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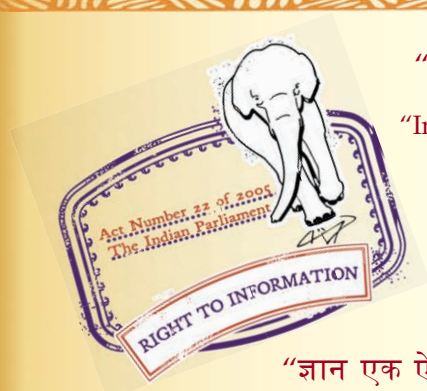
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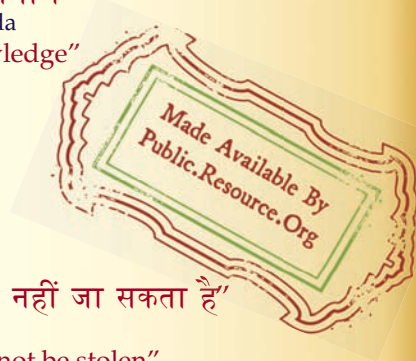
IS 11770-3 (1987): Recommendations for control of emission of asbestos dust in premises manufacturing products containing asbestos, Part 3: Non-cement asbestos products other than friction materials [CED 53: Cement Matrix Products]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

RECOMMENDATIONS FOR
CONTROL OF EMISSION OF ASBESTOS
DUST IN PREMISES MANUFACTURING
PRODUCTS CONTAINING ASBESTOS

PART 3 NON-CEMENT ASBESTOS PRODUCTS OTHER
THAN FRICTION MATERIALS

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

Indian Standard

RECOMMENDATIONS FOR CONTROL OF EMISSION OF ASBESTOS DUST IN PREMISES MANUFACTURING PRODUCTS CONTAINING ASBESTOS

PART 3 NON-CEMENT ASBESTOS PRODUCTS OTHER THAN FRICTION MATERIALS

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Indian Standard

RECOMMENDATIONS FOR CONTROL OF EMISSION OF ASBESTOS DUST IN PREMISES MANUFACTURING PRODUCTS CONTAINING ASBESTOS

PART 3 NON-CEMENT ASBESTOS PRODUCTS OTHER THAN FRICTION MATERIALS

0. F O R E W O R D

0.1 This Indian Standard (Part 3) was adopted by the Bureau of Indian Standards on 30 July 1987, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 In recent years, there has been a growing awareness that exposure to asbestos dust can have harmful effects on the health of workers. In order to give guidelines on how the risk of exposure to asbestos dust can be prevented, controlled or minimized, it was felt necessary to lay down some standards regarding safe use of different products containing asbestos, improving conditions in workplaces, preventive measures, protection and supervision of the health of workers, packaging and transport of asbestos, disposal of asbestos waste, etc. This standard laying down the recommendations for control of emission of asbestos dust in premises manufacturing products containing asbestos, has been prepared in three parts. This part of the standard lays down the recommendations for control of emission of asbestos dust in premises manufacturing non-cement asbestos products other than friction materials. Recommendations for control of emission of asbestos dust in premises manufacturing asbestos cement products and friction materials containing asbestos are covered in Parts 1 and 2 respectively. The concentration of airborne asbestos dust in work environment shall be determined in accordance with the method given in IS : 11450-1986*.

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. This has been met by deriving assistance from

*Method for determination of airborne asbestos fibre concentration in work environment by light microscopy (membrane filter method).

IS : 11770 (Part 3) - 1987

'ILO Codes of practice: Safety in the use of asbestos, 1984, published by the International Labour Office, Geneva.

