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Jawaharlal Nehru

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IS 5890 (2004): Mobile Hot Mix Asphalt Plants, Light Duty - Requirements [MED 18: Construction Plant and Machinery]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक
चल हॉट-मिक्स एस्फाल्ट प्लांट,
हल्का उपयोग — अपेक्षाएँ
(पहला पुनरीक्षण)

Indian Standard
MOBILE HOT MIX ASPHALT PLANT,
LIGHT DUTY — REQUIREMENTS
(*First Revision*)

ICS 91.220:93.080.20

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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Construction Plant and Machinery Sectional Committee had been approved by the Mechanical Engineering Division Council.

Based on the demand of high quality hot asphalt mixtures conforming to the desired specification for the construction and maintenance of roads, this Indian Standard for small capacity mobile hot mix asphalt plants was published in the year 1970. Since then, technology has become more advanced and in order to meet the latest requirements, this revision has been taken up. The design of the mobile hot mix asphalt plant shall be such that it can be operated by simple operators without much hazards and problems.

The requirements for large and elaborate hot asphalt mixing plants of continuous and batch mixing types are covered in IS 3066 : 1965 'Specification for hot asphalt mixing plants'. This specification was prepared for a simple plant of smaller capacity used primarily for small scale operations. This standards had been prepared with the object of providing guidance to prospective users and manufacturers of small capacity mobile hot mix asphalt plants and for ensuring that the plant will be capable of producing mixtures of the desired quality.

The recommended information to be supplied by the user for the guidance of the manufacturer is given in Annex B and by the manufacturer to the prospective user in Annex C.

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

MOBILE HOT MIX ASPHALT PLANT, LIGHT DUTY — REQUIREMENTS

(*First Revision*)

1 SCOPE

This standard lays down the requirements regarding materials, design features, construction, capacity and performance of mobile hot mix asphalt plant of small capacity (*see* 3.1).

2 REFERENCES

The standards listed at Annex A contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 CAPACITY OF THE PLANT AND SIZE OF AGGREGATES TO BE USED

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

- a) 3 to 5 tonnes per hour, and
- b) 6 to 10 tonnes per hour.

The rated capacity of the plant stabilizes after 50 h of run and plant shall be evaluated accordingly.

3.2 The size of aggregates to be used in mobile hot mix asphalt plants shall not exceed 25 mm.

4 MATERIALS

Materials used for construction of the plant, namely, steel materials (*see* IS 4431), engine (*see* IS 10001), gear box (*see* IS 2535), chain sprockets (*see* IS 12959), tyres [*see* IS 10914 (Part 2)] and tubes (*see* IS 13098), rims [*see* IS 10694 (Part 3)], parking brakes [*see* IS 11852 (Part 2)] shall comply with the requirements of relevant Indian Standards.

5 MOBILITY

The plant shall be mobile and to be mounted on a four wheeled chassis for better turning radius and for

shifting from one place to other. This ensures centre of gravity to be always within the base. The tyres shall be of pneumatic type and 900 mm × 20 mm size. Suitable towing arrangement (trailer type) shall be provided.

6 POWER UNIT

The plant shall be driven by a diesel engine. The power developed and transmitted by the power unit shall be adequate for the duty to be performed. As the plant is using burners for heating the aggregates and bitumen, which emits flames, using of a petrol engine to run the plant shall not be allowed. The power unit shall conform to the requirements of IS 10001. The starter battery for diesel engine shall conform to IS 7372. The battery shall be provided with a metallic cover with lock and key arrangement.

7 GENERAL REQUIREMENTS

7.1 The plant shall be designed such that it is stable when being towed and necessary arrangements shall be included for securing all loose components.

7.2 Safety Requirements

The design of the plant shall be such as to minimize hazards to the operator during its operation. All gears, pulleys, chains, bolts, sprockets and parts which are subject to high operating temperature shall be well guarded and protected and they shall not come in physical contact with the operating personnel.

7.2.1 Bitumen tank when provided with the plant shall be so placed that its operation is not complicated and it does not prove to be hazardous to the operator for maintenance and regular supply of bitumen.

7.2.2 Petrol being highly inflammable, using of petrol engine as primemover shall not be allowed.

7.3 Maintenance Accessibility

All components of the plant shall be easily and conveniently accessible for maintenance and repairs.

7.4 Lubrication

7.4.1 Lubrication facility shall be provided for all bearings and for all other moving parts requiring lubrication. Bearings or their shafts shall have

grease grooves. All lubricating nipples or grease cups shall be easily accessible. Where access for lubrication is difficult, self lubricating bearings shall be provided. Lubrication points shall be conspicuously marked to identify the lubricants and their temperature range. Chains, if having peripheral speed exceeding 15m/min shall be enclosed and provided with an oil bath or drip feed lubrication system.

