

AIR PERMIT BY RULE REGISTRATION PERMIT NO. TBD

CN604843086

RN TBD

Prepared for:

SAT14

CyrusOne, LLC

Prepared By:

**Ramboll Americas Engineering Solutions, Inc.
Houston, TX**

Date

August 2026

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1. INTRODUCTION

CyrusOne, LLC (CyrusOne) is submitting this air Permit by Rule (PBR) registration to authorize emissions from 174 new diesel-fired emergency backup generators at a proposed new data center campus. The proposed SAT14 facility ("the site", "the facility") is located at 3311 US Highway 90 W, Castroville, Medina County, Texas. This submittal is an initial air permit application for the new facility and the required Core Data Form is attached.

CyrusOne will own and operate the 174 emergency generators (EPNs shown in Table 1a) at the proposed SAT14 facility to provide electricity in the event of an emergency or power loss from the utility provider. This includes 6 1, 1.25, or 1.5 Megawatt (MW) house generators and 168 2.25 MW critical generators. All generators will be certified to meet USEPA Tier 2 emissions standards.

The house generators will be any of the following makes and models:

- 1 MW MTU 16V2000G86S DS1000
- 1.25 MW MTU 18V2000G76S DS1250
- 1.5 MW Cummins QSK38-G18 C1500DE

The critical generators will be any of the following makes and models:

- 2.25 MW Cummins QSK60 DQKAN
- 2.25 MW MTU 16V4000 DS2250
- 2.25 MW Caterpillar 3516C

The 168 critical generators will have the ability to operate with or without selective catalytic reduction (SCR) controls. Due to potential delays in equipment procurement, the emission calculations assume a worst-case operating scenario where these generators are uncontrolled. Along with the generators are 174 storage belly tanks. The generators will be operated periodically for short periods of time for maintenance and testing to ensure they will operate properly if needed during an emergency. Emissions associated with this PBR registration are authorized under 30 Texas Administrative Code (TAC) §106.511, which reads:

Internal combustion engine and gas turbine driven compressors, electric generator sets, and water pumps, used only for portable, emergency, and/or standby services are permitted by rule, provided that the maximum annual operating hours shall not exceed 10% of the normal annual operating schedule of the primary equipment; and all electric motors.

Total potential emissions from this application will be 3.37 tons per year (tpy) particulate matter (PM), 3.37 tpy PM less than 10 microns in diameter (PM₁₀), 3.37 tpy PM less than 2.5 microns in diameter (PM_{2.5}), 5.94 tpy volatile organic compounds (VOC), 28.54 tpy carbon monoxide (CO), 99.56 tpy oxides of nitrogen (NO_x), 0.08 tpy sulfur dioxide (SO₂), and 0.08 tpy of hazardous air pollutants (HAPs). Under these emission limitations, the facility will remain a minor source in relation to Federal New Source Review (NSR) and Title V Programs. Emission calculations for the emergency generators are included in Appendix A.

Activities included in this registration meet the general requirements for permitting by rule contained in 30 TAC §106.4, as well as the specific requirements of 30 TAC §106.511. The registration format corresponds to the Texas Commission on Environmental Quality (TCEQ) Form PI-7 CERT (Certification

and Registration for Permits by Rule) and demonstrates how the general and specific PBR requirements are met.

2. TCEQ FORM PI-7 CERT

Certification and Registration for Permits by Rule
Form PI-7-CERT
Page 1
Texas Commission on Environmental Quality

I. Registrant Information
A. Company or Other Legal Customer Name: CyrusOne, LLC
Company Official Contact Information (☐ Mr. ☒ Mrs. ☐ Ms. ☐ Other _____)
Name: Laura Cottrell
Title: Director of Environmental Compliance
Mailing Address: 2850 N Harwood Street, Suite 2200
City: Dallas
State: TX
ZIP Code: 75201
Phone: 603-793-0534
Fax:
Email Address: lcottrell@cyrusone.com
<i>All PBR registration responses will be sent via email.</i>
A. Technical Contact Information (☒ Mr. ☐ Mrs. ☐ Ms. ☐ Other _____)
Name: David Henderson
Title: STX Regional Operations Director
Company Name: CyrusOne, LLC
Mailing Address: 9999 Westover Hills Blvd
City: San Antonio
State: TX
ZIP Code: 78251
Phone Number: 361-532-9996
Fax Number:
Email Address: dhenderson@cyrusone.com

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II. Facility and Site Information
A. Name and Type of Facility
Facility Name: SAT14
Facility Type: ☒ Permanent ☐ Temporary
For portable units, please provide the serial number of the equipment being authorized below.
Serial No(s):
B. Facility Location Information
Street Address: 3311 Us Highway 90 W
If there is no street address, provide written driving directions to the site and provide the closest city or town, county, and ZIP code for the site (attach description if additional space is needed).
City: Castroville
County: Medina
ZIP Code: 78009
C. TCEQ Core Data Form
Is the Core Data Form (TCEQ Form Number 10400) attached? ☒ YES ☐ NO
If "NO," provide customer reference number (CN) and regulated entity number (RN) below.
Customer Reference Number (CN): 604843086
Regulated Entity Number (RN): TBD
D. TCEQ Account Identification Number (if known):
E. Type of Action
☒ Initial Application ☐ Change to Registration
For Change to Registration provide the Registration Number:
F. PBR number(s) claimed under 30 TAC Chapter 106
(List all the individual rule number(s) that are being claimed.)
106.511
106.
106.
106.

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II. Facility and Site Information <i>(continued)</i>
G. Historical Standard Exemption or PBR
Are you claiming a historical standard exemption or PBR? ☐ YES ☒ NO
If "YES," enter rule number(s) and associated effective date in the spaces provided below.
Rule Number: Effective Date:
Rule Number: Effective Date:
H. Previous Standard Exemption or PBR Registration Number
Is this authorization for a change to an existing facility previously authorized under a standard exemption or PBR? ☐ YES ☒ NO
If "YES," enter previous standard exemption number(s) and PBR registration number(s) and associated effective dates in the spaces provided below.
Standard Exemption and PBR Registration Number:
Effective Date:
I. Other Facilities at this Site Authorized by Standard Exemption, PBR, or Standard Permit
Are there any other facilities at this site that are authorized by an Air Standard Exemption, PBR, or Standard Permit? ☐ YES ☒ NO
If "YES," enter standard exemption number(s), PBR registration number(s), and Standard Permit registration number(s), and associated effective date in the spaces provided below.
Standard Exemption, PBR Registration, and Standard Permit Registration Number(s):
Effective Date:
Standard Exemption, PBR Registration, and Standard Permit Registration Number(s):
Effective Date:
Standard Exemption, PBR Registration, and Standard Permit Registration Number(s):
Effective Date:
J. Other Air Preconstruction Permits
Are there any other air preconstruction permits at this site? ☐ YES ☒ NO
If "YES," enter permit number(s) in the spaces provided below.
K. Affected Air Preconstruction Permits
Does the PBR being claimed directly affect any permitted facility? ☐ YES ☒ NO

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II. Facility and Site Information <i>(continued)</i>
If "YES," enter the permit number(s) in the spaces provided below.
L. Federal Operating Permit (FOP) Requirements (30 TAC Chapter 122 Applicability)
1. Is this facility located at a site that is required to obtain an FOP pursuant to 30 TAC Chapter 122? ☐ YES ☒ NO ☐ To Be Determined
If the site currently has an existing FOP, enter the permit number:
Check the requirements of 30 TAC Chapter 122 that will be triggered if this certification is accepted. <i>(check all that apply)</i>
☐ Initial Application for a FOP ☐ Significant Revision for an SOP ☐ Minor Revision for an SOP
☐ Operational Flexibility/Off Permit Notification for an SOP ☐ Revision for a GOP
☐ To be Determined ☒ None
2. Identify the type(s) of FOP issued and/or FOP application(s) submitted/pending for the site. <i>(check all that apply)</i>
☐ SOP ☐ GOP ☐ GOP application/revision (submitted or under APD review)
☒ N/A ☐ SOP application/revision (submitted or under APD review)
III. Fee Information <i>(See Section VII. for address to send fee or go to www.tceq.texas.gov/epay to pay online.)</i>
A. Fee Requirements
Is a fee required per Title 30 TAC § 106.50? ☒ YES ☐ NO
If "NO," specify the exception. There are three exceptions to paying a PBR fee. <i>(check all that apply)</i>
1. Registration is solely to establish a federally enforceable emission limit. ☐
2. Registration is within six months of an initial PBR review, and it is addressing deficiencies, administrative changes, or other allowed changes. ☐
3. Registration is for a remediation project (30 TAC § 106.533). ☐
B. Fee Amount
1. A \$100 fee is required if <i>any</i> of the answers in III.B.1 are "YES."
This business has less than 100 employees. ☐ YES ☒ NO
This business has less than \$6 million dollars in annual gross receipts. ☐ YES ☒ NO
This registration is submitted by a governmental entity with a population of less than 10,000. ☐ YES ☒ NO
This registration is submitted by a non-profit organization. ☐ YES ☒ NO

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III. Fee Information (See Section VII. for address to send fee or go to www.tceq.texas.gov/epay to pay online.) (continued)	
2. A \$450 fee is required for all other registrations	
A. Payment Information	
Check/money order/transaction or voucher number:	
Individual or company name on check:	
Fee Amount: \$450.00	
Was the fee paid online? ☒ YES ☐ NO	
IV. Technical Information Including State and Federal Regulatory Requirements Check the appropriate box to indicate what is included in your submittal. NOTE: Any technical or essential information needed to confirm that facilities are meeting the requirements of the PBR must be provided. Not providing key information could result in a deficiency of the project.	
A. PBR requirements (Checklists are optional; however, your review will go faster if you provide applicable checklists.)	
Did you demonstrate that the general requirements in 30 TAC § 106.4 are met? ☒ YES ☐ NO	
Did you demonstrate that the individual requirements of the specific PBR are met? ☒ YES ☐ NO	
B. Confidential Information Included (If confidential information is submitted with this registration, all confidential pages must be properly marked "CONFIDENTIAL.") ☐ YES ☒ NO	
C. Process Flow Diagram: ☒ YES ☐ NO	
D. Process Description: ☒ YES ☐ NO	
E. Maximum Emissions Data and Calculations: ☒ YES ☐ NO	
Note: If the facilities listed in this registration are subject to the Mass Emissions Cap & Trade program under 30 TAC Chapter 101, Subchapter H, Division 3 , the owner/operator of these facilities must possess NO _x allowances equivalent to the actual NO _x emissions from these facilities.	
F. Is this certification being submitted to certify the emissions for the entire site? ☒ YES ☐ NO	
If "NO," include a summary of the specific facilities and emissions being certified.	
G. Table 1(a) (Form 10153) Emission Point Summary: ☒ YES ☐ NO	
H. Distances from Property Line and Nearest Off-Property Structure	
Distance from this facility's emission release point to the nearest property line:	>100 feet
Distance from this facility's emission release point to the nearest off-property structure:	>100 feet

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IV. Technical Information Including State and Federal Regulatory Requirements

Check the appropriate box to indicate what is included in your submittal.

NOTE: Any technical or essential information needed to confirm that facilities are meeting the requirements of the PBR must be provided. Not providing key information could result in a deficiency of the project.

I. Project Status

Has the company implemented the project or waiting on a response from TCEQ? ☐ Implemented ☒ Waiting

J. Projected Start of Construction and Projected Start of Operation Dates:

Projected Start of Construction (provide date): Upon Approval

Projected Start of Operation (provide date): Upon Approval

V. Delinquent Fees

This form **will not be processed** until all delinquent fees and/or penalties owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ is paid in accordance with the Delinquent Fee and Penalty Protocol. For more information regarding Delinquent Fees and Penalties, go to the TCEQ website at: www.tceq.texas.gov/agency/financial/fees/delin/index.html.

VI. Signature For Registration and Certification

The signature below confirms that I have knowledge of the facts included in this application and that these facts are true and correct to the best of my knowledge and belief. I further state that to the best of my knowledge and belief, the project for which this application is made will not in any way violate any provision of the Texas Water Code (TWC), Chapter 7; the Texas Health and Safety Code, Chapter 382, the Texas Clean Air Act (TCAA); the air quality rules of the Texas Commission on Environmental Quality; or any local governmental ordinance or resolution enacted pursuant to the TCAA. I further state that I understand my signature indicates that this application meets all applicable nonattainment, prevention of significant deterioration, or major source of hazardous air pollutant permitting requirements. The signature further signifies awareness that intentionally or knowingly making or causing to be made false material statements or representations in the application is a criminal offense subject to criminal penalties.

Name (printed):

David Henderson

Signature (original signature required)

Date:

3. FORM PI-7 SECTION V: TECHNICAL INFORMATION

This section contains the process description, process flow diagram, emission estimation methodology, TCEQ Table 1(a), and applicable TCEQ checklists.

Appendix A of this registration contains detailed emission calculations.

3.1 Process Description

CyrusOne will own and operate the data center facility, SAT14, which will include the use of emergency generators to provide backup electricity for the facility's operations in the event of an emergency or power loss from the utility provider. The units will also operate periodically to perform maintenance and readiness testing checks. A process flow diagram for operation of the generators is presented in Figure 1.

By submitting this PBR registration, CyrusOne is establishing a federally enforceable limit of 99.56 tpy NO_x on an aggregate, 12-month rolling basis for these emergency generators. With the proposed NO_x limitation, emissions of CO, VOC, and PM (filterable)/PM₁₀/PM_{2.5}, SO₂ and HAPs will inherently be limited to below PBR and Major Source thresholds. CyrusOne will maintain on-site records of the monthly 12-month rolling total of NO_x emissions from all generators. Additionally, no individual generator will operate for more than 10% of the normal annual operating schedule for the data center, or 876 hours annually, as required by the PBR in §106.511.

There are no stationary combustion sources at the site other than the emergency backup generators. The only other stationary sources of VOC emissions will be the facility's diesel belly tanks. VOC emissions from the belly tanks will be permitted under PBR 106.472. In accordance with 30 TAC §106.8, CyrusOne will keep records on site to document compliance with PBR 106.472.

3.2 Process Flow Diagram

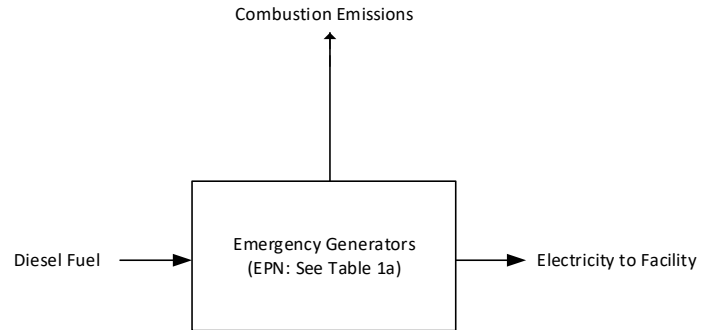


Figure 1 – Process Flow Diagram

3.3 Emissions Data and Calculations

The following section describes the assumptions and calculation methodology used to estimate emissions from the generators. Pollutants that will be emitted from the 174 new generators include NO_x; CO; VOCs; SO₂; PM, including PM₁₀ and PM_{2.5}; and HAPs. These calculations are provided in Appendix A of this registration.

3.3.1 Derivation of Potential Annual Emissions from All Generators

CyrusOne is submitting this PBR registration in order to establish a federally enforceable limit of 99.56 tpy NO_x on an aggregate, 12-month rolling basis. With the proposed NO_x limitation, emissions of CO, VOC, and PM (filterable)/PM₁₀/PM_{2.5}, SO₂, and HAPs will inherently be limited to below PBR and Major Source thresholds.

The emissions calculations were performed using the worst-case emission factors provided by the manufacturers for each engine via a specification sheet (Appendix B). If an emission factor was not made available in an engine's specification sheet, AP-42, Chapter 3.4 factors were used. Yearly operational hours listed at each load are for example emissions demonstration only. The actual operational limit will be determined on site using operational hours and load records to determine when the maximum allowable emissions have been reached.

3.3.2 Maintenance, Startup, and Shutdown (MSS) Activities

The emissions associated with scheduled routine maintenance of the generators are included in the emissions calculations detailed in the previous sections and will be authorized by PBR §106.511. Further, NO_x, CO, VOC, and PM (filterable)/PM₁₀/PM_{2.5} emissions from the MSS events are included in the site-wide NO_x, CO, VOC, and PM (filterable)/PM₁₀/PM_{2.5} emission limitations. There will be no routine excess startup or shutdown emissions associated with the use of generators at the facility.

3.3.3 Table 1(a) Emission Point Summary

Attached is the Table 1(a) Emission Point Summary, Page 1 only.



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	August 2026	Permit No.:	TBD	Regulated Entity No.:	TBD
Area Name:	SAT14			Customer Reference No.:	CN604843086

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
(A) EPN	(B) FIN	(C) NAME		(A) LB/HR	(B) TPY
SAT14A_HOUSE1, SAT14A_HOUSE2, SAT14A_HOUSE3, SAT14B_HOUSE1, SAT14B_HOUSE2, SAT14B_HOUSE3, SAT14A_GEN1, SAT14A_GEN2, SAT14A_GEN3, SAT14A_GEN4, SAT14A_GEN5, SAT14A_GEN6, SAT14A_GEN7, SAT14A_GEN8, SAT14A_GEN9, SAT14A_GEN10, SAT14A_GEN11, SAT14A_GEN12, SAT14A_GEN13, SAT14A_GEN14, SAT14A_GEN15, SAT14A_GEN16, SAT14A_GEN17, SAT14A_GEN18, SAT14A_GEN19, SAT14A_GEN20, SAT14A_GEN21, SAT14A_GEN22, SAT14A_GEN23, SAT14A_GEN24, SAT14A_GEN25, SAT14A_GEN26, SAT14A_GEN27, SAT14A_GEN28, SAT14A_GEN29, SAT14A_GEN30, SAT14A_GEN31, SAT14A_GEN32, SAT14A_GEN33, SAT14A_GEN34, SAT14A_GEN35, SAT14A_GEN36, SAT14A_GEN37, SAT14A_GEN38, SAT14A_GEN39, SAT14A_GEN40, SAT14A_GEN41, SAT14A_GEN42, SAT14A_GEN43, SAT14A_GEN44, SAT14A_GEN45, SAT14A_GEN46, SAT14A_GEN47, SAT14A_GEN48, SAT14A_GEN49, SAT14A_GEN50, SAT14A_GEN51, SAT14A_GEN52, SAT14A_GEN53, SAT14A_GEN54, SAT14A_GEN55, SAT14A_GEN56, SAT14A_GEN57, SAT14A_GEN58, SAT14A_GEN59, SAT14A_GEN60, SAT14A_GEN61, SAT14A_GEN62, SAT14A_GEN63, SAT14A_GEN64, SAT14A_GEN65, SAT14A_GEN66, SAT14A_GEN67, SAT14A_GEN68, SAT14A_GEN69, SAT14A_GEN70, SAT14A_GEN71, SAT14A_GEN72, SAT14A_GEN73, SAT14A_GEN74, SAT14A_GEN75, SAT14A_GEN76, SAT14A_GEN77, SAT14A_GEN78, SAT14A_GEN79, SAT14A_GEN80, SAT14A_GEN81, SAT14A_GEN82, SAT14A_GEN83, SAT14A_GEN84, SAT14B_GEN1, SAT14B_GEN2, SAT14B_GEN3, SAT14B_GEN4, SAT14B_GEN5, SAT14B_GEN6, SAT14B_GEN7, SAT14B_GEN8, SAT14B_GEN9, SAT14B_GEN10, SAT14B_GEN11, SAT14B_GEN12, SAT14B_GEN13, SAT14B_GEN14, SAT14B_GEN15, SAT14B_GEN16, SAT14B_GEN17, SAT14B_GEN18, SAT14B_GEN19, SAT14B_GEN20, SAT14B_GEN21, SAT14B_GEN22, SAT14B_GEN23, SAT14B_GEN24, SAT14B_GEN25, SAT14B_GEN26, SAT14B_GEN27, SAT14B_GEN28, SAT14B_GEN29, SAT14B_GEN30, SAT14B_GEN31, SAT14B_GEN32, SAT14B_GEN33, SAT14B_GEN34, SAT14B_GEN35, SAT14B_GEN36, SAT14B_GEN37, SAT14B_GEN38, SAT14B_GEN39, SAT14B_GEN40, SAT14B_GEN41, SAT14B_GEN42, SAT14B_GEN43, SAT14B_GEN44, SAT14B_GEN45, SAT14B_GEN46, SAT14B_GEN47, SAT14B_GEN48, SAT14B_GEN49, SAT14B_GEN50, SAT14B_GEN51, SAT14B_GEN52, SAT14B_GEN53, SAT14B_GEN54, SAT14B_GEN55, SAT14B_GEN56, SAT14B_GEN57, SAT14B_GEN58, SAT14B_GEN59, SAT14B_GEN60, SAT14B_GEN61, SAT14B_GEN62, SAT14B_GEN63, SAT14B_GEN64, SAT14B_GEN65, SAT14B_GEN66, SAT14B_GEN67, SAT14B_GEN68, SAT14B_GEN69, SAT14B_GEN70, SAT14B_GEN71, SAT14B_GEN72, SAT14B_GEN73, SAT14B_GEN74, SAT14B_GEN75, SAT14B_GEN76, SAT14B_GEN77, SAT14B_GEN78, SAT14B_GEN79, SAT14B_GEN80, SAT14B_GEN81, SAT14B_GEN82, SAT14B_GEN83, SAT14B_GEN84	SAT14A_HOUSE1, SAT14A_HOUSE2, SAT14A_HOUSE3, SAT14B_HOUSE1, SAT14B_HOUSE2, SAT14B_HOUSE3, SAT14A_GEN1, SAT14A_GEN2, SAT14A_GEN3, SAT14A_GEN4, SAT14A_GEN5, SAT14A_GEN6, SAT14A_GEN7, SAT14A_GEN8, SAT14A_GEN9, SAT14A_GEN10, SAT14A_GEN11, SAT14A_GEN12, SAT14A_GEN13, SAT14A_GEN14, SAT14A_GEN15, SAT14A_GEN16, SAT14A_GEN17, SAT14A_GEN18, SAT14A_GEN19, SAT14A_GEN20, SAT14A_GEN21, SAT14A_GEN22, SAT14A_GEN23, SAT14A_GEN24, SAT14A_GEN25, SAT14A_GEN26, SAT14A_GEN27, SAT14A_GEN28, SAT14A_GEN29, SAT14A_GEN30, SAT14A_GEN31, SAT14A_GEN32, SAT14A_GEN33, SAT14A_GEN34, SAT14A_GEN35, SAT14A_GEN36, SAT14A_GEN37, SAT14A_GEN38, SAT14A_GEN39, SAT14A_GEN40, SAT14A_GEN41, SAT14A_GEN42, SAT14A_GEN43, SAT14A_GEN44, SAT14A_GEN45, SAT14A_GEN46, SAT14A_GEN47, SAT14A_GEN48, SAT14A_GEN49, SAT14A_GEN50, SAT14A_GEN51, SAT14A_GEN52, SAT14A_GEN53, SAT14A_GEN54, SAT14A_GEN55, SAT14A_GEN56, SAT14A_GEN57, SAT14A_GEN58, SAT14A_GEN59, SAT14A_GEN60, SAT14A_GEN61, SAT14A_GEN62, SAT14A_GEN63, SAT14A_GEN64, SAT14A_GEN65, SAT14A_GEN66, SAT14A_GEN67, SAT14A_GEN68, SAT14A_GEN69, SAT14A_GEN70, SAT14A_GEN71, SAT14A_GEN72, SAT14A_GEN73, SAT14A_GEN74, SAT14A_GEN75, SAT14A_GEN76, SAT14A_GEN77, SAT14A_GEN78, SAT14A_GEN79, SAT14A_GEN80, SAT14A_GEN81, SAT14A_GEN82, SAT14A_GEN83, SAT14A_GEN84, SAT14B_GEN1, SAT14B_GEN2, SAT14B_GEN3, SAT14B_GEN4, SAT14B_GEN5, SAT14B_GEN6, SAT14B_GEN7, SAT14B_GEN8, SAT14B_GEN9, SAT14B_GEN10, SAT14B_GEN11, SAT14B_GEN12, SAT14B_GEN13, SAT14B_GEN14, SAT14B_GEN15, SAT14B_GEN16, SAT14B_GEN17, SAT14B_GEN18, SAT14B_GEN19, SAT14B_GEN20, SAT14B_GEN21, SAT14B_GEN22, SAT14B_GEN23, SAT14B_GEN24, SAT14B_GEN25, SAT14B_GEN26, SAT14B_GEN27, SAT14B_GEN28, SAT14B_GEN29, SAT14B_GEN30, SAT14B_GEN31, SAT14B_GEN32, SAT14B_GEN33, SAT14B_GEN34, SAT14B_GEN35, SAT14B_GEN36, SAT14B_GEN37, SAT14B_GEN38, SAT14B_GEN39, SAT14B_GEN40, SAT14B_GEN41, SAT14B_GEN42, SAT14B_GEN43, SAT14B_GEN44, SAT14B_GEN45, SAT14B_GEN46, SAT14B_GEN47, SAT14B_GEN48, SAT14B_GEN49, SAT14B_GEN50, SAT14B_GEN51, SAT14B_GEN52, SAT14B_GEN53, SAT14B_GEN54, SAT14B_GEN55, SAT14B_GEN56, SAT14B_GEN57, SAT14B_GEN58, SAT14B_GEN59, SAT14B_GEN60, SAT14B_GEN61, SAT14B_GEN62, SAT14B_GEN63, SAT14B_GEN64, SAT14B_GEN65, SAT14B_GEN66, SAT14B_GEN67, SAT14B_GEN68, SAT14B_GEN69, SAT14B_GEN70, SAT14B_GEN71, SAT14B_GEN72, SAT14B_GEN73, SAT14B_GEN74, SAT14B_GEN75, SAT14B_GEN76, SAT14B_GEN77, SAT14B_GEN78, SAT14B_GEN79, SAT14B_GEN80, SAT14B_GEN81, SAT14B_GEN82, SAT14B_GEN83, SAT14B_GEN84	All Emergency Generators	VOC	441.06	5.94
			NO _x	7851.64	99.56
			CO	2017.14	28.54
			PM	165.01	3.37
			PM ₁₀	165.01	3.37
			PM _{2.5}	165.01	3.37
			SO ₂	5.81	0.08

EPN = Emission Point Number
FIN = Facility Identification Number

3.4 General and Specific PBR Requirements Checklists

This section contains the following TCEQ PBR Checklists:

- 30 TAC §106.4 – Permit By Rule Applicability Checklist

Note that there is no checklist for 30 TAC §106.511 – Portable and Emergency Engines and Turbines, however, CyrusOne will maintain compliance with all requirements of the rule.

