



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

FOR

CEMENT WORKS

(CONCRETE BLOCK / PRECAST CONCRETE)

BPM 3/3 (94)

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 operations for the production of concrete block / precast concrete which comes within the specified process " Cement Works " described in Schedule 1 to the Ordinance as:

“Works in which the total silo capacity exceeds 50 tonnes and in which cement is handled or in which argillaceous and calcareous materials are used in the production of cement clinker, and works in which cement clinker is ground.”

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 limit 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 and controlled to prevent:

- (a) harm to the environment, or adverse effects to human health;
- (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 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.

4.3 Design of chimney

Chimney includes structures and openings of any kind from or through which air pollutants, generated from combustion, and/or other manufacturing process of the plant, may be emitted.

4.4 The design of chimneys 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 on human health or environment; and
- (c) no undue constraint will be incurred to existing and future development or land use.

4.5 In any case, subject to the requirements of Section 2 of this Note, the design of chimneys shall at least satisfy the following conditions:-

- (a) Chimney height
 - (i) For combustion process, 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 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 3 metres plus the building height.

(ii) For non-combustion process, the same guideline as above shall be observed as far as practicable.

(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 condition.

(c) Exit temperature

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

(d) Mode of discharge

Release to air from chimneys shall be directed vertically upwards and not restricted or deflected by the use of, for example, plates, caps, or cowls. The weather protection device of a chimney, if used, should be properly designed so as not to restrict the upward movement of gas flow.

4.6 Exhaust from dust arrestment plant (non-combustion process)

Wherever possible the final discharge point from particulate matter arrestment plant, where it is not necessary to achieve dispersion of the residual pollutants, should be at low level to minimise the effect on the local community in case of abnormal emissions and to facilitate maintenance and inspection.

5. OPERATION AND MAINTENANCE

5.1 Requirements include not only the provision of the appliances, but the proper operation and maintenance of equipment, its supervision when in use and the training and supervision of properly qualified staff. Specific operation and maintenance requirements may be specified for individual equipment.

5.2 Malfunctioning and breakdown of the process or air pollution control equipment which would cause exceedance of the emission limits or breaches of other air pollution control requirements should be reported to the Authority within 3 working days.

6. FUGITIVE EMISSION CONTROL

6.1 Boundary Ambient Standards

Total suspended particulates	:	260 µg/m ³ (24-hour average)
Respirable suspended particulates	:	180 µg/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.)

6.2 Engineering Design/Technical Requirements

To be agreed with the Authority. As a general guidance, 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:

- (a) visible dust emission; and/or
- (b) other noxious or offensive emissions.

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

Cement and Other Dusty Materials

6.4 The loading, unloading, handling, transfer or storage of cement, pulverised fuel ash (PFA) and/or other equally dusty materials shall be carried in a totally enclosed system acceptable to the Authority. All dust-laden air or waste gas generated by the process operations should be properly extracted and vented to fabric filtering system to meet the emission limits stipulated in Section 2 of this Note.

6.5 Cement, PFA and/or other equally dusty materials shall be stored in storage silo fitted with audible high level alarms to warn of over-filling. The high-level alarm indicators shall be interlocked with the material filling line such that in the event of the silo approaching an overfilling condition, an audible alarm will operate, and after 1 minute or less the material filling line will be closed.

6.6 Vents of all silos shall be fitted with fabric filtering system to meet the emission limits stipulated in Section 2 of this Note.

6.7 Vents of cement/PFA weighing scale shall be fitted with fabric filtering system to meet the emission limits stipulated in Section 2 of this Note.

6.8 Seating of pressure relief valves of all silos shall be checked, and the valves reseated if necessary, before each delivery.

