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Title V Air Permit
Consolidated Engineering Report
for
UMR, SSLP and KB4 Emission Units

Prepared For

UMR Boards Production LLC Facility
Plattsburgh NY

Contact: Terry Beyer
194 Pleasant Ridge Road
Plattsburgh, NY 12901
518-324-3416

Prepared by:

Contact: Paul M. Adel, PE
58 Church Street, Suite 200
Saratoga Springs, NY 12866
Phone: 518.584.8661

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1.0 INTRODUCTION

On behalf of UMR Boards Production LLC, CLA Site is submitting supplemental material to complete and consolidate the Title V Air Permit Application for the existing and proposed processes at the Schluter facilities in Plattsburgh, New York. The application forms are included with the submission of this report. A schematic outline of the emission units, processes, and emission points is included in Appendix A for reference.

The information and evaluation in this report amends previously submitted application materials for the existing UMR Board Productions, LLC (UMR) and Schluter Systems LP (SSLP) emission units and presents revised facility emission summaries that include emissions from the proposed Kerdi-Board Line 4 (KB4) facility. As noted in the earlier submission, the purpose of the proposed KB4 facility is to replace the processes in the SSLP emission unit with processes that will have lower volatile organic compound (VOC) emissions.

For the purposes of this Engineering Report and application forms, the SSLP emission unit label refers to the existing Kerdi-Board production area and is retained to be consistent with previous submittals. The existing Kerdi-Board production operations in the SSLP emission unit are generally referred to as KB3 in order to distinguish them from the proposed KB4 Kerdi-Board production operations. The KB4 facility (or KB4 emission unit) will be operated by Schluter Systems LP and Schluter Systems LP will be responsible for emissions from the KB4 emission unit for compliance purposes.

A site plan and building layout of the proposed facilities are attached as Appendix B.

2.0 BACKGROUND

This report consolidates and supplements information submitted previously to the New York State Department of Environmental Conservation (DEC) for the purposes of permitting the existing and proposed facilities in Plattsburgh. The following documents have been previously submitted.

<u>UMR and SSLP Title V Air Permit Application</u>

The following materials have been submitted in support of the Title V Air Permit Application for UMR and SSLP:

- UMR/SSLP Title V Engineering Report - June 2023 (submitted with Title V Air Permit Application)
- Response to Comments – September 2023 (including revised application Forms and calculations)
- UMR/SSLP New Source Review Evaluation – March 2024 (including revised analysis and emissions summaries), and
- SSLP VOC PTE Revision Report, Addendum to the Engineering Report – March 2024, submitted

as an attachment to the New Source Review Evaluation.

These documents and associated attachments are incorporated into this submittal by reference.

KB4 Registration Application

Considered separately, the emission levels anticipated from the KB4 facility would require an Air State Facility Registration from DEC. For this reason, the following material was submitted to support an application for an air state facility registration for KB4:

- KB4 Technical Report and Registration Application – April 2024 (letter report, calculations, the technical report and application are incorporated into this submittal by reference.

The KB4 Technical Report and associated attachments are incorporated into this submittal by reference.

This report includes revised consolidated emissions calculations in Appendix C, and dispersion modeling results in Appendix D.

3.0 FACILITY EMISSION UNIT DESCRIPTIONS

The Title V Air Permit Application maintains the structure outlined in the original Title V Engineering report with separate emission units for UMR, SSLP and combustion. The proposed KB4 facility has been incorporated as a fourth emission unit, as illustrated in the schematic outline of the emission units, processes, and emission points in Appendix A.

3.1 KB4 Emission Unit

Upon commissioning of the proposed KB4 emission unit production of Kerdi-Board will begin transitioning from the SSLP emission unit to the KB4 emission unit. The SSLP and KB4 emission units will jointly produce the projected production volume during the transition. The KB4 emission unit includes equipment for extruding the extruded polystyrene (XPS) foam core for the Kerdi-Board from polystyrene resin as well as the laminating and board finishing processes. As a result, the applicant will rely less on and eventually eliminate the use of XPS foam rolls provided by a third-party manufacturer. The rolled foam contains volatile organic compound (VOC) blowing agents consisting of butane and propane which is released to the ambient environment during the aging process before it is placed on the SSLP laminating line. For the proposed KB4 process the XPS resin is a solid at room temperature. The extrusion equipment heats the resin to a liquid state. Metered quantities of carbon dioxide, hydrofluoroolefin and dimethyl ether are injected into the liquid resin as blowing agents inside the extrusion equipment. Dimethly ether is a VOC (CAS# 00115-10-6). The weight percent of the dimethyl ether in the liquid resin formulation is expected to be 0.2%, compared to the combined butane and propane weight percent in the rolled foam XPS of 2.9%. With the lower VOC content of the KB4 process the annualized use of VOC is greatly reduced, resulting in lower potential to emit

(PTE) and lower actual annual emissions of VOC. A material safety data sheet for the XPS resin and the hydrofluoroolefin and dimethyl ether blowing agents are attached in Appendix E of this report.

Once the foam core has been extruded, the subsequent KB4 board laminating and board finishing processes are essentially the same as the those described in the original Title V Engineering Report. The laminating process will continue to use 4,4-methylene diphenyl diisocyanate (MDI), CAS# 101-68-8, to bond the face sheets to the foam core. MDI is on the Federal Hazardous Air Pollutants (HAP) list and listed as a high toxicity air contaminate in Table 2 of section 212-2.2 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6NYCRR). The KB4 application rate of the MDI on a per-square meter of board basis is not significantly different from the application rate on the existing SSLP laminating line. The difference is accounted for with conservative assumptions in the emissions calculations. The resulting annual emissions of MDI will continue to be a fraction of the allowable limit of 100 pounds per year. The method of calculating MDI emissions is described in detail in the SSLP VOC PTE Revision Report (March 2024) Addendum to the Title V Engineering Report. With the increased adhesive application rate the MDI PTE emissions of the KB4 emission unit will be 8.1 pounds per year, compared to the MDI PTE emissions of 1.8 pounds per year for the SSLP laminating line. In the emission summaries in Section 5 below, MDI is included in the Total HAP quantification.

3.2 UMR Emission Unit

The description of the processes and materials used in the UMR emission unit remains unchanged from the description provided in the original Title V Engineering Report. As noted in the original application, UMR has proposed installing an eighth molding press. The addition of the molding press increases the production capacity of the UMR emission unit as discussed in the original Title V Engineering Report.

3.3 SSLP Emission Unit

The description of the processes and materials used in the SSLP emission unit remains unchanged from the description provided in the original Title V Engineering Report except for the addition of the nuisance odor control hood and the associated emission point which were described as proposed features in the original Title V Engineering Report and application forms.

SSLP and UMR are in the process of acquiring and installing a regenerative thermal oxidizer (RTO) to control VOC emissions from the UMR and SSLP emission units. The processes that will be controlled by the RTO and the control device efficiency were described in the original Title V Engineering Report. This application seeks a permit condition requiring operation of the RTO to control VOC emissions continuously (when production processes are in operation and when raw material is present in the controlled storage areas). Taking this enforceable condition in the permit into account, the PTE of controlled processes have been calculated with the control efficiency specified by the RTO manufacturer. The RTO mechanical specifications were

included in the original Title V Engineering Report.

Updated actual and estimated future raw material use in the UMR and Kerdi-Board production areas have been incorporated into the revised VOC and MDI emissions calculations for 2022, 2023 and the assumed transition year 2027. In the emission summaries in Section 5 below, MDI is included in the Total HAP quantification. PTE raw material use in the UMR and SSLP emission units remain the same as the volumes used in the original engineering report.

3.4 Combustion Emission Unit

Updated actual and PTE fuel use have been incorporated into the combustion emissions calculations. The revisions include using high heat values that are consistent with the values DEC dictates for greenhouse gas emissions analysis, as well as the inclusion of a water heater and space heaters in the UMR and SSLP production areas that were not included in the original report. The emissions calculations included with this report include HAP emissions from natural gas combustion that were not included in the original Title V Engineering Report.

There are no combustion units required for the KB4 production process. The KB4 facility will be heated by a combination of geothermal and electric heat pumps but will have backup boilers that will be used to support the heating system on extreme cold days and in the event of a power outage. The KB4 facility will also have emergency power generators to provide backup power in the event of a power outage. The KB4 backup boilers and generators have been incorporated into the combustion emission unit established in the original Title V Air Permit Application, which includes the UMR process heat boiler, the SSLP hot oil heater, the RTO, and all exempt (less than 10 mmBTU) utility heat and backup boilers, emergency generators and fire pump engines burning natural gas or diesel fuel. The combustion emission unit emissions also include emissions from exempt space heaters in the UMR and SSLP production areas.

The KB4 exempt combustion sources include eight (8) backup natural gas fired boilers (Cleaver Brooks CFLC boilers) each with a heat rating of 8 mmBTU/hr. The facility anticipates the need for seven (7) backup boilers and plan the eighth for redundancy. The facility anticipates the need for five (5) emergency backup diesel generators. Manufacturer's specifications for the boilers and the proposed emergency generators listed below are attached in Appendix F of this report.

- Generac MD1000 1000 kW (1 unit)
- Generac MD1250 1250 kW (2 units)
- Generac MD2000 2000 kW (2 units)

The application seeks a permit condition to limit the operation of all emergency generators and fire pump engines to a maximum of 100 hours per year. Taking this enforceable condition in the permit into account, the PTE of all of the existing and proposed emergency generators and fire pumps in the UMR, SSLP, KB4, R&D and Thin Set facilities, have been calculated on the basis of 100 annual hours of operation.

The emissions summaries in this report include propane combustion emissions from forklift operations that are considered mobile sources for purposes of the CLCPA analysis provided separately. These emissions account for small differences between the facility emissions summaries in this report and corresponding summaries in the CLCPA report.

Exempt boilers and associated emission points are illustrated on the permit outline schematic in Appendix A. These sources and emission points are not included on the application forms because they are exempt, but are shown on the schematic and the facility layout to assist with facility inspections.

3.5 Finished Goods Warehousing

Finished goods warehousing was included as a process in the UMR and SSLP emission units in the original application. These processes remain in the current application, and emissions from UMR and SSLP products continue to be calculated for VOC off-gassing in the warehouse to the residual VOC content end point as discussed in the original Engineering Report. Finished goods warehousing in the KB4 facility is shown on the permit outline schematic for consistency but is not included as a process in the permit application because 100% of the VOC content in the raw materials used in KB4 are assumed to be lost as fugitive emissions before the finished goods reach the KB4 finished goods storage area. VOC emissions from the KB4 emission unit include residual VOC that may remain in the product following shipment. As such the VOC emissions associated with Kerdi-Board production are conservatively estimated for the proposed KB4 emission unit, but still result in lower overall emissions compared to the existing SSLP emission unit.

3.6 Exempt Activities

The Research and Development (R&D) activity and Thin Set Cement (Thin Set) manufacturing operation are exempt processes that remain as described in the original Title V Engineering Report. The R&D and Thin Set operations each have one emergency backup power generator with exempt combustion emissions, and the Thin Set operation generates exempt particulate emissions.

Exempt and trivial activities are unchanged from the original Engineering Report except for the addition of the exempt boilers and emergency generators in the KB4 emission unit.

4.0 APPLICABLE REGULATIONS

Applicable regulations for UMR and SSLP are described in the original Title V Engineering Report. The KB4 emission unit will have the similar laminating and board finishing processes as the SSLP emission unit. The XPS extruder is the only process that does not have a corresponding process already operating in the SSLP emission unit. The addition of the extruding process does not result in the facility being subject to any new regulations that were not already identified as applicable in the original Title V Air

Permit Application.

Federal regulations in Subpart IIII of Title 40 of the Code of Federal Regulations (40 CFR 60 Subpart IIII) apply to the proposed KB4 emergency generator diesel compression ignition engines as well as the existing compression ignition emergency diesel generator and fire pump engines installed at various locations in the facility. The existing spark ignition natural gas emergency generators installed at various locations in the facility are subject to 40 CFR 60 Subpart JJJJ. The applicable requirements are addressed in Section 10 and the Consolidated Compliance Strategy attached in Appendix G.

The greenhouse gas emissions evaluation (reported separately) has been revised to include the new KB4 combustion emission sources. The Environmental Justice evaluation has been revised to reflect mobile source emissions that are proportional to projected production growth.

5.0 CONSOLIDATED FACILITY EMISSIONS SUMMARY

UMR and SSLP process emissions calculations follow essentially the same approach used in the original Title V Engineering Report. The SSLP VOC PTE Revision Report provided revised calculations of the VOC PTE and actual emissions estimates for the SSLP emission unit using stack and ambient VOC and MDI measurements made in September 2023, after the original Title V Air Permit Application was submitted and after installation of the nuisance odor control hood at the adhesive application section of the SSLP laminating line. The stack and ambient test reports by KAS Environmental and Science Engineering and Alliance Technical Group were previously submitted to the DEC with the SSLP VOC PTE Revision Report (March 2024).

The PTE Revision Report analysis showed that VOC PTE and actual emissions are lower than the levels reported in the original Title V Engineering Report. The consolidated facility emissions summaries presented below utilize the revised calculations with the 2023 stack and ambient measurements for the 2023 and 2027 VOC actual and VOC PTE emissions from the SSLP emission unit. Since the nuisance odor hood was not in place in 2022, the 2022 VOC actual emissions from the SSLP emission unit tabulated below reflect VOC measurements made in 2021 with the calculation methodology from the original Title V Engineering Report.

As a baseline for comparison with actual facility emissions, the following table presents the VOC limit in the latest revision (2019) of the UMR Air State Facility Permit (ASFP) #5094200510 and the applicable PTE levels for criteria contaminants for the UMR facility. These PTE emissions include exempt emissions from the R&D and Thin Set activities that were in operation at the time of the 2019 permit update. The emissions from the exempt operations were not included with the original application for the UMR ASFP because exempt emissions are not subject to SFAP permitting. This summary presents emissions without the regenerative thermal oxidizer that is being implemented as a control for VOC from the UMR and SSLP emission units. The potential to emit is also predicated on the operation of seven molding presses that were permitted and that are presently operating in the UMR emission unit. This summary also includes process combustion emissions from the UMR boiler and emergency

backup boilers and generators that were already installed at the time of the 2019 permit update.

Table 1. UMR 2019 Permit Limit and PTE Emissions

Pollutants	UMR 2019 Permit Limit (tpy)	PTE UMR without RTO 7 Mold Press (tpy)
VOC	49.0	165.3
PM10/PM2.5	--	1.9
NOx	--	18.0
CO	--	12.36
SO2	--	0.4
Total HAPs	--	0.26
CO2	--	16513

(includes UMR, SSLP, R&D and Thin Set exempt combustion and Thin Set exempt particulate emissions)

The following table summarizes the facility actual emissions in 2022 and 2023 with simultaneous operation of UMR and SSLP emission units without the RTO and with seven molding presses, with comparison to the UMR emission limit and criteria pollutants PTE:

Table 2. UMR + SSLP 2022 and 2023 Actual Emissions

Pollutants	UMR 2019 Permit Limit (tpy)	PTE UMR without RTO 7 Mold Press (tpy)	Actual UMR + SSLP without RTO 2022 (tpy)	Actual UMR + SSLP without RTO 2023 (tpy)
VOC	49	165.3	104.4	98.7
PM10/PM2.5	--	1.9	1.0	1.1
NOx	--	18.0	2.4	2.6
CO	--	12.36	1.74	1.93
SO2	--	0.4	0.04	0.04
Total HAPs	--	0.26	0.04	0.04
CO2	--	16513	2411	2678

While the actual VOC emissions exceeded the permit limit the remaining pollutant emissions were well below the UMR PTE levels.

The following table summarizes the PTE emissions for the proposed facility, assuming RTO control of the UMR and SSLP emission unit processes and 8 molding presses. This is the PTE for the consolidated Title V Air Permit Application for UMR, SSLP and KB4, including combustion emissions and emissions from exempt processes:

Table 3. UMR + SSLP + KB4 PTE Emissions

Pollutants	PTE UMR + SSLP + KB4 with RTO 8 Mold Press (tpy)
VOC	132.0
PM10/PM2.5	14.6
NOx	44.3
CO	39.0
SO2	0.5
Total HAPs	0.79
CO2	51964

The application seeks an emissions limit on VOC of 132 tons per year.

The applicant anticipates that production of Kerdi-Board will begin transitioning from SSLP (KB3) to KB4 in late 2026 and into 2027. The applicant has provided a projection of anticipated Kerdi-Board production for the year 2027. The anticipated production volume is 1,615,612 boards of varying thicknesses requiring 2,417,788 kg of foam core material. The annual production volume will be jointly produced by the KB4 and SSLP emission units. As such, some of the foam core material will be derived from XPS foam rolls on the SSLP production line, and the rest will be produced on the KB4 production line. The exact duration of the transition is not known. As production in the KB4 emission unit increases, the production in the SSLP emission unit will decrease. Since the KB4 emission unit generates less VOC per kg of board produced, the worst-case scenario for the transition period would be to have the entire production volume produced in the SSLP emission unit. The combined VOC emissions for the SSLP and KB4 emission units during the transition cannot be greater than the emissions that would occur if the entire production volume is produced in the SSLP emission unit. As such, the following estimated actual emissions for 2027 are conservatively high under the assumptions stated. The applicant anticipates that the 2027 UMR shower tray production will use 1,891,518 kg of expanded polystyrene beads. The calculations for the 2027 emissions down to the process level are included in Appendix C of this report.

The actual facility emissions estimate summarized below assumes (1) control of the UMR and SSLP processes by the RTO; (2) includes combustion emissions from the UMR boiler and all of the

emergency backup boilers and generators installed in UMR, SSLP and KB4; and (3) includes emissions from the exempt R&D and Thin Set processes. The PTE emissions are included for comparison.

Table 4. 2027 Estimated Actual Emissions

Pollutants	PTE UMR + SSLP + KB4 with RTO 8 Mold Press (tpy)	Estimated Actual UMR + (SSLP + KB4) with RTO 2027 (tpy)
VOC	132.0	52.0
PM10/PM2.5	14.5	3.1
NOx	44.3	11.7
CO	39.0	8.3
SO2	0.5	0.06
Total HAPs	0.78	0.10
CO2	51965	7198

When production has been fully transferred to the KB4 emission unit, SSLP will cease operations and the laminating line in the SSLP emission unit will no longer be used to produce Kerdi-Board. The following summary compares the facility PTE described above including UMR, SSLP and KB4, with the facility PTE after SSLP has ceased operations.

Table 5. PTE Emissions With and Without SSLP

Pollutants	PTE UMR + SSLP + KB4 with RTO 8 Mold Press (tpy)	PTE UMR + KB4 with RTO 8 Mold Press (tpy)
VOC	132.0	85.3
PM10/PM2.5	14.5	11.94
NOx	44.3	44.0
CO	39.0	38.7
SO2	0.5	0.54
Total HAPs	0.78	0.78
CO2	51965	50801

Note that the application seeks the VOC limit in the first column above and the facility emissions summary in the application forms presents the PTE of the other criteria pollutants from the first column because it is anticipated that the Title V air permit will be issued before the SSLP emission unit ceases operations, and therefore for purposes of PTE the permit must assume that all of the emission units

could be operating simultaneously.

The following facility emissions summary presents the emissions associated with the same 2027 projected production volume used for the summary in Table 4, with all of the Kerdi-Board production manufactured by the KB4 emission unit. UMR processes will still be controlled by the RTO. The PTE of the combined facilities is provided for comparison.

Table 6. Title V Air Permit PTE and UMR + KB4 2027 Estimated Emissions

Pollutants	PTE UMR + SSLP + KB4 with RTO 8 Mold Press (tpy)	Estimated Actual UMR + KB4 with RTO 2027 (tpy)
VOC	132.0	30.2
PM10/PM2.5	14.6	3.1
NOx	44.3	11.7
CO	39.0	8.3
SO2	0.5	0.06
Total HAPs	0.79	0.10
CO2	51985	7198

This actual emissions summary includes KB4 emissions of 7.8 tons of VOC, compared to SSLP VOC emissions with RTO control of 29.4 tons for the same production volume. As described in the technical report for the KB4 registration application, the reduced VOC emissions are accomplished through the use of carbon dioxide in the blowing agent formulation. Since the VOC emissions from KB4 without control are less than 1/3rd of the corresponding emissions from SSLP with control, the transfer of Kerdi-Board production to KB4 achieves a substantial reduction of emissions without VOC controls. Justification for not applying VOC emissions controls on the KB4 emission unit will be discussed in the New Source Review evaluation that will be submitted under separate cover.

6.0 DISPERSION ANALYSIS

Dispersion analysis was conducted and documented in the original Title V Engineering Report for each of the regulated emission points in the UMR and SSLP emission units. Dispersion modeling has since been conducted for the proposed regulated emission points planned for construction in the KB4 emission unit.

Three emission points are evaluated as described below. These are the stacks for the planned KB4 laminating line dust handler, the UV printer module on the planned Kerdi-Board laminating line, and the planned nuisance odor control hood on the adhesive application section of the KB4 laminating

line. These points are analogous to the corresponding stacks in the SSLP emission unit. The following dispersion analysis benefits from the September 2023 ambient and stack testing noted above.

The dispersion modeling was performed using the AERSCREEN model. AERSCREEN is EPA's recommended screening level air quality based on AERMOD. Operationally, the AERSCREEN is AERMOD using the SCREEN option. The SCREEN option forces the model calculations to represent values for the plume centerline regardless of the sour-receptor-wind direction orientation, which leads to worst case estimates of impacts. AERSCREEN produces the highest 1-hour concentration and provides impacts for other averaging periods using scaling ratios including the annual average concentration.

The new KB4 emission unit stacks are expected to have similar if not the same dimensional and operating parameters as the stacks on the existing processing equipment in the SSLP emission unit. As such the dispersion models use the former parameters. Facility personnel provided estimates of the distance between the proposed stacks and the property line.

The VOC being emitted is dimethyl ether. Air Guide 1 (DAR-1) provides the short-term guideline concentrations (SGC) of 150,000 ug/m^3, the annual guideline concentrations (AGC) of 29,000 ug/m^3 and the toxicity code of L - low for dimethyl ether. The stack tests conducted on the SSLP stacks provided un-speciated VOC. As a very conservative approach, the SSLP stack VOC emission rates are being used for the KB4 modeling. This is a conservative approach because the process emissions of dimethyl ether from KB4 are expected to be substantially lower than the process VOC emissions from SSLP. The comparison is shown in the following table:

Table 7. Process VOC Emissions Comparison

	KB4 (tpy)	SSLP[1] (tpy)
PTE	19.3	123.1
Actual	7.6	45.6

1 - without RTO control

Note that the actual emissions shown for KB4 are for the projected Kerdi-Board production volume in the year 2027 while the SSLP emissions are for the lower actual Kerdi-Board production volume in the year 2023.

The following table presents the results of the AERSCREEN models for the proposed KB4 emission unit stacks. Stack parameters and the input and output files for each stack are attached in Appendix D.

Table 8. AERSCREEN Dispersion Modeling Results

Source	Emission Point	VOC Emission Rate lb/hr	Distance from Source Feet	Output Max 1-hr Concentr ug/m^3	Scaled Annual Concentr ug/m^3
KB4 Printer Module Stack	86	0.04	435	1.349	0.1349
KB4 Central Dust Handler	87	0.64	168	153.2	15.32
KB4 Odor Control Hood	88	0.067	500	6.495	0.6495
Worst Case - all sources simultaneous assuming all peaks at same distance from the facility				161.0	16.1
Air Guide 1 Guideline Concentrations				150,000	29,000

The combined maximum 1-hour concentration and the scaled annual concentration from the dispersion modeling are several orders of magnitude less than the guideline concentrations for dimethyl ether.

Since the overall combined VOC concentration under the very conservative assumptions given above does not exceed the SGC or AGC for dimethyl ether, the emission points comply with Part 212 process regulations, specifically meeting the requirements of Part 212-2.3 with respect to the degree of air cleaning required, i.e. guideline concentrations are not exceeded, and no air cleaning is required for these emission points.

7.0 NON-COMBUSTION PARTICULATE EMISSIONS

The discussion of non-combustion particulate emissions from the SSLP emission unit and exempt Thin Set operations were discussed in the original engineering report.

The KB4 emission unit adds non-combustion particulate emissions to the facility totals through the process of cutting extruded foam before and after laminating. These emissions and associated control devices were discussed in the Technical Report for the KB4 registration application. The revised application includes an emission point for the central dust handler that will control the cutting operations within the laminating line which will be either another ERBO unit or a unit that provides an equivalent level of dust control.

The cutting operations that occur prior to laminating occur in two separate phases. The extruded XPS foam is cut to a raw board dimension immediately after extrusion. These preliminary sized boards are placed in storage in the extrusion area until they are needed on the laminating line. Cutoff material and saw kerf dust are carefully captured, processed, and returned to the raw material storage silos for

re-use. This process includes an extensive dust handling system and an agglomerator that re-pelletizes the captured material. This process was described in the Technical Report and is included in the application and shown on the permit outline schematic under the Preliminary Sizing and Regranulation process. The dust handling equipment will include several cyclones and filters at points along the recycling process as well as final baghouse filters at the end of the process. In order to conserve energy while maintaining the temperature and humidity conditions inside the KB4 facility, these dust control devices will have internal exhaust points inside the building. As such, there are no emission points in the application for dust handling equipment in the board extrusion area. Particulate emissions were calculated for this process in the registration application Technical Report and the emissions are included in the facility emissions summaries in the form of fugitive dust emissions.

The second phase of board sizing occurs when the foam is brought out to the KB4 laminating line. The cutting and milling equipment used for the second phase of board sizing is included in the Preliminary Sizing and Regranulation process for purposes of emissions calculations, as described in the Technical Report. The dust generated by the second phase of board sizing is also captured and returned to the agglomerator recycling system, and is subject to the same controls described above. The second phase board sizing particulate emissions were also calculated in the Technical Report and the emissions are included with the emissions described above for the first phase of board sizing.

After the boards have been laminated there are further cutting and milling processes to produce the final dimensions of the finished products. This includes a cutting process inside the laminating line and subsequent milling and cutting operations for final dimensioning and assembly of subunits (niches, curbs and benches) as described in the original Engineering Report.

The cutting processes within the laminating line will be controlled by a central dust handling system, either the same as or similar to the ERBO system on the existing SSLP laminating line. This system will have an external exhaust vent that can be open or shut to conserve energy for the reasons noted above. Since it will be possible for this system to vent to the atmosphere an emission point is included in the application for the planned central dust handler, and the emissions calculations (and dispersion modeling) assume continuous discharge to the atmosphere.

The dust generated by the cutting and milling for final dimensioning and subunit assembly will be controlled by local dust management units that exhaust internally inside the KB4 building. The dust emissions associated with the locally controlled dust handlers are allocated to the overall particulate emissions summaries as fugitive emissions.

Since the particulate material generated by the first two phases of preliminary board sizing has value to the operator by offsetting the need for raw material, the capture and recycling is highly efficient. The KB4 laminating line central dust handler also has a very high capture and control efficiency. As a result the overall facility-wide non-combustion emissions combined with the combustion source particulate emissions are well below the major source threshold of 100 tons per year (14.6 tons PTE, 3.1 tons estimated actual 2027 emissions), and it is not necessary to impose an emission limit on the particulate emissions.

8.0 REGENERATIVE THERMAL OXIDIZER

The operation and emissions associated with the regenerative thermal oxidizer (RTO) were discussed in the original Engineering Report. There are no changes to the operative assumptions or the control efficiency in the current emissions calculations.

9.0 EMISSION POINT EMISSION RATES

Emission rates for individual VOC emission points in the UMR and SSLP emission units were documented in the original Engineering Report and remain unchanged. That evaluation determined that the emission rates and the property line concentrations associated with emission points not connected to the RTO were below the levels that would require controls. The RTO emissions were also evaluated by dispersion modeling and it was shown that the combined emissions did not exceed the applicable guideline concentrations.

Emission rates for VOC emission points in the KB4 emission unit are described in the dispersion analysis of this report. As noted, the emission rates for the KB4 emission points are assumed to be the same as the rates from the corresponding SSLP emission points and were modeled with the SSLP emission rates even though the VOC emission rates in the KB4 processes can be expected to be much lower. With these assumptions, none of the emission points exceeds the 3 pounds per hour rate that would presumptively require control, and the resultant property line dispersion concentrations are many orders of magnitude below the guideline concentrations for the dimethyl ether VOC that will be used in the KB4 process.

The facility has elected to install an RTO to control VOC process emissions from processes in the UMR and SSLP emission units. The following VOC emission points will be ducted to the RTO:

- Roll Storage Area (presently fugitive emissions)
- Silo room bead off-gassing collected by the floor sweep hoods in the silo storage room (presently fugitive emissions)
- Pre-expander fluidized bed stack (Emission Point 50 (was EP 2))
- Pre-expander main vessel (Emission Point 2 (was EP 2.5))
- Pre-expander room air control vent (Emission Point 32)
- Molding press stacks (EPs 4 – 10)

The original Engineering Report showed that the RTO system will provide greater than 81% capture and control. As such, pursuant to Part 212-3.1(c)(4), these controlled emission points are presumptively equipped with reasonably available control technology.

The original Title V Engineering Report and the Technical Report for the KB4 registration application presented calculations showing that the particulate emission rates from the central dust handling units

in the SSLP and KB4 emission units were below the regulatory limit of 0.05 grains per dry standard cubic foot.

10.0 COMPLIANCE STRATEGY

With the addition of the KB4 emission unit to the facility, VOC remains the only pollutant emission that triggers Title V permitting.

The compliance strategy for the UMR and SSLP emission units was described in the original Engineering Report. Compliance assurance monitoring (CAM) regulatory guidance for the RTO was included in Appendix K of the Engineering Report. The Registration Technical Report included a compliance strategy plan for the KB4 processes. Specific compliance unit certifications and associated compliance activity descriptions are included in the application forms.

The facility will demonstrate compliance with the permit limit on total VOC emissions and other applicable emission standards. These include total MDI emissions, particulate grains per dry standard cubic foot, and opacity. The RTO must be operated within certain parameters to achieve the nominal destruction efficiency. These parameters will serve as surrogates to direct measurement of destruction efficiency. Both combustion and process particulate emission points are subject to opacity limits. The requirements are summarized as follows:

- VOC Limit – Permit Limit tons per year
- HAP (MDI) Limit – 100 pounds per year
- RTO Operation – temperature as surrogate parameter for destruction efficiency
- Particulate Emissions – 0.05 grains per dry standard cubic foot
- Opacity – 20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity.

A destruction efficiency test of the RTO will be conducted at commissioning if required by the DEC.

Compression ignition emergency generator and fire pump engines are subject to federal regulation 40 CFR 60 Subpart IIII. Spark ignition emergency generator engines are subject to federal regulation 40 CFR 60 Subpart JJJJ. The federal regulations impose operating hour limits, maintenance and operation requirements and recordkeeping for these engines. These engines will not be used for any purposes other than emergency backup power or fire control. The compliance requirements are described further in the consolidated compliance strategy attached to this report as Appendix G.

11.0 EMISSION TRACKING, RECORDKEEPING AND CERTIFICATION

The methods for tracking emissions in the UMR, SSLP and KB4 emission units will follow the calculation methods developed for estimating the actual emissions as described in the original Engineering Report, the Technical Report and the SSLP VOC PTE Revision Report. For each emission unit the emissions calculations rely on annual raw material use. Raw material use recordkeeping is included

in the facility compliance strategy. The estimated actual emissions calculations for all three emission units are consolidated in Appendix C of this report.

The material use tracking records, temperature monitoring and inspection records will be compiled and reported pursuant to 6NYCRR Part 202-2, will be certified annually pursuant to 6NYCRR Part 202-6.4(e) and will be submitted to DEC in accordance with the agency's standards for recordkeeping and reporting under Title V.

APPENDIX A

PERMIT OUTLINE SCHEMATIC

FIGURE 1. FACILITY PERMIT OUTLINE

August 14, 2024

FACILITY

UMR EMISSION UNIT
EPS PRODUCTS

- PROCESS
  SILO STORAGE
- PROCESS
  PRE-EXPANDER
- PROCESS
  MOLDING PRESS FORMING
- PROCESS
  MOLDING PRESS PURGE
- PROCESS
  DRYER
- PROCESS
  UMR FINISHED GOODS INVENTORY

EMISSION UNIT
COMBUSTION

- PROCESS
  NATURAL GAS COMBUSTION

SSLP EMISSION UNIT
XPS PRODUCTS

- PROCESS
  ROLL STORAGE
- PROCESS
  LAMINATING
- PROCESS
  CUTTING/PARTS ASSEMBLY
- PROCESS
  SSLP FINISHED GOODS INVENTORY

KB4 EMISSION UNIT
XPS PRODUCTS

- PROCESS
  EXTRUDING
- PROCESS
  PRELIMINARY SIZING & REGRANULATION
- PROCESS
  LAMINATING
- PROCESS
  CUTTING/PARTS ASSEMBLY

EXEMPT AND TRIVIAL ACTIVITIES

- THINSET OPERATION
  EXEMPT ACTIVITY No. 37
  CONTROLLED BATCH PLANT
- UV CURE PRINTING (SSLP)
  EXEMPT ACTIVITY No. 19
- LASER CUTTING (SSLP)
  TRIVIAL ACTIVITY No. 19
- EMERGENCY GENERATORS
  AND FIRE PUMPS
  EXEMPT ACTIVITY No. 6
- FORK LIFTS
  TRIVIAL ACTIVITY No. 10

FIGURE 2. UMR EMISSION UNIT PERMIT OUTLINE August 14, 2024

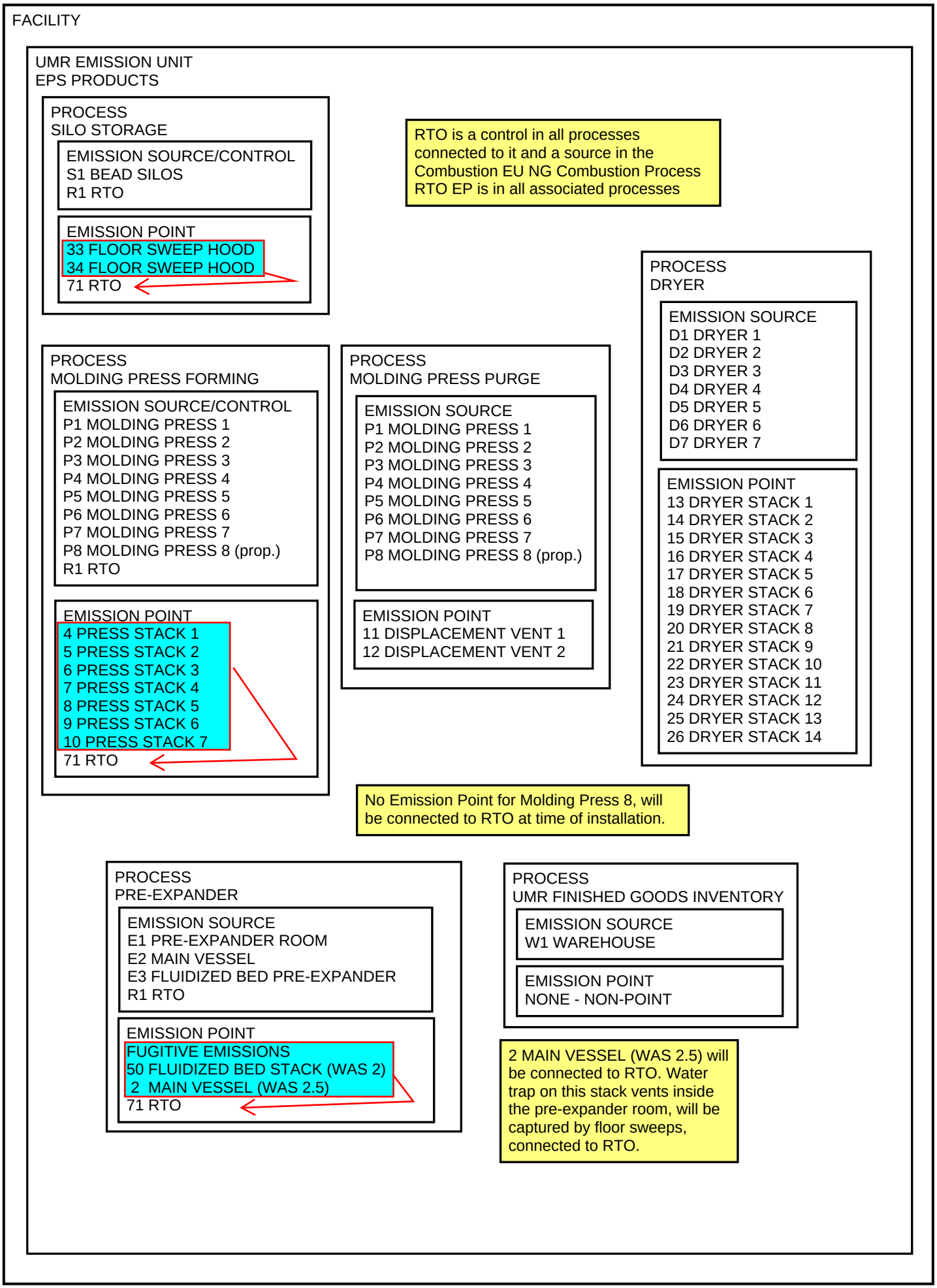


FIGURE 3. SSLP AND COMBUSTION EMISSION UNITS PERMIT OUTLINE August 14, 2024

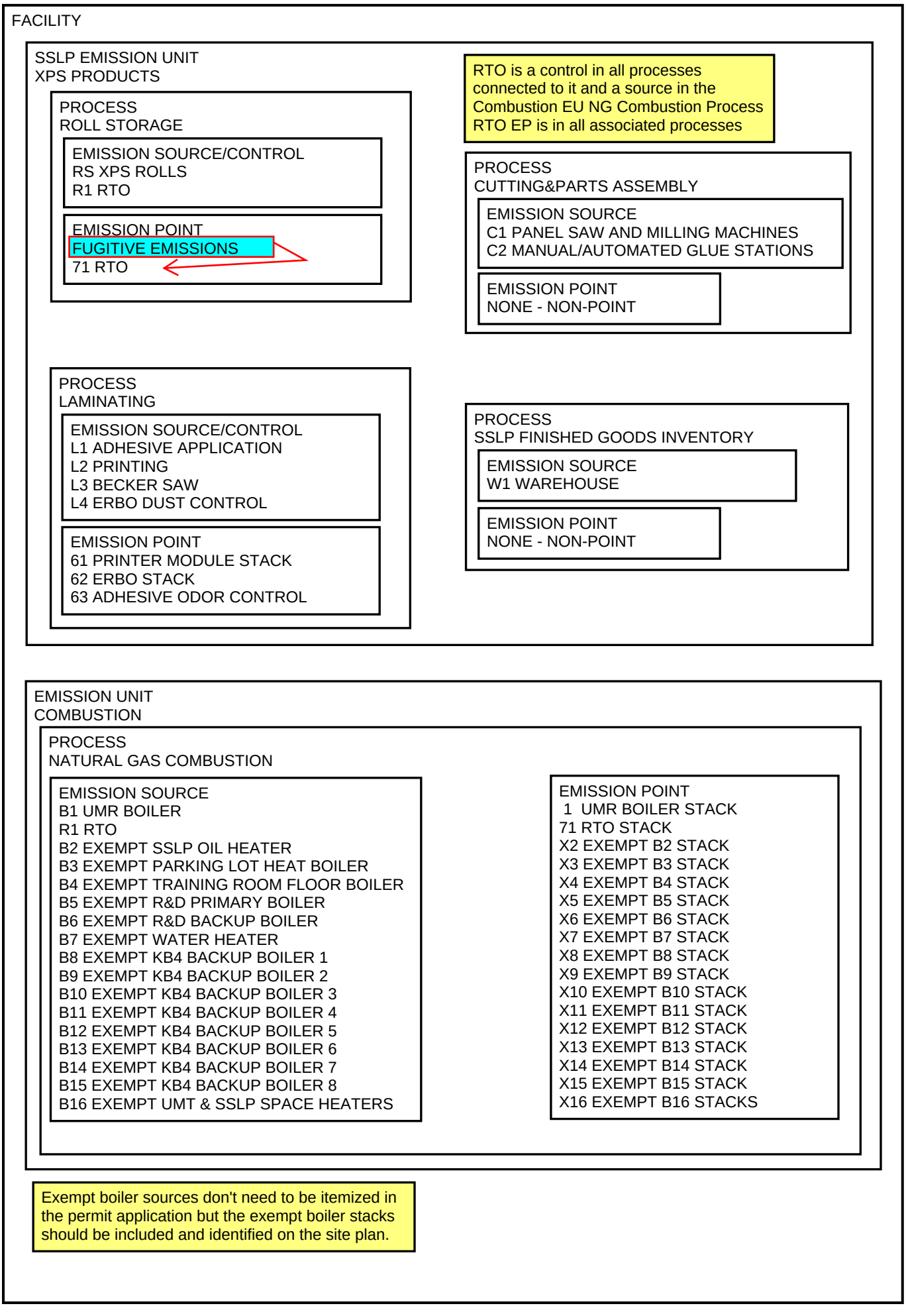
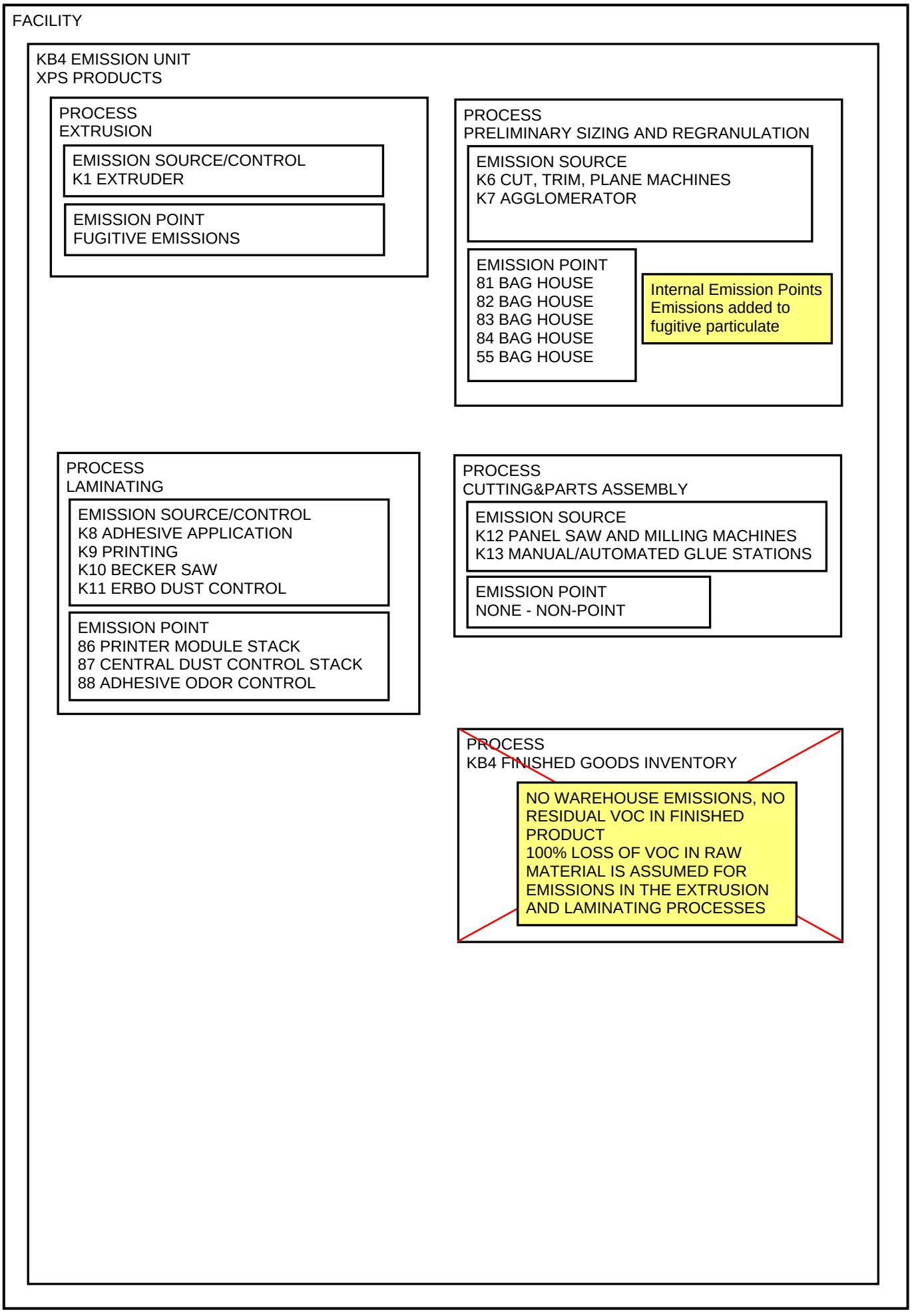


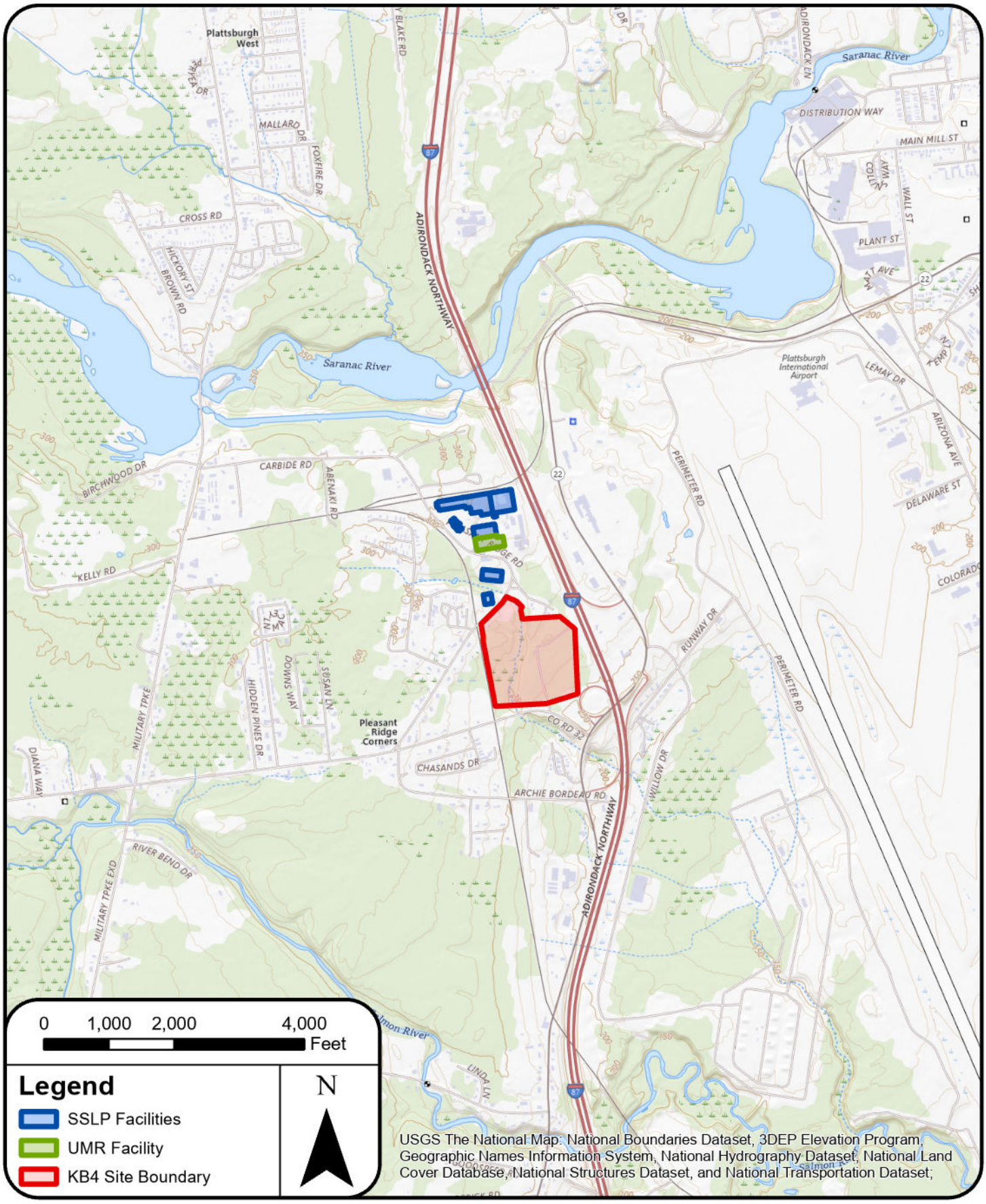
FIGURE 4. KB4 EMISSION UNIT PERMIT OUTLINE