Texas Commission on Environmental Quality
Permit by Rule Applicability Checklist
Title 30 Texas Administrative Code § 106.4

The following checklist was developed by the Texas Commission on Environmental Quality (TCEQ), **Air Permits Division**, to assist applicants in determining whether or not a facility meets all of the applicable requirements. Before claiming a specific Permit by Rule (PBR), a facility must first meet all of the requirements of **Title 30 Texas Administrative Code § 106.4** (30 TAC § 106.4), "Requirements for Permitting by Rule." Only then can the applicant proceed with addressing requirements of the specific Permit by Rule being claimed.

The use of this checklist is not mandatory; however, it is the responsibility of each applicant to show how a facility being claimed under a PBR meets the general requirements of 30 TAC § 106.4 and also the specific requirements of the PBR being claimed. If all PBR requirements cannot be met, a facility will not be allowed to operate under the PBR and an application for a construction permit may be required under 30 TAC § 116.110(a).

Registration of a facility under a PBR can be performed by completing **Form PI-7** (Registration for Permits by Rule) or **Form PI-7-CERT** (Certification and Registration for Permits by Rule). The appropriate checklist should accompany the registration form. Check the most appropriate answer and include any additional information in the spaces provided. If additional space is needed, please include an extra page and reference the question number. The PBR forms, tables, checklists, and guidance documents are available from the TCEQ, Air Permits Division website at: www.tceq.texas.gov/permitting/air/nav/air_pbr.html.

1. 30 TAC § 106.4(a)(1) and (4): Emission Limits	Answer
List emissions in tpy for each facility (add additional pages or table if needed):	
Are the SO ₂ , PM ₁₀ , VOC, or other air contaminant emissions claimed for each facility in this PBR submittal less than 25 tpy?	☒ YES ☐ NO
Are the NO _x and CO emissions claimed for each facility in this PBR submittal less than 250 tpy?	☒ YES ☐ NO
<i>If the answer to both is "Yes," continue to the question below. If the answer to either question is "No," a PBR cannot be claimed.</i>	
Has any facility at the property had public notice and opportunity for comment under 30 TAC Section 116 for a regular permit or permit renewal? (This does not include public notice for voluntary emission reduction permits, grandfathered existing facility permits, or federal operating permits.)	☐ YES ☒ NO
<i>If "Yes," skip to Section 2. If "No," continue to the questions below.</i>	
If the site has had no public notice, please answer the following:	
Are the SO ₂ , PM ₁₀ , VOC, or other emissions claimed for all facilities in this PBR submittal less than 25 tpy?	☒ YES ☐ NO
Are the NO _x and CO emissions claimed for all facilities in this PBR submittal less than 250 tpy?	☒ YES ☐ NO
<i>If the answer to both questions is "Yes," continue to Section 2.</i>	
<i>If the answer to either question is "No," a PBR cannot be claimed. A permit will be required under Chapter 116.</i>	

**Texas Commission on Environmental Quality
Permit by Rule Applicability Checklist
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2. 30 TAC § 106.4(a)(2): Nonattainment Check	Answer
Are the facilities to be claimed under this PBR located in a designated ozone nonattainment county?	☐ YES ☒ NO
<i>If "Yes," please indicate which county by checking the appropriate box to the right.</i>	
(Moderate) - Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller counties:	☐ HGB
(Moderate) - Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise counties:	☐ DFW
<i>If "Yes," to any of the above, continue to the next question. If "No," continue to Section 3.</i>	
Does this project trigger a nonattainment review?	☐ YES ☐ NO
Is the project's potential to emit (PTE) for emissions of VOC or NO _x increasing by 100 tpy or more?	☐ YES ☐ NO
<i>PTE is the maximum capacity of a stationary source to emit any air pollutant under its worst-case physical and operational design unless limited by a permit, rules, or made federally enforceable by a certification.</i>	
Is the site an existing major nonattainment site and are the emissions of VOC or NO _x increasing by 40 tpy or more?	☐ YES ☐ NO
<i>If needed, attach contemporaneous netting calculations per nonattainment guidance.</i>	
Additional information can be found at: www.tceq.texas.gov/permitting/air/forms/newsourcereview/tables/nsr_table8.html and www.tceq.texas.gov/permitting/air/nav/air_docs_newsourcereview.html	
<i>If "Yes," to any of the above, the project is a major source or a major modification and a PBR may not be used. A Nonattainment Permit review must be completed to authorize this project. If "No," continue to Section 3.</i>	
3. 30 TAC § 106.4(a)(3): Prevention of Significant Deterioration (PSD) check	
Does this project trigger a review under PSD rules?	
To determine the answer, review the information below:	
Are emissions of any regulated criteria pollutant increasing by 100 tpy of any criteria pollutant at a named source?	☐ YES ☒ NO
Are emissions of any criteria pollutant increasing by 250 tpy of any criteria pollutant at an unnamed source?	☐ YES ☒ NO
Are emissions increasing above significance levels at an existing major site?	☐ YES ☒ NO
PSD information can be found at: www.tceq.texas.gov/assets/public/permitting/air/Forms/NewSourceReview/Tables/10173tbl.pdf and www.tceq.texas.gov/permitting/air/nav/air_docs_newsourcereview.html	
<i>If "Yes," to any of the above, a PBR may not be used. A PSD Permit review must be completed to authorize the project.</i>	
<i>If "No," continue to Section 4.</i>	

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4. 30 TAC § 106.4(a)(6): Federal Requirements	Answer
Will all facilities under this PBR meet applicable requirements of Title 40 Code of Federal Regulations (40 CFR) Part 60, New Source Performance Standards (NSPS)?	☒ YES ☐ NO ☐ NA
If "Yes," which Subparts are applicable? (<i>answer below.</i>)	
Subpart IIII	
Will all facilities under this PBR meet applicable requirements of 40 CFR Part 63, Hazardous Air Pollutants Maximum Achievable Control Technology (MACT) standards?	☒ YES ☐ NO ☐ NA
If "Yes," which Subparts are applicable? (<i>answer below.</i>)	
Subpart ZZZZ	
Will all facilities under this PBR meet applicable requirements of 40 CFR Part 61, National Emissions Standards for Hazardous Air Pollutants (NESHAPs)?	☐ YES ☐ NO ☒ NA
If "Yes," which Subparts are applicable? (<i>answer below.</i>)	
<i>If "Yes" to any of the above, please attach a discussion of how the facilities will meet any applicable standards.</i>	
5. 30 TAC § 106.4(a)(7): PBR prohibition check	
Are there any air permits at the site containing conditions which prohibit or restrict the use of PBRs?	☐ YES ☒ NO
<i>If "Yes," PBRs may not be used or their use must meet the restrictions of the permit. A new permit or permit amendment may be required.</i>	
List permit number(s):	
6. 30 TAC § 106.4(a)(8): NO_x Cap and Trade	
Is the facility located in Harris, Brazoria, Chambers, Fort Bend, Galveston, Liberty, Montgomery, or Waller County?	☐ YES ☒ NO
<i>If "Yes," answer the question below.</i>	
<i>If "No," continue to Section 7.</i>	
Will the proposed facility or group of facilities obtain required allowances for NO _x if they are subject to 30 TAC Chapter 101, Subchapter H, Division 3 (relating to the Mass Emissions Cap and Trade Program)?	☐ YES ☐ NO

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7. Highly Reactive Volatile Organic Compounds (HRVOC) check		
Is the facility located in Harris County?	☐ YES ☒ NO	
<i>If "Yes," answer the next question. If "No," skip to the box below.</i>		
Will the project be constructed after June 1, 2006?	☐ YES ☐ NO	
<i>If "Yes," answer the next question.</i>		
<i>If "No," skip to the box below.</i>		
Will one or more of the following HRVOC be emitted as a part of this project?	☐ YES ☐ NO	
<i>If "Yes," complete the information below:</i>		
Information	lb/hr	tpy
▶ 1,3-butadiene		
▶ all isomers of butene (e.g., isobutene [2-methylpropene or isobutylene])		
▶ alpha-butylene (ethylethylene)		
▶ beta-butylene (dimethylethylene, including both cis- and trans-isomers)		
▶ ethylene		
▶ propylene		
Is the facility located in Brazoria, Chambers, Fort Bend, Galveston, Liberty, Montgomery, or Waller County?	☐ YES ☒ NO	
<i>If "Yes," answer the next question. If "No," the checklist is complete.</i>		
Will the project be constructed after June 1, 2006?	☐ YES ☐ NO	
<i>If "Yes," answer the next question. If "No," the checklist is complete.</i>		
Will one or more of the following HRVOC be emitted as a part of this project?	☐ YES ☐ NO	
<i>If "Yes," complete the information below:</i>		
Information	lb/hr	tpy
▶ ethylene		
▶ propylene		

PERMIT BY RULE REGISTRATION
CYRUSONE, LLC
SAT14 FACILITY

APPENDIX A:

EMISSION CALCULATIONS

Emergency Generator Calculations

Number of Generator Engines and Operating Hours ^{1, 2}

New Critical Generators		No SCR ³	With SCR ³	Potential Number of Hours of Operation at Each Load (hrs/engine/yr)					Startup Emissions ⁴ (hrs/engine/yr)
				<=10%	11%-25%	26%-50%	51%-75%	76%-100%	
Cummins QSK60 DQKAN	168	168	0	10	7	6	7	15	3.75
MTU 16V4000 DS2250									
Caterpillar 3516C									
New House Generators									
Cummins QSK38-G18 C1500D6E	6	6	0	10	9	9	9	15	0
MTU 18V2000G76S DS1250									
MTU 16V2000G86S DS1000									
Total	174	174	0	7872					0

- Notes:**
- (1) The SAT14 facility will include 168 critical generators and 6 house generators. The critical generators could be any combination of the 2.25 MWe generators. The new house generators could be any of the 1, 1.25, or 1.5 MWe gens listed. See manufacturer specifications for more detail.
 - (2) Yearly operational hours listed at each load are for example emissions demonstration only. The actual operational limit will be determined on site using operational hours and load records to determine when the maximum allowable emissions have been reached.
 - (3) Critical generators may be operated with or without an SCR. Calculations presented for this application are without SCR, as this represents a worst case emissions scenario.
 - (4) For SCR start-up emissions, the following values are used to estimate the total annual time of uncontrolled operation per generator:

Catalytic Reducer Start-Up Time = 0.25 hr
 Start-Ups Per Year = 15 /gen/yr
 Total Start-Up Uncontrolled Time = 3.75 hr/gen/yr

Engine Power Output by Load

Engines Group	Power Output ¹					Units of Power Provided
	10% Load	25% Load ²	50% Load	75% Load	Full Standby	
Cummins QSK60 DQKAN	385	854.0	1,637.0	2,419.0	3,202.0	BHP
MTU 16V4000 DS2250	249	625.0	1,251.0	1,879.0	2,505.0	kW
Caterpillar 3516C	455	941.0	1,752.0	2,563.0	3,374.0	BHP
Cummins QSK38-G18 C1500D6E	--	630.0	1,161.0	1,692.0	2,244.0	BHP
MTU 18V2000G76S DS1250	137	343.0	686.0	1,028.0	1,371.0	kW
MTU 16V2000G86S DS1000	137	343.0	686.0	1,029.0	1,366.0	kW

- Notes:**
- (1) Per the manufacturer specification sheets and performance data.

Diesel Fuel Consumption and Heat Input by Load

Engines Group	Diesel Fuel Consumption (gal/hr) ¹					Heat Input (MMBtu/hr/engine) ²				
	10% Load ³	25% Load ⁴	50% Load	75% Load	Full Standby	10% Load	25% Load	50% Load	75% Load	Full Standby
Cummins QSK60 DQKAN	26	48.0	82.0	116.0	152.0	3.6	6.6	11.2	15.9	20.8
MTU 16V4000 DS2250	27	49	86.0	123.0	163.0	3.7	6.7	11.8	16.9	22.3
Caterpillar 3516C	29	53.0	91.0	125.0	159.2	4.0	7.3	12.5	17.1	21.8
Cummins QSK38-G18 C1500D6E	--	35.0	59.0	84.0	104.0	--	4.8	8.1	11.5	14.3
MTU 18V2000G76S DS1250	13.5	25.0	45.0	66.0	87.0	1.8	3.4	6.2	9.0	11.9
MTU 16V2000G86S DS1000	7.3	18.3	38.0	56.0	73.0	1.0	2.5	5.2	7.7	10.0

- Notes:**
- (1) Refer to enclosed manufacturer specification sheets and performance data for each engine model.
 - (2) Diesel fuel consumption was converted to heat input based on the diesel high heating value from the USEPA's AP-42, Section 3.4, Large Stationary Diesel and All Stationary Dual-fuel Engines, Table 3.4-1, footnote a (October 1996):
 Diesel HHV = 0.137 MMBtu/gal
 - (3) 10% load data was not available for MTU 16V4000 DS2250, MTU 18V2000G76S DS1250, or MTU 16V2000G86S DS1000 on the manufacturer spec sheet, but the manufacturer provided estimated values via email as shown in Appendix B.
 - (4) 25% load data was not available for MTU 16V4000 DS2250, MTU 18V2000G76S DS1250, or MTU 16V2000G86S DS1000 on the manufacturer spec sheet, but the manufacturer provided estimated values via email as shown in Appendix B.

Emergency Generator Calculations

Uncontrolled Emission Factors

Pollutant	Uncontrolled Emission Factors - Cummins QSK60 DQKAN (g/bhp-hr) ¹					Uncontrolled Emission Factors - MTU 16V4000 DS2250 (g/kW-hr) ¹					Uncontrolled Emission Factors - Caterpillar 3516C (g/bhp-hr) ¹				
	10% Load	25% Load	50% Load	75% Load	Full Standby	10% Load	25% Load	50% Load	75% Load	Full Standby	10% Load	25% Load	50% Load	75% Load	Full Standby
NO _x	6.83	4.36	4.73	5.07	6.25	17.81	4.96	5.91	7.32	8.03	7.04	3.53	3.65	4.80	6.07
CO	4.00	2.20	1.20	0.60	1.00	9.24	2.31	0.86	1.75	2.15	4.80	1.66	0.65	0.48	0.60
VOC ²	0.83	0.27	0.15	0.12	0.09	4.69	1.28	0.46	0.24	0.16	1.00	0.43	0.30	0.20	0.14
Filterable PM ³	0.14	0.36	0.16	0.10	0.10	1.70	0.32	0.09	0.19	0.14	0.30	0.15	0.08	0.05	0.04

Pollutant	Uncontrolled Emission Factors - Cummins QSK38-G18 C1500D6E (g/bhp-hr) ¹					Uncontrolled Emission Factors - MTU 18V2000G76S DS1250 (g/kW-hr) ¹					Uncontrolled Emission Factors - MTU 16V2000G86S DS1000 (g/kW-hr) ¹				
	10% Load	25% Load	50% Load	75% Load	Full Standby	10% Load	25% Load	50% Load	75% Load	Full Standby	10% Load	25% Load	50% Load	75% Load	Full Standby
NO _x	--	3.99	4.80	5.33	8.97	17.56	8.57	6.41	6.61	8.18	15.44	8.01	7.17	6.78	10.15
CO	--	2.00	1.40	1.00	0.40	7.13	2.92	0.90	0.38	0.33	8.81	2.98	1.29	0.46	0.37
VOC ²	--	0.22	0.09	0.07	0.07	4.71	1.11	0.38	0.23	0.22	3.25	0.95	0.29	0.18	0.14
Filterable PM ³	--	0.16	0.20	0.08	0.02	0.55	0.10	0.08	0.05	0.03	0.44	0.16	0.09	0.04	0.02

Notes:

- (1) Refer to enclosed manufacturer performance data for each engine model. Engine emission factors are conservatively based on the manufacturer's "Not to Exceed" emissions data.
- (2) Assumes that all hydrocarbons (HC) are VOC.
- (3) Assumes that all filterable PM is less than 2.5 microns in diameter (i.e., PM = PM₁₀ = PM_{2.5}).

AP-42 Emission Factors

Pollutant	Emission Factor
	(lb/MMBtu) ¹
SO ₂ ²	1.52E-03
Condensable PM	7.70E-03
Benzene	7.76E-04
Toluene	2.81E-04
Xylenes	1.93E-04
Formaldehyde	7.89E-05
Acetaldehyde	2.52E-05
Acrolein	7.88E-06
Total PAH ³	2.12E-04

Notes:

- (1) Emission factors are from the U.S. EPA's AP-42, Section 3.4, Large Stationary Diesel And All Stationary Dual-fuel Engines, Tables 3.4-1, 3.4-2, 3.4-3, and 3.4-4 (October 1996).
- (2) The SO₂ emission factor was calculated based on the maximum allowable diesel fuel sulfur content under NSPS Subpart IIII:
Diesel Sulfur Content = **0.0015** wt.% Sulfur
- (3) PAH = Polycyclic Aromatic Hydrocarbons

Emergency Generator Calculations

Hourly Emission Rate Conversion of Uncontrolled Emission Factor

Pollutant	Cummins QSK60 DQKAN Engines (lb/hr/gen) ^{1, 2}						MTU 16V4000 DS2250 Engines (lb/hr/gen) ^{1, 2}						Caterpillar 3516C Engines (lb/hr/gen) ^{1, 2}					
	10% Load	25% Load	50% Load	75% Load	Full Standby	Maximum	10% Load	25% Load	50% Load	75% Load	Full Standby	Maximum	10% Load	25% Load ⁵	50% Load	75% Load	Full Standby	Maximum
Criteria Pollutants																		
NO _x	5.80	8.21	17.07	27.04	44.12	44.12	9.78	6.83	16.30	30.32	44.35	44.35	7.06	7.32	14.10	27.12	45.15	45.15
Controlled NO _x ¹	0.58	0.82	1.71	2.70	4.41	4.41	0.98	0.68	1.63	3.03	4.43	4.43	0.7	0.7	1.4	2.7	4.5	4.52
CO	3.40	4.14	4.33	3.20	7.06	7.06	5.07	3.18	2.37	7.25	11.87	11.87	4.81	3.44	2.51	2.71	4.46	4.81
VOC	0.70	0.51	0.54	0.64	0.64	0.70	2.57	1.76	1.27	0.99	0.88	2.57	1.00	0.89	1.16	1.13	1.04	1.16
Filt. PM	0.12	0.68	0.58	0.53	0.71	0.71	0.93	0.44	0.25	0.79	0.79	0.93	0.30	0.31	0.31	0.28	0.30	0.31
PM/PM ₁₀ /PM _{2.5} ⁵	0.15	0.73	0.66	0.66	0.87	0.87	0.96	0.49	0.34	0.92	0.96	0.96	0.33	0.37	0.41	0.41	0.47	0.47
SO ₂	5.40E-03	9.96E-03	1.70E-02	2.41E-02	3.16E-02	0.03	5.61E-03	1.02E-02	1.79E-02	2.55E-02	3.38E-02	3.38E-02	6.02E-03	1.10E-02	1.89E-02	2.60E-02	3.30E-02	0.03
Hazardous Air Pollutants																		
Benzene	2.76E-03	5.10E-03	8.72E-03	1.23E-02	1.62E-02	1.62E-02	2.87E-03	5.21E-03	9.14E-03	1.31E-02	1.73E-02	1.73E-02	3.08E-03	5.64E-03	9.68E-03	1.33E-02	1.69E-02	1.69E-02
Toluene	1.00E-03	1.85E-03	3.16E-03	4.47E-03	5.85E-03	5.85E-03	1.04E-03	1.89E-03	3.31E-03	4.74E-03	6.28E-03	6.28E-03	1.12E-03	2.04E-03	3.50E-03	4.81E-03	6.13E-03	6.13E-03
Xylenes	6.88E-04	1.27E-03	2.17E-03	3.07E-03	4.02E-03	4.02E-03	7.14E-04	1.30E-03	2.27E-03	3.25E-03	4.31E-03	4.31E-03	7.67E-04	1.40E-03	2.41E-03	3.31E-03	4.21E-03	4.21E-03
Formaldehyde	2.81E-04	5.19E-04	8.87E-04	1.25E-03	1.64E-03	1.64E-03	2.92E-04	5.30E-04	9.30E-04	1.33E-03	1.76E-03	1.76E-03	3.14E-04	5.73E-04	9.84E-04	1.35E-03	1.72E-03	1.72E-03
Acetaldehyde	8.98E-05	1.66E-04	2.83E-04	4.01E-04	5.25E-04	5.25E-04	9.32E-05	1.69E-04	2.97E-04	4.25E-04	5.63E-04	5.63E-04	1.00E-04	1.83E-04	3.14E-04	4.32E-04	5.50E-04	5.50E-04
Acrolein	2.81E-05	5.18E-05	8.85E-05	1.25E-04	1.64E-04	1.64E-04	2.92E-05	5.29E-05	9.29E-05	1.33E-04	1.76E-04	1.76E-04	3.13E-05	5.72E-05	9.83E-05	1.35E-04	1.72E-04	1.72E-04
Total PAH	7.55E-04	1.39E-03	2.38E-03	3.37E-03	4.42E-03	4.42E-03	7.84E-04	1.42E-03	2.50E-03	3.57E-03	4.74E-03	4.74E-03	8.42E-04	1.54E-03	2.64E-03	3.63E-03	4.62E-03	4.62E-03
Total HAP	5.61E-03	1.04E-02	1.77E-02	2.50E-02	3.28E-02	3.28E-02	5.82E-03	1.06E-02	1.85E-02	2.65E-02	3.52E-02	3.52E-02	6.25E-03	1.14E-02	1.96E-02	2.70E-02	3.43E-02	3.43E-02
Pollutant	Cummins QSK38-G18 C1500D6 Engines (lb/hr/gen) ^{1, 2}						MTU 18V2000G76S DS1250 Engines (lb/hr/gen) ^{1, 2}						MTU 16V2000G86S DS1000 Engines (lb/hr/gen) ^{1, 2}					
	10% Load	25% Load	50% Load	75% Load	Full Standby	Maximum	10% Load	25% Load ⁵	50% Load	75% Load	Full Standby	Maximum	10% Load	25% Load ⁵	50% Load	75% Load	Full Standby	Maximum
Criteria Pollutants																		
NO _x	--	5.54	12.29	19.88	44.38	44.38	5.30	6.48	9.69	14.98	24.72	24.72	4.66	6.06	10.84	15.38	30.57	30.57
Controlled NO _x ¹	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CO	--	2.78	3.58	3.73	1.98	3.73	2.15	2.21	1.36	0.86	1.00	2.21	2.66	2.25	1.95	1.04	1.11	2.66
VOC	--	0.31	0.23	0.26	0.35	0.35	1.42	0.84	0.57	0.52	0.66	1.42	0.98	0.72	0.44	0.41	0.42	0.98
Filt. PM	--	0.22	0.51	0.30	0.10	0.51	0.16	0.07	0.13	0.11	0.09	0.16	0.13	0.12	0.13	0.08	0.06	0.13
PM/PM ₁₀ /PM _{2.5} ⁵	--	0.26	0.57	0.39	0.21	0.57	0.18	0.10	0.17	0.18	0.18	0.18	0.14	0.14	0.17	0.14	0.14	0.17
SO ₂	--	7.27E-03	1.22E-02	1.74E-02	2.16E-02	0.02	2.80E-03	5.19E-03	9.34E-03	1.37E-02	1.81E-02	0.02	1.52E-03	3.79E-03	7.89E-03	1.16E-02	1.52E-02	0.02
Hazardous Air Pollutants																		
Benzene	--	3.72E-03	6.27E-03	8.93E-03	1.11E-02	1.11E-02	1.44E-03	2.66E-03	4.79E-03	7.02E-03	9.25E-03	9.25E-03	7.76E-04	1.94E-03	4.04E-03	5.95E-03	7.76E-03	7.76E-03
Toluene	--	1.35E-03	2.27E-03	3.23E-03	4.00E-03	4.00E-03	5.20E-04	9.63E-04	1.73E-03	2.54E-03	3.35E-03	3.35E-03	2.81E-04	7.03E-04	1.46E-03	2.16E-03	2.81E-03	2.81E-03
Xylenes	--	9.26E-04	1.56E-03	2.22E-03	2.75E-03	2.75E-03	3.57E-04	6.61E-04	1.19E-03	1.75E-03	2.30E-03	2.30E-03	1.93E-04	4.83E-04	1.00E-03	1.48E-03	1.93E-03	1.93E-03
Formaldehyde	--	3.78E-04	6.38E-04	9.08E-04	1.12E-03	1.12E-03	1.46E-04	2.70E-04	4.87E-04	7.14E-04	9.41E-04	9.41E-04	7.89E-05	1.97E-04	4.11E-04	6.05E-04	7.89E-04	7.89E-04
Acetaldehyde	--	1.21E-04	2.04E-04	2.90E-04	3.59E-04	3.59E-04	4.66E-05	8.63E-05	1.55E-04	2.28E-04	3.00E-04	3.00E-04	2.52E-05	6.30E-05	1.31E-04	1.93E-04	2.52E-04	2.52E-04
Acrolein	--	3.78E-05	6.37E-05	9.07E-05	1.12E-04	1.12E-04	1.46E-05	2.70E-05	4.86E-05	7.13E-05	9.39E-05	9.39E-05	7.88E-06	1.97E-05	4.10E-05	6.05E-05	7.88E-05	7.88E-05
Total PAH	--	1.02E-03	1.71E-03	2.44E-03	3.02E-03	3.02E-03	3.92E-04	7.26E-04	1.31E-03	1.92E-03	2.53E-03	2.53E-03	2.12E-04	5.30E-04	1.10E-03	1.63E-03	2.12E-03	2.12E-03
Total HAP	--	7.55E-03	1.27E-02	1.81E-02	2.24E-02	2.24E-02	2.91E-03	5.39E-03	9.71E-03	1.42E-02	1.88E-02	1.88E-02	1.57E-03	3.94E-03	8.20E-03	1.21E-02	1.57E-02	1.57E-02

Notes:

- (1) For engine-specific emission factors:
Hourly Emissions at Load X (lb/hr/gen) = Emission Factor at Load X (g/kW-hr) x Engine Power at Load X (kW/gen) / (453.6 g/lb)
- (2) For engine-specific emission factors:
Hourly Emissions at Load X (lb/hr/gen) = Emission Factor at Load X (g/bhp-hr) x Engine Power at Load X (bhp/gen) / (453.6 g/lb)
- (3) For AP-42 emission factors:
Hourly Emissions at Load X (lb/hr/gen) = Emission Factor (lb/MMBtu) x Heat Input at Load X (MMBtu/hr/gen)
- (4) The only models that may be SCR-controlled are the Cummins QSK60 DQKAN Engines, MTU 16V4000 DS2250 Engines, and Caterpillar 3516C Engines; if SCR is installed NOx will be controlled 90%. All other units will be operated as uncontrolled.
- (5) Total PM/PM₁₀/PM_{2.5} is the sum of filterable PM/PM₁₀/PM_{2.5} and condensable PM.

