



NCE JOB MEMO 2020-016-R2

TO: Jason Reposa

COMPANY: Good Feels, Inc.

FROM: Jeffrey Komrower, Noise Control Engineering

DATE: May 26, 2021

SUBJECT: Noise Predictions for Chiller and Backup Generator

Good Feels, Inc. is proposing to establish a Marijuana Product Manufacturing (MPM) facility located at 23 Jayar Road in Medway, MA. The location is in an industrial park and is not near any residential abutters, but still must meet noise regulations if any equipment will be installed that would be a noise source. Because of the type of facility, there is no cultivation requirements and thus no extreme requirements for supporting equipment. Calculations have previously been performed for a rooftop HVAC unit to support the facility operations. Since these calculations have been performed, there has been an addition of a chiller unit and backup generator to the facility. Both these units will be located at the back of the building as shown in Figure 1. The chiller unit is a Whaley SA5-3-2P30T packaged air chiller. Specifications are given in Appendix A. Appendix B shows the specifications for a Generac G9.0L SG/MG130 generator with a Level 1 sound enclosure.

Using measurements taken from MassGIS's online mapping tool (Figure 2), the distance to the closest property line (North property line) was determined to be 68 feet. The assumption is that if the units meet the noise requirements at this property line, it will also meet the requirements at the property line of the closest commercial abutter, which is on the opposite side of the building at a distance of 120 feet and in the shadow zone of the building. Absorption material will be installed on the wall behind the chiller and generator to eliminate any reflections off the building and an eight-foot-high barrier will be installed around the units.

The Town of Medway Environmental Standards for continuous noise are as follows:

Continuous Noise. For the purposes of this bylaw, continuous noise restrictions apply to permanent non-residential uses and home-based businesses where noise is a by-product of business operations (such as from exhaust equipment). Maximum permissible sound pressure levels (SPL) measured at the property line of the noise source shall not exceed the values specified in the Table 1 below. In addition, maximum permissible sound levels measured at sensitive receptors located within one-thousand feet of the property line of the noise source for noise radiated continuously from the noise source shall not exceed the values specified in the table below. Daytime is defined as between the hours of 7:00 a.m. and 9:00 p.m. and Nighttime is defined as between the hours of 9:00 p.m. and 7:00 a.m.