August 14, 2024



APPENDIX B

SITE PLAN AND PLANT LAYOUT



19 British American Blvd. W, Latham NY 12110
P: 518-782-0882| F: 518-782-0973| JMT.com

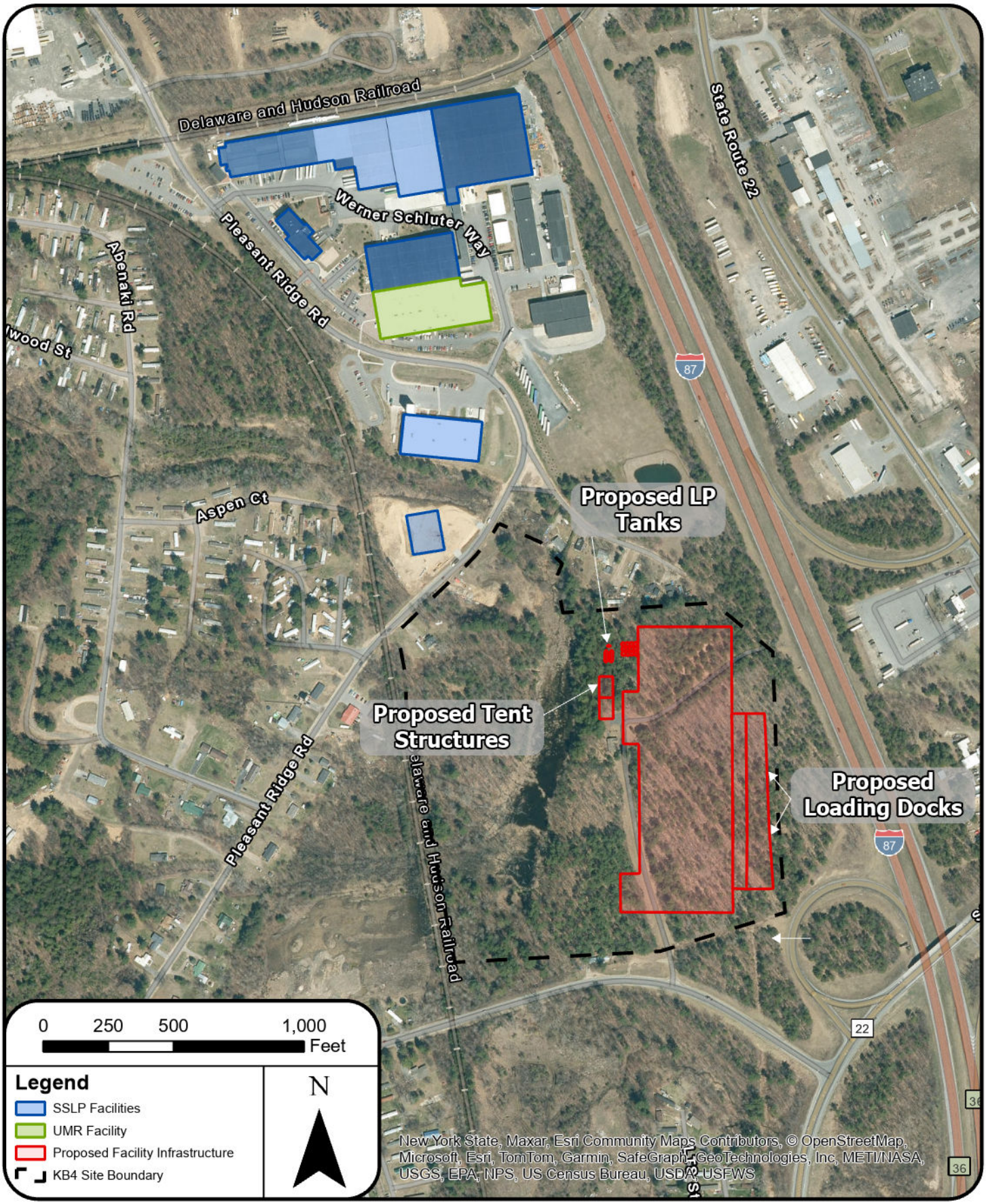
SITE LOCATION MAP

UMR BOARDS PRODUCTION, LLC

TITLE V PERMIT APPLICATION

TOWN OF PLATTSBURGH — CLINTON COUNTY, NY

PROJ. NO: 17-S0125N-001	DATE: 07/29/2024	SCALE: 1 IN = 2,000 FT	DWG NO. -	FIGURE: 1



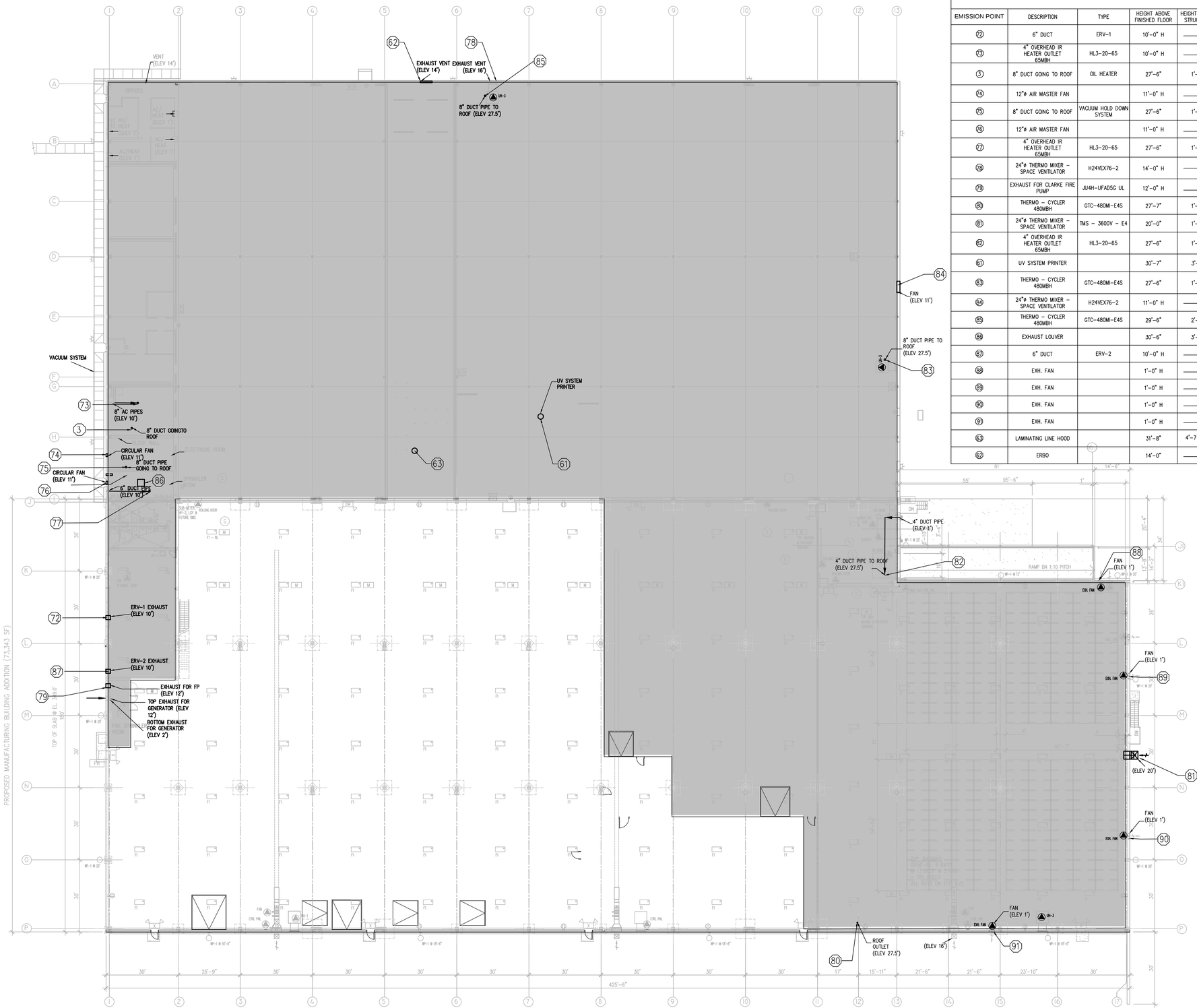
19 British American Blvd. W, Latham NY 12110
P: 518-782-0882| F: 518-782-0973| JMT.com

SITE PLAN MAP

UMR BOARDS PRODUCTION, LLC
TITLE V PERMIT APPLICATION

TOWN OF PLATTSBURGH — CLINTON COUNTY, NY

PROJ. NO: 17-S0125N-001	DATE: 07/29/2024	SCALE: 1 IN = 500 FT	DWG NO. -	FIGURE: 2



SCALE: NTS
UMS FLOOR PLAN

EMISSIONS TABLE												
EMISSION POINT	DESCRIPTION	TYPE	HEIGHT ABOVE FINISHED FLOOR	HEIGHT ABOVE STRUCTURE	SIZE	FLOW	VELOCITY	TEMPERATURE	DISTANCE TO PROPERTY LINE	PURPOSE	NYTM (N) (km)	NYTM (E) (km)
⑫	6" DUCT	ERV-1	10'-0" H	———	0'-6"	40 CFM	8 ft/s	95°F	34'-0"	AV	647.902	229.978
⑬	4" OVERHEAD IR HEATER OUTLET 65MBH	HL3-20-65	10'-0" H	———	0'-4"	43 CFM	8 ft/s	360°F	39'-0"	HEAT	647.929	229.978
③	8" DUCT GOING TO ROOF	OIL HEATER	27'-6"	1'-0"	0'-8"	50 CFM	2.4 ft/s	360°F	36'-0"	EX	647.926	229.978
⑭	12"ø AIR MASTER FAN		11'-0" H	———	1'-0"	500 CFM	9 ft/s	85°F	25'-0"	AV	647.922	229.975
⑮	8" DUCT GOING TO ROOF	VACUUM HOLD DOWN SYSTEM	27'-6"	1'-0"	0'-8"	500 CFM	24 ft/s	85°F	25'-0"	EX	647.921	229.978
⑯	12"ø AIR MASTER FAN		11'-0" H	———	1'-0"	500 CFM	41 ft/s	85°F	25'-0"	AV	647.919	229.975
⑰	4" OVERHEAD IR HEATER OUTLET 65MBH	HL3-20-65	27'-6"	1'-0"	0'-4"	43 CFM	8 ft/s	360°F	43'-0"	HEAT	647.918	229.981
⑱	24"ø THERMO MIXER - SPACE VENTILATOR	H24VEX76-2	14'-0" H	———	2'-0"	11,291 CFM	41 ft/s	85°F	25'-0"	AV	647.977	230.015
⑲	EXHAUST FOR CLARKE FIRE PUMP	JU4H-UFAD5G UL	12'-0" H	———	0'-4"	585 CFM	112 ft/s	180°F	39'-0"	SAFETY	647.893	229.980
⑳	THERMO - CYCLER 480MBH	GTC-480MI-E4S	27'-7"	1'-0"	0'-9"	125 CFM	6 ft/s	360°F	142'-0"	HEAT	647.879	230.079
㉑	24"ø THERMO MIXER - SPACE VENTILATOR	TMS - 3600V - E4	20'-0"	1'-0"	3'-4 1/2"	11,291 CFM	21 ft/s	85°F	37'-0"	EV	647.906	230.110
㉒	4" OVERHEAD IR HEATER OUTLET 65MBH	HL3-20-65	27'-6"	1'-0"	0'-4"	43 CFM	8 ft/s	360°F	130'-0"	HEAT	647.923	230.075
㉑	UV SYSTEM PRINTER		30'-7"	3'-1"	0'-8"	1,313.7 CFM	62.7 ft/s	126°F	206'-0"	PROCESS	647.936	230.028
㉓	THERMO - CYCLER 480MBH	GTC-480MI-E4S	27'-6"	1'-0"	0'-8"	125 CFM	6 ft/s	360°F	116'-0"	HEAT	647.950	230.070
㉔	24"ø THERMO MIXER - SPACE VENTILATOR	H24VEX76-2	11'-0" H	———	2'-0"	11,291 CFM	41 ft/s	85°F	98'-0"	AV	647.960	230.070
㉕	THERMO - CYCLER 480MBH	GTC-480MI-E4S	29'-6"	2'-0"	0'-8"	125 CFM	6 ft/s	360°F	86'-0"	HEAT	647.975	230.015
㉖	EXHAUST LOUVER		30'-6"	3'-0"	2.85'x2.85'	1000 CFM	2.4 FT/S	85°F	27'-0"	AV	647.919	229.980
㉗	6" DUCT	ERV-2	10'-0" H	———	0'-6"	40 CFM	8 ft/s	95°F	34'-0"	AV	647.895	229.980
㉘	EXH. FAN		1'-0" H	———	24"X24"	7,450 CFM	31 ft/s	75°F	49'-0"	EV	647.927	230.102
㉙	EXH. FAN		1'-0" H	———	24"X24"	7,450 CFM	31 ft/s	75°F	37'-0"	EV	647.916	230.107
㉚	EXH. FAN		1'-0" H	———	24"X24"	7,450 CFM	31 ft/s	75°F	37'-0"	EV	647.896	230.111
㉛	EXH. FAN		1'-0" H	———	24"X24"	7,450 CFM	31 ft/s	75°F	142'-0"	EV	647.881	230.096
⑭	LAMINATING LINE HOOD		31'-8"	4'-7 1/2"	2' ø	6,806 CFM	36.1 ft/s	72°F	153'-4"	PROCESS	647.929	230.013
⑫	ERBO		14'-0"	———	2'-0"	11,700 CFM	49.7 ft/s	85°F	25'-0"	PROCESS	647.976	230.007

NOTE:
ERV - ENERGY RECOVERY VENTILATOR
AV- ACTIVE VENTILATION
EV- EMERGENCY VENTILATION
H- HORIZONTAL DISCHARGE
EX- EXEMPT

MAGNETIC 2017

No.	Revision/Issue	Date
8	Updated Equip	6/07/23
7	Updated Equip	6/02/23
6	Updated Equip	5/16/23
5	Updated Equip	5/03/23
4	Updated Equip	8/26/22

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SOIL & MATERIAL TESTING
11 MacDONOUGH STREET, PLATTSBURGH, NY 12901
518.561.6145(PH) 518.561.2496 (FX)
RMSPC.COM

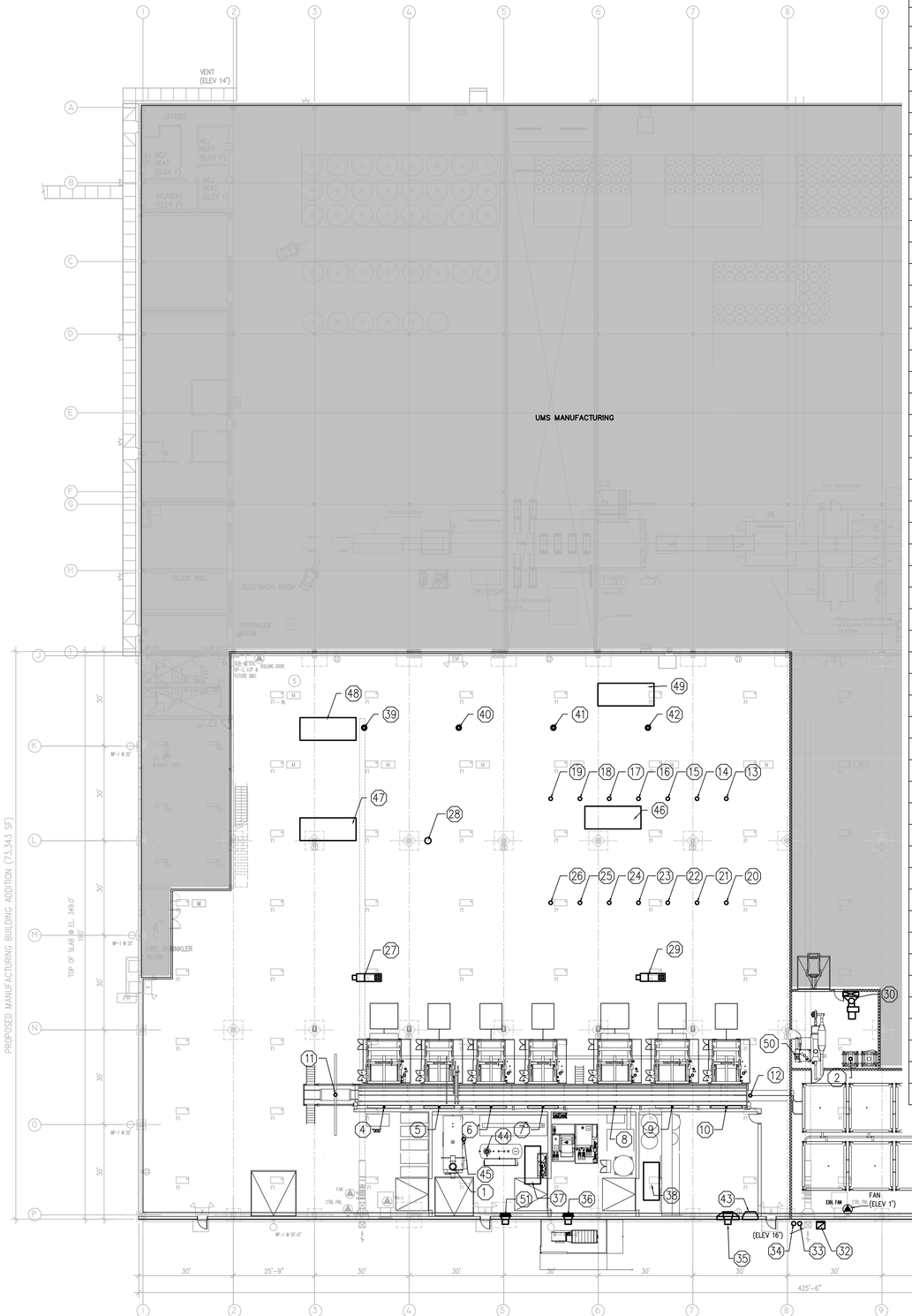
Project Name & Address

Map Showing Emissions points for SSLP Manufacturing

Town of Plattsburgh
Clinton County State of New York

Project # 22068	Sheet A-1A
Date 10/19/17	Floor Plans
Scale NTS	
Drawn LSC	Checked AJO

Aaron J. Ovios, P.E. NY LICENSE #077500



UMR FLOOR PLAN
SCALE: NTS

EMISSIONS TABLE												
EMISSION POINT	DESCRIPTION	TYPE	HEIGHT ABOVE FINISHED FLOOR	HEIGHT ABOVE STRUCTURE	SIZE	FLOW	VELOCITY	TEMPERATURE (°F)	DISTANCE TO PROPERTY LINE	PURPOSE	NYTM (N) (km)	NYTM (E) (km)
①	BOILER		40'-0"	10'-0"	1'-8"	2,241 CFM	17 ft/s	497	85.66 ft	PROCESS	647.873	230.0140
⑳	PRE EXPANDER FLUIDIZE BED		40'-0"	10'-0"	1'-3"	922 CFM	20 ft/s	160	168.01 ft	PROCESS	647.888	230.045
②	PRE EXPANDER MAIN VESSEL		40'-0"	10'-0"	0'-2 1/2"	.36 CFM	0.002 ft/s	80	156 Ft	PROCESS	647.889	230.050
㉛	EXHAUST FAN	GREENHECK MODEL SE1-16-428-A5	16' -0" H	———	18.5" X 18.5"	3000 CFM	22 ft/s	80	85.26 ft	AV	647.869	230.020
④	PRESS 1		30'-10"	2'-8 1/2"	0'-6"	40 CFM	24.9 ft/s	160	124.11 ft	PROCESS	647.877	230.006
⑤	PRESS 2		30'-11 1/2"	2'-10"	0'-6"	40 CFM	24.9 ft/s	160	129.53 ft	PROCESS	647.878	230.012
⑥	PRESS 3		30'-11 1/2"	2'-10"	0'-6"	40 CFM	24.9 ft/s	160	134.71 ft	PROCESS	647.879	230.017
⑦	PRESS 4		30'-11 1/2"	2'-10"	0'-6"	40 CFM	24.9 ft/s	160	139.90 ft	PROCESS	647.880	230.022
⑧	PRESS 5		30'-11 1/2"	2'-10"	0'-6"	40 CFM	24.9 ft/s	160	147.14 ft	PROCESS	647.881	230.028
⑨	PRESS 6		30'-11 1/2"	2'-10"	0'-6"	40 CFM	24.9 ft/s	160	147.86 ft	PROCESS	647.882	230.034
⑩	PRESS 7		30'-10 1/2"	2'-10"	0'-6"	40 CFM	24.9 ft/s	160	158.10 ft	PROCESS	647.883	230.039
⑪	MACHINE FILLING VENT A		31'-3 1/2"	3'-2"	1'-0"	154 CFM	3 ft/s	160	98.48 ft	PROCESS	647.878	230.002
⑫	MACHINE FILLING VENT B		31'-2 1/2"	3'-1"	1'-0"	154 CFM	3 ft/s	160	137.50 ft	PROCESS	647.884	230.041
⑬	DRYER 1		32'-4 1/2"	2'-3 1/2"	0'-6"	200 CFM	17 ft/s	150	170.98 ft	PROCESS	647.912	230.034
⑭	DRYER 2		32'-4 1/2"	2'-3 1/2"	0'-6"	200 CFM	17 ft/s	150	165.55 ft	PROCESS	647.911	230.031
⑮	DRYER 3		32'-4 1/2"	2'-3 1/2"	0'-6"	200 CFM	17 ft/s	150	159.83 ft	PROCESS	647.911	230.029
⑯	DRYER 4		32'-4 1/2"	2'-3 1/2"	0'-6"	200 CFM	17 ft/s	150	152.59 ft	PROCESS	647.911	230.026
⑰	DRYER 5		32'-4 1/2"	2'-3 1/2"	0'-6"	200 CFM	17 ft/s	150	147.41 ft	PROCESS	647.910	230.023
⑱	DRYER 6		32'-4 1/2"	2'-3 1/2"	0'-6"	200 CFM	17 ft/s	150	142.22 ft	PROCESS	647.910	230.020
⑲	DRYER 7		32'-4 1/2"	2'-3 1/2"	0'-6"	200 CFM	17 ft/s	150	156 ft	PROCESS	647.909	230.017
⑳	DRYER 8		31'-10"	2'-4"	0'-6"	200 CFM	17 ft/s	150	165.28 ft	PROCESS	647.902	230.036
㉑	DRYER 9		31'-10"	2'-4"	0'-6"	200 CFM	17 ft/s	150	174.57 ft	PROCESS	647.902	230.033
㉒	DRYER 10		31'-10"	2'-4"	0'-6"	200 CFM	17 ft/s	150	183.85 ft	PROCESS	647.901	230.030
㉓	DRYER 11		31'-10"	2'-4"	0'-6"	200 CFM	17 ft/s	150	193.13 ft	PROCESS	647.901	230.027
㉔	DRYER 12		31'-10"	2'-4"	0'-6"	200 CFM	17 ft/s	150	202.41 ft	PROCESS	647.900	230.025
㉕	DRYER 13		31'-10"	2'-4"	0'-6"	200 CFM	17 ft/s	150	211.96 ft	PROCESS	647.900	230.022
㉖	DRYER 14		31'-10"	2'-4"	0'-6"	200 CFM	17 ft/s	150	220.97 ft	PROCESS	647.899	230.019
㉗	ABSOLUTE AIR V4-HVM	MAKE UP AIR UNIT	35'-10"	4'-10"	48" X 16 3/4"	45 CFM	0.11 ft/s	180	100.14 ft	HEAT	647.889	230.004
㉘	24" LASER CUTTER		31'-0"	1'-0"	2'-0"	850 CFM	4.5 ft/s	80	117.0 ft	PROCESS	647.903	230.006
㉙	ABSOLUTE AIRE V4-HVM	MAKE UP AIR UNIT	35'-0"	4'-0"	48" X 163"	45 CFM	0.11 ft/s	180	160.98 ft	HEAT	647.894	230.031
㉚	EXHAUST FAN	GREENHECK MODEL CSW-12-B1-41-10-0-7	33'-3 1/2"	2'-3 1/2"	24" x 24"	1.880 CFM	4.7 ft/s	80	167.92 ft	EV	647.895	230.049
㉛	ROOFTOP DUCT FURNACE	ABSOLUTEAIRE MODEL 13 175	35'-0"	4'-0"	77" X 48"	53 CFM	0.13 ft/s	180	139.0 ft	HEAT	647.883	230.067
㉜	EXHAUST FAN	GREENHECK MODEL CSW-27-B1-41-10-0-50	8'-0" H	———	47" X 62"	10,500 CFM	47.2 ft/s	80	101.11 ft	EV	647.873	230.050
㉝	EXHAUST FAN	GREENHECK MODEL CW-099-VG	10'-0" H	———	24" X 22"	300 CFM	57.8 ft/s	80	100.1 ft	AV	647.873	230.048
㉞	EXHAUST FAN	GREENHECK MODEL CW-099-VG	10'-0" H	———	24" X 22"	300 CFM	57.8 ft/s	80	100.1 ft	AV	647.873	230.047
㉟	EXHAUST FAN	GREENHECK MODEL SE1-16-428-A5	16'-0" H	———	18 3/4" x 18 3/4"	3,000 CFM	22 ft/s	80	94.61 ft	AV	647.873	230.041
㊱	EXHAUST FAN	GREENHECK MODEL SE1-16-428-A5	16'-0" H	———	18 3/4" x 18 3/4"	3,000 CFM	22 ft/s	80	79.85 ft	AV	647.870	230.026
㊲	ROOF TOP UNIT	13-1-175-T-PO-HR	35'-0"	4'-0"	143" X 48"	36 CFM	2.8 ft/s	180	95.67 ft	HEAT	647.874	230.022
㊳	ROOF TOP UNIT	13-1-175-T-PO-HR	35'-0"	4'-0"	143" X 48"	42 CFM	2.4 ft/s	180	88.1 ft	HEAT	647.874	230.033
㊴	EXHAUST FAN	GREENHECK GB-240-15	35'-8"	4'-7 1/2"	24" X 24"	6,000 CFM	25 ft/s	80	95.5 ft	AV	647.913	229.999
㊵	EXHAUST FAN	GREENHECK GB-240-15	35'-8"	4'-7 1/2"	24" X 24"	6,000 CFM	25 ft/s	80	125.54 ft	AV	647.914	230.008
㊶	EXHAUST FAN	GREENHECK GB-240-15	35'-8"	4'-7 1/2"	24" X 24"	6,000 CFM	25 ft/s	80	155.54 ft	AV	647.916	230.0165
㊷	EXHAUST FAN	GREENHECK GB-240-15	35'-8"	4'-7 1/2"	24" X 24"	6,000 CFM	25 ft/s	80	185.54 ft	AV	647.917	230.026
㊸	"COMPRESSOR VENT"		14'-0" H	———	48" X 48"	6,475 CFM	6.75 ft/s	100	97.76 ft	EX	647.873	230.043
㊹	DEAERATOR		31'-0"	1'-0"	1" ø	15 LB/HR	80 ft/s	300	94.14 ft	EX	647.875	230.017
㊺	BOILER BLOWDOWN		31'-0"	1'-0"	1¼" ø	146 LB/DAY	80 ft/s	300	95.13 ft	EX	647.875	230.015
㊻	ROOF TOP AC UNIT	40 TON	36'- 3"	5'-4"	24"X24"	4,000 CFM	16 ft/s	86	117.0 ft	AV	647.908	230.024
㊼	ROOF TOP AC UNIT	40 TON	36'- 3"	5'-4"	24"X24"	4,000 CFM	16 ft/s	86	117.0 ft	AV	647.903	229.997
㊽	ROOF TOP AC UNIT	40 TON	36'- 3"	5'-4"	24"X24"	4,000 CFM	16 ft/s	86	95.5 ft	AV	647.912	229.995
㊾	ROOF TOP AC UNIT	40 TOM	36'- 3"	5'-4"	24"X24"	4,000 CFM	16 ft/s	86	95.5 ft	AV	647.920	230.023

AV- ACTIVE VENTILATION
EV- EMERGENCY VENTILATION
H- HORIZONTAL DISCHARGE
EX- EXEMPT

MAGNETIC 2017

No.	Revision/Issue	Date
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ENGINEERS - PLANNERS - SURVEYORS
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11 MACDONOUGH STREET, PLATTSBURGH, NY 12901
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RMSPC.COM

Project Name & Address

Map Showing Emissions points for UMR Manufacturing

Town of Plattsburgh
Clinton County State of New York

Project # 22068	Sheet A-1B
Date 10/19/17	
Scale NTS	Floor Plans
Drawn LSC	Checked AJO

Aaron J. Ovios, P.E. NY LICENSE #077500

APPENDIX C

EMISSIONS CALCULATIONS

FACILITY
AND
EMISSION UNIT
SUMMARIES

COMBINED FACILITY ERP, PTE AND 2027 ESTIMATED ACTUAL EMISSIONS SUMMARY

EMISSION UNITS ERP AND PTE PROCESS AND CUMBUSTION EMISSIONS SUMMARY

EMISSION UNIT 2027 ESTIMATED ACTUAL PROCESS EMISSIONS SUMMARY

KB4 EMISSION UNIT PROCESS/SOURCE AND COMBUSTION PTE AND 2027 ESTIMATED ACTUAL EMISSIONS SUMMARY

(For UMR and SSLP Process/Source Emissions Summaries see VOC, Combustion and Non-Combustion Particulate Summaries)

FACILITY COMBUSTION EMISSION UNIT PTE AND 2027 ESTIMATED ACTUAL EMISSIONS SUMMARY

KB4 COMBUSTION PTE AND 2027 ESTIMATED ACTUAL EMISSIONS SUMMARY

"Process Emissions" refers to non-combustion material processing and manufacturing emissions.
"Process/Source Emissions" refers to Source level emissions.

UMR Boards Production LLC
Facility Emissions Summary
UMR, SSLP and KB4 Emission Units

	UMR[1,2] Emission Unit			SSLP[3] Emission Unit			KB4[1] Emission Unit			Facility Total[4]		
	ERP tons/yr	PTE tons/yr	2027 Actual tons/yr	ERP tons/yr	PTE tons/yr	2027 Actual tons/yr	ERP tons/yr	PTE tons/yr	2027 Actual tons/yr	ERP tons/yr	PTE tons/yr	2027 Actual tons/yr
VOC	188.8	64.2	22.4	123.2	46.7	29.4	21.2	21.2	7.8	333.1	132.0	52.0
Particulate	596.3	1.9	1.6	2592.2	2.6	1.0	8586.2	10.0	1.5	11774.7	14.6	3.1
NOx	20.9	18.1	5.0	0.3	0.3	--	25.9	25.9	6.7	47.2	44.3	11.7
CO	22.6	12.6	5.7	0.3	0.3	--	26.1	26.1	2.6	49.0	39.0	8.3
SO2	0.4	0.4	0.05	0.002	0.002	--	0.2	0.2	0.010	0.5	0.5	0.06
HAP (incl. MDI)	0.26	0.26	0.073	0.0073	0.0073	0.0006	0.52	0.52	0.026	0.79	0.79	0.10
CO2	17463	17289	5431	407	1163	--	33512	33512	1767	51383	51964	7198
	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb	lb
MDI	--	--	--	1.8	1.8	1.1	8.1	8.1	4.0	9.8	9.8	4.0

1 - including combustion sources

2 - including RTO, &D and Thin Set

3 - ERP/PTE include combustion. SSLP actual combustion emissions included in UMR.

4 - 2027 VOC Actual worst case - all Kerdi-Board produced in SSLP. All other pollutants actual worst case - all Kerdi-Board produced in KB4.
2027 Actual emissions include UMR, SSLP and KB4 combustion emissions

UMR Boards Production LLC
Emission Unit Emissions - UMR, SSLP, KB4
ERP/PTE (with RTO control)

Process Emissions	UMR EPS Process ERP tons/yr	UMR EPS Process PTE tons/yr	SSLP XPS Process ERP tons/yr	SSLP XPS Process PTE tons/yr	KB4 XPS Process ERP tons/yr	KB4 XPS Process PTE tons/yr	Faciltiy Process Total ERP tons/yr	Faciltiy Process Total PTE tons/yr
VOC	188	63.1	123.1	46.7	19.3	19.3	330	129.0
Particulate	595	0.6	2592	2.6	8584	7.6	11771	10.7
HAP (incl. MDI)	--	--	0.001	0.001	0.004	0.004	0.005	0.005
CO2	--	--	--	--	290	290	290	290
	(incl. exempt R&D, Thin Set)							
	ERP lb	PTE lb	ERP lb	PTE lb	ERP lb	PTE lb	ERP lb	PTE lb
MDI	--	--	1.8	1.8	8.1	8.1	9.8	9.8

Combustion Emission Unit (incl. Exempt Sources)	UMR EU ERP tons/yr	UMR EU PTE tons/yr	SSLP EU ERP tons/yr	SSLP EU PTE tons/yr	KB4 EU ERP tons/yr	KB4 EU PTE tons/yr	Faciltiy Combustion Total ERP tons/yr	Faciltiy Combustion Total PTE tons/yr
VOC	1.2	1.1	0.019	0.019	1.8	1.8	3.0	3.0
Particulate	1.4	1.3	0.026	0.026	2.5	2.5	3.9	3.8
HAP	0.26	0.26	0.006	0.006	0.52	0.52	0.78	0.78
CO2	17463	17289	407	1163	33222	33222	51093	51675
	(Incl. UMR Boiler, RTO)		(Hot Oil Heater Only)					

UMR Boards Production LLC
Emission Unit Emissions - UMR, SSLP, KB4, Combustion
2027 Actual Emissions

Process Emissions	UMR EU[1] tons/yr	SSLP EU tons/yr	KB4 EU tons/yr	Combustion[2] EU tons/yr	Facility Total tons/yr
VOC	22.2	29.4	7.6	0.48	52.0
Particulate	1.25	0.95	1.2	0.61	3.1
HAP (incl. MDI)	--	0.0006	0.002	0.096	0.098
CO2	--	--	114.0	7084	7198
	lb	lb	lb	lb	lb
MDI	--	1.12	4.04	--	4.04

1 - includes exempt Thin Set particulate emissions

2 - includes UMR Boiler, SSLP Hot Oil Heater, RTO and all exempt combustion sources

Facility Total
VOC Actal Worst Case - All Kerdi-Board produced in SSLP EU

All other pollutants worst case - all Kerdi-Board produced in KB4 EU.

KB4 Emission Unit
Emissions Summary

Pollutants	Extrusion & Recycle PTE tpy	Extrusion & Recycle 2027 tons		Laminating and Sizing PTE tpy	Laminating and Sizing 2027 tons	Combustion Sources PTE tpy	Combustion Sources 2027 tons	Total KB4 PTE tpy	Total KB4 2027 tons
VOC	19.31	7.60		(combined)		1.84	0.23	21.15	7.83
PM10/PM2.5	1.87	0.69		5.69	0.55	2.45	0.28	10.01	1.52
NOx	--	--	--	--	--	25.9	6.7	25.9	6.7
CO	--	--	--	--	--	26.1	2.6	26.1	2.6
SO2	--	--	--	--	--	0.2	0.01	0.2	0.0
Total HAPs				0.004	0.002	0.52	0.02	0.523	0.026
CO2	289.68	113.97		(combined)		33223	1653	33513	1767
	lb/yr	lb		lb/yr	lb	lb/yr	lb	lb/yr	lb
MDI	--	--		8.05	4.04	--	--	8.05	4.04

UMR Boards Production LLC
Combustion Emission Unit

ERP/PTE	UMR Emission Unit ERP tons/yr	UMR Emission Unit PTE tons/yr	SSLP Emission Unit ERP tons/yr	SSLP Emission Unit PTE tons/yr	KB4 Emission Unit PTE/ERP tons/yr	Facility Total ERP tons/yr	Facility Total PTE tons/yr
VOC	1.2	1.1	0.02	0.02	1.8	3.0	3.0
PM (Total)	1.4	1.3	0.03	0.03	2.5	3.9	3.8
NOx	20.9	18.1	0.3	0.3	25.9	47.2	44.3
CO	22.6	12.6	0.3	0.3	26.1	49.0	39.0
SO2	0.4	0.4	0.002	0.002	0.2	0.5	0.5
HAP	0.259	0.257	0.006	0.006	0.517	0.782	0.781
CO2	17,463	17,289	407	1,163	33,222	51,093	51,675
	UMR includes SSLP non-process exempt sources		(Hot Oil Heater Only)		Exempt Boilers & Generators		

Actual 2027	UMR Emission Unit 2022 tons	UMR Emission Unit 2023 tons	UMR Emission Unit 2027 tons	SSLP Emission Unit 2022 tons	SSLP Emission Unit 2023 tons	SSLP Emission Unit 2027 tons	KB4 Emission Unit All Years tons	Facility Total 2022 tons	Facility Total 2023 tons	Facility Total 2027 tons
VOC	0.14	0.16	0.24				0.23	0.38	0.39	0.48
PM (Total)	0.18	0.2	0.3				0.3	0.5	0.5	0.6
NOx	2.39	2.6	5.0				6.7	9.1	9.3	11.7
CO	1.74	1.9	5.7				2.6	4.3	4.5	8.3
SO2	0.04	0.037	0.048				0.010	0.045	0.047	0.058
HAP	0.0364	0.0403	0.0726				0.0239	0.060	0.064	0.096
CO2	2,411	2,678	5,431				1,653	4,064	4,331	7,084
	UMR includes SSLP non-process exempt sources UMR/SSLP Exempt Sources do not grow			SSLP Combustion Actual = Hot Oil Heater only, fuel use not quantified separately from UMR, emissions included in UMR Emission Unit			KB4 Exempt Sources do not grow			

KB4 Emission Unit

Combustion Source Summary

	Boilers		Emergency Genrators		KB4 Combustion Total	
	PTE	2027	PTE	2027	PTE	2027
Pollutants	tpy	tons	tpy	tons	tpy	tons
VOC	1.49	0.06	0.35	0.17	1.84	0.23
PM10/PM2.5	2.06	0.08	0.39	0.19	2.45	0.28
NOx	13.6	0.6	12.34	6.17	25.92	6.73
CO	22.8	0.9	3.28	1.64	26.10	2.58
SO2	0.16	0.01	0.006	0.003	0.17	0.01
Total HAPs	0.51	0.0210	0.0075	0.0029	0.52	0.0239
CO2	32595	1340	627.82	313.91	33223	1653

VOC SOURCE SUMMARIES

UMR and SSLP EMISSION UNIT AND PROCESS/SOURCE EMISSIONS
(with and without RTO as noted)

- UMR AND SSLP EMISSION UNIT ERP (NO RTO, 7 MOLDING PRESSES)
- UMR AND SSLP PROCESS/SOURCE PTE EMISSIONS (NO RTO, 7 PRESSES)
- UMR AND SSLP EMISSION UNIT ERP (RTO, 8 MOLDING PRESSES)
- UMR AND SSLP PROCESS/SOURCE PTE EMISSIONS (RTO, 8 PRESSES)
- SSLP LAMINATING VOC and MDI PTE STACK and AMBIENT EMISSIONS
- UMR AND SSLP EMISSION UNIT VOC 2027 ESTIMATED ACTUAL EMISSIONS
- UMR AND SSLP PROCESS/SOURCE VOC and MDI ACTUAL EMISSIONS
  - 2022 without RTO
  - 2023 without RTO
  - 2027 with RTO

KB4 EMISSION UNIT AND PROCESS/SOURCE EMISSIONS

- EXTRUSION and LAMINATING PROCESSING CAPACITY (Pages 1 and 2 of 4)
- COMBINED PROCESS/SOURCE BLOWING AGENTS (VOC and CO2) PTE and 2027 ESTIMATED ACTUAL EMISSIONS (Page 3 of 4)
- LAMINATING MDI PTE and 2027 ESTIMATED ACTUAL EMISSIONS (Page 4 of 4)

UMR and SSLP VOC Emission Rate Potential - 7 Molding Presses

UMR Beads

Intial VOC Content		4.00%	Iso-pentane and pentane in raw beads (SDS)
Residual VOC Content		0.84%	Material testing of finished product
Loss in Production		3.16%	Weight percent of total bead use

Maximum Practical Production Seven Molding Presses (8760 hrs)

	117	seconds per cycle	
	738	cycles per day x 7 machines	7 MACHINES
	5.51	lbs beads/cycle (2.5 kg / cycle)	
	4,066	lbs/day/machine	
	28,465	lbs per day, 7 molding presses	7 MACHINES
	10,389,601	lbs beads per year (24/7)	5195 tons
	415,584	lbs VOC in EPS beads used	
	207.8	tons VOC in EPS beads used	
	328,000	lbs VOC per year (24/7) excluding VOC retained in product	
ERP	164.0	tons per year VOC ERP (24/7) excluding VOC retained in product	

SSLP Foam

Initial VOC Content		2.896%	Propane and Butane in received rolls by material testing
Residual VOC Content		0.081%	Finished boards after 4 weeks storage by material testing
Loss in Production		2.82%	Weight percent of roll foam used

Maximum Practical Production Kerdi-Board Line (8760 hrs)

	1,050	meters per roll	
	12	meters per minute (optimum) X 2 rolls	
	1,440	minutes per day	
	34,560	meters per day optimum	
	32.9	Rolls per day	12013.71 rolls per year (24/7)
	705	lb/roll	
	23,205	lbs foam per day	
	653.2	lbs VOC per day	
	8,469,669	lbs foam per year (24/7)	4235 tons
	245,282	lbs VOC in XPS foam	
	122.6	tons VOC in XPS foam	
	238,421	lbs VOC per year (24/7) excluding VOC retained in product	
ERP	119.2	tons per year VOC ERP (24/7) excluding VOC retained in product	

UMR and SSLP Emission Units - without RTO, 7 Molding Presses

VOC Capture/Control		ERP							PTE
	Percent of	Potential	Uncaptured	Uncaptured	Captured	Captured	Destruct	Destroyed		Emissions
	VOC Loss	Loss Tons	Percent	Tons	Percent	Tons	Efficiency	Tons	C/C	Tons
UMR EPS	Total VOC in beads:	207.8								
Blowing Agents										
Silo Room	18%	37.4	100%	37.40	0%	0.0	99%	0.0	0.0%	37.40
Pre-Expansion	23%	47.8	100%	47.79	0%	0.0	99%	0.0	0.0%	47.79
Molding Presses	11.97%	24.9	100%	24.87	0%	0.0	99%	0.0	0.0%	24.87
Press Purge Vents	0.03%	0.1	100%	0.06	0%	0.0	0%	0.0	0.0%	0.06
Drying	2%	4.2	100%	4.16	0%	0.0	0%	0.0	0.0%	4.16
Packaging	1.5%	3.1	100%	3.12	0%	0.0	0%	0.0	0.0%	3.12
Warehouse	22.5%	46.8	100%	46.8	0%	0.0	0%	0.0	0.0%	46.8
Subtotal		164.2								164.2
Retained in Product	21.0%	43.6								
SSLP XPS										
Blowing Agents	Total VOC in XPS Foam:	122.6								
Roll Storage	63%	77.3	100%	77.3	0%	0.0	99%	0.0	0.0%	77.26
Finished Goods Warehouse	34.2%	41.9	100%	41.94	0%	0.0	0%	0.0	0.0%	41.9
Subtotal		119.2								119.2
Retained in Product	2.8%	3.43								
SSLP Laminating, Parts Assembly and Packaging			(Blowing Agents & Adhesives)							
Stack Emissions		3.27	0%	0.00	0%	0.0	0%	0.0	0.0%	3.27
Ambient Emissions		0.66	100%	0.66	0%	0.0	0%	0.0	0.0%	0.66
Subtotal		3.94								3.94
SSLP Combnined Totals		123.14								123.14
		287.3	ERP (UMR + SSLP)					PTE (UMR + SSLP)		287.3
Combustion (from Combustion ERP PTE tab excluding RTO)										
		1.13								1.13
UMR and SLP VOC Emissions including combustion		288.4	ERP (UMR + SSLP)					PTE (UMR + SSLP)		288.4

UMR and SSLP VOC Emission Rate Potential - 8 Molding Presses

UMR Beads

Intial VOC Content		4.00%	Iso-pentane and pentane in raw beads (SDS)
Residual VOC Content		0.84%	Material testing of finished product
Loss in Production		3.16%	Weight percent of total bead use

Maximum Practical Production Seven Molding Presses (8760 hrs)

117	seconds per cycle		
738	cycles per day x 8 machines		8 MACHINES
5.51	lbs beads/cycle (2.5 kg / cycle)		
4,066	lbs/day/machine		
32,531	lbs per day, 8 molding presses		8 MACHINES
11,873,830	lbs beads per year (24/7)	5937	tons
474,953	lbs VOC in EPS beads used		
237.5	tons VOC in EPS beads used		
374,857	lbs VOC per year (24/7) excluding VOC retained in product		
ERP 187.4	tons per year VOC ERP (24/7) excluding VOC retained in product		

SSLP Foam

Initial VOC Content		2.896%	Propane and Butane in received rolls by material testing
Residual VOC Content		0.081%	Finished boards after 4 weeks storage by material testing
Loss in Production		2.82%	Weight percent of roll foam used

Maximum Practical Production Kerdi-Board Line (8760 hrs)

1,050	meters per roll		
12	meters per minute (optimum) X 2 rolls		
1,440	minutes per day		
34,560	meters per day optimum		
32.9	Rolls per day	12013.71	rolls per year (24/7)
705	lb/roll		
23,205	lbs foam per day		
653.2	lbs VOC per day		
8,469,669	lbs foam per year (24/7)	4235	tons
245,282	lbs VOC in XPS foam		
122.6	tons VOC in XPS foam		
238,421	lbs VOC per year (24/7) excluding VOC retained in product		
ERP 119.2	tons per year VOC ERP (24/7) excluding VOC retained in product		

UMR and SSLP Emission Units - with RTO, 8 Molding Presses

VOC Capture/Control ERP/PTE		ERP								PTE
	Percent of	Potential	Uncaptured	Uncaptured	Captured	Captured	Destruct	Destroyed		Emissions
	VOC Loss	Loss Tons	Percent	Tons	Percent	Tons	Efficiency	Tons	C/C	Tons
UMR EPS	Total VOC in beads:	237.5								
Blowing Agents										
Silo Room	18%	42.7	0%	0.00	100%	42.7	99%	42.3	99.0%	0.43
Pre-Expansion	23%	54.6	0%	0.00	100%	54.6	99%	54.1	99.0%	0.55
Molding Presses	11.97%	28.4	0%	0.00	100%	28.4	99%	28.1	99.0%	0.28
Press Purge Vents	0.03%	0.1	100%	0.07	0%	0.0	0%	0.0	0.0%	0.07
Drying	2%	4.7	100%	4.75	0%	0.0	0%	0.0	0.0%	4.75
Packaging	1.5%	3.6	100%	3.56	0%	0.0	0%	0.0	0.0%	3.56
Warehouse	22.5%	53.4	100%	53.4	0%	0.0	0%	0.0	0.0%	53.4
Subtotal		187.6								63.1
Retained in Product	21.0%	49.9								
SSLP XPS										
Blowing Agents	Total VOC in XPS Foam:	122.6								
Roll Storage	63%	77.3	0%	0.0	100%	77.3	99%	76.5	99.0%	0.77
Finished Goods Warehouse	34.2%	41.9	100%	41.94	0%	0.0	0%	0.0	0.0%	41.9
Subtotal		119.2								42.7
Retained in Product	2.8%	3.43								
SSLP Laminating, Parts Assembly and Packaging			(Blowing Agents & Adhesives)							
Stack Emissions		3.27	0%	0.00	100%	3.3	0%	0.0	0.0%	3.27
Ambient Emissions		0.66	100%	0.66	0%	0.0	0%	0.0	0.0%	0.66
Subtotal		3.94								3.94
SSLP Combnined Totals		123.1								46.7
		310.7	ERP (UMR + SSLP)					PTE (UMR + SSLP)		109.7
Combustion (from Combustion ERP PTE tab including RTO)										
		1.15								1.12
UMR + SSLP VOC Emissions including combustion		311.9	ERP						PTE	110.8

SSLP VOC / MDI PTE Calculation

Adhesive & XPS Blowing Agent

SSLP Measured Stack Emissions (sum of three stacks)	0.747	lb/hr
SSLP VOC PTE from Stacks	6,544	lb
	3.27	tons
SSLP Maximum Ambient VOC Concentration*	1.80	mg/m^3
SSLP Building Volume	76,455	m^3
Mass VOC in each building air volume	137,619	mg
	0.30	lb
Air Changes per hour	0.5	
Air Changes per year	4380	
SSLP VOC PTE from Ambient	1,328.87	lb
	0.66	tons
SSLP Adhesive Stacks + Ambient VOC PTE	3.94	tons

* Average Ambient Concentration from 4 measured locations is 1.325 mg/m^3. Using maximum of the 4 measured concentrations produces the worst possible case. Actual levels would be lower.

