RULE 2.27 LARGE BOILERS

ADOPTED October 27, 1993
REVISED August 14, 1996
REVISED May 15, 2019
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100 GENERAL

101 **PURPOSE:** To reduce emissions of Nitrogen Oxides (NOx) from boilers, steam generators and process heaters.

102 **APPLICABILITY:** This Rule applies to boilers, steam generators, and process heaters with rated heat inputs of greater than or equal to five (5.0) million BTU per hour.

110 **EXEMPTIONS – GENERAL:** The provisions of this Rule shall not apply to:

110.1 Boilers used by electric utilities to generate electricity;
110.2 Waste heat recovery boilers;
110.3 Dryers;
110.4 Cement and lime kilns, glass melting furnaces and smelters; or
110.5 Hot water pressure washers;

111 **EXEMPTION, LOW USAGE:**

111.1 Section 300 of this Rule shall not apply to process heaters used less than 250 hours per calendar year.

111.2 Section 300 of this Rule shall not apply to boilers or process heaters under curtailment conditions, provided that the curtailment fuels are not burned more than 200 cumulative hours in a calendar year, including testing and maintenance. During this time, NOx emissions shall not exceed 150 ppmv @ 3% O2;

111.3 Sections 301 and 302 of this Rule shall not apply to boilers or process heaters with a permitted capacity factor of 4.0 percent or less.

200 DEFINITIONS

201 **BOILER:** Any external combustion equipment fired with any fuel and used to produce hot water or steam including: boilers, steam generators, and hot water heaters.

202 **BRITISH THERMAL UNIT (BTU):** The amount of heat required to raise the temperature of one pound of water from 59°F to 60°F at one atmosphere.

203 **CURTAILMENT CONDITIONS:** Periods in which a unit that normally burns natural gas instead burns a nongaseous fuel only during emergency interruption of natural gas delivery by the serving utility.

204 **DRYER:** Any unit where the material being dried comes into direct contact with the products of combustion.

205 **GASEOUS FUEL:** Any fuel which is a gas at standard conditions.

206 **HEAT INPUT:** The chemical heat released due to fuel combustion in a unit, using the higher heating value of the fuel. This does not include the sensible heat of incoming combustion air.

207 **HIGHER HEATING VALUE (HHV):** The total heat liberated 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 their standard states at standard conditions. HHV shall be determined by one of the following test methods:

208.1 ASTM D 2015 for solid fuels; or
208.2 ASTM D 240 or ASTM D 2382 for liquid hydrocarbon fuels; or
208.3 ASTM D 1826 or ASTM D 1945 in conjunction with ASTM D 3588 for gaseous fuels.

208 **HOT WATER PRESSURE WASHER:** High-pressure cleaning machine in which the hot water discharge line (spray nozzle) is hand supported and intended for commercial and industrial applications.

209 **NOx EMISSIONS (NOx):** The sum of nitric oxides and nitrogen dioxide in the flue gas.

210 **NONGASEOUS FUEL:** Any fuel which is not a gas at standard conditions.

211 **PARTS PER MILLION BY VOLUME (ppmv):** The ratio of the number of gas molecules of a given species, or group of species, to the number of millions of total gas molecules.

212 **PERMITTED CAPACITY FACTOR:** The annual permitted fuel use divided by the product of the manufacturer's specified maximum hourly fuel consumption times 8,760 hours per year, as specified on the unit's District Permit to Operate (PTO).

213 **PROCESS HEATER:** Any combustion equipment fired with any fuel, and which transfers heat from combustion gases to water or process streams. This definition does not include any dryers in which the material being dried is in direct contact with the products of combustion, cement or lime kilns, glass melting furnaces, and smelters.

214 **RATED HEAT INPUT:** The heat input capacity, in million BTU per hour, specified on the nameplate of the combustion unit. If the combustion unit has been altered or modified such that its maximum heat input is different than the heat

input capacity specified on the nameplate, the maximum heat input shall be considered as the rated heat input.

215 **STANDARD CONDITIONS:** 68°F and one atmosphere.

216 **UNIT:** Any boiler, steam generator, or process heater as defined in Sections 201 or 213 of this Rule.

217 **WASTE HEAT RECOVERY BOILER:** A device that recovers normally unused energy and converts it to usable heat. Waste heat recovery boilers incorporating duct or supplemental burners that are designed to supply 50 percent or more of the total rated heat input capacity of the waste heat recovery boiler are not considered waste heat recovery boilers, but are considered boilers. Waste heat recovery boilers are also referred to as heat recovery steam generators.

300 STANDARDS

301 EMISSION LIMITS

301.1 Gaseous Fuel Firing: NOx emissions shall not exceed the following levels when firing on gaseous fuels.

Unit Size/Description mmBtu/hr Rated Input	Effective August 14, 1996 NOx Limits ppmvd @ 3% O2	Effective December 31, 2023 NOx Limits ppmvd @ 3% O2
≥ 5.0 - ≤ 20.0	30	15
> 20.0	30	9

301.2 Nongaseous Fuel Firing: NOx emissions shall not exceed 40 ppmvd @ 3% O2 when firing on nongaseous fuels.

301.3 Units installed on or after January 1, 2020 shall meet the December 31, 2023 standards at the time of installation.

301.4 For units that operate simultaneously on combinations of gaseous and nongaseous fuels, the NOx emissions shall not exceed the rated heat-input weighted average of the standards specified in Sections 301.1 and 301.2 above.