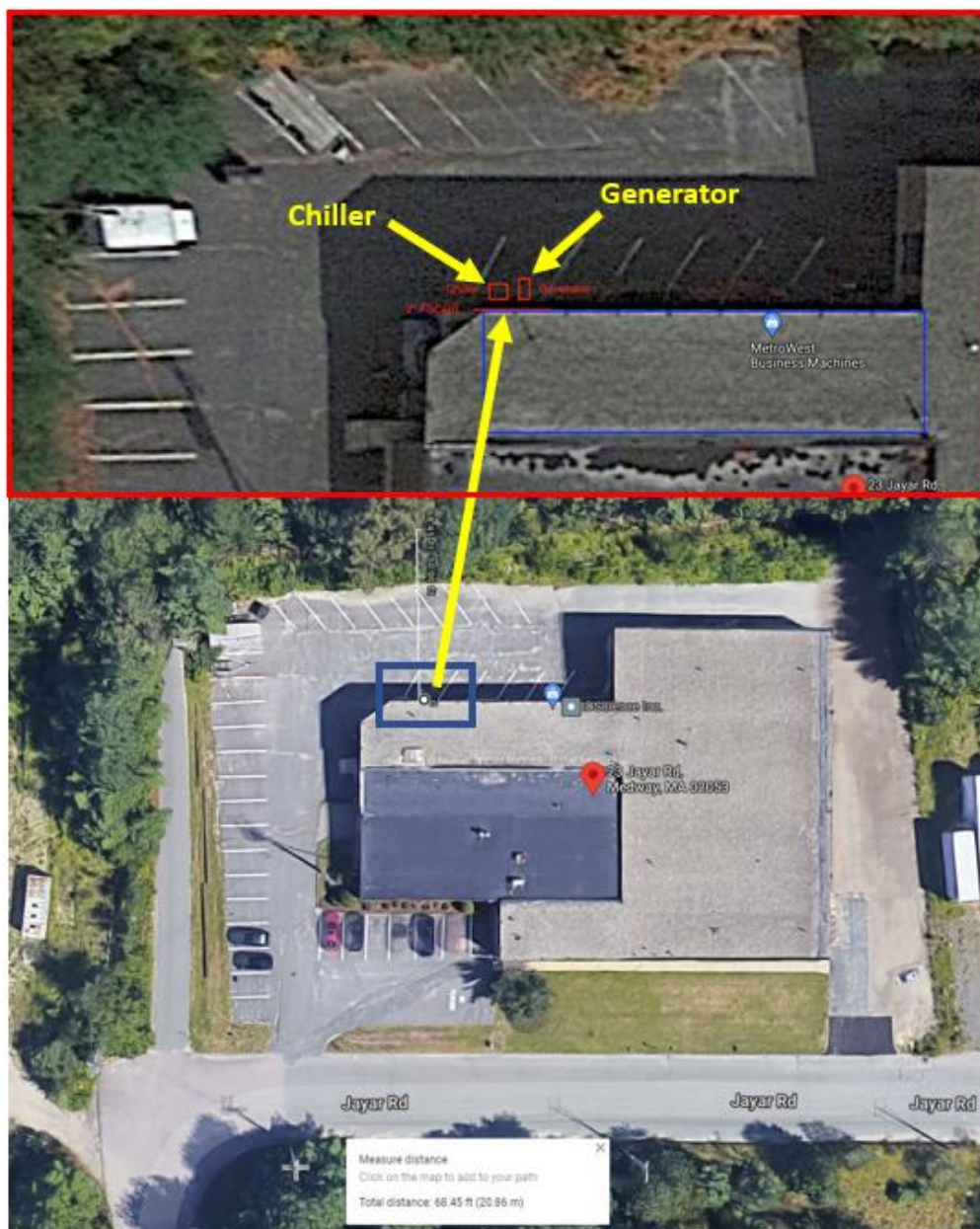


Figure 1. Location of proposed chiller unit and backup generator



Figure 2. Distance of proposed chiller and generator units to closest property lines

Octave Band Center Frequency (Hz)	Daytime (dB) 7:00 a.m. – 9:00 p.m.	Nighttime (dB) 9:00 p.m. – 7:00 a.m.
63	72	55
125	60	48
250	53	42
500	47	39
1000	43	36
2000	40	33
4000	37	30
8000	33	27
Overall Level (dBA)	52	42

Table 1: Town of Medway maximum permissible sound pressure levels

Published sound power levels for the chiller were obtained from manufacturer's published specifications which is provided in Appendix A. Calculations using hemispherical spreading were performed to predict noise levels from this unit at the property line. The results of this calculation for the overall SPL in dB(A) as well as the SPL for the individual octave bands in unweighted dB is presented in Table 2 along with the Town of Medway noise limits. The daytime noise levels are met without a barrier, however, the overall nighttime limit of 42 dB(A) is exceeded by 2 dB and several of the octave bands exceed the nighttime limits by up to 3 dB. With an eight-foot barrier around the chiller and generator units, the nighttime levels in all octave bands as well as the overall level are well below the limits. The barrier prediction model is shown in Figure 3. The manufacturer's specifications did not include the 63 Hz octave band (which will not significantly contribute to the overall level) so it was assumed to be at the same level as the 125 Hz octave band. It is not anticipated that the operation of this chiller unit will result in any noise pollution as described in the Town of Medway Environmental Standards.

