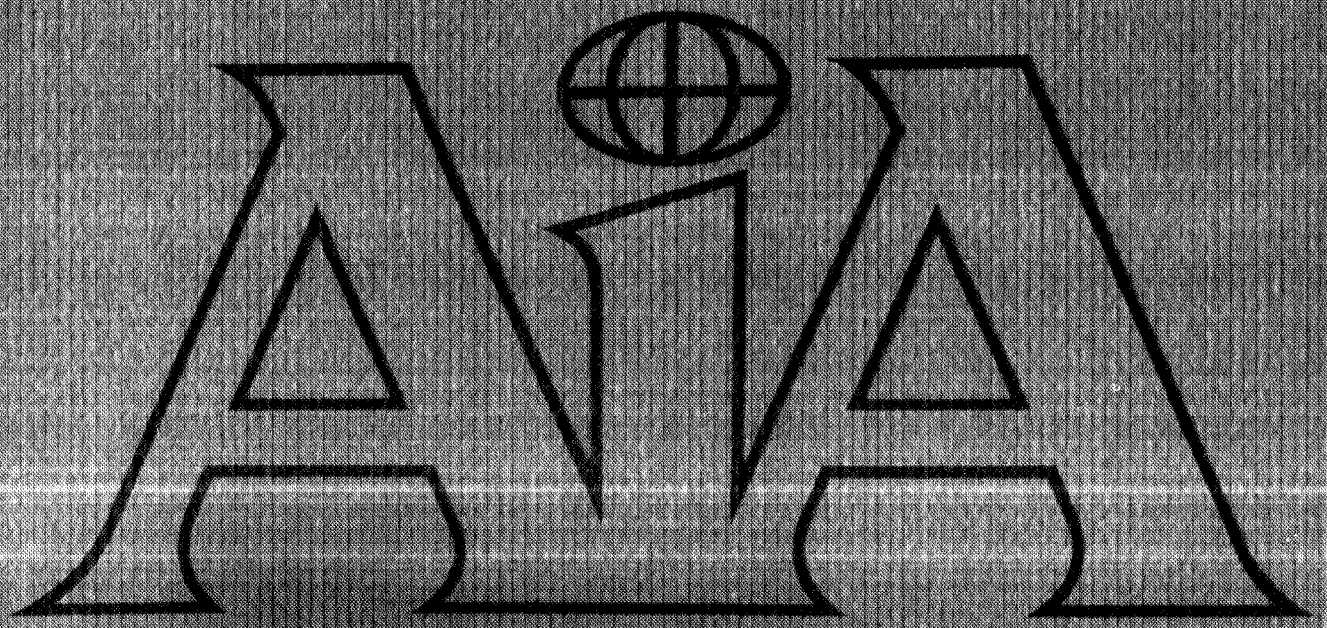
AIA Health and Safety Publication
Recommended Control Procedure No. 6 (RCP6)

Asbestos Textile Products — Manufacture



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INTRODUCTION

The prime object of this Association is to encourage and facilitate the endeavours of its members to eliminate risks to health, occupational and environmental, arising from the use of asbestos.

Many countries have official regulations and guide lines which producers, manufacturers and consumers are required to observe in order to prevent such risks occurring, and progressively the standards stipulated are being achieved. In the course of applying these requirements much practical experience has been acquired, and the interchange of such knowledge and the maximising of control techniques is seen as the principal means by which our members can attain our prime objective.

There are still areas where official guidance has not been provided, and others where the problems of applying statutory requirements are new and may appear formidable. The Asbestos International Association believes that it has an opportunity and a responsibility to provide what help it can to those concerned with this problem from the wide experience of its members, and has decided therefore to produce a series of advisory publications for this purpose.

