South Coast Air Quality Management District

Engineering and Permitting

Subject:				Doc. Type:	No.:
Source Testing Procedure for Demonstrating Compliance with U.S. EPA Tier 4 Final Emissions Standard for Stationary Emergency I.C. Engine-Compression Ignition ≥1000 BHP located at Major Polluting Facilities				Procedure	E2024-02
E&P Team(s):	Prepared by:	E&P Mgmt. Rep.:	Rule Citation	Rule Section	Date:
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Scope

This procedure is intended to standardize and streamline source testing requirements to demonstrate compliance with Tier 4 Final (Tier 4F) emission standards for Compliant and Retrofitted engines ≥1000 brake horsepower (BHP), located at Major Polluting Facilities. The procedure provides guidance for initial and subsequent source tests of the non-certified Tier 4F engines to show compliance with South Coast Air Quality Management District (South Coast AQMD)'s current Best Available Control Technology (BACT)/Lowest Achievable Emission Rate (LAER) for the Emergency I.C. Engine-Compression Ignition ≥1000 BHP, located at Major Polluting Facilities.

This procedure streamlines the permit process and outlines modified testing procedures for non-certified Tier 4F engines to streamline testing while ensuring compliance with Tier 4F standards (see Appendix A). It also provides typical permit conditions that can be used by the permitting engineers on a case-by-case basis (see Appendix B).

This procedure may be superseded by any future requirements in local, state, or federal rules.

Background

In September 2022, the South Coast AQMD established emission limits based on U.S. EPA's Tier 4F emission standards as BACT/ LAER for Stationary Emergency I.C. Engine-Compression Ignition rated 1000 BHP and greater located at Major Polluting Facilities[1].

These engines shall comply with the following emission limits per *ISO 8178 D2 cycle testing*:

NO_x:	0.67 g/kW-hr (0.5 g/bhp-hr)
NMHC:	0.19 g/kW-hr (0.14 g/bhp-hr)
CO:	3.5 g/kW-hr (2.61 g/bhp-hr)
PM:	0.03 g/kW-hr (0.02 g/bhp-hr)

[1] A facility is a major polluting facility (or a major stationary source as it is called in the federal Clean Air Act) if it emits, or has the potential to emit (PTE), a criteria air pollutant at a level that equals or exceeds emission thresholds specified in Rule 1302(s) based on the attainment or nonattainment status.

Tier 4F technology consists of multiple air pollution control strategies to reduce emissions of air contaminants from the operation of diesel engines. A Selective Catalytic Reduction (SCR) with urea injection is utilized to reduce emissions of NOx, a Diesel Particulate Filter (DPF) may be used to reduce PM emissions, and a Diesel Oxidation Catalyst (DOC) may be utilized for reducing CO, PM, and hydrocarbon emissions[2]. Historically, compliance with the tiered engine emission standards has typically relied upon certification testing by U.S. Environmental Protection Agency (U.S. EPA). However, compliance testing must now be considered due to multiple configurations of Tier 4F engine technologies, some of which may not be U.S. EPA Tier 4F certified. One of the configurations is conversion of a U.S. EPA Tier 2 engines to Tier 4F by adding aftertreatment equipment to meet with emission requirements of U.S. EPA Tier 4F engines.

Compliance with South Coast AQMD's BACT/LAER for the Emergency I.C. Engine-Compression Ignition ≥1000 BHP located at Major Polluting Facilities can be achieved through:

(1) Installing Certified Tier 4 Final I.C. Engines; or
(2) Installing Compliant OEM Tier 4 Final I.C. Engines; or
(3) Retrofitting Certified I.C. Engines, Non-Tier 4F, to meet Tier 4 Final emission limits

- Certified Tier 4F engine is a new diesel engine that is certified by the U.S. EPA for the intended use of the engine. The U.S. EPA issues a Certificate of Conformity to indicate that the engine has been tested and certified for the manufacturer's family of engines. For more information on Tier 4F emission standards and certification requirements, see *40 CFR Part 1039*. Also, *40 CFR Part 1065* provides detailed information on exhaust emission testing procedures required by U.S. EPA.
- Compliant Original Equipment Manufacturer (OEM) Tier 4F engine is a new engine that meets U.S. EPA's Tier 4F emissions standards but has not been certified by the U.S. EPA as Tier 4F. The compliant OEM engine is U.S. EPA certified to a lower tier level (i.e., Tier 2). A compliant engine typically uses same aftertreatment equipment as a certified engine but does not include some features (such as the inducements described below) that are inherent to U.S. EPA's certification of Tier 4F engines. Testing/monitoring will be required to demonstrate compliance with Tier 4F emissions standards.
- Retrofitted Tier 4F engine is a new or existing engine certified by U.S. EPA to a lower tier level (e.g., Tier 3, Tier 2, etc.), retrofitted with new third party aftertreatment equipment including SCR and/or DOC, and/or DPF to meet the Tier 4F emissions standards. Like the compliant engines, the retrofitted engines are not U.S. EPA certified for Tier 4F emission standards, not tested per U.S. EPA's certification procedures, and do not include some features such as the inducements.

[2] www.epa.gov/sites/default/files/2016-03/documents/420f10031.pdf

Table 1: Summary of I.C. Engine Source Test Requirements

	Certified Tier 4F	Compliant OEM Tier 4F	Retrofitted Tier 4F
Definition	New Tier 4F engine, certified by the U.S. EPA (including inducement features)	New engine, not certified as Tier 4F by the U.S. EPA, but certified by U.S. EPA to a lower tier level (such as Tier 2 or Tier 3) and retrofitted with an OEM aftertreatment equipment that is identical to the abatement equipment used on a certified Tier 4F engine, but with the inducement feature disabled	New or existing engine, certified by U.S. EPA to a lower tier level (such as Tier 2 or Tier 3), but retrofitted with third party aftertreatment equipment
Initial Source Test	Not required	Required*	Required
Subsequent Testing	Not required	Every 5 years	Every 5 years
Test Loads	N/A	50% and 75%	50% and 75%
Pooled Testing	N/A	Allowed upon request	Not allowed

* PM testing may not be required as noted in this procedure.

Inducement is the U.S. EPA term describing control settings that will induce the operator to properly maintain the SCR emission control system. In the event of an Emission After-Treatment System (EATS) failure or fault, the unit will enter an inducement phase. The inducement period allows a limited window for the operator to fix the fault before the unit begins to derate and eventually shutdown completely.

Note: On August 8, 2014, the U.S. EPA promulgated provisions allowing manufacturers of nonroad engines certified to the emission standards in 40 CFR Part 1039 to give operators the means to temporarily override emission control inducements during qualified emergency situations, such as those where operation of the engine is needed to protect human life (79 FR 46356, August 8, 2014). Qualified emergency situation is defined in 40 CFR 1039.665 as a:

> Condition of an engine's emission controls poses a significant direct or indirect risk to human life. An example of a direct risk would be an emission control condition that inhibits the performance of an engine being used to rescue a person from a life-threatening situation (for instance, providing power to a medical facility during an emergency situation). An example of an indirect risk would be an emission control condition that inhibits the performance of an engine being used to provide electrical power to a data center that routes ''911'' emergency response telecommunications.

Essential services facilities (such as publicly owned or operated sewage treatment facilities, landfill gas control or processing facilities, and water delivery operations) have expressed strong concerns about the possibility of the engine shutdown occurring during an emergency event. South Coast AQMD allows the use of non-certified Tier 4F engines to meet the BACT/LAER

requirements for the Emergency I.C. Engine-Compression Ignition ≥1000 BHP located at Major Polluting Facilities.

