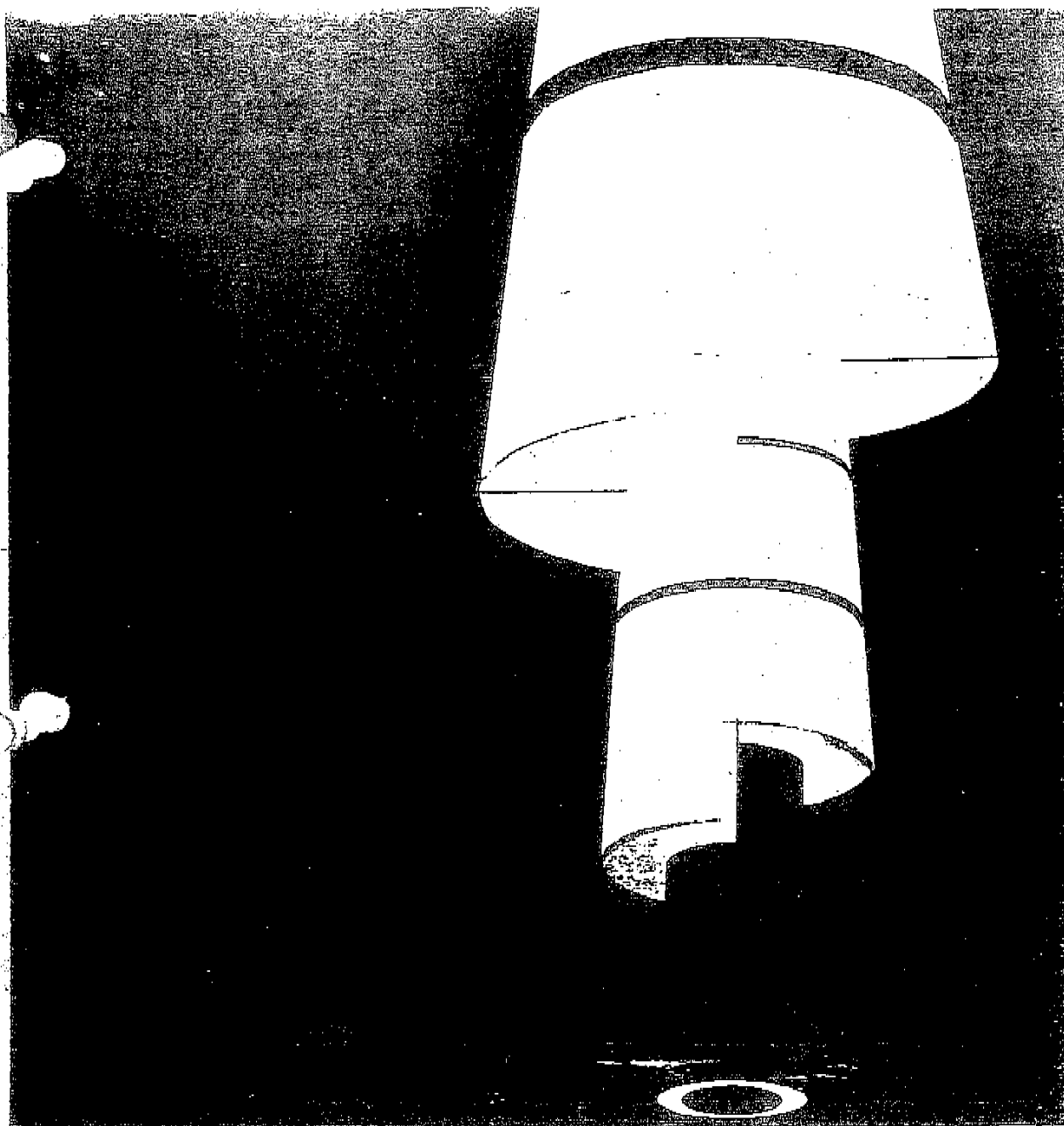
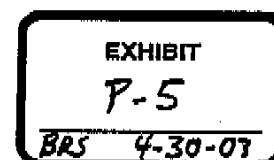




Pipe Coverers Handbook and Field Notes



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PIPE COVERER'S HANDBOOK

AND
FIELD NOTES

DEVELOPED

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INTRODUCTION

While the principal use of this handbook will be as a source of reference information, a section has been added which covers a number of subjects related to the covering trade. For example, due to the fact that asbestos is known to be a health hazard, this subject is discussed by a member of the Dow Medical Staff. In this way, we hope you will understand why Dow has chosen to do away with asbestos containing insulating materials whenever possible.

