

YOLO-SOLANO AIR QUALITY MANAGEMENT DISTRICT

**RULE 9.6 - NON-FERROUS METAL MELTING**

*(Adopted June 9, 1993)*

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## **100 GENERAL**

**101 PURPOSE:** The purpose of this rule is to control the emissions of arsenic, cadmium, and nickel from non-ferrous metal melting furnaces in compliance with the Airborne Toxic Control Measure

adopted by the California Air Resources Board (Title 17, California Code of Regulations [CCR], Section 93107).

102 **APPLICABILITY:** This rule applies to any person who owns or operates a non-ferrous metal melting furnace.

110 **EXEMPTION, SMALL QUANTITIES:** Facilities are exempt from Sections 301.1, 301.2, and 301.3 of this rule if they meet either of the following conditions:

110.1 Melt a total of no more than one ton per year of all metals; or

110.2 Melt no more than the listed quantities of any one of the specific metals listed in Table I.

**TABLE I**

<u>METAL</u>	<u>EXEMPTION LIMIT</u>
	<u>(Tons per year)</u>
Pure Lead	400
Hard Lead	200
Aluminum Scrap Aluminum Ingot containing more than 0.004 percent	125
Cadmium and 0.002 percent Arsenic	125
Solder	100
Zinc Scrap	30
Copper or copper-based alloys (except scrap) containing more than 0.004 percent cadmium or 0.002 percent arsenic	30
Type Metal (lead for linotype machines)	25

- a. For facilities melting more than one of the metals listed in Table I, eligibility for exemption shall be determined using the following calculation:
  - i. For each metal listed in Table I divide the quantity melted by the specific exemption limit listed.
  - ii. Sum the resulting fractions for all metals.

If the sum does not exceed 1.0, the facility qualifies for this exemption.

**111 EXEMPTION, METAL OR ALLOY PURITY:** Facilities or furnaces which do not melt scrap except clean aluminum scrap and which melt a metal or alloy (other than the metals listed in Table I) which is shown by the facility operator to have a content of no more than 0.004 percent cadmium and no more than 0.002 percent arsenic are exempt from Sections 301.1, 301.2, and 301.3 of this rule. A facility granted an exemption under Section 110.2 of this rule may also be granted exemption for all metals that meet the purity limits in this Section.

**112 EXEMPTION, ALUMINUM FURNACES:** The combustion chamber in a reverberatory furnace is exempt from the requirements of Sections 301.1 and 301.2 if the furnace meets both of the following conditions:

112.1 The furnace is used solely to produce aluminum and aluminum-based alloys; and

112.2 The furnace is constructed with a charging well or similar device in which feed is added to molten metal in a separate chamber.

**113 EXEMPTION, ALUMINUM POURING:** Ladles, launders, or other equipment used to convey aluminum from a melting or holding furnace to casting equipment is exempt from the requirements of Sections 301.1 and 301.2 of this rule.

**114 EXEMPTION, CLEAN ALUMINUM SCRAP:** Furnaces used exclusively to process clean aluminum scrap or a mixture of clean aluminum scrap and aluminum ingot to produce extrusion billet are exempt from Sections 301.1 and 301.2 of this rule.

## **200 DEFINITIONS**

**201 ALUMINUM AND ALUMINUM-BASED ALLOYS:** Any metal that is at least 80 percent aluminum by weight.

**202 ARB TEST METHOD 5:** The test method specified in Title 17, California Code of Regulations, Section 94105.

**203 CLEAN ALUMINUM SCRAP:** Scrap that is composed solely of aluminum and aluminum alloys (including anodized aluminum) and that is free of paints, coatings, rubber, or plastics.

**204 COPPER OR COPPER-BASED ALLOY:** Any metal that is more than 50 percent copper by weight, including but not limited to brass and bronze.

**205 DUST FORMING MATERIAL:** Any material containing more than 15 percent by weight of particulate matter less than 0.84 millimeter (mm) equivalent diameter as determined by ASTM C136-84a, "Standard Method for Sieve Analysis of Fine and Coarse Aggregates" using a no. 20 U.S. Bureau

of Standards sieve with 0.84-mm square openings or an alternate method deemed acceptable by the Air Pollution Control Officer.

**206 EMISSION COLLECTION SYSTEM:** Equipment which is installed for the purpose of directing, taking in, confining, and conveying an air contaminant and which conforms to specifications for design and operation given in Industrial Ventilation, Manual of Recommended Practices, 20th Edition, 1988, published by the American Conference of Government and Industrial Hygienists, which is incorporated by reference herein.

**207 EMISSION POINT:** Any location where molten metal is or can be exposed to air, including but not limited to furnaces, crucibles, refining kettles, ladles, tap holes, pouring spouts, and slag channels. A mold or die in which metal is cooling is not considered an emission point.

