

**REGULATION 9
INORGANIC GASEOUS POLLUTANTS
RULE 4
NITROGEN OXIDES FROM NATURAL GAS-FIRED ~~FAN-TYPE RESIDENTIAL~~
~~CENTRAL~~ FURNACES**

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Bay Area Air Quality Management District

DRAFT: December 20, 2022

REGULATION 9
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RULE 4
NITROGEN OXIDES FROM NATURAL GAS-FIRED ~~FAN-TYPE RESIDENTIAL~~
~~CENTRAL~~ FURNACES

9-4-100 GENERAL

9-4-101 Description: This Rule limits emissions of nitrogen oxides from natural gas-fired ~~fan type-residential-central~~ furnaces.

(Amended December 7, 1983)

9-4-102 **Applicability:** This Rule applies to any person who sells, installs, or offers for sale a natural gas-fired furnace for use within the District (Section 9-4-300s Standards) and any manufacturer who intends to sell or distribute for sale or installation a natural gas-fired furnace for use within the District (Section 9-4-400s Administrative Requirements and Section 9-4-600s Manual of Procedures).

9-4-200 DEFINITIONS

~~9-4-201~~ **~~Fan Type Central Furnace:~~** ~~A self-contained space heater providing for circulation of heated air at pressures other than atmospheric through ducts more than 25 cm (10 in) in length with an input rate of less than 175,000 BTU/hr, excluding heating/cooling units utilizing three phase electric current.~~

~~*(Amended December 7, 1983)*~~

9-4-201² **Annual Fuel Utilization Efficiency (AFUE):** The efficiency as defined by Section 4.2.35 of the Code of Federal Regulations, Title 10, Part 430, Subpart B, Appendix N.

(Amended December 7, 1983)

9-4-202 **BTU:** British thermal unit or units.

9-4-203 **Furnace:** A product with a heat input rate less than 175,000 BTU/hr which is designed to be a source of interior space heating.

203.1 **Natural Gas-Fired Furnace:** A furnace that utilizes single-phase, three-phase or direct current in conjunction with natural gas.

203.2 **Natural Gas-Fired Fan Type Central Furnace:** A self-contained space heater providing for circulation of heated air at pressures other than atmospheric through ducts more than 25 cm (10 in) in length with a heat input rate of less than 175,000 BTU/hr. This includes combination heating/cooling

units with natural gas heating and also an electric cooling rate less than 65,000 BTU/hr.

9-4-204 **Heat Input:** The heat of combustion based on the gross (higher) heating value of the fuel, excluding the enthalpy of incoming combustion air.

9-4-205 **Natural Gas:** A mixture of gaseous hydrocarbons containing at least 80 percent methane by volume as determined by ASTM Standard D1945, 2003.

9-4-206 **Nitrogen Oxides (NO_x):** The sum of nitrogen oxide (NO) and nitrogen dioxide (NO₂), collectively expressed as nitrogen dioxide.

9-4-207³ **Useful Heat Delivered to the Heated Space:** The Annual Fuel utilization efficiency (expressed as a fraction) multiplied by the heat input.

(Amended December 7, 1983)

9-4-300 STANDARDS

9-4-301 ~~**Residential Central Natural Gas-Fired Furnace Emission Standards:**—A person shall not sell, install or offer for sale within the District any stationary residential natural gas-fired fan type central furnace manufactured after January 1, 1984 that emits more than 40 nanograms of oxides of nitrogen expressed as NO₂ per joule of useful heat delivered to the heated space.~~ A person shall not sell, install or offer for sale within the District:

301.1 Any stationary residential natural gas-fired fan type central furnace manufactured after January 1, 1984, that emits more than 40 nanograms of nitrogen oxides expressed as NO₂ per joule of useful heat delivered to the heated space.

301.2 Any natural gas-fired fan type central furnace manufactured after January 1, 2024, that emits more than 14 nanograms of nitrogen oxides expressed as NO₂ per joule of useful heat delivered to the heated space.

301.3 Any natural gas-fired furnace manufactured after January 1, 2029, that emits more than 0.0 nanograms of nitrogen oxides expressed as NO₂ per joule of useful heat delivered to the heated space. This includes non-central installations such as wall furnaces as well as units installed in non-residential applications.

This section does not apply to furnaces used for mobile homes.

(Amended December 7, 1983)

9-4-302 Certified Furnaces: A person shall not sell, install or offer for sale within the District furnaces subject to the requirements of Section 9-4-301 unless such furnaces are certified in accordance with Sections [9-4-401](#), 402, 403, and 404.