We wish to remind readers of two important points..First, in considering any recommendations in the AIA publications these should be related to the specific legal requirements in the country concerned. It is clearly not possible in such publications to relate the recommendations in every respect to the specific detailed regulations in each state. Nevertheless, the greater part of existing laws on the subject calls for similar forms of control and where no official regulation exists we advise that action should be based on the recommendation of the ILO meeting of experts on the safe use of asbestos, December 1973.
Secondly, the development of techniques of control is a continuous process, and we hope that the efforts we are undertaking will help to accelerate the process. Techniques which are recommended have reached their present stage as a result of interchange of ideas and practical experience between international experts in the asbestos industry, plant manufacturers, government agencies and many others. It will certainly be necessary regularly to up-date and amend these publications in the light of new ideas and criticisms. All such will be welcomed and will be given full consideration during revision stages.

Asbestos International Association
68 Gloucester Place,
London W1H 3HL, England.
Telephone: 01-486 3528
Telex: 298618 INTA G

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1. Control of asbestos dust in textile manufacture

1.1 This publication has been prepared for the assistance of those undertaking manufacture from chrysotile asbestos fibre. A small quantity of crocidolite asbestos is used in textile production for some highly specialised uses, but this is now rare; it calls for procedures of a more exacting kind than can be covered in this document.

1.2 Asbestos textile manufacture usually covers all processes from the receipt of the fibre from the mines to the finished product which may be in the form of lap, yarn, tape, cloth or packings. Saleable materials may be extracted at some intermediate stages.

1.3 The machines used for the production of conventional asbestos textiles have evolved from traditional textile manufacture. By their nature they tend to produce dust, whether the material processed is animal, vegetable or mineral fibre, so that the problem of control is greater than where a less complex or a wet process is employed. To a limited extent dust suppression by wetting may be used. However, in the main, control must rely on enclosure and dust extraction and by the avoidance of manual operations as far as possible. This is especially important in the earlier stages of manufacture, such as opening and carding. The fundamental nature of the machines used is common to all manufacture. However, there are many variations in their designs and use and in the techniques which have been evolved to accommodate the grades of asbestos fibre available or the special requirements of the end product. In some cases novel variations have been developed in order to avoid the problems of control inherent in some of the traditional 'dry' processes, and also to incorporate features advantageous for certain types of use, such as dust-suppressed cloth.

1.4 Such variations are usually patented; while they may be available for adoption under licensing or similar arrangements, they are beyond the scope of the procedures offered in this publication.

1.5 The recommendations which follow are general in nature. Application to a particular plant must be developed with the assistance of specialist ventilation engineers to suit the actual type of machines in use, the particular premises and the layout of the particular plant. The requirements of national statutory regulations must also be borne in mind.

2. Operations covered by these recommendations

2.1 Fibre preparation — opening and blending.

2.2 Carding.

2.3 Spinning.

2.4 Doubling.

2.5 Winding.

2.6 Weaving.

2.7 Plaiting and braiding.

3. Fibre preparation

This includes a variety of processes (not all of which will be employed in any one plant), designed to open, clean and otherwise prepare the asbestos fibre for presentation for carding.

3.1 Bag opening and emptying — The asbestos fibre is usually supplied compressed in paper or plastic bags. Fibre can become airborne as the bag is cut and removed from the cake of compressed material. Therefore, the cutting and emptying operation must be performed either mechanically in a completely automatic bag-opening device or manually in an enclosed booth under negative pressure (see RCP5). Either method must be equipped with a feature for collecting empty bags for disposal and with proper dust extraction to prevent escape of respirable dust to the work area. As a rule, automatic bag openers will be economically practical only for very large volume production operations that do not require frequent changes or conversions from one type or grade of fibre to another.

3.2 Crushing — This operation is seldom used with the majority of present-day fibre supplies. When it is, the feed of fibre to the crusher pan from the fibre hopper should be by conveyor, the crusher itself maintained under negative pressure, and the discharge of fibre arranged through enclosed and ventilated ductwork to the storage point of the next operation.

3.3 Disintegrating, teasing, willowing, etc. — A variety of operations designed to separate the fibres and to eliminate dirt or non-fibrous material are employed. In all cases, the fibre should be fed into the machine mechanically and discharged under enclosed conditions with negative pressure into the receptacle or storage chamber for the next operation.

