



**A GUIDANCE NOTE ON THE
BEST PRACTICABLE MEANS**

FOR

IRON AND STEEL WORKS

(CUPOLAS)

BPM 9/1

Environmental Protection Department
Air Management Group

September 1993

1. Introduction

This note lists the minimum requirements for meeting the best practicable means for the conduct of Iron and Steel Works by cupolas. According to the Air Pollution Control Ordinance, Iron and Steel Works is defined as the works in which the installed furnace capacity exceeds 1 tonne, or, if the mode of operation is continuous, 1 tonne per hour, and in which a ferrous metal melting process for casting 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

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 Objectives (AQO) will not be threatened at ambient receptors;
- (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.

The final chimney height should be agreed with the Authority but as a general guideline, the chimney height, in a flat terrain situation, should as far as practicable be at least Building Height + 1.5 x Building Width or Building Height, whichever is the lesser. Suitable adjustment should be made to take into account local meteorological data, local topography and background air pollutant concentrations. In any case, the chimney height shall not be less than 20 metres above ground level and shall not be less than 3 metres above the building roof top.

For non-combustion process, same guideline should be observed as far as practicable and in any case, the chimney height shall not be less than 3 metres above the roof ridge of the building to which it is attached.

2.2 Efflux velocity

The efflux velocity, whenever practicable, should be at least 1.5 times of the wind speed at the chimney top. In any case, it shall not be less than 15 m/s at full load operation.

2.3 Exit temperature

For combustion process, the exit temperature shall not be less than the acid dew point; and in any case, it shall not be less than 80°C.

2.4 Mode of discharge

Releases to air from chimneys should be directed vertically upwards and not 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, i.e., a multi-flue chimney design should be used.

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

3. Emission Limits

Note: All figures are expressed as at the standard temperature and pressure conditions of 0°C and 101.325 kPa, without correction for water vapour content. The introduction of dilution air to achieve the emission concentration limits shall not be permitted.

3.1 Metal Melting Process

Particulates

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| (i) | The aggregate melting capacity in the premises is less than 4 tonnes per hour | 350 mg/m ³ ; or use of cyclone collectors with design acceptable to the Authority. |
| (ii) | The aggregate melting capacity in the premises is equal to or greater than 4 tonnes per hour | 100 mg/m ³ |

Sulphur dioxide

Potential emission from burning of solid fuel with a permissible maximum sulphur content of 1% by weight on air dried basis.

Smoke

Less than Ringelmann Shade 1 and no substantially visible emission during lighting-up period.

3.2 Non-combustion Process

Particulates

50 mg/m³

4. Fugitive Emission Control

4.1 Boundary Ambient Standards

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

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, wastes or by-products should be carried out 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 requirements, the following control measures shall be implemented:-

- (i) Ignition of coke bed - an appropriate method to ignite the coke bed shall be devised to avoid excessive emission of smoke during the ignition process; and
- (ii) Iron melting - all the emissions from iron melting shall be collected and vented to suitable arrestment plant to meet the emission limits stipulated in section 3.1.

5. Material / Fuel Restriction

5.1 Solid Fuel

Sulphur content	Not greater than 1% by weight
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5.2 Liquid Fuel

Sulphur content	Not greater than 0.5% by weight
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Viscosity	Not greater than 6 centistokes at 40°C
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5.3 Metallic Charge

Metallic charge should be clean, uncontaminated by grease, non-ferrous metals 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, should be conducted to demonstrate performance of the air pollution control measures and a report of commissioning trial should be submitted to the Authority within 1 month after completion of the trial.

8. Operation and Maintenance

Requirements include not only the provisions 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.

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 should be reported to the Authority within 3 working days.