

RULE 69.3.1. STATIONARY GAS TURBINE ENGINES

(Rev. Adopted and Effective 12/09/21 (*date of adoption*))

(a) APPLICABILITY

Except as provided in Subsection (b)(1), this rule shall apply to any stationary gas turbine engine with a power rating of 0.3 megawatt (MW) or greater. Any unit subject to Section (d) Standards of this rule shall not be subject to Rule 68 – Fuel-Burning Equipment-Oxides of Nitrogen.

(b) EXEMPTIONS

(1) The provisions of this rule shall not apply to the following:

(i) Any gas turbine engine when operated exclusively for the research, development or testing of gas turbine engines or their components.

(ii) Any portable gas turbine engine. It is the responsibility of any person claiming this exemption to maintain records indicating the dates that such gas turbine engine was located at each stationary source. These records shall be maintained for a minimum of two calendar years by the owner or operator of such gas turbine engine and made available to the District upon request.

(iii) Any stationary gas turbine engine with a power rating less than or equal to 0.4 MW used in conjunction with military tactical support equipment operated at military sites, provided that operations do not exceed 1,000 hours per calendar year. It is the responsibility of any person claiming this exemption to maintain records indicating the hours that such gas turbine engine was operated. These records shall be maintained for a minimum of two calendar years by the owner or operator of such gas turbine engine and made available to the District upon request.

(2) The provisions of Section (d) Standards shall not apply to any emergency unit provided that operation for testing or maintenance purposes to ensure operability in the event of an emergency situation does not exceed 80 hours per calendar year. It is the responsibility of any person claiming this exemption to maintain records in accordance with Subsections (e)(5) and (e)(8) of this rule.

(3) ~~The provisions of Subsections (d)(1) and (d)(2) shall not apply to the following:~~

(i) ~~Any unit during startup, shutdown or a fuel change for a period not to exceed 120 consecutive minutes except as provided for in Subsection (b)(4). Nothing in this rule shall be construed to limit the actual time needed to conduct a startup, shutdown or fuel change.~~

(ii) For turbines equipped with lean premix combustors, periods of operation at low load, provided that:

(A) The aggregate time of such periods does not exceed 130 minutes in any calendar day;

(B) The aggregate of all such periods does not exceed 780 minutes in any calendar year; and

(C) The turbine is equipped with a continuous emission monitoring system (CEMS) or other monitoring system that monitors and records turbine fuel flow and gross electrical output in increments of one minute or less.

(4) The provisions of Subsection (d)(1) shall not apply to any combined cycle gas turbine engine during an extended startup for a period not to exceed 360 consecutive minutes.

(c) **DEFINITIONS**

For the purposes of this rule, the following definitions shall apply:

(1) **"Combined-Cycle Gas Turbine Engine"** means any stationary gas turbine engine which recovers heat from the gas turbine exhaust gases to generate steam that is used to create additional power output in a steam turbine.

(2) **"Emergency Situation"** means any one of the following:

(i) An unforeseen electrical power failure of the serving utility or of onsite electrical transmission equipment;

(ii) An unforeseen flood or fire; or

(iii) An unforeseen event that requires the use of gas turbine engines to help alleviate the threat to public health and safety.

Emergency situation shall not include operation of any unit for training purposes or other foreseeable events, or operation of any peaking unit for the purpose of supplying power for distribution to an electrical grid.

(3) **"Emergency Unit"** means a stationary gas turbine engine used exclusively in emergency situations, or for testing or maintenance purposes only. A peaking unit shall not be considered an emergency unit.

(4) **"Extended Startup"** means the startup of a combined-cycle gas turbine engine when any of the following key operational parameters indicate that more than 120 consecutive minutes are needed to meet the emission limits of Section (d) Standards:

(i) The steam turbine reheat bowl temperature is less than or equal to 750°F when the startup period begins; or

(ii) The steam turbine inner casing temperature is less than or equal to 500°F when the startup period begins; or

(iii) The unit has experienced zero fuel flow for a period of 24 hours or more.

(5) **"Fuel Change"** means the transitory operating period when a switch occurs between liquid or gaseous fuels, or any combination thereof.