MDI

SSLP Measured Stack Emissions (sum of three stacks)	0.00013	lb/hr
SSLP MDI PTE from Stacks	1.17	lb
SSLP Building Volume	76,455	m^3
SSLP Average MDI Ambient Concentration**	0.00083	mg/m^3
Mass MDI in each building air volume	63	mg
	1.40E-04	lb
Air Changes per hour	0.5	
Air Changes per year	4380	
Theoretical MDI PTE from Ambient	0.61	lb
Combined MDI PTE (Stacks + Ambient)	1.79	lb

** MDI levels were below the quantitation limit of 0.00083mg/m^3 in all samples. Using the detection limit produces the worst possible case. Actual levels would be

SSLP Process PTE Emissions

	VOC tons	MDI pounds
Stack Emissions	3.27	1.17
Ambient Emissions	0.66	0.61
	3.94	1.79

UMR & SSLP VOC 2022, 2023, 2027 Actual Emissions Estimate

UMR Beads

			NO RTO	NO RTO	with RTO
Intial VOC Content	4.00%	Iso-pentane and pentane in raw beads (SDS)			
Residual VOC Content	0.84%	Material testing of finished product			
Potential Loss in Production	3.16%	Weight percent of total bead use			
			2022	2023	2027
Weight of Processed Beads		kg	1,545,160	1,530,599	1,891,518
2024 increase with 8th molding press		lbs	3,406,491	3,374,389	4,170,078
		tons	1,703	1,687	2,085
Weight of VOC in Beads	4.0%	tons	68.1	67.5	83.4
Weight of VOC Retained in Product	21.0%	tons	14.3	14.2	17.5
Potential VOC Loss from All Processes	79.0%	tons	53.8	53.3	65.8
Potential VOC Loss From Controlled Processes	53.0%	tons	36.1	35.7	44.2
Capture/Control	99.0%	tons	0.0	0.0	(43.7)
Loss after Control		tons	36.1	35.7	0.4
Loss from uncontrolled Processes	26.0%	tons	17.7	17.6	21.7
Actual after control (with RTO)		tons	53.8	53.3	22.2

Percent VOC Loss in Process	
Controlled Processes	
Silo Room	18.0%
Pre-Expansion	23.0%
Molding Presses	12.0%
	53.0%
Uncontrolled Processes	
Press Purge Vents	0.03%
Drying	2.0%
Packaging	1.5%
Warehouse	22.5%
	26.0%
Retained in Product	21.0%
	100.0%

SSLP Foam

Initial VOC Content	2.896%	Propane and Butane in received rolls by material testing			
Residual VOC Content	0.081%	Finished boards after 4 weeks storage by material testing			
Potential Loss in Production	2.815%	Weight percent of roll foam used from Projections			
			2022	2023	2027
Weight of Processed XPS Foam		kg	1,537,718	1,412,085	2,417,788
2024 based on 15% production increase		lbs	3,390,084	3,113,110	5,330,304
		tons	1,695	1,557	2,665
Weight of VOC in XPS Foam	2.896%	tons	49.1	45.1	77
Weight of VOC Retained in Product	2.8%	tons	1.4	1.3	2.2
Potential VOC Loss from All Processes			47.7	43.8	75.0
Potential VOC Loss from Controlled Processes	63%	tons	30.9	28.4	48.6
Capture/Control	99.0%	tons	0.0	0.0	(48.1)
Loss after Control		tons	30.9	28.4	0.5
Loss from uncontrolled Processes	34%	tons	16.8	15.4	26.4
Actual after control (with RTO)		tons	47.7	43.8	26.9

Percent VOC Loss in Process	
Controlled Processes	
Roll Storage	63.0%
Uncontrolled Processes	
Laminating Line	10.0%
Parts Assy/Pkging	4.1%
Warehouse	20.1%
	34.2%
Retained in Product	2.8%
	100%

UMR & SSLP VOC 2022, 2023, 2027 Actual Emissions Estimate (Cont'd)

SSLP Fugitive VOC and MDI

Refer to Registration Application for 2023, 2027 MDI + VOC Emission Estimate Calculation

		2022	2023	2027
	tons	2.7 (2021 Calc)	1.4 (2023 Calc)	2.5 (2023 Calc)
UMR + SSLP Process VOC Emissions	tons	104.3	98.6	51.5
		NO RTO	NO RTO	with RTO
UMR, SSLP, R&D and Thin Set Combustion Emissions		Actual	Actual	Projected
VOC Emissions NatGas, Propane, Diesel and RTO	tons	0.14	0.16	0.24
UMR + SSLP VOC Emissions including combustion	tons	104.4	98.7	51.8

UMR and SSLP Emission Units - No RTO

2022 VOC Process Actual Emissions EPS & XPS ONLY		Percent of VOC Loss	Process Potential Loss Tons	Uncaptured Percent	Uncaptured Tons	Captured Percent	Captured Tons	Destruct Efficiency	Destroyed Tons	C/C	Process Emissions Tons
UMR	Total EPS Bead Use		1703.2								
	VOC %		4.00%								
	Total VOC in beads:		68.1								
Silo Room		18%	12.3	100%	12.26	0%	0.0	0%	0.0	0.0%	12.26
Pre-Expansion		23%	15.7	100%	15.67	0%	0.0	0%	0.0	0.0%	15.67
Molding Presses		11.97%	8.2	100%	8.16	0%	0.0	0%	0.0	0.0%	8.16
Press Purge Vents		0.03%	0.0	100%	0.02	0%	0.0	0%	0.0	0.0%	0.02
Drying		2%	1.4	100%	1.36	0%	0.0	0%	0.0	0.0%	1.36
Packaging		1.5%	1.0	100%	1.02	0%	0.0	0%	0.0	0.0%	1.02
Warehouse		22.5%	15.3	100%	15.3	0%	0.0	0%	0.0	0.0%	15.3
			53.8								53.8
Retained in Product		21.0%	14.3								

		Percent of VOC Loss	Process Potential Loss Tons	Uncaptured Percent	Uncaptured Tons	Captured Percent	Captured Tons	Destruct Efficiency	Destroyed Tons	C/C	Process Emissions Tons
SSLP	Total XPA Foam Use		1695.0								
	VOC %		2.896%								
	Total VOC in XPS Foam:		49.1								
Roll Storage		63%	30.9	100%	30.9	0%	0.0	0%	0.0	0.0%	30.9
Laminating Line		10%	4.9	100%	4.91	0%	0.0	0%	0.0	0.0%	4.9
Parts Assy/Pkging		4.1%	2.0	100%	2.01	0%	0.0	0%	0.0	0.0%	2.0
Finshed Goods Warehousin		20.1%	9.87	100%	9.87	0%	0.0	0%	0.0	0.0%	9.87
			47.7								47.7
Retained in Product		2.8%	1.37								
UMR + SSLP Blowing Agents			101.5	Potential						Acutal	101.5

SSLP Fugitive VOC

	2021	2022
Total Adhesive Use	586.7 tons	857.2 tons
Adhesive Quantity Adjustment Factor		1.46
Average VOC Content	5.09%	5.08%
VOC Content Adjustment Factor		1.00
Overall Adjustment Factor (2022/2018)		1.46
Fugitive VOC Emissions	3747 lb VOC	
(Worker Exposure Study 2018)	1.87 tons VOC	
	6.8 lb MDI	
Adjusted Fugitive Emissions		2.7 tons VOC
		9.9 lb MDI

2.7	Potential = Actual, not Total VOC Content		Actual	2.7
UMR +SSLP Process VOC	104.3	Potential	Actual	104.3
Combustion	0.14	Potential	Actual	0.14
UMR + SSLP VOC Emissions including combustion	104.4	Potential	Actual	104.4

UMR and SSLP Emission Units - without RTO

2023 VOC Process Actual Emissions EPS & XPS ONLY		Percent of VOC Loss	Process Potential Loss Tons	Uncaptured Percent	Uncaptured Tons	Captured Percent	Captured Tons	Destruct Efficiency	Destroyed Tons	C/C	Process Emissions Tons
UMR EPS	Total EPS Bead Use		1687.2								
Blowing Agents	VOC %		4.00%								
	Total VOC in beads:		67.5								
Silo Room		18%	12.1	100%	12.15	0%	0.0	99%	0.0	0.0%	12.15
Pre-Expansion		23%	15.5	100%	15.52	0%	0.0	99%	0.0	0.0%	15.52
Molding Presses		11.97%	8.1	100%	8.08	0%	0.0	99%	0.0	0.0%	8.08
Press Purge Vents		0.03%	0.0	100%	0.02	0%	0.0	0%	0.0	0.0%	0.02
Drying		2%	1.3	100%	1.35	0%	0.0	0%	0.0	0.0%	1.35
Packaging		1.5%	1.0	100%	1.01	0%	0.0	0%	0.0	0.0%	1.01
Warehouse		22.5%	15.2	100%	15.2	0%	0.0	0%	0.0	0.0%	15.2
			53.3								53.3
Retained in Product		21.0%	14.2								
SSLP XPS	Total XPA Foam Use		1556.5								
Blowing Agents	VOC %		2.896%								
	Total VOC in XPS Foam:		45.1								
Roll Storage		63%	28.4	100%	28.4	0%	0.0	99%	0.0	0.0%	28.4
Finished Goods Warehouse		34.2%	15.42	100%	15.42	0%	0.0	0%	0.0	0.0%	15.42
			43.8								43.8
Retained in Product		2.8%	1.26								

SSLP Stack + Ambient VOC

Total 2023 Foam Use	1556.54	tons	
PTE Foam Use	4234.83	tons	
2023 Percent of Production Capacity	37%		
Inferred 2023 Hours of Operation	3219.8	hrs	
Measured Stack Emission Rate (sum of laminating, printer module, and Erbo stacks)	0.747	lb VOC/hr	0.00013 lb/hr MDI
Actual 2023 Stack Emissions	2405.2	lbs VOC	0.431 lbs MDI
Ambient Emission Rate	1328.9	lb VOC/8760 hrs	0.61 lb MDI /8760 hrs
	0.152	lb VOC/hr	7.0E-05 lb MDI /hr
Actual 2023 Ambient Emissions	488.4	lb VOC	0.23 lb MDI
Overall Stack + Ambient Emissions	2893.6	lbs VOC	0.66 lb MDI
	1.4	tons VOC	

	1.4	Potential	Actual	1.4
UMR + SSLP Process VOC	98.6	Potential	Acutal	98.6
Combustion VOC	0.16	Potential	Actual	0.16
UMR + SSLP VOC Emissions including combustion	98.7	Potential	Actual	98.7

UMR and SSLP Emission Units - with RTO

2027 VOC Actual Process Emissions EPS & XPS ONLY		Percent of VOC Loss	Process Potential Loss Tons	Uncaptured Percent	Uncaptured Tons	Captured Percent	Captured Tons	Destruct Efficiency	Destroyed Tons	C/C	Process Emissions Tons
UMR EPS	Total EPS Bead Use		2085.0								
Blowing Agents	VOC %		4.00%								
	Total VOC in beads:		83.4								
Silo Room		18%	15.0	0%	0.00	100%	15.0	99%	14.9	99.0%	0.15
Pre-Expansion		23%	19.2	0%	0.00	100%	19.2	99%	19.0	99.0%	0.19
Molding Presses		11.97%	10.0	0%	0.00	100%	10.0	99%	9.9	99.0%	0.10
Press Purge Vents		0.03%	0.0	100%	0.03	0%	0.0	0%	0.0	0.0%	0.03
Drying		2%	1.7	100%	1.67	0%	0.0	0%	0.0	0.0%	1.67
Packaging		1.5%	1.3	100%	1.25	0%	0.0	0%	0.0	0.0%	1.25
Warehouse		22.5%	18.8	100%	18.8	0%	0.0	0%	0.0	0.0%	18.8
			65.9								22.2
Retained in Product		21.0%	17.5								
SSLP XPS	Total XPA Foam Use		2665.2								
Blowing Agents	VOC %		2.896%								
	Total VOC in XPS Foam:		77.2								
Roll Storage		63%	48.6	0%	0.0	100%	48.6	99%	48.1	99.0%	0.5
Finished Goods Warehouse		34.2%	26.40	100%	26.40	0%	0.0	0%	0.0	0.0%	26.40
			75.0								26.9
Retained in Product		2.8%	2.16								
UMR + SSLP Blowing Agents			140.9	Potential						Actual	49.0

SSLP Stack + Ambient VOC

Est. Total 2027 Foam Use	2665.13	tons			
PTE Foam Use	4234.83	tons			
2027 Percent of Production Capacity	63%				
Inferred 2027 Hours of Operation	5513.0	hrs			
Measured Stack Emission Rate			0.747 lb VOC/hr	0.00013	lb/hr MDI
(sum of laminating, printer module, and Erbo stacks)					
Actual 2027 Stack Emissions			4118.2 lbs VOC	0.738	lbs MDI
Ambient Emission Rate			1328.9 lb VOC/8760 hrs	0.61	lb MDI /8760 hrs
			0.152 lb VOC/hr	7.0E-05	lb MDI /hr
Actual 2027 Ambient Emissions			836.3 lb VOC	0.39	lb MDI
Overall Stack + Ambient Emissions			4954.5 lbs VOC	1.12	lb MDI
			2.5 tons VOC		

	2.5	Potential	Actual	2.5
UMR +SSLP Process VOC	143.4	Potential	Acutal	51.5
Combustion	0.24	Potential	Actual	0.24
UMR + SSLP VOC Emissions including combustion	143.6	Potential	Actual	51.8

KB4 Extruder Capacity

Extrusion Process Rate (PTE)		
XPS Resin Use	1000	kg resin per hour
PTE Utilization	8760	hrs
Extrustion PTE Weight	8,760,000	kg/year
Exanded Foam Density	52	kg/m^3
Extruded Expanded PTE Volume	168,462	m^3/yr

Board Processing Capacity

Maximum Laminating Input

3 Feed lanes @	10	m/min						
	1800	m/hr						
	15,768,000	m	@	8760	hrs			
Raw board	1550	mm	X	2455	mm	=	3.80525	m^2
Raw Board Input	2790	m^2/hr	@	1550	mm			
	24,440,400	m^2	@	8760	hrs			
	159.03	m^3/hr	@	57	mm			
	33.48	m^3/hr	@	12	mm			
Typical Finished Board	1220	mm	X	2440	mm	=	2.9768	m^2
Finished / Raw Area	0.782							
Maximum Laminating Output	2182.58	m^2/hr						
	26.19	m^3/hr	@	12	mm			
	19,119,423	m^2	@	8760	hrs			
	229,433	m^3	@	8760	hrs			
	Exceeds Extrusion Capacity							

Actual Output 2027					
Wtd Avg Board Area	2.667	m^2			
Wtd Avg Board Thickness	12.03	mm			
Wtd Avg Board Volume	0.0321	m^3			
Total Boards	1,615,612	Boards			
Total Area	4,308,076	m^2			
Total Foam Volume	51,847	m^3			
Raw / Finished Area	1.2783				
Total Raw Foam Required	66,276	m^3			
	3,446,326	kg			
Actual Finished Board Area	5,507,023	m^2	@	12.03	mm

Laminating PTE (limited by Extruder Capacity)

Theor. Raw Board Area	24,440,400	m^2	@	33.48	m^3/hr
Extruder Capacity	19.23	m^3/hr			
PTE Raw Board Area	14,038,462	m^2	@	19.23	m^3/hr

Pre-lam Board	1310	mm	X	2743	mm	=	3.59333	m^2
Pre-lam/Raw Board Area	0.944							
PTE Prelam Board Area	13,256,639	m^2	@	19.23	m^3/hr			
Finished/Raw Board Area	0.782							
PTE Finished Board Area	10,982,115	m^2	@	19.23	m^3/hr			

KB4 Emissions Summary

Blowing Agents

Assume blowing agent off-gassing of 100% between raw material delivery and shipment. This is a conservative assumption because some of the blowing agents remain in the finished product.t of finished product.

Actual resin consumption is limited to demands of laminating line production.

XPS VOC Fraction (DME)	0.20%	
XPS CO2 Fraction	3.00%	

Projected 2027 Actual Board Production

Foam Demand	3,446,326	kg		
VOC Actual Emissions	6,893	kg	7.60	tons
CO2 Actual Emissions	103,390	kg	113.97	tons

Extrusion Process Rate (PTE)

XPS Resin Use	1000	kg resin per hour		
PTE Utilization	8760	hrs		
	8,760,000	kg/year		
VOC PTE Emissions	17,520	kg	19.31	tons
CO2 PTE Emissions	262,800	kg	289.68	tons

KB4

MDI Emissions

SSLP	Stack Emissions under Test Conditions				
SSLP	MDI Emission Rate During Test	0.0001339	lb/hr	@	10 m/min
SSLP	Annualized MDI Stack Emissions	1.17	lb (8760hr)		
SSLP	Ambient Emissions under Test Conditions				
SSLP	Annualized Ambient MDI Emissions	0.61	lb (8760hr)		
SSLP	Stack + Ambient under Test Conditions				
SSLP	MDI Annualized Emissions	1.79	lb (8760hr)		
SSLP	MDI Emission Rate	0.00020	lb/hr		

KB4	Maximum Line Speed	30	m/min
KB4/SSLP	Line Speed Multiplier	3.0	
SSLP	Adhesive Layers	4	
KB4	Adhesive Layers*	6	
KB4/SSLP	Adhesive Layers Multiplier	1.5	
KB4	Butt Joint Multiplier**	1.0023	
KB4/SSLP	Overall Multiplier	4.51	

KB4	MDI Emission Rate at Max Line Speed	0.00092	lb/hr	@	30 m/min

KB4	MDI PTE Emissions	8.05	lb

KB4	Max Production Capacity at 30m/min	10,982,115	m^2
KB4	2027 Projected Actual Production	5,507,023	m^2
KB4	Production Factor (Actual/Maximum)	0.50	

KB4	Projected Actual MDI Emissions	4.04	lb

* includes top and bottom leveling layer

** The butt joint consists of bonding the end of one board to the end of another board. Both surfaces have adhesive applied. This is the same as both ends of each board having adhesive applied. The two end areas of a board with a weighted average thickness of 12.93mm and a pre-laminated width of 1310mm add 0.034m^2 to a board having weighted average surface area 2.499m^2.

Each board gets 3 layers of adhesive on top and bottom (one leveling layer, one for facer and one for fleece) for total of 6 adhesive layers. End areas get 1 layer of adhesive each.

1 layer x 0.034 m^2 added to 6 layers x 2.499 m^2 increases adhesive use by 0.23%.

COMBUSTION SOURCE SUMMARIES

UMR and SSLP EMISSION UNIT AND PROCESS EMISSIONS
- COMBUSTION SOURCE LIST
  - BOILERS, GENERATORS and FIRE PUMPS
  - SPACE HEATERS
- PTE FUEL USE - ALL PROCESS and EXEMPT SOURCES
- PTE FUEL USE - UMR and EXEMPT SOURCES
- PTE FUEL USE - SSLP HOT OIL HEATER
- ACTUAL FUEL USE - ALL PROCESS AND EXEMPT SOURCES
- PTE COMBUSTION EMISSIONS
  - UMR and EXEMPT SOURCES (with and without RTO as noted)
  - SSLP HOT OIL HEATER
- UMR, SSLP AND EXEMPT SOURCES ACTUAL EMISSIONS
  - 2022 and 2023 without RTO, 2027 with RTO
- RTO
  - DESIGN BASIS
  - PTE EMISSIONS
  - CO2 PTE from VOC DESTRUCTION
- NATURAL GAS COMBUSTION HAP

KB4 EMISSION UNIT EMISSIONS
- COMBUSTION SOURCE LIST
- EMISSION UNIT COMBUSTION EMISSIONS SUMMARY
- PTE EMISSIONS
  - BOILERS
  - GENERATORS
  - CO2 EMISSIONS from BOILERS AND GENERATORS
- ACTUAL EMISSIONS
  - BOILERS
  - GENERATORS
  - CO2 EMISSIONS from BOILERS AND GENERATORS

GENSET/Fire Pumps

Building	Equipment Type	Rating (HP)	Fuel Type	UMR	SSLP
Pump Room	Fire Pump	575	Diesel		X
Pump Room	Fire Pump	575	Diesel		X
Pump Room	Emergency Generator	76	Nat Gas		X
Thinset	Emergency Generator	128	Nat Gas		X
Office	Emergency Generator	454	Nat Gas		X
UMR/SSLP[1]	Emergency Generator	400	Diesel	X	X
R&D	Emergency Generator	389	Diesel		X
Main Warehouse (old)	Emergency Generator	874	Diesel		X

1 - This generator supplies emergancy power to both UMR and SSLP

Boilers

Boilers	Name Plate Heat Input Rating (MMBtu)	Manufacturer	UMR	SSLP
UMR Package Plant	10.04	Cleaver Brooks	X	
SSLP Hot Oil Heater	0.8	Gesab 232 kW		X
Warehouse Parking Lot He	2.5	Laars Magnatherm		X
R&D Primary	0.264	Laars NeoTherm		X
R&D Backup	0.264	Laars NeoTherm		X
Training Floor Heater	0.096	Burnham		X
Hot Water Heater	0.18	Rinnai		X

Space Heaters

Equipment Category	Description/ Model #	Mfr'r	Capacity	Capacity Unit	Fuel Type	UMR	SSLP
Space Heating	Heating Unit	AbsolutAire	0.1215	MMBtu	Nat Gas	X	
Space Heating	Heating Unit	AbsolutAire	0.1215	MMBtu	Nat Gas	X	
Space Heating	Heating Unit	AbsolutAire	0.1215	MMBtu	Nat Gas	X	
Space Heating	Heating Unit	Trane	0.08	MMBtu	Nat Gas	X	
Space Heating	Heating Unit	Trane	0.08	MMBtu	Nat Gas	X	
Space Heating	Heating Unit	Trane	0.08	MMBtu	Nat Gas	X	
Space Heating	Heating Unit	Trane	0.08	MMBtu	Nat Gas	X	
Space Heating	Make-up Air Unit	AbsolutAire	1.125	MMBtu	Nat Gas	X	
Space Heating	Make-up Air Unit	AbsolutAire	1.125	MMBtu	Nat Gas	X	
Space Heating	Heating Unit	Modine	0.25	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Modine	0.25	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Modine	0.25	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler-GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-400	0.4	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-400	0.4	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-400	0.4	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-400	0.4	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Modine- Hot Dwag	0.125	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Modine- Hot Dwag	0.125	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Modine- Hot Dwag	0.125	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Modine- Hot Dwag	0.125	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Modine- Hot Dwag	0.125	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Modine- Hot Dwag	0.125	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler GTC-480	0.58	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Modine	1.769	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Reznor	0.175	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Reznor	0.175	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Reznor	0.175	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Reznor	0.175	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Reznor	0.3	MMBtu	Nat Gas		X
Space Heating	Heating Unit	Thermocycler	0.505	MMBtu	Nat Gas		X
Hot Water Heater	Hot Water Heater	Rinnai	0.18	MMBtu	Nat Gas		X
Space Heating	Infra-Red Heat Unit	Infra-Red Heat Unit	0.065	MMBtu	Nat Gas		X
Space Heating	Infra-Red Heat Unit	Infra-Red Heat Unit	0.065	MMBtu	Nat Gas		X
Space Heating	Infra-Red Heat Unit	Infra-Red Heat Unit	0.065	MMBtu	Nat Gas		X
Space Heating	Infra-Red Heat Unit	Infra-Red Heat Unit	0.065	MMBtu	Nat Gas		X
Space Heating	Modine- Hot Dwag	Modine- Hot Dwag	0.175	MMBtu	Nat Gas		X
Space Heating	Modine- Hot Dwag	Modine- Hot Dwag	0.175	MMBtu	Nat Gas		X
Space Heating	Modine- Hot Dwag	Modine- Hot Dwag	0.175	MMBtu	Nat Gas		X
Space Heating	Split System	York	0.06	MMBtu	Nat Gas		X
Space Heating	Split System	York	0.18	MMBtu	Nat Gas		X
Space Heating	Split System	York	0.06	MMBtu	Nat Gas		X
Space Heating	Split System	York	0.12	MMBtu	Nat Gas		X
Space Heating	Split System	York	0.12	MMBtu	Nat Gas		X

UMR Total: 2.9345 mmBTU
SSLP Total: 15.419 mmBTU

UMR, SSLP, R&D and Thin Set PTE Fuel Use

No.2 Fuel Oil PTE Fuel Consumption			
No. 2 Fuel OilEngine Description:	Total HP for Fuel Consumption @ 100 hrs per 6 CRR-NY 200.1 (bl)		
Engine Power Rating, hp	2,813	Diesel Fuel, BTU/gal.	137,000
No.2 Fuel Oil, gallons/hr	143.7		
mmBTU/hr	19.6910		
Operating Hrs/yr	100		
Fuel Consumption, gal/yr	**14,373**		
Natural Gas PTE Fuel Consumption			
Natural Gas Engine Description:	Total HP for Fuel Consumption @ 100 hrs per 6 CRR-NY 200.1 (bl)		
Engine Power Rating, hp	658	Natural Gas, BTU/scf	1,032
Natural Gas, scf/hr	4463.2		
mmBTU/hr	4.6060		
Operating Hrs/yr	100		
Fuel Consumption, mmscf/yr	**0.446**		
Burner Description:	Cumulative Boiler BTU/hr Rating		
Heat Rating, BTU/hr	32,317,500	Nat. Gas, BTU/scf	1,032
Nat. Gas, scf/hr	31,315		
Operating (Heating) Hrs/yr	8,760		
Nat. Gas, mmscf/yr	**274.32**		
Burner Description:	RTO		
Maximum Design, BTU/hr	1,672,000	Nat. Gas, BTU/scf	1,032
Normal Operation, BTU/hr	40,266		
Idle Mode, BTU/hr	1,257,594		
Normal Operating Hrs/yr	8,760		
Idle Operating, Hrs/yr	0		
Normal Operating mmbtu/yr	353		
Idle Operating mmbtu/yr	0		
Normal Mode Nat. Gas, mmscf/yr	0.34		
Idlel Mode Nat. Gas, mmscf/yr	0.00		
Nat. Gas, mmscf/yr	**0.34**		
Total mmscf/yr	**275.11**		
Propane PTE Fuel Consumption			
Actual, gal/yr	19,956		
Operating day/yr	252		
Consumption, gal/day	79.2		
Calendar, day/yr	365		
PTE, gal/yr*	**28,905**		

*Calculated by multiplying daily consumption by 365

UMR, R&D and Thin Set PTE Fuel Use

	Maximum Practical Run Time All Combustion Sources (8760 hrs)
	Factor Therms, Diesel and Propane from actual hours to 8760 hrs
31.70	Overall mmBTU/hr of all boilers
0.1	mmBTU/Therm
316.975	Therm per hour
7607.4	Therms per day
2776701	Therms per year
1032	mmBTU/mmCF
10320	Therm/mmCF
0.031	mmCF/hour
0.74	mmCF/day
269.06	mmCF/yr

Forklift Use	
Normal Operations 24/7, M - F, Minus 9 company holidays (per T.Beyer email, 4/11/23)	
52	weeks
5	days per week
260	days per year excl holidays
252	actual days per year
Factor 365/251	
1.45	X Actual fuel consumption = Potential Fuel Consumption
19,956	gallons (2022 usage)
28905	ERP propane use

Fire Pump and Emergency Genrators Diesel Consumption	
at 100 hours per year	
See Fuel CLCPA Master Spreadsheet 11.30.23 from JMT on 7/16/24	
14373.0	gallons
Nat Gas	
0.444	mmSCF
4583.8	Therms

Boilers	Name Plate Heat Input Rating (MMBtu)	
UMR Package Plant	10.04	Cleaver Brooks, constr 2/15/2018
SSLP Hot Oil Heater	0	Gesab 232 kW, mfg date 2009
Warehouse Parking Lot Heat	2.5	Laars Magnatherm, mfg date 3/20/2019
Training Room Floor Heat	0.096	Burnham, mfg date 9/96
R&D Primary	0.264	Laars NeoTherm, mfg date 8/25/2021
R&D Backup	0.264	Laars NeoTherm, mfg date 8/25/2021
Subtotal	13.16	
Hot Water Heater	0.18	
Space Heaters:		
UMR	2.9	
SSLP	15.4	
Total Heat Input Rating	31.70	

SSLP (Hot Oil Heter) PTE Fuel Use

	Maximum Practical Run Time All Combustion Sources (8760 hrs)
	Factor Therms, Diesel and Propane from actual hours to 8760 hrs
0.80	Overall mmBTU/hr of all boilers
0.1	mmBTU/Therm
8	Therm per hour
192	Therms per day
70080	Therms per year
1032	mmBTU/mmCF
10320	Therm/mmCF
0.001	mmCF/hour
0.02	mmCF/day
6.79	mmCF/yr

Forklift Use	
Normal Operations 24/7, M - F, Minus 9 company holidays (per T.Beyer email, 4/11/23)	
52	weeks
5	days per week
260	days per year excl holidays
252	actual days per year
Factor 365/251	
1.45	X Actual fuel consumption = Potential Fuel Consumption
0	gallons (2022 usage)
0	ERP propane use

Fire Pump and Emergency Genrators Diesel Consumption	
at 100 hours per year	
See Fuel CLCPA Master Spreadsheet 11.30.23 from JMT on 7/16/24	
0.0	gallons
Nat Gas	
0.000	mmSCF
0.0	Therms

Boilers	Name Plate Heat Input Rating (MMBtu)	
UMR Package Plant		Cleaver Brooks, constr 2/15/2018
SSLP Hot Oil Heater	0.8	Gesab 232 kW, mfg date 2009
Warehouse Parking Lot Heat		Laars Magnatherm, mfg date 3/20/2019
Training Room Floor Heat		Burnham, mfg date 9/96
R&D Primary		Laars NeoTherm, mfg date 8/25/2021
R&D Backup		Laars NeoTherm, mfg date 8/25/2021

Subtotal	0.80	mmBTU
Hot Water Heater	0	mmBTU
Space Heaters:		
UMR	0.0	mmBTU
SSLP	0.0	mmBTU
Total Heat Input Rating	0.80	mmBTU

Actual Natural Gas Consumption[1]	
Building/Operation	Max 12-Mo Rolling Total
Warehouse	113,850
Thinset	20,700
R&D[2]	16,100
SSLP	26,450
UMR	272,550
RTO[3]	33,993.00
Total (Therms)	483,643
Conversion, mmBTU/Therm	0.10
Annual mmBTU	48,364.30
Conversion, mmbtu/mmscf	1,037
Total (mmscf)	**46.64**

[1]NYSEG invoicing April 2020 to February 2022, factored up 15%

[2]annual average based on 3 months data, factored up 15%

[3]Per manufacturer projection

Actual No. 2 Fuel Oil Consumption[1]	
Building/Operation	Gallons
UMR/SSLP[2]	552
Thinset	23
R&D	543
Warehouse	31
Total	**1149**

[1]Based on purchases from March 2021 to March 2022

[2] Shared Fire Pump and Emergency Generator

Actual Propane Consumption[1]	
Building/Operation	Max 12-Mo Rolling Total Gallons
Main Warehouse	11,919
R&D Lab[2]	118
Thinset	6,162
UMS	4,751
Total	**22,949**

[1]Based on purchases from April 2019 to March 2022, factored up 15%

[2]Annual average based on 36 months of data, factored up 15%

UMR COMBUSTION ERP and PTE
PROCESS AND EXEMPT SOURCES

Natural Gas Usage

Annual Therms	**2,781,285**	Therms	0.10 mmBTU/Therm
Annual Energy	**278,128**	mmBTU	1,032 mmBTU/mmCF
Annual Volume	**269.50**	mmCF	

	lb/10^6 scf	lb/yr	tons/yr	Method of Calculation
NOx (uncontrolled)	100	**26,950**	**13.48**	AP-42 Emission Factors
CO	84	**22,638**	**11.32**	AP-42 Emission Factors
CO2	120,000	**32,340,521**	**16,170**	AP-42 Emission Factors
N2O (Uncontrolled)	2.2	**593**	**0.2965**	AP-42 Emission Factors
PM (Total)	7.6	**2,048**	**1.024**	AP-42 Emission Factors
PM (Condensable)	5.7	**1,536**	**0.768**	AP-42 Emission Factors
PM(Filterable)	1.9	**512**	**0.2560**	AP-42 Emission Factors
SO2	0.6	**162**	**0.0809**	AP-42 Emission Factors
TOC	11.0	**2,965**	**1.4823**	AP-42 Emission Factors
Methane	2.3	**620**	**0.3099**	AP-42 Emission Factors
VOC	5.5	**1,482**	**0.7411**	AP-42 Emission Factors
Lead	0.0005	**0**	**0.000067**	AP-42 Emission Factors
HAP (see Natural Gas HAP calculations)				

Propane - Fork Lifts

	28,905	gallons	
(using AP-42 Emission Factors for Boilers)			

	lb/1000 gal	lb/yr	tons/yr	Method of Calculation
NOx (uncontrolled)	13	**376**	**0.19**	AP-42 Emission Factors
CO	8	**217**	**0.11**	AP-42 Emission Factors
CO2	12,500	**361,307**	**181**	AP-42 Emission Factors
N2O (Uncontrolled)	0.9	**26**	**0.0130**	AP-42 Emission Factors
PM (Total)	0.7	**20**	**0.010**	AP-42 Emission Factors
PM (Condensable)	0.5	**14**	**0.007**	AP-42 Emission Factors
PM(Filterable)	0.2	**6**	**0.0029**	AP-42 Emission Factors
SO2 (0.10S)*	0.054	**2**	**0.0008**	AP-42 Emission Factors
TOC	1.0	**29**	**0.0145**	AP-42 Emission Factors
Methane	0.2	**6**	**0.0029**	AP-42 Emission Factors
VOC (TOC)	1.0	28.9	0.0145	
Lead	--			
HAP (trivial source)	--			

*Sulfur Content S	0.54 gr/100 cf	National Methodology and Emissions Inventory for Residential Fuel Combustion

UMR COMBUSTION ERP and PTE
PROCESS AND EXEMPT SOURCES

Diesel - All Combustion Units

14,373	gallons	
1,972	mmBTU	0.1372 mmBTU/gal

	lb/mmBTU	lb/yr	tons/yr	Method of Calculation
NOx (uncontrolled)	4.41	**8,696**	**4.35**	AP-42 Emission Factors
CO	0.95	**1,873**	**0.94**	AP-42 Emission Factors
CO2	164	**323,404**	**162**	AP-42 Emission Factors
N2O (Uncontrolled)	--			
PM-10	0.3	**611**	**0.306**	AP-42 Emission Factors
PM (Condensable)	--			
PM(Filterable)	--			
SOx	0.29	**572**	**0.2859**	AP-42 Emission Factors
TOC	0.4	**710**	**0.3550**	AP-42 Emission Factors
Methane	--			
VOC (TOC + HAP)	0.364	717	0.359	
Lead	--			
HAP**	0.0036	**7**	**0.0035**	AP-42 Emission Factors

**Total of benzen, toluene, xylenes, 1,3-butadiene, formaldehyde, acrolein, and naphthalene

UMR and Exempt Sources Combustion ERP and PTE

	With RTO		Without RTO	
	ERP tons/yr	PTE tons/yr	ERP tons/yr	PTE tons/yr
NOx (uncontrolled)	20.9	18.08	18.0	18.01
CO	22.6	12.61	12.4	12.36
CO2	17,463	17,289	16,513	16,513
N2O (Uncontrolled)	0.33	0.31	0.31	0.31
PM (Total)***	1.39	1.34	1.34	1.34
PM (Condensable)	0.82	0.78	0.78	0.78
PM(Filterable)	0.27	0.26	0.26	0.26
SO2	0.37	0.37	0.37	0.37
TOC	1.93	1.85	1.85	1.85
Methane	0.33	0.31	0.31	0.31
VOC	1.15	1.12	1.11	1.11
Lead	0.00007	0.00007	0.00007	0.00007
HAP (incl. Nat Gas)	0.2585	0.2572	0.2572	0.2572

*** PM (Total) includes PM-10 only from Diesel sources

SSLP COMBUSTION ERP and PTE
HOT OIL HEATER ONLY

Natural Gas Usage

Annual Therms	**70,080**	Therms	0.10	mmBTU/Therm
Annual Energy	**7,008**	mmBTU	1,032	mmBTU/mmCF
Annual Volume	**6.79**	mmCF		

	lb/10^6 scf	lb/yr	tons/yr	Method of Calculation
NOx (uncontrolled)	100	**679**	**0.34**	AP-42 Emission Factors
CO	84	**570**	**0.29**	AP-42 Emission Factors
CO2	120,000	**814,884**	**407**	AP-42 Emission Factors
N2O (Uncontrolled)	2.2	**15**	**0.0075**	AP-42 Emission Factors
PM (Total)	7.6	**52**	**0.026**	AP-42 Emission Factors
PM (Condensable)	5.7	**39**	**0.019**	AP-42 Emission Factors
PM(Filterable)	1.9	**13**	**0.0065**	AP-42 Emission Factors
SO2	0.6	**4**	**0.0020**	AP-42 Emission Factors
TOC	11.0	**75**	**0.0373**	AP-42 Emission Factors
Methane	2.3	**16**	**0.0078**	AP-42 Emission Factors
VOC	5.5	**37**	**0.0187**	AP-42 Emission Factors
Lead	0.0005	**0**	**0.000002**	AP-42 Emission Factors
HAP	--			

SSLP HOT OIL HEATER ERP/PTE

	ERP tons/yr	PTE tons/yr
NOx (uncontrolled)	0.3	0.34
CO	0.3	0.29
CO2	407	1,163
N2O (Uncontrolled)	0.01	0.01
PM (Total)***	0.03	0.03
PM (Condensable)	0.02	0.02
PM(Filterable)	0.01	0.01
SO2	0.00	0.00
TOC	0.04	0.04
Methane	0.01	0.01
VOC	0.02	0.02
Lead	0.00000	0.00000
HAP (incl. Nat Gas)	0.0064	0.0064

UMR + SSLP COMBUSTION EMISSIONS ESTIMATE ACTUAL

including exempt combustion sources

Natural Gas Usage - All Combustion Units excluding RTO

(using AP-42 Emission Factors for Boilers)

conversion 0.10 mmBTU/Therm

consersion 1,032 mmBTU/mmCF

	2022	2023	2027
Annual Therms	391,000	433,549	758,280
Annual Energy mmBTU	39,100	43,355	75,828
Annual Volume mmCF	38	42	73

	lb/mmCF	lb/yr	tons/yr	lb/yr	tons/yr	lb/yr	tons/yr
NOx (uncontrolled)	100	3,789	1.89	4,201	2.10	7,348	3.67
CO	84	3,183	1.59	3,529	1.76	6,172	3.09
CO2	120,000	4,546,512	2,273	5,041,267	2,521	8,817,208	4,409
N2O (Uncontrolled)	2.2	83	0.0417	92	0.0462	162	0.0808
PM (Total)	7.6	288	0.14	319	0.16	558	0.2792
PM (Condensable)	5.7	216	0.11	239	0.12	419	0.2094
PM(Filterable)	1.9	72	0.04	80	0.04	140	0.0698
SO2	0.6	23	0.01	25	0.01	44	0.0220
TOC	11.0	417	0.21	462	0.23	808	0.4041
Methane	2.3	87	0.04	97	0.05	169	0.0845
VOC	5.5	208	0.10	231	0.12	404	0.2021
Lead	0.0005	0.019	0.0000	0.021	0.0000	0.037	0.0000

Propane - Fork Lifts

(using AP-42 Emission Factors for Boilers)

	2022	2023	2027
gallons:	19,956	22,949	40,139

	lb/1000 gal	lb/yr	tons/yr	lb/yr	tons/yr	lb/yr	tons/yr
NOx (uncontrolled)	13	259	0.1297	298	0.1492	522	0.2609
CO	8	150	0.0748	172	0.0861	301	0.1505
CO2	12,500	249,450	125	286,868	143	501,733	251
N2O (Uncontrolled)	0.9	18	0.0090	21	0.0103	36	0.0181
PM (Total)	0.7	14	0.01	16	0.01	28	0.0140
PM (Condensable)	0.5	10	0.00	11	0.0057	20	0.0100
PM(Filterable)	0.2	4.0	0.00	4.6	0.0023	8.0	0.0040
SO2 (0.10S)*	0.054	1.1	0.00	1.2	0.0006	2.2	0.0011
TOC	1.0	20	0.01	23	0.0115	40	0.0201
Methane	0.2	4.0	0.00	4.6	0.0023	8.0	0.0040
VOC(TOC)	1.0	20	0.01	23	0.01	40	

*Sulfur Content S 0.54 gr/100 cf National Methodology and Emissions Inventory for Residential Fuel Combustion

UMR + SSLP COMBUSTION EMISSIONS ESTIMATE ACTUAL

including exempt combustion sources

Diesel - All Combustion Units

conversion 0.1372 mmBTU/gal

	2022			2023		2027	
gallons	1,200			1,200		1,200	
mmBTU	165			165		165	
	lb/mmBTU	lb/yr	tons/yr	lb/yr	tons/yr	lb/yr	tons/yr
NOx (uncontrolled)	4	726	0.3630	726	0.3630	726	0.3630
CO	1	156	0.0782	156	0.0782	156	0.0782
CO2	164	27,001	14	27,001	14	27,001	14
PM-10	0.3	51	0.03	51	0.03	51	0.0255
SOx	0.29	48	0.02	48	0.02	48	0.0239
TOC	0.4	59	0.03	59	0.03	59	0.0296
VOC(TOC+HAP**)	0.4	60	0.03	60	0.03	60	0.0299
HAP**	0.0036	0.6	0.0003	0.6	0.0003	0.6	0.0003

**Total of benzen, toluene, xylenes, 1,3-butadiene, formaldehyde, acrolein, and naphthalene

RTO

conversion 0.10 mmBTU/Therm

consersion 1,032 mmBTU/mmCF

Using RTO Manufacturer Fuel Use Estimates for Normal Operating and Idle Modes, including CO2 from natural gas combustion, VOC combustion and CO2 in process exhaust

	hrs	mmcf/yr	CO2 lb/yr	mmBTU/yr
Normal Operating	6,257	0.24	1,109,032	252
Idle Operating	2,503	3.04	407,213	3,148
	8,760	3.28	1,516,245	3,399

Emission Factors for NOx and CO provided by RTO Manufacturer

Compounds other than CO2, Nox and CO calculated with AP-42 emission factors for natural gas combustion

	2022			2023		2027	
Annual Therms (use PTE)	0			0		33,993	
Annual Energy mmBTU	0			0		3,399	
Annual Volume mmCF	0.00			0.00		3.29	
	lb/mmBTU	lb/yr	tons/yr	lb/yr	tons/yr	lb/yr	tons/yr
NOx (uncontrolled)	0.4	0	0.00	0	0.00	1,360	0.68
CO	1.4	0	0.00	0	0.00	4,759	2.38
CO2 ***	446	0	0	0	0	1,516,078	758
N2O (Uncontrolled)	0.002	0	0.0000	0	0.0000	7	0.0036
PM (Total)	0.007	0	0.00	0	0.00	25	0.0125
PM (Condensable)	0.006	0	0.00	0	0.00	19	0.0094
PM(Filterable)	0.002	0	0.00	0	0.00	6	0.0031
SO2	0.001	0	0.00	0	0.00	2	0.0010
TOC	0.011	0	0.00	0	0.00	36	0.0181
Methane	0.002	0	0.00	0	0.00	8	0.0038
VOC	0.005	0	0.00	0	0.00	18	0.0091
Lead	0.0000005	0.000	0.000	0.000	0.0000	0.002	0.0000
HAP	0.000						

*** Emission Factor supplied by RTO manufacturer, composite of operating modes

UMR + SSLP COMBUSTION EMISSIONS ESTIMATE ACTUAL

including exempt combustion sources

UMR + SSLP Combustion Emissions including exempt sources

including exempt sources	NO RTO 2022		NO RTO 2023		WITH RTO 2027
	lb/yr	tons/yr	lb/yr	tons/yr	tons/yr
NOx (uncontrolled)		2.39		2.61	4.98
CO		1.74		1.93	5.69
CO2		2,411		2,678	5,431
N2O (Uncontrolled)		0.05		0.06	0.10
PM (Total)***		0.18		0.19	0.33
PM (Condensable)		0.11		0.13	0.23
PM(Filterable)		0.04		0.04	0.08
SO2		0.04		0.04	0.05
TOC		0.25		0.27	0.47
Methane		0.05		0.05	0.09
VOC****		0.14		0.16	0.24
Lead		0.00		0.00	0.00
HAP (including Natural Gas combustion)		0.0360		0.0398	0.0726

*** PM (Total) includes PM-10 only from Diesel sources

**** VOC includes TOC from propane, TOC and HAP from diesel

Durr - CO2 emission calcs
10/6/2022

		Maximum Design	Normal Operation	Idle Mode	Total
airflow	scfm	10,000	9,792	8,500	
VOC loading (C5H12)	lb/hr	0.0	50.1	0.0	
annual operating hour	hr/yr	8,760	6,257	2,503	
burner firing rate	btu/hr	1,672,000	40,226	1,257,594	
annual burner firing rate	mmbtu/yr	14,647	252	3,148	
CO2 generated by natural gas					
natural gas HHV	mmbtu/mmcf	1,037.0	1,037.0	1,037.0	
annual natural gas consumption	mmcf/yr	14.12	0.24	3.04	
CO2 emission rate - natural gas	lb CO2/mmcf	120,000	120,000	120,000	
annual CO2 emissions	lb CO2/yr	**1,694,895**	**29,126**	**364,233**	**393,359**
CO2 generated by VOC					
annual VOC loading (C5H12)	lb/yr	0	313,483	0	
CO2 emission rate - C5H12	lb CO2/lb VOC	3.05	3.05	3.05	
annual CO2 emissions	lb CO2/yr	**0**	**956,123**	**0**	**956,123**
CO2 from process exhaust					
CO2 concentration in process exhaust	% vol	0.035%	0.030%	0.030%	
CO2 density at standard condition	lb/scf	0.114	0.114	0.114	
CO2 loading in process exhaust	lb CO2/yr	**206,682**	**123,783**	**42,980**	**166,764**
Total CO2 at RTO stack	lb CO2/yr	**1,901,578**	**1,109,032**	**407,213**	**1,516,245**
	tons CO2/yr	951	555	204	758

Regenerative Thermal Oxidizer

Manufacturer's Design Basis			
RTO Physical Capacity	10,000	cfm	
Natural Gas Heat Content	1,032	BTU/SCF	
Unrestricted Fuel Consumption	1,672,000	BTU/hr	(Info provided by Durr)

In operation, VOC load offsets RTO natural gas fuel demand

VOC Load at Full Flow 50.1 lb/hr
(sum of hourly emissions from stack testing)

Full Flow Operation controls UMR Pre-Expander Fluidized Bed, Pre-Expander Room Floor Sweeps, Molding Machine Stacks, Silo Room and Roll Storage Area

Idle Operation controls only Silo Room and Roll Storage Area.

RTO controls the Silo Room and Roll Storage Area continuously.

Equilibrium/steady state VOC concentration in Silo Room and Roll Storage area is trivial.

	Operating Flow Rate cfm	Fuel Demand BTU/hr	Schedule	Hours per Year	mmBTU/yr	
ERP						
At design capacity, no VOC load, 8760 hours	10,000	1,672,000	24/7/365	8,760	14,647	ERP
Full Flow	9,792	40,226	24/5	6,257	252	
Idle	8,500	1,257,594	24/2	2,503	3,148	
Normal Operation Theoretical Max Fuel Demand mmBTU/yr					3399	PTE

REGENERATIVE THERMAL OXIDIZER
ERP and PTE EMISSIONS

RTO ERP

Annual Therms	**146,467**	Therms	
Annual Energy	**14,647**	mmBTU/yr	8760 hrs Max Capacity, NG Only
Nat Gas Heat Content	**1,032**	mmBTU/mmCF	

	lb/mmBTU	lb/yr	tons/yr	Method of Calculation
NOx (uncontrolled)	0.4	**5,859**	**2.93**	Vendor Supplied
CO	1.4	**20,505**	**10.3**	Vendor Supplied
CO2	130	**1,901,578**	**951**	Vendor Supplied
N2O (Uncontrolled)	0.002	**31.22**	**0.0156**	AP-42 Emission Factors
PM (Total)	0.007	**107.86**	**0.054**	AP-42 Emission Factors
PM (Condensable)	0.006	**80.90**	**0.040**	AP-42 Emission Factors
PM(Filterable)	0.002	**26.97**	**0.0135**	AP-42 Emission Factors
SO2	0.0006	**8.52**	**0.0043**	AP-42 Emission Factors
TOC	0.01	**156.12**	**0.0781**	AP-42 Emission Factors
Methane	0.002	**32.64**	**0.0163**	AP-42 Emission Factors
VOC	0.005	**78.06**	**0.0390**	AP-42 Emission Factors
Lead	0.0000005	**0.01**	**0.000004**	AP-42 Emission Factors
HAP (see Natural Gas HAP calculations)				

RTO PTE

Annual Therms*	**3,524**	Therms (supplemental fuel use)	
Annual Energy	**352**	mmBTU/yr	8760 hrs Normal Op Mode
Nat Gas Heat Content	**1,032**	mmBTU/mmCF	

Pollutants from Natural Gas Combustion	lb/mmBTU	lb/yr	tons/yr	Method of Calculation
NOx (uncontrolled)	0.4	**141**	**0.07**	Vendor Supplied
CO	1.4	**493**	**0.25**	Vendor Supplied
CO2	116	**40,974**	**20**	AP-42 Emission Factors
N2O (Uncontrolled)	0.002	**0.8**	**0.0004**	AP-42 Emission Factors
PM (Total)	0.007	**2.6**	**0.001**	AP-42 Emission Factors
PM (Condensable)	0.006	**1.9**	**0.001**	AP-42 Emission Factors
PM(Filterable)	0.002	**0.6**	**0.0003**	AP-42 Emission Factors
SO2	0.0006	**0.2**	**0.0001**	AP-42 Emission Factors
TOC	0.01	**3.8**	**0.0019**	AP-42 Emission Factors
Methane	0.002	**0.8**	**0.0004**	AP-42 Emission Factors
VOC	0.005	**1.9**	**0.0009**	AP-42 Emission Factors
Lead	0.0000005	**0.0**	**0.000000**	AP-42 Emission Factors
HAP (see Natural Gas HAP calculations)				

* - Natural Gas burned while the primary energy source is process generated VOC.

REGENERATIVE THERMAL OXIDIZER
ERP and PTE EMISSIONS

CO2 Derived from destruction of process generated VOC

	8,760 hrs/yr			Method of
	lb/hr	lb/yr	tons/yr	Calculation
CO2	177.2	**1,552,680**	**776**	Vendor Supplied
RTO Total CO2 PTE			**797**	

HAP Emissions from Natural Gas Combustion

UMR+SSLP+RTO

	ERP Therms	PTE Therms	2023 Therms	2027 Therms
UMR, SSLP and Exempt Boilers	2,846,781	2,846,781	433,549	758,280
Generators	4584	4584		
RTO	14,647	352		33,993
Total	2,866,012	2,851,717	433,549	792,273
mmBTU	286,601	285,172	43,355	79,227
mmCF	278	276	42	77

	EF lb/mmscf[1]	Emissions tpy	Emissions tpy	Emissions tpy	Emissions tpy
2-Methylnaphthalene	2.40E-05	3.33E-06	3.32E-06	5.04E-07	9.21E-07
3-Methylcholanthrene	1.80E-06	2.50E-07	2.49E-07	3.78E-08	6.91E-08
7,12- Dimethylbenz(a)anthracene	1.60E-05	2.22E-06	2.21E-06	3.36E-07	6.14E-07
Acenaphthene	1.80E-06	2.50E-07	2.49E-07	3.78E-08	6.91E-08
Acenaphthylene	1.80E-06	2.50E-07	2.49E-07	3.78E-08	6.91E-08
Anthracene	2.40E-06	3.33E-07	3.32E-07	5.04E-08	9.21E-08
Benz(a)anthracene	1.80E-06	2.50E-07	2.49E-07	3.78E-08	6.91E-08
Benzene	2.10E-03	2.92E-04	2.90E-04	4.41E-05	8.06E-05
Benzo(a)pyrene	1.20E-06	1.67E-07	1.66E-07	2.52E-08	4.61E-08
Benzo(b)fluoranthene	1.80E-06	2.50E-07	2.49E-07	3.78E-08	6.91E-08
Benzo(g,h,i)perylene	1.20E-06	1.67E-07	1.66E-07	2.52E-08	4.61E-08
Benzo(k)fluoranthene	1.80E-06	2.50E-07	2.49E-07	3.78E-08	6.91E-08
Chrysene	1.80E-06	2.50E-07	2.49E-07	3.78E-08	6.91E-08
Dibenzo(a,h)anthracene	1.20E-06	1.67E-07	1.66E-07	2.52E-08	4.61E-08
Dichlorobenzene	1.20E-03	1.67E-04	1.66E-04	2.52E-05	4.61E-05
Fluoranthene	3.00E-06	4.17E-07	4.14E-07	6.30E-08	1.15E-07
Fluorene	2.80E-06	3.89E-07	3.87E-07	5.88E-08	1.07E-07
Formaldehyde	7.50E-02	1.04E-02	1.04E-02	1.58E-03	2.88E-03
Hexane	1.80E+00	2.50E-01	2.49E-01	3.78E-02	6.91E-02
Indendo(1,2,3-cd)pyrene	1.80E-06	2.50E-07	2.49E-07	3.78E-08	6.91E-08
Naphthalene	6.10E-04	8.47E-05	8.43E-05	1.28E-05	2.34E-05
Phenanathrene	1.70E-05	2.36E-06	2.35E-06	3.57E-07	6.53E-07
Pyrene	5.00E-06	6.94E-07	6.91E-07	1.05E-07	1.92E-07
Toluene	3.40E-03	4.72E-04	4.70E-04	7.14E-05	1.31E-04
Total		0.26138	0.26008	0.03954	0.07226

[1]USEPA AP-42 Chapter 1.4, Natural Gas Combustion

HAP Emissions from Natural Gas Combustion		UMR+SSLP no RTO		
		2022 Actual Therms	2023 Actual Therms	2027 Actual Therms
UMR, SSLP and Exempt Sources		391,000	433,549	758,280
RTO				
Total		391,000	433,549	758,280
mmBTU		39,100	43,355	75,828
mmCF		38	42	73
	EF lb/mmscf[1]	Emissions tpy	Emissions tpy	Emissions tpy
2-Methylnaphthalene	2.40E-05	4.55E-07	5.04E-07	8.82E-07
3-Methylcholanthrene	1.80E-06	3.41E-08	3.78E-08	6.61E-08
7,12- Dimethylbenz(a)anthracene	1.60E-05	3.03E-07	3.36E-07	5.88E-07
Acenaphthene	1.80E-06	3.41E-08	3.78E-08	6.61E-08
Acenaphthylene	1.80E-06	3.41E-08	3.78E-08	6.61E-08
Anthracene	2.40E-06	4.55E-08	5.04E-08	8.82E-08
Benz(a)anthracene	1.80E-06	3.41E-08	3.78E-08	6.61E-08
Benzene	2.10E-03	3.98E-05	4.41E-05	7.72E-05
Benzo(a)pyrene	1.20E-06	2.27E-08	2.52E-08	4.41E-08
Benzo(b)fluoranthene	1.80E-06	3.41E-08	3.78E-08	6.61E-08
Benzo(g,h,i)perylene	1.20E-06	2.27E-08	2.52E-08	4.41E-08
Benzo(k)fluoranthene	1.80E-06	3.41E-08	3.78E-08	6.61E-08
Chrysene	1.80E-06	3.41E-08	3.78E-08	6.61E-08
Dibenzo(a,h)anthracene	1.20E-06	2.27E-08	2.52E-08	4.41E-08
Dichlorobenzene	1.20E-03	2.27E-05	2.52E-05	4.41E-05
Fluoranthene	3.00E-06	5.68E-08	6.30E-08	1.10E-07
Fluorene	2.80E-06	5.30E-08	5.88E-08	1.03E-07
Formaldehyde	7.50E-02	1.42E-03	1.58E-03	2.76E-03
Hexane	1.80E+00	3.41E-02	3.78E-02	6.61E-02
Indendo(1,2,3-cd)pyrene	1.80E-06	3.41E-08	3.78E-08	6.61E-08
Naphthalene	6.10E-04	1.16E-05	1.28E-05	2.24E-05
Phenanathrene	1.70E-05	3.22E-07	3.57E-07	6.25E-07
Pyrene	5.00E-06	9.47E-08	1.05E-07	1.84E-07
Toluene	3.40E-03	6.44E-05	7.14E-05	1.25E-04
	Total	0.03566	0.03954	0.06916

[1]USEPA AP-42 Chapter 1.4, Natural Gas Combustion

HAP Emissions from UMR+RTO

Natural Gas Combustion

	ERP Therms	PTE Therms	2027 Therms
UMR Process and Exempt Boilers	2,776,701	2,776,701	758,280
Generators	4584	4584	--
RTO	146467	3524	33,993
Total	2,927,752	2,784,809	792,273
mmBTU	292,775	278,481	79,227
mmCF	284	270	77

	EF lb/mmscf[1]	**Emissions tpy**	**Emissions tpy**	**Emissions tpy**
2-Methylnaphthalene	2.40E-05	3.40E-06	3.24E-06	9.21E-07
3-Methylcholanthrene	1.80E-06	2.55E-07	2.43E-07	6.91E-08
7,12- Dimethylbenz(a)anthracene	1.60E-05	2.27E-06	2.16E-06	6.14E-07
Acenaphthene	1.80E-06	2.55E-07	2.43E-07	6.91E-08
Acenaphthylene	1.80E-06	2.55E-07	2.43E-07	6.91E-08
Anthracene	2.40E-06	3.40E-07	3.24E-07	9.21E-08
Benz(a)anthracene	1.80E-06	2.55E-07	2.43E-07	6.91E-08
Benzene	2.10E-03	2.98E-04	2.83E-04	8.06E-05
Benzo(a)pyrene	1.20E-06	1.70E-07	1.62E-07	4.61E-08
Benzo(b)fluoranthene	1.80E-06	2.55E-07	2.43E-07	6.91E-08
Benzo(g,h,i)perylene	1.20E-06	1.70E-07	1.62E-07	4.61E-08
Benzo(k)fluoranthene	1.80E-06	2.55E-07	2.43E-07	6.91E-08
Chrysene	1.80E-06	2.55E-07	2.43E-07	6.91E-08
Dibenzo(a,h)anthracene	1.20E-06	1.70E-07	1.62E-07	4.61E-08
Dichlorobenzene	1.20E-03	1.70E-04	1.62E-04	4.61E-05
Fluoranthene	3.00E-06	4.26E-07	4.05E-07	1.15E-07
Fluorene	2.80E-06	3.97E-07	3.78E-07	1.07E-07
Formaldehyde	7.50E-02	1.06E-02	1.01E-02	2.88E-03
Hexane	1.80E+00	2.55E-01	2.43E-01	6.91E-02
Indendo(1,2,3-cd)pyrene	1.80E-06	2.55E-07	2.43E-07	6.91E-08
Naphthalene	6.10E-04	8.65E-05	8.23E-05	2.34E-05
Phenanathrene	1.70E-05	2.41E-06	2.29E-06	6.53E-07
Pyrene	5.00E-06	7.09E-07	6.75E-07	1.92E-07
Toluene	3.40E-03	4.82E-04	4.59E-04	1.31E-04
Total		0.26702	0.25398	0.07226

