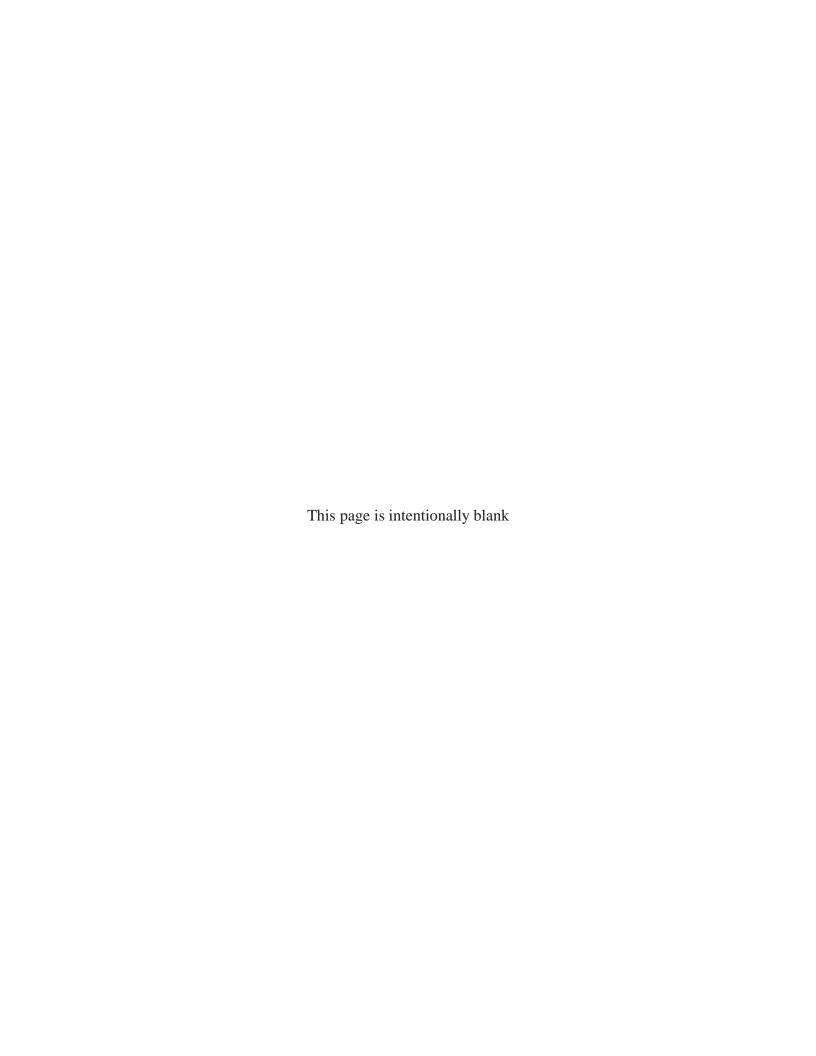
Appendix I Noise Propagation and Modeling Assessment

Byron Solar Project

Dodge and Olmsted counties, Minnesota





Main (952) 937-5150 Fax (952) 947-5822

May 25, 2021

Scott Wentzell EDF Renewables 10 Second Street NE, Suite 400 Minneapolis, MN 55413

Re: Byron Solar Project; Noise Propagation and Modeling Assessment

Dodge County, MN

Project No. R0028109.00

Dear Mr. Wentzell:

Westwood Professional Services, Inc. (Westwood) was authorized by Byron Solar Project, LLC (Byron Solar) to provide noise modeling for the Byron Solar Project in Dodge and Olmsted Counties, Minnesota (**Exhibit 1**) in support of the Site Permit Application (SPA) which will be submitted to the Minnesota Public Utilities Commission (Commission or PUC).

The planned output for the Project is up to 200 megawatts (MW) alternating current (AC) of nameplate solar-energy capacity. Byron Solar plans to construct the Project on a schedule that facilitates an in-service date in 2024. The project consists of 64 step-up locations consisting of one inverter at each location, and one substation location consisting of 2 medium power transformers (MPTs). The layout can be seen in **Exhibit 1**.

This project is required to comply with Minnesota Rules 7030.0010-7030.0080. All receptors in the project area are classified as NAC (Noise Area Classification) 1 (Residential Units). The maximum noise levels for NAC 1 are as follows:

NAC Classification	Daytime limit (dBA)	Nighttime limit (dBA)
NAC 1	60	50

It is assumed that the solar plant will only operate during daytime hours, thus an impact threshold of 60 dBA was used.

Predicted noise levels were determined using the Cadna-A noise propagation and modeling software. Existing background noise levels were assumed to be 40 dBA, in accordance with ANSI S12.9-13/Part 3 Category 6: Very Quiet Rural Residential. Noise levels for the inverters were provided by the manufacturer. Transformer noise was modelled according to maximum allowable levels published in NEMA-TR1. The data sheet and relevant excerpt from NEMA-TR1 are attached as **Exhibits 5 and 6**.

Using this data, noise contours for project noise were generated for the project area and presented in **Exhibit 5**. Additionally, future noise levels, (project contribution plus ambient) were calculated for all identified receptors within a screening distance of 500 feet. These levels are reported and compared to requirements in the following table.

Receptor ID	Land Use	Project Noise (Leq dBA)	Ambient Level (dBA)	Future Level (Project + Ambient) (dBA)	Impact Threshold (Lday dBA)	Impact?
1	Residential	31	40	41	60	No
2	Residential	26	40	40	60	No
3	Residential	29	40	40	60	No
4	Residential	37	40	42	60	No
5	Residential	35	40	41	60	No
6	Residential	34	40	41	60	No
7	Residential	35	40	41	60	No
8	Residential	36	40	42	60	No
9	Residential	34	40	41	60	No
10	Residential	29	40	40	60	No
11	Residential	28	40	40	60	No
12	Residential	29	40	40	60	No
13	Residential	28	40	40	60	No
14	Residential	25	40	40	60	No
15	Residential	34	40	41	60	No
16	Residential	32	40	41	60	No
17	Residential	27	40	40	60	No

The loudest predicted level at a receptor is 42 dB (receptor 4), well below the daytime limit of 60 dB. The predicted noise concentration zones and propagation model are shown on the attached **Exhibits 2-4**. There are no predicted impacts, and the project complies fully with MN Rules 7030.0010-7030.0080.

