

SAN JOAQUIN VALLEY UNIFIED AIR QUALITY MANAGEMENT DISTRICT

**RULE 4354 - GLASS MELTING FURNACES**

*(Adopted September 14, 1994)(Amended April 16, 1998; February 21, 2002; August 17, 2006)*

1.0 Purpose

The purpose of this rule is to limit emissions of nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), volatile organic compounds (VOC), and oxides of sulfur (SO<sub>x</sub>) from glass melting furnaces.

2.0 Applicability

The provisions of this rule shall apply to any glass-melting furnace.

3.0 Definitions

3.1 Air-fuel Firing: operation of a glass melting furnace where greater than 50% of the oxidant for the fuel comes from ambient air. 100% air-fuel fired means operation of a glass melting furnace where the oxidant is exclusively ambient air.

3.2 APCO: as defined in Rule 1020 (Definitions).

3.3 ARB: California Air Resources Board.

3.4 Block 24-hour Average: the arithmetic average of the hourly NO<sub>x</sub> emission rates of a furnace as measured over 24 one-hour periods, daily, from 12:00 AM to 11:59 PM, excluding periods of system calibration.

3.5 Carbon Monoxide (CO): emissions of carbon monoxide, a colorless and odorless gas resulting from incomplete combustion of fuel.

3.6 Commercial Propane: a gaseous fuel composed primarily of propane.

3.7 Container Glass: any glass manufactured by pressing, blowing in molds, drawing, rolling, or casting which is used as a container.

3.8 EPA: United States Environmental Protection Agency.

3.9 Fiberglass: material consisting of fine filaments of glass that are combined in yarn and woven or spun into fabrics, or that are used as reinforcement in other materials or in masses as thermal or as acoustical insulating products for the construction industry.

3.10 Flat glass: any glass produced by the float, sheet, rolled, or plate glass process which is used in windows, windshields, tabletops, or similar products.

- 3.11 Furnace Battery: two or more glass melting furnaces that exhaust to a common stack.
- 3.12 Furnace Rebuild: a cold tank repair which is commenced after the end of a furnace campaign period or expected life cycle of a furnace. For the purpose of compliance deadline in Section 7.1, the effective date of a furnace rebuild is the date of the start of the furnace shutdown.
- 3.13 Idling: the operation of a furnace at less than 25 percent of the permitted glass production capacity or fuel use capacity as stated on the Permit to Operate (PTO).
- 3.14 Liquefied Petroleum Gas (LPG): LPG is a general term for the following gases: commercial propane, commercial butane, propane-butane (PB) mixtures, and special duty propane, although some people consider commercial propane separate from LPG.
- 3.15 Multiple Furnaces: two or more glass melting furnaces at a single facility that do not exhaust to a common stack.
- 3.16 Normal Business Hours: Monday through Friday, 8:00 am to 5:00 pm.
- 3.17 Oxides of Nitrogen (NO<sub>x</sub>): the sum of oxides of nitrogen in the flue gas, collectively expressed as nitrogen dioxide (NO<sub>2</sub>).
- 3.18 Oxides of Sulfur (SO<sub>x</sub>): the sum of compounds containing sulfur and oxygen, such as sulfur dioxide (SO<sub>2</sub>) and sulfur trioxide (SO<sub>3</sub>).
- 3.19 Oxygen-Assisted Combustion: operation of a glass melting furnace where the oxidant is greater than the oxygen content in ambient air or greater than 20.9 percent oxygen.
- 3.20 Oxy-fuel Fired: operation of a glass melting furnace where greater than 50% of the oxidant for the fuel is provided from enriched oxygen streams.
- 3.21 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 a total gas molecules.
- 3.22 Parts Per Million by Weight (ppm): the ratio of the weight of the given species or group of species, to the weight of total mixture and the ratio multiplied by one million.
- 3.23 Permitted Glass Production Capacity: the maximum pull rate as stated in the Permit to Operate (PTO).

