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RECOMMENDATIONS FOR LOCAL EXHAUST VENTILATION SYSTEMS IN PREMISES MANUFACTURING PRODUCTS CONTAINING ASBESTOS

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Indian Standard

RECOMMENDATIONS FOR LOCAL EXHAUST VENTILATION SYSTEMS IN PREMISES MANUFACTURING PRODUCTS CONTAINING ASBESTOS

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Indian Standard

RECOMMENDATIONS FOR LOCAL EXHAUST VENTILATION SYSTEMS IN PREMISES MANUFACTURING PRODUCTS CONTAINING ASBESTOS

0. FOREWORD

0.1 This Indian Standard 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 guidance 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, disposal of waste, etc. This standard lays down the recommendations for local exhaust ventilation systems in premises manufacturing products containing asbestos so as to control the concentration of asbestos dust.

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 the following publications:

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

Schedule XIV on 'Handling and processing of asbestos' framed under Section 87 of Factories Act

RAJHANS (G S) and BRAGG (G M). Engineering aspects of asbestos dust control. Ann Arbor Science Publishers, USA

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 : 11770 (Part 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

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 : 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 local exhaust ventilation systems in premises engaged in processing and use of asbestos fibre and in manufacture of products containing asbestos.

2. OBJECT

2.1 The objects of this standard are:

a) to control the workplace concentration of asbestos dust during manufacture of products containing asbestos; and

b) to provide a dust control system by which the dust laden air is entrained and taken to a collector for effecting separation of asbestos fibre and dust from the air stream for discharge and disposal.

3. APPLICATION

3.1 The provisions of this standard shall apply to any operation involving the use of asbestos and manufacture of asbestos based products where there is a possibility of asbestos dust emission, such as fibre preparation, blending, spinning, mixing, forming, sheeting, cutting, polishing, braiding carding, doubling, weaving, plaiting, machining, etc.

4. LOCAL EXHAUST VENTILATION SYSTEM

4.1 General

4.1.1 Control of airborne asbestos dust is exercised by entraining the dust-laden air into a dust control system. Local exhaust ventilation system normally consists of the following:

a) *Hooding* — This is required for optimum enclosure and entrainment of airborne dust;

b) *Ducting* — This is required for connecting the hood or hoods with the dust collector;

c) *Dust Collector* — This is required for effecting separation of particles and dust from the air stream; and

d) *Fan* — This is required for moving the dust laden air.

4.1.2 Arrangements shall be made to prevent asbestos dust discharged from the local exhaust ventilation system being drawn into the air of any workroom.

4.1.3 For efficient operation, local exhaust ventilation system shall be located as close as possible to the source of dust emission by the use of captor hoods, booths or enclosures (*see* **4.2.1**).

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

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

4.1.6 In case of captor hoods and booths (*see* **4.2.1**), 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.

4.2 Hooding — Locating and determining the source and free path of the emitted dust, and the design of the hood to entrain such dust is important. The use of a high intensity light beam to locate and examine the path of dust is effective and helpful with regard to hood design.

4.2.1 All the operations shall be studied in details before deciding upon a final design of hood which will usually fall into one of the following two categories:

a) *Captor Type* — Captor type of hood is commonly used to entrain the dust from a localized dust source into the system through which it is finally collected; or

b) *Enclosure or Booth Type* — Enclosure or booth type of hoods, inside which the dust produced is contained as it is generated, is designed so as to prevent the dust escaping into the workplace. Enclosures are generally used for operations like feeding, bagging, bench work, etc, where dust is generated over an area rather than from a localized source.

4.2.2 The speed of air entering the hood shall be such that for captor type of hood, it would create sufficient air flow to draw in or entrain dust into the system; and for enclosure type of hood, it would create negative pressure within the enclosure so that dust shall not leak out into the workplace. Hoods of either kind shall be so designed that the openings are not larger than what is absolutely necessary since excess entry area will increase the volume of air to be handled. Larger openings will also increase the size without increasing its effectiveness. Some guidelines regarding assessment of air requirements are given in Appendix A.