Special equipment may be employed at this point to spray or otherwise apply dust-suppressing liquid onto the fibre. This process can also take place during blending.

3.4 Blending — Various methods are adopted for blending fibres of different grades (such as drum mixers or multiple hopper blending lines) and for blending with cotton or man-made fibres for commercial grades of textile products.

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Under no circumstances should blending be done by hand-mixing in open spaces. As with other fibre preparation stages, input and output should be automatically contrived and the process itself performed within an enclosed and dust-controlled chamber.

3.5 Delivery of opened fibre — As far as possible all the stages of fibre opening and preparation should be linked by enclosed conveyors to avoid manual handling, and the finally opened fibre should be collected into a dust-tight receptacle suitable for sealed delivery to the card.

Wherever feasible, direct mechanical or pneumatic feed from the blending equipment to the card input sections is to be preferred to manual handling of blended material.

See figs. 1 and 2

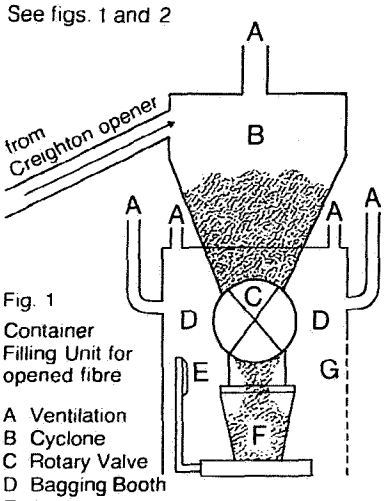


Fig. 1
Container Filling Unit for opened fibre

A Ventilation
B Cyclone
C Rotary Valve
D Bagging Booth
E Weighing Machine
F Fibre Container
G Plastic Strip Screen over access point

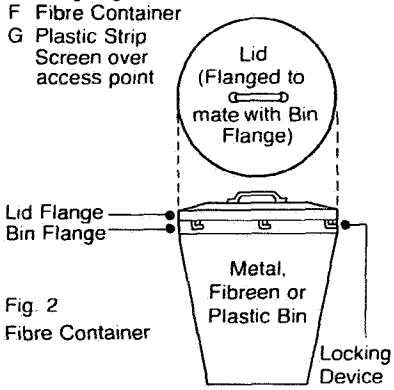


Fig. 2
Fibre Container

Delivery of Opened Fibre

4. Carding

4.1 Cards may be single cards or double cards; in the case of double cards the intermediate conveyors may be of different types, e.g. Scotch feed, camel back, etc. There are many points on the card where dry fibre is in movement and where, therefore, respirable fine dust may be emitted.

Wherever possible dust should be collected at the point of generation rather than allowed to escape into the card enclosure or general atmosphere. This may be achieved by the location of specific dust extraction points close to the working-surface of the card particularly where pressure points are created as a result of the carding action.

Since it is necessary to allow access for adjustment to the speed and setting of cylinders and their ancillary equipment (licker-in, workers, strippers, doffers) and for under-card clearance, etc., the application of dust extraction and its collector units is complicated and at times competing with the equipment needed to guard against injury. If possible, enclosure of the card or group of cards between the fibre hopper and the condenser is most satisfactory, with ventilation systems maintaining negative pressure within the enclosure. If entry inside such enclosure is required while machines are running, respiratory protection must be worn.

See fig. 3

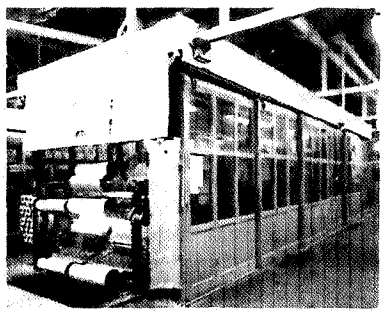


Fig. 3 Enclosed Carding Machine

4.2 Fibre supply — Fibre supply from the blending operation should be by either method outlined in 3.5 above. If mechanical or pneumatic delivery cannot be employed the transportation container (bag or rigid container) should be discharged into the card in such a way as to avoid the escape of dust. This may be achieved by ensuring that the outlet of the container is mated with a suitable discharge point into the card hopper.

