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IS 3066 (1965): Specification for Hot Asphalt Mixing Plants
[MED 18: Mechanical Engineering]



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“Knowledge is such a treasure which cannot be stolen”

FEB 2007

IS : 3066 - 1965
(Reaffirmed 2012)

Indian Standard
SPECIFICATION FOR
HOT ASPHALT MIXING PLANTS

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

AMENDMENT NO. 1 JULY 1980
TO
IS:3066-1965 SPECIFICATION FOR HOT ASPHALT
MIXING PLANTS

Addenda

(Page 9, clause 14.2.1) - Add the following new clause after 14.2.2:

'14.2.3 Hopper for aggregate as well as bitumen, may also be suspended from electric load cells of at least 25 percent more capacity than the actual aggregate or bitumen to be weighed. The load cell in turn can be connected to a dial either in operators cabin, or at a convenient place, so that the operator can easily check the weight of aggregate and bitumen thus weighed. The dial used, shall conform to IS:1853-1961*.'

(Page 9, foot-note) - Add the following new foot-note at the end:

'*Specification for self indicating and semi-self indicating counter type weighing machines.'

(BDC 28)

Indian Standard

SPECIFICATION FOR HOT ASPHALT MIXING PLANTS

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(*Continued on page 2*)

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IS : 3066 - 1965

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Indian Standard

SPECIFICATION FOR HOT ASPHALT MIXING PLANTS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 24 March 1965, after the draft finalized by the Construction Plant and Machinery Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Rapid industrialization has created a demand for improved road surfaces. For the production of high quality hot asphaltic mixtures conforming to the desired specifications, suitable mixing plants are required and the formulation of a standard specification for mixing plants has become necessary. This standard has been prepared with the objects of providing guidance to prospective users and manufacturers of plants and of ensuring that the plant will be capable of producing mixtures of the desired quality.

0.3 In view of complicated nature of such plants and of the variety of combinations of ancillary equipment that may be required under different conditions, information has to be supplied both by the user for the guidance of the manufacturer and by the manufacturer to the prospective user. The information to be supplied is recommended in Appendices A and B, but the list should be extended, wherever necessary, to obtain a truly comparative assessment of the different plants available and to ensure that plant selected is suited to the conditions prevailing.

0.4 In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in this field in this country. This has been met by deriving assistance from the specification issued by the Asphalt Institute, University of Maryland, College Park, Maryland, USA.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS: 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (*revised*).

IS : 3066 - 1965

1. SCOPE

1.1 This standard lays down the requirements regarding materials, design, construction, capacity and performance criteria for hot asphalt mixing plants of continuous and batch mixing types.

2. MATERIALS

2.1 Materials used in the construction of the plant, in ancillary equipment and in the power units shall comply with the requirements of relevant Indian Standards.

3. CAPACITY

3.1 The capacity of the plant shall be denoted by the approximate output rating of the hot mixed material in tonnes per hour at 6 percent and 2 percent moisture content (by weight) of the aggregates. The plants shall generally be of the following capacities at 6 percent and 2 percent moisture contents of the aggregates respectively:

20 - 30 tonnes
30 - 45 "
40 - 60 "
60 - 90 "
80 - 120 "

Plants of capacities higher than 80-120 tonnes may, however, be supplied if agreed to between the purchaser and the supplier.

4. MOBILITY

4.1 The plants shall be classified as being static, portable and mobile according to the requirements given in **4.1.1** to **4.1.3**.

4.1.1 *Static Plant* — A plant designed to be erected on a permanent site with no special arrangements to facilitate its removal.

4.1.2 *Portable Plant* — A plant so designed that it may be easily disassembled into sections which may be transported by road or rail.

4.1.3 *Mobile Plant* — A plant so designed that it may be readily separated into sections equipped with pneumatic tyres of adequate size, and overrun and parking brakes. The length, width and height of any section of the plant when prepared for moving, shall preferably not exceed 10 m, 3 m and 4.5 m respectively.