In performing its services, Westwood Professional Services used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made. If you have any questions or wish to discuss any particular aspect of the project, please feel free to call me at (720) 586-8104.

Attachments: Exhibit 1 Project Overview

Exhibit 2 Noise Impact Assessment Results

Exhibit 3 Substation Noise Impact Assessment Results Exhibit 4 Single Inverter Noise Impact Assessment

Exhibit 5 Sunny Central 1500V Data Sheet

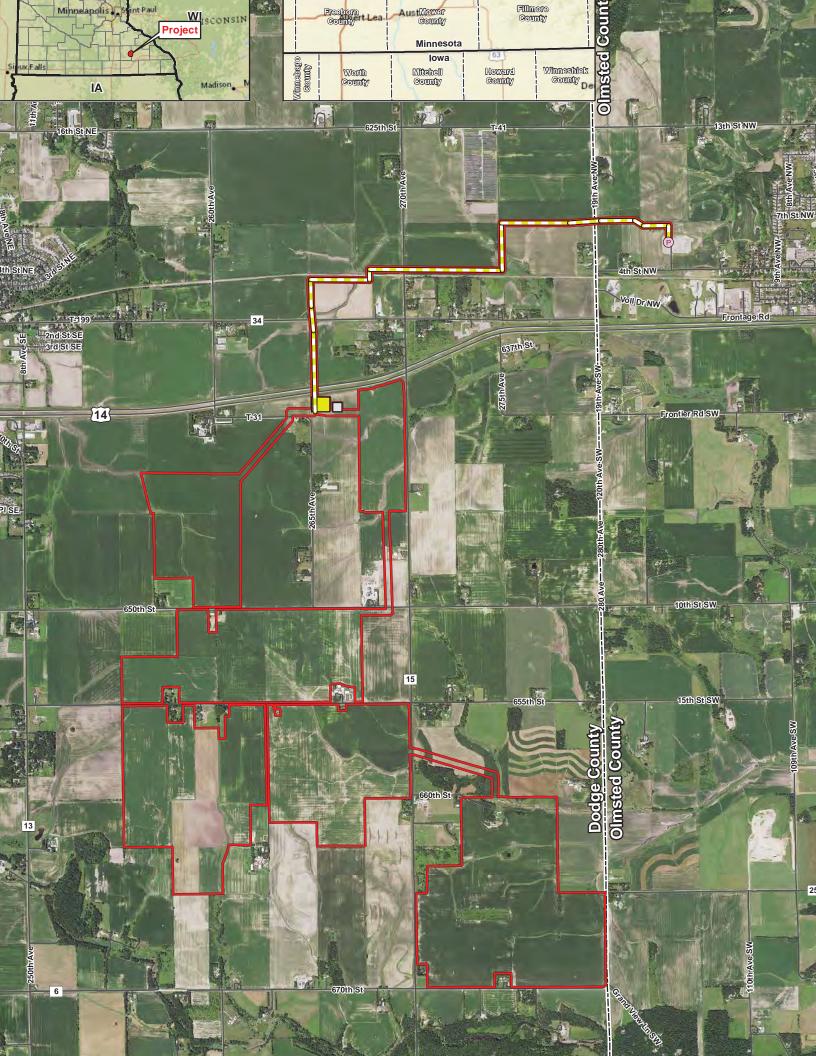
Exhibit 6 NEMA-TR1 Table

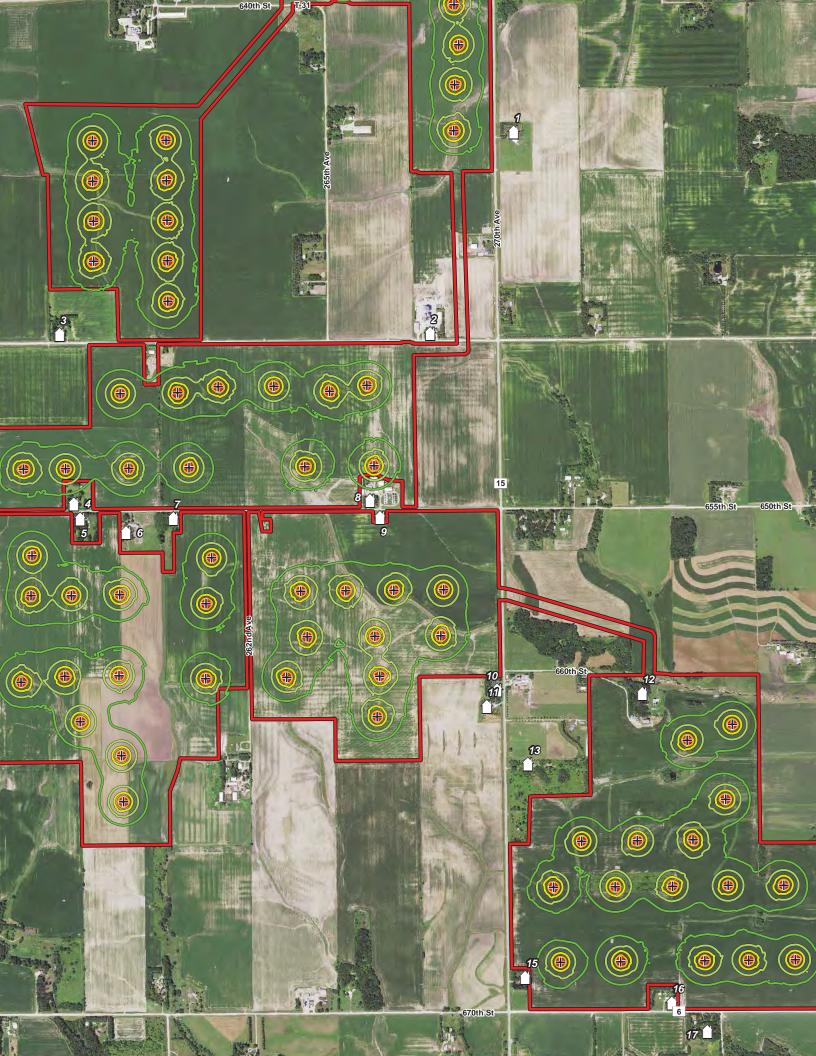
Sincerely,

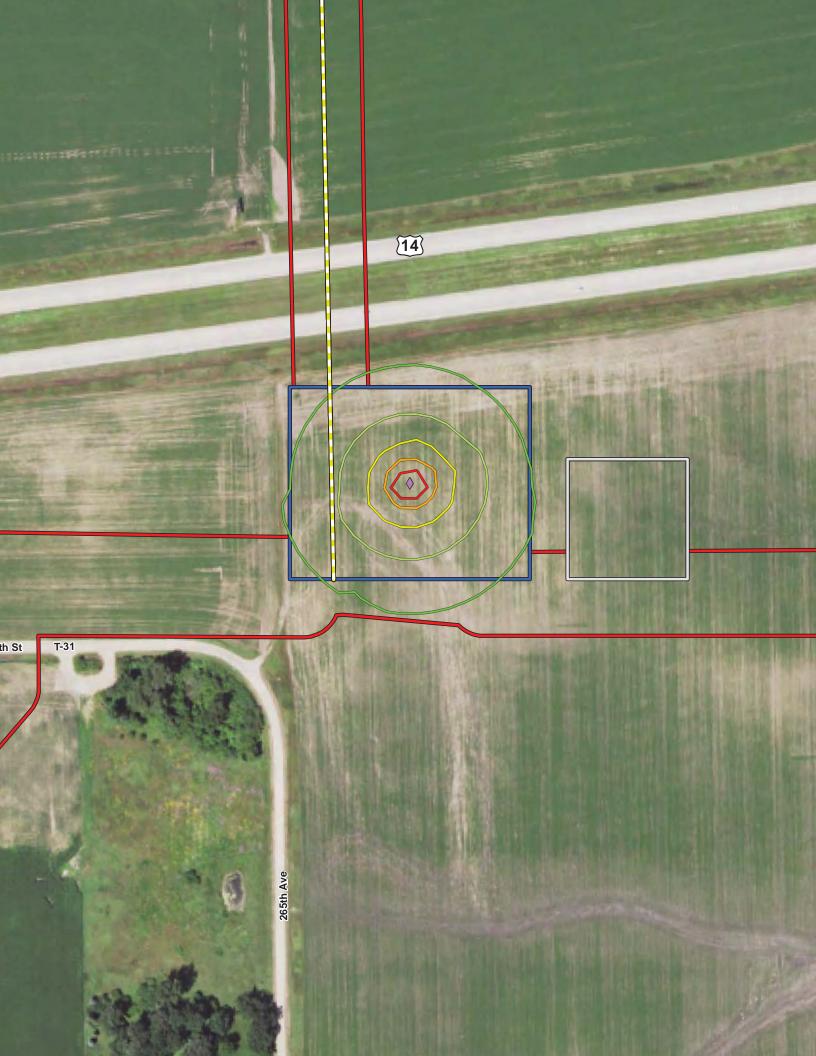
WESTWOOD PROFESSIONAL SERVICES

Jeff Fine

Energy Resource Manager









SUNNY CENTRAL 4000 UP-US / 4200 UP-US / 4400 UP-US / 4600 UP-US





Efficient

- Up to 4 inverters can be transported in one standard shipping container
- Overdimensioning up to 150% is possible
- Full power at ambient temperatures of up to 25°C

Robust

- Intelligent air cooling system
 OptiCool for efficient cooling
- Suitable for outdoor use in all climatic ambient conditions worldwide

Flexible

- Conforms to all known grid requirements worldwide
- Q on demand
- Available as a single device or turnkey solution, including medium-voltage block

Easy to Use

- Improved DC connection area
- Connection area for customer equipment
- Integrated voltage support for internal and external loads

SUNNY CENTRAL 4000 UP-US / 4200 UP-US / 4400 UP-US / 4600 UP-US

The new Sunny Central: more power per cubic meter

With an output of up to 4600 kVA and system voltages of 1500 V DC, the SMA central inverter allows for more efficient system design and a reduction in specific costs for PV power plants. A separate voltage supply and additional space are available for the installation of customer equipment. True 1500 V technology and the intelligent cooling system OptiCool ensure smooth operation even in extreme ambient temperature as well as a long service life of 25 years.

