21.57	20.11	18.28	15.49	14.45
12	09.56	08.33	07.01	06.14	04.34	03.18	03.43	05.12	06.42	08.05	08.39	10.00
	15.19	16.54	18.19	20.48	22.19	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.41	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.48	05.18	06.47	08.11	08.45	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.19	21.47	20.01	18.18	15.40	14.42
15	09.50	08.24	06.50	06.03	04.25	03.15	03.50	05.21	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.22	03.14	03.53	05.24	06.53	08.17	08.52	10.06
	15.30	17.06	18.30	21.00	22.31	23.45	23.15	21.40	19.54	18.11	15.35	14.42
17	09.46	08.17	06.43	05.57	04.19	03.14	03.56	05.27	06.55	08.20	08.55	10.08
	15.33	17.10	18.33	21.03	22.34	23.46	23.12	21.37	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40	05.53	04.16	03.13	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.47	23.09	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.13	03.13	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.27	14.41
20	09.39	08.08	06.33	05.46	04.10	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.12	22.43	23.48	23.04	21.26	19.40	17.58	15.24	14.41
21	09.36	08.04	06.30	05.43	04.07	03.12	04.07	05.39	07.06	08.32	09.07	10.11
	15.44	17.22	18.44	21.15	22.46	23.48	23.01	21.23	19.36	17.54	15.21	14.42
22	09.34	08.01	06.26	05.40	04.04	03.13	04.10	05.42	07.09	08.35	09.10	10.12
	15.48	17.25	18.47	21.18	22.49	23.49	22.58	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.13	05.45	07.12	08.38	09.13	10.12
	15.51	17.28	18.50	21.21	22.52	23.49	22.56	21.16	19.29	17.48	15.16	14.43
24	09.29	07.55	06.19	05.33	03.58	03.13	04.16	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.48	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.56	03.14	04.18	05.51	07.18	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.48	22.50	21.10	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.15	04.21	05.54	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.24	10.13
	16.03	17.40	19.02	21.33	23.03	23.47	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.48	03.16	04.27	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.05	21.36	23.06	23.47	22.41	20.59	19.12	16.32	15.05	14.47
29	09.15		07.02	05.16	03.45	03.18	04.30	06.02	07.29	07.56	09.30	10.13
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.49
30	09.12		06.59	05.13	03.43	03.19	04.33	06.05	07.31	07.59	09.33	10.12
	16.13		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.10		06.55		03.40		04.36	06.08		08.02		10.12
	16.16		20.13		23.14		22.32	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 31 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1309)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.10	03.38	03.20	04.40	06.11 07.05-07.29/24	07.34	08.05	09.36
	14.54	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36	03.22	04.43	06.14 07.04-07.28/24	07.37	08.08	09.38
	14.56	16.22	17.49	20.19	21.48	23.19	23.42	22.26	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45 07.16-07.25/9	05.03	03.34	03.24	04.46	06.16 07.04-07.28/24	07.40	08.11	09.41
	14.58	16.25	17.52	20.22	21.51	23.22	23.41	22.22	20.39	18.55	16.13	14.56
4	10.08	08.58	07.28	06.41 07.13-07.28/15	05.00	03.32	03.25	04.49	06.19 07.04-07.28/24	07.43	08.14	09.43
	15.00	16.29	17.55	20.25	21.54	23.24	23.40	22.19	20.35	18.52	16.10	14.54
5	10.07	08.55	07.25	06.38 07.09-07.28/19	04.56	03.30	03.27	04.52	06.22 07.04-07.26/22	07.46	08.17	09.46
	15.02	16.32	17.58	20.28	21.57	23.27	23.38	22.16	20.32	18.48	16.07	14.52
6	10.05	08.52	07.21	06.35 07.08-07.29/21	04.53	03.28	03.29	04.55	06.25 07.04-07.26/22	07.48	08.21	09.48
	15.04	16.35	18.01	20.31	22.00	23.29	23.36	22.13	20.28	18.45	16.04	14.51
7	10.04	08.49	07.18	06.31 07.08-07.30/22	04.50	03.26	03.31	04.58	06.28 07.06-07.25/19	07.51	08.24	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.35	22.10	20.25	18.41	16.01	14.49
8	10.03	08.46	07.14	06.28 07.06-07.30/24	04.47	03.24	03.33	05.01	06.31 07.07-07.22/15	07.54	08.27	09.52
	15.09	16.41	18.07	20.36	22.06	23.33	23.33	22.06	20.21	18.38	15.58	14.48
9	10.01	08.43	07.11	06.24 07.06-07.30/24	04.44	03.22	03.36	05.04	06.33 07.10-07.20/10	07.57	08.30	09.55
	15.11	16.45	18.10	20.39	22.10	23.35	23.31	22.03	20.18	18.35	15.55	14.47
10	09.59	08.40	07.08	06.21 07.06-07.30/24	04.40	03.21	03.38	05.07	06.36	08.00	08.33	09.57
	15.13	16.48	18.13	20.42	22.13	23.37	23.29	22.00	20.14	18.31	15.52	14.46
11	09.58	08.37	07.04	06.17 07.05-07.29/24	04.37	03.20	03.40	05.10	06.39	08.03	08.36	09.58
	15.16	16.51	18.16	20.45	22.16	23.38	23.26	21.57	20.11	18.28	15.49	14.45
12	09.56	08.33	07.01	06.14 07.05-07.29/24	04.34	03.18	03.43	05.13	06.42	08.06	08.39	10.00
	15.19	16.54	18.19	20.48	22.19	23.40	23.24	21.53	20.08	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10 07.06-07.29/23	04.31	03.17	03.45	05.16	06.44	08.08	08.42	10.02
	15.21	16.57	18.22	20.51	22.22	23.42	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07 07.06-07.28/22	04.28	03.16	03.48	05.19	06.47	08.11	08.45	10.04
	15.24	17.00	18.24	20.54	22.25	23.43	23.20	21.47	20.01	18.18	15.40	14.43
15	09.50	08.24	06.50	06.04 07.06-07.26/20	04.25	03.15	03.50	05.22	06.50	08.14	08.49	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00 07.07-07.25/18	04.22	03.14	03.53	05.25	06.53	08.17	08.52	10.06
	15.30	17.07	18.30	21.00	22.31	23.45	23.15	21.40	19.54	18.11	15.35	14.42
17	09.46	08.18	06.44	05.57 07.09-07.23/14	04.19	03.14	03.56	05.27	06.55	08.20	08.55	10.08
	15.33	17.10	18.33	21.03	22.34	23.46	23.12	21.37	19.50	18.08	15.32	14.41
18	09.43	08.14	06.40	05.53 07.12-07.20/8	04.16	03.13	03.59	05.30	06.58	08.23	08.58	10.09
	15.36	17.13	18.36	21.06	22.37	23.47	23.09	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.13	03.13	04.01	05.33	07.01	08.26	09.01	10.10
	15.39	17.16	18.39	21.09	22.40	23.48	23.07	21.30	19.43	18.01	15.27	14.41
20	09.39	08.08	06.33	05.46	04.10	03.13	04.04	05.36	07.04	08.29	09.04	10.11
	15.42	17.19	18.42	21.12	22.43	23.48	23.04	21.27	19.40	17.58	15.24	14.41
21	09.36	08.05	06.30	05.43	04.07	03.13	04.07	05.39	07.07	08.32	09.07	10.11
	15.45	17.22	18.45	21.15	22.46	23.48	23.01	21.23	19.36	17.54	15.22	14.42
22	09.34	08.01	06.26	05.40	04.04	03.13	04.10	05.42	07.09	08.35	09.10	10.12
	15.48	17.25	18.47	21.18	22.49	23.49	22.59	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.13	05.45	07.12	08.38	09.13	10.13
	15.51	17.28	18.50	21.21	22.52	23.49	22.56	21.16	19.29	17.48	15.17	14.43
24	09.29	07.55	06.19	05.33	03.59	03.13	04.16	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.49	22.53	21.13	19.26	17.45	15.14	14.43
25	09.26	07.51	06.16	05.30	03.56	03.14	04.19	05.51 07.14-07.23/9	07.18	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.48	22.50	21.10	19.23	16.41	15.12	14.44
26	09.23	07.48	06.13	05.26	03.53	03.15	04.22	05.54 07.12-07.26/14	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.10	14.45
27	09.21	07.45	06.09	05.23	03.51	03.16	04.25	05.57 07.09-07.27/18	07.23	07.50	09.25	10.13
	16.03	17.40	19.02	21.33	23.04	23.47	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.41	06.06	05.19	03.48	03.17	04.28	05.59 07.08-07.28/20	07.26	07.53	09.27	10.13
	16.06	17.43	19.05	21.36	23.06	23.47	22.41	20.59	19.12	16.32	15.05	14.47
29	09.15		07.02	05.16	03.45	03.18	04.31	06.02 07.07-07.29/22	07.29	07.56	09.30	10.13
	16.10		20.08	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.49
30	09.12		06.59	05.13	03.43	03.19	04.34	06.05 07.06-07.29/23	07.32	07.59	09.33	10.12
	16.13		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.10		06.55		03.41		04.37	06.08 07.05-07.29/24		08.02		10.12
	16.16		20.13		23.14		22.32	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	311	0	0	0	130	184	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 32 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1310)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.06	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.45	23.17	23.43	22.28	20.45	19.02	16.19	14.59
2	10.10	09.04	07.34	06.48	05.06	03.36	03.22	04.42	06.13	07.37	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.19	23.42	22.25	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.34	03.23	04.45	06.16	07.40	08.11	09.40
	14.57	16.25	17.52	20.22	21.51	23.22	23.41	22.22	20.38	18.55	16.12	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.43	08.14	09.43
	14.59	16.28	17.55	20.25	21.54	23.24	23.39	22.19	20.35	18.51	16.09	14.54
5	10.06	08.55	07.24	06.38	04.56	03.29	03.27	04.51	06.22	07.45	08.17	09.45
	15.01	16.32	17.58	20.27	21.57	23.26	23.38	22.16	20.32	18.48	16.06	14.52
6	10.05	08.52	07.21	06.34	04.53	03.27	03.29	04.54	06.25	07.48	08.20	09.48
	15.04	16.35	18.01	20.30	22.00	23.29	23.36	22.13	20.28	18.45	16.03	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26	03.31	04.57	06.27	07.51	08.23	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.34	22.09	20.25	18.41	16.00	14.49
8	10.02	08.46	07.14	06.27	04.46	03.24	03.33	05.00	06.30	07.54	08.27	09.52
	15.08	16.41	18.07	20.36	22.06	23.33	23.32	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.54
	15.11	16.44	18.10	20.39	22.09	23.35	23.30	22.03	20.18	18.34	15.54	14.47
10	09.59	08.39	07.07	06.20	04.40	03.21	03.38	05.06	06.36	08.00	08.33	09.56
	15.13	16.47	18.13	20.42	22.12	23.36	23.28	22.00	20.14	18.31	15.51	14.46
11	09.57	08.36	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.02	08.36	09.58
	15.16	16.51	18.15	20.45	22.15	23.38	23.26	21.56	20.11	18.28	15.48	14.45
12	09.56	08.33	07.00	06.14	04.34	03.18	03.42	05.12	06.41	08.05	08.39	10.00
	15.18	16.54	18.18	20.48	22.19	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.41	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.48	05.18	06.47	08.11	08.45	10.03
	15.24	17.00	18.24	20.54	22.25	23.43	23.19	21.46	20.00	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.25	03.15	03.50	05.21	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.22	03.14	03.53	05.24	06.52	08.17	08.51	10.06
	15.30	17.06	18.30	21.00	22.31	23.45	23.14	21.40	19.53	18.11	15.34	14.41
17	09.45	08.17	06.43	05.56	04.18	03.13	03.56	05.27	06.55	08.20	08.54	10.07
	15.32	17.09	18.33	21.02	22.34	23.46	23.12	21.36	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40	05.53	04.16	03.13	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.05	22.37	23.47	23.09	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.36	05.50	04.13	03.13	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.08	22.40	23.47	23.06	21.30	19.43	18.01	15.26	14.41
20	09.38	08.08	06.33	05.46	04.10	03.12	04.04	05.36	07.04	08.29	09.04	10.10
	15.41	17.19	18.41	21.11	22.43	23.48	23.04	21.26	19.40	17.57	15.24	14.41
21	09.36	08.04	06.30	05.43	04.07	03.12	04.07	05.39	07.06	08.32	09.07	10.11
	15.44	17.22	18.44	21.14	22.46	23.48	23.01	21.23	19.36	17.54	15.21	14.41
22	09.34	08.01	06.26	05.39	04.04	03.12	04.10	05.42	07.09	08.35	09.10	10.12
	15.47	17.25	18.47	21.17	22.49	23.48	22.58	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.12	05.45	07.12	08.37	09.13	10.12
	15.50	17.28	18.50	21.20	22.52	23.48	22.55	21.16	19.29	17.48	15.16	14.42
24	09.28	07.54	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.40	09.16	10.13
	15.54	17.31	18.53	21.23	22.55	23.48	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.56	03.14	04.18	05.51	07.17	07.43	09.19	10.13
	15.57	17.34	18.56	21.26	22.58	23.48	22.50	21.09	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.14	04.21	05.53	07.20	07.47	09.21	10.13
	16.00	17.37	18.59	21.29	23.00	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.20	07.44	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.24	10.13
	16.03	17.40	19.02	21.32	23.03	23.47	22.44	21.03	19.15	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.48	03.16	04.27	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.04	21.35	23.06	23.46	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.28	07.56	09.30	10.12
	16.09		20.07	21.39	23.09	23.45	22.38	20.56	19.08	16.28	15.03	14.48
30	09.12		06.58	05.13	03.43	03.19	04.33	06.05	07.31	07.59	09.33	10.12
	16.12		20.10	21.42	23.11	23.44	22.35	20.52	19.05	16.25	15.01	14.50
31	09.09		06.55		03.40		04.36	06.08		08.02		10.11
	16.16		20.13		23.14		22.32	20.49		16.22		14.51
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 33 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1311)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June
1	10.10	09.06	07.38	06.51 19.07-19.31/24	05.09	03.38
	14.54	16.19	17.46	20.16	21.45	23.17
2	10.10	09.04 15.32-15.33/1	07.34	06.48 19.07-19.32/25	05.06	03.36
	14.55	16.22	17.49	20.19	21.48	23.19
3	10.09	09.01 15.30-15.38/8	07.31	06.45 19.07-19.32/25	05.03	03.33
	14.57	16.25	17.52	20.22	21.51	23.22
4	10.08	08.58 15.28-15.41/13	07.28	06.41 19.07-19.31/24	04.59	03.31
	14.59	16.28	17.55	20.24	21.54	23.24
5	10.06	08.55 15.28-15.46/18	07.24	06.38 19.07-19.30/23	04.56	03.29
	15.01	16.32	17.58	20.27	21.57	23.26
6	10.05	08.52 15.27-15.47/20	07.21	06.34 19.07-19.28/21	04.53	03.27
	15.04	16.35	18.01	20.30	22.00	23.28
7	10.04	08.49 15.26-15.47/21	07.17	06.31 19.08-19.28/20	04.50	03.26
	15.06	16.38	18.04	20.33	22.03	23.31
8	10.02	08.46 15.26-15.48/22	07.14	06.27 19.10-19.26/16	04.46	03.24
	15.08	16.41	18.07	20.36	22.06	23.33
9	10.01	08.43 15.25-15.48/23	07.11	06.24 19.11-19.24/13	04.43	03.22
	15.11	16.44	18.10	20.39	22.09	23.35
10	09.59	08.39 15.26-15.49/23	07.07	06.20 19.14-19.20/6	04.40	03.21
	15.13	16.47	18.13	20.42	22.12	23.36
11	09.57	08.36 15.25-15.49/24	07.04	06.17	04.37	03.19
	15.16	16.51	18.15	20.45	22.15	23.38
12	09.56	08.33 15.26-15.49/23	07.00	06.14	04.34	03.18
	15.18	16.54	18.18	20.48	22.18	23.40
13	09.54	08.30 15.26-15.48/22	06.57	06.10	04.31	03.17
	15.21	16.57	18.21	20.51	22.22	23.41
14	09.52	08.27 15.26-15.47/21	06.54	06.07	04.28	03.16
	15.24	17.00	18.24	20.54	22.25	23.43
15	09.50	08.24 15.27-15.47/20	06.50	06.03	04.24	03.15
	15.27	17.03	18.27	20.57	22.28	23.44
16	09.47	08.20 15.28-15.46/18	06.47	06.00	04.21	03.14
	15.29	17.06	18.30	20.59	22.31	23.45
17	09.45	08.17 15.30-15.45/15	06.43	05.56	04.18	03.13
	15.32	17.09	18.33	21.02	22.34	23.46
18	09.43	08.14 15.32-15.42/10	06.40	05.53	04.15	03.13
	15.35	17.12	18.36	21.05	22.37	23.47
19	09.41	08.11	06.36	05.50	04.12	03.13
	15.38	17.16	18.39	21.08	22.40	23.47
20	09.38	08.08	06.33	05.46	04.10	03.12
	15.41	17.19	18.41	21.11	22.43	23.48
21	09.36	08.04	06.29	05.43	04.07	03.12
	15.44	17.22	18.44	21.14	22.46	23.48
22	09.33	08.01	06.26	05.39	04.04	03.12
	15.47	17.25	18.47	21.17	22.49	23.48
23	09.31	07.58	06.23	05.36	04.01	03.13
	15.50	17.28	18.50	21.20	22.52	23.48
24	09.28	07.54	06.19	05.33	03.58	03.13
	15.54	17.31	18.53	21.23	22.55	23.48
25	09.26	07.51	06.16	05.29	03.56	03.14
	15.57	17.34	18.56	21.26	22.58	23.48
26	09.23	07.48	06.12 18.17-18.24/7	05.26	03.53	03.14
	16.00	17.37	18.59	21.29	23.00	23.48
27	09.20	07.44	06.09 18.15-18.27/12	05.23	03.50	03.15
	16.03	17.40	19.01	21.32	23.03	23.47
28	09.18	07.41	06.05 18.12-18.29/17	05.19	03.48	03.16
	16.06	17.43	19.04	21.35	23.06	23.46
29	09.15		07.02 19.11-19.31/20	05.16	03.45	03.17
	16.09		20.07	21.38	23.09	23.45
30	09.12		06.58 19.09-19.31/22	05.13	03.43	03.19
	16.12		20.10	21.42	23.11	23.44
31	09.09		06.55 19.09-19.32/23		03.40	
	16.16		20.13		23.14	
Potential sun hours	179	241	363	448	562	610
Sum of minutes with flicker	0	302	101	197	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 33 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1311)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	July	August	September		October		November		December
1	03.20	04.39	06.11		07.34		08.05	14.55-15.18/23	09.35
	23.43	22.28	20.45		19.02		16.19		14.59
2	03.22	04.42	06.13	19.13-19.19/6	07.37		08.08	14.55-15.18/23	09.38
	23.42	22.25	20.42		18.58		16.16		14.57
3	03.23	04.45	06.16	19.09-19.22/13	07.40		08.11	14.55-15.18/23	09.40
	23.41	22.22	20.38		18.55		16.12		14.55
4	03.25	04.48	06.19	19.07-19.23/16	07.42		08.14	14.56-15.18/22	09.43
	23.39	22.19	20.35		18.51		16.09		14.54
5	03.27	04.51	06.22	19.05-19.25/20	07.45		08.17	14.56-15.16/20	09.45
	23.38	22.16	20.31		18.48		16.06		14.52
6	03.29	04.54	06.25	19.03-19.25/22	07.48		08.20	14.57-15.15/18	09.48
	23.36	22.13	20.28		18.44		16.03		14.51
7	03.31	04.57	06.27	19.02-19.25/23	07.51		08.23	14.59-15.11/12	09.50
	23.34	22.09	20.25		18.41		16.00		14.49
8	03.33	05.00	06.30	19.02-19.26/24	07.54		08.26	15.01-15.08/7	09.52
	23.32	22.06	20.21		18.38		15.57		14.48
9	03.35	05.03	06.33	19.01-19.25/24	07.57		08.30	15.03-15.04/1	09.54
	23.30	22.03	20.18		18.34		15.54		14.47
10	03.38	05.06	06.36	19.01-19.25/24	07.59		08.33		09.56
	23.28	22.00	20.14		18.31		15.51		14.46
11	03.40	05.09	06.39	19.01-19.25/24	08.02		08.36		09.58
	23.26	21.56	20.11		18.27		15.48		14.45
12	03.42	05.12	06.41	19.00-19.23/23	08.05		08.39		10.00
	23.24	21.53	20.07		18.24		15.46		14.44
13	03.45	05.15	06.44	19.01-19.23/22	08.08		08.42		10.02
	23.22	21.50	20.04		18.21		15.43		14.43
14	03.47	05.18	06.47	19.01-19.22/21	08.11		08.45		10.03
	23.19	21.46	20.00		18.17		15.40		14.42
15	03.50	05.21	06.50	19.01-19.20/19	08.14		08.48		10.05
	23.17	21.43	19.57		18.14		15.37		14.42
16	03.53	05.24	06.52	19.03-19.16/13	08.17		08.51		10.06
	23.14	21.40	19.53		18.11		15.34		14.41
17	03.55	05.27	06.55	19.05-19.13/8	08.20		08.54		10.07
	23.12	21.36	19.50		18.07		15.32		14.41
18	03.58	05.30	06.58		08.23		08.57		10.08
	23.09	21.33	19.46		18.04		15.29		14.41
19	04.01	05.33	07.01		08.26		09.01		10.09
	23.06	21.30	19.43		18.01		15.26		14.41
20	04.04	05.36	07.03		08.29		09.04		10.10
	23.04	21.26	19.40		17.57		15.24		14.41
21	04.07	05.39	07.06		08.31		09.07		10.11
	23.01	21.23	19.36		17.54		15.21		14.41
22	04.10	05.42	07.09		08.34		09.10		10.12
	22.58	21.19	19.33		17.51		15.19		14.42
23	04.12	05.45	07.12		08.37	16.06-16.10/4	09.13		10.12
	22.55	21.16	19.29		17.47		15.16		14.42
24	04.15	05.48	07.15		08.40	16.01-16.13/12	09.16		10.13
	22.52	21.13	19.26		17.44		15.14		14.43
25	04.18	05.50	07.17		07.43	14.59-15.15/16	09.18		10.13
	22.50	21.09	19.22		16.41		15.12		14.44
26	04.21	05.53	07.20		07.46	14.58-15.16/18	09.21		10.13
	22.47	21.06	19.19		16.38		15.09		14.45
27	04.24	05.56	07.23		07.49	14.56-15.17/21	09.24		10.13
	22.44	21.02	19.15		16.35		15.07		14.46
28	04.27	05.59	07.26		07.53	14.56-15.18/22	09.27		10.13
	22.41	20.59	19.12		16.31		15.05		14.47
29	04.30	06.02	07.28		07.56	14.55-15.18/23	09.30		10.12
	22.38	20.56	19.08		16.28		15.03		14.48
30	04.33	06.05	07.31		07.59	14.55-15.18/23	09.33		10.12
	22.35	20.52	19.05		16.25		15.01		14.50
31	04.36	06.08			08.02	14.55-15.18/23			10.11
	22.32	20.49			16.22				14.51
Potential sun hours	598	504	392		307		204		147
Sum of minutes with flicker	0	0	302		162		149		0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi

Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 34 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1312)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.45	23.17	23.43	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36	03.22	04.43	06.14	07.37	08.08	09.38
	14.56	16.22	17.49	20.19	21.48	23.19	23.42	22.25	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.34	03.24	04.46	06.16	07.40	08.11	09.41
	14.58	16.25	17.52	20.22	21.51	23.22	23.41	22.22	20.39	18.55	16.13	14.56
4	10.08	08.58	07.28	06.41	05.00	03.32	03.25	04.49	06.19	07.43	08.14	09.43
	15.00	16.29	17.55	20.25	21.54	23.24	23.39	22.19	20.35	18.52	16.10	14.54
5	10.07	08.55	07.24	06.38	04.56	03.30	03.27	04.52	06.22	07.46	08.17	09.45
	15.02	16.32	17.58	20.28	21.57	23.26	23.38	22.16	20.32	18.48	16.07	14.52
6	10.05	08.52	07.21	06.34	04.53	03.28	03.29	04.55	06.25	07.48	08.20	09.48
	15.04	16.35	18.01	20.30	22.00	23.29	23.36	22.13	20.28	18.45	16.04	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26	03.31	04.58	06.28	07.51	08.24	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.34	22.10	20.25	18.41	16.00	14.49
8	10.03	08.46	07.14	06.28	04.47	03.24	03.33	05.01	06.30	07.54	08.27	09.52
	15.09	16.41	18.07	20.36	22.06	23.33	23.32	22.06	20.21	18.38	15.58	14.48
9	10.01	08.43	07.11	06.24	04.44	03.23	03.36	05.04	06.33	07.57	08.30	09.54
	15.11	16.45	18.10	20.39	22.09	23.35	23.30	22.03	20.18	18.34	15.55	14.47
10	09.59	08.40	07.08	06.21	04.40	03.21	03.38	05.07	06.36	08.00	08.33	09.56
	15.13	16.48	18.13	20.42	22.13	23.37	23.28	22.00	20.14	18.31	15.52	14.46
11	09.58	08.37	07.04	06.17	04.37	03.20	03.40	05.10	06.39	08.03	08.36	09.58
	15.16	16.51	18.16	20.45	22.16	23.38	23.26	21.57	20.11	18.28	15.49	14.45
12	09.56	08.33	07.01	06.14	04.34	03.18	03.43	05.13	06.42	08.05	08.39	10.00
	15.19	16.54	18.19	20.48	22.19	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.16	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.41	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.48	05.19	06.47	08.11	08.45	10.03
	15.24	17.00	18.24	20.54	22.25	23.43	23.19	21.47	20.01	18.18	15.40	14.43
15	09.50	08.24	06.50	06.03	04.25	03.15	03.50	05.22	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.22	03.14	03.53	05.24	06.53	08.17	08.52	10.06
	15.30	17.07	18.30	21.00	22.31	23.45	23.14	21.40	19.54	18.11	15.35	14.42
17	09.45	08.17	06.44	05.57	04.19	03.14	03.56	05.27	06.55	08.20	08.55	10.08
	15.33	17.10	18.33	21.03	22.34	23.46	23.12	21.37	19.50	18.08	15.32	14.41
18	09.43	08.14	06.40	05.53	04.16	03.13	03.59	05.30	06.58	08.23	08.58	10.09
	15.36	17.13	18.36	21.06	22.37	23.47	23.09	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.13	03.13	04.01	05.33	07.01	08.26	09.01	10.10
	15.39	17.16	18.39	21.09	22.40	23.47	23.07	21.30	19.43	18.01	15.27	14.41
20	09.39	08.08	06.33	05.46	04.10	03.13	04.04	05.36	07.04	08.29	09.04	10.11
	15.42	17.19	18.42	21.12	22.43	23.48	23.04	21.26	19.40	17.58	15.24	14.41
21	09.36	08.04	06.30	05.43	04.07	03.13	04.07	05.39	07.06	08.32	09.07	10.11
	15.45	17.22	18.45	21.15	22.46	23.48	23.01	21.23	19.36	17.54	15.22	14.42
22	09.34	08.01	06.26	05.40	04.04	03.13	04.10	05.42	07.09	08.35	09.10	10.12
	15.48	17.25	18.47	21.18	22.49	23.48	22.58	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.13	05.45	07.12	08.38	09.13	10.12
	15.51	17.28	18.50	21.21	22.52	23.48	22.56	21.16	19.29	17.48	15.17	14.43
24	09.29	07.55	06.19	05.33	03.59	03.13	04.16	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.48	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.56	03.14	04.19	05.51	07.18	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.48	22.50	21.10	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.15	04.22	05.54	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.10	14.45
27	09.21	07.45	06.09	05.23	03.51	03.16	04.25	05.57	07.23	07.50	09.24	10.13
	16.03	17.40	19.02	21.33	23.03	23.47	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.41	06.06	05.19	03.48	03.17	04.27	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.05	21.36	23.06	23.46	22.41	20.59	19.12	16.32	15.05	14.47
29	09.15		07.02	05.16	03.45	03.18	04.30	06.02	07.29	07.56	09.30	10.12
	16.10		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.49
30	09.12		06.59	05.13	03.43	03.19	04.33	06.05	07.31	07.59	09.33	10.12
	16.13		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.10		06.55		03.41		04.36	06.08		08.02		10.11
	16.16		20.13		23.14		22.32	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 35 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1313)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.45	23.17	23.44	22.29	20.45	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36	03.22	04.42	06.13	07.37	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.19	23.42	22.25	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.34	03.23	04.45	06.16	07.40	08.11	09.41
	14.57	16.25	17.52	20.22	21.51	23.22	23.41	22.22	20.39	18.55	16.13	14.55
4	10.08	08.58	07.28	06.41	04.59	03.31	03.25	04.48	06.19	07.43	08.14	09.43
	14.59	16.28	17.55	20.25	21.54	23.24	23.39	22.19	20.35	18.51	16.09	14.54
5	10.07	08.55	07.24	06.38	04.56	03.29	03.27	04.51	06.22	07.45	08.17	09.45
	15.01	16.32	17.58	20.27	21.57	23.26	23.38	22.16	20.32	18.48	16.06	14.52
6	10.05	08.52	07.21	06.34	04.53	03.28	03.29	04.54	06.25	07.48	08.20	09.48
	15.04	16.35	18.01	20.30	22.00	23.29	23.36	22.13	20.28	18.45	16.03	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26	03.31	04.57	06.28	07.51	08.23	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.34	22.10	20.25	18.41	16.00	14.49
8	10.02	08.46	07.14	06.27	04.47	03.24	03.33	05.00	06.30	07.54	08.27	09.52
	15.08	16.41	18.07	20.36	22.06	23.33	23.32	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.54
	15.11	16.44	18.10	20.39	22.09	23.35	23.30	22.03	20.18	18.34	15.54	14.47
10	09.59	08.40	07.07	06.21	04.40	03.21	03.38	05.06	06.36	08.00	08.33	09.56
	15.13	16.48	18.13	20.42	22.12	23.37	23.28	22.00	20.14	18.31	15.51	14.46
11	09.58	08.36	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.02	08.36	09.58
	15.16	16.51	18.16	20.45	22.16	23.38	23.26	21.56	20.11	18.28	15.49	14.45
12	09.56	08.33	07.01	06.14	04.34	03.18	03.42	05.12	06.41	08.05	08.39	10.00
	15.19	16.54	18.18	20.48	22.19	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.41	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.48	05.18	06.47	08.11	08.45	10.03
	15.24	17.00	18.24	20.54	22.25	23.43	23.19	21.47	20.00	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.25	03.15	03.50	05.21	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.22	03.14	03.53	05.24	06.53	08.17	08.51	10.06
	15.30	17.06	18.30	21.00	22.31	23.45	23.14	21.40	19.54	18.11	15.34	14.41
17	09.45	08.17	06.43	05.56	04.19	03.13	03.56	05.27	06.55	08.20	08.55	10.08
	15.32	17.10	18.33	21.03	22.34	23.46	23.12	21.37	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40	05.53	04.16	03.13	03.58	05.30	06.58	08.23	08.58	10.09
	15.35	17.13	18.36	21.06	22.37	23.47	23.09	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.13	03.13	04.01	05.33	07.01	08.26	09.01	10.10
	15.38	17.16	18.39	21.09	22.40	23.47	23.07	21.30	19.43	18.01	15.26	14.41
20	09.39	08.08	06.33	05.46	04.10	03.12	04.04	05.36	07.04	08.29	09.04	10.11
	15.41	17.19	18.42	21.11	22.43	23.48	23.04	21.26	19.40	17.57	15.24	14.41
21	09.36	08.04	06.30	05.43	04.07	03.12	04.07	05.39	07.06	08.32	09.07	10.11
	15.44	17.22	18.44	21.14	22.46	23.48	23.01	21.23	19.36	17.54	15.21	14.42
22	09.34	08.01	06.26	05.39	04.04	03.13	04.10	05.42	07.09	08.35	09.10	10.12
	15.47	17.25	18.47	21.17	22.49	23.48	22.58	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.13	05.45	07.12	08.38	09.13	10.12
	15.51	17.28	18.50	21.20	22.52	23.49	22.56	21.16	19.29	17.48	15.16	14.42
24	09.29	07.55	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.23	22.55	23.48	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.56	03.14	04.18	05.51	07.17	07.44	09.19	10.13
	15.57	17.34	18.56	21.26	22.58	23.48	22.50	21.09	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.14	04.21	05.53	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.09	14.45
27	09.21	07.45	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.50	09.24	10.13
	16.03	17.40	19.02	21.33	23.03	23.47	22.44	21.03	19.15	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.48	03.16	04.27	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.04	21.36	23.06	23.46	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.17	04.30	06.02	07.29	07.56	09.30	10.12
	16.09		20.07	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.49
30	09.12		06.59	05.13	03.43	03.19	04.33	06.05	07.31	07.59	09.33	10.12
	16.13		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.09		06.55		03.40		04.36	06.08		08.02		10.11
	16.16		20.13		23.14		22.32	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 36 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1314)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.10	03.38	03.21	04.40	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.45	23.17	23.43	22.29	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36	03.22	04.43	06.14	07.37	08.08	09.38
	14.56	16.22	17.49	20.19	21.48	23.19	23.42	22.26	20.42	18.58	16.16	14.58
3	10.09	09.01	07.31	06.45	05.03	03.34	03.24	04.46	06.17	07.40	08.11	09.41
	14.58	16.26	17.52	20.22	21.51	23.22	23.41	22.22	20.39	18.55	16.13	14.56
4	10.08	08.58	07.28	06.41	05.00	03.32	03.25	04.49	06.19	07.43	08.14	09.43
	15.00	16.29	17.55	20.25	21.54	23.24	23.39	22.19	20.35	18.52	16.10	14.54
5	10.07	08.55	07.25	06.38	04.56	03.30	03.27	04.52	06.22	07.46	08.17	09.46
	15.02	16.32	17.58	20.28	21.57	23.26	23.38	22.16	20.32	18.48	16.07	14.52
6	10.05	08.52	07.21	06.35	04.53	03.28	03.29	04.55	06.25	07.48	08.20	09.48
	15.04	16.35	18.01	20.31	22.00	23.29	23.36	22.13	20.28	18.45	16.04	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26	03.31	04.58	06.28	07.51	08.24	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.34	22.10	20.25	18.41	16.01	14.50
8	10.03	08.46	07.14	06.28	04.47	03.24	03.33	05.01	06.31	07.54	08.27	09.52
	15.09	16.41	18.07	20.36	22.06	23.33	23.32	22.06	20.21	18.38	15.58	14.48
9	10.01	08.43	07.11	06.24	04.44	03.23	03.36	05.04	06.33	07.57	08.30	09.54
	15.11	16.45	18.10	20.39	22.09	23.35	23.30	22.03	20.18	18.35	15.55	14.47
10	09.59	08.40	07.08	06.21	04.40	03.21	03.38	05.07	06.36	08.00	08.33	09.56
	15.14	16.48	18.13	20.42	22.13	23.37	23.28	22.00	20.14	18.31	15.52	14.46
11	09.58	08.37	07.04	06.17	04.37	03.20	03.40	05.10	06.39	08.03	08.36	09.58
	15.16	16.51	18.16	20.45	22.16	23.38	23.26	21.57	20.11	18.28	15.49	14.45
12	09.56	08.33	07.01	06.14	04.34	03.18	03.43	05.13	06.42	08.05	08.39	10.00
	15.19	16.54	18.19	20.48	22.19	23.40	23.24	21.53	20.08	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.16	06.44	08.08	08.42	10.02
	15.21	16.57	18.22	20.51	22.22	23.41	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.48	05.19	06.47	08.11	08.45	10.03
	15.24	17.00	18.24	20.54	22.25	23.43	23.19	21.47	20.01	18.18	15.40	14.43
15	09.50	08.24	06.50	06.04	04.25	03.15	03.51	05.22	06.50	08.14	08.48	10.05
	15.27	17.04	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.22	03.14	03.53	05.25	06.53	08.17	08.52	10.06
	15.30	17.07	18.30	21.00	22.31	23.45	23.14	21.40	19.54	18.11	15.35	14.42
17	09.46	08.18	06.44	05.57	04.19	03.14	03.56	05.27	06.55	08.20	08.55	10.08
	15.33	17.10	18.33	21.03	22.34	23.46	23.12	21.37	19.50	18.08	15.32	14.42
18	09.43	08.14	06.40	05.53	04.16	03.13	03.59	05.30	06.58	08.23	08.58	10.09
	15.36	17.13	18.36	21.06	22.37	23.47	23.09	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.13	03.13	04.01	05.33	07.01	08.26	09.01	10.10
	15.39	17.16	18.39	21.09	22.40	23.47	23.07	21.30	19.43	18.01	15.27	14.41
20	09.39	08.08	06.33	05.46	04.10	03.13	04.04	05.36	07.04	08.29	09.04	10.11
	15.42	17.19	18.42	21.12	22.43	23.48	23.04	21.27	19.40	17.58	15.24	14.42
21	09.36	08.05	06.30	05.43	04.07	03.13	04.07	05.39	07.07	08.32	09.07	10.11
	15.45	17.22	18.45	21.15	22.46	23.48	23.01	21.23	19.36	17.54	15.22	14.42
22	09.34	08.01	06.26	05.40	04.04	03.13	04.10	05.42	07.09	08.35	09.10	10.12
	15.48	17.25	18.47	21.18	22.49	23.48	22.58	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.13	05.45	07.12	08.38	09.13	10.12
	15.51	17.28	18.50	21.21	22.52	23.48	22.56	21.16	19.29	17.48	15.17	14.43
24	09.29	07.55	06.19	05.33	03.59	03.14	04.16	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55	23.48	22.53	21.13	19.26	17.45	15.14	14.43
25	09.26	07.51	06.16	05.30	03.56	03.14	04.19	05.51	07.18	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.48	22.50	21.10	19.23	16.41	15.12	14.44
26	09.23	07.48	06.13	05.26	03.53	03.15	04.22	05.54	07.20	07.47	09.22	10.13
	16.00	17.37	18.59	21.30	23.01	23.48	22.47	21.06	19.19	16.38	15.10	14.45
27	09.21	07.45	06.09	05.23	03.51	03.16	04.25	05.57	07.23	07.50	09.24	10.13
	16.03	17.40	19.02	21.33	23.03	23.47	22.44	21.03	19.16	16.35	15.08	14.46
28	09.18	07.41	06.06	05.20	03.48	03.17	04.28	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.05	21.36	23.06	23.46	22.41	20.59	19.12	16.32	15.05	14.48
29	09.15		07.02	05.16	03.46	03.18	04.31	06.02	07.29	07.56	09.30	10.12
	16.10		20.08	21.39	23.09	23.46	22.38	20.56	19.09	16.28	15.03	14.49
30	09.12		06.59	05.13	03.43	03.19	04.34	06.05	07.32	07.59	09.33	10.12
	16.13		20.10	21.42	23.12	23.45	22.35	20.52	19.05	16.25	15.01	14.50
31	09.10		06.55		03.41		04.37	06.08		08.02		10.11
	16.16		20.13		23.14		22.32	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 37 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1315)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.06	07.38 16.41-17.03/22	06.51	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.45	23.16	23.43	22.28	20.45	19.02	16.19	14.59
2	10.09	09.03	07.34 16.40-17.03/23	06.48	05.06	03.36	03.22	04.42	06.13	07.37	08.08	09.38
	14.55	16.22	17.49	20.19	21.48	23.19	23.42	22.25	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31 16.41-17.03/22	06.45	05.03	03.34	03.23	04.45	06.16	07.40	08.11	09.40
	14.57	16.25	17.52	20.22	21.51	23.21	23.41	22.22	20.38	18.55	16.12	14.55
4	10.07	08.58	07.28 16.40-17.03/23	06.41	04.59	03.32	03.25	04.48	06.19	07.42 17.23-17.32/9	08.14	09.43
	14.59	16.28	17.55	20.24	21.54	23.24	23.39	22.19	20.35	18.51	16.09	14.54
5	10.06	08.55	07.24 16.41-17.03/22	06.38	04.56	03.29	03.27	04.51	06.22	07.45 17.20-17.35/15	08.17	09.45
	15.01	16.32	17.58	20.27	21.57	23.26	23.38	22.16	20.31	18.48	16.06	14.52
6	10.05	08.52	07.21 16.41-17.01/20	06.34	04.53	03.28	03.29	04.54	06.25	07.48 17.18-17.36/18	08.20	09.48
	15.04	16.35	18.01	20.30	22.00	23.28	23.36	22.12	20.28	18.44	16.03	14.51
7	10.04	08.49	07.17 16.42-17.01/19	06.31	04.50	03.26	03.31	04.57	06.27	07.51 17.17-17.36/19	08.23	09.50
	15.06	16.38	18.04	20.33	22.03	23.30	23.34	22.09	20.25	18.41	16.00	14.49
8	10.02	08.46	07.14 16.42-16.59/17	06.27	04.46	03.24	03.33	05.00	06.30	07.54 17.16-17.37/21	08.26	09.52
	15.08	16.41	18.07	20.36	22.06	23.32	23.32	22.06	20.21	18.38	15.57	14.48
9	10.01	08.42	07.11 16.44-16.56/12	06.24	04.43	03.22	03.35	05.03	06.33	07.57 17.15-17.37/22	08.29	09.54
	15.11	16.44	18.10	20.39	22.09	23.34	23.30	22.03	20.18	18.34	15.54	14.47
10	09.59	08.39	07.07 16.48-16.53/5	06.20	04.40	03.21	03.38	05.06	06.36	07.59 17.14-17.37/23	08.33	09.56
	15.13	16.47	18.13	20.42	22.12	23.36	23.28	22.00	20.14	18.31	15.51	14.46
11	09.57	08.36	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.02 17.14-17.37/23	08.36	09.58
	15.16	16.51	18.15	20.45	22.15	23.38	23.26	21.56	20.11	18.27	15.48	14.45
12	09.55	08.33	07.00	06.14	04.34	03.18	03.43	05.12	06.41	08.05 17.14-17.36/22	08.39	10.00
	15.18	16.54	18.18	20.48	22.18	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.15	06.44	08.08 17.14-17.36/22	08.42	10.02
	15.21	16.57	18.21	20.51	22.21	23.41	23.21	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.48	05.18	06.47	08.11 17.15-17.36/21	08.45	10.03
	15.24	17.00	18.24	20.54	22.25	23.42	23.19	21.46	20.00	18.17	15.40	14.42
15	09.49	08.24	06.50	06.03	04.25	03.15	03.50	05.21	06.50	08.14 17.16-17.34/18	08.48	10.05
	15.27	17.03	18.27	20.56	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.47	08.20	06.47	06.00	04.22	03.14	03.53	05.24	06.52	08.17 17.17-17.31/14	08.51	10.06
	15.30	17.06	18.30	20.59	22.31	23.45	23.14	21.40	19.53	18.11	15.34	14.42
17	09.45	08.17	06.43	05.56	04.19	03.14	03.56	05.27	06.55	08.20 17.18-17.27/9	08.54	10.07
	15.32	17.09	18.33	21.02	22.34	23.46	23.12	21.36	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40	05.53	04.16	03.13	03.58	05.30	06.58	08.23 17.21-17.23/2	08.57	10.08
	15.35	17.13	18.36	21.05	22.37	23.46	23.09	21.33	19.46	18.04	15.29	14.41
19	09.41	08.11	06.36	05.50	04.13	03.13	04.01	05.33	07.01	08.26	09.00	10.09
	15.38	17.16	18.39	21.08	22.40	23.47	23.06	21.30	19.43	18.01	15.26	14.41
20	09.38	08.07	06.33	05.46	04.10	03.13	04.04	05.36	07.03	08.28	09.03	10.10
	15.41	17.19	18.41	21.11	22.43	23.48	23.04	21.26	19.40	17.57	15.24	14.41
21	09.36	08.04	06.29	05.43	04.07	03.12	04.07	05.39	07.06	08.31	09.07	10.11
	15.44	17.22	18.44	21.14	22.46	23.48	23.01	21.23	19.36	17.54	15.21	14.42
22	09.33	08.01	06.26	05.39	04.04	03.13	04.10	05.42	07.09	08.34	09.10	10.12
	15.47	17.25	18.47	21.17	22.49	23.48	22.58	21.19	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.13	05.45	07.12	08.37	09.12	10.12
	15.50	17.28	18.50	21.20	22.52	23.48	22.55	21.16	19.29	17.48	15.16	14.43
24	09.28	07.54 16.49-16.53/4	06.19	05.33	03.58	03.13	04.15	05.48	07.15	08.40	09.15	10.12
	15.54	17.31	18.53	21.23	22.55	23.48	22.52	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51 16.46-16.56/10	06.16	05.29	03.56	03.14	04.18	05.51	07.17	07.43	09.18	10.13
	15.57	17.34	18.56	21.26	22.57	23.48	22.49	21.09	19.22	16.41	15.12	14.44
26	09.23	07.48 16.43-16.59/16	06.12	05.26	03.53	03.15	04.21	05.53	07.20	07.46	09.21	10.13
	16.00	17.37	18.59	21.29	23.00	23.47	22.47	21.06	19.19	16.38	15.09	14.45
27	09.20	07.44 16.43-17.02/19	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.49	09.24	10.13
	16.03	17.40	19.01	21.32	23.03	23.47	22.44	21.02	19.15	16.35	15.07	14.46
28	09.18	07.41 16.41-17.02/21	06.05	05.19	03.48	03.16	04.27	05.59	07.26	07.52	09.27	10.12
	16.06	17.43	19.04	21.35	23.06	23.46	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.18	04.30	06.02	07.28	07.56	09.30	10.12
	16.09		20.07	21.38	23.09	23.45	22.38	20.56	19.08	16.28	15.03	14.49
30	09.12		06.58	05.13	03.43	03.19	04.33	06.05	07.31	07.59	09.32	10.12
	16.12		20.10	21.41	23.11	23.44	22.35	20.52	19.05	16.25	15.01	14.50
31	09.09		06.55		03.40		04.36	06.08		08.02		10.11
	16.16		20.13		23.14		22.31	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	70	185	0	0	0	0	0	0	258	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 38 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1316)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.06	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.45	23.17	23.43	22.28	20.45	19.02	16.19	14.59
2	10.10	09.04	07.34	06.48	05.06	03.36	03.22	04.42	06.13	07.37	08.08	09.38
	14.56	16.22	17.49	20.19	21.48	23.19	23.42	22.25	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.34	03.23	04.45	06.16	07.40	08.11	09.40
	14.57	16.25	17.52	20.22	21.51	23.21	23.41	22.22	20.38	18.55	16.13	14.56
4	10.08	08.58	07.28	06.41	04.59	03.32	03.25	04.48	06.19	07.42	08.14	09.43
	14.59	16.28	17.55	20.24	21.54	23.24	23.39	22.19	20.35	18.51	16.09	14.54
5	10.06	08.55	07.24	06.38	04.56	03.30	03.27	04.51	06.22	07.45	08.17	09.45
	15.02	16.32	17.58	20.27	21.57	23.26	23.38	22.16	20.32	18.48	16.06	14.52
6	10.05	08.52	07.21	06.34	04.53	03.28	03.29	04.54	06.25	07.48	08.20	09.48
	15.04	16.35	18.01	20.30	22.00	23.28	23.36	22.13	20.28	18.45	16.03	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26	03.31	04.57	06.27	07.51	08.23	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.34	22.09	20.25	18.41	16.00	14.49
8	10.02	08.46	07.14	06.27	04.47	03.24	03.33	05.00	06.30	07.54	08.26	09.52
	15.08	16.41	18.07	20.36	22.06	23.33	23.32	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.22	03.35	05.03	06.33	07.57	08.30	09.54
	15.11	16.44	18.10	20.39	22.09	23.34	23.30	22.03	20.18	18.34	15.54	14.47
10	09.59	08.39	07.07	06.20	04.40	03.21	03.38	05.06	06.36	08.00	08.33	09.56
	15.13	16.48	18.13	20.42	22.12	23.36	23.28	22.00	20.14	18.31	15.51	14.46
11	09.57	08.36	07.04	06.17	04.37	03.19	03.40	05.09	06.39	08.02	08.36	09.58
	15.16	16.51	18.15	20.45	22.15	23.38	23.26	21.56	20.11	18.28	15.49	14.45
12	09.55	08.33	07.00	06.14	04.34	03.18	03.43	05.12	06.41	08.05	08.39	10.00
	15.19	16.54	18.18	20.48	22.18	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.41	23.21	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.48	05.18	06.47	08.11	08.45	10.03
	15.24	17.00	18.24	20.54	22.25	23.42	23.19	21.46	20.00	18.17	15.40	14.42
15	09.50	08.24	06.50	06.03	04.25	03.15	03.50	05.21	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.47	08.20	06.47	06.00	04.22	03.14	03.53	05.24	06.52	08.17	08.51	10.06
	15.30	17.06	18.30	20.59	22.31	23.45	23.14	21.40	19.53	18.11	15.34	14.42
17	09.45	08.17	06.43	05.56	04.19	03.14	03.56	05.27	06.55	08.20	08.54	10.07
	15.33	17.09	18.33	21.02	22.34	23.46	23.12	21.36	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40	05.53	04.16	03.13	03.58	05.30	06.58	08.23	08.57	10.08
	15.35	17.13	18.36	21.05	22.37	23.46	23.09	21.33	19.46	18.04	15.29	14.41
19	09.41	08.11	06.36	05.50	04.13	03.13	04.01	05.33	07.01	08.26	09.01	10.09
	15.38	17.16	18.39	21.08	22.40	23.47	23.06	21.30	19.43	18.01	15.26	14.41
20	09.38	08.08	06.33	05.46	04.10	03.13	04.04	05.36	07.04	08.29	09.04	10.10
	15.41	17.19	18.41	21.11	22.43	23.48	23.04	21.26	19.40	17.57	15.24	14.41
21	09.36	08.04	06.30	05.43	04.07	03.13	04.07	05.39	07.06	08.31	09.07	10.11
	15.44	17.22	18.44	21.14	22.46	23.48	23.01	21.23	19.36	17.54	15.21	14.42
22	09.33	08.01	06.26	05.39	04.04	03.13	04.10	05.42	07.09	08.34	09.10	10.12
	15.47	17.25	18.47	21.17	22.49	23.48	22.58	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.13	05.45	07.12	08.37	09.13	10.12
	15.51	17.28	18.50	21.20	22.52	23.48	22.55	21.16	19.29	17.48	15.16	14.43
24	09.28	07.54	06.19	05.33	03.58	03.13	04.16	05.48	07.15	08.40	09.16	10.12
	15.54	17.31	18.53	21.23	22.55	23.48	22.52	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.56	03.14	04.18	05.51	07.17	07.43	09.18	10.13
	15.57	17.34	18.56	21.26	22.57	23.48	22.50	21.09	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.15	04.21	05.53	07.20	07.46	09.21	10.13
	16.00	17.37	18.59	21.29	23.00	23.47	22.47	21.06	19.19	16.38	15.09	14.45
27	09.20	07.44	06.09	05.23	03.50	03.15	04.24	05.56	07.23	07.49	09.24	10.13
	16.03	17.40	19.02	21.32	23.03	23.47	22.44	21.02	19.15	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.48	03.16	04.27	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.04	21.35	23.06	23.46	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.18	04.30	06.02	07.28	07.56	09.30	10.12
	16.09		20.07	21.38	23.09	23.45	22.38	20.56	19.08	16.28	15.03	14.49
30	09.12		06.58	05.13	03.43	03.19	04.33	06.05	07.31	07.59	09.32	10.12
	16.13		20.10	21.42	23.11	23.44	22.35	20.52	19.05	16.25	15.01	14.50
31	09.09		06.55		03.40		04.36	06.08		08.02		10.11
	16.16		20.13		23.14		22.31	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 39 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1317)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.11	09.07	07.38	06.52	05.10 05.46-05.59/13	03.38 05.17-05.34/17	03.21	04.40 05.49-06.15/26	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.45	23.17	23.43	22.29 05.27-05.43/16	20.46	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06 05.45-06.01/16	03.36 05.18-05.34/16	03.22	04.43 05.49-06.15/26	06.14	07.37	08.08	09.38
	14.56	16.22	17.49	20.19	21.48	23.19	23.42	22.25 05.30-05.43/13	20.42	18.58	16.16	14.58
3	10.09	09.01	07.31	06.45	05.03 05.43-06.02/19	03.34 05.19-05.33/14	03.24	04.46 05.49-06.14/25	06.16	07.40	08.11	09.40
	14.58	16.26	17.52	20.22	21.51	23.22	23.41	22.22 05.32-05.40/8	20.39	18.55	16.13	14.56
4	10.08	08.58	07.28	06.41	05.00 05.42-06.03/21	03.32 05.20-05.33/13	03.26	04.49 05.49-06.15/26	06.19	07.43	08.14	09.43
	15.00	16.29	17.55	20.25	21.54	23.24	23.39	22.19 05.35-05.38/3	20.35	18.52	16.10	14.54
5	10.07	08.55	07.24	06.38	04.56 05.41-06.03/22	03.30 05.21-05.32/11	03.27 05.29-05.35/6	04.52 05.49-06.14/25	06.22	07.46	08.17	09.45
	15.02	16.32	17.58	20.28	21.57	23.26	23.38	22.16	20.32	18.48	16.07	14.53
6	10.05	08.52	07.21	06.34	04.53 05.40-06.04/24	03.28 05.22-05.31/9	03.29 05.29-05.37/8	04.55 05.49-06.14/25	06.25	07.48	08.20	09.48
	15.04	16.35	18.01	20.30	22.00	23.28	23.36	22.13	20.28	18.45	16.04	14.51
7	10.04	08.49	07.18	06.31	04.50 05.39-06.04/25	03.26 05.23-05.30/7	03.31 05.27-05.38/11	04.58 05.50-06.14/24	06.28	07.51	08.24	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.34	22.10	20.25	18.41	16.01	14.50
8	10.02	08.46	07.14	06.28	04.47 05.40-06.05/25	03.24 05.25-05.28/3	03.34 05.27-05.39/12	05.01 05.50-06.12/22	06.30	07.54	08.27	09.52
	15.09	16.41	18.07	20.36	22.06	23.33	23.32	22.06	20.21	18.38	15.58	14.48
9	10.01	08.43	07.11	06.24	04.44 05.39-06.05/26	03.23	03.36 05.27-05.41/14	05.04 05.51-06.12/21	06.33	07.57	08.30	09.54
	15.11	16.45	18.10	20.39	22.09 05.24-05.29/5	23.35	23.30	22.03	20.18	18.35	15.55	14.47
10	09.59	08.40	07.08	06.21	04.40 05.39-06.04/25	03.21	03.38 05.25-05.41/16	05.07 05.52-06.10/18	06.36	08.00	08.33	09.56
	15.14	16.48	18.13	20.42	22.12 05.21-05.31/10	23.36	23.28	22.00	20.14	18.31	15.52	14.46
11	09.57	08.36	07.04	06.17	04.37 05.38-06.04/26	03.20	03.40 05.25-05.42/17	05.10 05.53-06.09/16	06.39	08.03	08.36	09.58
	15.16	16.51	18.16	20.45	22.16 05.18-05.32/14	23.38	23.26	21.56	20.11	18.28	15.49	14.45
12	09.56	08.33	07.01	06.14	04.34 05.39-06.05/26	03.18	03.43 05.25-05.43/18	05.13 05.56-06.07/11	06.42	08.05	08.39	10.00
	15.19	16.54	18.19	20.48	22.19 05.16-05.34/18	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31 05.39-06.04/25	03.17	03.45 05.25-05.44/19	05.16 05.59-06.02/3	06.44	08.08	08.42	10.02
	15.22	16.57	18.22	20.51	22.22 05.14-05.34/20	23.41	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28 05.40-06.04/24	03.16	03.48 05.24-05.44/20	05.19	06.47	08.11	08.45	10.03
	15.24	17.00	18.24	20.54	22.25 05.14-05.35/21	23.43	23.19	21.47	20.01	18.18	15.40	14.43
15	09.50	08.24	06.50	06.04	04.25 05.39-06.03/24	03.15	03.51 05.24-05.45/21	05.22	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.57	22.28 05.13-05.35/22	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.22 05.40-06.03/23	03.15	03.53 05.24-05.45/21	05.25	06.53	08.17	08.51	10.06
	15.30	17.07	18.30	21.00	22.31 05.13-05.36/23	23.45	23.14	21.40	19.54	18.11	15.35	14.42
17	09.45	08.17	06.44	05.57	04.19 05.40-06.02/22	03.14	03.56 05.24-05.46/22	05.27	06.55	08.20	08.55	10.07
	15.33	17.10	18.33	21.03	22.34 05.13-05.36/23	23.46	23.12	21.37	19.50	18.08	15.32	14.42
18	09.43	08.14	06.40	05.53	04.16 05.41-06.02/21	03.13	03.59 05.23-05.46/23	05.30	06.58	08.23	08.58	10.09
	15.36	17.13	18.36	21.06	22.37 05.13-05.37/24	23.47	23.09	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.13 05.42-06.02/20	03.13	04.01 05.23-05.46/23	05.33	07.01	08.26	09.01	10.10
	15.39	17.16	18.39	21.09	22.40 05.13-05.37/24	23.47	23.07	21.30	19.43	18.01	15.27	14.41
20	09.39	08.08	06.33	05.46	04.10 05.43-06.00/17	03.13	04.04 05.58-06.04/6	05.36	07.04	08.29	09.04	10.10
	15.42	17.19	18.42	21.12	22.43 05.12-05.37/25	23.48	23.04 05.22-05.46/24	21.26	19.40	17.58	15.24	14.42
21	09.36	08.04	06.30	05.43	04.07 05.44-05.59/15	03.13	04.07 05.56-06.07/11	05.39	07.07	08.32	09.07	10.11
	15.45	17.22	18.45	21.15	22.46 05.13-05.37/24	23.48	23.01 05.23-05.47/24	21.23	19.36	17.54	15.22	14.42
22	09.34	08.01	06.26	05.40	04.04 05.45-05.58/13	03.13	04.10 05.55-06.09/14	05.42	07.09	08.35	09.10	10.12
	15.48	17.25	18.47	21.18	22.49 05.13-05.37/24	23.48	22.58 05.23-05.47/24	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01 05.47-05.57/10	03.13	04.13 05.53-06.10/17	05.45	07.12	08.38	09.13	10.12
	15.51	17.28	18.50	21.21	22.52 05.13-05.37/24	23.48	22.55 05.23-05.47/24	21.16	19.29	17.48	15.17	14.43
24	09.29	07.55	06.19	05.33	03.59 05.51-05.54/3	03.14	04.16 05.53-06.12/19	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.24	22.55 05.14-05.37/23	23.48	22.53 05.23-05.48/25	21.13	19.26	17.45	15.14	14.44
25	09.26	07.51	06.16	05.30	03.56 05.14-05.37/23	03.14	04.19 05.52-06.12/20	05.51	07.18	07.44	09.19	10.13
	15.57	17.34	18.56	21.27	22.58	23.48	22.50 05.23-05.47/24	21.09	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53 05.14-05.37/23	03.15	04.22 05.51-06.12/21	05.54	07.20	07.47	09.21	10.13
	16.00	17.37	18.59	21.30	23.00	23.48	22.47 05.23-05.47/24	21.06	19.19	16.38	15.10	14.45
27	09.21	07.45	06.09	05.23	03.51 05.15-05.37/22	03.16	04.25 05.51-06.14/23	05.57	07.23	07.50	09.24	10.13
	16.03	17.40	19.02	21.33	23.03	23.47	22.44 05.24-05.47/23	21.03	19.16	16.35	15.08	14.46
28	09.18	07.41	06.06	05.20	03.48 05.15-05.36/21	03.17	04.28 05.50-06.14/24	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.05	21.36	23.06	23.46	22.41 05.23-05.46/23	20.59	19.12	16.32	15.05	14.48
29	09.15		07.02	05.16	03.46 05.15-05.36/21	03.18	04.31 05.50-06.15/25	06.02	07.29	07.56	09.30	10.12
	16.10		20.07	21.39	23.09	23.45	22.38 05.24-05.46/22	20.56	19.09	16.28	15.03	14.49
30	09.12		06.59	05.13 05.49-05.56/7	03.43 05.16-05.35/19	03.19	04.34 05.49-06.14/25	06.05	07.31	07.59	09.33	10.12
	16.13		20.10	21.42	23.11	23.44	22.35 05.25-05.45/20	20.52	19.05	16.25	15.01	14.50
31	09.09		06.55		03.41 05.17-05.35/18		04.37 05.50-06.15/25	06.08		08.02		10.11
	16.16		20.13		23.14		22.32 05.26-05.45/19	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	7	956	90	757	308	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi

Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 40 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1318)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.07	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.45	23.17	23.43	22.28	20.45	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36	03.22	04.42	06.14	07.37	08.08	09.38
	14.56	16.22	17.49	20.19	21.48	23.19	23.42	22.25	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.34	03.24	04.46	06.16	07.40	08.11	09.40
	14.58	16.25	17.52	20.22	21.51	23.22	23.41	22.22	20.39	18.55	16.13	14.56
4	10.08	08.58	07.28	06.41	05.00	03.32	03.25	04.49	06.19	07.43	08.14	09.43
	15.00	16.29	17.55	20.25	21.54	23.24	23.39	22.19	20.35	18.51	16.10	14.54
5	10.06	08.55	07.24	06.38	04.56	03.30	03.27	04.52	06.22	07.45	08.17	09.45
	15.02	16.32	17.58	20.27	21.57	23.26	23.38	22.16	20.32	18.48	16.07	14.52
6	10.05	08.52	07.21	06.34	04.53	03.28	03.29	04.55	06.25	07.48	08.20	09.48
	15.04	16.35	18.01	20.30	22.00	23.28	23.36	22.13	20.28	18.45	16.03	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26	03.31	04.58	06.28	07.51	08.23	09.50
	15.06	16.38	18.04	20.33	22.03	23.31	23.34	22.09	20.25	18.41	16.00	14.49
8	10.02	08.46	07.14	06.27	04.47	03.24	03.33	05.01	06.30	07.54	08.27	09.52
	15.09	16.41	18.07	20.36	22.06	23.33	23.32	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.23	03.36	05.04	06.33	07.57	08.30	09.54
	15.11	16.44	18.10	20.39	22.09	23.35	23.30	22.03	20.18	18.34	15.55	14.47
10	09.59	08.40	07.07	06.21	04.40	03.21	03.38	05.07	06.36	08.00	08.33	09.56
	15.13	16.48	18.13	20.42	22.12	23.36	23.28	22.00	20.14	18.31	15.52	14.46
11	09.57	08.36	07.04	06.17	04.37	03.20	03.40	05.10	06.39	08.02	08.36	09.58
	15.16	16.51	18.16	20.45	22.15	23.38	23.26	21.56	20.11	18.28	15.49	14.45
12	09.56	08.33	07.01	06.14	04.34	03.18	03.43	05.13	06.42	08.05	08.39	10.00
	15.19	16.54	18.19	20.48	22.19	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.16	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.22	23.41	23.22	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.48	05.19	06.47	08.11	08.45	10.03
	15.24	17.00	18.24	20.54	22.25	23.43	23.19	21.46	20.00	18.18	15.40	14.43
15	09.50	08.24	06.50	06.03	04.25	03.15	03.50	05.21	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.48	08.21	06.47	06.00	04.22	03.14	03.53	05.24	06.53	08.17	08.51	10.06
	15.30	17.06	18.30	21.00	22.31	23.45	23.14	21.40	19.54	18.11	15.35	14.42
17	09.45	08.17	06.43	05.57	04.19	03.14	03.56	05.27	06.55	08.20	08.54	10.07
	15.33	17.10	18.33	21.03	22.34	23.46	23.12	21.36	19.50	18.08	15.32	14.41
18	09.43	08.14	06.40	05.53	04.16	03.13	03.59	05.30	06.58	08.23	08.58	10.08
	15.36	17.13	18.36	21.06	22.37	23.47	23.09	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.37	05.50	04.13	03.13	04.01	05.33	07.01	08.26	09.01	10.09
	15.39	17.16	18.39	21.08	22.40	23.47	23.06	21.30	19.43	18.01	15.27	14.41
20	09.38	08.08	06.33	05.46	04.10	03.13	04.04	05.36	07.04	08.29	09.04	10.10
	15.42	17.19	18.42	21.11	22.43	23.48	23.04	21.26	19.40	17.58	15.24	14.42
21	09.36	08.04	06.30	05.43	04.07	03.13	04.07	05.39	07.06	08.32	09.07	10.11
	15.45	17.22	18.44	21.14	22.46	23.48	23.01	21.23	19.36	17.54	15.21	14.42
22	09.34	08.01	06.26	05.40	04.04	03.13	04.10	05.42	07.09	08.35	09.10	10.12
	15.48	17.25	18.47	21.17	22.49	23.48	22.58	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.13	05.45	07.12	08.38	09.13	10.12
	15.51	17.28	18.50	21.20	22.52	23.48	22.55	21.16	19.29	17.48	15.17	14.43
24	09.28	07.55	06.19	05.33	03.59	03.14	04.16	05.48	07.15	08.41	09.16	10.13
	15.54	17.31	18.53	21.23	22.55	23.48	22.53	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.56	03.14	04.19	05.51	07.17	07.44	09.19	10.13
	15.57	17.34	18.56	21.26	22.58	23.48	22.50	21.09	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.15	04.22	05.54	07.20	07.47	09.21	10.13
	16.00	17.37	18.59	21.29	23.00	23.47	22.47	21.06	19.19	16.38	15.10	14.45
27	09.21	07.45	06.09	05.23	03.51	03.16	04.25	05.56	07.23	07.50	09.24	10.13
	16.03	17.40	19.02	21.32	23.03	23.47	22.44	21.03	19.16	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.48	03.17	04.27	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.04	21.36	23.06	23.46	22.41	20.59	19.12	16.32	15.05	14.47
29	09.15		07.02	05.16	03.45	03.18	04.30	06.02	07.29	07.56	09.30	10.12
	16.09		20.07	21.39	23.09	23.45	22.38	20.56	19.09	16.28	15.03	14.49
30	09.12		06.59	05.13	03.43	03.19	04.33	06.05	07.31	07.59	09.33	10.12
	16.13		20.10	21.42	23.11	23.44	22.35	20.52	19.05	16.25	15.01	14.50
31	09.09		06.55		03.41		04.36	06.08		08.02		10.11
	16.16		20.13		23.14		22.32	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi

Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 41 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1319)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.06	07.38	06.52	05.09	03.38	03.20	04.39	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.45	23.16	23.43	22.28	20.45	19.02	16.19	14.59
2	10.09	09.04	07.34	06.48	05.06	03.36	03.22	04.42	06.13	07.37	08.08	09.38
	14.56	16.22	17.49	20.19	21.48	23.19	23.42	22.25	20.42	18.58	16.16	14.57
3	10.09	09.01	07.31	06.45	05.03	03.34	03.24	04.45	06.16	07.40	08.11	09.40
	14.58	16.25	17.52	20.22	21.51	23.21	23.41	22.22	20.38	18.55	16.13	14.56
4	10.07	08.58	07.28	06.41	05.00	03.32	03.25	04.48	06.19	07.43	08.14	09.43
	15.00	16.29	17.55	20.25	21.54	23.24	23.39	22.19	20.35	18.51	16.10	14.54
5	10.06	08.55	07.24	06.38	04.56	03.30	03.27	04.52	06.22	07.45	08.17	09.45
	15.02	16.32	17.58	20.27	21.57	23.26	23.37	22.16	20.32	18.48	16.06	14.52
6	10.05	08.52	07.21	06.34	04.53	03.28	03.29	04.55	06.25	07.48	08.20	09.48
	15.04	16.35	18.01	20.30	22.00	23.28	23.36	22.13	20.28	18.45	16.03	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26	03.31	04.58	06.28	07.51	08.23	09.50
	15.06	16.38	18.04	20.33	22.03	23.30	23.34	22.09	20.25	18.41	16.00	14.49
8	10.02	08.46	07.14	06.27	04.47	03.24	03.33	05.01	06.30	07.54	08.26	09.52
	15.09	16.41	18.07	20.36	22.06	23.32	23.32	22.06	20.21	18.38	15.57	14.48
9	10.01	08.43	07.11	06.24	04.43	03.23	03.36	05.04	06.33	07.57	08.30	09.54
	15.11	16.44	18.10	20.39	22.09	23.34	23.30	22.03	20.18	18.34	15.54	14.47
10	09.59	08.39	07.07	06.21	04.40	03.21	03.38	05.07	06.36	08.00	08.33	09.56
	15.13	16.48	18.13	20.42	22.12	23.36	23.28	22.00	20.14	18.31	15.52	14.46
11	09.57	08.36	07.04	06.17	04.37	03.20	03.40	05.10	06.39	08.02	08.36	09.58
	15.16	16.51	18.16	20.45	22.15	23.38	23.26	21.56	20.11	18.28	15.49	14.45
12	09.55	08.33	07.01	06.14	04.34	03.18	03.43	05.13	06.41	08.05	08.39	10.00
	15.19	16.54	18.18	20.48	22.18	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17	03.45	05.15	06.44	08.08	08.42	10.02
	15.21	16.57	18.21	20.51	22.21	23.41	23.21	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16	03.48	05.18	06.47	08.11	08.45	10.03
	15.24	17.00	18.24	20.54	22.25	23.42	23.19	21.46	20.00	18.17	15.40	14.43
15	09.50	08.24	06.50	06.03	04.25	03.15	03.50	05.21	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.47	08.20	06.47	06.00	04.22	03.14	03.53	05.24	06.53	08.17	08.51	10.06
	15.30	17.06	18.30	20.59	22.31	23.45	23.14	21.40	19.53	18.11	15.35	14.42
17	09.45	08.17	06.43	05.57	04.19	03.14	03.56	05.27	06.55	08.20	08.54	10.07
	15.33	17.10	18.33	21.02	22.34	23.46	23.12	21.36	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40	05.53	04.16	03.13	03.59	05.30	06.58	08.23	08.57	10.08
	15.36	17.13	18.36	21.05	22.37	23.46	23.09	21.33	19.47	18.04	15.29	14.41
19	09.41	08.11	06.36	05.50	04.13	03.13	04.01	05.33	07.01	08.26	09.00	10.09
	15.39	17.16	18.39	21.08	22.40	23.47	23.06	21.30	19.43	18.01	15.27	14.41
20	09.38	08.08	06.33	05.46	04.10	03.13	04.04	05.36	07.04	08.29	09.04	10.10
	15.42	17.19	18.42	21.11	22.43	23.48	23.04	21.26	19.40	17.57	15.24	14.41
21	09.36	08.04	06.30	05.43	04.07	03.13	04.07	05.39	07.06	08.32	09.07	10.11
	15.45	17.22	18.44	21.14	22.46	23.48	23.01	21.23	19.36	17.54	15.21	14.42
22	09.33	08.01	06.26	05.40	04.04	03.13	04.10	05.42	07.09	08.34	09.10	10.12
	15.48	17.25	18.47	21.17	22.49	23.48	22.58	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13	04.13	05.45	07.12	08.37	09.13	10.12
	15.51	17.28	18.50	21.20	22.52	23.48	22.55	21.16	19.29	17.48	15.17	14.43
24	09.28	07.54	06.19	05.33	03.59	03.14	04.16	05.48	07.15	08.40	09.15	10.12
	15.54	17.31	18.53	21.23	22.55	23.48	22.52	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29	03.56	03.14	04.19	05.51	07.17	07.43	09.18	10.13
	15.57	17.34	18.56	21.26	22.57	23.48	22.50	21.09	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.15	04.22	05.54	07.20	07.46	09.21	10.13
	16.00	17.37	18.59	21.29	23.00	23.47	22.47	21.06	19.19	16.38	15.10	14.45
27	09.20	07.44	06.09	05.23	03.51	03.16	04.24	05.56	07.23	07.49	09.24	10.13
	16.03	17.40	19.02	21.32	23.03	23.47	22.44	21.02	19.15	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19	03.48	03.17	04.27	05.59	07.26	07.53	09.27	10.12
	16.06	17.43	19.04	21.35	23.06	23.46	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16	03.45	03.18	04.30	06.02	07.29	07.56	09.30	10.12
	16.09		20.07	21.38	23.09	23.45	22.38	20.56	19.09	16.28	15.03	14.49
30	09.12		06.58	05.13	03.43	03.19	04.33	06.05	07.31	07.59	09.32	10.12
	16.13		20.10	21.42	23.11	23.44	22.35	20.52	19.05	16.25	15.01	14.50
31	09.09		06.55		03.41		04.36	06.08		08.02		10.11
	16.16		20.13		23.14		22.31	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 42 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1320)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.06	07.38	06.52	05.09 20.24-20.50/26	03.38	03.20	04.39 20.41-20.53/12	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.44	23.16	23.43	22.28	20.45	19.02	16.19	14.59
2	10.09	09.03	07.34	06.48	05.06 20.24-20.50/26	03.36	03.22	04.42 20.38-20.54/16	06.13	07.37	08.08	09.38
	14.56	16.22	17.49	20.19	21.48	23.19	23.42	22.25	20.42	18.58	16.16	14.57
3	10.08	09.01	07.31	06.45	05.03 20.24-20.49/25	03.34	03.24	04.45 20.37-20.56/19	06.16	07.40	08.11	09.40
	14.58	16.25	17.52	20.22	21.51	23.21	23.40	22.22	20.38	18.55	16.13	14.56
4	10.07	08.58	07.28	06.41	05.00 20.24-20.49/25	03.32	03.25	04.48 20.36-20.56/20	06.19	07.42	08.14	09.43
	15.00	16.28	17.55	20.24	21.54	23.24	23.39	22.19	20.35	18.51	16.09	14.54
5	10.06	08.55	07.24	06.38	04.56 20.24-20.48/24	03.30	03.27	04.51 20.35-20.57/22	06.22	07.45	08.17	09.45
	15.02	16.32	17.58	20.27	21.57	23.26	23.37	22.16	20.31	18.48	16.06	14.52
6	10.05	08.52	07.21	06.34	04.53 20.25-20.49/24	03.28	03.29	04.54 20.35-20.58/23	06.25	07.48	08.20	09.47
	15.04	16.35	18.01	20.30	22.00	23.28	23.36	22.12	20.28	18.45	16.03	14.51
7	10.04	08.49	07.17	06.31	04.50 20.25-20.48/23	03.26	03.31	04.57 20.34-20.58/24	06.27	07.51	08.23	09.50
	15.06	16.38	18.04	20.33	22.03	23.30	23.34	22.09	20.25	18.41	16.00	14.49
8	10.02	08.46	07.14	06.27	04.47 20.26-20.47/21	03.24	03.33	05.00 20.34-20.59/25	06.30	07.54	08.26	09.52
	15.08	16.41	18.07	20.36	22.06	23.32	23.32	22.06	20.21	18.38	15.57	14.48
9	10.01	08.42	07.11	06.24	04.43 20.26-20.46/20	03.23	03.36	05.03 20.33-20.58/25	06.33	07.57	08.29	09.54
	15.11	16.44	18.10	20.39	22.09	23.34	23.30	22.03	20.18	18.34	15.54	14.47
10	09.59	08.39	07.07	06.20	04.40 20.28-20.45/17	03.21	03.38	05.06 20.33-20.58/25	06.36	07.59	08.33	09.56
	15.13	16.48	18.13	20.42	22.12	23.36	23.28	22.00	20.14	18.31	15.51	14.46
11	09.57	08.36	07.04	06.17	04.37 20.29-20.44/15	03.20	03.40	05.09 20.33-20.59/26	06.39	08.02	08.36	09.58
	15.16	16.51	18.15	20.45	22.15	23.38	23.26	21.56	20.11	18.28	15.49	14.45
12	09.55	08.33	07.00	06.14	04.34 20.31-20.41/10	03.18	03.43	05.12 20.32-20.58/26	06.41	08.05	08.39	10.00
	15.19	16.54	18.18	20.48	22.18	23.39	23.24	21.53	20.07	18.24	15.46	14.44
13	09.53	08.30	06.57	06.10	04.31 20.34-20.39/5	03.17	03.45	05.15 20.33-20.58/25	06.44	08.08	08.42	10.01
	15.21	16.57	18.21	20.51	22.21	23.41	23.21	21.50	20.04	18.21	15.43	14.43
14	09.51	08.27	06.54	06.07	04.28	03.16	03.48	05.18 20.32-20.57/25	06.47	08.11	08.45	10.03
	15.24	17.00	18.24	20.54	22.24	23.42	23.19	21.46	20.00	18.17	15.40	14.43
15	09.49	08.24	06.50	06.03	04.25	03.15	03.50	05.21 20.33-20.56/23	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.56	22.28	23.43	23.17	21.43	19.57	18.14	15.37	14.42
16	09.47	08.20	06.47	06.00	04.22	03.14	03.53	05.24 20.34-20.56/22	06.52	08.17	08.51	10.06
	15.30	17.06	18.30	20.59	22.31	23.45	23.14	21.40	19.53	18.11	15.35	14.42
17	09.45	08.17	06.43	05.56	04.19	03.14	03.56	05.27 20.34-20.54/20	06.55	08.20	08.54	10.07
	15.33	17.09	18.33	21.02	22.34	23.45	23.12	21.36	19.50	18.07	15.32	14.41
18	09.43	08.14	06.40	05.53	04.16	03.13	03.58	05.30 20.35-20.52/17	06.58	08.23	08.57	10.08
	15.36	17.13	18.36	21.05	22.37	23.46	23.09	21.33	19.46	18.04	15.29	14.41
19	09.41	08.11	06.36	05.50	04.13	03.13	04.01	05.33 20.37-20.49/12	07.01	08.26	09.00	10.09
	15.38	17.16	18.39	21.08	22.40	23.47	23.06	21.30	19.43	18.01	15.27	14.41
20	09.38	08.07	06.33	05.46	04.10	03.13	04.04	05.36 20.39-20.46/7	07.04	08.28	09.03	10.10
	15.41	17.19	18.41	21.11	22.43	23.47	23.04	21.26	19.40	17.57	15.24	14.41
21	09.36	08.04	06.30	05.43	04.07	03.13	04.07	05.39	07.06	08.31	09.06	10.11
	15.45	17.22	18.44	21.14	22.46	23.48	23.01	21.23	19.36	17.54	15.21	14.42
22	09.33	08.01	06.26	05.39	04.04	03.13	04.10	05.42	07.09	08.34	09.09	10.11
	15.48	17.25	18.47	21.17	22.49	23.48	22.58	21.19	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36 20.33-20.41/8	04.01	03.13	04.13	05.45	07.12	08.37	09.12	10.12
	15.51	17.28	18.50	21.20	22.52	23.48	22.55	21.16	19.29	17.48	15.17	14.43
24	09.28	07.54	06.19	05.33 20.30-20.43/13	03.59	03.14	04.16	05.48	07.15	08.40	09.15	10.12
	15.54	17.31	18.53	21.23	22.54	23.48	22.52	21.13	19.26	17.44	15.14	14.43
25	09.26	07.51	06.16	05.29 20.29-20.46/17	03.56	03.14	04.19	05.51	07.17	07.43	09.18	10.13
	15.57	17.34	18.56	21.26	22.57	23.48	22.49	21.09	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26 20.27-20.48/21	03.53	03.15	04.21	05.53	07.20	07.46	09.21	10.13
	16.00	17.37	18.59	21.29	23.00	23.47	22.46	21.06	19.19	16.38	15.10	14.45
27	09.20	07.44	06.09	05.23 20.27-20.49/22	03.50	03.16	04.24	05.56	07.23	07.49	09.24	10.13
	16.03	17.40	19.01	21.32	23.03	23.47	22.44	21.02	19.15	16.35	15.07	14.46
28	09.18	07.41	06.05	05.19 20.26-20.49/23	03.48	03.17	04.27	05.59	07.26	07.52	09.27	10.12
	16.06	17.43	19.04	21.35	23.06	23.46	22.41	20.59	19.12	16.31	15.05	14.47
29	09.15		07.02	05.16 20.25-20.50/25	03.45	03.18	04.30	06.02	07.28	07.56	09.30	10.12
	16.09		20.07	21.38	23.08	23.45	22.38	20.56	19.08	16.28	15.03	14.49
30	09.12		06.58	05.13 20.25-20.50/25	03.43	03.19	04.33	06.05	07.31	07.59	09.32	10.12
	16.13		20.10	21.41	23.11	23.44	22.34	20.52	19.05	16.25	15.01	14.50
31	09.09		06.55		03.41		04.36 20.43-20.50/7	06.08		08.02		10.11
	16.16		20.13		23.14		22.31	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	147
Sum of minutes with flicker	0	0	0	154	261	0	7	414	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 43 - Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1321)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.06	07.38	06.52	05.10	03.38 22.11-22.17/6	03.21 22.11-22.34/23	04.40	06.11	07.34	08.05	09.35
	14.54	16.19	17.46	20.16	21.45	23.16	23.43	22.28	20.45	19.02	16.19	14.59
2	10.10	09.04	07.35	06.48	05.06	03.36 22.09-22.18/9	03.22 22.12-22.33/21	04.43	06.14	07.37	08.08	09.38
	14.56	16.22	17.49	20.19	21.48	23.19	23.42	22.25	20.42	18.58	16.16	14.58
3	10.09	09.01	07.31	06.45	05.03	03.34 22.09-22.20/11	03.24 22.13-22.34/21	04.46	06.16	07.40	08.11	09.40
	14.58	16.26	17.52	20.22	21.51	23.21	23.41	22.22	20.39	18.55	16.13	14.56
4	10.08	08.58	07.28	06.41	05.00	03.32 22.09-22.22/13	03.26 22.13-22.34/21	04.49	06.19	07.43	08.14	09.43
	15.00	16.29	17.55	20.25	21.54	23.24	23.39	22.19	20.35	18.52	16.10	14.54
5	10.06	08.55	07.24	06.38	04.56	03.30 22.08-22.23/15	03.27 22.13-22.33/20	04.52	06.22	07.45	08.17	09.45
	15.02	16.32	17.58	20.28	21.57	23.26	23.38	22.16	20.32	18.48	16.07	14.53
6	10.05	08.52	07.21	06.34	04.53	03.28 22.08-22.25/17	03.29 22.14-22.32/18	04.55	06.25	07.48	08.20	09.48
	15.04	16.35	18.01	20.30	22.00	23.28	23.36	22.13	20.28	18.45	16.04	14.51
7	10.04	08.49	07.18	06.31	04.50	03.26 22.08-22.27/19	03.31 22.14-22.31/17	04.58	06.28	07.51	08.23	09.50
	15.06	16.38	18.04	20.33	22.03	23.30	23.34	22.09	20.25	18.41	16.01	14.50
8	10.02	08.46	07.14	06.28	04.47	03.24 22.08-22.28/20	03.34 22.15-22.30/15	05.01	06.30	07.54	08.27	09.52
	15.09	16.41	18.07	20.36	22.06	23.32	23.32	22.06	20.21	18.38	15.58	14.48
9	10.01	08.43	07.11	06.24	04.44	03.23 22.08-22.29/21	03.36 22.16-22.28/12	05.04	06.33	07.57	08.30	09.54
	15.11	16.45	18.10	20.39	22.09	23.34	23.30	22.03	20.18	18.34	15.55	14.47
10	09.59	08.40	07.07	06.21	04.40	03.21 22.07-22.29/22	03.38 22.17-22.27/10	05.07	06.36	08.00	08.33	09.56
	15.14	16.48	18.13	20.42	22.12	23.36	23.28	22.00	20.14	18.31	15.52	14.46
11	09.57	08.36	07.04	06.17	04.37	03.20 22.07-22.29/22	03.40 22.18-22.25/7	05.10	06.39	08.02	08.36	09.58
	15.16	16.51	18.16	20.45	22.15	23.38	23.26	21.56	20.11	18.28	15.49	14.45
12	09.56	08.33	07.01	06.14	04.34	03.19 22.08-22.30/22	03.43 22.19-22.24/5	05.13	06.42	08.05	08.39	10.00
	15.19	16.54	18.19	20.48	22.18	23.40	23.24	21.53	20.07	18.24	15.46	14.44
13	09.54	08.30	06.57	06.10	04.31	03.17 22.08-22.30/22	03.45 22.21-22.23/2	05.16	06.44	08.08	08.42	10.02
	15.22	16.57	18.21	20.51	22.22	23.41	23.21	21.50	20.04	18.21	15.43	14.43
14	09.52	08.27	06.54	06.07	04.28	03.16 22.08-22.31/23	03.48	05.19	06.47	08.11	08.45	10.03
	15.24	17.00	18.24	20.54	22.25	23.42	23.19	21.46	20.00	18.18	15.40	14.43
15	09.50	08.24	06.50	06.03	04.25	03.15 22.08-22.31/23	03.51	05.22	06.50	08.14	08.48	10.05
	15.27	17.03	18.27	20.57	22.28	23.44	23.17	21.43	19.57	18.14	15.37	14.42
16	09.47	08.21	06.47	06.00	04.22	03.15 22.08-22.31/23	03.53	05.25	06.53	08.17	08.51	10.06
	15.30	17.07	18.30	21.00	22.31	23.45	23.14	21.40	19.54	18.11	15.35	14.42
17	09.45	08.17	06.43	05.57	04.19	03.14 22.08-22.32/24	03.56	05.27	06.55	08.20	08.54	10.07
	15.33	17.10	18.33	21.03	22.34	23.46	23.12	21.36	19.50	18.08	15.32	14.42
18	09.43	08.14	06.40	05.53	04.16	03.14 22.08-22.31/23	03.59	05.30	06.58	08.23	08.58	10.08
	15.36	17.13	18.36	21.06	22.37	23.46	23.09	21.33	19.47	18.04	15.29	14.42
19	09.41	08.11	06.37	05.50	04.13	03.13 22.08-22.32/24	04.01	05.33	07.01	08.26	09.01	10.09
	15.39	17.16	18.39	21.08	22.40	23.47	23.06	21.30	19.43	18.01	15.27	14.42
20	09.38	08.08	06.33	05.46	04.10	03.13 22.08-22.32/24	04.04	05.36	07.04	08.29	09.04	10.10
	15.42	17.19	18.42	21.11	22.43	23.48	23.04	21.26	19.40	17.58	15.24	14.42
21	09.36	08.04	06.30	05.43	04.07	03.13 22.09-22.33/24	04.07	05.39	07.06	08.32	09.07	10.11
	15.45	17.22	18.44	21.14	22.46	23.48	23.01	21.23	19.36	17.54	15.22	14.42
22	09.34	08.01	06.26	05.40	04.04	03.13 22.09-22.33/24	04.10	05.42	07.09	08.35	09.10	10.12
	15.48	17.25	18.47	21.17	22.49	23.48	22.58	21.20	19.33	17.51	15.19	14.42
23	09.31	07.58	06.23	05.36	04.01	03.13 22.09-22.33/24	04.13	05.45	07.12	08.38	09.13	10.12
	15.51	17.28	18.50	21.20	22.52	23.48	22.55	21.16	19.29	17.48	15.17	14.43
24	09.28	07.55	06.19	05.33	03.59	03.14 22.10-22.33/23	04.16	05.48	07.15	08.41	09.16	10.12
	15.54	17.31	18.53	21.23	22.55	23.48	22.52	21.13	19.26	17.45	15.14	14.44
25	09.26	07.51	06.16	05.30	03.56	03.14 22.10-22.33/23	04.19	05.51	07.18	07.44	09.18	10.13
	15.57	17.34	18.56	21.26	22.57	23.48	22.50	21.09	19.22	16.41	15.12	14.44
26	09.23	07.48	06.12	05.26	03.53	03.15 22.10-22.34/24	04.22	05.54	07.20	07.47	09.21	10.13
	16.00	17.37	18.59	21.29	23.00	23.47	22.47	21.06	19.19	16.38	15.10	14.45
27	09.20	07.45	06.09	05.23	03.51	03.16 22.11-22.34/23	04.25	05.57	07.23	07.50	09.24	10.13
	16.03	17.40	19.02	21.32	23.03	23.47	22.44	21.03	19.16	16.35	15.08	14.46
28	09.18	07.41	06.06	05.20	03.48	03.17 22.10-22.33/23	04.28	05.59	07.26	07.53	09.27	10.13
	16.06	17.43	19.05	21.36	23.06	23.46	22.41	20.59	19.12	16.32	15.05	14.48
29	09.15		07.02	05.16	03.46	03.18 22.11-22.34/23	04.31	06.02	07.29	07.56	09.30	10.12
	16.10		20.07	21.39	23.09	23.45	22.38	20.56	19.09	16.28	15.03	14.49
30	09.12		06.59	05.13	03.43	03.19 22.11-22.34/23	04.34	06.05	07.31	07.59	09.33	10.12
	16.13		20.10	21.42	23.11	23.44	22.35	20.52	19.05	16.25	15.01	14.50
31	09.09		06.55		03.41 22.11-22.14/3		04.37	06.08		08.02		10.11
	16.16		20.13		23.14		22.32	20.49		16.22		14.52
Potential sun hours	179	241	363	448	562	610	598	504	392	307	204	148
Sum of minutes with flicker	0	0	0	0	3	617	192	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 44 - Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1454)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.06	07.38	06.52	05.10	03.39	03.21	04.40	06.11	07.34	08.04	09.35
	14.54	16.19	17.46	20.16	21.44	23.16	23.42	22.28	20.45	19.02	16.19	15.00
2	10.09	09.03	07.34	06.48	05.06	03.37	03.23	04.43	06.14	07.37	08.08	09.37
	14.56	16.22	17.49	20.19	21.47	23.18	23.41	22.25	20.42	18.58	16.16	14.58
3	10.08	09.00	07.31	06.45	05.03	03.34	03.24	04.46	06.16	07.40	08.11	09.40
	14.58	16.26	17.52	20.21	21.50	23.21	23.40	22.22	20.38	18.55	16.13	14.56
4	10.07	08.57	07.28	06.41	05.00	03.32	03.26	04.49	06.19	07.42	08.14	09.42
	15.00	16.29	17.55	20.24	21.53	23.23	23.38	22.19	20.35	18.51	16.10	14.54
5	10.06	08.54	07.24	06.38	04.57	03.30	03.28	04.52	06.22	07.45	08.17	09.45
	15.02	16.32	17.58	20.27	21.56	23.25	23.37	22.15	20.31	18.48	16.07	14.53
6	10.04	08.51	07.21	06.34	04.53	03.28	03.30	04.55	06.25	07.48	08.20	09.47
	15.04	16.35	18.01	20.30	22.00	23.27	23.35	22.12	20.28	18.45	16.04	14.51
7	10.03	08.48	07.17	06.31	04.50	03.27	03.32	04.58	06.28	07.51	08.23	09.49
	15.07	16.38	18.04	20.33	22.03	23.30	23.33	22.09	20.24	18.41	16.01	14.50
8	10.02	08.45	07.14	06.27	04.47	03.25	03.34	05.01	06.30	07.54	08.26	09.51
	15.09	16.41	18.07	20.36	22.06	23.32	23.31	22.06	20.21	18.38	15.58	14.49
9	10.00	08.42	07.11	06.24	04.44	03.23	03.36	05.04	06.33	07.57	08.29	09.53
	15.11	16.45	18.10	20.39	22.09	23.34	23.29	22.02	20.18	18.34	15.55	14.47
10	09.58	08.39	07.07	06.21	04.41	03.22	03.39	05.07	06.36	07.59	08.32	09.55
	15.14	16.48	18.13	20.42	22.12	23.35	23.27	21.59	20.14	18.31	15.52	14.46
11	09.57	08.36	07.04	06.17	04.37	03.20	03.41	05.10	06.39	08.02	08.35	09.57
	15.16	16.51	18.16	20.45	22.15	23.37	23.25	21.56	20.11	18.28	15.49	14.45
12	09.55	08.33	07.00	06.14	04.34	03.19	03.43	05.13	06.41	08.05	08.39	09.59
	15.19	16.54	18.18	20.48	22.18	23.39	23.23	21.53	20.07	18.24	15.46	14.45
13	09.53	08.30	06.57	06.10	04.31	03.18	03.46	05.16	06.44	08.08	08.42	10.01
	15.22	16.57	18.21	20.50	22.21	23.40	23.21	21.49	20.04	18.21	15.43	14.44
14	09.51	08.27	06.54	06.07	04.28	03.17	03.48	05.19	06.47	08.11	08.45	10.02
	15.25	17.00	18.24	20.53	22.24	23.41	23.18	21.46	20.00	18.18	15.40	14.43
15	09.49	08.23	06.50	06.03	04.25	03.16	03.51	05.22	06.50	08.14	08.48	10.04
	15.27	17.03	18.27	20.56	22.27	23.43	23.16	21.43	19.57	18.14	15.38	14.43
16	09.47	08.20	06.47	06.00	04.22	03.15	03.54	05.25	06.53	08.17	08.51	10.05
	15.30	17.07	18.30	20.59	22.30	23.44	23.13	21.39	19.53	18.11	15.35	14.42
17	09.45	08.17	06.43	05.57	04.19	03.15	03.56	05.28	06.55	08.20	08.54	10.07
	15.33	17.10	18.33	21.02	22.33	23.45	23.11	21.36	19.50	18.08	15.32	14.42
18	09.42	08.14	06.40	05.53	04.16	03.14	03.59	05.30	06.58	08.22	08.57	10.08
	15.36	17.13	18.36	21.05	22.36	23.45	23.08	21.33	19.46	18.04	15.30	14.42
19	09.40	08.11	06.36	05.50	04.13	03.14	04.02	05.33	07.01	08.25	09.00	10.09
	15.39	17.16	18.39	21.08	22.39	23.46	23.06	21.29	19.43	18.01	15.27	14.42
20	09.38	08.07	06.33	05.46	04.10	03.14	04.05	05.36	07.04	08.28	09.03	10.10
	15.42	17.19	18.41	21.11	22.42	23.47	23.03	21.26	19.40	17.58	15.24	14.42
21	09.35	08.04	06.30	05.43	04.07	03.14	04.07	05.39	07.06	08.31	09.06	10.10
	15.45	17.22	18.44	21.14	22.45	23.47	23.00	21.23	19.36	17.54	15.22	14.42
22	09.33	08.01	06.26	05.40	04.05	03.14	04.10	05.42	07.09	08.34	09.09	10.11
	15.48	17.25	18.47	21.17	22.48	23.47	22.58	21.19	19.33	17.51	15.19	14.43
23	09.30	07.58	06.23	05.36	04.02	03.14	04.13	05.45	07.12	08.37	09.12	10.11
	15.51	17.28	18.50	21.20	22.51	23.47	22.55	21.16	19.29	17.48	15.17	14.43
24	09.28	07.54	06.19	05.33	03.59	03.14	04.16	05.48	07.15	08.40	09.15	10.12
	15.54	17.31	18.53	21.23	22.54	23.47	22.52	21.12	19.26	17.44	15.15	14.44
25	09.25	07.51	06.16	05.30	03.56	03.15	04.19	05.51	07.17	07.43	09.18	10.12
	15.57	17.34	18.56	21.26	22.57	23.47	22.49	21.09	19.22	16.41	15.12	14.45
26	09.23	07.48	06.12	05.26	03.54	03.16	04.22	05.54	07.20	07.46	09.21	10.12
	16.00	17.37	18.59	21.29	23.00	23.46	22.46	21.06	19.19	16.38	15.10	14.46
27	09.20	07.44	06.09	05.23	03.51	03.16	04.25	05.57	07.23	07.49	09.24	10.12
	16.03	17.40	19.01	21.32	23.02	23.46	22.43	21.02	19.15	16.35	15.08	14.47
28	09.17	07.41	06.05	05.20	03.48	03.17	04.28	05.59	07.26	07.52	09.26	10.12
	16.07	17.43	19.04	21.35	23.05	23.45	22.40	20.59	19.12	16.32	15.06	14.48
29	09.15		07.02	05.16	03.46	03.19	04.31	06.02	07.28	07.55	09.29	10.11
	16.10		20.07	21.38	23.08	23.44	22.37	20.55	19.09	16.28	15.04	14.49
30	09.12		06.58	05.13	03.44	03.20	04.34	06.05	07.31	07.58	09.32	10.11
	16.13		20.10	21.41	23.11	23.43	22.34	20.52	19.05	16.25	15.02	14.51
31	09.09		06.55		03.41		04.37	06.08		08.01		10.10
	16.16		20.13		23.13		22.31	20.49		16.22		14.52
Potential sun hours	180	241	363	448	561	609	597	504	392	307	204	148
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 45 - Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1455)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.06	07.38	06.52	05.10	03.39	03.21	04.40	06.11	07.34	08.04	09.35
	14.54	16.19	17.46	20.16	21.44	23.16	23.42	22.28	20.45	19.02	16.19	15.00
2	10.09	09.03	07.34	06.48	05.06	03.37	03.23	04.43	06.14	07.37	08.07	09.37
	14.56	16.22	17.49	20.19	21.47	23.18	23.41	22.25	20.42	18.58	16.16	14.58
3	10.08	09.00	07.31	06.45	05.03	03.34	03.24	04.46	06.16	07.40	08.11	09.40
	14.58	16.26	17.52	20.21	21.50	23.21	23.40	22.22	20.38	18.55	16.13	14.56
4	10.07	08.57	07.27	06.41	05.00	03.32	03.26	04.49	06.19	07.42	08.14	09.42
	15.00	16.29	17.55	20.24	21.53	23.23	23.38	22.18	20.35	18.51	16.10	14.54
5	10.06	08.54	07.24	06.38	04.57	03.30	03.28	04.52	06.22	07.45	08.17	09.45
	15.02	16.32	17.58	20.27	21.56	23.25	23.37	22.15	20.31	18.48	16.07	14.53
6	10.04	08.51	07.21	06.34	04.53	03.28	03.30	04.55	06.25	07.48	08.20	09.47
	15.04	16.35	18.01	20.30	21.59	23.27	23.35	22.12	20.28	18.45	16.04	14.51
7	10.03	08.48	07.17	06.31	04.50	03.27	03.32	04.58	06.28	07.51	08.23	09.49
	15.07	16.38	18.04	20.33	22.03	23.30	23.33	22.09	20.24	18.41	16.01	14.50
8	10.02	08.45	07.14	06.27	04.47	03.25	03.34	05.01	06.30	07.54	08.26	09.51
	15.09	16.41	18.07	20.36	22.06	23.32	23.31	22.06	20.21	18.38	15.58	14.49
9	10.00	08.42	07.11	06.24	04.44	03.23	03.36	05.04	06.33	07.56	08.29	09.53
	15.11	16.45	18.10	20.39	22.09	23.33	23.29	22.02	20.18	18.34	15.55	14.47
10	09.58	08.39	07.07	06.21	04.41	03.22	03.39	05.07	06.36	07.59	08.32	09.55
	15.14	16.48	18.13	20.42	22.12	23.35	23.27	21.59	20.14	18.31	15.52	14.46
11	09.57	08.36	07.04	06.17	04.37	03.20	03.41	05.10	06.39	08.02	08.35	09.57
	15.16	16.51	18.15	20.45	22.15	23.37	23.25	21.56	20.11	18.28	15.49	14.45