Tier 4F Certified nonroad engines are tested to simulate real-world operation when tested per *ISO 8178 D2 test cycle*. Emissions levels are evaluated on a 5-mode, weighted test cycle average as described in Table 2 of appendix B of 40 CFR Part 89. A full *ISO 8178 D2 cycle testing* is typically conducted at the manufacturer's facility and can take several days to complete. Additional durability testing is also required by the OEM for the certified engine.

Unlike the rigorous ISO 8178 D2 cycle testing requirement for the Tier 4F Certified engines, the OEM Compliant or Retrofitted engines may not have undergone the same testing required for U.S. EPA certification. Thus, testing the Tier 4F Compliant and Retrofitted engines is needed to assure compliance with the Tier 4F emissions limits, and periodic long-term testing is also needed to assure proper operation of the engines and control equipment, as well as ensuring continued compliance with the Tier 4F emissions standards.

South Coast AQMD limits the operation of emergency compression-ignition engines to 50 hours per year (typically 4.2 hours/month), or less if required by Rule 1470, for maintenance and testing (M&T) and limits the total operation, including emergency use, M&T, and compliance testing (initial/subsequent source testing), to a maximum of 200 hours per year. Note that the time required for initial and subsequent source testing is not included in the 50 hours per year allowed for M&T (Rule 1470 (c)(2)(C)(i)), and is not included in any monthly M&T hourly limits[3]. For example, during the years when source testing is required, if 10 hours are allowed for testing, then a maximum of 14.2 hours will be allowed during the month when source testing is performed. The testing hours allowance will be determined at the time of permitting on a case-by-case basis and will be specified as a condition in the permit.

A full ISO 8178 D2 testing takes several days to complete. Also, it is typically conducted using a load bank and thus the engines would not be generating useful power while at the same time generating additional emissions including Diesel Particulate Matter (DPM). Therefore, minimizing testing time is desired to limit the operation of these engines during emissions testing.

The use of modified testing procedures for the non-certified Tier 4F engines will reduce the overall testing time, and at the same time, provide sufficient compliance assurance that these engines can meet the Tier 4F standards. This guidance memo provides the operators of Tier 4F Compliant and Retrofitted engines with options to minimize the impacts of source testing requirements for these engines.

[3] Per Rule 1470 (c)(3)(C)(v), hours of operation used solely for testing and demonstration for compliance with District rules shall not be included as part of the engine's cumulative annual hours specified in clauses (c)(3)(C)(i) through (c)(3)(C)(iii).

Procedure

SOURCE TESTING REQUIREMENTS FOR TIER 4F ENGINES LOCATED AT MAJOR SOURCE FACILITIES IN SOUTH COAST AQMD JURISDICTION

Certified Tier 4F I.C. Engine

Neither initial nor subsequent testing will be required for Tier 4F Certified engines (certified by U.S. EPA) to demonstrate compliance with Tier 4F emission requirements. For Tier 4F Certified engines, the operation and maintenance of the equipment should be consistent with the engine manufacturer's recommendations to ensure ongoing compliance. Currently, the inducement features of the certified models are expected to reliably ensure ongoing compliance into the future.

Compliant OEM Tier 4F and Retrofitted Tier 4F I.C. Engines

Source testing of Compliant OEM Tier 4F and Retrofitted Tier 4F engines will be required to assure that these engines can meet the Tier 4F emissions requirements for the applicable pollutants that are subject to the Tier 4F requirements, i.e., PM, NOx, CO, and NMHC/VOCs. Testing for ammonia slip is also required. The extent and frequency of testing will depend on the engine and air pollution control configuration and testing (if any) conducted by the manufacturer. Additionally, for certain circumstances, when facilities have multiple identical engines (i.e., same engine size/rating/make/model equipped with identical aftertreatment system), a streamlined testing approach can be used to minimize the impact of testing, as indicated under "Pooled Testing" section in this document.

This procedure is only intended to be used by permitting engineers for guidance during the permitting process, and the final requirements on the permit are expected to be imposed on a case-by-case basis as determined during permitting of the engine(s).

The operator of Tier 4F Compliant and Retrofitted engines will need to conduct source tests using 40 CFR Part 1065 for sampling and analytical methodology and the Modified ISO 8178 testing requirements for operating cycle (loads specified for testing) described in Appendix A. The tests are to be conducted at two loads; 50% and 75% (± 5%), and the results will be averaged to demonstrate compliance with the Tier 4F emissions standards. The small range allowance may be necessary for the test loads during source testing, and the source test protocol and report should address any deviations in the test loads to ensure the test conditions are representative. Previous analysis by South Coast AQMD Engineering staff has shown that emissions for these two loads are considered representative of the full 5-mode, weighted test cycle average.

Permit conditions will require the operator to conduct initial testing within a certain timeframe of the date of engine installation or the date that the engine is operational, and this is recommended to be from 120-180 days, to be determined at the time of permitting. Additional time considerations for source testing timelines may be needed due to source test protocol review and approval.

Emissions Testing Requirements for Compliant OEM Tier 4F and Retrofitted Tier 4F I.C. Engines

- **PM Testing Requirements**

  Emissions testing will not be required for PM provided that the engine is equipped with *current (valid) CARB-verified Level 3 DPF*, or the DPF included in the EPA certification of a Tier 4F engine. CARB-verified Level 3 DPF is designed to reduce at least 85% of PM or soot from the diesel engine exhaust. The CARB Executive Order for the DPF shall be submitted with the permit application to confirm CARB verification. The valid CARB verification of the Level 3 DPF will be considered independent of the presence of SCR control. If a facility cannot provide records of the DPF CARB Level 3 verification, then it will be assumed to be non-CARB-verified and require testing.

- **NOx, CO, and VOC Testing Requirements**

  For Tier 4F Compliant OEM and Retrofitted engines, initial source testing will be required for NOx, CO, and VOCs. Please refer to Appendix A for further details on the testing requirements for these pollutants.

- **Alternative NOx Testing/Monitoring Options**

  For subsequent testing and monitoring requirements, stakeholders suggested utilizing alarm dataloggers in lieu of requiring testing every 5 years. According to the OEM, the Tier 4F Compliant system is identical to the U.S. EPA Tier 4F Certified system, and the alarms required by U.S. EPA are all present, just the inducement shutdowns from these alarms are turned off. South Coast AQMD staff are not currently aware of any achieved in practice cases which demonstrate that the alarm datalogger installed on a Compliant Tier 4F engine can reliably be utilized for compliance monitoring in lieu of source testing requirements. Although not part of this procedure, staff may revisit this issue in the future if information and data become available for additional monitoring and enforceable permit requirements utilizing a datalogger, and update this procedure as required.

- **Ammonia Testing Requirements**

  For Tier 4F Compliant OEM and Retrofitted engines, South Coast AQMD will require testing for ammonia slip using South Coast AQMD Method 207.1 or U.S. EPA Method 320, or any other method approved by South Coast AQMD. Please refer to Appendix A for details on ammonia testing requirements.

- **Alternative Testing Options for Mass Emission Limits**

  The U.S. EPA Tier 4F emission limits for NOx, CO and NMHC/VOCs are mass-based limits requiring exhaust flow measurements. Feedback from initial testing efforts has indicated that there may be complications and safety concerns regarding source testing exhaust flow measurements of some engines. The purpose of the testing is to ensure ongoing proper operation of the engine and the air pollution control equipment, and concentrations limits would be indicative of compliant operation. An operator may request to perform initial and ongoing testing utilizing equivalent NOx, CO, and NMHC/VOCs

concentration limits for the engine. Since the equivalent concentrations are dependent on individual characteristics of the engines (e.g., engine efficiency), these requests shall be addressed on a case-by-case basis during permitting of the engine. The applicant will need to provide all calculations for the equivalent concentration limits with the permit application, which will be verified by South Coast AQMD permitting engineers. An appropriately sized resistance load bank (or equivalent) shall be used during the emissions testing to ensure the engine is operating at 50% and 75% (± 5%) loads. Please refer to Appendix A for further details. Permit conditions with the equivalent concentration limits will be added to the engine permit at the time of permitting. The respective Tier 4F mass emission limits will still be required to be included in permit conditions as a reference.