7.4.2 Any other approved or recognized lubrication system may be provided by mutual agreement between the purchaser and the manufacturer for all bearings and other moving parts requiring lubrication.

7.5 Gearing

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

7.6 Rotating and Fixed Shaft and Axles

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

7.7 Chain Drives

Chain drives shall be of steel bushed roller chains.

8 COMPOSITION OF PLANT

The mixing plant shall have the following components:

- a) Belt conveyor or chain bucket elevator system as feeding arrangement;
- b) Drier with oil burner, blower and oil pump;
- c) Separate mixing arrangement;
- d) Calibrated bitumen bucket;
- e) Bitumen boiler (when specified by the purchaser);
- f) Chassis with pneumatic tyres and tubes; and
- g) Hot aggregate hopper.

9 LOADING ARRANGEMENT OF AGGREGATE

9.1 Loading of aggregate to the drier drum can be carried out by means of installing belt conveyor or chain bucket elevator arrangement. The type of loading arrangement may be mutually agreed to between the manufacturer and the purchaser. The design of the loading arrangement shall be such that its operation does not become hazardous to the operator.

9.2 All the material used for manufacturing the loading system shall conform to their relevant specifications.

10 DRIER

10.1 The drier 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 give the rated output and supply material to the mixer at the temperature and moisture content specified. The lifting flights shall be so fitted that they can be replaced when necessary.

10.2 The rating of the drier tested in accordance with relevant Indian Standards shall be in tonnes per hour of aggregates having initial moisture content of 6 percent and 2 percent by weight, the aggregates wholly passing a 20mm square mesh IS Sieve with 50 percent by dry weight retained on 2.36 mm IS sieve, and having final moisture content of not more than 0.5 percent by weight and mass aggregate temperature of not less than 180°C. A temperature gauge for ascertaining the temperature of the heated aggregate shall be provided at a suitable location by the manufacturer. The burner shall be of adequate capacity suitable for burning diesel oil or kerosine. A blower for supplying air in the volume and at the pressure required for combustion and an oil pump for supplying oil to the burner shall be incorporated in the machine. Suitable valves shall be provided for controlling the flow of air and fuel. A fuel oil tank having 4 h burning capacity shall be conveniently placed in such a position so that it is easily accessible to the operator for filling. There shall also be a suitable protected peep hole for adjusting the flame of the burner.

10.3 The drying drum shall rotate on two steel tyres running on chilled cast iron or cast steel rollers mounted on anti-friction bearings. The drive may be either through an external level or worm gear ring mounted on the drum and driven through a bevel or worm pinion, or may be through the drum rollers. Alternatively any other suitable arrangement for rotating the drying drum may be incorporated by mutual agreement between the purchaser and the manufacturer.

10.4 A suitable exhaust fan connected through ducting in which a butterfly damper for the purpose of varying the draught shall be provided for removing the products of combustion from the drier. Alternatively an equally efficient collapsible chimney may be provided.

11 MIXER

11.1 Mixing shall be carried out in a separate pug

mill mixer. Any alternative arrangement of mixing can be provided as per mutual agreement between the purchaser and the manufacturer. It shall be ensured that mixing is not carried out in the drying drum.

11.2 The mixer shall be a twin shaft pug mill mixer capable of producing a uniform mix when mixing the maximum dryer output of aggregate. The mixer shall be so constructed as to prevent leakage of contents until the batch is discharged. The height and location of the discharge end of the mixing zone shall be such as to allow free use of standard wheel barrow (*see* IS 2431 and IS 4184) for carrying the mixed materials.

11.3 Mixer box liner plates, paddle arms and paddle tips shall be of high manganese steel (*see* IS 4431) or equally wear resistant material and shall be replaceable.

12 BITUMEN SUPPLY

12.1 Bitumen boiler, if supplied with the plant as per specific requirement of the purchaser, shall form an integral part of the plant. A trough type calibrated bitumen bucket shall be provided for measuring the required quantity of bitumen per batch. The capacity of the bitumen bucket shall be at least 10 percent in excess of the weight of bitumen required for a batch of hot mixed asphalt containing 8 percent of bitumen by weight of the total mix.