12	09.55	08.33	07.00	06.14	04.34	03.19	03.43	05.13	06.41	08.05	08.38	09.59
	15.19	16.54	18.18	20.47	22.18	23.39	23.23	21.53	20.07	18.24	15.46	14.45
13	09.53	08.30	06.57	06.10	04.31	03.18	03.46	05.16	06.44	08.08	08.42	10.01
	15.22	16.57	18.21	20.50	22.21	23.40	23.21	21.49	20.04	18.21	15.43	14.44
14	09.51	08.27	06.54	06.07	04.28	03.17	03.48	05.19	06.47	08.11	08.45	10.02
	15.24	17.00	18.24	20.53	22.24	23.41	23.18	21.46	20.00	18.17	15.40	14.43
15	09.49	08.23	06.50	06.03	04.25	03.16	03.51	05.22	06.50	08.14	08.48	10.04
	15.27	17.03	18.27	20.56	22.27	23.43	23.16	21.43	19.57	18.14	15.38	14.43
16	09.47	08.20	06.47	06.00	04.22	03.15	03.54	05.25	06.52	08.17	08.51	10.05
	15.30	17.07	18.30	20.59	22.30	23.44	23.13	21.39	19.53	18.11	15.35	14.42
17	09.45	08.17	06.43	05.57	04.19	03.15	03.56	05.27	06.55	08.20	08.54	10.06
	15.33	17.10	18.33	21.02	22.33	23.45	23.11	21.36	19.50	18.07	15.32	14.42
18	09.42	08.14	06.40	05.53	04.16	03.14	03.59	05.30	06.58	08.22	08.57	10.08
	15.36	17.13	18.36	21.05	22.36	23.45	23.08	21.33	19.46	18.04	15.29	14.42
19	09.40	08.11	06.36	05.50	04.13	03.14	04.02	05.33	07.01	08.25	09.00	10.09
	15.39	17.16	18.39	21.08	22.39	23.46	23.06	21.29	19.43	18.01	15.27	14.42
20	09.38	08.07	06.33	05.46	04.10	03.14	04.05	05.36	07.03	08.28	09.03	10.09
	15.42	17.19	18.41	21.11	22.42	23.47	23.03	21.26	19.39	17.58	15.24	14.42
21	09.35	08.04	06.29	05.43	04.07	03.14	04.07	05.39	07.06	08.31	09.06	10.10
	15.45	17.22	18.44	21.14	22.45	23.47	23.00	21.23	19.36	17.54	15.22	14.42
22	09.33	08.01	06.26	05.40	04.05	03.14	04.10	05.42	07.09	08.34	09.09	10.11
	15.48	17.25	18.47	21.17	22.48	23.47	22.57	21.19	19.33	17.51	15.19	14.43
23	09.30	07.57	06.23	05.36	04.02	03.14	04.13	05.45	07.12	08.37	09.12	10.11
	15.51	17.28	18.50	21.20	22.51	23.47	22.55	21.16	19.29	17.48	15.17	14.43
24	09.28	07.54	06.19	05.33	03.59	03.14	04.16	05.48	07.15	08.40	09.15	10.12
	15.54	17.31	18.53	21.23	22.54	23.47	22.52	21.12	19.26	17.44	15.15	14.44
25	09.25	07.51	06.16	05.30	03.56	03.15	04.19	05.51	07.17	07.43	09.18	10.12
	15.57	17.34	18.56	21.26	22.57	23.47	22.49	21.09	19.22	16.41	15.12	14.45
26	09.23	07.48	06.12	05.26	03.54	03.16	04.22	05.54	07.20	07.46	09.21	10.12
	16.00	17.37	18.59	21.29	23.00	23.46	22.46	21.06	19.19	16.38	15.10	14.46
27	09.20	07.44	06.09	05.23	03.51	03.16	04.25	05.56	07.23	07.49	09.24	10.12
	16.03	17.40	19.01	21.32	23.02	23.46	22.43	21.02	19.15	16.35	15.08	14.47
28	09.17	07.41	06.05	05.20	03.48	03.17	04.28	05.59	07.26	07.52	09.26	10.12
	16.07	17.43	19.04	21.35	23.05	23.45	22.40	20.59	19.12	16.32	15.06	14.48
29	09.14		07.02	05.16	03.46	03.19	04.31	06.02	07.28	07.55	09.29	10.11
	16.10		20.07	21.38	23.08	23.44	22.37	20.55	19.08	16.28	15.04	14.49
30	09.12		06.58	05.13	03.44	03.20	04.34	06.05	07.31	07.58	09.32	10.11
	16.13		20.10	21.41	23.10	23.43	22.34	20.52	19.05	16.25	15.02	14.51
31	09.09		06.55		03.41		04.37	06.08		08.01		10.10
	16.16		20.13		23.13		22.31	20.49		16.22		14.52
Potential sun hours	180	241	363	448	561	609	597	504	392	307	204	148
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 46 - Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1456)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.10	09.06	07.38	06.52	05.10	03.39	03.21	04.40	06.11	07.34	08.04	09.34
	14.55	16.19	17.46	20.16	21.44	23.16	23.42	22.28	20.45	19.02	16.19	15.00
2	10.09	09.03	07.34	06.48	05.06	03.37	03.23	04.43	06.14	07.37	08.07	09.37
	14.56	16.22	17.49	20.19	21.47	23.18	23.41	22.25	20.42	18.58	16.16	14.58
3	10.08	09.00	07.31	06.45	05.03	03.35	03.25	04.46	06.16	07.40	08.11	09.40
	14.58	16.26	17.52	20.21	21.50	23.20	23.39	22.22	20.38	18.55	16.13	14.56
4	10.07	08.57	07.27	06.41	05.00	03.32	03.26	04.49	06.19	07.42	08.14	09.42
	15.00	16.29	17.55	20.24	21.53	23.23	23.38	22.18	20.35	18.51	16.10	14.55
5	10.06	08.54	07.24	06.38	04.57	03.30	03.28	04.52	06.22	07.45	08.17	09.44
	15.02	16.32	17.58	20.27	21.56	23.25	23.36	22.15	20.31	18.48	16.07	14.53
6	10.04	08.51	07.21	06.34	04.53	03.29	03.30	04.55	06.25	07.48	08.20	09.47
	15.04	16.35	18.01	20.30	21.59	23.27	23.35	22.12	20.28	18.45	16.04	14.51
7	10.03	08.48	07.17	06.31	04.50	03.27	03.32	04.58	06.28	07.51	08.23	09.49
	15.07	16.38	18.04	20.33	22.03	23.29	23.33	22.09	20.24	18.41	16.01	14.50
8	10.01	08.45	07.14	06.27	04.47	03.25	03.34	05.01	06.30	07.54	08.26	09.51
	15.09	16.42	18.07	20.36	22.06	23.31	23.31	22.06	20.21	18.38	15.58	14.49
9	10.00	08.42	07.11	06.24	04.44	03.23	03.36	05.04	06.33	07.56	08.29	09.53
	15.12	16.45	18.10	20.39	22.09	23.33	23.29	22.02	20.18	18.34	15.55	14.48
10	09.58	08.39	07.07	06.21	04.41	03.22	03.39	05.07	06.36	07.59	08.32	09.55
	15.14	16.48	18.13	20.42	22.12	23.35	23.27	21.59	20.14	18.31	15.52	14.46
11	09.57	08.36	07.04	06.17	04.38	03.21	03.41	05.10	06.39	08.02	08.35	09.57
	15.17	16.51	18.16	20.45	22.15	23.37	23.25	21.56	20.11	18.28	15.49	14.46
12	09.55	08.33	07.00	06.14	04.34	03.19	03.43	05.13	06.41	08.05	08.38	09.59
	15.19	16.54	18.18	20.47	22.18	23.38	23.23	21.53	20.07	18.24	15.46	14.45
13	09.53	08.30	06.57	06.10	04.31	03.18	03.46	05.16	06.44	08.08	08.42	10.01
	15.22	16.57	18.21	20.50	22.21	23.40	23.21	21.49	20.04	18.21	15.43	14.44
14	09.51	08.27	06.54	06.07	04.28	03.17	03.48	05.19	06.47	08.11	08.45	10.02
	15.25	17.00	18.24	20.53	22.24	23.41	23.18	21.46	20.00	18.18	15.40	14.43
15	09.49	08.23	06.50	06.03	04.25	03.16	03.51	05.22	06.50	08.14	08.48	10.04
	15.27	17.03	18.27	20.56	22.27	23.42	23.16	21.43	19.57	18.14	15.38	14.43
16	09.47	08.20	06.47	06.00	04.22	03.15	03.54	05.25	06.53	08.17	08.51	10.05
	15.30	17.07	18.30	20.59	22.30	23.44	23.13	21.39	19.53	18.11	15.35	14.42
17	09.45	08.17	06.43	05.57	04.19	03.15	03.56	05.28	06.55	08.20	08.54	10.06
	15.33	17.10	18.33	21.02	22.33	23.44	23.11	21.36	19.50	18.08	15.32	14.42
18	09.42	08.14	06.40	05.53	04.16	03.14	03.59	05.30	06.58	08.22	08.57	10.07
	15.36	17.13	18.36	21.05	22.36	23.45	23.08	21.33	19.46	18.04	15.30	14.42
19	09.40	08.11	06.36	05.50	04.13	03.14	04.02	05.33	07.01	08.25	09.00	10.08
	15.39	17.16	18.39	21.08	22.39	23.46	23.06	21.29	19.43	18.01	15.27	14.42
20	09.38	08.07	06.33	05.46	04.10	03.14	04.05	05.36	07.04	08.28	09.03	10.09
	15.42	17.19	18.41	21.11	22.42	23.46	23.03	21.26	19.39	17.58	15.24	14.42
21	09.35	08.04	06.30	05.43	04.07	03.14	04.08	05.39	07.06	08.31	09.06	10.10
	15.45	17.22	18.44	21.14	22.45	23.47	23.00	21.23	19.36	17.54	15.22	14.42
22	09.33	08.01	06.26	05.40	04.05	03.14	04.10	05.42	07.09	08.34	09.09	10.11
	15.48	17.25	18.47	21.17	22.48	23.47	22.57	21.19	19.33	17.51	15.19	14.43
23	09.30	07.57	06.23	05.36	04.02	03.14	04.13	05.45	07.12	08.37	09.12	10.11
	15.51	17.28	18.50	21.20	22.51	23.47	22.55	21.16	19.29	17.48	15.17	14.43
24	09.28	07.54	06.19	05.33	03.59	03.15	04.16	05.48	07.15	08.40	09.15	10.12
	15.54	17.31	18.53	21.23	22.54	23.47	22.52	21.12	19.26	17.45	15.15	14.44
25	09.25	07.51	06.16	05.30	03.56	03.15	04.19	05.51	07.17	07.43	09.18	10.12
	15.57	17.34	18.56	21.26	22.57	23.47	22.49	21.09	19.22	16.41	15.12	14.45
26	09.23	07.48	06.12	05.26	03.54	03.16	04.22	05.54	07.20	07.46	09.21	10.12
	16.00	17.37	18.59	21.29	22.59	23.46	22.46	21.06	19.19	16.38	15.10	14.46
27	09.20	07.44	06.09	05.23	03.51	03.17	04.25	05.57	07.23	07.49	09.24	10.12
	16.03	17.40	19.01	21.32	23.02	23.46	22.43	21.02	19.15	16.35	15.08	14.47
28	09.17	07.41	06.05	05.20	03.49	03.18	04.28	05.59	07.26	07.52	09.26	10.12
	16.07	17.43	19.04	21.35	23.05	23.45	22.40	20.59	19.12	16.32	15.06	14.48
29	09.14		07.02	05.16	03.46	03.19	04.31	06.02	07.28	07.55	09.29	10.11
	16.10		20.07	21.38	23.08	23.44	22.37	20.55	19.08	16.28	15.04	14.49
30	09.12		06.58	05.13	03.44	03.20	04.34	06.05	07.31	07.58	09.32	10.11
	16.13		20.10	21.41	23.10	23.43	22.34	20.52	19.05	16.25	15.02	14.51
31	09.09		06.55		03.41		04.37	06.08		08.01		10.10
	16.16		20.13		23.13		22.31	20.48		16.22		14.52
Potential sun hours	180	241	363	448	561	609	597	504	392	307	204	148
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 47 - Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1457)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.06	07.38	06.52	05.10	03.39	03.21	04.40	06.11	07.34	08.04	09.34
	14.55	16.19	17.46	20.16	21.44	23.15	23.42	22.28	20.45	19.02	16.19	15.00
2	10.09	09.03	07.34	06.48	05.06	03.37	03.23	04.43	06.14	07.37	08.07	09.37
	14.56	16.22	17.49	20.19	21.47	23.18	23.41	22.25	20.42	18.58	16.16	14.58
3	10.08	09.00	07.31	06.45	05.03	03.35	03.25	04.46	06.16	07.40	08.11	09.40
	14.58	16.26	17.52	20.21	21.50	23.20	23.39	22.22	20.38	18.55	16.13	14.56
4	10.07	08.57	07.27	06.41	05.00	03.33	03.26	04.49	06.19	07.42	08.14	09.42
	15.00	16.29	17.55	20.24	21.53	23.23	23.38	22.18	20.35	18.51	16.10	14.55
5	10.05	08.54	07.24	06.38	04.57	03.31	03.28	04.52	06.22	07.45	08.17	09.44
	15.02	16.32	17.58	20.27	21.56	23.25	23.36	22.15	20.31	18.48	16.07	14.53
6	10.04	08.51	07.21	06.34	04.53	03.29	03.30	04.55	06.25	07.48	08.20	09.47
	15.05	16.35	18.01	20.30	21.59	23.27	23.35	22.12	20.28	18.45	16.04	14.51
7	10.03	08.48	07.17	06.31	04.50	03.27	03.32	04.58	06.28	07.51	08.23	09.49
	15.07	16.38	18.04	20.33	22.02	23.29	23.33	22.09	20.24	18.41	16.01	14.50
8	10.01	08.45	07.14	06.27	04.47	03.25	03.34	05.01	06.30	07.54	08.26	09.51
	15.09	16.42	18.07	20.36	22.06	23.31	23.31	22.06	20.21	18.38	15.58	14.49
9	10.00	08.42	07.11	06.24	04.44	03.23	03.36	05.04	06.33	07.56	08.29	09.53
	15.12	16.45	18.10	20.39	22.09	23.33	23.29	22.02	20.17	18.34	15.55	14.48
10	09.58	08.39	07.07	06.21	04.41	03.22	03.39	05.07	06.36	07.59	08.32	09.55
	15.14	16.48	18.13	20.42	22.12	23.35	23.27	21.59	20.14	18.31	15.52	14.47
11	09.57	08.36	07.04	06.17	04.38	03.21	03.41	05.10	06.39	08.02	08.35	09.57
	15.17	16.51	18.16	20.45	22.15	23.37	23.25	21.56	20.11	18.28	15.49	14.46
12	09.55	08.33	07.00	06.14	04.34	03.19	03.44	05.13	06.41	08.05	08.38	09.59
	15.19	16.54	18.18	20.47	22.18	23.38	23.23	21.53	20.07	18.24	15.46	14.45
13	09.53	08.30	06.57	06.10	04.31	03.18	03.46	05.16	06.44	08.08	08.41	10.01
	15.22	16.57	18.21	20.50	22.21	23.40	23.20	21.49	20.04	18.21	15.43	14.44
14	09.51	08.27	06.54	06.07	04.28	03.17	03.49	05.19	06.47	08.11	08.45	10.02
	15.25	17.00	18.24	20.53	22.24	23.41	23.18	21.46	20.00	18.18	15.40	14.43
15	09.49	08.23	06.50	06.03	04.25	03.16	03.51	05.22	06.50	08.14	08.48	10.04
	15.27	17.03	18.27	20.56	22.27	23.42	23.16	21.43	19.57	18.14	15.38	14.43
16	09.47	08.20	06.47	06.00	04.22	03.15	03.54	05.25	06.53	08.17	08.51	10.05
	15.30	17.07	18.30	20.59	22.30	23.43	23.13	21.39	19.53	18.11	15.35	14.42
17	09.45	08.17	06.43	05.57	04.19	03.15	03.56	05.28	06.55	08.19	08.54	10.06
	15.33	17.10	18.33	21.02	22.33	23.44	23.11	21.36	19.50	18.08	15.32	14.42
18	09.42	08.14	06.40	05.53	04.16	03.14	03.59	05.31	06.58	08.22	08.57	10.07
	15.36	17.13	18.36	21.05	22.36	23.45	23.08	21.33	19.46	18.04	15.30	14.42
19	09.40	08.10	06.36	05.50	04.13	03.14	04.02	05.33	07.01	08.25	09.00	10.08
	15.39	17.16	18.39	21.08	22.39	23.46	23.06	21.29	19.43	18.01	15.27	14.42
20	09.38	08.07	06.33	05.46	04.10	03.14	04.05	05.36	07.04	08.28	09.03	10.09
	15.42	17.19	18.41	21.11	22.42	23.46	23.03	21.26	19.39	17.58	15.24	14.42
21	09.35	08.04	06.30	05.43	04.08	03.14	04.08	05.39	07.06	08.31	09.06	10.10
	15.45	17.22	18.44	21.14	22.45	23.47	23.00	21.23	19.36	17.54	15.22	14.43
22	09.33	08.01	06.26	05.40	04.05	03.14	04.10	05.42	07.09	08.34	09.09	10.11
	15.48	17.25	18.47	21.17	22.48	23.47	22.57	21.19	19.33	17.51	15.19	14.43
23	09.30	07.57	06.23	05.36	04.02	03.14	04.13	05.45	07.12	08.37	09.12	10.11
	15.51	17.28	18.50	21.20	22.51	23.47	22.55	21.16	19.29	17.48	15.17	14.43
24	09.28	07.54	06.19	05.33	03.59	03.15	04.16	05.48	07.15	08.40	09.15	10.11
	15.54	17.31	18.53	21.23	22.54	23.47	22.52	21.12	19.26	17.45	15.15	14.44
25	09.25	07.51	06.16	05.30	03.56	03.15	04.19	05.51	07.17	07.43	09.18	10.12
	15.57	17.34	18.56	21.26	22.57	23.46	22.49	21.09	19.22	16.41	15.12	14.45
26	09.23	07.48	06.12	05.26	03.54	03.16	04.22	05.54	07.20	07.46	09.21	10.12
	16.00	17.37	18.59	21.29	22.59	23.46	22.46	21.06	19.19	16.38	15.10	14.46
27	09.20	07.44	06.09	05.23	03.51	03.17	04.25	05.57	07.23	07.49	09.23	10.12
	16.04	17.40	19.01	21.32	23.02	23.46	22.43	21.02	19.15	16.35	15.08	14.47
28	09.17	07.41	06.05	05.20	03.49	03.18	04.28	05.59	07.26	07.52	09.26	10.12
	16.07	17.43	19.04	21.35	23.05	23.45	22.40	20.59	19.12	16.32	15.06	14.48
29	09.14		07.02	05.16	03.46	03.19	04.31	06.02	07.28	07.55	09.29	10.11
	16.10		20.07	21.38	23.08	23.44	22.37	20.55	19.08	16.28	15.04	14.49
30	09.12		06.58	05.13	03.44	03.20	04.34	06.05	07.31	07.58	09.32	10.11
	16.13		20.10	21.41	23.10	23.43	22.34	20.52	19.05	16.25	15.02	14.51
31	09.09		06.55		03.41		04.37	06.08		08.01		10.10
	16.16		20.13		23.13		22.31	20.48		16.22		14.52
Potential sun hours	180	241	363	448	561	609	597	503	392	307	204	148
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 48 - Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1458)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.06	07.38	06.52	05.10	03.39	03.22	04.40	06.11	07.34	08.04	09.34
	14.55	16.19	17.46	20.16	21.44	23.15	23.42	22.28	20.45	19.02	16.19	15.00
2	10.09	09.03	07.34	06.48	05.06	03.37	03.23	04.43	06.14	07.37	08.07	09.37
	14.56	16.23	17.49	20.19	21.47	23.18	23.41	22.25	20.42	18.58	16.16	14.58
3	10.08	09.00	07.31	06.45	05.03	03.35	03.25	04.46	06.16	07.40	08.10	09.39
	14.58	16.26	17.52	20.21	21.50	23.20	23.39	22.21	20.38	18.55	16.13	14.56
4	10.07	08.57	07.27	06.41	05.00	03.33	03.26	04.49	06.19	07.42	08.14	09.42
	15.00	16.29	17.55	20.24	21.53	23.23	23.38	22.18	20.35	18.51	16.10	14.55
5	10.05	08.54	07.24	06.38	04.57	03.31	03.28	04.52	06.22	07.45	08.17	09.44
	15.02	16.32	17.58	20.27	21.56	23.25	23.36	22.15	20.31	18.48	16.07	14.53
6	10.04	08.51	07.21	06.34	04.53	03.29	03.30	04.55	06.25	07.48	08.20	09.47
	15.05	16.35	18.01	20.30	21.59	23.27	23.35	22.12	20.28	18.45	16.04	14.52
7	10.03	08.48	07.17	06.31	04.50	03.27	03.32	04.58	06.28	07.51	08.23	09.49
	15.07	16.38	18.04	20.33	22.02	23.29	23.33	22.09	20.24	18.41	16.01	14.50
8	10.01	08.45	07.14	06.27	04.47	03.25	03.34	05.01	06.30	07.54	08.26	09.51
	15.09	16.42	18.07	20.36	22.05	23.31	23.31	22.06	20.21	18.38	15.58	14.49
9	10.00	08.42	07.11	06.24	04.44	03.24	03.37	05.04	06.33	07.56	08.29	09.53
	15.12	16.45	18.10	20.39	22.09	23.33	23.29	22.02	20.17	18.34	15.55	14.48
10	09.58	08.39	07.07	06.21	04.41	03.22	03.39	05.07	06.36	07.59	08.32	09.55
	15.14	16.48	18.13	20.42	22.12	23.35	23.27	21.59	20.14	18.31	15.52	14.47
11	09.56	08.36	07.04	06.17	04.38	03.21	03.41	05.10	06.39	08.02	08.35	09.57
	15.17	16.51	18.16	20.45	22.15	23.37	23.25	21.56	20.11	18.28	15.49	14.46
12	09.55	08.33	07.00	06.14	04.34	03.19	03.44	05.13	06.41	08.05	08.38	09.59
	15.19	16.54	18.18	20.47	22.18	23.38	23.23	21.52	20.07	18.24	15.46	14.45
13	09.53	08.30	06.57	06.10	04.31	03.18	03.46	05.16	06.44	08.08	08.41	10.01
	15.22	16.57	18.21	20.50	22.21	23.40	23.20	21.49	20.04	18.21	15.43	14.44
14	09.51	08.26	06.54	06.07	04.28	03.17	03.49	05.19	06.47	08.11	08.45	10.02
	15.25	17.00	18.24	20.53	22.24	23.41	23.18	21.46	20.00	18.18	15.40	14.43
15	09.49	08.23	06.50	06.04	04.25	03.16	03.51	05.22	06.50	08.14	08.48	10.04
	15.28	17.04	18.27	20.56	22.27	23.42	23.16	21.43	19.57	18.14	15.38	14.43
16	09.47	08.20	06.47	06.00	04.22	03.16	03.54	05.25	06.53	08.17	08.51	10.05
	15.30	17.07	18.30	20.59	22.30	23.43	23.13	21.39	19.53	18.11	15.35	14.43
17	09.44	08.17	06.43	05.57	04.19	03.15	03.57	05.28	06.55	08.19	08.54	10.06
	15.33	17.10	18.33	21.02	22.33	23.44	23.11	21.36	19.50	18.08	15.32	14.42
18	09.42	08.14	06.40	05.53	04.16	03.14	03.59	05.31	06.58	08.22	08.57	10.07
	15.36	17.13	18.36	21.05	22.36	23.45	23.08	21.33	19.46	18.04	15.30	14.42
19	09.40	08.10	06.36	05.50	04.13	03.14	04.02	05.33	07.01	08.25	09.00	10.08
	15.39	17.16	18.39	21.08	22.39	23.46	23.05	21.29	19.43	18.01	15.27	14.42
20	09.38	08.07	06.33	05.47	04.10	03.14	04.05	05.36	07.04	08.28	09.03	10.09
	15.42	17.19	18.41	21.11	22.42	23.46	23.03	21.26	19.39	17.58	15.24	14.42
21	09.35	08.04	06.30	05.43	04.08	03.14	04.08	05.39	07.06	08.31	09.06	10.10
	15.45	17.22	18.44	21.14	22.45	23.46	23.00	21.22	19.36	17.54	15.22	14.43
22	09.33	08.01	06.26	05.40	04.05	03.14	04.10	05.42	07.09	08.34	09.09	10.11
	15.48	17.25	18.47	21.17	22.48	23.47	22.57	21.19	19.33	17.51	15.19	14.43
23	09.30	07.57	06.23	05.36	04.02	03.14	04.13	05.45	07.12	08.37	09.12	10.11
	15.51	17.28	18.50	21.20	22.51	23.47	22.54	21.16	19.29	17.48	15.17	14.44
24	09.28	07.54	06.19	05.33	03.59	03.15	04.16	05.48	07.15	08.40	09.15	10.11
	15.54	17.31	18.53	21.23	22.54	23.47	22.52	21.12	19.26	17.45	15.15	14.44
25	09.25	07.51	06.16	05.30	03.57	03.15	04.19	05.51	07.17	07.43	09.18	10.12
	15.57	17.34	18.56	21.26	22.56	23.46	22.49	21.09	19.22	16.41	15.12	14.45
26	09.22	07.48	06.12	05.26	03.54	03.16	04.22	05.54	07.20	07.46	09.21	10.12
	16.00	17.37	18.59	21.29	22.59	23.46	22.46	21.06	19.19	16.38	15.10	14.46
27	09.20	07.44	06.09	05.23	03.51	03.17	04.25	05.57	07.23	07.49	09.23	10.12
	16.04	17.40	19.01	21.32	23.02	23.45	22.43	21.02	19.15	16.35	15.08	14.47
28	09.17	07.41	06.05	05.20	03.49	03.18	04.28	05.59	07.26	07.52	09.26	10.11
	16.07	17.43	19.04	21.35	23.05	23.45	22.40	20.59	19.12	16.32	15.06	14.48
29	09.14		07.02	05.16	03.46	03.19	04.31	06.02	07.28	07.55	09.29	10.11
	16.10		20.07	21.38	23.08	23.44	22.37	20.55	19.08	16.29	15.04	14.50
30	09.12		06.58	05.13	03.44	03.20	04.34	06.05	07.31	07.58	09.32	10.11
	16.13		20.10	21.41	23.10	23.43	22.34	20.52	19.05	16.25	15.02	14.51
31	09.09		06.55		03.41		04.37	06.08		08.01		10.10
	16.16		20.13		23.13		22.31	20.48		16.22		14.53
Potential sun hours	180	241	363	448	561	608	597	503	392	307	205	148
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 49 - Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1459)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.06	07.37	06.52	05.10	03.39	03.22	04.40	06.11	07.34	08.04	09.34
	14.55	16.19	17.46	20.16	21.44	23.15	23.42	22.28	20.45	19.02	16.19	15.00
2	10.08	09.03	07.34	06.48	05.06	03.37	03.23	04.43	06.14	07.37	08.07	09.37
	14.56	16.23	17.49	20.19	21.47	23.18	23.41	22.25	20.42	18.58	16.16	14.58
3	10.08	09.00	07.31	06.45	05.03	03.35	03.25	04.46	06.16	07.40	08.10	09.39
	14.58	16.26	17.52	20.21	21.50	23.20	23.39	22.21	20.38	18.55	16.13	14.56
4	10.06	08.57	07.27	06.41	05.00	03.33	03.26	04.49	06.19	07.42	08.14	09.42
	15.00	16.29	17.55	20.24	21.53	23.23	23.38	22.18	20.35	18.51	16.10	14.55
5	10.05	08.54	07.24	06.38	04.57	03.31	03.28	04.52	06.22	07.45	08.17	09.44
	15.02	16.32	17.58	20.27	21.56	23.25	23.36	22.15	20.31	18.48	16.07	14.53
6	10.04	08.51	07.21	06.34	04.53	03.29	03.30	04.55	06.25	07.48	08.20	09.47
	15.05	16.35	18.01	20.30	21.59	23.27	23.35	22.12	20.28	18.45	16.04	14.52
7	10.03	08.48	07.17	06.31	04.50	03.27	03.32	04.58	06.28	07.51	08.23	09.49
	15.07	16.38	18.04	20.33	22.02	23.29	23.33	22.09	20.24	18.41	16.01	14.50
8	10.01	08.45	07.14	06.27	04.47	03.25	03.34	05.01	06.30	07.54	08.26	09.51
	15.09	16.42	18.07	20.36	22.05	23.31	23.31	22.05	20.21	18.38	15.58	14.49
9	10.00	08.42	07.11	06.24	04.44	03.24	03.37	05.04	06.33	07.56	08.29	09.53
	15.12	16.45	18.10	20.39	22.09	23.33	23.29	22.02	20.17	18.34	15.55	14.48
10	09.58	08.39	07.07	06.21	04.41	03.22	03.39	05.07	06.36	07.59	08.32	09.55
	15.14	16.48	18.13	20.42	22.12	23.35	23.27	21.59	20.14	18.31	15.52	14.47
11	09.56	08.36	07.04	06.17	04.38	03.21	03.41	05.10	06.39	08.02	08.35	09.57
	15.17	16.51	18.15	20.44	22.15	23.37	23.25	21.56	20.11	18.28	15.49	14.46
12	09.55	08.33	07.00	06.14	04.34	03.19	03.44	05.13	06.41	08.05	08.38	09.59
	15.19	16.54	18.18	20.47	22.18	23.38	23.23	21.52	20.07	18.24	15.46	14.45
13	09.53	08.30	06.57	06.10	04.31	03.18	03.46	05.16	06.44	08.08	08.41	10.00
	15.22	16.57	18.21	20.50	22.21	23.40	23.20	21.49	20.04	18.21	15.43	14.44
14	09.51	08.26	06.53	06.07	04.28	03.17	03.49	05.19	06.47	08.11	08.44	10.02
	15.25	17.00	18.24	20.53	22.24	23.41	23.18	21.46	20.00	18.18	15.40	14.43
15	09.49	08.23	06.50	06.03	04.25	03.16	03.51	05.22	06.50	08.14	08.48	10.04
	15.28	17.04	18.27	20.56	22.27	23.42	23.16	21.43	19.57	18.14	15.38	14.43
16	09.47	08.20	06.47	06.00	04.22	03.16	03.54	05.25	06.52	08.17	08.51	10.05
	15.30	17.07	18.30	20.59	22.30	23.43	23.13	21.39	19.53	18.11	15.35	14.43
17	09.44	08.17	06.43	05.57	04.19	03.15	03.57	05.28	06.55	08.19	08.54	10.06
	15.33	17.10	18.33	21.02	22.33	23.44	23.11	21.36	19.50	18.08	15.32	14.42
18	09.42	08.14	06.40	05.53	04.16	03.14	03.59	05.31	06.58	08.22	08.57	10.07
	15.36	17.13	18.36	21.05	22.36	23.45	23.08	21.33	19.46	18.04	15.30	14.42
19	09.40	08.10	06.36	05.50	04.13	03.14	04.02	05.33	07.01	08.25	09.00	10.08
	15.39	17.16	18.39	21.08	22.39	23.46	23.05	21.29	19.43	18.01	15.27	14.42
20	09.38	08.07	06.33	05.46	04.10	03.14	04.05	05.36	07.03	08.28	09.03	10.09
	15.42	17.19	18.41	21.11	22.42	23.46	23.03	21.26	19.39	17.58	15.24	14.42
21	09.35	08.04	06.29	05.43	04.08	03.14	04.08	05.39	07.06	08.31	09.06	10.10
	15.45	17.22	18.44	21.14	22.45	23.46	23.00	21.22	19.36	17.54	15.22	14.43
22	09.33	08.01	06.26	05.40	04.05	03.14	04.10	05.42	07.09	08.34	09.09	10.10
	15.48	17.25	18.47	21.17	22.48	23.47	22.57	21.19	19.33	17.51	15.19	14.43
23	09.30	07.57	06.23	05.36	04.02	03.14	04.13	05.45	07.12	08.37	09.12	10.11
	15.51	17.28	18.50	21.20	22.51	23.47	22.54	21.16	19.29	17.48	15.17	14.44
24	09.28	07.54	06.19	05.33	03.59	03.15	04.16	05.48	07.15	08.40	09.15	10.11
	15.54	17.31	18.53	21.23	22.54	23.47	22.52	21.12	19.26	17.45	15.15	14.44
25	09.25	07.51	06.16	05.30	03.57	03.15	04.19	05.51	07.17	07.43	09.18	10.12
	15.57	17.34	18.56	21.26	22.56	23.46	22.49	21.09	19.22	16.41	15.12	14.45
26	09.22	07.47	06.12	05.26	03.54	03.16	04.22	05.54	07.20	07.46	09.20	10.12
	16.00	17.37	18.58	21.29	22.59	23.46	22.46	21.05	19.19	16.38	15.10	14.46
27	09.20	07.44	06.09	05.23	03.51	03.17	04.25	05.57	07.23	07.49	09.23	10.12
	16.04	17.40	19.01	21.32	23.02	23.45	22.43	21.02	19.15	16.35	15.08	14.47
28	09.17	07.41	06.05	05.20	03.49	03.18	04.28	05.59	07.26	07.52	09.26	10.11
	16.07	17.43	19.04	21.35	23.05	23.45	22.40	20.59	19.12	16.32	15.06	14.48
29	09.14		07.02	05.16	03.46	03.19	04.31	06.02	07.28	07.55	09.29	10.11
	16.10		20.07	21.38	23.08	23.44	22.37	20.55	19.08	16.28	15.04	14.50
30	09.11		06.58	05.13	03.44	03.20	04.34	06.05	07.31	07.58	09.32	10.11
	16.13		20.10	21.41	23.10	23.43	22.34	20.52	19.05	16.25	15.02	14.51
31	09.09		06.55		03.41		04.37	06.08		08.01		10.10
	16.16		20.13		23.13		22.31	20.48		16.22		14.53
Potential sun hours	180	241	363	448	561	608	597	503	392	307	205	148
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Calendar per WTG

