

AIA Health and Safety Publication
Recommended Control Procedure No.4 (RCP4)

ASBESTOS FIBRES

Packaging, Handling and Transportation



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Reprint of April 1981



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 guidelines 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 Fibres - Packaging, Handling and Transportation

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ASBESTOS FIBRES

Packaging, Handling and Transportation

1. Products and operations covered by these recommendations

- 1.1 Chrysotile asbestos fibre
- 1.2 Amosite asbestos fibre
- 1.3 Crocidolite asbestos fibre
- 1.4 Fibrous anthophyllite
- 1.5 Any other asbestos fibre or mixtures thereof

These recommendations cover the handling during loading and unloading consignments of fibre at port or other despatch or receiving depot, storage on ship, road vehicle or railway wagon, transport between mine and point of ultimate consumption, storage and disposal.

2. Basic requirements

2.1 Today it is known that the inhalation of fine asbestos dust may — under certain circumstances — cause serious bodily harm. Many asbestos fibre producers therefore draw attention to the need for suitable precautions with a distinct warning label on each bag; some draw attention to the responsibility for proper control in their sales contracts.

2.2 Consumers of asbestos fibre (i.e. manufacturers of asbestos products) become responsible for control of harmful asbestos dust emission as soon as the asbestos fibre comes into their possession. (This may be at any stage from leaving the mine onwards according to the conditions of purchase.) Handling consignments of fibre in a dockyard, on ships, in transit and in store can result in dust hazards from spillage unless good packaging and handling methods are employed. The problem of dust control at a factory during the initial stages of most manufacturing processes can be greatly relieved by well-designed packaging of the unprocessed fibre.

2.3 Asbestos fibre producers have developed a number of methods of packaging to ensure the safe and spillage-free arrival of asbestos fibre at its final destination. These methods of packaging are designed to permit various techniques of handling, transportation and storage which minimise the possibility of damage to bags and consequent spillage.

2.4 The disposal of empty asbestos fibre bags so that they may not be re-used for other purposes is a feature of control which must not be overlooked.

3. Packing — initial packing of fibre

3.1 Type of bag. Asbestos fibres should always be packed in impermeable bags. The following materials are used:

- (a) Woven and coated polyethylene or polypropylene.
- (b) Multiwall impermeable paper and multiwall water-soluble paper.

3.2 Polyethylene or polypropylene are recommended because of their much greater resistance to damage during handling. The coated exterior surface of the woven plastic bags is less inclined to slip when stacked than paper bags.

3.3 Multiwall, water-soluble paper bags are not recommended because of their vulnerability to tearing. They are used in special situations where the bags are fed into a wet process without opening them. Because the bags are water soluble they are consumed in the end product. However, this system is not acceptable unless the bags are carefully transported in closed railway wagons, containers or vans without transhipment.

3.4 The plastic used should preferably be polyethylene, this material being more convenient for recycling than polypropylene. However, polypropylene is the best second choice depending on availability.

3.5 An ultraviolet inhibitor should be added to the plastic material, which allows some exposure to sunlight without protective cover, and ensures that the plastic bags retain their strength even though they may be exposed to sunlight during transhipment or temporary storage at ports. However, once a shipment has been delivered to its final destination it is essential that the bags be protected from further exposure to sunlight. This can be accomplished by storage in a proper warehouse or by the use of such protective devices as tarpaulins, rubber or black plastic sheeting.

3.6 Closure of bags may be by stitching or heat sealing. Stitching at approximately two stitches per centimetre is recommended. Where plastic bags are recycled, the cotton thread may cause problems; in such cases polyester thread should be used for sewing if the bags cannot be heat-sealed.

3.7 Bags are usually pressure packed, partially pressure packed for subsequent press-baling, or 'high density' blocked. This latter method, developed by a Canadian producer for chrysotile fibre, consists of compression of the fibre into a solid block (about half the volume of a normal pressure-packed bag), individually wrapped in water-soluble paper for subsequent shrink — or stretch — wrapping with plastic film onto pallets.

3.8 Bags should be printed with a health warning label incorporating the 'a' symbol recommended by AIA. (See Fig. 1.)



Fig. 1

4. Packaging for consignment

The prime aim of all types of packaging for consignment is to eliminate individual handling of bags wherever possible and to minimise damage to bags which would result in spillage.

4.1 Pallets

4.1.1 For the transport of small tonnages in break bulk vessels (i.e. those carrying mixed cargoes) the bags should be palletised in an interlocked fashion. This does not apply to bags of amphibole asbestos which are normally too large to permit interlocking on standard pallets. Furthermore, the bags should be securely attached to the pallet by using such techniques as strapping, glue locking and shrink — or stretch — wrapping.

4.1.2 By using containers it is possible to design the loading so that 100 per cent of each shipment is on pallets. It is undesirable to double-stack small units in the container because the top pallets can cause damage to the lower units during transport. Depending on bag size, weight and container capacity, this will generally mean forming pallet loads to consist of seven to nine interlocked layers. The addition of plastic stretch or shrink wrapping is sufficient to avoid bag movement.