4.3 Ducting — In any dust control installation, where the collector and fan are located away from the dust source and where plants with more than one dust source are served by one collector and fan, ducting shall be made.

4.3.1 Some recommendations regarding ducting are given in Appendix B for guidance. However, the following general principles shall be observed:

a) Ducting of circular section shall be of such size as to provide an adequate air carrying velocity throughout the system;

b) The interior of the ducting shall be smooth and all bends shall be of generous radii;

c) Connections to a main duct shall be made from top or from side. A series of upward rising connections into the bottom of a main duct is not effective;

d) Access doors shall be provided at intervals and adjacent to bends where build-up may occur. Suitable test points shall be provided; and

e) All ducting shall be adequately supported for stability.

4.4 Dust Collectors — Generally two types of dust collector, namely, cyclones and fabric filter collectors as detailed in **4.4.1** and **4.4.2** are recommended for use.

4.4.1 *Cyclones* — Cyclones are of relatively poor efficiency as dust separators and for this reason shall not be used as sole collectors of asbestos dust. They may, however, sometimes be used before a fabric filter to take out heavy materials and particles from the air stream and thus reducing the load on the filter.

4.4.2 *Fabric Filter Collectors* — Fabric filter collectors are most suitable for asbestos working. There are two main types of such collectors, the choice of which will depend upon the working conditions to be controlled. These are as follows:

a) *Intermittent Type* — These are used when the pattern of work allows the system to be closed down for cleaning and where the dust load between cleaning times is within the capacity of the filter; and

b) *Continuous Type* — These are of more sophisticated design and usually arranged in sections, allowing one section at a time to be automatically isolated from the fan system for a few minutes for cleaning, while the remainder of the filter sections continue with their normal function. The filters are cleaned either by shaking the sleeves or applying reverse air through them. The air supply to such reverse jets shall be clean, dry and at the stipulated pressure. The continuous operation filter is usually considered in cases where duty has to be non-stop, or where the dust load is so high as to call for the removal of the collected dust from the filter element at more frequent intervals than the work routine permits.

4.4.2.1 *Filter materials* — The materials used for the filter may be felt or woven cloth or a combination of both. The felt material has a better permeability and a higher collection efficiency; the woven material generally has greater strength and flexibility. Woven material shall be limited to 2·5 cm/s air velocity through the cloth, while velocity of 5 cm/s are recommended for felt materials.

4.4.2.2 *Filter capacity* — The volume of air to be handled and the air velocity through the filter material determine the filter area and consequently the size of the filter collector. Total filter area shall be calculated as follows:

$$\text{Total filter area} = \frac{\text{volume of air to be handled}}{\text{filtering speed}}$$

4.4.2.3 *Filter collectors* — Many types of filter collectors, ranging from large installations serving multiple dust points with the filter suitably housed outside the factory building to small units complete with integral fan and motor located near the machine being served, may be used. These unit filters allow rapid and inexpensive provision of dust control facilities to a single machine or a group of limited size. The location of the filter collector shall be such as to give easy access for all sorts of maintenance and cleaning. Hopper design shall be done carefully so as to avoid bridging of the waste material, that is, blocking by the arching of fibres. All filters shall exhaust to outside atmosphere.

4.5 Fans and Motors — These shall be capable of continuous and efficient operation. The fan shall not work at the extreme limit of its performance. Where fabric filters are used, the fan shall be located after the filter, on the clean air side. Full aerofoil fans are recommended for use. Where the fan is located on the dirty side and is pushing air through the filter, fan with simple impellers shall be used.

4.5.1 The fan shall be installed after the filter. This ensures that the system works under negative pressure. Additional air entrainment is to be allowed for in the design to cater for leakages which may occur during the life of the installation.