Other subjects, such as heat transfer and "k" factors, are explained so that you may have a better basic understanding of terms and nomenclature. Older craftsmen will at some time have used most of the materials and methods listed in the book. There are some new techniques and materials listed, however, and these should be used to good advantage. Pre-cut head blocks and vinyl-acrylic mastics are good examples.

A large number of the sketches and tables have been taken from the Dow Engineering Practices. The help and cooperation of the Engineering Technical Specialists group has been greatly appreciated. A special "Thank You" is also due to the many other people who have helped with the compilation of this handbook.

Roy Anderson
July, 1971

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HEALTH AND SAFETY

Only in recent years have we become fully aware of the health hazards involved in working with asbestos-containing materials. In 1969 the Environmental Research Laboratory made a thorough study of air borne dust with relation to our coverers. As a result of this study and with strong support from the Medical Department, a program was initiated whereby we would (1) reduce drastically the purchase of all asbestos-containing insulating materials, and (2) wear approved respiratory protection when working with asbestos. Since then the purchase of asbestos-containing materials has been reduced to almost zero, and our Medical Department has instituted a very rigorous program of surveillance. See Medical Information on page 3.

In general, our dust problem can be divided into two categories, namely asbestos dust and nuisance dust. We have thousands of feet of lines still covered with asbestos insulation. These lines are continually being uncovered and recovered. It is mandatory that respiratory protection be worn when these operations are taking place. Whenever possible the materials should be wetted down to reduce the dust. Nuisance dusts, while not as potentially dangerous as asbestos, can still be a very real source of irritation and respiratory protection is highly recommended. Rarely is a demolition job accomplished without a lot of dust. Wear your respirator.

Good housekeeping is essential in reducing the dust level in a working area. Always pick up torn off insulation and deposit in a dumpster promptly. Do not cut insulation or mix up cement in a confined area and wear clean, loose-fitting clothing.

Two types of U. S. Bureau of Mines approved respirators are carried in stock. They are Dustfoe #66 and #67, and Sure-Guard #R2090. These pieces of equipment, properly fitted and kept in good condition, will afford

and 2M ~~Respirators~~

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adequate protection. It is very important that the outer edges of the face piece form a perfect seal with the face. This should be checked frequently.

Coverers are frequently called upon to work on hot vessels and lines and to remove insulation that has been saturated with chemicals. This calls for alertness and caution. In other respects the safety habits of coverers should be no different than any other maintenance personnel. Remember, "~~Safety must be a first consideration and basic responsibility of every Midland Division employee.~~"

safety is a personal thing, "Life in Texas"

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MEDICAL INFORMATION

The Medical Department is concerned about the hazards of excessive asbestos exposure not only because of the possibility of developing asbestosis, a permanent scarring condition of the lungs, but also because of the increased risk of developing lung cancer. We know that cigarette smoking along with exposure to asbestos dusts increases the risk of developing lung cancer about 80 times. Therefore, it is against your best general interest to smoke from a health standpoint--more so, if you are a pipe coverer.

Always wear the proper protective equipment when working with asbestos containing insulation materials.

The Medical Department maintains surveillance of all pipe coverers through periodic chest x-rays, measurements of breathing ability and health screening examinations. After an initial series of chest x-rays are taken, if you are under 40 years of age or have been pipe covering less than 10 years, follow up x-rays will be taken every year. If you are over 40 years of age or have been pipe covering more than 10 years, follow up chest x-rays will be taken every 6 months.

In recent years we have markedly reduced the use of asbestos in the Midland Plant. Our long range plans call for complete elimination of asbestos; however, until this is possible through the substitution of other materials, you are urged to use extreme caution when working with asbestos containing insulation.

Should you have any question relating to your health in regard to the handling of these materials, please contact the Medical Department at 6-2243.

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GENERAL THEORY AND PRACTICEHeat Transfer

The function of thermal insulation is to retard heat flow. We can best accomplish this by knowing how heat is transferred. Heat has two methods of transfer, namely, conduction and radiation. Convection, in the strict sense of the word, is not a method of heat transfer even though it is commonly used as such. Definitions are as follows:

Conduction is energy (heat) transferred from one body to another through actual physical contact. Example: heat traveling through a metal wire.