(6) **"Gaseous Fuel"** means natural gas, digester gas, landfill gas, methane, ethane, propane, butane, or any gas stored as a liquid at high pressure such as liquefied petroleum gas.

(7) **"Higher Heating Value (HHV)"** means the total heat liberated, including the heat of condensation of water, per mass of fuel burned (Btu per pound) when fuel and dry air at standard conditions undergo complete combustion and all resultant products are brought to standard conditions.

(8) **"Lean Mixture"** means a mixture of air and fuel such that the operating air-to-fuel ratio is more than 1.1 times the stoichiometric air-to-fuel ratio.

(9) **"Lean Premix Combustor"** means any turbine combustor design where the air and majority of the fuel are thoroughly mixed to form a lean mixture before combustion. Mixing may occur before or in the combustion chamber. A lean premix combustor may operate in a non-lean-premix mode (diffusion flame mode) during operating conditions including, but not limited to, startup and shutdown, or period of operation at low load.

(10) **"Liquid Fuel"** means any fuel which is a liquid at standard conditions including, but not limited to, distillate oils, kerosene and jet fuel. Liquefied gaseous fuels are not liquid fuels.

(11) **"Lower Heating Value (LHV)"** means the total heat liberated, excluding the heat of condensation of water, per mass of fuel burned (Btu per pound) when fuel and dry air at standard conditions undergo complete combustion and all resultant products are brought to standard conditions.

(12) **“Manufacturer’s Rated Thermal Efficiency (MRTE)”** means the manufacturer’s continuous rated percent thermal efficiency of the gas turbine engine, including the effect of any air pollution control equipment if such equipment is installed, at peak load, after correction to lower heating value.

(13) **“Military Tactical Support Equipment”** means any equipment owned by the U.S. Department of Defense or the National Guard and used in combat, combat support, combat service support, tactical or relief operations, or training for such operations.

(14) **“Peaking Unit”** means a stationary gas turbine engine that is only operated for generation of electric power during periods of high energy demand as directed by the California Independent System Operator (CAISO), or for testing or maintenance purposes only.

(15) **“Period of Operation at Low Load”** means a period of time that begins when the gas turbine power level is reduced from a higher level to a lower level such that the gas turbine is unable to comply with the standards of Section (d) Standards, and ends 10 minutes after the turbine power level next exceeds the level where the gas turbine is capable of complying with the standards of Section (d) Standards, provided that fuel is continuously combusted during the entire period. No period of operation at low load shall begin during a period ~~when the provisions of Section (d) do not apply pursuant to Subsection (b)(3)(i), or Subsection (b)(4) of startup, extended startup, shutdown, or fuel change operations.~~

(16) **“Portable Gas Turbine Engine”** means a gas turbine engine which meets the definition of a portable emission unit in Rule 20.1 – New Source Review (NSR)-General Provisions.

(17) **“Power Augmentation”** means an increase in the gas turbine engine shaft output, or a decrease in turbine fuel consumption, by the addition of energy recovered from exhaust heat.

(18) **“Power Rating”** means the maximum, continuous, gross power output of a unit, in megawatts (MW) or equivalent at ISO standard day conditions, as certified by the manufacturer unless limited by a condition in a District Authority to Construct or a Permit to Operate. Power augmentation shall not be included in power rating.

(19) **“Selective Catalytic Reduction (SCR)”** means a post-combustion control technology that utilizes a reducing agent, such as ammonia, injected into the exhaust gas stream where it converts oxides of nitrogen (NOx) to molecular nitrogen in the presence of a catalyst.

(20) **"Shutdown"** means an action necessary to cease operation of a unit and includes the amount of time needed to safely do so. For gas turbines equipped with a CEMS or other continuous monitoring system that monitors and records fuel flow in increments of one minute or less, a shutdown period ends five minutes after fuel flow to the unit ceases.

(21) **"Stationary Gas Turbine Engine"** means any gas turbine engine system, with or without power augmentation, which is permanently attached to a foundation, or is not a portable gas turbine engine. Two or more gas turbines powering a common shaft shall be treated as one gas turbine.