4.5.2 The correct direction of rotation of fans shall be clearly marked on each fan casing.

4.6 Operation of the System — It is essential to exercise periodical checks on the exhaust system so as to ensure its proper functioning. Some important guidelines for the operation of the system are given in Appendix C.

4.7 Extension of Existing System — The addition of extensions to an existing dust exhaust ventilation system without increasing the total air extracted shall be avoided. Ad-hoc extension may result in the extension being inffective and the efficiency of the original installation will be impaired.

5. HIGH-VOLUME, LOW-VELOCITY EXHAUST SYSTEMS

5.1 The high-volume, low-velocity exhaust system uses high volumes of air at relatievely low velocities to control the dust at workplaces. Control is achieved by exhausting the air directly from the dust generation area using well designed suction hoods, ducts, etc. The capture velocity shall be such that even the particles generated farthest from the hood is sucked to ensure that all particles are taken into the suction hood.

5.2 The recommendations given in **5.2.1** to **5.2.7** shall be followed in high-volume, low-velocity exhaust system.

5.2.1 The face velocity and air requirement for the suction hood position at dust generating point should be determined.

5.2.2 Hood shall be as close as practicable to the dust generation source and shall enclose it.

5.2.3 The shape of hood shall be appropriately designed such that all the particles generated from the source shall be streamlined towards the centre of mouth of hood.

5.2.4 A shield shall be provided to capture the particles released at greater velocity.

5.2.5 The air velocity moving into the hood shall be greater than the dust releasing velocity to achieve complete capturing of particles.

5.2.6 Suction air velocity and dust release velocity shall be in the same direction.

5.2.7 Operator shall not come between the exhaust hood and the dust generating source.

6. LOW-VOLUME, HIGH-VELOCITY EXHAUST SYSTEMS

6.1 Low-volume, high-velocity exhaust systems are useful particularly to hand tools and machining operations. Control is achieved by exhausting the air directly from the point of dust generation, using close-fitting custom-made hoods and nozzles. Capturing velocities are generally as high as 50 to 60 m per second, but the volume of air used is low (generally 0·3 to 7 m^3 per minute) because of close proximity of the nozzle to the dust source. For flexibility, small-bore Plastic hose may be used as a connection to the tool with the remainder of the system utilizing fixed steam piping and fittings. This method provides local exhaust ventilation with effective control at the dust source and in situations where conventional high-volume, low-velocity systems would be too cumbersome.

6.2 The dust is conveyed at high speed through the flexible piping. With the high entering velocities involved, exhaust needs to be provided with a multi-stage centrifugal exhauster capable of providing a static pressures of about 125 mm mercury at the nozzle opening. Suitable industrial vacuum cleaners may sometimes be adopted to provide this type of localized extraction.

7. PRESSURE MONITORING

7.1 Checks on the performance of an exhaust system shall be made by comparing the static pressure readings at points in the system with the readings recorded at the same points upon commissioning.

7.2 A simple portable manometer may be used to measure the static pressure in the ducting. Test holes to take the tubing from the manometer shall be provided at suitable test points in the system. These holes shall be sealed with rubber stoppers when not in use.

7.3 Dial-type gauges may also be permanently installed at selected points in the system, the dials being marked with the limiting readings established on commissioning of the plant.

7.4 Recommeded points for pressure monitoring are exit from each hood, and entry and exhaust of the filtering units.

7.4.1 If permanent gauges are fitted, then these should be mounted on rigid parts of the plant or building adjacent to the test point and connected to the test point by small-bore piping.

8. INSPECTION AND EXAMINATION OF EXHAUST VENTILATION SYSTEM

8.1 Exhaust ventilation system shall be examined and inspected at least once in every seven days and shall be thoroughly examined and tested by a competent person at least once in a year. Any defect found by such examinations or tests shall be rectified forthwith. A report of the results of such examination and particulars of repairs or alterations carried out shall be properly maintained.

