



**A GUIDANCE NOTE ON THE  
BEST PRACTICABLE MEANS  
FOR  
ALUMINIUM WORKS  
(SECONDARY ALUMINIUM PROCESSES)  
BPM 2/1(92)**

Environmental Protection Department  
Air Policy Group

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## **1. INTRODUCTION**

- 1.1 This Note is one of a series issued by the Environmental Protection Department to provide guidance on air pollution management for processes specified under Part IV of the Air Pollution Control Ordinance (the Ordinance). It also serves as a guide for the assessment of an application for Specified Process licence under the Ordinance.
- 1.2 It should be understood that this Note sets out the basic requirements for the applicant to provide and maintain the best practicable means for the prevention of emission of air pollutants. The applicant should recognize that whether a licence is granted or refused, and on what conditions, will depend on all the circumstances of an individual application besides the requirements set out in this Note. The Authority may devise specific requirements for individual facility carrying out the specified process.
- 1.3 This Note covers works described as "Aluminium Works" in Schedule 1 to the Ordinance, including recovery of aluminium or aluminium alloys from aluminium or aluminium scrap fabricated metal, swarf, skimmings or other residues by melting under flux cover, and in which the processing capacity exceeds 1 tonne, or, if the mode of operation is continuous, 0.67 tonne per hour (expressed as aluminium).

## **2. EMISSION LIMITS**

- 2.1 All emissions to air, other than steam or water vapour, shall be colourless, free from persistent mist or fume, and free from droplets.
- 2.2 Emission from specified and associated processes for the recovery of aluminium or aluminium alloys by smelting/ refining shall not:
- (a) exceed the concentration limits set out in Annex I.
  - (b) appear to be as dark as or darker than Shade 1 on the Ringelmann Chart when compared in the appropriate manner with the Ringelmann Chart or an approved device.

## **3. FUEL RESTRICTION**

- 3.1 All fuels to be used shall comply with the Air Pollution Control (Fuel Restriction) Regulations in force.

## 4. CONTROL OF EMISSIONS

### 4.1 Design of Chimney

Chimney includes structures and openings of any kind from or through which air pollutants, generated from combustion, drying and/or other manufacturing process of the plant, may be emitted.

4.2 The design of chimney is to be determined by mathematical or physical dispersion modelling techniques acceptable to the Authority. The aims are to ensure:-

- (a) the relevant Air Quality Objectives (AQOs) will not be threatened at ambient receptors;
- (b) the emission of non-AQO pollutants, in particular, heavy metals and carcinogenic organic compounds, will not cause any adverse effect to human health or environment; and
- (c) no undue constraint will be incurred to the existing and future development or land use.

4.3 The final chimney height shall be agreed with the Authority and in any case, it shall be at least 5 metres above the highest point within a distance of 70 metres. In addition, suitable adjustment shall be made to take into account of local meteorology, local topography and background emissions.

4.4 For non-combustion process, same guideline shall be observed as far as practicable and in any case, the chimney height shall be at least 3 metres above the roof ridge of the building to which it is attached.

4.5 In any case, the design of chimney shall satisfy at least the following conditions:

(a) Efflux velocity

Not less than 15 m/s at full load operation. Where a wet method of arrestment is used, the linear velocity within the chimney shall not exceed 9 m/s.

(b) Exit temperature

For combustion process, not less than the acid dew point and in any case, not less than 80°C.

(c) Mode of discharge

Releases to air from chimneys shall be directed vertically upwards and not be restricted or deflected by the use of, for example, plates, caps or cowls.

In order to obtain maximum advantage from thermal buoyancy, hot emissions should take place from the minimum practicable number of chimneys, and multiplicity of discharge points should be avoided.

Chimney for release of hot emissions shall, wherever possible, be insulated with materials free of asbestos.

- 4.6 Clean energy sources and fuels with proven benefits to air pollution reduction shall be used whenever possible in the relevant specified process and associated operations. The use of electricity or gaseous fuel for process heating or production of goods is always recommended.

## **5. FUGITIVE EMISSION CONTROL**

### **5.1 Boundary Ambient Standards**

Total suspended particulates	260 µg/m <sup>3</sup> (24-hour average)
Odour	2 odour units

*(Note: An odour unit is the measuring unit of odour level and is analogous to pollutant concentration. In this context, the odour level is defined as the ratio of the volume which the sample would occupy when diluted with air to the odour threshold, to the volume of the sample. In other words, one odour unit is the concentration of the odorant which just induces an odour sensation.)*

### **5.2 Engineering Design/Technical Requirements**

To be agreed with the Authority. As a general guideline, the loading, unloading, handling and storage of fuel, raw materials, wastes or by-products should be carried out as to prevent the release of:

- (a) visible dust emissions; and/or
- (b) emissions of organic vapours; and/or
- (c) other noxious or offensive emissions.