SUNNY CENTRAL 4000 UP-US / 4200 UP-US

Cechnical data*	SC 4000 UP-US	SC 4200 UP-US
nput (DC)		
MPP voltage range V _{DC} (at 25 °C / at 50 °C)	880 to 1325 V / 1100 V	921 to 1325 V / 1100 V
Min. input voltage V _{DC, min} / Start voltage V _{DC, Start}	849 V / 1030 V	891 V / 1071 V
Max. input voltage V _{DC, min}	1500 V	1500 V
Max. input current I _{DC, max}	4750 A	4750 A
Max. short-circuit current I _{DC, sc}	6400 A	6400 A
Number of DC inputs	24 double pole fused	
Max. number of DC cables per DC input (for each polarity)	2 x 800 kcmil,	
ntegrated zone monitoring	2 x 000 xc,	
Available DC fuse sizes (per input)	200 A, 250 A, 315 A, 350	
Output (AC)	200 A, 200 A, 010 A, 000	7 A, 400 A, 400 A, 500 A
Nominal AC power at cos φ = 1 (at 25°C / at 50°C)	4000 kVA / 3400 kVA	4200 kVA / 3570 kVA
Nominal AC power at cos φ = 1 (at 25 °C / at 50 °C)	3200 kW / 2720 kW	3360 kW / 2856 kW
Nominal AC current I _{AC, nom} (at 25°C / at 50°C)	3850 A / 3273 A	3850 A / 3273 A
Max. total harmonic distortion	< 3% at nominal power	< 3% at nominal power
Nominal AC voltage / nominal AC voltage range ^{1) 8)}	600 V / 480 V to 720 V	630 V / 504 V to 756 V
AC power frequency / range	50 Hz / 47 60 Hz / 57	
Min. short-circuit ratio at the AC terminals ⁹	>	
Power factor at rated power / displacement power factor adjustable ^{8) 10)}	1 / 0.8 overexcited	to 0.8 underexcited
Efficiency	. , 313 0.0.0.0	
Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾	98.7%* / 98.6%* / 98.5%*	98.7%* / 98.6%* / 98.5%*
Protective Devices	7 6.1 76 7 7 6.676 7 7 6.676	7 6.0 70 7 7 6.676 7 7 6.676
nput-side disconnection point	DC load br	eak switch
Output-side disconnection point	AC circuit	
·		
OC overvoltage protection	Surge arre	* '
AC overvoltage protection (optional)	Surge arres	
ightning protection (according to IEC 62305-1)	Lightning Prote	
Ground-fault monitoring / remote ground-fault monitoring	0 /	
nsulation monitoring	C	
Degree of protection	NEM	A 3K
General Data	0700 / 0010 / 1500	100 / /01 0 / /0 5
Dimensions (W / H / D)	2780 / 2318 / 1588 mm (
Weight	< 4000 kg /	
Self-consumption (max. ⁴) / partial load ⁵) / average ⁶)	< 8100 W / < 180	'
Self-consumption (standby)	< 37	0 W
nternal auxiliary power supply	○ Integrated 8.4	
Operating temperature range ⁸⁾	−25°C to 60°C /	-13°F to 140°F
Noise emission ⁷⁾	67.0 d	B(A)*
Temperature range (standby)	-40°C to 60°C /	-40°F to 140°F
Temperature range (storage)	-40°C to 70°C /	-40°F to 158°F
Max. permissible value for relative humidity (condensing / non-condensing)	95% to 100% (2 mont	h/year) / 0% to 95%
Maximum operating altitude above MSL ⁸⁾ 1000 m / 2000 m / 3000 m	✓ ○ / ○ (earlier tempered)	ature-dependent derating)
resh air consumption	6500	m³/h
eatures		
OC connection	Terminal lug on each	input (without fuse)
AC connection	With busbar system (three bus	
Communication	Ethernet, Modbus M	
Communication with SMA string monitor (transmission medium)	Modbus TCP / Ether	
Enclosure / roof color	RAL 9016 /	
Supply transformer for external loads	o (2.5	
Standards and directives complied with	UL 62109-1, UL 1741 (Chapter 31 IEEE 1 <i>547, M</i>	, CDR 6I), UL 1741-SA, UL 1998,
EMC standards	FCC Part 1	
Quality standards and directives complied with	VDI/VDE 2862 page	
· · · · · · · · · · · · · · · · · · ·		

- At nominal AC voltage, nominal AC power decreases in the same proportion
 Efficiency measured without internal power supply
 Efficiency measured with internal power supply
 Self-consumption at rated operation
 Self-consumption at < 75% Pn at 25°C
 Self-consumption averaged out from 5% to 100% Pn at 25°C

- 7) Sound pressure level at a distance of 10 m
 8) Values apply only to inverters. Permissible values for SMA MV solutions from SMA can be found in the corresponding data sheets.

 9) A short-circuit ratio of < 2 requires a special approval from SMA
 10) Depending on the DC voltage