		Whaley SA5 Packaged Chiller Unit No. TSA060H4 - No Barrier			With Barrier		Town of Medway Environmental Standards			
Hz	A-wt	Unit No. TSA060H4 Published Sound Power Levels (Lw)	Predicted Sound Pressure Levels at 68 feet		Predicted Sound Pressure Levels at 68 feet		Daytime Limits (7 am to 9 PM)		Nighttime Limits (7 am to 9 PM)	
Octave	Filters	dB	dB	dB(A)	dB	dB(A)	dB	dB(A)	dB	dB(A)
125	-16	77	42	26	32	16	60	44	48	32
250	-9	78	43	35	32	23	53	44	42	33
500	-3	78	43	40	29	26	47	44	39	36
1000	0	74	39	39	27	27	43	43	36	36
2000	1	69	35	36	20	21	40	41	33	34
4000	1	64	29	30	12	13	37	38	30	31
8000	-1	61	26	25	5	4	33	32	27	26
OA		83	48	44	37	31	61	51	50	42

Table 2: Predicted noise levels from chiller at nearest property line

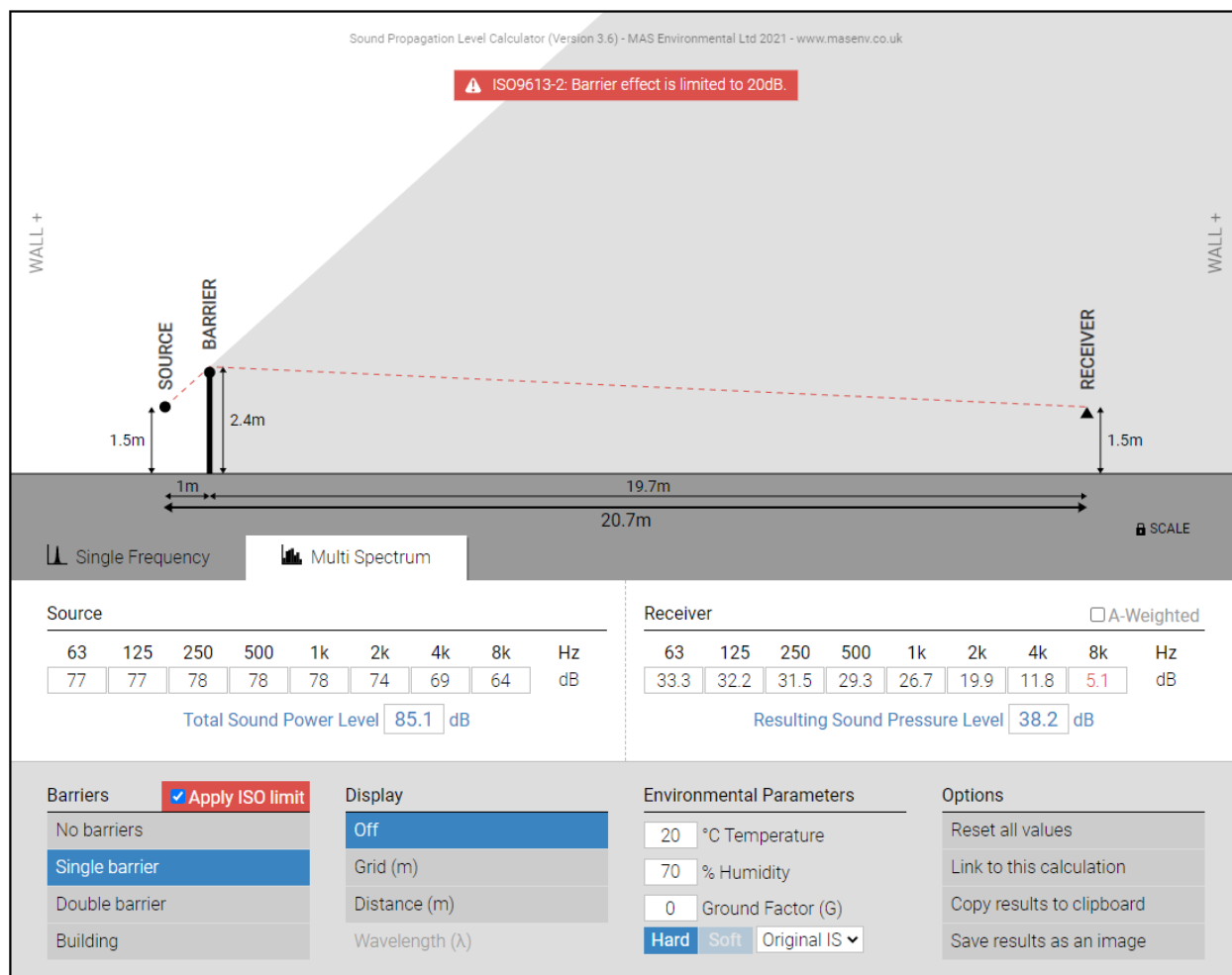


Figure 3. Barrier calculation for chiller with eight-foot barrier

For the backup generator, SPL's at 7 meters from the unit were obtained from the manufacturer's specification sheet which is provided in Appendix B. The generator is expected to only be operated for a 5-minute test cycle monthly during daytime hours unless there is an emergency situation. Calculations using hemispherical spreading were performed to predict noise levels from this unit at the North property line. The results of this calculation for the overall SPL in dB(A) as well as the SPL for the individual octave bands in unweighted dB is presented in Table 3 along with the Town of Medway noise limits. As can be seen, the calculated noise levels at the property line when the backup generator is in operation exceed both the daytime and nighttime limits without the barrier. The barrier prediction is shown in Figure 4. With the barrier in place, noise levels meet the daytime overall noise level, but there are two octave bands that are slightly above the limits. However, neither the overall nor octave band nighttime limits are met at this property line.