[1]USEPA AP-42 Chapter 1.4, Natural Gas Combustion

HAP Emissions from Natural Gas Combustion

UMR no RTO

	ERP Therms	PTE Therms	2027 Therms
UMR and Exempt Boilers	2776701	2776701	758280
Generators	4584	4584	--
RTO			
Total	2,781,285	2,781,285	758280
mmBTU	278128	278128	75828
mmCF	270	270	73

	EF lb/mmscf[1]	Emissions tpy	Emissions tpy	Emissions tpy
2-Methylnaphthalene	2.40E-05	3.23E-06	3.23E-06	8.82E-07
3-Methylcholanthrene	1.80E-06	2.43E-07	2.43E-07	6.61E-08
7,12- Dimethylbenz(a)anthracene	1.60E-05	2.16E-06	2.16E-06	5.88E-07
Acenaphthene	1.80E-06	2.43E-07	2.43E-07	6.61E-08
Acenaphthylene	1.80E-06	2.43E-07	2.43E-07	6.61E-08
Anthracene	2.40E-06	3.23E-07	3.23E-07	8.82E-08
Benz(a)anthracene	1.80E-06	2.43E-07	2.43E-07	6.61E-08
Benzene	2.10E-03	2.83E-04	2.83E-04	7.72E-05
Benzo(a)pyrene	1.20E-06	1.62E-07	1.62E-07	4.41E-08
Benzo(b)fluoranthene	1.80E-06	2.43E-07	2.43E-07	6.61E-08
Benzo(g,h,i)perylene	1.20E-06	1.62E-07	1.62E-07	4.41E-08
Benzo(k)fluoranthene	1.80E-06	2.43E-07	2.43E-07	6.61E-08
Chrysene	1.80E-06	2.43E-07	2.43E-07	6.61E-08
Dibenzo(a,h)anthracene	1.20E-06	1.62E-07	1.62E-07	4.41E-08
Dichlorobenzene	1.20E-03	1.62E-04	1.62E-04	4.41E-05
Fluoranthene	3.00E-06	4.04E-07	4.04E-07	1.10E-07
Fluorene	2.80E-06	3.77E-07	3.77E-07	1.03E-07
Formaldehyde	7.50E-02	1.01E-02	1.01E-02	2.76E-03
Hexane	1.80E+00	2.43E-01	2.43E-01	6.61E-02
Indendo(1,2,3-cd)pyrene	1.80E-06	2.43E-07	2.43E-07	6.61E-08
Naphthalene	6.10E-04	8.22E-05	8.22E-05	2.24E-05
Phenanathrene	1.70E-05	2.29E-06	2.29E-06	6.25E-07
Pyrene	5.00E-06	6.74E-07	6.74E-07	1.84E-07
Toluene	3.40E-03	4.58E-04	4.58E-04	1.25E-04
Total		0.25366	0.25366	0.06916

[1]USEPA AP-42 Chapter 1.4, Natural Gas Combustion

HAP Emissions from **SSLP**

Natural Gas Combustion **Hot Oil Heater Only**

	ERP Therms	PTE Therms
SSLP Oil Heater Only	70,080	70,080
Generators		
RTO		
Total	70,080	70,080
mmBTU	7008	7008
mmCF	6.8	6.8

	EF lb/mmscf[1]	Emissions tpy	Emissions tpy
2-Methylnaphthalene	2.40E-05	8.15E-08	8.15E-08
3-Methylcholanthrene	1.80E-06	6.11E-09	6.11E-09
7,12- Dimethylbenz(a)anthracene	1.60E-05	5.43E-08	5.43E-08
Acenaphthene	1.80E-06	6.11E-09	6.11E-09
Acenaphthylene	1.80E-06	6.11E-09	6.11E-09
Anthracene	2.40E-06	8.15E-09	8.15E-09
Benz(a)anthracene	1.80E-06	6.11E-09	6.11E-09
Benzene	2.10E-03	7.13E-06	7.13E-06
Benzo(a)pyrene	1.20E-06	4.07E-09	4.07E-09
Benzo(b)fluoranthene	1.80E-06	6.11E-09	6.11E-09
Benzo(g,h,i)perylene	1.20E-06	4.07E-09	4.07E-09
Benzo(k)fluoranthene	1.80E-06	6.11E-09	6.11E-09
Chrysene	1.80E-06	6.11E-09	6.11E-09
Dibenzo(a,h)anthracene	1.20E-06	4.07E-09	4.07E-09
Dichlorobenzene	1.20E-03	4.07E-06	4.07E-06
Fluoranthene	3.00E-06	1.02E-08	1.02E-08
Fluorene	2.80E-06	9.51E-09	9.51E-09
Formaldehyde	7.50E-02	2.55E-04	2.55E-04
Hexane	1.80E+00	6.11E-03	6.11E-03
Indendo(1,2,3-cd)pyrene	1.80E-06	6.11E-09	6.11E-09
Naphthalene	6.10E-04	2.07E-06	2.07E-06
Phenanathrene	1.70E-05	5.77E-08	5.77E-08
Pyrene	5.00E-06	1.70E-08	1.70E-08
Toluene	3.40E-03	1.15E-05	1.15E-05
	Tota	0.00639	0.00639

[1]USEPA AP-42 Chapter 1.4, Natural Gas Combustion

KB4 Exempt Combustion Sources

Inentory of Proposed Boilers		
Boiler	Name Plate Heat Input Rating (MMBtu)	Fuel Type
Cleaver Brooks DR CFLC - 1	8	Natural Gas
Cleaver Brooks DR CFLC - 2	8	Natural Gas
Cleaver Brooks DR CFLC - 3	8	Natural Gas
Cleaver Brooks DR CFLC - 4	8	Natural Gas
Cleaver Brooks DR CFLC - 5	8	Natural Gas
Cleaver Brooks DR CFLC - 6	8	Natural Gas
Cleaver Brooks DR CFLC - 7	8	Natural Gas
Cleaver Brooks DR CFLC - 8	8	Natural Gas

Inventory of Proposed Generators		
Generator	Raiting HP	Fuel Type
Generac MD 1250	1,881	Diesel
Generac MD 1000	1412	Diesel
Generac MD 2000	2,923	Diesel
Generac MD 2000	2,923	Diesel
Generac MD 1250	1,881	Diesel

KB4 Combustion Source Emissions Summary

ERP/PTE	KB4 Exempt Boilers tons/yr	KB4 Exempt Generators tons/yr	KB4 Emission Unit Combustion tons/yr
VOC	1.49	0.35	1.84
PM (Total)	2.1	0.4	2.5
NOx	13.6	12.3	25.9
CO	22.8	3.3	26.1
SO2	0.163	0.006	0.169
HAP	0.51	0.0058	0.5171
CO2	32,595	627	33,222

Actual 2027	KB4 Exempt Boilers tons	KB4 Exempt Generators tons	KB4 Emission Unit Combustion tons
VOC	0.06	0.17	0.23
PM (Total)	0.1	0.2	0.3
NOx	0.6	6.2	6.7
CO	0.9	1.6	2.6
SO2	0.007	0.0029	0.0096
HAP	0.0210	0.0029	0.0239
CO2	1,340	313	1,653

KB4 Combustion PTE Emissions

I. Operating Parameters

Hours/year	8,760

Exempt Boilers

A) Burner Description: Supplementary Boilers(exempt per 6 CRR-NY 201-3.2 (1)(i))

Cumulative Heat Rating, BTU/hr[1]	64,000,000
Nat. Gas, BTU/scf	1,032
Nat. Gas, scf/hr	62,016
[2]Operating (Heating) Hrs/yr*	8,760
Nat. Gas, mmscf/yr	543.26

USEPA AP-42 Chapter 1.4, *Natural Gas Combustion*, 7/98 Tables 1.4-1 & 1.4-2.

Criteria Pollutants	EF lb/mmscf	Emissions (lb/hr)	Emissions (lb/yr)	Emissions (tpy)
NOx[3]	50	3.1008	27,162.79	13.58
PM	7.6	0.4713	4,128.74	2.06
PM10	7.6	0.4713	4,128.74	2.06
SO2	0.6	0.0372	325.95	0.16
CO[3]	84	5.2093	45,633.49	22.82
VOC	5.5	0.3411	2,987.91	1.49

[1]Cumulative rating of seven (8) boilers, each rated at 8,000,000 btu/hr.

[2] All calculations on this page are overly conservative.

[3]AP42 Controlled Low NOx Small Boiler (<100 MMBtu/hr)

Exempt Boilers Speciated Organics

Burner Description: Supplementary Boilers(exempt per 6 CRR-NY 201-3.2 (1)(i))

Heat Rating, BTU/hr	64,000,000
Natural Gas, BTU/scf	1,032
Natural Gas, scf/hr	62,016
mmBTU/hr	64
Operating (Heating) Hrs/yr	8,760 (assumed maximum, all calculations on this page are overly conservative)
Natural Gas, mmscf/yr	543.26

	EF lb/mmscf[1]	Emissions lb/hr	Emissions lb/yr	Emissions tpy
2-Methylnaphthalene	2.40E-05	1.49E-06	1.30E-02	6.52E-06
3-Methylcholanthrene	1.80E-06	1.12E-07	9.78E-04	4.89E-07
7,12- Dimethylbenz(a)anthracene	1.60E-05	9.92E-07	8.69E-03	4.35E-06
Acenaphthene	1.80E-06	1.12E-07	9.78E-04	4.89E-07
Acenaphthylene	1.80E-06	1.12E-07	9.78E-04	4.89E-07
Anthracene	2.40E-06	1.49E-07	1.30E-03	6.52E-07
Benz(a)anthracene	1.80E-06	1.12E-07	9.78E-04	4.89E-07
Benzene	2.10E-03	1.30E-04	1.14E+00	5.70E-04
Benzo(a)pyrene	1.20E-06	7.44E-08	6.52E-04	3.26E-07
Benzo(b)fluoranthene	1.80E-06	1.12E-07	9.78E-04	4.89E-07
Benzo(g,h,i)perylene	1.20E-06	7.44E-08	6.52E-04	3.26E-07
Benzo(k)fluoranthene	1.80E-06	1.12E-07	9.78E-04	4.89E-07
Chrysene	1.80E-06	1.12E-07	9.78E-04	4.89E-07
Dibenzo(a,h)anthracene	1.20E-06	7.44E-08	6.52E-04	3.26E-07
Dichlorobenzene	1.20E-03	7.44E-05	6.52E-01	3.26E-04
Fluoranthene	3.00E-06	1.86E-07	1.63E-03	8.15E-07
Fluorene	2.80E-06	1.74E-07	1.52E-03	7.61E-07
Formaldehyde	7.50E-02	4.65E-03	4.07E+01	2.04E-02
Hexane	1.80E+00	1.12E-01	9.78E+02	4.89E-01
Indendo(1,2,3-cd)pyrene	1.80E-06	1.12E-07	9.78E-04	4.89E-07
Naphthalene	6.10E-04	3.78E-05	3.31E-01	1.66E-04
Phenanathrene	1.70E-05	1.05E-06	9.24E-03	4.62E-06
Pyrene	5.00E-06	3.10E-07	2.72E-03	1.36E-06
Toluene	3.40E-03	2.11E-04	1.85E+00	9.24E-04
	Total	**0.12**	**1022.62**	**0.51**

[1]USEPA AP-42 Chapter 1.4, Natural Gas Combustion

Exempt Generators

PTE Critera Pollutants

Cummulative Engine Power Rating, hp	11,020	Diesel Fuel, BTU/gal.	137,200
Diesel, gallons/hr	562.2	Fuel Sulfur Content, %	0.0015% (Assumed max.)
mmBTU/hr	77.1400		ULSD
Operating Hrs/yr	100		
Fuel Consumption, gal/yr	56,224		

Engine Data Emissions Per AP-42 Chapter 3.4 for Engines >600hp

Criteria Pollutants	EF lb/mmBTU	Emissions lb/hr	Emissions lb/yr	Emissions lb/gal	Emissions tpy
NOx	3.20	246.85	24,685	0.4390	12.34
CO	0.85	65.57	6,557	0.1166	3.28
HC	0.09	6.94	694	0.0123	0.35
Sox	0.001515	0.12	12	0.0002	0.01
PM_{10}	0.1	7.71	771	0.0137	0.39

Exempt Generators

PTE HAPs

Cummulative Engine Power Rating, hp	11,020	**Diesel Fuel, BTU/gal.**	137,200
Diesel, gallons/hr	562.2		
mmBTU/hr	77.1400		
Operating Hrs/yr	100		
Fuel Consumption, gal/yr	56,224		

Engine Data Emissions Per AP-42 Chapter 3.4 for Engines >600hp

HAPs	**EF lb/mmBTU**		**Emissions lb/hr**	**Emissions lb/yr**	**Emissions tpy**
Benzene	7.76E-04		0.06	6	0.0030
Toluene	2.81E-04		0.02	2	0.0011
Xylenes	1.93E-04		0.01	1	0.0007
Formaldehyde	7.89E-05		0.01	1	0.0003
Acetaldehyde	2.52E-05		0.00	0	0.0001
Acrolein	7.88E-06		0.00	0	0.0000
Naphthalene	1.30E-04		0.01	1	0.0005
		Total HAPs	0.1151	11.51	0.0058

KB4 Combustion PTE Emissions

Exempt Boilers

Natural Gas - PTE Greenhouse Gas Emissions						
Pollutant	Source	Emission Factor	Units	Fuel Consumption (mmscf)	Emissions (lb)	Emissions (ton)
CO2	AP-42	120,000	lb/mmscf	543.26	65,190,698	32,595

Exempt Generators

No. 2 Fuel Oil -PTE Direct Greenhouse Gas Emissions						
Pollutant	Source	Emission Factor	Units	Fuel Consumption (g)	Emissions (lb)	Emissions (ton)
CO2	AP-42	22,300	lb/10^3 gallon	56,224	1,253,806	627

KB4 Combustion Emissions Estimated Actual

I. Operating Parameters

Hours/year 480

Exempt Boilers

A) Burner Description: Supplementary Boilers (exempt per 6 CRR-NY 201-3.2 (1)(i))

Cumulative Heat Rating, BTU/hr[1]	48,000,000
Nat. Gas, BTU/scf	1,032
Nat. Gas, scf/hr	46,512
[2]Operating (Heating) Hrs/yr	480
Nat. Gas, mmscf/yr	22.33

USEPA AP-42 Chapter 1.4, *Natural Gas Combustion* , 7/98 Tables 1.4-1 & 1.4-2.

Criteria Pollutants	EF lb/mmscf	Emissions (lb/hr)	Emissions (lb/yr)	Emissions (tpy)
NOx[3]	50	2.3256	1,116.28	0.56
PM	7.6	0.3535	169.67	0.08
PM10	7.6	0.3535	169.67	0.08
SO2	0.6	0.0279	13.40	0.01
CO[3]	84	3.9070	1,875.35	0.94
VOC	5.5	0.2558	122.79	0.06

[1]Cumulative rating of six (6) boilers, each rated at 8,000,000 btu/hr. Note, there are eight (8) boilers, but two (2) are for redundancy

[2] Principal source of comfort heat is electric heat pumps. Actual hours based on anticipated hours below 10F and demand relative to working hours.

[3]AP42 Controlled Low NOx Small Boiler (<100 MMBtu/hr)

Exempt Boilers Speciated Organics

Burner Description: Supplementary Boilers(exempt per 6 CRR-NY 201-3.2 (1)(i))

Heat Rating, BTU/hr	48,000,000
Natural Gas, BTU/scf	1,032
Natural Gas, scf/hr	46,512
mmBTU/hr	48
Operating (Heating) Hrs/yr	480
Natural Gas, mmscf/yr	22.33

	EF lb/mmscf[1]	Emissions lb/hr	Emissions lb/yr	Emissions tpy
2-Methylnaphthalene	2.40E-05	1.12E-06	5.36E-04	2.68E-07
3-Methylcholanthrene	1.80E-06	8.37E-08	4.02E-05	2.01E-08
7,12- Dimethylbenz(a)anthracene	1.60E-05	7.44E-07	3.57E-04	1.79E-07
Acenaphthene	1.80E-06	8.37E-08	4.02E-05	2.01E-08
Acenaphthylene	1.80E-06	8.37E-08	4.02E-05	2.01E-08
Anthracene	2.40E-06	1.12E-07	5.36E-05	2.68E-08
Benz(a)anthracene	1.80E-06	8.37E-08	4.02E-05	2.01E-08
Benzene	2.10E-03	9.77E-05	4.69E-02	2.34E-05
Benzo(a)pyrene	1.20E-06	5.58E-08	2.68E-05	1.34E-08
Benzo(b)fluoranthene	1.80E-06	8.37E-08	4.02E-05	2.01E-08
Benzo(g,h,i)perylene	1.20E-06	5.58E-08	2.68E-05	1.34E-08
Benzo(k)fluoranthene	1.80E-06	8.37E-08	4.02E-05	2.01E-08
Chrysene	1.80E-06	8.37E-08	4.02E-05	2.01E-08
Dibenzo(a,h)anthracene	1.20E-06	5.58E-08	2.68E-05	1.34E-08
Dichlorobenzene	1.20E-03	5.58E-05	2.68E-02	1.34E-05
Fluoranthene	3.00E-06	1.40E-07	6.70E-05	3.35E-08
Fluorene	2.80E-06	1.30E-07	6.25E-05	3.13E-08
Formaldehyde	7.50E-02	3.49E-03	1.67E+00	8.37E-04
Hexane	1.80E+00	8.37E-02	4.02E+01	2.01E-02
Indendo(1,2,3-cd)pyrene	1.80E-06	8.37E-08	4.02E-05	2.01E-08
Naphthalene	6.10E-04	2.84E-05	1.36E-02	6.81E-06
Phenanathrene	1.70E-05	7.91E-07	3.80E-04	1.90E-07
Pyrene	5.00E-06	2.33E-07	1.12E-04	5.58E-08
Toluene	3.40E-03	1.58E-04	7.59E-02	3.80E-05
	Total	**0.09**	**42.03**	**0.02**

[1]USEPA AP-42 Chapter 1.4, Natural Gas Combustion

Exempt Generators

Actual Critera Pollutants

Cummulative Engine Power Rating, hp	11,020	Diesel Fuel, BTU/gal.	137,200
Diesel, gallons/hr	562.2	Fuel Sulfur Content, %	0.0015% (Assumed max.)
mmBTU/hr	77.1400		ULSD
Operating Hrs/yr	50		
Fuel Consumption, gal/yr	28,112		

Engine Data Emissions Per AP-42 Chapter 3.4 for Engines >600hp

Criteria Pollutants	EF lb/mmBTU	Emissions lb/hr	Emissions lb/yr	Emissions lb/gal	Emissions tpy
NOx	3.20	246.85	12,342	0.4390	6.17
CO	0.85	65.57	3,278	0.1166	1.64
HC	0.09	6.94	347	0.0123	0.17
Sox	0.001515	0.12	6	0.0002	0.00
PM_{10}	0.1	7.71	386	0.0137	0.19

Exempt Generators

Actual HAPs

Cummulative Engine Power Rating, hp	11,020	**Diesel Fuel, BTU/gal.**	137,200
Diesel, gallons/hr	562.2		
mmBTU/hr	77.1400		
Operating Hrs/yr	50		
Fuel Consumption, gal/yr	28,112		

Engine Data Emissions Per AP-42 Chapter 3.4 for Engines >600hp

HAPs	**EF lb/mmBTU**		**Emissions lb/hr**	**Emissions lb/yr**	**Emissions tpy**
Benzene	7.76E-04		0.06	3	0.0015
Toluene	2.81E-04		0.02	1	0.0005
Xylenes	1.93E-04		0.01	1	0.0004
Formaldehyde	7.89E-05		0.01	0	0.0002
Acetaldehyde	2.52E-05		0.00	0	0.0000
Acrolein	7.88E-06		0.00	0	0.0000
Naphthalene	1.30E-04		0.01	1	0.0003
		Total HAPs	0.1151	5.75	0.0029

KB4 Combustion Emissions Estimated Actual

Exempt Boilers

Natural Gas - Actual Greenhouse Gas Emissions						
Pollutant	Source	Emission Factor	Units	Fuel Consumption (mmscf)	Emissions (lb)	Emissions (ton)
CO2	AP-42	120,000	lb/mmscf	22.33	2,679,070	1,340

Exempt Generators

No. 2 Fuel Oil -Actual Direct Greenhouse Gas Emissions						
Pollutant	Source	Emission Factor	Units	Fuel Consumption (g)	Emissions (lb)	Emissions (ton)
CO2	AP-42	22,300	lb/10^3 gallon	28,112	626,903	313

NON-COMBUSTION SOURCE PARTICULATE SUMMARIES

SSLP AND THIN SET
- PTE EMISSIONS
- 2022, 2023 AND ESTIMATED 2027 ACTUAL EMISSIONS

KB4
- PTE EMISSIONS (2 PAGES)
  - LAMINATING PROCESS, RECYCLING PROCESS, COMBINED
- 2027 ESTIMATED ACTUAL EMISSIONS (2 PAGES)
  - LAMINATING PROCESS, RECYCLING PROCESS, COMBINED
- SUPPLEMENTAL DATA (9 PAGES)

THIN SET
- PTE EMISSIONS
- 2027 ESTIMATD ACTUAL EMISSIONS

CONTROL DISCHARGE CONCENTRATION
- SSLP ERBO DUST HANDLER PTE
- THIN SET DUST CONTROLS PTE
- KB4 CENTRAL DUST HANDLER
  - LAMINATING & SECONDARY OPS PTE
  - EXTRUSTION RECYCLING PTE
  - LAMINATING & SECONDARY OPS ESTIMATED ACTUAL
  - EXTRUSTION RECYCLING PTE ESTIMATED ACTUAL

SSLP and THIN SET
NON-COMBUSTION PARTICULATE
PTE EMISSIONS

SSLP Kerdi-Board Cutting and Milling

	lb	tons	
Annual Board Production (2022)		4,038	Master Data Board Wt
Particulate Control	99.90%		
Quantity accumulated in Dust Collector (2022)		481.5	11.9% of Total Board Production
Process Generated Particulate		482.0	
Estimated 2022 Emissions from Erbo		0.48	
Maximum theoretical foam use	8,469,669	4,235	
Pounds of boards produced per pound of foam used	5.13		based on 2022 production
Maximum theoretical board production	43,481,975	21,741	based on maximum theoretical line speed
Theoretical Maximum Particulate Generated		2,592	(ERP)
Theoretical Maximum Emissions		2.6	(PTE)

Thin Set

2022	lb	tons	
Volume of Cement Packaged	134,821,950	67,411	
Schedule - 24/5 for 49 weeks			
Loss to Dust Control Unit			
per day	2,000		
Annual(Assume 245 days per year)	490,000	245.0	
Ratio of Accum Dust to Qty Produced	0.36%		
Control Unit Efficiency	99.90%		
Annual Process Generated Particulate	490,490	245.25	
Controlled Emissions per year		0.25	
PTE (Maximum capacity based on finishd goods storage and raw material supply)			
Theoretical Max Capacity	6,540,800	@ 50 lb bags	
	327,040,000	163,520	
Ratio of Accum Dust to Qty Produced	0.36%		
Dust accumulated in collector	1,188,602	594.3	
Control Unit Efficiency	99.90%		
Process Generated Particulate	1,189,791	594.90	(ERP)
Controlled Emissions	1190	0.59	(PTE)

SSLP and THIN SET
NON-COMBUSTION PARTICULATE
ACTUAL EMISSIONS ESTIMATE

Estimated Production Growth 15%

SSLP Kerdi-Board Cutting and Milling

		2022	2023	2027
Annual Board Production	lb			
	tons	4,038	3,652	6,229
Particulate Control	99.90%			
Assume entire annual board production is converted to dust, and filtration system vents to atmosphere 365 days/yr				
Particulate Loss (worst case)	lb	0	0	0
	tons	4.04	3.65	6.23
(Filtration system exhaust is internal to the building during winter months to avoid heat loss)				
Actual particulate loss is limited to the amount of material converted to dust from saw cuts and edge milling		from Master board Production and foam use		
Accumulated Waste Material (tons)	11.9%			
Generated Waste Material (tons)		572.63	560.79	950.19
Estimated Actual Particulate Emissions	lb	1145	1122	1900
	tons	0.57	0.56	0.95

Thin Set

		2022	2023	2027
50 lb	bags	2,696,439	3,375,059	3,260,752
Volume of Cement Packaged	lb	134,821,950	168,752,950	163,037,600
	tons	67,411	84,376	81,519
Dust Accumulated in Collector per day	lb	2000		
Assume 49 weeks at 24/5	days	245		
Annual Accumulated Dust	lb/yr	490,000	613,320	592,548
	tons/yr	245	307	296
Percent Accumulated		0.36%		
Actual Emissions (controlled)	lb/yr	490	614	593
	tons/yr	0.25	0.31	0.30

KB4 Laminating Process and Extrusion Recycle Process

Particulate - PTE

PTE Board Thickness		57	mm
Pre-Lam Board Area	1310x2743	3.594	m^2
Finished Board Area	1220x1440	2.977	m^2
Foam Density		52	kg/m^3

NOTE: 8760 foam demand for laminating cannot be met by extrusion capacity

	8760 Annual boards	8760 Foam m^3	8760 Foam kg	8760 board area m^2
Pre-lam	5,748,451	1,177,482	61,229,085	20,657,586
Finished	6,462,295	975,383	50,719,932	19,236,960
Recycle + KB4 Cut/Mill (Pre-lam - Finished)				1,420,626

	Cut/Mill per board m^3	8760 boards	8760 Cut/Mill m^3	8760 Cut/Mill kg		
Pre-Lam Recycle	0.013091	5,748,451	75,254	3,913,184	447	kg/hr
KB4 Waste	0.012129	6,462,295	78,383	4,075,902		
Split board A waste (10%)	0.000348	646,230	225	11,684		
Split board B waste (5%)	0.000695	323,115	225	11,684		
Foam Only				4,099,270	468	kg/hr
Fleece/Paper/Adhesive	0.744	kg/m^2		1,056,946	121	kg/hr

KB4 Laminating Process and Extrusion Recycle Process

Particulate - PTE (cont'd)

Secondary Operations						
Average Area Density (57mm)	3.71	kg/m^2	8760	8760		
Average Volume Density	0.211	kg/m^3	m^3	kg		
Cut-off			6,612	1398		
Cut/Mill Dust			512	108		
				1506		
Total Laminating + Secondary Ops				5,157,722		589 kg/hr
				11,372,776	lb	
				5,686	tons	
Capture/Control	99.9%					
KB4 Laminating Emissions				**5.69**	**tons**	
Resin Recycle Emissions	0.1936	kg particulate emissions per				
	1000	kg resin		8760		
				Resin kg		
Resin Use (= Foam)	1000	kg/hr max capacity		8,760,000		
Particulate Emissions				1,696		
				3,740	lb	
Recycling Emissions				**1.87**	**tons**	
Laminating + Recycle Loss				**7.56**	**tons**	

KB4 Laminating Process and Extrusion Recycle Process

Particulate - 2027 Actual Emissions

Weighted Avg Board Thickness		12.035	mm
Pre-Lam Board Area	1310x2743	3.593	m^2
Finished Board Area	1220x1440	2.977	m^2
Foam Density		52	kg/m^3

NOTE: 8760 foam demand for laminating cannot be met by extrusion capacity

	8760 Boards	8760 Foam m^3	8760 Foam kg	8760 Board Area m^2	Actual Boards	Actual Foam m^3	Actual Foam kg	Actual Board Area m^2
Pre-Lam	5,748,451	248,590	12,926,691	20,656,080	1,437,146	62,149	3,231,748	5,164,141
Finished	6,462,295	205,938	10,708,778	19,236,960	1,615,612	51,847	2,696,018	4,809,352
		Actual/8760			25%	25%		
Recycle + KB4 Cut/Mill (Pre-lam - Finished)				1,419,120				354,788

Foam	Cut/Mill per Board m^3	8760 Boards	8760 Cut/Mill m^3	8760 Cut/Mill kg	Actual Boards	Actual Cut/Mill m^3	Actual Cut/Mill kg	
Pre-Lam Recycle	0.011305	5,748,451	64,986	3,379,253	1,437,146	16,247	844,833	incl. Recycle Losses
KB4 waste	0.002774	6,462,295	17,928	932,267	1,615,612	4,482	233,072	
Split board A waste (10%)	0.000079	646,230	51	2,651	161,561	13	663	
Split board B waste (5%)	0.000158	323,115	51	2,651	80,781	13	663	
Foam Only				937,568			234,397	kg
							258	tons
Fleece/Paper/Adhesive	0.744	kg/m^2		1,055,825			263,962	kg
							291	tons

KB4 Laminating Process and Extrusion Recycle Process

Particulate - 2027 Actual Emissions (cont'd)

Secondary Operations

			8760	8760		Actual	Actual	
Average Area Density (12.9mm)	1.42	kg/m^2						
Average Volume Density	0.017	kg/m^3	m^3	kg		m^3	kg	
Cut-off			6,612	113		4,539	77	
Cut/Mill Dust			512	9		352	6	
				121			83	
Total Laminating + Secondary Ops				1,993,515	kg		498,443	kg
				4,395,700	lb		1,099,068	lb
				2,198	tons		550	tons
Capture/Control	99.9%							
KB4 Laminating Emissions				**2.198**	**tons**		**0.550**	**tons**

PTE Filter Dust Load Rate	228	kg/hr		
(Total / 8760 hrs)	501.79	lb/hr		
Actual Filter Dust Load Rate is the same as PTE Rate				

			8760		Actual	
Resin Recycle Emissions	0.1936	kg particulate emissions per				
	1000	kg resin	Resin kg		Resin kg	
Resin Use (= Foam)	1000	kg/hr max capacity	8,760,000		3,231,748	
Recycle Particulate Emissions			1,696	kg	626	kg
			3,740	lb	1,380	lb
Recycling Emissions			**1.87**	**tons**	**0.69**	**tons**
Laminating + Recycle Loss			**4.07**	**tons**	**1.24**	**tons**

Supplemental Data Page 1

Part Number	Part Description	W	w mm	L	l mm	t	t mm	Area in^2	Area m^2	Vol m^3	Forecast 2030	m^2	m^3	Notes
KB198321220/UV	KERDI-BOARD PANEL 3/4" X 33" X 48"	33	832	48	1220	0.75	19	1584	1.015	0.019	51,656	52,433	996	48" Curb Board
KB198321524/UV	KERDI-BOARD PANEL 3/4" X 33" X 60"	33	832	60	1524	0.75	19	1980	1.268	0.024	72,391	91,789	1,744	60" Curb Board
KB199651248/UV	KERDI-BOARD PANEL 3/4" X 38" X 49"	38	965	48	1220	0.75	19	1824	1.177	0.022	84,239	99,175	1,884	38" Curb Board
KB199651575/UV	KERDI-BOARD PANEL 3/4" X 38" X 62"	38	965	62	1575	0.75	19	2356	1.520	0.029	46,412	70,540	1,340	Bench board
KB199652057/UV	KERDI-BOARD PANEL 3/4" X 38" X 81"	38	965	81	2057	0.75	19	3078	1.985	0.038	28,856	57,278	1,088	Bench board
KB199652616/UV	KERDI-BOARD PANEL 3/4" X 38" X 103"	38	965	103	2616	0.75	19	3914	2.524	0.048	15,090	38,094	724	Bench board
KB121220812	KERDI-BOARD PANEL 1/2" X 48" X 32"	48	1220	32	812	0.5	12	1536	0.991	0.012	267,687	265,181	3,182	
KB1512202440	KERDI-BOARD PANEL 5/8" X 48" X 96"	48	1220	96	2440	0.625	15	4608	2.977	0.045	18,744	55,796	837	
KB1212201625	KERDI-BOARD PANEL 1/2" X 48" X 64"	48	1220	64	1625	0.5	12	3072	1.983	0.024	57,499	113,991	1,368	
KB1212442896	KERDI-BOARD, PANEL 1/2" x 49" x 114"	49	1244	114	2896	0.5	12	5586	3.603	0.043	78,650	283,348	3,400	niche board
KB1212442997	KERDI-BOARD, PANEL 1/2" x 49" x 118"	49	1244	118	2997	0.5	12	5782	3.728	0.045	30,958	115,420	1,385	niche board
KB1212202440	KERDI-BOARD PANEL 1/2" X 48" X 96"	48	1220	96	2440	0.5	12	4608	2.977	0.036	1,422,400	4,234,199	50,810	
KB121220965	KERDI-BOARD PANEL 1/2" X 48" X 38"	48	1220	38	965	0.5	12	1824	1.177	0.014	64,171	75,548	907	
KB1212442489	KERDI-BOARD, PANEL 1/2" x 49" x 98"	49	1244	98	2489	0.5	12	4802	3.096	0.037	68,328	211,565	2,539	niche board
KB1512203050	KERDI-BOARD PANEL 5/8" X 48" X 120"	48	1220	120	3050	0.625	15	5760	3.721	0.056	587	2,184	33	
	Total										**2,307,666**	**5,766,541**	**72,238**	

Supplemental Data Page 2

t	*qty*	
19	298,643	5,674,223.33
12	1989691	23,876,297.20
15	19331	289,961.25
	2,307,666	29,840,481.78
Wtd Avg Thickness		12.93 mm

Area	*Qty*	
1.015	51,656	52432.90624
1.268	72,391	91789.47149
1.177	148,410	174722.8968
1.520	46,412	70539.67856
1.985	28,856	57278.31178
2.524	15,090	38093.7996
0.991	267,687	265180.9544
2.977	1,441,143	4289995.723
1.983	57,499	113990.9745
3.603	78,650	283347.5785
3.728	30,958	115419.7207
3.096	68,328	211564.5636
3.721	587	2184.227
	2,307,666	5,766,541
Wtd Avg Area		2.499 m^2

Length	*Qty*	
1220	135,895	165792306.7
1524	72,391	110323884
1575	46,412	73098112.5
2057	28,856	59355763.5
2616	15,090	39475440
2440	1,441,143	3516389937
812	267,687	217361438
1625	57,499	93435225
2896	78,650	227771365.3
2997	30,958	92781126
965	64,171	61924532.5
2489	68,328	170067977.2
3050	587	1790350
	2,307,666	4829567457
Wtd Avg Length		2,092.84 m

Width	*Qty*	
832	124,047	103207104
965	174,596	168485461.7
1220	1,831,086	2233924940
1244	177,936	221352591.3
	2,307,666	2726970097
Wtd Avg Width		1,181.70 m

Projected Board Production 2030

wtd avg thickness	12.93	mm		
wtd avg area	2.499	m^2		
wtd avg board foam volume	0.03	m^3		
foam	52	kg/m^3		
wtd avg boad foam weight	1.68	kg		
Total Foam Deman	3,877,499	kg	74,567	m^3
fleece	0.06	kg/m^2		
paper	0.36	kg/m^2		
adhesive	0.324	kg/m^2		
Total	0.744	kg/m^2		
foam volume	0.03	m^3 per wtd avg board		
	1.68	kg foam per wtd avg board		
	0.15	kg fleece per wtd avg board		
	0.90	kg paper per wtd avg board		
	0.81	kg adhesive per wtd avg board		
	3.54	kg total per wtd avg board		
	1.42	kg/m^2 per wtd avg board		
Total produced boards	3,268,608	kg		
	7,207,281	lb		
	3,603.64	tons		

Supplemental Data Page 4
Cut & Mill Basis - Wtd Average Thickness

KB4 Throughput	
Line speed (m/min)	30
Production days/week	7
Production hours/day	24
Production weeks	52
Efficiency	100%

Annual Maximum (m)	15,768,000

Finished Board Properties		
Board length (mm)	2440	
Board Width (mm)	1220	2.977 m^2
Finished Board Thickness (mm)	12.93	Wtd Avg 2030
Annual Boards	6,462,295	

Unfaced Board Properties		
Unfaced Board Width (mm)	1310	
Unfaced Board Length (mm)	2,743	3.594 m^2
Annual Boards	5,748,031	
Foam Density (kg/m3)	52	

Kerdiboard Material Weights	
Adhesive weight (g/m^2) (50-70)	60
Total adhesive (g/m2)	360
Non-woven weight (g/m^2)	30
Total non-woven (g/m2)	60
Facer weight (g/m^2)	180
Total Facer (g/m2)	360

KB Facer and Adh total **kg**/m2	0.78

Foam	0.672 kg/m^2
Board unit weight	1.452 kg/m^2

Estimated KB4 KG Waste														
Collector	Operation	Total Depth of Cut (mm)*	Cut Area m^2	Est. Waste per board (m^3)	Rate m/hr	Board Length m	Boards Cut per hr	Est. Foam Waste per hr (m^3)	Cut Depth m	Est. Facer waste per hr (m^2)	Foam Waste Wt kg/hr	Facer Waste Wt kg/hr	Est. waste per hr (kg)	Est. Waste per year (m^3)
SSF	Unfaced Board (Planning)	3	3.593592	0.01078	1800	2.743	656.17	7.074		0.0	367.8		368	61,968
	Unfaced Board width (Trimming)	10	0.0169396	0.00017	1800	2.743	656.17	0.111		0.0	5.8		6	974
	Unfaced Board length (Trimming)	10	0.0354724	0.00035	1800	2.743	656.17	0.233		0.0	12.1		12	2,039
KB4	Longitudinal Squaring	80	0.0315517	0.00252	1800	2.440	737.70	1.862	0.080	144	96.8	112.3	209	16,312
	Longitudinal Bevel	---	0.01952	0.00002	1800	2.440	737.70	0.014			0.7	0.0	1	126
	Flying Saw	4	0.0157759	0.00006	1800	2.440	737.70	0.047	0.004	7	2.4	5.6	8	408
	Double End Tenoner Machine	10	0.0157759	0.00016	1800	1.220	1475.41	0.233	0.010	18	12.1	14.0	26	1,019
	Width Bevel	---	0.00976	0.00001	1800	1.220	1475.41	0.014			0.7	0.0	1	63
	Central Split (812 & 965)**	5	0.0157759	0.00008	1800	2.440	737.70	0.058	0.005	9	3.0	7.0	10	51
	Central Split (2' boards)***	5	0.0315517	0.00016	1800	2.440	737.70	0.116	0.005	9	6.1	7.0	13	25
*Will be confirmed during equipment commissioning				0.01130			1968.50	7.42		Recycled	385.73	0.00	385.73	64980.90
**Estimated product mix ~10%				0.00277			5163.93	2.17		Uncontrolled	112.85	131.98	244.83	17928.20
***Future State. Estimated product mix ≤5%				0.00024			1475.41	0.17		Uncontrolled	9.08	14.04	23.12	76.46
								2.34			121.93	146.02	267.94	18004.66
													2,347,179	kg (8760hrs)
												100%	2,587	tons
												99.9%	2584.7	tons captured
												0.10%	2.59	tons discharged

Supplemental Data Page 6
Cut & Mill Basis - Maximum Thickness

KB4 Throughput	
Line speed (m/min)	30
Production days/week	7
Production hours/day	24
Production weeks	52
Efficiency	100%

Annual Maximum (m)	15,768,000

Finished Board Properties		
Board length (mm)	2440	
Board Width (mm)	1220	2.977 m^2
Finished Board Thickness (mm)	57.00	Maximum
Annual Boards	6,462,295	

Unfaced Board Properties		
Unfaced Board Width (mm)	1310	
Unfaced Board Length (mm)	2,743	3.594 m^2
Annual Boards	5,748,031	
Foam Density (kg/m3)	52	

Kerdiboard Material Weights	
Adhesive weight (g/m^2) (50-70)	60
Total adhesive (g/m2)	360
Non-woven weight (g/m^2)	30
Total non-woven (g/m2)	60
Facer weight (g/m^2)	180
Total Facer (g/m2)	360

KB Facer and Adh total **kg**/m2	0.78

Foam	2.964 kg/m^2
Board unit weight	3.744 kg/m^2

Estimated KB4 KG Waste														
Collector	Operation	Total Depth of Cut (mm)*	Cut Area m^2	Est. Waste per board (m^3)	Rate m/hr	Board Length m	Boards Cut per hr	Est. Foam Waste per hr (m^3)	Cut Depth m	Est. Facer waste per hr (m^2)	Foam Waste Wt kg/hr	Facer Waste Wt kg/hr	Est. waste per hr (kg)	Est. Waste per year (m^3)
SSF	Unfaced Board (Planning)	3	3.593592	0.01078	1800	2.743	656.17	7.074		0.0	367.8		368	61,968
	Unfaced Board width (Trimming)	10	0.07467	0.00075	1800	2.743	656.17	0.490		0.0	25.5		25	4,292
	Unfaced Board length (Trimming)	10	0.1563624	0.00156	1800	2.743	656.17	1.026		0.0	53.4		53	8,988
KB4	Longitudinal Squaring	80	0.13908	0.01113	1800	2.440	737.70	8.208	0.080	144	426.8	112.3	539	71,902
	Longitudinal Bevel	---	0.01952	0.00002	1800	2.440	737.70	0.014			0.7	0.0	1	126
	Flying Saw	4	0.06954	0.00028	1800	2.440	737.70	0.205	0.004	7	10.7	5.6	16	1,798
	Double End Tenoner Machine	10	0.06954	0.00070	1800	1.220	1475.41	1.026	0.010	18	53.4	14.0	67	4,494
	Width Bevel	---	0.00976	0.00001	1800	1.220	1475.41	0.014			0.7	0.0	1	63
	Central Split (812 & 965)**	5	0.06954	0.00035	1800	2.440	737.70	0.257	0.005	9	13.3	7.0	20	225
	Central Split (2' boards)***	5	0.13908	0.00070	1800	2.440	737.70	0.513	0.005	9	26.7	7.0	34	112
*Will be confirmed during equipment commissioning				0.01309			1968.50	8.59		Recycled	446.68	0.00	446.68	75248.06
**Estimated product mix ~10%				0.01213			5163.93	9.47		Uncontrolled	492.34	131.98	624.31	78382.73
***Future State. Estimated product mix ≤5%				0.00104			1475.41	0.77		Uncontrolled	40.01	14.04	54.05	337.04
								10.24			532.35	146.02	678.37	78719.77
													5,942,486	kg (8760hrs)
												100%	6,550	tons
												99.9%	6543.8	tons captured
												0.10%	6.55	tons discharged

Supplemental Data Page 8
Cut & Mill Basis - Wtd Avg Thick and Area

KB4 Throughput	
Line speed (m/min)	30
Production days/week	7
Production hours/day	24
Production weeks	52
Efficiency	100%

Annual Maximum (m)	15,768,000

Finished Board Properties		
Board length (mm)	2092.8	
Board Width (mm)	1181.7	2.473 m^2
Finished Board Thickness (mm)	12.93	Wtd Avg 2030
Annual Boards	7,534,271	

Unfaced Board Properties		
Unfaced Board Width (mm)	1310	
Unfaced Board Length (mm)	2,743	3.594 m^2
Annual Boards	5,748,031	
Foam Density (kg/m3)	52	

Kerdiboard Material Weights	
Adhesive weight (g/m^2) (50-70)	60
Total adhesive (g/m2)	360
Non-woven weight (g/m^2)	30
Total non-woven (g/m2)	60
Facer weight (g/m^2)	180
Total Facer (g/m2)	360

KB Facer and Adh total **kg**/m2	0.78

Foam	0.672 kg/m^2
Board unit weight	1.452 kg/m^2

Estimated KB4 KG Waste														
Collector	Operation	Total Depth of Cut (mm)*	Cut Area m^2	Est. Waste per board (m^3)	Rate m/hr	Board Length m	Boards Cut per hr	Est. Foam Waste per hr (m^3)	Cut Depth m	Est. Facer waste per hr (m^2)	Foam Waste Wt kg/hr	Facer Waste Wt kg/hr	Est. waste per hr (kg)	Est. Waste per year (m^3)
SSF	Unfaced Board (Planning)	3	3.593592	0.01078	1800	2.743	656.17	7.074		0.0	367.8		368	61,968
	Unfaced Board width (Trimming)	10	0.0169396	0.00017	1800	2.743	656.17	0.111		0.0	5.8		6	974
	Unfaced Board length (Trimming)	10	0.0354724	0.00035	1800	2.743	656.17	0.233		0.0	12.1		12	2,039
KB4	Longitudinal Squaring	80	0.0270625	0.00217	1800	2.093	860.08	1.862	0.080	144	96.8	112.3	209	16,312
	Longitudinal Bevel	---	0.0167427	0.00002	1800	2.093	860.08	0.014			0.7	0.0	1	126
	Flying Saw	4	0.0152806	0.00006	1800	2.093	860.08	0.053	0.004	7	2.7	5.6	8	461
	Double End Tenoner Machine	10	0.0152806	0.00015	1800	1.182	1523.23	0.233	0.010	18	12.1	14.0	26	1,151
	Width Bevel	---	0.0083713	0.00001	1800	1.182	1523.23	0.013			0.7	0.0	1	63
	Central Split (812 & 965)**	5	0.0152806	0.00008	1800	2.093	860.08	0.066	0.005	9	3.4	7.0	10	58
	Central Split (2' boards)***	5	0.0270625	0.00014	1800	2.093	860.08	0.116	0.005	9	6.1	7.0	13	29
*Will be confirmed during equipment commissioning				0.01130			1968.50	7.42		Recycled	385.73	0.00	385.73	64980.90
**Estimated product mix ~10%				0.00240			5626.69	2.17		Uncontrolled	113.08	131.98	245.05	18112.72
***Future State. Estimated product mix ≤5%				0.00021			1720.15	0.18		Uncontrolled	9.47	14.04	23.51	86.35
								2.36			122.55	146.02	268.56	18199.07
													2,352,596	kg (8760hrs)
												100%	2,593	tons
												99.9%	2590.7	tons captured
												0.10%	2.59	tons discharged

ERBO Particulate Emissions Estimate grains / dscf
PTE

Production Days		250	days	50 weeks x 5 days/week
8-hr Shifts		3	per day	
Production Hours	(A)	6000	hrs/year	
Weight of Cut/Mill Waste		2592	tons/year	
Weight of Cut/Mill Waste	(B)	5,184,000	lb/year	
Load on Dust Collector	(B/A)	864.00	lb/hr	
	(C)	14.400	lb/min	
ERBO Air Flow Rate	(D)	11,700	cfm	
Mass To Dust Coll.	(C/D) =	1.23E-03	lb/cf	
	(E)	8.62	gr/cf	(7000 grains/lb)
Removal Efficiency	(F)	99.9	%	
Emission Rate	(G = E x (1-F))	0.00862	grains/cf	

Dry Standard Adjustment	Temp deg F	Press atm
Indoor Ambient Condition	70	1
Dry Standard Condition	32	1

Coversion Factor			
cf ambient / cf std	(H)	1.063	
Emission Rate	**(G x H) =**	**0.00916**	**grains/dscf**

Thin Set Particulate Emissions Estimate grains / dscf

PTE

Production Days		245	days	49 weeks x 5 days/week
8-hr Shifts		3	per day	
Production Hours	(A)	5880	hrs/year	
Weight of Generated Dust	(B)	490,000	lb/year	
Load on Dust Collector	(B/A)	83.33	lb/hr	
	(C)	1.389	lb/min	
ERBO Air Flow Rate	(D)	9,000	cfm	
Mass To Dust Coll.	(C/D) =	1.54E-04	lb/cf	
	(E)	1.08	gr/cf	(7000 grains/lb)
Removal Efficiency	(F)	99.9	%	
Emission Rate	(G = E x F)	0.00108	grains/cf	

Dry Standard Adjustment	Temp deg F	Press atm
Indoor Ambient Condition	70	1
Dry Standard Condition	32	1

Coversion Factor			
cf ambient / cf std	(H)	1.063	
Emission Rate	**(G x H) =**	**0.00115**	**grains/dscf**

Laminating + Sec Ops Particulate Emissions Estimate grains / dscf
PTE (8760@57mm)

Load on Dust Collector		589	kg/hr	
		1298.26	lb/hr	
	(C)	21.638	lb/min	
Air Flow Rate		35,340	m^3/hr	
	(D)	20,801	cfm	
Mass To Dust Coll.	(C/D) =	1.04E-03	lb/cf	
	(E)	7.28	gr/cf	(7000 grains/lb)
Removal Efficiency	(F)	99.9	%	
Emission Rate	(G = E x (1-F))	0.00728	grains/cf	

Dry Standard Adjustment	Temp deg F	Press atm
Indoor Ambient Condition	70	1
Dry Standard Condition	32	1

Coversion Factor			
cf ambient / cf std	(H)	1.063	
Emission Rate	(G x H) =	0.008	grains/dscf
6NYCRR Part 212-2.4(b)(1) Limit		0.05	grains/dscf

Resin Recycle Particulate Emissions Estimate grains/dscf
PTE (8760@57mm)

Load on Dust Collector		0.1936	kg/hr	
		0.43	lb/hr	
	(C)	0.007	lb/min	
Air Flow Rate		58,000	m^3/hr	
	(D)	34,138	cfm	
Mass To Dust Coll.	(C/D) =	2.08E-07	lb/cf	
	(E)	1.46E-03	gr/cf	(7000 grains/lb)
Removal Efficiency	(F)	0.00	%	
Emission Rate	(G = E x (1-F))	0.00146	grains/cf	

Dry Standard Adjustment	Temp deg F	Press atm
Indoor Ambient Condition	70	1
Dry Standard Condition	32	1

Coversion Factor			
cf ambient / cf std	(H)	1.063	
Emission Rate	(G x H) =	0.0016	grains/dscf
6NYCRR Part 212-2.4(b)(1) Limit		0.05	grains/dscf

Laminating + Sec Ops Particulate Emissions Estimate grains / dscf
Actual (8760@12.93mm)

Load on Dust Collector		228	kg/hr	
		501.79	lb/hr	
	(C)	8.363	lb/min	
Air Flow Rate		35,340	m^3/hr	
	(D)	20,801	cfm	
Mass To Dust Coll.	(C/D) =	4.02E-04	lb/cf	
	(E)	2.81	gr/cf	(7000 grains/lb)
Removal Efficiency	(F)	99.9	%	
Emission Rate	(G = E x (1-F))	0.00281	grains/cf	

Dry Standard Adjustment	Temp deg F	Press atm
Indoor Ambient Condition	70	1
Dry Standard Condition	32	1

Coversion Factor			
cf ambient / cf std	(H)	1.063	
Emission Rate	**(G x H) =**	**0.0030**	**grains/dscf**
6NYCRR Part 212-2.4(b)(1) Limit		0.05	grains/dscf

Resin Recycle Particulate Emissions Estimate grains/dscf
Actual (8760@12.93mm)

Load on Dust Collector		0.1936	kg/hr	
		0.43	lb/hr	
	(C)	0.007	lb/min	
Air Flow Rate		58,000	m^3/hr	
	(D)	34,138	cfm	
Mass To Dust Coll.	(C/D) =	2.08E-07	lb/cf	
	(E)	1.46E-03	gr/cf	(7000 grains/lb)
Removal Efficiency	(F)	0.00	%	
Emission Rate	(G = E x (1-F))	0.00146	grains/cf	

Dry Standard Adjustment	Temp deg F	Press atm
Indoor Ambient Condition	70	1
Dry Standard Condition	32	1