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)WTG: 50 - Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1460)

Assumptions for shadow calculations

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

	January	February	March	April	May	June	July	August	September	October	November	December
1	10.09	09.06	07.37	06.52	05.10	03.39	03.22	04.40	06.11	07.34	08.04	09.34
	14.55	16.19	17.46	20.16	21.44	23.15	23.42	22.28	20.45	19.02	16.19	15.00
2	10.08	09.03	07.34	06.48	05.06	03.37	03.23	04.43	06.14	07.37	08.07	09.37
	14.57	16.23	17.49	20.18	21.47	23.18	23.40	22.24	20.42	18.58	16.16	14.58
3	10.07	09.00	07.31	06.45	05.03	03.35	03.25	04.46	06.16	07.40	08.10	09.39
	14.58	16.26	17.52	20.21	21.50	23.20	23.39	22.21	20.38	18.55	16.13	14.56
4	10.06	08.57	07.27	06.41	05.00	03.33	03.27	04.49	06.19	07.42	08.13	09.42
	15.00	16.29	17.55	20.24	21.53	23.23	23.38	22.18	20.35	18.51	16.10	14.55
5	10.05	08.54	07.24	06.38	04.57	03.31	03.28	04.52	06.22	07.45	08.17	09.44
	15.02	16.32	17.58	20.27	21.56	23.25	23.36	22.15	20.31	18.48	16.07	14.53
6	10.04	08.51	07.21	06.34	04.53	03.29	03.30	04.55	06.25	07.48	08.20	09.47
	15.05	16.35	18.01	20.30	21.59	23.27	23.34	22.12	20.28	18.45	16.04	14.52
7	10.03	08.48	07.17	06.31	04.50	03.27	03.32	04.58	06.28	07.51	08.23	09.49
	15.07	16.38	18.04	20.33	22.02	23.29	23.33	22.09	20.24	18.41	16.01	14.50
8	10.01	08.45	07.14	06.27	04.47	03.25	03.34	05.01	06.30	07.54	08.26	09.51
	15.09	16.42	18.07	20.36	22.05	23.31	23.31	22.05	20.21	18.38	15.58	14.49
9	10.00	08.42	07.11	06.24	04.44	03.24	03.37	05.04	06.33	07.56	08.29	09.53
	15.12	16.45	18.10	20.39	22.08	23.33	23.29	22.02	20.17	18.34	15.55	14.48
10	09.58	08.39	07.07	06.21	04.41	03.22	03.39	05.07	06.36	07.59	08.32	09.55
	15.14	16.48	18.13	20.42	22.12	23.35	23.27	21.59	20.14	18.31	15.52	14.47
11	09.56	08.36	07.04	06.17	04.38	03.21	03.41	05.10	06.39	08.02	08.35	09.57
	15.17	16.51	18.15	20.44	22.15	23.37	23.25	21.56	20.11	18.28	15.49	14.46
12	09.55	08.33	07.00	06.14	04.34	03.20	03.44	05.13	06.41	08.05	08.38	09.59
	15.19	16.54	18.18	20.47	22.18	23.38	23.23	21.52	20.07	18.24	15.46	14.45
13	09.53	08.30	06.57	06.10	04.31	03.18	03.46	05.16	06.44	08.08	08.41	10.00
	15.22	16.57	18.21	20.50	22.21	23.40	23.20	21.49	20.04	18.21	15.43	14.44
14	09.51	08.26	06.53	06.07	04.28	03.17	03.49	05.19	06.47	08.11	08.44	10.02
	15.25	17.00	18.24	20.53	22.24	23.41	23.18	21.46	20.00	18.18	15.41	14.43
15	09.49	08.23	06.50	06.03	04.25	03.16	03.51	05.22	06.50	08.14	08.48	10.03
	15.28	17.04	18.27	20.56	22.27	23.42	23.16	21.43	19.57	18.14	15.38	14.43
16	09.47	08.20	06.47	06.00	04.22	03.16	03.54	05.25	06.52	08.16	08.51	10.05
	15.30	17.07	18.30	20.59	22.30	23.43	23.13	21.39	19.53	18.11	15.35	14.43
17	09.44	08.17	06.43	05.57	04.19	03.15	03.57	05.28	06.55	08.19	08.54	10.06
	15.33	17.10	18.33	21.02	22.33	23.44	23.11	21.36	19.50	18.08	15.32	14.42
18	09.42	08.14	06.40	05.53	04.16	03.15	03.59	05.31	06.58	08.22	08.57	10.07
	15.36	17.13	18.36	21.05	22.36	23.45	23.08	21.32	19.46	18.04	15.30	14.42
19	09.40	08.10	06.36	05.50	04.13	03.14	04.02	05.33	07.01	08.25	09.00	10.08
	15.39	17.16	18.39	21.08	22.39	23.45	23.05	21.29	19.43	18.01	15.27	14.42
20	09.38	08.07	06.33	05.46	04.10	03.14	04.05	05.36	07.03	08.28	09.03	10.09
	15.42	17.19	18.41	21.11	22.42	23.46	23.03	21.26	19.39	17.58	15.25	14.42
21	09.35	08.04	06.29	05.43	04.08	03.14	04.08	05.39	07.06	08.31	09.06	10.10
	15.45	17.22	18.44	21.14	22.45	23.46	23.00	21.22	19.36	17.54	15.22	14.43
22	09.33	08.01	06.26	05.40	04.05	03.14	04.11	05.42	07.09	08.34	09.09	10.10
	15.48	17.25	18.47	21.17	22.48	23.47	22.57	21.19	19.33	17.51	15.20	14.43
23	09.30	07.57	06.23	05.36	04.02	03.14	04.13	05.45	07.12	08.37	09.12	10.11
	15.51	17.28	18.50	21.20	22.51	23.47	22.54	21.16	19.29	17.48	15.17	14.44
24	09.28	07.54	06.19	05.33	03.59	03.15	04.16	05.48	07.15	08.40	09.15	10.11
	15.54	17.31	18.53	21.23	22.54	23.46	22.51	21.12	19.26	17.45	15.15	14.44
25	09.25	07.51	06.16	05.30	03.57	03.15	04.19	05.51	07.17	07.43	09.18	10.11
	15.57	17.34	18.56	21.26	22.56	23.46	22.49	21.09	19.22	16.41	15.12	14.45
26	09.22	07.47	06.12	05.26	03.54	03.16	04.22	05.54	07.20	07.46	09.20	10.12
	16.00	17.37	18.58	21.29	22.59	23.46	22.46	21.05	19.19	16.38	15.10	14.46
27	09.20	07.44	06.09	05.23	03.51	03.17	04.25	05.57	07.23	07.49	09.23	10.11
	16.04	17.40	19.01	21.32	23.02	23.45	22.43	21.02	19.15	16.35	15.08	14.47
28	09.17	07.41	06.05	05.20	03.49	03.18	04.28	05.59	07.26	07.52	09.26	10.11
	16.07	17.43	19.04	21.35	23.05	23.45	22.40	20.59	19.12	16.32	15.06	14.48
29	09.14		07.02	05.16	03.46	03.19	04.31	06.02	07.28	07.55	09.29	10.11
	16.10		20.07	21.38	23.07	23.44	22.37	20.55	19.08	16.29	15.04	14.50
30	09.11		06.58	05.13	03.44	03.20	04.34	06.05	07.31	07.58	09.32	10.11
	16.13		20.10	21.41	23.10	23.43	22.34	20.52	19.05	16.25	15.02	14.51
31	09.09		06.55		03.41		04.37	06.08		08.01		10.10
	16.16		20.13		23.13		22.31	20.48		16.22		14.53
Potential sun hours	180	241	363	448	561	608	597	503	392	307	205	148
Sum of minutes with flicker	0	0	0	0	0	0	0	0	0	0	0	0

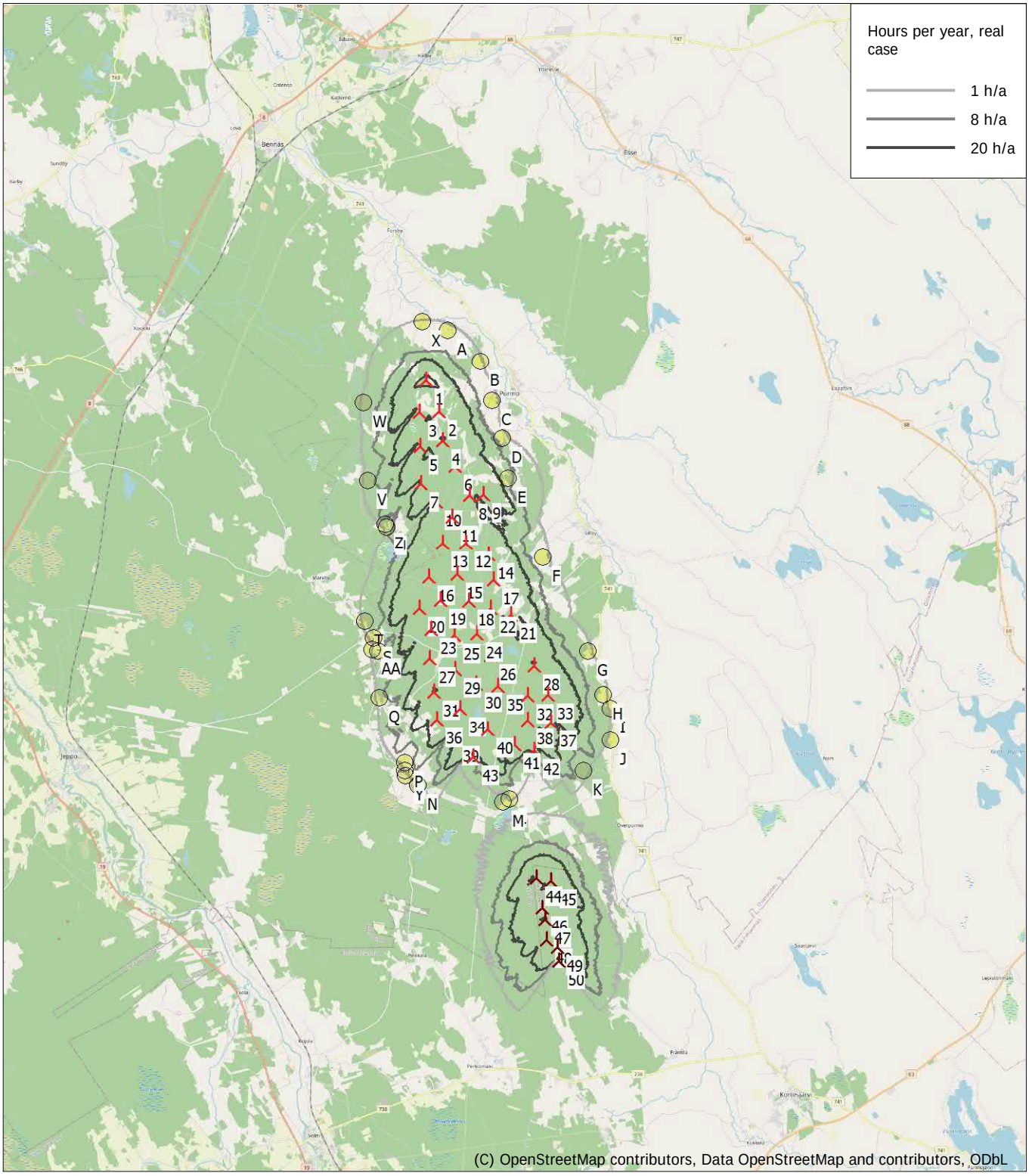
Table layout: For each day in each month the following matrix apply

Day in month	Sun rise (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker
	Sun set (hh:mm)	First time (hh:mm) with flicker-Last time (hh:mm) with flicker/Minutes with flicker

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.18/3.5.584

SHADOW - Map

Calculation: Purmo VE1 RD200x43xHH200_real case, no forest_20220505+ YV(Salo-Ylikoski)



Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 298 020 North: 7 042 710

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Purmon tuulivoimahanke_0.wpo (4)

Time step: 4 minutes, Day step: 14 days, Map resolution: 30 m, Visibility resolution: 15 m, Eye height: 1,5 m

Bilaga 11. Purmo vindkraftsprojekt – skuggmodelleringens resultat ”real case, Luke forest” (ALT1) tillsammans med Salo–Ylikoski-projektet.

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.27/3.5.584

SHADOW - Main Result

Calculation: Purmo VE1_RD200x43xHH200_real case, Luke forest_20220505+YV(Salo-Ylikoski)

Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	1 minutes

Sunshine probability S (Average daily sunshine hours) []

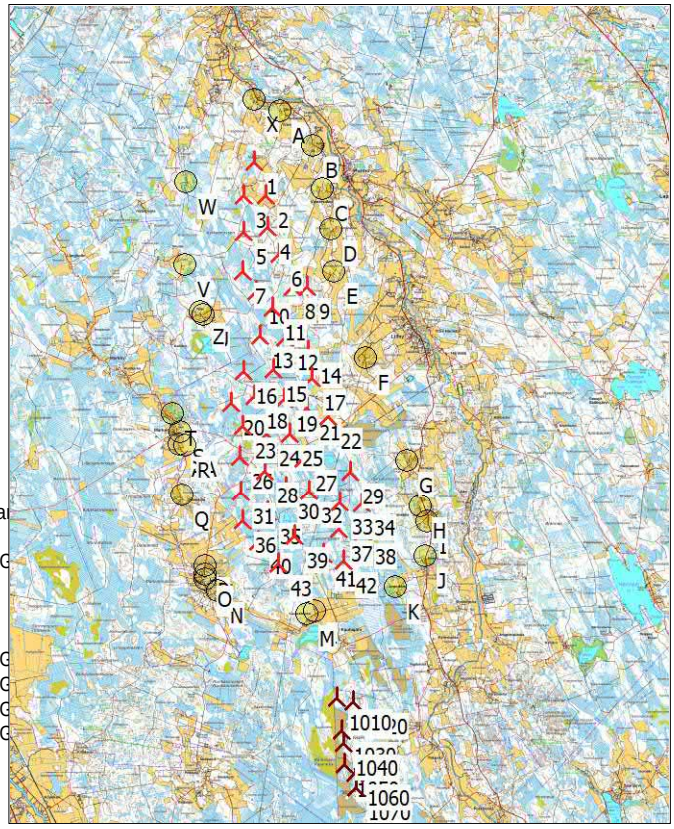
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_Purmon tuulivoimahar
Area object(s) used in calculation:
Area object (Heights a.g.l. for e.g. Forest (ORA tool) or ZVI obstructions): REC
Area object (itä1): (7)
Area object (itä2): (8)
Area object (länsi1): (9)
Area object (Heights a.g.l. for e.g. Forest (ORA tool) or ZVI obstructions): REC
Area object (Heights a.g.l. for e.g. Forest (ORA tool) or ZVI obstructions): REC
Area object (Heights a.g.l. for e.g. Forest (ORA tool) or ZVI obstructions): REC
Area object (Heights a.g.l. for e.g. Forest (ORA tool) or ZVI obstructions): REC
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:250 000

New WTG Shadow receptor

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	296 015	7 050 633	25,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
2	296 402	7 049 512	28,1	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
3	295 688	7 049 533	26,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
4	296 468	7 048 488	31,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
5	295 661	7 048 308	32,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
6	296 860	7 047 573	35,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
7	295 626	7 047 011	32,3	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
8	297 281	7 046 511	32,8	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
9	297 768	7 046 509	35,8	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
10	296 092	7 046 333	36,1	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
11	296 633	7 045 796	35,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
12	297 035	7 044 833	36,9	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
13	296 211	7 044 887	37,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
14	297 806	7 044 390	40,6	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
15	296 659	7 043 785	40,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
16	295 680	7 043 726	37,7	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
17	297 935	7 043 485	36,3	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
18	296 033	7 042 892	40,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
19	297 013	7 042 799	42,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
20	295 245	7 042 663	37,3	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
21	297 759	7 042 500	40,9	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
22	298 459	7 042 222	42,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
23	295 640	7 041 888	35,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
24	296 420	7 041 637	37,1	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
25	297 207	7 041 637	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
26	295 536	7 040 877	38,9	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
27	297 642	7 040 813	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
28	296 377	7 040 414	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4

To be continued on next page...

SHADOW - Main Result

Calculation: Purmo VE1_RD200x43xHH200_real case, Luke forest_20220505+YV(Salo-Ylikoski)

...continued from previous page

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
29	299 185	7 040 392	48,4	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
30	297 071	7 039 884	45,8	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
31	295 591	7 039 696	41,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
32	297 841	7 039 740	47,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
33	298 849	7 039 361	49,7	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
34	299 581	7 039 334	53,6	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
35	296 466	7 039 042	47,3	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
36	295 637	7 038 744	41,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
37	298 820	7 038 484	53,1	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
38	299 616	7 038 389	54,3	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
39	297 367	7 038 248	47,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
40	296 154	7 038 055	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
41	298 305	7 037 659	50,9	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
42	298 984	7 037 431	54,8	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
43	296 802	7 037 326	47,5	Generic RD200 HH20...	No	Generic	RD200 HH200 ABO Wind-5 600	5 600	200,0	200,0	2 086	10,4
1010	298 762	7 032 913	58,6	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1020	299 290	7 032 796	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1030	298 900	7 031 842	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1040	298 977	7 031 430	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1050	299 000	7 030 729	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1060	299 358	7 030 441	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1070	299 389	7 029 959	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	Asuinrakennus A (Lillkvist)	296 866	7 052 328	26,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	Asuinrakennus B (Dallberga)	297 952	7 051 163	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	Asuinrakennus C (Tormbacka)	298 274	7 049 757	28,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	Asuinrakennus D (Kallträskvägen)	298 556	7 048 421	35,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	Metsästysmaja E (Kejsarbacken)	298 663	7 047 017	33,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	Lomarakennus F (Källbacken)	299 710	7 044 165	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	Asuinrakennus G (Kornjärv)	301 071	7 040 772	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	Asuinrakennus H (Sandnabba)	301 519	7 039 228	51,6	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	Asuinrakennus I (Asp)	301 749	7 038 736	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	Asuinrakennus J (Stennabba)	301 661	7 037 581	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	Asuinrakennus K (Långnabba)	300 689	7 036 583	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	Lomarakennus L (Åvistvägen)	298 031	7 035 773	52,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
M	Asuinrakennus M (Stenbacka)	297 753	7 035 671	53,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
N	Asuinrakennus N (Adler)	294 812	7 036 441	44,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
O	Asuinrakennus O (Åvistvägen)	294 394	7 036 982	41,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
P	Asuinrakennus P (Finnabbavägen)	294 415	7 037 260	40,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Q	Asuinrakennus Q (Dalabacka)	293 652	7 039 610	40,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
R	Asuinrakennus R (Kronkvist)	293 736	7 041 267	32,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
S	Asuinrakennus S (Tallbacka)	293 575	7 041 715	32,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
T	Asuinrakennus T (Norrgård)	293 326	7 042 304	30,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
U	Asuinrakennus U (Nåpi)	294 326	7 045 578	35,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
V	Asuinrakennus V (Skutas)	293 741	7 047 247	32,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
W	Asuinrakennus W (Åbrännan)	293 782	7 049 981	22,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
X	Lomarakennus X (Dalbacka)	296 008	7 052 686	21,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Y	Asuinrakennus Y (Åvist)	294 403	7 036 830	41,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Z	Asuinrakennus Z (Nabba)	294 257	7 045 675	35,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
AA	Asuinrakennus AA (Kronkvist)	293 533	7 041 290	31,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.27/3.5.584

SHADOW - Main Result

Calculation: Purmo VE1_RD200x43xHH200_real case, Luke forest_20220505+YV(Salo-Ylikoski)

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	Asuinrakennus A (Lillkvist)	2:17
B	Asuinrakennus B (Dallberga)	1:34
C	Asuinrakennus C (Tormbacka)	1:42
D	Asuinrakennus D (Kallträskvägen)	4:01
E	Metsästysmaja E (Kejsarbacken)	8:33
F	Lomarakennus F (Källbacken)	3:53
G	Asuinrakennus G (Kornjärv)	3:27
H	Asuinrakennus H (Sandnabba)	3:25
I	Asuinrakennus I (Asp)	0:00
J	Asuinrakennus J (Stennabba)	0:00
K	Asuinrakennus K (Långnabba)	0:00
L	Lomarakennus L (Åvistvägen)	0:00
M	Asuinrakennus M (Stenbacka)	0:00
N	Asuinrakennus N (Adler)	0:00
O	Asuinrakennus O (Åvistvägen)	4:30
P	Asuinrakennus P (Finnabbavägen)	0:00
Q	Asuinrakennus Q (Dalabacka)	1:58
R	Asuinrakennus R (Kronkvist)	1:52
S	Asuinrakennus S (Tallbacka)	6:39
T	Asuinrakennus T (Norrgård)	0:00
U	Asuinrakennus U (Nåpi)	5:56
V	Asuinrakennus V (Skutas)	1:49
W	Asuinrakennus W (Åbrännan)	1:36
X	Lomarakennus X (Dalbacka)	2:49
Y	Asuinrakennus Y (Åvist)	0:00
Z	Asuinrakennus Z (Nabba)	2:45
AA	Asuinrakennus AA (Kronkvist)	1:28

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Expected [h/year]
1	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1279)	6:40
2	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1280)	1:42
3	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1281)	1:36
4	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1282)	0:00
5	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1283)	0:00
6	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1284)	4:13
7	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1285)	2:57
8	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1286)	0:00
9	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1287)	8:18
10	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1288)	5:06
11	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1289)	0:00
12	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1290)	0:00
13	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1291)	1:29
14	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1292)	2:01
15	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1293)	0:00
16	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1294)	0:00
17	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1295)	1:51
18	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1297)	0:00
19	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1296)	0:00
20	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1298)	4:57
21	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1300)	0:00
22	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1299)	0:00
23	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1301)	1:43
24	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1303)	0:00
25	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1302)	0:00
26	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1305)	1:59
27	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1304)	0:00
28	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1307)	0:00
29	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1306)	1:37
30	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1308)	0:00

To be continued on next page...

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.27/3.5.584

SHADOW - Main Result

Calculation: Purmo VE1_RD200x43xHH200_real case, Luke forest_20220505+YV(Salo-Ylikoski)

...continued from previous page

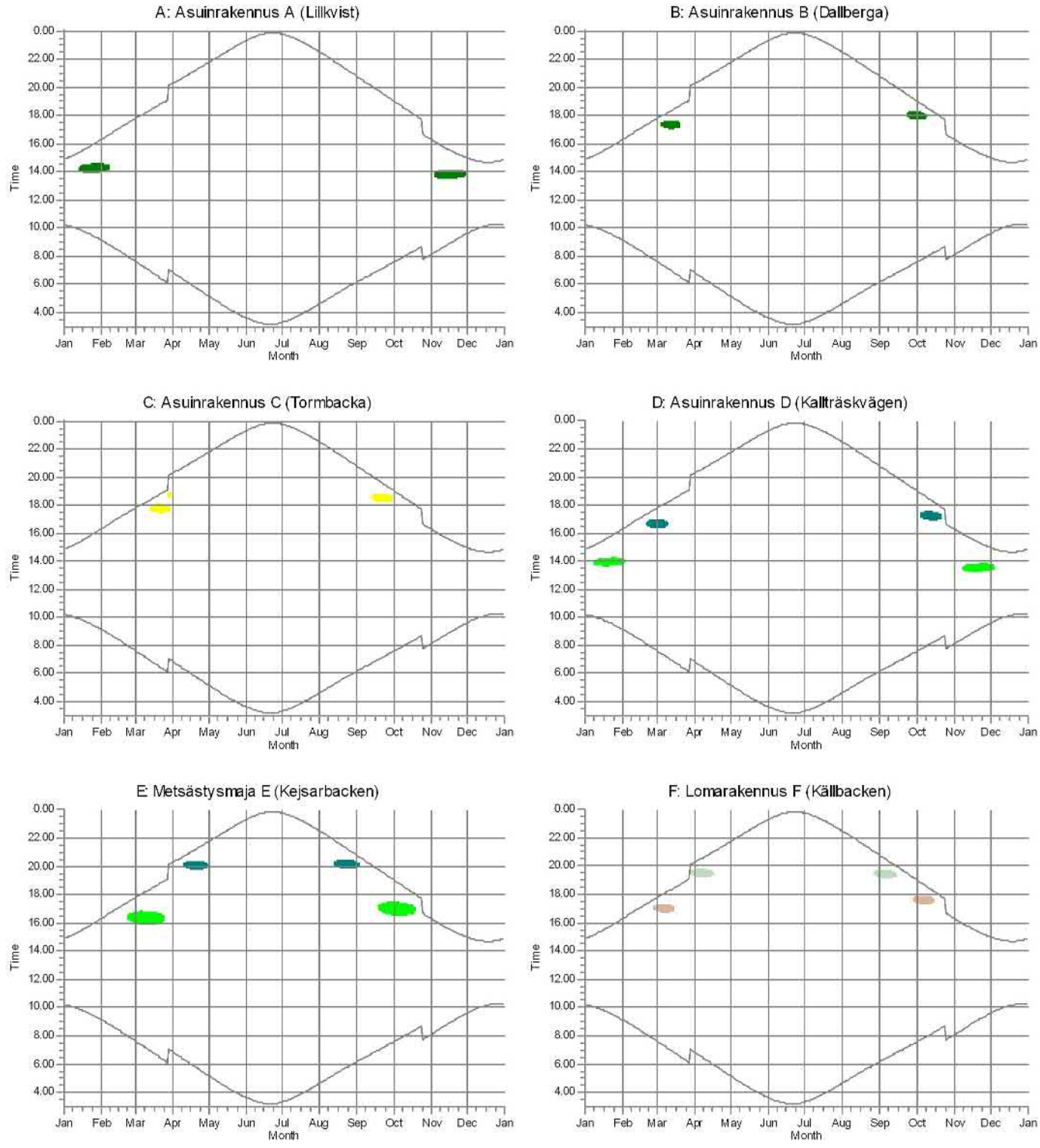
No.	Name	Expected [h/year]
31	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1309)	1:58
32	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1313)	0:00
33	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1310)	0:00
34	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1311)	3:41
35	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1312)	0:00
36	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1314)	0:00
37	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1316)	0:00
38	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1315)	1:34
39	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1318)	0:00
40	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1317)	4:30
41	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1319)	0:00
42	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1320)	0:00
43	Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1321)	0:00
1010	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1454)	0:00
1020	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1455)	0:00
1030	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1456)	0:00
1040	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1457)	0:00
1050	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1458)	0:00
1060	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1459)	0:00
1070	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1460)	0:00

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.27/3.5.584

SHADOW - Calendar, graphical

Calculation: Purmo VE1_RD200x43xHH200_real case, Luke forest_20220505+YV(Salo-Ylikoski)

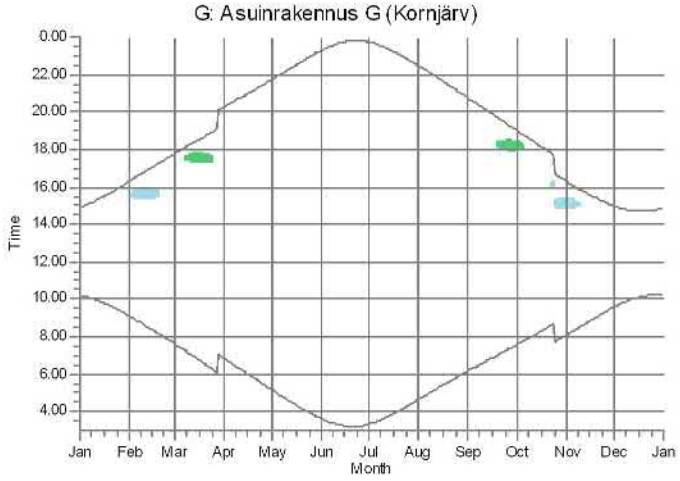


Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.27/3.5.584

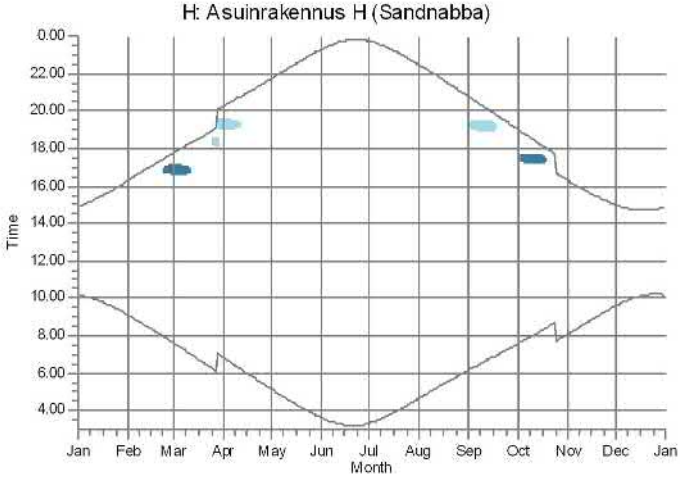
SHADOW - Calendar, graphical

Calculation: Purmo VE1_RD200x43xHH200_real case, Luke forest_20220505+YV(Salo-Ylikoski)