		Generac G9.0L SG/MG130 with Level 1 Sound Attenuated Enclosure Q=2 for hemispherical Spreading					With Barrier		Town of Medway Environmental Standards			
Hz	A-wt	Sound Power Levels (Lw)	Sound Pressure Level at 7 meters		Equivalent Sound Pressure Levels at 68 feet		Equivalent Sound Pressure Levels at 68 feet		Daytime Limits (7 am to 9 PM)		Nighttime Limits (7 am to 9 PM)	
Octave	Filters	dB	dB	dB(A)	dB	dB(A)	dB	dB(A)	dB	dB(A)	dB	dB(A)
63	-26	113	88	62	79	53	69	43	72	46	55	29
125	-16	108	83	67	74	58	63	47	60	44	48	32
250	-9	101	77	68	67	59	54	45	53	44	42	33
500	-3	93	68	65	59	56	43	40	47	44	39	36
1000	0	90	65	65	56	56	38	38	43	43	36	36
2000	1	83	58	59	48	50	28	29	40	41	33	34
4000	1	77	52	53	43	44	19	20	37	38	30	31
8000	-1	74	49	48	40	39	15	14	33	32	27	26
OA		115	90	73	80	64	70	51	72	52	56	42

Table 3: Predicted noise levels from backup generator at nearest property line

Since the backup generator was above limits at the North property line, a calculation was performed at the South property line near Jayer Road. In this calculation, shown in Table 4, the building acts as a barrier and the distance from the generator is 120 feet. As can be seen, the daytime noise levels are met, however the overall level is slightly above the nighttime limits and the lower three octave bands are also above the nighttime limits. However, again, it is not expected that the generator will be operating at night except during an emergency situation.