If an owner or operator of a facility wants to opt for concentration limits for testing purposes after permitting, permit applications to modify the existing permit conditions may be submitted. The applicant must provide all the information necessary from the manufacturer with the permit application package for staff to review these requests.

This alternative testing option is not available for any required PM testing, since PM test methods are typically gravimetric methods.

- **Manufacturer Testing of Compliant OEM or Retrofitted Engines**

  Emissions testing of Tier 4F Compliant OEM and Retrofitted engines by the engine manufacturer will be allowed for the same size and model number of engines provided the testing requirements above are followed. In this case, the facility operator will not be required to conduct the initial emissions testing for engines that are tested by the manufacturer; however, periodic testing every five years would still be required using the Modified ISO 8178 testing requirements in Appendix A. The source test protocol shall be submitted to the Engineering & Permitting Team 60 days prior to conducting the source test. The test shall be conducted in accordance with the approved source test protocol by an approved source testing company. The test report will be submitted to a permitting engineer for South Coast AQMD review and approval prior to allowance of this provision. Modification or changes to the aftertreatment equipment may require additional testing by the engine manufacturer.

- **Pooled Testing**

  For Tier 4F Compliant OEM engines, pooled testing for identical engines (i.e., same engine size/rating/make/model equipped with identical aftertreatment system) will be allowed to show compliance with the emission limits in the Tier 4F emission standards. Specific scenarios discussed below illustrate the suggested testing requirements; any scenario not covered below, and other site-specific considerations will be evaluated on a case-by-case basis during permitting. Permit applicants must request engines to be identified as Pooled Units during the permitting process so the appropriate permit conditions may be evaluated and added. Units not identified as Pooled Units will default to the standard testing requirements identified in this document. This option is not available for retrofitted engines that use third party aftertreatment equipment.

The owner or operator of three or more identical engines located at the same facility may elect to conduct pooled source testing for PM (if required), NOx, CO, NMHC/VOCs, and ammonia, pursuant to the following:

- At least one-third of the engines will be source tested during the initial source test and all subsequent source testing will be conducted on a different one-third engines. Subsequent source testing of pooled engines will be conducted at least every three years from the date of the previous source test, no later than the last day of the calendar month that the test is due;
- Identical Units installed after the initial source test has been performed will be included with the engines pool that is subject to the next emissions testing cycle;
- If any engine subject to the pooled source testing exceeds any permitted emissions limits, the owner or operator will repair the engine that failed the source tests and repeat the source test on that engine, and will conduct source testing on an additional one-third of the engines within six months of failing the tests (additional time may be allotted for compliance determinations or review of the source test results by Source Test Engineering); and
- All pooled units at a facility will be source tested at least once every nine years.

Title V Reporting of Deviations and Rule 430 Requirements

Form 500-N – Deviations, Emergencies & Breakdowns must be completed and submitted to the South Coast AQMD Compliance & Enforcement Division for any deviations from permit or applicable rule requirements. Breakdowns as required by Rule 430 – *Breakdown Provisions* or Rule 2004(i) - *Breakdown Provisions* should also be reported. Condition 22 of Section K of the standardized Title V permit conditions provides the details of this reporting requirement.

Related Policies and Procedures

Not applicable.

Resources

Appendix A Source Testing Requirements for Stationary Emergency I.C. Engine-Compression Ignition (Non-Agricultural, Non-Direct Drive Fire Pump) Rated 1000 BHP and Greater Subject to BACT Determination Dated 9/2/2022

Appendix B Example of Equipment Descriptions & Permit Conditions for Stationary Emergency I.C. Engine-Compression Ignition (Non-Agricultural, Non-Direct Drive Fire Pump) Rated 1000 BHP and Greater Subject to BACT Determination Dated 9/2/2022

Review and Revisions

The initial version of the Source Testing Guidance for Demonstrating Compliance with U.S. EPA Tier 4 Final Emissions Standard for Stationary Emergency I.C. Engine-Compression Ignition ≥1000 BHP located at Major Polluting Facilities was approved and became effective on December 29, 2023.

This version of the Source Testing Procedure for Demonstrating Compliance with U.S. EPA Tier 4 Final Emissions Standard for Stationary Emergency I.C. Engine-Compression Ignition ≥1000 BHP located at Major Polluting Facilities supersedes the initial version and is effective on December 20, 2024.

Approvals

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Document History

No.	Version Number	Effective Date	Retirement Date
-	1	12/29/2023	12/19/2024
E2024-02	2	12/20/2024	N/A

Appendix A

Source Testing Requirements
for Stationary Emergency I.C. Engine-Compression Ignition
(Non-Agricultural, Non-Direct Drive Fire Pump)
Rated 1000 Brake Horsepower (BHP) and Greater
Subject to BACT Determination Dated 9/2/2022

Source Testing Requirements for Stationary Emergency I.C. Engine-Compression Ignition rated 1000 brake horsepower (BHP) and greater

The ISO 8178 is an international standard for exhaust emission measurement from a number of non-road engine applications. The ISO 8178 test methods are used for emission certification and/or type approval testing in many countries, including the United States, European Union, and Japan. Depending on the legislation, the cycle can be defined by reference to the ISO 8178 standard or else by specifying a test cycle equivalent to ISO 8178 in the national legislation.

The ISO 8178 includes a collection of steady-state engine dynamometer test cycles (designated as type C1, C2, D1, etc.) designed for different classes of engines and equipment. Each of these cycles represents a sequence of several steady-state modes with different weighting factors.

For the Tier 4F engines covered under this procedure that are required to meet the BACT requirements for Stationary Emergency I.C. Engine-Compression Ignition rated 1000 brake horsepower (BHP) and greater located at Major Sources, testing under the ISO 8178 cycle D2 applies. Details of the testing requirements are covered in the ISO 8178 standards.

The ISO 8178 test method requires analyzing the exhaust gas based on full flow dilution or partial flow dilution. For five load tests, testing is performed at each of the five engine torque load levels and data is reduced to a single-weighted average value using the weighting factors. Emissions testing is conducted on the ISO 8178 D2 cycle consistent with constant speed stationary engines (5% @100%, 25% @75%, 30% @50%, 30% @25%, and 10% @10% Torque).

Modified ISO-8178 Test Method (Partial dilution):

South Coast AQMD will allow the use of a modified ISO 8178 testing method described in this appendix to show that the Tier 4F Compliant OEM and Retrofit engines meet the Tier 4F standards. The modified method is based on partial dilution of the exhaust. Partial flow dilution is the method of analyzing the exhaust gas whereby a part of the total exhaust gas flow is separated and then mixed with an appropriate amount of dilution air prior to reaching the particulate sampling filter. The test consists of two test-runs and shall be performed at 50% and 75% engine torque load levels consistent with constant speed stationary engines. An appropriately sized resistance load bank (or equivalent) shall be used during the emissions testing to ensure the engine is operating at 50% and 75% (± 5% or other acceptable allowance) loads.

Source testing shall be conducted according to the testing requirements and the schedule in Table 1 and as approved in a valid source testing protocol. Each engine shall operate no more than 10 hours per stack testing event (additional hours may be allowed at the time of permitting and must be included in the permit).