5. POWER UNIT

5.1 The various units shall be driven, either individually or in combination, by petrol or diesel engines or electric motors, as may be specified. The

power developed and transmitted by the power units shall be adequate for the duty to be performed. The power units shall conform to the requirements of relevant Indian Standards.

6. GENERAL REQUIREMENTS

6.1 Safety Requirements — The design of the plant shall minimize hazards to the operator. All gears, pulleys, chains, belt sprockets, dangerous moving parts and parts which are subject to high operating temperatures or are energized electrically shall be insulated, well guarded and protected. Adequate and safe stairways to the mixer platform and other units shall be provided.

6.1.1 Adequate unobstructed space shall be provided on the mixing platform with easy and safe access to a location above the mixer to obtain samples of the aggregates in the bins, and also in and around the truck loading space with a ladder or platform to permit easy and safe inspection of the mixture being delivered into trucks.

6.1.2 The various components shall be so designed that overloading of any part as a result of jamming is immediately relieved by breaker bolts or shear pins or similar devices.

6.1.3 Installation of combustion devices, boilers and fuel tanks shall conform to relevant safety regulations. Effective precautions shall be taken to minimize the risk of fires resulting from spilling or overflowing of fuel or bitumen or due to any other cause.

6.2 Maintenance Accessibility — The design of the plant shall provide convenient accessibility to all components, sub-assemblies and parts for maintenance and repairs.

6.3 Lubrication — Lubrication means shall be provided for all bearings and all other moving parts requiring lubrication. Plain bearings or their shafts shall have oil or grease grooves. All lubricating nipples shall be of similar type and shall be readily accessible. Where access for lubrication is difficult, bearings shall be such that lubrication is required as infrequently as possible or facilities for lubrication from a remote position shall be provided. Lubrication points shall be conspicuously marked to identify the lubricants and their temperature range. Chains shall be enclosed and provided with an oil bath or drip feed lubrication.

6.4 Gearing — Gearing shall be designed to have ample strength and to adequately withstand wear and temperature rise. They shall, as far as possible, conform to the requirements of IS: 2535-1963*. Moulded teeth may be used for pitch line speeds not exceeding 30 m/min. Keys in gear trains shall be so fitted and secured that they cannot work loose.

*Basic rack, modules and diametral pitches of cylindrical gears for general engineering.

6.5 Rotating and Fixed Shafts and Axles — Shafts and axles shall have ample rigidity and adequate bearing surfaces for their purposes. They shall, where necessary, be finished smooth.

6.6 Chain Drives — Chain drives shall be of steel bushed roller chain.

7. COMPOSITION OF PLANT

7.1 The mixing plants shall have such of the following components as may be specified by the purchaser:

- a) Cold aggregate feeder;
- b) Dryer, including cold aggregate elevator, if necessary;
- c) Dust collector, including exhaust fan;
- d) Screening unit;
- e) Aggregate proportioning unit;
- f) Mineral filler supply unit;
- g) Bitumen control unit;
- h) Mixer unit, with elevator, if necessary, the mixer being either of the continuous or batch mixing type as specified (*see 14 and 15*); and
- j) Bitumen heating and storage unit.

7.1.1 The various components shall conform to the requirements given in **8** to **16**.

8. COLD AGGREGATE FEEDER

8.1 The cold aggregate feeder shall have not less than two (or more, where so desired by the purchaser) bins or compartments, each provided with accurate mechanical means for feeding the aggregate at a uniform and predetermined rate to the cold elevator or to some intermediate conveyor or directly into the dryer. The feeder shall provide for the adjustment of total and proportional feed and shall be capable of being locked in any setting.

8.2 The capacity of the feeder with the gates half closed shall not be less than the capacity of the dryer.

8.3 The feeder shall be constructed generally of mild steel of such dimensions that there is no distortion of the bins when they are fully loaded.

9. DRYER

9.1 The dryer shall be of the rotary drum type that will continuously agitate the mineral aggregate during the drying and heating process. It shall be capable of heating and drying all aggregates in the necessary quantities to supply the mixing unit continuously at its operating capacity

and at the temperature and moisture content hereinafter specified. The lifting flights shall be so fitted that they may be renewed when necessary.