8.1.1 Every report (*see* **8.1**) shall be attached to the general register and be preserved and kept available for inspection.

8.1.2 The weekly check is made to ensure that the plant is being handled correctly. The checks to be generally exercised during weekly inspection are given in Appendix D for guidance.

8.1.3 The examination and testing carried out at least once in a year calls for a more detailed technical approach. A specimen check list for this examination and test is given in Appendix E for guidance.

9. COLLECTION AND DISPOSAL OF WASTE

9.1 Fine Dust — Fine dust, which is normally produced by sanding or machining operations, is collected by fixed extraction systems. The air is filtered and the dust is collected in hoppers which are normally fitted with bagging-off outlets. These outlets shall be designed to make bag changing easy and to minimize dust leakage. Polyethylene bags of adequate strength shall be used so that the dust levels are visible from outside to facilitate its change before being over-filled.

9.1.1 When filled, the bags shall be sealed so as to prevent the escape of dust during subsequent handling.

9.1.2 Suitable protective clothing and respirator shall be worn when bags on a dust collector are changed.

9.2 Waste Other than Fine Dust

9.2.1 Waste materials from operations like strapping, cutting, stripping, etc, shall be collected in polyethylene bags and sealed. Where such material has been allowed to fall on floors, it shall be thoroughly damped before sweeping and the damped materials shall be placed in impermeable bags and sealed.

9.3 Asbestos waste, in sealed bags, shall be disposed of in accordance with the procedures laid down in IS : 11768-1986* in such a way that no dust is emitted into the air during transport or in the act of final disposal.

APPENDIX A

(*Clause* 4.2.2)

GUIDELINES FOR ASSESSMENT OF AIR REQUIREMENTS

A-1. The quantity of air needed at any point is determined by the design of the hood and its proximity to the source of the dust. Thereafter the sum of the volumes of air taken by each hood in a system determine the size of collectors, fans, etc.

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*Recommendations for disposal of asbestos waste material.

A-2. Broad indications of the air volumes used for some machines are given in **A-2.1** to **A-2.4**. These shall be taken as guidelines only. It is important that the air velocity at the point of origin of the dust shall be sufficient to capture it. Hoods shall be carefully designed to make them effective.

A-2.1 Typical exhaust rates of some machines for conventional high-volume, low-velocity system are given in Table 1.

TABLE 1 TYPICAL EXHAUST RATES FOR CONVENTIONAL HIGH-VOLUME, LOW-VELOCITY SYSTEM

Sl No.	Machines	Connection	Exhaust Rate m^3/Min
i)	Power circular saw		
	a) 250 to 300 mm dia	Top connection	8·5
		Bottom connection	9·9
	b) 400 to 450 mm dia	Top connection	9·9
		Bottom connection	12·75
ii)	Bandsaw up to 900 mm dia pulleys	Top connection	8·5
		Bottom connection	9·9
iii)	Sander		
	a) Double disc 750 mm dia	per disc	9·9
	b) Bobbin sander	per disc	12·75

A-2.2 Typical airflow/capture velocity and transport velocity for some operations using high-volume, low-velocity system are given in Table 2.

A-2.3 Routing — Routing machines are difficult to provide with a standard hood due to the wide range of operations performed on them. For small repetitive work, a close-proximity hood fitted with a bristle curtain may be applied. The open area face velocity shall be not less than 3 m/s. For large and varied operations, a booth enclosure on the machine table and around the cutter is recommended with a face velocity of not less than 1·25 m/s.

A-2.4 Drilling — Fixed pedestal drills are best served when fitted with a small hood having high velocity in excess of 10 m/s. Recommended air volume per spindle is 3·4 m^3/min.

A-2.5 Milling and Turning — Close proximity hood with face velocity of 10 m/s should be used, where possible. However, the nature of the machining operation will often prevent this and it may be necessary to supplement or replace the local exhaust points with a booth type hooding around the machining area and in such cases the face velocity shall be 1·75 to 2·5 m/s.