Table 1 - Emission Limits and Testing Requirements

Pollutant	Load Test	Method	Duration
PM	Two-load average	40 CFR 1065	Two consecutive runs per load, District approved averaging time (total of 4 runs)
NOx	Two-load average	40 CFR 1065 or South Coast AQMD Method 100.1	Two consecutive runs per load, 30-minutes per run per load (total of 4 runs)
CO	Two-load average	40 CFR 1065 or South Coast AQMD Method 100.1	Two consecutive runs per load, 30-minutes per run per load (total of 4 runs)
NMHC/ VOC	Two-load average	40 CFR 1065 or South Coast AQMD Method 25.1 or 25.3	Two consecutive runs per load, 30-minutes per run per load (total of 4 runs)
NH_3	Two-load average	EPA Method 320 (FTIR), South Coast AQMD Method 207.1*, or other method with South Coast AQMD approval	Two consecutive runs per load, 30-minutes per run per load (total of 4 runs)

* For South Coast AQMD Method 207.1, two test runs per load, which implies non-concurrent duplicate sampling trains per load, are required. The test run shall be conducted with one sample train collected during each test run. For the purposes of this method, these two trains shall be considered a duplicate sample.

Stack gas volumetric flow rate, in dry standard cubic feet per minute (dscfm), can be measured:

- Directly at the stack in accordance with South Coast AQMD Methods 1.1- 4.1 determined at a standard temperature of 60 °F, or
- Alternatively, it can be calculated using O_2 reading and oxygen-based F factor, dry basis, in accordance with EPA Method 19, determined at the U.S. EPA standard temperature of 68 °F:

$$Q_s = F_d \times HV \times [\frac{20.9}{20.9 - O_2}]$$

where;

Q_s: Stack flow rate [dscf/min]

F_d: Fuel-specific oxygen-based F factor, dry basis, from Method 19 [scf /10E6 Btu]

HV: Fuel heat input rate [10E6 Btu/min]

O_2: Stack oxygen concentration, dry basis [%]

Once the stack gas volumetric flow rate is determined, mass emissions can be calculated in pounds per hour (lbs/hr) using the flow rate, concentration, and molecular weight at standard temperature, as shown below:

$$m^{\circ} = C \times \text{Qs} \times 60 \times \left[\frac{M_W}{385}\right] \times 0.000001$$

where

m°: Mass emissions from stack gas volumetric flow rate [lb/hr]

C: Pollutant concentration in parts per million by volume [ppmv]

Qs: Stack flow rate [dscf/min] at 68 °F

M_W: Molecular weight of the pollutant (e.g., NO_2, CO, etc.) [lb/lb-mol]

385 is the molar volume of gas at standard conditions (68 °F, 1 atm) in dscf [dscf/lb-mol]

Note 1: To calculate the diesel fuel heat input and stack flow rate, the use of 137,000 Btu/gallon [4] and Method 19 Fd of 9,190 dscf/MMBtu @ 0% O_2 (rather than requiring fuel analysis) is allowed.

Compliance with the permit limits will be determined by calculating emissions in g/kWhr or g/bhp-hr using the mass emissions (lbs/hr) and engine power rating (bhp):

$$g/bhp\text{-}hr = m^{\circ} \times (454/bhp)$$

$$g/kW\text{-}hr = m^{\circ} \times (454/(bhp \times 0.7457)$$

where

m°: Mass emissions from stack gas volumetric flow rate [lb/hr]

The operator may opt to determine compliance with the permit limit by converting the emissions limits to ppm @ 15% O_2 (see example below), on a case-by-case basis. The source test protocol should include the details on how the operator proposes to convert the emissions into ppm, and the protocol must be approved by the South Coast AQMD prior to using this method. The facility must request this provision and provide the necessary information for staff to review the request. The engine efficiency factor needs to be provided by the engine manufacturer. See example calculation below for NOx where 44.5 ppm at 15 % O_2 is calculated using EPA Tier 4F limit of 0.67 g/KW-hr, assuming 40% engine efficiency:

$$\frac{0.67\ g\ NOx}{kWhr\ out} \times \frac{0.7457\ kWhr\ out}{1\ bhp\ out} \times \frac{lb}{454\ g} \times \frac{0.4\ bhp\ out}{1\ bhp\ in} \times \frac{bhp\ in}{0.002545\ mmBtu} = \frac{0.173\ lbs}{mmBtu}$$

$$\frac{0.173\ lbs}{mmBtu} \times \frac{mmBtu}{9190\ scf} \times \frac{20.9 - 15}{20.9} \times \frac{ppmv}{1.194\ E-7\ lb/scf} = 44.5\ ppmv\ NOx$$

[4] Rule 218.3, Table 6: http://www.aqmd.gov/docs/default-source/rule-book/reg-ii/r218-3.pdf?sfvrsn=20

Appendix B

Example of Equipment Descriptions & Permit Conditions for Stationary Emergency I.C. Engine-Compression Ignition (Non-Agricultural, Non-Direct Drive Fire Pump) Rated 1000 Brake Horsepower (BHP) and Greater Subject to BACT Determination Dated 9/2/2022

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I. Certified Tier 4 Final I.C. Engines, equipped with SCR [and DPF or Oxidation Catalyst]

Generally, a stationary emergency diesel internal combustion engine is described in the permit as follows:

Internal Combustion Engine, Tier 4 Final Certified, Manufacturer's *Name, Diesel-Fueled, Model No.,* Aspiration (e.g., *Turbocharged, Aftercooled*)*, No. of Cylinders, Two/Four-Cycle, Engine Brake Horsepower with an Integrated Aftertreatment System including Selective Catalytic Reduction [and Diesel Particulate Filter or other Diesel Exhaust Particulate Matter Abatement System]*, Purpose (e.g. Driving an Emergency Electrical Generator/non-direct Fire Pump*).*

Notes: The permit conditions below are suggested to be used for Tier 4 Final Certified engines (Stationary Emergency I.C. Engine-Compression Ignition rated 1000 brake horsepower or greater). Source testing is not required.

Permit conditions listed below are intended as guidance for specific Tier 4 Final related issues and are meant to be as general as possible. Additional conditions may be required for other circumstances or rules. It is the discretion of the Engineer and their supervisor to modify or include new conditions as appropriate for the application(s) being evaluated.

The bold print numbers and text in parenthesis are typical and could vary from permit to permit.

1. Operation of this equipment shall be conducted in accordance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.
   [Rule 204]
2. This equipment shall be properly maintained and kept in good operating condition.
   [Rule 204]
3. This equipment shall only be operated by personnel properly trained in its operation.
   [Rule 204]
4. An operational non-resettable totalizing elapsed time meter shall be installed and maintained to indicate the engine elapsed operating time.
   [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1470; 40CFR 60 Subpart IIII]
5. This engine shall not be operated more than 200 hours in any one year, which includes no more than 50 hours in any one year for maintenance and testing purposes.
   [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1470; 40CFR 60 Subpart IIII]
6. This engine shall not be operated more than (**4.2**) hours in any one month for maintenance and testing purposes.
   [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1470]

7. The operation of engine beyond the 50 hours per year allotted for maintenance and testing purposes shall be allowed only in the event of a loss of grid power or up to 30 minutes prior to a rotating outage, provided that the utility distribution company has ordered rotating outages in the control area where the engine is located or has indicated that it expects to issue such an order at a certain time, and the engine is located in a utility service block that is subject to the rotating outage. Engine operation shall be terminated immediately after the utility distribution company advises that a rotating outage is no longer imminent or in effect. [Rule 1304(a)(4) Modeling and Offset exemption]
8. This engine shall not be used as a part of a Demand Response Program using an Interruptible Service Contract in which a facility receives a payment or reduced rates in return for reducing its electric load on the grid when requested to do so by the utility or the grid operator.
   [Rule 1304(a)(4) Modeling and Offset exemption]
9. This engine shall not be operated unless it is equipped with an air pollution control system consisting of a Selective Catalytic Reduction (SCR) System (**and Diesel Particulate Filter (DPF) or other diesel exhaust particulate matter abatement system**). The air pollution control system shall be maintained and operated in accordance with the manufacturer's specifications.
   [Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]
10. This engine shall not be operated unless its exhaust is vented to a (**CARB level 3 verified**) diesel particulate filter (DPF) system, as described in condition (9), which is in full operation and which is in good operating condition at all times, unless otherwise approved in this permit.
    [Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII][*]
11. The DPF shall be equipped with an operational backpressure monitor to indicate to the owner or operator when the high back pressure limit is approached.

