IS 2094 (Part 2) : 1999
(Superseding IS 2093 : 1974)

भारतीय मानक

बिटुमेन (तार) और इमलशन के लिए हीटर – विशिष्टि

भाग 2 बिटुमेन स्प्रेयर

Indian Standard

SPECIFICATION FOR HEATER FOR BITUMEN (TAR) AND EMULSION

PART 2 BITUMEN SPRAYER

ICS 91.220.75.140

BUREAU OF INDIAN STANDARDS
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Price Group 3

FOREWORD

This Indian Standard (Part 2) 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 Heavy Mechanical Engineering Division Council.

Construction Plant and Machinery Sectional Committee had published the following Indian Standards:

IS 2093 : 1974 Specification for distributors for hot tar and bitumen (*first revision*)
IS 2094 : 1996 Specification for heater for bitumen (tar) and emulsion — Specification (*second revision*)
IS 4198 : 1967 Specification for emulsion spraying machine for roads

The above standards are related to the same subject and, therefore, the Sectional Committee while revising IS 2093 and IS 4198 decided that the revision of these standards be made as Part 2 and Part 3 respectively of IS 2094 and existing IS 2094 : 1996 be treated as Part 1. As per the decision, the standards now covered under IS 2094 shall be as under :

IS 2094 (Part 1) Specification for heater for bitumen (tar) and emulsion: Part 1 Bitumen heater
IS 2094 (Part 2) Specification for heater for bitumen (tar) and emulsion: Part 2 Bitumen sprayer
IS 2094 (Part 3) Specification for heater for bitumen (tar) and emulsion: Part 3 Emulsion

Further, it was decided to withdraw the standards IS 2093 and IS 4198.

In view of convenience of bulk supply of tar and bitumen from the suppliers, there is an increasing use of mechanical distributors in the pavement construction work, such as surface dressing, soil stabilization and grouting. In surface dressing, uniformity of distribution of binder across the surface is one of the most important factors in achieving a durable and strong surface. Time for distributing binder is very valuable specially in large pavement construction work from the point of view of economy and quality of the finished surface. Distributors are being used by various organizations because of their unique advantages over other means. This standard has been prepared with a view to assisting the users in obtaining distributors capable of distributing binder uniformly to the specified standard and having a satisfactory mechanical efficiency.

This standard includes a number of requirements which are at the option of the purchaser; for the sake of convenience to the purchaser and the supplier, requirements to be specified by the purchaser while making an enquiry or placing an order for distributors for hot tar and bitumen have been listed in 'Annex A'.

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

SPECIFICATION FOR HEATER FOR BITUMEN (TAR) AND EMULSION

PART 2 BITUMEN SPRAYER

1 SCOPE

This standard (Part 2) covers distributors for hot tar and bitumen for pavement construction work, such as surface dressing, soil stabilization and grouting. The standard lays down the requirements for road worthiness, capacity, construction, safety and performance.

2 REFERENCE

The Indian Standard listed below is a necessary adjunct to this standard:

IS No.	*Title*
2094 (Part 1) : 1996	Specification for heater for bitumen (tar) and emulsion: Part 1 Bitumen heaters (*second revision*)

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Binder

Tar, bitumen, tar/bitumen mixture or a cutback, with or without special additives.

3.2 Rate of Spread

The number of litres of binder required to cover one square metre of surface at the temperature of application.

3.3 Transportable Distributor

A distributor, which is intended for travelling short distances at low speeds, and is normally carried to any distant site on another vehicle.

NOTE — Distributors for hand spraying are usually transportable. Mechanical distributors are usually mobile.

4 TYPES

The distributors shall be of the following types. They may be mobile or transportable:

a) Binder tanks and spraying equipment for hand spraying, with manually or mechanically operated pressure systems.

b) Mechanical tank-spraying units, provided with a series of nozzle fixed to a transverse header holding binder under pressure.

c) Mechanical tank-units, provided either with gravity outflow pipes or a pump feed, combined with revolving or oscillating brushes to distribute the binder.

d) Mechanical tank-units provided with a combination of gravity or pump-fed simple nozzles and a series of blades revolving on a horizontal shaft.

