



**A GUIDANCE NOTE ON  
BEST PRACTICABLE MEANS**

**FOR**

**NON-FERROUS METALLURGICAL WORKS**

**(SOLDER MANUFACTURING)**

**BPM 29**

Environmental Protection Department  
Air Management Group

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## 1. INTRODUCTION

This note lists the minimum requirements for meeting the best practicable means for the conduct of solder manufacturing which is within the class of Non-ferrous Metallurgical Works. According to the Air Pollution Control Ordinance, Non-ferrous Metallurgical Works is defined as the works in which the processing capacity exceeds 1 tonne per hour and in which melting of any non-ferrous metal, other than aluminium, copper, lead and zinc for galvanising is carried out.

It should be noted that in granting a licence under the Air Pollution Control Ordinance, the Authority, i.e., the Director of Environmental Protection, will also consider all other relevant aspects and may impose more stringent and/or additional control requirements.

## 2. DESIGN OF CHIMNEY

Chimneys include 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.

### 2.1 Chimney height

To be determined by mathematical or physical dispersion modelling techniques acceptable to the Authority. The aims are to ensure:-

- (i) the relevant Air Quality Objective (AQO) will not be threatened;
- (ii) 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
- (iii) no undue constraint will be incurred to the existing and future development or land use.

For combustion process, the final chimney height should 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 should be made to take into account of local meteorology, local topography and background emissions.

For non-combustion process, the same guideline should 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.

### 2.2 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.

### 2.3 Exit temperature

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

### 2.4 Mode of discharge

Releases to air from chimneys 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 should, wherever possible, be insulated. The insulation materials shall be free of asbestos.

## 3. EMISSION LIMITS

All emissions to air, other than steam or water vapour, shall be colourless and free from persistent mist or fume.

The emission limits stipulated below shall be applicable to all emissions during normal operations. For smoke emission, the emission limits shall also be applicable to the start-up and shutdown periods. The introduction of dilution air to achieve the emission limits is not permitted.

### 3.1 Metal melting process

All the following emission limits are expressed as at 0°C and 101.325 kPa conditions without correction for CO<sub>2</sub> and water content (except emission limit on smoke).

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>
Smoke	Less than Ringelmann Shade 1

### 3.2 Other auxiliary operations

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.

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 following emission limit.

Particulates	50 mg/m <sup>3</sup> (expressed as at 0°C and 101.325 kPa conditions without correction of water content)
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## 4. FUGITIVE EMISSION CONTROL

### 4.1 Boundary ambient standards

Total suspended particulates	260 µg/m <sup>3</sup> (24-hour average)
Respirable suspended particulates	180 µg/m <sup>3</sup> (24-hour average)
Odour	2 odour units

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(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.)

### 4.2 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 should be carried out in a manner acceptable to the Authority so as to prevent the release of:-

- (i) visible dust emissions; and/or
- (ii) emissions of organic vapours; and/or
- (iii) other noxious or offensive emissions.

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

- (1) 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.
- (2) All residues produced, including those produced by arrestment plant, should be handled and stored in a manner which could minimize emissions to air.
- (3) Air pollutant emissions from melting or holding furnaces and other process equipment should be adequately contained to prevent fugitive emissions. The emissions should be vented to suitable arrestment plant where necessary to meet the requirements stipulated in section 3 of this note.

## 5. FUEL / MATERIAL RESTRICTION

### 5.1 Solid fuel

Sulphur content : Not greater than 1% (by weight)

### 5.2 Liquid fuel

Sulphur content : Not greater than 0.5% (by weight)

Viscosity : Not greater than 6 centistokes (at 40<sup>0</sup>C)

### 5.3 Metallic charge

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.

## 6. MONITORING REQUIREMENTS

Parameters and sampling frequency will be determined by the Authority.

## 7. COMMISSIONING

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.

8. OPERATION AND MAINTENANCE

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.

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.