Emergency Generator Calculations

Fuel Usage-Based Pound per Gallon Emission Rates Based on the Fuel Consumption and the Hourly Emission Rate

Pollutant	Cummins QSK60 DQKAN Engines - Fuel Usage-Based Emission Factors (lb/gal) ^{2,3}						MTU 16V4000 DS2250 Engines - Fuel Usage-Based Emission Factors (lb/gal) ^{1,3}						Caterpillar 3516C Engines - Fuel Usage-Based Emission Factors (lb/gal) ^{2,3}					
	10% Load	25% Load	50% Load	75% Load	Full Standby	Maximum	10% Load	25% Load	50% Load	75% Load	Full Standby	Maximum	10% Load	25% Load ⁵	50% Load	75% Load	Full Standby	Maximum
Criteria Pollutants																		
NO _x	0.22	0.17	0.21	0.23	0.29	0.29	0.36	0.14	0.19	0.25	0.27	0.36	0.24	0.14	0.15	0.22	0.28	0.28
Controlled NO _x ⁴	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.01	0.02	0.02	0.03	0.04	0.02	0.01	0.02	0.02	0.03	0.03
CO	0.13	0.09	0.05	0.03	0.05	0.13	0.19	0.06	0.03	0.06	0.07	0.19	0.17	0.06	0.03	0.02	0.03	0.17
VOC	0.03	1.06E-02	6.60E-03	5.52E-03	4.18E-03	0.03	0.10	3.60E-02	1.48E-02	8.08E-03	5.42E-03	9.54E-02	0.03	1.68E-02	1.27E-02	9.04E-03	6.54E-03	0.03
Filt. PM	4.57E-03	1.41E-02	7.04E-03	4.60E-03	4.64E-03	0.01	0.03	8.89E-03	2.85E-03	6.40E-03	4.84E-03	3.46E-02	0.01	5.87E-03	3.40E-03	2.26E-03	1.87E-03	0.01
PM/PM ₁₀ /PM _{2.5} ⁵	0.01	1.52E-02	8.10E-03	5.65E-03	5.70E-03	0.02	0.04	9.94E-03	3.91E-03	7.45E-03	5.90E-03	3.56E-02	0.01	6.93E-03	4.45E-03	3.32E-03	2.92E-03	0.01
SO ₂	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04
Hazardous Air Pollutants																		
Benzene	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04
Toluene	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05
Xylenes	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05
Formaldehyde	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05
Acetaldehyde	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06
Acrolein	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06
Total PAH	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05
Total HAP	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04
Pollutant	Cummins QSK38-G18 C1500D6E Engines - Fuel Usage-Based Emission Factors (lb/gal) ^{2,3}						MTU 18V2000G76S DS1250 Engines - Fuel Usage-Based Emission Factors (lb/gal) ^{1,3}						Caterpillar 3516C Engines - Fuel Usage-Based Emission Factors (lb/gal) ^{2,3}					
	10% Load	25% Load	50% Load	75% Load	Full Standby	Maximum	10% Load	25% Load ⁵	50% Load	75% Load	Full Standby	Maximum	10% Load	25% Load ⁵	50% Load	75% Load	Full Standby	Maximum
Criteria Pollutants																		
NO _x	--	0.16	0.21	0.24	0.43	0.43	0.39	0.26	0.22	0.23	0.28	0.39	0.64	0.33	0.29	0.27	0.42	0.64
Controlled NO _x ⁴	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CO	--	0.08	0.06	0.04	0.02	0.08	0.16	0.09	0.03	0.01	0.01	0.16	0.36	0.12	0.05	0.02	0.02	0.36
VOC	--	8.73E-03	3.90E-03	3.11E-03	3.33E-03	0.01	0.11	3.36E-02	1.28E-02	7.90E-03	7.64E-03	0.11	1.34E-01	3.94E-02	1.15E-02	7.29E-03	5.78E-03	0.13
Filt. PM	--	6.35E-03	8.68E-03	3.55E-03	9.51E-04	0.01	0.01	2.99E-03	2.79E-03	1.68E-03	1.04E-03	0.01	1.82E-02	6.42E-03	3.38E-03	1.46E-03	8.66E-04	0.02
PM/PM ₁₀ /PM _{2.5} ⁵	--	7.40E-03	9.73E-03	4.61E-03	2.01E-03	0.01	0.01	4.05E-03	3.84E-03	2.74E-03	2.10E-03	0.01	1.93E-02	7.48E-03	4.44E-03	2.51E-03	1.92E-03	0.02
SO ₂	--	2.08E-04	2.08E-04	2.08E-04	2.08E-04	0.00	0.00	2.08E-04	2.08E-04	2.08E-04	2.08E-04	0.00	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04	2.08E-04
Hazardous Air Pollutants																		
Benzene	--	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04	1.06E-04
Toluene	--	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05	3.85E-05
Xylenes	--	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05	2.64E-05
Formaldehyde	--	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05
Acetaldehyde	--	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06	3.45E-06
Acrolein	--	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06	1.08E-06
Total PAH	--	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05	2.91E-05
Total HAP	--	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04

Notes:

- For engine-specific emission factors:
Per-Gallon Emissions at Load X (lb/gal/gen) = (Emission Factor at Load X (g/kw-hr) x Engine Power at Load X (kw/gen) / (453.6 g/lb)) / (Engine-Specific Fuel Usage at Load X (gal/hr))
- For engine-specific emission factors:
Per-Gallon Emissions at Load X (lb/gal/gen) = (Emission Factor at Load X (g/bhp-hr) x Engine Power at Load X (bhp/gen) / (453.6 g/lb)) / (Engine-Specific Fuel Usage at Load X (gal/hr))
- For AP-42 emission factors:
Per-Gallon Emissions at Load X (lb/gal/gen) = (Emission Factor (lb/MMBtu) x Heat Input at Load X (MMBtu/hr/gen)) / (Engine-Specific Fuel Usage at Load X (gal/hr))
- The only models that may be SCR-controlled are the Cummins QSK60 DQKAN Engines, MTU 16V4000 DS2250 Engines, and Caterpillar 3516C Engines; if SCR is installed NOx will be controlled 90%. All other units will be operated as uncontrolled.
- Total PM/PM₁₀/PM_{2.5} is the sum of filterable PM/PM₁₀/PM_{2.5} and condensable PM.

Emergency Generator Calculations

Site-Wide Potential Uncontrolled NO_x Emissions based on Load-Based Pound per Hour Emission Rates

			Pounds of NO _x Emissions at Each Load per Generator (lbs/hr/tonn) ¹					Tons of NO _x Emissions at Each Load per Generator (tons/yr/gen)					Tons of NO _x at Each Load for all Generators (tons/yr)					Totals	Sitewide NO _x Emissions
			<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%		
New Critical Generators²	No SCR	With SCR																	
Cummins QSK60 DQKAN	168	0	97.77	57.46	102.42	212.26	677.27	0.05	0.03	0.05	0.11	0.34	8.21	4.83	8.60	17.83	56.89	96.36	99.56
MTU 16V4000 DS2250																			
Caterpillar 3516C																			
New House Generators¹	No SCR	With SCR	<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%		
Cummins QSK38-G18 C1500D6E	6	0	53.04	58.32	110.57	178.94	665.64	0.03	0.03	0.06	0.09	0.33	0.16	0.17	0.33	0.54	2.00	3.20	
MTU 18V2000G76S DS1250																			
MTU 16V2000G86S DS1000																			

Notes:

- (1) The NO_x emissions are calculated by using the worst-case emission factor between all possible make/model types for each corresponding generator type (critical or house).
(2) The SAT14 facility will include 168 critical generators and 6 house generators. The critical generators could be any combination of the 2.25 MWe generators. The new house generators could be any of the 1 MWe, 1.25 MWe, or 1.5 MWe gens listed. See manufacturer specifications for more detail.

Site-Wide Potential CO Emissions based on Load-Based Pound per Hour Emission Rates

			Pounds of CO Emissions at Each Load per Generator (lbs/hr/tonn) ¹					Tons of CO Emissions at Each Load per Generator (tons/yr/gen)					Tons of CO at Each Load for all Generators (tons/yr)					Totals	Sitewide CO Emissions
			<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%		
New Critical Generators²	No SCR	With SCR																	
Cummins QSK60 DQKAN	168	0	50.72	28.99	25.98	50.75	178.10	0.03	0.01	0.01	0.03	0.09	4.26	2.44	2.18	4.26	14.96	28.10	28.54
MTU 16V4000 DS2250																			
Caterpillar 3516C																			
New House Generators¹	No SCR	With SCR	<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%		
Cummins QSK38-G18 C1500D6E	6	0	26.61	25.00	32.25	33.57	29.68	1.33E-02	1.25E-02	1.61E-02	1.68E-02	1.48E-02	0.08	0.08	0.10	0.10	0.09	0.44	
MTU 18V2000G76S DS1250																			
MTU 16V2000G86S DS1000																			

Notes:

- (1) The CO emissions are calculated by using the worst-case emission factor between all possible make/model types for each corresponding generator type (critical or house).
(2) The SAT14 facility will include 168 critical generators and 6 house generators. The critical generators could be any combination of the 2.25 MWe generators. The new house generators could be any of the 1 MWe, 1.25 MWe, or 1.5 MWe gens listed. See manufacturer specifications for more detail.

Site-Wide Potential VOC Emissions based on Load-Based Pound per Hour Emission Rates

			Pounds of VOC Emissions at Each Load per Generator (lbs/hr/tonn) ¹					Tons of VOC Emissions at Each Load per Generator (tons/yr/gen)					Tons of VOC at Each Load for all Generators (tons/yr)					Totals	Sitewide VOC Emissions
			<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%		
New Critical Generators²	No SCR	With SCR																	
Cummins QSK60 DQKAN	168	0	25.75	12.35	7.61	7.91	15.62	0.01	0.01	3.81E-03	3.96E-03	0.01	2.16	1.04	0.64	0.66	1.31	5.82	5.94
MTU 16V4000 DS2250																			
Caterpillar 3516C																			
New House Generators¹	No SCR	With SCR	<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%	<=10%	11%-25%	26%-50%	51%-75%	76%-100%		
Cummins QSK38-G18 C1500D6E	6	0	14.23	7.55	5.17	4.69	9.97	0.01	3.78E-03	2.59E-03	2.35E-03	4.99E-03	0.04	0.02	0.02	0.01	0.03	0.12	
MTU 18V2000G76S DS1250																			
MTU 16V2000G86S DS1000																			

Notes:

- (1) The VOC emissions are calculated by using the worst-case emission factor between all possible make/model types for each corresponding generator type (critical or house).
(2) The SAT14 facility will include 168 critical generators and 6 house generators. The critical generators could be any combination of the 2.25 MWe generators. The new house generators could be any of the 1 MWe, 1.25 MWe, or 1.5 MWe gens listed. See manufacturer specifications for more detail.

Emergency Generator Calculations

Site-Wide Potential PM Emissions based on Load-Based Pound per Hour Emission Rates

			Pounds of PM Emissions at Each Load per Generator (lbs/yr/gen) ¹					Tons of PM Emissions at Each Load per Generator (tons/yr/gen)					Tons of PM at Each Load for all Generators (tons/yr)					Totals	Sitewide PM Emissions	
New Critical Generators ²			No SCR	With SCR	<=10%	<=25%	26%-50%	51%-75%	76%-100%	<=10%	<=25%	26%-50%	51%-75%	76%-100%	<=10%	<=25%	26%-50%			51%-75%
Cummins QSK60 DQKAN	168	0	9.62	5.10	3.98	6.42	14.43	4.81E-03	2.55E-03	1.99E-03	3.21E-03	0.01	0.81	0.43	0.33	0.54	1.21	3.32	3.37	
MTU 16V4000 DS2250																				
Caterpillar 3516C																				
New House Generators ¹			No SCR	With SCR	<=10%	<=25%	26%-50%	51%-75%	76%-100%	<=10%	<=25%	26%-50%	51%-75%	76%-100%	<=10%	<=25%	26%-50%	51%-75%		76%-100%
Cummins QSK38-G18 C1500D6E	6	0	1.79	2.33	5.17	3.48	3.13	8.96E-04	1.17E-03	2.58E-03	1.74E-03	1.57E-03	0.01	0.01	0.02	0.01	0.01	0.05		
MTU 18V2000G76S DS1250																				
MTU 16V2000G86S DS1000																				

Notes:

- (1) The PM emissions are calculated by using the worst-case emission factor between all possible make/model types for each corresponding generator type (critical or house).
 (2) The SAT14 facility will include 168 critical generators and 6 house generators. The critical generators could be any combination of the 2.25 MWe generators. The new house generators could be any of the 1 MWe, 1.25 MWe, or 1.5 MWe gens listed. See manufacturer specifications for more detail.

Site-Wide Potential SO₂ Emissions based on Load-Based Pound per Hour Emission Rates

			Pounds of SO ₂ Emissions at Each Load per Generator (lbs/hr/gen) ¹					Tons of SO ₂ Emissions at Each Load per Generator (tons/yr/gen)					Tons of SO ₂ at Each Load for all Generators (tons/yr)					Totals	Sitewide SO ₂ Emissions	
			<=10%	<=25%	26%-50%	51%-75%	76%-100%	<=10%	<=25%	26%-50%	51%-75%	76%-100%	<=10%	<=25%	26%-50%	51%-75%	76%-100%			
New Critical Generators ²			No SCR	With SCR																
Cummins QSK60 DQKAN	168	0																		0.08
MTU 16V4000 DS2250																				
Caterpillar 3516C																				
New House Generators ¹			No SCR	With SCR																
Cummins QSK38-G18 C1500D6E	6	0																		
MTU 18V2000G76S DS1250																				
MTU 16V2000G86S DS1000																				

Notes:

- (1) The SO₂ emissions are calculated by using the worst-case emission factor between all possible make/model types for each corresponding generator type (critical or house).
 (2) The SAT14 facility will include 168 critical generators and 6 house generators. The critical generators could be any combination of the 2.25 MWe generators. The new house generators could be any of the 1 MWe, 1.25 MWe, or 1.5 MWe gens listed. See manufacturer specifications for more detail.

Site-Wide Potential Criteria Pollutant Emissions based on Maximum Pound per Hour Emission Rates

Pollutant	Total Potential Annual Emissions for Uncontrolled House Generators [All Purposes] (tpy)	Total Potential Annual Emissions for Uncontrolled Critical Generators ¹ [All Purposes] (tpy)	Total Potential Annual Emissions for All Generators [All Purposes] (tpy)
NO _x	3.20	96.36	99.56
CO	0.44	28.10	28.54
VOC	0.12	5.82	5.94
PM/PM ₁₀ /PM _{2.5}	0.05	3.32	3.37
SO ₂	2.05E-03	0.08	0.08
Hazardous Air Pollutants²			
Benzene	1.05E-03	0.04	0.04
Toluene	3.81E-04	0.01	0.02
Xylenes	2.62E-04	0.01	0.01
Formaldehyde	1.07E-04	4.11E-03	4.22E-03
Acetaldehyde	3.42E-05	1.31E-03	1.35E-03
Acrolein	1.07E-05	4.11E-04	4.21E-04
Total PAH	2.87E-04	0.01	0.01
Total HAP	2.13E-03	0.08	0.08

Notes:

- (1) Critical generators may be operated with or without an SCR. Calculations presented for this application are without SCR, as this represents a worst case emissions scenario.
 (2) The HAPs are calculated using the max fuel consumption rate across all engines to provide a conservative assumption of HAP emissions

APPENDIX B:

TABLE 29 AND GENERATOR VENDOR DATA

Texas Commission on Environmental Quality
Table 29 Reciprocating Engines

I. Engine Data											
Manufacturer: TBD		Model No. TBD		Serial No. TBD		Manufacture Date: TBD					
Rebuilds Date: N/A		No. of Cylinders: TBD		Compression Ratio: TBD		EPN: See Attached Table					
Application: ☐ Gas Compression ☐ Electric Generation ☐ Refrigeration ☒ Emergency/Stand by											
☒ 4 Stroke Cycle ☐ 2 Stroke Cycle ☐ Carbureted ☐ Spark Ignited ☐ Dual Fuel ☐ Fuel Injected											
☒ Diesel ☐ Naturally Aspirated ☐ Blower /Pump Scavenged ☐ Turbo Charged and I.C. ☐ Turbo Charged											
☐ Intercooled ☐ I.C. Water Temperature ☐ Lean Burn ☐ Rich Burn											
Ignition/Injection Timing:		Fixed:				Variable:					
Manufacture Horsepower Rating: TBD						Proposed Horsepower Rating: TBD					
Discharge Parameters											
Stack Height (Feet)		Stack Diameter (Feet)		Stack Temperature (°F)				Exit Velocity (FPS)			
				TBD							
II. Fuel Data											
Type of Fuel: ☐ Field Gas ☐ Landfill Gas ☐ LP Gas ☐ Natural Gas ☐ Digester Gas ☒ Diesel											
Fuel Consumption (gal/hr): TBD				Higher Heating Value:				Lower Heating Value			
Sulfur Content (grains/100 scf - weight %): 5 ppm											
III. Emission Factors (Before Control)											
NO _x		CO		SO ₂		VOC		Formaldehyde		PM ₁₀	
g/hp-hr	ppmv	g/hp-hr	ppm v	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppm v	g/hp-hr	ppmv
13.28		6.89		4.57E-03		3.50		2.38E-04		1.27	
Source of Emission Factors: ☒ Manufacturer Data ☒ AP-42 ☐ Other (specify):											
IV. Emission Factors (Post Control)											
NO _x		CO		SO ₂		VOC		Formaldehyde		PM ₁₀	
g/hp-hr	ppmv	g/hp-hr	ppm v	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppm v	g/hp-hr	ppmv
Method of Emission Control: ☐ NSCR Catalyst ☐ Lean Operation ☐ Parameter Adjustment ☐ Stratified Charge ☐ JLCC Catalyst ☐ Other (Specify):											
Note: Must submit a copy of any manufacturer control information that demonstrates control efficiency.											
Is Formaldehyde included in the VOCs?										☐ Yes ☒ No	
V. Federal and State Standards (Check all that apply)											
☐ NSPS JJJJ ☒ MACT ZZZZ ☒ NSPS IIII ☐ Title 30 Chapter 117 - List County: _____											
VI. Additional Information											
1. Submit a copy of the engine manufacturer's site rating or general rating specification data. 2. Submit a typical fuel gas analysis, including sulfur content and heating value. For gaseous fuels, provide mole percent of constituents. 3. Submit description of air/fuel ratio control system (manufacturer information is acceptable).											

Flex Critical Engine Inventory

EPN	Serial Number	Manufacture Date
SAT14A_GEN1	TBD	TBD
SAT14A_GEN2	TBD	TBD
SAT14A_GEN3	TBD	TBD
SAT14A_GEN4	TBD	TBD
SAT14A_GEN5	TBD	TBD
SAT14A_GEN6	TBD	TBD
SAT14A_GEN7	TBD	TBD
SAT14A_GEN8	TBD	TBD
SAT14A_GEN9	TBD	TBD
SAT14A_GEN10	TBD	TBD
SAT14A_GEN11	TBD	TBD
SAT14A_GEN12	TBD	TBD
SAT14A_GEN13	TBD	TBD
SAT14A_GEN14	TBD	TBD
SAT14A_GEN15	TBD	TBD
SAT14A_GEN16	TBD	TBD
SAT14A_GEN17	TBD	TBD
SAT14A_GEN18	TBD	TBD
SAT14A_GEN19	TBD	TBD
SAT14A_GEN20	TBD	TBD
SAT14A_GEN21	TBD	TBD
SAT14A_GEN22	TBD	TBD
SAT14A_GEN23	TBD	TBD
SAT14A_GEN24	TBD	TBD
SAT14A_GEN25	TBD	TBD
SAT14A_GEN26	TBD	TBD
SAT14A_GEN27	TBD	TBD
SAT14A_GEN28	TBD	TBD
SAT14A_GEN29	TBD	TBD
SAT14A_GEN30	TBD	TBD
SAT14A_GEN31	TBD	TBD
SAT14A_GEN32	TBD	TBD
SAT14A_GEN33	TBD	TBD
SAT14A_GEN34	TBD	TBD
SAT14A_GEN35	TBD	TBD
SAT14A_GEN36	TBD	TBD
SAT14A_GEN37	TBD	TBD
SAT14A_GEN38	TBD	TBD
SAT14A_GEN39	TBD	TBD
SAT14A_GEN40	TBD	TBD

SAT14A_GEN41	TBD	TBD
SAT14A_GEN42	TBD	TBD
SAT14A_GEN43	TBD	TBD
SAT14A_GEN44	TBD	TBD
SAT14A_GEN45	TBD	TBD
SAT14A_GEN46	TBD	TBD
SAT14A_GEN47	TBD	TBD
SAT14A_GEN48	TBD	TBD
SAT14A_GEN49	TBD	TBD
SAT14A_GEN50	TBD	TBD
SAT14A_GEN51	TBD	TBD
SAT14A_GEN52	TBD	TBD
SAT14A_GEN53	TBD	TBD
SAT14A_GEN54	TBD	TBD
SAT14A_GEN55	TBD	TBD
SAT14A_GEN56	TBD	TBD
SAT14A_GEN57	TBD	TBD
SAT14A_GEN58	TBD	TBD
SAT14A_GEN59	TBD	TBD
SAT14A_GEN60	TBD	TBD
SAT14A_GEN61	TBD	TBD
SAT14A_GEN62	TBD	TBD
SAT14A_GEN63	TBD	TBD
SAT14A_GEN64	TBD	TBD
SAT14A_GEN65	TBD	TBD
SAT14A_GEN66	TBD	TBD
SAT14A_GEN67	TBD	TBD
SAT14A_GEN68	TBD	TBD
SAT14A_GEN69	TBD	TBD
SAT14A_GEN70	TBD	TBD
SAT14A_GEN71	TBD	TBD
SAT14A_GEN72	TBD	TBD
SAT14A_GEN73	TBD	TBD
SAT14A_GEN74	TBD	TBD
SAT14A_GEN75	TBD	TBD
SAT14A_GEN76	TBD	TBD
SAT14A_GEN77	TBD	TBD
SAT14A_GEN78	TBD	TBD
SAT14A_GEN79	TBD	TBD
SAT14A_GEN80	TBD	TBD
SAT14A_GEN81	TBD	TBD
SAT14A_GEN82	TBD	TBD
SAT14A_GEN83	TBD	TBD
SAT14A_GEN84	TBD	TBD
SAT14B_GEN1	TBD	TBD
SAT14B_GEN2	TBD	TBD
SAT14B_GEN3	TBD	TBD