0.4 This standard is one of a series of Indian Standards on safety in handling and use of asbestos. Other standards in the series already formulated and under preparation are as follows:

- IS : 11450-1986 Method for determination of airborne asbestos fibre concentration in work environment by light microscopy (membrane filter method)
- IS : 11451-1986 Recommendations for safety and health requirements relating to occupational exposure to asbestos
- IS : 11767-1986 Recommendations for cleaning of premises and plants using asbestos fibres
- IS : 11768-1986 Recommendations for disposal of asbestos waste material
- IS : 11769 (Part 1)-1987 Guidelines for safe use of products containing asbestos: Part 1 Asbestos cement products
- IS : 11769 (Part 2)-1986 Guidelines for safe use of products containing asbestos: Part 2 Friction materials
- IS : 11769 (Part 3)-1986 Guidelines for safe use of products containing asbestos: Part 3 Non-cement asbestos products other than friction materials
- IS : 11770 (Part 1)-1987 Recommendations for control of emission of asbestos dust in premises manufacturing products containing asbestos: Part 1 Asbestos cement products
- IS : 11770 (Part 2)-1986 Recommendations for control of emission of asbestos dust in premises manufacturing products containing asbestos: Part 2 Friction materials
- IS : 12078-1987 Recommendations for personal protection of workers engaged in handling asbestos
- IS : 12079-1987 Recommendations for packaging, transport and storage of asbestos
- IS : 12080-1987 Recommendations for local exhaust ventilation systems in premises manufacturing products containing asbestos
- IS : 12081 (Part 1)-1987 Recommendations for pictorial warning signs and precautionary notices for asbestos and products containing asbestos: Part 1 Workplaces
- IS : 12081 (Part 2)-1987 Recommendations for pictorial warning signs and precautionary notices for asbestos and products containing asbestos: Part 2 Asbestos and its products
- IS : 12082 (Part 1)-1987 Recommendations for control of asbestos emission: Part 1 Mining of asbestos ore

IS : 12082 (Part 2) Recommendations for control of asbestos emission: Part 2 Milling of asbestos (*under preparation*)

Method for determination of asbestos concentration in water (*under preparation*)

1. SCOPE

1.1 This standard lays down the recommendations for control of emission of asbestos dust in premises used for manufacture of non-cement asbestos products other than friction materials.

2. OBJECT

2.1 The object of this standard is to recommend procedures that shall be adopted in premises used for the manufacture of non-cement asbestos products other than friction materials so as to minimize and control emission of asbestos dust in the working environment for the safety of workers.

3. APPLICATION

3.1 The provisions of this standard shall apply to premises manufacturing the following asbestos products:

- a) Asbestos textiles,
- b) Compressed asbestos fibre jointings, beater addition jointings, and
- c) Asbestos millboards.

4. GENERAL REQUIREMENTS

4.1 All appropriate and practicable measures of engineering control, work practice and administrative control shall be adopted to eliminate or to minimize the asbestos dust concentration in the working environment to the lowest possible level.

4.2 Engineering Controls — Engineering controls shall include mechanical handling, ventilation and redesign of the process to eliminate, contain or collect asbestos dust emission by the following processes:

- a) Process separation, automation or enclosure;
- b) Bonding asbestos fibres with other materials to prevent dust generation;
- c) General ventilation of working areas with clean air;
- d) Local ventilation of processes, operations, equipment and tools for prevention of dust dissemination;

IS : 11770 (Part 3) - 1987

- e) Use of wet methods where appropriate; and
- f) Separate work places for certain processes.

4.2.1 Local Exhaust Ventilation

4.2.1.1 Where total enclosure of dust-producing process is not practicable, local exhaust ventilation equipment shall be provided and maintained as given in IS : 12080-1987*.

4.2.1.2 For efficient operation, the exhaust ventilation shall be located as close as possible to the source of dust emission by the use of hoods, booths or enclosures.

4.2.1.3 The local exhaust systems shall be designed to collect and remove all dust-laden air.

4.2.1.4 Openings in the enclosures shall be as small as possible while still allowing access to the necessary work operation.

4.2.1.5 In case of captor hoods and booths, the ventilation equipment shall be so constructed that air turbulence and eddies created by the work process or by the workers do not prevent the effective removal of dust.

