



**A GUIDANCE NOTE ON  
BEST PRACTICABLE MEANS**

**FOR**

**NON-FERROUS METALLURGICAL WORKS**

**(SOLDER MANUFACTURING)**

**BPM 29 (94)**

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 the specified process and associated processes in relation to the melting of non-ferrous metal, described as "Non-ferrous Metallurgical Works" in Schedule 1 to the Ordinance. Non-ferrous Metallurgical Works are works in which the processing capacity exceeds 1 tonne per hour, and in which any non-ferrous metal, other than aluminium, copper, lead and zinc for galvanizing is carried out.

## **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 Emissions from the specified process and associated processes covered by this Note 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, including vents and process exhausts, from or through which air pollutants generated from combustion, melting and/or other manufacturing process 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;
- (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 In any case, the design of chimney shall at least satisfy the following conditions:

#### (a) Chimney height

- (i) For combustion process, the final chimney height shall be agreed with the Authority and in any case, it shall be at least 3 metres above the roof top of the building to which it is attached or 8 metres above ground level, whichever is the greater. In addition, suitable adjustment shall be made to take into account of local meteorology, local topography and background emissions.
- (ii) For non-combustion process, the same guideline shall be observed as far as practicable and in any case, it shall be at least 3 metres above the roof top of the building to which it is attached.

#### (b) Efflux velocity

The efflux velocity of the chimneys shall not be less than 15 m/s at full load condition. Where a wet method of arrestment is used, the linear velocity within the chimney shall not exceed 9 m/s to avoid entrainment of droplets from chimney surface into the gas stream.

#### (c) Exit temperature

For combustion process, the flue gas exit temperature shall not be less than the acid dew point.

(d) Mode of discharge

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

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

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

4.4 Other auxiliary operations

(a) For auxiliary operations including drawing of solder wire, preparing or handling flux material such as rosin and any other process that may generate air pollutants, suitable control measures shall be provided to minimize the air pollutant emissions to air.

(b) In particular, for any process which would generate particulate emissions, the particulates generated shall be collected and vented to an arrestment plant to meet the emission limit stipulated in Section 2 of this Note.

4.5 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 $\mu\text{g}/\text{m}^3$ (24-hour average)
Respirable suspended particulates	180 $\mu\text{g}/\text{m}^3$ (24-hour average)
Odour	2 odour units

*(Note: An odour unit is the measuring unit of odour level and 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, products, wastes or by-products shall be carried out in a manner acceptable to the Authority so 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.

## 5.3 Without prejudice to the generality of the above general requirements, the following control measures shall be implemented:

- (a) Dusty materials, or potentially dusty materials, for example, powder additives, shall be stored and handled in such a manner as to minimize resultant fugitive dust emission.
- (b) All residues produced, including those produced by arrestment plant, shall be handled and stored in a manner which could minimize emissions to air.
- (c) Air pollutant emissions from melting or holding furnaces and other process equipment shall be adequately contained to prevent fugitive emissions. The emissions shall be vented to suitable arrestment plant, where necessary, meeting the emission limits stipulated in Section 2 of this Note.

## **6. MATERIAL RESTRICTION**

- 6.1 Metallic charge to melting furnace 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 provision of the appliances, but the proper operation and maintenance of equipment, its supervision and the training and supervision of properly qualified staff. Specific operation and maintenance requirements may be specified for individual equipment.
- 7.2 Malfunctioning and breakdown of the process equipment or air pollution control equipment which 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 and capability 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 NON-FERROUS METALLURGICAL WORKS - SOLDER MANUFACTURING

I.1 The concentration limits stipulated in the tables below shall be applicable to all emissions from the subject specified process and associated processes covered by this Note during normal operations. The introduction of dilution air to achieve the emission limits is not permitted.

(a) Metal melting process

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

Air Pollutant	Concentration Limit
Particulates	50 mg/m <sup>3</sup>
Tin and its compounds (as tin)	10 mg/m <sup>3</sup>
Lead and its compounds (as lead)	2 mg/m <sup>3</sup>
Cadmium and its compounds (as cadmium)	1 mg/m <sup>3</sup>
Antimony and its compounds (as antimony)	5 mg/m <sup>3</sup>

(b) Other auxiliary operations

The air pollutant concentration is expressed at reference conditions of 0°C temperature, 101.325 kPa pressure, and without correction of water content.

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