SAT14B_GEN4	TBD	TBD
SAT14B_GEN5	TBD	TBD
SAT14B_GEN6	TBD	TBD
SAT14B_GEN7	TBD	TBD
SAT14B_GEN8	TBD	TBD
SAT14B_GEN9	TBD	TBD
SAT14B_GEN10	TBD	TBD
SAT14B_GEN11	TBD	TBD
SAT14B_GEN12	TBD	TBD
SAT14B_GEN13	TBD	TBD
SAT14B_GEN14	TBD	TBD
SAT14B_GEN15	TBD	TBD
SAT14B_GEN16	TBD	TBD
SAT14B_GEN17	TBD	TBD
SAT14B_GEN18	TBD	TBD
SAT14B_GEN19	TBD	TBD
SAT14B_GEN20	TBD	TBD
SAT14B_GEN21	TBD	TBD
SAT14B_GEN22	TBD	TBD
SAT14B_GEN23	TBD	TBD
SAT14B_GEN24	TBD	TBD
SAT14B_GEN25	TBD	TBD
SAT14B_GEN26	TBD	TBD
SAT14B_GEN27	TBD	TBD
SAT14B_GEN28	TBD	TBD
SAT14B_GEN29	TBD	TBD
SAT14B_GEN30	TBD	TBD
SAT14B_GEN31	TBD	TBD
SAT14B_GEN32	TBD	TBD
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SAT14B_GEN36	TBD	TBD
SAT14B_GEN37	TBD	TBD
SAT14B_GEN38	TBD	TBD
SAT14B_GEN39	TBD	TBD
SAT14B_GEN40	TBD	TBD
SAT14B_GEN41	TBD	TBD
SAT14B_GEN42	TBD	TBD
SAT14B_GEN43	TBD	TBD
SAT14B_GEN44	TBD	TBD
SAT14B_GEN45	TBD	TBD
SAT14B_GEN46	TBD	TBD
SAT14B_GEN47	TBD	TBD
SAT14B_GEN48	TBD	TBD
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SAT14B_GEN50	TBD	TBD

SAT14B_GEN51	TBD	TBD
SAT14B_GEN52	TBD	TBD
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SAT14B_GEN54	TBD	TBD
SAT14B_GEN55	TBD	TBD
SAT14B_GEN56	TBD	TBD
SAT14B_GEN57	TBD	TBD
SAT14B_GEN58	TBD	TBD
SAT14B_GEN59	TBD	TBD
SAT14B_GEN60	TBD	TBD
SAT14B_GEN61	TBD	TBD
SAT14B_GEN62	TBD	TBD
SAT14B_GEN63	TBD	TBD
SAT14B_GEN64	TBD	TBD
SAT14B_GEN65	TBD	TBD
SAT14B_GEN66	TBD	TBD
SAT14B_GEN67	TBD	TBD
SAT14B_GEN68	TBD	TBD
SAT14B_GEN69	TBD	TBD
SAT14B_GEN70	TBD	TBD
SAT14B_GEN71	TBD	TBD
SAT14B_GEN72	TBD	TBD
SAT14B_GEN73	TBD	TBD
SAT14B_GEN74	TBD	TBD
SAT14B_GEN75	TBD	TBD
SAT14B_GEN76	TBD	TBD
SAT14B_GEN77	TBD	TBD
SAT14B_GEN78	TBD	TBD
SAT14B_GEN79	TBD	TBD
SAT14B_GEN80	TBD	TBD
SAT14B_GEN81	TBD	TBD
SAT14B_GEN82	TBD	TBD
SAT14B_GEN83	TBD	TBD
SAT14B_GEN84	TBD	TBD

Performance Number: EM6222

Change Level: 01

SALES MODEL:	3516C	COMBUSTION:	DIRECT INJECTION
BRAND:	CAT	ENGINE SPEED (RPM):	1,800
MACHINE SALES MODEL:		HERTZ:	60
ENGINE POWER (BHP):	3,379	FAN POWER (HP):	130.1
GEN POWER WITH FAN (EKW):	2,250.0	ASPIRATION:	TA
COMPRESSION RATIO:	14.7	AFTERCOOLER TYPE:	ATAAC
RATING LEVEL:	MISSION CRITICAL STANDBY	AFTERCOOLER CIRCUIT TYPE:	JW+OC, ATAAC
PUMP QUANTITY:	1	INLET MANIFOLD AIR TEMP (F):	122
FUEL TYPE:	DIESEL	JACKET WATER TEMP (F):	219.2
MANIFOLD TYPE:	DRY	TURBO CONFIGURATION:	PARALLEL
GOVERNOR TYPE:	ADEM3	TURBO QUANTITY:	4
ELECTRONICS TYPE:	ADEM3	TURBOCHARGER MODEL:	GT6041BN-48T-1.10
CAMSHAFT TYPE:	STANDARD	CERTIFICATION YEAR:	2022
IGNITION TYPE:	CI	CRANKCASE BLOWBY RATE (FT3/HR):	3,619.4
INJECTOR TYPE:	EUI	FUEL RATE (RATED RPM) NO LOAD (GAL/HR):	16.0
FUEL INJECTOR:	3920221	PISTON SPD @ RATED ENG SPD (FT/MIN):	2,539.4
UNIT INJECTOR TIMING (IN):	64.34		
REF EXH STACK DIAMETER (IN):	12		
MAX OPERATING ALTITUDE (FT):	2,953		

INDUSTRY	SUBINDUSTRY	APPLICATION
ELECTRIC POWER	STANDARD	PACKAGED GENSET
OIL AND GAS	LAND PRODUCTION	PACKAGED GENSET

General Performance Data

THIS STANDBY RATING IS FOR A STANDBY ONLY ENGINE ARRANGEMENT. RERATING THE ENGINE TO A PRIME OR CONTINUOUS RATING IS NOT PERMITTED.

THE INLET MANIFOLD AIR TEMP LISTED IN THE HEADER, AND IN THE GENERAL PERFORMANCE DATA, IS THE AVERAGE INLET MANIFOLD TEMP FRONT TO REAR ON THE ENGINE.

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	BRAKE MEAN EFF PRES (BMEP)	BRAKE SPEC FUEL CONSUMPTN (BSFC)	ISO BRAKE SPEC FUEL CONSUMPTN (BSFC)	VOL FUEL CONSUMPTN (VFC)	ISO VOL FUEL CONSUMPTN (VFC)	ELEC SPEC FUEL CONSUMPTN (ESFC)	ISO ELEC SPEC FUEL CONSUMPTN (ESFC)
EKW	%	BHP	PSI	LB/BHP-HR	LB/BHP-HR	GAL/HR	GAL/HR	LB/EKW-HR	LB/EKW-HR
2,250.0	100	3,374	312	0.335	0.328	159.2	156.2	0.502	0.492
2,025.0	90	3,050	282	0.338	0.331	145.2	142.4	0.509	0.499
1,800.0	80	2,726	252	0.343	0.336	131.8	129.2	0.519	0.509
1,687.5	75	2,563	237	0.346	0.339	125.0	122.7	0.526	0.516
1,575.0	70	2,401	222	0.350	0.343	118.3	116.1	0.533	0.523
1,350.0	60	2,077	192	0.358	0.351	104.9	102.9	0.551	0.541
1,125.0	50	1,752	162	0.368	0.361	91.0	89.2	0.574	0.563
900.0	40	1,428	132	0.377	0.370	75.9	74.4	0.598	0.587
675.0	30	1,103	102	0.390	0.383	60.7	59.5	0.637	0.625
562.5	25	941	87	0.400	0.392	53.0	52.0	0.669	0.656
450.0	20	779	72	0.407	0.399	44.7	43.8	0.704	0.691
225.0	10	455	42	0.453	0.444	29.0	28.5	0.914	0.897

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	INLET MFLD PRES	INLET MFLD TEMP	EXH MFLD TEMP	EXH MFLD PRES	ENGINE OUTLET TEMP	COMPRESSOR OUTLET PRES	COMPRESSOR OUTLET TEMP
EKW	%	BHP	IN-HG	DEG F	DEG F	IN-HG	DEG F	IN-HG	DEG F
2,250.0	100	3,374	73.1	120.0	1,200.9	62.9	831.1	79	449.4
2,025.0	90	3,050	66.7	117.7	1,168.2	57.3	814.6	73	426.3
1,800.0	80	2,726	60.0	115.6	1,143.1	51.7	803.6	66	402.1
1,687.5	75	2,563	56.6	114.5	1,131.8	48.9	798.2	62	389.5
1,575.0	70	2,401	53.1	113.6	1,121.5	46.1	792.6	58	376.7
1,350.0	60	2,077	45.8	111.9	1,103.7	40.3	781.6	51	350.5
1,125.0	50	1,752	37.5	110.4	1,081.5	34.0	773.0	42	321.2
900.0	40	1,428	27.9	108.8	1,047.3	26.6	767.3	32	282.4
675.0	30	1,103	19.1	107.5	987.7	20.1	741.8	23	234.7
562.5	25	941	14.9	106.8	942.3	17.1	717.7	18	209.9
450.0	20	779	10.8	106.0	863.4	14.1	672.8	14	186.4
225.0	10	455	4.1	103.8	674.7	9.4	542.9	7	149.6

General Performance Data (Continued)

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	WET INLET AIR VOL FLOW RATE	ENGINE OUTLET WET EXH GAS VOL FLOW RATE	WET INLET AIR MASS FLOW RATE	WET EXH GAS MASS FLOW RATE	WET EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)	DRY EXH VOL FLOW RATE (32 DEG F AND 29.98 IN HG)
EKW	%	BHP	CFM	CFM	LB/HR	LB/HR	FT3/MIN	FT3/MIN
2,250.0	100	3,374	6,858.2	17,407.1	30,365.3	31,494.0	6,630.5	6,037.5
2,025.0	90	3,050	6,489.6	16,154.5	28,654.3	29,680.3	6,233.1	5,692.3
1,800.0	80	2,726	6,087.8	15,004.0	26,862.9	27,791.8	5,839.4	5,345.3
1,687.5	75	2,563	5,872.3	14,427.7	25,926.6	26,809.3	5,639.6	5,167.8
1,575.0	70	2,401	5,647.2	13,834.3	24,963.3	25,801.3	5,431.5	4,981.7
1,350.0	60	2,077	5,158.9	12,527.3	22,833.7	23,578.6	4,962.2	4,559.4
1,125.0	50	1,752	4,572.7	11,023.3	20,251.8	20,897.8	4,396.8	4,044.9
900.0	40	1,428	3,860.7	9,269.3	17,111.4	17,649.6	3,714.5	3,419.8
675.0	30	1,103	3,239.5	7,617.3	14,362.7	14,794.6	3,117.1	2,877.2
562.5	25	941	2,947.8	6,779.0	13,070.3	13,446.6	2,830.8	2,618.8
450.0	20	779	2,658.3	5,843.7	11,787.4	12,106.6	2,537.2	2,356.0
225.0	10	455	2,196.2	4,258.9	9,730.2	9,935.9	2,088.6	1,962.8

Heat Rejection Data

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	REJECTION TO JACKET WATER	REJECTION TO ATMOSPHERE	REJECTION TO EXH	EXHAUST RECOVERY TO 350F	FROM OIL COOLER	FROM AFTERCOOLER	WORK ENERGY	LOW HEAT VALUE ENERGY	HIGH HEAT VALUE ENERGY
EKW	%	BHP	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN	BTU/MIN
2,250.0	100	3,374	44,961	8,695	131,476	63,993	18,438	40,758	143,102	346,181	368,770
2,025.0	90	3,050	42,398	8,278	120,387	58,091	16,816	35,879	129,344	315,723	336,324
1,800.0	80	2,726	39,796	7,978	110,538	53,009	15,259	31,108	115,585	286,488	305,182
1,687.5	75	2,563	38,475	7,859	105,617	50,468	14,481	28,765	108,706	271,872	289,612
1,575.0	70	2,401	37,140	7,759	100,698	47,928	13,702	26,451	101,827	257,256	274,043
1,350.0	60	2,077	34,339	7,618	90,867	42,630	12,145	22,036	88,068	228,026	242,905
1,125.0	50	1,752	31,319	7,440	80,442	36,985	10,536	17,258	74,310	197,807	210,714
900.0	40	1,428	27,975	7,134	68,114	30,787	8,786	11,958	60,551	164,955	175,718
675.0	30	1,103	24,301	6,592	55,504	24,155	7,025	7,409	46,792	131,892	140,498
562.5	25	941	22,280	6,232	48,971	20,544	6,140	5,467	39,913	115,281	122,803
450.0	20	779	19,891	5,781	40,969	16,154	5,174	3,811	33,033	97,146	103,485
225.0	10	455	15,117	4,928	26,069	7,803	3,359	1,778	19,275	63,071	67,186

Sound Data

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:1.5 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	118.0	108.0	123.0	119.0	111.0
2,025.0	90	3,050	117.0	107.0	122.0	118.0	110.0
1,800.0	80	2,726	116.0	106.0	121.0	117.0	109.0
1,687.5	75	2,563	115.0	106.0	120.0	116.0	108.0
1,575.0	70	2,401	115.0	105.0	120.0	116.0	108.0
1,350.0	60	2,077	114.0	104.0	119.0	115.0	107.0
1,125.0	50	1,752	112.0	103.0	117.0	113.0	105.0
900.0	40	1,428	111.0	101.0	116.0	112.0	104.0
675.0	30	1,103	109.0	99.0	114.0	110.0	102.0
562.5	25	941	108.0	98.0	113.0	109.0	101.0
450.0	20	779	107.0	97.0	112.0	108.0	100.0
225.0	10	455	105.0	95.0	110.0	106.0	98.0

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:1.5 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
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PERFORMANCE DATA[EM6222]

January 21, 2025

EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	110.0	111.0	111.0	109.0
2,025.0	90	3,050	109.0	110.0	110.0	108.0
1,800.0	80	2,726	107.0	109.0	109.0	107.0
1,687.5	75	2,563	107.0	108.0	108.0	106.0
1,575.0	70	2,401	106.0	108.0	107.0	105.0
1,350.0	60	2,077	105.0	106.0	106.0	104.0
1,125.0	50	1,752	104.0	105.0	105.0	103.0
900.0	40	1,428	102.0	104.0	103.0	101.0
675.0	30	1,103	101.0	102.0	102.0	100.0
562.5	25	941	100.0	101.0	101.0	99.0
450.0	20	779	99.0	100.0	100.0	98.0
225.0	10	455	96.0	98.0	97.0	96.0

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:7 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	105.0	96.0	113.0	107.0	98.0
2,025.0	90	3,050	104.0	95.0	112.0	106.0	97.0
1,800.0	80	2,726	103.0	94.0	111.0	105.0	96.0
1,687.5	75	2,563	102.0	93.0	110.0	104.0	96.0
1,575.0	70	2,401	101.0	93.0	109.0	104.0	95.0
1,350.0	60	2,077	100.0	92.0	108.0	102.0	94.0
1,125.0	50	1,752	99.0	90.0	107.0	101.0	92.0
900.0	40	1,428	97.0	89.0	105.0	100.0	91.0
675.0	30	1,103	96.0	87.0	104.0	98.0	89.0
562.5	25	941	95.0	86.0	103.0	97.0	88.0
450.0	20	779	94.0	85.0	102.0	96.0	87.0
225.0	10	455	91.0	83.0	99.0	94.0	85.0

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:7 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	97.0	97.0	97.0	95.0
2,025.0	90	3,050	96.0	96.0	96.0	93.0
1,800.0	80	2,726	95.0	95.0	95.0	92.0
1,687.5	75	2,563	94.0	95.0	95.0	92.0
1,575.0	70	2,401	93.0	94.0	94.0	91.0
1,350.0	60	2,077	92.0	93.0	93.0	90.0
1,125.0	50	1,752	91.0	92.0	91.0	89.0
900.0	40	1,428	89.0	90.0	90.0	87.0
675.0	30	1,103	88.0	88.0	88.0	86.0
562.5	25	941	87.0	87.0	87.0	85.0
450.0	20	779	86.0	87.0	86.0	84.0
225.0	10	455	83.0	84.0	84.0	81.0

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:15 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	98.0	89.0	106.0	100.0	92.0
2,025.0	90	3,050	97.0	88.0	105.0	99.0	91.0
1,800.0	80	2,726	96.0	87.0	104.0	98.0	90.0
1,687.5	75	2,563	95.0	87.0	103.0	98.0	89.0
1,575.0	70	2,401	95.0	86.0	103.0	97.0	88.0
1,350.0	60	2,077	94.0	85.0	102.0	96.0	87.0
1,125.0	50	1,752	92.0	84.0	100.0	94.0	86.0
900.0	40	1,428	91.0	82.0	99.0	93.0	84.0
675.0	30	1,103	89.0	80.0	97.0	91.0	83.0
562.5	25	941	88.0	80.0	96.0	90.0	82.0
450.0	20	779	87.0	79.0	95.0	89.0	81.0
225.0	10	455	85.0	76.0	93.0	87.0	78.0

PERFORMANCE DATA[EM6222]

January 21, 2025

EXHAUST:SOUND PRESSURE(OBCF) DISTANCE:15 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	90.0	91.0	91.0	88.0
2,025.0	90	3,050	89.0	90.0	90.0	87.0
1,800.0	80	2,726	88.0	89.0	88.0	86.0
1,687.5	75	2,563	87.0	88.0	88.0	85.0
1,575.0	70	2,401	87.0	87.0	87.0	85.0
1,350.0	60	2,077	86.0	86.0	86.0	83.0
1,125.0	50	1,752	84.0	85.0	85.0	82.0
900.0	40	1,428	83.0	83.0	83.0	81.0
675.0	30	1,103	81.0	82.0	82.0	79.0
562.5	25	941	80.0	81.0	81.0	78.0
450.0	20	779	79.0	80.0	80.0	77.0
225.0	10	455	77.0	78.0	77.0	75.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:1 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	105.0	92.0	100.0	101.0	99.0
2,025.0	90	3,050	105.0	92.0	100.0	101.0	99.0
1,800.0	80	2,726	105.0	92.0	100.0	101.0	99.0
1,687.5	75	2,563	105.0	92.0	100.0	101.0	99.0
1,575.0	70	2,401	105.0	92.0	100.0	101.0	99.0
1,350.0	60	2,077	105.0	92.0	100.0	101.0	99.0
1,125.0	50	1,752	105.0	92.0	100.0	101.0	99.0
900.0	40	1,428	105.0	92.0	100.0	101.0	99.0
675.0	30	1,103	105.0	92.0	100.0	101.0	99.0
562.5	25	941	105.0	92.0	100.0	101.0	99.0
450.0	20	779	105.0	92.0	100.0	101.0	99.0
225.0	10	455	105.0	92.0	100.0	101.0	99.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:1 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	100.0	101.0	99.0	103.0
2,025.0	90	3,050	100.0	101.0	99.0	103.0
1,800.0	80	2,726	100.0	101.0	99.0	103.0
1,687.5	75	2,563	100.0	101.0	99.0	103.0
1,575.0	70	2,401	100.0	101.0	99.0	103.0
1,350.0	60	2,077	100.0	101.0	99.0	103.0
1,125.0	50	1,752	100.0	101.0	99.0	103.0
900.0	40	1,428	100.0	101.0	99.0	103.0
675.0	30	1,103	100.0	101.0	99.0	103.0
562.5	25	941	100.0	101.0	99.0	103.0
450.0	20	779	100.0	101.0	99.0	103.0
225.0	10	455	100.0	101.0	99.0	103.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:7 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	94.0	81.0	88.0	89.0	87.0
2,025.0	90	3,050	94.0	81.0	88.0	89.0	87.0
1,800.0	80	2,726	94.0	81.0	88.0	89.0	87.0
1,687.5	75	2,563	94.0	81.0	88.0	89.0	87.0
1,575.0	70	2,401	94.0	81.0	88.0	89.0	87.0
1,350.0	60	2,077	94.0	81.0	88.0	89.0	87.0
1,125.0	50	1,752	94.0	81.0	88.0	89.0	87.0
900.0	40	1,428	94.0	81.0	88.0	89.0	87.0
675.0	30	1,103	94.0	81.0	88.0	89.0	87.0
562.5	25	941	94.0	81.0	88.0	89.0	87.0

450.0	20	779	94.0	81.0	88.0	89.0	87.0
225.0	10	455	94.0	81.0	88.0	89.0	87.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:7 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	89.0	90.0	87.0	91.0
2,025.0	90	3,050	89.0	90.0	87.0	91.0
1,800.0	80	2,726	89.0	90.0	87.0	91.0
1,687.5	75	2,563	89.0	90.0	87.0	91.0
1,575.0	70	2,401	89.0	90.0	87.0	91.0
1,350.0	60	2,077	89.0	90.0	87.0	91.0
1,125.0	50	1,752	89.0	90.0	87.0	91.0
900.0	40	1,428	89.0	90.0	87.0	91.0
675.0	30	1,103	89.0	90.0	87.0	91.0
562.5	25	941	89.0	90.0	87.0	91.0
450.0	20	779	89.0	90.0	87.0	91.0
225.0	10	455	89.0	90.0	87.0	91.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:15 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	OVERALL SOUND	63 HZ	125 HZ	250 HZ	500 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	88.0	76.0	83.0	84.0	82.0
2,025.0	90	3,050	88.0	76.0	83.0	84.0	82.0
1,800.0	80	2,726	88.0	76.0	83.0	84.0	82.0
1,687.5	75	2,563	88.0	76.0	83.0	84.0	82.0
1,575.0	70	2,401	88.0	76.0	83.0	84.0	82.0
1,350.0	60	2,077	88.0	76.0	83.0	84.0	82.0
1,125.0	50	1,752	88.0	76.0	83.0	84.0	82.0
900.0	40	1,428	88.0	76.0	83.0	84.0	82.0
675.0	30	1,103	88.0	76.0	83.0	84.0	82.0
562.5	25	941	88.0	76.0	83.0	84.0	82.0
450.0	20	779	88.0	76.0	83.0	84.0	82.0
225.0	10	455	88.0	76.0	83.0	84.0	82.0

MECHANICAL:SOUND PRESSURE(OBCF) DISTANCE:15 METER

GENSET POWER WITH FAN	PERCENT LOAD	ENGINE POWER	1000 HZ	2000 HZ	4000 HZ	8000 HZ
EKW	%	BHP	dB(A)	dB(A)	dB(A)	dB(A)
2,250.0	100	3,374	83.0	84.0	82.0	86.0
2,025.0	90	3,050	83.0	84.0	82.0	86.0
1,800.0	80	2,726	83.0	84.0	82.0	86.0
1,687.5	75	2,563	83.0	84.0	82.0	86.0
1,575.0	70	2,401	83.0	84.0	82.0	86.0
1,350.0	60	2,077	83.0	84.0	82.0	86.0
1,125.0	50	1,752	83.0	84.0	82.0	86.0
900.0	40	1,428	83.0	84.0	82.0	86.0
675.0	30	1,103	83.0	84.0	82.0	86.0
562.5	25	941	83.0	84.0	82.0	86.0
450.0	20	779	83.0	84.0	82.0	86.0
225.0	10	455	83.0	84.0	82.0	86.0

Emissions Data

DIESEL

RATED SPEED NOMINAL DATA: 1800 RPM

GENSET POWER WITH	EKW	2,250.0	1,687.5	1,125.0	562.5	225.0
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PERFORMANCE DATA[EM6222]

January 21, 2025

FAN						
PERCENT LOAD	%	100	75	50	25	10
ENGINE POWER	BHP	3,374	2,563	1,752	941	455
TOTAL NOX (AS NO2)	G/HR	16,908	10,163	5,286	2,744	2,641
TOTAL CO	G/HR	1,114	674	628	861	1,201
TOTAL HC	G/HR	361	388	396	303	339
TOTAL CO2	KG/HR	1,614	1,257	902	517	278
PART MATTER	G/HR	100.9	89.2	98.5	97.9	96.6
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	2,253.1	1,706.2	1,248.8	1,114.3	1,971.4
TOTAL CO (CORR 5% O2)	MG/NM3	153.8	118.7	153.7	368.3	948.1
TOTAL HC (CORR 5% O2)	MG/NM3	43.4	60.0	84.2	112.2	233.9
PART MATTER (CORR 5% O2)	MG/NM3	11.5	12.9	20.7	35.9	64.2
TOTAL NOX (AS NO2) (CORR 15% O2)	MG/NM3	836.1	633.1	463.4	413.5	731.5
TOTAL CO (CORR 15% O2)	MG/NM3	57.1	44.1	57.0	136.6	351.8
TOTAL HC (CORR 15% O2)	MG/NM3	16.1	22.3	31.3	41.6	86.8
PART MATTER (CORR 15% O2)	MG/NM3	4.3	4.8	7.7	13.3	23.8
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,097	831	608	543	960
TOTAL CO (CORR 5% O2)	PPM	123	95	123	295	759
TOTAL HC (CORR 5% O2)	PPM	81	112	157	209	437
TOTAL NOX (AS NO2) (CORR 15% O2)	PPM	407	308	226	201	356
TOTAL CO (CORR 15% O2)	PPM	46	35	46	109	281
TOTAL HC (CORR 15% O2)	PPM	30	42	58	78	162
TOTAL NOX (AS NO2)	G/HP-HR	5.06	4.00	3.04	2.94	5.86
TOTAL CO	G/HP-HR	0.33	0.27	0.36	0.92	2.67
TOTAL HC	G/HP-HR	0.11	0.15	0.23	0.32	0.75
PART MATTER	G/HP-HR	0.03	0.04	0.06	0.11	0.21
TOTAL NOX (AS NO2)	G/KW-HR	6.88	5.44	4.14	4.00	7.97
TOTAL CO	G/KW-HR	0.45	0.36	0.49	1.26	3.63
TOTAL HC	G/KW-HR	0.15	0.21	0.31	0.44	1.02
PART MATTER	G/KW-HR	0.04	0.05	0.08	0.14	0.29
TOTAL NOX (AS NO2)	LB/HR	37.28	22.40	11.65	6.05	5.82
TOTAL CO	LB/HR	2.46	1.49	1.39	1.90	2.65
TOTAL HC	LB/HR	0.80	0.85	0.87	0.67	0.75
TOTAL CO2	LB/HR	3,558	2,772	1,989	1,140	612
PART MATTER	LB/HR	0.22	0.20	0.22	0.22	0.21
OXYGEN IN EXH	%	9.7	10.6	11.4	12.4	14.7
DRY SMOKE OPACITY	%	1.2	1.5	2.1	2.7	3.7
BOSCH SMOKE NUMBER		0.78	0.81	0.87	0.98	1.11

