A GUIDANCE NOTE ON THE BEST PRACTICABLE MEANS

FOR

IRON AND STEEL WORKS

(CUPOLAS)

BPM 9/1 (93)

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 for the melting of a ferrous metal by cupolas for casting, described as "Iron and Steel Works" in Schedule 1 to the Ordinance. Iron and Steel Works are 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.

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

(a) Chimney height

(i) For combustion processes, the final chimney height shall 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 shall 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.

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

(b) Efflux velocity

The efflux velocity, whenever practicable, shall 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.

(c) Exit temperature

For combustion process, the flue gas exit temperature shall not be less than the acid dew point; and in any case, it shall not be less than 80^{o}C.

(d) Mode of discharge

Releases to air from chimney 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 shall 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 shall, wherever possible, be insulated with materials free of asbestos.

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

(Note: An odour unit is the measuring unit of odour level and is analogous to pollution 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 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.

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

(a) 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

(b) 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 2 of this Note.

6. MATERIAL RESTRICTION

6.1 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.

7. OPERATION AND MAINTENANCE

7.1 Requirements include not only the provisions of the appliances, but also 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 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 IRON AND STEEL WORKS - CUPOLAS

I.1 Air pollutant emissions from the subject specified process and associated processes covered by this Note shall not exceed the concentration limits specified in the tables below. The air pollutant concentration is expressed at reference conditions of $0^{o}C$ temperature, 101.325 kPa pressure, and without correction for water vapour content. The introduction of dilution air to achieve the emission concentration limits shall not be permitted.

(a) Metal Melting Process

Air Pollutant	Concentration Limit
Particulates	
(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

(b) Non-combustion Process

Air Pollutant	Concentration Limit
Particulates	50 mg/m^3