ASBESTOS INFORMATION ASSOCIATION
NORTH AMERICA
1660 L Street, N.W. / Washington, D.C. 20036 / (202) 223-4885

PLAINTIFF'S EXHIBIT
UC-4243

RECOMMENDED WORK PRACTICES

MANUFACTURE AND FABRICATION OF PRODUCTS

USING

ASBESTOS FILLED RESINOUS MOLDING COMPOUNDS

DRAFT
1/3/75

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ACL Doc 18834 · Page 1 of 99
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INDEX

INTRODUCTION	Page 2
SUMMARY OF OSHA ASBESTOS STANDARD. . . .	Pages 4-5
GENERAL RECOMMENDATIONS	Pages 6-7
SPECIFIC RECOMMENDATIONS	Page 8
OSHA ASBESTOS STANDARD (1910.93a). . . .	Appendix A
DRAWING	Appendix B

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work P... Published by AsbestosClaims.Law
ACL Doc 18834 · Page 2 of 99 **asbestosclaims.law/library/18834/2**

INTRODUCTION

The work practices on the following pages have been prepared by the Standards and Technical Committee of the Asbestos Information Association/North America. They are intended as general guidance for safe and clean workplace conditions in keeping with the spirit and intent of the Occupational Safety and Health Administration's Standard for Occupational Exposure to Asbestos Fiber.

The practices have been developed through careful study and consultation and are recommended as good procedure. It is recognized that manufacturing conditions vary. Implementation of the practices contained herein cannot be considered as a guarantee of OSHA compliance.

Thorough understanding of the OSHA standard is important to management of any company utilizing asbestos in its manufacturing or processing operations. The standard was originally published on June 7, 1972 and was republished in the Federal Register on June 27, 1974. The standard, Part 1910, Section 1910.93a, of the Department of Labor, Occupational Safety and Health Standards, is reproduced in Appendix A. The OSHA asbestos standard is under continuing review. Revisions or amendments to the standard which may occur will be published as a matter of course in the Federal Register. Manufacturers are urged to consult with OSHA personnel where there is any question of compliance with the standard.

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work P... Published by AsbestosClaims.Law
ACL Doc 18834 · Page 3 of 99 asbestosclaims.law/library/18834/3

RECOMMENDED WORK PRACTICES
MANUFACTURE AND FABRICATION OF PRODUCTS
USING
ASBESTOS FILLED RESINOUS MOLDING COMPOUNDS

Types of asbestos filled resinous molding compounds covered by these work practice recommendations are:

Pelletized

Granular

Nodular

Shredded

Chopped

Dry mixed.

Operations to which these work practices might apply are:

Handling and warehousing.

Bag opening and introduction of materials into process equipment.

Mold filling.

General housekeeping.

Clean-up of spilled materials.

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ACL Doc 18834 · Page 4 of 99 asbestosclaims.law/library/18834/4

SUMMARY OF THE REQUIREMENTS OF THE OSHA ASBESTOS STANDARD (1910.93a)

General

The Asbestos Standard applies to any manufacturing, fabricating or handling process or operation utilizing asbestos fiber or materials containing asbestos fiber.

Exposure Levels [1910.93a (b)]

It is the employer's responsibility to maintain "permissible exposure to airborne concentrations of asbestos fibers" below the levels prescribed.

Methods of Compliance [1910.93a (c)]

Exposure levels may be controlled by isolation, enclosure, exhaust ventilation and dust collection. Other methods that achieve the fiber exposure level objective may be used.

Particular Tools [1910.93a (c)]

All hand operated and power operated tools which may produce airborne asbestos fibers in excess of permissible exposure levels shall be provided with local exhaust systems.

Wet Methods [1910.93a (c)]

When practicable, asbestos products shall be handled in a wet state sufficient to prevent the emission of dust to the atmosphere. This procedure is not required where the usefulness of the product might be diminished by wetting. Application of wet methods is limited and engineering controls are normally preferable.

Personal Protective Equipment and Clothing [1910.93a (d)]

Under certain conditions specified in this paragraph of the standard, respirators may be used to protect employees exposed to airborne fiber levels above permissible. Only respirators of the type prescribed for the various exposure levels should be used.

Under prescribed conditions where the airborne asbestos fiber level exceeds permissible, the employer is required to provide:

protective clothing
change rooms
clothes lockers.

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work P...
ACL Doc 18834 · Page 5 of 99
Published by AsbestosClaims.Law
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Monitoring [1910.93a (e)]

The standard requires that within six months of its effective date, all workplaces where asbestos fibers are released shall be monitored to determine exposure levels. Monitoring must be repeated at six month intervals if the fiber concentrations are above permissible levels. Monitoring shall be repeated at reasonable intervals at the employer's discretion if the fiber concentrations are below permissible levels.

Caution Signs and Labels [1910.93a (g)]

Caution signs shall be displayed at each location where asbestos fiber concentrations exceed permissible exposure levels.

Caution labels shall be applied to all materials and products which during any reasonably foreseeable use might release concentrations of asbestos fibers in excess of permissible exposure levels.

Housekeeping [1910.93a (h)]

All external surfaces, machinery and equipment shall be maintained free of asbestos fiber accumulations that might, if dispersed, create asbestos fiber concentrations above permissible exposure levels. Vacuum cleaning is the preferred method for removal. It is recommended that the vacuum cleaners be equipped with a disposable collection bag and an efficient internal filtration system. Other methods may be used if they don't create fiber concentrations in excess of permissible levels.

All asbestos containing waste material, such as dust and scrap, which might in the disposal process create fiber concentrations in excess of permissible levels, shall be disposed of in sealed bags or containers. These bags and containers shall carry the prescribed caution label.

Medical Examinations [1910.93a (j)]

Every employer shall provide or make available at his cost the prescribed medical examination to all his employees exposed to airborne asbestos fiber.

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work P...
ACL Doc 18834 · Page 6 of 99
Published by AsbestosClaims.Law
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GENERAL RECOMMENDATIONS

Exhaust and Dust Collection Systems

The OSHA Asbestos Standard requires that exhaust and dust collection systems be designed and maintained in accordance with American National Standard,* "Fundamentals Governing the Design and Operation of Local Exhaust Systems",, ANSI Z9.2-1971. However, other reference volumes such as

> Industrial Ventilation - A Manual of Recommended Practices, prepared by the Committee on Industrial Ventilation of the American Conference of Governmental Industrial Hygienists,
>
> and
>
> Design of Industrial Exhaust Systems by Alden and Kane, published by the Industrial Press, Inc.

are recognized as authoritative.

For small and intermittent production and fabrication operations major dust collection systems of the high volume, low velocity type design described in the design references in the paragraph above may not be necessary. Instead, systems of the low volume, high velocity type utilizing as their exhaust air source a high efficiency vacuum cleaner could be suitable. For design information on these systems refer to the work practices on fabrication of asbestos-containing sheet products.

All exhaust and dust collection systems should be inspected periodically for proper functioning and broken bags. For continuous operations it is recommended that the system operation and the interior of the baghouse be checked daily. A scheduled maintenance program that includes bag replacement should be prepared and followed.

Wherever possible, operations involving asbestos containing materials should be isolated from other work areas by partitions, curtains or other means. If central exhaust systems are utilized, the areas should be maintained under a slight negative pressure.

*American National Standards Institute, Inc.
1430 Broadway
New York, N.Y. 10018

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ACL Doc 18834 · Page 7 of 99 asbestosclaims.law/library/18834/7

Personal Protection

Persons exposed to airborne asbestos fiber should develop good personal hygiene practices. Included should be:

Don't smoke.

Wash thoroughly before eating.

Shower after work.

Change to work clothes upon arrival at work and change from work clothes at the conclusion of the work day.

Wear proper protective clothing and respirators as provided by your employer when the situation warrants. Be certain that the respirator fits properly.

Contaminated work clothing taken home for laundering should be carefully washed, by themselves -- do not wash with other clothing..

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work P... Published by AsbestosClaims.Law
ACL Doc 18834 · Page 8 of 99 **asbestosclaims.law/library/18834/8**

RECOMMENDED WORK PRACTICES
MANUFACTURE AND FABRICATION OF PRODUCTS
USING
ASBESTOS FILLED RESINOUS MOLDING COMPOUNDS

SPECIFIC RECOMMENDATIONS

When feasible and available, molding compounds that have been specially prepared to reduce dust generation should be used.

Prior to unloading bags of molding compound from any vehicle a visual inspection of the cargo shall be made to determine if bag damage has occurred and if any loose material is present. Damaged bags shall be repaired by taping or insertion into a slip bag. Loose material shall be removed by vacuum cleaning or other suitable method that does not generate significant concentrations of airborne fiber.

Compound should be removed from containers with care to avoid unnecessary generation of airborne dust. Where possible, charging stations with effective dust collection hoods connected to a local exhaust system should be employed. For design of a typical station with provisions for controlled bag disposal, refer to Drawing No. 26065-1 in Appendix B.

Surface dust and spilled material should be removed from equipment and building surfaces regularly, preferably by vacuum methods. Refer to paragraph "Housekeeping" on Page 4.

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ACL Doc 18834 · Page 9 of 99 asbestosclaims.law/library/18834/9

§ 1910.93a Asbestos.

(a) *Definitions.* For the purpose of this section, (1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(b) *Permissible exposure to airborne concentrations of asbestos fibers*—(1) *Standard effective July 7, 1972.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(2) *Standard effective July 1, 1976.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(3) *Ceiling concentration.* No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(c) *Methods of compliance*—(1) *Engineering methods.* (i) *Engineering controls.* Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet the exposure limits prescribed in paragraph (b) of this section.

(ii) *Local exhaust ventilation.* (a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2–1971, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z9.2–1971, and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(iii) *Particular tools.* All hand-operated and power-operated tools which may produce or release asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section such as, but not limited to, saws, scorers, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subdivision (ii) of this subparagraph.

(2) *Work practices*—(i) *Wet methods.* Insofar as practicable, asbestos shall be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to prevent the emission of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the usefulness of the product would be diminished thereby.

(ii) *Particular products and operations.* No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated so as to prevent effectively the release of airborne asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) *Spraying, demolition, or removal.* Employees engaged in the spraying of asbestos, the removal, or demolition of pipes, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

(d) *Personal protective equipment*—(1) Compliance with the exposure limits prescribed by paragraph (b) of this section may not be achieved by the use of respirators or shift rotation of employees, except:

(i) During the time period necessary to install the engineering controls and to institute the work practices required by paragraph (c) of this section;

(ii) In work situations in which the methods prescribed in paragraph (c) of this section are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section; or

(iii) In emergencies.

(iv) Where both respirators and personnel rotation are allowed by subdivisions (i), (ii), or (iii) of this subparagraph, and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by subparagraph (1) of this paragraph, it shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare, under the provisions of 30 CFR Part 11 (37 F.R. 6244, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(i) *Air purifying respirators.* A reusable or single use air purifying respirator, or a respirator described in subdivision (ii) or (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(ii) *Powered air purifying respirators.* A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in subdivision (iii) of this subparagraph, shall be used to reduce the concentrations of asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(iii) *Type "C" supplied-air respirators, continuous flow or pressure-demand class.* A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(iv) *Establishment of a respirator program.* (a) The employer shall establish a respirator program in accordance with the requirements of the American National Standards Practices for Respiratory Protection, ANSI Z88.2–1969, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z88.2–1969 and the maintenance of an historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(c) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or other employees will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such a different position is available.

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ACL Doc 18834 · Page 10 of 99 asbestosclaims.law/library/18834/10

(3) Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms: (i) At any fixed place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(ii) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent contamination of the employee's street clothes from his work clothes.

(iii) Laundering: (a) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(b) Any employer who gives asbestos-contaminated clothing to another person for laundering shall inform such person of the requirement in (a) of this subdivision to effectively prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(c) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (g) of this section.

(e) *Method of measurement.* All determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400–450 × (magnification) (4 millimeter objective) with phase contrast illumination.

(f) *Monitoring*—(1) *Initial determinations.* Within 6 months of the publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employee's exposure to asbestos fibers is below the limits prescribed in paragraph (b) of this section. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with paragraph (c) of this section.

(2) *Personal monitoring*—(i) Samples shall be collected from within the breathing zone of the employees, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) Sampling frequency and patterns. After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section.

(3) *Environmental monitoring*—(i) samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employees. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) *Sampling frequency and patterns.* After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. In no case shall sampling be at intervals greater than 6 months for employees whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in paragraph (b) of this section.

(4) *Employee observation of monitoring.* Affected employees, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this paragraph and shall have access to the records thereof.

(g) *Caution signs and labels.* (1) *Caution signs.* (i) *Posting.* Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section. Signs shall be posted at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing excessive concentrations of airborne asbestos fibers.

(ii) *Sign specifications.* The warning signs required by subdivision (i) of this subparagraph shall conform to the requirements of 20" x 14" vertical format signs specified in § 1910.145(d)(4), and to this subdivision. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in this subdivision.

Legend	Notation
Asbestos	1" Sans Serif, Gothic or Block.
Dust Hazard	¾" Sans Serif, Gothic or Block.
Avoid Breathing Dust	¼" Gothic.
Wear Assigned Protective Equipment.	¼" Gothic.
Do Not Remain In Area Unless Your Work Requires It.	¼" Gothic.
Breathing Asbestos Dust May Be Hazardous To Your Health.	14 point Gothic.

Spacing between lines shall be at least equal to the height of the upper of any two lines.

(2) *Caution labels*—(i) *Labeling.* Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers, except that no label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

(ii) *Label specifications.* The caution labels required by subdivision (i) of this subparagraph shall be printed in letters of sufficient size and contrast as to be readily visible and legible. The label shall state:

CAUTION

Contains Asbestos Fibers

Avoid Creating Dust

Breathing Asbestos Dust May Cause Serious Bodily Harm

(h) *Housekeeping*—(1) *Cleaning.* All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with their dispersion, there would be an excessive concentration.

(2) *Waste disposal.* Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

(i) *Recordkeeping*—(1) *Exposure records.* Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of at least 3 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health, and to authorized representatives of either.

(2) *Employee access.* Every employee and former employee shall have reasonable access to any record required to be maintained by subparagraph (1) of this paragraph, which indicates the employee's own exposure to asbestos fibers.

(3) *Employee notification.* Any employee found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in paragraph (b) of this section shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

(j) *Medical examinations*—(1) *General.* The employer shall provide or make available at his cost, medical examinations relative to exposure to asbestos required by this paragraph.

UCC 010910

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ACL Doc 18834 · Page 11 of 99 asbestosclaims.law/library/18834/11

(2) *Preplacement.* The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(3) *Annual examinations.* On or before January 31, 1973, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(4) *Termination of employment.* The employer shall provide, or make available, within 30 calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(5) *Recent examinations.* No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(6) *Medical records*—(i) *Maintenance.* Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) *Access.* The contents of the records of the medical examinations required by this paragraph shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of NIOSH, to authorized physicians and medical consultants of either of them, and, upon the request of an employee or former employee, to his physician. Any physician who conducts a medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

23505

§ 1910.19 Asbestos dust.

Section 1910.93a shall apply to the exposure of every employee to asbestos dust in every employment and place of employment covered by § 1910.12, § 1910.13, § 1910.14, § 1910.15, or § 1910.16, in lieu of any different standard on exposure to asbestos dust which would otherwise be applicable by virtue of any of those sections.

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ACL Doc 18834 · Page 12 of 99 asbestosclaims.law/library/18834/12

ASBESTOS INFORMATION ASSOCIATION
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RECOMMENDED WORK PRACTICES

FABRICATION AND USE

OF

ASBESTOS FRICTION MATERIALS

DRAFT
1/3/75

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INDEX

INTRODUCTION . . . . . Page 2

SUMMARY OF OSHA ASBESTOS STANDARD . . . . Pages 4-5

GENERAL RECOMMENDATIONS . . . . . Pages 6-7

SPECIFIC RECOMMENDATIONS . . . . . Page 8

OSHA ASBESTOS STANDARD (1910.93a) . . . . . Appendix A

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work…
ACL Doc 18834 · Page 14 of 99
Published by AsbestosClaims.Law
asbestosclaims.law/library/18834/14

INTRODUCTION

The work practices on the following pages have been prepared by the Standards and Technical Committee of the Asbestos Information Association/North America. They are intended as general guidance for safe and clean workplace conditions in keeping with the spirit and intent of the Occupational Safety and Health Administration's Standard for Occupational Exposure to Asbestos Fiber.

The practices have been developed through careful study and consultation and are recommended as good procedure. It is recognized that manufacturing conditions vary. Implementation of the practices contained herein cannot be considered as a guarantee of OSHA compliance.

Thorough understanding of the OSHA standard is important to management of any company utilizing asbestos in its manufacturing or processing operations. The standard was originally published on June 7, 1972 and was republished in the Federal Register on June 27, 1974. The standard, Part 1910, Section 1910.93a, of the Department of Labor, Occupational Safety and Health Standards, is reproduced in Appendix A. The OSHA asbestos standard is under continuing review. Revisions or amendments to the standard which may occur will be published as a matter of course in the Federal Register. Manufacturers are urged to consult with OSHA personnel where there is any question of compliance with the standard.

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work… Published by AsbestosClaims.Law
ACL Doc 18834 · Page 15 of 99 **asbestosclaims.law/library/18834/15**

RECOMMENDED WORK PRACTICES
FABRICATION AND USE
OF
ASBESTOS FRICTION MATERIALS

The types of asbestos friction material products covered by these work practice recommendations are:

Clutch facings

Brake lining segments

Brake blocks

Disc brake pads

Brake band materials

Automotive transmission discs.

Operations to which these work practices might apply are:

Clutch assembly and rebuilding operations

Brake assembly or relining operations

Automatic transmission assembly and rebuilding operations.

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work... Published by AsbestosClaims.Law
ACL Doc 18834 · Page 16 of 99 **asbestosclaims.law/library/18834/16**

SUMMARY OF THE REQUIREMENTS OF THE OSHA ASBESTOS STANDARD (1910.93a)

General

The Asbestos Standard applies to any manufacturing, fabricating or handling process or operation utilizing asbestos fiber or materials containing asbestos fiber.

Exposure Levels [1910.93a (b)]

It is the employer's responsibility to maintain "permissible exposure to airborne concentrations of asbestos fibers" below the levels prescribed.

Methods of Compliance [1910.93a.(c)]

Exposure levels may be controlled by isolation, enclosure, exhaust ventilation and dust collection. Other methods that achieve the fiber exposure level objective may be used.

Particular Tools [1910.93a (c)]

All hand operated and power operated tools which may produce airborne asbestos fibers in excess of permissible exposure levels shall be provided with local exhaust systems.

Wet Methods [1910.93a (c)]

When practicable, asbestos products shall be handled in a wet state sufficient to prevent the emission of dust to the atmosphere. This procedure is not required where the usefulness of the product might be diminished by wetting. Application of wet methods is limited and engineering controls are normally preferable.

Personal Protective Equipment and Clothing [1910.93a (d)]

Under certain conditions specified in this paragraph of the standard, respirators may be used to protect employees exposed to airborne fiber levels above permissible. Only respirators of the type prescribed for the various exposure levels should be used.

Under prescribed conditions where the airborne asbestos fiber level exceeds permissible, the employer is required to provide:

Protective clothing
change rooms
clothes lockers.

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work... Published by AsbestosClaims.Law
ACL Doc 18834 · Page 17 of 99 asbestosclaims.law/library/18834/17

Monitoring [1910.93a (e)]

The standard requires that within six months of its effective date, all workplaces where asbestos fibers are released shall be monitored to determine exposure levels. Monitoring must be repeated at six month intervals if the fiber concentrations are above permissible levels. Monitoring shall be repeated at reasonable intervals at the employer's discretion if the fiber concentrations are below permissible levels.

Caution Signs and Labels [1910.93a (g)]

Caution signs shall be displayed at each location where asbestos fiber concentrations exceed permissible exposure levels.

Caution labels shall be applied to all materials and products which during any reasonably foreseeable use might release concentrations of asbestos fibers in excess of permissible exposure levels.

Housekeeping [1910.93a (h)]

All external surfaces, machinery and equipment shall be maintained free of asbestos fiber accumulations that might, if dispersed, create asbestos fiber concentrations above permissible exposure levels. Vacuum cleaning is the preferred method for removal. It is recommended that the vacuum cleaners be equipped with a disposable collection bag and an efficient internal filtration system. Other methods may be used if they don't create fiber concentrations in excess of permissible levels.

All asbestos containing waste material, such as dust and scrap, which might in the disposal process create fiber concentrations in excess of permissible levels, shall be disposed of in sealed bags or containers. These bags and containers shall carry the prescribed caution label.

Medical Examinations [1910.93a (j)]

Every employer shall provide or make available at his cost the prescribed medical examination to all his employees exposed to airborne asbestos fiber.

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ACL Doc 18834 · Page 18 of 99 asbestosclaims.law/library/18834/18

GENERAL RECOMMENDATIONS

Exhaust and Dust Collection Systems

The OSHA Asbestos Standard requires that exhaust and dust collection systems be designed and maintained in accordance with American National Standard,* "Fundamentals Governing the Design and Operation of Local Exhaust Systems", ANSI Z9.2-1971. However, other reference volumes such as

> Industrial Ventilation - A Manual of Recommended Practices, prepared by the Committee on Industrial Ventilation of the American Conference of Governmental Industrial Hygienists,
>
> and
>
> Design of Industrial Exhaust Systems by Alden and Kane, published by the Industrial Press, Inc.

are recognized as authoritative.