- 3.24 Potential to Emit: as defined in Rule 2201 (New and Modified Stationary Source Review Rule).
- 3.25 Primary Furnace Combustion System: the burners in a furnace that are used during production of glass.
- 3.26 PTO: a Permit To Operate issued by the District.
- 3.27 PUC-quality Natural Gas: a gaseous fuel that meets the requirements specified in California Public Utilities Commission (PUC) General Order 58-A. PUC-quality natural gas also means that the sulfur content is no more than one-fourth (0.25) grain of hydrogen sulfide per one hundred (100) standard cubic feet and no more than five (5) grains of total sulfur per one hundred (100) standard cubic feet.
- 3.28 Pull Rate: the amount of glass coming out of a glass melting furnace, expressed in short tons per day.
- 3.29 Rolling 30-day Average: the arithmetic average of the daily emission rates of a furnace over a contiguous 30-day period, excluding periods of system calibration.
- 3.30 Shutdown: the period of time during which a glass-melting furnace is taken from an operational to a non-operational status by allowing it to cool down from its operating temperature to a cold or ambient temperature as the fuel supply is turned off.
- 3.31 Start-up: the period of time, after initial construction or a furnace rebuild, during which a glass melting furnace is heated to operating temperature by the primary furnace combustion system, and systems and instrumentation are brought to stabilization.
- 3.32 Stationary Source: as defined in Rule 2201 (New and Modified Stationary Source Review Rule).
- 3.33 Volatile Organic Compound (VOC): as defined in Rule 1020 (Definitions).

#### 4.0 Exemptions

- 4.1 Except for Section 6.8, the provisions of this rule shall not apply to electric glass melting furnaces where all the heat is supplied by an electric current from electrodes submerged in the molten glass, except that heat may be supplied by other fuels for start-up when the furnace contains no molten glass.
- 4.2 Except for Section 6.8, the provisions of this rule shall not apply to any glass-melting furnace that is part of a stationary source with a total potential to emit, for all processes, of less than ten (10.0) tons per year of NO<sub>x</sub> and less than ten (10.0) tons per year of VOC.

4.3 The emission limits in Section 5.1 Table 1 shall not apply during periods of start-up, shutdown, or idling, provided the operator complies with the applicable requirements of Sections 5.3, 5.4, 5.5, and 6.7.

5.0 Requirements

5.1 Except as specified in Section 4.3, the operator of any glass melting furnace shall not operate a furnace in such a manner that results in NO<sub>x</sub>, CO, or VOC emissions exceeding the limits in Table 1. The deadlines to comply with the emission limits are specified in Section 7.0.

Table 1 NO<sub>x</sub>, CO, and VOC Emission Limits

Type of Furnace	Combustion Type	Tier 1 Emission Limits	Tier 2 Emission Limits		
		NO <sub>x</sub>	NO <sub>x</sub>	CO	VOC
Container Glass or Fiberglass	100% Air-Fuel Fired	5.5 lb/ton of glass pulled	4.0 lb/ton of glass pulled on a block 24-hour average	300 ppmv	20 ppmv
	Oxygen-Assisted Combustion	5.5 lb/ton of glass pulled	4.0 lb/ton of glass pulled on a block 24-hour average	1.0 lb / ton of glass pulled	0.25 lb / ton of glass pulled
Flat Glass	100% Air-Fuel Fired	See Section 5.7	9.2 lb/ton of glass pulled on a block 24-hour average and 7.0 lb/ton of glass pulled on a rolling 30-day average	300 ppmv	20 ppmv
	Oxygen-Assisted Combustion	See Section 5.7	9.2 lb/ton of glass pulled on a block 24-hour average and 7.0 lb/ton of glass pulled on a rolling 30-day average	0.9 lb / ton of glass pulled	0.1 lb / ton of glass pulled

5.2 In order to limit SO<sub>x</sub> emissions, all glass melting furnaces subject to Table 1 emission limits shall fire on PUC-quality natural gas, commercial propane, or LPG on and after March 31, 2008. Liquid fuel may be used as backup fuel or standby fuel provided the liquid fuel contains no more than 15 ppm of sulfur and the furnace exhaust is controlled by a SO<sub>x</sub> emission control system with control system efficiency of 50% or greater.