(22) **"Stationary Source"** means the same as defined in Rule 2 – Definitions.

(23) **"Startup"** means an action necessary to begin operation of a unit and includes the amount of time needed for a unit and ancillary equipment to achieve stable operation. For gas turbines equipped with a CEMS or other continuous monitoring system that monitors and records fuel flow in increments of one minute or less, a startup period begins when fuel starts flowing to the gas turbine engine.

(24) **"Testing or Maintenance"** means operating an emergency unit, or a peaking unit as otherwise indicated, to:

- (i) Evaluate the ability of the unit or its supported equipment to perform during an emergency. "Supported Equipment" includes, but is not limited to, generators, pumps, transformers, switchgear, uninterruptible power supply, and breakers; or
- (ii) Facilitate the training of personnel on emergency activities; or
- (iii) Provide electric power for the facility when the utility distribution company takes its power distribution equipment offline to service that equipment for any reason that does not qualify as an emergency situation; or
- (iv) Provide additional hours of operation to perform testing on an emergency unit that has experienced a breakdown or failure during maintenance. Upon approval by the Air Pollution Control Officer, these additional hours of operation will not be counted in the maximum allowable annual hours of operation for the emergency unit that provided the electrical power. Operation for testing or maintenance purposes as described in this Subsection may be allowed for not more than 10 hours per year, with prior written authorization from the Air Pollution Control Officer, provided that an owner or operator demonstrates to the satisfaction of the Air Pollution Control Officer that such additional operation is necessary; or
- (v) Provide electric power from the emergency unit for the facility during an electrical upgrade, such as the replacement or addition of electrical equipment and systems resulting in increased generation, transmission and/or distribution capacity; or

(vi) Provide electric power from the emergency unit for the facility during the repair of supported equipment as defined in Subsection (c)(24)(i); or

(vii) Evaluate the ability of the peaking unit or its supported equipment, as defined in Subsection (c)(24)(i), to operate as directed by the CAISO.

(25) **"Unit"** means any stationary gas turbine engine.

(26) **"Unit Thermal Efficiency (E)"** means the percent thermal efficiency of the gas turbine engine and is calculated as follows:

$$E = \frac{\text{MRTE} \times \text{LHV}}{\text{HHV}}$$

A gas turbine engine with an efficiency lower than 25 percent shall be assigned a unit thermal efficiency of 25 percent.

(d) **STANDARDS**

(1) Except as provided for in Section (b) Exemptions and Subsections (d)(2), (d)(6), the emissions concentration in parts per million by volume (ppmv) of NOx from any unit subject to this rule, calculated as nitrogen dioxide at 15% oxygen on a dry basis, shall not exceed the following:

<u>Power Rating (Gross Megawatts)</u>	<u>NOx Emissions Concentration</u>	
	<u>(ppmv @ 15% O₂)</u>	<u>Liquid Fuel</u>
≥0.3 and <2.9	42	65
<4.0 and operating less than 877 hours per calendar year	42	65
≥2.9 and <10.0	25 x E/25	65
≥10.0 without installed post-combustion air pollution control equipment	15 x E/25	42 x E/25
≥10.0 with installed post-combustion air pollution control equipment	9 x E/25	25 x E/25

(2) Except as provided for in Section (b) Exemptions and notwithstanding Subsection (d)(1), the emissions concentration in parts per million by volume (ppmv) of NOx from any unit combined-cycle gas turbine engine subject to this rule, calculated as nitrogen dioxide at 15% oxygen on a dry basis, shall not exceed the following during an extended startup as defined in Subsection (c)(4):

<u>Unit Description</u>	<u>NOx Emissions Concentration</u> <u>(ppmv @ 15% O₂)</u>	
	<u>Gaseous Fuel</u>	<u>Liquid Fuel</u>
Combined-cycle units, following the first 120 consecutive minutes of an extended startup	42	65

(3) The emission limits in Subsections (d)(1) and (d)(2) shall not apply to:

(i) Any unit during startup, shutdown, or fuel change provided that such a period does not exceed 120 consecutive minutes, except as provided for in Subsection (d)(4) during an extended startup.