RATED SPEED POTENTIAL SITE VARIATION: 1800 RPM

GENSET POWER WITH FAN		EKW	2,250.0	1,687.5	1,125.0	562.5	225.0
PERCENT LOAD	%	100	75	50	25	10	
ENGINE POWER	BHP	3,374	2,563	1,752	941	455	
TOTAL NOX (AS NO2)	G/HR	20,290	12,195	6,343	3,293	3,170	
TOTAL CO	G/HR	2,006	1,214	1,131	1,550	2,162	
TOTAL HC	G/HR	480	516	527	403	451	
PART MATTER	G/HR	141.2	124.9	137.9	137.1	135.2	
TOTAL NOX (AS NO2) (CORR 5% O2)	MG/NM3	2,703.7	2,047.4	1,498.6	1,337.2	2,365.7	
TOTAL CO (CORR 5% O2)	MG/NM3	276.9	213.7	276.6	662.9	1,706.6	
TOTAL HC (CORR 5% O2)	MG/NM3	57.8	79.8	112.1	149.2	311.0	
PART MATTER (CORR 5% O2)	MG/NM3	16.1	18.1	28.9	50.3	89.8	
TOTAL NOX (AS NO2) (CORR 15% O2)	MG/NM3	1,003.3	759.7	556.1	496.2	877.8	
TOTAL CO (CORR 15% O2)	MG/NM3	102.7	79.3	102.7	246.0	633.3	
TOTAL HC (CORR 15% O2)	MG/NM3	21.4	29.6	41.6	55.4	115.4	
PART MATTER (CORR 15% O2)	MG/NM3	6.0	6.7	10.7	18.7	33.3	
TOTAL NOX (AS NO2) (CORR 5% O2)	PPM	1,317	997	730	651	1,152	
TOTAL CO (CORR 5% O2)	PPM	222	171	221	530	1,365	
TOTAL HC (CORR 5% O2)	PPM	108	149	209	278	581	
TOTAL NOX (AS NO2) (CORR 15% O2)	PPM	489	370	271	242	428	
TOTAL CO (CORR 15% O2)	PPM	82	63	82	197	507	
TOTAL HC (CORR 15% O2)	PPM	40	55	78	103	215	
TOTAL NOX (AS NO2)	G/HP-HR	6.07	4.80	3.65	3.53	7.04	
TOTAL CO	G/HP-HR	0.60	0.48	0.65	1.66	4.80	
TOTAL HC	G/HP-HR	0.14	0.20	0.30	0.43	1.00	
PART MATTER	G/HP-HR	0.04	0.05	0.08	0.15	0.30	
TOTAL NOX (AS NO2)	G/KW-HR	8.25	6.53	4.97	4.80	9.57	
TOTAL CO	G/KW-HR	0.82	0.65	0.89	2.26	6.53	
TOTAL HC	G/KW-HR	0.20	0.28	0.41	0.59	1.36	
PART MATTER	G/KW-HR	0.06	0.07	0.11	0.20	0.41	
TOTAL NOX (AS NO2)	LB/HR	44.73	26.89	13.98	7.26	6.99	
TOTAL CO	LB/HR	4.42	2.68	2.49	3.42	4.77	
TOTAL HC	LB/HR	1.06	1.14	1.16	0.89	0.99	

PART MATTER	LB/HR	0.31	0.28	0.30	0.30	0.30
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Regulatory Information

EPA EMERGENCY STATIONARY			2011 - ----	
GASEOUS EMISSIONS DATA MEASUREMENTS PROVIDED TO THE EPA ARE CONSISTENT WITH THOSE DESCRIBED IN EPA 40 CFR PART 60 SUBPART IIII AND ISO 8178 FOR MEASURING HC, CO, PM, AND NOX. THE "MAX LIMITS" SHOWN BELOW ARE WEIGHTED CYCLE AVERAGES AND ARE IN COMPLIANCE WITH THE EMERGENCY STATIONARY REGULATIONS.				
Locality	Agency	Regulation	Tier/Stage	Max Limits - G/BKW - HR
U.S. (INCL CALIF)	EPA	STATIONARY	EMERGENCY STATIONARY	CO: 3.5 NOx + HC: 6.4 PM: 0.20

Altitude Derate Data

STANDARD

ALTITUDE CORRECTED POWER CAPABILITY (BHP)

AMBIENT OPERATING TEMP (F)	30	40	50	60	70	80	90	100	110	120	130	140	NORMAL
ALTITUDE (FT)													
0	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,244	3,379
1,000	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,356	3,299	3,176	3,379
2,000	3,379	3,379	3,379	3,379	3,379	3,379	3,379	3,351	3,292	3,236	3,176	2,872	3,379
3,000	3,373	3,373	3,373	3,373	3,373	3,350	3,289	3,230	3,173	3,119	2,872	2,500	3,373
4,000	3,258	3,258	3,258	3,258	3,258	3,228	3,169	3,113	3,058	2,906	2,534	2,061	3,258
5,000	3,147	3,147	3,147	3,147	3,147	3,110	3,053	2,999	2,940	2,568	2,061	1,690	3,147
6,000	3,040	3,040	3,040	3,040	3,040	2,995	2,941	2,888	2,568	2,095	1,690	1,419	3,040
7,000	2,937	2,937	2,937	2,937	2,937	2,884	2,831	2,602	2,129	1,723	1,453	1,250	2,937
8,000	2,838	2,838	2,838	2,838	2,828	2,776	2,534	2,163	1,723	1,453	1,250	1,115	2,838
9,000	2,743	2,743	2,743	2,743	2,669	2,433	2,095	1,757	1,487	1,284	1,115	1,014	2,743
10,000	2,651	2,651	2,651	2,568	2,298	1,960	1,723	1,487	1,284	1,149	1,014	912	2,651
11,000	2,563	2,563	2,433	2,129	1,825	1,622	1,453	1,284	1,149	1,047	946	879	2,500
12,000	2,478	2,298	1,994	1,723	1,554	1,385	1,284	1,149	1,047	946	879		2,163
13,000	2,163	1,858	1,622	1,453	1,318	1,216	1,149	1,047	946	879			1,858
14,000	1,757	1,554	1,385	1,284	1,183	1,115	1,014	946	879				1,622
15,000	1,487	1,352	1,216	1,149	1,081	1,014	946	879					1,419

Cross Reference

Test Spec	Setting	Engine Arrangement	Engineering Model	Engineering Model Version	Start Effective Serial Number	End Effective Serial Number
5958066	LL2883	6250804	PG243	-	LYM00001	

Supplementary Data

Type	Classification	Performance Number
SOUND	SOUND PRESSURE	DM8779

Performance Parameter Reference

Parameters Reference:DM9600-15
PERFORMANCE DEFINITIONS

PERFORMANCE DATA[EM6222]

January 21, 2025

PERFORMANCE DEFINITIONS DM9600

APPLICATION:

Engine performance tolerance values below are representative of a typical production engine tested in a calibrated dynamometer test cell at SAE J1995 standard reference conditions. Caterpillar maintains ISO9001:2000 certified quality management systems for engine test Facilities to assure accurate calibration of test equipment. Engine test data is corrected in accordance with SAE J1995. Additional reference material SAE J1228, J1349, ISO 8665, 3046-1:2002E, 3046-3:1989, 1585, 2534, 2288, and 9249 may apply in part or are similar to SAE J1995. Special engine rating request (SERR) test data shall be noted.

PERFORMANCE PARAMETER TOLERANCE FACTORS:

Power +/- 3%

Torque +/- 3%

Exhaust stack temperature +/- 8%

Inlet airflow +/- 5%

Intake manifold pressure-gage +/- 10%

Exhaust flow +/- 6%

Specific fuel consumption +/- 3%

Specific fuel consumption (C7-C18) +/- 4%

Fuel rate +/- 5%

Specific DEF consumption +/- 3%

DEF rate +/- 5%

Heat rejection +/- 5%

Heat rejection exhaust only +/- 10%

Heat rejection CEM only +/- 10%

Heat Rejection values based on using treated water.

Torque is included for truck and industrial applications, do not use for Gen Set or steady state applications.

On C7 - C18 engines, at speeds of 1100 RPM and under these values are provided for reference only, and may not meet the tolerance listed.

On 3500 and C175 engines, at speeds below Peak Torque these values are provided for reference only, and may not meet the tolerance listed.

These values do not apply to C280/3600. For these models, see the tolerances listed below.

C280/3600 HEAT REJECTION TOLERANCE FACTORS:

Heat rejection +/- 10%

Heat rejection to Atmosphere +/- 50%

Heat rejection to Lube Oil +/- 20%

Heat rejection to Aftercooler +/- 5%

TEST CELL TRANSDUCER TOLERANCE FACTORS:

Torque +/- 0.5%

Speed +/- 0.2%

Fuel flow +/- 1.0%

Temperature +/- 2.0 C degrees

Intake manifold pressure +/- 0.1 kPa

OBSERVED ENGINE PERFORMANCE IS CORRECTED TO SAE J1995 REFERENCE

AIR AND FUEL CONDITIONS.

REFERENCE ATMOSPHERIC INLET AIR

FOR 3500 ENGINES AND SMALLER

SAE J1228 AUG2002 for marine engines, and J1995 JAN2014 for other engines, reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity at the stated aftercooler water temp, or inlet manifold temp.

FOR 3600 ENGINES

Engine rating obtained and presented in accordance with ISO 3046/1 and SAE J1995 JANJAN2014 reference atmospheric pressure is 100 KPA (29.61 in hg), and standard temperature is 25deg C (77 deg F) at 30% relative humidity and 150M altitude at the stated aftercooler water temperature.

MEASUREMENT LOCATION FOR INLET AIR TEMPERATURE

Location for air temperature measurement air cleaner inlet at stabilized operating conditions.

REFERENCE EXHAUST STACK DIAMETER

The Reference Exhaust Stack Diameter published with this dataset is only used for the calculation of Smoke Opacity values displayed in this dataset. This value does not necessarily represent the actual stack diameter of the engine due to the variety of exhaust stack adapter options available. Consult the price list, engine order or general dimension drawings for the actual stack diameter size ordered or options available.

REFERENCE FUEL

DIESEL

Reference fuel is #2 distillate diesel with a 35API gravity;

A lower heating value is 42,780 KJ/KG (18,390 BTU/LB) when used at 15 deg C (59 deg F), where the density is 850 G/Liter (7.0936 Lbs/Gal).

GAS

Reference natural gas fuel has a lower heating value of 33.74 KJ/L (905 BTU/CU Ft). Low BTU ratings are based on 18.64 KJ/L (500 BTU/CU FT) lower heating value gas. Propane ratings are based on 87.56 KJ/L (2350 BTU/CU Ft) lower heating value gas.

ENGINE POWER (NET) IS THE CORRECTED FLYWHEEL POWER

PERFORMANCE DATA[EM6222]

January 21, 2025

(GROSS) LESS

EXTERNAL AUXILIARY LOAD

Engine corrected gross output includes the power required to drive standard equipment; lube oil, scavenge lube oil, fuel transfer, common rail fuel, separate circuit aftercooler and jacket water pumps. Engine net power available for the external (flywheel) load is calculated by subtracting the sum of auxiliary load from the corrected gross flywheel output power. Typical auxiliary loads are radiator cooling fans, hydraulic pumps, air compressors and battery charging alternators. For Tier 4 ratings additional Parasitic losses would also include Intake, and Exhaust Restrictions.

ALTITUDE CAPABILITY

Altitude capability is the maximum altitude above sea level at standard temperature and standard pressure at which the engine could develop full rated output power on the current performance data set.

Standard temperature values versus altitude could be seen on TM2001.

When viewing the altitude capability chart the ambient temperature is the inlet air temp at the compressor inlet.

Engines with ADEM MEUI and HEUI fuel systems operating at conditions above the defined altitude capability derate for atmospheric pressure and temperature conditions outside the values defined, see TM2001.

Mechanical governor controlled unit injector engines require a setting change for operation at conditions above the altitude defined on the engine performance sheet. See your Caterpillar technical representative for non standard ratings.

REGULATIONS AND PRODUCT COMPLIANCE

TMI Emissions information is presented at 'nominal' and 'Potential Site Variation' values for standard ratings. No tolerances are applied to the emissions data. These values are subject to change at any time. The controlling federal and local emission requirements need to be verified by your Caterpillar technical representative.

Customer's may have special emission site requirements that need to be verified by the Caterpillar Product Group engineer.

EMISSION CYCLE LIMITS:

Cycle emissions Max Limits apply to cycle-weighted averages only. Emissions at individual load points may exceed the cycle-weighted limit.

WET & DRY EXHAUST/EMISSIONS DESCRIPTION:

Wet - Total exhaust flow or concentration of total exhaust flow

Dry - Total exhaust flow minus water vapor or concentration of exhaust flow with water vapor excluded

EMISSIONS DEFINITIONS:

Emissions : DM1176

EMISSION CYCLE DEFINITIONS

1. For constant-speed marine engines for ship main propulsion, including,diesel-electric drive, test cycle E2 shall be applied, for controllable-pitch propeller sets test cycle E2 shall be applied.
2. For propeller-law-operated main and propeller-law-operated auxiliary engines the test cycle E3 shall be applied.
3. For constant-speed auxiliary engines test cycle D2 shall be applied.
4. For variable-speed, variable-load auxiliary engines, not included above, test cycle C1 shall be applied.

HEAT REJECTION DEFINITIONS:

Diesel Circuit Type and HHV Balance : DM9500

HIGH DISPLACEMENT (HD) DEFINITIONS:

3500: EM1500

RATING DEFINITIONS:

Agriculture : TM6008

Fire Pump : TM6009

Generator Set : TM6035

Generator (Gas) : TM6041

Industrial Diesel : TM6010

Industrial (Gas) : TM6040

Irrigation : TM5749

Locomotive : TM6037

Marine Auxiliary : TM6036

Marine Prop (Except 3600) : TM5747

Marine Prop (3600 only) : TM5748

MSHA : TM6042

Oil Field (Petroleum) : TM6011

Off-Highway Truck : TM6039

On-Highway Truck : TM6038

SOUND DEFINITIONS:

Sound Power : DM8702

Sound Pressure : TM7080

Date Released : 03/12/24



April 25th, 2024

To Whom It May Concern:

With regards to Cummins Power Systems (CPS) manufactured diesel generator set model **DQKAN** rated for 60 Hz operation and equipped with Cummins **QSK60 – G19** engine:

When tested under the following conditions:

Table 1	
Fuel Specification:	ASTM D975 No. 2-D S15 diesel fuel with 0.0015% sulfur content (by weight), and 42-48 cetane number.
Air Inlet Temperature:	77 °F
Fuel Inlet Temperature:	104 °F (at fuel pump inlet)
Barometric Pressure:	29.53 in. Hg
Humidity:	NOx measurement corrected to 75 grains H ₂ O/lb. dry air

Based on engine emissions validation testing, the table below represents the nominal performance and exhaust emissions data for the generator set listed above:

Standby						
PERFORMANCE DATA	10%	25%	50%	75%	90%	100%
Electrical Power (kWe)	225	563	1125	1688	2025	2250
Engine Power (BHP at 1800 RPM/60Hz)	385	854	1637	2419	2889	3202
Fuel Consumption (US Gal/hr)	26	48	82	116	138	152
Exhaust Gas Flow (CFM)	4195	6436	10110	13438	15353	16444
Exhaust Gas Temperature (°F)	596	795	881	890	907	921
NOx (Oxides of Nitrogen)	5.54	3.54	3.84	4.11	4.51	5.07
NMHC (Nonmethane Hydrocarbons)	0.49	0.16	0.09	0.07	0.06	0.05
CO (Carbon Monoxide)	2.0	1.1	0.6	0.3	0.4	0.5
PM (Particulate Matter)	0.07	0.18	0.08	0.05	0.05	0.05
All emissions values above are cited as g/bhp-hr						

Steady-State emissions recorded per ISO8178-1 during operation at rated engine speed (+/-2%) and stated constant load (+/-2%) with engine temperatures, pressures and emission rates stabilized.

The NOx, HC, CO, and PM emission data tabulated here are representative of test data taken from a single engine under the test conditions shown above. Data for the other components are estimated. This data is subject to instrumentation and engine-to-engine variability. Field emissions test data is not guaranteed to these levels. Actual field test results may vary due to test ambient, site conditions, installation, fuel specification, test procedures, instrumentation and ambient correction factors. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.



Values provided in the table below are representative of "Potential Site Variation" for the Cyrus One SAT VI site in SAN ANTONIO, TEXAS. These values account for variances as indicated above without consideration of improper generator set maintenance.

Standby						
PERFORMANCE DATA	10%	25%	50%	75%	90%	100%
Electrical Power (kWe)	225	563	1125	1688	2025	2250
Engine Power (BHP at 1800 RPM/60Hz)	385	854	1637	2419	2889	3202
NOx (Oxides of Nitrogen)	6.83	4.36	4.73	5.07	5.56	6.25
NMHC (Nonmethane Hydrocarbons)	0.83	0.27	0.15	0.12	0.10	0.09
CO (Carbon Monoxide)	4.0	2.2	1.2	0.6	0.8	1.0
PM (Particulate Matter)	0.14	0.36	0.16	0.10	0.10	0.10
All emissions values above are cited as g/bhp-hr						
Potential Site variation values provided above are accounted for Engine, Ambient variation and measurement with no correction factors.						

The values in this letter are applicable for engines operating on ASTM D975 DF2 and paraffinic fuels conforming to EN15940, including Hydrotreated Vegetable Oil (HVO). Please consult Fluids for Cummins Engines bulletin # 3379001 for more information on the applicability of HVO.

The data and information provided in this letter is for informational purposes to assist customers in making purchasing decisions appropriate for their site-specific compliance needs. Owners/operators of compression ignition internal combustion engines are responsible for ensuring compliance with applicable local, state, and federal standards when CI engines are installed at the owner/operator site. The data and information contained herein regarding site variation values in particular should be considered as part of a site-specific compliance evaluation.

This letter does not supersede any of the commercial terms of sale, including, but not limited to, warranty coverage and compliance with law obligations. THE INFORMATION IN THIS LETTER IS PROVIDED "AS IS" AND WITH ALL FAULTS AND DEFECTS. CUMMINS DOES NOT WARRANT THE ACCURACY OF THE INFORMATION PROVIDED AND THIS LETTER SHOULD NOT BE SHARED WITH THIRD PARTIES WITHOUT CUMMINS PRIOR WRITTEN CONSENT. For further questions on this product or application, please contact the local Cummins Sales and Service representative.

Best Regards,

Rina Pineda Alvarado
Application Engineer – Strategic Accounts (Data Center)
Cummins Power Generation



Diesel Generator Set

MTU 16V4000 DS2250 50 °C

2,250 kWe/60 Hz/Standby/380 - 13,800V

System ratings

Voltage (L-L)	380V ^{† ‡}	416V ^{† ‡}	440V ^{† ‡}	480V ^{† ‡}	600V [‡]
Phase	3	3	3	3	3
PF	0.8	0.8	0.8	0.8	0.8
Hz	60	60	60	60	60
kW	2,250	2,250	2,250	2,250	2,250
kVA	2,812	2,812	2,812	2,812	2,812
Amps	4,273	3,903	3,691	3,383	2,706
skVA@30% voltage dip	6,885	5,573	4,047	4,914	6,271
Generator model*	841-L75	841-L75	641-VL95	641-VL90	841-S60
Temp rise	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C
Connection	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE

Voltage (L-L)	4,160V	12,470V	13,200V	13,800V
Phase	3	3	3	3
PF	0.8	0.8	0.8	0.8
Hz	60	60	60	60
kW	2,250	2,250	2,250	2,250
kVA	2,812	2,812	2,812	2,812
Amps	390	130	123	117
skVA@30% voltage dip	5,852	4,266	4,017	4,390
Generator model*	841-S60	4P6.6-2800	4P6.6-2800	4P6.6-2800
Temp rise	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C
Connection	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE

* Consult the factory for alternate configuration. Generator model may end with -M or -R, depending on selection.

[†] UL 2200 offered

[‡] CSA offered

Certifications and standards

- Emissions
 - EPA Tier 2 certified
- Generator set is designed and manufactured in facilities certified to standards ISO 9001:2008 and ISO 14001:2004
- Seismic certification – optional
 - IBC certification
 - OSHPD pre-approval
- UL 2200 – optional (refer to *System ratings* for availability)
- CSA – optional (refer to *System ratings* for availability)
 - CSA C22.2 No. 100
 - CSA C22.2 No. 14
- Performance Assurance Certification (PAC)
 - Generator set tested to ISO 8528-5 for transient response
 - Verified product design, quality, and performance integrity
 - All engine systems are prototype and factory tested
- Power rating
 - Accepts rated load in one step per NFPA 110
 - Permissible average power output during 24 hours of operation is approved up to 85%

Standard features*

- MTU is a single source supplier
- Global product support
- 2 year standard warranty
- 16V4000 diesel engine
 - 76.3 liter displacement
 - Common rail fuel injection
 - 4-cycle
- Complete range of accessories
- Cooling system
 - Integral set-mounted
 - Engine-driven fan
- Generator
 - Brushless, rotating field generator
 - 2/3 pitch windings
 - PMG (Permanent Magnet Generator) supply to regulator
 - 300% short circuit capability
- Digital control panel(s)
 - UL recognized, CSA certified, NFPA 110
 - Complete system metering
 - LCD display

Standard equipment*

Engine

- Air cleaners
- Oil pump
- Oil drain extension and S/O valve
- Full flow oil filter
- Closed crankcase ventilation
- Jacket water pump
- Inter cooler water pump
- Thermostats
- Blower fan and fan drive
- Radiator - unit mounted
- Electric starting motor - 24V
- Governor – electronic isochronous
- Base - structural steel
- SAE flywheel and bell housing
- Charging alternator - 24V
- Battery box and cables
- Flexible fuel connectors
- Flexible exhaust connection
- EPA certified engine
- Digital, solid state, volts-per-hertz regulator
- No load to full load regulation
- Brushless alternator with brushless pilot exciter
- 4 pole, rotating field
- 130 °C maximum standby temperature rise
- 1-bearing, sealed
- Flexible coupling
- Full amortisseur windings
- 125% rotor balancing
- 3-phase voltage sensing
- ±0.25% voltage regulation
- 100% of rated load - one step
- 5% maximum total harmonic distortion

Digital control panel(s)

- Digital metering
- Engine parameters
- Generator protection functions
- Engine protection
- CANBus ECU communications
- Windows®-based software
- Multilingual capability
- Remote communications to RDP-110 remote annunciator
- Programmable input and output contacts
- UL recognized, CSA certified, CE approved
- Event recording
- IP 54 front panel rating with integrated gasket
- NFPA 110 compatible

Generator

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting
- Sustained short circuit current of up to 300% of the rated current for up to 10 seconds
- Self-ventilated and drip-proof
- Superior voltage waveform

Application data

Engine

Manufacturer	MTU
Model	16V4000G84S
Type	4-cycle
Arrangement	16-V
Displacement: L (in ³)	76.3 (4,656)
Bore: cm (in)	17 (6.69)
Stroke: cm (in)	21 (8.27)
Compression ratio	16.5:1
Rated rpm	1,800
Engine governor	electronic isochronous (ADEC)
Maximum power: kWm (bhp)	2,500 (3,353)
Speed regulation	± 0.25%
Air cleaner	dry

Liquid capacity (Lubrication)

Total oil system: L (gal)	300 (79.3)
Engine jacket water capacity: L (gal)	175 (46.2)
After cooler water capacity: L (gal)	50 (13.2)
System coolant capacity: L (gal)	719 (190)

Electrical

Electric volts DC	24
Cold cranking amps under -17.8 °C (0 °F)	2,800

Fuel system

Fuel supply connection size	-16 JIC 37° female 1" NPT adapter provided
Fuel return connection size	-16 JIC 37° female 1" NPT adapter provided
Maximum fuel lift: m (ft)	1 (3)
Recommended fuel	diesel #2
Total fuel flow: L/hr (gal/hr)	1,200 (317)

Fuel consumption

At 100% of power rating: L/hr (gal/hr)	617 (163)
At 75% of power rating: L/hr (gal/hr)	467 (123)
At 50% of power rating: L/hr (gal/hr)	325 (86)

Cooling - radiator system

Ambient capacity of radiator: °C (°F)	50 (122)
Maximum restriction of cooling air: intake and discharge side of radiator: kPa (in. H ₂ O)	0.12 (0.5)
Water pump capacity: L/min (gpm)	1,350 (357)
After cooler pump capacity: L/min (gpm)	583 (154)
Heat rejection to coolant: kW (BTUM)	930 (52,888)
Heat rejection to after cooler: kW (BTUM)	680 (38,671)
Heat radiated to ambient: kW (BTUM)	202.1 (11,493)
Fan power: kW (hp)	105.9 (142)

Air requirements

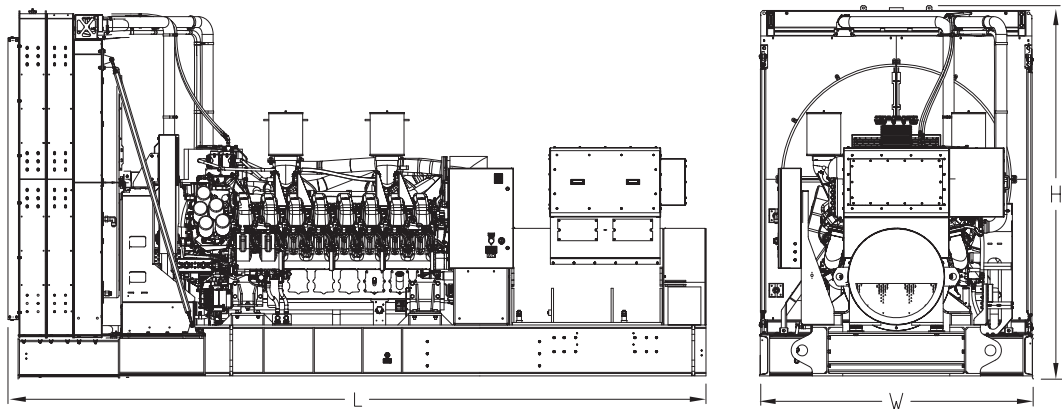
Aspirating: *m ³ /min (SCFM)	192 (6,780)
Air flow required for radiator cooled unit: *m ³ /min (SCFM)	3,089 (109,079)
Remote cooled applications; air flow required for dissipation of radiated generator set heat for a maximum of 25 °F rise: *m ³ /min (SCFM)	739 (26,241)

* Air density = 1.184 kg/m³ (0.0739 lbm/ft³)

Exhaust system

Gas temp. (stack): °C (°F)	505 (941)
Gas volume at stack temp: m ³ /min (CFM)	504 (17,799)
Maximum allowable back pressure at outlet of engine, before piping: kPa (in. H ₂ O)	8.5 (34.1)

Weights and dimensions



Drawing above for illustration purposes only, based on standard open power 480 volt generator set. Lengths may vary with other voltages. Do not use for installation design. See website for unit specific template drawings.

