

**PLAINTIFF'S
EXHIBIT**
DUP-535
APPLICATION
SERIES 100 - PIPE AND FITTINGS
**FACTORY-APPLIED 8-OZ CANVAS FINISH
ON PIPE AND FIELD-APPLIED
8-OZ CANVAS FINISH ON FITTINGS**
THERMAL INSULATION
STANDARD ENGINEERING SPECIFICATION
ISSUED OCT 1954
SN 100.02 A
**REVISED
JAN 1959**
Page 1 of 4
1. SCOPE

1.1 This Specification covers Application of Molded Block and Pipe Insulation listed below, with Factory-applied 8-ounce Canvas Finish on all Pipe, and Field-applied 8-ounce Canvas Finish on all Fittings and Valves.

2. MATERIALS

2.1 All materials shall be in accordance with the SN-M Section of the Standard Engineering Specifications governing.

2.2 For this Specification, Series 100 pipe insulation shall be purchased with 8-ounce Canvas, Code 704, finish applied by the manufacturer. A minimum of 2 inches lap shall be provided on the longitudinal seam and at one end. The laps shall not be permanently cemented until installed.

2.3 Basic Insulation Materials - Molded*

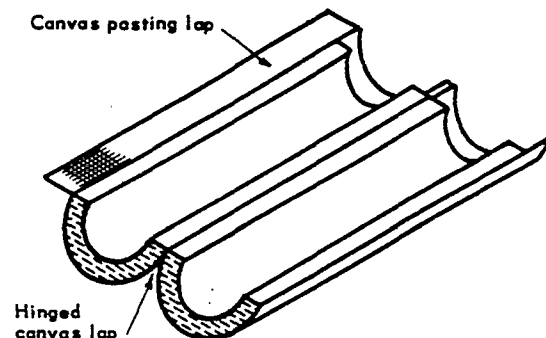
Code 101 - 85% Magnesia
Code 102 - Calcium Silicate
Code 112.17 - Glass Fiber

2.4 Basic Insulation Materials - Fluid and Plastic

Code 502* - Insulation Cement
Code 502.1 - Insulation and Finishing Cement
(Limited to 800 degrees F)

2.5 Accessory Materials

Code 704 - 8-ounce Canvas
Code 712 - Finish Cement
Code 714 - Poultry Netting
Code 802 - Lagging Adhesive
Code 920 - Series - Stainless Wires and Bands**
Code 930 - Series - Monel Wires and Bands**
Code 962 - Ladders Staples

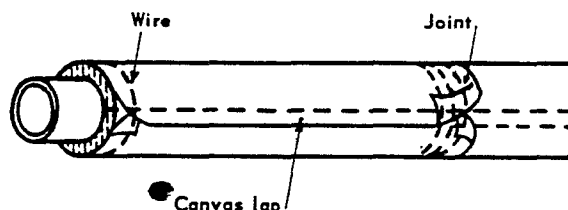

FIGURE 1

* Selection specified on project or job specification index.
** Sizes - See Table 1, Wires and Bands.

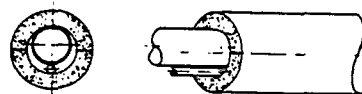
SUBCOMMITTEE NO. 25

3. PIPE - INSULATION APPLICATION

3.1 Pipe insulation shall be applied snugly on pipe with joints tightly butted together. See Figures 1 and 2.


FIGURE 2

3.2 Pipe insulation on chased lines shall be of a size large enough to enclose both pipeline and chaser. The insulation shall be a snug fit to the pipe and chaser or its ring spacer. See Figure 3.


FIGURE 3

3.3 Insulation shall be applied to the pipe in 3-foot sections wherever possible. Longitudinal joints will not be staggered. Longitudinal joints shall be applied vertical, wherever possible, making canvas laps on top or bottom of pipe, wherever is least visible. Ends shall be butted tightly against the adjacent sections of insulation. See Figure 2. The canvas shall be drawn back from the ends of the sections to allow a wire to be applied over the insulation 1 inch from each end of the section in accordance with paragraph 3.5; All chipped edges, cracks or imperfections shall be filled in and smoothed with Insulation Cement, Code 502.

3.4 Lagging Adhesive, Code 802, shall be brushed on the inside of the laps in sufficient quantity to provide thorough adhesion of the canvas. The laps

*When Code 502 is specified herein, Code 502.1 can be substituted provided the temperature conditions do not exceed 800 degrees F.



shall be pressed down and shall be free of air pockets and wrinkles.

3.5 Wires and Bands. Glass Fiber insulation, Code 112, shall be installed without wires or bands. Insulation greater than 1 inch in thickness shall be secured with Lagers Staples, Code 962. No fastening is required for thicknesses under 1 inch. Other insulation shall be applied to the pipe and secured with wires or bands as specified in Table 1. Wires shall be applied with 2 separate loops per section, twisted, bent, and hammered into the insulation. Bands shall be applied 2 per section of insulation, tightened and held with band seals. Wires or bands shall be located 1 inch from the ends of the section. See Figure 2.