(Amended and Renumbered December 7, 1983)

9-4-400 ADMINISTRATIVE REQUIREMENTS

9-4-401 Certification: The manufacturer shall have each appliance model tested in accordance with the following:

- 401.1 [Nitrogen oxides, carbon dioxide and oxygen](#) measurements, test equipment, and other required test procedures shall be in accordance with ~~Oxides of nitrogen measurements, test equipment, and other required test procedures shall be in accordance with methods and standards or equivalent procedures approved by the APCO.~~ [Section 9-4-601](#).
- 401.2 Operation of the furnace shall be in accordance with the procedures specified in Section 3.1 of [the](#) Code of Federal Regulations, Title 10, Part 430, Subpart B, Appendix N.
- 401.3 ~~The following calculation~~ [One of the two formulas shown below](#) shall be used to determine the ~~nanograms emissions~~ of NO_x [in units of nanograms](#) per joule of useful heat delivered to heated space:

$$N = \frac{3.655 \times 10^{10} \times P}{(20.9 - Y) \times Z \times E}$$

or

$$N = \frac{4.566 \times 10^4 \times P \times U}{H \times C \times E}$$

Where:

N = ~~Nanograms~~ [Calculated mass emissions](#) of NO_x [per unit of useful heat \(nanograms emitted](#) per joule of useful heat delivered to the heated space).

P = [Measured concentration of NO_x in flue gas \(P](#)parts per million ~~of NO_x by volume~~).

Y = [Measured concentration](#) ~~Percentage~~ of O₂ in flue gas [\(percentage by volume\)](#).

Z = [Gross H](#) heating value of gas [in \(joules per cubic \(meter\)³ at 0.0 degrees Celcius, 1 atm\)](#).

E = AFUE (percentage), [as defined in Section 9-4-201](#).

U = ~~Volume percent~~ [Concentration of](#) CO₂ in water-free flue gas for stoichiometric combustion [\(percentage by volume\)](#).

H = Gross heating value of the fuel, [\(BTU/cu. ft. per cubic foot, \(60°F, 30-in Hg.\)](#).

C = Measured ~~volume percent concentration~~ of CO₂ in ~~water-free~~ flue gas, ~~(percentage by volume) assuming complete combustion and no CO present.~~

(Amended December 7, 1983)

9-4-402 Compliance Statement: The manufacturer shall submit to the APCO ~~a~~ either of the following:

402.1 A statement that ~~each affected furnace~~ ~~the~~ model ~~meets the standards set forth in Section 301 of~~ this Rule. The statement shall be signed and dated, and shall attest to the accuracy of all information. The statement shall include the brand name and model number as ~~its~~ appears on the furnace rating plate, ~~and be on forms provided by the APCO.~~ or

402.2 A valid South Coast Air Quality Management District (SCAQMD) certification for SCAQMD Rule 1111 for furnaces demonstrating compliance with Section 9-4-301.2.

(Amended December 7, 1983)

9-4-403 Identification: The manufacturer shall display the model number of the furnace complying with this rule on the shipping carton and rating plate.

9-4-404 Enforcement: The APCO may require the emission test results to be provided when deemed necessary to verify compliance and may periodically conduct such tests as are deemed necessary to ~~i~~ensure compliance.

9-4-405 Interim Report: At least two years prior to the compliance date listed in Section 9-4-301.3, the APCO shall present to the Air District Board of Directors for consideration at a public meeting a report that includes the technology options currently (and projected to be) available to be sold, installed or offered for sale that do not conflict with the standard in Section 9-4-301.3; the projected costs of purchase and installation of such technology, including any ancillary costs, as applicable; any incentive programs available to reduce these costs; and infrastructure readiness associated with rule compliance.

9-4-600 MANUAL OF PROCEDURES

9-4-601 Determination of Emissions: Furnaces subject to Sections 9-4-301 and 302 shall be tested in accordance with the following provisions:

601.1 Each furnace model shall receive certification based on emission tests of a randomly selected unit of that furnace model.

601.2 The measurement of nitrogen oxides emissions shall be conducted in accordance US EPA Reference Method RM-7 (40 CFR Part 60, Appendix A, Test Method 7E).

601.3 The measurement of carbon dioxide shall be conducted in accordance with the Manual of Procedures, Volume IV, Method ST-5 or US EPA Method 3A.

601.4 The measurement of oxygen shall be conducted in accordance with the Manual of Procedures, Volume IV, Method ST-14 or US EPA Method 3A.