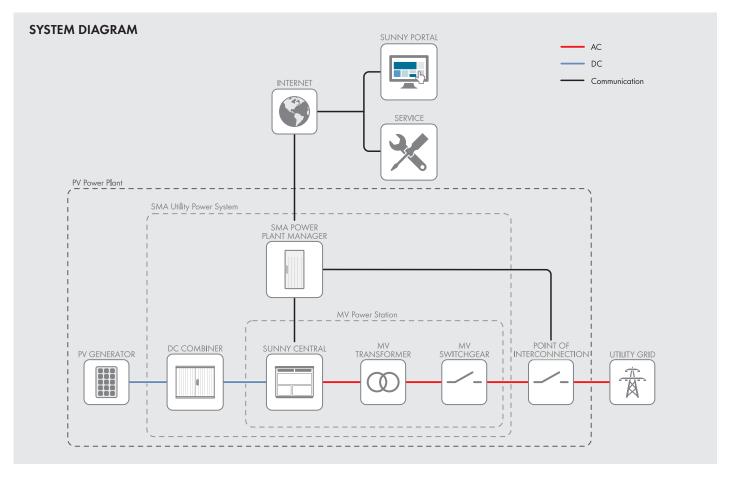
SUNNY CENTRAL 4400 UP-US / 4600 UP-US

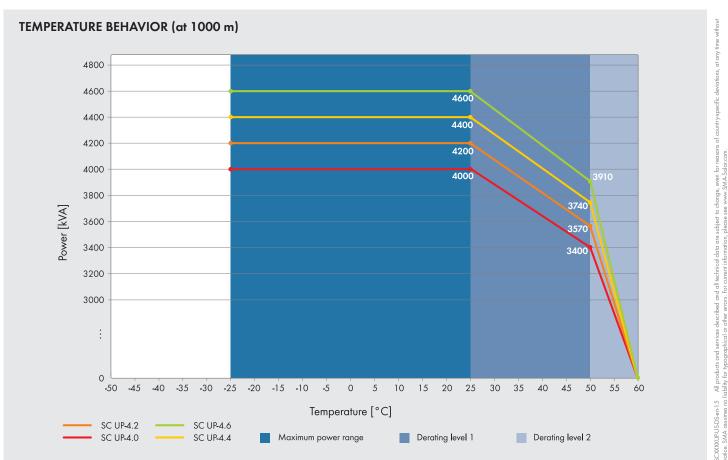
Input (DC) MPP voltage range V_{DC} (at 25 °C / at 50 °C) Min. input voltage $V_{DC, min}$ / Start voltage $V_{DC, Start}$ Max. input current $I_{DC, max}$ Max. input current $I_{DC, max}$ Max. short-circuit current $I_{DC, sc}$ Number of DC inputs Max. number of DC cables per DC input (for each polarity) Integrated zone monitoring Available DC fuse sizes (per input) Output (AC) Nominal AC power at $\cos \varphi = 1$ (at 25° C / at 50° C) Nominal AC power at $\cos \varphi = 0.8$ (at 25° C / at 50° C) Nominal AC current $I_{AC, nom}$ (at 25° C / at 50° C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range I_{B} 1 (at $I_{AC, nom}$ 1 (at $I_{AC, nom}$ 2) Min. short-circuit ratio at the AC terminals $I_{AC, nom}$ 2 Power factor at rated power / displacement power factor adjustable $I_{AC, nom}$ 3 Protective Devices Input-side disconnection point	200 A, 250 A, 315 A, 350 4400 kVA / 3740 kVA 3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57	2 x 400 mm ² 0 A, 400 A, 450 A, 500 A 4600 kWA / 3910 kWA 3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Min. input voltage V _{DC, min} / Start voltage V _{DC, Start} Max. input voltage V _{DC, max} Max. input current I _{DC, max} Max. short-circuit current I _{DC, max} Max. number of DC inputs Max. number of DC cables per DC input (for each polarity) Integrated zone monitoring Available DC fuse sizes (per input) Output (AC) Nominal AC power at cos φ = 1 (at 25°C / at 50°C) Nominal AC power at cos φ = 0.8 (at 25°C / at 50°C) Nominal AC current I _{AC, nom} (at 25°C / at 50°C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range ^{1) 8)} AC power frequency / range Min. short-circuit ratio at the AC terminals ⁹⁾ Power factor at rated power / displacement power factor adjustable ^{8) 10)} Efficiency Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾ Protective Devices	934 V / 1112 V 1500 V 4750 A 6400 A 24 double pole fused 2 x 800 kcmil, 200 A, 250 A, 315 A, 350 4400 kVA / 3740 kVA 3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%*	976 V / 1153 V 1500 V 4750 A 6400 A (32 single pole fused) 2 x 400 mm² 0 A, 400 A, 450 A, 500 A 4600 kVA / 3910 kVA 3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Min. input voltage V _{DC, min} / Start voltage V _{DC, Start} Max. input voltage V _{DC, max} Max. input current I _{DC, max} Max. short-circuit current I _{DC, max} Max. number of DC inputs Max. number of DC cables per DC input (for each polarity) Integrated zone monitoring Available DC fuse sizes (per input) Output (AC) Nominal AC power at cos φ = 1 (at 25°C / at 50°C) Nominal AC power at cos φ = 0.8 (at 25°C / at 50°C) Nominal AC current I _{AC, nom} (at 25°C / at 50°C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range ^{1) 8)} AC power frequency / range Min. short-circuit ratio at the AC terminals ⁹⁾ Power factor at rated power / displacement power factor adjustable ^{8) 10)} Efficiency Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾ Protective Devices	1500 V 4750 A 6400 A 24 double pole fused 2 x 800 kcmil, 200 A, 250 A, 315 A, 350 4400 kVA / 3740 kVA 3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%*	1500 V 4750 A 6400 A (32 single pole fused) 2 x 400 mm ² 0 A, 400 A, 450 A, 500 A 4600 kVA / 3910 kVA 3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Max. input voltage V DC, max Max. input current I DC, max Max. short-circuit current I DC, max Max. short-circuit current I DC, max Max. number of DC inputs Max. number of DC cables per DC input (for each polarity) Integrated zone monitoring Available DC fuse sizes (per input) Output (AC) Nominal AC power at cos φ = 1 (at 25°C / at 50°C) Nominal AC power at cos φ = 0.8 (at 25°C / at 50°C) Nominal AC current I DC, max (at 25°C / at 50°C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range (1) 8) AC power frequency / range Min. short-circuit ratio at the AC terminals (2) Power factor at rated power / displacement power factor adjustable (8) (10) Efficiency Max. efficiency (2) / European efficiency (2) / CEC efficiency (3) Protective Devices	1500 V 4750 A 6400 A 24 double pole fused 2 x 800 kcmil, 200 A, 250 A, 315 A, 350 4400 kVA / 3740 kVA 3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%*	1500 V 4750 A 6400 A (32 single pole fused) 2 x 400 mm ² 0 A, 400 A, 450 A, 500 A 4600 kVA / 3910 kVA 3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Max. input current I _{DC, max} Max. short-circuit current I _{DC, te} Number of DC inputs Max. number of DC cables per DC input (for each polarity) Integrated zone monitoring Available DC fuse sizes (per input) Output (AC) Nominal AC power at cos φ = 1 (at 25°C / at 50°C) Nominal AC power at cos φ = 0.8 (at 25°C / at 50°C) Nominal AC current I _{AC, nom} (at 25°C / at 50°C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range ^{1) 8)} AC power frequency / range Min. short-circuit ratio at the AC terminals ⁹⁾ Power factor at rated power / displacement power factor adjustable ^{8) 10)} Efficiency Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾ Protective Devices	4750 A 6400 A 24 double pole fused 2 x 800 kcmil, 200 A, 250 A, 315 A, 350 4400 kVA / 3740 kVA 3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%*	