5 CAPACITY

5.1 The distributors shall have the following standard nominal capacities in litres:

1 000, 1 500, 2 000, 3 000, 5 000, 7 500, 10 000

5.2 The actual capacity of the distributor shall be atleast 10 percent greater than the nominal capacity.

6 TANKS

6.1 When distributors have pan type of U-shaped tanks, which can be filled from drums, their general construction shall comply with the requirements specified in IS 2094 (Part 1). A barrel hoist shall be fitted when required by the purchaser.

6.2 When a pressure tank is employed, this shall comply with the relevant safety regulations for pressure vessels.

6.3 The tank shall have a dipstick clearly marked with the serial number of the tank to which it belongs. The dipstick shall fit into a guide or be positively located by other means, and shall be calibrated and clearly marked to show the contents of the tank at any level within an accuracy of ±1 percent of the nominal capacity.

7 LAGGING OF TANKS

Lagging of tanks shall comply with the following requirements:

a) The tank shall be covered with a suitable lagging material of adequate thickness; exposed feed and return pipes from the tank to the means of application shall be lagged. The lagging material in contact with the tank shall be non-combustible.

b) The insulating material shall be protected and retained in position by suitable lagging plates, or their equivalent, to ensure that it does not deteriorate in use or become impregnated with binder.

c) The temperature drop in a full load of binder, at an initial temperature of 150°C with the atmospheric temperature between 24°C and 30°C shall be not more than 20°C after 8 h when the tank and its contents are at rest.

8 HEATERS

When heaters are required to raise the temperature, the heating arrangements for distributors shall comply with the requirements specified in IS 2094 (Part 1).

9 MEASUREMENT OF TEMPERATURE

Distributors shall be fitted with a temperature indicator, or indicators, to show both the temperature at which the binder is being drawn off for application and the maximum temperature of the binder in the tank. The indicator, or indicators shall be accurate to within ±3°C.

10 COMPLIANCE WITH INDIAN STANDARDS

All materials used in the construction of distributors shall comply with appropriate Indian Standards.

11 ROAD WORTHINESS

11.1 Transportable distributors shall be fitted with iron, rubber or pneumatic tyres, and the wheels may run on plain bearings. An efficient hand operated parking brake shall be provided.

11.2 All distributors shall comply with the relevant road traffic regulations.

12 MARKING

12.1 Each distributor shall have firmly attached to it a plate giving the following particulars:

a) Manufacturer's name or trade-name,
b) Type of distributor,
c) Nominal capacity,
d) Tank serial number, and
e) Year of manufacture.

12.2 BIS Certification Marking

The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act,* 1986 and the Rules and Regulations made thereunder. The details of conditions under which a licence for the use of Standard Mark may be granted to the manufacturers or the producers may be obtained from the Bureau of Indian Standards.

13 PUMPING SYSTEM

13.1 The binder pump shall be either inside the tank or attached close to a heated part of the casing, so that special preheating is not required before pumping. The pumping system shall be so designed that there are no visible pulsations at the spray nozzle.

13.2 To assist in clearing the system, provisions shall be made either for pumping air through the nozzle pipe or for admitting air to it at the pump end. An additional device for drawing the binder left over in the spray bar may also be provided, if required by the purchaser.

14 STRAINER

A strainer, in which the maximum dimension of any aperture is not more than half the minimum dimension of the smallest aperture in the pump valves or spray nozzle, shall be provided on the pump suction pipe. The strainer shall be easily removable for cleaning and shall be designed in such a way that all the binder will pass through it.

