



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

FOR

IRON AND STEEL WORKS

(INDUCTION FURNACES)

BPM 9/2 (97)

Environmental Protection Department
Air Policy Group

September 2008

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 induction furnace 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 Emission of air pollutants shall be minimised to prevent:

- (a) harm to the environment, adverse effects to human health, or creation of any nuisance situation;
- (b) threatening the attainment or maintenance of the relevant air quality objectives;
- (c) giving rise to an objectionable odour noticeable outside the premises where the process is carried on; and
- (d) imposing undue constraint on the existing and future development or land use.

4.2 To satisfy the emission limits set out in Section 2 of this Note, prevention or reduction of emissions at source is the choice. Where the emission cannot be prevented or reduced at source sufficiently to meet these requirements, air pollution control equipment shall be provided.

4.3 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.

Design of chimney

4.4 Chimney includes vents, structures and openings of any kind from or through which air pollutants may be emitted. The applicant will need to demonstrate that the proposed chimney will provide sufficient dispersion of air pollutants.

4.5 A chimney shall be at least 3 metres above the roof of any building to which it attaches and above the roof of any adjacent buildings.

4.6 Emissions from chimney shall be directed vertically upwards and not be restricted or deflected by the use of, for example, plates or rain caps.

4.7 The efflux velocity of the exhaust gas stream emitted from a chimney shall not be less than 15 m/s at full load condition.

Materials Handling

4.8 Handling and storage of fuel, raw material, products, wastes or by-product shall be carried out in such a manner to prevent the release of:

- (a) visible dust emissions;

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

Ferrous Metal Melting

- 4.9 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.
- 4.10 Dust-laden air from equipment for the melting of scrap ferrous materials shall be adequately contained and vented to a suitable equipment to meet the emission limit set out in Section 2 of this Note.
- 4.11 Enclosed furnaces, casting, ductwork and ancillary equipment shall be made and maintained as gas-tight as is practicable. Emissions from charging operations shall be prevented by careful selection of scrap and its introduction to the furnace. Local exhaust ventilation shall be provided to vent the emissions to suitable arrestment plant to meet the emission limit set out in Section 2 of this Note.

'Knock Out' and Casting Finishing Processes

- 4.12 Mechanical 'knock out' operations shall be undertaken in either a booth or area with high-efficiency extraction to ensure containment and capture of dust. Emissions shall be vented to suitable arrestment plant to meet the emission limit set out in Section 2 of this Note.
- 4.13 All casting finishing processes including grinding, shot blasting, polishing and arc air cutting shall be carried out in booths or areas with extraction of emissions or using equipment incorporating built-in extraction equipment. All extraction shall be vented to suitable arrestment plant to meet the emission limit set out in Section 2 of this Note.

Sand Mould Making and Foundry Sand Reclamation

- 4.14 Mould formation, curing of mould and all mixing, crushing and reclamation of sand shall be carried out in a manner to minimise air pollutant emissions. Emissions shall be adequately contained and vented to suitable arrestment plant where necessary to meet the emission limit set out in Section 2 of this Note.

Miscellaneous

- 4.15 Traffic areas, including roads and areas with regular vehicle movements, shall be paved with a suitable roadway covering and be kept clean constantly by means of sweeping machines or other facilities.

- 4.16 External surfaces of the process building, ancillary plant and open yards and storage areas shall be regularly cleaned to prevent the accumulation of dusty material in circumstances where the dust may become wind entrained. Particular attention shall be paid to roofs, guttering, roadways, external storage areas and yards. Cleaning operations shall be carried out by methods which minimize emissions of particulates to air, for example by vacuum cleaning, wet cleaning or other appropriate techniques.

5. OPERATION AND MAINTENANCE

- 5.1 Best practicable means requirements include not only the provision of the appliances, but also the proper operation and maintenance of equipment, its supervision when in use, and the training and supervision of properly qualified staff.
- 5.2 Equipment shall be repaired as soon as practicable. Operation and maintenance requirements shall be specified for individual pieces of equipment used in the specified process.
- 5.3 Malfunction, breakdown or failure of any process or air pollution control equipment that may result in abnormal emission of air pollutants shall be reported to the Authority by telephone or facsimile as soon as possible, followed by a written report within 3 working days after the incident.

6. MONITORING REQUIREMENTS

- 6.1 The applicant shall satisfy the Authority that:
- (a) he will provide the necessary instrumentation, process controls and monitors to demonstrate that the process is being properly controlled;
 - (b) the scope, manner and monitoring frequency will be sufficient to demonstrate compliance with the terms and conditions imposed in the licence at all times; and
 - (c) he will have sufficient staff to service these requirements.

Results of all monitoring and inspections shall be recorded in such a manner specified by the Authority. This record shall be retained at the premises for a minimum of two years, or other period specified by the Authority, after the date of last entry and be made available for examination as and when required by the Authority.

- 6.2 Indication of the satisfactory performance of air pollution control equipment shall be provided. For example, the pressure drop across filters shall be displayed.

6.3 Ambient monitoring shall be made for total suspended particulates and/or respirable suspended particulates, if required by the Authority, in such a manner and at such locations and frequency specified by the Authority.

7. COMMISSIONING

7.1 Commissioning trials, to be witnessed by the Authority whenever appropriate, shall be conducted to demonstrate the performance and capability of the air pollution control measures. Unless otherwise agreed by the Authority, the report of the 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 - INDUCTION FURNACES

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°C temperature, 101.325 kPa pressure and dry gas, without correction for oxygen content, and compensated for any effect of dilution air to the concentration.

(a) Induction furnace

Air Pollutant	Concentration Limit
Particulates	100 mg/m ³

(b) Other processes (such as casting finishing, foundry sand reclamation)

Air Pollutant	Concentration Limit
Particulates	50 mg/m ³