4. INSULATION AT PIPE HANGERS

4.1 Pipe hangers attached to the pipe shall be insulated. Where possible, the pipe insulation should be cut out to fit snugly over the hanger with the outer surface of the insulation unbroken and free from bulging. Where the shape of the hanger does not permit this procedure, the pipe insulation can be butted up to the hanger and the void filled with Insulation Cement, Code 502, until flush with the pipe insulation. See Figures 4 and 5. The insulation around the hanger clamp and rod shall be sealed with Finish Cement, Code 712.

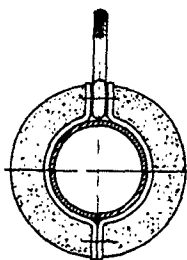


FIGURE 4

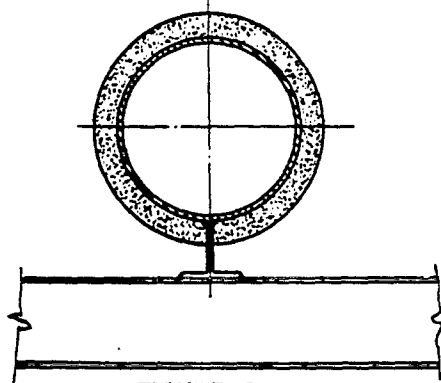


FIGURE 5

5. PIPE - FINISH APPLICATION

5.1 Finish shall consist of factory-applied 8-ounce Canvas, Code 704, over insulation.

6. FITTINGS - INSULATION APPLICATION

6.1 Welded and screwed fittings and valves 2 inches and smaller shall be insulated with Insulation Cement, Code 502, to a thickness at least equal to the adjacent pipe insulation. See Figures 6 and 7.

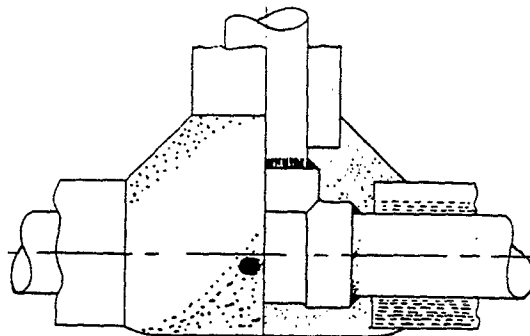


FIGURE 6

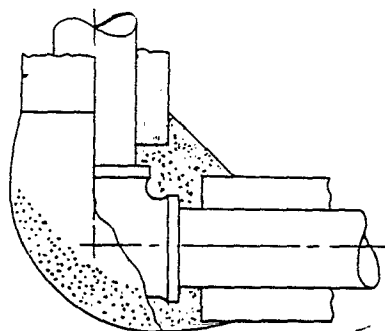


FIGURE 7

6.2 Welded fittings 3 inches and larger, shall be insulated with block or pipe insulation equal in thickness and in same number of layers as adjacent pipe insulation. See Figure 8.

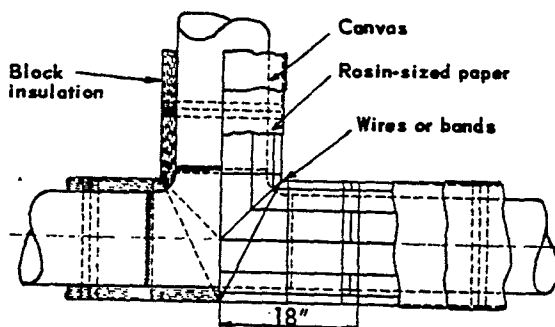


FIGURE 8



6.3 Flanged fittings and flanged valves shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe insulation, or 2 inches whichever is less. The fitting insulation shall overlap the adjacent pipe insulation 2 inches or equal the pipe insulation thickness, whichever is greater. See Figures 9 and 10.