9.2 The rating of the dryer, tested in accordance with relevant Indian Standards shall be in tonnes per hour of aggregates having initial moisture contents of 6 percent and 2 percent by weight, the aggregates wholly passing a 20-mm square mesh IS sieve with 50 percent by dry weight retained on 2.36-mm IS sieve and having final moisture contents of not more than 0.5 percent by weight and mass aggregate temperatures of not less than 180°C. The velocity of the gases in the drum shall not exceed 180 m/min.

9.3 At the discharge end of the dryer or any other suitable location, means shall be provided for ascertaining the temperature of the heated aggregate.

9.4 The burner shall be of adequate capacity having its fuel pump linked with the drum drive to prevent the use of the burner with a stationary drum.

9.5 The cold elevator, where provided, shall comprise a malleable iron, steel bushed chain with steel or malleable iron buckets having a hard facing on the leading edge; or alternatively a belt conveyor may be used.

10. DUST COLLECTOR AND EXHAUST FAN

10.1 The plant shall be supplied, if specified, with an effective dust collecting unit which will return uniformly to the hot elevator the material collected.

10.2 Exhaust Fan — An exhaust fan having sufficient capacity to ensure an effective air flow through the dryer and through the dust collecting unit, if such a unit is specified, shall be provided.

11. SCREENING UNIT

11.1 The dried aggregate shall be screened into not less than three sizes and the screens shall have a normal capacity slightly in excess of the full capacity of the mixer or dryer. The screens shall have an efficiency such that there shall be not more than 10 percent undersize material in any bin or in the rejects when the plant is operating at its maximum capacity.

11.2 Each bin shall be provided with an overflow pipe that shall be of such size and location as to prevent any backing up of material into other bins or against the screens. Adequate tell-tale devices shall be provided to indicate the levels of the aggregates in the bins.

12. MINERAL FILLER SUPPLY UNIT

12.1 Means shall be provided for conveying, proportioning and charging mineral filler into the mixer to the extent of 6 percent by weight of the maximum plant output.

13. BITUMEN CONTROL UNIT

13.1 Satisfactory means, by weighing, metering or volumetric measurements, shall be provided to obtain the required percentage of bitumen in the mix within a tolerance of ± 2 percent of the quantity required. Where the quantity of bitumen is controlled by metering or by volume, provision shall be made whereby the amount of bitumen delivered through the meter or the bitumen bucket may be readily checked by weight. Suitable insulation for maintaining the temperature of the bitumen in pipe lines, meters, weigh buckets, spray bars, flow lines or other containers shall be provided.

13.2 An armoured thermometer reading from 90°-200°C shall be fixed in the bitumen feed line at a suitable location near the discharge valve at the mixer unit.

14. BATCH TYPE MIXER UNIT

14.1 Batch type mixer unit shall include equipment for weighing or volumetric measurement of aggregate and bitumen, and a batch mixer of the twin shaft pugmill type.

14.2 Weighing Equipment — All weighing equipment shall be substantially constructed and of a design which will permit easy realignment and adjustment. Equipment shall include a means for accurately weighing each bin size of aggregate and of mineral filler in a weigh box or hopper suspended on scales ample in size to hold a full batch without hand raking or running over. The weigh box or hopper shall be supported on a fulcrum; knife edges shall be so constructed that they will not easily be thrown out of alignment. Gates on both bins and hopper shall be so constructed as to prevent leakage when they are closed. A weigh box that permits the segregation of aggregate sizes in the ends of the mixer shall not be permitted.

14.2.1 Aggregate Scales — Scales for any weigh-bbx or hopper may be of either the beam or springless dial type and shall be of suitable design, accurate to ± 0.5 percent of the indicated load.

14.2.1.1 When scales are of the beam type, there shall be a tare beam for balancing the hopper and a separate beam for the aggregate from each hot bin. A tell-tale dial shall be provided that will start functioning when the load being applied is within 50 kg of the weight desired. Each beam shall have a locking device designed and so located that the beam can easily be suspended or thrown into action.