See figs. 4 and 5

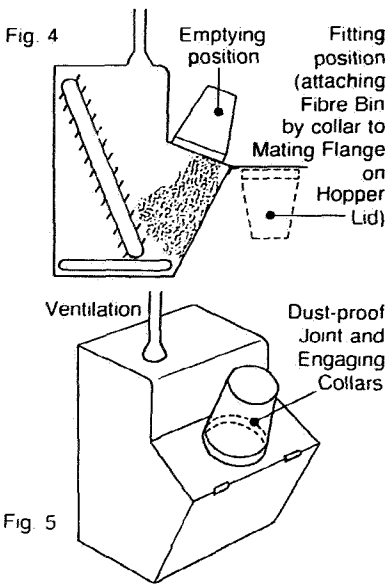


Fig. 4
Fig. 5

Feeding Fibre to Card Hopper

4.3 Cards for lap material and rope lagging — When these materials are being produced, the end product is delivered from the doffer cylinder on to a delivery conveyor (in the case of rope lagging, coupled with a rolling device) instead of a condenser. The delivery conveyor should be designed to deliver the lap material for subsequent processing or packing within an enclosed and ventilated chamber.

4.4 Condenser — For the protection of workers engaged in removing rovings from the card, it is recommended that the negative pressure within the recommended enclosure (4.1 above) be reinforced by ventilation directing the air flow away from the operators and into the enclosure. Rovings should be transferred to the spinning-section in such a manner that dust generation is minimised. Where it is necessary to remove dry waste from the roving supply package, this operation should be carried out under a ventilated hood.

4.5 Card stripping, cleaning and grinding — Cleaning by hand (hand stripping) should not be employed. It should be carried out 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 should be connected to the dust extraction system. Cylinder grinding should be carried on only with the full operation of the card dust exhaust system. Whenever practicable, roll cleaning, stripping and grinding should be scheduled for off-shift or week-end hours when work areas are not heavily occupied.

4.6 Cleaning and grinding of small card rolls — This operation should be performed on stripping and grinding frames fitted with an enclosed hood provided with dust extraction.

4.7 Waste-end collectors — Where practical waste-ends should be collected by vacuum devices. Plain (unreinforced) end may be returned directly to the card input sections. Inserted materials should be directed to a waste recovery section or to a suitable collector for disposal or may be taken up on coreless cheeses for return to an enclosed roving reclamation machine for cutting, opening and subsequent return to the blender line.

4.8 Removal, collection and disposal of card wastes — Top fly should be picked up by the primary exhaust system for collection in a filtration system. Material may be returned to the process through proper handling and reprocessing through the preparation department, or may be bagged and disposed of in accordance with standard asbestos waste disposal procedures.

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5. Spinning

5.1 Ring frames — The preferred method of control is by wetting. Either wet packages may be used for machine feed or wetting rolls may be used for applying moisture to the roving ends as they are fed into the machine. Wetting rolls generally are the preferred method for achievement of maximum uniformity of moisture in the finished yarn. In some cases dust extraction may also be employed to advantage.

5.2 Automatic stop spindles and dry waste removal by vacuum should be employed to minimise dust generation caused by broken and/or loose ends.

5.3 Pot spinning frames — Where these are employed it is essential to ensure that the pot is maintained under negative pressure effectively to control dust emission.

5.4 Flyer frames — Material wetting, low operating speed, good maintenance and good general ventilation are the procedures used for dust control on flyer-type frames.

5.5 Bobbin stripping — Unless dust emission is controlled by wetting, a slow-speed pneumatic or hydraulic press should be employed for this operation. This is preferred to high-speed cutter-type stripping methods. Dust extraction with partial enclosure may be employed.