Radiation is energy (heat) transmitted through space from a hotter to a colder body. Example: the sun's heat on the earth.

Convection is the movement of a mass (air) from one location to another. Example: the movement of air from one part of a room to another.

One of the important measurements of an insulation's value is its thermal conductivity or "k" factor. This is defined as the amount of heat in Btu which will travel through a square foot of insulation one inch thick in one hour. The lower the "k" factor the better the insulation. Another way of saying the same thing would be to state that a good insulating material is a poor heat conductor. One of the big reasons for this is that insulating materials contain a large number of air spaces, and dry, immobile air is a very poor conductor.

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The loss of heat due to radiation is countered by the use of reflective insulation. The use of aluminum foil over a steam traced line is a good example of this type of insulation. Reflective insulation is often used as a part of building construction. More recently we have seen "space age" reflective blankets and the gear worn by our astronauts.

Next, let us consider convection. Convection of air or heat energy within or around an insulation mass reduces its effectiveness. This is why an insulation made up of many tiny air cells is better than one containing larger air spaces. Convection currents, as we can call them, are set in motion by temperature differences. For example, we know that warm air moves upward.

In moving through an insulating material, heat will use all three modes of transfer. It is impossible to determine exactly the effect from each method. Therefore, the total amount is stated to be by conduction. Figure 1-1 illustrates how heat energy moves through an insulation mass.

As a basis for comparison the following table shows the thermal conductivity (k factor) for a number of insulating materials.

Thermal Conductivity (k factor) Table

Material	k factor at temperatures indicated				
	100°F.	200°F.	300°F.	500°F.	1000°F.
Polyurethane	.16				
Styrofoam	.27				
Fiberglas	.27	.29	.36		
Kaylo	.34	.36	.42	.50	
Careytemp	.32	.37	.42	.51	.83
Unibestos	.32	.36	.42	.50	.75
Foamglas	.42	.48	.56	.73	

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INSULATION SUNDRIES

- 1.0 The following materials are required in the application of piping and equipment insulations. Most of them are carried in Dow Stock and stock code numbers are listed accordingly. Other items which are not in Dow Stock must be purchased as required.

INSULATING CEMENTS

- | | |
|---|---|
| 1. B-E-H No. 1 Plus Cement
Dow Stock Code No. 200270 | A mineral wool, bentonite clay, and asbestos fiber cement for use up to 2100°F. Supplied by Baldwin-Ehrat-Hill Co., in 50 pound bags. Coverage 25 sq. ft. at 1" thick per bag ASTM C-195. |
| OR | |
| Super "66" Cement | A mineral wool cement for use up to 1800°F. Supplied by Eagle Picher Co., in 50 pound bags. Coverage 25 sq. ft. at 1" thick per bag. |
| OR | |
| MW No. 50 Cement | A mineral wool cement for use up to 1600°F. Supplied by Philip Carey Mfg. Co., in 50 lb. bags. Coverage 20 sq. ft. at 1" thick, per bag. |

INSULATING FINISHING CEMENTS (Also known as "Blue Mud")

- | | |
|--|--|
| 2. No. 303 Cement (or 7M) Dow
Stock Code No. 200271 | An asbestos base finishing cement for use up to 1000°F. Supplied by Philip Carey Co., in 100 lb. bags. Coverage 19 sq. ft. at 1" thick per bag. Also known as 7M Cement. |
| OR | |
| No. 152 Cement | An asbestos base finishing cement for use up to 1000°F. Supplied by Armstrong Cork Co. in 100 lb. bags. Coverage 19 sq. ft. at 1" thick per bag. |
| OR | |
| No. 352 Cement | An asbestos base finishing cement for use up to 1000°F. Supplied by Johns-Manville in 100 lb. bags. Coverage 19 sq. ft. at 1" thick per bag. |
| OR | |
| MW-One Cement | A mineral wool base finishing cement for use up to 1000°F. Supplied by Philip Carey Co. in 50 lb. bags. Coverage 20 sq. ft. at 1" thick per bag. |

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HYDRAULIC SETTING INSULATING CEMENT

3. Superpowerhouse Cement
Dow Stock Code 200264 - A hydraulic setting mineral wool cement for one-coat finishing on equipment and large pipes. Supplied by Baldwin-Ehret-Hill Co., in 50 lb. bags. Coverage 55 sq. ft. at 1/2" thick per 100 lbs.
- OR
- E.P. One-Cote Cement Same as above. Supplied by Eagle-Picher Co., in 50 lb. bags. Coverage 75 sq. ft. at 1/2" thick per 100 lbs.