14.2.1.2 Dial scales shall be springless and shall be designed, constructed and installed in such a manner as to be free from vibration. They shall also be of such size that the numerals on the dial can be read at a distance of three metres. All dials shall be so located as to be plainly visible to the operator at all times. The end of the pointer shall be set close to the face

of the dial and shall be free from excessive parallax. The scale shall be provided with adjustable pointers for marking the weight of each material to be weighed into the batch.

14.2.2 Bitumen Scales — Scales for the weighing of bitumen shall conform to the requirements for aggregate scales, except that beam scales shall consist of a full capacity beam and a tare beam. The minimum graduation shall be not greater than one kilogram and there shall be attached a tell-tale device which will start functioning when the load being applied is within ten kilograms of the weight desired. Dial scales for weighing the bitumen shall read to the nearest half kilogram. All scales for weighing the bitumen shall have a capacity of not more than 15 percent of the normal capacity of the mixer.

14.3 Volumetric Method of Proportioning — Volumetric method of proportioning may be provided as an alternative to weighing but in this case convenient and accurate scales and facilities shall be provided for checking the measuring devices by weight. A hopper that permits the segregation of aggregate sizes in the ends of the mixer shall not be permitted.

14.3.1 Bitumen measuring equipment provided on the plant shall be capable of accurately measuring into each batch the required amount of bitumen within a tolerance of ± 2 percent.

14.3.2 When a bitumen bucket is used, it shall be a non-tilting type provided with a loose sheet metal cover. The capacity of the bitumen bucket shall be at least 10 percent in excess of the weight of bitumen required for a one-batch mix. The plant shall have a quick-closing, non-dripping, charging valve. The length of the discharge opening or spray bar shall not be less than three-fourths of the length of the mixer and it shall discharge directly into the mixer. The discharge system shall be designed and arranged to deliver the bitumen the full length of the mixer in a thin, uniform sheet or in multiple streams or sprays.

14.3.3 When a volumetric meter is used, the meter shall be designed and constructed so that it will automatically meter the bitumen into each batch. The dial to indicate the amount of bitumen shall have a capacity of at least 10 percent in excess of the weight or litres of bitumen required in one batch. The meter shall be constructed so that it may be locked at any dial setting and will automatically reset to this reading after the addition of bitumen to each batch. The dial shall be in full view of the mixer operator. The flow of bitumen shall be automatically controlled so that it will begin when the dry mixing period is completed and is discharged in not more than 20 seconds after the flow has started. The size and spacing of the spray bar openings shall provide a uniform application of bitumen the full length of the mixer. The section of the bitumen flow line between the charging valve and the spray bar shall be provided with a valve and outlet, for checking and testing the accuracy of the meter.

14.4 Mixer — The plant shall include a batch mixer of the twin shaft pugmill type capable of producing a uniform mix when mixing the maximum dryer output of aggregate. If not enclosed, the mixer box shall be equipped with a dust hood to prevent loss of dust. The mixer shall be so constructed as to prevent leakage of contents until the batch is discharged.

14.4.1 Mixer box liner plates and paddle tips shall be of high-manganese steel or equally wear-resistant material and shall be replaceable.

14.4.2 Unless means are provided for elevating the mixed material to a hopper or to waiting trucks, the discharge height of the mixer shall be not less than two metres above ground level.

15. CONTINUOUS TYPE MIXER UNIT

15.1 Gradation Control Unit — The plant shall, if so specified, include a means for accurately proportioning each bin size of aggregate either by weight or by volumetric measurement. When gradation control is by volume, the unit shall include a feeder mounted under the compartment bins. The feeder shall be equipped with a dust-proof revolution counter with minimum graduations of one-tenth of a revolution. Each bin shall have an accurately controlled individual gate to form an orifice for volumetrically measuring the material drawn from each respective bin compartment. The orifice shall be rectangular, with one dimension adjustable by positive mechanical adjustment, and provided with a lock. Indicators shall be provided on each gate to show the gate opening in centimetres. Mineral filler shall be proportioned separately from a suitable hopper equipped with an adjustable feed which may be accurately and conveniently calibrated and interlocked with the aggregate and bitumen feeds.