### 5.3 Start-up Requirements

- 5.3.1 The operator shall submit a request for a start-up exemption to the APCO, ARB, and EPA in conjunction with or in advance of an application for Authority to Construct (ATC) associated with a furnace rebuild.
- 5.3.2 The operator shall submit to the APCO, ARB, and EPA any information deemed necessary by the APCO, ARB, or EPA to determine the appropriate length of start-up exemption. This information shall include, but is not limited to:
  - 5.3.2.1 A detailed list of activities to be performed during start-up, and a reasonable explanation for the length of time needed to complete each activity, and
  - 5.3.2.2 A description of the material process flow rates, system operating parameters, etc., that the operator plans to evaluate during the process optimization,
  - 5.3.2.3 Clearly identified control technologies or strategies to be utilized,
  - 5.3.2.4 Explicit description of what physical conditions prevail during start-up periods that prevent the controls from being effective, and
  - 5.3.2.5 Reasonably precise estimate as to when physical conditions will have reached a state that allows for the effective control of emissions.
- 5.3.3 Start up exemptions shall begin upon activation of the primary combustion system.
- 5.3.4 The actual length of the start-up exemption shall be determined by the APCO, ARB, and EPA at the time of the ATC issuance, but in any case, it shall not exceed the amount of time specified in Table 2. The approval for the startup exemption shall be in writing from each agency.

Table 2 – Maximum Start-up Time

Type of Furnace	Maximum Start-up NOx control system that does not meet Section 5.3.4.2 provisions	Maximum Start-up NOx control system that meets Section 5.3.4.2 provisions
Container glass	70 days	100 days
Fiber glass	40 days	105 days
Flat glass	104 days	208 days

5.3.4.1 Maximum start-up time for furnaces with NOx controls that do not meet any of the conditions of 5.3.4.2 is listed in the center column of Table 2.

5.3.4.2 Maximum start-up time column as shown in the rightmost column of Table 2 shall be the maximum startup time if the NOx control system meets one or more of the following conditions:

5.3.4.2.1 Is innovative,

5.3.4.2.2 Is not in common use,

5.3.4.2.3 Is not readily available from a commercial supplier,

5.3.4.2.4 Is funded as original research by a public agency.

5.3.5 During start-up period, the stoichiometric ratio of the primary furnace combustion system shall not exceed 5% excess oxygen, as calculated from the actual fuel and oxidant flow measurements for combustion in the glass melting furnace.

5.3.6 The emission control system shall be in operation as soon as technologically feasible during start-up to minimize emissions.

5.3.7 Notifications shall be performed and records kept in accordance with Section 6.7.

#### 5.4 Shutdown Requirements

5.4.1 The duration of shutdown, as measured from the time the furnace operations drop below the idle threshold specified in Section 3.13 to when all emissions from the furnace cease, shall not exceed 20 days.

5.4.2 The emission control system shall be in operation whenever technologically feasible during shutdown to minimize emissions.

5.4.3 Notifications shall be performed and records kept in accordance with Section 6.7.

5.5 Idling Requirements

5.5.1 The emission control system shall be in operation whenever technologically feasible during idling to minimize emissions.

5.5.2 The NO<sub>x</sub>, CO, and VOC emission during idling shall not exceed the amount as calculated using the following equation:

Pounds per day emission limit of NO<sub>x</sub>, VOC, or CO = (Applicable Tier 1 or Tier 2 emission limit in pounds emissions per ton of glass produced) x (Furnace permitted production capacity in tons of glass produced per day)

5.5.3 Notifications shall be performed and records kept in accordance with Section 6.7.

5.6 Compliance Determination

5.6.1 The emissions measured for compliance with Tier 1 NO<sub>x</sub> limits and Tier 2 CO and VOC limits shall be averaged over a three hour period in accordance with the applicable test methods in Section 6.5, or, if a continuous emission monitoring system (CEMS) or an alternate emission monitoring method is used, the applicable requirements of Sections 6.6.1 or 6.6.2, respectively.

5.6.2 Any source testing result, CEMS or alternate emission monitoring method averaged value exceeding the applicable emission limits in Section 5.1 shall constitute a violation of the rule.

5.7 The Tier 1 NO<sub>x</sub> emission limit for flat glass furnaces shall be calculated using the following equation:

$$\text{NO}_x \text{ Limit} = (32 \text{ lb NO}_x \text{ per ton of glass pulled}) - [(0.2 \text{ lb NO}_x \text{ per ton of glass pulled}) \times \text{CF}]$$

Where:

$$\text{CF} = \frac{\text{Glass Pull Rate in tons per day}}{\text{Permitted Production Capacity in tons per day}} \times 100\%$$

5.8 In lieu of each furnace complying individually with the Tier 2 emission limits in Section 5.1, the owner operator of a furnace battery or multiple furnaces may comply with this rule according to Section 9.0.