TABLE 2 TYPICAL AIRFLOW/CAPTURE VELOCITY AND TRANSPORT VELOCITY FOR OPERATIONS USING HIGH-VOLUME, LOW-VELOCITY SYSTEM

SL No.	OPERATION	TYPE OF HOOD	AIRFLOW/CAPTURE VELOCITY	TRANSPORT VELOCITY m/s, *Min*
(1)	(2)	(3)	(4)	(5)
i)	Crushing	Enclosure	2 740 $m^3/h/m^2$ of opening	20 to 23
ii)	Screening	Enclosure	3 650 $m^2/h/m^2$ through hood openings but not less than 450 $m^3/h/m^2$ of screen area	20
iii)	Conveying	Enclosure	1 800 $m^3/h/m^2$ of open area	20 to 23
iv)	Bagging	Enclosure/ Booth	1 to 1·25 m/s through opening	20
v)	Dumping	Booth	1 to 1·25 m/s	20
vi)	Mixing	Booth over the mixture	0·75 to 1·0 m/s	20
vii)	Bag slitting	Enclosure	1·0 to 1·25 m/s	20
viii)	Preform press for brake shoes	Enclosure	1·0 m/s	20
ix)	Hot press for brake shoes	Enclosure	1·0 to 1·25 m/s	20
x)	Grinding of brake shoes	Enclosure	2·0 m/s at the tool rest	20

A-3. ENCLOSED DUST POINTS

A-3.1 In order to ensure that dust remains inside the designed enclosure, velocity of the air entering the enclosure through the arranged aperture shall not be less than 0·75 m/s.

A-4. LOW-VOLUME, HIGH-VELOCITY SYSTEMS

A-4.1 These systems are quite different from conventional systems and generally require 0·3 to 7 m^3/min of air at velocities of 50 to 100 m/s. Experimental work shall be undertaken in order to ascertain nozzle design, air quantity and air speed more accurately and in such cases an industrial vacuum cleaner may be useful for this exploratory work.

APPENDIX B

(*Clause* 4.3.1)

RECOMMENDATIONS REGARDING DUCTING

B-1. GENERAL

B-1.1 All ducting shall be circular in section and manufactured from mild steel. Interior surface shall be smooth and free of obstructions. Ducting shall be sized to give a minimum air conveying velocity of 17·5 m/s. Velocities of 22·5 m/s may be necessary for dust containing metal particles.

B-2. THICKNESS OF SHEETING

B-2.1 For different diameter of ducting, the recommended thicknesses of mild steel sheet are as follows:

Up to 300 mm diameter	0·90 mm
From 300 to 750 mm diameter	1·25 mm
From 750 to 1 000 mm diameter	1·60 mm
From 1 000 mm and above	2·00 mm

B-3. FINISH

B-3.1 Ducting shall have a suitable protective finish.

B-4. JOINTS

B-4.1 Ducting up to 350 mm diameter shall have rivetted and taped slip joints; for 350 mm diameter and above, flanged and gasketted joints are recommended.

B-5. BENDS

B-5.1 All bends shall have a mean radius of three times the diameter of the duct, whenever possible.

B-6. CONNECTIONS

B-6.1 Branch connections shall enter the side of the main duct on an expending taper and at an angle of not more than 30° to the main duct.

B-7. BALANCING

B-7.1 Where system balancing is necessary, the design volume is obtained by the fitting of balancing cones or slide dampers. Balancing cones have the advantage of not being subject to unauthorized alteration, but require the provision of access doors for their adjustment. Slide dampers, being adjustable from outside the ducting, may be tampered with and, as such, shall be locked after initial adjustment.

B-8. ACCESS DOORS AND PANELS

B-8.1 When balancing cones are fitted, adjacent access panels shall be required. Inspection doors for duct maintenance shall be provided at intervals in horizontal main ducting and adjacent to bends.