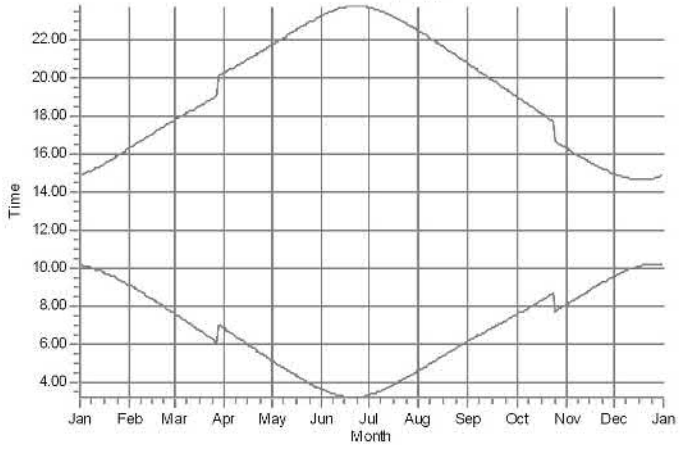
G: Asuinrakennus G (Kornjärv)



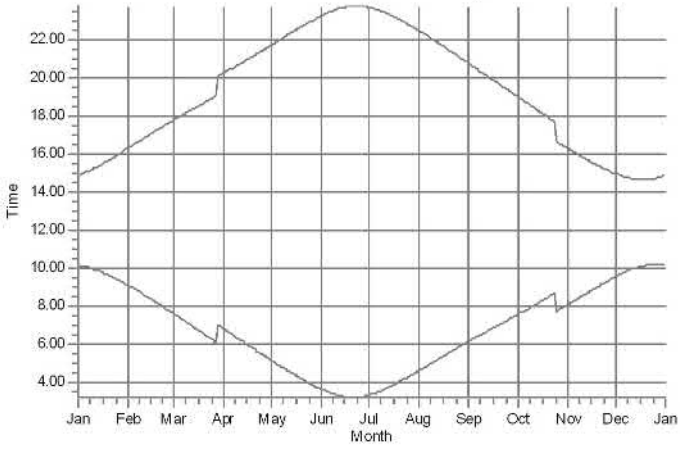
H: Asuinrakennus H (Sandnabba)



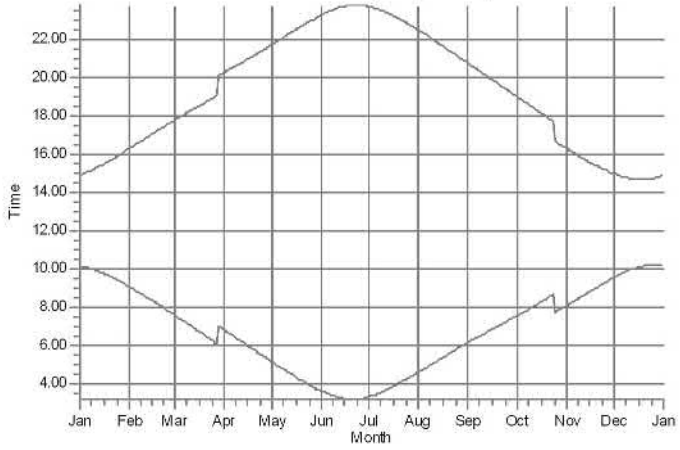
I: Asuinrakennus I (Asp)



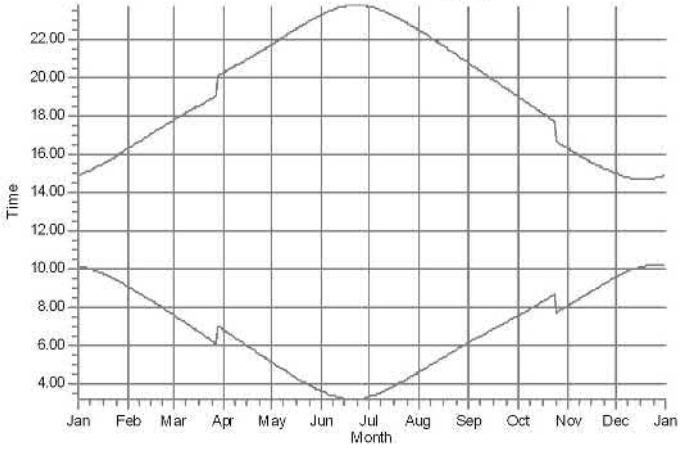
J: Asuinrakennus J (Stennabba)



K: Asuinrakennus K (Långnabba)



L: Lomarakennus L (Åvistvägen)



WTGs

29: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1306)

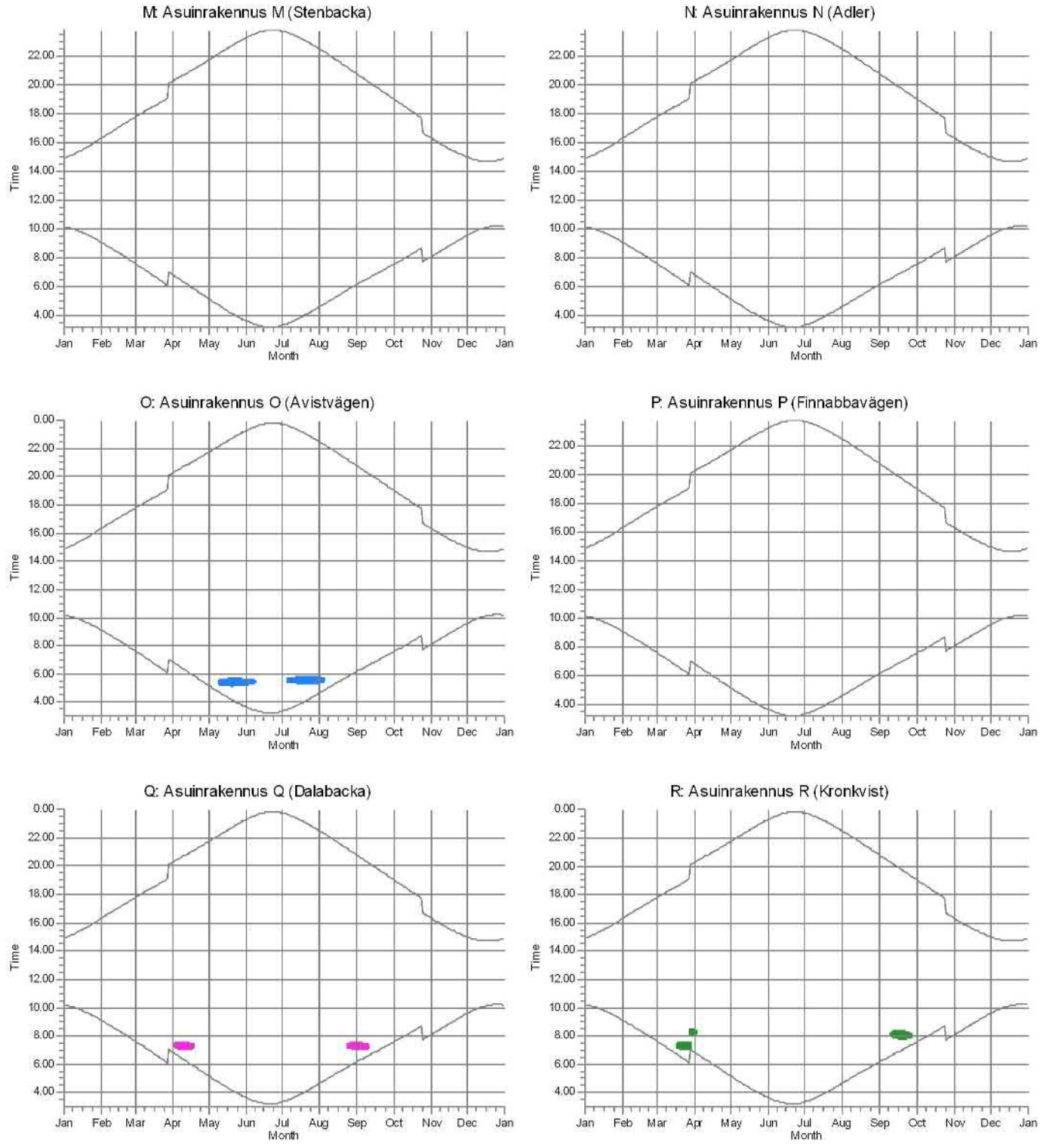
34: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1311)

38: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1315)

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.27/3.5.584

SHADOW - Calendar, graphical

Calculation: Purmo VE1_RD200x43xHH200_real case, Luke forest_20220505+YV(Salo-Ylikoski)

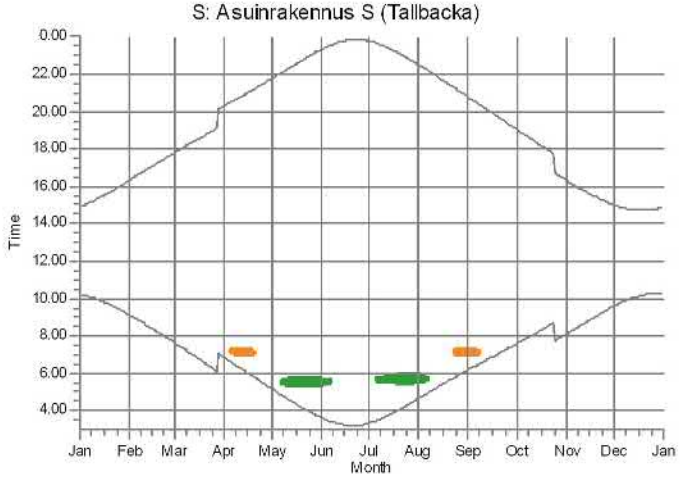


Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.27/3.5.584

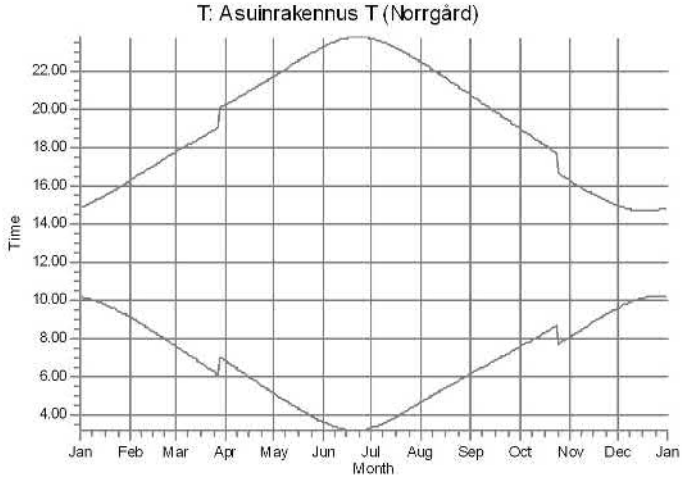
SHADOW - Calendar, graphical

Calculation: Purmo VE1_RD200x43xHH200_real case, Luke forest_20220505+YV(Salo-Ylikoski)

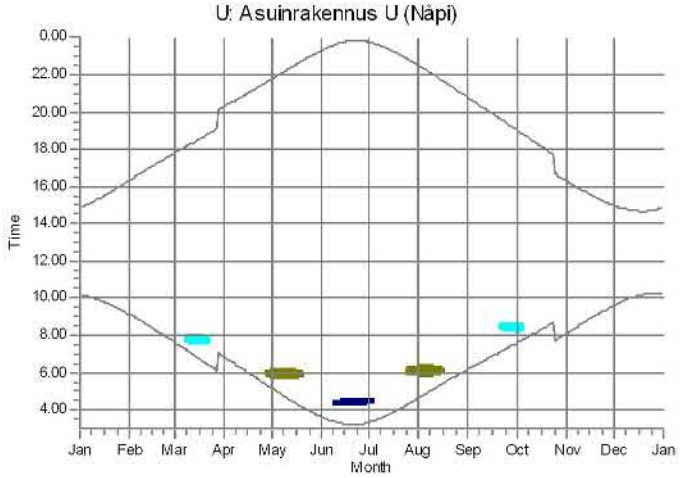
S: Asuinrakennus S (Tallbacka)



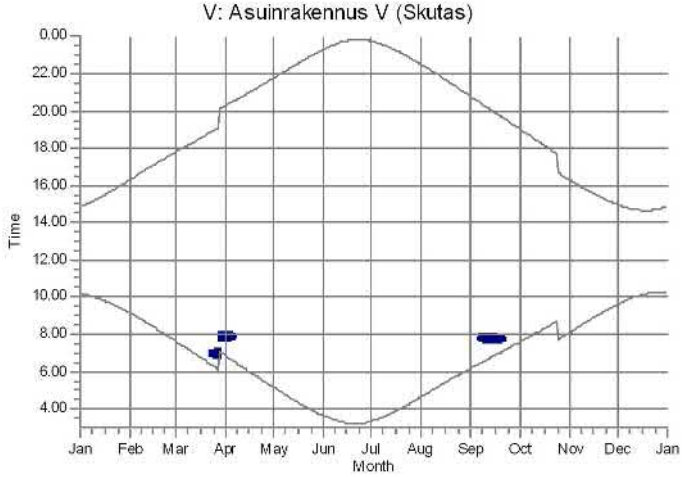
T: Asuinrakennus T (Norrgård)



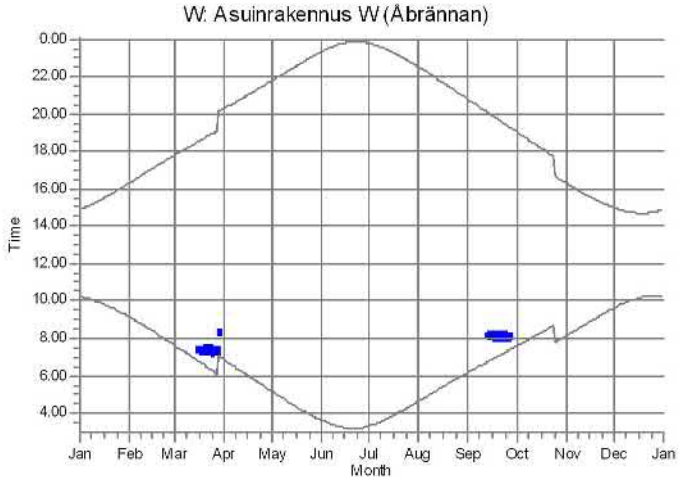
U: Asuinrakennus U (Näpi)



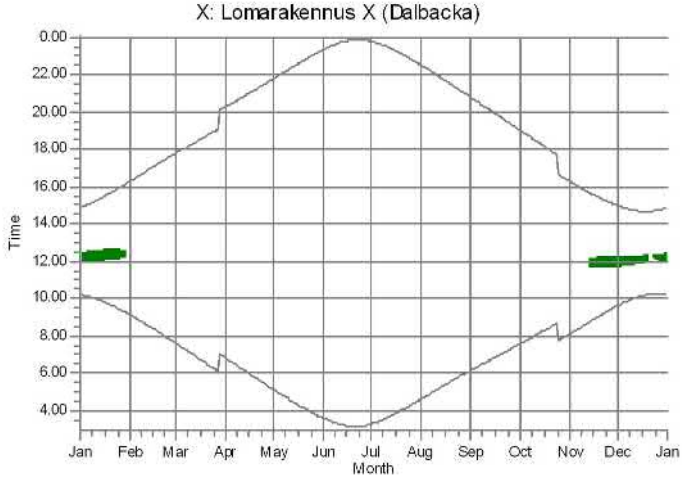
V: Asuinrakennus V (Skutas)



W: Asuinrakennus W (Åbrännan)



X: Lomarakennus X (Dalbacka)



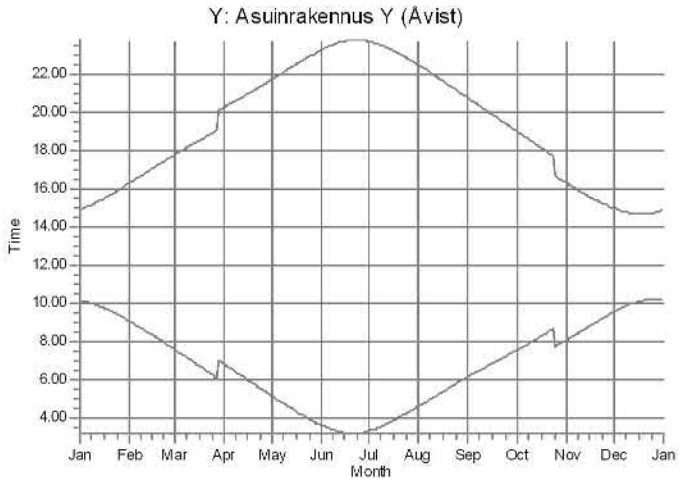
WTGs

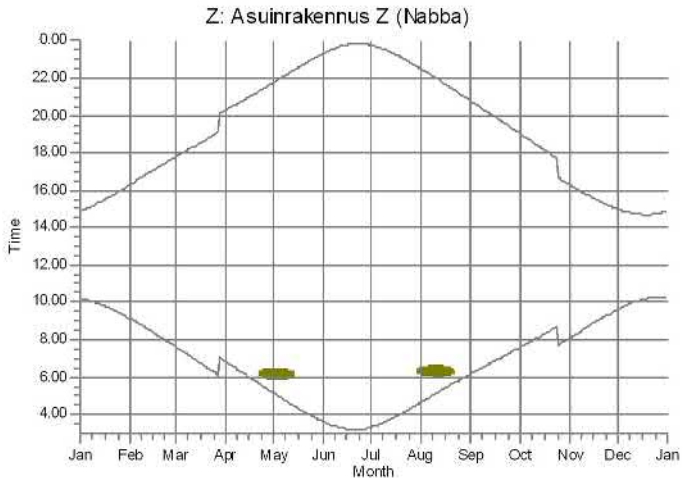
1: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1279)
3: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1281)
7: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1285)
10: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1288)
13: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1291)
20: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1298)
23: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1301)

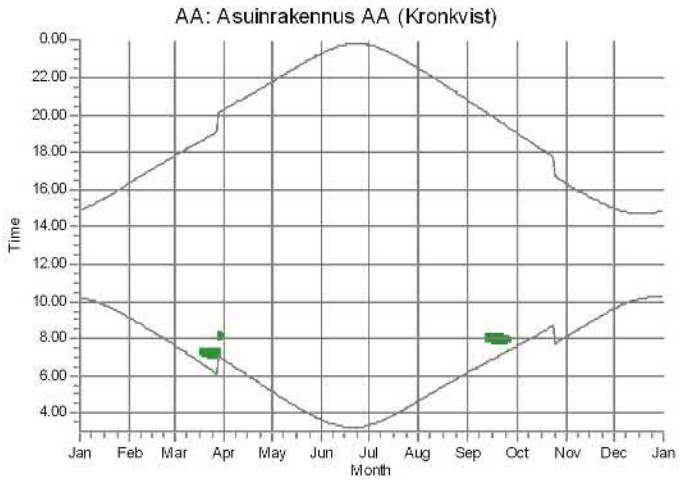
Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.27/3.5.584

SHADOW - Calendar, graphical

Calculation: Purmo VE1_RD200x43xHH200_real case, Luke forest_20220505+YV(Salo-Ylikoski)







WTGs

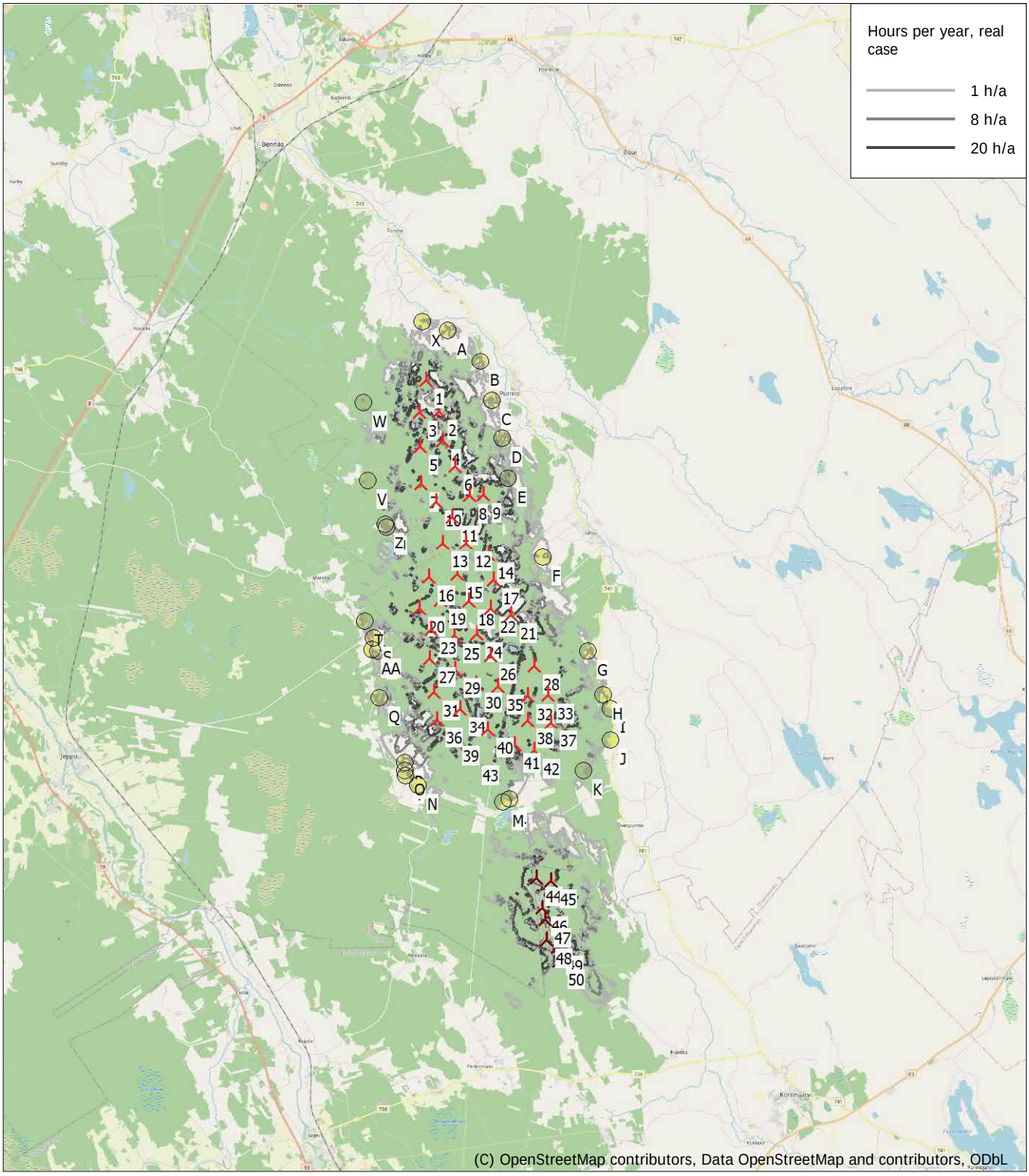
10: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1288)

26: Generic RD200 HH200 ABO Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1305)

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.27/3.5.584

SHADOW - Map

Calculation: Purmo VE1_RD200x43xHH200_real case, Luke forest_20220505+YV(Salo-Ylikoski)



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 298 020 North: 7 042 710

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Purmon tuulivoimahanke_0.wpo (4)

Time step: 4 minutes, Day step: 14 days, Map resolution: 30 m, Visibility resolution: 15 m, Eye height: 1,5 m

Bilaga 12. Purmo vindkraftsprojekt – skuggmodelleringens resultat ”real case, no forest” (ALT2) tillsammans med Salo–Ylikoski-projektet.

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.33/3.5.584

SHADOW - Main Result

Calculation: Purmo VE2_RD200x37xHH200_real case, no forest_20220505+YV(Salo-Ylikoski)

Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	1 minutes

Sunshine probability S (Average daily sunshine hours) []

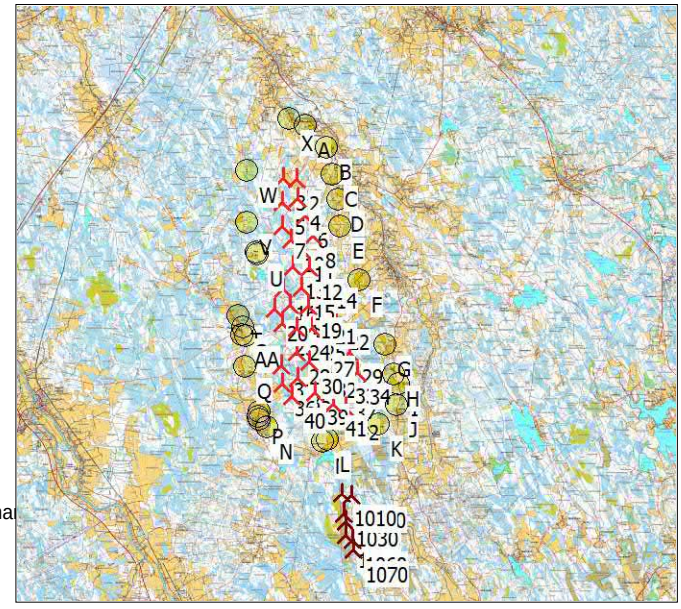
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_Purmon tuulivoimahar
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000

New WTG Shadow receptor

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
2	296 402	7 049 512	28,1	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
3	295 688	7 049 533	26,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
4	296 468	7 048 488	31,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
5	295 661	7 048 308	32,5	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
6	296 860	7 047 573	35,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
7	295 626	7 047 011	32,3	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
8	297 281	7 046 511	32,8	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
10	296 092	7 046 333	36,1	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
11	296 633	7 045 796	35,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
12	297 035	7 044 833	36,9	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
13	296 211	7 044 887	37,5	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
14	297 806	7 044 390	40,6	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
15	296 659	7 043 785	40,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
16	295 680	7 043 726	37,7	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
18	296 033	7 042 892	40,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
19	297 013	7 042 799	42,5	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
20	295 245	7 042 663	37,3	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
21	297 759	7 042 500	40,9	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
22	298 459	7 042 222	42,5	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
23	295 640	7 041 888	35,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
24	296 420	7 041 637	37,1	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
25	297 207	7 041 637	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
27	297 642	7 040 813	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
28	296 377	7 040 414	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
29	299 185	7 040 392	48,4	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
30	297 071	7 039 884	45,8	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
31	295 591	7 039 696	41,5	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
32	297 823	7 039 673	47,5	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
33	298 849	7 039 361	49,7	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
34	299 581	7 039 334	53,6	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
35	296 466	7 039 042	47,3	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
36	295 637	7 038 744	41,5	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
37	298 820	7 038 484	53,1	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
39	297 367	7 038 248	47,5	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
40	296 154	7 038 055	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
41	298 305	7 037 659	50,9	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
42	298 984	7 037 431	54,8	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4

To be continued on next page...

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.33/3.5.584

SHADOW - Main Result

Calculation: Purmo VE2_RD200x37xHH200_real case, no forest_20220505+YV(Salo-Ylikoski)

...continued from previous page

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Shadow data Power, rated	Rotor diameter	Hub height	Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1010	298 762	7 032 913	58,6	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1020	299 290	7 032 796	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1030	298 900	7 031 842	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1040	298 977	7 031 430	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1050	299 000	7 030 729	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1060	299 358	7 030 441	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1070	299 389	7 029 959	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	Asuinrakennus A (Lillkvist)	296 866	7 052 328	26,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	Asuinrakennus B (Dallberga)	297 952	7 051 163	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	Asuinrakennus C (Tormbacka)	298 274	7 049 757	28,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	Asuinrakennus D (Kallträskvägen)	298 556	7 048 421	35,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	Metsästysmaja E (Kejsarbacken)	298 663	7 047 017	33,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	Lomarakennus F (Källbacken)	299 710	7 044 165	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	Asuinrakennus G (Kornjärv)	301 071	7 040 772	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	Asuinrakennus H (Sandnabba)	301 519	7 039 228	51,6	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	Asuinrakennus I (Asp)	301 749	7 038 736	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	Asuinrakennus J (Stennabba)	301 661	7 037 581	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	Asuinrakennus K (Långnabba)	300 689	7 036 583	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	Lomarakennus L (Åvistvägen)	298 031	7 035 773	52,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
M	Asuinrakennus M (Stenbacka)	297 753	7 035 671	53,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
N	Asuinrakennus N (Adler)	294 812	7 036 441	44,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
O	Asuinrakennus O (Åvistvägen)	294 394	7 036 982	41,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
P	Asuinrakennus P (Finnabbavägen)	294 415	7 037 260	40,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Q	Asuinrakennus Q (Dalabacka)	293 652	7 039 610	40,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
R	Asuinrakennus R (Kronkvist)	293 736	7 041 267	32,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
S	Asuinrakennus S (Tallbacka)	293 575	7 041 715	32,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
T	Asuinrakennus T (Norrgård)	293 326	7 042 304	30,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
U	Asuinrakennus U (Nåpi)	294 326	7 045 578	35,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
V	Asuinrakennus V (Skutas)	293 741	7 047 247	32,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
W	Asuinrakennus W (Åbrännan)	293 782	7 049 981	22,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
X	Lomarakennus X (Dalbacka)	296 008	7 052 686	21,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Y	Asuinrakennus Y (Åvist)	294 403	7 036 830	41,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Z	Asuinrakennus Z (Nabba)	294 257	7 045 675	35,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
AA	Asuinrakennus AA (Kronkvist)	293 533	7 041 290	31,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values Shadow hours per year [h/year]
A	Asuinrakennus A (Lillkvist)	0:00
B	Asuinrakennus B (Dallberga)	0:00
C	Asuinrakennus C (Tormbacka)	1:42
D	Asuinrakennus D (Kallträskvägen)	1:58
E	Metsästysmaja E (Kejsarbacken)	5:17
F	Lomarakennus F (Källbacken)	2:01
G	Asuinrakennus G (Kornjärv)	3:27
H	Asuinrakennus H (Sandnabba)	1:51
I	Asuinrakennus I (Asp)	0:00
J	Asuinrakennus J (Stennabba)	0:00
K	Asuinrakennus K (Långnabba)	2:49
L	Lomarakennus L (Åvistvägen)	0:00
M	Asuinrakennus M (Stenbacka)	0:00
N	Asuinrakennus N (Adler)	0:00
O	Asuinrakennus O (Åvistvägen)	4:30

To be continued on next page...