4.1.3 In general the size and design of the pallet is made to suit the asbestos bags and the type of shipment involved. For example, small tonnages in break bulk vessels should be on pallets similar to the sketch shown at Fig. 2. The actual dimensions of the pallet should be such that the bags slightly overhang the pallet on all sides. If the pallet protrudes beyond the bags it can easily damage bags in an adjacent pallet load. It should also be a 'wing' style as shown at Fig. 2. This is to permit easy lifting with slings and to assist in anchoring shrink or stretch wrapping.

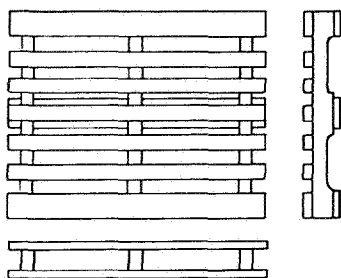


Fig. 2

4.1.4 The afore-mentioned pallet is also suitable for loading in containers, vans and railway wagons, because it can be picked up from all four sides with a lift truck.

4.1.5 Another style which is also suitable for containers and has gained wide acceptance is shown at Fig. 3.

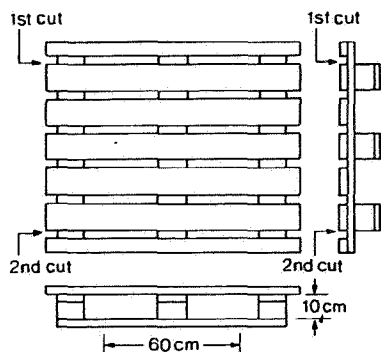


Fig. 3

4.1.6 This pallet should have the following dimensions:

- four entries, 10 cm high
- min. 60 cm width of opening on each side allowing the lifting by any forklift.

The two wings may be cut easily to allow for the re-use of the pallet for finished products. For example, a pallet of size 100 x 120 cm can be altered with one cut to 90 x 120 cm or with two cuts to 80 x 120 cm (standard European size). Thus, the rather high pallet costs are offset and the disposal problem of the one-way pallet presently in use is solved.

4.2 Marino slings

4.2.1 For charter shipments where several thousand tons of asbestos are stowed in a vessel, experience has shown that pallets should not be used because the wood may damage bags during loading and unloading or through the movement of cargo during the voyage. These problems can be overcome by the use of disposable marino slings (see Fig. 4). A design which has been found very satisfactory for use with chrysotile asbestos (but which is not generally recommended for use with amphibole asbestos) incorporates the use of webbing straps and has a plastic sheet embedded in the bottom to create a platform on which a unit of bags is placed. These units must be made up of interlocked bags and not exceed five layers high. Each unit should then be stretch wrapped to ensure maximum stability.

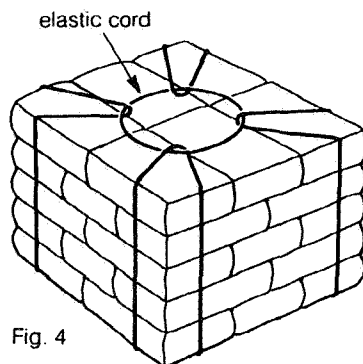


Fig. 4

The four corner straps should be held together by an elastic cord to keep them available for lifting. Otherwise stevedores may have to search for them, which delays unloading.

4.2.2 For the most efficient handling of these units, spreader devices of particular design have been created. These permit the handling of multiple units at one time, thereby greatly reducing the time required to load and unload from the vessel.

4.2.3 It is also important to understand that once the units in marino slings are removed from the ship they are placed on pallets for further handling by fork-lift truck.

4.3 Plastic cover

4.3.1 In order to further protect the bags against damage and to bring stability to the unit, a plastic cover should be added. It should be used for units on wooden pallets as well as for units in marino slings.

4.3.2 There are two basic types of plastic covers, namely shrink-wrapping and stretch-wrapping. The shrink-wrapping has the advantage of being a complete cover for the top and four sides of the unit. It is heated causing it to shrink and tighten around the unit ensuring very good stability. However, the heat may in some cases cause the cover and bags to stick together. To avoid this a satisfactory alternative is stretch-wrapping. This form of wrapping generally covers only the four sides of the unit. If it is important that the top be protected (in case of double stacking), a top cover can be added and held in position by the stretch-wrapping.

4.3.3 An ultra-violet inhibitor should be added to both types of wrapping to increase their outdoor resistance further. However, this will only prolong their resistance to sunlight for a short period of time (e.g. a few months). Neither the stretch- nor the shrink-wrapped units are weather proof and they should therefore be covered if outside storage is necessary.

4.3.4 An alternative form of cover recommended for use with palletised units of amphibole asbestos is a heavy-gauge plastic cover which fits over the top and four sides of the unit and is strapped in position.