ASPHALT MASTIC EMULSION

4. Thermotex
Dow Stock Code No. 200263 For weatherproof finish supplied by Philip Carey Co., in 50, 100, 300 and 500 lb. containers. Weight 10 lbs. per gallon. Coverage 55 sq. ft. at 1/4" thick wet per 100 lbs.
- OR
- Insulkote Johns-Manville in 50, 150 and 500 lb. containers. Weight 10 lbs. per gallon. Coverage 55 sq. ft. at 1/4" thick wet per 100 lbs.
- OR
- 90-07 H.I. Mastic Benjamin Foster in 1, 5 and 55 gallon containers.

ALTERNATE: Fire Resisting Mastic, used at 794 Bldg.
Insul-Caustic No. 551 (gray) vinyl-acrylic, 15 sq. ft. per gal. at 1/8" thick wet film, 10.3 lbs. per gal.

ADHESIVE CEMENTS

5. No. 340 Cement
Dow Stock Code No. 200260 For cementing joints in Styrofoam and cork. Supplied by Armstrong Cork Co., in 1 and 5 gallon cans. Weight 12 1/2 lbs. per gallon. Coverage 30 sq. ft. per gallon, trowel application.
6. Plastic Elastigum
Dow Stock Code No. 300114 For applying hair felt and sealing laps of Weatherproof Felt. Supplied by Barrett in 10, 50 and 500 lb. containers. Weight 10 lbs. per gallon. Coverage 100 sq. ft. at 1/16" per 35 to 40 lbs.

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7. No. 81-71 Adhesive
Dow Stock Code No. 200224
For cementing glass fiber insulation on air ducts. Supplied by Benjamin Foster Co. (Ductfas) in 1 and 5 gallon cans. Coverage 150-200 sq. ft. per gallon. Drying time 10 - 15 min. Flammable solvent.
8. Flashing Insulmastic
No. 4010 Vaporseal Mastic
Dow Stock Code No. 200247
Used with glass fabric to seal weather-proof mastic around nozzles and brackets. Supplied by Pittsburgh Coke and Chemical Co. in 1 and 5 gallon pails and 55 gallon drums. Coverage 10 sq. ft. at 1/8" dry thickness per gallon. Flammable solvent.
- OR
- Flashing Compound No. 9510
Benjamin Foster Co.
9. No. 5D-40 Adhesive
Dow Stock Code No. 200261
Used in spraying cork on indoor piping and equipment. Supplied by Schermerhorn Paint Prod. Co., (Navy Gicle) in 5 gallon pails. Coverage 10 sq. ft. per gallon for 1/2" thick cork. Water soluble.
10. Sodium Silicate
Dow Stock Code No. 300203
Used with Asbestos Cement to adhere insulation to metal surfaces. Use 40 Baume type. Supplied in 50 gallon drums.
11. Careytemp Fibrous Adhesive
An asbestos fiber and silicate of soda fibrous plastic cement for use up to 800°F. Supplied by Philip Carey Co. in one and five gallon pails and 55 gallon barrels. One gallon covers 25 - 30 sq. ft. at 1/8" thickness.
12. Pittsburgh-Corning's
Pittseal 111
Used for bedding cellular insulations and as a sealer in expansion joints. It cushions insulations against abrasion and seals joints against vapor leaks which might cause condensation and freezing. Aluminum in color. Temperature range of -100°F. to +300°F. Supplied by Foamglas distributors in one and five gallon containers. One gallon covers 26 sq. ft. at 1/16" thickness or 13 sq. ft. at 1/8" thickness.

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FASTENING MATERIALS

13. Staples, Copper Clad
Flat, 12 Ga.

For fastening pipe covering.
Supplied in 100 lb. boxes.
(Jennison Hardware Co.)

Dow Stock Code No.
200257

Size 3/4" x 1/2", 350 pcs. per lb.

Dow Stock Code No.
200258

Size 1" x 3/4", 185 pcs. per lb.

Dow Stock Code No.
200259

Size 1 1/4" x 1", 140 pcs. per lb.

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