Coversion Factor			
cf ambient / cf std	(H)	1.063	
Emission Rate	(G x H) =	0.0016	grains/dscf
6NYCRR Part 212-2.4(b)(1) Limit		0.05	grains/dscf

APPENDIX D

AERSCREEN DISPERSION MODELING INPUT AND OUTPUT FILES

Vent/Stack	Emission Point	Input VOC Emission Rate lb/hr	g/s	Stack Height ft	m	Stack Dim x - in	Stack Dim y - in	Stack Area sq-in	Equiv Diameter in	Modeled Stack Diameter in	m	Exit Temp Deg F	Deg K
UV Printer Stack	86	0.04	0.00504	30.58	9.320					8	0.203	118.1	321.0
Kerdi Erbo Dust Collector Horiz.	87	0.64	0.08064	14	4.267	56.9	39.5	2248	53.5	56.9	1.445	98.8	310.3
Kerdi Adhesive Hood	88	0.067	0.00844	31.667	9.652					27	0.686	79.7	299.7

Vent/Stack	Alliance Measured Exit Velocity ft/s	Rural/ Urban	Distance from Source Feet	Distance from Source meters	Alliance Rpt Flow Rate ACFM	AERSCREEN Flow Rate ACFM	Output Max 1-hr Concentr ug/m^3	Scaled Annual Concentr ug/m^3	File Name
UV Printer Stack	55.6	rural	435	132.6	587	587	1.349	0.1349	Print01
Kerdi Erbo Dust Collector Horiz.	71.9	rural	167	51			153.2	15.32	ERBO01b
Kerdi Adhesive Hood	20.1	rural	500	152.4	5964	4797	6.495	0.6495	Glue01

KB4 PRINTER MODULE
AERSCREEN INPUT FILE

```
** STACK DATA         Rate    Height     Temp.  Velocity     Diam.     Flow

**              0.5000E-02    9.3200  321.0000   16.9469    0.2030     1162.



** BUILDING DATA   BPIP    Height  Max dim.  Min dim.   Orient.   Direct.    Offset

**                   N      0.0000    0.0000    0.0000    0.0000    0.0000    0.0000



** MAKEMET DATA    MinT    MaxT Speed   AnemHt Surf Clim  Albedo   Bowen  Length  SC
FILE

**               249.82  310.93   0.5   10.000    7    1   0.3500   1.5000   1.0000
"NA"



** ADJUST U*      N



** TERRAIN DATA   Terrain    UTM East   UTM North  Zone  Nada     Probe     PROFBASE
 Use AERMAP elev

**                   N           0.0         0.0     0     0       5000.0
0.00         N



** DISCRETE RECEPTORS  Discflag   Receptor file

**                      N        "NA"
```

```
** UNITS/POPULATION   Units   R/U  Population      Amb. dist.   Flagpole    Flagpole
height

**                      M     R            0.         132.600       N         0.00



** FUMIGATION        Inversion Break-up  Shoreline  Distance    Direct  Run
AERSCREEN

**                         N                  N         0.00     -9.0     Y



** DEBUG OPTION      Debug

**                       Y



** OUTPUT FILE "PRINT01.OUT"



** Temporal sector: Winter, spatial sector:  1



CO STARTING

   TITLEONE ERBO01

**            REFINE STAGE 3
```

```
   MODELOPT CONC SCREEN  FLAT

   AVERTIME 1

   POLLUTID OTHER

   RUNORNOT RUN

CO FINISHED



SO STARTING

   LOCATION SOURCE POINT        0.0     0.0

   SRCPARAM SOURCE   0.5000E-02    9.320  321.000   16.947    0.203



   SRCGROUP  ALL



SO FINISHED



RE STARTING

** Fence line receptor

   DISCCART        132.60         0.00
```

```
** Refined receptors

   DISCCART        133.00         0.00

   DISCCART        134.00         0.00

   DISCCART        135.00         0.00

   DISCCART        136.00         0.00

   DISCCART        137.00         0.00

   DISCCART        138.00         0.00

   DISCCART        139.00         0.00

   DISCCART        140.00         0.00

   DISCCART        141.00         0.00

   DISCCART        142.00         0.00

   DISCCART        143.00         0.00

   DISCCART        144.00         0.00

   DISCCART        145.00         0.00

   DISCCART        146.00         0.00

   DISCCART        147.00         0.00

   DISCCART        148.00         0.00
```

DISCCART	149.00	0.00
DISCCART	150.00	0.00
DISCCART	151.00	0.00
DISCCART	152.00	0.00
DISCCART	153.00	0.00
DISCCART	154.00	0.00
DISCCART	155.00	0.00
DISCCART	156.00	0.00
DISCCART	157.00	0.00
DISCCART	158.00	0.00
DISCCART	159.00	0.00
DISCCART	160.00	0.00
DISCCART	161.00	0.00
DISCCART	162.00	0.00
DISCCART	163.00	0.00
DISCCART	164.00	0.00

DISCCART	165.00	0.00
DISCCART	166.00	0.00
DISCCART	167.00	0.00
DISCCART	168.00	0.00
DISCCART	169.00	0.00
DISCCART	170.00	0.00
DISCCART	171.00	0.00
DISCCART	172.00	0.00
DISCCART	173.00	0.00
DISCCART	174.00	0.00
DISCCART	175.00	0.00
DISCCART	176.00	0.00
DISCCART	177.00	0.00
DISCCART	178.00	0.00
DISCCART	179.00	0.00
DISCCART	180.00	0.00
DISCCART	181.00	0.00

```
   DISCCART        182.00         0.00


RE FINISHED


ME STARTING
   SURFFILE  aerscreen_01_01.sfc  FREE
   PROFFILE  aerscreen_01_01.pfl  FREE
   SURFDATA  11111   2010  SCREEN
   UAIRDATA  22222   2010  SCREEN
   PROFBASE    0.0 METERS
ME FINISHED


OU STARTING
   RECTABLE 1  FIRST
   MAXTABLE  ALLAVE  50


   FILEFORM  EXP
```

```
   RANKFILE  1 10 AERSCREEN.FIL

   PLOTFILE  1 ALL  FIRST  AERSCREEN.PLT

OU FINISHED
```

KB4 PRINTER MODULE
AERSCREEN OUTPUT FILE

AERSCREEN 21112 / AERMOD 23132 08/02/24
10:32:57

TITLE: Print01

********** STACK PARAMETERS **********

SOURCE EMISSION RATE:	0.500E-02	g/s	0.397E-01	lb/hr
STACK HEIGHT:	9.32	meters	30.58	feet
STACK INNER DIAMETER:	0.203	meters	7.99	inches
PLUME EXIT TEMPERATURE:	321.0	K	118.1	Deg F
PLUME EXIT VELOCITY:	16.947	m/s	55.60	ft/s
STACK AIR FLOW RATE:	1162	ACFM		
RURAL OR URBAN:	RURAL			
INITIAL PROBE DISTANCE =	5000.	meters	16404.	feet

********** BUILDING DOWNWASH PARAMETERS **********

NO BUILDING DOWNWASH HAS BEEN REQUESTED FOR THIS ANALYSIS

********** PROBE ANALYSIS **********

25 meter receptor spacing: 133. meters - 5000. meters

SECTOR	Zo ROUGHNESS LENGTH	1-HR CONC (ug/m3)	DIST (m)	TEMPORAL PERIOD
1*	1.000	1.349	132.6	WIN

* = worst case flow sector

********** MAKEMET METEOROLOGY PARAMETERS **********

MIN/MAX TEMPERATURE: 249.8 / 310.9 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Urban
DOMINANT CLIMATE TYPE: Average Moisture
DOMINANT SEASON: Winter

ALBEDO: 0.35
BOWEN RATIO: 1.50
ROUGHNESS LENGTH: 1.000 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR	MO	DY	JDY	HR
10	02	15	15	01

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
-1.67	0.159	-9.000	0.020	-999.	145.	228.5	1.000	1.50	0.35	1.00

HT	REF TA	HT
10.0	310.9	2.0

WIND SPEED AT STACK HEIGHT (non-downwash):   1.0 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 9.3 meters
ESTIMATED FINAL PLUME RISE (non-downwash):   5.2 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash):   14.6 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR	MO	DY	JDY	HR
10	02	15	15	01

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
-1.67	0.159	-9.000	0.020	-999.	145.	228.5	1.000	1.50	0.35	1.00

HT	REF TA	HT
10.0	310.9	2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 1.0 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 9.3 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 5.2 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 14.6 meters

********** AERSCREEN AUTOMATED DISTANCES **********

OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)
132.60	1.349	2575.00	0.2395
150.00	1.148	2600.00	0.2374
175.00	1.055	2625.00	0.2354
200.00	1.231	2650.00	0.2334
225.00	1.302	2675.00	0.2314
250.00	1.261	2700.00	0.2301
275.00	1.202	2725.00	0.2288
300.00	1.189	2750.00	0.2275
325.00	1.204	2775.00	0.2262
350.00	1.178	2800.00	0.2249
375.00	1.146	2825.00	0.2236
400.00	1.112	2850.00	0.2224
425.00	1.076	2875.00	0.2211
450.00	1.039	2900.00	0.2198
475.00	1.003	2925.00	0.2186
500.00	0.9669	2950.00	0.2173
525.00	0.9322	2975.00	0.2161
550.00	0.9004	3000.00	0.2148
575.00	0.8721	3025.00	0.2136
600.00	0.8453	3050.00	0.2124
625.00	0.8198	3075.00	0.2111
650.00	0.7950	3100.00	0.2099
675.00	0.7710	3125.00	0.2087
700.00	0.7478	3150.00	0.2075
725.00	0.7255	3175.00	0.2063
750.00	0.7041	3200.00	0.2051
775.00	0.6835	3225.00	0.2040
800.00	0.6638	3250.00	0.2028
825.00	0.6448	3275.00	0.2016
850.00	0.6266	3300.00	0.2005
875.00	0.6092	3325.00	0.1993
900.00	0.5924	3350.00	0.1982

925.00	0.5764	3375.00	0.1971
950.00	0.5610	3400.00	0.1959
975.00	0.5462	3425.00	0.1948
1000.00	0.5321	3450.00	0.1937
1025.00	0.5185	3475.00	0.1926
1050.00	0.5054	3500.00	0.1915
1075.00	0.4928	3525.00	0.1904
1100.00	0.4808	3550.00	0.1893
1125.00	0.4692	3575.00	0.1883
1150.00	0.4580	3600.00	0.1872
1175.00	0.4473	3625.00	0.1862
1200.00	0.4369	3650.00	0.1851
1225.00	0.4270	3675.00	0.1841
1250.00	0.4174	3700.00	0.1830
1275.00	0.4082	3725.00	0.1820
1300.00	0.3992	3750.00	0.1810
1325.00	0.3906	3775.00	0.1800
1350.00	0.3834	3800.00	0.1790
1375.00	0.3794	3825.00	0.1780
1400.00	0.3751	3850.00	0.1770
1425.00	0.3705	3875.00	0.1760
1450.00	0.3658	3900.00	0.1750
1475.00	0.3609	3925.00	0.1741
1500.00	0.3563	3950.00	0.1731
1525.00	0.3530	3975.00	0.1722
1550.00	0.3497	4000.00	0.1712
1575.00	0.3465	4025.00	0.1703
1600.00	0.3432	4050.00	0.1695
1625.00	0.3400	4075.00	0.1686
1650.00	0.3368	4100.00	0.1678
1675.00	0.3337	4125.00	0.1670
1700.00	0.3305	4150.00	0.1662
1725.00	0.3274	4175.00	0.1654
1750.00	0.3243	4200.00	0.1646
1775.00	0.3212	4225.00	0.1638
1800.00	0.3182	4250.00	0.1630
1825.00	0.3152	4275.00	0.1622
1850.00	0.3122	4300.00	0.1614
1875.00	0.3092	4325.00	0.1606
1900.00	0.3063	4350.00	0.1598
1925.00	0.3034	4375.00	0.1591
1950.00	0.3006	4400.00	0.1583
1975.00	0.2977	4425.00	0.1575
2000.00	0.2950	4450.00	0.1568
2025.00	0.2922	4475.00	0.1560
2050.00	0.2895	4500.00	0.1553
2075.00	0.2868	4525.00	0.1545
2100.00	0.2841	4550.00	0.1538
2125.00	0.2815	4575.00	0.1531
2150.00	0.2789	4600.00	0.1523

2175.00	0.2763	4625.00	0.1516
2200.00	0.2738	4650.00	0.1509
2225.00	0.2713	4675.00	0.1502
2250.00	0.2688	4700.00	0.1495
2275.00	0.2664	4725.00	0.1488
2300.00	0.2640	4750.00	0.1482
2325.00	0.2616	4775.00	0.1475
2350.00	0.2593	4800.00	0.1468
2375.00	0.2569	4825.00	0.1461
2400.00	0.2547	4850.00	0.1455
2425.00	0.2524	4875.00	0.1448
2450.00	0.2502	4900.00	0.1442
2475.00	0.2480	4925.00	0.1435
2500.00	0.2458	4950.00	0.1429
2525.00	0.2437	4975.00	0.1422
2550.00	0.2415	5000.00	0.1416

********** AERSCREEN MAXIMUM IMPACT SUMMARY **********

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	1.349	1.349	1.214	0.8092	0.1349

DISTANCE FROM SOURCE 132.60 meters

IMPACT AT THE AMBIENT BOUNDARY	1.349	1.349	1.214	0.8092	0.1349

DISTANCE FROM SOURCE 132.60 meters

KB4 CENTRAL DUST HANLER
AERSCREEN INPUT FILE

```
** STACK DATA         Rate    Height     Temp.  Velocity     Diam.     Flow

**              0.8064E-01    4.2670  309.7000   21.6103    1.4200    72516.



** BUILDING DATA   BPIP    Height  Max dim.  Min dim.   Orient.   Direct.    Offset

**                   N      0.0000    0.0000    0.0000    0.0000    0.0000    0.0000



** MAKEMET DATA    MinT    MaxT Speed   AnemHt Surf Clim  Albedo   Bowen  Length  SC
FILE

**               249.82  310.93   0.5   10.000    7    1   0.3500   1.5000   1.0000
"NA"



** ADJUST U*      N



** TERRAIN DATA   Terrain    UTM East   UTM North  Zone  Nada     Probe     PROFBASE
 Use AERMAP elev

**                   N           0.0         0.0     0     0       5000.0
0.00         N



** DISCRETE RECEPTORS  Discflag   Receptor file

**                      N        "NA"
```

```
** UNITS/POPULATION   Units   R/U  Population      Amb. dist.   Flagpole    Flagpole
height

**                      M     R            0.          51.000       N         0.00



** FUMIGATION        Inversion Break-up  Shoreline  Distance    Direct  Run
AERSCREEN

**                         N                  N         0.00     -9.0     Y



** DEBUG OPTION      Debug

**                       Y



** OUTPUT FILE "ERBO01b.out"



** Temporal sector: Winter, spatial sector:  1



CO STARTING

   TITLEONE ERBO01

**            REFINE STAGE 3
```

```
   MODELOPT CONC SCREEN  FLAT

   AVERTIME 1

   POLLUTID OTHER

   RUNORNOT RUN

CO FINISHED



SO STARTING

   LOCATION SOURCE POINT        0.0     0.0

   SRCPARAM SOURCE   0.8064E-01    4.267  309.700   21.610    1.420



   SRCGROUP  ALL



SO FINISHED



RE STARTING

** Fence line receptor

   DISCCART         51.00         0.00
```

```
** Refined receptors

   DISCCART         52.00         0.00

   DISCCART         53.00         0.00

   DISCCART         54.00         0.00

   DISCCART         55.00         0.00

   DISCCART         56.00         0.00

   DISCCART         57.00         0.00

   DISCCART         58.00         0.00

   DISCCART         59.00         0.00

   DISCCART         60.00         0.00

   DISCCART         61.00         0.00

   DISCCART         62.00         0.00

   DISCCART         63.00         0.00

   DISCCART         64.00         0.00

   DISCCART         65.00         0.00

   DISCCART         66.00         0.00

   DISCCART         67.00         0.00
```

DISCCART	68.00	0.00
DISCCART	69.00	0.00
DISCCART	70.00	0.00
DISCCART	71.00	0.00
DISCCART	72.00	0.00
DISCCART	73.00	0.00
DISCCART	74.00	0.00
DISCCART	75.00	0.00
DISCCART	76.00	0.00
DISCCART	77.00	0.00
DISCCART	78.00	0.00
DISCCART	79.00	0.00
DISCCART	80.00	0.00
DISCCART	81.00	0.00
DISCCART	82.00	0.00
DISCCART	83.00	0.00

DISCCART	84.00	0.00
DISCCART	85.00	0.00
DISCCART	86.00	0.00
DISCCART	87.00	0.00
DISCCART	88.00	0.00
DISCCART	89.00	0.00
DISCCART	90.00	0.00
DISCCART	91.00	0.00
DISCCART	92.00	0.00
DISCCART	93.00	0.00
DISCCART	94.00	0.00
DISCCART	95.00	0.00
DISCCART	96.00	0.00
DISCCART	97.00	0.00
DISCCART	98.00	0.00
DISCCART	99.00	0.00
DISCCART	100.00	0.00

```
   DISCCART        101.00         0.00


RE FINISHED


ME STARTING
   SURFFILE  aerscreen_01_01.sfc  FREE
   PROFFILE  aerscreen_01_01.pfl  FREE
   SURFDATA  11111   2010  SCREEN
   UAIRDATA  22222   2010  SCREEN
   PROFBASE    0.0 METERS
ME FINISHED


OU STARTING
   RECTABLE 1  FIRST
   MAXTABLE  ALLAVE  50


   FILEFORM  EXP
```

```
   RANKFILE  1 10 AERSCREEN.FIL

   PLOTFILE  1 ALL  FIRST  AERSCREEN.PLT

OU FINISHED
```

KB4 CENTRAL DUST HANDLER
AERSCREEN OUTPUT FILE

AERSCREEN 21112 / AERMOD 23132 08/02/24
10:15:02

TITLE: ERBO01b

********** STACK PARAMETERS **********

SOURCE EMISSION RATE:	0.0806	g/s	0.640	lb/hr
STACK HEIGHT:	4.27	meters	14.00	feet
STACK INNER DIAMETER:	1.420	meters	55.91	inches
PLUME EXIT TEMPERATURE:	309.7	K	97.8	Deg F
PLUME EXIT VELOCITY:	21.610	m/s	70.90	ft/s
STACK AIR FLOW RATE:	72516	ACFM		
RURAL OR URBAN:	RURAL			
INITIAL PROBE DISTANCE =	5000.	meters	16404.	feet

********** BUILDING DOWNWASH PARAMETERS **********

NO BUILDING DOWNWASH HAS BEEN REQUESTED FOR THIS ANALYSIS

********** PROBE ANALYSIS **********

25 meter receptor spacing: 51. meters - 5000. meters

Zo SECTOR	ROUGHNESS LENGTH	1-HR CONC (ug/m3)	DIST (m)	TEMPORAL PERIOD
1*	1.000	153.2	51.0	WIN

* = worst case flow sector

********** MAKEMET METEOROLOGY PARAMETERS **********

MIN/MAX TEMPERATURE: 249.8 / 310.9 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Urban
DOMINANT CLIMATE TYPE: Average Moisture
DOMINANT SEASON: Winter

ALBEDO: 0.35
BOWEN RATIO: 1.50
ROUGHNESS LENGTH: 1.000 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR	MO	DY	JDY	HR
10	03	02	2	01

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
-11.69	0.130	-9.000	0.020	-999.	108.	18.1	1.000	1.50	0.35	1.50

HT	REF TA	HT
10.0	310.9	2.0

WIND SPEED AT STACK HEIGHT (non-downwash):   0.7 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.3 meters
ESTIMATED FINAL PLUME RISE (non-downwash):   0.0 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash):   4.3 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR	MO	DY	JDY	HR
10	03	02	2	01

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
-11.69	0.130	-9.000	0.020	-999.	108.	18.1	1.000	1.50	0.35	1.50

HT	REF TA	HT
10.0	310.9	2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 0.7 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 4.3 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 0.0 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 4.3 meters

********** AERSCREEN AUTOMATED DISTANCES **********

OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)
51.00	153.2	2550.00	0.6565
75.00	88.56	2575.00	0.6518
100.00	58.34	2600.00	0.6472
125.00	42.15	2625.00	0.6427
150.00	32.32	2650.00	0.6383
175.00	25.83	2675.00	0.6339
200.00	21.28	2700.00	0.6296
225.00	17.95	2725.00	0.6253
250.00	15.41	2750.00	0.6211
275.00	13.43	2775.00	0.6170
300.00	11.85	2800.00	0.6130
325.00	10.56	2825.00	0.6090
350.00	9.492	2850.00	0.6050
375.00	8.597	2875.00	0.6011
400.00	7.837	2900.00	0.5973
425.00	7.184	2925.00	0.5935
450.00	6.619	2950.00	0.5898
475.00	6.126	2975.00	0.5861
500.00	5.693	3000.00	0.5825
525.00	5.309	3025.00	0.5789
550.00	4.967	3050.00	0.5754
575.00	4.661	3075.00	0.5719
600.00	4.386	3100.00	0.5685
625.00	4.138	3125.00	0.5651
650.00	3.913	3150.00	0.5618
675.00	3.708	3175.00	0.5585
700.00	3.521	3200.00	0.5552
725.00	3.349	3225.00	0.5520
750.00	3.192	3250.00	0.5488
775.00	3.047	3275.00	0.5457
800.00	2.913	3300.00	0.5426
825.00	2.789	3325.00	0.5396

850.00	2.674	3350.00	0.5366
875.00	2.568	3375.00	0.5336
900.00	2.469	3400.00	0.5306
925.00	2.376	3425.00	0.5277
950.00	2.290	3450.00	0.5248
975.00	2.210	3475.00	0.5220
1000.00	2.135	3500.00	0.5192
1025.00	2.064	3525.00	0.5164
1050.00	1.998	3550.00	0.5137
1075.00	1.937	3575.00	0.5110
1100.00	1.878	3600.00	0.5083
1125.00	1.824	3625.00	0.5057
1150.00	1.772	3650.00	0.5030
1175.00	1.724	3675.00	0.5005
1200.00	1.678	3700.00	0.4979
1225.00	1.631	3725.00	0.4954
1250.00	1.585	3750.00	0.4929
1275.00	1.541	3775.00	0.4904
1300.00	1.499	3800.00	0.4879
1325.00	1.458	3825.00	0.4855
1350.00	1.420	3850.00	0.4831
1375.00	1.383	3875.00	0.4807
1400.00	1.348	3900.00	0.4784
1425.00	1.315	3925.00	0.4761
1450.00	1.283	3950.00	0.4738
1475.00	1.252	3975.00	0.4715
1500.00	1.222	4000.00	0.4693
1525.00	1.193	4025.00	0.4670
1550.00	1.166	4050.00	0.4648
1575.00	1.140	4075.00	0.4627
1600.00	1.114	4100.00	0.4605
1625.00	1.090	4125.00	0.4584
1650.00	1.066	4150.00	0.4562
1675.00	1.044	4175.00	0.4541
1700.00	1.022	4200.00	0.4521
1725.00	1.001	4225.00	0.4500
1750.00	0.9802	4250.00	0.4480
1775.00	0.9605	4275.00	0.4460
1800.00	0.9415	4300.00	0.4440
1825.00	0.9230	4325.00	0.4420
1850.00	0.9052	4350.00	0.4400
1875.00	0.8880	4375.00	0.4381
1900.00	0.8712	4400.00	0.4362
1925.00	0.8551	4425.00	0.4343
1950.00	0.8394	4450.00	0.4324
1975.00	0.8241	4475.00	0.4305
2000.00	0.8094	4500.00	0.4287
2025.00	0.7951	4525.00	0.4269
2050.00	0.7812	4550.00	0.4250
2075.00	0.7677	4575.00	0.4232

2100.00	0.7557	4600.00	0.4215
2125.00	0.7492	4625.00	0.4197
2150.00	0.7430	4650.00	0.4179
2175.00	0.7368	4675.00	0.4162
2200.00	0.7307	4700.00	0.4145
2225.00	0.7248	4725.00	0.4128
2250.00	0.7190	4750.00	0.4111
2275.00	0.7133	4775.00	0.4094
2300.00	0.7076	4800.00	0.4077
2325.00	0.7021	4825.00	0.4061
2350.00	0.6967	4850.00	0.4045
2375.00	0.6914	4875.00	0.4028
2400.00	0.6861	4900.00	0.4012
2425.00	0.6810	4925.00	0.3996
2450.00	0.6759	4950.00	0.3981
2475.00	0.6709	4975.00	0.3965
2500.00	0.6660	5000.00	0.3949
2525.00	0.6612		

********** AERSCREEN MAXIMUM IMPACT SUMMARY **********

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	153.2	153.2	137.9	91.93	15.32

DISTANCE FROM SOURCE 51.00 meters

IMPACT AT THE AMBIENT BOUNDARY	153.2	153.2	137.9	91.93	15.32

DISTANCE FROM SOURCE 51.00 meters

KB4 ODOR CONTROL HOOD
AERSCREEN INPUT FILE

```
** STACK DATA         Rate    Height     Temp.  Velocity     Diam.     Flow

**              0.8400E-02    9.6500  299.7000    6.1265    0.6860     4798.



** BUILDING DATA   BPIP    Height  Max dim.  Min dim.   Orient.   Direct.    Offset

**                   N      0.0000    0.0000    0.0000    0.0000    0.0000    0.0000



** MAKEMET DATA    MinT    MaxT Speed   AnemHt Surf Clim  Albedo   Bowen  Length  SC
FILE

**               249.82  310.93   0.5   10.000    7    1   0.3500   1.5000   1.0000
"NA"



** ADJUST U*      N



** TERRAIN DATA   Terrain    UTM East   UTM North  Zone  Nada     Probe     PROFBASE
 Use AERMAP elev

**                   N           0.0         0.0     0     0       5000.0
0.00         N



** DISCRETE RECEPTORS  Discflag   Receptor file

**                      N        "NA"
```

```
** UNITS/POPULATION   Units   R/U  Population      Amb. dist.   Flagpole    Flagpole
height

**                      M     R            0.         152.400       N         0.00



** FUMIGATION        Inversion Break-up  Shoreline  Distance    Direct  Run
AERSCREEN

**                         N                  N         0.00     -9.0     Y



** DEBUG OPTION      Debug

**                       Y



** OUTPUT FILE "GLUE01.OUT"



** Temporal sector: Winter, spatial sector:  1



CO STARTING

   TITLEONE ERBO01

**            REFINE STAGE 3
```

```
   MODELOPT CONC SCREEN  FLAT

   AVERTIME 1

   POLLUTID OTHER

   RUNORNOT RUN

CO FINISHED



SO STARTING

   LOCATION SOURCE POINT        0.0     0.0

   SRCPARAM SOURCE   0.8400E-02    9.650  299.700    6.127    0.686



   SRCGROUP  ALL



SO FINISHED



RE STARTING

** Fence line receptor

   DISCCART        152.40         0.00
```

```
** Refined receptors

   DISCCART        153.00         0.00

   DISCCART        154.00         0.00

   DISCCART        155.00         0.00

   DISCCART        156.00         0.00

   DISCCART        157.00         0.00

   DISCCART        158.00         0.00

   DISCCART        159.00         0.00

   DISCCART        160.00         0.00

   DISCCART        161.00         0.00

   DISCCART        162.00         0.00

   DISCCART        163.00         0.00

   DISCCART        164.00         0.00

   DISCCART        165.00         0.00

   DISCCART        166.00         0.00

   DISCCART        167.00         0.00

   DISCCART        168.00         0.00
```

DISCCART	169.00	0.00
DISCCART	170.00	0.00
DISCCART	171.00	0.00
DISCCART	172.00	0.00
DISCCART	173.00	0.00
DISCCART	174.00	0.00
DISCCART	175.00	0.00
DISCCART	176.00	0.00
DISCCART	177.00	0.00
DISCCART	178.00	0.00
DISCCART	179.00	0.00
DISCCART	180.00	0.00
DISCCART	181.00	0.00
DISCCART	182.00	0.00
DISCCART	183.00	0.00
DISCCART	184.00	0.00

DISCCART	185.00	0.00
DISCCART	186.00	0.00
DISCCART	187.00	0.00
DISCCART	188.00	0.00
DISCCART	189.00	0.00
DISCCART	190.00	0.00
DISCCART	191.00	0.00
DISCCART	192.00	0.00
DISCCART	193.00	0.00
DISCCART	194.00	0.00
DISCCART	195.00	0.00
DISCCART	196.00	0.00
DISCCART	197.00	0.00
DISCCART	198.00	0.00
DISCCART	199.00	0.00
DISCCART	200.00	0.00
DISCCART	201.00	0.00

```
   DISCCART        202.00         0.00


RE FINISHED


ME STARTING
   SURFFILE  aerscreen_01_01.sfc  FREE
   PROFFILE  aerscreen_01_01.pfl  FREE
   SURFDATA  11111   2010  SCREEN
   UAIRDATA  22222   2010  SCREEN
   PROFBASE    0.0 METERS
ME FINISHED


OU STARTING
   RECTABLE 1  FIRST
   MAXTABLE  ALLAVE  50


   FILEFORM  EXP
```

```
   RANKFILE  1 10 AERSCREEN.FIL

   PLOTFILE  1 ALL  FIRST  AERSCREEN.PLT

OU FINISHED
```

KB4 ODOR CONTROL HOOD
AERSCREEN OUTPUT FILE

AERSCREEN 21112 / AERMOD 23132 08/02/24
10:28:13

TITLE: Glue01

********** STACK PARAMETERS **********

SOURCE EMISSION RATE:	0.840E-02	g/s	0.667E-01	lb/hr
STACK HEIGHT:	9.65	meters	31.66	feet
STACK INNER DIAMETER:	0.686	meters	27.01	inches
PLUME EXIT TEMPERATURE:	299.7	K	79.8	Deg F
PLUME EXIT VELOCITY:	6.127	m/s	20.10	ft/s
STACK AIR FLOW RATE:	4798	ACFM		
RURAL OR URBAN:	RURAL			
INITIAL PROBE DISTANCE =	5000.	meters	16404.	feet

********** BUILDING DOWNWASH PARAMETERS **********

NO BUILDING DOWNWASH HAS BEEN REQUESTED FOR THIS ANALYSIS

********** PROBE ANALYSIS **********

25 meter receptor spacing: 152. meters - 5000. meters

SECTOR	Zo ROUGHNESS LENGTH	1-HR CONC (ug/m3)	DIST (m)	TEMPORAL PERIOD
1*	1.000	6.495	152.4	WIN

* = worst case flow sector

********** MAKEMET METEOROLOGY PARAMETERS **********

MIN/MAX TEMPERATURE: 249.8 / 310.9 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10.000 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Urban
DOMINANT CLIMATE TYPE: Average Moisture
DOMINANT SEASON: Winter

ALBEDO: 0.35
BOWEN RATIO: 1.50
ROUGHNESS LENGTH: 1.000 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADUSTED

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR	MO	DY	JDY	HR
10	02	21	21	01

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
-3.68	0.087	-9.000	0.020	-999.	59.	17.0	1.000	1.50	0.35	1.00

HT	REF TA	HT
10.0	310.9	2.0

WIND SPEED AT STACK HEIGHT (non-downwash):   1.0 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 9.6 meters
ESTIMATED FINAL PLUME RISE (non-downwash):   0.0 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash):   9.6 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR	MO	DY	JDY	HR
10	02	21	21	01

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS
-3.68	0.087	-9.000	0.020	-999.	59.	17.0	1.000	1.50	0.35	1.00

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WIND SPEED AT STACK HEIGHT (non-downwash): 1.0 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 9.6 meters
ESTIMATED FINAL PLUME RISE (non-downwash): 0.0 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash): 9.6 meters

********** AERSCREEN AUTOMATED DISTANCES **********

OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)
152.40	6.495	2600.00	0.2243
175.00	5.824	2625.00	0.2214
200.00	5.229	2650.00	0.2185
225.00	4.706	2675.00	0.2157
250.00	4.250	2700.00	0.2129
275.00	3.856	2725.00	0.2102
300.00	3.515	2750.00	0.2076
325.00	3.219	2775.00	0.2050
350.00	2.961	2800.00	0.2025
375.00	2.735	2825.00	0.2000
400.00	2.536	2850.00	0.1975
425.00	2.360	2875.00	0.1952
450.00	2.203	2900.00	0.1928
475.00	2.062	2925.00	0.1905
500.00	1.936	2950.00	0.1883
525.00	1.823	2975.00	0.1861
550.00	1.720	3000.00	0.1840
575.00	1.626	3025.00	0.1818
600.00	1.541	3050.00	0.1798
625.00	1.463	3075.00	0.1777
650.00	1.392	3100.00	0.1757
675.00	1.326	3125.00	0.1738
700.00	1.265	3150.00	0.1719
725.00	1.209	3175.00	0.1700
750.00	1.157	3200.00	0.1681
775.00	1.109	3225.00	0.1663
800.00	1.064	3250.00	0.1645
825.00	1.022	3275.00	0.1628
850.00	0.9826	3300.00	0.1614
875.00	0.9460	3325.00	0.1606
900.00	0.9116	3350.00	0.1597
925.00	0.8794	3375.00	0.1589

950.00	0.8491	3400.00	0.1581
975.00	0.8205	3425.00	0.1573
1000.00	0.7937	3450.00	0.1564
1025.00	0.7683	3475.00	0.1558
1050.00	0.7444	3500.00	0.1552
1075.00	0.7217	3525.00	0.1545
1100.00	0.7003	3550.00	0.1539
1125.00	0.6800	3575.00	0.1533
1150.00	0.6608	3600.00	0.1527
1175.00	0.6426	3625.00	0.1520
1200.00	0.6253	3650.00	0.1514
1225.00	0.6088	3675.00	0.1508
1250.00	0.5932	3700.00	0.1501
1275.00	0.5783	3725.00	0.1495
1300.00	0.5642	3750.00	0.1489
1325.00	0.5507	3775.00	0.1483
1350.00	0.5378	3800.00	0.1477
1375.00	0.5255	3825.00	0.1470
1400.00	0.5138	3850.00	0.1464
1425.00	0.5027	3875.00	0.1458
1450.00	0.4920	3900.00	0.1452
1475.00	0.4818	3925.00	0.1446
1500.00	0.4720	3950.00	0.1440
1525.00	0.4627	3975.00	0.1433
1550.00	0.4537	4000.00	0.1427
1575.00	0.4442	4025.00	0.1421
1600.00	0.4349	4050.00	0.1415
1625.00	0.4259	4075.00	0.1409
1650.00	0.4172	4100.00	0.1403
1675.00	0.4088	4125.00	0.1397
1700.00	0.4007	4150.00	0.1391
1725.00	0.3929	4175.00	0.1385
1750.00	0.3853	4200.00	0.1379
1775.00	0.3780	4225.00	0.1374
1800.00	0.3709	4250.00	0.1368
1825.00	0.3640	4275.00	0.1362
1850.00	0.3574	4300.00	0.1356
1875.00	0.3509	4325.00	0.1350
1900.00	0.3447	4350.00	0.1344
1925.00	0.3386	4375.00	0.1339
1950.00	0.3327	4400.00	0.1333
1975.00	0.3270	4425.00	0.1327
2000.00	0.3214	4450.00	0.1322
2025.00	0.3160	4475.00	0.1316
2050.00	0.3108	4500.00	0.1310
2075.00	0.3057	4525.00	0.1305
2100.00	0.3007	4550.00	0.1299
2125.00	0.2959	4575.00	0.1294
2150.00	0.2912	4600.00	0.1288
2175.00	0.2867	4625.00	0.1283

2200.00	0.2822	4650.00	0.1277
2225.00	0.2779	4675.00	0.1272
2250.00	0.2737	4700.00	0.1266
2275.00	0.2695	4725.00	0.1261
2300.00	0.2655	4750.00	0.1256
2325.00	0.2616	4775.00	0.1250
2350.00	0.2578	4800.00	0.1245
2375.00	0.2541	4825.00	0.1240
2400.00	0.2505	4850.00	0.1235
2425.00	0.2469	4875.00	0.1229
2450.00	0.2435	4900.00	0.1224
2475.00	0.2401	4925.00	0.1219
2500.00	0.2368	4950.00	0.1214
2525.00	0.2335	4975.00	0.1209
2550.00	0.2304	5000.00	0.1204
2575.00	0.2273		

********** AERSCREEN MAXIMUM IMPACT SUMMARY **********

CALCULATION PROCEDURE	MAXIMUM 1-HOUR CONC (ug/m3)	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)
FLAT TERRAIN	6.495	6.495	5.846	3.897	0.6495

DISTANCE FROM SOURCE 152.40 meters

IMPACT AT THE AMBIENT BOUNDARY	6.495	6.495	5.846	3.897	0.6495

DISTANCE FROM SOURCE 152.40 meters

APPENDIX E

XPS RESIN MATERIAL AND BLOWING AGENTS SAFETY DATA SHEETS

HDC HYUNDAI ENGINEERING PLASTICS

Material Safety Data Sheet

SOLARENE® GPPS

1. Product Identification

Chemical name : POLYSTYRENE
Designation or trade name : SOLARENE G-126
Commonly used synonyms : PS(Polystyrene), GPPS(General Purpose Polystyrene), Crystal Polystyrene
Company's Address : #108-256, Sapyeong-ro, Nam-gu, Ulsan, Korea
Company's Zip Code : 44785
Company's Emerg Ph. # : +82.52.279.0565
Date MSDS Prepared : Nov.18, 1988
Review Date : Oct 10, 2017
Reviewed by : Sung-jin, Kim/Manager of QA Team

2. Composition / Information on Ingredients

Ingredient : Polystyrene(GPPS)
Sequence Number : 01
Percentage : min 95%
CAS Name : POLYSTYRENE
CAS Number : 9003-53-6

3. Hazards Identification

NFPA rating(0-4) : health=1, fire=1, reactivity=0

4. First-aid Measures

Inhalation :
Symptoms: dusts that may be present on the material can irritate the respiratory organs.
First aid action: move the person from the contaminated area to fresh air.

Skin contact:
No adverse effect expectable. The product and its dust are not known to be irritant for the skin.

Eye contact:
Symptoms: Dusts can redden eyes
First aid action: Wash plentifully with water. If irritation remain, require medical assistance.

Ingestion:
The ingestion is very improbable due to pellet shape. This material does not present a signification degree of toxicity.
First aid action: If considerable material quantities are swallowed, require medical assistance.

Material Safety Data Sheet

SOLARENE® GPPS

5. Fire-fighting Measures

Suitable extinguishing media:
Water, water spray, foam, dry chemicals, carbon dioxide.

Exposure hazards arising from the material itself, combustion products, resulting gases:
The material, when involved in a fire can release fumes made up of water, carbon dioxide, carbon monoxide in lacking of oxygen. Overheating/Pyrolysis evolve vapors made up of monomer (styrene), low polymers and their oxidation products.

Special protective equipment for firefighters:
Wear suitable protective clothing, with protection of the respiratory organs.
(self contained breathing apparatus).

6. Accidental Release Measures

Collect mechanically. Reuse if possible or deplete according to the current regulations.

7. Handling and Storage

Handling
In normal conditions masks with anti-dust filter shall be available to be used when requested.

Storage
. Keep away from sources of ignition, heat and sparks and from flammable products.
. In storage and working areas avoid pellets spilling as a possible cause of slipping.
· Store it in a place with no exposure to direct sunlight. kept in its original packages in cool and dry place.

8. Exposure Controls / Personal Protection

Precautionary and engineering measures to be taken during use in order to minimize worker exposure:
· During processing (molding, extrusion) vapor of the substances mentioned may evolve, particularly at unusually high processing temperatures (see clause 5).
· Work rooms must be provided with adequate ventilation and/or fume and dust collectors, so as to prevent their concentrations exceed the fixed OSHA TWA values as follows;

for dust
OSHA PEL/8-hours TWA, Total:15ppm, Breathable: 5ppm

for Gases as styrene
OSHA PEL/8-hours TWA, Total:50ppm

Equipment to provide adequate and personal protection:
· Ventilation: Provide sufficient ventilation to control exposure levels below air-borne exposure limits.
· Respirators: In normal handling conditions masks with anti-dust filter shall be available to be used when Requested.

Material Safety Data Sheet

SOLARENE® GPPS

9. Physical and Chemical Properties

- Appearance
  . physical state at 23°C : solid (pellets)
  . color : transparent or colored according to request
- Odor : none
- Glass transition Temp. : 105 - 135°C
· Molecular weight : Variable(Approx. 150,000~500,000 g/mol)
- Decomposition Temperature : > 300°C
- Auto-flammability : > 427°C
- Specific gravity : 1.05(at 20℃)
- Bulk density : approx 650 kg/㎥
- Solubility in water : insoluble
- Solubility with other solvents : soluble in chlorinated, aromatic solvents, acetone.

10. Stability and Reactivity

Material is stable and inert in the normal handling and storage conditions.

Conditions to avoid

Avoid excessive heat (see clause 9).

Hazardous decomposition products:

When processed to unusually high temperatures, the product may evolve vapors made up of monomer(styrene), low polymers and their oxidation products

11. Toxicological Information

No evidence of acute/chronic toxicity have been reported.
Powder may cause eyes and/or respiratory organs irritation.

Delayed and immediate effects from short and long term exposure:

Carcinogenesis, mutagenicity, reproduce toxicity: No evidence of such effects have been reported.

12.. Ecological Information

Aquatic toxicity and other data relating to ecotoxicity:

The material is not soluble in water.

Effects, behavior and environmental fate

Persistence and degradability: The material is a not biodegradable polymer.

Material Safety Data Sheet

SOLARENE® GPPS

13. Disposal Considerations

Appropriate methods of disposal:

Recycling : Material can be safely recycled with fresh material when allowed by the final application.

Incineration : Thermo-destruction with energy recovery is possible at suitable incineration facilities.

Landfill : To be avoided as much as possible. The material do not pose any harm for the landfill site nor can pollute the ground waters.

14. Transport Information

DOT PSN Code : ZZZ
DOT Proper Shipping Name : Not Regulated by This Mode of Transportation.
IMO PSN Code : ZZZ
IMO Proper Shipping Name : Not Regulated by This Mode of Transportation.
IATA PSN Code : ZZZ
IATA Proper Shipping Name : Not Regulated by This Mode of Transportation.
AFI PSN Code : ZZZ
AFI Proper Shipping Name : Not Regulated by This Mode of Transportation.

Additional Trans Data : Not Regulated for Shipping.

15. Regulatory Information

N/A

16. Other Information

Data and information contained in this Safety Data Sheet are based on our available knowledge at the last revision date.
No guarantee can be given as to the sufficiency of any safety measures contained in this Safety Data Sheet, nor can it be assumed that other or additional measures may not be required under particular or exceptional circumstances. The user must make sure of the fitness and completeness of the information, according to the specific use he wants to do.

Solstice® 1234ze

000000012546

Version 2.12 | Revision Date 05/12/2016 | Print Date 04/16/2019

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	Solstice® 1234ze
Number	:	000000012546
Product Use Description	:	Foam blowing agent
Manufacturer or supplier's details	:	Honeywell International Inc. 115 Tabor Road Morris Plains, NJ 07950-2546
For more information call	:	800-522-8001 +1-973-455-6300 (Monday-Friday, 9:00am-5:00pm)
In case of emergency call	:	**Medical: 1-800-498-5701 or +1-303-389-1414**
	:	**Transportation (CHEMTREC): 1-800-424-9300 or +1-703-527-3887**
	:	
	:	(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form	:	Liquefied gas
Color	:	colourless
Odor	:	slight ether-like

Classification of the substance or mixture

Classification of the substance or mixture	:	Gases under pressure, Liquefied gas Simple Asphyxiant

GHS Label elements, including precautionary statements

Symbol(s) :

Signal word : Warning

Hazard statements : Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.

Precautionary statements : **Prevention:**
Use personal protective equipment as required.

Storage:
Protect from sunlight. Store in a well-ventilated place.

Carcinogenicity

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature : Substance

Chemical name	CAS-No.	Concentration
trans-1,3,3,3-Tetrafluoroprop-1-ene	29118-24-9	100.00 %

SECTION 4. FIRST AID MEASURES

Inhalation : Remove to fresh air. If breathing is irregular or stopped, administer artificial respiration. Use oxygen as required, provided a qualified operator is present. Call a physician.

Skin contact : Rapid evaporation of the liquid may cause frostbite. If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. Call a physician if irritation develops or persists.

Eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. In case of frostbite water should be lukewarm, not hot. If symptoms persist, call a physician.

Ingestion : Unlikely route of exposure. As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. Call a physician immediately.

Notes to physician

Treatment : Treat frost-bitten areas as needed.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Water mist
Dry powder
Foam
Carbon dioxide (CO2)

Specific hazards during firefighting : Contents under pressure.
Heating will cause pressure rise with risk of bursting
Cool closed containers exposed to fire with water spray.
Product is not combustible under normal conditions.
However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources.
Do not allow run-off from fire fighting to enter drains or water courses.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Some risk may be expected of corrosive and toxic decomposition products.
Fire may cause evolution of:
Hydrogen fluoride

Special protective equipment for firefighters : In the event of fire and/or explosion do not breathe fumes.
Wear self-contained breathing apparatus and protective suit.
No unprotected exposed skin areas.
Exposure to decomposition products may be a hazard to health.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Immediately evacuate personnel to safe areas.
Keep people away from and upwind of spill/leak.
Wear personal protective equipment. Unprotected persons must be kept away.
Remove all sources of ignition.
Avoid skin contact with leaking liquid (danger of frostbite).
Ventilate the area.
After release, disperses into the air.
Vapours are heavier than air and can cause suffocation by

reducing oxygen available for breathing.
Avoid accumulation of vapours in low areas.
Unprotected personnel should not return until air has been tested and determined safe.

Environmental precautions	:	Prevent further leakage or spillage if safe to do so. The product evapourates readily. Prevent spreading over a wide area (e.g. by containment or oil barriers).
Methods for cleaning up	:	Do not direct water spray at the point of leakage. Allow to evaporate.

SECTION 7. HANDLING AND STORAGE

Handling

Handling	:	Handle with care. Avoid inhalation of vapour or mist. Do not get in eyes, on skin, or on clothing. Wear personal protective equipment. Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Follow all standard safety precautions for handling and use of compressed gas cylinders. Use authorized cylinders only. Protect cylinders from physical damage. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Do not remove screw cap until immediately ready for use. Always replace cap after use.
Advice on protection against fire and explosion	:	Do not spray on a naked flame or any incandescent material. Keep away from direct sunlight. Fire or intense heat may cause violent rupture of packages. Vapours may form explosive mixtures with air. The product is not easily combustible.

Storage

Requirements for storage areas and containers	:	Keep containers tightly closed in a cool, well-ventilated place. Keep away from direct sunlight. Protect cylinders from physical damage. Store away from incompatible substances.
Further information on	:	Keep only in the original container at temperature not

storage conditions exceeding 50°C

Advice on common storage : Do not store together with:
Oxidizing agents

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective measures : Do not breathe vapour.
Avoid contact with skin, eyes and clothing.
Ensure that eyewash stations and safety showers are close to the workstation location.

Engineering measures : Local exhaust

Eye protection : Goggles

Hand protection : Protective gloves

Skin and body protection : Impervious clothing
Wear cold insulating gloves/ face shield/ eye protection.

Respiratory protection : In case of insufficient ventilation wear suitable respiratory equipment.
Wear a positive-pressure supplied-air respirator.

Hygiene measures : Avoid breathing vapours, mist or gas.
Keep working clothes separately.

Exposure Guidelines

Components	CAS-No.	Value	Control parameters	Update	Basis
trans-1,3,3,3-Tetrafluoroprop-1-ene	29118-24-9	TWA : Time weighted average	(800 ppm)	2012	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide
trans-1,3,3,3-Tetrafluoroprop-1-ene	29118-24-9	TWA : Time weighted average	(800 ppm)	31.03.11	Honeywell:Limit established by Honeywell International Inc.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	:	Liquefied gas
Color	:	colourless
Odor	:	slight ether-like
pH	:	Note: neutral
Boiling point/boiling range	:	-19 °C
Flash point	:	Note: Not applicable
Lower explosion limit	:	Note: No LEL and UEL was assigned at standard testing conditions, 20°C., Exhibits flame limits at temperatures in excess of 28˚ C.
Upper explosion limit	:	Note: No LEL and UEL was assigned at standard testing conditions, 20°C., Exhibits flame limits at temperatures in excess of 28˚ C.
Vapor pressure	:	4,271 hPa at 20 °C(68 °F) 11,152 hPa at 54.4 °C(129.9 °F)
Vapor density	:	4 Note: (Air = 1.0)
Density	:	1.17 g/cm3 at 21.1 °C
Water solubility	:	0.373 g/l
Partition coefficient: n-octanol/water	:	log Pow: 1.6
Ignition temperature	:	368 °C Method: Auto-ignition temperature

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Hazardous polymerisation does not occur.
Conditions to avoid	:	Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C. Can form a combustible mixture with air at pressures above atmospheric pressure. Do not mix with oxygen or air above atmospheric pressure.
Incompatible materials to avoid	:	Reactions with alkali metals.
Hazardous decomposition products	:	Pyrolysis products containing fluoride Fluorocarbons Hydrogen fluoride

SECTION 11. TOXICOLOGICAL INFORMATION

Acute oral toxicity	:	Note: Not applicable Study technically not feasible.
Acute inhalation toxicity	:	Species: Mouse Note: Acute (4-Hour) Inhalation Toxicity Screening Study (mouse): No lethality at >100,000 ppm.
	:	LC50: > 207000 ppm Exposure time: 4 h Species: Rat
Acute dermal toxicity	:	Note: no data available Study technically not feasible.
Skin irritation	:	Species: Rabbit Result: No skin irritation Method: OECD Test Guideline 404
Eye irritation	:	Note: no data available Study technically not feasible.

Sensitisation	:	Cardiac sensitization Species: dogs Result: Did not cause sensitisation on laboratory animals.
	:	Species: human Result: Does not cause skin sensitisation.
Repeated dose toxicity	:	Species: Rat Application Route: Inhalation Exposure time: 13 Weeks Note: Causes mild effects on the heart. NOEL 5,000 ppm
Genotoxicity in vitro	:	Test Method: Chromosome aberration test in vitro Cell type: Human lymphocytes Result: negative Method: OECD Test Guideline 473
	:	Test Method: Ames test Result: negative
Genotoxicity in vivo	:	Test Method: Mutagenicity (in vivo mammalian bone-marrow cytogenetic test, chromosomal analysis) Species: Mouse Cell type: Micronucleus Application Route: Inhalation Method: OECD Test Guideline 474 Result: negative
Reproductive toxicity	:	Test Method: Two-generation study Species: Rat Application Route: Inhalation NOEL: > 20,000 ppm NOEL: > 20,000 ppm Method: OECD Test Guideline 416
Teratogenicity	:	Species: Rabbit Method: OECD 416 Note: Did not show teratogenic effects in animal experiments.
	:	Species: Rat Method: OECD 416 Note: Did not show teratogenic effects in animal experiments.
Teratogenicity	:	Species: RatApplication Route: Inhalation NOAEC: 15,000 ppm

Method: OECD Test Guideline 414

Further information : Note: Excessive exposure may cause central nervous system effects including drowsiness and dizziness. Excessive exposure may also cause cardiac arrhythmia. Rapid evaporation of the liquid may cause frostbite.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Toxicity to fish : static test
LC0: > 117 mg/l
Exposure time: 96 h
Species: Cyprinus carpio (Carp)
Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates : static test
EC50: > 160 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)
Method: OECD Test Guideline 202

Toxicity to algae : Growth rate
NOEC: > 170 mg/l
Exposure time: 72 h
Species: Algae
Method: OECD Test Guideline 201

: Biomass
NOEC: > 170 mg/l
Exposure time: 72 h
Species: Algae
Method: OECD Test Guideline 201

Elimination information (persistence and degradability)

Bioaccumulation : Note: No bioaccumulation is to be expected (log Pow <= 4).

Biodegradability : aerobic
Result: Not readily biodegradable.