15 FLEXIBLE PIPE AND SPRAY PIPE

The flexible pipe and spray pipe shall have not less than 12mm bore. The flexible pipe shall be not less than 3m long and shall be made of a material that will resist deterioration from the hot binder. The pipe and its unions shall be capable of withstanding four times the maximum pressure that can be developed in the system.

16 SPRAY LANCE

The spray lance shall be fitted with thermally insulated adjustable handles and a shut-off valve shall be provided between the pump and the spray nozzles.

17 SPRAY NOZZLE

The spray nozzle shall be of a type which will deliver the binder in a fine spray of well defined shape.

18 PRESSURE GAUGE

A suitable pressure gauge, capable of reading to at least double the normal working pressure and accurate to within ±5 percent, shall be fitted to the delivery pipe.

19 TEST FOR UNIFORM DISTRIBUTION

19.1 For the distributors capable of being tested in accordance with the general requirements described in Annex B, the amount of binder collected on any strip of surface 5 cm wide within the effective width, the length of the strip being parallel to the direction of travel of the distributor, shall not differ from the average amount over the effective width by more than 15 percent. Further, the mean of the amount of binder

collected in any four adjacent trays within the effective width shall not differ from the average over the effective width by more than 10 percent.

19.2 For the purpose of calculating the average amount collected, the effective width shall be the whole sprayed width less 15 cm at each side.

19.3 The amount of binder received on the 15 cm margin at either side of the effective width of the spray shall be neither less than 50 percent nor more than 100 percent of the mean amount per 15 cm of the effective width sprayed.

20 INSTRUCTIONS

Instructions shall be supplied with each distributor to enable the operator to ensure that the specified rate of spread is obtained.

ANNEX A

(Foreword)

INFORMATION TO BE SUPPLIED WITH AN ENQUIRY OR ORDER

A-1 Information in regard to the following requirements which are at the option of the purchaser shall be supplied to the manufacturer while making an enquiry or placing an order for distributors for hot tar and bitumen:

a) Type (*see* **3.1**)

b) Nominal capacity (*see* **4.1**),

c) Whether a barrel hoist is required (*see* **5.1**),

d) Whether heaters are required (*see* **7.1**), and

e) Whether a device for drawing in binder left over in the spray bar is required (*see* **12.2**).

ANNEX B

(Clause 19.1)

TEST FOR UNIFORMITY OF TRANSVERSE DISTRIBUTION OF BINDER (DEPOT TRAY TESTS)

B-1 GENERAL

B-1.1 This annex lays down the method for testing uniformity of distribution of binder across the surface being sprayed.Various methods for determining the transverse uniformity of distribution have been developed, the essential requirements of which are the following:

a) The conditions prevailing during the test are comparable with those occuring during normal operations as regards.

   1) temperature of binder,
   2) viscosity of binder,
   3) height of distributing gear above the test surface,
   4) pressure in the distribution system, and
   5) speed of operation of mechanical distributing gear when applicable.

b) The test surface is divided into strips of equal width, usually 5 cm; the length of the strips being parallel to the direction of travel of the distributor.

c) The test is so arranged that the distributor can operate for a sufficient period to obtain the normal working conditions, and when this has been achieved, the test surface is exposed to the discharge for suitable period.

d) The amount of binder delivered on each 5 cm strip is then measured and the results expressed as a percentage deviation from the mean for all the 5 cm unit over the effective width. The effective width is defined as the sprayed width less than 15 cm margin at each side.

e) The results of the test are recorded in the form indicated in Fig. 1. A suitable record card is shown in Fig. 2.