System	Dimensions (L x W x H)	Weight (less tank)
Open power unit (OPU)	6,474 x 2,539 x 3,434 mm (254.9 x 99.9 x 135.2 in)	21,554 kg (47,523 lb)

Weights and dimensions are based on open power units and are estimates only. Consult the factory for accurate weights and dimensions for your specific generator set.

Sound data

Unit type	Standby full load
Level O: Open power unit: dB(A)	98.7

Sound data is provided at 7 m (23 ft). Generator set tested in accordance with ISO 8528-10 and with infinite exhaust.

Emissions data

NO _x + NMHC	CO	PM
5.07	0.52	0.04

— All units are in g/hp-hr and shown at 100% load (not comparable to EPA weighted cycle values). Emission levels of the engine may vary with ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data was obtained in compliance with US EPA regulations. The weighted cycle value (not shown) from each engine is guaranteed to be within the US EPA standards.

Rating definitions and conditions

- Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. No overload capability for this rating. Ratings are in accordance with ISO 8528-1, ISO 3046-1, BS 5514, and AS 2789. Average load factor: ≤ 85%.
- Consult your local MTU Distributor for derating information.

From: Toby Morgan <toby.morgan@istate.com>

Sent: Wednesday, August 6, 2025 4:15 PM

To: Laura Cottrell <lcottrell@cyrusone.com>; David Meeks <david.meeks@istate.com>

Subject: RE: [External Message]RE: Generator Load/Fuel Consumption Correlation

Hey Laura,

MTU does not have this published at 25%, 10%, and no load consumptions so we had one of our engineers go through the MTU Engine Data and they have come up with the following:

- 25% load = 49 gal/hr
- 10% load = 27 gal/hr
- No-load fuel of 19.7 gal/hr,

Let us know any questions on this.

Thanks,

Toby Morgan | Power Generation Sales | Interstate Energy Systems

210 Alexandra Way, Carol Stream, IL 60188

C: 281-543-7404

www.istate.com | toby.morgan@istate.com

“Pride in Service”



Contents

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	16V4000G84S				
Rated power [kW]	2500				
Rated speed [rpm]	1800				
Application Group	3D				
Legislative body	EPA Stationary EMERG T2 (40CFR60)				
Test cycle	D2				
Data Set No.	XZ54854100579				
Data Set Basis	EPA Nonroad T2 (40CFR1039)				
Fuel sulphur content [ppm]	8.9				

Content	Page
Disclaimer	2
Emission data sheet (EDS)	3
Not to exceed emission values	5

		PDF	Name	Project no. na	Size
		Configurator	Ungermann, Stefanie (TARC)	Order no. na	A4
		Approver1	Kneifel, Alexander (TSLE)	EDS-ID	
		Approver2	Fraser, Neil (TSL)	2465-03.03.2023	
		Approver3		Title Emission data sheet	
		Approver4			
		User	NA/schroederch		
Description of Revision		Frequency		Engine model 16V4000G84S	
Data generated by EDS Creator version 1.0 and unipilot. Ref.-dataset: 19.010.44.02_RP117_042920_Cert 1800rpm_D2V2.0;1_D;1.nc for 800 in EDS platform.		All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.		Emissionstage EPA Stationary EMERG T2 (40CFR60)	
				Sheet 1	
				of	
Configuration-ID 800	Documentation Interstate needs for 2023	Emissionstage basis EPA Nonroad T2 (40CFR1039)		5	



General Disclaimers (valid for Measured and NTE values)

Please note that these data are physical and/or technical values only referring to and representing a normative defined operating condition. Any change in operating time and conditions will have impact on physical values and engine behavior, which must be considered and assessed within the complete propulsion system especially in regard to emission compliance and product safety.

Measurements listed in this EDS are representative of the listed engine rating at the time of testing. These measurements and results can change according to instrumentation, boundary condition, and engine to engine variability. In addition - changes to the engine family hard or software may occur which could result in changes to some of the listed values.

Emissions data measurement procedures are conducted according to applicable rules and standards as per "Emission Stage/Optimization". Potential deviations from these procedures are documented internally.

The listed emission values relate to the corresponding certification data. Seller doesn't take any responsibility or liability neither out or in connection with the contract nor on any other basis

- beyond these specified operating conditions of the engine
- and for any installation/modification of the entire propulsion system by the customer itself or any third party

and the customer will indemnify MTU on first demand for any third party claim out or in connection with this.

Seller reserves the right to amend specifications and information without notice and without obligation or liability. No liability for any errors, facts or opinions is accepted. Customers must satisfy themselves as to the suitability of this product for their application. No responsibility for any loss as a result of any person placing reliance on any material contained in this data sheet will be accepted.

Seller reserves all rights in the information contained in this data sheet. It shall not be reproduced, made available to a third party or otherwise used in any way whatsoever.

When applicable, emission values are measured after combined exhaust streams.

Measured Emissions data is based on single operating points and thus cannot be used to compare to regulations which use values based on a weighted cycle.

Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures, and instrumentation. Over time deterioration may occur which may have an impact on emission levels.

The SO₂ emission rates comprehend exclusively the SO₂ content as found in the fuel source, oil consumption effects are not included. Variation of sulfur content in the fuel changes only the stated SO₂ emissions, cross sensitivity to other emissions (e.g. particulates) is not possible.

All values based on metric units, inaccuracies for non metric values can occur, values are not binding.

Specific to gas engines: The listed emission values are based on gas composition at the time of certification measurement. Gas composition is as displayed in the EDS-document. Carbon dioxide and methane concentrations have direct influence on the corresponding displayed carbon dioxide and methane emissions.

EAT Specific Disclaimers (valid for EDS values)

NH₃ emissions levels measured with AVL SESAM i60/ 4 FT Multi Component Exhaust Measurement System (FTIR) including EPA 40 CFR 1065 legislation compliant automated checks for linearity.

Generators or engines with exhaust after-treatment systems require a stabilization period of approximately 1 hour to ensure stable temperatures across SCR prior to performing an emissions test. Performing emissions measurements before a stable temperature has been achieved can result in inconsistent emission values. NO_x Values only applicable if temperatures across SCR reached for DEF Dosing.

NTE Disclaimers (valid for NTE calculated values)

Calculated not to exceed values (NTE) are not proven by tests and therefore the accuracy is not guaranteed.

All emission data shown in chapters Emission Data Sheet, Not to Exceed Values, and Type Approval were gathered from a corresponding certification engine under test conditions shown above and complying to corresponding TEN data.

		PDF	Name	Project no. na	Size A4	
		Configurator	Ungermann, Stefanie (TARC)	Order no. na		
		Approver1	Kneifel, Alexander (TSLE)	EDS-ID		
		Approver2	Fraser, Neil (TSL)	2465-03.03.2023		
		Approver3		Title Emission data sheet		
Approver4						
User	NA/schroederch					
Description of Revision		Frequency		All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.		
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 19.010.44.02_RP117_042920_Cert 1800rpm_D2V2.0;1_D;1.nc for 800 in EDS platform.		Engine model 16V4000G84S				
		Emissionstage EPA Stationary EMERG T2 (40CFR60)				Sheet 2
		Emissionstage basis EPA Nonroad T2 (40CFR1039)				of 5
Configuration-ID 800		Documentation Interstate needs for 2023				



Engine data

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	16V4000G84S				
Application Group	3D				
Legislative body	EPA Stationary EMERG T2 (40CFR60)				
Test cycle	D2				
Fuel sulphur content [ppm]	8.9				
mg/mN ³ values base on residual oxygen value of [%]	Measured				

Engine raw emissions*

Cycle point	[-]	n1	n2	n3	n4	n5
Power	kW	2505	1879	1251	625	249
Power relative	[-]	1	0.75	0.5	0.25	0.1
Engine speed	rpm	1800	1800	1800	1800	1800
Engine speed relative	[-]	1	1	1	1	1
Filter smoke number	FSN	0.85	0.88	0.31	0.71	0.21
Exhaust temperature after ETC	grdC	531.9	463	422	369.2	248.4
Exhaust back pressure after ETC (static)	mbar	64	47	31	16	7
Exhaust back pressure after ETC (total)	mbar	76	56	37	19	9
Exhaust mass flow wet	kg/h	13464	11813	9687	7078	5065
NOX-Emissions specific	g/(bhp*h) g/kWh	4.71 6.32	4.2 5.63	3.39 4.55	2.47 3.31	6.99 9.37
SO2-Emissions specific	g/(bhp*h) g/kWh	0.003 0.004	0.003 0.004	0.003 0.004	0.004 0.005	0.004 0.006
CO-Emissions specific	g/(bhp*h) g/kWh	0.94 1.27	0.77 1.03	0.34 0.45	0.86 1.16	3.45 4.62
HC1-Emissions specific	g/(bhp*h) g/kWh	0.07 0.1	0.1 0.14	0.18 0.24	0.48 0.64	1.21 1.62
NMHC-Emissions specific	g/(bhp*h) g/kWh	0.07 0.1	0.1 0.14	0.18 0.24	0.48 0.64	1.21 1.62

		PDF	Name	Project no. na	Size A4
		Configurator	Ungermann, Stefanie (TARC)	Order no. na	
		Approver1	Kneifel, Alexander (TSLE)	EDS-ID	
		Approver2	Fraser, Neil (TSL)	2465-03.03.2023	
		Approver3		Title Emission data sheet	
Approver4					
User	NA/schroederch				
Engine model 16V4000G84S					
Description of Revision		Frequency		All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.	
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 19.010.44.02_RP117_042920_Cert 1800rpm_D2V2.0;1_D;1.nc for 800 in EDS platform.					
		Emissionstage			Sheet
		EPA Stationary EMERG T2 (40CFR60)			3
Configuration-ID 800		Documentation Interstate needs for 2023			of
		Emissionstage basis EPA Nonroad T2 (40CFR1039)			5



NOX+HC1-Emissions specific	g/(bhp*h)	4.78	4.3	3.57	2.94	8.2
	g/kWh	6.42	5.77	4.79	3.95	10.99
NOX+NMHC-Emissions specific	g/(bhp*h)	4.79	4.3	3.57	2.95	8.2
	g/kWh	6.42	5.77	4.79	3.95	10.99
CO2-Emissions specific	g/(bhp*h)	501.4	504	540.6	632.6	781.6
	g/kWh	672.4	675.9	725	848.4	1048
PM-Emissions specific (Meas.)	g/(bhp*h)	0.071	0.088	0.044	0.157	0.343
	g/kWh	0.095	0.118	0.059	0.211	0.46

		PDF		Name		Project no.		Size			
		Configurator		Ungermann, Stefanie (TARC)		Order no.		A4			
		Approver1		Kneifel, Alexander (TSLE)		EDS-ID					
		All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.		Approver2		Fraser, Neil (TSL)		2465-03.03.2023			
				Approver3							
				Approver4							
User				NA/schroederch							
Description of Revision		Frequency		Engine model 16V4000G84S		Title Emission data sheet					
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 19.010.44.02_RP117_042920_Cert 1800rpm_D2V2.0;1_D;1.nc for 800 in EDS platform.											
Configuration-ID 800		Documentation Interstate needs for 2023		Emissionstage						Sheet	
				EPA Stationary EMERG T2 (40CFR60)						4	
				Emissionstage basis						of	
				EPA Nonroad T2 (40CFR1039)						5	

Engine data

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	16V4000G84S				
Application Group	3D				
Legislative body	EPA Stationary EMERG T2 (40CFR60)				
Test cycle	D2				
Fuel sulphur content [ppm]	8.9				
mg/mN ³ values base on residual oxygen value of [%]	Measured				

Not to exceed emission values*

Cycle point	[-]	n1	n2	n3	n4	n5
Power	kW	2505	1879	1251	625	249
Power relative	[-]	1	0.75	0.5	0.25	0.1
Engine speed	rpm	1800	1800	1800	1800	1800
Engine speed relative	[-]	1	1	1	1	1
NOX-Emissions specific	g/(bhp*h) g/kWh	5.99 8.03	5.46 7.32	4.41 5.91	3.7 4.96	13.28 17.81
CO-Emissions specific	g/(bhp*h) g/kWh	1.61 2.15	1.31 1.75	0.64 0.86	1.72 2.31	6.89 9.24
HC1-Emissions specific	g/(bhp*h) g/kWh	0.12 0.16	0.18 0.24	0.34 0.46	0.95 1.28	3.5 4.69
NMHC-Emissions specific	g/(bhp*h) g/kWh	0.12 0.16	0.18 0.24	0.35 0.46	0.96 1.28	
NOX+HC1-Emissions specific	g/(bhp*h) g/kWh	6.11 8.2	5.63 7.55	4.75 6.37	4.65 6.24	16.78 22.5
NOX+NMHC-Emissions specific	g/(bhp*h) g/kWh	6.11 8.2	5.63 7.56	4.75 6.37	4.66 6.25	
PM-Emissions specific (Meas.)	g/(bhp*h) g/kWh	0.107 0.143	0.141 0.19	0.066 0.089	0.236 0.316	1.268 1.7

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			Configurator	Ungermann, Stefanie (TARC)	Order no. na	
			Approver1	Kneifel, Alexander (TSLE)	EDS-ID 2465-03.03.2023	
			Approver2	Fraser, Neil (TSL)	Title Emission data sheet	
			Approver3			
Approver4						
Description of Revision		Frequency	User	NA/schroederch		
Data generated by EDS Creator version 1.0 and unipilot. Ref.-dataset: 19.010.44.02_RP117_042920_Cert 1800rpm_D2V2.0;1_D;1.nc for 800 in EDS platform.			Engine model 16V4000G84S			
		Emissionstage EPA Stationary EMERG T2 (40CFR60)				Sheet 5
Configuration-ID 800	Documentation Interstate needs for 2023	Emissionstage basis EPA Nonroad T2 (40CFR1039)				of 5

Texas Commission on Environmental Quality
Table 29 Reciprocating Engines

I. Engine Data											
Manufacturer: TBD		Model No. TBD		Serial No. TBD		Manufacture Date: TBD					
Rebuilds Date: N/A		No. of Cylinders: TBD		Compression Ratio: TBD		EPN: See Attached Table					
Application: ☐ Gas Compression ☐ Electric Generation ☐ Refrigeration ☒ Emergency/Stand by											
☒ 4 Stroke Cycle ☐ 2 Stroke Cycle ☐ Carbureted ☐ Spark Ignited ☐ Dual Fuel ☐ Fuel Injected											
☒ Diesel ☐ Naturally Aspirated ☐ Blower /Pump Scavenged ☐ Turbo Charged and I.C. ☐ Turbo Charged											
☐ Intercooled ☐ I.C. Water Temperature ☐ Lean Burn ☐ Rich Burn											
Ignition/Injection Timing:		Fixed:				Variable:					
Manufacture Horsepower Rating: TBD						Proposed Horsepower Rating: TBD					
Discharge Parameters											
Stack Height (Feet)		Stack Diameter (Feet)		Stack Temperature (°F)		Exit Velocity (FPS)					
				TBD							
II. Fuel Data											
Type of Fuel: ☐ Field Gas ☐ Landfill Gas ☐ LP Gas ☐ Natural Gas ☐ Digester Gas ☒ Diesel											
Fuel Consumption (gal/hr): TBD				Higher Heating Value:				Lower Heating Value			
Sulfur Content (grains/100 scf - weight %): 5 ppm											
III. Emission Factors (Before Control)											
NO _x		CO		SO ₂		VOC		Formaldehyde		PM ₁₀	
g/hp-hr	ppmv	g/hp-hr	ppm v	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppm v	g/hp-hr	ppmv
13.09		6.57		4.46E-03		3.51		2.32E-04		0.41	
Source of Emission Factors: ☒ Manufacturer Data ☒ AP-42 ☐ Other (specify):											
IV. Emission Factors (Post Control)											
NO _x		CO		SO ₂		VOC		Formaldehyde		PM ₁₀	
g/hp-hr	ppmv	g/hp-hr	ppm v	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppm v	g/hp-hr	ppmv
Method of Emission Control: ☐ NSCR Catalyst ☐ Lean Operation ☐ Parameter Adjustment ☐ Stratified Charge ☐ JLCC Catalyst ☐ Other (Specify):											
Note: Must submit a copy of any manufacturer control information that demonstrates control efficiency.											
Is Formaldehyde included in the VOCs?										☐ Yes ☒ No	
V. Federal and State Standards (Check all that apply)											
☐ NSPS JJJJ ☒ MACT ZZZZ ☒ NSPS IIII ☐ Title 30 Chapter 117 - List County: _____											
VI. Additional Information											
1. Submit a copy of the engine manufacturer's site rating or general rating specification data. 2. Submit a typical fuel gas analysis, including sulfur content and heating value. For gaseous fuels, provide mole percent of constituents. 3. Submit description of air/fuel ratio control system (manufacturer information is acceptable).											

Flex House Engine Inventory

EPN	Serial Number	Manufacture Date
SAT14A_HOUSE1	TBD	TBD
SAT14A_HOUSE2	TBD	TBD
SAT14A_HOUSE3	TBD	TBD
SAT14B_HOUSE1	TBD	TBD
SAT14B_HOUSE2	TBD	TBD
SAT14B_HOUSE3	TBD	TBD



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2025 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: Rolls-Royce Solutions America Inc
(U.S. Manufacturer or Importer)

Certificate Number: SMDDL40.1GNR-003

Effective Date:

10/15/2024

Expiration Date:

12/31/2025

Byron J. Bunker, Division Director
Compliance Division

Issue Date:

10/15/2024

Revision Date:

N/A

Model Year: 2025

Manufacturer Type: Original Engine Manufacturer

Engine Family: SMDDL40.1GNR

Mobile/Stationary Indicator: Stationary

Emissions Power Category: 560<kW<=2237

Fuel Type: Diesel

After Treatment Devices: No After Treatment Devices Installed

Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.



Contents

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	16V2000G86S - TB				
Fuel type	Zertifizierungskraftstoff / Certification Fuel				
Rated power [kW]	1371				
Rated speed [rpm]	1800				
Application Group	3D				
Legislative body	EPA Stationary EMERG T2 (40CFR60)				
Test cycle	D2				
Data Set No.	XZ 545 541 002 53				
Data Set Basis	EPA Stationary EMERG T2 (40CFR60)				
Fuel sulphur content [ppm]	360				

Content	Page
Disclaimer	2
Emission data sheet (EDS)	3
Not to exceed emission values	6

		PDF	Name	Project no. 0	Size
		Configurator	Lenhof, Torsten (TRC)	Order no. 0	A4
		Approver1	Kneifel, Alexander (TSLE)	EDS-ID	
		Approver2		4181-26.01.2025	
		Approver3	Fraser, Neil (TS)	Title Emission data sheet	
		Approver4			
		User	FN2100045229		
		Engine model 16V2000G86S			
Description of Revision		Frequency			
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 216187_009_Parent-Engine_1371kW - TESP_D2.nc for 178 in EDS platfrom.		All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.			
		Emissionstage EPA Stationary EMERG T2 (40CFR60)			Sheet 1
Configuration-ID 178		Emissionstage basis EPA Stationary EMERG T2 (40CFR60)			of 7
Documentation Mark Holt verified 01_26_2025					



General Disclaimers (valid for Measured and NTE values)

Please note that these data are physical and/or technical values only referring to and representing a normative defined operating condition. Any change in operating time and conditions will have impact on physical values and engine behavior, which must be considered and assessed within the complete propulsion system especially in regard to emission compliance and product safety.

Measurements listed in this EDS are representative of the listed engine rating at the time of testing. These measurements and results can change according to instrumentation, boundary condition, and engine to engine variability. In addition - changes to the engine family hard or software may occur which could result in changes to some of the listed values.

Emissions data measurement procedures are conducted according to applicable rules and standards as per "Emission Stage/Optimization". Potential deviations from these procedures are documented internally.

The listed emission values relate to the corresponding certification data. Seller doesn't take any responsibility or liability neither out or in connection with the contract nor on any other basis

- beyond these specified operating conditions of the engine
- and for any installation/modification of the entire propulsion system by the customer itself or any third party

and the customer will indemnify MTU on first demand for any third party claim out or in connection with this.

Seller reserves the right to amend specifications and information without notice and without obligation or liability. No liability for any errors, facts or opinions is accepted. Customers must satisfy themselves as to the suitability of this product for their application. No responsibility for any loss as a result of any person placing reliance on any material contained in this data sheet will be accepted.

Seller reserves all rights in the information contained in this data sheet. It shall not be reproduced, made available to a third party or otherwise used in any way whatsoever.

When applicable, emission values are measured after combined exhaust streams.

Measured Emissions data is based on single operating points and thus cannot be used to compare to regulations which use values based on a weighted cycle.

Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures, and instrumentation. Over time deterioration may occur which may have an impact on emission levels.

The SO₂ emission rates comprehend exclusively the SO₂ content as found in the fuel source, oil consumption effects are not included. Variation of sulfur content in the fuel changes only the stated SO₂ emissions, cross sensitivity to other emissions (e.g. particulates) is not possible.

All values based on metric units, inaccuracies for non metric values can occur, values are not binding.

Specific to gas engines: The listed emission values are based on gas composition at the time of certification measurement. Gas composition is as displayed in the EDS-document. Carbon dioxide and methane concentrations have direct influence on the corresponding displayed carbon dioxide and methane emissions.

EAT Specific Disclaimers (valid for EDS values)

NH₃ emissions levels measured with AVL SESAM i60/ 4 FT Multi Component Exhaust Measurement System (FTIR) including EPA 40 CFR 1065 legislation compliant automated checks for linearity.

Generators or engines with exhaust after-treatment systems require a stabilization period of approximately 1 hour to ensure stable temperatures across SCR prior to performing an emissions test. Performing emissions measurements before a stable temperature has been achieved can result in inconsistent emission values. NO_x Values only applicable if temperatures across SCR reached for DEF Dosing.

NTE Disclaimers (valid for NTE calculated values)

Calculated not to exceed values (NTE) are not proven by tests and therefore the accuracy is not guaranteed.

All emission data shown in chapters Emission Data Sheet, Not to Exceed Values, and Type Approval were gathered from a corresponding certification engine under test conditions shown above and complying to corresponding TEN data.