Further information on ecology

Additional ecological information	:	no data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods	:	Observe all Federal, State, and Local Environmental regulations.

SECTION 14. TRANSPORT INFORMATION

DOT	UN/ID No.	:	UN 3163
	Proper shipping name	:	LIQUEFIED GAS, N.O.S. (trans-1,3,3,3-Tetrafluoroprop-1-ene)
	Class		2.2
	Packing group		
	Hazard Labels		2.2
IATA	UN/ID No.	:	UN 3163
	Description of the goods	:	LIQUEFIED GAS, N.O.S. (trans-1,3,3,3-Tetrafluoroprop-1-ene)
	Class	:	2.2
	Hazard Labels	:	2.2
	Packing instruction (cargo aircraft)	:	200
	Packing instruction (passenger aircraft)	:	200
IMDG	UN/ID No.	:	UN 3163
	Description of the goods	:	LIQUEFIED GAS, N.O.S. (TRANS-1,3,3,3-TETRAFLUOROPROP-1-ENE)
	Class	:	2.2
	Hazard Labels	:	2.2
	EmS Number	:	F-C, S-V
	Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

Inventories

US. Toxic Substances Control Act	:	On TSCA Inventory
Australia. Industrial Chemical (Notification and Assessment) Act	:	On the inventory, or in compliance with the inventory

Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)	:	All components of this product are on the Canadian DSL
Japan. Kashin-Hou Law List	:	On the inventory, or in compliance with the inventory
Korea. Toxic Chemical Control Law (TCCL) List	:	On the inventory, or in compliance with the inventory
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	:	Not in compliance with the inventory
China. Inventory of Existing Chemical Substances	:	On the inventory, or in compliance with the inventory
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	:	On the inventory, or in compliance with the inventory

National regulatory information

SARA 302 Components	:	No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
SARA 311/312 Hazards	:	Acute Health Hazard Sudden Release of Pressure Hazard
California Prop. 65	:	This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

WHMIS Classification : A: Compressed Gas
This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

SECTION 16. OTHER INFORMATION

		HMIS III	NFPA
Health hazard	:	1	2
Flammability	:	1	1
Physical Hazard	:	0	
Instability	:		0

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Final determination of suitability of any material is the sole responsibility of the user. This information should not constitute a guarantee for any specific product properties.

Changes since the last version are highlighted in the margin. This version replaces all previous versions.
Previous Issue Date: 11/18/2015
Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group

SECTION 1. IDENTIFICATION

Product name	:	Solstice® LBA
Number	:	000000012786
Product Use Description	:	Foam blowing agent
Manufacturer or supplier's details	:	Honeywell International Inc. 115 Tabor Road Morris Plains, NJ 07950-2546
For more information call	:	800-522-8001 +1-973-455-6300 (Monday-Friday, 9:00am-5:00pm)
In case of emergency call	:	**Medical: 1-800-498-5701 or +1-303-389-1414**
	:	**Transportation (CHEMTREC): 1-800-424-9300 or +1-703-527-3887**
	:	
	:	(24 hours/day, 7 days/week)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form	:	liquid, clear
Color	:	colourless
Odor	:	slight

Classification of the substance or mixture

Classification of the substance or mixture	:	Gases under pressure, Liquefied gas Simple Asphyxiant

GHS Label elements, including precautionary statements

Symbol(s) :

Signal word	:	Warning
Hazard statements	:	Contains gas under pressure; may explode if heated. May displace oxygen and cause rapid suffocation.
Precautionary statements	:	**Prevention:** Use personal protective equipment as required. **Storage:** Protect from sunlight. Store in a well-ventilated place.

Carcinogenicity

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature : Substance

Chemical name	CAS-No.	Concentration
trans-1-Chloro-3,3,3-trifluoropropene	102687-65-0	>99.00 %

SECTION 4. FIRST AID MEASURES

Inhalation	:	Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is present. Call a physician.
Skin contact	:	After contact with skin, wash immediately with plenty of water. If symptoms persist, call a physician. Take off all contaminated clothing immediately. Wash contaminated clothing before re-use.
Eye contact	:	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Call a physician if irritation develops or persists.
Ingestion	:	If victim is fully conscious, give a cupful of water. Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Call a physician immediately.

Notes to physician

Indication of immediate medical attention and special treatment needed, if necessary	:	Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	The product is not flammable. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Water spray Carbon dioxide (CO2) Dry chemical Foam
Specific hazards during firefighting	:	This product is not flammable at ambient temperatures and atmospheric pressure. Container may rupture on heating. Cool closed containers exposed to fire with water spray.

Do not allow run-off from fire fighting to enter drains or water courses.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Exposure to decomposition products may be a hazard to health.
Fire may cause evolution of:
Hydrogen fluoride
Gaseous hydrogen chloride (HCl).
Carbon oxides
Halogenated compounds
Carbonyl halides

Special protective equipment for firefighters : In the event of fire and/or explosion do not breathe fumes.
Wear self-contained breathing apparatus and protective suit.
No unprotected exposed skin areas.

Further information : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Immediately evacuate personnel to safe areas.
Keep people away from and upwind of spill/leak.
Wear personal protective equipment. Unprotected persons must be kept away.
Ventilate the area.
Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Avoid accumulation of vapours in low areas.
Unprotected personnel should not return until air has been tested and determined safe.
Ensure that the oxygen content is >= 19.5%.

Environmental precautions : Do not flush into surface water or sanitary sewer system.
Prevent further leakage or spillage if safe to do so.
Prevent spreading over a wide area (e.g. by containment or oil barriers).

Methods and materials for : Contain spillage, and then collect with non-combustible

containment and cleaning up	absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).

SECTION 7. HANDLING AND STORAGE

Handling

Precautions for safe handling	:	Handle with care. Do not use in areas without adequate ventilation. Do not breathe vapours or spray mist. Avoid contact with skin, eyes and clothing. Follow all standard safety precautions for handling and use of compressed gas cylinders. Use authorized cylinders only. Protect cylinders from physical damage. Do not puncture or drop cylinders, expose them to open flame or excessive heat. Do not pierce or burn, even after use. Do not spray on a naked flame or any incandescent material. Do not remove screw cap until immediately ready for use. Always replace cap after use.
Advice on protection against fire and explosion	:	Normal measures for preventive fire protection. Keep product and empty container away from heat and sources of ignition.

Storage

Conditions for safe storage, including any incompatibilities	:	Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 55 °C. Keep containers tightly closed in a dry, cool and well-ventilated place. Storage rooms must be properly ventilated. Ensure adequate ventilation, especially in confined areas. Protect cylinders from physical damage. Store away from incompatible substances.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Protective measures	:	Ensure that eyewash stations and safety showers are close to the workstation location. Do not breathe vapours or spray mist. Avoid contact with skin, eyes and clothing.
Engineering measures	:	Use with local exhaust ventilation. Perform filling operations only at stations with exhaust ventilation facilities.
Eye protection	:	Wear as appropriate: Safety glasses with side-shields Safety goggles
Hand protection	:	Impervious gloves Gloves must be inspected prior to use. Replace when worn.
Skin and body protection	:	Wear as appropriate: Solvent-resistant gloves Solvent-resistant apron and boots If splashes are likely to occur, wear: Protective suit
Respiratory protection	:	In case of insufficient ventilation wear suitable respiratory equipment. Wear a positive-pressure supplied-air respirator. For rescue and maintenance work in storage tanks use self-contained breathing apparatus. Use NIOSH approved respiratory protection.
Hygiene measures	:	Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Do not breathe vapours or spray mist. Ensure adequate ventilation, especially in confined areas. Remove and wash contaminated clothing before re-use. Contaminated work clothing should not be allowed out of the workplace. Keep working clothes separately. Wash hands before breaks and immediately after handling the product.

Exposure Guidelines

Components	CAS-No.	Value	Control parameters	Update	Basis
trans-1-Chloro-3,3,3-trifluoropropene	102687-65-0	TWA : Time weighted average	(800 ppm)	2014	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide
trans-1-Chloro-3,3,3-trifluoropropene	102687-65-0	TWA : Time weighted average	(800 ppm)	2014	WEEL:US. OARS. WEELs Workplace Environmental Exposure Level Guide
trans-1-Chloro-3,3,3-trifluoropropene	102687-65-0	TWA : Time weighted average	(800 ppm)	2013	Honeywell:Limit established by Honeywell International Inc.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	:	liquid, clear
Color	:	colourless
Odor	:	slight
Melting point/range	:	< -90 °C Method: OECD Test Guideline 102
Boiling point/boiling range	:	19 °C Method: OECD Test Guideline 103
Flash point	:	Method: ISO 2719 Note: Not applicable

Flammability	:	The product is not flammable. Method: Flammability (gases)
Lower explosion limit	:	Note: None
Upper explosion limit	:	Note: None
Vapor pressure	:	1,516 hPa at 30 °C(86 °F)
Vapor density	:	Note: (Air = 1.0), not determined
Density	:	1.27 g/cm3
Water solubility	:	1.90 g/l at 20 °C Method: OECD Test Guideline 105
Partition coefficient: n-octanol/water	:	log Pow: 2.2 at 25 °C
Ignition temperature	:	380 °C at 986.8 - 1,035.9 hPa Method: DIN 51794
Decomposition temperature	:	> 250 °C
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Molecular weight	:	130.5 g/mol

SECTION 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under recommended storage conditions.
Possibility of hazardous reactions	:	Polymerisation can occur.
Conditions to avoid	:	Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 55 °C.
Incompatible materials	:	Strong oxidizing agents Finely divided magnesium Finely divided aluminium
Hazardous decomposition products	:	Halogenated compounds Carbon oxides Hydrogen fluoride Carbonyl halides Gaseous hydrogen chloride (HCl).

SECTION 11. TOXICOLOGICAL INFORMATION

Acute inhalation toxicity	:	LC50: 120000 ppm Exposure time: 4 h Species: Rat
Skin irritation	:	Species: Rabbit Result: No skin irritation Classification: Not classified as a skin irritant in animal testing. Method: OECD Test Guideline 404 Exposure time: 4 h
Sensitisation	:	Result: Does not cause skin sensitisation. Classification: Patch test on human volunteers did not demonstrate sensitisation properties.

: Cardiac sensitization
Species: dogs
Note: Cardiac sensitisation threshold (dog): 25000 ppm.

Repeated dose toxicity : Species: Rat
Application Route: Inhalation
Exposure time: 4 Weeks
NOEL: 4500 ppm
Note: Subacute toxicity

Genotoxicity in vitro : Test Method: Mutagenicity (Salmonella typhimurium - reverse mutation assay)
Metabolic activation: with and without metabolic activation
Result: negative

: Test Method: Mutagenicity (Escherichia coli - reverse mutation assay)
Metabolic activation: with and without metabolic activation
Result: negative
Method: OECD Test Guideline 471

: Test Method: Chromosome aberration test in vitro
Cell type: Human lymphocytes
Result: negative
Method: OECD Test Guideline 473

Genotoxicity in vivo : Species: Rat
Cell type: Bone marrow
Method: Mutagenicity (micronucleus test)
Result: negative

Genotoxicity in vivo : Test Method: Unscheduled DNA synthesis
Species: Rat
Result: negative

Genotoxicity in vivo : Species: Mouse
Cell type: Bone marrow
Method: Mutagenicity (micronucleus test)
Result: negative

Reproductive toxicity : Species: Rabbit

Note: No-observed-effect level - 15,000 ppm

: Species: Rat
Note: No-observed-effect level - 10,000 ppm

Teratogenicity : Species: Rabbit
Note: No-observed-effect level - 15,000 ppm

: Species: Rat
Note: No-observed-effect level - 10,000 ppm

Further information : Note: Excessive exposure may cause central nervous system effects including drowsiness and dizziness. Excessive exposure may also cause cardiac arrhythmia.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Toxicity to fish : LC50: 38 mg/l
Exposure time: 96 h
Species: Oncorhynchus mykiss (rainbow trout)
Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates : Immobilization
EC50: 82 mg/l
Exposure time: 48 h
Species: Daphnia magna (Water flea)
Method: OECD Test Guideline 202

Toxicity to algae : Growth inhibition
EC50: > 215 mg/l
Exposure time: 72 h
Species: Pseudokirchneriella subcapitata (green algae)
Method: OECD Test Guideline 201

: Growth rate
NOEC: 115 mg/l
Exposure time: 72 h
Species: Pseudokirchneriella subcapitata (green algae)
Method: OECD Test Guideline 201

Elimination information (persistence and degradability)

Bioaccumulation : Note: Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected.

Biodegradability : Result: Not readily biodegradable.
Value: 0 %
Method: OECD 301 D

Further information on ecology

Ecotoxicology Assessment

Results of PBT assessment
This substance is not considered to be very persistent and very bioaccumulating (vPvB)., This substance is not considered to be persistent, bioaccumulating and toxic (PBT).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods : Observe all Federal, State, and Local Environmental regulations.

Note : Where possible recycling is preferred to disposal or incineration.

SECTION 14. TRANSPORT INFORMATION

DOT UN/ID No. : UN 3163
Proper shipping name : LIQUEFIED GAS, N.O.S.
(Trans-1-Chloro-3,3,3-trifluoropropene)

	Class		2.2
	Packing group		
	Hazard Labels		2.2

IATA	UN/ID No.	:	UN 3163
	Description of the goods	:	LIQUEFIED GAS, N.O.S. (Trans-1-Chloro-3,3,3-trifluoropropene)
	Class	:	2.2
	Hazard Labels	:	2.2
	Packing instruction (cargo aircraft)	:	200
	Packing instruction (passenger aircraft)	:	200

IMDG	UN/ID No.	:	UN 3163
	Description of the goods	:	LIQUEFIED GAS, N.O.S. (TRANS-1-CHLORO-3,3,3-TRIFLUOROPROPENE)
	Class	:	2.2
	Hazard Labels	:	2.2
	EmS Number	:	F-C, S-V
	Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

Inventories

US. Toxic Substances Control Act	:	On TSCA Inventory
Australia. Industrial Chemical (Notification and Assessment) Act	:	On the inventory, or in compliance with the inventory
Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL)	:	All components of this product are on the Canadian DSL
Japan. Kashin-Hou Law	:	On the inventory, or in compliance with the inventory

List

Korea. Existing Chemicals Inventory (KECI)	:	On the inventory, or in compliance with the inventory
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act	:	Not in compliance with the inventory
China. Inventory of Existing Chemical Substances	:	On the inventory, or in compliance with the inventory
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand	:	On the inventory, or in compliance with the inventory

National regulatory information

SARA 302 Components	:	No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
SARA 311/312 Hazards	:	Acute Health Hazard Sudden Release of Pressure Hazard
California Prop. 65	:	This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

New Jersey RTK	:	trans-1-Chloro-3,3,3-trifluoropropene	102687-65-0
Pennsylvania RTK	:	trans-1-Chloro-3,3,3-trifluoropropene	102687-65-0

SECTION 16. OTHER INFORMATION

		HMIS III	NFPA
Health hazard	:	2	2
Flammability	:	0	0
Physical Hazard	:	0	
Instability	:		0

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Final determination of suitability of any material is the sole responsibility of the user. This information should not constitute a guarantee for any specific product properties.

Changes since the last version are highlighted in the margin. This version replaces all previous versions.
Previous Issue Date: 06/16/2014
Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group

SAFETY DATA SHEET

Dimethyl Ether

Airgas
an Air Liquide company

Section 1. Identification

GHS product identifier : Dimethyl Ether

Chemical name : dimethyl ether

Other means of identification : Methane, 1,1'-oxybis-; Methane, oxybis-; Methyl ether; oxybismethane; DME; Methoxymethane; Wood ether; Ether, Dimethyl; Dimethyl oxide; N,N-dimethyl ether; DIMETHYL ETHER PROPELLANT

Product type : Gas.

Product use : Synthetic/Analytical chemistry.

Synonym : Methane, 1,1'-oxybis-; Methane, oxybis-; Methyl ether; oxybismethane; DME; Methoxymethane; Wood ether; Ether, Dimethyl; Dimethyl oxide; N,N-dimethyl ether; DIMETHYL ETHER PROPELLANT

SDS # : 001021

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

24-hour telephone : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.
May cause drowsiness or dizziness.

Precautionary statements

General : Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach suspected leak area with caution.

Prevention : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only outdoors or in a well-ventilated area. Avoid breathing gas.

Response : IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.

Storage : Store locked up. Protect from sunlight. Store in a well-ventilated place.

Section 2. Hazards identification

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : In addition to any other important health or physical hazards, this product may displace oxygen and cause rapid suffocation.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : dimethyl ether

Other means of identification : Methane, 1,1'-oxybis-; Methane, oxybis-; Methyl ether; oxybismethane; DME; Methoxymethane; Wood ether; Ether, Dimethyl; Dimethyl oxide; N,N-dimethyl ether; DIMETHYL ETHER PROPELLANT

Product code : 001021

CAS number/other identifiers

CAS number : 115-10-6

Ingredient name	%	CAS number
dimethyl ether	100	115-10-6

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : As this product is a gas, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : Can cause central nervous system (CNS) depression. As this product is a gas, refer to the inhalation section.

Over-exposure signs/symptoms

Eye contact : No specific data.

Section 4. First aid measures

Inhalation : Adverse symptoms may include the following:, nausea or vomiting, headache, drowsiness/fatigue, dizziness/vertigo, unconsciousness

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : Accidental releases pose a serious fire or explosion hazard. No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Section 6. Accidental release measures

Methods and materials for containment and cleaning up

Small spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.

Large spill : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Contains gas under pressure. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Use only non-sparking tools. Avoid contact with eyes, skin and clothing. Empty containers retain product residue and can be hazardous. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Eliminate all ignition sources. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F). Store locked up. Keep container tightly closed and sealed until ready for use. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
dimethyl ether	**AIHA WEEL (United States, 10/2011).** TWA: 1000 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Section 8. Exposure controls/personal protection

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Gas.

Color : Colorless.

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Melting point : -141.5°C (-222.7°F)

Boiling point : -24.82°C (-12.7°F)

Critical temperature : 126.95°C (260.5°F)

Flash point : Closed cup: -41.11°C (-42°F)

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 3.3%
Upper: 26.2%

Vapor pressure : 62.3 (psig)

Vapor density : 1.6 (Air = 1)

Specific Volume (ft^3/lb) : 8.1833

Gas Density (lb/ft^3) : 0.1222

Relative density : Not applicable.

Solubility : Not available.

Solubility in water : 45.6 g/l

Partition coefficient: n-octanol/water : 0.07

Auto-ignition temperature : 350°C (662°F)

Decomposition temperature : Not available.

Viscosity : Not applicable.

Section 9. Physical and chemical properties

Flow time (ISO 2431) : Not available.

Molecular weight : 46.08 g/mole

Aerosol product

Heat of combustion : -31284700 J/kg

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

Incompatible materials : Oxidizers

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
dimethyl ether	LC50 Inhalation Gas. LC50 Inhalation Gas. LC50 Inhalation Vapor	Rat Rat Rat	82000 ppm 164000 ppm 309 g/m³	1 hours 4 hours 4 hours

Irritation/Corrosion

Not available.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
dimethyl ether	Category 3	Not applicable.	Narcotic effects

Section 11. Toxicological information

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Inhalation.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness.

Skin contact : No known significant effects or critical hazards.

Ingestion : Can cause central nervous system (CNS) depression. As this product is a gas, refer to the inhalation section.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : Adverse symptoms may include the following:, nausea or vomiting, headache, drowsiness/fatigue, dizziness/vertigo, unconsciousness

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
dimethyl ether	0.07	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty Airgas-owned pressure vessels should be returned to Airgas. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1033	UN1033	UN1033	UN1033	UN1033
UN proper shipping name	DIMETHYL ETHER	DIMETHYL ETHER	DIMETHYLETHERS	DIMETHYL ETHER	DIMETHYL ETHER
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Additional information

DOT Classification : **Limited quantity** Yes.
Quantity limitation Passenger aircraft/rail: Forbidden. Cargo aircraft: 150 kg.
Special provisions T50

Section 14. Transport information

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2).
Explosive Limit and Limited Quantity Index 0.125
ERAP Index 3000
Passenger Carrying Ship Index Forbidden
Passenger Carrying Road or Rail Index Forbidden

IATA : **Quantity limitation** Passenger and Cargo Aircraft: Forbidden. Cargo Aircraft Only: 150 kg.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined
Clean Air Act (CAA) 112 regulated flammable substances: dimethyl ether

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

State regulations

Massachusetts : This material is listed.

New York : This material is not listed.

New Jersey : This material is listed.

Pennsylvania : This material is listed.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Section 15. Regulatory information

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

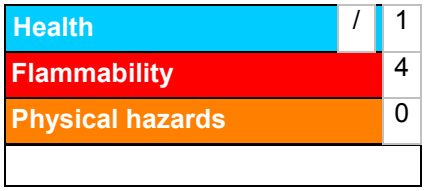
Not listed.

Inventory list

Australia	:	This material is listed or exempted.
Canada	:	This material is listed or exempted.
China	:	This material is listed or exempted.
Europe	:	This material is listed or exempted.
Japan	:	**Japan inventory (ENCS)**: This material is listed or exempted. **Japan inventory (ISHL)**: This material is listed or exempted.
Malaysia	:	Not determined.
New Zealand	:	This material is listed or exempted.
Philippines	:	This material is listed or exempted.
Republic of Korea	:	This material is listed or exempted.
Taiwan	:	This material is listed or exempted.
Thailand	:	Not determined.
Turkey	:	This material is listed or exempted.
United States	:	This material is listed or exempted.
Viet Nam	:	Not determined.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Section 16. Other information

Classification	Justification
FLAMMABLE GASES - Category 1 GASES UNDER PRESSURE - Liquefied gas SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3	Expert judgment Expert judgment Expert judgment

History

Date of printing : 6/11/2019

Date of issue/Date of revision : 6/11/2019

Date of previous issue : No previous validation

Version : 1

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

References : Not available.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

APPENDIX F

KB4 EXEMPT COMBUSTION SOURCE MANUFACTURERS SPECIFICATIONS

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

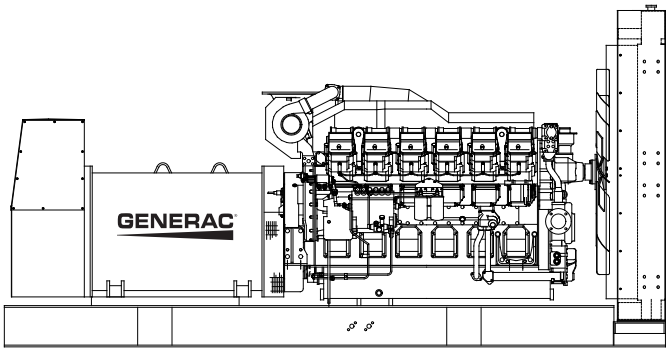
EPA Certified Stationary Emergency

Standby Power Rating
1,250 kW, 1,563 kVA, 60 Hz

Prime Power Rating*
1,125 kW, 1,406 kVA, 60 Hz

*Assembled in the USA using domestic and foreign parts

*EPA Certified Prime ratings are not available in the US or its Territories



Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.

UL2200, UL6200, UL1236, UL489, UL142

CSA C22.2

BS5514 and DIN 6271

SAE J1349

NFPA 37, 70, 99, 110

NEC700, 701, 702, 708

NEMA ICS10, MG1, 250, ICS6, AB1

ANSI C62.41

IBC 2009, IBC 2012, ASCE 7-05, ASCE 7-10, ICC-ES AC-156 (2012)

Powering a Smarter World

For over 65 years, Generac has been at the forefront of power generation, pioneering innovative solutions and unparalleled manufacturing excellence. At the heart of our reputation for superior quality lies our commitment to meticulously designing and manufacturing key components of our generators—ranging from alternators and enclosures to base tanks, control systems, and cutting-edge communications software.

Generac's gensets stand out for their unparalleled versatility and reliability. Engineered to offer a wide range of options and configurations, they are tailored to meet the unique demands of virtually any application, seamlessly adapting to its complexity. Our commitment to reliability drives us to globally source only the most dependable engines, selected through stringent criteria for optimal performance under the toughest industrial conditions.

Beyond the sale, Generac's dedication to our customers extends to comprehensive service support, for peace of mind and reliability long after your purchase. Our commitment is to not only provide state-of-the-art power solutions but also enduring success and satisfaction of our customers through ongoing support and service excellence.

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

GENERAC | INDUSTRIAL POWER

STANDARD FEATURES

ENGINE SYSTEM
- Oil Drain Extension
- Air Cleaner
- Fan Guard
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Radiator Duct Adapter (Open Set Only)
- Engine Coolant Heater
- Critical Grade Silencer (Enclosed Units Only)

FUEL SYSTEM
- Flexible Fuel Lines (When Tank is Selected)
- Primary Fuel Filter

COOLING SYSTEM
- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- Radiator Drain Extension
- 50/50 Ethylene Glycol Antifreeze

ELECTRICAL SYSTEM
- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

ALTERNATOR SYSTEM
- Class H Insulation Material
- 2/3 Pitch
- Skewed Stator
- Permanent Magnet Excitation
- Sealed Bearing
- Full Load Capacity Alternator

GENERATOR SET
- Separation of Circuits - High/Low Voltage
- Separation of Circuits - Dual Breakers
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)
- 1 Year Limited Warranty (Prime Rated Units)

ENCLOSURE (If Selected)
- Structural Steel Sub-Base
- Sub-Base Lifting Eyes
- Enamel Finish
- Zinc Plated Fasteners
- Zinc Plated Cast Aluminum Keylock Door Handles
- Heavy Duty Stainless Steel Hinges with Removable Brass Pins
- Modular Construction

FUEL TANKS(If Selected)
- UL 142
- Double Wall
- Vents
- Factory Pressure Tested (2 psi)
- Rupture Basin Alarm
- Fuel Level
- Check Valve in Supply and Return Lines
- Stainless Steel Hardware
- Fuel Line Hose
- Fuel Line Hose and Separator
- Electronic Fuel Level
- Secondary Fuel Filter

CONTROL SYSTEM

InteliGen NT Display

Program Functions
- Programmable Crank Limiter
- 7-Day Programmable Exerciser
- Special Applications Programmable Logic Controller
- RS-232/485 Communications
- 2-Wire Start Capability
- Date/Time Fault History (Event Log)
- Isochronous Governor Control
- Waterproof/Sealed Connectors
- Audible Alarms and Shutdowns
- Not in Auto (Flashing Light)
- Auto/Off/Manual Switch
- Customizable Alarms, Warnings, and Events
- Modbus® Protocol
- Predictive Maintenance Algorithm
- Sealed Boards
- Password Parameter Adjustment Protection
- Single Point Ground
- 16 Channel Remote Trending
- 0.2 msec High Speed Remote Trending
- Alarm Information Automatically Annunciated on the Display

Full System Status Display
- Power Output (kW)
- Power Factor
- kW Hours, Total, and Last Run
- Real/Reactive/Apparent Power
- All Phase AC Voltage
- All Phase Currents
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Speed
- Battery Voltage
- Frequency

Alarms and Warnings
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Overspeed
- Battery Voltage
- Alarms and Warnings Time and Date Stamped
- Snap Shots of Key Operation Parameters During Alarms and Warnings
- Alarms and Warnings Spelled Out (No Alarm Codes)

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

CONFIGURABLE OPTIONS

ENGINE SYSTEM
- 50° Ambient Cooling System
- Critical and Hospital Grade Silencers
- Critical Grade Exhaust (Open Set Only)
- CCV (Closed Crankcase Ventilation)
- Engine Drain Kit
- Air Cleaner with Indicator

ELECTRICAL SYSTEM
- 10A UL Battery Charger
- 20A UL Battery Charger
- Battery Warmer

ALTERNATOR SYSTEM
- Alternator Upsizing
- Anti-Condensation Heater

CIRCUIT BREAKER OPTIONS
- Main Line Circuit Breaker
- 2nd Main Line Circuit Breaker
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

GENERATOR SET
- Spring Isolators (Standard/Seismic)

ENCLOSURE
- Weather Protected Enclosure
- Level 1 Sound Attenuated with Motorized Dampers
- Level 2 Sound Attenuated with Motorized Dampers
- Steel Enclosure
- Aluminum Enclosure
- Up to 200 MPH Wind Load Rating (Contact Factory for Availability)
- Louvers with Gravity Dampers
- Enclosure Heaters (Motorized Dampers Only)
- AC Electrical Lighting Package (ELP)
- Enclosure Heater

WARRANTY (Standby Gensets Only)
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

CONTROL SYSTEM
- NFPA110 Level I and II (Programmable) 15- LED Remote Annunciator
- Remote Relay Assembly (8 or 16)
- Shipped Loose Remote E-Stop - Surface Mount
- Generator Control Panel Mounted E-Stop
- Remote Communication - InternetBridge NT
- 10A Engine Run Relay
- Low Coolant Level Indication
- 90% High Fuel Alarm

FUEL TANKS (Size on Last Page)
- Mechanical Fuel Level
- 12 Hour Run Time
- 24 Hour Run Time

ENGINEERED OPTIONS

ENGINE SYSTEM
- Coolant Heater Ball Valves
- Oil Heater
- Fuel Cooler
- High Lift Pumps
- Heavy Duty Air Filters (Open Set Only)

ALTERNATOR SYSTEM
- 3rd Breaker System
- 4th Breaker Options
- Unit Mounted Load Banks
- Medium Voltage Alternators
- Digital Voltage Regulator

CONTROL SYSTEM
- Spare Inputs (x4) / Outputs (x4)
- Battery Disconnect Switch
- PM-SCi

GENERATOR SET
- Special Testing
- 12 VDC Enclosure Lighting Kit
- 24 VDC/120 VAC Enclosure Lighting Kit

ENCLOSURE
- Door Open Alarm Switch
- Level 3 Sound Attenuated Enclosure
- Custom Enclosure

TANKS
- Overfill Protection Valve
- UL2085 Tank
- ULC S601 Tank
- Special Fuel Tanks
- External Vent Extensions
- Transfer Pumps and Controllers
- Fuel Tank Heaters

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

APPLICATION AND ENGINEERING DATA

ENGINE SPECIFICATIONS

General

Make	Mitsubishi
Model	S12R-Y2PTAW-1
EPA Emissions Compliance	Tier 2
EPA Emissions Reference	See Emission Data Sheet
Cylinder #	12
Type	4 Cycle - V12
Displacement - in^3 (L)	2,992 (49.0)
Bore - in (mm)	6.69 (170)
Stroke - in (mm)	7.09 (180)
Compression Ratio	14.5:1
Intake Air Method	Turbocharged/Intercooled
Cylinder Head	4-Valve
Piston Type	Aluminum
Crankshaft Type	Dropped Forged Steel

Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	±0.25%

Lubrication System

Oil Pump Type	Gear Driven
Oil Filter Type	Cartridge
Crankcase Capacity - qt (L)	158.5 (150)

Cooling System

Cooling System Type	Unit Mounted Radiator
Water Pump Type	Centrifugal
Fan Type	Pusher
Fan Speed - RPM	710
Fan Diameter - in (mm)	88 (2,235)

Fuel System

Fuel Type	Ultra Low Sulfur Diesel #2
Fuel Specifications	ASTM
Fuel Filtering (Microns)	10 (Final Filters)
Fuel Inject Pump Make	Mechanical
Fuel Pump Type	Engine Driven Gear
Injector Type	Mitsubishi PS8 Type x 2
Fuel Supply Line - in (mm)	0.75” NPT (19.0)
Fuel Return Line - in (mm)	0.75” NPT (19.0)

Engine Electrical System

System Voltage	24 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	(4) – 12 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	K2112064N22
Poles	4
Field Rype	Rotating
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	<50

Standard Excitation	Permanent Magnet
Bearings	Single Sealed Cartridge
Coupling	Direct via Flexible Disc
Load Capacity - Standby	100%
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Analog
Regulation Accuracy (Steady State)	±0.5%

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

OPERATING DATA

POWER RATINGS

		Standby
Three-Phase 277/480 VAC @0.8pf	1,250 kW	Amps: 1,882
Three-Phase 346/600 VAC @0.8pf	1,250 kW	Amps: 1,505

MOTOR STARTING CAPABILITIES (SKVA)

skVA vs. Voltage Dip	
277/480 VAC	30%
K2112064N22	7,709
K2268064N22	9,417

FUEL CONSUMPTION RATES*

Fuel Pump Lift- ft (m)
3 (1)

Total Fuel Pump Flow (Combustion + Return) - gph (Lph)
127 (479)

Diesel - gph (Lph)	
Percent Load	Standby
25%	30.0 (113.6)
50%	50.3 (190.4)
75%	72.9 (275.9)
100%	97.7 (369.8)

*Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

Cooling Rating - Jacket Water		Standby
Coolant Flow	gpm (Lpm)	489 (1,851)
Coolant System Capacity	gal (L)	95 (360)
Heat Rejection to Coolant	BTU/hr (kW)	1,829,820 (536)
Inlet Air- 40°C Cooling Package	scfm (m^3/min)	66,100 (1,872)
Inlet Air- 50°C Cooling Package	scfm (m^3/min)	70,800 (2,005)
Maximum Operating Ambient Temperature	°F (°C)	104 (40)
Maximum Operating Ambient Temperature (Before Derate)	see Bulletin No. 0199270SSD	
Maximum Additional Radiator Backpressure	in H_2O (kPa)	0.5 (0.12)

Cooling Rating - Aftercooler		Standby
Coolant Flow	gpm (Lpm)	90 (341)
Coolant System Capacity	gal (L)	50 (189)

Cooling Rating- Fuel Pump		Standby
Heat Rejected to Fuel	BTU/hr (kW)	10,098 (3.0)

COMBUSTION AIR REQUIREMENTS

	Standby/Demand Response
Flow at Rated Power - scfm (m^3/min)	4,767 (135)

ENGINE

		Standby
Rated Engine Speed	rpm	1,800
Horsepower at Rated kW**	hp	1,881
Piston Speed	ft/min (m/min)	2,126 (648)
BMEP	psi (kPa)	276 (1,903)

** See "Emissions Data Sheet" for maximum bHP for EPA and SCAQMD permitting purposes.

EXHAUST

		Standby
Exhaust Flow (Rated Output)	scfm (m^3/min)	12,570 (356)
Maximum Allowable Back Pressure (Post Turbo)	in H2O (kPa)	1.7 (5.87)
Exhaust Temp (Rated Output - Post Silencer)	°F (°C)	932 (500)

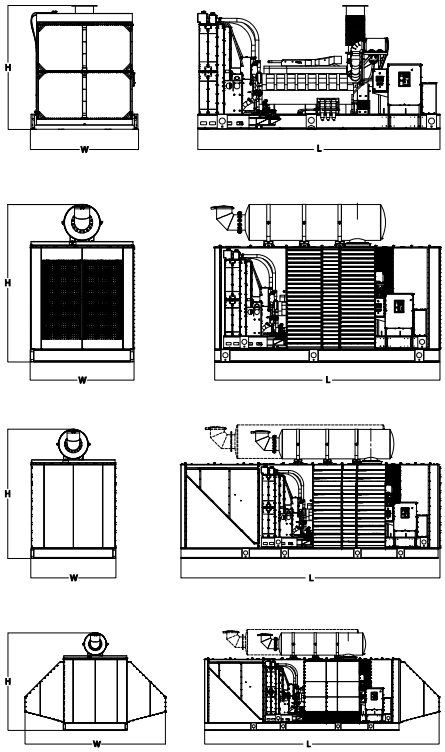
Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.
Please contact a Generac Power Systems Industrial Ottomotores CAT® Dealer for additional details. All performance ratings in accordance with BS5514 and DIN6271 standards..
Standby - See Bulletin 10000018933 • Prime - See Bulletin 10000018926

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

DIMENSIONS AND WEIGHTS*



OPEN SET (Includes Exhaust Flex)

Run Time Hours	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)
No Tank	—	215.7 (5,478) x 93.0 (2,362) x 115.1 (2,924)	26,045 (11,814)
12	1,250 (4,732)	243.0 (6,172) x 116.0 (2,945) x 132.1 (3,356)	Contact Factory
24	2,500 (9,464)	243.0 (6,172) x 116.0 (2,945) x 148.0 (3,759)	Contact Factory

WEATHER PROTECTED ENCLOSURE

Run Time Hours	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	—	244.0 (6,198) x 110.0 (2,791) x 184.0 (4,661)	Contact Factory	
12	1,250 (4,732)	264.0 (6,698) x 110.0 (2,791) x 201.0 (5,093)		
24	2,500 (9,464)	264.0 (6,698) x 110.0 (2,791) x 217.0 (5,499)		

LEVEL 1 SOUND ATTENUATED ENCLOSURE

Run Time Hours	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	—	327.0 (8,306) x 119.0 (3,021) x 184.0 (4,674)	Contact Factory	
12	1,250 (4,732)	330.0 (8,382) x 119.0 (3,021) x 206.3 (5,239)		
24	2,500 (9,464)	330.0 (8,382) x 119.0 (3,021) x 208.0 (5,284)		

LEVEL 2 SOUND ATTENUATED ENCLOSURE

Run Time Hours	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	—	404.0 (10,268) x 262.0 (6,666) x 126.0 (3,209)	Contact Factory	
12	1,250 (4,732)	404.0 (10,268) x 262.0 (6,666) x 140.0 (3,565)		
24	2,500 (9,464)	404.0 (10,268) x 262.0 (6,666) x 150.0 (3,819)		

*All measurements are approximate and for estimation purposes only.

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Dimensions and weights are for preliminary purposes only. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.

SPEC SHEET

Generac Power Systems, Inc. | S45 W29290 HWY. 59 | Waukesha, WI 53189 | generac.com

Part No. A0004067538
Rev. B 05/10/2024

STATEMENT OF EXHAUST EMISSIONS
2024 MHI Diesel Fueled Generator

The measured emissions values provided here are proprietary to Generac and it's authorized dealers. This information may only be disseminated upon request to regulatory governmental bodies for emissions permitting purposes or to specifying organizations as submittal data when expressly required by project specifications, and shall remain confidential and not open to public viewing. This information is not intended for compilation or sales purposes and may not be used as such, nor may it be reproduced without the expressed written permission of Generac Power Systems, Inc.. The data provided shall not be meant to include information made public by Generac.

Generator Model:	**SD/MD1250**	EPA Certificate Number:	**RMVXL49.0BBA-005**
kW_e Rating:	**1,250**	CARB Certificate Number:	**Not Applicable**
Engine Family:	**RMVXL49.0BBA**	SCAQMD CEP Number:	**476463**
Engine Model:	**S12R-Y2PTAW-1**	Emission Standard Category:	**Tier 2**
Rated Engine Power (BHP)*:	**1,881**	Certification Type:	**Stationary Emergency CI (40 CFR Part 60 Subpart IIII)**
Fuel Consumption (gal/hr)*:	**103.3**		
Aspiration:	**Turbocharged/Aftercooled**		
Rated RPM:	**1,800**		

*Engine power are declared by the engine manufacturer of record and the U.S EPA.

Emissions Based on Engine Power of Specific Engine Model

These Values are Actual Composite Weighted Exhaust Emissions Results Over the EPA 5-Mode Test Cycle

CO	NOx + NMHC	PM	
0.7	**5.98**	**0.14**	Grams/kW-hr
0.52	**4.46**	**0.10**	Grams/bhp-hr

These Values are 100% Load Data Exhaust Emissions Results.

CO	NOx + NMHC	PM	
0.604	**5.04**	**0.082**	Grams/kW-hr
0.45	**3.76**	**0.06**	Grams/bhp-hr

- The stated values are actual exhaust emission test measurements obtained from an engine representative of the type described above.
- Values based on 5-Mode testing are official data of record as submitted to regulatory agencies for certification purposes. Testing was conducted in accordance with prevailing EPA protocol, which is typically accepted by SCAQMD and other regional authorities.
- No emissions values provided above are to be construed as guarantees of emission levels for any given Generac generator unit.
- Generac Power Systems, Inc. reserves the right to revise this information without prior notice.
- Consult state and local regulatory agencies for specific permitting requirements.
- The emission performance data supplied by the equipment manufacturer is only one element required toward completion of the permitting and installation process. State and local regulations may vary on a case-by-case basis and local agencies must be consulted by the permit application/equipment owner prior to equipment purchase or installation. The data supplied herein by Generac Power Systems Inc. cannot be construed as a guarantee of installability of the generating set.

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

Standby Power Rating

2,000 kW, 2,500 kVA, 60 Hz

Prime Power Rating

1,800 kW, 2,250 kVA, 60 Hz

*Assembled in the USA using domestic and foreign parts

*EPA Certified Prime Ratings are not available in the US or its Territories.

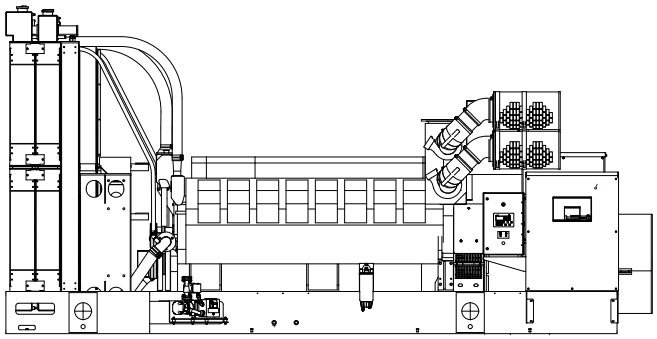


Image used for illustration purposes only

Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.

UL2200, UL6200, UL1236, UL489, UL142

CSA C22.2, ULC S601

BS5514 and DIN 6271

SAE J1349

NFPA 37, 70, 99, 110

NEC700, 701, 702, 708

NEMA ICS10, MG1, 250, ICS6, AB1

ANSI C62.41

IBC 2009, CBC 2010, IBC 2012, ASCE 7-05, ASCE 7-10, ICC-ES AC-156 (2012)

Powering Ahead

For over 60 years, Generac has provided innovative design and superior manufacturing.

Generac provides superior quality by designing and manufacturing most of its generator components, including alternators, enclosures and base tanks, control systems and communications software.

Generac gensets utilize a wide variety of options, configurations and arrangements, allowing us to meet the standby power needs of practically every application.

Generac searched globally to find the most reliable engines to power our generators. We choose only engines that have already been proven in heavy-duty industrial applications under adverse conditions.

Generac is committed to ensuring our customers' service support continues after their generator purchase.

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

STANDARD FEATURES

ENGINE SYSTEM
- Oil Drain Extension
- Air Cleaner
- Level 1 Fan and Belt Guards
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Radiator Duct Adapter (Open Set Only)

FUEL SYSTEM
- Flexible Fuel Lines (When Tank is Selected)
- Primary Fuel Filter

COOLING SYSTEM
- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- Radiator Drain Extension
- 50/50 Ethylene Glycol Antifreeze

ELECTRICAL SYSTEM
- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

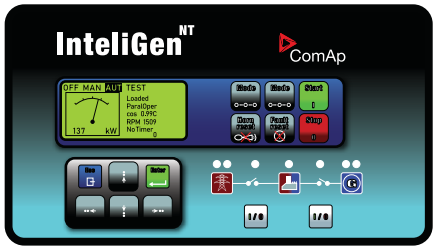
ALTERNATOR SYSTEM
- Class H Insulation Material
- 2/3 Pitch
- Skewed Stator
- Permanent Magnet Excitation
- Sealed Bearing
- Full Load Capacity Alternator
- Main Line Circuit Breaker

GENERATOR SET
- Separation of Circuits - High/Low Voltage
- Separation of Circuits - Dual Breakers
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)
- 1 Year Limited Warranty (Prime Rated Units)

ENCLOSURE (If Selected)
- Structural Steel Sub-Base
- Sub-Base Lifting Eyes
- Enamel Finish
- Zinc Plated Fasteners
- Zinc Plated Cast Aluminum Keylock Door Handles
- Heavy Duty Stainless Steel Hinges with Removable Brass Pins
- Modular Construction
- Powder Coat

FUEL TANKS (If Selected)
- UL 142/ULC S601
- Double Wall
- Vents
- Factory Pressure Tested (2 psi)
- Rupture Basin Alarm
- Fuel Level
- Check Valve in Supply and Return Lines
- Stainless Steel Hardware
- Fuel Line Hose
- Fuel Line Hose and Separator
- Electronic Fuel Level
- Secondary Fuel Filter

CONTROL SYSTEM



Inteligen® NT Display

Program Functions
- Programmable Crank Limiter
- 7-Day programmable Exerciser
- Special Applications Programmable Logic Controller
- RS-232/485 Communications
- 2-Wire Start Capability
- Date/Time Fault History (Event Log)
- Isochronous Governor Control
- Waterproof/Sealed Connectors
- Audible Alarms and Shutdowns
- Not in Auto (Flashing Light)
- Auto Off/Manual Switch
- Customizable alarms, Warnings, and Events
- Modbus® Protocol
- Predictive Maintenance Algorithm
- Sealed Boards
- Password Parameter Adjustment Protection
- Single Point Ground
- 16 Channel Remote Trending
- 0.2 msec High Speed Remote Trending
- Alarm Information Automatically Annunciated on the Display

Full System Status Display
- Power Output (kW)
- Power Factor
- kW Hours, Total, and Last Run
- Real/Reactive/Apparent Power
- All Phase AC Voltage
- All Phase Currents
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Speed
- Battery Voltage
- Frequency

Alarms and Warnings
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Overspeed
- Battery Voltage
- Alarms and Warnings Time and Date Stamped
- Snap Shots of Key Operation Parameters During Alarms and Warnings
- Alarms and Warnings Spelled Out (No Alarm Codes)

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

CONFIGURABLE OPTIONS

ENGINE SYSTEM
- 50 °C Ambient Cooling System
- Critical and Hospital Grade Silencers
- CCV (Closed Crankcase Ventilation)

ELECTRICAL SYSTEM
- 10A UL Listed Battery Charger
- 20A UL Listed Battery Charger
- Battery Warmer

ALTERNATOR SYSTEM
- Alternator Upsizing
- Anti-Condensation Heater

CIRCUIT BREAKER OPTIONS
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

GENERATOR SET
- Spring Isolators (Standard/Seismic)

ENCLOSURE
- Weather Protected Enclosure
- Level 1 Sound Attenuation
- Level 2 Sound Attenuation
- Steel Enclosure
- Aluminum Enclosure
- Up to 200 MPH Wind Load Rating (Contact Factory for Availability)
- Louvers with Gravity Dampers
- Enclosure Heaters
- AC Electrical Lighting Package (ELP)

WARRANTY (Standby Gensets Only)
- 2 Year Limited Warranty
- 5 Year Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

CONTROL SYSTEM
- NFPA 110 Level I and II (Programmable) 15- LED Remote Annunciator
- Remote Relay Assembly (8 or 16)
- Shipped Loose Remote E-Stop - Surface Mount
- Generator Control Panel Mounted E-Stop
- Remote Communication - InternetBridge NT
- 10A Engine Run Relay
- Low Coolant Level Indication
- 90% High Fuel Alarm

FUEL TANKS (Size on Last Page)
- 2 Year Extended Limited Warranty
- 5 Year Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

ENGINEERED OPTIONS

ENGINE SYSTEM
- Coolant Heater Ball Valves
- Oil Heater
- Fuel Cooler
- High Lift Pumps
- Heavy Duty Air Filters (Open Set Only)

ALTERNATOR SYSTEM
- 2nd Breaker System
- Unit Mounted Load Banks
- Medium Voltage Alternators
- Digital Voltage Regulator

CONTROL SYSTEM
- Spare Inputs (x4) / Outputs (x4)
- Battery Disconnect Switch
- PM-SCi

GENERATOR SET
- Special Testing
- 12 VDC Enclosure Lighting Kit
- 24 VDC/120 VAC Enclosure Lighting Kit

ENCLOSURE
- Door Open Alarm Horn
- Level 3 Sound Attenuated Enclosure
- Custom Enclosure

FUEL TANKS
- Overfill Protection Valve
- UL2085 Tank
- Special Fuel Tanks
- External Vent Extensions
- Transfer Pumps and Controllers
- Fuel Tank Heaters

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

GENERAC | INDUSTRIAL POWER

APPLICATION AND ENGINEERING DATA

ENGINE SPECIFICATIONS

General

Make	Mitsubishi
Model	S16R-Y2PTAW2-1
EPA Emissions Compliance	Tier 2
EPA Emissions Reference	See Emission Data Sheet
Cylinder #	16
Type	4 Cycle - V16
Displacement - in^3 (L)	3,989 (65.4)
Bore - in (mm)	6.69 (170)
Stroke - in (mm)	7.09 (180)
Compression Ratio	14.0:1
Intake Air Method	Turbocharged/Intercooled
Cylinder Head	4-Valve
Piston Type	Aluminum
Crankshaft Type	Dropped Forged Steel

Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	±0.25%

Lubrication System

Oil Pump Type	Gear
Oil Filter Type	Cartridge
Crankcase Capacity: qt (L)	212 (200)

Cooling System

Cooling System Type	Unit Mounted Radiator
Water Pump Type	Centrifugal
Fan Type	Pusher
Fan Speed (RPM)	710
Fan Diameter - in (mm)	88 (2,235))

Fuel System

Fuel Type	Ultra Low Sulfur Diesel #2
Fuel Specifications	ASTM
Fuel Filtering (Microns)	10 (Final Filters)
Fuel Inject Pump Make	Mechanical
Fuel Pump Type	Engine Driven Gear
Injector Type	Mitsubishi PS8 Type x 2
Fuel Supply Line - in (mm)	1” NPT (25.4)
Fuel Return Line - in (mm)	1” NPT (25.4)

Engine Electrical System

System Voltage	24 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	(4) - 12 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	K2112064N22
Poles	4
Field Type	Rotating
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	<50

Standard Excitation	Permanent Magnet
Bearings	Single Sealed Cartridge
Coupling	Direct via Flexible Disc
Load Capacity - Standby	100%
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Analog
Regulation Accuracy (Steady State)	±0.5%

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

GENERAC | INDUSTRIAL POWER

OPERATING DATA

POWER RATINGS

	Standby	
Three-Phase 277/480 VAC @0.8pf	2,000 kW/2,500 kVA	Amps: 3,007
Three-Phase 346/600 VAC @0.8pf	2,000 kW/2,500 kVA	Amps: 2,406

MOTOR STARTING CAPABILITIES (skVA)

skVA vs. Voltage Dip	
277/480 VAC	30%
K2112064N22	7,709
K2268064N22	9,417

FUEL CONSUMPTION RATES*

Fuel Pump Lift- ft (m)
3 (1)

Total Fuel Pump Flow (Combustion + Return) - gph (Lph)
330 (1,250)

	Diesel - gph (Lph)
Percent Load	Standby
25%	50.1 (189.6)
50%	84.9 (321.4)
75%	122.6 (464.1)
100%	163.4 (618.5)

*Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

Cooling Rating - Jacket Water		Standby
Coolant Flow	gpm (Lpm)	489 (1,851)
Coolant System Capacity	gal (L)	106 (401)
Heat Rejection to Coolant	BTU/hr (kW)	2,818,260 (826)
Inlet Air- 40°C Cooling Package	cfm (m^3/min)	101,400 (2,872)
Inlet Air- 50°C Cooling Package	cfm (m^3/min)	100,700 (2,852
Maximum Operating Ambient Temperature	°F (°C)	122 (50)
Maximum Operating Ambient Temperature (Before Derate)	See Bulletin No. 0199280SSD	
Maximum Additional Radiator Backpressure	in H_2O (kPa)	0.5 (0.12)

Cooling Rating - Aftercooler		Standby
Coolant Flow	gpm (Lpm)	243 (920)
Coolant System Capacity	gal (L)	65 (246)
Heat Rejection to Coolant	BTU/hr (kW)	2,818,260 (826)

Cooling Rating - Fuel Pump		Standby
Heat Rejected to Fuel	BTU/hr (kW)	54,350 (15.9)

COMBUSTION AIR REQUIREMENTS

	Standby
Flow at Rated Power cfm — (m^3/min)	7,274 (206)

ENGINE

		Standby
Rated Engine Speed	RPM	1,800
Horsepower at Rated kW**	hp	2,923
Piston Speed	ft/min (m/min)	2,126 (648)
BMEP	psi (kPa)	323 (2,227)

** Refer to “Emissions Data Sheet” for maximum bHP for EPA and SCAQMD permitting purposes.

EXHAUST

		Standby
Exhaust Flow (Rated Output)	cfm (m^3/min)	19,209 (544)
Maximum Allowable Backpressure	inHG (kPa)	1.7 (5.87)
Exhaust Temperature (Rated Output - Post Silencer)	°F (°C)	932 (500)

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.