6. Doubling (twisting)

6.1 The preferred method of control is by wetting. Wet packages may be used for machine feed and/or wetting rolls may be used for applying moisture to the yarn ends as they are fed into the machine. Wetting rolls is the generally preferred method for achievement of maximum uniformity of moisture in the finished yarn. In some cases dust extraction also can be employed to advantage. Automatic stop spindles and dry waste removal by vacuum should be employed to minimise dust generation caused by broken and/or loose ends.

7. Winding

7.1 Cop winding — Cops may be wound wet using a wet roller to apply controlled moisture to the yarn. In some cases dust extraction can be used to advantage for controlling this operation.

7.2 Traverse winding and cheese winding — Equipment should be enclosed and fitted with dust extraction. The use of overlapping transparent plastic strips to cover the working entrance of the enclosure has been found to be advantageous when winding dry yarn. Such a cover minimises the air volume required for good dust control while permitting easy operator access and visibility to the working section of the winding machinery.

8. Weaving

8.1 Warp beaming — The most effective control method has been found to be heavy humidification by means of spray nozzles and/or use of wet feed packages.

8.2 Creel warping — Where possible use wet packages. Where the addition of moisture is undesirable at beaming, creel ventilation with the creel partially enclosed by curtains can be quite effective. In these circumstances local ventilation of the reed and winding point on the beam should be employed.

8.3 Fabric weaving — Use wet packages, spray nozzles, wet rolls and/or dust extraction.

8.4 Finishing processes (inspection, calendering, drying, etc.) — For some applications a dust suppressant treatment or finish may be applied as a part of the finishing process. In general, dust control for these operations should be achieved by avoidance of violent manual or mechanical handling and the use of dust extraction or water sprays where possible. Woven material should be cut, not torn.

9. Braiding and plaiting

In some cases application of moisture or dust suppressant treatment may be employed with advantage. Where this is not possible enclose the equipment and fit with dust extraction. At least a portion of the enclosure should be fitted with clear plastic to provide operator visibility of the operation.

10. Packing and warehousing

Low-speed application of plastic wrapping to rolls of cloth and coils of tape is the preferred packaging method for asbestos textile material. Yarns, rope and roving are normally packaged in dust-tight cardboard cartons with tape seals. Shrink-wrapping of individual packages can form a useful means of totally encapsulating individual units such as fabric or spools of yarn.

11. Waste

Waste should be sealed in labelled plastic bags for landfill disposal or delivery to appropriate reprocessing facilities. Controlled wetting of waste before bags are sealed may be used to advantage to minimise dust emission during the bag-sealing operation or in case of bag rupture. Only heavy-gauge plastic bags should be employed for handling asbestos-containing waste materials (see RCP3).

12. Protective clothing and equipment

Full details of suppliers of suitable equipment which has been tested for use with products together with advice on the design and specification of such equipment may be obtained from AIA or from the Association's members. They will be pleased to supply names and addresses of national suppliers of such equipment.

Publications by the Asbestos International Association

Recommended Control Procedures

- RCP1 *The Control of Asbestos Dust*
- RCP2 Asbestos Cement Products
- Insert — Catalogue of Tools for working with asbestos cement products on site
- RCP3 Asbestos Waste Materials.
- RCP4 Asbestos Fibres, Packaging Handling and Transportation.
- RCP5 Asbestos Fibres, Bag Opening.
- RCP6 Asbestos Textile Products — Manufacture.
- RCP7 Asbestos Textile Products — Fabrication and Use.
- RCP8 Repair and Removal of Asbestos Insulation.
- RCP9 Protection equipment for use in the manufacture and use of Asbestos Products.
- RCP10 Asbestos Containing Friction Material, Application and Servicing.

Recommended Technical Methods

- RTM1 *Reference Method for the determination of Airborne Asbestos Fibre concentrations at Workplaces by Light Microscopy (Membrane Filter Method).*
- RTM2 *Reference Method for the determination of Airborne Asbestos Fibres by Scanning Electron Microscopy.**

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