4750 A 6400 A (32 single pole fused) 2 x 400 mm ² 0 A, 400 A, 450 A, 500 A 4600 kVA / 3910 kVA 3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Max. short-circuit current I _{DC, sc} Number of DC inputs Max. number of DC cables per DC input (for each polarity) Integrated zone monitoring Available DC fuse sizes (per input) Output (AC) Nominal AC power at cos φ = 1 (at 25°C / at 50°C) Nominal AC power at cos φ = 0.8 (at 25°C / at 50°C) Nominal AC current I _{AC, nom} (at 25°C / at 50°C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range ^{1) 8)} AC power frequency / range Min. short-circuit ratio at the AC terminals ⁹⁾ Power factor at rated power / displacement power factor adjustable ^{8) 10)} Efficiency Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾ Protective Devices	6400 A 24 double pole fused 2 x 800 kcmil, 200 A, 250 A, 315 A, 350 4400 kVA / 3740 kVA 3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%*	6400 A (32 single pole fused) 2 x 400 mm ² 0 A, 400 A, 450 A, 500 A 4600 kVA / 3910 kVA 3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Number of DC inputs Max. number of DC cables per DC input (for each polarity) Integrated zone monitoring Available DC fuse sizes (per input) Output (AC) Nominal AC power at cos φ = 1 (at 25°C / at 50°C) Nominal AC power at cos φ = 0.8 (at 25°C / at 50°C) Nominal AC current I _{AC, nom} (at 25°C / at 50°C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range 11 81 AC power frequency / range Min. short-circuit ratio at the AC terminals 91 Power factor at rated power / displacement power factor adjustable 81 101 Efficiency Max. efficiency 21 / European efficiency 22 / CEC efficiency 31 Protective Devices	24 double pole fused 2 x 800 kcmil, 200 A, 250 A, 315 A, 350 4400 kVA / 3740 kVA 3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load by	(32 single pole fused) . 2 x 400 mm ² . 0 A, 400 A, 450 A, 500 A 4600 kVA / 3910 kVA 3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Max. number of DC cables per DC input (for each polarity) Integrated zone monitoring Available DC fuse sizes (per input) Output (AC) Nominal AC power at cos φ = 1 (at 25°C / at 50°C) Nominal AC power at cos φ = 0.8 (at 25°C / at 50°C) Nominal AC current I _{AC, nom} (at 25°C / at 50°C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range ^{1) 8)} AC power frequency / range Min. short-circuit ratio at the AC terminals ⁹⁾ Power factor at rated power / displacement power factor adjustable ^{8) 10)} Efficiency Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾ Protective Devices	2 x 800 kcmil, 200 A, 250 A, 315 A, 350 4400 kVA / 3740 kVA 3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load by	2 x 400 mm ² 0 A, 400 A, 450 A, 500 A 4600 kWA / 3910 kWA 3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Integrated zone monitoring Available DC fuse sizes (per input) Output (AC) Nominal AC power at cos $\varphi = 1$ (at 25°C / at 50°C) Nominal AC power at cos $\varphi = 0.8$ (at 25°C / at 50°C) Nominal AC current $I_{AC, nom}$ (at 25°C / at 50°C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range 11 81 AC power frequency / range Min. short-circuit ratio at the AC terminals 91 Power factor at rated power / displacement power factor adjustable 81 101 Efficiency Max. efficiency 21 / European efficiency 22 / CEC efficiency 31 Protective Devices	200 A, 250 A, 315 A, 350 4400 kVA / 3740 kVA 3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load by	4600 kVA / 3910 kVA 3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Available DC fuse sizes (per input) Output (AC) Nominal AC power at $\cos \varphi = 1$ (at 25° C / at 50° C) Nominal AC power at $\cos \varphi = 0.8$ (at 25° C / at 50° C) Nominal AC current $I_{AC, nom}$ (at 25° C / at 50° C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range 1) 8) AC power frequency / range Min. short-circuit ratio at the AC terminals 9) Power factor at rated power / displacement power factor adjustable 8) 10) Efficiency Max. efficiency 2 / European efficiency 2 / CEC efficiency 3) Protective Devices	200 A, 250 A, 315 A, 350 4400 kVA / 3740 kVA 3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load by	4600 kVA / 3910 kVA 3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Output (AC) Nominal AC power at cos φ = 1 (at 25°C / at 50°C) Nominal AC power at cos φ = 0.8 (at 25°C / at 50°C) Nominal AC current I _{AC, nom} (at 25°C / at 50°C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range ^{1) 8)} AC power frequency / range Min. short-circuit ratio at the AC terminals ⁹⁾ Power factor at rated power / displacement power factor adjustable ^{8) 10)} Efficiency Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾ Protective Devices	4400 kVA / 3740 kVA 3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load by	4600 kVA / 3910 kVA 3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Nominal AC power at cos φ = 1 (at 25°C / at 50°C) Nominal AC power at cos φ = 0.8 (at 25°C / at 50°C) Nominal AC current I _{AC, nom} (at 25°C / at 50°C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range 1181 AC power frequency / range Min. short-circuit ratio at the AC terminals 91 Power factor at rated power / displacement power factor adjustable 81101 Efficiency Max. efficiency 21 / European efficiency 22 / CEC efficiency 31 Protective