301.5 Emissions from units subject to this Section shall not exceed a carbon monoxide concentration of 400 parts per million by volume (ppmv).

302 **PERFORMANCE TESTING:** Effective, December 31, 2019, any unit subject to section 301 shall perform testing to demonstrate compliance with the emission limitations in accordance with the following frequency:

Rated Heat Input mmBTU/hr	Frequency
≥ 5.0 - ≤ 20.0	Source test at least once every 24 months
> 20.0	Source test at least once every 12 months

303 **TUNE-UPS:** Any unit exempted from the Section 301 and 302 standards pursuant to Section 111.3 shall be tuned not less than once every 12 months by a technician that is qualified to perform a tune-up. The tune-up shall be done in accordance with manufacturer's recommendations or EPA 40 CFR 60 Subpart JJJJJJ guidance.

304 **MONITORING EQUIPMENT:**

304.1 Fuel meters: Owners or operators of units subject to this Rule shall install and maintain a dedicated non-resetting totalizing fuel meter in each fuel line. If a volumetric flow rate meter is installed, it must compensate for temperature and pressure using integral gauges. Owners or operators may use the serving utility provider meter if the meter serves only one unit.

304.2 Hour meters: For units with a rated heat input equal to or less than 20.0 mmBTU/hr, the owner or operator may use a non-resetting totalizing hour meter or computerized tracking system in lieu of a dedicated fuel meter. In this case, the fuel usage shall be calculated by multiplying the number of operating hours for the unit by the maximum fuel usage for the unit as specified by the unit manufacturer.

400 ADMINISTRATIVE REQUIREMENTS

401 **COMPLIANCE SCHEDULE:** An owner or operator of any unit(s) subject to this Rule shall fulfill the following increments of progress:

401.1 By August 1, 2019, submit an application for Authority to Construct for any existing unit for which the low usage exemption pursuant to Section 111.3 will be claimed.

401.2 By December 31, 2019, submit a written plan containing a description of the method the owner or operator will use to comply with the applicable standards of Section 301.

401.3 By December 31, 2021, all owners or operators subject to the provisions of this Rule shall submit an application for Authority to Construct for any modifications required to achieve compliance with the requirements of this Rule.

401.4 By December 31, 2023, all owners or operators subject to this Rule shall demonstrate final compliance with all applicable standards and requirements of this Rule.

402 **COMPLIANCE DETERMINATION:**

402.1 When making determinations in accordance with Section 302, the determinations shall be made in the as-found operating condition, except that emission determinations shall include at a minimum at least one test run conducted at the maximum firing rate allowed by the District permit, and no compliance determination shall be established within two hours after a continuous period in which fuel flow to the unit is zero, or shut off, for 30 minutes or longer.

402.2 All ppmv emission limits specified in Sections 111 and 301 are referenced at dry stack-gas conditions and 3.00 percent by volume stack-gas oxygen. Emission concentrations shall be corrected to 3.00 percent oxygen as follows:

$$[ppm\ NOx]_{corrected} = \frac{20.9\% - 3.0\%}{20.9\% - [\%O2]_{measured}} * [ppm\ NOx]_{measured}$$

$$[ppm\ CO]_{corrected} = \frac{20.9\% - 3.0\%}{20.9\% - [\%O2]_{measured}} * [ppm\ CO]_{measured}$$

403 **TEST REPORTS:** The owners or operators of units subject to Section 302 of this Rule shall submit a written protocol to the District for approval at least 14 days prior to the test event, and shall submit a completed written test report to the District for approval within 60 days after performing any test.

404 **TUNE-UP REPORTS:** The owners or operators of units subject to Section 303 of this Rule shall maintain documentation (e.g. receipt or work order) that a tune-up was performed. In addition, written documentation of the tune-up method used (manufacturer's recommendations or EPA tune-up guide) shall be maintained. All documentation shall be maintained by the owner or operator for at least five years and made readily available to the District upon request.

500 MONITORING AND RECORDS

501 **USAGE MONITORING:** Owners or operators of units subject to this Rule shall monitor and record for each unit the actual annual hours of operation or usage of each fuel using the meter(s) required in section 304. Records shall be updated quarterly.

Records shall be maintained by the owner or operator for the five previous calendar years and made available to the District upon request.

502 **TEST METHODS:**

502.1 Compliance with NOx emission requirements and the stack-gas carbon monoxide and oxygen requirements of Section 300 shall be determined using the following test methods:

a. Oxides of Nitrogen - ARB Method 100.
b. Carbon Monoxide - ARB Method 100.
c. Stack-Gas Oxygen - ARB Method 100.
d. NOx Emission Rate (Heat Input Basis) - EPA Method 19.

502.2 Test methods other than those specified in Section 502.1 for oxides of nitrogen, stack-gas oxygen, and stack-gas carbon monoxide, may be used to determine compliance so long as they are functionally equivalent and approved by the APCO and EPA.

502.3 For source testing performed pursuant to Section 302, compliance with an applicable standard or numerical limitation of this Rule shall be determined from the arithmetic average of three (3) 30 consecutive minute test runs. If two (2) of three (3) runs are above an applicable limit, the test cannot be used to demonstrate compliance with an applicable limit. With prior District approval, multiple smaller measurement periods may be combined into composite runs of at least 30 minutes provided that the smaller measurement periods are not separated by long spans of time or by an adjustment to the unit being tested.