



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

FOR

TAR AND BITUMEN WORKS

(ASPHALTIC CONCRETE PLANTS)

BPM 15

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 Tar and Bitumen Works (Asphaltic Concrete Plants) which include the aggregates handling, heating and screening processes.

It should be noted that in granting a licence under the 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 by taking into account individual process characteristics, local topography and air quality and any other factors.

2. DESIGN OF CHIMNEY

Chimneys include 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. The design of chimneys are 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;
- (iii) no undue constraint will be incurred to existing and future development or land use.

(a) Chimney Height

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 should not be less than 3 metres plus the building height or 8 metres above ground level, whichever is the greater.

(b) Efflux Velocity

The efflux velocity of gases from the main chimney (i.e., chimney for the kiln dryer), whenever practicable, should be at least 1.5 times of the wind speed at the chimney top. In any case, it should not be less than 12 m/s at full load condition.

(c) Exit Temperature of Flue Gases From Chimneys

For combustion process, the exit temperature from all chimneys should not be less than the acid dew point.

(d) Mode of Discharge

Release to air from chimneys should be directed vertically upwards and not restricted or deflected by the use of, for example, plates, caps or cowls.

Chimney flues and ductwork leading to the chimney should, as far as practicable, be adequately insulated with materials not containing asbestos to minimise the cooling of waste gases and to prevent liquid condensation on internal surfaces.

In order to obtain maximum thermal buoyancy, hot emissions should, as far as practicable, be discharged from the minimum number of chimneys, i.e., a multi-flue chimney design should be used.

3. EMISSION LIMITS

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

Bitumen fumes	: 5 mg/m ³ (not applicable to the vents of bitumen decanters)
Particulates	: 50 mg/m ³
Smoke	: Less than Ringelmann Shade 1

(For combustion gases, the emission limits are expressed at dry, 0°C, 101.325 kPa and 3% oxygen content conditions.

For non-combustion gases, the emission limits are expressed at 0°C, 101.325 kPa and conditions without correction for water vapour or oxygen content. The introduction of dilution air to achieve the emission limits is not permitted.)

4. FUGITIVE EMISSION CONTROL

(a) 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 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.)

(b) 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:-

COLD FEED SIDE

- I) The aggregates with a nominal size less than or equal to 5 mm shall be stored in totally enclosed structure such as storage bin and shall not be handled in open area. Where there is sufficient buffer area surrounding the plant, 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. If these aggregates are stored above the feeding hopper, they shall be enclosed at least on top and 3 sides and be wetted on the surface to prevent wind-whipping.
- II) The aggregates with a nominal size greater than 5 mm should preferably be stored in totally enclosed structure. Aggregates stockpile that is above the feeding hopper shall be enclosed at least on top and 3 sides. If open stockpiling is used, the stockpiles shall be enclosed on 3 sides with the enclosure wall sufficiently higher than the top of the stockpile to prevent wind whipping.
- III) Belt conveyors shall be enclosed on top and 2 sides and provided with a metal board at the bottom to eliminate any dust emission due to the wind-whipping effect. Other type of enclosure will also be accepted by the Authority if it can be demonstrated that the proposed enclosure can be achieve the same performance.
- IV) Scrapers shall be provided at the turning points of all belt conveyors inside the chute of the transfer points to remove dust adhered to the belt surface.

- V) All conveyor transfer points shall be totally enclosed. Openings for the passages of conveyors shall be fitted with adequate flexible seals.
- VI) All materials returned from dust collection system shall be transferred in enclosed system and shall be stored inside bins or enclosures.

HOT FEED SIDE

- VII) The inlet and outlet of the rotary dryer shall be enclosed and ducted to a dust extraction and collection system such as a fabric filter. The particulate and gaseous concentration at the exhaust outlet of the dust collector shall not exceed the limiting value mentioned in paragraph 3.
- VIII) The bucket elevator shall be totally enclosed and the air be extracted and ducted to a dust collection system to meet the particulates limiting value mentioned in paragraph 3.
- IX) All vibratory screens shall be totally enclosed and dust tight with close-fitted access inspection opening. Gaskets shall be installed to seal off any cracks and edges of any inspection openings.
- X) Chutes for carrying hot material shall be rigid and preferably fitted with abrasion resistant plate inside. They shall be inspected daily for leakages.
- XI) All hot bins shall be totally enclosed and dust tight with close-fitted access inspection opening. Gaskets shall be installed to seal off any cracks and edges of any inspection openings. The air shall be extracted and ducted to a dust collection system to meet the particulates limiting value mentioned in paragraph 3.
- XII) Appropriate control measures shall be adopted in order to meet the bitumen emission limit and odour level.