		PDF	Name	Project no. 0	Size A4	
		Configurator	Lenhof, Torsten (TRC)	Order no. 0		
		Approver1	Kneifel, Alexander (TSLE)	EDS-ID 4181-26.01.2025		
		Approver2				
		Approver3	Fraser, Neil (TS)			
Approver4						
Description of Revision		Frequency	All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.	User	FN2100045229	Title Emission data sheet
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 216187_009_Parent-Engine_1371kW - TESP_D2.nc for 178 in EDS platform.		Engine model 16V2000G86S				
		Emissionstage EPA Stationary EMERG T2 (40CFR60)		Sheet 2		
		Emissionstage basis EPA Stationary EMERG T2 (40CFR60)		of 7		
Configuration-ID 178	Documentation Mark Holt verified 01_26_2025					



Engine data

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	16V2000G86S				
Fuel type	Zertifizierungskraftstoff / Certification Fuel				
Application Group	3D				
Legislative body	EPA Stationary EMERG T2 (40CFR60)				
Test cycle	D2				
Fuel sulphur content [ppm]	360				
mg/mN ³ values base on residual oxygen value of [%]	Measured				

Engine raw emissions*

Cycle point	[-]	n1	n2	n3	n4	n5
Power	kW	1366	1029	686	343	137
Power relative	[-]	1	0.75	0.5	0.25	0.1
Engine speed	1/min	1800	1801	1801	1800	1800
Engine speed relative	[-]	1	1	1	1	1
Exhaust back pressure after ETC (static)	mbar	44.8	32.8	13.8	3.7	1.3
Exhaust temperature after ETC	grdC	522	486	463	410	276
Carbon dioxide (CO ₂)	%	8.8	7.7	7.2	5.9	3.7
Oxygen (O ₂)	%	8.7	10.2	10.9	12.7	15.7
Filter smoke number	[-]	0.09	0.17	0.54	0.69	0.41
Exhaust mass flow wet	kg/h	7174	6415	4506	3025	2273

		PDF	Name	Project no. 0	Size A4		
		Configurator	Lenhof, Torsten (TRC)	Order no. 0			
		Approver1	Kneifel, Alexander (TSLE)	EDS-ID 4181-26.01.2025			
		Approver2					
		Approver3	Fraser, Neil (TS)				
Description of Revision		Frequency		Title Emission data sheet			
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 216187_009_Parent-Engine_1371kW - TESP_D2.nc for 178 in EDS platform.		All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.		Engine model 16V2000G86S			
		Emissionstage EPA Stationary EMERG T2 (40CFR60)				Sheet 3	
Configuration-ID 178	Documentation Mark Holt verified 01_26_2025	Emissionstage basis EPA Stationary EMERG T2 (40CFR60)				of 7	



Exhaust volume flow (real)	m ³ /s	4.56	3.91	2.69	1.69	1.02
NO _x -Emissions specific	g/(bhp*h)	5.82	3.89	4.11	4.08	6.06
	g/kWh	7.8	5.22	5.52	5.47	8.12
CO-Emissions specific	g/(bhp*h)	0.16	0.2	0.51	1.11	3.28
	g/kWh	0.22	0.27	0.68	1.49	4.4
CO ₂ -Emissions specific	g/(bhp*h)	479.8	501.5	496.5	553.4	664.5
	g/kWh	643.4	672.5	665.8	742.1	891.1
HC ₁ -Emissions specific	g/(bhp*h)	0.06	0.08	0.11	0.35	0.84
	g/kWh	0.08	0.11	0.15	0.48	1.12
NMHC-Emissions specific	g/(bhp*h)	0.06	0.08	0.11	0.35	0.82
	g/kWh	0.08	0.11	0.15	0.47	1.1
NO _x +HC ₁ -Emissions specific	g/(bhp*h)	5.88	3.97	4.22	4.43	6.89
	g/kWh	7.89	5.32	5.67	5.94	9.25
NO _x +NMHC-Emissions specific	g/(bhp*h)	5.88	3.97	4.22	4.42	6.88
	g/kWh	7.89	5.32	5.66	5.93	9.22
PT-Emissions specific (Meas.)	g/(bhp*h)	0.01	0.017	0.042	0.077	0.089
	g/kWh	0.014	0.023	0.057	0.103	0.119
CO-Emissions (based on O ₂ meas)	mg/m ³ N	58	60	144	233	359
CO ₂ -Emissions (based on O ₂ meas)	mg/m ³ N	173143	150889	141178	115753	72570
HC ₁ -Emissions (based on O ₂ meas)	mg/m ³ N	23	24	32	74	91
NO _x +HC ₁ -Emissions (based on O ₂ meas)	mg/m ³ N	2289	1289	1298	1000	808

		PDF	Name	Project no. 0	Size A4			
		Configurator	Lenhof, Torsten (TRC)	Order no. 0				
		Approver1	Kneifel, Alexander (TSLE)	EDS-ID	4181-26.01.2025			
		Approver2		Title Emission data sheet				
		Approver3	Fraser, Neil (TS)					
Approver4								
Description of Revision		Frequency	All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.		User	FN2\00045229	Engine model 16V2000G86S	
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 216187_009_Parent-Engine_1371kW - TESP_D2.nc for 178 in EDS platform.				Emissionstage				Sheet
				EPA Stationary EMERG T2 (40CFR60)				4
				Emissionstage basis				of
				EPA Stationary EMERG T2 (40CFR60)				7
Configuration-ID 178		Documentation Mark Holt verified 01_26_2025						



NO _x +NMHC-Emissions (based on O ₂ meas)	mg/m ³ N	2288	1288	1297	998	806
PT-Emissions (based on O ₂ meas)	mg/m ³ N	3.7	5.1	12	16.1	9.7

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			Configurator	Lenhof, Torsten (TRC)	Order no. 0	
			Approver1	Kneifel, Alexander (TSLE)	EDS-ID	
			Approver2		4181-26.01.2025	
			Approver3	Fraser, Neil (TS)	Title Emission data sheet	
			Approver4			
User	FN2100045229					
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 216187_009_Parent-Engine_1371kW - TESP_D2.nc for 178 in EDS platform.			Engine model 16V2000G86S			
Description of Revision		Frequency	Emissionstage			Sheet
			EPA Stationary EMERG T2 (40CFR60)			5
Configuration-ID 178		Documentation Mark Holt verified 01_26_2025	Emissionstage basis			of
			EPA Stationary EMERG T2 (40CFR60)			7



Engine data

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	16V2000G86S				
Fuel type	Zertifizierungskraftstoff / Certification Fuel				
Application Group	3D				
Legislative body	EPA Stationary EMERG T2 (40CFR60)				
Test cycle	D2				
Fuel sulphur content [ppm]	360				
mg/mN ³ values base on residual oxygen value of [%]	Measured				

Not to exceed emission values*

Cycle point	[-]	n1	n2	n3	n4	n5
Power	kW	1366	1029	686	343	137
Power relative	[-]	1	0.75	0.5	0.25	0.1
Engine speed	1/min	1800	1801	1801	1800	1800
Engine speed relative	[-]	1	1	1	1	1
NO _x -Emissions specific	g/(bhp*h)	7.57	5.06	5.35	5.97	11.51
	g/kWh	10.15	6.78	7.17	8.01	15.44
CO-Emissions specific	g/(bhp*h)	0.27	0.34	0.96	2.22	6.57
	g/kWh	0.37	0.46	1.29	2.98	8.81
HC ₁ -Emissions specific	g/(bhp*h)	0.11	0.14	0.21	0.71	2.42
	g/kWh	0.14	0.18	0.29	0.95	3.25
NMHC-Emissions specific	g/(bhp*h)	0.1	0.13	0.21	0.7	
	g/kWh	0.14	0.18	0.28	0.93	
NO _x +HC ₁ -Emissions specific	g/(bhp*h)	7.67	5.19	5.56	6.68	13.93
	g/kWh	10.29	6.96	7.45	8.96	18.69

		PDF	Name	Project no. 0	Size A4	
		Configurator	Lenhof, Torsten (TRC)	Order no. 0		
		Approver1	Kneifel, Alexander (TSLE)	EDS-ID	4181-26.01.2025	
		Approver2				
		Approver3	Fraser, Neil (TS)			
Approver4						
Description of Revision		Frequency	All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.	User	FN2100045229	Title Emission data sheet
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 216187_009_Parent-Engine_1371kW - TESP_D2.nc for 178 in EDS platform.		Engine model 16V2000G86S				
		Emissionstage				Sheet
		EPA Stationary EMERG T2 (40CFR60)				6
Configuration-ID 178	Documentation Mark Holt verified 01_26_2025	Emissionstage basis				of
		EPA Stationary EMERG T2 (40CFR60)				7



NO _x +NMHC-Emissions specific	g/(bhp*h)	7.67	5.19	5.55	6.67	
	g/kWh	10.29	6.96	7.45	8.94	
PT-Emissions specific (Meas.)	g/(bhp*h)	0.015	0.027	0.063	0.115	0.328
	g/kWh	0.021	0.036	0.085	0.155	0.44
CO-Emissions (based on O ₂ meas)	mg/m ³ N	99	103	275	465	718
HC ₁ -Emissions (based on O ₂ meas)	mg/m ³ N	38	41	60	148	264
NO _x +HC ₁ -Emissions (based on O ₂ meas)	mg/m ³ N	2984	1685	1706	1504	1626
NO _x +NMHC-Emissions (based on O ₂ meas)	mg/m ³ N	2984	1684	1705	1501	
PT-Emissions (based on O ₂ meas)	mg/m ³ N	5.6	8.1	18	24.1	35.8

		All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.		PDF	Name	Project no. 0	Size A4
				Configurator	Lenhof, Torsten (TRC)	Order no. 0	
				Approver1	Kneifel, Alexander (TSLE)	EDS-ID 4181-26.01.2025	
				Approver2			
				Approver3	Fraser, Neil (TS)		
Approver4							
Description of Revision		Frequency	Engine model 16V2000G86S		Title Emission data sheet		
Data generated by EDS Creator version 1.0 and unipLOT. Ref.-dataset: 216187_009_Parent-Engine_1371kW - TESP_D2.nc for 178 in EDS platform.							
		User					FN2100045229
				Emissionstage		Sheet 7 of 7	
				EPA Stationary EMERG T2 (40CFR60)			
Configuration-ID 178		Documentation Mark Holt verified 01_26_2025		Emissionstage basis EPA Stationary EMERG T2 (40CFR60)			

SECTION II



Diesel Generator Set

mtu 16V2000 DS1000

1,000 kWe/60 Hz/Standby/208 - 4,160V

Reference **mtu 16V2000 DS1000** (900 kWe) for Prime Rating Technical Data

System ratings

Voltage (L-L)	208V † ‡	240V † ‡	380V † ‡	480V † ‡	600V †	4,160V
Phase	3	3	3	3	3	3
PF	0.8	0.8	0.8	0.8	0.8	0.8
Hz	60	60	60	60	60	60
kW	1,000	1,000	1,000	1,000	1,000	1,000
kVA	1,250	1,250	1,250	1,250	1,250	1,250
Amps	3,470	3,007	1,899	1,504	1,203	173
skVA@30% voltage dip	1,540	1,535	1,965	2,475	2,160	2,070
Generator model*	LSA 50.2 M6	LSA 50.2 M6	LSA 50.2 M6	LSA 49.1 L11	LSA 50.2 M6	LS 50.2 VL7
Temp rise	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C
Connection	12 LEAD WYE	12 LEAD DELTA	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE	6 LEAD WYE

* Consult the factory for alternate configuration.

† UL 2200 offered

‡ CSA offered

Certifications and standards

- Emissions
 - EPA Tier 2 certified
 - South Coast Air Quality Management District (SCAQMD)
- Generator set is designed and manufactured in facilities certified to standards ISO 9001:2008 and ISO 14001:2004
- Seismic certification – optional
 - 2021 IBC certification
 - HCAI pre-approval
- UL 2200 - optional (refer to *System ratings* for availability)
- CSA - optional (refer to *System ratings* for availability)
 - CSA C22.2 No. 100
 - CSA C22.2 No. 14
- Performance Assurance Certification (PAC)
 - Generator set tested to ISO 8528-5 for transient response
 - Verified product design, quality, and performance integrity
 - All engine systems are prototype and factory tested
- Power rating
 - Accepts rated load in one step per NFPA 110
 - Permissible average power output during 24 hours of operation is approved up to 85%.

Standard features *

- Single source supplier
- Global product support
- Two (2) Year/3,000 Hour Basic Limited Warranty
- 16V2000 diesel engine
 - 35.7 liter displacement
 - Common rail fuel injection
 - 4-cycle
- Complete range of accessories
- Cooling system
 - Integral set-mounted
 - Engine-driven fan
- Generator
 - Brushless, rotating field generator
 - 2/3 pitch windings
 - AREP supply to regulator
 - 300% short circuit capability
- Digital control panel(s)
 - UL recognized, CSA Certified, NFPA 110
 - Complete system metering
 - LCD display

Standard equipment *

Engine

- Air cleaners
- Oil pump
- Oil drain extension and shut-off valve
- Full flow oil filter
- Closed crankcase ventilation
- Jacket water pump
- Inter cooler water pump
- Thermostats
- Blower fan and fan drive
- Radiator - unit mounted
- Electric starting motor - 24V
- Governor - electronic isochronous
- Base - structural steel
- SAE flywheel and bell housing
- Charging alternator - 24V
- Battery rack and cables
- Flexible fuel connectors
- Flexible exhaust connection
- EPA certified engine

Generator

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting
- Sustained short circuit current of up to 300% of the rated current for up to 10 seconds
- Self-ventilated and drip-proof
- Superior voltage waveform
- Digital, solid state, volts-per-hertz regulator
- Brushless alternator with brushless pilot exciter
- 4 pole, rotating field
- 130 °C standby temperature rise
- 1-bearing, sealed
- Flexible coupling
- Full amortisseur windings
- 125% rotor balancing
- 3-phase voltage sensing
- $\pm 0.25\%$ voltage regulation no load to full load
- 100% of rated load - one step
- 5% maximum total harmonic distortion

Digital control panel(s)

- Digital metering
- Engine parameters
- Generator protection functions
- Engine protection
- CANBus ECU Communications
- Windows®-based software
- Multilingual capability
- Communications to remote annunciator
- Programmable input and output contacts
- UL recognized, CSA certified, CE approved
- Event recording
- IP 54 front panel rating with integrated gasket
- NFPA 110 compatible

Application data

Engine

Manufacturer	mtu
Model	16V2000G86S
Type	4-cycle
Arrangement	16-V
Displacement: L (in ³)	35.7 (2,179)
Bore: cm (in)	13.5 (5.3)
Stroke: cm (in)	15.6 (6.1)
Compression ratio	16:1
Rated rpm	1,800
Engine governor	electronic isochronous (ADEC)
Maximum power: kWm (bhp)	1,371 (1,839)
Steady state frequency band	± 0.25%
Air cleaner	dry

Liquid capacity

Total oil system: L (gal)	114 (30.1)
Engine jacket water capacity: L (gal)	70 (18.5)
After cooler water capacity: L (gal)	25 (6.6)
System coolant capacity: L (gal)	188 (50)

Electrical

Electric volts DC	24
Cold cranking amps under -17.8 °C (0 °F)	2,800
Batteries: group size	8D
Batteries: quantity	4

Fuel system

Fuel supply connection size	#12 JIC 37° male
Fuel return connection size	#12 JIC 37° male
Maximum fuel lift: m (ft)	5 (16)
Recommended fuel	diesel #2
Total fuel flow: L/hr (gal/hr)	1,500 (396)

Fuel consumption

At 100% of power rating: L/hr (gal/hr)	276 (73)
At 75% of power rating: L/hr (gal/hr)	211 (56)
At 50% of power rating: L/hr (gal/hr)	146 (38)

Cooling - radiator system

Ambient capacity of radiator: °C (°F)	50 (122)
Maximum restriction of cooling air:	
intake and discharge side of radiator: kPa (in. H ₂ O)	0.12 (0.5)
Water pump capacity: L/min (gpm)	783 (207)
After cooler pump capacity: L/min (gpm)	258 (68)
Heat rejection to coolant: kW (BTUM)	444 (25,272)
Heat rejection to after cooler: kW (BTUM)	293 (16,677)
Heat radiated to ambient: kW (BTUM)	91 (5,289)
Fan power: kW (hp)	49 (65.7)

Air requirements

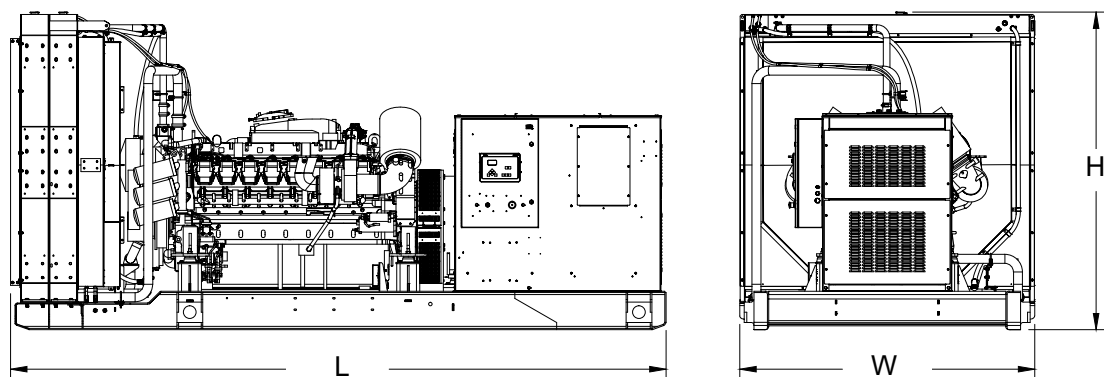
Aspirating: *m ³ /min (SCFM)	102 (3,602)
Air flow required for radiator	
cooled unit: *m ³ /min (SCFM)	1,709 (60,350)
Remote cooled applications; air flow required for dissipation of radiated generator set heat for a maximum of 25 °F rise: *m ³ /min (SCFM)	338 (11,925)

* Air density = 1.184 kg/m³ (0.0739 lbm/ft³)

Exhaust system

Gas temperature (stack): °C (°F)	505 (941)
Gas volume at stack temperature: m ³ /min (CFM)	270 (9,535)
Maximum allowable back pressure at outlet of engine, before piping: kPa (in. H ₂ O)	8.5 (34.1)

Weights and dimensions



Drawing above for illustration purposes only, based on standard open power 480 volt generator set. Lengths may vary with other voltages. Do not use for installation design. See website for unit specific template drawings.

System	Dimensions (L x W x H)	Weight
Open Power Unit (OPU)	5,093 x 2,292 x 2,477 mm (200.5 x 90.3 x 97.5 in)	8,525 kg (18,795 lb)

Weights and dimensions are based on open power units and are estimates only. Consult the factory for accurate weights and dimensions for your specific generator set.

Sound data

Unit type	Standby full load
Level O (OPU): dB(A)	95.1

Sound data is provided at 7 m (23 ft). Generator set tested in accordance with ISO 8528-10 and with infinite exhaust.

Emissions data

NO _x + NMHC	CO	PM
5.88	0.01	0.01

— All units are in g/hp-hr and shown at 100% load (not comparable to EPA weighted cycle values). Emission levels of the engine may vary with ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data was obtained in compliance with US EPA regulations. The weighted cycle value (not shown) from each engine is guaranteed to be within the US EPA Standards.

Rating definitions and conditions

- Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. No overload capability for this rating. Ratings are in accordance with ISO 8528-1, ISO 3046-1, BS 5514, and AS 2789. Average load factor: ≤ 85%.
- Nominal ratings at standard conditions: 25 °C and 300 meters (77 °F and 1,000 feet).
- Deration factor:
 - Consult your local **mtu** Distributor for altitude derations.
 - Consult your local **mtu** Distributor for temperature derations.



March 11th, 2025

To Whom It May Concern:

With regards to Cummins Power Systems (CPS) manufactured diesel generator set model **C1500DE** rated for 60 Hz operation and equipped with Cummins **QSK38-G18** engine (RCEXL050.AAD):

When tested under the following conditions:

Table 1	
Fuel Specification:	ASTM D975 No. 2-D S15 diesel fuel with 0.0015% sulfur content (by weight), and 42-48 cetane number.
Air Inlet Temperature:	77 °F
Fuel Inlet Temperature:	104 °F (at fuel pump inlet)
Barometric Pressure:	29.53 in. Hg
Humidity:	NOx measurement corrected to 75 grains H ₂ O/lb. dry air

Based on engine emissions validation testing, the table below represents the nominal performance and exhaust emissions data for the generator set listed above:

	Standby			
PERFORMANCE DATA	25%	50%	75%	100%
Electrical Power (kWe)	375	750	1125	1500
Engine Power (BHP at 1800 RPM/60Hz)	630	1161	1692	2244
Fuel Consumption (US Gal/hr)	35	59	84	104
Exhaust Gas Flow (CFM)	4872	7214	9620	10704
Exhaust Gas Temperature (°F)	766	832	879	933
NOx (Oxides of Nitrogen)	3.14	3.78	4.20	7.06
NMHC (Nonmethane Hydrocarbons)	0.13	0.05	0.04	0.04
CO (Carbon Monoxide)	1.0	0.7	0.5	0.2
PM (Particulate Matter)	0.08	0.10	0.04	0.01
All emissions values above are cited as g/bhp-hr				

Steady-State emissions recorded per ISO8178-1 during operation at rated engine speed (+/-2%) and stated constant load (+/-2%) with engine temperatures, pressures and emission rates stabilized.

The NOx, HC, CO, and PM emission data tabulated here are representative of test data taken from a single engine under the test conditions shown above. Data for the other components are estimated. This data is subject to instrumentation and engine-to-engine variability. Field emissions test data is not guaranteed to these levels. Actual field test results may vary due to test ambient, site conditions, installation, fuel specification, test procedures, instrumentation and ambient correction factors. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.



Values provided in the table below are representative of “Potential Site Variation” for the CyrusOne site New Albany, OH. These values account for variances as indicated above without consideration of improper generator set maintenance.

	Standby			
PERFORMANCE DATA	25%	50%	75%	100%
Electrical Power (kWe)	375	750	1125	1500
Engine Power (BHP at 1800 RPM/60Hz)	630	1161	1692	2244
NOx (Oxides of Nitrogen)	3.99	4.80	5.33	8.97
NMHC (Nonmethane Hydrocarbons)	0.22	0.09	0.07	0.07
CO (Carbon Monoxide)	2.00	1.40	1.00	0.40
PM (Particulate Matter)	0.16	0.20	0.08	0.02
All emissions values above are cited as g/bhp-hr				
Potential Site variation values provided above are accounted for Engine, Ambient variation and measurement with no correction factors.				

The values in this letter are applicable for engines operating on ASTM D975 DF2 and paraffinic fuels conforming to EN15940, including Hydrotreated Vegetable Oil (HVO). Please consult Fluids for Cummins Engines bulletin # 3379001 for more information on the applicability of HVO. For engine nameplate rating please consult corresponding Environmental Protection Agency Compliance Statement (EPA).

The data and information provided in this letter is for informational purposes to assist customers in making purchasing decisions appropriate for their site-specific compliance needs. Owners/operators of compression ignition internal combustion engines are responsible for ensuring compliance with applicable local, state, and federal standards when CI engines are installed at the owner/operator site. The data and information contained herein regarding site variation values in particular should be considered as part of a site-specific compliance evaluation.

This letter does not supersede any of the commercial terms of sale, including, but not limited to, warranty coverage and compliance with law obligations. THE INFORMATION IN THIS LETTER IS PROVIDED “AS IS” AND WITH ALL FAULTS AND DEFECTS. CUMMINS DOES NOT WARRANT THE ACCURACY OF THE INFORMATION PROVIDED AND THIS LETTER SHOULD NOT BE SHARED WITH THIRD PARTIES WITHOUT CUMMINS PRIOR WRITTEN CONSENT. For further questions on this product or application, please contact the local Cummins Sales and Service representative.

Best Regards,

Miguel Araujo
Application Engineer – Strategic Accounts (Data Center)
Cummins Power Generation



Diesel Generator Set

mtu 18V2000 DS1250

1,250 kWe/60 Hz/Standby/380 - 4,160V

Reference **mtu 18V2000 DS1250** (1,000 kWe) for Prime Rating Technical Data

System ratings

Voltage (L-L)	380V † ‡	480V † ‡	600V ‡	4,160V
Phase	3	3	3	3
PF	0.8	0.8	0.8	0.8
Hz	60	60	60	60
kW	1,250	1,250	1,250	1,250
kVA	1,562	1,562	1,562	1,562
Amps	2,374	1,879	1,503	216
skVA@30% voltage dip	2,700	3,100	4,650	3,100
Generator model*	743RSL4052	742RSL4048	743RSS4288	742FSM4366
Temp rise	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C	130 °C/40 °C
Connection	4 LEAD WYE	4 LEAD WYE	4 LEAD WYE	6 LEAD WYE

* Consult the factory for alternate configuration.

† UL 2200 offered

‡ CSA offered

Certifications and standards

- Emissions
 - EPA Tier 2 certified
 - South Coast Air Quality Management District (SCAQMD)
- Generator set is designed and manufactured in facilities certified to standards ISO 9001:2008 and ISO 14001:2004
- UL 2200 - optional (refer to *System ratings* for availability)
- CSA - optional (refer to *System ratings* for availability)
 - CSA C22.2 No. 100
 - CSA C22.2 No. 14
- Performance Assurance Certification (PAC)
 - Generator set tested to ISO 8528-5 for transient response
 - Verified product design, quality, and performance integrity
 - All engine systems are prototype and factory tested
- Power rating
 - Accepts rated load in one step per NFPA 110
 - Permissible average power output during 24 hours of operation is approved up to 85%.

