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IS 5916 (1970): Safety code for construction involving use of hot bituminous materials [CED 29: Construction Management including safety in Construction]



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( Reaffirmed 1990 )

*Indian Standard*

**SAFETY CODE FOR  
CONSTRUCTIONS INVOLVING USE OF  
HOT BITUMINOUS MATERIALS**

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

**Gr 3**

*March 1971*

# *Indian Standard*

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# *Indian Standard*

## SAFETY CODE FOR CONSTRUCTIONS INVOLVING USE OF HOT BITUMINOUS MATERIALS

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 19 December 1970, after the draft finalized by the Safety in Construction Sectional Committee had been approved by the Civil Engineering Division Council.

**0.2** Hot bituminous materials are used on various operations connected with civil engineering jobs. The work involved is of specialized and hazardous nature which, some times leads to accidents. These accidents may cause burns to workman, injury to lungs due to breathing of dust laden air, or fire to materials and equipment. It is necessary, therefore, that certain rules are laid down for every phase of work involved and that these are meticulously followed by each member of the crew working on the job, not only for his own safety but also for the safety of his fellow workers and on-lookers. This standard has, therefore, been formulated to lay down safety requirements for constructions involving the use of hot bituminous materials.

**0.3** 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 the field in this country.

**0.4** 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.

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### 1. SCOPE

**1.1** This standard lays down the safety requirements for constructions involving the use of hot bituminous materials.

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

## 2. TERMINOLOGY

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

**2.1 Bituminous Materials** — Binder materials, such as asphalt/bitumen; both penetration grades and cutbacks, road tars as well as mixtures of such binders with road aggregates, pitch, bituminous mastic and joint sealers.

**2.2 Bitumen Plant** — A plant for producing bituminous mixtures with or without provision to batch and heat the aggregate materials as well as binder to the required extent and mixing them together. This includes storage for different aggregates, elevators, driers, screening and gradation control units, batching arrangements and mixing units.

**2.3 Boilers** — Suitable containers or tanks in which bitumen or tar can be heated to the required extent and provided with suitable controllable outlets for taking out hot material.

**2.4 Sprayer** — A mechanical equipment to spray hot binder uniformly, at a constant volume or constant pressure to give the required amount of binder per unit area.

**2.5 Spreader** — A mechanical equipment to spread uniformly stone chips at a desired rate per unit area.

**2.6 Paver** — A mechanical equipment with arrangement to receive the hot mixture from tippers and to lay it uniformly to the required width, depth and camber as well as to give an initial compaction.

## 3. SAFETY PROGRAMME

**3.1 General** — On all major works, an experienced and competent foreman or supervisor shall be placed in-charge of the work, and shall be made responsible for the strict observance of the safety rules. He shall guard against the use of defective appliances, tools and equipment, and shall brief all workmen on all potential hazards and the ways to eliminate or guard against them. He shall stock the necessary protective equipment, fire-extinguishing equipment, first-aid kit, etc. He shall also keep a record of the accidents taking place on any particular job, with reasons thereof, and shall suggest suitable remedial measures to the management for prevention thereof.

**3.2 Protective Covering** — Workers engaged on jobs involving handling of hot bitumen tar or bituminous mixtures shall use protective wears, such as boots and gloves, preferably of asbestos or otherwise of rubber, goggles and helmet. No worker shall be permitted to handle such materials without wearing the needed protective covering.

### 3.3 Fire Fighting Arrangements

**3.3.1** When heating and handling of hot bituminous materials is to be done in the open, sufficient stocks of clean dry sand or loose earth shall be made available at the work site to cope with any resultant fires. When such materials are not available, nor are any suitable type of fire extinguishers provided at the work site in the open, and reliance has to be on using water for fighting any fire, the water supply available should be in abundance and the water shall be applied to the fire in the form of spray.

**3.3.2** When heating of bituminous materials is carried out in enclosed spaces, sufficient number of properly maintained dry powder fire extinguisher conforming to IS:2171-1962\* or foam extinguisher conforming to IS:933-1967†, shall be kept in readiness on the work site.