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.33/3.5.584

SHADOW - Main Result

Calculation: Purmo VE2_RD200x37xHH200_real case, no forest_20220505+YV(Salo-Ylikoski)

...continued from previous page

No.	Name	Shadow, expected values Shadow hours per year [h/year]
P	Asuinrakennus P (Finnabbavägen)	3:43
Q	Asuinrakennus Q (Dalabacka)	1:58
R	Asuinrakennus R (Kronkvist)	6:45
S	Asuinrakennus S (Tallbacka)	6:39
T	Asuinrakennus T (Norrgård)	2:05
U	Asuinrakennus U (Nåpi)	5:56
V	Asuinrakennus V (Skutas)	1:49
W	Asuinrakennus W (Åbrännan)	1:36
X	Lomarakennus X (Dalbacka)	0:00
Y	Asuinrakennus Y (Åvist)	0:00
Z	Asuinrakennus Z (Nabba)	6:28
AA	Asuinrakennus AA (Kronkvist)	0:00

Total amount of flickering on the shadow receptors caused by each WTG

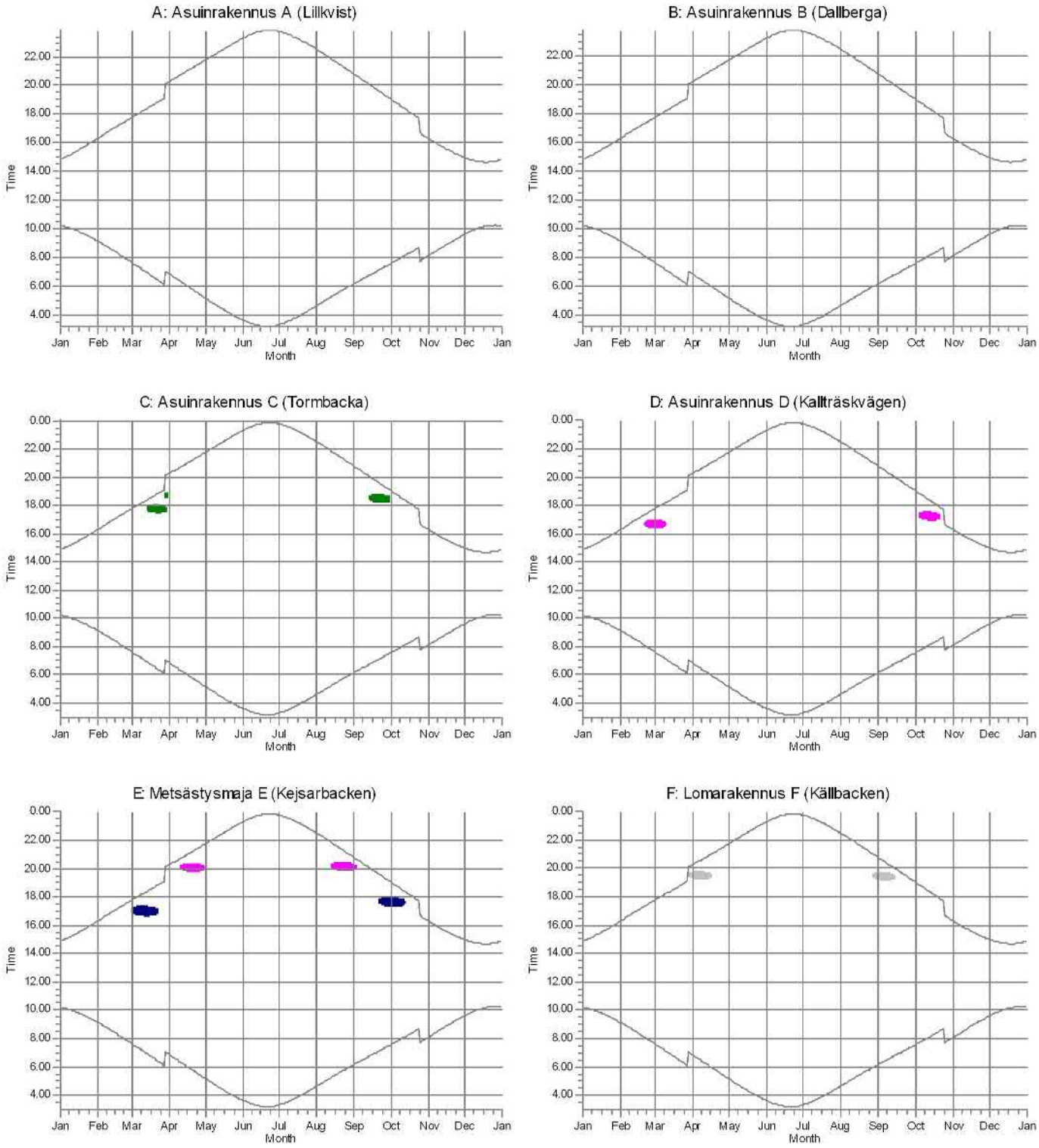
No.	Name	Expected [h/year]
2	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1233)	1:42
3	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1234)	1:36
4	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1235)	0:00
5	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1236)	0:00
6	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1237)	4:13
7	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1238)	6:15
8	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1239)	3:02
10	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1240)	5:06
11	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1241)	0:00
12	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1242)	0:00
13	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1243)	1:29
14	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1244)	2:01
15	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1245)	0:00
16	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1246)	0:00
18	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1248)	0:00
19	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1247)	0:00
20	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1249)	11:21
21	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1251)	0:00
22	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1250)	0:00
23	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1252)	4:10
24	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1254)	0:00
25	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1253)	0:00
27	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1255)	0:00
28	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1257)	0:00
29	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1256)	1:37
30	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1258)	0:00
31	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1259)	1:58
32	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1263)	0:00
33	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1260)	0:00
34	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1261)	3:41
35	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1262)	0:00
36	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1264)	0:00
37	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1265)	0:00
39	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1267)	0:00
40	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1266)	8:14
41	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1268)	0:00
42	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1269)	2:49
1010	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1454)	0:00
1020	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1455)	0:00
1030	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1456)	0:00
1040	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1457)	0:00
1050	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1458)	0:00
1060	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1459)	0:00
1070	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1460)	0:00

Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.33/3.5.584

SHADOW - Calendar, graphical

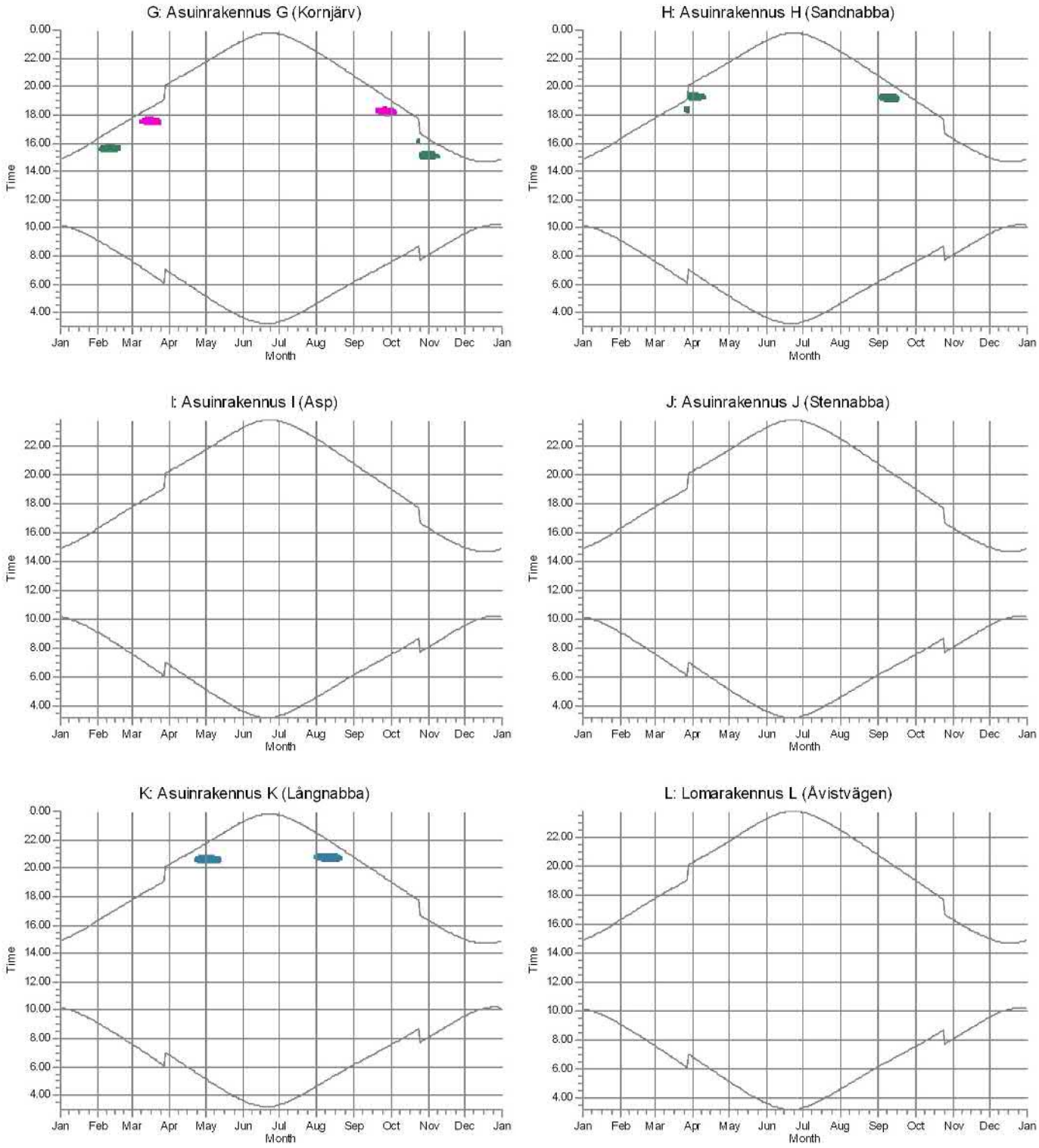
Calculation: Purmo VE2_RD200x37xHH200_real case, no forest_20220505+YV(Salo-Ylikoski)



Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.33/3.5.584

SHADOW - Calendar, graphical

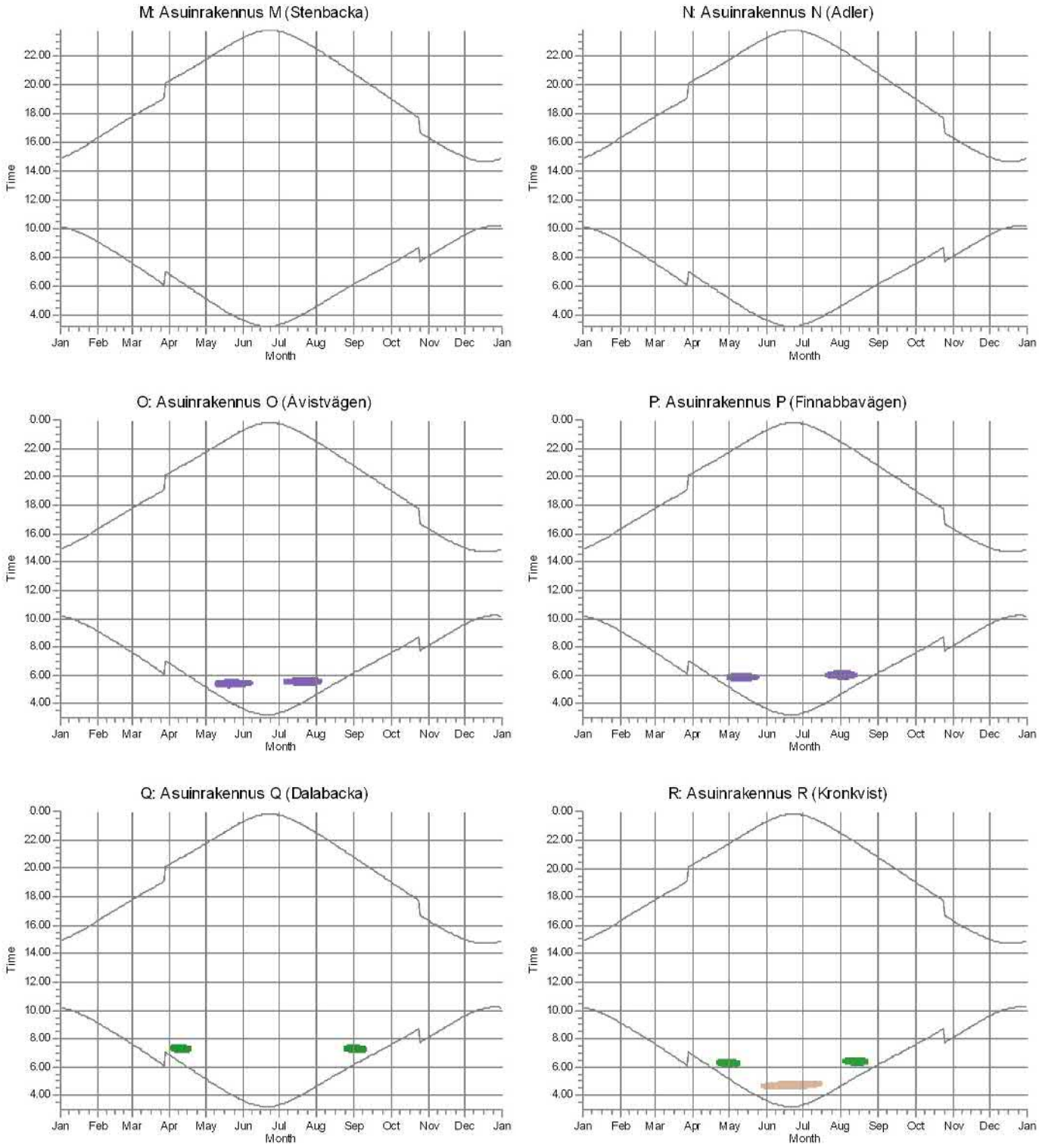
Calculation: Purmo VE2_RD200x37xHH200_real case, no forest_20220505+YV(Salo-Ylikoski)



Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.33/3.5.584

SHADOW - Calendar, graphical

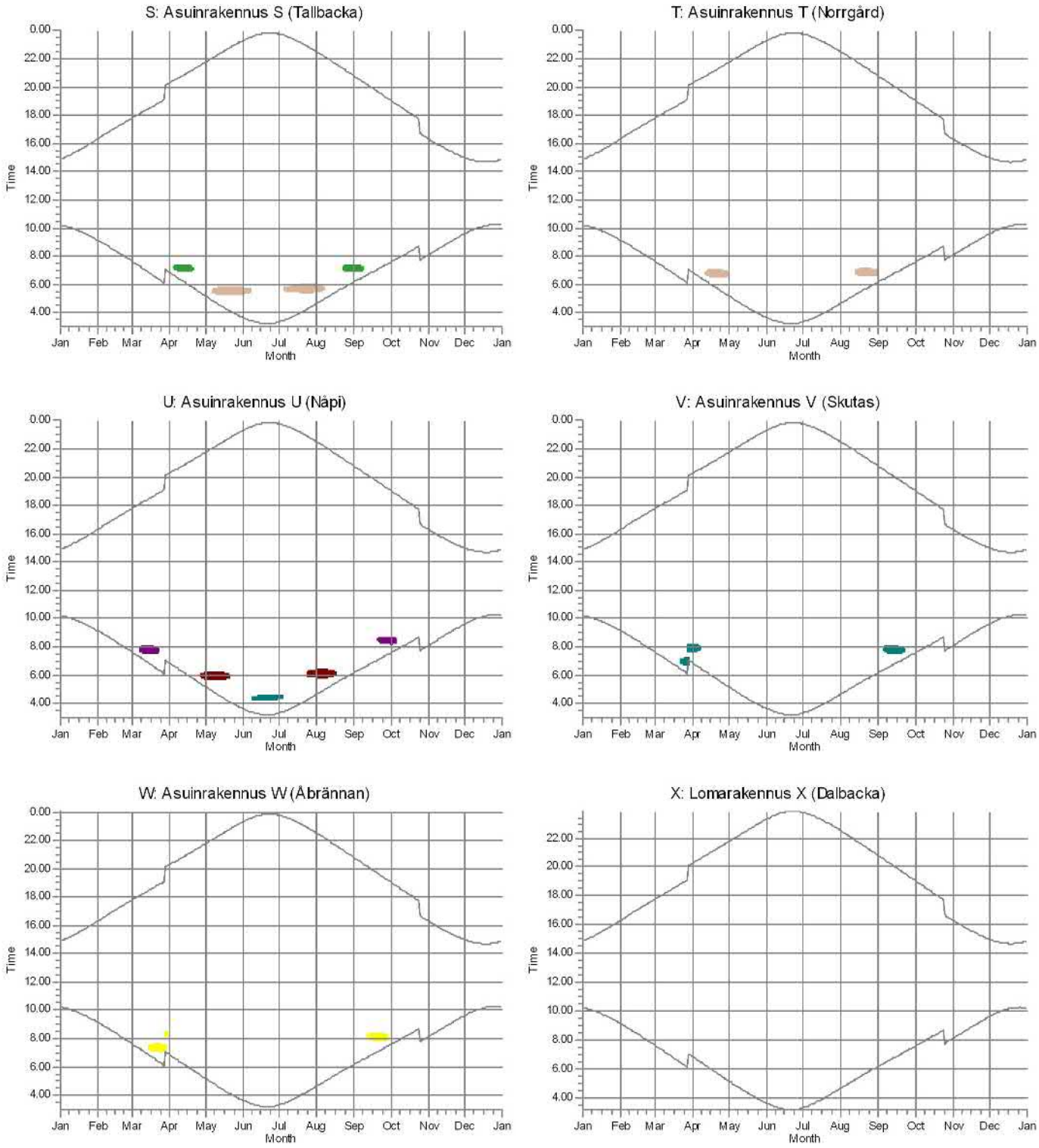
Calculation: Purmo VE2_RD200x37xHH200_real case, no forest_20220505+YV(Salo-Ylikoski)



Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.33/3.5.584

SHADOW - Calendar, graphical

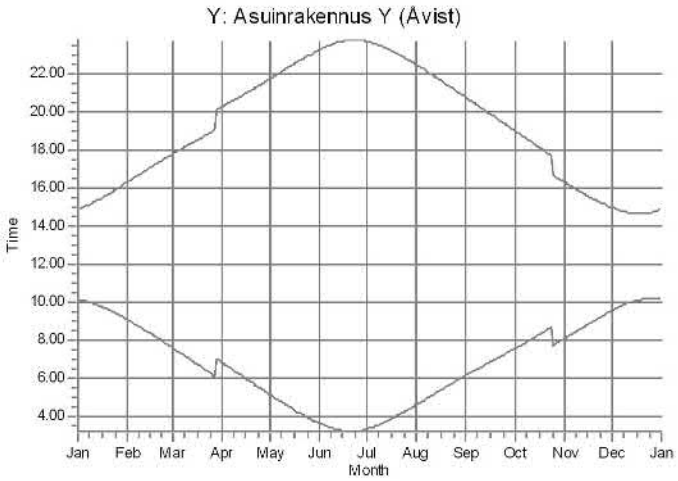
Calculation: Purmo VE2_RD200x37xHH200_real case, no forest_20220505+YV(Salo-Ylikoski)

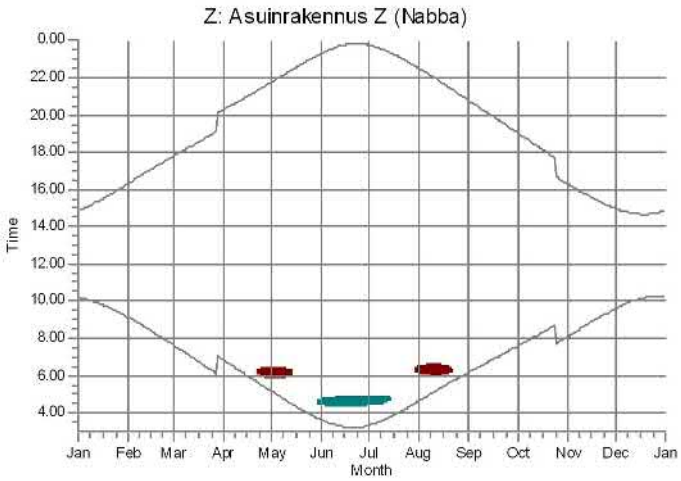


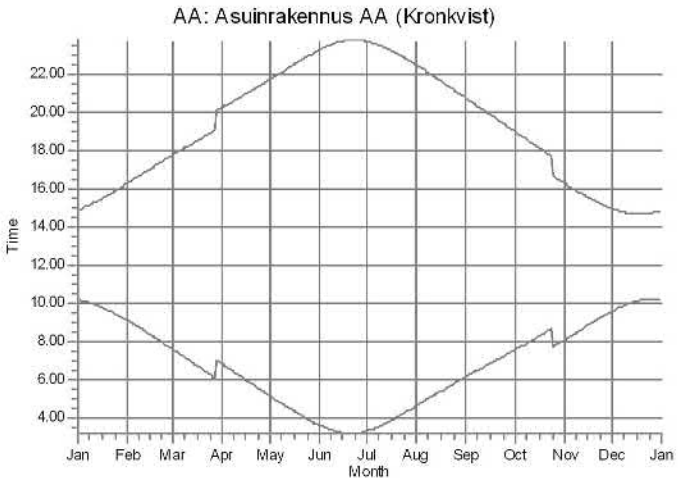
Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.33/3.5.584

SHADOW - Calendar, graphical

Calculation: Purmo VE2_RD200x37xHH200_real case, no forest_20220505+YV(Salo-Ylikoski)







WTGs

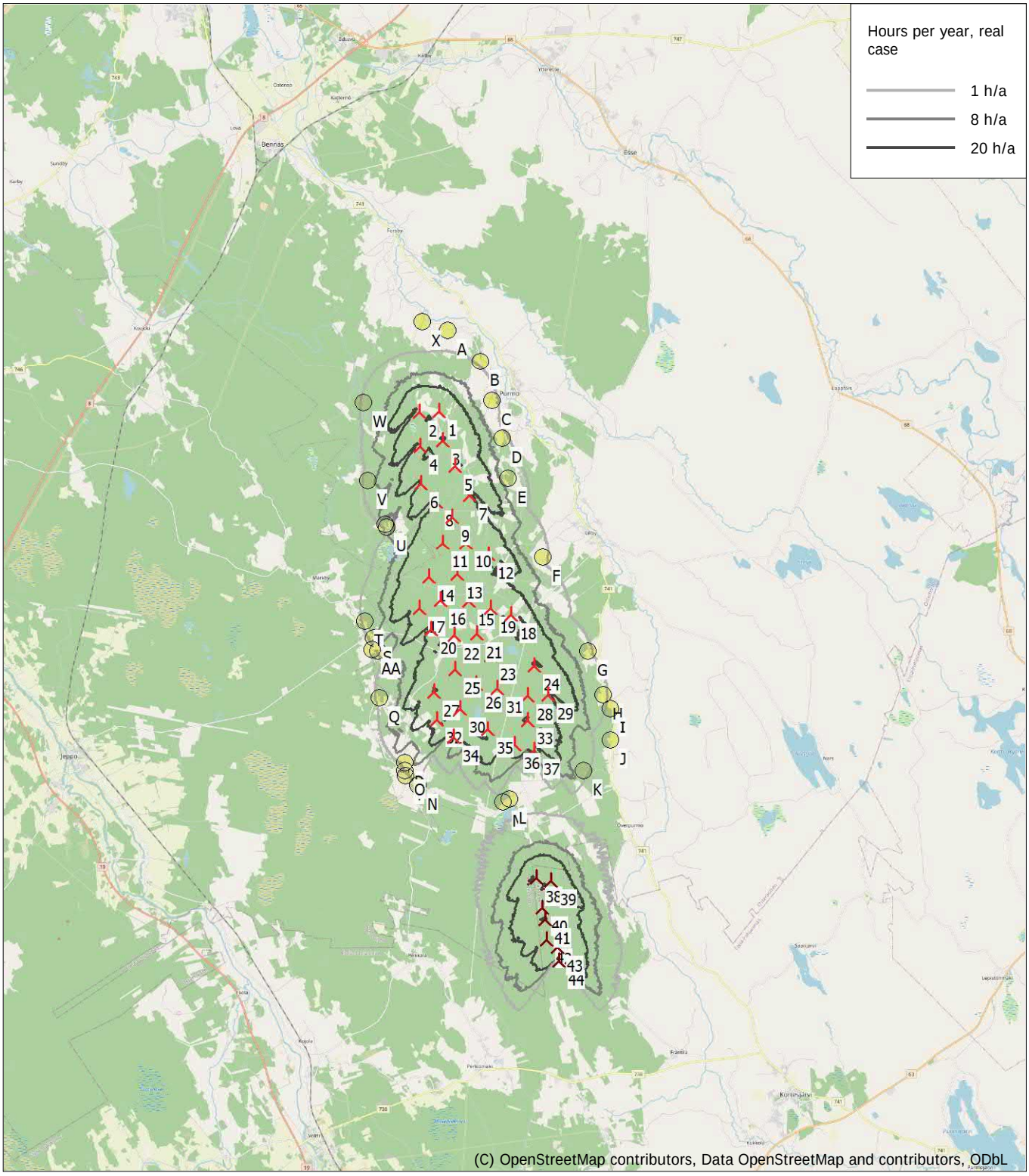
7: Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1238)

10: Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1240)

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.33/3.5.584

SHADOW - Map

Calculation: Purmo VE2_RD200x37xHH200_real case, no forest_20220505+YV(Salo-Ylikoski)



0 2,5 5 7,5 10km

Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 298 020 North: 7 042 710

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Purmon tuulivoimahanke_0.wpo (4)

Time step: 4 minutes, Day step: 14 days, Map resolution: 30 m, Visibility resolution: 15 m, Eye height: 1,5 m

Bilaga 13. Purmo vindkraftsprojekt – skuggmodelleringens resultat ”real case, no forest” (ALT3) tillsammans med Salo–Ylikoski-projektet.

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.37/3.5.584

SHADOW - Main Result

Calculation: Purmo VE3_RD200x9xHH200_real case, no forest_20220505+YV(Yli-Salokoski)

Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	1 minutes

Sunshine probability S (Average daily sunshine hours) []

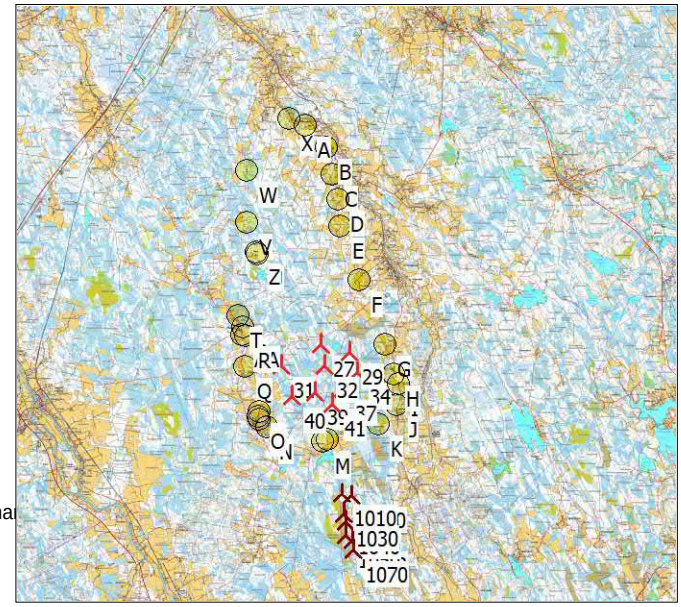
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,02	2,84	3,78	6,14	8,62	9,94	7,42	5,13	4,32	3,43	1,58	0,96

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
678	512	405	372	488	734	1 013	1 177	845	619	495	545	7 883

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_Purmon tuulivoimaha
Obstacles used in calculation
Receptor grid resolution: 1,0 m

All coordinates are in
Finish TM ETRS-TM35FIN-ETRS89



Scale 1:400 000

New WTG Shadow receptor

WTGs

	East	North	Z	Row data/Description	WTG type Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Shadow data Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
27	297 642	7 040 813	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
29	299 163	7 040 378	48,1	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
31	295 591	7 039 696	41,5	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
32	297 843	7 039 671	47,5	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
34	299 581	7 039 334	53,6	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
37	298 820	7 038 484	53,1	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
39	297 381	7 038 242	47,5	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
40	296 154	7 038 055	45,0	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
41	298 289	7 037 664	50,4	Generic RD200 HH20...	No	Generic	RD200 HH200 Åbo Wind-5 600	5 600	200,0	200,0	2 086	10,4
1010	298 762	7 032 913	58,6	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1020	299 290	7 032 796	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1030	298 900	7 031 842	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1040	298 977	7 031 430	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1050	299 000	7 030 729	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1060	299 358	7 030 441	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4
1070	299 389	7 029 959	60,0	Generic RD180 HH15...	Yes	Generic	RD180 HH150-7 000	7 000	180,0	150,0	2 264	10,4

Shadow receptor-Input

No.	Name	East	North	Z	Width	Height	Elevation a.g.l.	Slope of window	Direction mode	Eye height (ZVI) a.g.l.
				[m]	[m]	[m]	[m]	[°]		[m]
A	Asuinrakennus A (Lillkvist)	296 866	7 052 328	26,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
B	Asuinrakennus B (Dallberga)	297 952	7 051 163	25,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
C	Asuinrakennus C (Tormbacka)	298 274	7 049 757	28,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
D	Asuinrakennus D (Kallträskvägen)	298 556	7 048 421	35,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
E	Metsästysmaja E (Kejsarbacken)	298 663	7 047 017	33,8	5,0	5,0	1,0	90,0	"Green house mode"	6,0
F	Lomarakennus F (Källbacken)	299 710	7 044 165	37,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
G	Asuinrakennus G (Kornjärv)	301 071	7 040 772	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
H	Asuinrakennus H (Sandnabba)	301 519	7 039 228	51,6	5,0	5,0	1,0	90,0	"Green house mode"	6,0
I	Asuinrakennus I (Asp)	301 749	7 038 736	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
J	Asuinrakennus J (Stennabba)	301 661	7 037 581	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
K	Asuinrakennus K (Långnabba)	300 689	7 036 583	55,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
L	Lomarakennus L (Åvistvägen)	298 031	7 035 773	52,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
M	Asuinrakennus M (Stenbacka)	297 753	7 035 671	53,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
N	Asuinrakennus N (Adler)	294 812	7 036 441	44,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0

To be continued on next page...

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.37/3.5.584

SHADOW - Main Result

Calculation: Purmo VE3_RD200x9xHH200_real case, no forest_20220505+YV(Yli-Salokoski)

...continued from previous page

No.	Name	East	North	Z [m]	Width [m]	Height [m]	Elevation a.g.l. [m]	Slope of window [°]	Direction mode	Eye height (ZVI) a.g.l. [m]
O	Asuinrakennus O (Åvistvägen)	294 394	7 036 982	41,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
P	Asuinrakennus P (Finnabbavägen)	294 415	7 037 260	40,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Q	Asuinrakennus Q (Dalabacka)	293 652	7 039 610	40,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
R	Asuinrakennus R (Kronkvist)	293 736	7 041 267	32,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
S	Asuinrakennus S (Tallbacka)	293 575	7 041 715	32,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
T	Asuinrakennus T (Norrgård)	293 326	7 042 304	30,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
U	Asuinrakennus U (Nåpi)	294 326	7 045 578	35,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
V	Asuinrakennus V (Skutas)	293 741	7 047 247	32,3	5,0	5,0	1,0	90,0	"Green house mode"	6,0
W	Asuinrakennus W (Åbrännan)	293 782	7 049 981	22,5	5,0	5,0	1,0	90,0	"Green house mode"	6,0
X	Lomarakennus X (Dalbacka)	296 008	7 052 686	21,2	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Y	Asuinrakennus Y (Åvist)	294 403	7 036 830	41,9	5,0	5,0	1,0	90,0	"Green house mode"	6,0
Z	Asuinrakennus Z (Nabba)	294 257	7 045 675	35,0	5,0	5,0	1,0	90,0	"Green house mode"	6,0
AA	Asuinrakennus AA (Kronkvist)	293 533	7 041 290	31,7	5,0	5,0	1,0	90,0	"Green house mode"	6,0

Calculation Results

Shadow receptor

No.	Name	Shadow, expected values: Shadow hours per year [h/year]
A	Asuinrakennus A (Lillkvist)	0:00
B	Asuinrakennus B (Dallberga)	0:00
C	Asuinrakennus C (Tormbacka)	0:00
D	Asuinrakennus D (Kallträskvägen)	0:00
E	Metsästysmaja E (Kejsarbacken)	0:00
F	Lomarakennus F (Källbacken)	0:00
G	Asuinrakennus G (Kornjärv)	3:25
H	Asuinrakennus H (Sandnabba)	1:51
I	Asuinrakennus I (Asp)	0:00
J	Asuinrakennus J (Stennabba)	0:00
K	Asuinrakennus K (Långnabba)	0:00
L	Lomarakennus L (Åvistvägen)	0:00
M	Asuinrakennus M (Stenbacka)	0:00
N	Asuinrakennus N (Adler)	0:00
O	Asuinrakennus O (Åvistvägen)	4:30
P	Asuinrakennus P (Finnabbavägen)	3:43
Q	Asuinrakennus Q (Dalabacka)	1:58
R	Asuinrakennus R (Kronkvist)	0:00
S	Asuinrakennus S (Tallbacka)	0:00
T	Asuinrakennus T (Norrgård)	0:00
U	Asuinrakennus U (Nåpi)	0:00
V	Asuinrakennus V (Skutas)	0:00
W	Asuinrakennus W (Åbrännan)	0:00
X	Lomarakennus X (Dalbacka)	0:00
Y	Asuinrakennus Y (Åvist)	0:00
Z	Asuinrakennus Z (Nabba)	0:00
AA	Asuinrakennus AA (Kronkvist)	0:00

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Expected [h/year]
27	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1270)	0:00
29	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1271)	1:35
31	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1272)	1:58
32	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1274)	0:00
34	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1273)	3:41
37	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1275)	0:00
39	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1277)	0:00
40	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1276)	8:14
41	Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1278)	0:00
1010	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1454)	0:00
1020	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1455)	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: Purmo VE3_RD200x9xHH200_real case, no forest_20220505+YV(Yli-Salokoski)

...continued from previous page

No.	Name	Expected [h/year]
1030	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1456)	0:00
1040	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1457)	0:00
1050	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1458)	0:00
1060	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1459)	0:00
1070	Generic RD180 HH150 7000 180.0 !O! hub: 150,0 m (TOT: 240,0 m) (1460)	0:00

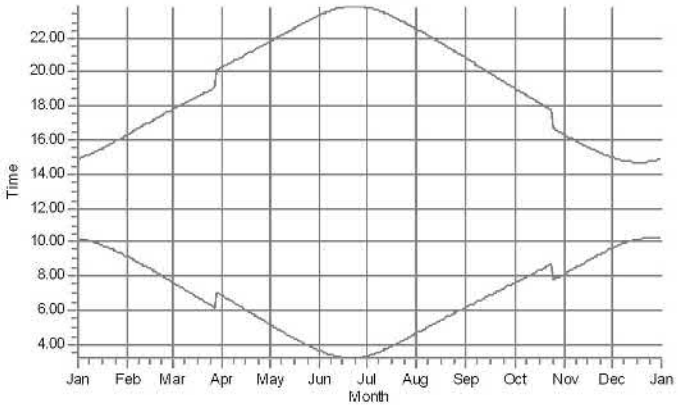
Total times in Receptor wise and WTG wise tables can differ, as a WTG can lead to flicker at 2 or more receptors simultaneously and/or receptors may receive flicker from 2 or more WTGs simultaneously.