**208 ENCLOSED STORAGE AREA:** Any space used to contain materials that has a wall or partition on at least three sides or three-quarters of its circumference and that screens the material stored therein to prevent emissions of the material to the air.

**209 FACILITY:** Any real or personal property being used for metal melting activities, which is located on one or more contiguous or adjacent parcels of property in actual contact or separated only by a public roadway or other public right-of-way and owned or operated by the same person or persons, corporation, government agency, public district, public officer, association, joint venture, partnership, or any combination of such entities.

**210 FUGITIVE EMISSION CONTROL:** Any equipment, activity, or process carried out to reduce emissions resulting either from the storage or handling of dust forming materials or material collected by a particulate matter control system or the removal of particulate matter from metal melting or pouring that has settled on the ground or other surfaces, or that has escaped from a properly designed and operated emission collection system.

**211 GOOD OPERATING PRACTICES:** Specific activities necessary to maintain the original collection and control efficiencies of the air pollution control equipment as designed. These activities include but are not limited to verifying operating specifications such as cleaning cycles, air flow, and velocity; and inspecting equipment such as duct work, blowers, and components of the control equipment through a general maintenance and inspection program.

**212 HARD LEAD:** Any alloy containing at least 90 percent lead and more than 0.001 percent arsenic, by weight, or 0.001 percent cadmium, by weight.

**213 MOLTEN METAL:** Any metal or metal alloy in a liquid state, in which a cohesive mass of metal will flow under atmospheric pressure and take the shape of a container in which it is placed.

**214 METAL MELTING FURNACE:** Any apparatus in which metal in a container is brought to a liquid state, including but not limited to reverberatory, cupola, induction, direct arc furnaces, sweat furnaces, and refining kettles. "Metal Melting Furnace" does not include any apparatus in which the metal is heated but does not reach a molten state such as a sintering furnace or an annealing furnace.

**215 NEW SAND:** Any sand not exposed to the casting process.

**216 NON-FERROUS METAL:** Lead, copper, zinc, cadmium, arsenic, aluminum, and their alloys.

217 **PARTICULATE MATTER (PM):** Any solid material except uncombined water, which exists in a finely divided form at standard conditions of temperature and pressure [293°K(20°C) and 760 mm Hg].

218 **PARTICULATE MATTER CONTROL SYSTEM:** Any device or series of devices designed and operated in a manner intended to remove fine particulate matter (<10 um) from an air or gas stream.

219 **PERSON:** The same meaning as defined in Health and Safety Code Section 39047.

220 **PROCESS EMISSION CONTROL:** Any equipment installed and operated to control emissions of toxic metals from any emission point as defined in Section 206 of this rule.

221 **PURE LEAD:** Any alloy that is at least 90 percent lead and contains no more than 0.001 percent cadmium, by weight, and 0.001 percent arsenic, by weight.

222 **RINGELMANN CHART:** The Ringelmann Chart published in the United States Review of Mine Information Circular No. 1C8333, (May 1967), as specified in Health and Safety Code Section 41701(b).

223 **SCRAP:** Any metal or metal containing material that has been discarded or removed from the use for which it was produced or manufactured and which is intended for reprocessing. "Scrap" does not include spares, gates, risers, foundry returns, and similar material intended for remelting that has been generated at the facility as a consequence of casting or forming processes, but has not been coated or surfaced with any material containing cadmium, arsenic or nickel.

224 **SOLDER:** Any metal in which the sum of the lead and the tin is greater than 50 percent, by weight and which is used for the purpose of joining two metals or of joining a metal to any other material.

225 **TYPE METAL:** Any lead-based alloy used for linotype machines.

### **300 STANDARDS**

301 **OPERATION:** No person shall operate a non-ferrous metal melting furnace unless the facility is in compliance with all the requirements specified in Sections 301.1 through 301.3.

#### **301.1 Emission Collection System:**

- a. All emission points shall be equipped with an emission collection system designed and operated according to the criteria specified in Section 205. The design criteria and operating parameters shall be specified as conditions of the Authority to Construct and the Permit to Operate granted to the facility for the equipment.
- b. Good operating practices shall be used by the facility, and demonstrated through a maintenance plan or procedures approved in writing by the Air Pollution Control Officer, to maintain air movement and emission collection efficiency by the system consistent with the design criteria for the system. The maintenance plan or procedure shall specify at a minimum the following:

- i. Maximum allowable variation from designed values of operating parameters, such as air velocity in the hood and ducts and pressure drop across the control device.
- ii. Areas to be visually inspected, such as the clean side of the control device and ducts operating under positive pressure, and the required frequency of such inspections.
- iii. Methods of documenting compliance with these requirements, such as a log of such inspections and records of observations and measurements.