B-2 DEPOT TRAY TEST

B-2.1 The apparatus consists of a wheeled trolley carrying a set of removable containers. Each container

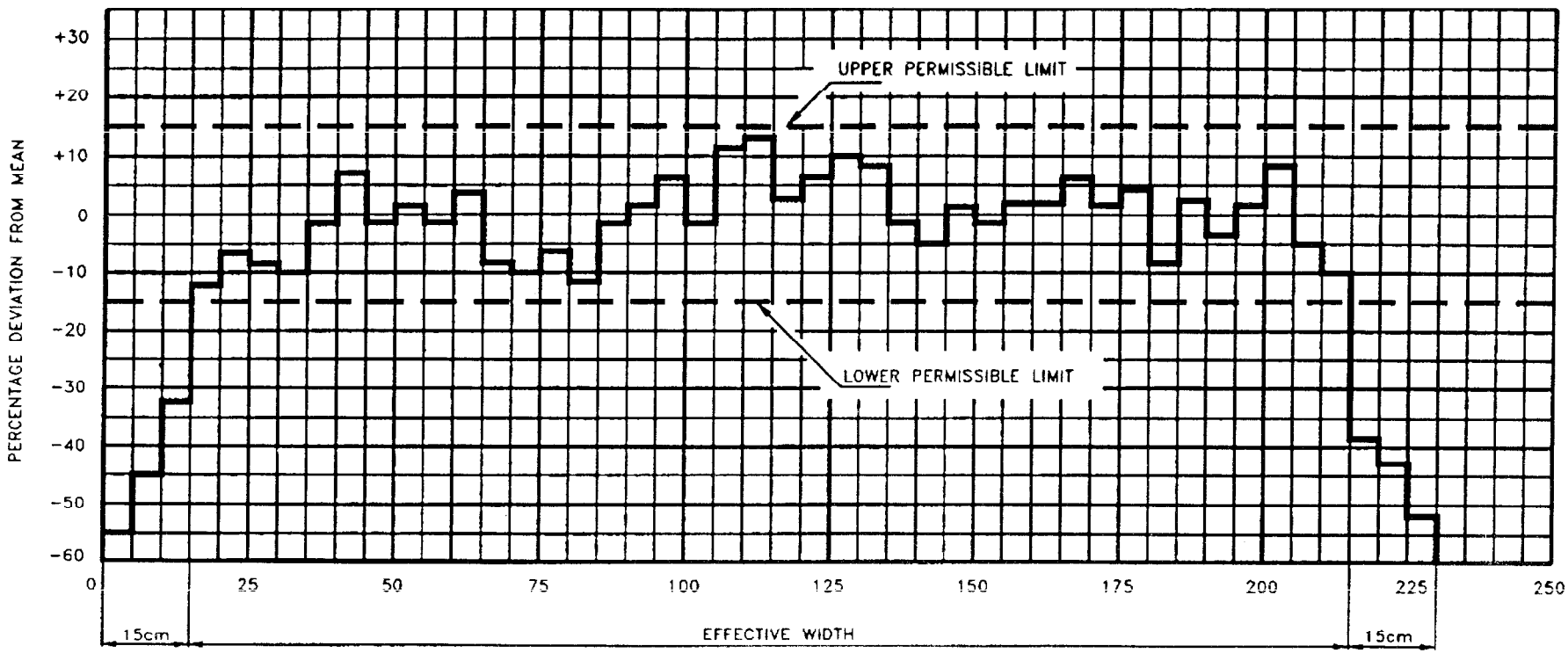
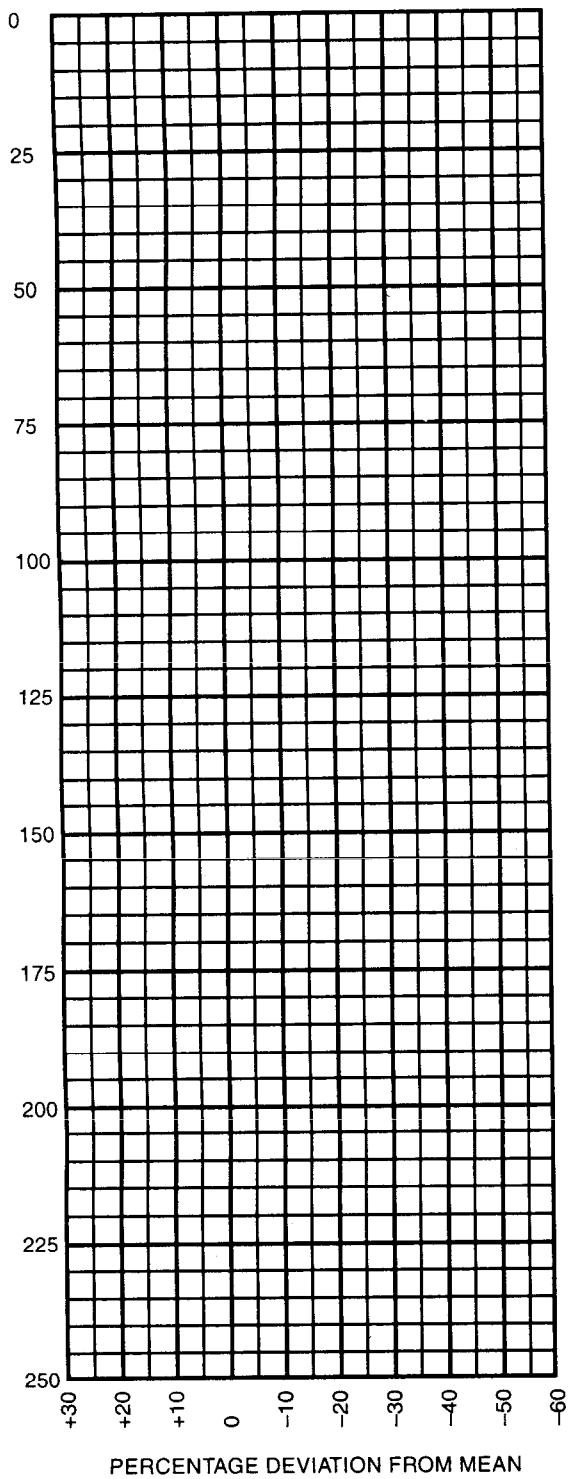