Standard features*

- Single source supplier
- Global product support
- Two (2) Year/3,000 Hour Basic Limited Warranty
- 18V2000 diesel engine
 - 40.2 liter displacement
 - Common rail fuel injection
 - 4-cycle
- Engine-generator resilient mounted
- Complete range of accessories
- Cooling system
 - Integral set-mounted
 - Engine-driven fan
- Generator
 - Brushless, rotating field generator
 - 2/3 pitch windings
 - Permanent Magnet Generator (PMG) supply to regulator
 - 300% short circuit capability
- Digital control panel(s)
 - UL recognized, CSA Certified, NFPA 110
 - Complete system metering
 - LCD display

Standard equipment*

Engine

- Air cleaners
- Oil pump
- Oil drain extension and shut-off valve
- Full flow oil filter
- Closed crankcase ventilation
- Jacket water pump
- Thermostat
- Blower fan and fan drive
- Radiator - unit mounted
- Electric starting motor - 24V
- Governor - electronic isochronous
- Base - formed steel
- SAE flywheel and bell housing
- Charging alternator - 24V
- Battery rack and cables
- Flexible fuel connectors
- Flexible exhaust connection
- EPA certified engine

Generator

- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting
- Sustained short circuit current of up to 300% of the rated current for up to 10 seconds
- Self-ventilated
- Superior voltage waveform
- Digital, solid state, volts-per-hertz regulator
- Brushless alternator with brushless pilot exciter
- 4 pole, rotating field
- 130 °C maximum standby temperature rise
- 1-bearing, sealed
- Flexible coupling
- Full amortisseur windings
- 125% rotor balancing
- 3-phase voltage sensing
- $\pm 0.25\%$ voltage regulation no load to full load
- 100% of rated load - one step
- 5% maximum total harmonic distortion

Digital control panel(s)

- Digital metering
- Engine parameters
- Generator protection functions
- Engine protection
- CANBus ECU communications
- Windows®-based software
- Multilingual capability
- Communications to remote annunciator
- Programmable input and output contacts
- UL recognized, CSA certified, CE approved
- Event recording
- IP 54 front panel rating with integrated gasket
- NFPA 110 compatible

Application data

Engine

Manufacturer	mtu
Model	18V2000G76S
Type	4-cycle
Arrangement	18-V
Displacement: L (in ³)	40.2 (2,448)
Bore: cm (in)	13.5 (5.3)
Stroke: cm (in)	15.6 (6.15)
Compression ratio	17.5:1
Rated speed: rpm	1,800
Engine governor	electronic isochronous (ADEC)
Maximum power: kWm (bhp)	1,371 (1,838)
Steady state frequency band	± 0.25%
Air cleaner	dry

Liquid capacity

Total oil system: L (gal)	122 (32.2)
Engine jacket water capacity: L (gal)	73 (19.3)
System coolant capacity: L (gal)	185 (48.9)

Electrical

Electric volts DC	24
Cold cranking amps under -17.8 °C (0 °F)	2,800
Batteries: group size	8D
Batteries: quantity	4

Fuel system

Fuel supply connection size	#12 JIC 37° female 1" NPT adapter provided
Fuel return connection size	#12 JIC 37° female 1" NPT adapter provided
Maximum fuel lift: m (ft)	5 (16)
Recommended fuel	diesel #2
Total fuel flow: L/hr (gal/hr)	1,500 (396)

Fuel consumption

At 100% of power rating: L/hr (gal/hr)	329 (87)
At 75% of power rating: L/hr (gal/hr)	251 (66)
At 50% of power rating: L/hr (gal/hr)	171 (45)

Cooling - radiator system

Ambient capacity of radiator: °C (°F)	50 (122)
Maximum restriction of cooling air:	
intake and discharge side of radiator: kPa (in. H ₂ O)	0.12 (0.5)
Water pump capacity: L/min (gpm)	950 (251)
Heat rejection to coolant: kW (BTUM)	515 (29,288)
Heat rejection to after cooler: kW (BTUM)	340 (19,335)
Heat radiated to ambient: kW (BTUM)	117.3 (6,671)
Fan power: kW (hp)	33.5 (44.9)

Air requirements

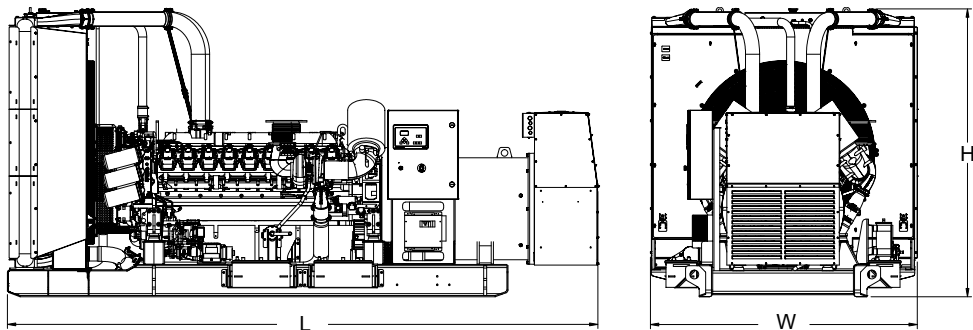
Aspirating: *m ³ /min (SCFM)	102 (3,602)
Air flow required for radiator	
cooled unit: *m ³ /min (SCFM)	1,512 (53,396)
Remote cooled applications; air flow required for dissipation of radiated generator set heat for a maximum of 25 °F rise: *m ³ /min (SCFM)	428 (15,224)

* Air density = 1.184 kg/m³ (0.0739 lbm/ft³)

Exhaust system

Gas temperature (stack): °C (°F)	480 (896)
Gas volume at stack temperature: m ³ /min (CFM)	252 (8,899)
Maximum allowable back pressure at outlet of engine, before piping: kPa (in. H ₂ O)	8.5 (34.1)

Weights and dimensions



Drawing above for illustration purposes only, based on standard open power 480 volt generator set. Lengths may vary with other voltages. Do not use for installation design. See website for unit specific template drawings.

System	Dimensions (L x W x H)	Weight
Open Power Unit (OPU)	5,036 x 2,275 x 2,454 mm (198.3 x 89.6 x 96.6 in)	9,525 kg (21,000 lb)

Weights and dimensions are based on open power units and are estimates only. Consult the factory for accurate weights and dimensions for your specific generator set.

Sound data

Unit type	Standby full load
Level O (OPU): dB(A)	88.4

Sound data is provided at 7 m (23 ft). Generator set tested in accordance with ISO 8528-10 and with infinite exhaust.

Emissions data

NO _x + NMHC	CO	PM
4.77	0.15	0.01

— All units are in g/hp-hr and shown at 100% load (not comparable to EPA weighted cycle values). Emission levels of the engine may vary with ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data was obtained in compliance with US EPA regulations. The weighted cycle value (not shown) from each engine is guaranteed to be within the US EPA Standards.

Rating definitions and conditions

- Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage. No overload capability for this rating. Ratings are in accordance with ISO 8528-1, ISO 3046-1, BS 5514, and AS 2789. Average load factor: ≤ 85%.
- Nominal ratings at standard conditions: 25 °C and 300 meters (77 °F and 1,000 feet).
- Deration factor:
 - Consult your local **mtu** Distributor for altitude derations.
 - Consult your local **mtu** Distributor for temperature derations.

From: Toby Morgan <toby.morgan@istate.com>
Sent: Monday, August 18, 2025 11:23 AM
To: Laura Cottrell; David Meeks
Subject: RE: [External Message]RE: Generator Load/Fuel Consumption Correlation

Good Morning Laura,
Please see below for the 1250kW .

- 25% load – 25gal/hr.
- 10% load – 13.5gal/hr.
- No load – 6gal/hr.

Let us know if we can help with anything else.

Thanks,

Toby Morgan | Power Generation Sales | Interstate Energy Systems

210 Alexandra Way, Carol Stream, IL 60188

C: 281-543-7404

www.istate.com | toby.morgan@istate.com

“Pride in Service”

From: Laura Cottrell <lcottrell@cyrusone.com>
Sent: Monday, August 11, 2025 5:38 AM
To: Toby Morgan <toby.morgan@istate.com>; David Meeks <david.meeks@istate.com>
Subject: Re: [External Message]RE: Generator Load/Fuel Consumption Correlation

External Mail Sender

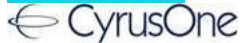
Hi Toby, can you provide the same (25%, 10%, no-load) for the 1.25MWe house gen?

Laura Cottrell

Director, Environmental Compliance

m: 603-793-0534

cyrusone.com





Contents

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	18V2000G76S - TD				
Fuel type	Zertifizierungskraftstoff / Certification Fuel				
Rated power [kW]	1371				
Rated speed [rpm]	1800				
Application Group	3D				
Legislative body	EPA Stationary EMERG T2 (40CFR60)				
Test cycle	D2				
Data Set No.	XZ 546 541 000 44				
Data Set Basis	EPA Stationary EMERG T2 (40CFR60)				
Fuel sulphur content [ppm]	417				

Content	Page
Disclaimer	2
Emission data sheet (EDS)	3
Not to exceed emission values	6
Cycle information for EPA Stationary EMERG T2 (40CFR60)	8

		PDF	Name	Project no.	Size
		Configurator		Order no.	A4
		Approver1	Kneifel, Alexander (TSLE)	EDS-ID	
		Approver2	Koliwer, Michael (TV)	3617-10.06.2024	
		Approver3		Title Emission data sheet	
		Approver4			
		User	NA/schroederch		
Description of Revision		Frequency		Engine model 18V2000G76S	
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 218V_012_TESP_D2.nc for 1363 in EDS platform.		All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.			
		Emissionstage EPA Stationary EMERG T2 (40CFR60)			
Configuration-ID 1363		Emissionstage basis EPA Stationary EMERG T2 (40CFR60)			
Documentation		Sheet 1 of 8			



Please note that these data are physical and/or technical values only referring to and representing a normative defined operating condition. Any change in operating time and conditions will have impact on physical values and engine behavior, which must be considered and assessed within the complete propulsion system especially in regard to emission compliance and product safety.

Emissions data measurement procedures are conducted according to applicable rules and standards as per "Emission Stage/Optimization". Potential deviations from these procedures are documented internally.

- beyond these specified operating conditions of the engine
- and for any installation/modification of the entire propulsion system by the customer itself or any third party
- and the customer will indemnify MTU on first demand for any third party claim out or in connection with this.

Seller reserves all rights in the information contained in this data sheet. It shall not be reproduced, made available to a third party or otherwise used in any way whatsoever.

Measured Emissions data is based on single operating points and thus cannot be used to compare to regulations which use values based on a weighted cycle.

The SO₂ emission rates comprehend exclusively the SO₂ content as found in the fuel source, oil consumption effects are not included. Variation of sulfur content in the fuel changes only the stated SO₂ emissions, cross sensitivity to other emissions (e.g. particulates) is not possible.

Specific to gas engines: The listed emission values are based on gas composition at the time of certification measurement. Gas composition is as displayed in the EDS-document. Carbon dioxide and methane concentrations have direct influence on the corresponding displayed carbon dioxide and methane emissions.

Generators or engines with exhaust after-treatment systems require a stabilization period of approximately 1 hour to ensure stable temperatures across SCR prior to performing an emissions test. Performing emissions measurements before a stable temperature has been achieved can result in inconsistent emission values. NOx Values only applicable if temperatures across SCR reached for DEF Dosing.

Calculated not to exceed values (NTE) are not proven by tests and therefore the accuracy is not guaranteed.

All the emission data shown in chapters Emission Data Sheet, Not to Exceed Values, and Type Approval were gathered from a corresponding certification engine under test conditions shown above and complying to corresponding TEN data.

		PDF		Name	Project no.	Size
		Configurator			Order no.	A4
		Approver1		Knerfel, Alexander (TSLE)	EDS-ID	
		Approver2		Koliwer, Michael (TV)	3617-10.06.2024	
		Approver3			Title Emission data sheet	
Approver4						
User		NA/schroederch				
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		Emissionstage				Sheet
		EPA Stationary EMERG T2 (40CFR60)				2
Configuration-ID		Documentation		Emissionstage basis		of
1363	EPA Stationary EMERG T2 (40CFR60)			8		



Engine data

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	18V2000G76S				
Fuel type	Zertifizierungskraftstoff / Certification Fuel				
Application Group	3D				
Legislative body	EPA Stationary EMERG T2 (40CFR60)				
Test cycle	D2				
Fuel sulphur content [ppm]	417				
mg/mN ³ values base on residual oxygen value of [%]	Measured				

Engine raw emissions*

Cycle point	[-]	n1	n2	n3	n4	n5
Power	kW	1371	1028	686	343	137
Power relative	[-]	1	0.75	0.5	0.25	0.1
Engine torque	Nm	7273	5455	3637	1818	727
Engine torque relative	[-]	1	0.75	0.5	0.25	0.1
Engine speed	1/min	1800	1800	1800	1800	1800
Engine speed relative	[-]	1	1	1	1	1
Eff. mean pressure	bar	26.11	19.59	13.06	6.53	2.61
Ambient air pressure	bar	0.969	0.971	0.973	0.974	0.97
Air pressure at humidity measurement position	bar	0.969	0.971	0.973	0.974	0.97
Air temperature at humidity measurement position	grdC	21.2	21.2	21.1	20.6	21
Intake air temperature	grdC	21.2	21.2	21.1	20.6	21
Exhaust back pressure after ETC (static)	mbar	85.8	60.3	33.1	12.4	5.9
Exhaust temperature after ETC	grdC	484	444	417	356	257
Exhaust pressure at AMA measurement position	mbar	86	60	33	12	6
NOX correctionfactor	[-]	0.965	0.962	0.957	0.953	0.953

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			Approver3			
Description of Revision		Frequency	Approver4			
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			Engine model 18V2000G76S			
		Emissionstage				Sheet
			EPA Stationary EMERG T2 (40CFR60)			3
Configuration-ID		Documentation	Emissionstage basis			of
1363			EPA Stationary EMERG T2 (40CFR60)			8



NOX concentration corr.	ppm	763	541	469	403	332
Carbon monoxide (CO)	ppm	42	43	80	181	220
Carbon dioxide (CO2)	%	8.9	7.9	7.2	5.8	3.7
Oxygen (O2)	%	8.6	10.1	11	12.8	15.7
Hydrocarbon (HC)	ppm	51	48	64	130	193
Filter smoke number	[-]	0.15	0.26	0.48	0.37	0.37
Exhaust mass flow wet	kg/h	7121	6092	4540	3061	2406
Exhaust volume flow (norm)	m3/s	1.53	1.31	0.98	0.66	0.52
Exhaust volume flow (real)	m3/s	4.07	3.38	2.48	1.55	1.04
NOX mass flow	kg/h	8.62	5.23	3.38	1.96	1.27
CO mass flow	kg/h	0.26	0.23	0.32	0.5	0.49
CO2 mass flow	kg/h	877	669	459	254	130
O2 mass flow	kg/h	618	623	509	406	397
HC1 mass flow	kg/h	0.17	0.14	0.14	0.19	0.22
NMHC mass flow	kg/h	0.17	0.14	0.14	0.19	0.22
NOX+HC1 mass flow	kg/h	8.8	5.37	3.52	2.15	1.49
NOX+NMHC mass flow	kg/h	8.79	5.37	3.52	2.15	1.48
PM mass flow	kg/h	0.028	0.032	0.038	0.023	0.02
NOX-Emissions specific	g/kWh	6.29	5.09	4.93	5.71	9.24
CO-Emissions specific	g/kWh	0.19	0.23	0.47	1.46	3.56
CO2-Emissions specific	g/kWh	640	650.2	669.1	741.3	952.1
HC1-Emissions specific	g/kWh	0.13	0.14	0.2	0.56	1.62
NMHC-Emissions specific	g/kWh	0.12	0.13	0.2	0.55	1.59
NOX+HC1-Emissions specific	g/kWh	6.42	5.22	5.13	6.27	10.86
NOX+NMHC-Emissions specific	g/kWh	6.41	5.22	5.13	6.26	10.83
PM-Emissions specific (Meas.)	g/kWh	0.02	0.031	0.056	0.066	0.148

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			Approver1	Kneifel, Alexander (TSLE)	EDS-ID	
			Approver2	Koliwer, Michael (TV)	3617-10.06.2024	
			Approver3			
Description of Revision		Frequency	Approver4			
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 218V_012_TESP_D2.nc for 1363 in EDS platform.			User	NA/schroederch	Title Emission data sheet	
			Engine model 18V2000G76S			
		Emissionstage EPA Stationary EMERG T2 (40CFR60)				Sheet 4
Configuration-ID 1363	Documentation	Emissionstage basis EPA Stationary EMERG T2 (40CFR60)				of 8



Exhaust volume flow dry (based on O2 meas)	m3/s	1.39	1.2	0.9	0.62	0.49
NOX-Emissions (based on O2 meas)	mg/m3N	1782	1255	1088	927	749
	ppmV	1588	1265	1195	1246	1543
CO-Emissions (based on O2 meas)	mg/m3N	53	54	100	226	275
CO2-Emissions (based on O2 meas)	mg/m3N	174887	154338	141200	114581	73500
HC1-Emissions (based on O2 meas)	mg/m3N	35	32	43	86	125
NMHC-Emissions (based on O2 meas)	mg/m3N	34	32	42	84	123
NOX+HC1-Emissions (based on O2 meas)	mg/m3N	1817	1287	1130	1013	874
NOX+NMHC-Emissions (based on O2 meas)	mg/m3N	1816	1287	1129	1011	871
PM-Emissions (based on O2 meas)	mg/m3N	5.5	7.3	11.7	10.2	11.4
Dry-wet correction factor	[-]	0.911	0.919	0.925	0.937	0.954
NO/NO2 ratio	[-]	-	230.1	56.3	15.9	9.2
NO2/NO ratio	[-]	-	0	0	0.1	0.1

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			Approver3		Title Emission data sheet	
Approver4						
User	NAIschroederch					
Description of Revision		Frequency	Engine model 18V2000G76S			
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			Emissionstage EPA Stationary EMERG T2 (40CFR60)			Sheet 5
Configuration-ID 1363	Documentation		Emissionstage basis EPA Stationary EMERG T2 (40CFR60)			of 8

Engine data

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	18V2000G76S				
Fuel type	Zertifizierungskraftstoff / Certification Fuel				
Application Group	3D				
Legislative body	EPA Stationary EMERG T2 (40CFR60)				
Test cycle	D2				
Fuel sulphur content [ppm]	417				
mg/mN ³ values base on residual oxygen value of [%]	Measured				

Not to exceed emission values*

Cycle point	[-]	n1	n2	n3	n4	n5
Power	kW	1371	1028	686	343	137
Power relative	[-]	1	0.75	0.5	0.25	0.1
Engine speed	1/min	1800	1800	1800	1800	1800
Engine speed relative	[-]	1	1	1	1	1
NOX concentration corr.	ppm	992	703	610	605	630
Carbon monoxide (CO)	ppm	72	73	152	361	440
Hydrocarbon (HC)	ppm	87	82	121	261	560
NOX mass flow	kg/h	11.21	6.8	4.39	2.94	2.41
CO mass flow	kg/h	0.45	0.39	0.62	1	0.98
HC1 mass flow	kg/h	0.3	0.24	0.26	0.38	0.64
NMHC mass flow	kg/h	0.29	0.23	0.26	0.37	
NOX+HC1 mass flow	kg/h	11.51	7.04	4.66	3.32	3.05
NOX+NMHC mass flow	kg/h	11.5	7.03	4.65	3.31	
PM mass flow	kg/h	0.041	0.05	0.057	0.034	0.075
NOX-Emissions specific	g/kWh	8.18	6.61	6.41	8.57	17.56
CO-Emissions specific	g/kWh	0.33	0.38	0.9	2.92	7.13
HC1-Emissions specific	g/kWh	0.22	0.23	0.38	1.11	4.71
NMHC-Emissions specific	g/kWh	0.21	0.23	0.38	1.09	

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			Engine model 18V2000G76S				
		Emissionstage				Sheet	
			EPA Stationary EMERG T2 (40CFR60)			6	
Configuration-ID 1363		Documentation	Emissionstage basis				of
			EPA Stationary EMERG T2 (40CFR60)				8



NOX+HC1-Emissions specific	g/kWh	8.39	6.85	6.8	9.68	22.26
NOX+NMHC-Emissions specific	g/kWh	8.39	6.84	6.79	9.66	
PM-Emissions specific (Meas.)	g/kWh	0.03	0.049	0.083	0.099	0.546
NOX-Emissions (based on O2 meas)	mg/m3N	2317	1631	1414	1390	1423
	ppmV	2065	1645	1554	1869	2932
CO-Emissions (based on O2 meas)	mg/m3N	90	91	190	451	550
HC1-Emissions (based on O2 meas)	mg/m3N	59	55	81	172	363
NMHC-Emissions (based on O2 meas)	mg/m3N	58	54	79	168	
NOX+HC1-Emissions (based on O2 meas)	mg/m3N	2376	1687	1495	1562	1785
NOX+NMHC-Emissions (based on O2 meas)	mg/m3N	2375	1686	1493	1559	
PM-Emissions (based on O2 meas)	mg/m3N	8.3	11.7	17.6	15.3	42.1

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			Engine model 18V2000G76S				
		Emissionstage				Sheet	
			EPA Stationary EMERG T2 (40CFR60)			7	
Configuration-ID 1363	Documentation		Emissionstage basis				of
			EPA Stationary EMERG T2 (40CFR60)				8



Cycle information for EPA Stationary EMERG T2 (40CFR60)

	Genset	Marine	O & G	Rail	C & I
Application	X				
Engine model	18V2000G76S				
Serial-number	546100017				
Application Group	3D				
Legislative body	EPA Stationary EMERG T2 (40CFR60)				
Test cycle	D2				
Data Set No.	XZ 546 541 000 44				
Test-Report-Number	3617-10.06.2024				
Test location	P127				
Date of test	27.08.2014				
Tester	MTU a Rolls-Royce Solution				
Date of EDS	10.06.2024				

Engine cycle emissions*

Emission	Unit	Cycle value	EPA Stationary EMERG T2 (40CFR60)-Limit
CO cycle value	g/kWh	0.567	3.5
NOX+NMHC cycle value	g/kWh	5.602	6.4
Particulate (measurement) cycle value	g/kWh	0.046	0.2

Description of Revision Frequency		All industrial property rights reserved. Disclosure, reproduction or use for any other purpose is prohibited unless our express permission has been given. Any infringement results in liability to pay damages.	PDF	Name	Project no.	Size	
			Configurator		Order no.	A4	
			Approver1	Kneifel, Alexander (TSLE)	EDS-ID		
			Approver2	Koliwer, Michael (TV)	3617-10.06.2024		
			Approver3		Title Emission data sheet		
Approver4							
User	NAIschroederch						
Data generated by EDS Creator version 1.0 and uniplot. Ref.-dataset: 218V_012_TESP_D2.nc for 1363 in EDS platform.			Engine model				
			18V2000G76S				
Configuration-ID 1363		Documentation	Emissionstage EPA Stationary EMERG T2 (40CFR60)				Sheet
			Emissionstage basis EPA Stationary EMERG T2 (40CFR60)				8 of 8

PERMIT BY RULE REGISTRATION
CYRUSONE, LLC
SAT14 FACILITY

APPENDIX C:

CORE DATA FORM



TCEQ Core Data Form

For detailed instructions on completing this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission (If other is checked please describe in space provided.)		
☒ New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)		
☐ Renewal (Core Data Form should be submitted with the renewal form)	☐ Other	
2. Customer Reference Number (if issued)	Follow this link to search for CN or RN numbers in Central Registry**	3. Regulated Entity Reference Number (if issued)
CN 604843086		RN

SECTION II: Customer Information

4. General Customer Information		5. Effective Date for Customer Information Updates (mm/dd/yyyy)							
☐ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership ☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)									
<i>The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).</i>									
6. Customer Legal Name (If an individual, print last name first: eg: Doe, John)				<i>If new Customer, enter previous Customer below:</i>					
CyrusOne LLC									
7. TX SOS/CPA Filing Number		8. TX State Tax ID (11 digits)		9. Federal Tax ID (9 digits)	10. DUNS Number (if applicable)				
11. Type of Customer:		☒ Corporation		☐ Individual	Partnership: ☐ General ☐ Limited				
Government: ☐ City ☐ County ☐ Federal ☐ Local ☐ State ☐ Other		☐ Sole Proprietorship		☐ Other:					
12. Number of Employees				13. Independently Owned and Operated?					
☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☒ 501 and higher				☐ Yes ☒ No					
14. Customer Role (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check one of the following									
☐ Owner ☐ Operator ☒ Owner & Operator ☐ Other: ☐ Occupational Licensee ☐ Responsible Party ☐ VCP/BSA Applicant									
15. Mailing Address:		2850 N Harwood Street, Suite 2200							
		City	Dallas	State	TX	ZIP	75201	ZIP + 4	
16. Country Mailing Information (if outside USA)						17. E-Mail Address (if applicable)			
						lcottrell@cyrusone.com			

18. Telephone Number	19. Extension or Code	20. Fax Number (if applicable)
(603) 793-0534		() -

SECTION III: Regulated Entity Information

21. General Regulated Entity Information (If 'New Regulated Entity' is selected, a new permit application is also required.)								
☒ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information								
<i>The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core Data Standards (removal of organizational endings such as Inc, LP, or LLC).</i>								
22. Regulated Entity Name (Enter name of the site where the regulated action is taking place.)								
SAT14								
23. Street Address of the Regulated Entity: (No PO Boxes)	3311 Us Highway 90 W							
	City	Castroville	State	TX	ZIP	78009	ZIP + 4	
24. County	Medina							

If no Street Address is provided, fields 25-28 are required.

25. Description to Physical Location:								
26. Nearest City					State	Nearest ZIP Code		
<i>Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).</i>								
27. Latitude (N) In Decimal:		29.349071			28. Longitude (W) In Decimal:		-98.949440	
Degrees	Minutes	Seconds		Degrees	Minutes	Seconds		
29	20	56.6556		98	56	57.984		
29. Primary SIC Code		30. Secondary SIC Code		31. Primary NAICS Code		32. Secondary NAICS Code		
(4 digits)		(4 digits)		(5 or 6 digits)		(5 or 6 digits)		
7376				518210				
33. What is the Primary Business of this entity? (Do not repeat the SIC or NAICS description.)								
Data Center								
34. Mailing Address:	2850 N Harwood Street, Suite 2200							
	City	Dallas	State	TX	ZIP	75201	ZIP + 4	
35. E-Mail Address:		dhenderson@cyrusone.com						
36. Telephone Number			37. Extension or Code			38. Fax Number (if applicable)		
(361) 532-9996						() -		

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☒ New Source Review Air	☐ OSSF	☒ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☐ Wastewater	☐ Wastewater Agriculture	☐ Water Rights	☒ Other:
				EPCRA Tier II

SECTION IV: Preparer Information

40. Name:	Rachel Korenek	41. Title:	Managing Consultant
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(713) 470-6653		() -	rkorenek@ramboll.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:	CyrusOne, LLC	Job Title:	Director of Environmental Compliance
Name (In Print):	Laura Cottrell	Phone:	(603) 793- 534
Signature:		Date:	