For small and intermittent production and fabrication operations major dust collection systems of the high volume, low velocity type design described in the design references in the paragraph above may not be necessary. Instead, systems of the low volume, high velocity type utilizing as their exhaust air source a high efficiency vacuum cleaner could be suitable. For design information on these systems refer to the work practices on fabrication of asbestos-containing sheet products.

All exhaust and dust collection systems should be inspected periodically for proper functioning and broken bags. For continuous operations it is recommended that the system operation and the interior of the baghouse be checked daily. A scheduled maintenance program that includes bag replacement should be prepared and followed.

Wherever possible, operations involving asbestos containing materials should be isolated from other work areas by partitions, curtains or other means. If central exhaust systems are utilized, the areas should be maintained under a slight negative pressure.

*American National Standards Institute, Inc.
1430 Broadway
New York, N.Y. 10018

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Personal Protection

Persons exposed to airborne asbestos fiber should develop good personal hygiene practices. Included should be:

Don't smoke.

Wash thoroughly before eating.

Shower after work.

Change to work clothes upon arrival at work and change from work clothes at the conclusion of the work day.

Wear proper protective clothing and respirators as provided by your employer when the situation warrants. Be certain that the respirator fits properly.

Contaminated work clothing taken home for laundering should be carefully washed, by themselves -- do not wash with other clothing..

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ACL Doc 18834 · Page 20 of 99 asbestosclaims.law/library/18834/20

RECOMMENDED WORK PRACTICES
FABRICATION AND USE
OF
ASBESTOS FRICTION MATERIALS

SPECIFIC RECOMMENDATIONS

To avoid additional fabricating operations, where possible, friction materials should be obtained from the manufacturer in finished form; cut, machined and/or drilled to suit the final requirements.

Fabricating equipment such as grinders, lathes, drill presses working on large capacity operations should be equipped with high volume, low velocity exhaust and dust collection systems designed in accordance with the recommendations on Page 6.

Intermittent, short duration machining operations might be equipped with high velocity, low volume exhaust and dust collection systems also described on Page 6.

If dust control by means of exhaust ventilation is not feasible or practicable, then wet machining utilizing fluid cutting lubricants might be a suitable alternate.

Dust and chips generated by the machining operations must be removed regularly and disposed of in accordance with the paragraph "Housekeeping" on Page 5.

Dust present on the surface of the in-process or finished products must be removed by wiping with a damp cloth or other suitable means between fabricating steps and before shipment.

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ACL Doc 18834 · Page 21 of 99 **asbestosclaims.law/library/18834/21**

§ 1910.93a Asbestos.

(a) *Definitions.* For the purpose of this section, (1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(b) *Permissible exposure to airborne concentrations of asbestos fibers*—(1) *Standard effective July 7, 1972.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(2) *Standard effective July 1, 1976.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(3) *Ceiling concentration.* No employee shall be exposed at any time to airborne cencentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(c) *Methods of compliance*—(1) *Engineering methods.* (i) *Engineering controls.* Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet the exposure limits prescribed in paragraph (b) of this section.

(ii) *Local exhaust ventilation.* (a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2–1971, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z9.2–1971, and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(iii) *Particular tools.* All hand-operated and power-operated tools which may produce or release asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section such as, but not limited to, saws, scorers, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subdivision (ii) of this subparagraph.

(2) *Work practices*—(i) *Wet methods.* Insofar as practicable, asbestos shall be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to prevent the emission of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the usefulness of the product would be diminished thereby.

(ii) *Particular products and operations.* No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated so as to prevent effectively the release of airborne asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) *Spraying, demolition, or removal.* Employees engaged in the spraying of asbestos, the removal, or demolition of pipes, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

(d) *Personal protective equipment*—(1) Compliance with the exposure limits prescribed by paragraph (b) of this section may not be achieved by the use of respirators or shift rotation of employees, except:

(i) During the time period necessary to install the engineering controls and to institute the work practices required by paragraph (c) of this section;

(ii) In work situations in which the methods prescribed in paragraph (c) of this section are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section; or

(iii) In emergencies.

(iv) Where both respirators and personnel rotation are allowed by subdivisions (i), (ii), or (iii) of this subparagraph, and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by subparagraph (1) of this paragraph, it shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare, under the provisions of 30 CFR Part 11 (37 F.R. 6244, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(i) *Air purifying respirators.* A reusable or single use air purifying respirator, or a respirator described in subdivision (ii) or (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(ii) *Powered air purifying respirators.* A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in subdivision (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(iii) *Type "C" supplied-air respirators, continuous flow or pressure-demand class.* A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(iv) *Establishment of a respirator program.* (a) The employer shall establish a respirator program in accordance with the requirements of the American National Standards Practices for Respiratory Protection, ANSI Z88.2–1969, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z88.2–1969 and the maintenance of an historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(c) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or other employees will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such a different position is available.

UCC 010921

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ACL Doc 18834 · Page 22 of 99 asbestosclaims.law/library/18834/22

(3) Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms: (i) At any fixed place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(ii) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent contamination of the employee's street clothes from his work clothes.

(iii) Laundering: (*a*) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(*b*) Any employer who gives asbestos-contaminated clothing to another person for laundering shall inform such person of the requirement in (*a*) of this subdivision to effectively prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(*c*) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (g) of this section.

(*e*) *Method of measurement.* All determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400–450 × (magnification) (4 millimeter objective) with phase contrast illumination.

(*f*) *Monitoring*—(1) *Initial determinations.* Within 6 months of the publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employee's exposure to asbestos fibers is below the limits prescribed in paragraph (b) of this section. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with paragraph (c) of this section.

(2) *Personal monitoring*—(i) Samples shall be collected from within the breathing zone of the employees, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) Sampling frequency and patterns. After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section.

(3) *Environmental monitoring*—(i) samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employees. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) *Sampling frequency and patterns.* After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. In no case shall sampling be at intervals greater than 6 months for employees whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in paragraph (b) of this section.

(4) *Employee observation of monitoring.* Affected employees, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this paragraph and shall have access to the records thereof.

(*g*) *Caution signs and labels.* (1) *Caution signs.* (i) *Posting.* Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section. Signs shall be posted at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing excessive concentrations of airborne asbestos fibers.

(ii) *Sign specifications.* The warning signs required by subdivision (i) of this subparagraph shall conform to the requirements of 20" x 14" vertical format signs specified in § 1910.145(d)(4), and to this subdivision. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in this subdivision.

Legend	*Notation*
Asbestos	1" Sans Serif, Gothic or Block.
Dust Hazard	¾" Sans Serif, Gothic or Block.
Avoid Breathing Dust	¼" Gothic.
Wear Assigned Protective Equipment.	¼" Gothic.
Do Not Remain In Area Unless Your Work Requires It.	¼" Gothic.
Breathing Asbestos Dust May Be Hazardous To Your Health.	14 point Gothic.

Spacing between lines shall be at least equal to the height of the upper of any two lines.

(2) *Caution labels*—(i) *Labeling.* Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers, except that no label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

(ii) *Label specifications.* The caution labels required by subdivision (i) of this subparagraph shall be printed in letters of sufficient size and contrast as to be readily visible and legible. The label shall state:

CAUTION

Contains Asbestos Fibers

Avoid Creating Dust

Breathing Asbestos Dust May Cause Serious Bodily Harm

(h) *Housekeeping*—(1) *Cleaning.* All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with the dispersion, there would be an excessive concentration.

(2) *Waste disposal.* Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

(i) *Recordkeeping*—(1) *Exposure records.* Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of at least 3 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health, and to authorized representatives of either.

(2) *Employee access.* Every employee and former employee shall have reasonable access to any record required to be maintained by subparagraph (1) of this paragraph, which indicates the employee's own exposure to asbestos fibers.

(3) *Employee notification.* Any employee found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in paragraph (b) of this section shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

(j) *Medical examinations*—(1) *General.* The employer shall provide or make available at his cost, medical examinations relative to exposure to asbestos required by this paragraph.

UCC 010922

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ACL Doc 18834 · Page 23 of 99 asbestosclaims.law/library/18834/23

(2) *Preplacement.* The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(3) *Annual examinations.* On or before January 31, 1973, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(4) *Termination of employment.* The employer shall provide, or make available, within 30 calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(5) *Recent examinations.* No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(6) *Medical records*—(i) *Maintenance.* Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) *Access.* The contents of the records of the medical examinations required by this paragraph shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of NIOSH, to authorized physicians and medical consultants of either of them, and, upon the request of an employee or former employee, to his physician. Any physician who conducts a medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

23505

§ 1910.19 Asbestos dust.

Section 1910.93a shall apply to the exposure of every employee to asbestos dust in every employment and place of employment covered by § 1910.12, § 1910.13, § 1910.14, § 1910.15, or § 1910.16, in lieu of any different standard on exposure to asbestos dust which would otherwise be applicable by virtue of any of those sections.

UCC 010923

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ASBESTOS INFORMATION ASSOCIATION
NORTH AMERICA
1660 L Street, N.W. / Washington, D.C. 20036 / (202) 223-4885

RECOMMENDED WORK PRACTICES

FABRICATION AND USE

OF

ASBESTOS REINFORCED PLASTIC PRODUCTS

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INDEX

INTRODUCTION . . . . . Page 2

SUMMARY OF OSHA ASBESTOS STANDARD . . . . Pages 4-5

GENERAL RECOMMENDATIONS . . . . . Pages 6-7

SPECIFIC RECOMMENDATIONS . . . . . Page 8

OSHA ASBESTOS STANDARD (1910.93a). . . . . Appendix A

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ACL Doc 18834 · Page 26 of 99 **asbestosclaims.law/library/18834/26**

INTRODUCTION

The work practices on the following pages have been prepared by the Standards and Technical Committee of the Asbestos Information Association/North America. They are intended as general guidance for safe and clean workplace conditions in keeping with the spirit and intent of the Occupational Safety and Health Administration's Standard for Occupational Exposure to Asbestos Fiber.

The practices have been developed through careful study and consultation and are recommended as good procedure. It is recognized that manufacturing conditions vary. Implementation of the practices contained herein cannot be considered as a guarantee of OSHA compliance.

Thorough understanding of the OSHA standard is important to management of any company utilizing asbestos in its manufacturing or processing operations. The standard was originally published on June 7, 1972 and was republished in the Federal Register on June 27, 1974. The standard, Part 1910, Section 1910.93a, of the Department of Labor, Occupational Safety and Health Standards, is reproduced in Appendix A. The OSHA asbestos standard is under continuing review. Revisions or amendments to the standard which may occur will be published as a matter of course in the Federal Register. Manufacturers are urged to consult with OSHA personnel where there is any question of compliance with the standard.

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ACL Doc 18834 · Page 27 of 99 asbestosclaims.law/library/18834/27

RECOMMENDED WORK PRACTICES
FABRICATION AND USE
OF
ASBESTOS REINFORCED PLASTIC PRODUCTS

Types of asbestos reinforced plastic products covered by these work practice recommendations are:

Compression molded

Transfer molded

Injection molded

Extruded

Convolute and spiral wound

Laminated.

Operations to which the recommended work practices might apply are:

Finished machining of rough molded, extruded or wound products.

Drilling and/or counter-boring

Blanking, punching and/or shearing

Surface preparation for adhesive application

Miscellaneous assembly fabrication maintenance and/or repair operations

Field alterations.

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ACL Doc 18834 · Page 28 of 99 **asbestosclaims.law/library/18834/28**

SUMMARY OF THE REQUIREMENTS OF THE OSHA ASBESTOS STANDARD (1910.93a)

General

The Asbestos Standard applies to any manufacturing, fabricating or handling process or operation utilizing asbestos fiber or materials containing asbestos fiber.

Exposure Levels [1910.93a (b)]

It is the employer's responsibility to maintain "permissible exposure to airborne concentrations of asbestos fibers" below the levels prescribed.

Methods of Compliance [1910.93a (c)]

Exposure levels may be controlled by isolation, enclosure, exhaust ventilation and dust collection. Other methods that achieve the fiber exposure level objective may be used.

Particular Tools [1910.93a (c)]

All hand operated and power operated tools which may produce airborne asbestos fibers in excess of permissible exposure levels shall be provided with local exhaust systems.

Wet Methods [1910.93a (c)]

When practicable, asbestos products shall be handled in a wet state sufficient to prevent the emission of dust to the atmosphere. This procedure is not required where the usefulness of the product might be diminished by wetting. Application of wet methods is limited and engineering controls are normally preferable.

Personal Protective Equipment and Clothing [1910.93a (d)]

Under certain conditions specified in this paragraph of the standard, respirators may be used to protect employees exposed to airborne fiber levels above permissible. Only respirators of the type prescribed for the various exposure levels should be used.

Under prescribed conditions where the airborne asbestos fiber level exceeds permissible, the employer is required to provide:

Protective clothing
change rooms
clothes lockers

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ACL Doc 18834 · Page 29 of 99 asbestosclaims.law/library/18834/29

Monitoring [1910.93a (e)]

The standard requires that within six months of its effective date, all workplaces where asbestos fibers are released shall be monitored to determine exposure levels. Monitoring must be repeated at six month intervals if the fiber concentrations are above permissible levels. Monitoring shall be repeated at reasonable intervals at the employer's discretion if the fiber concentrations are below permissible levels.

Caution Signs and Labels [1910.93a (g)]

Caution signs shall be displayed at each location where asbestos fiber concentrations exceed permissible exposure levels.

Caution labels shall be applied to all materials and products which during any reasonably foreseeable use might release concentrations of asbestos fibers in excess of permissible exposure levels.

Housekeeping [1910.93a (h)]

All external surfaces, machinery and equipment shall be maintained free of asbestos fiber accumulations that might, if dispersed, create asbestos fiber concentrations above permissible exposure levels. Vacuum cleaning is the preferred method for removal. It is recommended that the vacuum cleaners be equipped with a disposable collection bag and an efficient internal filtration system. Other methods may be used if they don't create fiber concentrations in excess of permissible levels.

All asbestos containing waste material, such as dust and scrap, which might in the disposal process create fiber concentrations in excess of permissible levels, shall be disposed of in sealed bags or containers. These bags and containers shall carry the prescribed caution label.

Medical Examinations [1910.93a (j)]

Every employer shall provide or make available at his cost the prescribed medical examination to all his employees exposed to airborne asbestos fiber.

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ACL Doc 18834 · Page 30 of 99 asbestosclaims.law/library/18834/30

GENERAL RECOMMENDATIONS

Exhaust and Dust Collection Systems

The OSHA Asbestos Standard requires that exhaust and dust collection systems be designed and maintained in accordance with American National Standard,* "Fundamentals Governing the Design and Operation of Local Exhaust Systems", ANSI Z9.2-1971. However, other reference volumes such as

> Industrial Ventilation - A Manual of Recommended Practices, prepared by the Committee on Industrial Ventilation of the American Conference of Governmental Industrial Hygienists,
>
> and
>
> Design of Industrial Exhaust Systems by Alden and Kane, published by the Industrial Press, Inc.

are recognized as authoritative.

For small and intermittent production and fabrication operations major dust collection systems of the high volume, low velocity type design described in the design references in the paragraph above may not be necessary. Instead, systems of the low volume, high velocity type utilizing as their exhaust air source a high efficiency vacuum cleaner could be suitable. For design information on these systems refer to the work practices on fabrication of asbestos-containing sheet products.

All exhaust and dust collection systems should be inspected periodically for proper functioning and broken bags. For continuous operations it is recommended that the system operation and the interior of the baghouse be checked daily. A scheduled maintenance program that includes bag replacement should be prepared and followed.

Wherever possible, operations involving asbestos containing materials should be isolated from other work areas by partitions, curtains or other means. If central exhaust systems are utilized, the areas should be maintained under a slight negative pressure.

*American National Standards Institute, Inc.
1430 Broadway
New York, N.Y. 10018

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ACL Doc 18834 · Page 31 of 99 asbestosclaims.law/library/18834/31

Personal Protection

Persons exposed to airborne asbestos fiber should develop good personal hygiene practices. Included should be:

Don't smoke.

Wash thoroughly before eating.

Shower after work.

Change to work clothes upon arrival at work and change from work clothes at the conclusion of the work day.

Wear proper protective clothing and respirators as provided by your employer when the situation warrants. Be certain that the respirator fits properly.

Contaminated work clothing taken home for laundering should be carefully washed, by themselves -- do not wash with other clothing..

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ACL Doc 18834 · Page 32 of 99 **asbestosclaims.law/library/18834/32**

RECOMMENDED WORK PRACTICES
FABRICATION AND USE
OF
ASBESTOS REINFORCED PLASTIC PRODUCTS

SPECIFIC RECOMMENDATIONS

To avoid additional fabricating operations, where possible, these plastic products should be obtained from the manufacturer in finished form; cut, machined and/or drilled to suit the final requirements.

Fabricating equipment such as grinders, lathes, drill presses working on large capacity operations should be equipped with high volume, low velocity exhaust and dust collection systems designed in accordance with the recommendations on Page 6.

Intermittent, short duration machining operations might be equipped with high velocity, low volume exhaust and dust collection systems also described on Page 6.

If dust control by means of exhaust ventilation is not feasible or practicable, then wet machining utilizing fluid cutting lubricants might be a suitable alternate.

Dust and chips generated by the machining operations must be removed regularly and disposed of in accordance with the paragraph "Housekeeping" on Page 5.

Dust present on the surface of the in-process or finished products must be removed by wiping with a damp cloth or other suitable means between fabricating steps and before shipment.

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ACL Doc 18834 · Page 33 of 99
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§ 1910.93a Asbestos.

(a) *Definitions.* For the purpose of this section, (1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(b) *Permissible exposure to airborne concentrations of asbestos fibers*—(1) *Standard effective July 7, 1972.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(2) *Standard effective July 1, 1976.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(3) *Ceiling concentration.* No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(c) *Methods of compliance*—(1) *Engineering methods.* (i) *Engineering controls.* Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet the exposure limits prescribed in paragraph (b) of this section.

(ii) *Local exhaust ventilation.* (a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2–1971, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z9.2–1971, and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(iii) *Particular tools.* All hand-operated and power-operated tools which may produce or release asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section such as, but not limited to, saws, scorers, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subdivision (ii) of this subparagraph.

(2) *Work practices*—(i) *Wet methods.* Insofar as practicable, asbestos shall be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to prevent the emission of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the usefulness of the product would be diminished thereby.

(ii) *Particular products and operations.* No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated so as to prevent effectively the release of airborne asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) *Spraying, demolition, or removal.* Employees engaged in the spraying of asbestos, the removal, or demolition of pipes, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

(d) *Personal protective equipment*—(1) Compliance with the exposure limits prescribed by paragraph (b) of this section may not be achieved by the use of respirators or shift rotation of employees, except:

(i) During the time period necessary to install the engineering controls and to institute the work practices required by paragraph (c) of this section;

(ii) In work situations in which the methods prescribed in paragraph (c) of this section are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section; or

(iii) In emergencies.

(iv) Where both respirators and personnel rotation are allowed by subdivisions (i), (ii), or (iii) of this subparagraph, and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by subparagraph (1) of this paragraph, it shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare, under the provisions of 30 CFR Part 11 (37 F.R. 6244, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(i) *Air purifying respirators.* A reusable or single use air purifying respirator, or a respirator described in subdivision (ii) or (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(ii) *Powered air purifying respirators.* A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in subdivision (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(iii) *Type "C" supplied-air respirators, continuous flow or pressure-demand class.* A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(iv) *Establishment of a respirator program.* (a) The employer shall establish a respirator program in accordance with the requirements of the American National Standards Practices for Respiratory Protection, ANSI Z88.2–1969, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z88.2–1969 and the maintenance of an historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(c) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or other employees will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such a different position is available.

UCC 010933

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work…
ACL Doc 18834 · Page 34 of 99
Published by AsbestosClaims.Law
asbestosclaims.law/library/18834/34

(3) Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms: (i) At any fixed place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(ii) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent contamination of the employee's street clothes from his work clothes.

(iii) Laundering: (a) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(b) Any employer who gives asbestos-contaminated clothing to another person for laundering shall inform such person of the requirement in (a) of this subdivision to effectively prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(c) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (g) of this section.

(e) *Method of measurement.* All determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400–450 × (magnification) (4 millimeter objective) with phase contrast illumination.

(f) *Monitoring*—(1) *Initial determinations.* Within 6 months of the publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employee's exposure to asbestos fibers is below the limits prescribed in paragraph (b) of this section. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with paragraph (c) of this section.

(2) *Personal monitoring*—(i) Samples shall be collected from within the breathing zone of the employees, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) Sampling frequency and patterns. After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section.

(3) *Environmental monitoring*—(i) samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employees. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) *Sampling frequency and patterns.* After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. In no case shall sampling be at intervals greater than 6 months for employees whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in paragraph (b) of this section.

(4) *Employee observation of monitoring.* Affected employees, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this paragraph and shall have access to the records thereof.

(g) *Caution signs and labels.* (1) *Caution signs.* (i) *Posting.* Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section. Signs shall be posted at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing excessive concentrations of airborne asbestos fibers.

(ii) *Sign specifications.* The warning signs required by subdivision (i) of this subparagraph shall conform to the requirements of 20" x 14" vertical format signs specified in § 1910.145(d)(4), and to this subdivision. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in this subdivision.

Legend	*Notation*
Asbestos	1" Sans Serif, Gothic or Block.
Dust Hazard	¾" Sans Serif, Gothic or Block.
Avoid Breathing Dust	¼" Gothic.
Wear Assigned Protective Equipment.	¼" Gothic.
Do Not Remain In Area Unless Your Work Requires It.	¼" Gothic.
Breathing Asbestos Dust May Be Hazardous To Your Health.	14 point Gothic.