15.1.1 *Weight Calibration of Bitumen and Aggregate Feed* — Weight of test samples shall be taken as a means of calibrating gate openings and bitumen flow. Materials shall be fed out of the bins through individual orifices and by-passed to a suitable test box. The plant shall be equipped to handle conveniently such test samples weighing not less than 50 kg. An accurate scale for weighing the test samples shall be incorporated.

15.1.2 *Synchronization of Aggregate and Bitumen feed* — Satisfactory means shall be provided to afford positive interlocking control between the flow of aggregate from the bins or compartment and the flow of bitumen from the meter or other proportioning device. This control shall be accomplished by interlocking mechanical means or by any positive method. The aggregate bins shall be provided with automatic controls and signal devices which will warn of low levels. The bitumen storage system shall be provided with automatic controls and signal devices which will warn of low levels of bitumen.

15.3 If a gradation control unit is not specified, the dried aggregate shall be delivered to a single bin having a capacity of not less than five minutes

plant output. The floor of the bin shall be formed by an apron feeder which will convey the aggregate at a uniform rate through a rectangular orifice with one dimension adjustable by positive mechanical adjustment and provided with a lock. An indicator shall be provided on the orifice to show the opening in inches and centimetres. The feeder shall be equipped with a dust-proof revolution counter with minimum graduation of one-tenth of a revolution. Mineral filler shall be proportioned separately from a suitable hopper equipped with an adjustable feed which may be accurately and conveniently calibrated and interlocked with the aggregate and bitumen feeds.

15.3 Mixer

15.3.1 The plant shall include a continuous mixer of an approved twin shaft pugmill type capable of producing a uniform mix. If not enclosed, the mixer box shall be equipped with a dust hood to prevent loss of dust. The paddles shall be of a type adjustable for angular position on the shafts and reversible to retard the flow of the mix.

15.3.2 Mixer box liner plates and paddle tips shall be of high manganese steel or equally wear-resistant material and shall be replaceable.

15.3.3 In order to facilitate the placing of empty trucks in position to receive mixed material, a suitable arrangement shall be provided at the discharge end of the mixer which shall be capable of retaining mixed material during a period of one minute.

15.3.4 Unless means are provided for elevating the mixed material to a hopper or to waiting trucks, the discharge height of the mixer shall be not less than two metres above ground level.

16. BITUMEN HEATING AND STORAGE UNIT

16.1 Tanks for storage of bitumen shall be equipped for heating the material, under effective and positive control at all times, to the temperature requirements set forth in the specifications for the paving mixture. Heating shall be accomplished by steam or oil coils, electricity or low flame temperature oil burners. If oil burners are used, fire brick, cast iron or other suitable liners shall be provided so that the flame cannot impinge directly on the tank plates or flue. A circulating system for the bitumen shall be provided, of adequate capacity to provide for proper and continuous circulation between storage tank and proportioning units during the entire operating period. Suitable arrangement shall be provided for recording the temperature at the tanks and in the circulating system. All pipe lines and fittings shall be steam or oil jacketed and properly insulated to prevent loss of heat. Storage tank capacity shall be sufficient for at least one day's run. If so specified, means shall be provided for the filling of the storage tanks with packed bitumen by means that will ensure the complete emptying

IS : 3066 - 1965

of bitumen drums at a rate not less than the maximum demand of the plant.

17. FINISHING

17.1 All exposed parts of the plant shall be cleaned, treated and painted with suitable anti-corrosive protective paint conforming to the relevant Indian Standards. Electrical equipment, power units and parts subjected to high temperature shall be painted with special paint suited for the purpose.

17.2 Fungus Control — Electrical connections including terminal and circuit connections, components and circuit elements shall be suitably treated to resist the growth of fungi. However, components and elements, inherently inert to fungi or hermetically sealed, and the components and elements whose operation will be adversely affected by fungus control treatment, need not be treated.