**301.2 Process Emission Control:** The gas stream from the emission collection system required by Section 301.1 shall be duct to a particulate matter control device meeting the following requirements:

- a. The particulate matter control device shall reduce particulate matter emissions by 99 percent or more.
- b. The temperature of the gas stream entering any particulate matter control device that is part of an emissions collection system shall not exceed 360 degrees Fahrenheit. A device to be used for making this measurement shall be maintained at the facility and shall be made available to the District for inspection upon request.
- c. The owner or operator of a facility shall demonstrate compliance with Section 301.2.a, by conducting an initial source test to verify the 99 percent reduction in particulate matter as determined by means of an emissions test conducted in accordance with ARB Test Method 5. The Air Pollution Control Officer may require additional source testing to verify continued compliance or when the process is changed. Particulate matter reduction shall be calculated using the following equation:

$$\text{Particulate Matter Reduction} = \frac{[\text{Mass}_{in} - \text{Mass}_{out}]}{\text{X } 100} \text{Mass}_{in}$$

where:

*Mass<sub>in</sub>* = Mass of particulate matter at the inlet to the control device.

*Mass<sub>out</sub>* = Mass of particulate matter at the outlet of the control device.

*Mass = Sum of filter catch, probe catch, impinger catch, and solvent extract.*

- d. Testing access: The owner or operator of any facility subject to Section 301.2 of this rule shall provide access and sampling ports sufficient to perform testing in accordance with ARB Test Method 5. Ducts and stacks shall have sampling ports so placed as to satisfy minimum requirements for Method 5 testing with regard to flow disturbances, or acceptable alternative requirements as approved by the Air Pollution Control Officer.

### **301.3 Fugitive Emissions Control:**

- a. No activity associated with metal melting at a facility including furnace operation, casting, emission control system operation, and the storage, handling, or transfer of any materials (except new sand) shall discharge into the air any air contaminant, other than uncombined water vapor, for a period aggregating more than three minutes in any one hour which is:
  - i. Half as dark or darker in shade as that designated as Number 1 on the Ringelmann Chart, as published by the United States Bureau of Mines, or
  - ii. Of such opacity as to obscure an observer's view to a degree equal to or greater than smoke as described in Section 301.3.a (i) or 10 percent opacity.
- b. Dust-forming material including, but not limited to, dross, ash, or feed material shall be stored in an enclosed storage area or stored in a manner which meets the requirements of Section 301.3.a.
- c. Material collected by a particulate matter control system shall be discharged into closed containers or an enclosed system that is completely sealed to prevent any dust from getting out.
- d. Surfaces that are subject to vehicular or foot traffic shall be vacuumed, wet mopped, or otherwise maintained in accordance with a maintenance plan approved by the Air Pollution Control Officer. The plan shall specify, at a minimum: the areas to be cleaned, the method to be used, the required frequency of the cleaning activities, and a method of documenting the completion of the required activities. The plan shall be designed and carried out in a way which will meet the requirements of Section 301.3.a.

## **400 ADMINISTRATIVE REQUIREMENTS**

### **401 COMPLIANCE SCHEDULE:**

401.1 Facilities seeking exemption under Sections 110, 111, and 114 of this rule shall apply and submit evidence of eligibility for exemption to the Air Pollution Control Officer no later than six months after June 9, 1993.

401.2 Facilities subject to this rule shall submit an application for an Authority to Construct for the emission collection system and the air pollution control equipment necessary to comply with Section 301 of this rule no later than 12 months after June 9, 1993. These facilities shall be in compliance no later than 24 months after June 9, 1993.

**402 ALTERNATIVE COMPLIANCE OPTION:** An alternative approach to compliance proposed by the facility operator may be approved, if the facility operator demonstrates to the satisfaction of the

Air Pollution Control Officer that the alternative is enforceable, achieves the same or better reductions in emissions and risk, and achieves these reductions within the same time period as required by this rule. The alternative approach shall also be consistent with the Federal Clean Air Act. The Air Pollution Control Officer shall revoke this approval if the facility operator fails to adequately implement the alternative approach or the alternative approach does not reduce emissions as required. The Air Pollution Control officer shall notify the ARB whenever it proposes to approve an alternative approach to compliance to this rule.

## **500 MONITORING AND RECORDKEEPING**

### **501 RECORDKEEPING:**

501.1 Facilities subject to Section 301 of this rule shall maintain on site for a period of two years, and make available to a District representative upon request, a record of:

- a. The results of any source testing required by the District to demonstrate that the emission collection system(s) and particulate matter control system(s) are operating as required by Section 301.2.a.

501.2 Facilities seeking exemption under Sections 110, 111, or 114 of this rule shall maintain for a period of two years a record of the amount and type of metal processed in those furnaces including results of analyses as required to support exemption under Section 111 of this rule. These records shall be made available to a District representative upon request.