Spacing between lines shall be at least equal to the height of the upper of any two lines.

(2) *Caution labels*—(i) *Labeling.* Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers, except that no label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

(ii) *Label specifications.* The caution labels required by subdivision (i) of this subparagraph shall be printed in letters of sufficient size and contrast as to be readily visible and legible. The label shall state:

CAUTION

Contains Asbestos Fibers

Avoid Creating Dust

Breathing Asbestos Dust May Cause Serious Bodily Harm

(h) *Housekeeping*—(1) *Cleaning.* All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with their dispersion, there would be an excessive concentration.

(2) *Waste disposal.* Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

(i) *Recordkeeping*—(1) *Exposure records.* Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of at least 3 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health, and to authorized representatives of either.

(2) *Employee access.* Every employee and former employee shall have reasonable access to any record required to be maintained by subparagraph (1) of this paragraph, which indicates the employee's own exposure to asbestos fibers.

(3) *Employee notification.* Any employee found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in paragraph (b) of this section shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

(j) *Medical examinations*—(1) *General.* The employer shall provide or make available at his cost, medical examinations relative to exposure to asbestos required by this paragraph.

UCC 010934

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ACL Doc 18834 · Page 35 of 99 asbestosclaims.law/library/18834/35

(2) *Preplacement.* The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(3) *Annual examinations.* On or before January 31, 1973, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(4) *Termination of employment.* The employer shall provide, or make available, within 30 calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(5) *Recent examinations.* No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(6) *Medical records*—(i) *Maintenance.* Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) *Access.* The contents of the records of the medical examinations required by this paragraph shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of NIOSH, to authorized physicians and medical consultants of either of them, and, upon the request of an employee or former employee, to his physician. Any physician who conducts a medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

23505

§ 1910.19 Asbestos dust.

Section 1910.93a shall apply to the exposure of every employee to asbestos dust in every employment and place of employment covered by § 1910.12, § 1910.13, § 1910.14, § 1910.15, or § 1910.16, in lieu of any different standard on exposure to asbestos dust which would otherwise be applicable by virtue of any of those sections.

UCC 010935

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ACL Doc 18834 · Page 36 of 99 asbestosclaims.law/library/18834/36

ASBESTOS INFORMATION ASSOCIATION
NORTH AMERICA
1660 L Street, N.W. / Washington, D.C. 20036 / (202) 223-4885

RECOMMENDED WORK PRACTICES

FABRICATION AND USE

OF

ASBESTOS PAPER PRODUCTS

DRAFT
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INDEX

INTRODUCTION . . . . . Page 2

SUMMARY OF OSHA ASBESTOS STANDARD . . . . Pages 4-5

GENERAL RECOMMENDATIONS . . . . . Pages 6-7

SPECIFIC RECOMMENDATIONS . . . . . Page 8

OSHA ASBESTOS STANDARD (1910.93a). . . . . Appendix A

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work…
ACL Doc 18834 · Page 38 of 99
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INTRODUCTION

The work practices on the following pages have been prepared by the Standards and Technical Committee of the Asbestos Information Association/North America. They are intended as general guidance for safe and clean workplace conditions in keeping with the spirit and intent of the Occupational Safety and Health Administration's Standard for Occupational Exposure to Asbestos Fiber.

The practices have been developed through careful study and consultation and are recommended as good procedure. It is recognized that manufacturing conditions vary. Implementation of the practices contained herein cannot be considered as a guarantee of OSHA compliance.

Thorough understanding of the OSHA standard is important to management of any company utilizing asbestos in its manufacturing or processing operations. The standard was originally published on June 7, 1972 and was republished in the Federal Register on June 27, 1974. The standard, Part 1910, Section 1910.93a, of the Department of Labor, Occupational Safety and Health Standards, is reproduced in Appendix A. The OSHA asbestos standard is under continuing review. Revisions or amendments to the standard which may occur will be published as a matter of course in the Federal Register. Manufacturers are urged to consult with OSHA personnel where there is any question of compliance with the standard.

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work… Published by AsbestosClaims.Law
ACL Doc 18834 · Page 39 of 99 **asbestosclaims.law/library/18834/39**

RECOMMENDED WORK PRACTICES
FABRICATION AND USE
OF
ASBESTOS PAPER PRODUCTS

The types of asbestos paper covered by these work practice recommendations are:

Gasketing

Millboard

Commercial Grades

Electrical Insulating

Cushion

Sound Deadening

Saturation Grades.

Operations to which these work practices might apply are:

Die Cutting

Shearing

Sheeting

Combining

Coating

Saturating

Other fabricating operations.

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ACL Doc 18834 · Page 40 of 99 asbestosclaims.law/library/18834/40

SUMMARY OF THE REQUIREMENTS OF THE OSHA ASBESTOS STANDARD (1910.93a)

General

The Asbestos Standard applies to any manufacturing, fabricating or handling process or operation utilizing asbestos fiber or materials containing asbestos fiber.

Exposure Levels [1910.93a (b)]

It is the employer's responsibility to maintain "permissible exposure to airborne concentrations of asbestos fibers" below the levels prescribed.

Methods of Compliance [1910.93a (c)]

Exposure levels may be controlled by isolation, enclosure, exhaust ventilation and dust collection. Other methods that achieve the fiber exposure level objective may be used.

Particular Tools [1910.93a (c)]

All hand operated and power operated tools which may produce airborne asbestos fibers in excess of permissible exposure levels shall be provided with local exhaust systems.

Wet Methods [1910.93a (c)]

When practicable, asbestos products shall be handled in a wet state sufficient to prevent the emission of dust to the atmosphere. This procedure is not required where the usefulness of the product might be diminished by wetting. Application of wet methods is limited and engineering controls are normally preferable.

Personal Protective Equipment and Clothing [1910.93a (d)]

Under certain conditions specified in this paragraph of the standard, respirators may be used to protect employees exposed to airborne fiber levels above permissible. Only respirators of the type prescribed for the various exposure levels should be used.

Under prescribed conditions where the airborne asbestos fiber level exceeds permissible, the employer is required to provide:

Protective clothing
change rooms

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ACL Doc 18834 · Page 41 of 99 asbestosclaims.law/library/18834/41

Monitoring [1910.93a (e)]

The standard requires that within six months of its effective date, all workplaces where asbestos fibers are released shall be monitored to determine exposure levels. Monitoring must be repeated at six month intervals if the fiber concentrations are above permissible levels. Monitoring shall be repeated at reasonable intervals at the employer's discretion if the fiber concentrations are below permissible levels.

Caution Signs and Labels [1910.93a (g)]

Caution signs shall be displayed at each location where asbestos fiber concentrations exceed permissible exposure levels.

Caution labels shall be applied to all materials and products which during any reasonably foreseeable use might release concentrations of asbestos fibers in excess of permissible exposure levels.

Housekeeping [1910.93a (h)]

All external surfaces, machinery and equipment shall be maintained free of asbestos fiber accumulations that might, if dispersed, create asbestos fiber concentrations above permissible exposure levels. Vacuum cleaning is the preferred method for removal. It is recommended that the vacuum cleaners be equipped with a disposable collection bag and an efficient internal filtration system. Other methods may be used if they don't create fiber concentrations in excess of permissible levels.

All asbestos containing waste material, such as dust and scrap, which might in the disposal process create fiber concentrations in excess of permissible levels, shall be disposed of in sealed bags or containers. These bags and containers shall carry the prescribed caution label.

Medical Examinations [1910.93a (j)]

Every employer shall provide or make available at his cost the prescribed medical examination to all his employees exposed to airborne asbestos fiber.

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ACL Doc 18834 · Page 42 of 99 asbestosclaims.law/library/18834/42

GENERAL RECOMMENDATIONS

Exhaust and Dust Collection Systems

The OSHA Asbestos Standard requires that exhaust and dust collection systems be designed and maintained in accordance with American National Standard,* "Fundamentals Governing the Design and Operation of Local Exhaust Systems", ANSI Z9.2-1971. However, other reference volumes such as

> Industrial Ventilation - A Manual of Recommended Practices, prepared by the Committee on Industrial Ventilation of the American Conference of Governmental Industrial Hygienists,
>
> and
>
> Design of Industrial Exhaust Systems by Alden and Kane, published by the Industrial Press, Inc.

are recognized as authoritative.

For small and intermittent production and fabrication operations major dust collection systems of the high volume, low velocity type design described in the design references in the paragraph above may not be necessary. Instead, systems of the low volume, high velocity type utilizing as their exhaust air source a high efficiency vacuum cleaner could be suitable. For design information on these systems refer to the work practices on fabrication of asbestos-containing sheet products.

All exhaust and dust collection systems should be inspected periodically for proper functioning and broken bags. For continuous operations it is recommended that the system operation and the interior of the baghouse be checked daily. A scheduled maintenance program that includes bag replacement should be prepared and followed.

Wherever possible, operations involving asbestos containing materials should be isolated from other work areas by partitions, curtains or other means. If central exhaust systems are utilized, the areas should be maintained under a slight negative pressure.

*American National Standards Institute, Inc.
1430 Broadway
New York, N.Y. 10018

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ACL Doc 18834 · Page 43 of 99 asbestosclaims.law/library/18834/43

Personal Protection

Persons exposed to airborne asbestos fiber should develop good personal hygiene practices. Included should be:

Don't smoke.

Wash thoroughly before eating.

Shower after work.

Change to work clothes upon arrival at work and change from work clothes at the conclusion of the work day.

Wear proper protective clothing and respirators as provided by your employer when the situation warrants. Be certain that the respirator fits properly.

Contaminated work clothing taken home for laundering should be carefully washed, by themselves -- do not wash with other clothing..

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ACL Doc 18834 · Page 44 of 99 **asbestosclaims.law/library/18834/44**

RECOMMENDED WORK PRACTICES
FABRICATION AND USE
OF
ASBESTOS PAPER PRODUCTS

SPECIFIC RECOMMENDATIONS

Asbestos paper products should be mechanically cut. Tearing should be avoided. Slitters employing either shear slitting or score slitting are recommended. Heavy-duty scissors can be used for short duration cutting.

Tables and other work surfaces where asbestos papers are handled should be kept smooth and clean.

Rolled asbestos papers should be unwound gently from mandrel supports. Avoid pulling from a free-standing roll or jerking the material during unwinding.

Dust should be removed from the surfaces of cut and fabricated materials before packing and shipping. Dust removal procedures should not cause workplace contamination.

Fabricating operations other than unwinding, slitting and shearing frequently will require the use of dust control systems to prevent airborne fiber concentrations from exceeding permissible levels.

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ACL Doc 18834 · Page 45 of 99 **asbestosclaims.law/library/18834/45**

§ 1910.93a Asbestos.

(a) *Definitions.* For the purpose of this section, (1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(b) *Permissible exposure to airborne concentrations of asbestos fibers*—(1) *Standard effective July 7, 1972.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(2) *Standard effective July 1, 1976.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(3) *Ceiling concentration.* No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(c) *Methods of compliance*—(1) *Engineering methods.* (i) *Engineering controls.* Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet the exposure limits prescribed in paragraph (b) of this section.

(ii) *Local exhaust ventilation.* (a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2–1971, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z9.2–1971, and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(iii) *Particular tools.* All hand-operated and power-operated tools which may produce or release asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section such as, but not limited to, saws, scorers, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subdivision (ii) of this subparagraph.

(2) *Work practices*—(i) *Wet methods.* Insofar as practicable, asbestos shall be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to prevent the emission of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the usefulness of the product would be diminished thereby.

(ii) *Particular products and operations.* No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated so as to prevent effectively the release of airborne asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) *Spraying, demolition, or removal.* Employees engaged in the spraying of asbestos, the removal, or demolition of pipes, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

(d) *Personal protective equipment*—(1) Compliance with the exposure limits prescribed by paragraph (b) of this section may not be achieved by the use of respirators or shift rotation of employees, except:

(i) During the time period necessary to install the engineering controls and to institute the work practices required by paragraph (c) of this section;

(ii) In work situations in which the methods prescribed in paragraph (c) of this section are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section; or

(iii) In emergencies.

(iv) Where both respirators and personnel rotation are allowed by subdivisions (i), (ii), or (iii) of this subparagraph, and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by subparagraph (1) of this paragraph, it shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare, under the provisions of 30 CFR Part 11 (37 F.R. 6244, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(i) *Air purifying respirators.* A reusable or single use air purifying respirator, or a respirator described in subdivision (ii) or (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(ii) *Powered air purifying respirators.* A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in subdivision (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(iii) *Type "C" supplied-air respirators, continuous flow or pressure-demand class.* A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(iv) *Establishment of a respirator program.* (a) The employer shall establish a respirator program in accordance with the requirements of the American National Standards Practices for Respiratory Protection, ANSI Z88.2–1969, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z88.2–1969 and the maintenance of an historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(c) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or other employees will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such a different position is available.

UCC 010945

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work…
ACL Doc 18834 · Page 46 of 99
Published by AsbestosClaims.Law
asbestosclaims.law/library/18834/46

(3) Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms: (i) At any fixed place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(ii) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent contamination of the employee's street clothes from his work clothes.

(iii) Laundering: (a) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(b) Any employer who gives asbestos-contaminated clothing to another person for laundering shall inform such person of the requirement in (a) of this subdivision to effectively prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(c) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (g) of this section.

(e) *Method of measurement.* All determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400–450 × (magnification) (4 millimeter objective) with phase contrast illumination.

(f) *Monitoring*—(1) *Initial determinations.* Within 6 months of the publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employee's exposure to asbestos fibers is below the limits prescribed in paragraph (b) of this section. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with paragraph (c) of this section.

(2) *Personal monitoring*—(i) Samples shall be collected from within the breathing zone of the employees, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) Sampling frequency and patterns. After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section.

(3) *Environmental monitoring*—(i) samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employees. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) *Sampling frequency and patterns.* After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. In no case shall sampling be at intervals greater than 6 months for employees whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in paragraph (b) of this section.

(4) *Employee observation of monitoring.* Affected employees, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this paragraph and shall have access to the records thereof.

(g) *Caution signs and labels.* (1) *Caution signs.* (i) *Posting.* Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section. Signs shall be posted at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing excessive concentrations of airborne asbestos fibers.

(ii) *Sign specifications.* The warning signs required by subdivision (i) of this subparagraph shall conform to the requirements of 20" x 14" vertical format signs specified in § 1910.145(d)(4), and to this subdivision. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in this subdivision.

Legend	*Notation*
Asbestos	1" Sans Serif, Gothic or Block.
Dust Hazard	⅝" Sans Serif, Gothic or Block.
Avoid Breathing Dust	¼" Gothic.
Wear Assigned Protective Equipment.	¼" Gothic.
Do Not Remain In Area Unless Your Work Requires It.	¼" Gothic.
Breathing Asbestos Dust May Be Hazardous To Your Health.	14 point Gothic.

Spacing between lines shall be at least equal to the height of the upper of any two lines.

(2) *Caution labels*—(i) *Labeling.* Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers, except that no label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

(ii) *Label specifications.* The caution labels required by subdivision (i) of this subparagraph shall be printed in letters of sufficient size and contrast as to be readily visible and legible. The label shall state:

CAUTION

Contains Asbestos Fibers

Avoid Creating Dust

Breathing Asbestos Dust May Cause Serious Bodily Harm

(h) *Housekeeping*—(1) *Cleaning.* All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with their dispersion, there would be an excessive concentration.

(2) *Waste disposal.* Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

(i) *Recordkeeping*—(1) *Exposure records.* Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of at least 3 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health, and to authorized representatives of either.

(2) *Employee access.* Every employee and former employee shall have reasonable access to any record required to be maintained by subparagraph (1) of this paragraph, which indicates the employee's own exposure to asbestos fibers.

(3) *Employee notification.* Any employee found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in paragraph (b) of this section shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

(j) *Medical examinations*—(1) *General.* The employer shall provide or make available at his cost, medical examinations relative to exposure to asbestos required by this paragraph.

UCC 010946

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ACL Doc 18834 · Page 47 of 99 asbestosclaims.law/library/18834/47

(2) *Preplacement.* The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(3) *Annual examinations.* On or before January 31, 1973, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(4) *Termination of employment.* The employer shall provide, or make available, within 30 calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(5) *Recent examinations.* No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(6) *Medical records*—(i) *Maintenance.* Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) *Access.* The contents of the records of the medical examinations required by this paragraph shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of NIOSH, to authorized physicians and medical consultants of either of them, and, upon the request of an employee or former employee, to his physician. Any physician who conducts a medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

23505

§ 1910.19 Asbestos dust.

Section 1910.93a shall apply to the exposure of every employee to asbestos dust in every employment and place of employment covered by § 1910.12, § 1910.13, § 1910.14, § 1910.15, or § 1910.16, in lieu of any different standard on exposure to asbestos dust which would otherwise be applicable by virtue of any of those sections.

UCC 010947

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ACL Doc 18834 · Page 48 of 99 asbestosclaims.law/library/18834/48

ASBESTOS INFORMATION ASSOCIATION
NORTH AMERICA
1660 L Street, N.W. / Washington, D.C. 20036 / (202) 223-4885

RECOMMENDED WORK PRACTICES

USE AND HANDLING

OF

ASBESTOS TEXTILE PRODUCTS

DRAFT
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INDEX

INTRODUCTION . . . . . Page 2

SUMMARY OF OSHA ASBESTOS STANDARD . . . . Pages 4-5

GENERAL RECOMMENDATIONS . . . . . Pages 6-7

SPECIFIC RECOMMENDATIONS . . . . . Page 8

OSHA ASBESTOS STANDARD (1910.93a). . . . . Appendix A

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work… Published by AsbestosClaims.Law
ACL Doc 18834 · Page 50 of 99 **asbestosclaims.law/library/18834/50**

INTRODUCTION

The work practices on the following pages have been prepared by the Standards and Technical Committee of the Asbestos Information Association/North America. They are intended as general guidance for safe and clean workplace conditions in keeping with the spirit and intent of the Occupational Safety and Health Administration's Standard for Occupational Exposure to Asbestos Fiber.

The practices have been developed through careful study and consultation and are recommended as good procedure. It is recognized that manufacturing conditions vary. Implementation of the practices contained herein cannot be considered as a guarantee of OSHA compliance.

Thorough understanding of the OSHA standard is important to management of any company utilizing asbestos in its manufacturing or processing operations. The standard was originally published on June 7, 1972 and was republished in the Federal Register on June 27, 1974. The standard, Part 1910, Section 1910.93a, of the Department of Labor, Occupational Safety and Health Standards, is reproduced in Appendix A. The OSHA asbestos standard is under continuing review. Revisions or amendments to the standard which may occur will be published as a matter of course in the Federal Register. Manufacturers are urged to consult with OSHA personnel where there is any question of compliance with the standard.

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ACL Doc 18834 · Page 51 of 99 **asbestosclaims.law/library/18834/51**

RECOMMENDED WORK PRACTICES
USE AND HANDLING
OF
ASBESTOS TEXTILE PRODUCTS

Types of asbestos products covered by these work practice recommendations are:

Asbestos roving

Asbestos rope, wick and cord

Asbestos yarn

Asbestos cloth, tapes and braids

Operations to which these work practices might apply are:

Electrical wire manufacture

Braiding (packing and gasket materials)

Cutting and sawing

Lamination of woven materials, insulation, wrapping and fabrication

General use.

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ACL Doc 18834 · Page 52 of 99 **asbestosclaims.law/library/18834/52**

SUMMARY OF THE REQUIREMENTS OF THE OSHA ASBESTOS STANDARD (1910.93a)

General

The Asbestos Standard applies to any manufacturing, fabricating or handling process or operation utilizing asbestos fiber or materials containing asbestos fiber.

Exposure Levels [1910.93a (b)]

It is the employer's responsibility to maintain "permissible exposure to airborne concentrations of asbestos fibers" below the levels prescribed.

Methods of Compliance [1910.93a (c)]

Exposure levels may be controlled by isolation, enclosure, exhaust ventilation and dust collection. Other methods that achieve the fiber exposure level objective may be used.

Particular Tools [1910.93a (c)]

All hand operated and power operated tools which may produce airborne asbestos fibers in excess of permissible exposure levels shall be provided with local exhaust systems.

Wet Methods [1910.93a (c)]

When practicable, asbestos products shall be handled in a wet state sufficient to prevent the emission of dust to the atmosphere. This procedure is not required where the usefulness of the product might be diminished by wetting. Application of wet methods is limited and engineering controls are normally preferable.

Personal Protective Equipment and Clothing [1910.93a (d)]

Under certain conditions specified in this paragraph of the standard, respirators may be used to protect employees exposed to airborne fiber levels above permissible. Only respirators of the type prescribed for the various exposure levels should be used.

Under prescribed conditions where the airborne asbestos fiber level exceeds permissible, the employer is required to provide:

Protective clothing
change rooms
clothes lockers.

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ACL Doc 18834 · Page 53 of 99 asbestosclaims.law/library/18834/53

Monitoring [1910.93a (e)]

The standard requires that within six months of its effective date, all workplaces where asbestos fibers are released shall be monitored to determine exposure levels. Monitoring must be repeated at six month intervals if the fiber concentrations are above permissible levels. Monitoring shall be repeated at reasonable intervals at the employer's discretion if the fiber concentrations are below permissible levels.

Caution Signs and Labels [1910.93a (g)]

Caution signs shall be displayed at each location where asbestos fiber concentrations exceed permissible exposure levels.