Devices	3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%*	3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Nominal AC power at cos φ =0.8 (at 25 ° C / at 50 ° C) Nominal AC current I _{AC, nom} (at 25 ° C / at 50 ° C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range ^{1) 8)} AC power frequency / range Win. short-circuit ratio at the AC terminals ⁹⁾ Power factor at rated power / displacement power factor adjustable ^{8) 10)} Efficiency Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾ Protective Devices	3520 kW / 2992 kW 3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%*	3680 kW / 3128 kW 3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Nominal AC current I _{AC, nom} (at 25°C / at 50°C) Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range ^{1) 8)} AC power frequency / range Min. short-circuit ratio at the AC terminals ⁹⁾ Power factor at rated power / displacement power factor adjustable ^{8) 10)} Efficiency Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾ Protective Devices	3850 A / 3273 A < 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load by	3850 A / 3273 A < 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Max. total harmonic distortion Nominal AC voltage / nominal AC voltage range 11 81 AC power frequency / range Min. short-circuit ratio at the AC terminals 91 Power factor at rated power / displacement power factor adjustable 81 101 Efficiency Max. efficiency 21 / European efficiency 22 / CEC efficiency 31 Protective Devices	< 3% at nominal power 660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load by	< 3% at nominal power 690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Nominal AC voltage / nominal AC voltage range 1) 8) AC power frequency / range Min. short-circuit ratio at the AC terminals 9) Power factor at rated power / displacement power factor adjustable 8) 10) Efficiency Max. efficiency 2 / European efficiency 2 / CEC efficiency 3) Protective Devices	660 V / 528 V to 759 V 50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load by	690 V / 552 V to 759 V Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
AC power frequency / range Min. short-circuit ratio at the AC terminals ⁹ Power factor at rated power / displacement power factor adjustable ^{8] 10]} Efficiency Max. efficiency ² / European efficiency ² / CEC efficiency ³ Protective Devices	50 Hz / 47 60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load by	Hz to 53 Hz Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Min. short-circuit ratio at the AC terminals ⁹ Power factor at rated power / displacement power factor adjustable ^{8] 10]} Efficiency Max. efficiency ² / European efficiency ² / CEC efficiency ³ Protective Devices	60 Hz / 57 > 1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load b	Hz to 63 Hz 2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Power factor at rated power / displacement power factor adjustable ^{8] 10]} Efficiency Max. efficiency ^{2]} / European efficiency ^{2]} / CEC efficiency ^{3]} Protective Devices	1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load b	2 to 0.8 underexcited 98.7%* / 98.6%* / 98.5%*
Power factor at rated power / displacement power factor adjustable ^{8] 10]} Efficiency Max. efficiency ^{2]} / European efficiency ^{2]} / CEC efficiency ^{3]} Protective Devices	1 / 0.8 overexcited 98.7%* / 98.6%* / 98.5%* DC load b	98.7%* / 98.6%* / 98.5%*
Efficiency Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾ Protective Devices	98.7%* / 98.6%* / 98.5%* DC load bi	98.7%* / 98.6%* / 98.5%*
Max. efficiency ²⁾ / European efficiency ²⁾ / CEC efficiency ³⁾ Protective Devices	DC load b	,
Protective Devices	DC load b	,
		roak switch
Output-side disconnection point		
DC overvoltage protection	Surge arre	· ·
AC overvoltage protection (optional)	Surge arre	
Lightning protection (according to IEC 62305-1)	* *	ection Level III
Ground-fault monitoring / remote ground-fault monitoring		/ 0
Insulation monitoring		
Degree of protection	NEM	IA 3R
General Data		
Dimensions (W / H / D)	2780 / 2318 / 1588 mm	
Weight	< 4000 kg /	
Self-consumption (max.4) / partial load ⁵⁾ / average ⁶⁾)	< 8100 W / < 180	
Self-consumption (standby)	< 37	'0 W
Internal auxiliary power supply	Integrated 8.4	kVA transformer
Operating temperature range ⁸⁾	−25°C to 60°C /	/ -13°F to 140°F
Noise emission ⁷	67.0 c	B(A)*
Temperature range (standby)	-40°C to 60°C /	/ -40°F to 140°F
Temperature range (storage)	-40°C to 70°C /	/ −40°F to 158°F
Max. permissible value for relative humidity (condensing / non-condensing)	95% to 100% (2 mon	th/year) / 0% to 95%
Maximum operating altitude above MSL ⁸⁾ 1000 m / 2000 m / 3000 m	● / ○ / ○ (earlier temper	
Fresh air consumption	6500	m³/h
Features		·
DC connection	Terminal lug on each	n input (without fuse)
AC connection	With busbar system (three bus	
Communication	•	aster, Modbus Slave
Communication with SMA string monitor (transmission medium)	Modbus TCP / Ether	
Enclosure / roof color	RAL 9016	
Supply transformer for external loads	○ (2.5	
Standards and directives complied with	UL 62109-1, UL 1741 (Chapter 3	1, CDR 6I), UL 1741-SA, UL 1998
EMC standards		AIL-STD-810G 15 Class A
Quality standards and directives complied with	VDI/VDE 2862 page	
adding standards and affectives complied with	۷۵۱/ ۷۵E 2002 page	Z, DIIN EIN 130 7001