12.1.1 The supply of bitumen available for measuring shall be continuous.

12.2 Bitumen boiler, when provided with the plant, shall be an integral part. The supply of heated bitumen to the calibrated bitumen bucket shall be taken by gravitational force or through a gear pump. The bitumen boiler when supplied with the plant shall be placed in such a position that its operation and maintenance does not become hazardous to the operator. A mechanical circulation system shall be provided in the boiler for circulating the bitumen at the time of heating. The supply from the bitumen boiler to the pug mill shall be either through a pump or gravity fed.

12.3 Pump driven by the power unit may be allowed and it should not become hazardous to the operator for regular cleaning of the pipe line and pump as it gets clogged at frequent intervals.

12.4 The capacity of the bitumen boiler when supplied with the plant as integral part shall not exceed 500 litres.

13 CHASSIS WITH PNEUMATIC TYRES

Chassis shall be fabricated from rolled steel sections

firmly braced. It shall be mounted on wheels having anti-friction bearings with pneumatic tyres and tubes of suitable size and capacity which can take the load of entire plant, and shall be provided with a draw-bar. In case of chassis mounted on four wheels, turn-table arrangement is to be provided on the front two wheels for easy manoeuvrability.

14 HOT AGGREGATE HOPPER

In case the loading arrangement of aggregate into the drying drum is with belt conveyor or chain bucket elevator system, a suitable measuring device for the aggregate after it comes out of the dryer shall be provided in the plant. The capacity of the hot aggregate hopper and pug mill mixer shall be such that the hopper can hold one batch required in the mixer box.

15 FINISHING

All exposed parts of the plant shall be cleaned, treated and painted with suitable anti-corrosive protective paint conforming to IS 2932. Power units and parts subjected to high temperature like drier, bitumen boiler, discharge chute, chimney shall be painted inside and outside with special paint suitable for the purpose. All hardwares shall be galvanized conforming to IS 2629.

16 MAINTENANCE TOOLS AND ACCESSORIES

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. Provision shall be made for suitably affixing the tool box on the machine.

17 MARKING

17.1 Instruction Plate

The plant shall be fitted with instruction plates including warnings and cautions, suitably located, describing any special or important procedures to be followed in operating and servicing the plant.

17.2 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,
- d) Type and rating of power units, and
- e) Year of manufacture.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
2431 : 1963	Steel wheel barrows (single wheel type)	10001 : 1981	Performance requirements for constant speed compression ignition (diesel) engines for general purposes (up to 20 kW)
2535 : 1978	Basic rack and modules of cylindrical gears for general engineering and heavy engineering (<i>second revision</i>)	10694 (Part 3) : 1991	Automotive vehicles — Rims — General requirements: Part 3 Commercial vehicle rims (<i>first revision</i>)
2629 : 1985	Recommended practice for hot dip galvanizing of iron and steel (<i>first revision</i>)	10914 (Part 2) : 1992	Automotive vehicles — Pneumatic tyres — Specification: Part 2 Truck, bus and light truck tyres — Diagonal ply (<i>second revision</i>)
2932 : 1993	Enamel, synthetic, exterior: (a) undercoating (b) finishing — Specification (<i>second revision</i>)	11852 (Part 2) : 2001	Automotive vehicles — Brakes and braking systems: Part 2 General functions and features (<i>first revision</i>)
4184 : 1967	Steel wheel barrows (with two wheels)	12959 : 1990	Technical supply requirements for sprocket wheels for link chains
4431 : 1978	Carbon and carbon manganese free cutting steels (<i>first revision</i>)	13098 : 1991	Automotive vehicles — Tubes for pneumatic tyres — Specification
7372 : 1995	Lead-acid storage batteries for motor vehicles — Specification (<i>first revision</i>)		

ANNEX B

(Foreword)

INFORMATION RECOMMENDED TO BE SUPPLIED BY THE PURCHASER WITH ENQUIRY

B-1 The following information shall be supplied to the manufacturer while making an enquiry for hot asphalt plants:

- a) The rating of the plant in t/h; and
- b) Whether bitumen kettle is to be supplied with the plant.

ANNEX C

(Foreword)

INFORMATION RECOMMENDED TO BE SUPPLIED BY THE MANUFACTURER

C-1 The following information shall be supplied by the manufacturer with the tender:

- a) The rating of the plant in t/h;
- b) The model and type of plant offered, and drawing or catalogue number;
- c) The weight and axle loads;
- d) A general specification embodying the following information:
 - i) The rating, model and makers of the power unit and the method of power transmission;
 - ii) A description of the plant giving dimensions and capacities; and
 - iii) A description of the running gear and brakes supplied.
- e) Operator's manual to be supplied with the machine.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

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Amendments Issued Since Publication

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