18. MAINTENANCE TOOLS AND ACCESSORIES

18.1 A strong tool box with-lock and key and containing necessary tools and accessories for normal maintenance adjustment and lubrication of the plant together with instructions and inventory of tools and accessories shall be provided. Provisions shall be made for suitably affixing the tool box on the machine.

19. MARKING

19.1 Instruction Plate — Each unit of the plant shall be equipped with instruction plates including warnings and cautions, suitably located, describing any special or important procedures to be followed in operating and servicing the plant.

19.2 Marking Plate — Plant shall have an identification plate permanently affixed to it with the following particulars conspicuously marked on it:

- a) Manufacturer's name or trade-mark,
- b) Manufacturer's reference number of plant,
- c) Capacity of plant (*see 3*),
- d) Type of mixer (*see 14 and 15*),
- e) Type and rating of power units, and
- f) Year of manufacture.

19.2.1 Plant may also be marked with the ISI Certification Mark.

NOTE – The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian

Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer.

ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

APPENDIX A

(Clause 0.3)

INFORMATION RECOMMENDED TO BE SUPPLIED BY THE PURCHASER WITH ENQUIRY OR ORDER

A-1. The information in regard to the requirements in **A-1.1** to **A-1.5** shall be supplied to the manufacturer while making an enquiry or placing an order for hot asphalt mixing plants.

A-1.1 The rating of the plant in tonnes per hour when producing mixtures having aggregates of the types described in **9.2**.

A-1.2 Type of Plant (*see 4, 14 and 15*).

- a) Static
- b) Portable
- c) Mobile
- d) Mixer to be batch type, continuous type or either..

A-1.3 Site Conditions

- a) Urban area where no dust nuisance should be created.
- b) Rural area where 80 percent dust collection efficiency would be satisfactory.
- c) Rural area where dust would create no nuisance.—
- d) Temperate or tropical climate.
- e) Approximate altitude above sea level.
- f) Any other special conditions under which the plant is to be used.

A-1.4 Motive Power—State type of prime movers required or full particulars of external electricity supply.

A-1.5 Requirements for ancillary equipment, stating:

- a) The number of compartments required in the aggregate feeder.
- b) If dust collector is to be supplied and the type of dust collector:
 - 1) *Ordinary dust collector (efficiency below 80 percent),
 - 2) High efficiency dust collector (efficiency over 80 percent).
- c) If screening unit or gradation control unit is required.
- d) If proportioning of aggregate is to be by weight or by volume or by either method.
- e) If measuring of bitumen is to be by weight, by volume or by either method.
- f) If pre-heater for oil supply is to be supplied and if so, give viscosity of fuel oil.
- g) The method of plant operation required:
 - 1) Manual,
 - 2) Power assisted manual control,
 - 3) Fully automatic control on mixing plant,
 - 4) Fully automatic control throughout,
 - 5) Any alternative requirement.
- h) If bitumen heating and storage unit is required or not and if facilities are to be supplied for handling packed bitumen.

*Generally, cyclonic type dust collectors will have efficiency of about 80 percent.

A P P E N D I X B

(Clause 0.3)

INFORMATION RECOMMENDED TO BE SUPPLIED BY THE MANUFACTURER

B-1. The information in regard to the requirements in **B-1.1** to **B-1.4** shall be supplied by the manufacturer with the tender.

B-1.1 The model and type of plant offered. Drawing or catalogue number.

B-1.2 A drawing or diagram of the plant showing the general arrangement and the overall dimensions:

- a) when working, and
- b) when disassembled for travelling, if the plant is portable or mobile.

B-1.3 The weights of the various units and the axle loads, if the plant is portable or mobile.

B-1.4 A general specification embodying the following information:

- a) The rating, model and makers of the power units offered and the methods of power transmission.
- b) A description of each unit of the plant giving dimensions and capacities.
- c) A description of the running gear and brakes supplied, if the plant is mobile.

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