## 4. BITUMEN PLANTS

### 4.1 General Provision

**4.1.1** Bitumen plants shall be provided with:

- a) safe means of access and working platforms with hand rails; and
- b) all pulleys, belts and drive mechanisms should be protected by suitable guards.

**4.1.2** Compressors, electrical installations and other equipment, such as elevators and conveyors shall be adequately protected against weather and mechanical damage for safety of workmen.

**4.1.3** When necessary to prevent danger from rock dust in bitumen plants precautions given under **4.1.3.1** to **4.1.3.10** shall be followed.

**4.1.3.1** The screen enclosure and the mixing chamber shall be equipped with a mechanical exhaust system.

**4.1.3.2** The screen overflow chutes and hoppers shall be enclosed.

**4.1.3.3** The waste conveyor system shall be enclosed at transfer and discharge points.

**4.1.3.4** All material transfer points shall be equipped with effective dust seals.

**4.1.3.5** Conveyor and elevator covers shall be dust tight.

**4.1.3.6** The drier discharge to the screen elevator shall be equipped with an effective dust seal provided with a dust collector.

**4.1.3.7** Contaminated air shall be so discharged that it cannot return to working areas.

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\*Specification for portable fire extinguishers, dry powder type.

†Specification for portable chemical fire extinguisher, foam type (*first revision*).

**4.1.3.8** The mixer elevator shall be enclosed in a wooden or sheet metal shaft. The shaft shall have a window for observation, lubrication and maintenance.

**4.1.3.9** The mixer shall be provided with a suitable cover to prevent dust coming out.

**4.1.3.10** Suitable protective guard, such as wire grill or asbestos cover sheets shall be provided behind the drier burner or bitumen boiler burner.

## **4.2 Operation**

**4.2.1** Only competent persons shall operate bitumen plants.

**4.2.2** When bitumen plants are working on a public road an adequate traffic control system shall be established.

**4.2.3** Ample storage space shall be provided for materials, vehicles, etc, so that operations are not obstructed.

**4.2.4** Workers handling hot bitumen plants shall wear boots and gloves, preferably of asbestos or otherwise of rubber, goggles, helmet and if necessary, to prevent danger, suitable protective clothing.

**4.2.5** Burners shall be lighted by butane lights or other suitable devices and not by burning rags and the like.

**4.2.6** When not in use flexible piping shall not be left on the ground.

**4.2.7** Bitumen plants provided with oil-fired burners shall not be heated:

- a) while bitumen is being pumped,
- b) while bitumen is being spread, and
- c) while the plant is being transported.

**4.2.8** Mineral aggregate shall be added on to the elevator after the drying drum has warmed up.

**4.2.9** The drier drum and mixer shall not be inspected or repaired while they are in motion.

## **5. SPRAYER SPREADER/PAVER**

**5.1 Sprayer** — The sprayer shall be provided with a fire resisting screen. The screen shall have an observation window.

**5.1.1** Piping for hot tar and bitumen shall be adequately insulated to protect workers from injury by burns.

**5.1.2** Flexible piping working under positive pressure shall be of metal which shall be adequately insulated as provided for under **5.1.1**.

**5.1.3** Workers shall not stand facing the wind directions while spraying hot binder, lest it may fall on them causing burns.

**5.1.4** Workers shall be provided with suitable protective equipment for the eyes, hands and legs (*see 3.2*).

## **5.2 Spreader/Paver**

**5.2.1** Spreaders in operation shall be protected by signals, signs or other effective means.

**5.2.2** People should be warned against walking over hot mixture laid.

**5.2.3** Gravel spreaders shall always keep at a safe distance from sprayer.

**5.2.4** Workers with the hot mix shall have protection for eyes, hands and legs (*see 3.2*).

**5.2.5** Elevated platforms on spreaders shall be protected by suitable railing and be provided with an access ladder.

## **6. EQUIPMENT FOR HEATING OF BITUMEN AND TARS**

**6.1** Tanks, vats, kettles, pots, drums and other vessels for heating tar, bitumen and other bituminous materials shall:

- a) be adequately resistant to damage by heat, transportation, etc;
- b) be capable of holding a full load without danger of collapse bursting or distortion;
- c) be provided with a close fitting cover suitable for smothering a fire in the vessel or protection from rain; and
- d) be leak proof, and provided with suitable outlets which can be controlled for taking out the hot material.