MATERIAL TRANSPORTATION

- XIII) The loading, unloading, handling, transfer or storage of other raw materials which may generate airborne dust emissions such as crushed rocks, sands, stone aggregates, reject fines, shall be carried out in such a manner as to minimize dust emissions.
- XIV) Roadways from the entrance of the Works to the product loading points and/or any other working areas where there are regular movements of vehicles shall be paved or hard surfaced.
- XV) Haul roads inside the Works shall be adequately wetted with water and/or chemical suppressants by water trucks or water sprayers.
- XVI) Vehicle exhausts, wherever possible, shall be directed upward.

- XVII) Wheel cleaning facilities shall be provided for vehicles leaving the Works. All vehicles shall use the wheel cleaning facility before leaving the premises to wash off any dust and/or mud deposited on the wheels.
- XVIII) Transportation of finished products shall be carried out with closed tankers or trucks that are fully and tightly covered with tarpaulin sheet before leaving the premises.

CONTROL OF EMISSIONS FROM BITUMEN DECANTING

- XIX) The heating temperature of the particular bitumen type and grade shall not exceed the corresponding temperature limit of the same type listed in Appendix A. Tamper-free high temperature cutoff device shall be provided to shut off the fuel supply or electricity in case the upper limit for bitumen temperature is reached.
- XX) Proper chimney for the discharge of bitumen fumes shall be provided at high level. The emission of bitumen fumes shall not exceed the emission limit above.
- XXI) The air-to-fuel ratio shall be properly controlled to allow complete combustion of the fuel. The fuel burners, if any, shall be maintained properly and free from carbon deposits in the burner nozzles.

LIQUID FUEL

- XXII) The receipt, handling and storage of liquid fuel shall be carried out so as to prevent the release of emissions of organic vapours and/or other noxious and offensive emissions to the air.

HOUSEKEEPING

- XXIII) A high standard of housekeeping shall be maintained. Waste material, spillage and scattered piles gathered beneath belt conveyors, inside and around enclosures shall be cleared frequently. The minimum clearing frequency is on a weekly basis.

5. MATERIAL / FUEL RESTRICTION

Gaseous fuel is the recommend fuel to be used but the Authority may also accept the use of liquid fuel with the following specifications :-

- Sulphur content : Not greater than 0.5% (by weight)
- Viscosity : 6 centistokes (at 40°C)

6. MONITORING REQUIREMENTS

Parameters and sampling frequency will be determined by the Authority. In any case, the emissions of particulate matter and bitumen fumes from the main chimney (i.e., the chimney serving the kiln dryer) shall be tested at least annually. In addition, the following parameters should be monitored continuously as a minimum requirement:-

(a) In-stack Monitoring

Particulate matter (opacity) from the combustion process by an opacity meter installed at the main chimney.

(b) Process Monitoring

Production rate and other essential operating parameter(s) which may significantly affect the emission of air pollutants.

(c) Ambient Monitoring

Monitoring of the 24-hour average concentration of the total suspended and/or respirable suspended particulates in ambient air shall be conducted at the site boundary and/or any other locations to be agreed by the Authority. The sampling shall conform to the United States Environmental Protection Agency's Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-volume Method) and shall be conducted at a frequency of not less than once every 6 calendar days.

7. COMMISSIONING

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 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 when in use, and the training and supervision of properly qualified staff. Specified operation and maintenance requirements may be specified for individual equipment.

In particular, the dust extraction and collection system shall be routinely inspected and maintained in good condition at all times and shall be used whenever the concerned equipment or emission points are in use. The owner shall conduct inspection of the dust extraction and collection system at least once per month and record on the list of inspection items that are to be agreed with the Authority. The handling and storage of the dust collected by the dust collection system shall be

carried out without fugitive particulate emissions.

Malfunctioning or breakdown of equipment leading to abnormal emissions shall be dealt with promptly. In any case, the duration of any abnormal emission due to equipment failure shall not be more than 5 minutes or an aggregate of 30 minutes in any calendar month. These incidents shall be reported to the Authority within 3 working days.

Maximum Heating Temperature of Different Grades of Bitumen

Grade	Temperature (°C)
Penetration grades	
450	130
300	135
200	140
100	155
70	160
50	165
35	175
25	185
15	190
Hard grades	
H80/90	200
H110/120	230
Oxidised grades	
75/30	195
85/25	210
85/40	210
95/25	220
115/15	230
BS Cutback grades	
50 secs	105
100 secs	110
200 secs	120
ASTM Cutback grades	
MC. 30	30
RC.MC.SC. 70	45
RC.MC.SC. 250	70
RC.MC.SC. 800	85
RC.MC.SC. 3000	105