Caution labels shall be applied to all materials and products which during any reasonably foreseeable use might release concentrations of asbestos fibers in excess of permissible exposure levels.

Housekeeping [1910.93a (h)]

All external surfaces, machinery and equipment shall be maintained free of asbestos fiber accumulations that might, if dispersed, create asbestos fiber concentrations above permissible exposure levels. Vacuum cleaning is the preferred method for removal. It is recommended that the vacuum cleaners be equipped with a disposable collection bag and an efficient internal filtration system. Other methods may be used if they don't create fiber concentrations in excess of permissible levels.

All asbestos containing waste material, such as dust and scrap, which might in the disposal process create fiber concentrations in excess of permissible levels, shall be disposed of in sealed bags or containers. These bags and containers shall carry the prescribed caution label.

Medical Examinations [1910.93a (j)]

Every employer shall provide or make available at his cost the prescribed medical examination to all his employees exposed to airborne asbestos fiber.

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work... Published by AsbestosClaims.Law
ACL Doc 18834 · Page 54 of 99 asbestosclaims.law/library/18834/54

GENERAL RECOMMENDATIONS

Exhaust and Dust Collection Systems

The OSHA Asbestos Standard requires that exhaust and dust collection systems be designed and maintained in accordance with American National Standard,* "Fundamentals Governing the Design and Operation of Local Exhaust Systems", ANSI Z9.2-1971. However, other reference volumes such as

> Industrial Ventilation - A Manual of Recommended Practices, prepared by the Committee on Industrial Ventilation of the American Conference of Governmental Industrial Hygienists,
>
> and
>
> Design of Industrial Exhaust Systems by Alden and Kane, published by the Industrial Press, Inc.

are recognized as authoritative.

For small and intermittent production and fabrication operations major dust collection systems of the high volume, low velocity type design described in the design references in the paragraph above may not be necessary. Instead, systems of the low volume, high velocity type utilizing as their exhaust air source a high efficiency vacuum cleaner could be suitable. For design information on these systems refer to the work practices on fabrication of asbestos-containing sheet products.

All exhaust and dust collection systems should be inspected periodically for proper functioning and broken bags. For continuous operations it is recommended that the system operation and the interior of the baghouse be checked daily. A scheduled maintenance program that includes bag replacement should be prepared and followed.

Wherever possible, operations involving asbestos containing materials should be isolated from other work areas by partitions, curtains or other means. If central exhaust systems are utilized, the areas should be maintained under a slight negative pressure.

*American National Standards Institute, Inc.
1430 Broadway
New York, N.Y. 10018

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ACL Doc 18834 · Page 55 of 99 asbestosclaims.law/library/18834/55

Personal Protection

Persons exposed to airborne asbestos fiber should develop good personal hygiene practices. Included should be:

Don't smoke.

Wash thorcughly before eating.

Shower after work.

Change to work clothes upon arrival at work and change from work clothes at the conclusion of the work day.

Wear proper protective clothing and respirators as provided by your employer when the situation warrants. Be certain that the respirator fits properly.

Contaminated work clothing taken home for laundering should be carefully washed, by themselves -- do not wash with other clothing..

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ACL Doc 18834 · Page 56 of 99 asbestosclaims.law/library/18834/56

RECOMMENDED WORK PRACTICES
USE AND HANDLING
OF ASBESTOS TEXTILE PRODUCTS

SPECIFIC RECOMMENDATIONS

Wherever possible, asbestos textiles that have been specially treated to reduce dust emissions should be used.

Handling of sewn and/or cut pieces should be kept to a minimum.

Asbestos textiles should be mechanically cut or sheared to avoid tearing and/or fraying. Rotary knives or heavy duty scissors are the best for cutting operations.

Cutting and sewing edges or surfaces should be dampened to reduce dust generation during handling.

Tables and other working surfaces where asbestos textiles are being fabricated or handled should be kept smooth and clean.

Asbestos textiles in storage should be kept in sealed containers or dust-tight wrappings.

Cut pieces or any form of processing waste from asbestos textiles shall be disposed of in accordance with paragraph "Housekeeping" on Page 5.

Asbestos textiles should be unrolled gently from spools, coils or mandrels to the table or other working surfaces. Avoid pulling from a free standing supply or roll and avoid jerking of the material during unrolling.

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ACL Doc 18834 · Page 57 of 99 **asbestosclaims.law/library/18834/57**

§ 1910.93a Asbestos.

(a) *Definitions.* For the purpose of this section, (1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(b) *Permissible exposure to airborne concentrations of asbestos fibers*—(1) *Standard effective July 7, 1972.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(2) *Standard effective July 1, 1976.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(3) *Ceiling concentration.* No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(c) *Methods of compliance*—(1) *Engineering methods.* (i) *Engineering controls.* Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet the exposure limits prescribed in paragraph (b) of this section.

(ii) *Local exhaust ventilation.* (a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2–1971, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z9.2–1971, and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(iii) *Particular tools.* All hand-operated and power-operated tools which may produce or release asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section such as, but not limited to, saws, scorers, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subdivision (ii) of this subparagraph.

(2) *Work practices*—(i) *Wet methods.* Insofar as practicable, asbestos shall be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to prevent the emission of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the usefulness of the product would be diminished thereby.

(ii) *Particular products and operations.* No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated so as to prevent effectively the release of airborne asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) *Spraying, demolition, or removal.* Employees engaged in the spraying of asbestos, the removal, or demolition of pipes, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

(d) *Personal protective equipment*—(1) Compliance with the exposure limits prescribed by paragraph (b) of this section may not be achieved by the use of respirators or shift rotation of employees, except:

(i) During the time period necessary to install the engineering controls and to institute the work practices required by paragraph (c) of this section;

(ii) In work situations in which the methods prescribed in paragraph (c) of this section are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section; or

(iii) In emergencies.

(iv) Where both respirators and personnel rotation are allowed by subdivisions (i), (ii), or (iii) of this subparagraph, and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by subparagraph (1) of this paragraph, it shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare, under the provisions of 30 CFR Part 11 (37 F.R. 6244, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(i) *Air purifying respirators.* A reusable or single use air purifying respirator, or a respirator described in subdivision (ii) or (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(ii) *Powered air purifying respirators.* A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in subdivision (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(iii) *Type "C" supplied-air respirators, continuous flow or pressure-demand class.* A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(iv) *Establishment of a respirator program.* (a) The employer shall establish a respirator program in accordance with the requirements of the American National Standards Practices for Respiratory Protection, ANSI Z88.2–1969, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z88.2–1969 and the maintenance of an historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(c) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or other employees will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such a different position is available.

UCC 010957

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ACL Doc 18834 · Page 58 of 99

asbestosclaims.law/library/18834/58

(3) Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms: (i) At any fixed place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(ii) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent contamination of the employee's street clothes from his work clothes.

(iii) Laundering: (a) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(b) Any employer who gives asbestos-contaminated clothing to another person for laundering shall inform such person of the requirement in (a) of this subdivision to effectively prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(c) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (g) of this section.

(e) *Method of measurement.* All determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400–450 × (magnification) (4 millimeter objective) with phase contrast illumination.

(f) *Monitoring*—(1) *Initial determinations.* Within 6 months of the publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employee's exposure to asbestos fibers is below the limits prescribed in paragraph (b) of this section. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with paragraph (c) of this section.

(2) *Personal monitoring*—(i) Samples shall be collected from within the breathing zone of the employees, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) Sampling frequency and patterns. After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section.

(3) *Environmental monitoring*—(i) samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employees. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) *Sampling frequency and patterns.* After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. In no case shall sampling be at intervals greater than 6 months for employees whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in paragraph (b) of this section.

(4) *Employee observation of monitoring.* Affected employees, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this paragraph and shall have access to the records thereof.

(g) *Caution signs and labels.* (1) *Caution signs.* (i) *Posting.* Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section. Signs shall be posted at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing excessive concentrations of airborne asbestos fibers.

(ii) *Sign specifications.* The warning signs required by subdivision (i) of this subparagraph shall conform to the requirements of 20" x 14" vertical format signs specified in § 1910.145(d)(4), and to this subdivision. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in this subdivision.

Legend	*Notation*
Asbestos	1" Sans Serif, Gothic or Block.
Dust Hazard	¾" Sans Serif, Gothic or Block.
Avoid Breathing Dust	¼" Gothic.
Wear Assigned Protective Equipment.	¼" Gothic.
Do Not Remain In Area Unless Your Work Requires It.	¼" Gothic.
Breathing Asbestos Dust May Be Hazardous To Your Health.	14 point Gothic.

Spacing between lines shall be at least equal to the height of the upper of any two lines.

(2) *Caution labels*—(i) *Labeling.* Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers, except that no label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

(ii) *Label specifications.* The caution labels required by subdivision (i) of this subparagraph shall be printed in letters of sufficient size and contrast as to be readily visible and legible. The label shall state:

CAUTION

Contains Asbestos Fibers

Avoid Creating Dust

Breathing Asbestos Dust May Cause Serious Bodily Harm

(h) *Housekeeping*—(1) *Cleaning.* All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with their dispersion, there would be an excessive concentration.

(2) *Waste disposal.* Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

(i) *Recordkeeping*—(1) *Exposure records.* Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of at least 3 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health, and to authorized representatives of either.

(2) *Employee access.* Every employee and former employee shall have reasonable access to any record required to be maintained by subparagraph (1) of this paragraph, which indicates the employee's own exposure to asbestos fibers.

(3) *Employee notification.* Any employee found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in paragraph (b) of this section shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

(j) *Medical examinations*—(1) *General.* The employer shall provide or make available at his cost, medical examinations relative to exposure to asbestos required by this paragraph.

UCC 010958

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ACL Doc 18834 · Page 59 of 99 asbestosclaims.law/library/18834/59

(2) *Preplacement.* The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(3) *Annual examinations.* On or before January 31, 1973, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(4) *Termination of employment.* The employer shall provide, or make available, within 30 calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(5) *Recent examinations.* No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(6) *Medical records*—(i) *Maintenance.* Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) *Access.* The contents of the records of the medical examinations required by this paragraph shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of NIOSH, to authorized physicians and medical consultants of either of them, and, upon the request of an employee or former employee, to his physician. Any physician who conducts a medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

23505

§ 1910.19 Asbestos dust.

Section 1910.93a shall apply to the exposure of every employee to asbestos dust in every employment and place of employment covered by § 1910.12, § 1910.13, § 1910.14, § 1910.15, or § 1910.16, in lieu of any different standard on exposure to asbestos dust which would otherwise be applicable by virtue of any of those sections.

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ACL Doc 18834 · Page 60 of 99 asbestosclaims.law/library/18834/60

ASBESTOS INFORMATION ASSOCIATION
NORTH AMERICA
1660 L Street, N.W. / Washington, D.C. 20036 / (202) 223-4885

RECOMMENDED WORK PRACTICES

SHOP AND FIELD FABRICATION

OF

ASBESTOS SHEET PRODUCTS

DRAFT
1/3/75

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INDEX

INTRODUCTION . . . . . Page 2

SUMMARY OF OSHA ASBESTOS STANDARD. . . . . Pages 4-5

GENERAL RECOMMENDATIONS . . . . . Pages 6-7

SPECIFIC RECOMMENDATIONS . . . . . .

COMMENTS . . . . . Page 8

SHOP (FIXED) TOOLS . . . . . Page 9

Radial Arm Saw . . . . . Page 10

Table Saw . . . . . Page 11

Stone Saw . . . . . Page 12

Shaper . . . . . Page 13

Vacuum Requirements . . . . . Page 14

PORTABLE TOOLS . . . . . Page 15

Rotary Power Saw . . . . . Pages 16-24

Electric Drill . . . . . Pages 25-3

Electric Sanders . . . . . Pages 31-3

Vacuum Requirements . . . . . Page 35

PORTABLE VACUUM SOURCE . . . . . Pages 36-3

APPENDIX A - OSHA ASBESTOS STANDARD (1910.93a). . . . . Page 38

Union Carbide trial exhibit UC-4243: Asbestos Information Association/North America, Draft Recommended Work… Published by AsbestosClaims.Law
ACL Doc 18834 · Page 62 of 99 **asbestosclaims.law/library/18834/62**

RECOMMENDED WORK PRACTICES
SHOP AND FIELD FABRICATION
OF
ASBESTOS SHEET PRODUCTS

Types of asbestos sheet products covered by these work practices are:

Flat asbestos-cement sheets - plain and pigmented - press produced

Corrugated asbestos-cement sheets - press produced

Flat asbestos-cement sheets - plain and pigmented - wet machine produced

Corrugated asbestos-cement sheets - wet machine produced

Asbestos-cement sheets and shapes - extruded

Flat asbestos calcium silicate sheets - press produced.

Structural sandwich panels - flat asbestos-cement sheets with insulating core.

Operations to which these work practices might apply are:

Handling and warehousing

General housekeeping, including waste disposal

Sawing

Drilling

Shaping

Sanding.

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ACL Doc 18834 · Page 63 of 99 **asbestosclaims.law/library/18834/63**

SUMMARY OF THE REQUIREMENTS OF THE OSHA ASBESTOS STANDARD (1910.93a)

General

The Asbestos Standard applies to any manufacturing, fabricating or handling process or operation utilizing asbestos fiber or materials containing asbestos fiber.

Exposure Levels [1910.93a (b)]

It is the employer's responsibility to maintain "permissible exposure to airborne concentrations of asbestos fibers" below the levels prescribed.

Methods of Compliance [1910.93a (c)]

Exposure levels may be controlled by isolation, enclosure, exhaust ventilation and dust collection. Other methods that achieve the fiber exposure level objective may be used.

Particular Tools [1910.93a (c)]

All hand operated and power operated tools which may produce airborne asbestos fibers in excess of permissible exposure levels shall be provided with local exhaust systems.

Wet Methods [1910.93a (c)]

When practicable, asbestos products shall be handled in a wet state sufficient to prevent the emission of dust to the atmosphere. This procedure is not required where the usefulness of the product might be diminished by wetting. Application of wet methods is limited and engineering controls are normally preferable.

Personal Protective Equipment and Clothing [1910.93a (d)]

Under certain conditions specified in this paragraph of the standard, respirators may be used to protect employees exposed to airborne fiber levels above permissible. Only respirators of the type prescribed for the various exposure levels should be used.

Under prescribed conditions where the airborne asbestos fiber level exceeds permissible, the employer is required to provide:

protective clothing
change rooms
clothes lockers.

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ACL Doc 18834 · Page 64 of 99 asbestosclaims.law/library/18834/64

Monitoring [1910.93a (e)]

The standard requires that within six months of its effective date, all workplaces where asbestos fibers are released shall be monitored to determine exposure levels. Monitoring must be repeated at six month intervals if the fiber concentrations are above permissible levels. Monitoring shall be repeated at reasonable intervals at the employer's discretion if the fiber concentrations are below permissible levels.

Caution Signs and Labels [1910.93a (g)]

Caution signs shall be displayed at each location where asbestos fiber concentrations exceed permissible exposure levels.

Caution labels shall be applied to all materials and products which during any reasonably foreseeable use might release concentrations of asbestos fibers in excess of permissible exposure levels.

Housekeeping [1910.93a (h)]

All external surfaces, machinery and equipment shall be maintained free of asbestos fiber accumulations that might, if dispersed, create asbestos fiber concentrations above permissible exposure levels. Vacuum cleaning is the preferred method for removal. It is recommended that the vacuum cleaners be equipped with a disposable collection bag and an efficient internal filtration system. Other methods may be used if they don't create fiber concentrations in excess of permissible levels.

All asbestos containing waste material, such as dust and scrap, which might in the disposal process create fiber concentrations in excess of permissible levels, shall be disposed of in sealed bags or containers. These bags and containers shall carry the prescribed caution label.

Medical Examinations [1910.93a (j)]

Every employer shall provide or make available at his cost the prescribed medical examination to all his employees exposed to airborne asbestos fiber.

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ACL Doc 18834 · Page 65 of 99 asbestosclaims.law/library/18834/65

GENERAL RECOMMENDATIONS

Exhaust and Dust Collection Systems

The OSHA Asbestos Standard requires that exhaust and dust collection systems be designed and maintained in accordance with American National Standard,* "Fundamentals Governing the Design and Operation of Local Exhaust Systems", ANSI Z9.2-1971. However, other reference volumes such as

> Industrial Ventilation - A Manual of Recommended Practices, prepared by the Committee on Industrial Ventilation of the American Conference of Governmental Industrial Hygienists,
>
> and
>
> Design of Industrial Exhaust Systems by Alden and Kane, published by the Industrial Press, Inc.

are recognized as authoritative.

For small and intermittent production and fabrication operations major dust collection systems of the high volume, low velocity type design described in the design references in the paragraph above may not be necessary. Instead, systems of the low volume, high velocity type utilizing as their exhaust air source a high efficiency vacuum cleaner could be suitable. For design information on these systems refer to the work practices on fabrication of asbestos-containing sheet products.

All exhaust and dust collection systems should be inspected periodically for proper functioning and broken bags. For continuous operations it is recommended that the system operation and the interior of the baghouse be checked daily. A scheduled maintenance program that includes bag replacement should be prepared and followed.

Wherever possible, operations involving asbestos containing materials should be isolated from other work areas by partitions, curtains or other means. If central exhaust systems are utilized, the areas should be maintained under a slight negative pressure.

*American National Standards Institute, Inc.
1430 Broadway
New York, N.Y. 10018

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ACL Doc 18834 · Page 66 of 99 asbestosclaims.law/library/18834/66

Personal Protection

Persons exposed to airborne asbestos fiber should develop good personal hygiene practices. Included should be:

Don't smoke.

Wash thoroughly before eating.

Shower after work.

Change to work clothes upon arrival at work and change from work clothes at the conclusion of the work day.

Wear proper protective clothing and respirators as provided by your employer when the situation warrants. Be certain that the respirator fits properly.

Contaminated work clothing taken home for laundering should be carefully washed, by themselves -- do not wash with other clothing..

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ACL Doc 18834 · Page 67 of 99 **asbestosclaims.law/library/18834/67**

RECOMMENDED WORK PRACTICES
SHOP AND FIELD FABRICATION
OF
ASBESTOS SHEET PRODUCTS

SPECIFIC RECOMMENDATIONS - COMMENTS

Prior to handling of sheet materials excess dust should be removed from the surface of the sheets to prevent dispersion of asbestos fiber into the workplace.

Fabricating machinery should be equipped with suitable dust control systems. Refer to standards on page 6 and to typical designs shown on pages 10 through 37.

All dust control systems which discharge exhaust air to atmosphere must be equipped with fabric filter collection devices (requirement of the Federal Environmental Protection Agency "National Emission Standards for Hazardous Air Pollutants - Asbestos").

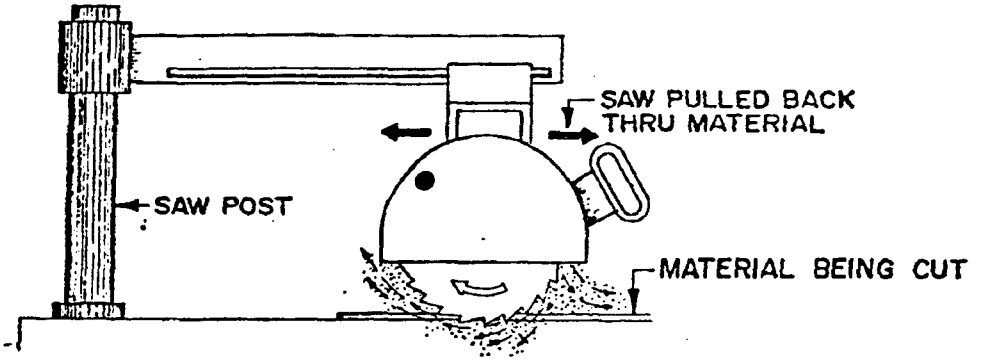
Wet fabricating methods can be a suitable alternative to dust control systems utilizing exhaust ventilation.

After fabricating and before shipping all excess dust and chips should be removed from the surface of the sheet to prevent dust contamination of the fabricator's workplace and his customer's workplace.

All dust and waste must be disposed of in accordance with paragraph "Housekeeping" on Page 5. Dust from the dust collection devices must be disposed of in sealed containers. Scrap disposal, since it is not friable and disposal does not generate asbestos fiber concentrations above permissible levels, need not follow the requirement for sealed and labeled containers.