4.3 Work Practices — Appropriate work practices shall be followed where materials or processes are used which may give rise to asbestos dust in the working environment. Such work practices shall include the following:

- a) Requirements to use and maintain properly process machinery, installations, equipment, tools, local exhausts and ventilation systems;
- b) Damping, wherever appropriate, of asbestos products and materials at workplaces before processing, handling, using, machining, cleaning, stripping and removing;
- c) Regular cleaning of machinery and work areas by appropriate methods; and
- d) Proper use of personal protective equipment, wherever required (*see* IS : 12078-1987†).

5. ASBESTOS TEXTILES

5.1 Fibre Preparation

5.1.1 The plastic bags containing asbestos fibre shall be opened and emptied either automatically or in an enclosed booth connected to a dust extraction system.

*Recommendations for local exhaust ventilation systems in premises manufacturing products containing asbestos.

†Recommendations for personal protection of workers engaged in handling asbestos.

5.1.2 In either case there shall be provision for collection and disposal of empty bags within the same dust extraction system to prevent the escape of dust into the workplace.

5.1.3 The delivery of fibre from the hopper to the machine employed for opening and for the elimination of non-fibrous material shall be fully enclosed and provided with a hood.

5.1.4 The fibre shall be fed into the machine mechanically and discharged within enclosed conditions under negative pressure, into the storage chamber.

5.1.5 Where blending is required with other grades of asbestos fibre or with cotton or man-made fibres, input and output shall be automatically controlled, the blending itself taking place within an enclosed chamber. Blending shall not be carried out by hand-mixing or in open spaces.

5.2 Carding

5.2.1 Where practicable, direct mechanical or pneumatic feed from the blending operation to the card input shall be used. Alternatively, the fibre shall be transported in a dust-proof container.

5.2.2 Where a container is used, it shall be discharged into the card in a way which minimizes the escape of dust. This may be achieved by joining the container outlet with the entry aperture of the hopper.

5.2.3 The card or group of cards between the fibre hopper and condenser shall be interlocked with the working of the machine.

5.2.4 Wherever possible, dust shall be collected and shall not be allowed to escape into the card enclosure or into the general atmosphere.

Negative pressure shall be maintained within the enclosure by means of the exhaust ventilation system.

5.2.5 Where entry into the enclosure is required while the machines are running, appropriate respiratory protection shall be worn.

5.2.6 Specific dust extraction points shall be located close to the working surface of the card, particularly where pressure points are created by the carding action.

5.2.7 Where laps and rope lagging are being produced, the delivery conveyor from the doffer cylinder shall deliver the material for subsequent processing and packing within an enclosed and ventilated chamber.

5.2.8 Where rovings are being produced, operators engaged in removing them from the card shall be protected by ventilation which directs the air away from them and into the card enclosure.

Such ventilation shall be in addition to the negative pressure within the enclosure.

5.2.9 Rovings shall be transferred to the spinning section in a way which minimizes dust generation.

5.2.10 Where it is necessary to remove dry waste from the roving package, this operation shall be carried out under a ventilated hood.

5.2.11 Hand stripping of cards shall not be permitted.

5.2.12 Cards shall be stripped by the use of a revolving cylindrical brush mounted on a traversing mechanism, in turn mounted onto the cylinder by means of the grinding brackets.

The brush shall be connected to the dust extraction system, which shall be of the low-volume, high-velocity type.

5.2.13 Small card rolls shall be cleaned and ground on frames fitted with an enclosed hood provided with dust extraction.

5.3 Spinning, Doubling and Winding

5.3.1 Where practicable, the primary control of dust shall be by wetting. This may be accomplished either by wetting packages for the machine feed or by applying moisture to the roving ends by passing them through water as they are fed to the spinner.

5.3.2 Dust extraction shall also be employed for additional control.

5.3.3 Automatic stop spindles or other means shall be used and dry waste shall be removed by vacuum to minimize the generation of dust from broken or loose ends.

5.3.4 Where pot spinning frames are employed, the pot shall be maintained under negative pressure.

5.3.5 Where flyer frames are used, low speeds and good maintenance shall be observed in addition to wetting and dust extraction.