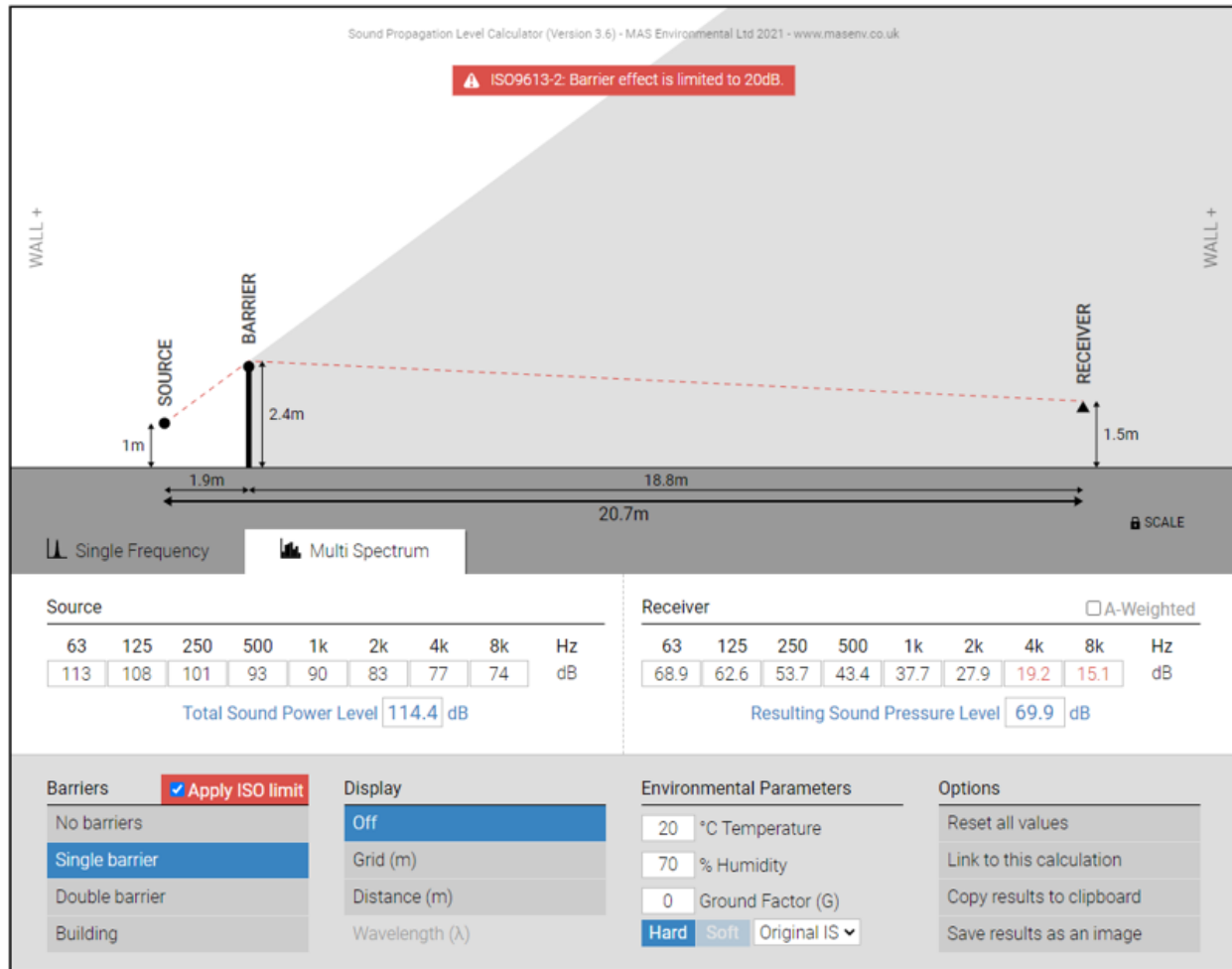


Figure 3. Barrier calculation for generator with eight-foot barrier

		Generac G9.0L SG/MG130 with Level 1 Sound Attenuated Enclosure			Opposite Side of Building		Town of Medway Environmental Standards			
Hz	A-wt	Sound Power Levels (Lw)	Sound Pressure Level at 7 meters		Predicted Sound Pressure Levels at 120 feet		Daytime Limits (7 am to 9 PM)		Nighttime Limits (7 am to 9 PM)	
Octave	Filters	dB	dB	dB(A)	dB	dB(A)	dB	dB(A)	dB	dB(A)
63	-26	113	88	62	63	37	72	46	55	29
125	-16	108	83	67	56	40	60	44	48	32
250	-9	101	77	68	46	37	53	44	42	33
500	-3	93	68	65	35	32	47	44	39	36
1000	0	90	65	65	31	31	43	43	36	36
2000	1	83	58	59	23	24	40	41	33	34
4000	1	77	52	53	17	18	37	38	30	31
8000	-1	74	49	48	12	11	33	32	27	26
OA		115	90	73	64	44	72	52	56	42