    The operator shall inspect the diesel particulate filter every (**XXX**) hours and clean, if needed, and per manufacturer's specifications.

    The owner or operator shall keep records of any corrective action taken on the DPF.

    There shall not be any changes to the design or operating conditions of the DPF without prior written approval by the South Coast AQMD.

    The owner/operator shall take all corrective actions recommended by the manufacturer in response to backpressure monitor notifications.
    [Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII][*]
12. To determine compliance with the above conditions, the operator shall maintain the following records and shall make these records available to South Coast AQMD personnel upon request. All records shall be retained for a minimum of five calendar years from the

[*] For some Certified Tier 4F engines, the aftertreatment is an SCR system only. In such cases, there is no DPF and conditions (10) and (11) do not apply.

date of entry. These recordkeeping requirements shall not replace the recordkeeping requirements contained in any applicable South Cost AQMD, state, or federal regulations.

i. Maintenance records for engine and diesel exhaust aftertreatment system including SCR (**and DPF or other Diesel Exhaust Particulate Matter Abatement System**)
ii. SCR system owner's manual or manufacturer's specifications
iii. DPF owner's manual or manufacturer's specifications (if applicable)
iv. All backpressure monitor notifications and corrective actions (if applicable)

[Rule 1303(a)(1)-BACT]

13. The operator shall keep a log of engine operations documenting the total time the engine is operated each month and the specific reason for operating as:
    A. Emergency use,
    B. Maintenance and testing,
    C. Initial start-up and testing hours,
    D. Other (specify the reason for operating)

    In addition, each time the engine is manually started, the log shall include the date of engine operation, the specific reason for operation, and the totalizing meter reading in hours and tenths of hours at the beginning and the end of operation. The log shall be kept for a minimum of five calendar years and shall be made available to South Coast AQMD personnel upon request. The total hours of operation for the previous calendar year shall be recorded on or before January 15th of each year.
    [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1110.2 Exemption; Rule 1470; 40CFR 60 Subpart IIII]

14. Sulfur content of diesel fuel supplied to the engine shall not exceed 15 ppm by weight. The operator shall keep a log of the fuel used. The owner or operator shall document the use of CARB diesel fuel through the retention of fuel purchase records indicating that the fuel purchased for supply to an emergency standby engine was CARB diesel fuel.
    [Rule 431.2; Rule 1470]

15. The engine shall be installed and configured according to the manufacturer's emission related specifications.
    The operator shall operate and maintain the stationary engine and control device according to the manufacturer's written emission-related instructions (or procedures developed by the operator that are approved by the engine manufacturer), change only those emission-related settings that are permitted by the manufacturer, and meet the requirements of South Coast AQMD Rules 431.2 and 1470, 40 CFR Part 60 Subpart IIII, and 40 CFR Part 63 Subpart ZZZZ.
    [Rule 431.2; Rule 1470; 40CFR 60 Subpart IIII; 40CFR 63 Subpart ZZZZ]

16. The diesel exhaust fluid (DEF) injection system shall be in full operation whenever the outlet temperature to the SCR reaches (**XXX**) degrees Fahrenheit.
    [Rule 1303(a)(l)-BACT; Rule 1470; 40CFR 60 Subpart IIII]

    Note: The temperature at which SCR operates must be provided by the applicant.

17. DPF shall comply with (CARB Executive Order **X-X-XXX-XXXX**), independent of the presence of SCR control.
    [Rule 1303(a)(1)-BACT]

18. This engine shall comply with the following emission limits:

NO_x:	0.67 g/kW-hr (0.5 g/bhp-hr)
NMHC:	0.19 g/kW-hr (0.14 g/bhp-hr)
CO:	3.5 g/kW-hr (2.61 g/bhp-hr)
PM:	0.03 g/kW-hr (0.02 g/bhp-hr)

    [Rule 1303(a)(1)-BACT]

19. This engine shall comply with the following emission limits:

NMHC+NO_x:	6.4 g/kW-hr (4.8 g/bhp-hr)
CO:	3.5 g/kW-hr (2.60 g/bhp-hr)

    [Rule 1470]

20. This engine shall comply with the following emission limits:

NO_x:	7.85 g/kW-hr (5.89 g/bhp-hr)
PM:	0.4 g/kW-hr (0.3 g/bhp-hr)

    [40CFR 60 Subpart IIII]

21. This equipment is subject to the applicable requirements of the following Rules and regulations:

PM:	Rule 404
PM:	Rule 1470
SO_x, PM:	Rule 431.2
NO_x, PM:	40 CFR 60 Subpart IIII
HAP:	40 CFR 63 Subpart ZZZZ

II. Compliant OEM Tier 4 Final I.C. Engines, equipped with add-on SCR [and DPF or Oxidation Catalyst]

Generally, a stationary emergency diesel internal combustion engine is described in the permit as follows:

Internal Combustion Engine, Tier 4 Final Compliant, Manufacturer's *Name, Diesel-Fueled, Model No.,* Aspiration (e.g., *Turbocharged, Aftercooled*)*, No.* o*f Cylinders, Two/Four-Cycle, Engine Brake Horsepower with an Integrated Aftertreatment System including Selective Catalytic Reduction [and Diesel Particulate Filter or other Diesel Exhaust Particulate Matter Abatement System]*, Purpose (e.g. Driving an Emergency Electrical Generator/non-direct Fire Pump*).*

Notes: The permit conditions below are suggested to be used for lower tiered certified engines that are not Tier 4 Final Certified by U.S. EPA and equipped with same add-on SCR and DPF or other Diesel Exhaust Particulate Matter Abatement System as a Tier 4 Final Certified engine, but does not include some features such as inducements that are inherent to U.S. EPA's certification of Tier 4 Final engines (Stationary Emergency I.C. Engine-Compression Ignition rated 1000 brake horsepower or greater). Source testing is required.

Permit conditions listed below are intended as guidance for specific Tier 4 Final related issues and are meant to be as general as possible. Additional conditions may be required for other circumstances or rules. It is the discretion of the Engineer and their supervisor to modify or include new conditions as appropriate for the application(s) being evaluated.

The bold print numbers and text in parenthesis are typical and could vary from permit to permit.

1. Operation of this equipment shall be conducted in accordance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.
   [Rule 204]
2. This equipment shall be properly maintained and kept in good operating condition.
   [Rule 204]
3. This equipment shall only be operated by personnel properly trained in its operation.
   [Rule 204]
4. An operational non-resettable totalizing timer shall be installed and maintained to indicate the engine elapsed operating time.
   [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1470; 40CFR 60 Subpart IIII]
5. This engine shall not be operated more than 200 hours in any one year, which includes no more than 50 hours in any one year for maintenance and testing purposes.
   [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1470; 40CFR 60 Subpart IIII]