Please contact a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with BS5514 and DIN6271 standards.

Standby - See Bulletin 10000018933

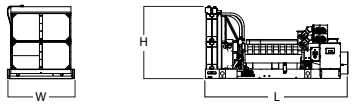
Prime - See Bulletin 10000018926

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

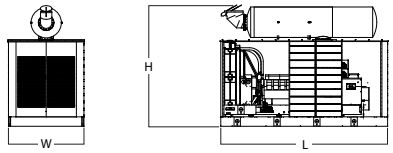
EPA Certified Stationary Emergency

DIMENSIONS AND WEIGHTS*



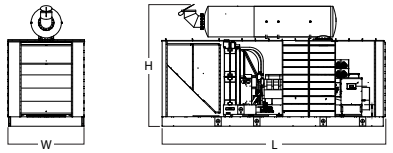
OPEN SET

Run Time Hours**	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)
No Tank	—	241.9 (6,145) x 106.8 (2,712) x 123.5 (3,136)	36,220 (16,464)
12	1,925 (7,287)	274.5 (6,972) x 120.0 (3,048) x 150.1 (3,812)	42,290 (19,223)
24	3,850 (14,574)	274.5 (6,972) x 120.0 (3,048) x 168.1 (4,270)	50,263 (22,847)



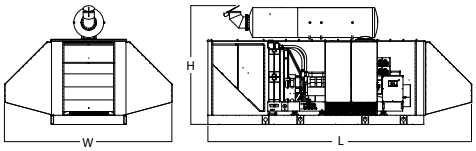
WEATHER PROTECTED ENCLOSURE

Run Time Hours**	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)	
			Steel	Aluminum
No Tank	—	266.5 (6,769) x 122.0 (3,099) x 185.3 (4,706)	45,868 (20,849)	43,592 (19,815)
12	1,925 (7,287)	275.5 (6,997) x 122.0 (3,099) x 196.3 (4,985)	48,418 (22,008)	46,142 (20,974)
24	3,850 (14,574)	275.5 (6,997) x 122.0 (3,099) x 214.3 (5,443)	50,321 (22,873)	48,045 (21,839)



LEVEL 1 SOUND ATTENUATED ENCLOSURE

Run Time Hours**	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)	
			Steel	Aluminum
No Tank	—	373.0 (9,474) x 122.0 (3,099) x 185.3 (4,706)	48,235 (21,925)	45,105 (20,502)
12	1,925 (7,287)	381.7 (9,669) x 122.0 (3,099) x 206.3 (5,239)	51,785 (23,539)	48,655 (22,116)
24	3,850 (14,574)	381.7 (9,696) x 122.0 (3,099) x 218.3 (5,544)	53,516 (24,326)	50,386 (22,903)



LEVEL 2 SOUND ATTENUATED ENCLOSURE

Run Time Hours**	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)	
			Steel	Aluminum
No Tank	—	445.4 (11,312) x 267.1 (6,785) x 185.3 (4,706)	51,791 (23,542)	46,883 (21,311)
12	1,925 (7,287)	445.4 (11,312) x 267.1 (6,785) x 206.3 (5,239)	55,341 (25,155)	50,433 (22,924)
24	3,850 (14,574)	445.4 (11,312) x 267.1 (6,785) x 218.3 (5,544)	57,072 (25,942)	52,164 (23,711)

*All measurements are approximate and for estimation purposes only.

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Dimensions and weights are for preliminary purposes only. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.

SPEC SHEET

Generac Power Systems, Inc. | S45 W29290 HWY. 59 | Waukesha, WI 53189 | generac.com

Part No. 10000031601
Rev. D 06/12/2024

STATEMENT OF EXHAUST EMISSIONS
2024 MHI Diesel Fueled Generator

The measured emissions values provided here are proprietary to Generac and it's authorized dealers. This information may only be disseminated upon request to regulatory governmental bodies for emissions permitting purposes or to specifying organizations as submittal data when expressly required by project specifications, and shall remain confidential and not open to public viewing. This information is not intended for compilation or sales purposes and may not be used as such, nor may it be reproduced without the expressed written permission of Generac Power Systems, Inc.. The data provided shall not be meant to include information made public by Generac.

Generator Model:	**SD/MD2000**	EPA Certificate Number:	**RMVXL65.4BBA-006**
kW_e Rating:	**2,000**	CARB Certificate Number:	**Not Applicable**
Engine Family:	**RMVXL65.4BBA**	SCAQMD CEP Number:	**476471**
Engine Model:	**S16R-Y2PTAW2-1**	Emission Standard Category:	**Tier 2**
Rated Engine Power (BHP)*:	**2,923**	Certification Type:	**Stationary Emergency CI (40 CFR Part 60 Subpart IIII)**
Fuel Consumption (gal/hr)*:	**126.6**		
Aspiration:	**Turbocharged/Aftercooler**		
Rated RPM:	**1,800**		

*Engine power are declared by the engine manufacturer of record and the U.S EPA.

Emissions Based on Engine Power of Specific Engine Model
These Values are Actual Composite Weighted Exhaust Emissions Results Over the EPA 5-Mode Test Cycle

CO	NOx + NMHC	PM	
0.7	**5.97**	**0.15**	Grams/kW-hr
0.5	**4.4**	**0.1**	Grams/bhp-hr

These Values are 100% Load Data Exhaust Emissions Results

CO	NOx + NMHC	PM	
0.762	**5.707**	**0.077**	Grams/kW-hr
0.56	**4.20**	**0.06**	Grams/bhp-hr

- The stated values are actual exhaust emission test measurements obtained from an engine representative of the type described above.
- Values based on 5-Mode testing are official data of record as submitted to regulatory agencies for certification purposes. Testing was conducted in accordance with prevailing EPA protocol, which is typically accepted by SCAQMD and other regional authorities.
- No emissions values provided above are to be construed as guarantees of emission levels for any given Generac generator unit.
- Generac Power Systems, Inc. reserves the right to revise this information without prior notice.
- Consult state and local regulatory agencies for specific permitting requirements.
- The emission performance data supplied by the equipment manufacturer is only one element required toward completion of the permitting and installation process. State and local regulations may vary on a case-by-case basis and local agencies must be consulted by the permit application/equipment owner prior to equipment purchase or installation. The data supplied herein by Generac Power Systems Inc. cannot be construed as a guarantee of installability of the generating set.

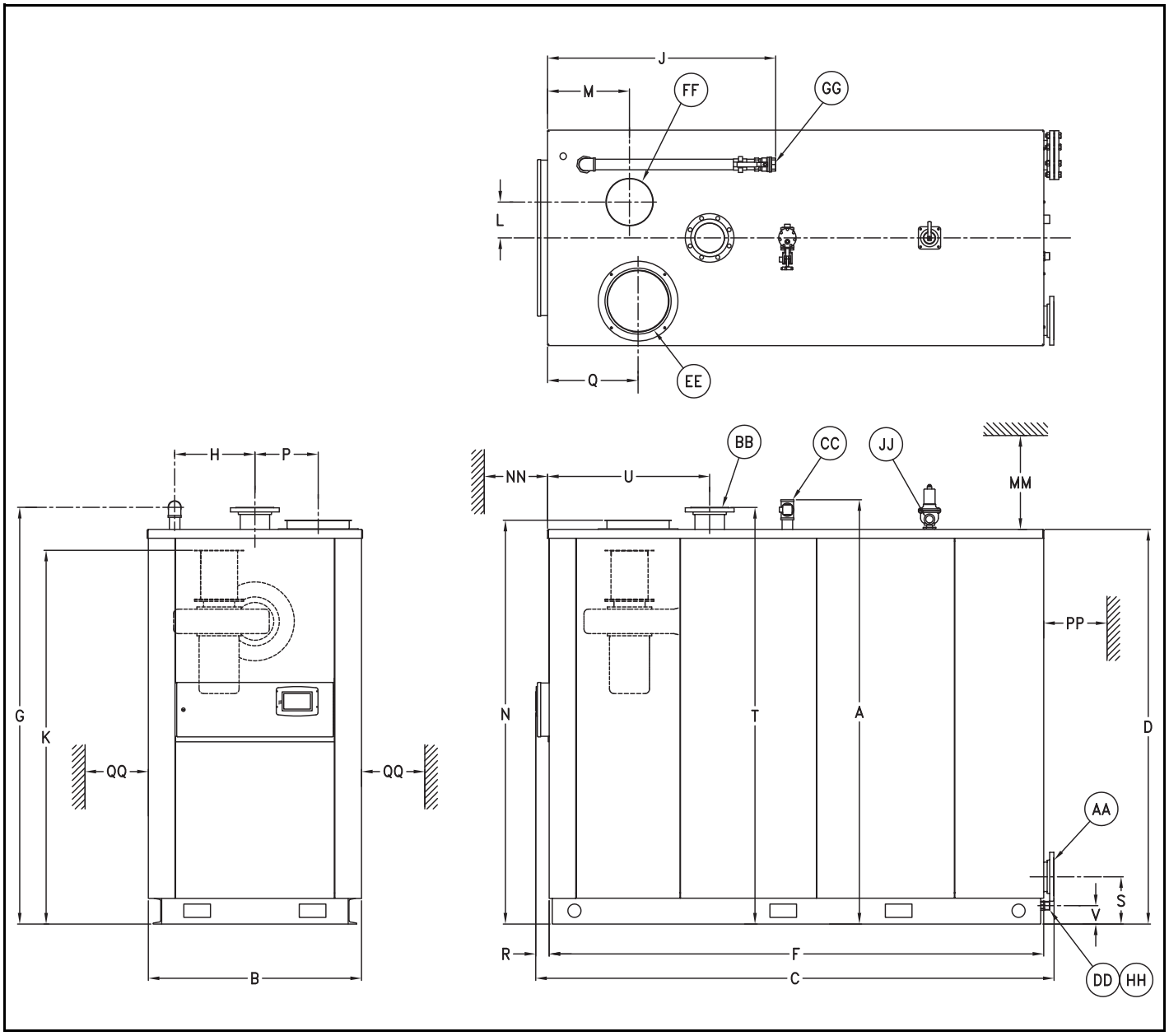
Part No. A0005031810
Rev. B 10/31/23

CFLC

ClearFire® large condensing boiler

8000 MBH

Dimensions and Ratings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D
AA
S
V
R
F
C
DD
HH

Table 1. ***U.S. Standard Dimensions Model CFLC Boiler***

ITEM	DIMENSIONS (inches)	8000
A	Overall Height	106
B	Overall Width	57.5
C	Overall Depth	131
D	Casing Height	99
F	Casing Depth	125.5
G	Gas Connection to Floor	104
H	Gas Connection to Boiler Centerline	21
J	Gas Connection to Front of Boiler	58
K	Air Inlet Venturi to Floor	95
L	Air Inlet Centerline to Boiler Centerline	10.5
M	Air Inlet Centerline to Front of Boiler	21
N	Stack Connection to Floor	101
P	Stack Connection to Boiler Centerline	18
Q	Stack Connection to Front of Boiler	23
R	Control Panel Projection	3
S	Return Connections to Floor	14.5
T	Supply Connection to Floor	104
U	Supply Connection to Front of Boiler	40.5
V	Floor to Drain Connection	6
CONNECTIONS (inches)		
AA	Water Return, 150# RF Flg	6”
BB	Water Supply, 150# RF Flg	6”
CC	Boiler Air Vent, NPT	2”
DD	Boiler Drain, NPT	1-1/2”
EE	Flue Gas, Nominal OD	16”
FF	Combustion Air Option*	14” or 16”
GG	Gas Connection, NPT	2-1/2”
HH	Condensate Drain, FPT	1-1/4”
JJ	Relief Valve outlet @ 160# Setting	1-1/2”
CLEARANCES (inches)		
MM	Overhead	36
NN	Front	36
PP	Rear	36
QQ	Side	24

*Direct vent connection size based on duct layout. Contact local C-B representative with questions.

Dimensions are approximate. Do not use for construction or installation; refer to appropriate Dimensional Diagram for the specific boiler.

Table 2. ***Metric Dimensions Model CFLC Boiler***

ITEM	DIMENSIONS (mm)	8000
A	Overall Height	2692
B	Overall Width	1461
C	Overall Depth	3327
D	Casing Height	2515
F	Casing Depth	3188
G	Gas Connection to Floor	2642
H	Gas Connection to Boiler Centerline	533
J	Gas Connection to Front of Boiler	1473
K	Air Inlet Venturi to Floor	2413
L	Air Inlet Centerline to Boiler Centerline	267
M	Air Inlet Centerline to Front of Boiler	533
N	Stack Connection to Floor	2565
P	Stack Connection to Boiler Centerline	457
Q	Stack Connection to Front of Boiler	584
R	Control Panel Projection	76
S	Return Connections to Floor	368
T	Supply Connection to Floor	2642
U	Supply Connection to Front of Boiler	1029
V	Floor to Drain Connection	152
CONNECTIONS (inches)		
AA	Water Return, 150# RF Flg	6”
BB	Water Supply, 150# RF Flg	6”
CC	Boiler Air Vent, NPT	2”
DD	Boiler Drain, NPT	1-1/2”
EE	Flue Gas, Nominal OD	16”
FF	Combustion Air Option*	14” or 16”
GG	Gas Connection, NPT	2-1/2”
HH	Condensate Drain, FPT	1-1/4”
JJ	Relief Valve outlet @ 160# Setting	1-1/2”
CLEARANCES (mm)		
MM	Overhead	914
NN	Front	914
PP	Rear	914
QQ	Side	610

*Direct vent connection size based on duct layout. Contact local C-B representative with questions.

Dimensions are approximate. Do not use for construction or installation; refer to appropriate Dimensional Diagram for the specific boiler.

Table 3. ***Model CFLC Boiler Ratings (Sea Level to 2000 Feet)***

Description	Units	8000
Input Max.	BTU/Hr.	8,000,000
	KCAL/Hr.	2,016,000
Natural Gas (1000 Btu/ft3)	FT3/Hr	8000
Natural Gas	M3/Hr	226
Output at 130/80 F [54/27 C] 100% Firing	BTU/Hr.	7,520,000
	KCAL/Hr.	1,895,040
	BHP	225
	KW	2204
Output at 180/140 F [82/60 C] 100% Firing	BTU/Hr.	7,040,000
	KCAL/Hr.	1,774,080
	BHP	210
	KW	2063
MAWP	PSI	160
	BAR	11
MAWT	°F	250
	°C	121
Operating Temperature, Max.	°F	230
	°C	110
Water Content	Gallons	511
	Liters	1934
Weight w/o Water (Shipping)	Pounds	10,500
	Kg	4763
Operating Weight	Pounds	14,760
	Kg	6695
Fireside Heating Surface	ft2	1,454
	m2	135
Waterside Heating Surface	ft2	546
	m2	51
Standby Heat Loss	BTU/Hr	16,000
	Watts	4689
Fan Motor Size 20ppm NOx	HP	10
Fan Motor Size 9ppm NOx	HP	15
Operating Voltage, Fan [A]	Volts/Ph/Hz	460/3/60
Control Circuit [B]	Volts/Ph/Hz	115/1/60
Incoming Power (Ampacity)	Amps	18.5
Flue Gas Mass Flow @ 100% Firing (Natural Gas)	lb/hr	9,064
	kg/h	4111

Notes:
A. Consult Cleaver Brooks for alternate voltage requirements.
B. Transformer is provided as standard

e-mail: info@cleaverbrooks.com
Web: http://www.cleaverbrooks.com

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INDUSTRIAL DIESEL GENERATOR SET

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Standby Power Rating

1,000 kW, 1,250 kVA, 60 Hz

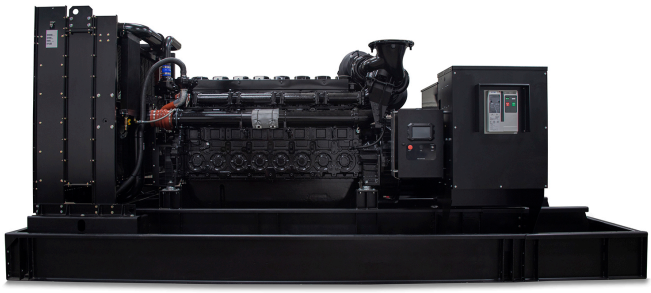

Image used for illustration purposes only

USA ENGINEERED & BUILT*

*Assembled in the USA using domestic and foreign parts

Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.

UL2200, UL6200, UL1236, UL489, UL142

CSA C22.2, ULC S601

BS5514 and DIN 6271

SAE J1349

NFPA 37, 70, 99, 110

NEC700, 701, 702, 708

NEMA ICS10, MG1, 250, ICS6, AB1

ANSI C62.41

Powering a Smarter World

For over 65 years, Generac has been at the forefront of power generation, pioneering innovative solutions and unparalleled manufacturing excellence. At the heart of our reputation for superior quality lies our commitment to meticulously designing and manufacturing key components of our generators—ranging from alternators and enclosures to base tanks, control systems, and cutting-edge communications software.

Generac's gensets stand out for their unparalleled versatility and reliability. Engineered to offer a wide range of options and configurations, they are tailored to meet the unique demands of virtually any application, seamlessly adapting to its complexity. Our commitment to reliability drives us to globally source only the most dependable engines, selected through stringent criteria to ensure they perform optimally under the toughest industrial conditions.

Beyond the sale, Generac's dedication to our customers extends to comprehensive service support, ensuring peace of mind and reliability long after your purchase. Our commitment is to not only provide state-of-the-art power solutions but also to ensure the enduring success and satisfaction of our customers through ongoing support and service excellence.

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INDUSTRIAL DIESEL GENERATOR SET

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STANDARD FEATURES

ENGINE SYSTEM
- Oil Drain Extension
- Air Filter Restriction Indicator
- Air Cleaner
- Level 1 Fan and Belt Guards (Open Set Only)
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Radiator Duct Adapter (Open Set Only)
- Engine Coolant Heater

FUEL SYSTEM
- Flexible Fuel Lines
- Primary and Secondary Fuel Filter

COOLING SYSTEM
- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- 50/50 Ethylene Glycol Antifreeze
- Radiator Drain Extension

ELECTRICAL SYSTEM
- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

ALTERNATOR SYSTEM
- Main Line Circuit Breaker
- Class H Insulation Material
- 2/3 Pitch
- Skewed Stator
- Permanent Magnet Excitation
- Sealed Bearing
- Full Load Capacity Alternator

GENERATOR SET
- Separation of Circuits - High/Low Voltage
- Separation of Circuits - Multiple Breakers
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)
- Spring Isolator

ENCLOSURE (If Selected)
- Structural Steel Sub-Base
- Sub-Base Lifting Eyes
- Enamel Finish
- Zinc Plated Fasteners
- Zinc Plated Cast Aluminum Keylock Door Handles
- Heavy Duty Stainless Steel Hinges with Removable Brass Pins
- Modular Construction

FUEL TANKS (If Selected)
- UL 142/ULC S601
- Double Wall
- Vents
- Factory Pressure Tested (2 psi)
- Rupture Basin Alarm
- Fuel Level
- Check Valve In Supply and Return Lines
- Stainless Steel Hardware
- Fuel Line Hose
- Fuel Line Hose and Separator
- Electronic Fuel Level
- Secondary Fuel Filter

CONTROL SYSTEM

DSE G8601 Controller

The G8601 is a genset controller with integral heater designed for multiple application environments.

Key Features
- Advanced PLC Functionality
- Multi-Purpose PIDs
- Virtual Inputs
- On-Screen Mimic (SLDs)
- Multi-Level Pin Protected Front Panel Editor
- Integral LCD Display Heater
- Enhanced High-Resolution 240 x 128 Pixel Display
- Integral Gasket (IP65 protection)

Standard Protections
- Low Coolant Level
- High/Low Coolant Temperature
- Oil Temperature
- Over/Under Speed
- Over/Under Voltage
- Over/Under Frequency
- Over/Under Current
- Over Load
- Battery Voltage
- Battery Charger Current
- Phase to Phase and Phase to Neutral Short Circuits (I^2T Algorithm)
- Ground Fault

Control Panel
- Auto/Off/Manual
  - — Indication Through Display Screen
- Audible Alarm and Silence
- Not in Auto Indication

Voltage Regulation
- Digital Control
- Three Phase Sensing
- Negative Power Limit
- Loss of Sensing Protection
- Fault Protection (I^2T Function)
- High Voltage Limit
- Low Voltage Limit
- Maximum Power Limit

More Features
- Uses Engine ECU
- Digital AVR Support
- Multiple Language Support
- Three Phase Generator Sensing & Protection
- Three Phase Bus Sensing
- Generator Current, Protection & Power Monitoring
- Configurable Timers
- Integrated SNMP
- Data Logging
- PC Configuration
- DSENet® (Expansion Support)
- Flexible I/O (Inputs/Outputs)
- Automatic and Front Panel Breaker Control
- Power-Save Mode

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INDUSTRIAL DIESEL GENERATOR SET

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CONFIGURABLE OPTIONS

ENGINE SYSTEM
- Critical Grade Silencer
- Hospital Grade Silencer
- CCV (Closed Crankcase Ventilation)
- Oil Heater
- Radiator Duct Flange
- Radiator Stone Guard

ELECTRICAL SYSTEM
- 20A UL Listed Battery Charger
- Battery Warmer

ALTERNATOR SYSTEM
- Alternator Upsizing
- Anti-Condensation Heater

CIRCUIT BREAKER OPTIONS
- Main Line Circuit Breaker
- 2nd Main Line Circuit Breaker
- 3rd Main Line Circuit Breaker
- 4th Main Line Circuit Breaker
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

GENERATOR SET
- Spring Isolators (Standard/Seismic)
- 24 Position Load Center
- Extended Factory Testing

ENCLOSURE
- Level 0 Sound Attenuated
- Level 1 Sound Attenuated
- Level 2 Sound Attenuated
- Level 1 Sound Attenuated with Motorized Dampers
- Level 2 Sound Attenuated with Motorized Dampers
- Steel Enclosure
- Aluminum Enclosure
- Enclosure Light Kit
- Up to 200 MPH Wind Load Rating (Contact Factory for Availability)
- Louvers with Gravity Dampers
- Enclosure Heaters (with Motorized Dampers Only)
- Door Open Alarm Horn
-

FUEL TANKS (Size On Last Page)
- Overfill Prevention Valve
- Fuel Fill Drop Tube
- 5 Gal Spill Return Hose
- Tank Risers
- 90% High Fuel Level Alarm
- Vent Extensions
- Fire Rated Fuel Hose

CONTROL SYSTEM
- NFPA 110 Level 1 Compliant 21-Light Remote Annunciator
- Remote Output Relays (8 or 16)
- Remote E-Stop (Break Glass-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Flush Mount)
- 100 dB Alarm Horn
- Ground Fault Annunciator
- 10 Amp Engine Run Relay
- 120V GFCI and 240V Outlet
- Oil Temperature Indication and Alarm
- Flush Mount Annunciator Kit
- Damper Alarm Contacts (with Motorized Dampers Only)

WARRANTY (Standby Gensets Only)
- 2 Year Extended Limited Warranty
- 5 Year Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

ENGINEERED OPTIONS

ENGINE SYSTEM
- Coolant Heater Ball Valves
- Fuel Cooler
- High Lift Pumps

ALTERNATOR SYSTEM
- 2nd Breaker System
- 3rd Breaker System
- 4th Breaker System
- Unit Mounted Load Banks
- Medium Voltage Alternators

CONTROL SYSTEM
- Spare Inputs (x4) / Outputs (x4)
- Battery Disconnect Switch

GENERATOR SET
- Special Testing

ENCLOSURE
- Custom Enclosure

FUEL TANKS
- UL2085 Tank
- Special Fuel Tanks

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INDUSTRIAL DIESEL GENERATOR SET

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GENERAC | INDUSTRIAL POWER

APPLICATION AND ENGINEERING DATA

ENGINE SPECIFICATIONS

General

Make	Perkins
EPA Emissions Compliance	Tier 2
EPA Emissions Reference	See Emissions Data Sheet
Cylinder #	8
Type	In-Line
Displacement - in^3 (L)	1,865 (30.6)
Bore - in (mm)	6.3 (160)
Stroke - in (mm)	7.48 (190)
Compression Ratio	14.1
Intake Air Method	Turbocharged/Intercooled
Cylinder Head	4-Valve

Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	±0.25%

Lubrication System

Oil Pump Type	Gear Driven
Oil Filter Type	Full Flow Spin-On Cartridge
Crankcase Capacity - qt (L)	162 (153)

Cooling System

Cooling System Type	Pressurized Closed
Fan Type	Pusher
Fan Diameter - in (mm)	49.2 (1,250)

Fuel System

Fuel Type	Ultra Low Sulfur Diesel #2
Fuel Specifications	ASTM
Fuel Filtering (Microns)	4
Fuel Inject Pump	MEUI
Injector Type	Electronic
Fuel Supply Line O.D. Minimum - in (mm)	0.59 (15.0)
Fuel Return Line O.D. Minimum - in (mm)	0.59 (15.0)

Engine Electrical System

System Voltage	24 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	12 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	K1248064N22
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	<50
Standard Excitation	Permanent Magnet
Bearings	Sealed Ball
Coupling	Direct Drive
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Digital
Number of Sensed Phases	All
Regulation Accuracy (Steady State)	±0.25%

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INDUSTRIAL DIESEL GENERATOR SET

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OPERATING DATA

POWER RATINGS

		Standby
Three-Phase 277/480 VAC @0.8pf	1,000 kW/1,250 kVA	Amps: 1,504
Three-Phase 346/600 VAC @0.8pf	1,000 kW/1,250 kVA	Amps: 1,203

MOTOR STARTING CAPABILITIES (SKVA)

skVA vs. Voltage Dip

277/480 VAC	30%		30%
K1248064N22	3,300	L1136064N22	3,600
K1344064N22	4,000	L1280064N22	4,250
K1500064N22	4,500	L1412064N22	5,100

FUEL CONSUMPTION RATES*

Fuel Pump Lift- ft (m)
8.2 (2.5)

Total Fuel Pump Flow (Combustion + Return) - gph (Lph)
238 (900)

Diesel - gph (Lph)	
Percent Load	Standby
50%	38.0 (144.0)
75%	54.7 (207.2)
100%	70.9 (268.4)

*Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

		Standby
Air Flow (Fan Air Flow Across Radiator)	cfm (m^3/min)	34,538 (978)
Coolant Flow	gpm (Lpm)	174 (660)
Coolant System Capacity	gal (L)	37 (140)
Maximum Operating Ambient Temperature	°F (°C)	122 (50)
Maximum Operating Ambient Temperature (Before Derate)	See Bulletin No. 0199280SSD	
Maximum Additional Radiator Backpressure	in H_2O (kPa)	0.8 (0.2)

COMBUSTION AIR REQUIREMENTS

	Standby
Flow at Rated Power cfm — (m^3/min)	2,935 (83)

ENGINE

		Standby
Rated Engine Speed	rpm	1,800
Horsepower at Rated kW**	hp	1,412
Piston Speed	ft/min (m/min)	2,244 (684)
BMEP	psi (kPa)	350 (2,415)

** See “Emissions Data Sheet” for maximum bHP for EPA and SCAQMD permitting purposes.

EXHAUST

		Standby
Exhaust Flow (Rated Output)	cfm (m^3/min)	7,097 (201)
Maximum Allowable Back Pressure (Post Turbo)	inHg (kPa)	4.1 (14.0)
Exhaust Temperature (Rated Output - Post Turbo)	°F (°C)	937 (503)

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.
Please contact a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with BS5514 and DIN6271 standards.
Standby - See Bulletin Standby - See Bulletin 10000018933

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INDUSTRIAL DIESEL GENERATOR SET

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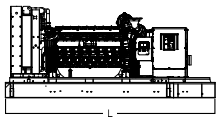
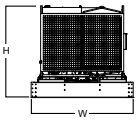
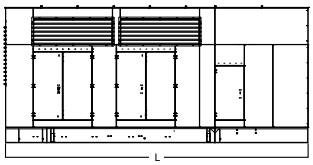
DIMENSIONS AND WEIGHTS*

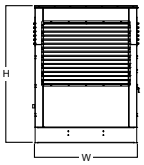




OPEN SET

Run Time - Hours)	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Unit Only
No Tank	—	209.8 (5,328) x 102.0 (2,590) x 91.5 (2,325)	18,766 - 20,463 (8,512 - 9,282)
12	840 (3,180)	210.0 (5,334) x 102.0 (2,590) x 107.5 (2,731)	
24	1,680 (6,359)	329.0 (8,357) x 102.0 (2,590) x 109.5 (2,781)	
24	1,680 (6,359)	210.0 (5,334) x 102.0 (2,590) x 121.5 (3,086)	
36	2,520 (9,539)	210.0 (5,334) x 102.0 (2,590) x 134.5 (3,416)	





LEVEL 0 SOUND ATTENUATED ENCLOSURE

Run Time - Hours)	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	—	304.0 (7,721) x 105.7 (2,685) x 137.0 (3,481)	3,761 (1,706)	Contact Factory
12	840 (3,180)	304.0 (7,721) x 105.7 (2,685) x 148.0 (3,759)		
12	840 (3,180)	329.0 (8,357) x 105.7 (2,685) x 148.0 (3,759)		
24	1,680 (6,359)	329.0 (8,357) x 105.7 (2,685) x 155.0 (3,937)		
24	1,680 (6,359)	329.0 (8,357) x 105.7 (2,685) x 155.0 (3,937)		
36	2,520 (9,539)	304.0 (7,722) x 105.7 (2,685) x 166.0 (4,216)		
36	2,520 (9,539)	329.0 (8,357) x 105.7 (2,685) x 163.0 (4,140)		
48	3,360 (12,719)	304.0 (7,722) x 105.7 (2,685) x 175.0 (4,445)		
48	3,360 (12,719)	329.0 (8,357) x 105.7 (2,685) x 171.0 (4,343)		
72	5,040 (19,078)	329.0 (8,357) x 105.7 (2,685) x 187.0 (4,750)		

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INDUSTRIAL DIESEL GENERATOR SET

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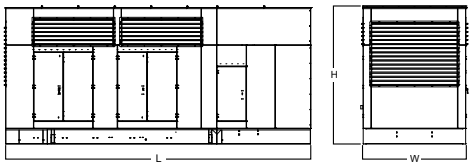
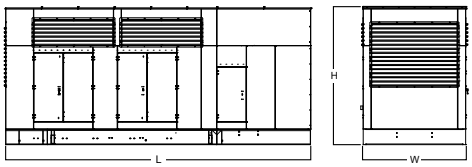
DIMENSIONS AND WEIGHTS*



LEVEL 1 SOUND ATTENUATED ENCLOSURE

Run Time - Hours)	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	—	304.0 (7,721) x 105.7 (2,685) x 137.0 (3,481)	5,005 (2,270)	Contact Factory
12	840 (3,180)	304.0 (7,721) x 105.7 (2,685) x 148.0 (3,759)		
12	840 (3,180)	329.0 (8,357) x 105.7 (2,685) x 148.0 (3,759)		
24	1,680 (6,359)	329.0 (8,357) x 105.7 (2,685) x 155.0 (3,937)		
24	1,680 (6,359)	329.0 (8,357) x 105.7 (2,685) x 155.0 (3,937)		
36	2,520 (9,539)	304.0 (7,722) x 105.7 (2,685) x 166.0 (4,216)		
36	2,520 (9,539)	329.0 (8,357) x 105.7 (2,685) x 163.0 (4,140)		
48	3,360 (12,719)	304.0 (7,722) x 105.7 (2,685) x 175.0 (4,445)		
48	3,360 (12,719)	329.0 (8,357) x 105.7 (2,685) x 171.0 (4,343)		
72	5,040 (19,078)	329.0 (8,357) x 105.7 (2,685) x 187.0 (4,750)		



LEVEL 2 SOUND ATTENUATED ENCLOSURE

Run Time - Hours)	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	—	304.0 (7,721) x 105.7 (2,685) x 137.0 (3,481)	6,901 (3,130)	Contact Factory
12	840 (3,180)	304.0 (7,721) x 105.7 (2,685) x 148.0 (3,759)		
12	840 (3,180)	329.0 (8,357) x 105.7 (2,685) x 148.0 (3,759)		
24	1,680 (6,359)	329.0 (8,357) x 105.7 (2,685) x 155.0 (3,937)		
24	1,680 (6,359)	329.0 (8,357) x 105.7 (2,685) x 155.0 (3,937)		
36	2,520 (9,539)	304.0 (7,722) x 105.7 (2,685) x 166.0 (4,216)		
36	2,520 (9,539)	329.0 (8,357) x 105.7 (2,685) x 163.0 (4,140)		
48	3,360 (12,719)	304.0 (7,722) x 105.7 (2,685) x 175.0 (4,445)		
48	3,360 (12,719)	329.0 (8,357) x 105.7 (2,685) x 171.0 (4,343)		
72	5,040 (19,078)	329.0 (8,357) x 105.7 (2,685) x 187.0 (4,750)		

*All measurements are approximate and for estimation purposes only.

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Dimensions and weights are for preliminary purposes only. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.

SPEC SHEET

Generac Power Systems, Inc. | S45 W29290 HWY. 59 | Waukesha, WI 53189 | generac.com

Part No. A0001316734
Rev. C 03/04/2024

STATEMENT OF EXHAUST EMISSIONS
2024 Perkins Diesel Fueled Generator

The measured emissions values provided here are proprietary to Generac and it's authorized dealers. This information may only be disseminated upon request to regulatory governmental bodies for emissions permitting purposes or to specifying organizations as submittal data when expressly required by project specifications, and shall remain confidential and not open to public viewing. This information is not intended for compilation or sales purposes and may not be used as such, nor may it be reproduced without the expressed written permission of Generac Power Systems, Inc.. The data provided shall not be meant to include information made public by Generac.

Generator Model:	**SD/MD1000**	EPA Certificate Number:	**RCPXL45.8NZS-029**
kW_e Rating:	**1000**	CARB Certificate Number:	**Not applicable**
Engine Family:	**RCPXL45.8NZS**	SCAQMD CEP Number:	**634217**
Engine Model:	**5008C-E30TAG5**	Emission Standard Category:	**Tier II**
Rated Engine Power (BHP)*:	**1,484**	Certification Type:	**Stationary Emergency CI (40 CFR Part 60 Subpart IIII)**
Fuel Consumption (gal/hr)*:	**71.4**		
Aspiration:	**Turbocharged/Aftercooled**		
Rated RPM:	**1,800**		

*Engine power and fuel consumption are declared by the engine manufacturer of record and the U.S EPA.

EMISSIONS BASED ON ENGINE POWER OF SPECIFIC ENGINE MODEL

These Values Are Actual Composite Weighted Exhaust Emissions Results Over the EPA 5-Mode Test Cycle

CO	NOx + NMHC	PM	
0.80	**5.86**	**0.09**	Grams/kW-hr
0.6	**4.3**	**0.1**	Grams/bhp-hr

These Values are 100% Load Data Exhaust Emissions Results.

CO	NOx + NMHC	PM	
0.46	**6.239**	**0.075**	Grams/kW-hr
0.34	**4.59**	**0.06**	Grams/bhp-hr

- The stated values are actual exhaust emission test measurements obtained from an engine representative of the type described above.
- Values based on 5-Mode testing are official data of record as submitted to regulatory agencies for certification purposes. Testing was conducted in accordance with prevailing EPA protocol, which is typically accepted by SCAQMD and other regional authorities.
- No emissions values provided above are to be construed as guarantees of emission levels for any given Generac generator unit.
- Generac Power Systems, Inc. reserves the right to revise this information without prior notice.
- Consult state and local regulatory agencies for specific permitting requirements.
- The emission performance data supplied by the equipment manufacturer is only one element required toward completion of the permitting and installation process. State and local regulations may vary on a case-by-case basis and local agencies must be consulted by the permit application/equipment owner prior to equipment purchase or installation. The data supplied herein by Generac Power Systems Inc. cannot be construed as a guarantee of installability of the generating set.

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

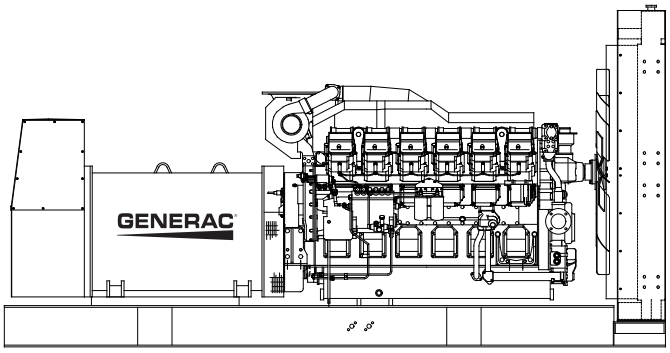
EPA Certified Stationary Emergency

Standby Power Rating
1,250 kW, 1,563 kVA, 60 Hz

Prime Power Rating*
1,125 kW, 1,406 kVA, 60 Hz

*Assembled in the USA using domestic and foreign parts

*EPA Certified Prime ratings are not available in the US or its Territories



Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.

UL2200, UL6200, UL1236, UL489, UL142

CSA C22.2

BS5514 and DIN 6271

SAE J1349

NFPA 37, 70, 99, 110

NEC700, 701, 702, 708

NEMA ICS10, MG1, 250, ICS6, AB1

ANSI C62.41

IBC 2009, IBC 2012, ASCE 7-05, ASCE 7-10, ICC-ES AC-156 (2012)

Powering a Smarter World

For over 65 years, Generac has been at the forefront of power generation, pioneering innovative solutions and unparalleled manufacturing excellence. At the heart of our reputation for superior quality lies our commitment to meticulously designing and manufacturing key components of our generators—ranging from alternators and enclosures to base tanks, control systems, and cutting-edge communications software.

Generac's gensets stand out for their unparalleled versatility and reliability. Engineered to offer a wide range of options and configurations, they are tailored to meet the unique demands of virtually any application, seamlessly adapting to its complexity. Our commitment to reliability drives us to globally source only the most dependable engines, selected through stringent criteria for optimal performance under the toughest industrial conditions.

Beyond the sale, Generac's dedication to our customers extends to comprehensive service support, for peace of mind and reliability long after your purchase. Our commitment is to not only provide state-of-the-art power solutions but also enduring success and satisfaction of our customers through ongoing support and service excellence.

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

GENERAC | INDUSTRIAL POWER

STANDARD FEATURES

ENGINE SYSTEM
- Oil Drain Extension
- Air Cleaner
- Fan Guard
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Radiator Duct Adapter (Open Set Only)
- Engine Coolant Heater
- Critical Grade Silencer (Enclosed Units Only)

FUEL SYSTEM
- Flexible Fuel Lines (When Tank is Selected)
- Primary Fuel Filter

COOLING SYSTEM
- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- Radiator Drain Extension
- 50/50 Ethylene Glycol Antifreeze

ELECTRICAL SYSTEM
- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

ALTERNATOR SYSTEM
- Class H Insulation Material
- 2/3 Pitch
- Skewed Stator
- Permanent Magnet Excitation
- Sealed Bearing
- Full Load Capacity Alternator

GENERATOR SET
- Separation of Circuits - High/Low Voltage
- Separation of Circuits - Dual Breakers
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)
- 1 Year Limited Warranty (Prime Rated Units)

ENCLOSURE (If Selected)
- Structural Steel Sub-Base
- Sub-Base Lifting Eyes
- Enamel Finish
- Zinc Plated Fasteners
- Zinc Plated Cast Aluminum Keylock Door Handles
- Heavy Duty Stainless Steel Hinges with Removable Brass Pins
- Modular Construction

FUEL TANKS(If Selected)
- UL 142
- Double Wall
- Vents
- Factory Pressure Tested (2 psi)
- Rupture Basin Alarm
- Fuel Level
- Check Valve in Supply and Return Lines
- Stainless Steel Hardware
- Fuel Line Hose
- Fuel Line Hose and Separator
- Electronic Fuel Level
- Secondary Fuel Filter

CONTROL SYSTEM

InteliGen NT Display

Program Functions
- Programmable Crank Limiter
- 7-Day Programmable Exerciser
- Special Applications Programmable Logic Controller
- RS-232/485 Communications
- 2-Wire Start Capability
- Date/Time Fault History (Event Log)
- Isochronous Governor Control
- Waterproof/Sealed Connectors
- Audible Alarms and Shutdowns
- Not in Auto (Flashing Light)
- Auto/Off/Manual Switch
- Customizable Alarms, Warnings, and Events
- Modbus® Protocol
- Predictive Maintenance Algorithm
- Sealed Boards
- Password Parameter Adjustment Protection
- Single Point Ground
- 16 Channel Remote Trending
- 0.2 msec High Speed Remote Trending
- Alarm Information Automatically Annunciated on the Display

Full System Status Display
- Power Output (kW)
- Power Factor
- kW Hours, Total, and Last Run
- Real/Reactive/Apparent Power
- All Phase AC Voltage
- All Phase Currents
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Speed
- Battery Voltage
- Frequency

Alarms and Warnings
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Overspeed
- Battery Voltage
- Alarms and Warnings Time and Date Stamped
- Snap Shots of Key Operation Parameters During Alarms and Warnings
- Alarms and Warnings Spelled Out (No Alarm Codes)

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

CONFIGURABLE OPTIONS

ENGINE SYSTEM
- 50° Ambient Cooling System
- Critical and Hospital Grade Silencers
- Critical Grade Exhaust (Open Set Only)
- CCV (Closed Crankcase Ventilation)
- Engine Drain Kit
- Air Cleaner with Indicator

ELECTRICAL SYSTEM
- 10A UL Battery Charger
- 20A UL Battery Charger
- Battery Warmer

ALTERNATOR SYSTEM
- Alternator Upsizing
- Anti-Condensation Heater

CIRCUIT BREAKER OPTIONS
- Main Line Circuit Breaker
- 2nd Main Line Circuit Breaker
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

GENERATOR SET
- Spring Isolators (Standard/Seismic)

ENCLOSURE
- Weather Protected Enclosure
- Level 1 Sound Attenuated with Motorized Dampers
- Level 2 Sound Attenuated with Motorized Dampers
- Steel Enclosure
- Aluminum Enclosure
- Up to 200 MPH Wind Load Rating (Contact Factory for Availability)
- Louvers with Gravity Dampers
- Enclosure Heaters (Motorized Dampers Only)
- AC Electrical Lighting Package (ELP)
- Enclosure Heater

WARRANTY (Standby Gensets Only)
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

CONTROL SYSTEM
- NFPA110 Level I and II (Programmable) 15- LED Remote Annunciator
- Remote Relay Assembly (8 or 16)
- Shipped Loose Remote E-Stop - Surface Mount
- Generator Control Panel Mounted E-Stop
- Remote Communication - InternetBridge NT
- 10A Engine Run Relay
- Low Coolant Level Indication
- 90% High Fuel Alarm

FUEL TANKS (Size on Last Page)
- Mechanical Fuel Level
- 12 Hour Run Time
- 24 Hour Run Time

ENGINEERED OPTIONS

ENGINE SYSTEM
- Coolant Heater Ball Valves
- Oil Heater
- Fuel Cooler
- High Lift Pumps
- Heavy Duty Air Filters (Open Set Only)

ALTERNATOR SYSTEM
- 3rd Breaker System
- 4th Breaker Options
- Unit Mounted Load Banks
- Medium Voltage Alternators
- Digital Voltage Regulator

CONTROL SYSTEM
- Spare Inputs (x4) / Outputs (x4)
- Battery Disconnect Switch
- PM-SCi

GENERATOR SET
- Special Testing
- 12 VDC Enclosure Lighting Kit
- 24 VDC/120 VAC Enclosure Lighting Kit

ENCLOSURE
- Door Open Alarm Switch
- Level 3 Sound Attenuated Enclosure
- Custom Enclosure

TANKS
- Overfill Protection Valve
- UL2085 Tank
- ULC S601 Tank
- Special Fuel Tanks
- External Vent Extensions
- Transfer Pumps and Controllers
- Fuel Tank Heaters

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

APPLICATION AND ENGINEERING DATA

ENGINE SPECIFICATIONS

General

Make	Mitsubishi
Model	S12R-Y2PTAW-1
EPA Emissions Compliance	Tier 2
EPA Emissions Reference	See Emission Data Sheet
Cylinder #	12
Type	4 Cycle - V12
Displacement - in^3 (L)	2,992 (49.0)
Bore - in (mm)	6.69 (170)
Stroke - in (mm)	7.09 (180)
Compression Ratio	14.5:1
Intake Air Method	Turbocharged/Intercooled
Cylinder Head	4-Valve
Piston Type	Aluminum
Crankshaft Type	Dropped Forged Steel

Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	±0.25%

Lubrication System

Oil Pump Type	Gear Driven
Oil Filter Type	Cartridge
Crankcase Capacity - qt (L)	158.5 (150)

Cooling System

Cooling System Type	Unit Mounted Radiator
Water Pump Type	Centrifugal
Fan Type	Pusher
Fan Speed - RPM	710
Fan Diameter - in (mm)	88 (2,235)

Fuel System

Fuel Type	Ultra Low Sulfur Diesel #2
Fuel Specifications	ASTM
Fuel Filtering (Microns)	10 (Final Filters)
Fuel Inject Pump Make	Mechanical
Fuel Pump Type	Engine Driven Gear
Injector Type	Mitsubishi PS8 Type x 2
Fuel Supply Line - in (mm)	0.75” NPT (19.0)
Fuel Return Line - in (mm)	0.75” NPT (19.0)

Engine Electrical System

System Voltage	24 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	(4) – 12 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	K2112064N22
Poles	4
Field Rype	Rotating
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	<50

Standard Excitation	Permanent Magnet
Bearings	Single Sealed Cartridge
Coupling	Direct via Flexible Disc
Load Capacity - Standby	100%
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Analog
Regulation Accuracy (Steady State)	±0.5%

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

OPERATING DATA

POWER RATINGS

		Standby
Three-Phase 277/480 VAC @0.8pf	1,250 kW	Amps: 1,882
Three-Phase 346/600 VAC @0.8pf	1,250 kW	Amps: 1,505

MOTOR STARTING CAPABILITIES (SKVA)

skVA vs. Voltage Dip	
277/480 VAC	30%
K2112064N22	7,709
K2268064N22	9,417

FUEL CONSUMPTION RATES*

Fuel Pump Lift- ft (m)
3 (1)

Total Fuel Pump Flow (Combustion + Return) - gph (Lph)
127 (479)

Diesel - gph (Lph)	
Percent Load	Standby
25%	30.0 (113.6)
50%	50.3 (190.4)
75%	72.9 (275.9)
100%	97.7 (369.8)

*Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

Cooling Rating - Jacket Water		Standby
Coolant Flow	gpm (Lpm)	489 (1,851)
Coolant System Capacity	gal (L)	95 (360)
Heat Rejection to Coolant	BTU/hr (kW)	1,829,820 (536)
Inlet Air- 40°C Cooling Package	scfm (m^3/min)	66,100 (1,872)
Inlet Air- 50°C Cooling Package	scfm (m^3/min)	70,800 (2,005)
Maximum Operating Ambient Temperature	°F (°C)	104 (40)
Maximum Operating Ambient Temperature (Before Derate)	see Bulletin No. 0199270SSD	
Maximum Additional Radiator Backpressure	in H_2O (kPa)	0.5 (0.12)

Cooling Rating - Aftercooler		Standby
Coolant Flow	gpm (Lpm)	90 (341)
Coolant System Capacity	gal (L)	50 (189)

Cooling Rating- Fuel Pump		Standby
Heat Rejected to Fuel	BTU/hr (kW)	10,098 (3.0)

COMBUSTION AIR REQUIREMENTS

	Standby/Demand Response
Flow at Rated Power - scfm (m^3/min)	4,767 (135)

ENGINE

		Standby
Rated Engine Speed	rpm	1,800
Horsepower at Rated kW**	hp	1,881
Piston Speed	ft/min (m/min)	2,126 (648)
BMEP	psi (kPa)	276 (1,903)

** See "Emissions Data Sheet" for maximum bHP for EPA and SCAQMD permitting purposes.

EXHAUST

		Standby
Exhaust Flow (Rated Output)	scfm (m^3/min)	12,570 (356)
Maximum Allowable Back Pressure (Post Turbo)	in H2O (kPa)	1.7 (5.87)
Exhaust Temp (Rated Output - Post Silencer)	°F (°C)	932 (500)

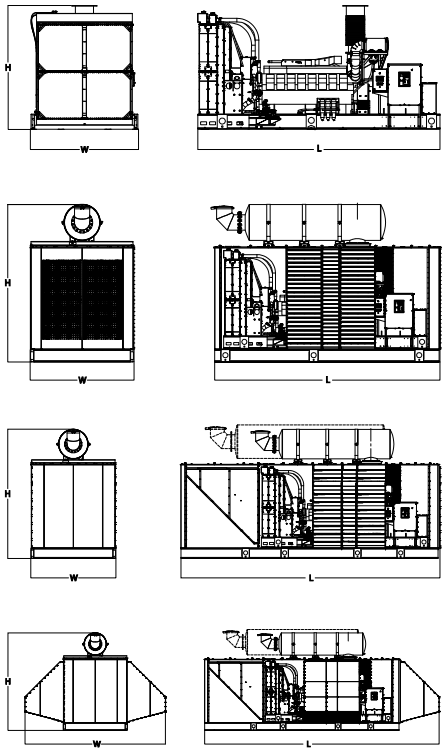
Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.
Please contact a Generac Power Systems Industrial Ottomotores CAT® Dealer for additional details. All performance ratings in accordance with BS5514 and DIN6271 standards..
Standby - See Bulletin 10000018933 • Prime - See Bulletin 10000018926

MD1250 | 49.0 L | 1,250 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

DIMENSIONS AND WEIGHTS*



OPEN SET (Includes Exhaust Flex)

Run Time Hours	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)
No Tank	—	215.7 (5,478) x 93.0 (2,362) x 115.1 (2,924)	26,045 (11,814)
12	1,250 (4,732)	243.0 (6,172) x 116.0 (2,945) x 132.1 (3,356)	Contact Factory
24	2,500 (9,464)	243.0 (6,172) x 116.0 (2,945) x 148.0 (3,759)	Contact Factory

WEATHER PROTECTED ENCLOSURE

Run Time Hours	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	—	244.0 (6,198) x 110.0 (2,791) x 184.0 (4,661)	Contact Factory	
12	1,250 (4,732)	264.0 (6,698) x 110.0 (2,791) x 201.0 (5,093)		
24	2,500 (9,464)	264.0 (6,698) x 110.0 (2,791) x 217.0 (5,499)		

LEVEL 1 SOUND ATTENUATED ENCLOSURE

Run Time Hours	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	—	327.0 (8,306) x 119.0 (3,021) x 184.0 (4,674)	Contact Factory	
12	1,250 (4,732)	330.0 (8,382) x 119.0 (3,021) x 206.3 (5,239)		
24	2,500 (9,464)	330.0 (8,382) x 119.0 (3,021) x 208.0 (5,284)		

LEVEL 2 SOUND ATTENUATED ENCLOSURE

Run Time Hours	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	—	404.0 (10,268) x 262.0 (6,666) x 126.0 (3,209)	Contact Factory	
12	1,250 (4,732)	404.0 (10,268) x 262.0 (6,666) x 140.0 (3,565)		
24	2,500 (9,464)	404.0 (10,268) x 262.0 (6,666) x 150.0 (3,819)		

*All measurements are approximate and for estimation purposes only.

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Dimensions and weights are for preliminary purposes only. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.