Table 4: Predicted noise levels from backup generator at Jayar Road property line

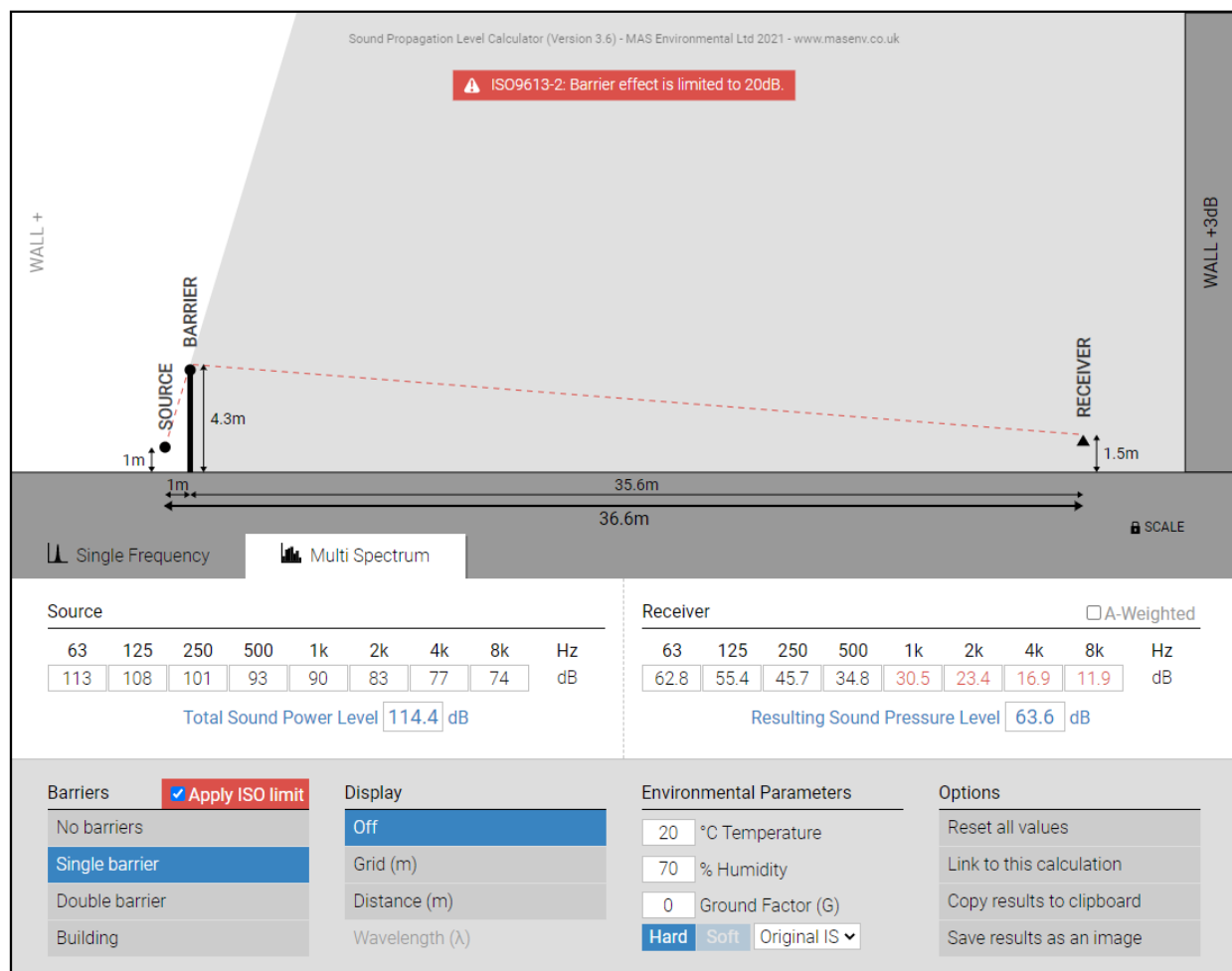


Figure 4. Barrier calculation for backup generator at Jayar Road

Appendix A: Specifications for Whaley SA5-3-2P30T Packaged Air Chiller

BUDGETARY QUOTATION

QUOTATION#: NRE2110481.00

REFERENCE: CONTROL POINT 2 15 BBL BBTFINAL661

CLIENT: CONTROL POINT

PROSPERO

#	DESCRIPTION
5	<p>WHA-SA532P30TU0 \$11,350.00</p> <p>SA5-3-2P30T - PACKAGED AIR COOLED CHILLER</p> <p>STANDARD FEATURES</p> <p>High Efficient R-410A Refrigerant</p> <p>Copeland Scroll compressor(s)</p> <p>Insulated stainless steel copper-brazed plate evaporator(s) (others available)</p> <p>Cast iron end suction centrifugal supply pump rated at 2.4gpm per ton at 100 TDH (stainless available)</p> <p>Insulated polypropylene reservoir with fill port and liquid level sight glass (larger volumes available)</p> <p>Thermostatic expansion valve, filter drier, sight glass installed on refrigerant circuit(s)</p> <p>Service ports and valves</p> <p>NEMA 4 control panel with digital temperature controller</p> <p>High and low pressure safety</p> <p>Single point power connection</p> <p>Direct drive fan(s) made to run slower and more quiet</p> <p>Vertical air discharge fans minimizes operating sound</p> <p>Weather resistant fan motor made to survive in the elements.