6. This engine shall not be operated more than (**4.2**) hours in any one month for maintenance and testing purposes, except during the months when the source testing is conducted as required by this permit.
   [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1470]
7. Operating beyond the 50 hours per year allotted for maintenance and testing purposes shall be allowed only in the event of a loss of grid power or up to 30 minutes prior to a rotating outage, provided that the utility distribution company has ordered rotating outages in the control area where the engine is located or has indicated that it expects to issue such an order at a certain time, and the engine is located in a utility service block that is subject to the rotating outage. Engine operation shall be terminated immediately after the utility distribution company advises that a rotating outage is no longer imminent or in effect.
   [Rule 1304(a)(4) Modeling and Offset exemption]
8. This engine shall not be used as a part of a Demand Response Program using an Interruptible Service Contract in which a facility receives a payment or reduced rates in return for reducing its electric load on the grid when requested to do so by the utility or the grid operator.
   [Rule 1304(a)(4) Modeling and Offset exemption]
9. This engine shall not be operated unless it is equipped with an air pollution control system consisting of a Selective Catalytic Reduction (SCR) System (**and Diesel Particulate Filter (DPF) or other diesel exhaust particulate matter abatement system**). The air pollution control system shall be maintained and operated in accordance with the manufacturer's specifications.
   [Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]
10. This engine shall not be operated unless its exhaust is vented to a (**CARB level 3 verified**) diesel particulate filter (DPF) system, as described in condition (9), which is in full operation and which is in good operating condition at all times, unless otherwise approved in this permit.
    [Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]
11. The DPF system shall not be operated unless it is equipped with an operational exhaust temperature and engine backpressure monitor, alarm log, and alarm system to indicate to the owner or operator when the high back pressure limit is approached. The operator shall inspect the diesel particulate filter every (**XXX**) hours and regenerate the filter as recommended by the manufacturer to ensure proper operation and to prevent the maximum backpressure of the engine from being exceeded.
    [Rule 1303(a)(l)-BACT; Rule 1470; 40CFR 60 Subpart IIII)
12. The owner or operator shall keep records of any corrective action taken after the backpressure monitor has notified the operator that the backpressure limit of the engine approached.

    There shall not be any changes to the design or operating conditions of the DPF without prior written approval by the South Coast AQMD.

The owner/operator shall take all corrective actions recommended by the manufacturer in response to backpressure monitor notifications.
[Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]

13. The ammonia concentration at the exit of the SCR unit shall not exceed (**XX**) ppmv NH_3 at 15 percent oxygen, measured by volume on a dry basis over a 30-minute average corrected to 15% oxygen.
[Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]

14. The operator shall maintain records of the following parameters (*the following are recommended parameters and should be evaluated during permit evaluation*):

    Diesel exhaust fluid (DEF) injection status alarm (Yes/No), Urea Empty, Low DEF Concentration, Non-DEF Fluid in Tank, Diesel in DEF Tank, DEF Failure to Pump, ... (*others may be added based on permit evaluation*)
    [Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]

15. The tank containing the DEF shall be checked regularly before, during, and after each engine operation. The operator shall refill the DEF tank at a frequency no less than the recommended frequency as specified by the manufacturer.
[Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]

16. The operator shall keep a log of engine operations documenting the total time the engine is operated each month and the specific reason for operating as:
    A. Emergency use,
    B. Maintenance and testing,
    C. Initial start-up and testing hours,
    D. Other including but not limited to compliance testing (specify the reason for operating)

    In addition, each time the engine is manually started, the log shall include the date of engine operation, the specific reason for operation, and the totalizing meter reading in hours and tenths of hours at the beginning and the end of operation. The log shall be kept for a minimum of five calendar years and shall be made available to South Coast AQMD personnel upon request. The total hours of operation for the previous calendar year shall be recorded on or before January 15th of each year.
    [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1110.2 Exemption; Rule 1470; 40CFR 60 Subpart IIII]

17. Sulfur content of diesel fuel supplied to the engine shall not exceed 15 ppm by weight. The operator shall keep a log of the fuel used. The owner or operator shall document the use of CARB diesel fuel through the retention of fuel purchase records indicating that the fuel purchased for supply to an emergency standby engine was CARB diesel fuel.
[Rule 431.2; Rule 1470]

18. The engine shall be installed and configured according to the manufacturer's emission related specifications.
[Rule 431.2; Rule 1470; 40CFR 60 Subpart IIII; 40CFR 63 Subpart ZZZZ]

19. The operator shall operate and maintain the stationary engine and control device according to the manufacturer's written emission-related instructions (or procedures developed by the operator that are approved by the engine manufacturer), change only those emission-related settings that are permitted by the manufacturer, and meet the requirements of South Coast AQMD Rules 431.2 and 1470, 40 CFR Part 60 Subpart IIII, and 40 CFR Part 63 Subpart ZZZZ.
    [Rule 431.2; Rule 1470; 40CFR 60 Subpart IIII; 40CFR 63 Subpart ZZZZ]
20. The DEF injection system shall be in full operation whenever the outlet temperature to the SCR reaches (**XXX**) degrees Fahrenheit.
    [Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]

    Note: The temperature at which SCR operates must be provided by the applicant.
21. The owner/operator shall conduct source test(s) for the pollutant(s) identified below and shall comply with all applicable testing, sampling port location and safe access requirements as specified in the test methods.

Pollutant to be tested	Required Test Method(s)	Averaging Time	Test Location
PM emissions	40 CFR 1065	Two consecutive runs per load, District approved averaging time (total of 4 runs)	Outlet stack
CO emissions	40 CFR 1065 or South Coast AQMD Method 100.1	Two consecutive 30-minute runs per load (total of 4 runs)	Outlet stack
NMHC/VOC emissions	40 CFR 1065 or South Coast AQMD Method 25.1 or 25.3	Two consecutive 30-minute runs per load (total of 4 runs)	Outlet stack
NOx emissions	40 CFR 1065 or South Coast AQMD Method 100.1	Two consecutive 30-minute runs per load (total of 4 runs)	Outlet stack
Ammonia	U.S. EPA Method 320, South Coast AQMD Method 207.1[5], or other method with South Coast AQMD approval	Two consecutive 30-minute runs per load (total of 4 runs)	Outlet stack

[5] For South Coast AQMD Method 207.1, two test runs per load, which implies non-concurrent duplicate sampling trains per load, are required. The test run shall be conducted with one sample train collected during each test run. For the purposes of this method, these two trains shall be considered a duplicate sample.

A. The tests shall be conducted once every five years [for non-pooled engines].

B. The source test shall be conducted using the South Coast AQMD approved source test methods or South Coast AQMD approved source test protocol, but no later than 180 days after initial operation of the equipment unless otherwise approved in writing by the South Coast AQMD. The test shall be conducted to demonstrate compliance with emission limits and to determine the oxygen levels in the exhaust.

C. Source test protocol(s) shall be submitted to the South Coast AQMD via mail (addressed to South Coast Air Quality Management District, Attention Permit Engineer, P.O. Box 4941, Diamond Bar, CA 91765) and electronically to (permit engineer)@aqmd.gov at least 60 days prior to commencement of the source test, unless otherwise approved in writing by the South Coast AQMD.

D. Notice of the source test(s) shall be submitted to the South Coast AQMD (addressed to South Coast Air Quality Management District, Attention Permit Engineer, P.O. Box 4941, Diamond Bar, CA 91765) and electronically to sourcetesting@aqmd.gov at least 30 days prior to commencement of testing so that a South Coast AQMD observer may be present.

E. These tests shall be conducted at 50% and 75% loads using an appropriately sized resistance load bank (or equivalent), for two consecutive 30-minute runs and the results shall be averaged to show compliance with the Tier 4F standards as required by this permit.

F. Source test reports (include the application number and a copy of the permit in the report) shall be submitted to the South Coast AQMD (addressed to South Coast Air Quality Management District, Attention Permit Engineer, P.O. Box 4941, Diamond Bar, CA 91765, and submitted electronically to (permit engineer)@aqmd.gov 60 days after the source test is completed, unless otherwise approved in writing by the Executive Officer. The report shall include, but not be limited to, emission rate in g/kW-hr, g/bhp-hr, pounds per hour, and concentration in ppmv @ 15% oxygen at the outlet of the air pollution control system.