4.4 'Big bags' and 'tank trucks'

Two methods have been developed to handle asbestos in bulk form. These are 'big (balloon) bags' and 'tank trucks', which have a limited application; they are only capable of handling short asbestos fibres and are only economical for transporting short distances. It is also necessary that the receiving plant is suitably equipped to handle each delivery in a controlled manner.

5. Transportation

5.1 Closed vehicles

5.1.1 The ideal methods of transporting asbestos are palletised and plastic-wrapped units loaded in either closed road vehicles or railway cars for overland and closed containers for overseas shipment. As the doors are closed at the asbestos mine or port and opened only when the shipment arrives at the user plant, any spillage of asbestos during transport is completely avoided.

5.1.2 The direct unloading of these vehicles by fork-lift truck may not be possible unless a ramp is available. If not, a satisfactory alternative is to pull the palletised units to the doorway with a trans-pallet where they can easily be picked up with a fork-lift truck. More expensive solutions are the use of mobile ramps or special trailers which lift the containers to the ground.

5.2 Alternatives

5.2.1 Small overseas shipments which cannot be made in containers should nevertheless be palletised and plastic covered and loaded in break bulk vessels. (See 4.1.1 above.)

5.2.2 Large overseas shipments which cannot be transported in containers should be unitised in marine slings and stretch-wrapped. However, this method of transport can only be successful by choosing the proper type of vessel. The ideal ship is box type single-decked, having vertical sides and full-width hatches. Whilst the units are being loaded aboard ship, all significant empty spaces must be filled by using disposable inflatable dunnage.

5.2.3 All vehicles used for the transport of asbestos must be properly cleaned after the unloading process. The recommended procedures are by dry vacuuming or wet sweeping, and personnel concerned should be provided with suitable protection when harmful dust emission cannot be avoided.

6. Warehousing

The following preparations must be completed before final storage:

6.1 All bags should be palletised.

6.2 All units must be carefully inspected for damage and cleanliness.

6.3 All damaged bags must be immediately repaired. (See 7 below.)

6.4 All units having loose asbestos or other debris on them must be cleaned by dry vacuum and the worker should be provided with suitable protection.

6.5 The final storage ideally should be in a dry warehouse. If outside storage cannot be avoided the units must be protected by such devices as tarpaulins, rubber or black plastic sheeting.

7. Bag repair

It is very important to instruct workers who handle asbestos units in ports or warehouses that they should repair any damaged bag immediately with appropriate adhesive tape. Otherwise the asbestos spilled during handling will defeat the efforts which are described in these recommendations.

8. Bag opening

This is a complex subject covering a multiplicity of methods of opening of the several different forms in which asbestos is packaged and will be the subject of a Recommended Control Procedure to be published separately.

9. Disposal of packing materials

9.1 It is important to recognise that empty asbestos bags and wrapping contain a small residue of loose asbestos. Therefore they must be carefully handled in a manner to avoid creating dust, and disposed of by one of the methods listed below:

They are:

9.1.1 Grinding for inclusion in the end product.

9.1.2 Melting for safe disposal in normal waste-dumps.

9.1.3 Recycling into secondary plastic products.

9.1.4 Bagging.

9.2 Grinding

Chopping equipment has been developed which can cut the plastic materials into particles small enough to permit their inclusion in some end products. It is important to note that the empty bags and wrapping material amount to about 0.5 per cent of the asbestos. If the end product, such as asbestos cement sheets, contains 10 per cent asbestos, the plastic then becomes only .05 per cent of the final product. Two criteria are important for this concept to be successful. The plastic must be compatible with the process and other ingredients in the end product, and the plastic particles must be cut fine enough to ensure that they disperse properly.

9.3 Melting

If the end product cannot accept the plastic, an alternative is to melt it. By melting the empty plastic bags and wrappers, the asbestos residue becomes embedded in the melted plastic. As a result of the asbestos being 'locked in', it should be possible to dispose of this material in any normal waste dump. Specific low-volume melting equipment, which can be employed at individual bag-opening stations, is in development.

9.4 Recycling

Work has now been completed which demonstrates that the melted plastic material can also be incorporated into secondary plastic applications. For example, it can be added as an ingredient in the manufacture of certain plastic pipe or moulded parts where recycled plastic is permissible. It is recognised that the cost of the moulding equipment is quite high and would require a large usage of asbestos bags to justify the installation of equipment at the asbestos-using plant. Therefore, the final choice of whether to re-use the plastic in this manner will depend on the economics of the specific situation.

9.5 Bagging

Unless one of the above three methods can be adopted, used packing materials should be collected under suitable dust control conditions into an impermeable container (such as new, unused plastic bags) immediately after being emptied. Such containers should be properly sealed and despatched for disposal at authorised waste dumps. In no case should bags which have contained asbestos fibre be re-used in any other manner than described above. (See also AIA RCP3 — Asbestos Waste Materials.)

10. General

Further information on any aspect of safe working with asbestos will gladly be supplied by the Asbestos International Association or by any of the Association members whose addresses are contained elsewhere in this publication.

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**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.*

*Not yet printed.