</p> <p>Highly efficient coil provides excellent heat transfer and low air resistance</p> <p>Energy Star qualified unit</p> <p>Assembled, plumbed, and wired on industrial epoxy-coated steel frame</p> <p>Refrigerant circuit(s) pressure tested for leaks with nitrogen charge</p> <p>Refrigerant circuit(s) vacuum tested for leaks to negative-psi pressure</p> <p>Refrigerant circuit(s) fully charged with refrigerant</p> <p>Hydronic circulation loop leak tested under full flow using the WHALE-SOFT™ Testing Platform</p> <p>Complete systems fully run tested under heat load using the WHALE-SOFT™ Testing Platform</p> <p>COOLING PERFORMANCE AT 50F GLYCOL / 95F AMB / 0% GLYCOL <u>Nominal Tons: 5 Tons</u> KW: 17.55 BTU/hr: 60000</p> <p>COOLING PERFORMANCE AT 25F GLYCOL / 95F AMB / 50% GLYCOL <u>Nominal Tons: 2.46 Tons</u> KW: 9.02</p>



sample image only

BUDGETARY QUOTATION

QUOTATION#: NRE2110481.00

REFERENCE: CONTROL POINT 2 15 BBL BBTFINAL661

CLIENT: CONTROL POINT

PROSPERO

#	DESCRIPTION
	BTU/hr: 29460 REFRIGERATION CIRCUIT DETAILS: Compressor QTY: 1 Configuration: Single circuit PUMP AND TANK DETAILS Supply Pump Flow & Pressure: 12gpm @ 100tdh (43psi) <u>Tank Volume: 30 gallon</u> CONNECTIONS Inlet/Outlet: 1.0" FNPT PHYSICAL DATA Length: 40" Width: 40" Height: 67.25" ELECTRICAL SPECIFICATIONS Voltage: 208-240v/3ph/60hz UNIT FLA: 23.5 UNIT MCA: 29.375 UNIT MOCP: 30.0 F.O.B. Burkburnett, TX