(ii) Any unit equipped with a lean premix combustor, periods of operation at low load provided that:

(A) The aggregate time of such periods does not exceed 130 minutes in any calendar day;

(B) The aggregate of all such periods does not exceed 780 minutes in any calendar year; and

(C) The unit is equipped with a continuous emission monitoring system (CEMS) or other monitoring system that monitors and records turbine fuel flow and gross electrical output in increments of one minute or less.

(4) The emission limits in Subsections (d)(1) shall not apply to any combined-cycle gas turbine engine during an extended startup for a period not to exceed 360 consecutive minutes.

(5) During periods of startup and shutdown, an owner or operator of any gas turbine engine shall:

(i) Operate each unit in accordance with the manufacturer's recommended procedures.

(ii) Maintain proper air to fuel ratios.

(iii) If applicable, begin water injection, urea/ammonia injection, or engage lean-premix combustion mode as soon as possible during startup.

(6) The frequency and duration of startup and shutdown periods and their associated emissions from any unit subject to this rule shall be minimized to the greatest extent practicable.

(e) MONITORING AND RECORD KEEPING REQUIREMENTS

(1) An owner or operator of a unit which is subject to the requirements of Section (d) Standards shall install, calibrate and maintain continuous monitors in accordance with the manufacturer's recommended procedures to monitor and record the operational characteristics of the unit and of any NOx emissions reduction system, as applicable, to demonstrate continuous compliance, including, but not limited to:

- (i) fuel flow rate;
- (ii) exhaust gas temperature;
- (iii) ammonia injection rate;
- (iv) water injection rate;
- (v) stack-gas oxygen content;
- (vi) inlet or outlet SCR catalyst temperature; and
- (vii) operational parameters defining an extended startup.

(2) An owner or operator of any unit with a power rating of 10 MW or more that operates more than 4,000 hours per calendar year shall install and operate a CEMS to measure and record NOx emissions. The CEMS shall be certified, calibrated and maintained in accordance with all applicable federal regulations including, but not limited to, the requirements of Sections 60.7(c), 60.7(d), and 60.13 of Title 40, Code of Federal Regulations, Part 60 (40 CFR Part 60), performance specifications of Appendix B of 40 CFR Part 60, quality assurance procedures of Appendix F of 40 CFR Part 60, Sections 75.10 and 75.12 of 40 CFR Part 75, the specifications and test procedures of Appendix A of 40 CFR Part 75, the quality assurance and quality control procedures of Appendix B of

40 CFR Part 75, and a protocol approved in writing by the San Diego County Air Pollution Control Officer.

(3) An owner or operator of any unit with a CEMS which has been installed to monitor and record NOx emissions pursuant to any federal regulation shall certify, calibrate and maintain the CEMS in accordance with applicable federal regulations including the requirements of Sections 60.7(c), 60.7(d), and 60.13 of Title 40, Code of Federal Regulations Part 60 (40 CFR Part 60), performance specifications of Appendix B of 40 CFR Part 60, quality assurance procedures of Appendix F of 40 CFR Part 60, and a protocol approved in writing by the San Diego County Air Pollution Control Officer.

(4) An owner or operator of any unit subject to this rule shall maintain, as applicable for the type of unit, records of dates and times of operation, times of all startups, shutdowns, periods of operation at low load, fuel changes and records of the type, and quantity of each fuel used during each calendar day and calendar year, and actions taken to comply with Subsections (d)(5) and (d)(6).

(5) An owner or operator of an emergency unit shall maintain records of dates and times of operation, including operating hours for testing or maintenance purposes and during each emergency situation. At a minimum, these records shall include the dates and times of all startups and shutdowns, total cumulative hours of operation for testing or maintenance purposes during each calendar year, and a description of each emergency situation.

(6) An owner or operator of a peaking unit shall maintain records of dates and times of operation, the hours of operation each calendar day, and the total cumulative hours of operation during each calendar year.

(7) An owner or operator of any unit operating less than 877 hours per calendar year and subject to Subsection (d)(1) shall maintain records of the total cumulative hours of operation during each calendar year.