   The following operating data shall also be included for each firing load:

   I. The exhaust flow rates, in actual cubic feet per minute (ACFM),
   II. The engine loads,
   III. The exhaust temperature, in degrees F,
   IV. The oxygen content of the exhaust gases in percent, and
   V. The fuel flow rate.

G. A testing laboratory certified by the South Coast AQMD Laboratory Approval Program (LAP) in the required test methods for criteria pollutant to be measured, and in compliance with South Coast AQMD Rule 304 (no conflict of interest) shall conduct the test.

H. Sampling facilities shall comply with the South Coast AQMD “guidelines for construction of sampling and testing facilities”, pursuant to Rule 217.

[Rule 1303(a)(l)-BACT]

22. For the pooled testing of identical engines, at least one-third of Pooled Units shall be source tested initially using the South Coast AQMD approved source test methods or South Coast AQMD approved source test protocol, but no later than 60 days after the initial start-up unless otherwise approved in writing by the Executive Officer.
    [Rule 1303(a)(1)-BACT]

    Note: this condition only applies to the Pooled Units

23. For subsequent pooled testing of identical engines, testing shall be conducted on a different one-third of engines in the group of identical engines at least every 36 months after initial source testing from the date of the previous source test, no later than the last day of the calendar month that the test is due. The final pool of source testing may be less than one-third if the group of engines includes the balance of engines remaining to be tested.

    Identical Units installed after the initial source test has been performed shall be included with the engines subject to the pooled subsequent emissions testing.

    If any engine subject to the pooled source testing exceeds any emissions limits, the owner or operator shall repair the engine that failed the source tests and repeat the source test and shall conduct source testing on an additional one-third engines.
    [Rule 1303(a)(1)-BACT]

    Note: this condition only applies to the Pooled Units

24. This equipment is a Pooled Unit for source testing purposes. All Pooled Units at a facility shall be source tested at least once every nine years.
    [Rule 1303(a)(1)-BACT]

    Note: this condition only applies to the Pooled Units

25. The DPF shall comply with (CARB Executive Order **X-X-XXX-XXXX**), independent of the presence of SCR control.
    [Rule 1303(a)(1)-BACT]

26. This engine shall comply with the following emission limits:

NO_x:	0.67 g/kW-hr (0.5 g/bhp-hr)
NMHC:	0.19 g/kW-hr (0.14 g/bhp-hr)
CO:	3.5 g/kW-hr (2.61 g/bhp-hr)
PM:	0.03 g/kW-hr (0.02 g/bhp-hr)

    [Rule 1303(a)(1)-BACT]

27. This engine shall comply with the following emission limits:

NMHC+NO_x:	6.4 g/kW-hr (4.8 g/bhp-hr)
CO:	3.5 g/kW-hr (2.60 g/bhp-hr)

    [Rule 1470]

28. This engine shall comply with the following emission limits:

NO_x:	7.85 g/kW-hr (5.89 g/bhp-hr)
PM:	0.4 g/kW-hr (0.3 g/bhp-hr)

    [40CFR 60 Subpart IIII]

29. This equipment is subject to the applicable requirements of the following Rules and regulations:

PM:	Rule 404
PM:	Rule 1470
SO_x, PM:	Rule 431.2
NO_x, PM:	40 CFR 60 Subpart IIII
HAP:	40 CFR 63 Subpart ZZZZ

III. Retrofitted Tier 4 Final I.C. Engines, equipped with third party add-on SCR [and DPF or Oxidation Catalyst]

Generally, a stationary emergency diesel internal combustion engine is described in the permit as follows:

Internal Combustion Engine, Tier 4 Final, Manufacturer's *Name, Diesel-Fueled, Model No.,* Aspiration (e.g., *Turbocharged, Aftercooled*), *No.* of *Cylinders, Two/Four-Cycle, Engine Brake Horsepower with an Aftertreatment System including Selective Catalytic Reduction [and Diesel Particulate Filter or other Diesel Exhaust Particulate Matter Abatement System]*, Purpose (e.g. Driving an Emergency Electrical Generator/non-direct Fire Pump*).*

Notes: The permit conditions below are suggested to be used for new or existing lower tiered certified engines that are not Tier 4 Final Certified by U.S. EPA and retrofitted with new third party aftertreatment equipment including add-on SCR and DPF or other Diesel Exhaust Particulate Matter Abatement System to meet the Tier 4 Final emissions standards (Stationary Emergency I.C. Engine-Compression Ignition rated 1000 brake horsepower or greater). Source testing is required.

Permit conditions listed below are intended as guidance for specific Tier 4 Final related issues and are meant to be as general as possible. Additional conditions may be required for other circumstances or rules. It is the discretion of the Engineer and their supervisor to modify or include new conditions as appropriate for the application(s) being evaluated.

The bold print numbers and text in parenthesis are typical and could vary from permit to permit.

1. Operation of this equipment shall be conducted in accordance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted below.
   [Rule 204]
2. This equipment shall be properly maintained and kept in good operating condition.
   [Rule 204]
3. This equipment shall only be operated by personnel properly trained in its operation.
   [Rule 204]
4. An operational non-resettable totalizing timer shall be installed and maintained to indicate the engine elapsed operating time.
   [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1470; 40CFR 60 Subpart IIII]
5. This engine shall not be operated more than 200 hours in any one year, which includes no more than 50 hours in any one year for maintenance and testing purposes.
   [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1470; 40CFR 60 Subpart IIII]

6. This engine shall not be operated more than (**4.2**) hours in any one month for maintenance and testing purposes, except during the months when the source testing is conducted as required by this permit.
   [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1470]
7. Operating beyond the 50 hours per year allotted for maintenance and testing purposes shall be allowed only in the event of a loss of grid power or up to 30 minutes prior to a rotating outage, provided that the utility distribution company has ordered rotating outages in the control area where the engine is located or has indicated that it expects to issue such an order at a certain time, and the engine is located in a utility service block that is subject to the rotating outage. Engine operation shall be terminated immediately after the utility distribution company advises that a rotating outage is no longer imminent or in effect.
   [Rule 1304(a)(4) Modeling and Offset exemption]
8. This engine shall not be used as a part of a Demand Response Program using an Interruptible Service Contract in which a facility receives a payment or reduced rates in return for reducing its electric load on the grid when requested to do so by the utility or the grid operator.
   [Rule 1304(a)(4) Modeling and Offset exemption]
9. This engine shall not be operated unless it is equipped with an air pollution control system consisting of a Selective Catalytic Reduction (SCR) System (**and Diesel Particulate Filter (DPF) or other diesel exhaust particulate matter abatement system**). The air pollution control system shall be maintained and operated in accordance with the manufacturer's specifications.
   [Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]
10. This engine shall not be operated unless its exhaust is vented to a (**CARB level 3 verified**) diesel particulate filter (DPF) system, as described in condition (9), which is in full operation and which is in good operating condition at all times, unless otherwise approved in this permit.
    [Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]
11. The DPF system shall not be operated unless it is equipped with an operational exhaust temperature and engine backpressure monitor, data log, and alarm system to indicate to the owner or operator when the high back pressure limit is approached. The operator shall inspect the diesel particulate filter every (**XXX**) hours and regenerate the filter as recommended by the manufacturer to ensure proper operation and to prevent the maximum backpressure of the engine from being exceeded.
    [Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]
12. The owner or operator shall keep records of any corrective action taken after the backpressure monitor has notified the operator that the backpressure limit of the engine approached.

    There shall not be any changes to the design or operating conditions of the DPF without prior written approval by the South Coast AQMD.