- 5.9 The operator of any glass melting furnace shall implement a NO<sub>x</sub> CEMS or a NO<sub>x</sub> alternate emissions monitoring method on each furnace, that is approved, in writing, by the APCO, ARB, and EPA, and that meets the requirements of Sections 6.6. For a furnace battery, a single CEMS or alternate emissions monitoring method may be used to determine the total NO<sub>x</sub> emissions from all the furnaces provided the emission measurements are made at the common stack. The operator of a glass melting furnace not subject to the Table 1 limits of this rule before August 17, 2006 that becomes subject to Table 1 limits on August 17, 2006 shall implement an approved monitoring system by March 31, 2008.

## 6.0 Administrative Requirements

### 6.1 Permitted Glass Production Capacity and Fuel Use Capacity

Each glass melting furnace's PTO shall include either 6.1.1 or 6.1.2 or both as a permit condition.

6.1.1 The furnace's permitted glass production capacity in units of tons of glass pulled per day; or

6.1.2 The furnace's maximum fuel use capacity in units of million British thermal units per hour or per day (MMBtu/hr or MMBtu/day).

### 6.2 Emission Control Plan (ECP)

6.2.1 The operator of any glass melting furnace subject to the provisions of this rule on February 21, 2002 shall submit to the APCO an ECP in accordance with the compliance schedule in Section 7.1 which identifies all actions to be taken to satisfy the requirements of Section 5.0. Such plan shall identify the type of emission controls, CEMS or alternate emission monitoring method to be applied to each glass melting furnace and a construction schedule. The method used for determining pull rate shall be submitted. If the pull rate calculation method is changed, the new calculation method shall be submitted within 30 days from the date of such change. If a furnace is already achieving Section 5.1 Tier 2 emission limits prior to the compliance deadline specified in Section 7.1 Table 3 Tier 2, the ECP shall include CEMS or alternate emission monitoring data, or source tests results that are sufficient to demonstrate compliance with all the requirements of this rule.

6.2.2 An operator of a glass melting furnace not subject to the Table 1 limits of this rule before August 17, 2006 that becomes subject to the Table 1 limits on August 17, 2006 shall submit an ECP to the APCO by February 17, 2007. The ECP shall contain, at minimum, the following information:



- 6.2.2.1 The type of emission controls to be used to meet the requirements of Section 5.0.
- 6.2.2.2 Whether CEMS or alternate emission monitoring will be used for emission monitoring.
- 6.2.2.3 The method used to calculate pull rate. If the calculation method is changed, the new calculation method shall be submitted within 10 calendar days from the date of such change.
- 6.2.2.4 The construction schedule, should construction be necessary to meet the requirements of this rule.
- 6.2.2.5 If a furnace is achieving Section 5.1 Tier 2 emission limits before March 31, 2008, the ECP shall include emission monitoring data or source test results that are sufficient to demonstrate compliance with all requirements of the rule.

### 6.3 Operations Records

- 6.3.1 Until the full compliance date for Tier 2 emission limits specified in Section 7.1, the operator of any glass melting furnace subject to the provisions of this rule before February 21, 2002 shall maintain an operating log for each furnace that includes, on a monthly basis: the total hours of operation; type and quantity of fuel used in each furnace; and the quantity of glass pulled. The owner shall maintain records of source tests and operating parameters established during initial source test, maintenance, repair, malfunction, idling, shutdown, and start-up. This information shall be made available on site during normal business hours for a period of five years, and submitted to the APCO upon request.
- 6.3.2 Effective on and after the full compliance date for Tier 2 emission limits specified in Section 7.1, the owner of any glass melting furnace subject to the emission limits of Table 1 before February 21, 2002 shall maintain the records specified in Sections 6.3.2.1, 6.3.2.2, and 6.3.2.3 for a period of five years, make them available on site during normal business hours, and submit them to the APCO, ARB, or EPA upon request.
  - 6.3.2.1 Daily records of the total hours of operation, type and quantity of fuel used in each furnace, and/or the quantity of glass pulled from each furnace whichever matches the permit condition in the furnace's PTO.
  - 6.3.2.2 Daily records of NOx emission rate in lb/ton of glass pulled.

6.3.2.3 Records of source tests and operating parameters established during initial source test, maintenance and repair, malfunction, and idling, start-up and shutdown.

6.3.3 The operator of a glass furnace that is not subject to the emission limits of Table 1 prior to August 17, 2006 that becomes subject to the Table 1 emission limits on August 17, 2006 shall maintain the following records:

6.3.3.1 Daily records of total hours of operation and type of fuel used in each furnace.

6.3.3.2 Daily records of either the quantity of fuel used by each furnace or the quantity of glass pulled from each furnace, whichever matches the permit condition in the furnace's PTO.