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.37/3.5.584

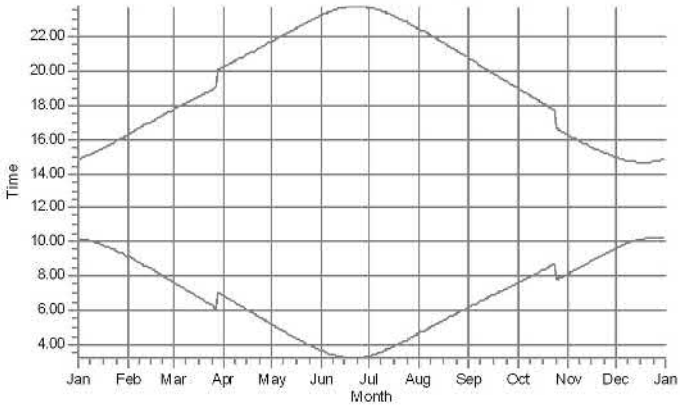
SHADOW - Calendar, graphical

Calculation: Purmo VE3_RD200x9xHH200_real case, no forest_20220505+YV(Yli-Salokoski)

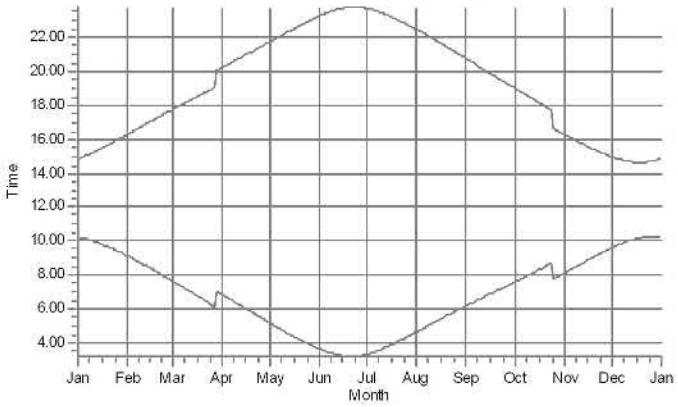
A: Asuinrakennus A (Lillkvist)



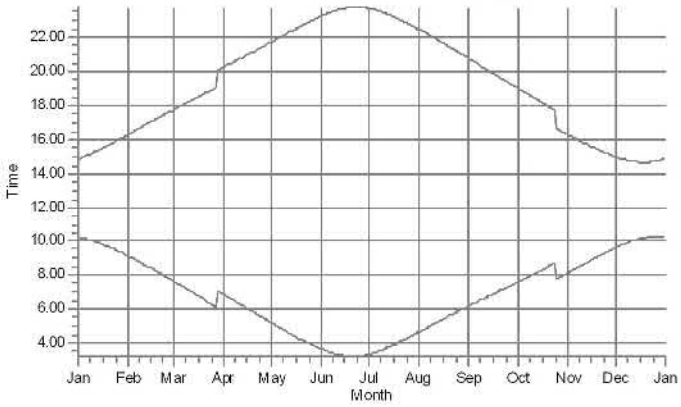
B: Asuinrakennus B (Dallberga)



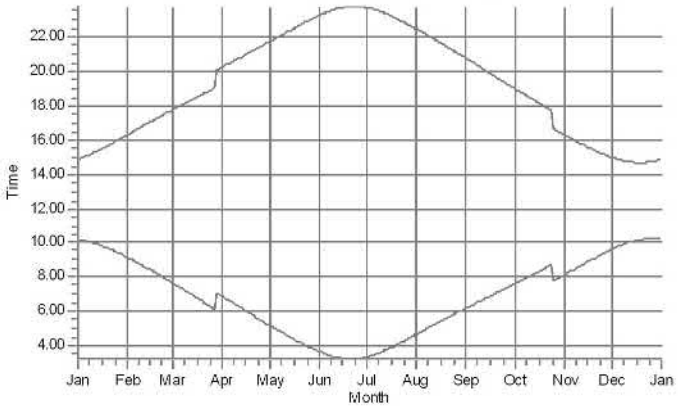
C: Asuinrakennus C (Tormbacka)



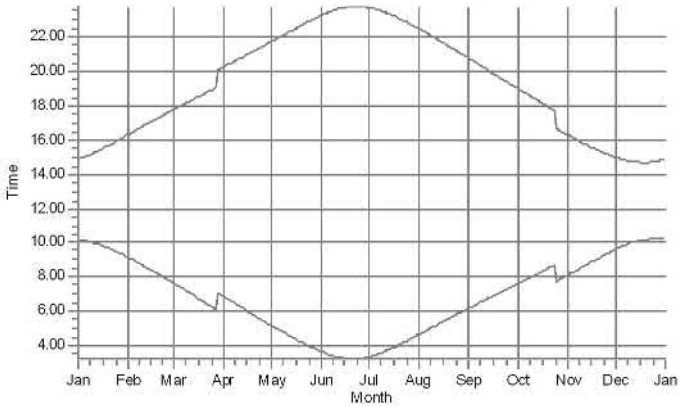
D: Asuinrakennus D (Kalltträskvägen)



E: Metsästysmaja E (Kejsarbacken)



F: Lomarakennus F (Källbacken)



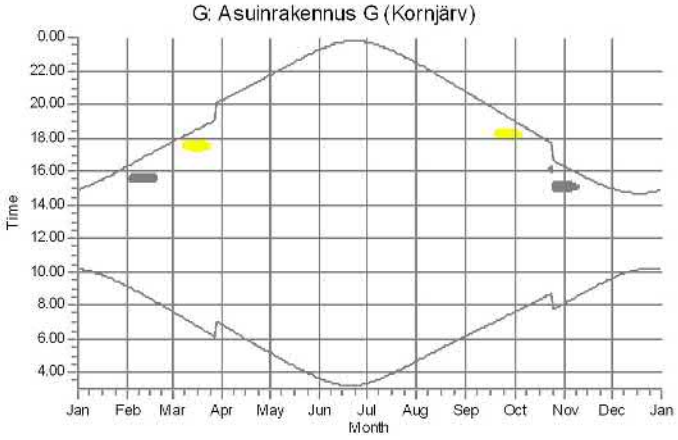
WTGs

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.37/3.5.584

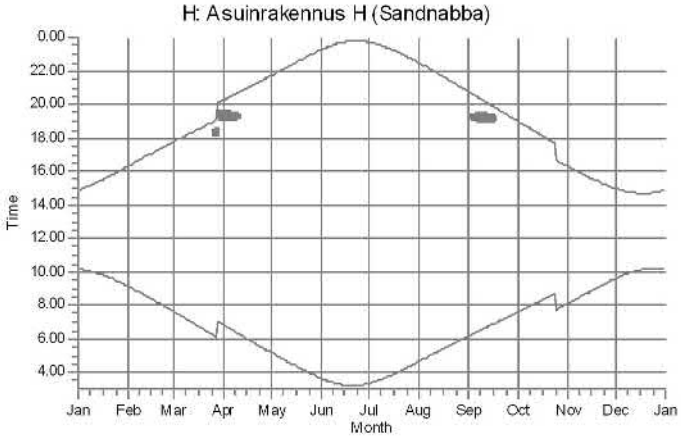
SHADOW - Calendar, graphical

Calculation: Purmo VE3_RD200x9xHH200_real case, no forest_20220505+YV(Yli-Salokoski)

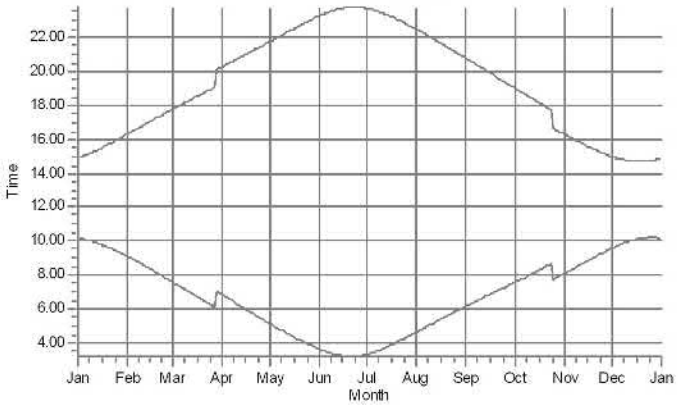
G: Asuinrakennus G (Kornjärv)



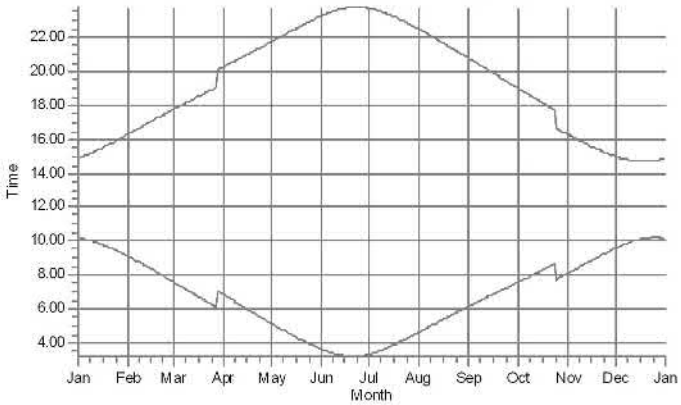
H: Asuinrakennus H (Sandnabba)



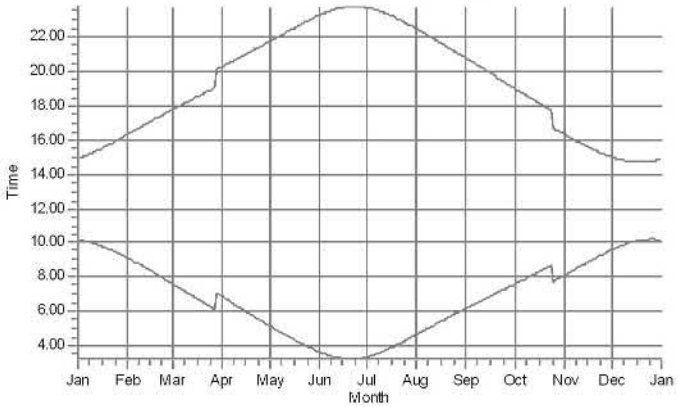
I: Asuinrakennus I (Asp)



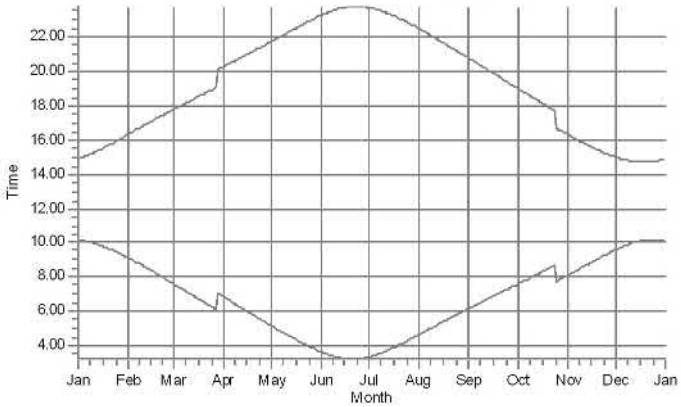
J: Asuinrakennus J (Stennabba)



K: Asuinrakennus K (Långnabba)



L: Lomarakennus L (Åvistvägen)



WTGs

29: Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1271)

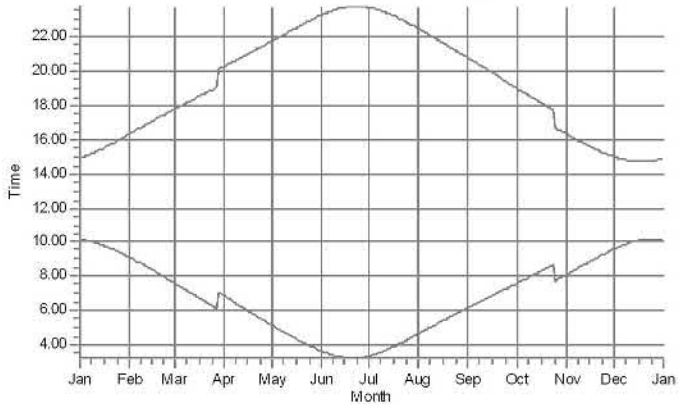
34: Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1273)

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.37/3.5.584

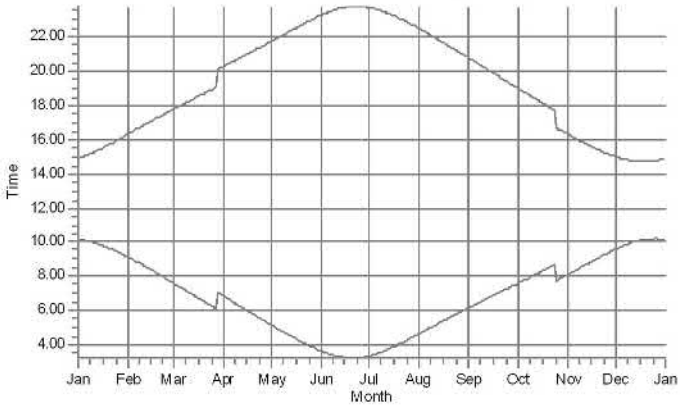
SHADOW - Calendar, graphical

Calculation: Purmo VE3_RD200x9xHH200_real case, no forest_20220505+YV(Yli-Salokoski)

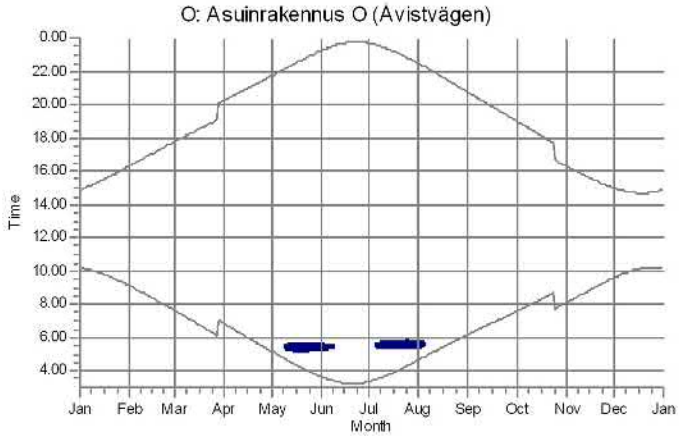
M: Asuinrakennus M (Stenbacka)



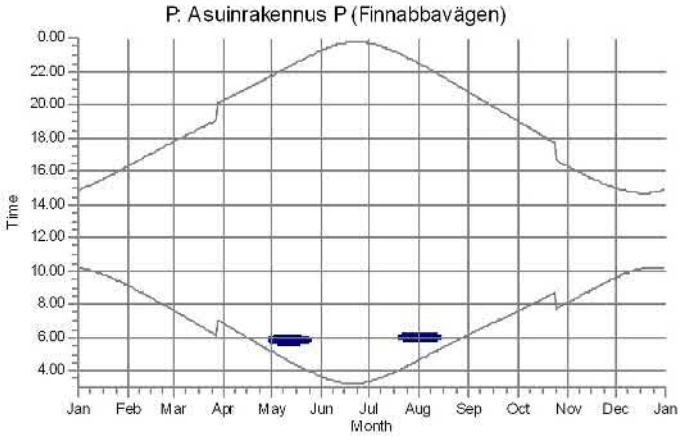
N: Asuinrakennus N (Adler)



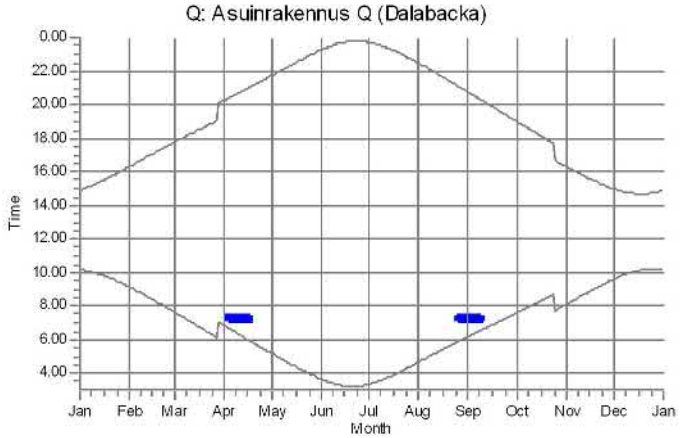
O: Asuinrakennus O (Åvistvägen)



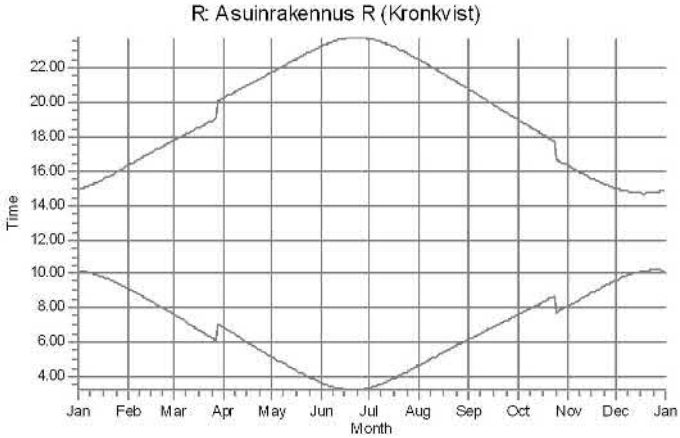
P: Asuinrakennus P (Finnabbavägen)



Q: Asuinrakennus Q (Dalabacka)



R: Asuinrakennus R (Kronkvist)



WTGs

31: Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1272)

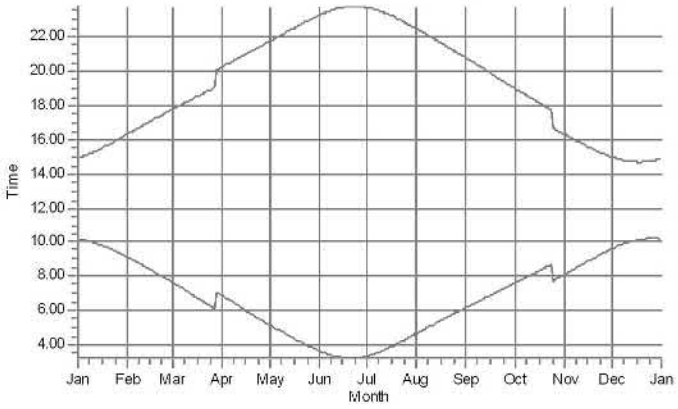
40: Generic RD200 HH200 Åbo Wind 5600 200.0 !O! hub: 200,0 m (TOT: 300,0 m) (1276)

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.37/3.5.584

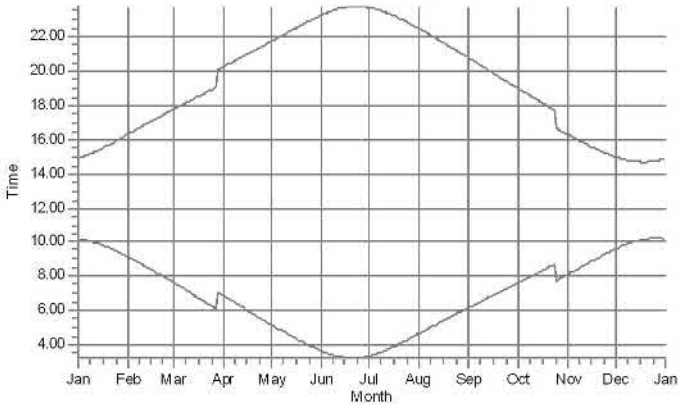
SHADOW - Calendar, graphical

Calculation: Purmo VE3_RD200x9xHH200_real case, no forest_20220505+YV(Yli-Salokoski)

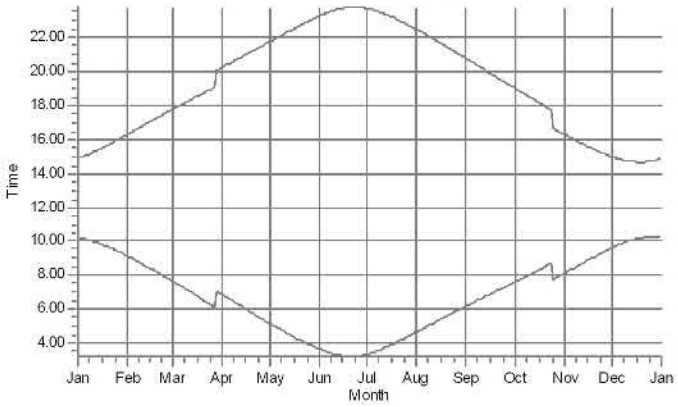
S: Asuinrakennus S (Tallbacka)



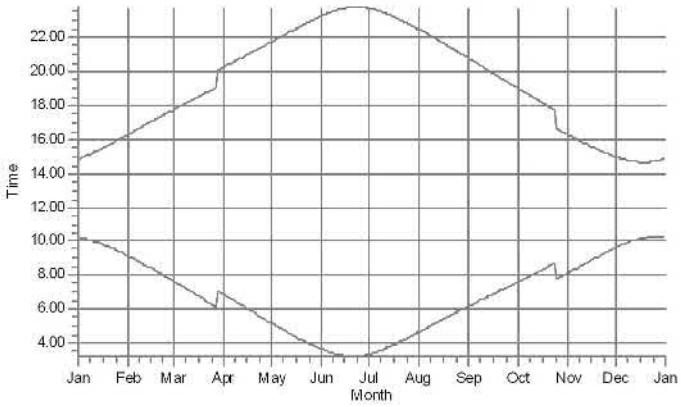
T: Asuinrakennus T (Norrgård)



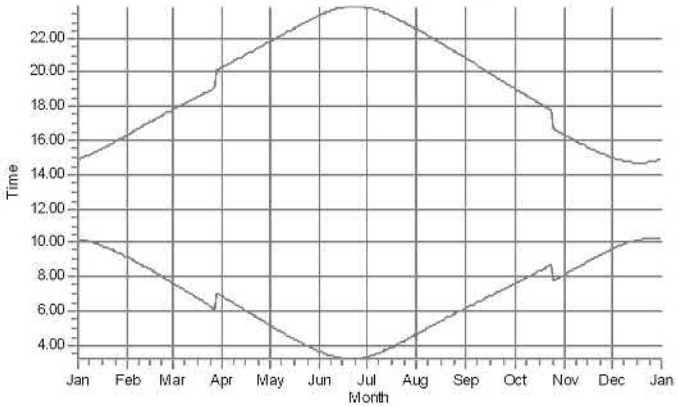
U: Asuinrakennus U (Näpi)



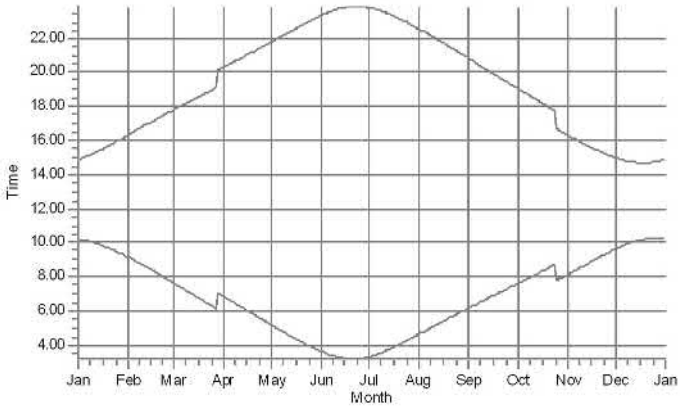
V: Asuinrakennus V (Skutas)



W: Asuinrakennus W (Åbrännan)



X: Lomarakennus X (Dalbacka)

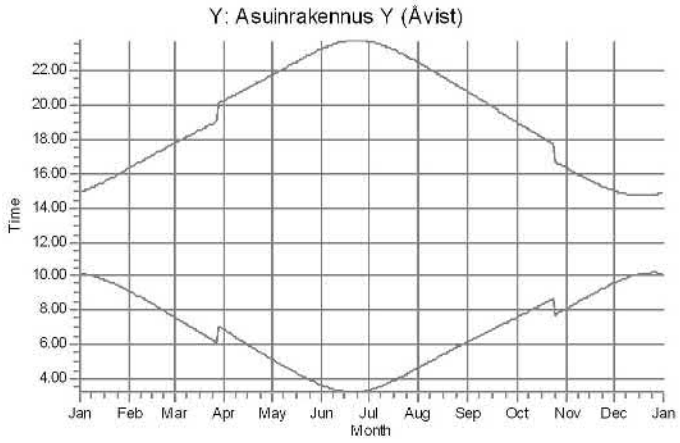


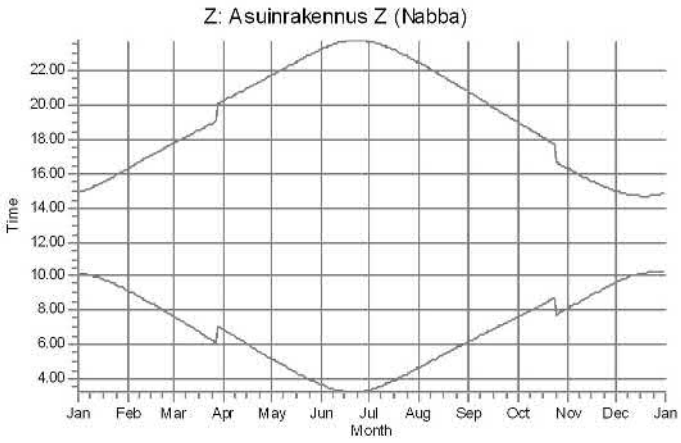
WTGs

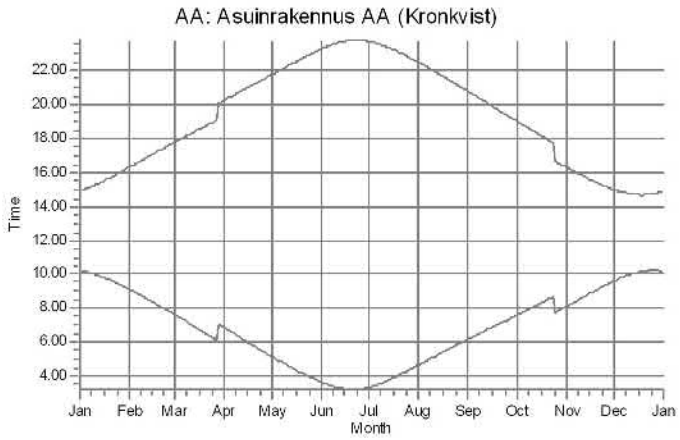
Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.37/3.5.584

SHADOW - Calendar, graphical

Calculation: Purmo VE3_RD200x9xHH200_real case, no forest_20220505+YV(Yli-Salokoski)





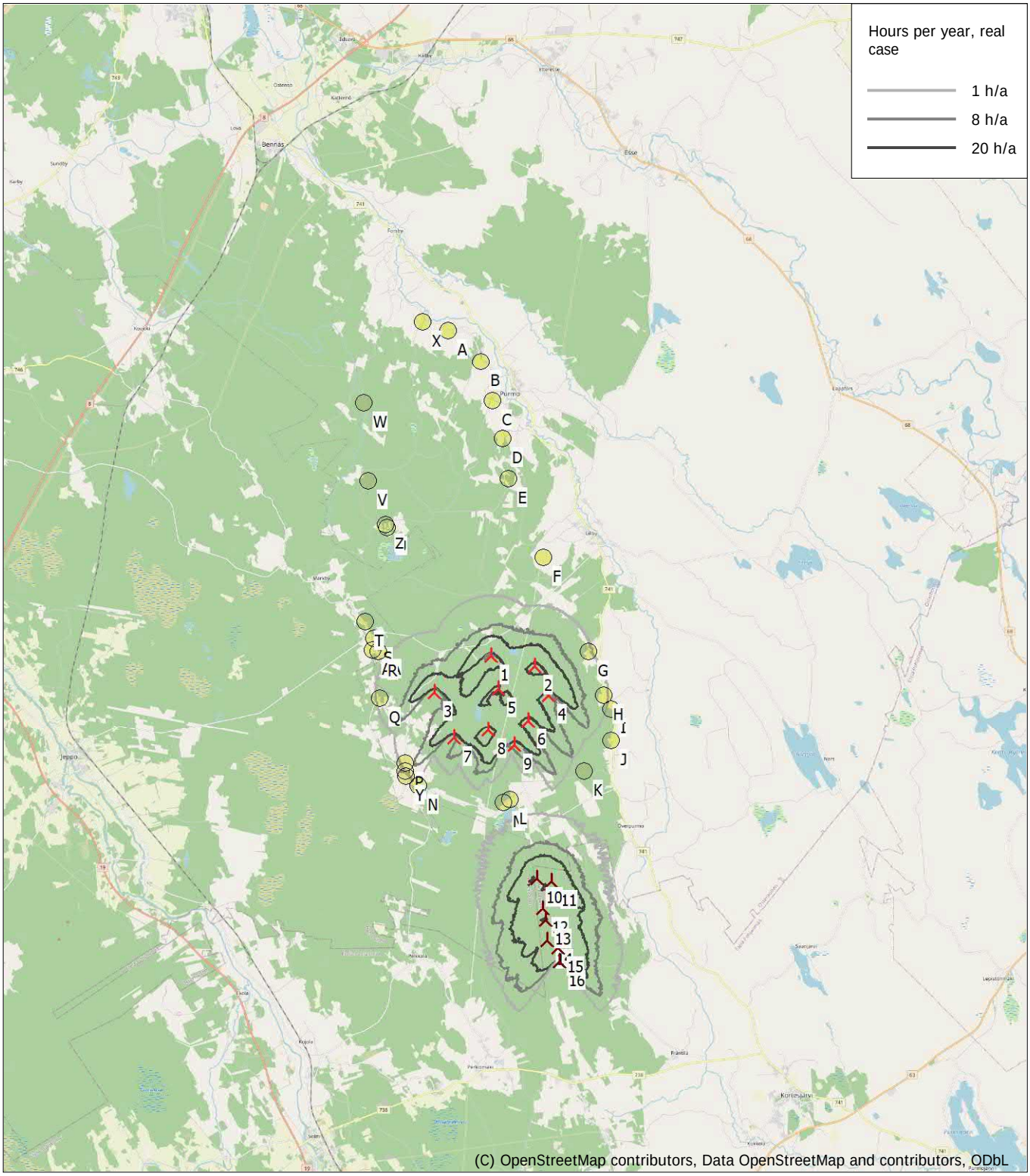


WTGs

Licensed user:
FCG Finnish Consulting Group Oy
Osmontie 34, PO Box 950
FI-00601 Helsinki
+358104095666
Henna-Riikka / henna-riikka.rintamaki@fcg.fi
Calculated:
8.2.2023 16.37/3.5.584

SHADOW - Map

Calculation: Purmo VE3_RD200x9xHH200_real case, no forest_20220505+YV(Yli-Salokoski)



Map: EMD OpenStreetMap , Print scale 1:200 000, Map center Finish TM ETRS-TM35FIN-ETRS89 East: 298 020 North: 7 042 710

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_Purmon tuulivoimahanke_0.wpo (4)

Time step: 4 minutes, Day step: 14 days, Map resolution: 30 m, Visibility resolution: 15 m, Eye height: 1,5 m