The owner/operator shall take all corrective actions recommended by the manufacturer in response to backpressure monitor notifications.
[Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]

13. The ammonia concentration at the exit of the SCR unit shall not exceed (**XX**) ppmv NH_3 at 15 percent oxygen, measured by volume on a dry basis over a 30-minute average corrected to 15% oxygen.
[Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]

14. The operator shall maintain records of the following parameters (these are the recommended parameters *and should be evaluated during permit evaluation*):

    Diesel exhaust fluid (DEF) injection status alarm (Yes/No), Urea Empty, Low DEF Concentration, Non-DEF Fluid in Tank, Diesel in DEF Tank, DEF Failure to Pump, ... (*others may be added based on permit evaluation*)
    [Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]

15. The tank containing the DEF shall be checked regularly before, during, and after each engine operation. The operator shall refill the DEF tank at a frequency no less than the recommended frequency as specified by the manufacturer.
[Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]

16. The operator shall keep a log of engine operations documenting the total time the engine is operated each month and the specific reason for operating as:
    A. Emergency use,
    B. Maintenance and testing,
    C. Initial start-up and testing hours,
    D. Other including but not limited to compliance testing (specify the reason for operating)

    In addition, each time the engine is manually started, the log shall include the date of engine operation, the specific reason for operation, and the totalizing meter reading in hours and tenths of hours at the beginning and the end of operation. The log shall be kept for a minimum of five calendar years and shall be made available to South Coast AQMD personnel upon request. The total hours of operation for the previous calendar year shall be recorded on or before January 15th of each year.
    [Rule 1304(a)(4) Modeling and Offset exemption; Rule 1110.2 Exemption; Rule 1470; 40CFR 60 Subpart IIII]

17. Sulfur content of diesel fuel supplied to the engine shall not exceed 15 ppm by weight. The operator shall keep a log of the fuel used. The owner or operator shall document the use of CARB diesel fuel through the retention of fuel purchase records indicating that the fuel purchased for supply to an emergency standby engine was CARB diesel fuel.
[Rule 431.2; Rule 1470]

18. The engine shall be installed and configured according to the manufacturer's emission related specifications.
    The operator shall operate and maintain the stationary engine and control device according to the manufacturer's written emission-related instructions (or procedures developed by the

operator that are approved by the engine manufacturer), change only those emission-related settings that are permitted by the manufacturer, and meet the requirements of South Coast AQMD Rules 431.2 and 1470, 40 CFR Part 60 Subpart IIII, and 40 CFR Part 63 Subpart ZZZZ.
[Rule 431.2; Rule 1470; 40CFR 60 Subpart IIII; 40CFR 63 Subpart ZZZZ]

19. The DEF injection system shall be in full operation whenever the outlet temperature to the SCR reaches (**XXX**) degrees Fahrenheit.
[Rule 1303(a)(1)-BACT; Rule 1470; 40CFR 60 Subpart IIII]

Note: The temperature at which SCR operates must be provided by the applicant.

20. The owner/operator shall conduct source test(s) for the pollutant(s) identified below and shall comply with all applicable testing, sampling port location and safe access requirements as specified in the test methods.

Pollutant to be tested	Required Test Method(s)	Averaging Time	Test Location
PM emissions	40 CFR 1065	Two consecutive runs per load, District approved averaging time (total of 4 runs)	Outlet stack
CO emissions	40 CFR 1065 or South Coast AQMD Method 100.1	Two consecutive 30-minute runs per load (total of 4 runs)	Outlet stack
NMHC/VOC emissions	40 CFR 1065 or South Coast AQMD Method 25.1 or 25.3	Two consecutive 30-minute runs per load (total of 4 runs)	Outlet stack
NOx emissions	40 CFR 1065 or South Coast AQMD Method 100.1	Two consecutive 30-minute runs per load (total of 4 runs)	Outlet stack
Ammonia	U.S. EPA Method 320, South Coast AQMD Method 207.1[6], or other method with South Coast AQMD approval	Two consecutive 30-minute runs per load (total of 4 runs)	Outlet stack

[6] For South Coast AQMD Method 207.1, two test runs per load, which implies non-concurrent duplicate sampling trains per load, are required. The test run shall be conducted with one sample train collected during each test run. For the purposes of this method, these two trains shall be considered a duplicate sample.

A. The tests shall be conducted once every five years.

B. Source test shall be conducted using the South Coast AQMD approved source test methods or South Coast AQMD approved source test protocol, but no later than 180 days after initial operation of the equipment unless otherwise approved in writing by the South Coast AQMD. The test shall be conducted to demonstrate compliance with emission limits and to determine the oxygen levels in the exhaust.

C. Source test protocol(s) shall be submitted to the South Coast AQMD via mail (addressed to South Coast Air Quality Management District, Attention Permit Engineer, P.O. Box 4941, Diamond Bar, CA 91765) and electronically to (permit engineer)@aqmd.gov at least 60 days prior to commencement of the source test, unless otherwise approved in writing by the South Coast AQMD.

D. Notice of the source test(s) shall be submitted to the South Coast AQMD (addressed to South Coast Air Quality Management District, Attention Permit Engineer, P.O. Box 4941, Diamond Bar, CA 91765) and electronically to sourcetesting@aqmd.gov at least 30 days prior to commencement of testing so that a South Coast AQMD observer may be present.

E. These tests shall be conducted at 50% and 75% loads using an appropriately sized resistance load bank (or equivalent), for two consecutive 30-minute runs and the results shall be averaged to show compliance with the Tier 4F standards as required by this permit.

F. Source test reports (include the application number and a copy of the permit in the report) shall be submitted to the South Coast AQMD (addressed to South Coast Air Quality Management District, Attention Permit Engineer, P.O. Box 4941, Diamond Bar, CA 91765, and submitted electronically to (permit engineer)@aqmd.gov 60 days after the source test is completed, unless otherwise approved in writing by the Executive Officer. The report shall include, but not be limited to, emission rate in g/kW-hr, g/bhp-hr, pounds per hour, and concentration in ppmv @ 15% oxygen at the outlet of the air pollution control system.

   The following operating data shall also be included for each firing load:

   I. The exhaust flow rates, in actual cubic feet per minute (ACFM),
   II. The engine loads,
   III. The exhaust temperature, in degrees F,
   IV. The oxygen content of the exhaust gases in percent, and
   V. The fuel flow rate.

G. A testing laboratory certified by the South Coast AQMD Laboratory Approval Program (LAP) in the required test methods for criteria pollutant to be measured, and in compliance with South Coast AQMD Rule 304 (no conflict of interest) shall conduct the test.

H. Sampling facilities shall comply with the South Coast AQMD "guidelines for construction of sampling and testing facilities", pursuant to Rule 217.
[Rule 1303(a)(l)-BACT]

21. This equipment shall comply with (CARB Executive Order **X-X-XXX-XXXX**), independent of the presence of SCR control.
[Rule 1303(a)(1)-BACT]

22. This engine shall comply with the following emission limits:

NO_x:	0.67 g/kW-hr (0.5 g/bhp-hr)
NMHC:	0.19 g/kW-hr (0.14 g/bhp-hr)
CO:	3.5 g/kW-hr (2.61 g/bhp-hr)
PM:	0.03 g/kW-hr (0.02 g/bhp-hr)

[Rule 1303(a)(1)-BACT]

23. This engine shall comply with the following emission limits:

NMHC+NO_x:	6.4 g/kW-hr (4.8 g/bhp-hr)
CO:	3.5 g/kW-hr (2.60 g/bhp-hr)

[Rule 1470]

24. This engine shall comply with the following emission limits:

NO_x:	7.85 g/kW-hr (5.89 g/bhp-hr)
PM:	0.4 g/kW-hr (0.3 g/bhp-hr)

[40CFR 60 Subpart IIII]

25. This equipment is subject to the applicable requirements of the following Rules and regulations:

PM:	Rule 404
PM:	Rule 1470
SO_x, PM:	Rule 431.2
NO_x, PM:	40 CFR 60 Subpart IIII
HAP:	40 CFR 63 Subpart ZZZZ