6.3.3.3 Daily records of NO<sub>x</sub> emission rate in lb/ton of glass pulled.

6.3.3.4 Records of source tests and operating parameters established during initial source test, maintenance and repair, and malfunction.

6.3.4 The operator shall retain the records specified in Sections 6.3.3.1 through 6.3.3.4 for a period of five years, make them available on site during normal business hours to the APCO, ARB, or EPA, and submit them to the APCO, ARB, or EPA upon request.

#### 6.4 Compliance Source Testing

6.4.1 Each glass melting furnace or a furnace battery shall be source tested at least once every calendar year, but not more than every 18 months and not sooner than every 6 months to demonstrate compliance with the applicable requirements of Section 5.0.

6.4.2 Source test conditions shall be representative of normal operations, but not less than 60 percent of either the permitted glass production capacity or the furnace's maximum fuel use capacity for each furnace, whichever limit is stated in the furnace's PTO.

6.4.3 For source testing performed in accordance with Section 6.4.1, the arithmetic average of three (3) 30-consecutive-minute test runs shall apply. If two of the three runs individually demonstrate emissions above the applicable limit, the test cannot be used to demonstrate compliance for the furnace, even if the averaged emissions of all three test runs is less than the applicable limit.

#### 6.5 Test Methods

Compliance with the requirements of Section 5.0 shall be determined in accordance with the following source test procedures or their equivalents as approved by the EPA, ARB, and the APCO:

- 6.5.1 Oxides of nitrogen – EPA Method 7E, EPA Method 19, or ARB Method 100.
- 6.5.2 Carbon monoxide (ppmv) – EPA Method 10, or ARB Method 100.
- 6.5.3 Volatile Organic Compound (ppmv) – EPA Method 25A expressed in terms of carbon. EPA Test Method 18 or ARB Method 422 shall be used to determine emissions of exempt compounds.
- 6.5.4 Stack gas oxygen, carbon dioxide, excess air, and dry molecular weight – EPA Method 3 or 3A, or ARB Method 100.
- 6.5.5 Stack gas velocity and volumetric flow rate – EPA Method 2.
- 6.5.6 The SOx emission control system efficiency shall be determined using the following:
  - 6.5.6.1 EPA Method 2 for measuring flow rates; and
  - 6.5.6.2 EPA Method 6C or EPA Method 8 for measuring total SOx (expressed as SO<sub>2</sub>) concentrations at the inlet and outlet of the control device.
  - 6.5.6.3 The SOx emission control system efficiency shall be calculated using the following equation:

$$\% \text{ Control Efficiency} = [ (C_{\text{SO}_2, \text{inlet}} - C_{\text{SO}_2, \text{outlet}}) / C_{\text{SO}_2, \text{inlet}} ] \times 100$$

Where:

$C_{\text{SO}_2, \text{inlet}}$  = concentration of SOx (expressed as SO<sub>2</sub>) at the inlet side of the SOx emission control system, in lb/dscf

$C_{\text{SO}_2, \text{outlet}}$  = concentration of SOx (expressed as SO<sub>2</sub>) at the outlet side of the SOx emission control system, in lb/dscf

## 6.6 Emissions Monitoring Systems

6.6.1. An approved CEMS shall comply with all of the following requirements:

6.6.1.1 40 Code of Federal Regulations (CFR) Part 51;