- At nominal AC voltage, nominal AC power decreases in the same proportion
 Efficiency measured without internal power supply
 Efficiency measured with internal power supply
 Self-consumption at rated operation
 Self-consumption at < 75% Pn at 25°C
 Self-consumption averaged out from 5% to 100% Pn at 25°C

- 7) Sound pressure level at a distance of 10 m
 8) Values apply only to inverters. Permissible values for SMA MV solutions from SMA can be found in the corresponding data sheets.

 9) A short-circuit ratio of < 2 requires a special approval from SMA
 10) Depending on the DC voltage





-IMMERSED POWER TRANSFORMERS ble 0-2

AUDIBLE SOUND LEVELS FI

Column 1 - Class*OA, Ow and FOW Ratings
Column 2 - Class* FA and FOA Fins stage Auxiliary Cooling**†
Column 3 - Straight FOA* Ratings, FA* FOA* Second-stage Auxiliary Cooling*†

7500 N Elt and Below 450, 550, 650 N Elt	Average Sound								Equi	Equivalent Two-winding Rating&	ding Rating&									1
10 10 10 10 10 10 10 10			50 kV Bil. and	Below		150, 550, 650 k	VBIL	7	50 and 825 kV	BIL	006	And 1050 kV	BIL		1175 kV BIL		130	O ky Bil. and	Above	Z
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,		-	Ci.	67		2		·	2	6	+	24	6		8	6	-	2	6	TD
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,		700	į	;	ŧ	- 1	7	ì	i	1	į	÷	ŧ	1	1	i	1	i	3	. N
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,		1000			1		c	***	(4)	James .	1440	-	1	ŧ	343	*				E
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,		í	-	i	200	***	Ţ	(644)	1	1			1	1		1	Was.	10		M,
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,		1500	3	3	1000	***	1			-	100	**	11	1	***	ī	****	3446	***	A
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,		2000		10	3	**	100	-111	100	r	-	ŧ	91	ŧ		200		346	1	T
1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,		2500			1500	HQ		36			-	1	1	1	:	-	1	-	.1	R
1,500 1,50		2000	414		2000					200		-			:	-	Ī	4.	1]
1,500 1,50		2000		Ŧ	2500	1						1	***	***	1		1	and .	77	<u>.</u> -
1,500 1,50		2009		F	3000	1			ŧ	***	-	***	Ŧ	9.	r		:	1		E
1,200 1,200 1,50		9000	I à		4000			3000	i	100	101	0	1	1	E		****	44		NO
1,500 1,50		7500	4.4036.8		2000	2750A.A		4000	312544	3			3	ŧ			1	1	400	SL
1,200 1,50		380	20000	:	2000	2000		2009	3750					197	3					
1500 1500		2000	9375		7500	6250		0009	2000			:	1		ì	775	No.	ī	***	ľ
1500 1500		00031	12500		10000	7500		7500	6250	:	-	***	1		:		Ann	7	101	94
20000 15000 <th< td=""><td></td><td>20000</td><td>(989)</td><td></td><td>12500</td><td>9375</td><td></td><td>10000</td><td>7500</td><td>***</td><td>(tr</td><td>ja.</td><td>1</td><td>1</td><td>1</td><td>1.</td><td>1</td><td>77</td><td>191</td><td>EF</td></th<>		20000	(989)		12500	9375		10000	7500	***	(tr	ja.	1	1	1	1.	1	77	191	EF
76667 25000 20000 18500 <th< td=""><td></td><td>25000</td><td>20000</td><td>20800</td><td>15000</td><td>12500</td><td>ż</td><td>12500</td><td>9375</td><td>ome</td><td>ì</td><td>1</td><td>1</td><td></td><td>1</td><td>1</td><td>671</td><td>ŧ</td><td>***</td><td></td></th<>		25000	20000	20800	15000	12500	ż	12500	9375	ome	ì	1	1		1	1	671	ŧ	***	
1,500 1,50		30000	26667	25000	20000	16667		15000	12500	0.00	12500	166	100	9	1	×	100	***		
40000 41647 30000 28667 25000 25000 25000 25000 25000 25000 25000 15000 <th< td=""><td></td><td>40000</td><td>33333</td><td>33333</td><td>25000</td><td>20000</td><td>20800</td><td>20000</td><td>18867</td><td>100</td><td>15000</td><td>-</td><td>100</td><td>12500</td><td>1</td><td></td><td>1</td><td>1</td><td></td><td>8</td></th<>		40000	33333	33333	25000	20000	20800	20000	18867	100	15000	-	100	12500	1		1	1		8
\$3333 \$0000 \$40000 \$19333 \$2000 \$2660 \$7000 \$16667 \$15000 \$16600		20000	40000	41667	30000	26667	25000	25000	20000	20800	20000	16667		15000		359	12500			I
1,000 1,00		80000	53333	20000	40000	33333	33333	30000	28667	25000	25000	50000	20800	20000	16667	**	15000	300		54
BOOK Bead BOOK Bead BOOK Bead Book		80000	66887	66667	20000	40000	41667	40000	33333	33333	30000	26667	25000	25000	20000	20800	20000	16667		70
1,000,000 1,00		100000	80000	83333	00009	53333	20000	20000	40000	41667	40000	33333	33333	30000	26667	25000	25000	20000	20800	12
13333 13333 100000 80000 81333 80000 86667 8667 8667			106667	100000	80000	66667	66667	00009	53333	20000	20000	40000	41667	40000	33333	33333	30000	26667	25000	4
196667 196667 1900000 190000 190000 190000 190000 190000 190000 1900000 190000 190000 190000 190000 190000 190000 1900000 190000 190000 190000 190000 190000 190000 1900000 190000 190000 1900000 190000 190000 190000 19000000 19000000 1900000 1900000 1900000 19000000 19000000 19000000 1900000 1900000 1900000 19			133333	133333	100000	80000	83333	80000	66667	29999	00009	53333	20000	20000	40000	41667	40000	32323	33353	7
13333 13333 13333 108667 100000 100000 83333 80000 84667 86667 80000 83333 80000 86667 80000 84667 8		ž	I	166667	£	106667	100000	100000	8000	83333	80000	28999	66667	00009	53333	20000	20000	40000	41867	1
166667				200000		133303	133333	1	108667	100000	100000	80000	83333	90000	69667	66667	80000	53333	90009	15
250000		ž	:	250000			166667		133333	133333	:	108687	100000	100000	80000	63333	80000	19999	68867	21
250000			3116	300000			200000			186667	191	133333	133333		108667	100000	100000	90000	83333	41
200000			I	400000			250000		3	200000		-	166667	1	133333	133333	Proj.	106667	1000001	46
2500000 2000000 25000000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 25000000 25000000 2500000 2500000 2500000 2500000 25000000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 2500000 250000000 25000000 25000000 25000000 25000000 250000000 25000000 25000000 25000000 250000000 250000000 250000000 250000000 250000000000			31.		Ī		300000	1	4	250000	1	-	200000	1	į	166867	***	133333	133333	. 6
400000 1 1 250000 1 1 250000 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		1	1							-			000000			Some			168667	
400000				-	***	è	*****		i	200000		***	200000			250000			200000	78
		141	1	1441	***		Ŧ	-	-	***************************************		797	400000	1	1	200000	0.0	1	250000	35
			ŧ		3.	Ť		ī	1			in	*******	4		400000			300000	;
1		***	19.50	****	1	*		+1.6	1	:				ţ	***	20000			WOOD,	
				ī	1	1	70	1111	i	1444	ş	-	-	ł	1	I	,	100	-	

Classes of cooling (see 2.6.1 of American National Standard C57.12.00-1988 "First- and second-stage auxiliary cooling (see TR 1.0.02).

FFor column 2 and 3 ratings, the sound levels are with the auxiliary cooling equipment in operation. If For intermediate kVA ratings, use the average sound level of the next larger kVA rating.

A The equivalent heo-winding 55°C or 65°C rating is defined as one-half the aum of the kVA rating of all windings.

A.Sixty-seven decibels for all kVA ratings equal to this or amaller.