## **6. MATERIAL RESTRICTION**

- 6.1 Metallic charge shall be clean, uncontaminated by grease or non-metallic matters unless the furnace is either designed or fitted with equipment for control of emission of pollutants to the satisfaction of the Authority.

## **7. OPERATION AND MAINTENANCE**

- 7.1 Requirements include not only the provisions of the appliances, but the proper operation and maintenance of equipment, its supervision when in use and the training and supervision of properly qualified staff. Specific operation and maintenance requirements may be specified for individual equipment.
- 7.2 Malfunction and breakdown of the process equipment or air pollution control equipment that would cause exceedance of the emission limits or breach of other air pollution control requirements shall be reported to the Authority within 3 working days.

## **8. MONITORING REQUIREMENTS**

- 8.1 Parameters and sampling frequency will be determined by the Authority.

## **9. COMMISSIONING**

- 9.1 Commissioning trials (to be witnessed by the Authority whenever appropriate) shall be conducted to demonstrate performance of the air pollution control measures and a report of commissioning trial shall be submitted to the Authority within 1 month after completion of the trial.

## ANNEX I CONCENTRATION LIMIT FOR EMISSION FROM ALUMINIUM WORKS - SECONDARY ALUMINIUM PROCESSES

I.1 The concentration limits stipulated below shall be applicable to all emissions from the subject specified process and associated processes covered by this Note during normal operations including load change. For smoke emission, the emission limits shall also be applicable to the start-up and shutdown periods.

(a) Metal Melting Process

(i) Reverberatory furnaces

The concentration of air pollutant is expressed as at dry, 0°C temperature, 101.325 kPa pressure, 12% CO<sub>2</sub> conditions.

Air Pollutant	Concentration Limit
Particulates	50 mg/m <sup>3</sup>
Metals and their compounds (as metals)	
Tin	10 mg/m <sup>3</sup>
Molybdenum	10 mg/m <sup>3</sup>
Copper	5 mg/m <sup>3</sup>
Lead	5 mg/m <sup>3</sup>
Antimony	5 mg/m <sup>3</sup>
Arsenic	2 mg/m <sup>3</sup>
Chromium	2 mg/m <sup>3</sup>
Platinum	2 mg/m <sup>3</sup>
Selenium	2 mg/m <sup>3</sup>
Cadmium	1 mg/m <sup>3</sup>
Mercury	1 mg/m <sup>3</sup>
Rhodium	1 mg/m <sup>3</sup>
Beryllium	0.002 mg/m <sup>3</sup>
Phosphorus and its compounds (as phosphorus)	10 mg/m <sup>3</sup>
Halogen compounds	
Hydrogen chloride	50 mg/m <sup>3</sup>
Chlorine	30 mg/m <sup>3</sup>
Fluoride (as hydrogen fluoride)	10 mg/m <sup>3</sup>

(ii) Crucible furnaces or alike serving by overhead evacuation system

The concentration of air pollutant is expressed as at dry, 0°C temperature, 101.325 kPa pressure and undiluted conditions without correction of CO<sub>2</sub> content.

<b>Air Pollutant</b>	<b>Concentration Limit</b>
Particulates	50 mg/m <sup>3</sup>
Metals and their compounds (as metals)	
Tin	10 mg/m <sup>3</sup>
Molybdenum	10 mg/m <sup>3</sup>
Copper	5 mg/m <sup>3</sup>
Lead	5 mg/m <sup>3</sup>
Antimony	5 mg/m <sup>3</sup>
Arsenic	2 mg/m <sup>3</sup>
Chromium	2 mg/m <sup>3</sup>
Platinum	2 mg/m <sup>3</sup>
Selenium	2 mg/m <sup>3</sup>
Cadmium	1 mg/m <sup>3</sup>
Mercury	1 mg/m <sup>3</sup>
Rhodium	1 mg/m <sup>3</sup>
Beryllium	0.002 mg/m <sup>3</sup>
Phosphorus and its compounds (as phosphorus)	10 mg/m <sup>3</sup>
Halogen compounds	
Hydrogen chloride	50 mg/m <sup>3</sup>
Chlorine	30 mg/m <sup>3</sup>
Fluoride (as hydrogen fluoride)	10 mg/m <sup>3</sup>

(b) Non-combustion Process

The concentration of air pollutant is expressed as at dry, 0°C temperature, 101.325 kPa pressure conditions

<b>Air Pollutant</b>	<b>Concentration Limit</b>
Particulates	50 mg/m <sup>3</sup>