- 6.6.1.2 40 CFR Part 60.7;
  - 6.6.1.3 40 CFR Part 60.13;
  - 6.6.1.4 40 CFR Part 60 Appendix B (Performance Specifications);
  - 6.6.1.5 40 CFR Part 60 Appendix F (Quality Assurance Procedures);  
and
  - 6.6.1.6 Applicable sections of Rule 1080 (Stack Monitoring).
- 6.6.2 An approved alternate emissions monitoring method shall be capable of determining the furnace emissions on an hourly basis and shall comply with the following requirements:
- 6.6.2.1 42 FR 54900 (Compliance Assurance Monitoring); and
  - 6.6.2.2 40 CFR 60.13 (Monitoring Requirements).
- 6.7 Notifications and Records for Start-up, Shutdown, and Idling
- 6.7.1 The operator of any glass melting furnace claiming an exemption under Section 4.3 shall notify the APCO by telephone at least 24 hours before initiating idling, shutdown, or start-up. The notification shall include: date and time of the start of the exempt operation, reason for performing the operation, and an estimated completion date.
  - 6.7.2 The operator shall notify the APCO by telephone within 24 hours after completion of the start-up, shutdown, or idling.
  - 6.7.3 The operator claiming exemption under Section 4.3 shall maintain all operating records/support documentation necessary to support claim of exemption.
  - 6.7.4 Records/support documentation required by Section 6.7.3 shall meet the following requirements:
    - 6.7.4.1 The records/support documentation shall be retained on-site for five years.
    - 6.7.4.2 The records/support documentation shall be made available to the APCO, ARB, or EPA during normal business hours.
    - 6.7.4.3 The records/support documentation shall be submitted to the APCO, ARB, or EPA upon request.

6.8 Records for Exempt Furnaces

6.8.1 An operator claiming exemption under Section 4.1 or Section 4.2 shall maintain records/documentation necessary to support claim of exemption.

6.8.2 Records/support documentation specified in Section 6.8.1 shall meet the following requirements:

6.8.2.1 The records/documentation shall be retained on-site for five years after exemption is lost.

6.8.2.2 The records/documentation shall be made available to the APCO, ARB, or EPA during normal business hours.

6.8.2.3 The records/documentation shall be submitted to the APCO, ARB, or EPA upon request.

7.0 Compliance Schedule

7.1 The operator of any flat glass, container glass, or fiberglass melting furnace subject to Table 1 limits of this rule before February 21, 2002 shall demonstrate full compliance with the provisions of this rule not later than the schedules in Table 3.

Table 3 Compliance Schedule

Emission Limits	Emission Control Plan (ECP)	Authority to Construct (ATC) Application	Full Compliance
Tier 1	3/14/95	3/14/95	5/31/95
Tier 2	12 months prior to next furnace rebuild after 1/1/99 and no later than 3/31/2007	9 months prior to next furnace rebuild after 1/1/99 and no later than 6/31/2007	Next furnace rebuild after 1/1/99 and no later than 3/31/2008

7.2 For furnaces subject to this rules before February 21, 2002, as shown in Section 7.1 Table 3, the column labeled:

7.2.1 “Emission Control Plan (ECP)” identifies the date by which the operator shall submit an Emission Control Plan according to Section 6.2.1, or Section 9.0.

7.2.2 “Authority to Construct (ATC) Application” identifies the date by which the operator shall submit a complete application for Authority to Construct (ATC) for any necessary modifications to each glass melting furnace.

7.2.3 “Full Compliance” identifies the date by which the operator shall demonstrate that each furnace is in compliance after start-up with the emission limits in Section 5.1 and after which, the operator shall remain in compliance with the applicable emission limits in Section 5.1.

7.3 A glass melting furnace not subject to the Table 1 limits of this rule before August 17, 2006 that becomes subject to the Table 1 limits on August 17, 2006 shall be in full compliance with the requirements of this rule by March 31, 2008, unless otherwise specified in the rule requirements.

## 8.0 Calculations

8.1 The NOx emission rate in ppmv shall be converted to lb/hr by using the appropriate conversion equations in ARB Method 100, EPA Method 19, or an equivalent conversion method approved, in writing, by each of the following: APCO, ARB, and EPA. The NOx mass emission rate in lb/hr shall be converted to lb NOx/ton of glass pulled according to the following equation:

$$lb\ NOx / ton\ of\ glass\ pulled = \frac{lb / hr\ of\ NOx}{Pull\ rate\ in\ tons / hr}$$

8.2 100% air-fuel fired furnaces which have concentration limits in ppmv values shall be subject to the CO and VOC emission limits specified in Section 5.1. These limits are referenced at dry stack gas conditions and 8.0 percent by volume of stack oxygen. The CO and VOC emission concentrations shall be corrected to 8.0 percent oxygen by using the equation below, or an equivalent correction method that is approved, in writing, by each of the following: APCO, ARB, and EPA.

$$(ppmv\ CO)_{corrected} = \frac{12.9\%}{20.9\% - (\% O_2)_{measured}} \times (ppmv\ CO)_{measured}$$

$$(ppmv\ VOC)_{corrected} = \frac{12.9\%}{20.9\% - (\% O_2)_{measured}} \times (ppmv\ VOC)_{measured}$$

8.3 The operator of a oxy-fuel fired furnace, oxygen-assisted combustion furnace, or a furnace utilizing any fuel oxidants other than 100% ambient air, shall submit to the APCO, ARB, and EPA for approval any methodologies and data that will be used to calculate emission rates for NOx, CO, and VOC if the methods are different than specified in Sections 8.1 or 8.2. Unless the operator received prior written approval from APCO, ARB, and EPA of all the calculation methods to be used that are different than specified in Sections 8.1 or 8.2, compliance with the emissions limits cannot be fully demonstrated, and it shall be deemed to be a violation of the rule.