FIG. 1 TYPICAL RESULTS OF TEST FOR UNIFORMITY OF TRANSVERSE DISTRIBUTION OF BINDER



CON-TAINER NO.	DIP	DEVIATION FROM MEAN	
	mm	mm	mm
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FIG. 2 RECORD CARD FOR TEST FOR TRANSVERSE DISTRIBUTION OF BINDER

is 5 cm wide, 1 m long and 15 cm deep, made of 0.900 mm thick mild steel sheet, and of approximately 7 litres capacity. The containers extend to a width 15 cm greater than the full spray width of the distributor, there being six containers in 30 cm of spray width. The rim of each container is lipped on one side in order that the containers will overlap and prevent binder from escaping. Before each test, the containers are examined for damage and replacement made if such damage is likely to affect the test.

B-2.2 The trolley runs on steel rails fastened to the top of 1 500 litre-catch tank, the rails being horizontal and parallel to the sides of the tank and sufficiently long to allow the trolley to lie clear of the spray before the test. The top rim of each container, when fitted on the trolley, is parallel to the rails, and the same distance below the nozzles or distributing gear as of the road surface under normal working conditions.

B-2.3 The distributor is backed into position with the spray-bar over the catch tank, precautions being taken to see that the spray bar is horizontal and at right angles to the rails. The trolley and containers rest on the rails clear of the spray hood. A short preliminary spray is made to ensure that all nozzles are functioning and that the distributor is otherwise in normal working condition.

B-2.4 The trolley and containers are then pushed underneath the spray bar and spraying is commenced, and maintained for a period of time sufficient almost to fill the containers. The trolley is then withdrawn to the previous position.

B-2.5 The depth of binder in each container is measured by dipping with a steel rule graduated in millimetres. Each container dipped in the same position, a convenient place being about 30 cm from one end. Dipping is to commence when the froth has settled.