### **502 TEST METHODS:**

502.1 One of the following methods or an alternative method deemed acceptable by the Air Pollution Control Officer and the Executive Officer of the Air Resources Board shall be used. Sampling for these methods shall comply with ASTM E 88, "Standard Practice for Sampling Nonferrous Metals and Alloys in Cast Form for Determination of Chemical Composition."

502.2 To determine the composition of alloys defined in Section 201 and to determine the cadmium content of aluminum alloys to evaluate eligibility for exemption under Section 111 one of the following methods shall be used:

- a. ASTM E 277, "Standard Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique"; or
- b. ASTM E 607, "Standard Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique, Nitrogen Atmosphere"; or
- c. ASTM E 1251, "Standard Test Method for Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Argon Atmosphere, Point-to-Plane, Unipolar Self-Initiating Capacitor Discharge."

502.3 To determine alloy composition as defined in Sections 211 and 220, ASTM E 117, "Standard Method for Spectrographic Analysis of Pig Lead by the Point-to-Plane Technique" shall be used.

502.4 To determine alloy compositions as defined in Section 223, ASTM E 46, "Test Method for Chemical Analysis of Lead- and Tin-Base Solder" shall be used.

502.5 To determine cadmium concentration in zinc and zinc alloys to evaluate eligibility for exemption under Section 111, ASTM E 536, "Standard Test Method for Chemical Analysis of Zinc and Zinc Alloys" shall be used.

502.6 To determine cadmium concentration in copper and copper-based alloys to evaluate eligibility for exemption under Section 111, ASTM E 53, "Standard Test Methods for Chemical Analysis of Copper and Copper Alloys" shall be used.

502.7 To determine arsenic concentration in copper and copper-based alloys to evaluate eligibility for exemption under Section 111, ASTM E 62, "Standard Test Method for Chemical Analysis of Copper and Copper Alloys" shall be used.

502.8 Determination of arsenic content in aluminum or zinc (or any other alloy in which determination of arsenic by spectrochemical methods is compromised by interference) to evaluate eligibility for exemption under Section 111 of this rule, shall be by EPA Method 7061, "Arsenic (Atomic Absorption, Gaseous Hydride)", U.S. EPA Test Methods for Evaluating Solid Waste Physical and Chemical Methods, First Update (3rd Edition), January, 1988; EPA/530/SW-846.3-1; PB 89-14876 shall be used in the following manner:

- a. For aluminum alloys, sample digestion shall employ the hydroxide digestion technique given in Section 600 of this rule.

## **600 DIGESTION OF METAL ALUMINUM SAMPLES FOR DETERMINING ARSENIC**

**601 INTRODUCTION:** Metal Aluminum cannot react with nitric acid or concentrated sulfuric acid. It can dissolve in diluted sulfuric acid or hydrochloric acid. Active hydrogen generated during the acid digestion process will reduce arsenic to  $\text{AsH}_3$ , which will escape from solution, resulting in a low or negative arsenic value. The proposed method sets up a protocol to dissolve metal alumina without loss of arsenic.

### **602 REAGENTS AND PROCEDURE:**

#### **602.1 Reagents:**

- a. 3M NaOH;
- b. 10 %  $\text{HgSO}_4$  Solution;
- c. 30 %  $\text{H}_2\text{O}_2$ ;
- d. 1:1  $\text{H}_2\text{SO}_4$ ;
- e. Concentrated  $\text{HNO}_3$ ;
- f. Tiling Copper.

#### **602.2 Procedure:**

- a. **Dissolve Metal:**

- i. Method 1 - Dissolve using NaOH: Weigh 0.5 g of metal aluminum sample to a 125ml Erlenmeyer flask, add 15ml of 3M NaOH solution, allow to react and dissolve about 20 minutes. Again add 10ml of 3M NaOH, continue reaction until no gas bubbles are present and the sample is dissolved completely.
  - ii. Method 2 - Dissolve using HgSO<sub>4</sub>: Weigh 0.5g of metal aluminum to a 125ml Erlenmeyer flask, add 10ml of 10% HgSO<sub>4</sub> solution and 5ml of 30% H<sub>2</sub>O<sub>2</sub>. After 20 minutes, add appropriate amount of HgSO<sub>4</sub>. Allow reaction to continue until no gas bubbles are present. Add metal copper strips (large surface area) into the sample solution. After 10 minutes, withdraw the copper strips and add new copper strips. Repeat until the surface of the copper strips in the sample solution do not change to a silver color. Withdraw all copper strips from sample solution.
- b. **Digestion:** Add 3ml of concentrated HNO<sub>3</sub>, 5ml of 1:1 H<sub>2</sub>SO<sub>4</sub> into the sample solution obtained from Sections 602.2.a.(i) or 602.2.a.(ii). Heat slowly and evaporate the sample solution until SO<sub>3</sub> fumes are present for 5 minutes. Cool and dilute the sample to 50.0ml. Determine Arsenic by Atomic Absorption method.