Other Raw Materials

- 6.9 The loading, unloading, handling, transfer or storage of other raw materials which may generate airborne dust emissions such as crushed rock, sand, stone aggregate, shall be carried out in such a manner to prevent or minimise dust emissions.
- 6.10 The materials mentioned in paragraph 6.9 above shall be adequately wetted prior to and during the loading, unloading and handling operations. Manual or automatic water spraying system shall be provided at all unloading areas, stock piles and material discharge or transfer points.
- 6.11 All receiving hoppers for unloading materials mentioned in paragraph 6.9 above shall be enclosed on three sides up to 3 metres above the unloading point. In no case shall these hoppers be used as the material storage devices.
- 6.12 The belt conveyor for handling materials mentioned in paragraph 6.9 above shall be enclosed on top and 2 sides with a metal board at the bottom to eliminate any dust emission due to wind-whipping effect. Other type of enclosure will also be accepted by the Authority if it can be demonstrated that the proposed enclosure can achieve same performance.
- 6.13 All conveyor transfer points shall be totally enclosed. Openings for the passage of conveyors shall be fitted with adequate flexible seals.
- 6.14 Scrapers shall be provided at the turning points of all conveyors to remove dust adhered to the belt surface.
- 6.15 Conveyors discharged to stockpiles of materials mentioned in paragraph 6.9 above shall be arranged to minimise free fall as far as practicable. All free falling transfer points from conveyors to stockpiles shall be enclosed with chute(s) and water sprayed.
- 6.16 Aggregates with a nominal size less than or equal to 5 millimeters should be stored in totally enclosed structure such as storage bin and should not be handled in open area. Where there is sufficient buffer area surrounding the cement works, ground stockpiling may be used. The stockpile shall be enclosed at least on top and 3 sides and with flexible curtain to cover the entrance side.
- 6.17 Aggregates with a nominal size greater than 5 millimeters should preferably be stored in a totally enclosed structure. If open stockpiling is used, the stockpile shall be enclosed on 3 sides with enclosure wall sufficiently higher than the top of the stockpile to prevent wind whipping.
- 6.18 The opening between the storage bin and weighing scale of the materials mentioned in paragraph 6.9 above shall be fully enclosed.

Material Mixing

- 6.19 The mixing processes including loading of cement and other materials to the mixer shall be carried out in a totally enclosed system. The dust-laden air shall be vented to dust arrestment plant to meet the particulate limit in Section 2 of this Note.

Vehicles

- 6.20 All practicable measures shall be taken to prevent or minimise the dust emission caused by vehicle movement.
- (a) All access and route roads within the premises shall be paved and adequately wetted.
- (b) Vehicle cleaning facilities shall be provided and used by all vehicles leaving the premises to wash off any dust and/or mud deposited on the wheels and/or vehicle body.

Odorous Emissions

- 6.21 The odorous emission from any process including moulding, curing and setting of the raw materials, intermediate products and products shall be minimised. If necessary, suitable local extraction and arrestment plant should be installed in order to meet the ambient odour limit of 2 odour units stipulated in paragraph 6.1 above.

Housekeeping

- 6.22 A high standard of housekeeping shall be maintained. All spillages or deposits of materials on ground, support structures or roofs shall be cleaned up promptly by a cleaning method acceptable to the Authority. Any dumping of materials at open area shall be prohibited.

7 MONITORING REQUIREMENTS

- 7.1 Parameters and sampling frequency will be determined by the Authority. However, the following parameters should be monitored as specified below:

(a) Process Monitoring

Total monthly raw input, product output and material stock (by manual recording), and other essential operating parameter(s) which may significantly affect the emission of air pollutants.

(b) Ambient Monitoring

At site boundary and/or any other locations acceptable to the Authority

Total suspended particulates and/or respirable suspended particulates (at least one 24-hour sample per 6 calendar days)

8 COMMISSIONING

- 8.1 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 CEMENT WORKS – CONCRETE BLOCK / PRECAST CONCRETE

I.1 Air pollutant emission from the subject specified process and associated processes covered by this Note shall not exceed the concentration limit specified below. The air pollutant concentration is expressed at reference conditions of temperature 273 K, pressure 101.3 kPa, and without correction for water vapour content. Introduction of diluted air to achieve the emission concentration limit shall not be permitted.

Air Pollutant	Concentration Limit
Particulates	50 mg/m ³