## 9.0 Furnace Battery or Multiple Furnaces Control

As an alternative to complying with Section 5.1 Tier 2 NO<sub>x</sub> emission limits and Section 7.0, the operator of a furnace battery or multiple furnaces shall operate the furnace battery or multiple furnaces pursuant to Sections 9.1 through 9.7. Any violation of the requirements below shall be considered a violation of this rule, and a violation of the aggregated emission limits shall constitute a violation for each furnace for the entire averaging time.

Any operator who elects to comply with Section 9.0 in lieu of complying with the requirements of Section 5.1 Tier 2 NO<sub>x</sub> emission limits and Section 7.0 shall be subject to a 10% environmental air quality benefit pursuant to the EPA's Emissions Trading Policy. NO<sub>x</sub> emissions shall be at least 10% lower than the limits specified in Section 5.1 Tier 2. The furnace shall not be subject to this requirement if the operator can demonstrate compliance by operating an approved CEMS or an approved alternate monitoring method for each furnace in accordance with the provisions of Section 6.6.

- 9.1 The operator shall submit an ECP and a complete ATC in accordance with schedules in Section 7.1. The ECP shall:
  - 9.1.1 contain, in addition to the requirements of Section 6.2, all data, records, and other information necessary to determine eligibility of a furnace battery or multiple furnaces for NO<sub>x</sub> emission control under Section 9.0, including, but not limited to:
    - 9.1.1.1 a list of furnaces subject to the ECP;
    - 9.1.1.2 estimated aggregate emission levels as determined in accordance with Section 9.7; and
    - 9.1.1.3 estimated aggregate glass production rates.
  - 9.1.2 detail the method of recording and verifying daily compliance with the ECP.
- 9.2 The operator shall submit an updated or modified ECP for approval by the APCO, ARB, and EPA prior to any modification to the furnace(s) which requires an ATC as outlined in Rule 2010 (Permits Required).
- 9.3 The ECP schedule for achieving reduced NO<sub>x</sub> emission levels shall be at least as expeditious as the schedule were each furnace to comply individually with the emission limits in Section 5.1 Tier 2 and the compliance schedule in Section 7.1.

- 9.4 The daily aggregate NO<sub>x</sub> emissions, as determined in accordance with Section 9.7, shall be no greater than those obtained by controlling each furnace to comply individually with the limits in Section 5.1 Tier 2.
- 9.5 The operator shall conduct source testing of the furnace according to the requirements of Section 6.4.
- 9.6 Determination of Compliance
- 9.6.1 The operator shall calculate and record on a daily basis the aggregated NO<sub>x</sub> emissions of furnaces which are subject to an ECP. Such records shall be kept for a period of five years. The operator shall notify the APCO of any violation of Section 9.4 within 24 hours. The notification shall include:
- 9.6.1.1 name and location of the facility;
  - 9.6.1.2 identification of furnace(s) causing the exceedances;
  - 9.6.1.3 the cause and the expected duration of exceedances;
  - 9.6.1.4 calculation of actual NO<sub>x</sub>, CO and VOC emissions;
  - 9.6.1.5 corrective actions and schedules to complete the work.
- 9.6.2 The operator shall demonstrate compliance with the requirements of Section 9.4 through CEMS data or approved alternate emission monitoring methods, and source test results.
- 9.7 Determination of Aggregated NO<sub>x</sub> Emissions
- 9.7.1 The aggregated NO<sub>x</sub> emissions of a furnace battery are the NO<sub>x</sub> emissions as measured at the common stack divided by the sum of the daily glass pulled from each furnace.
- 9.7.2 The aggregated NO<sub>x</sub> emissions of multiple furnaces are the sum of the daily NO<sub>x</sub> emissions of each furnace divided by the sum of the daily glass pulled from each furnace.



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