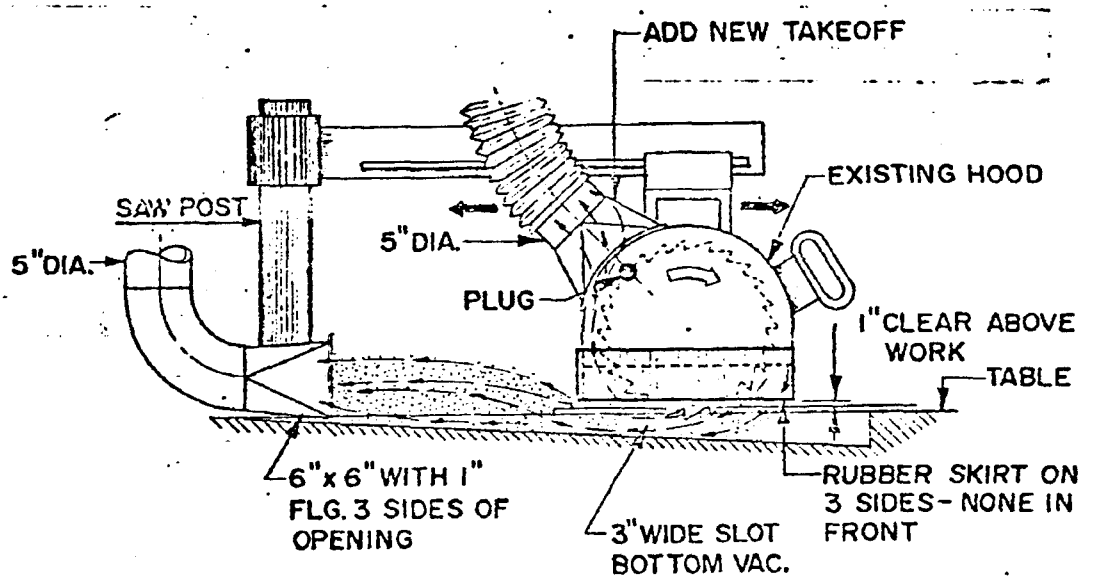
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ACL Doc 18834 · Page 68 of 99
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RADIAL ARM SAW:



1. Dust escapes from top side of material as saw breaks through top surface - some goes to saw post area, some goes around top guard and out towards operator.
2. Dust escapes from bottom surface as saw breaks through and goes below table top.

Recommended engineered dust control system.



AIR VOLUME = 2500 C.F.M. TOTAL
SUCTION = 14"WATER OR 1" Hg

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ACL Doc 18834 · Page 69 of 99 asbestosclaims.law/library/18834/69

TABLE SAW

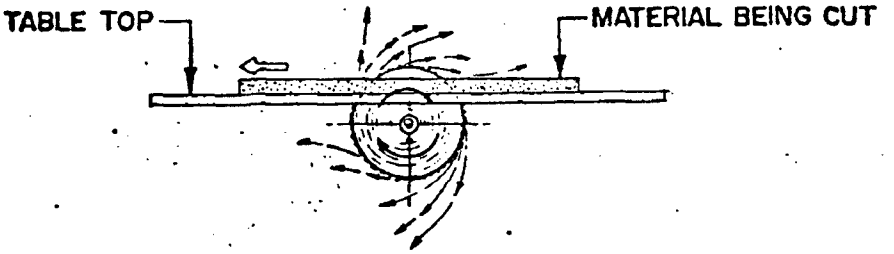
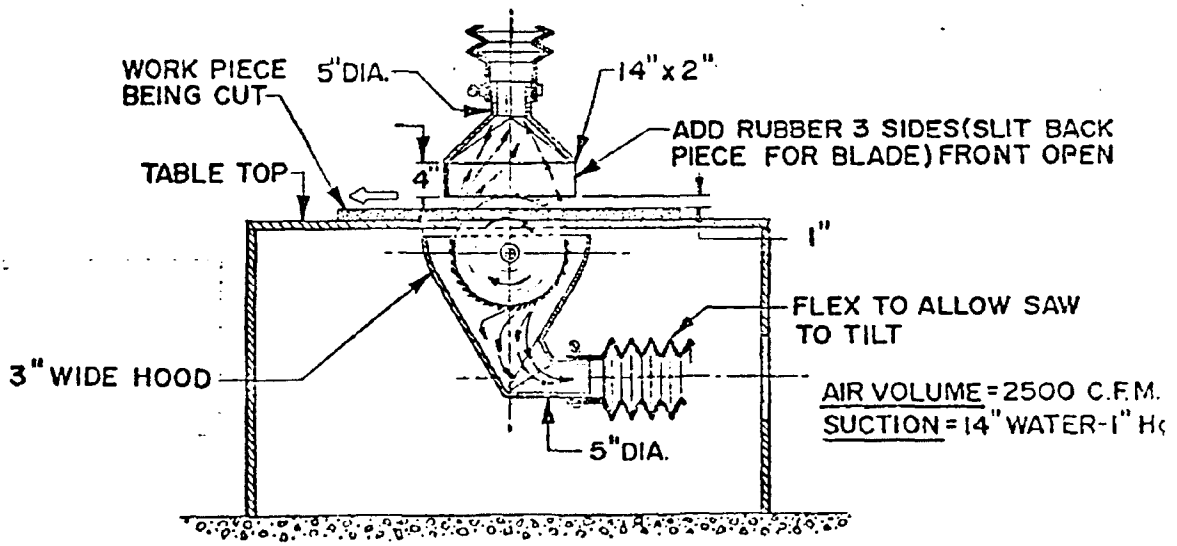


Table saws generate dust as follows:

1. Dust escapes from bottom side as leading edge of material engages downward moving saw teeth. Dust is propelled downward and towards back of saw below table top.
2. Some dust generated over top of material cut due to rubbing of saw or binding in saw cut. Dust rises over saw and towards operator.

Recommended engineered dust control system.



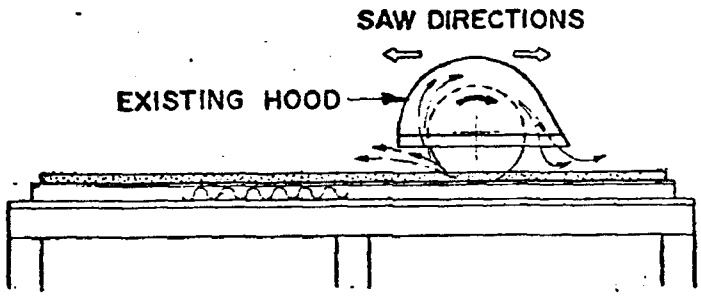
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STONE SAW: - DRY CUTTING:

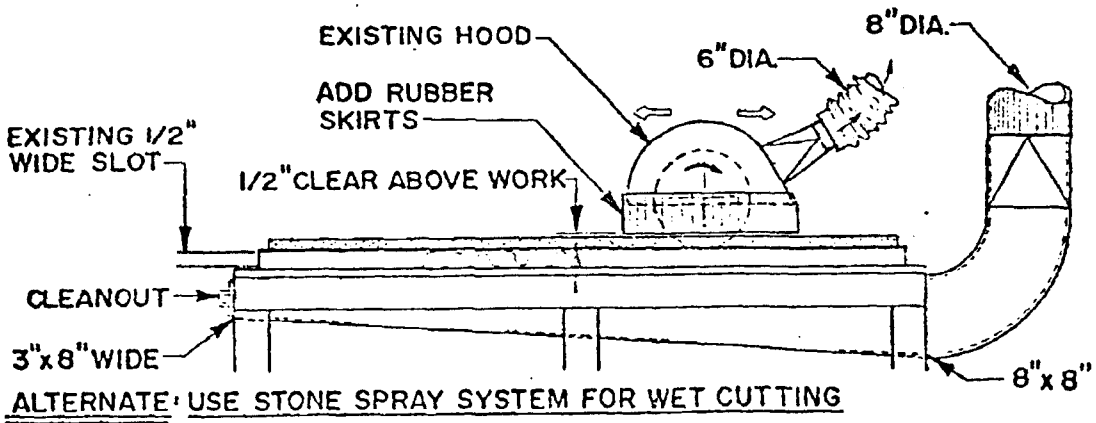
Stone saws when used dry cutting asbestos sheet products generate dust as follows:

1. On the leading edge of the wheel as it breaks through the top surface.
2. On the back edge of the hood which emits dust and chips carried over.



Recommended engineered dust control system.

1. Add rubber skirt on existing hood to ½ inch above work.
2. Add 6" pipe to existing hood for dust pick-up.
3. Add 8" wide slot below table for dust pick-up.
4. Use 2500 to 4000 C.F.M. at 14" water on 1" Hg. for vacuum pick-up.



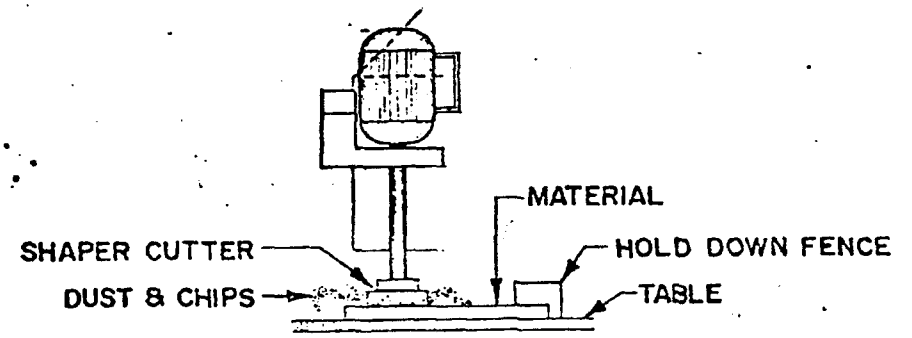
ALTERNATE: USE STONE SPRAY SYSTEM FOR WET CUTTING

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ACL Doc 18834 · Page 71 of 99
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SHAPER - FOR DRY SHAPING:

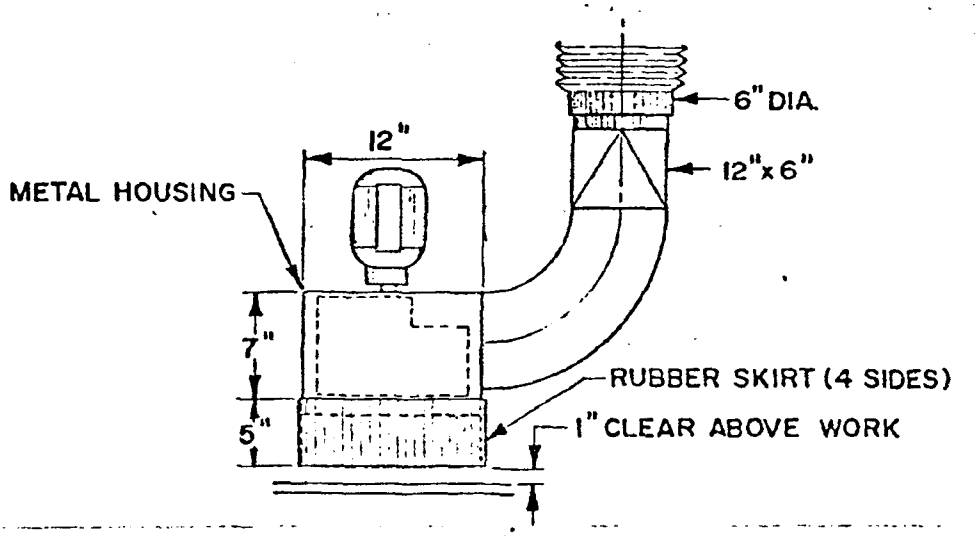
A shaper when shaping or contouring an asbestos sheet product generates dust as follows:

1. The cutter blade on the shaper peels off a very fine chip due to the high velocity of the shaper.
2. The vibration in the cutter shaft or the chatter in the material being shaped generates dust.



Recommended engineered dust control systems and equipment.

1. Enclose shaper shaft and tool in metal housing.
2. Add rubber skirt on 4 sides to 1" clear above work.
3. Add duct work as shown on sketch. Vacuum required is 2500 C.F.M. at 14" water or 1" HG.
4. Use 2" outlet and hose to canister type vacuum 75 C.F.M. at 68" water for 5" Hg.



UCC 010971

ENGINEERED DUST CONTROL TOOLS-SHOP TOOLS

VACUUM REQUIREMENTS

TYPE TOOL	C.F.M.	VACUUM
RADIAL ARM SAW	2500	14" Water
TABLE SAW	2500	14" Water
STONE SAW	2500 to 4000	14" Water
SHAPER	2500	14" Water

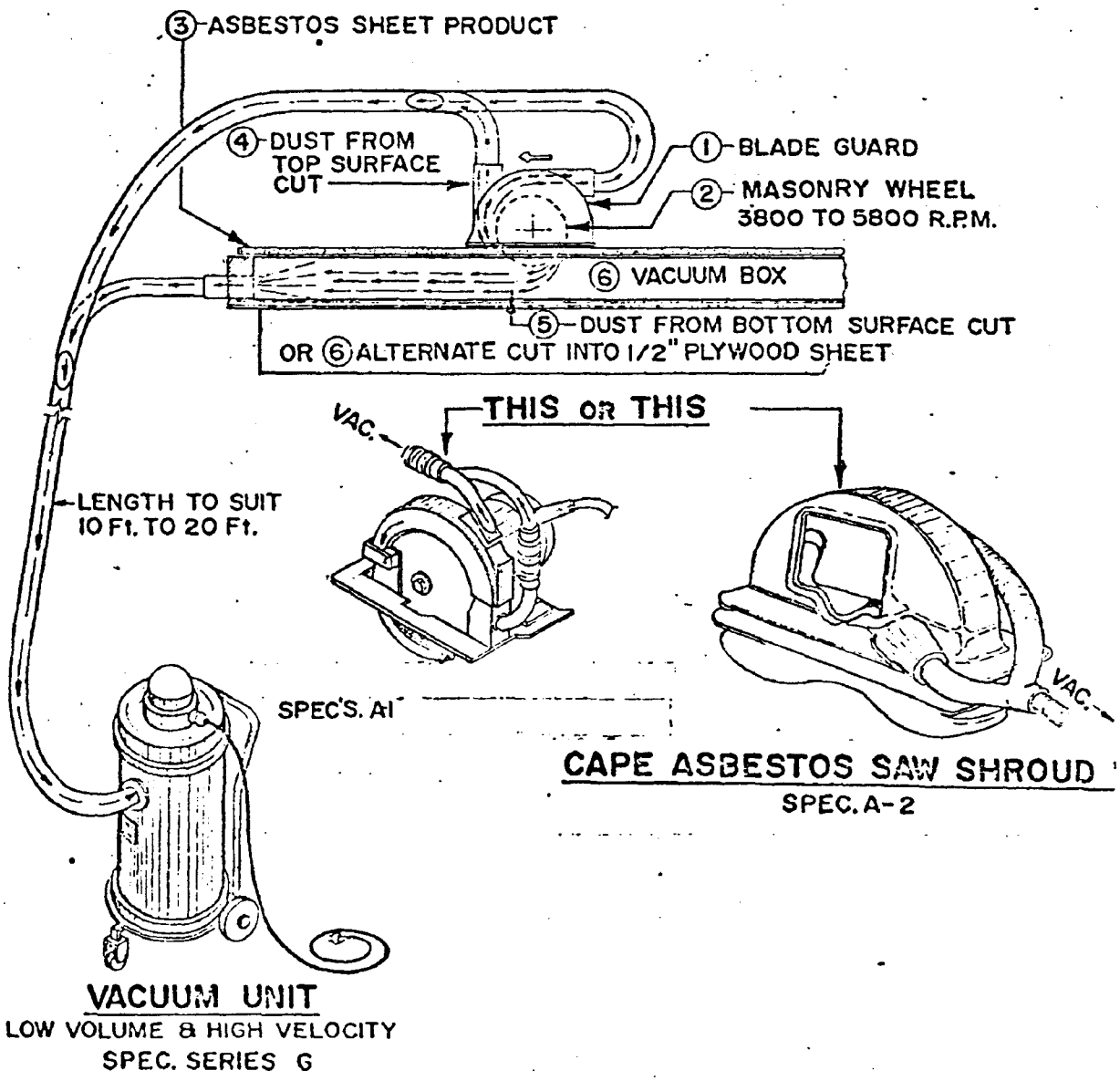
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ACL Doc 18834 · Page 73 of 99 **asbestosclaims.law/library/18834/73**

METHODS OF ENGINEERED DUST CONTROL SYSTEMS

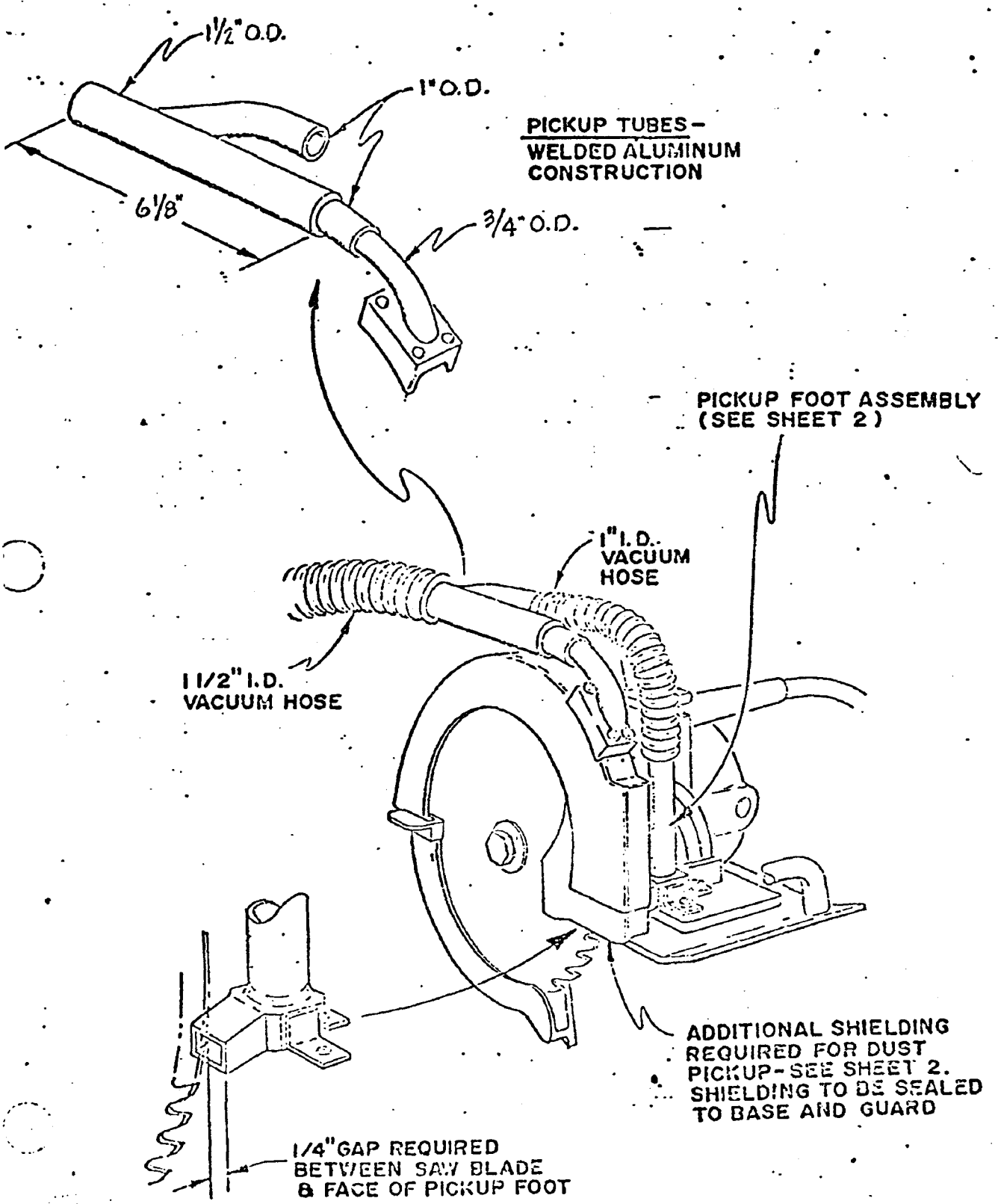
PORTABLE ELECTRIC ROTARY POWER SAWS.