SPEC SHEET

Generac Power Systems, Inc. | S45 W29290 HWY. 59 | Waukesha, WI 53189 | generac.com

Part No. A0004067538
Rev. B 05/10/2024

STATEMENT OF EXHAUST EMISSIONS
2024 MHI Diesel Fueled Generator

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Generator Model:	**SD/MD1250**	EPA Certificate Number:	**RMVXL49.0BBA-005**
kW_e Rating:	**1,250**	CARB Certificate Number:	**Not Applicable**
Engine Family:	**RMVXL49.0BBA**	SCAQMD CEP Number:	**476463**
Engine Model:	**S12R-Y2PTAW-1**	Emission Standard Category:	**Tier 2**
Rated Engine Power (BHP)*:	**1,881**	Certification Type:	**Stationary Emergency CI (40 CFR Part 60 Subpart IIII)**
Fuel Consumption (gal/hr)*:	**103.3**		
Aspiration:	**Turbocharged/Aftercooled**		
Rated RPM:	**1,800**		

*Engine power are declared by the engine manufacturer of record and the U.S EPA.

Emissions Based on Engine Power of Specific Engine Model

These Values are Actual Composite Weighted Exhaust Emissions Results Over the EPA 5-Mode Test Cycle

CO	NOx + NMHC	PM	
0.7	**5.98**	**0.14**	Grams/kW-hr
0.52	**4.46**	**0.10**	Grams/bhp-hr

These Values are 100% Load Data Exhaust Emissions Results.

CO	NOx + NMHC	PM	
0.604	**5.04**	**0.082**	Grams/kW-hr
0.45	**3.76**	**0.06**	Grams/bhp-hr

- The stated values are actual exhaust emission test measurements obtained from an engine representative of the type described above.
- Values based on 5-Mode testing are official data of record as submitted to regulatory agencies for certification purposes. Testing was conducted in accordance with prevailing EPA protocol, which is typically accepted by SCAQMD and other regional authorities.
- No emissions values provided above are to be construed as guarantees of emission levels for any given Generac generator unit.
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- The emission performance data supplied by the equipment manufacturer is only one element required toward completion of the permitting and installation process. State and local regulations may vary on a case-by-case basis and local agencies must be consulted by the permit application/equipment owner prior to equipment purchase or installation. The data supplied herein by Generac Power Systems Inc. cannot be construed as a guarantee of installability of the generating set.

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

Standby Power Rating

2,000 kW, 2,500 kVA, 60 Hz

Prime Power Rating

1,800 kW, 2,250 kVA, 60 Hz

*Assembled in the USA using domestic and foreign parts

*EPA Certified Prime Ratings are not available in the US or its Territories.

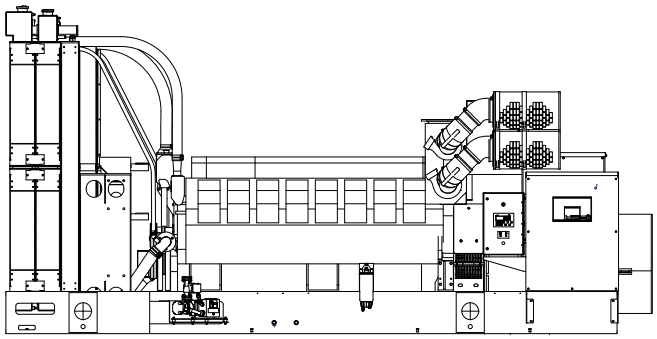

Image used for illustration purposes only

Codes and Standards

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UL2200, UL6200, UL1236, UL489, UL142

CSA C22.2, ULC S601

BS5514 and DIN 6271

SAE J1349

NFPA 37, 70, 99, 110

NEC700, 701, 702, 708

NEMA ICS10, MG1, 250, ICS6, AB1

ANSI C62.41

IBC 2009, CBC 2010, IBC 2012, ASCE 7-05, ASCE 7-10, ICC-ES AC-156 (2012)

Powering Ahead

For over 60 years, Generac has provided innovative design and superior manufacturing.

Generac provides superior quality by designing and manufacturing most of its generator components, including alternators, enclosures and base tanks, control systems and communications software.

Generac gensets utilize a wide variety of options, configurations and arrangements, allowing us to meet the standby power needs of practically every application.

Generac searched globally to find the most reliable engines to power our generators. We choose only engines that have already been proven in heavy-duty industrial applications under adverse conditions.

Generac is committed to ensuring our customers' service support continues after their generator purchase.

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

STANDARD FEATURES

ENGINE SYSTEM
- Oil Drain Extension
- Air Cleaner
- Level 1 Fan and Belt Guards
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Radiator Duct Adapter (Open Set Only)

FUEL SYSTEM
- Flexible Fuel Lines (When Tank is Selected)
- Primary Fuel Filter

COOLING SYSTEM
- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- Radiator Drain Extension
- 50/50 Ethylene Glycol Antifreeze

ELECTRICAL SYSTEM
- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

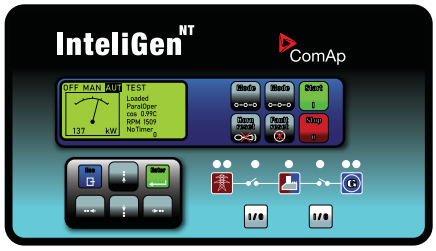
ALTERNATOR SYSTEM
- Class H Insulation Material
- 2/3 Pitch
- Skewed Stator
- Permanent Magnet Excitation
- Sealed Bearing
- Full Load Capacity Alternator
- Main Line Circuit Breaker

GENERATOR SET
- Separation of Circuits - High/Low Voltage
- Separation of Circuits - Dual Breakers
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)
- 1 Year Limited Warranty (Prime Rated Units)

ENCLOSURE (If Selected)
- Structural Steel Sub-Base
- Sub-Base Lifting Eyes
- Enamel Finish
- Zinc Plated Fasteners
- Zinc Plated Cast Aluminum Keylock Door Handles
- Heavy Duty Stainless Steel Hinges with Removable Brass Pins
- Modular Construction
- Powder Coat

FUEL TANKS (If Selected)
- UL 142/ULC S601
- Double Wall
- Vents
- Factory Pressure Tested (2 psi)
- Rupture Basin Alarm
- Fuel Level
- Check Valve in Supply and Return Lines
- Stainless Steel Hardware
- Fuel Line Hose
- Fuel Line Hose and Separator
- Electronic Fuel Level
- Secondary Fuel Filter

CONTROL SYSTEM



Inteligen® NT Display

Program Functions
- Programmable Crank Limiter
- 7-Day programmable Exerciser
- Special Applications Programmable Logic Controller
- RS-232/485 Communications
- 2-Wire Start Capability
- Date/Time Fault History (Event Log)
- Isochronous Governor Control
- Waterproof/Sealed Connectors
- Audible Alarms and Shutdowns
- Not in Auto (Flashing Light)
- Auto Off/Manual Switch
- Customizable alarms, Warnings, and Events
- Modbus® Protocol
- Predictive Maintenance Algorithm
- Sealed Boards
- Password Parameter Adjustment Protection
- Single Point Ground
- 16 Channel Remote Trending
- 0.2 msec High Speed Remote Trending
- Alarm Information Automatically Annunciated on the Display

Full System Status Display
- Power Output (kW)
- Power Factor
- kW Hours, Total, and Last Run
- Real/Reactive/Apparent Power
- All Phase AC Voltage
- All Phase Currents
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Speed
- Battery Voltage
- Frequency

Alarms and Warnings
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Overspeed
- Battery Voltage
- Alarms and Warnings Time and Date Stamped
- Snap Shots of Key Operation Parameters During Alarms and Warnings
- Alarms and Warnings Spelled Out (No Alarm Codes)

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

CONFIGURABLE OPTIONS

ENGINE SYSTEM
- 50 °C Ambient Cooling System
- Critical and Hospital Grade Silencers
- CCV (Closed Crankcase Ventilation)

ELECTRICAL SYSTEM
- 10A UL Listed Battery Charger
- 20A UL Listed Battery Charger
- Battery Warmer

ALTERNATOR SYSTEM
- Alternator Upsizing
- Anti-Condensation Heater

CIRCUIT BREAKER OPTIONS
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

GENERATOR SET
- Spring Isolators (Standard/Seismic)

ENCLOSURE
- Weather Protected Enclosure
- Level 1 Sound Attenuation
- Level 2 Sound Attenuation
- Steel Enclosure
- Aluminum Enclosure
- Up to 200 MPH Wind Load Rating (Contact Factory for Availability)
- Louvers with Gravity Dampers
- Enclosure Heaters
- AC Electrical Lighting Package (ELP)

WARRANTY (Standby Gensets Only)
- 2 Year Limited Warranty
- 5 Year Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

CONTROL SYSTEM
- NFPA 110 Level I and II (Programmable) 15- LED Remote Annunciator
- Remote Relay Assembly (8 or 16)
- Shipped Loose Remote E-Stop - Surface Mount
- Generator Control Panel Mounted E-Stop
- Remote Communication - InternetBridge NT
- 10A Engine Run Relay
- Low Coolant Level Indication
- 90% High Fuel Alarm

FUEL TANKS (Size on Last Page)
- 2 Year Extended Limited Warranty
- 5 Year Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

ENGINEERED OPTIONS

ENGINE SYSTEM
- Coolant Heater Ball Valves
- Oil Heater
- Fuel Cooler
- High Lift Pumps
- Heavy Duty Air Filters (Open Set Only)

ALTERNATOR SYSTEM
- 2nd Breaker System
- Unit Mounted Load Banks
- Medium Voltage Alternators
- Digital Voltage Regulator

CONTROL SYSTEM
- Spare Inputs (x4) / Outputs (x4)
- Battery Disconnect Switch
- PM-SCi

GENERATOR SET
- Special Testing
- 12 VDC Enclosure Lighting Kit
- 24 VDC/120 VAC Enclosure Lighting Kit

ENCLOSURE
- Door Open Alarm Horn
- Level 3 Sound Attenuated Enclosure
- Custom Enclosure

FUEL TANKS
- Overfill Protection Valve
- UL2085 Tank
- Special Fuel Tanks
- External Vent Extensions
- Transfer Pumps and Controllers
- Fuel Tank Heaters

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

GENERAC | INDUSTRIAL POWER

APPLICATION AND ENGINEERING DATA

ENGINE SPECIFICATIONS

General

Make	Mitsubishi
Model	S16R-Y2PTAW2-1
EPA Emissions Compliance	Tier 2
EPA Emissions Reference	See Emission Data Sheet
Cylinder #	16
Type	4 Cycle - V16
Displacement - in^3 (L)	3,989 (65.4)
Bore - in (mm)	6.69 (170)
Stroke - in (mm)	7.09 (180)
Compression Ratio	14.0:1
Intake Air Method	Turbocharged/Intercooled
Cylinder Head	4-Valve
Piston Type	Aluminum
Crankshaft Type	Dropped Forged Steel

Engine Governing

Governor	Electronic
Frequency Regulation (Steady State)	±0.25%

Lubrication System

Oil Pump Type	Gear
Oil Filter Type	Cartridge
Crankcase Capacity: qt (L)	212 (200)

Cooling System

Cooling System Type	Unit Mounted Radiator
Water Pump Type	Centrifugal
Fan Type	Pusher
Fan Speed (RPM)	710
Fan Diameter - in (mm)	88 (2,235))

Fuel System

Fuel Type	Ultra Low Sulfur Diesel #2
Fuel Specifications	ASTM
Fuel Filtering (Microns)	10 (Final Filters)
Fuel Inject Pump Make	Mechanical
Fuel Pump Type	Engine Driven Gear
Injector Type	Mitsubishi PS8 Type x 2
Fuel Supply Line - in (mm)	1” NPT (25.4)
Fuel Return Line - in (mm)	1” NPT (25.4)

Engine Electrical System

System Voltage	24 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	(4) - 12 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	K2112064N22
Poles	4
Field Type	Rotating
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	<50

Standard Excitation	Permanent Magnet
Bearings	Single Sealed Cartridge
Coupling	Direct via Flexible Disc
Load Capacity - Standby	100%
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Analog
Regulation Accuracy (Steady State)	±0.5%

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

GENERAC | INDUSTRIAL POWER

OPERATING DATA

POWER RATINGS

	Standby	
Three-Phase 277/480 VAC @0.8pf	2,000 kW/2,500 kVA	Amps: 3,007
Three-Phase 346/600 VAC @0.8pf	2,000 kW/2,500 kVA	Amps: 2,406

MOTOR STARTING CAPABILITIES (skVA)

skVA vs. Voltage Dip	
277/480 VAC	30%
K2112064N22	7,709
K2268064N22	9,417

FUEL CONSUMPTION RATES*

Fuel Pump Lift- ft (m)
3 (1)

Total Fuel Pump Flow (Combustion + Return) - gph (Lph)
330 (1,250)

	Diesel - gph (Lph)
Percent Load	Standby
25%	50.1 (189.6)
50%	84.9 (321.4)
75%	122.6 (464.1)
100%	163.4 (618.5)

*Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

Cooling Rating - Jacket Water		Standby
Coolant Flow	gpm (Lpm)	489 (1,851)
Coolant System Capacity	gal (L)	106 (401)
Heat Rejection to Coolant	BTU/hr (kW)	2,818,260 (826)
Inlet Air- 40°C Cooling Package	cfm (m^3/min)	101,400 (2,872)
Inlet Air- 50°C Cooling Package	cfm (m^3/min)	100,700 (2,852
Maximum Operating Ambient Temperature	°F (°C)	122 (50)
Maximum Operating Ambient Temperature (Before Derate)	See Bulletin No. 0199280SSD	
Maximum Additional Radiator Backpressure	in H_2O (kPa)	0.5 (0.12)

Cooling Rating - Aftercooler		Standby
Coolant Flow	gpm (Lpm)	243 (920)
Coolant System Capacity	gal (L)	65 (246)
Heat Rejection to Coolant	BTU/hr (kW)	2,818,260 (826)

Cooling Rating - Fuel Pump		Standby
Heat Rejected to Fuel	BTU/hr (kW)	54,350 (15.9)

COMBUSTION AIR REQUIREMENTS

	Standby
Flow at Rated Power cfm — (m^3/min)	7,274 (206)

ENGINE

		Standby
Rated Engine Speed	RPM	1,800
Horsepower at Rated kW**	hp	2,923
Piston Speed	ft/min (m/min)	2,126 (648)
BMEP	psi (kPa)	323 (2,227)

** Refer to “Emissions Data Sheet” for maximum bHP for EPA and SCAQMD permitting purposes.

EXHAUST

		Standby
Exhaust Flow (Rated Output)	cfm (m^3/min)	19,209 (544)
Maximum Allowable Backpressure	inHG (kPa)	1.7 (5.87)
Exhaust Temperature (Rated Output - Post Silencer)	°F (°C)	932 (500)

Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.

Please contact a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with BS5514 and DIN6271 standards.

Standby - See Bulletin 10000018933

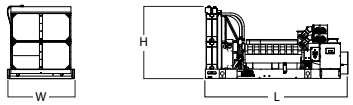
Prime - See Bulletin 10000018926

MD 2000 | 64.5 L | 2,000 kW

INDUSTRIAL DIESEL GENERATOR SET

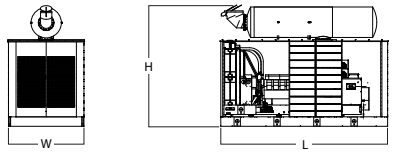
EPA Certified Stationary Emergency

DIMENSIONS AND WEIGHTS*



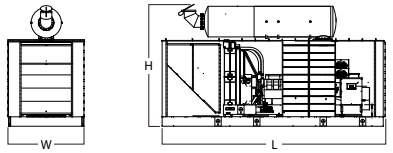
OPEN SET

Run Time Hours**	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)
No Tank	—	241.9 (6,145) x 106.8 (2,712) x 123.5 (3,136)	36,220 (16,464)
12	1,925 (7,287)	274.5 (6,972) x 120.0 (3,048) x 150.1 (3,812)	42,290 (19,223)
24	3,850 (14,574)	274.5 (6,972) x 120.0 (3,048) x 168.1 (4,270)	50,263 (22,847)



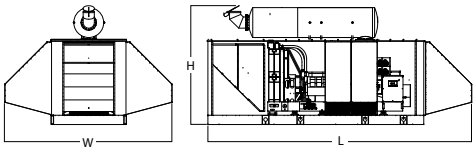
WEATHER PROTECTED ENCLOSURE

Run Time Hours**	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)	
			Steel	Aluminum
No Tank	—	266.5 (6,769) x 122.0 (3,099) x 185.3 (4,706)	45,868 (20,849)	43,592 (19,815)
12	1,925 (7,287)	275.5 (6,997) x 122.0 (3,099) x 196.3 (4,985)	48,418 (22,008)	46,142 (20,974)
24	3,850 (14,574)	275.5 (6,997) x 122.0 (3,099) x 214.3 (5,443)	50,321 (22,873)	48,045 (21,839)



LEVEL 1 SOUND ATTENUATED ENCLOSURE

Run Time Hours**	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)	
			Steel	Aluminum
No Tank	—	373.0 (9,474) x 122.0 (3,099) x 185.3 (4,706)	48,235 (21,925)	45,105 (20,502)
12	1,925 (7,287)	381.7 (9,669) x 122.0 (3,099) x 206.3 (5,239)	51,785 (23,539)	48,655 (22,116)
24	3,850 (14,574)	381.7 (9,696) x 122.0 (3,099) x 218.3 (5,544)	53,516 (24,326)	50,386 (22,903)



LEVEL 2 SOUND ATTENUATED ENCLOSURE

Run Time Hours**	Usable Capacity Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)	
			Steel	Aluminum
No Tank	—	445.4 (11,312) x 267.1 (6,785) x 185.3 (4,706)	51,791 (23,542)	46,883 (21,311)
12	1,925 (7,287)	445.4 (11,312) x 267.1 (6,785) x 206.3 (5,239)	55,341 (25,155)	50,433 (22,924)
24	3,850 (14,574)	445.4 (11,312) x 267.1 (6,785) x 218.3 (5,544)	57,072 (25,942)	52,164 (23,711)

*All measurements are approximate and for estimation purposes only.

YOUR FACTORY RECOGNIZED GENERAC INDUSTRIAL DEALER

Specification characteristics may change without notice. Dimensions and weights are for preliminary purposes only. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.

SPEC SHEET

Generac Power Systems, Inc. | S45 W29290 HWY. 59 | Waukesha, WI 53189 | generac.com

Part No. 10000031601
Rev. D 06/12/2024

STATEMENT OF EXHAUST EMISSIONS
2024 MHI Diesel Fueled Generator

The measured emissions values provided here are proprietary to Generac and it's authorized dealers. This information may only be disseminated upon request to regulatory governmental bodies for emissions permitting purposes or to specifying organizations as submittal data when expressly required by project specifications, and shall remain confidential and not open to public viewing. This information is not intended for compilation or sales purposes and may not be used as such, nor may it be reproduced without the expressed written permission of Generac Power Systems, Inc.. The data provided shall not be meant to include information made public by Generac.

Generator Model:	**SD/MD2000**	EPA Certificate Number:	**RMVXL65.4BBA-006**
kW_e Rating:	**2,000**	CARB Certificate Number:	**Not Applicable**
Engine Family:	**RMVXL65.4BBA**	SCAQMD CEP Number:	**476471**
Engine Model:	**S16R-Y2PTAW2-1**	Emission Standard Category:	**Tier 2**
Rated Engine Power (BHP)*:	**2,923**	Certification Type:	**Stationary Emergency CI (40 CFR Part 60 Subpart IIII)**
Fuel Consumption (gal/hr)*:	**126.6**		
Aspiration:	**Turbocharged/Aftercooler**		
Rated RPM:	**1,800**		

*Engine power are declared by the engine manufacturer of record and the U.S EPA.

Emissions Based on Engine Power of Specific Engine Model
These Values are Actual Composite Weighted Exhaust Emissions Results Over the EPA 5-Mode Test Cycle

CO	NOx + NMHC	PM	
0.7	**5.97**	**0.15**	Grams/kW-hr
0.5	**4.4**	**0.1**	Grams/bhp-hr

These Values are 100% Load Data Exhaust Emissions Results

CO	NOx + NMHC	PM	
0.762	**5.707**	**0.077**	Grams/kW-hr
0.56	**4.20**	**0.06**	Grams/bhp-hr

- The stated values are actual exhaust emission test measurements obtained from an engine representative of the type described above.
- Values based on 5-Mode testing are official data of record as submitted to regulatory agencies for certification purposes. Testing was conducted in accordance with prevailing EPA protocol, which is typically accepted by SCAQMD and other regional authorities.
- No emissions values provided above are to be construed as guarantees of emission levels for any given Generac generator unit.
- Generac Power Systems, Inc. reserves the right to revise this information without prior notice.
- Consult state and local regulatory agencies for specific permitting requirements.
- The emission performance data supplied by the equipment manufacturer is only one element required toward completion of the permitting and installation process. State and local regulations may vary on a case-by-case basis and local agencies must be consulted by the permit application/equipment owner prior to equipment purchase or installation. The data supplied herein by Generac Power Systems Inc. cannot be construed as a guarantee of installability of the generating set.

Part No. A0005031810
Rev. B 10/31/23

APPENDIX G

CONSOLIDATED COMPLIANCE STRATEGY

Consolidated Compliance Strategy

Emissions are a function of fuel use and raw materials processed.

All emissions associated with EPS bead use are ducted to discreet emission points. UMR manufacturing processes contribution to VOC emissions will be calculated on the basis of the quantity of raw EPS bead stock used annually, the VOC content of the beads according to manufacturer's safety or material data documents, and capture/control applied to the various process steps. Records will be maintained to track raw EPS bead use by weight on a 12-month rolling total. The UMR VOC emissions calculation shown in Appendix C of this report is an example of the calculation using estimated 2027 material usage and VOC control with the RTO.

XPS foam and adhesive use generate point source and fugitive VOC emissions. SSLP manufacturing processes contribution to VOC emissions from XPS foam will be calculated on the basis of the quantity of XPS foam roll stock used annually, the VOC content of the XPS foam according to manufacturer's safety or material data documents, and capture/control applied to the various process steps. Records will be maintained to track XPS foam roll use by weight on a 12-month rolling total. The SSLP VOC emissions calculation from XPS foam shown in Appendix C of this report is an example of the calculation using estimated 2027 material usage and control with the RTO.

The method of estimating stack and ambient fugitive VOC and MDI emissions in the SSLP fabrication areas derived from XPS foam and adhesive was described in the SSLP VOC PTE Revision Report. The quantity of adhesive use is proportional to the quantity of Kerdi-Board product produced. The stack and ambient concentrations measured in 2023 by KAS Environmental Science &Engineering and Alliance Technical Group (test results reports attached to the SSLP VOC PTE Revision Report) will be used with the production volumes to estimate annual VOC and MDI emissions associated with adhesives. The stack and ambient fugitive VOC and MDI calculations for SSLP and KB4 shown in Appendix C of this report are examples of the calculations using estimated 2027 material usage. Records will be maintained to track adhesive use by weight on a 12-month rolling total basis as a means of cross checking the emissions estimate.

Particulate emission points include the SSLP ERBO and KB4 central dust handler stacks and combustion stacks, although these units normally discharge inside the building as an energy conservation practice. Small boilers and the Thin Set operation are exempt. Compliance with the particulate emissions limit will be demonstrated by stack testing if required by NYSDEC.

Small boilers and space heaters are exempt, therefore emissions tracking based on fuel use is not required. However, natural gas use for all of the boilers and space heaters is metered in aggregate

and the emissions from all sources burning natural gas including the RTO will be reflected in the overall combustion emissions reporting with respect to VOC emissions. VOC emissions derived from natural gas combustion will be calculated on the basis of actual (metered) natural gas use tracked by the 12-month rolling total using AP-42 emission factors.

All of the diesel and propane combustion sources are exempt. VOC from these sources have been shown to be relatively trivial. VOC emissions from these sources will not be included in the annual summation.

RTO Operation and Compliance Assurance Monitoring Plan

VOC emissions depend on proper and nominal operation of the RTO in order to achieve the destruction efficiency claimed by the manufacturer.

Compliance assurance monitoring (CAM) defined by and required under 40 CFR 64 for operation of the RTO will follow the approach presented in the *Technical Guidance Document: Compliance Assurance Monitoring, Appendix B.6 Thermal Oxidizers* published by EPA (appendix revision January 2005). The CAM illustration No. 6c Thermal Oxidizer for VOC Control from Appendix B.6 of the Technical Guidance document is attached in this appendix.

A destruction efficiency test will be conducted at commissioning if required by DEC. The ongoing compliance for the RTO operation will be documented by recordkeeping of operating hours and outlet temperature of the combustion chamber, and periodic inspection of the RTO. The temperature measurement device will be specified by the RTO manufacturer or by UMR staff in consultation with the RTO manufacturer and will be consistent with the guidance on Temperature Measurement Systems found in Section 4.2 of the CAM Technical Guidance. Temperature will be monitored and recorded hourly. RTO inspections will be conducted annually.

Emergency Generator and Fire Pump Engine Operation and Compliance Plan

The following table lists emergency generators and fire pumps in service or planned at various locations in the facility.

Unit #	Building/Location	Purpose	Engine	Year Mfg	Mfr	Displacement	Engine Model
Spark Ignition (Subpart JJJJ)							
3	Fire Pump House	Emerg. Gen	76 HP Nat Gas	2022	Generac	4.5 litre 4 cyl	SG035
5	Thinset Bldg 147	Emerg. Gen	128 HP Nat Gas	2016	Generac	8.1 litre 4 cyl	SG080
7	Office Bldg 10	Emerg. Gen	454 HP Nat Gas	2008	Generac	13.3 Litre 6 cyl	MG250 G088486
Compression Ignition (Subpart IIII)							
1	Fire Pump House	Fire Pump	575 HP Diesel	2022	CAT	18.1 litre 6 cyl	C18
2	Fire Pump House	Fire Pump	575 HP Diesel	2022	CAT	18.1 litre 6 cyl	C18
4	UMR/SSLP Bldg 26	Emerg. Gen	400 HP Diesel	2003	VolvoPenta	9.6 litre 6 cyl	TAD 1031 GE
6	Lab Bldg 109	Emerg. Gen	389 HP Diesel	2021	FPT	8.7 litre 6 cyl	F2CE9685A*E
8	Warehouse Bldg 3	Emerg. Gen	874 HP Diesel	2017	Perkins	18.1 litre 6 cyl	2806C-E18TAG3
KB4-1	Extrustion Electrical Room	Emerg. Gen	2923 HP Diesel	purchase date	Mitsubishi	64.5 litre 16 cyl	S16R-Y2PTAW2-1
KB4-2	Extrustion Electrical Room	Emerg. Gen	1484 HP Diesel	purchase date	Perkins	30.6 litre 8 cyl	5008C-E30TAGS
KB4-3	Extrustion Electrical Room	Emerg. Gen	1881 HP Diesel	purchase date	Mitsubishi	49.0 liter 12 cyl	S12R-Y2PTAW-1
KB4-4	Laminating Electric Room	Emerg. Gen	1881 HP Diesel	purchase date	Mitsubishi	49.0 liter 12 cyl	S12R-Y2PTAW-1
KB4-5	Boiler Electric Room	Emerg. Gen	2923 HP Diesel	purchase date	Mitsubishi	64.5 litre 16 cyl	S16R-Y2PTAW2-1

The three natural gas fired emergency generator engines are subject to 40 CFR 60 Subpart JJJJ regulations for spark ignition engines. The diesel fired emergency generator and fire pump engines, except for Unit #4 (model year 2003 400 hp emergency generator engine), are subject to 40 CFR 60 Subpart IIII for compression ignition engines.

These engines will no be used for any purposes other than emergency operations, and routine maintenance and testing as permitted in 60.4243(d) and 60.4211(f).

Applicable compliance requirements for spark ignition engines (Subpart JJJJ):

- purchase certified engines (60.4243(b)(1))
- operate engines in accordance with manufacturer's written instructions (applicable regulation 60.4243(b)(1) refers back to 60.4243(a)(1))
- keep records of maintenance (applicable regulation 60.4243(b)(1) refers back to 60.4243(a)(1), 60.4245(a)(2))
- no performance testing required (applicable regulation 60.4243(b)(1) refers back to 60.4243(a)(1))
- limit operation for maintenance and testing to 100 hours per year (60.4243(d))
- keep manufacturer documentation showing engines are certified to meet emissions standards (60.4245(a)(3))

Applicable compliance requirements for compression ignition engines (Subpart IIII) except Unit #4:

- fuel must meet non-road diesel requirements of 40 CFR 1090.305 (60.4207(b))
- operate engines in accordance with manufacturer's written instructions (60.4211(a)(1))
- change only those emission related settings that are permitted by the manufacturer (60.4211(a)(1))

- install and configure engines according to manufacturer's emission-related specifications (60.4211(c))
- limit operation for maintenance and testing to 100 hours per year (60.4211(f))
- no initial notification required (60.4214(b))
- recordkeeping applies only to emergency engines that do not meet non-emergency engine standards (60.4214(b))
- if engine is equipped with a diesel particulate filter, maintain records of any corrective action taken after the backpressure monitor indicates the high backpressure limit is approached (60.4214(c))

Record Keeping

All control equipment shall be operated in a manner consistent with manufacturer's specifications.

The following Compliance Records will be maintained for five years:

a) Monthly Material Usage Records (XPS Resin, Blowing Agents, Adhesives)
b) Control Equipment Operation and Maintenance Logs (monthly logs including notation of control equipment breakdown, malfunction, repair, maintenance or any other deviations from design parameters)
c) Purchase orders, invoices and other documents to support the information in the monthly log.
d) Other process parameters to be monitored as required by the Department
e) Annual emission estimate

Documentation shall be maintained at the facility of the equipment used to fabricate UMR and Kerdi-Board products. Documentation shall include equipment specifications and the maximum processing rate of the equipment.

The following documentation for dust control equipment will also be maintained on file at the facility:

- Maximum design or rated capacity
- Inlet and outlet temperatures
- concentrations of each pollutant controlled
- baghouse data (design, cleaning method, fabric material, flow rate, air/cloth ratio)
- other design data as appropriate
- all emission source test information

Annual Certification

The material use tracking records, temperature monitoring and inspection records will be compiled and certified annually and submitted to NYSDEC in accordance with the agency's standards for recordkeeping and reporting under Title V.

A responsible official shall verify annually that required records have been maintained demonstrating that the requirements have been met and affirming that equipment has been operated in accordance with the applicable requirements.

Plan Revision and Updates

This compliance plan will be reviewed annually and updated or revised as necessary to reflect changes to the facility equipment inventory or operating practices to ensure continuing compliance with applicable regulations.

B.6 THERMAL OXIDIZERS [1,2,3,4,13,14]

B.6.1 Background

Thermal oxidizers or thermal incinerators are combustion systems that control VOC, CO, and volatile HAP emissions by combusting them to carbon dioxide (CO_2) and water. The design of an incineration system is dependent on the pollutant concentration in the waste gas stream, type of pollutant, presence of other gases, level of oxygen, stability of processes vented to the system, and degree of control required. Important design factors include temperature (a temperature high enough to ignite the organic constituents in the waste gas stream), residence time (sufficient time for the combustion reaction to occur), and turbulence or mixing of combustion air with the waste gas. Time, temperature, degree of mixing, and sufficient oxygen concentration govern the completeness of the combustion reaction. Of these, only temperature and oxygen concentration can be significantly controlled after construction. Residence time and mixing are fixed by oxidizer design, and flow rate can be controlled only over a limited range.

The rate at which VOC compounds, volatile HAP, and CO are oxidized is greatly affected by temperature; the higher the temperature, the faster the oxidation reaction proceeds. Because inlet gas concentrations are well below the lower explosive limit (LEL) to prevent pre-ignition explosions in ducting the stream from the process to the oxidizer, the gas must be heated with auxiliary fuel above the autoignition temperature. Thermal destruction of most organics occurs at combustion temperatures between 800°F and 2000°F. Residence time is equal to the oxidizer chamber volume divided by the total actual flow rate of flue gases (waste gas flow, added air, and products of combustion). A residence time of 0.2 to 2.0 seconds, a length-to-diameter ratio of 2 to 3 for the chamber dimensions, and an average gas velocity of 10 to 50 feet per second are common. Thorough mixing is necessary to ensure that all waste and fuel come in contact with oxygen. Because complete mixing generally is not achieved, excess air/oxygen is added (above stoichiometric or theoretical amount) to ensure complete combustion.

Normal operation of a thermal oxidizer should include a fixed outlet temperature or an outlet temperature above a minimum level. A variety of operating parameters that may be used to indicate good operation include: inlet and outlet VOC concentration, outlet combustion temperature, auxiliary fuel input, fuel pressure (magnehelic gauge), fan current (ammeter), outlet CO concentration, and outlet O_2 concentration.

B.6.2 Indicators of Thermal Oxidizer Performance

For VOC control, the primary indicators of thermal oxidizer performance are the outlet VOC concentration and outlet or combustion chamber temperature. Other indicators of thermal oxidizer performance include outlet CO concentration, exhaust gas flow rate, fan current, outlet CO_2 concentration, outlet O_2 concentration, and auxiliary fuel line pressure. For CO control, the indicators of performance are the same as for VOC control, with the exception of outlet VOC and CO_2 concentrations, which would not be monitored for a CO emission limit. Each of these indicators is described below. Table B-6A lists these indicators and illustrates potential

monitoring options for thermal oxidizers for VOC control, and Table B-6B lists the indicators and monitoring options for CO control by thermal oxidation.

Outlet VOC concentration. The most direct single indicator of the performance of a thermal oxidizer is the VOC concentration at the outlet of the unit.

Outlet combustion temperature. The outlet temperature of the combustion chamber provides a good indication of thermal oxidizer performance. As temperature increases, control efficiency also increases.

Outlet CO concentration. When VOC is the primary pollutant to be controlled, the CO concentration at the outlet of a thermal oxidizer provides an indication of combustion efficiency. The presence of CO indicates incomplete combustion. An increase in CO levels indicates a decrease in combustion efficiency. When CO is the primary pollutant, outlet CO concentration is a direct indicator of performance.

Exhaust gas flow rate. Thermal oxidizer control efficiency is primarily a function of combustion chamber temperature and residence time, and residence time is a function of exhaust gas flow rate. Consequently, as flow rate increases, residence time decreases and control efficiency may also decrease. For processes with fairly constant flow rates or tested at maximum flow, exhaust gas flow rate is not as good an indicator of performance as is outlet combustion temperature because temperature has a much greater effect on control efficiency than small variations in flow rates.

Fan current. Changes in fan current generally correspond to changes in exhaust gas flow rate. Consequently, fan current can be a surrogate for exhaust gas flow rate. An increase in fan current would signify an increase in flow rate and a decrease in residence time.

Outlet O_2 or CO_2 concentration. Outlet O_2 or CO_2 concentration by itself does not provide an indication of thermal oxidizer performance. However, monitoring the O_2 or CO_2 level provides an indication of the excess air rate and may be used to normalize the measured VOC concentration to a standard O_2 or CO_2 level. For emission limits that specify VOC concentrations corrected to a specified percent O_2, monitoring both the VOC and O_2 concentrations would be required to determine compliance.

Inspections. Inspections of the oxidizer can ensure proper operation of the device. These inspections may include frequent visual checks of the flame and burner while in operation and annual inspections of the burner assemblies, blowers, fans, dampers, refractory lining, oxidizer shell, fuel lines, and ductwork.

B.6.3 Illustrations

The following illustrations present examples of compliance assurance monitoring for thermal oxidizers:

For CO Control:

6a: Monitoring combustion temperature and annual burner inspection.
6b: Monitoring CO concentration.

For VOC Control:

6c: Monitoring combustion temperature and annual burner inspection.
6d: Monitoring combustion temperature, annual burner inspection, and exhaust gas flow rate.
6e: Monitoring combustion temperature and CO concentration.
6f: Monitoring VOC concentration (CEMS).

TABLE B-6A. SUMMARY OF PERFORMANCE INDICATORS FOR THERMAL OXIDIZERS FOR VOC CONTROL

Parameters	Performance indication	Approach No.	1	2	3	4	5
		Illustration No.	6c	6d	6e		6f
		Example CAM Submittals	A1a		A1b		
		Comment	✔	✔		✔	✔
Primary Indicators of Performance							
Outlet VOC concentration	Direct measure of outlet concentration. Most direct single indicator of oxidizer performance; for limits that are corrected to an O_2 content, must be combined with O_2 monitoring to determine compliance.						X
Outlet combustion temperature	Control efficiency is largely a function of temperature. Control efficiency increases with increasing outlet combustion temperature.		X	X	X	X	
Other Performance Indicators							
Outlet CO concentration	Indicator of combustion efficiency. Presence of CO indicates incomplete combustion.				X		
Exhaust gas flow rate	Determines residence time within oxidizer. Increase in flow rate generally indicates a decrease in residence time, which may affect control efficiency.			X			
Inspections	Visual check of burner and flame can indicate if burner is operating properly. Annual inspection of the burner and oxidizer can ensure proper operation.		X	X			

Comments:

- Approach No. 1 is required by 40 CFR 63, subpart NNN (Wool Fiberglass).
- Approach No. 4 is specified by several NSPS and NESHAP, including 40 CFR 63, subparts G (HON), O (Commercial Ethylene Oxide Sterilization), R (Gasoline Distribution), U (Polymers and Resins I), Y (Marine Vessel), CC (Petroleum Refiners), DD (Offsite Waste and Recovery), EE (Magnetic Tape), GG (Aerospace), HH (Oil and Natural Gas), JJ (Wood Furniture), KK (Printing and Publishing), JJJ (Polymers and Resins IV), MMM (Pesticides), and OOO (Polymers and Resins III).
- Approach No. 5 is specified as an alternative monitoring approach by 40 CFR 63, subparts G (HON), S (Pulp and Paper), Y (Marine Vessel), DD (Offsite Waste and Recovery), EE (Magnetic Tape), HH (Oil and Natural Gas), and MMM (Pesticides).

TABLE B-6B. SUMMARY OF PERFORMANCE INDICATORS FOR THERMAL OXIDIZERS FOR CO CONTROL

Parameters	Performance indication	Approach No. / Illustration No. / Example CAM Submittals / Comment	1 / 6a /	2 / 6b /
Primary Indicators of Performance				
Outlet CO concentration	Direct measure of outlet concentration. Most direct single indicator of oxidizer performance for CO.			X
Outlet combustion temperature	Control efficiency is largely a function of temperature. Control efficiency increases with increasing combustion chamber temperature.		X	
Other Performance Indicators				
Exhaust gas flow rate	Determines residence time within oxidizer. Increase in flow rate generally indicates a decrease in residence time, which may affect control efficiency.			
Inspections	Visual check of burner and flame can indicate if burner is operating properly. Annual inspection of the burner and oxidizer can ensure long-term proper operation.		X	
Comments: None.				

CAM ILLUSTRATION
No. 6a. THERMAL OXIDIZER FOR CO CONTROL

1. APPLICABILITY

1.1 Control Technology: Thermal oxidizer [021]; also applicable to direct flame afterburners with or without heat exchangers [021, 022], boilers, or similar devices for controlling CO emissions by combustion

1.2 Pollutants
Primary: Carbon monoxide (CO)
Other: Volatile organic compounds (VOCs)

1.3 Process/Emissions units: Fluid catalytic cracking unit (FCCU) catalyst regenerators; petroleum refining

2. MONITORING APPROACH DESCRIPTION

2.1 Parameters to be Monitored: Combustion chamber temperature and annual burner inspection.

2.2 Rationale for Monitoring Approach
- Combustion chamber temperature: Low temperature indicates potential for insufficient destruction of CO.
- Annual burner inspection: Maintain proper burner operation and efficiency.

2.3 Monitoring Location
- Combustion chamber temperature: Outlet of combustion chamber.
- Annual burner inspection: At the burner.

2.4 Analytical Devices Required
- Combustion chamber temperature: Thermocouples, RTDs, or alternative methods/instrumentation as appropriate for specific gas stream; see section 4.2 (Temperature) for additional information on devices.
- Annual burner inspection: None.

2.5 Data Acquisition and Measurement System Operation
- Frequency of measurement:
  - Combustion chamber temperature: Hourly, or recorded continuously on strip chart or data acquisition system.
  - Annual burner inspection: Annually.
- Reporting units:
  - Combustion chamber temperature: Degrees Fahrenheit or Celsius (°F, °C).
  - Annual burner inspection: None
- Recording process:
  - Combustion chamber temperature: Operators log data manually, or recorded automatically on strip chart or data acquisition system.
  - Annual burner inspection: Operators log data manually

2.6 Data Requirements
- Baseline combustion chamber temperature measurements concurrent with emission test.

- Historical plant records on combustion chamber temperature measurements and burner inspection.
- Manufacturer's data and recommended operating ranges.

2.7 Specific QA/QC Procedures: Calibrate, maintain, and operate thermocouples using procedures that take into account manufacturer's specifications.

3. COMMENTS

3.1 Data Collection Frequency: For large emission units, a measurement frequency of once per hour would not be adequate; collection of four or more data points each hour is required. (See Section 3.3.1.2.)

CAM ILLUSTRATION
No. 6b. THERMAL OXIDIZER FOR CO CONTROL

1. APPLICABILITY

1.1 Control Technology: Thermal oxidizer [021]; also applicable to direct flame afterburners with or without heat exchangers [021, 022], boilers, or similar devices for controlling CO emissions by combustion

1.2 Pollutants
Primary: Carbon monoxide (CO)
Other: Volatile organic compounds (VOCs)

1.3 Process/Emissions units: Fluid catalytic cracking unit (FCCU) catalyst regenerators; petroleum refining

2. MONITORING APPROACH DESCRIPTION

2.1 Indicators Monitored: Outlet CO concentration.

2.2 Rationale for Monitoring Approach: Provides direct indicator of CO emissions.

2.3 Monitoring Location: Combustion chamber outlet.

2.4 Analytical Devices Required: Nondispersive infrared (NDIR) analyzer or other methods or instrumentation.

2.5 Data Acquisition and Measurement System Operation
- Frequency of measurement: Hourly, if read manually; continuously, if CEMS.
- Reporting units: Parts per million by volume (ppm_v), dry basis.
- Recording process: Operators log data manually, or recorded automatically on strip chart or data acquisition system.

2.6 Data Requirements
- Baseline outlet CO concentration measurements concurrent with emissions test.
- Historical plant records outlet CO concentration measurements.

2.7 Specific QA/QC Procedures: Calibrate, maintain, and operate CEMS using procedures that take into account manufacturer's specifications.

3. COMMENTS

3.1 Data Collection Frequency: For large emission units, a measurement frequency of once per hour would not be adequate; collection of four or more data points each hour is required. (See Section 3.3.1.2.)

3.2 Concentration measurements: Outlet CO concentration in terms of ppm can be used as an indicator of control device performance even if the emission standard is a mass emissions standard (i.e., lb/hr); additional information (e.g., flow) to calculate/report emission in units of the standard is not required for CAM; however, such a measurement may be a monitoring requirement of the applicable requirement.

CAM ILLUSTRATION
No. 6c. THERMAL OXIDIZER FOR VOC CONTROL

1. APPLICABILITY

1.1 Control Technology: Thermal oxidizer [021]; also applicable to direct flame afterburners with or without heat exchangers [021, 022], boilers, or similar devices for controlling VOC emissions by combustion

1.2 Pollutants
Primary: Volatile organic compounds (VOCs)
Other: Higher molecular weight organic compounds

1.3 Process/Emissions units: Coating, spraying, printing, polymer manufacturing, distillation units, wastewater treatment units, air oxidation units, petroleum refining, miscellaneous SOCMI units

2. MONITORING APPROACH DESCRIPTION

2.1 Indicators Monitored: Combustion chamber temperature and annual burner inspection.

2.2 Rationale for Monitoring Approach
- Combustion chamber temperature: Proper temperature range is related to good performance.
- Annual burner inspection: Maintain proper burner operation and efficiency.

2.3 Monitoring Location
- Combustion chamber temperature: Outlet of combustion chamber.
- Annual burner inspection: At the burner.

2.4 Analytical Devices Required
- Combustion chamber temperature: Thermocouples, RTDs, or alternative methods/instrumentation as appropriate for specific gas stream; see section 4.2 (Temperature) for additional information on devices.
- Annual burner inspection: None.

2.5 Data Acquisition and Measurement System Operation
- Frequency of measurement:
  - Combustion chamber temperature: Hourly, or recorded continuously on strip chart or data acquisition system.
  - Annual burner inspection: Annually.
- Reporting units:
  - Combustion chamber temperature: Degrees Fahrenheit or Celsius (°F, °C).
  - Annual burner inspection: None.
- Recording process:
  - Combustion chamber temperature: Operators log data manually, or recorded automatically on strip chart or data acquisition system.
  - Annual burner inspection: Operators log data manually.

2.6 Data Requirements
- Baseline combustion chamber temperature measurements concurrent with emissions test.
- Historical plant records on combustion chamber temperature measurements and burner inspection.

2.7 Specific QA/QC Procedures: Calibrate, maintain, and operate instrumentation using procedures that take into account manufacturer's specifications.

3. COMMENTS

3.1 Data Collection Frequency: For large emission units, a measurement frequency of once per hour would not be adequate; collection of four or more data points each hour is required. (See Section 3.3.1.2.)

CAM ILLUSTRATION
No. 6d. THERMAL OXIDIZER FOR VOC CONTROL

1. APPLICABILITY

1.1 Control Technology: Thermal oxidizer [021]; also applicable to direct flame afterburners with or without heat exchangers [021, 022], for controlling VOC emissions by combustion

1.2 Pollutants
Primary: Volatile organic compounds (VOCs)
Other: Higher molecular weight organic compounds

1.3 Process/Emissions units: Coating, spraying, printing

2. MONITORING APPROACH DESCRIPTION

2.1 Indicators Monitored: Combustion chamber temperature, annual burner inspection, and exhaust gas flow rate.

2.2 Rationale for Monitoring Approach
- Combustion chamber temperature: Proper temperature range can be related to good performance.
- Exhaust gas flow rate: Maintaining proper flow through the entire control system is important for maintaining capture efficiency.
- Annual burner inspection: Maintain proper burner operation and efficiency.

2.3 Monitoring Location
- Combustion chamber temperature: Outlet of combustion chamber.
- Exhaust gas flow rate: Oxidizer outlet or fan instrumentation.

2.4 Analytical Devices Required
- Combustion chamber temperature: Thermocouples, RTDs, or alternative methods/instrumentation as appropriate for specific gas stream.
- Exhaust gas flow rate: Differential pressure flow device, fan motor ammeter, or other type of device that measures gas velocity or flow rate.

2.5 Data Acquisition and Measurement System Operation:
- Frequency of measurement: Hourly, or recorded continuously on strip chart or digital data acquisition system.
- Reporting units:
  – Combustion chamber temperature: Degrees Fahrenheit or Celsius (°F, °C).
  – Exhaust gas flow rate: Cubic feet per minute (ft^3/min); amps if fan motor current.
- Recording process: Operators take readings and manually log data, or recorded automatically on strip chart or digital data acquisition system.

2.6 Data Requirements
- Baseline combustion chamber temperature measurements, exhaust gas flow rate measurements, and outlet VOC concentration or destruction efficiency measurements concurrent with emission test; or
- Historical plant records on combustion chamber temperature and exhaust gas flow rates.

2.7 Specific QA/QC Procedures

- Calibrate, maintain and operate instrumentation using procedures that take into account manufacturer's specifications.

3. COMMENTS

3.1 Data Collection Frequency: For large emission units, collection of four or more data points each hour is required. (See Section 3.3.1.2.)

CAM ILLUSTRATION
No. 6e. THERMAL OXIDIZER FOR VOC CONTROL

1. APPLICABILITY

1.1 Control Technology: Thermal oxidizer [021; also applicable to direct flame afterburners with or without heat exchangers [021, 022], boilers, or similar devices for controlling VOC emissions by combustion

1.2 Pollutants
Primary: Volatile organic compounds (VOCs)
Other: High molecular weight organic compounds

1.3 Process/Emissions Unit: Coating, spraying, printing, polymer manufacturing, distillation units, wastewater treatment units, air oxidation units, petroleum refining, miscellaneous SOCMI units

2. MONITORING APPROACH DESCRIPTION

2.1 Parameters to be Monitored: Combustion chamber temperature and outlet CO concentration.

2.2 Rationale for Monitoring Approach
- Combustion chamber temperature: Proper temperature range is related to good performance.
- Outlet CO concentration: CO is a product of incomplete combustion and is an indicator of combustion efficiency.

2.3 Monitoring Location
- Combustion chamber temperature: Outlet of combustion chamber.
- Outlet CO concentration: Outlet to oxidizer.

2.4 Analytical Devices Required
- Combustion chamber temperature: Thermocouples, RTDs, or alternative methods/instrumentation as appropriate for specific gas stream; see section 4.2 (Temperature) for additional information on devices.
- Outlet CO concentration: Nondispersive infrared (NDIR) analyzer calibrated to manufacturer's specifications, or other methods or instrumentation.

2.5 Data Acquisition and Measurement System Operation
- Frequency of measurement: Hourly if read manually, or continuously recorded on strip chart or data acquisition system.
- Reporting units:
  – Combustion chamber temperature: Degrees Fahrenheit or Celsius (°F, °C).
  – Outlet CO concentration: parts per million by volume (ppmv), dry basis.
- Recording process: Operators log data manually, or recorded automatically on strip chart or data acquisition system.

2.6 Data Requirements
- Baseline combustion chamber temperature measurements and outlet CO concentration measurements concurrent with emission test.
- Historical plant records on combustion chamber temperature and outlet CO concentrations.

2.7 Specific QA/QC Procedures
- Calibrate, maintain and operate instrumentation using procedures that take into account manufacturer's specifications.

3. COMMENTS

3.1 Data Collection Frequency: For large emission units, a measurement frequency of once per hour would not be adequate; collection of four or more data points each hour is required. (See Section 3.3.1.2.)

CAM ILLUSTRATION
No. 6f. THERMAL OXIDIZER FOR VOC CONTROL

1. APPLICABILITY

1.1 Control Technology: Thermal oxidizer [021]; also applicable to direct flame afterburners with or without heat exchangers [021, 022], boilers, or similar devices for controlling VOC emissions by combustion

1.2 Pollutants
Primary: Volatile organic compounds (VOCs)
Other: Higher molecular weight organic compounds

1.3 Process/Emissions units: Coating, spraying, printing, chemical manufacturing

2. MONITORING APPROACH DESCRIPTION

2.1 Indicators Monitored: Outlet THC concentration.

2.2 Rationale for Monitoring Approach: Direct measure of VOC concentration.

2.3 Monitoring Location: At outlet stack of thermal oxidizer.

2.4 Analytical Devices Required: THC analyzer.

2.5 Data Acquisition and Measurement System Operation
- Frequency of measurement: Continuous.
- Reporting units: Parts per million by volume (ppmv).
- Recording process: Automatically on data acquisition system.

2.6 Data Requirements
- Baseline outlet THC concentration measurements concurrent with emissions test.

2.7 Specific QA/QC Procedures: Calibrate, maintain, and operate CEMS using procedures that take into account manufacturer's specifications. QA/QC should, as a minimum, include: initial calibration, periodic calibration and drift checks, routine maintenance, and inventory of spare parts.

3. COMMENTS

3.1 This illustration presents a general monitoring approach for using a continuous emissions analyzer as an indicator of performance; the indicator range must be selected and QA/QC procedures appropriate for the application must be implemented. Note that § 64.3(d)(2) of the CAM rule indicates that CEMS that satisfy any of the following monitoring requirements are deemed to satisfy the general design and performance criteria for CAM and further justification for their use are not required:

§ 51.214 and Appendix P of 40 CFR 51;
§ 60.13 and Appendix B of 40 CFR 60;
§ 63.8 and applicable performance specifications of the applicable subpart of 40 CFR 63;
40 CFR 75;

subpart H and Appendix IX of 40 CFR 266; or
comparable requirements established by the permitting authority.
For example, this would include performance specifications 8 and 9 of 40 CFR 60, Appendix A.

3.2 Furthermore, indicator ranges need not be specified for CEMS that provide data in units of the applicable emissions standard because the level of the standard is the level at which an excess emissions occurs. The use of CEMS that provide results in units of the standard for the pollutant of interest and meet the criteria presented in § 64.3(d)(2) is presumptively acceptable CAM. (See sections 2.2 and 3.4).