5.3.6 Dust control of doubling operations shall also be achieved by wetting packages for the machine feed or by applying moisture to yarn ends, together with dust extraction, the use of automatic stop spindles and the removal of dry waste by vacuum.

5.3.7 Cops shall be wound wet by applying moisture to the yarn.

5.3.8 Traverse winding and cheese winding equipment shall be enclosed and fitted with a means of dust extraction.

Where practicable, dust control in this operation shall be made easier by the use of temporary enclosure, such as overlapping transparent plastic strips which cover the working entrance of the enclosure, thereby minimizing the volume of air to be extracted while maintaining easy operator access and vision.

5.4 Weaving

5.4.1 Where practicable, dust shall be controlled by both moisture and dust extraction.

5.4.2 In warp beaming, heavy humidification by means of spray nozzles shall be used, with wet feed packages as an addition or an alternative.

5.4.3 In creel warping, wet packages shall be used where practicable. Where this process has to be carried out with dry materials, the creel shall be partially enclosed by curtains. Local exhaust ventilation of the reed and winding point on the beam shall be installed.

5.4.4 In fabric weaving, wet packages, spray nozzles or wet rolls shall be used, wherever practicable. Dust extraction shall also be employed.

5.4.5 Dust control in finishing processes, such as inspection, calendering and drying, may be helped by the application of a dust-suppressant treatment or finish to the material.

Violent manual or mechanical handling shall be avoided. Woven materials shall be cut, not torn. Dust extraction and, where practicable, water sprays shall be employed.

5.5 Braiding, Plaiting and Rope Lagging

5.5.1 Wherever practicable, moisture or dust-suppressant treatment shall be applied.

5.5.2 Where this is not possible, the equipment shall be enclosed.

5.5.2.1 A portion of the enclosure shall be of transparent plastic to allow the operator to see the process.

5.5.3 Rope lagging should be supplied, transported and stored in impermeable wrapping.

Damaged bags should be repaired with adhesive tape or should be put inside new bags.

5.6 Packaging

5.6.1 Rolls of cloth and coils of tape should be packed by the low-speed application of plastic wrapping.

5.6.2 Yarns, rope and rovings may be packed in cartons. These should be dust-proof with tape seals.

5.6.3 Where practicable, shrink-wrapping should be employed to give total encapsulation of individual units such as fabric or spools of yarn.

6. COMPRESSED ASBESTOS FIBRE JOINTINGS/BEATER ADDITION JOINTINGS

6.1 Fibre Preparation

6.1.1 The plastic bags containing asbestos fibre shall be opened and emptied either automatically or in an enclosed booth connected to a dust extraction system.

6.1.2 In either case there shall be provision for collection and disposal of empty bags within the same dust extraction system to prevent the escape of dust into the workplace.

6.1.3 The delivery of fibre from the hopper to the machine employed for opening and for the elimination of non-fibrous material shall be fully enclosed and provided with a hood.

6.1.4 The fibre shall be fed into the machine mechanically and discharged, within enclosed conditions under negative pressure, into the storage chamber.

6.1.5 Where blending is required with other grades of asbestos fibre or with cotton or man-made fibres, input and output shall be automatically controlled, the blending itself taking place within an enclosed chamber.

Blending shall not be carried out by hand-mixing or in open spaces.

6.2 Mixing

6.2.1 Where practicable, direct mechanical or pneumatic feed from the blending operation to the mixer shall be used. Alternatively, the fibre shall be transported in impermeable bags.

6.2.2 Where impermeable bags are used, it shall be discharged into the mixer in a way which minimizes the escape of dust.

6.2.3 Negative pressure shall be maintained at the feeding point by provision of a suitable exhaust ventilation system.

6.2.4 Specific dust extraction points shall be located above the feeding point to prevent escape of dust into the environment.

6.2.5 Loose fibres, which may settle on the sides of the mixer during the process of mixing, shall be cleaned by using a suitable suction unit.