I. Use dust control systems shown below (Spec. A-1) or Cape Asbestos shroud kit. (Spec. A-2)

II. Do all cutting on J-M design vacuum box (6) as per Spec. No. E-1, or cut into 1/2" plywood.



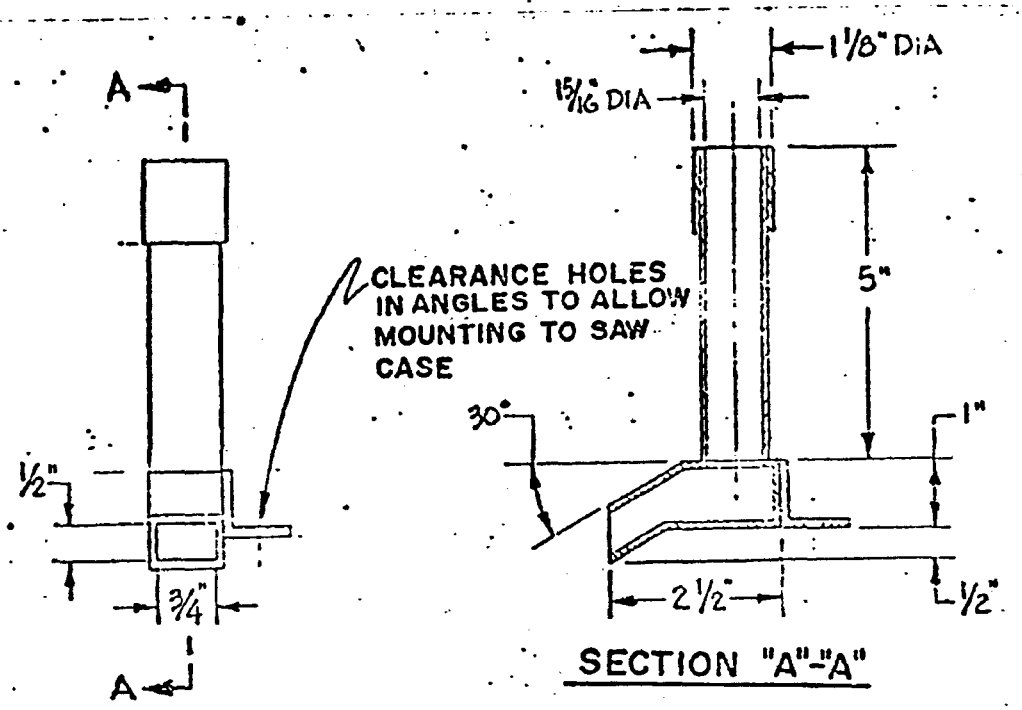
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DUST EXTRACTOR-PORTABLE SAW-10 1/4" DIA. BLADE

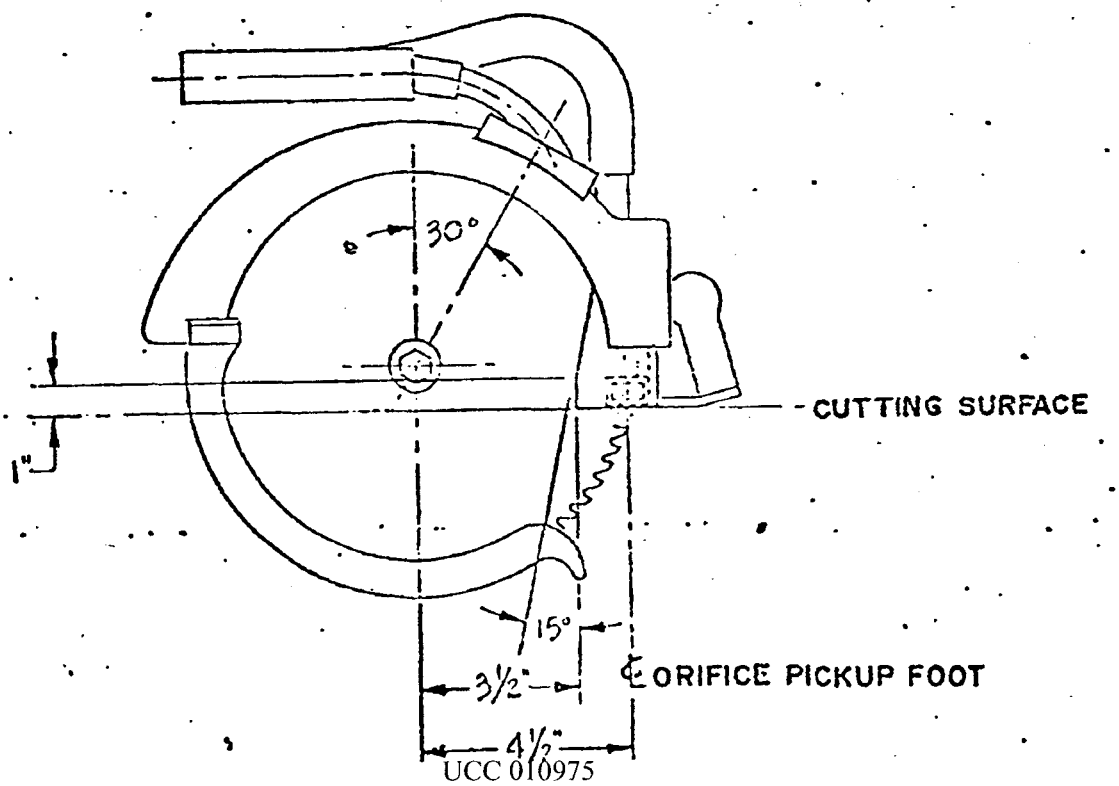
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DETAIL 2



SECTION "A"-"A"

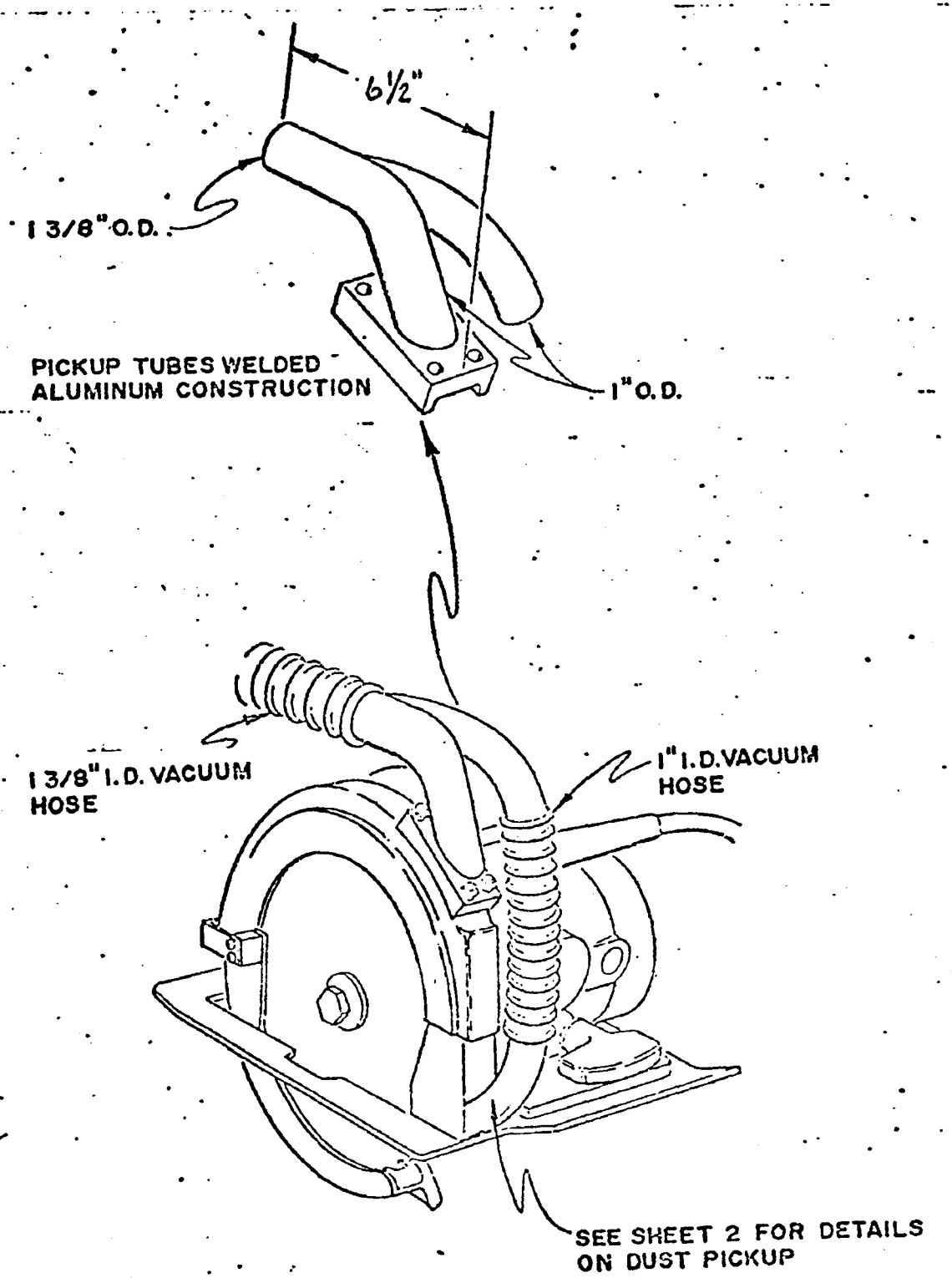
PICKUP FOOT- WELDED ALUMINUM CONSTRUCTION



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DETAIL 3

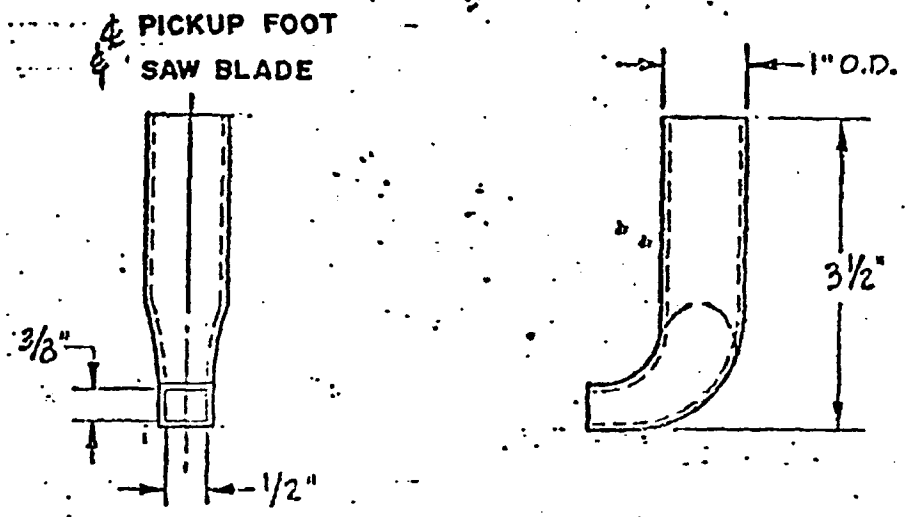


DUST EXTRACTOR - PORTABLE SAW - 7 1/4" DIA. BLADE

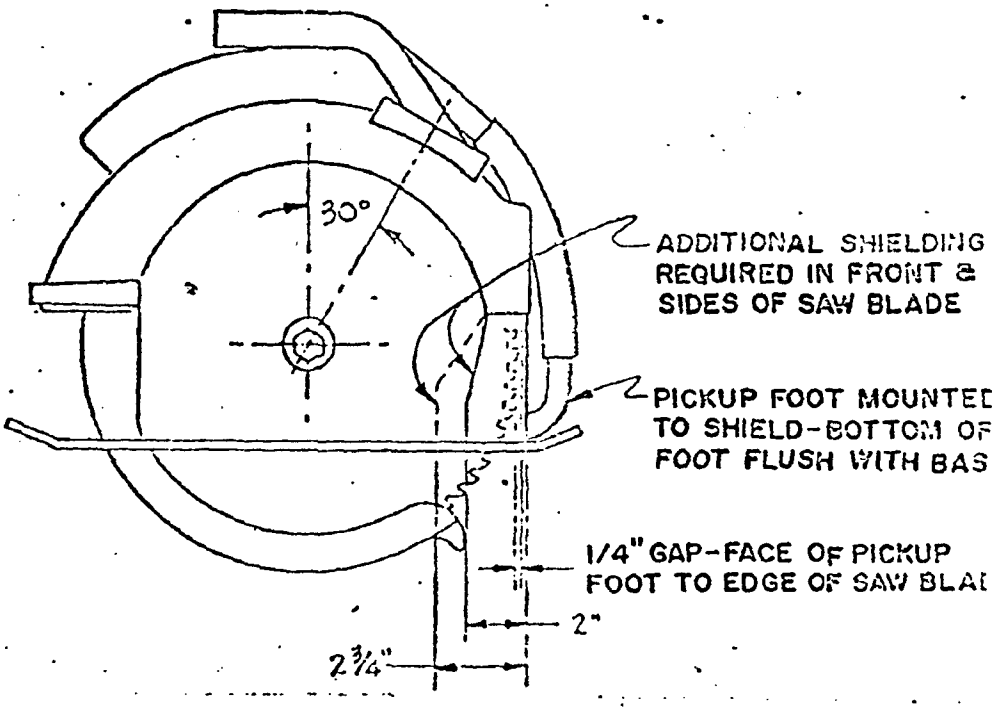
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SPEC. A-1
DETAIL 4



PICKUP FOOT-WELDED TO SHIELDING



DUST EXTRACTOR-PORTABLE SAW-7 1/4" DIA. BLADE

UCC 010977

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SPECIFICATION NO. A-2

DETAIL 1

MANUFACTURER:

Cape Universal Building Products
Uxbridge, Middlesex England or (Watford 34551)
Register Office Box 165, Exchange Road, Waterford 34551

TYPE OF EQUIPMENT:
Plastisol Type Semi-Flexible
Portable Saw Special Design Shroud Kit

7" for 7¼" Sawcats

9¼" for 9½" Sawcats

Stocked in Denver by M. L. Foss, Black & Decker distributor.

EQUIPMENT SPECIFICATIONS:
Order through Cape Universal (includes following)

1. Shroud
2. Hose harness, comprising 2 hose pieces and "Y"
3. Jubilee clips (2)

SIZES: For 7¼" and 9¼" Sawcats

ELECTRICAL: -NONE-

VACUUM:

2 hose pieces for vacuum attachments

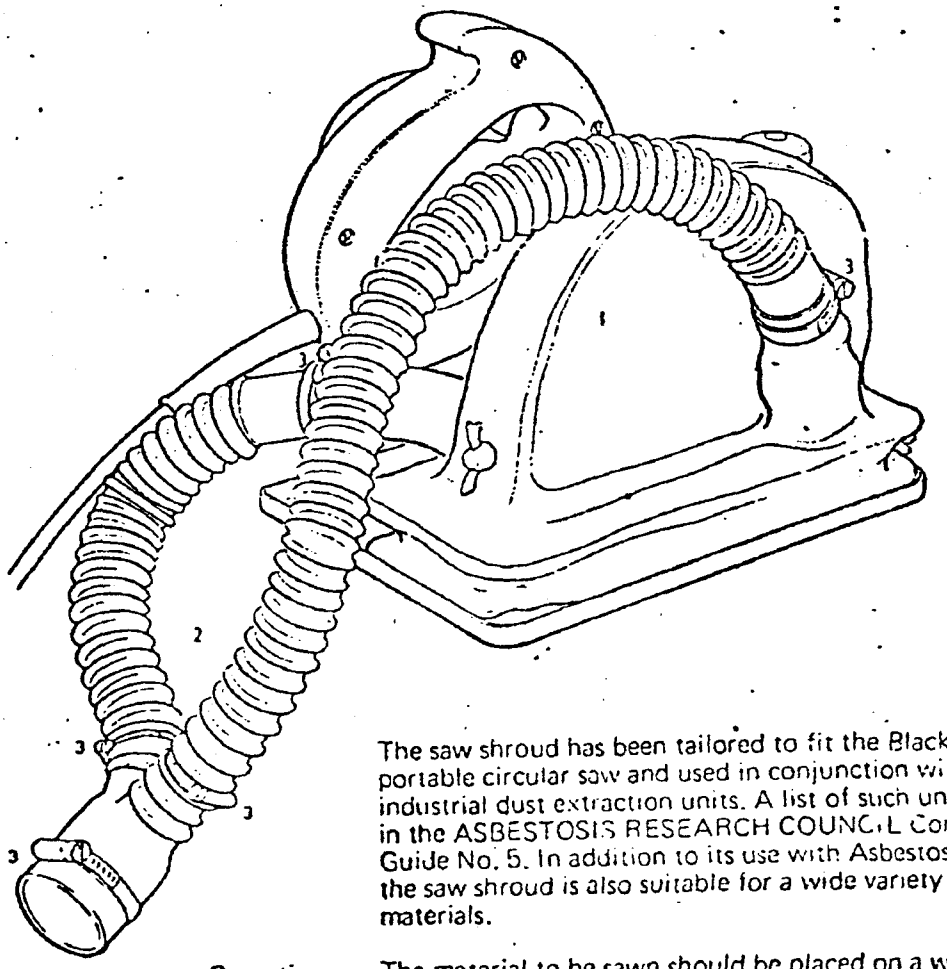
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ACL Doc 18834 · Page 79 of 99
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SPEC. A-2
DETAIL 2

Dust extraction shroud kit for the HD1215 portable saw

Approved by the Asbestosis Research Council



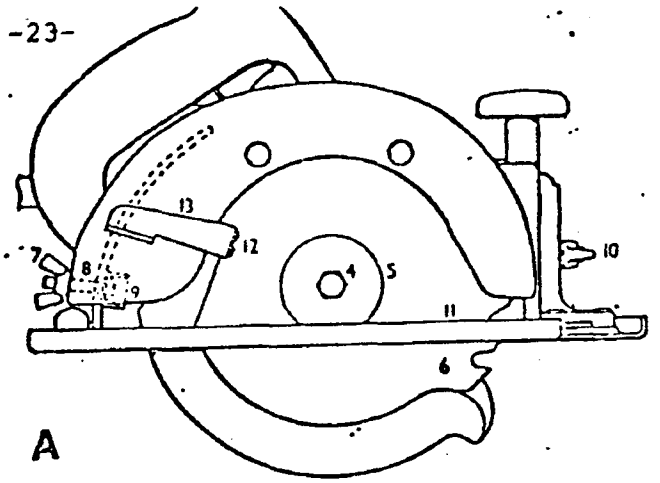
The saw shroud has been tailored to fit the Black and Decker portable circular saw and used in conjunction with approved industrial dust extraction units. A list of such units is included in the ASBESTOSIS RESEARCH COUNCIL Control and Safety Guide No. 5. In addition to its use with Asbestos based materials the saw shroud is also suitable for a wide variety of other materials.

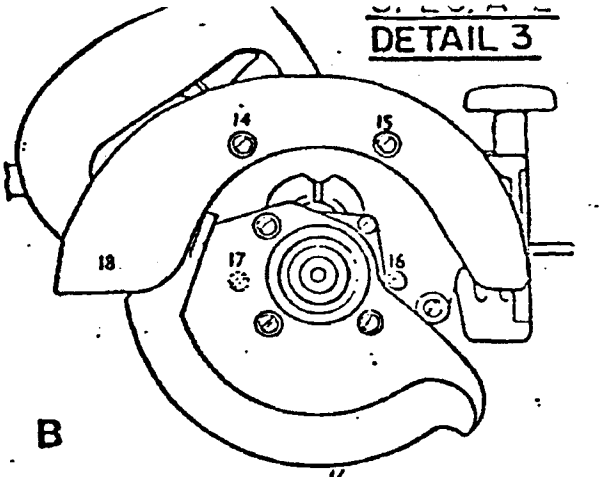
Operating instructions

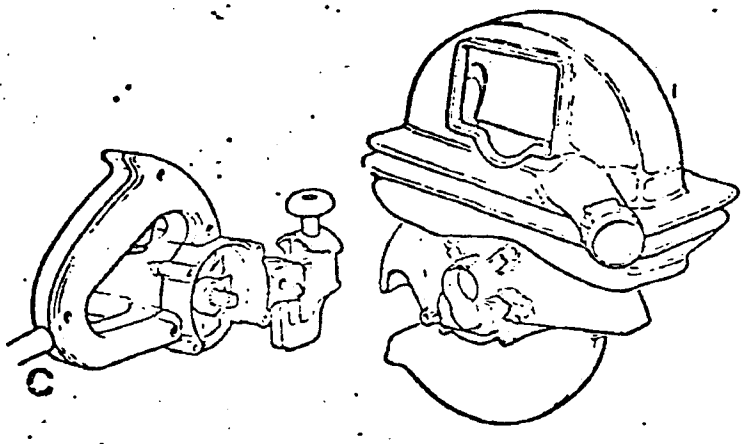
The material to be sawn should be placed on a wooden base (preferably ¾" plywood if considerable cutting is to be carried spanning the whole length of the saw cut and the blade depth adjusted so that it cuts through the material with minimum cut into base board. This prevents dust from falling below the saw cut and concentrates the extraction to the shroud and to the upper part of the blade where the dust is drawn off via

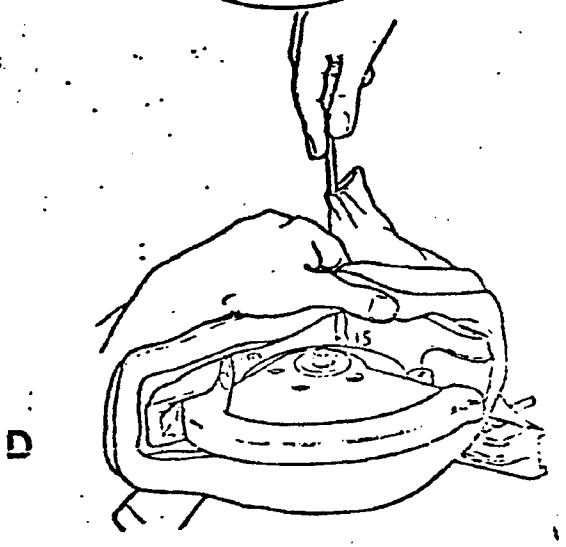
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Components (illustrated overleaf)

1 Shroud

2 Hose harness, comprising two hose pieces and 'Y' connector

3 Jubilee clips (4 of No 1 and 1 of No 2)

Dismantling saw

Remove bolt 4, outer clamp washer 5, saw blade 6, inner clamp washer, wing nut 7, bolt 8, guard stop 9, wing nut 10, shoe 11, two retaining screws 12, lever arm 13, screws 14 15 16 17 and finally main guard 18 by carefully tapping free with hide faced hammer. Should motor unit also be withdrawn, ensure carbon brushes are correctly re-positioned before reassembly

Reassembly with shroud

Fit saw shroud 1 to guard 18 and reassemble in reverse order ensuring that all screws are fully tightened. Omit lever arm 13 and retaining screws 12. Where necessary lift shroud to gain access to screws. To tighten screw 15 insert screwdriver as shown in drawing D. Ensure that shroud is fitted inside lip of shoe when replacing saw blade. Connect hose harness to shroud. Connect hoses to Y piece, secure all connections with Jubilee clips. An additional clip is included for coupling the unit to the dust extraction hose.