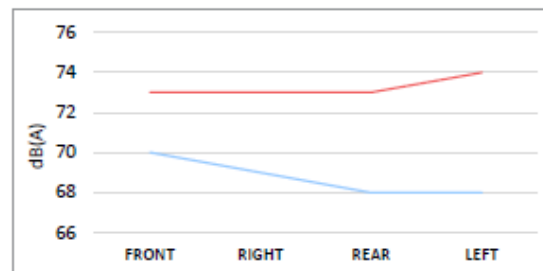
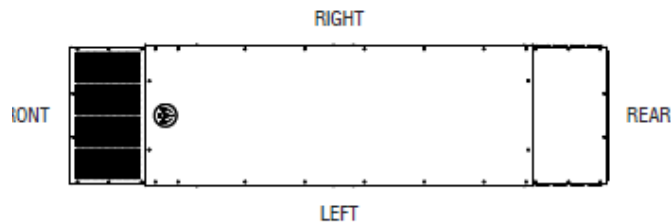
Unit	Octave Band Linear Sound Power Levels dB, re 10 ⁻¹² Watts Center Frequency - HZ						
Model No.	125	250	500	1000	2000	4000	8000
SA3 PACKAGED	73.5	75.0	74.0	72.5	67.5	62.5	56.5
SA4 PACKAGED	76.5	74.0	73.5	73.5	70.0	62.5	58.5
SA5 PACKAGED	76.5	77.5	77.5	73.5	69.0	63.5	60.5

Appendix B: Specifications for Generac G9.0L SG/MG130 with Level 1 Sound Enclosure

LEVEL 1 SOUND ATTENUATED ENCLOSURE G9.0L Generac, SG/MG130

60Hz NO-LOAD, dB(A)										DISTANCE: 7 METERS
MICROPHONE LOCATION	OCTAVE BAND CENTER FREQUENCY (Hz)									
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	dB(A)
FRONT	37	53	57	62	66	66	59	52	45	70
RIGHT	38	55	59	63	63	64	57	52	45	69
REAR	39	58	64	59	61	64	52	47	42	68
LEFT	39	55	61	63	63	61	56	51	45	68
AVERAGE	38	55	60	62	63	64	56	50	44	69

60Hz FULL-LOAD, dB(A)										DISTANCE: 7 METERS
MICROPHONE LOCATION	OCTAVE BAND CENTER FREQUENCY (Hz)									
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	dB(A)
FRONT	35	61	63	67	66	70	60	55	48	73
RIGHT	36	59	65	71	66	62	60	54	50	73
REAR	37	66	71	66	62	64	54	48	44	73
LEFT	36	63	69	69	67	63	61	53	49	74
AVERAGE	36	62	67	68	65	65	59	53	48	73



- All positions at 23 feet (7 meters) from side faces of generator set.
- Test conducted on a 100 foot diameter asphalt surface.
- Sound pressure levels are subject to instrumentation, installation and testing conditions.
- Sound levels are ± 2 dB(A).

Table 2: Sound pressure levels at 1 meter from manufacturer's specification sheet

		Mitsubishi MXZ-8C48NAHZ2						Town of Medway Environmental Standards			
Hz	A-wt	Sound Pressure Level at 1 meter		Equivalent Sound Pressure Levels at 120 feet		Equivalent Sound Pressure Levels at 80 feet		Daytime Limits (7 am to 9 PM)		Nighttime Limits (7 am to 9 PM)	
Octave	Filters	dB	dB(A)	dB	dB(A)	dB	dB(A)	dB	dB(A)	dB	dB(A)
63	-26	65	39	37	11	40	14	72	46	55	29
125	-16	56	40	28	12	31	15	60	44	48	32
250	-9	55	46	27	18	30	22	53	44	42	33
500	-3	53	50	25	22	28	25	47	44	39	36
1000	0	48	48	20	20	23	23	43	43	36	36
2000	1	43	44	15	16	18	19	40	41	33	34
4000	1	39	40	11	12	14	15	37	38	30	31
8000	-1	33	32	5	4	8	7	33	32	27	26
OA		66	54	38	26	41	29	72	52	56	42

Table 3: Predicted noise levels from rooftop HVAC equipment at nearest property lines