B-9. INSTRUMENT TEST HOLES

B-9.1 Test holes of 10 mm diameter shall be provided for checking air flow throughout the system. These holes shall be covered when not in use.

B-10. LOW-VOLUME, HIGH-VELOCITY SYSTEM

B-10.1 This system generally does not use conventional sheet metal ducting, but makes use of commercial steam piping and fittings. Bends should be of the 'long sweep' type and kept to the least possible number.

APPENDIX C

(*Clause* 4.6)

GUIDELINES FOR OPERATION OF LOCAL EXHAUST VENTILATION SYSTEM

C-1. Before starting any machine which incorporates exhaust ventilation, make sure that the exhaust system is switched "ON" and that suction is felt at the extraction hood. Where multiple extraction points are used, ensure that all are effective.

C-2. For short stoppages of a machine for normal operative attention, the exhaust system shall remain "ON". Local exhaust ventilation system shall, while any work of maintenance or repair to the machinery, apparatus or other plant or equipment in connection with which it is provided is being carried on, be kept in use so as to produce an exhaust draught which prevents the entry of asbestos dust into the air of any workplace.

C-3. When the machine or process is to be stopped for meal breaks or at the end of a shift, the exhaust system shall be left running for at least two minutes after the machine has stopped to clear hoods and ducting.

C-4. Where the installed filter is cleaned by manual operation of the shaking gear, this should be carried out at all convenient break periods. Some unit dust collectors have filters incorporating shaking gear which operates automatically each time the suction fan is switched off.

C-5. Exhaust ventilation systems normally have dampers incorporated in the ducting to achieve initial balancing of the system. These, after balancing has been carried out, shall be securely looked in position. The dampers shall not be used for any other purpose; if it becomes necessary subsequently to re-adjust the air balance, this work shall be carried out by trained staff and all dampers affected re-secured.

C-6. Weekly inspection of the exhaust ventilation system shall be carried out as mentioned in **8.1.2**. The extraction hoods shall be checked to see that they are free from obstruction. If there is doubt as to the correct position of a hood, the effectiveness of the hood shall be re-examined by the light beam method. This will enable the optimum hood position to be re-established and arrangements shall then be made for a more effective fixing of the hood to prevent a recurrence of mis-alignment.

APPENDIX D

(*Clause* 8.1.2)

CHECK LIST OF WEEKLY INSPECTION OF EXHAUST VENTILATION SYSTEMS

D-1. The weekly inspection of exhaust ventilation systems shall include at least the following checks:

a) That the condition of the hoods and nozzles is being maintained and that they are correctly positioned;

b) That the filter hoppers are not overfilled and the emptying routine is being regularly carried out;

c) That there are no leakages in the system;

d) That none of the filter elements are leaking dust;

e) That the filter shaking gear or cleaning equipment is functioning properly; and

f) That the designed pressures are being maintained in the gauges where fitted. The normal or expected gauge reading should be clearly marked on or near the gauge.

APPENDIX E

(*Clause* 8.1.3)

CHECK LIST OF YEARLY EXAMINATION AND TESTING OF EXHAUST VENTILATION SYSTEMS

E-1. The yearly inspection and testing of exhaust ventilation systems shall include at least the following checks:

a) That all hoods and ducting are in position and in good order;

b) That there are no air leakages in any part of the system;

c) That the condition of all filter elements is good;

d) That there is no unacceptable wear of component parts of the filter shaking or cleaning gear;

e) That all lubrication points are charged;

f) That the fan and drive to the fan are in good condition and correctly adjusted; and

g) That the air flow in each part of the system and the fan inlet pressure are to the designed specification.

NOTE — While the above inspection and testing are to be carried out at least once in a year, it is recommended that items (d), (e) and (f) be also checked every three months.

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Asbestos Cement Products Subcommittee, BDC 2 : 3

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S-436 Greater Kailash
New Delhi

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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