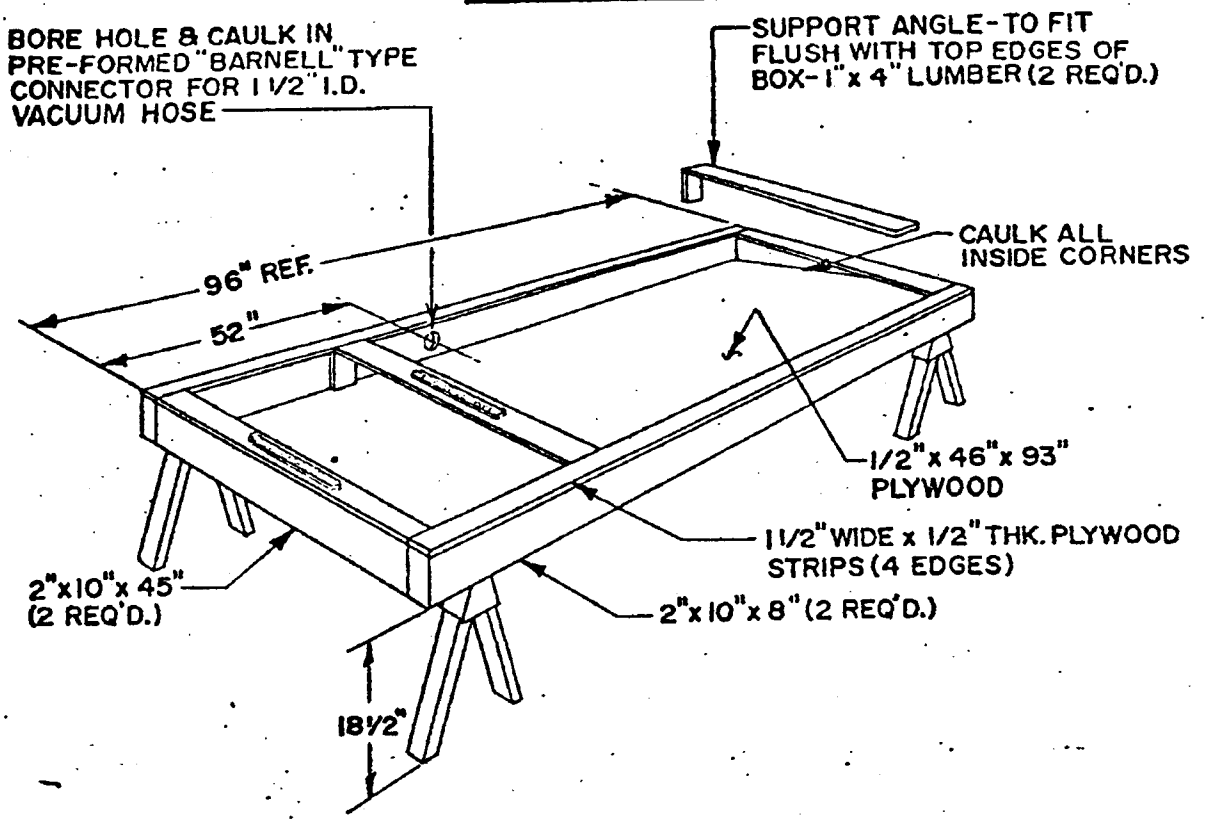
®Cape Universal

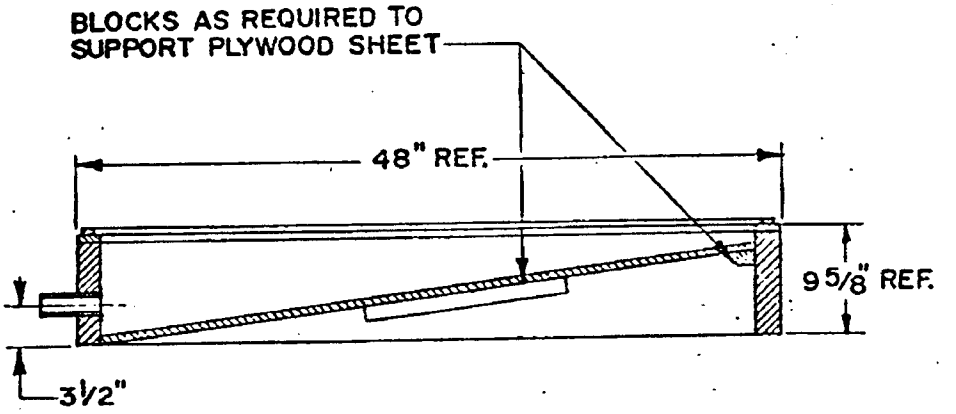
Pat. app. No. 56586/7(

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ACL Doc 18834 · Page 81 of 99 asbestosclaims.law/library/18834/81

CUTTING BOX-USE WITH ROTARY SAW

SPEC. E-1, DETAIL 1





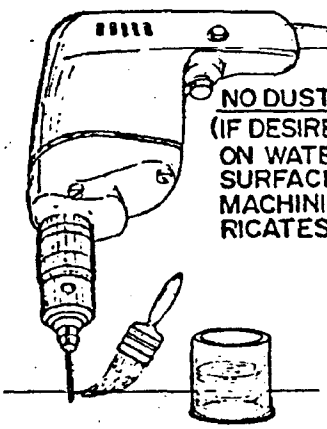
SECTION

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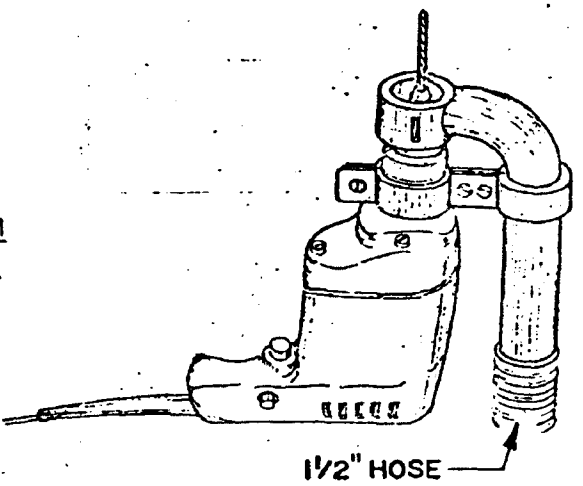
METHODS OF ENGINEERED DUST CONTROL SYSTEMS

PORTABLE ELECTRIC DRILLS

NORMAL DRILLING OF HORIZONTAL SHEETS



DRILLING OVERHEAD OR DRILLING OF VERTICAL SURFACES

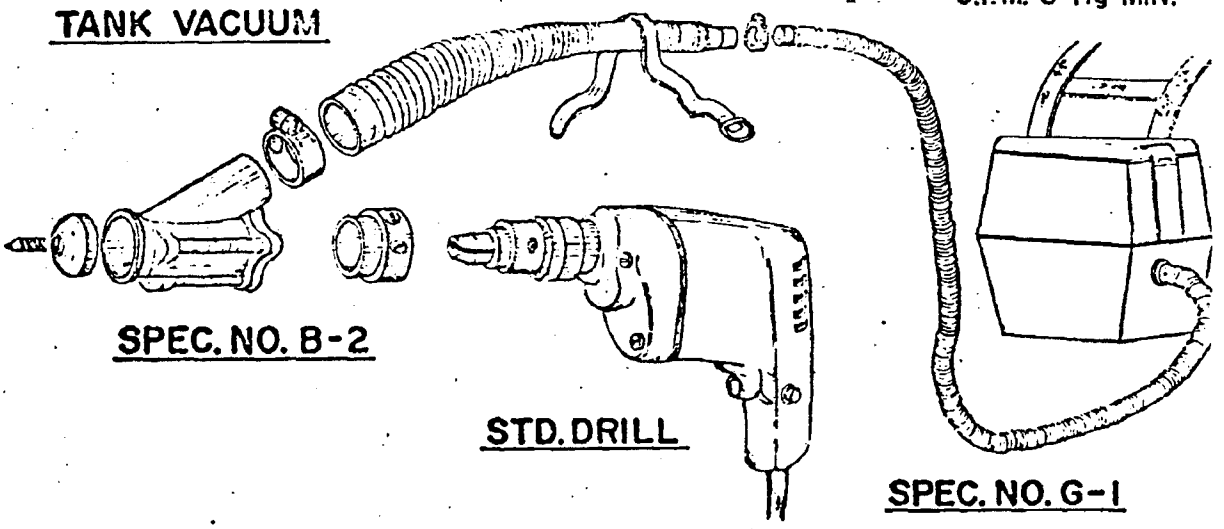


SPEC. B-1

OR

CAPE PORTABLE DRILL NOZZLE KIT COMPLETE WITH BACK PACK TANK VACUUM

VACUUM-50 TO 75 C.F.M. 5" Hg MIN.



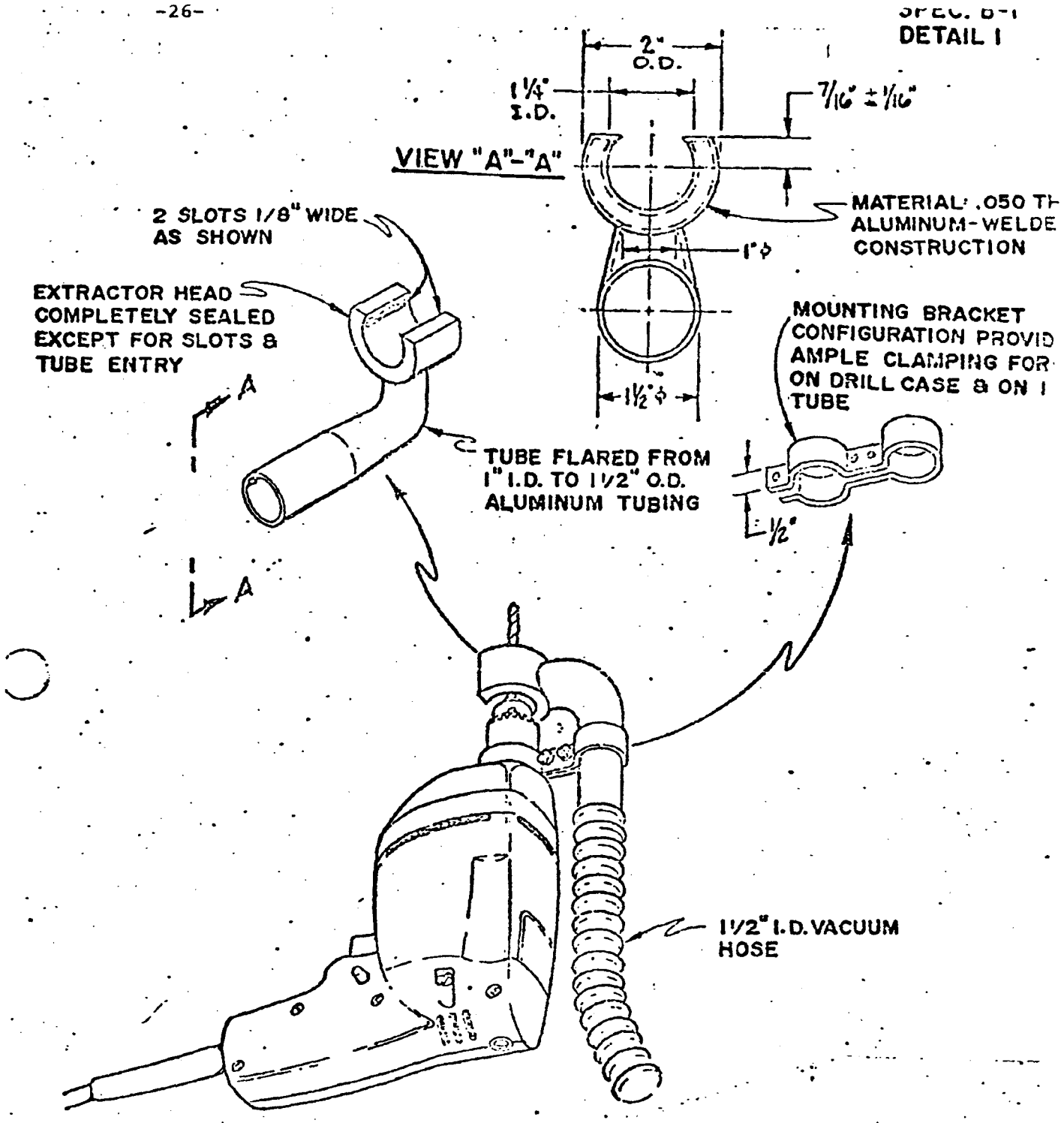
SPEC. NO. B-2

STD. DRILL

SPEC. NO. G-1

UCC 010982

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DUST EXTRACTOR-DRILL

UCC 010983

SPECIFICATION NO. B-2

DETAIL 1

MANUFACTURER: Cape Universal Building Products
Register Office P. O. Box 165
Exchange Road
Watford, England
Phone: Watford 34551

TYPE OF EQUIPMENT:
Portable Drill Nozzle Kit

MODEL NO.
NONE

EQUIPMENT SPECIFICATIONS:
Portable Drill Nozzle Kit - Pat. App. 59390

SIZE:
Fits with Adaptor A 3/8" or 5/16" size drills or 1/2" drills with chucks less than bearing size.

ELECTRICAL: -NONE-

VACUUM:
Works with Back Pak or regular vacuum units.

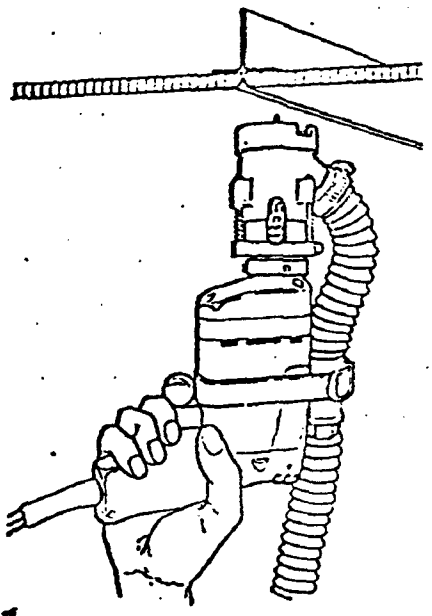
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ACL Doc 18834 · Page 85 of 99
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SPEC. B-2
DETAIL 2

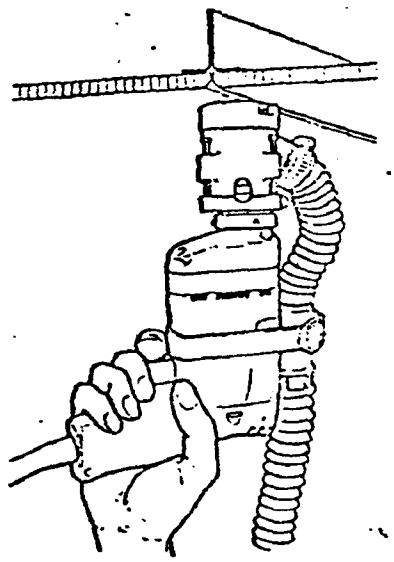
Portable drill nozzle kit

pat. app. 59390

Approved by the Asbestosis Research Council



1



2

Operating instructions

Power drills adapted with the kit do not require special operating procedures. The design of the kit allows the drill bit to be accurately positioned on the surface to be drilled (1) and as drilling takes place the drill nozzle compresses to allow the drill bit to proceed (2)

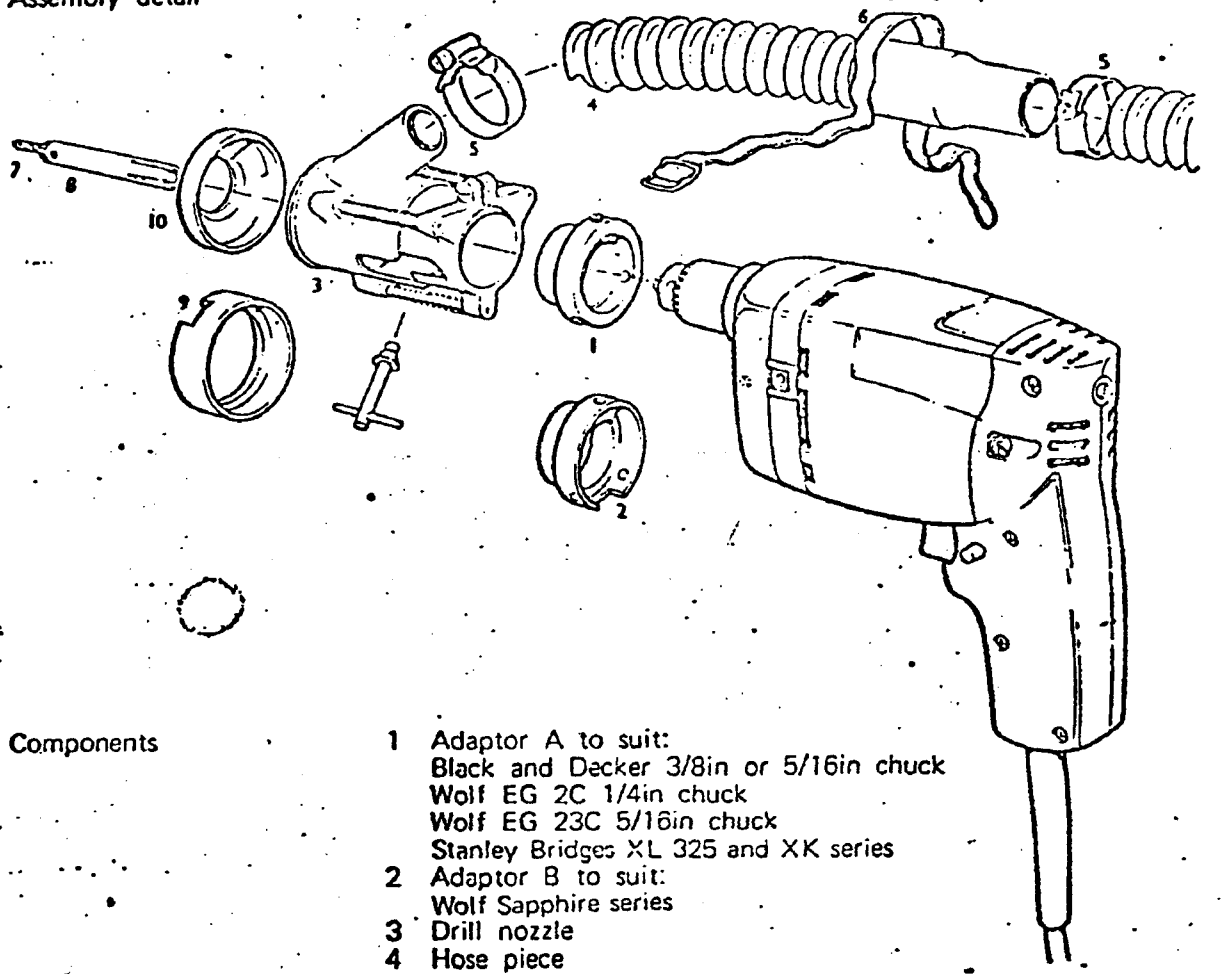
The nozzle can be adapted to accommodate the Teks® screw fixing system; advice obtainable from Cape Universal Building Products Limited.

UCC 010985

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SPEC. B-2
DETAIL 3

Assembly detail



Components

1 Adaptor A to suit:
Black and Decker 3/8in or 5/16in chuck
Wolf EG 2C 1/4in chuck
Wolf EG 23C 5/16in chuck
Stanley Bridges XL 325 and XK series
2 Adaptor B to suit:
Wolf Sapphire series
3 Drill nozzle
4 Hose piece
5 Jubilee clip (2 no)
6 Retaining strap with adhesive backing
7 9/64in drill bit
8 Countersink attachment
9 Open ended cap: for horizontal surfaces (ceilings)
10 Conical cap: for vertical surfaces (walls)

Assembly instructions

Select adaptor 1 or 2 to suit drill. Fit to neck of drill and secure with three grub screws
Fit drill nozzle 3 to neck of adaptor, ensure that exhaust outlet is at top and tighten flange screw
Connect hose piece 4 to exhaust outlet and secure with jubilee clip 5
Remove paper from adhesive backing of retaining strap and secure hose to drill with strap
Insert hose piece into exhaust unit hose and secure with second jubilee clip. Assemble drill and countersink attachment and fit into chuck
Tighten chuck by inserting key through aperture in nozzle. Select cap 9 or 10 and fix to nozzle using twisting action.

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ACL Doc 18834 · Page 87 of 99 **asbestosclaims.law/library/18834/87**

Cape Universal Drill Attachment Cross-Match with American Drills

Manufacturer	Model Number	Size	
SKIL	596	1/4	
	597	3/8	
	598	1/2	(o.k. if chuck changed
	1176	1/4	
	401	1/4	
	75	1/4	
	220	1/4	
	597	3/8	only if Rigid Supreme Model B90A chuck or Model B80A chuck
Millers Falls	SP220	1/4	
	SP220-1	1/4	
	SP220-3	1/4	
	SP321	1/4	
	220-11	1/4	
	SP342	3/8	
	NO250	3/8	
	SP501	3/8	
Milwaukee Drills	0101	1/4	uses Jacobs 4BF- o.k.
	0102-1	1/4	uses Jacobs 4BF- o.k.
	0120	1/4	uses Jacobs 4BF- o.k.
	0140	1/4	uses Jacobs 4BF- o.k.
	0180	1/4	uses Jacobs 4BF- o.k.
	0190	1/4	uses Jacobs 4BF- o.k.
	0200	5/16	uses Jacobs 30B- o.k.
	0121		
	0122-1		
	0141		
	0161		
	0181		
	0192		
Black and Decker	1040	1/4	
	1041	1/4	
	1042	1/4	
	1043	1/4	
	1044	1/4	
	1060	1/4	
	1180	3/8	only if Jacobs 31B chuck is used
Black and Decker Air Drills	1487	o.k.	
	1488	o.k.	