(8) An owner or operator of any unit subject to this rule shall maintain all records required by this Section (e) Monitoring and Record Keeping Requirements and records of all source tests required by Subsection (g)(2) or Subsection(g)(3) for a minimum of two calendar years. These records shall be maintained on the premises and made available to the District upon request. Records for facilities that are unmanned may be kept at an alternative location approved in writing by the San Diego County Air Pollution Control Officer.

(9) An owner or operator of any emergency unit subject to Subsection (b)(2) shall install and maintain a non-resettable meter that measures elapsed operating time if deemed necessary by the San Diego County Air Pollution Control Officer.

(f) TEST METHODS

When more than one test method or set of test methods are specified in this section, a violation of any requirement of this rule established by any one of the specified test methods or set of test methods shall constitute a violation of the rule.

(1) To determine compliance with Section (d) Standards, measurement of NO_x and stack-gas oxygen content shall be conducted in accordance with the U.S. Environmental Protection Agency (EPA) Method 7E (Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)), May 2018, and Method 3A (Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)), August 2017; or District Source Test Method 100 (Test Procedures for the Determination of Nitrogen Oxides, Carbon Monoxide and Diluent Gases by Continuous Emission Monitoring), May 1995, as approved by the EPA.

(2) The higher heating value and lower heating value of a fuel shall be determined by the following methods or their most current versions and can be provided by a fuel supplier:

(i) ASTM Test Method D240-19, “Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter”, or D4809-18, “Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)” for liquid fuels, or their most current versions, and

(ii) ASTM Test Method D1826-94(2017), Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter”, or D1945-14(2019), “Standard Test Method for Analysis of Natural Gas by Gas Chromatography”, in conjunction with ASTM Test Method D3588-98(2017)e1, “Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density of Gaseous Fuels” for gaseous fuels, or their most current versions.

(g) SOURCE TEST REQUIREMENTS AND COMPLIANCE DETERMINATION

(1) Any required source testing shall be performed at no less than 80% of the power rating. If an owner or operator of a gas turbine engine demonstrates to the satisfaction of the San Diego County Air Pollution Control Officer that the turbine cannot operate at these conditions, then emissions source testing shall be performed at the highest achievable continuous power rating.

(2) Except as specified in Subsection (g)(3), a unit subject to the requirements of Section (d) Standards shall be tested for compliance at least once annually in the twelve-calendar-month period ending on the last day of the Permit to Operate expiration month, unless more frequent testing is specified in writing by the San Diego County Air Pollution Control Officer.

(3) Unless more frequent testing is specified in writing by the San Diego County Air Pollution Control Officer, a unit equipped with a continuous emission monitoring system (CEMS), subject to the requirements of Section (d) Standards, and subject to the provisions of the federal Acid Rain Program pursuant to Section 72.6 of 40 CFR Part 72, shall be tested for compliance at a frequency in accordance with 40 CFR Part 75 Appendix B Section 2.3.1 and Section 2.3.3.

(4) All testing shall be conducted in accordance with the requirements of Section (f) Test Methods and a source test protocol approved in writing by the San Diego County Air Pollution Control Officer.

(5) Test reports shall include the operational characteristics, as described in Subsection (e)(1), of the unit and of all add-on NOx control systems.

(6) For the purposes of a compliance determination based on source testing, the NOx emissions concentration shall be calculated as an average of three subtests.

(7) For the purposes of a compliance determination based on CEMS data, the averaging period to calculate NOx emissions concentration shall be one clock hour. For the purposes of compliance determination, the clock hour average NOx emissions concentration shall not include the data during periods of startup, shutdown, fuel change, and operation at low load.

(8) Notwithstanding provisions of this Section (g) Source Test Requirements and Compliance Determination, the San Diego County Air Pollution Control Officer may require source testing to determine compliance with these Rules and Regulations or to determine emissions at any time.

(h) COMPLIANCE SCHEDULE

An owner or operator of a new or replacement unit shall comply with all applicable provisions of this rule upon initial installation and commencement of operation.