**6.2** Suitable indicator gauges shall be used to ascertain level and temperature of the material in the boiler. On no account shall workers be allowed to peep into the boiler for this purpose. For ascertaining levels, in small plants, dipstick may also be used.

**6.3** Gas and oil-fired bitumen and tar kettles or pots shall be equipped with burners, regulators and safety devices of types approved by the competent authority.

**6.4** Heating appliances for vessels shall distribute the heat uniformly over the heating surface so as to avoid overheating. In case of bituminous mixtures using mineral aggregates filler together with bitumen, it is preferable to have some means for stirring as well.

**6.5** Only vessels heated by electricity shall be used inside buildings.

**6.6** Buckets for hot bitumen, bituminous materials or tar shall have:

- a) the bail or handle firmly secured, and
- b) a second handle near the bottom for tipping.

**6.7** Bitumen or tar boilers mounted on wheels for easy transport or towing shall preferably be provided with hand pumps for spraying purposes.

**6.8** Vessels in operation shall be kept at a safe distance from combustible materials.

**6.9** When vessels are used in confined spaces the gases, fumes and smoke generated shall be removed by exhaust, ventilation or by forced ventilations.

**6.10** Vessels that are being heated shall not be left unattended.

**6.11** Pieces of bituminous material shall not be thrown into the hot vessel so as to cause splashing.

**6.12** Covers shall be kept closed when vessels are not in use.

**6.13** Containers shall not be filled with hot bitumen or tar to a level that might cause danger when they are carried or hoisted.

**6.14** Enough space shall be left in vessels for expansion of binder when heated.

**6.15** Bitumen/tar shall be kept dry and to avoid fire due to foaming, boiler shall have a device that prevents foam from reaching the burners or anti-foaming agents shall be used to control the same. Alternatively to avoid fire due to foaming the heating shall be at low temperature till the water entrapped, if any, is completely evaporated.

**6.16** Any water present in the boiler shall also be drained before using it for heating binders.

**6.17** No open light shall be used for ascertaining the level of binder in boilers.

**6.18** Heating tubes in boilers shall be kept well covered with bitumen.

**6.19** If a burner goes out, the fuel supply shall be cut off and the heating tube shall be thoroughly blown out by the fan so as to prevent a back fire.

**6.20** Cutbacks shall not be heated over an open flame unless a water jacket is used. While they are being heated the vessel shall be kept open.

**6.21** Piping shall not be warmed with burning rags and instead blow-lamps or similar devices shall be used.

**6.22** Spilled bitumen or tar shall be promptly cleaned up around boilers.

**6.23** Inspection openings shall not be opened while there is any pressure in the boiler.

**6.24** When tanks are cleaned by steam, adequate precautions shall be taken to prevent any build up of pressure.

**6.25** Workers employed at vessels or handling hot bituminous materials shall be provided with suitable protective equipment for the eyes, hands and legs.

## **7. HANDLING BITUMEN/TAR**

**7.1** Bitumen or tar shall not be heated in open drums but only in boilers complying with the requirements of the relevant Indian Standard.

**7.2** Bitumen/tar shall not be heated beyond the temperature recommended by the manufacturer of the product.

**7.3** While discharging heated binder from the boiler, workers shall not stand opposite to the jet so as to avoid the possibility of hot binder falling on them. The container shall be handled only after closing the control valve.

**7.4** While handling hot bitumen/tar, workers shall exercise scrupulous care to prevent accidental spillage thereof. The buckets and cans in which the hot material is carried from boiler shall be checked before use to ensure that they are intact and safe.

**7.5** Mops and other applicators contaminated with bituminous materials shall not be stored inside buildings.

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