6.2.6 Unloading of mix from the mixer does not normally present any hazard as the mix is 'wet' at this stage. Nevertheless unloading operation shall be done with due care and the material placed in containers and closed with lids.

6.2.7 Empty asbestos bags, after the unloading of fibres over the mix, shall be placed in containers and closed with lids.

6.3 Sheeting

6.3.1 During the manufacture of compressed asbestos fibre jointings/ beater addition jointings, wet waste shall be collected at regular intervals and stored in polyethylene bags for disposal in an approved manner as given in 10.1.

6.4 Cutting, Sizing, Branding

6.4.1 The sheets shall be trimmed or punched to size using slow speed shears or a guillotine or a suitable punch.

6.4.2 Side trimmings and other waste material collected at the time of cutting/ punching shall be placed in polyethylene bags for disposal in an approved manner as given in 10.1 or alternatively, processed for reuse wherever possible.

7. ASBESTOS MILLBOARD

7.1 Fibre Preparation

7.1.1 The plastic bags containing asbestos fibre shall be opened and emptied automatically, whenever practicable.

7.1.2 If the bags are opened by hand, this shall be carried out in an enclosed booth connected to a dust extraction system under negative pressure.

7.1.3 The bags shall be placed as close as possible to the hopper or feed chamber.

7.1.4 The contents of the bag shall be discharged without the bag being shaken.

7.1.5 Empty bags shall be disposed of immediately in a manner as to prevent the release of asbestos dust to the atmosphere.

7.1.6 The delivery of the fibre to the storage chamber and any subsequent weighing and mixing with other materials shall be carried out under enclosed conditions.

7.1.6.1 Exhaust ventilation with negative pressure shall be maintained within the enclosure to prevent leakage of asbestos dust.

7.2 Handling Finished Products

7.2.1 At the final stage of manufacturing, or wherever asbestos mill-board products are being handled in large quantities, mechanical handling equipment should be used when practicable.

7.2.2 Individual boards, sheets or other products, when moved manually, shall be placed with care on the stack or other resting site.

Dropping and dragging of finished production shall be avoided.

7.2.3 All storage of asbestos millboard products on site shall be within a designated area.

7.2.3.1 The designated area shall be maintained in a clean condition.

7.3 Finishing Operations

7.3.1 All cutting/punching machines shall be fitted with efficient dust extraction system.

7.3.2 Low-volume, high-velocity air systems are usually the most suitable for this purpose.

7.3.3 Where possible asbestos millboard should have in the basic mix a dust suppressant as part of the formulation.

7.3.4 Dust and swarf shall be removed from the workplace by vacuum cleaning.

7.3.5 Vacuum systems, protective clothing and respiratory equipment shall be provided and used where maintenance work is carried out.

8. GENERAL VENTILATION

8.1 Where appropriate, in conjunction with local exhaust ventilation, the entire work area should be supplied with clean air to replace the air as it is exhausted and to reduce airborne asbestos concentrations.

8.2 The flow rates of general ventilation shall be sufficient to change the air of the workplace according to safety and health requirements.

8.3 The exhausted air shall be sufficiently filtered and shall not be recirculated back to the working environment.

9. CLEANING OF PLANT AND PREMISES

9.1 The work premises shall be maintained in a clean state and free from asbestos waste. All machinery, plant and equipment together with all external surfaces of exhaust ventilation equipment and all internal surfaces of the building shall be kept free from dust. Cleaning shall be done in accordance with the provisions laid down in IS : 11767-1986*.

10. DISPOSAL OF WASTE

10.1 All waste material shall be disposed of in accordance with the provisions laid down in IS : 11768-1986†.

*Recommendations for cleaning of premises and plants using asbestos fibres.

†Recommendations for disposal of asbestos waste material.

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SHRI NAVNIT TALWAR	Reinz Tal-Broz (Pvt) Ltd, New Delhi
SHRI A. K. SHARMA (<i>Alternate</i>)	

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²