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ACL Doc 18834 · Page 88 of 99 asbestosclaims.law/library/18834/88

RECOMMENDED DUST CONTROL SYSTEM FOR PORTABLE ELECTRIC SANDERS

I. The following are the methods of dust control for portable electric sanders.

BELT TYPE SANDERS

Some belt type sanders have a built-in control system with dust bag. These can be used by themselves or connect to vacuum unit of 50 to 75 C.F.M. and 6" hg. or 68" water vacuum capacity. See Specs. G for vacuum equipment. For control on sanders without built-in systems, see Spec. C-4.

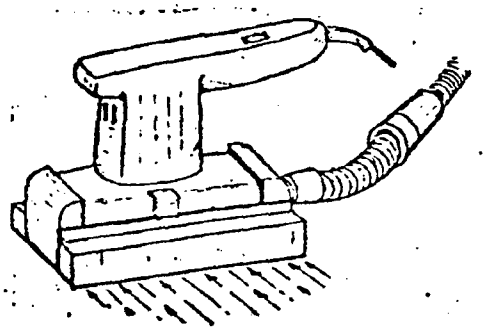


BELT TYPE SANDER
SPEC. C-1,C-2,C-3

VIBRATORY TYPE SANDERS

There are on the market several dustless sanders (or polishers) of the orbital type which have built-in dustless attachments for use with canister type vacuum units as Spec. G and specified for belt type units above.

DUSTLESS SANDER



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ACL Doc 18834 · Page 89 of 99
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SPECIFICATION NO. C-3

MANUFACTURER: Skil Corporation
7234 Linder Avenue
Skokie, Illinois
(312) 679-6830
Attn: Messrs. William Skinner or William Foote

TYPE OF EQUIPMENT:	MODEL NO.
4½" Heavy Dust Belt Sander with Vacuum Dust Collector	324

EQUIPMENT SPECIFICATIONS:

Skil Model No. 324

Belt size 4¼" X 26", Pad 4½" X 3/4"

with Vacuum Dust Collector

SIZE:

4½" Heavy Duty

ELECTRICAL:

No. 324 115 Volt AC/DC 10 amps 1,300 FPM no load

VACUUM:

Dust collector bag attached. Suggest it be hose connected to other vacuum equipment.

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ACL Doc 18834 · Page 90 of 99
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SPECIFICATION NO. C-2

MANUFACTURER: Rockwell International
400 Lexington Avenue
Pittsburgh, Pennsylvania
(421) 241-8400
Attn: Rex Moore or Dennis Huntsman

TYPE OF EQUIPMENT:	MODEL NO.
Portable Electric Belt Sanders	No. 500 Dust Controlled
Portable Electric Belt Sanders	No. 503 Dust Controlled
Portable Electric Orbital Sander	No. 505 Dust Controlled

EQUIPMENT SPECIFICATIONS:

Portable Electric Belt Sanders	No. 500 with dust control
Portable Electric Belt Sander	No. 503 with dust control
Portable Electric Orbital Sander	No. 505 with dust control

SIZE:

Model 500, 4" X 27" with dust control
Model 503, 3" X 24" with dust control
Model 505, orbital sander, with dust control

ELECTRICAL:

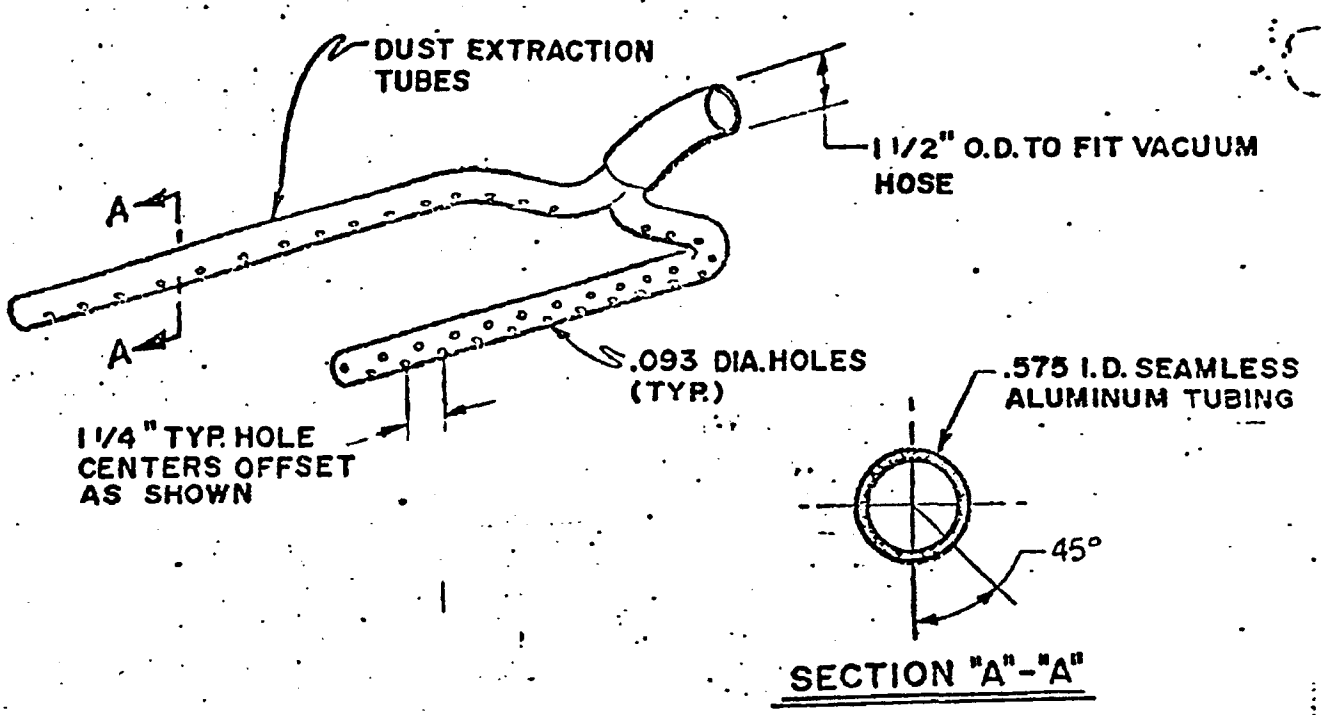
Model No. 500	115 volt AC/DC	12 amps	1,550 FSPM
Model No. 503	115 vold AC/DC	9 amps	1,180 FSPM
Model No. 505 (Orbital Sander)	115 volt AC/DC	3 amps	10,000 OPM

VACUUM:

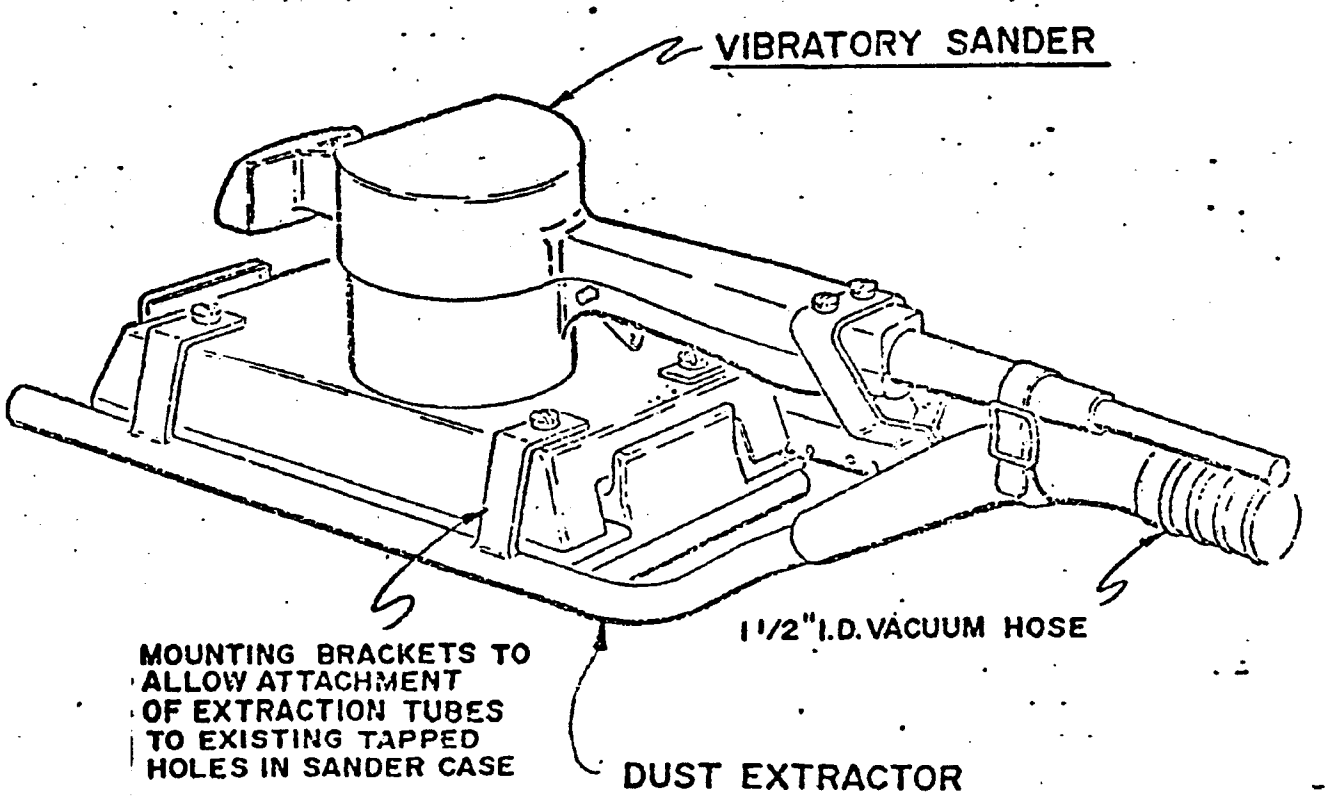
Built-in attachment for bag can also be used with hose and larger vacuum system.

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ACL Doc 18834 · Page 91 of 99 asbestosclaims.law/library/18834/91

SPEC. C-4
DETAIL 1



SECTION "A"-"A"



DUST EXTRACTOR — VIBRATORY SANDER

UCC 010991

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ENGINEERED DUST CONTROL - PORTABLE TOOLS

VACUUM REQUIREMENTS*

TYPE TOOL	C.F.M.	MINIMUM VACUUM
4½" Dia. Portable Circular Saw	150	68" Water
7¼" Dia. Portable Circular Saw	150	68" Water
9¼" Dia. Portable Circular Saw	150	68" Water
10" Dia. Portable Circular Saw	150	68" Water
Hand Electric Drill - Portable	75	68" Water
Hand Electric Drill with Hole Cutter	75	68" Water
Portable Belt Type Electric Sander	150	68" Water
Portable Vibratory Type Electric Sander	150	68" Water

*Portable Electric Circular Saws should be used with Vacuum Table.

Use plastic bag liner for waste container for sealed disposal of dust.

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ACL Doc 18834 · Page 93 of 99 asbestosclaims.law/library/18834/93

SPECIFICATION NO. G-2

MANUFACTURER: Hoffman Air & Filtration Division
Clarkson Industries
103 Fourth Avenue
New York City, N. Y. 10003
(212) 677-3600; Attn: Mr. Guy Cusumano

TYPE OF EQUIPMENT:	MODEL NO.
Hoffman Vacuum	No. 237 Special

EQUIPMENT SPECIFICATIONS:

No. 237 Special Hoffman

SIZE:

7½ hp unit

ELECTRICAL:

7½ hp TEFC, 110 V controls
440 volt, 3-phase, 60 cycle
50 ft. cable - conductor type

VACUUM:

2" pipe, 2 connections

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ACL Doc 18834 · Page 94 of 99 asbestosclaims.law/library/18834/94

SPECIFICATION NO. G-3

MANUFACTURER: Spencer Turbine Company
Hartford, Connecticut
(203) 233-3631
Attn: Mr. Blair Alexander

TYPE OF EQUIPMENT:	MODEL NO.
Spencer Turbine Type Vacuum	P-190

EQUIPMENT SPECIFICATIONS:

150 SCFM at 6½" Mercury
Turbine type vacuum unit, Bulletin 190

SIZE:

150 SCFM at 6½" Mercury

ELECTRICAL:

Normally 220/440 V, 3-phase, 60 cycle

VACUUM:

150 SCFM at 6½" Mercury

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ACL Doc 18834 · Page 95 of 99
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§ 1910.93a Asbestos.

(a) *Definitions.* For the purpose of this section, (1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(b) *Permissible exposure to airborne concentrations of asbestos fibers*—(1) *Standard effective July 7, 1972.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(2) *Standard effective July 1, 1976.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(3) *Ceiling concentration.* No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(c) *Methods of compliance*—(1) *Engineering methods.* (i) *Engineering controls.* Engineering controls, such as, but not limited to, isolation, enclosure, exhaust ventilation, and dust collection, shall be used to meet the exposure limits prescribed in paragraph (b) of this section.

(ii) *Local exhaust ventilation.* (a) Local exhaust ventilation and dust collection systems shall be designed, constructed, installed, and maintained in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, ANSI Z9.2–1971, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z9.2–1971, and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(iii) *Particular tools.* All hand-operated and power-operated tools which may produce or release asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section such as, but not limited to, saws, scorers, abrasive wheels, and drills, shall be provided with local exhaust ventilation systems in accordance with subdivision (ii) of this subparagraph.

(2) *Work practices*—(i) *Wet methods.* Insofar as practicable, asbestos shall be handled, mixed, applied, removed, cut, scored, or otherwise worked in a wet state sufficient to prevent the emission of airborne fibers in excess of the exposure limits prescribed in paragraph (b) of this section, unless the usefulness of the product would be diminished thereby.

(ii) *Particular products and operations.* No asbestos cement, mortar, coating, grout, plaster, or similar material containing asbestos shall be removed from bags, cartons, or other containers in which they are shipped, without being either wetted, or enclosed, or ventilated so as to prevent effectively the release of airborne asbestos fibers in excess of the limits prescribed in paragraph (b) of this section.

(iii) *Spraying, demolition, or removal.* Employees engaged in the spraying of asbestos, the removal, or demolition of pipes, structures, or equipment covered or insulated with asbestos, and in the removal or demolition of asbestos insulation or coverings shall be provided with respiratory equipment in accordance with paragraph (d)(2)(iii) of this section and with special clothing in accordance with paragraph (d)(3) of this section.

(d) *Personal protective equipment*—(1) Compliance with the exposure limits prescribed by paragraph (b) of this section may not be achieved by the use of respirators or shift rotation of employees, except:

(i) During the time period necessary to install the engineering controls and to institute the work practices required by paragraph (c) of this section;

(ii) In work situations in which the methods prescribed in paragraph (c) of this section are either technically not feasible or feasible to an extent insufficient to reduce the airborne concentrations of asbestos fibers below the limits prescribed by paragraph (b) of this section; or

(iii) In emergencies.

(iv) Where both respirators and personnel rotation are allowed by subdivisions (i), (ii), or (iii) of this subparagraph, and both are practicable, personnel rotation shall be preferred and used.

(2) Where a respirator is permitted by subparagraph (1) of this paragraph, it shall be selected from among those approved by the Bureau of Mines, Department of the Interior, or the National Institute for Occupational Safety and Health, Department of Health, Education, and Welfare, under the provisions of 30 CFR Part 11 (37 F.R. 6244, Mar. 25, 1972), and shall be used in accordance with subdivisions (i), (ii), (iii), and (iv) of this subparagraph.

(i) *Air purifying respirators.* A reusable or single use air purifying respirator, or a respirator described in subdivision (ii) or (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(ii) *Powered air purifying respirators.* A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in subdivision (iii) of this subparagraph, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(iii) *Type "C" supplied-air respirators, continuous flow or pressure-demand class.* A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(iv) *Establishment of a respirator program.* (a) The employer shall establish a respirator program in accordance with the requirements of the American National Standards Practices for Respiratory Protection, ANSI Z88.2–1969, which is incorporated by reference herein.

(b) See § 1910.6 concerning the availability of ANSI Z88.2–1969 and the maintenance of an historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(c) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or other employees will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such a different position is available.

UCC 010995

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ACL Doc 18834 · Page 96 of 99
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asbestosclaims.law/library/18834/96

(3) Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms: (i) At any fixed place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(ii) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent contamination of the employee's street clothes from his work clothes.

(iii) Laundering: (a) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(b) Any employer who gives asbestos-contaminated clothing to another person for laundering shall inform such person of the requirement in (a) of this subdivision to effectively prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(c) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (g) of this section.

(e) *Method of measurement.* All determinations of airborne concentrations of asbestos fibers shall be made by the membrane filter method at 400–450 × (magnification) (4 millimeter objective) with phase contrast illumination.

(f) *Monitoring*—(1) *Initial determinations.* Within 6 months of the publication of this section, every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine whether every employee's exposure to asbestos fibers is below the limits prescribed in paragraph (b) of this section. If the limits are exceeded, the employer shall immediately undertake a compliance program in accordance with paragraph (c) of this section.

(2) *Personal monitoring*—(i) Samples shall be collected from within the breathing zone of the employees, on membrane filters of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) Sampling frequency and patterns. After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section.

(3) *Environmental monitoring*—(i) samples shall be collected from areas of a work environment which are representative of the airborne concentrations of asbestos fibers which may reach the breathing zone of employees. Samples shall be collected on a membrane filter of 0.8 micrometer porosity mounted in an open-face filter holder. Samples shall be taken for the determination of the 8-hour time-weighted average airborne concentrations and of the ceiling concentrations of asbestos fibers.

(ii) *Sampling frequency and patterns.* After the initial determinations required by subparagraph (1) of this paragraph, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the employees. In no case shall sampling be at intervals greater than 6 months for employees whose exposures to asbestos may reasonably be foreseen to exceed the exposure limits prescribed in paragraph (b) of this section.

(4) *Employee observation of monitoring.* Affected employees, or their representatives, shall be given a reasonable opportunity to observe any monitoring required by this paragraph and shall have access to the records thereof.

(g) *Caution signs and labels.* (1) *Caution signs.* (i) *Posting.* Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section. Signs shall be posted at such a distance from such a location so that an employee may read the signs and take necessary protective steps before entering the area marked by the signs. Signs shall be posted at all approaches to areas containing excessive concentrations of airborne asbestos fibers.

(ii) *Sign specifications.* The warning signs required by subdivision (i) of this subparagraph shall conform to the requirements of 20" x 14" vertical format signs specified in § 1910.145(d)(4), and to this subdivision. The signs shall display the following legend in the lower panel, with letter sizes and styles of a visibility at least equal to that specified in this subdivision.

Legend	*Notation*
Asbestos	1" Sans Serif, Gothic or Block.
Dust Hazard	¾" Sans Serif, Gothic or Block.
Avoid Breathing Dust	¼" Gothic.
Wear Assigned Protective Equipment.	¼" Gothic.
Do Not Remain In Area Unless Your Work Requires It.	¼" Gothic.
Breathing Asbestos Dust May Be Hazardous To Your Health.	14 point Gothic.

Spacing between lines shall be at least equal to the height of the upper of any two lines.

(2) *Caution labels*—(i) *Labeling.* Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers, except that no label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

(ii) *Label specifications.* The caution labels required by subdivision (i) of this subparagraph shall be printed in letters of sufficient size and contrast as to be readily visible and legible. The label shall state:

CAUTION

Contains Asbestos Fibers

Avoid Creating Dust

Breathing Asbestos Dust May Cause Serious Bodily Harm

(h) *Housekeeping*—(1) *Cleaning.* All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with their dispersion, there would be an excessive concentration.

(2) *Waste disposal.* Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

(i) *Recordkeeping*—(1) *Exposure records.* Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of at least 3 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health, and to authorized representatives of either.

(2) *Employee access.* Every employee and former employee shall have reasonable access to any record required to be maintained by subparagraph (1) of this paragraph, which indicates the employee's own exposure to asbestos fibers.

(3) *Employee notification.* Any employee found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in paragraph (b) of this section shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

(j) *Medical examinations*—(1) *General.* The employer shall provide or make available at his cost, medical examinations relative to exposure to asbestos required by this paragraph.

UCC 010996

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ACL Doc 18834 · Page 97 of 99 asbestosclaims.law/library/18834/97

(2) *Preplacement.* The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(3) *Annual examinations.* On or before January 31, 1973, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(4) *Termination of employment.* The employer shall provide, or make available, within 30 calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 x 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(5) *Recent examinations.* No medical examination is required of any employee, if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.

(6) *Medical records*—(i) *Maintenance.* Employers of employees examined pursuant to this paragraph shall cause to be maintained complete and accurate records of all such medical examinations. Records shall be retained by employers for at least 20 years.

(ii) *Access.* The contents of the records of the medical examinations required by this paragraph shall be made available, for inspection and copying, to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of NIOSH, to authorized physicians and medical consultants of either of them, and, upon the request of an employee or former employee, to his physician. Any physician who conducts a medical examination required by this paragraph shall furnish to the employer of the examined employee all the information specifically required by this paragraph, and any other medical information related to occupational exposure to asbestos fibers.

23505

§ 1910.19 Asbestos dust.

Section 1910.93a shall apply to the exposure of every employee to asbestos dust in every employment and place of employment covered by § 1910.12, § 1910.13, § 1910.14, § 1910.15, or § 1910.16, in lieu of any different standard on exposure to asbestos dust which would otherwise be applicable by virtue of any of those sections.

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ACL Doc 18834 · Page 98 of 99 asbestosclaims.law/library/18834/98

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