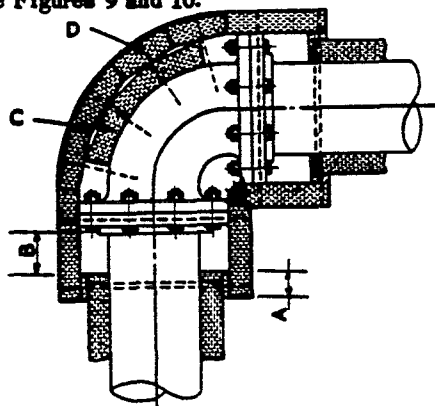


FIGURE 9

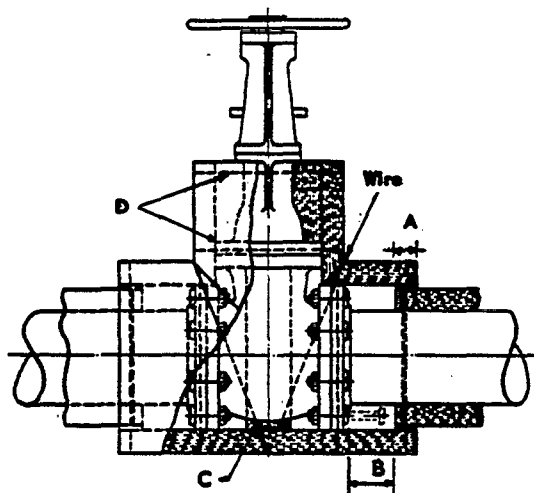


FIGURE 10

Legend - Figures 9 and 10

- A - Not less than 2 inches
- B - Clearance to remove bolts
- C - Block support for cover
- D - Wires or bands not over 6-inch centers

For fittings over 12 inches in diameter, apply poultry netting over insulation to reinforce the Finish Cement.

6.4 Line flanges shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe covering or 2 inches, whichever is less. The length to be in accordance with Figure 11 and Table 2.

6.5 Each section or segment of block or pipe insulation used for insulation of fittings shall be held securely by wires or bands as specified in Table 1.

6.6 The outside of the insulation on all fittings, valves and line flanges shall be given a $\frac{1}{4}$ -inch trowel coat of Finish Cement, Code 712, to present a smooth surface. For valves and fittings with insulation diameter 13 inches or over the finish cement shall be reinforced with Poultry Netting, Code 714.

7. FITTINGS - FINISH APPLICATION

7.1 Finish shall consist of field-applied 8-ounce Canvas, Code 704, over the Finish Cement, using Lagging Adhesive, Code 802 to completely cover the fittings smoothly and snugly.

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TABLE 1

WIRES AND BANDS					
Pipe Insulation Diameter (In.)		920 Series Stainless Steel	930 Series Monel		
Minimum	Maximum				
—	6 ¹ / ₄	921	931		
Over 6 ¹ / ₄	12 ³ / ₄	922	932		
13	—	926	936		

LENGTH OF 1-INCH NOMINAL THICKNESS INSULATION COVERS FOR LINE FLANGES

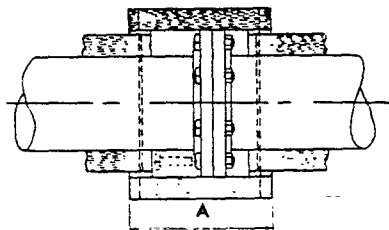


FIGURE 11

TABLE 2

Nominal Pipe Size (inches)	Length A (in.)									
	Flanges									
	150-lb.		370-lb.		600-lb.		900-lb.		1500-lb.	
	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD
1/2	9	3 ¹ / ₂	9	3 ³ / ₄	12	3 ³ / ₄	12	4 ³ / ₄	12	4 ³ / ₄
3/4	9	3 ⁷ / ₈	9	4 ⁵ / ₈	12	4 ⁵ / ₈	12	5 ¹ / ₈	12	5 ¹ / ₈
1	9	4 ¹ / ₄	9	4 ⁷ / ₈	12	4 ⁷ / ₈	12	5 ⁷ / ₈	12	5 ⁷ / ₈
1 1/4	9	4 ⁵ / ₈	9	5 ¹ / ₄	12	5 ¹ / ₄	12	6 ¹ / ₄	12	6 ¹ / ₄
1 1/2	9	5	9	6 ¹ / ₈	12	6 ¹ / ₈	18	7	18	7
2	9	6	9	6 ¹ / ₂	12	6 ¹ / ₂	18	8 ¹ / ₂	18	8 ¹ / ₂
2 1/2	9	7	12	7 ¹ / ₂	12	7 ¹ / ₂	18	9 ⁵ / ₈	18	9 ⁵ / ₈
3	12	7 ¹ / ₂	12	8 ¹ / ₄	12	8 ¹ / ₄	18	9 ¹ / ₂	18	10 ¹ / ₂
3 1/2	12	8 ¹ / ₂	12	9	18	9	-	-	-	-
4	12	9	12	10	18	10 ³ / ₄	18	11 ¹ / ₂	18	12 ¹ / ₄
5	12	10	12	11	18	13	18	13 ³ / ₄	24	14 ³ / ₄
6	12	11	12	12 ¹ / ₂	18	14	18	15	24	15 ¹ / ₂
8	12	13 ¹ / ₂	18	15	18	16 ¹ / ₂	24	18 ¹ / ₂	24	19
10	12	16	18	17 ¹ / ₂	24	20	24	21 ¹ / ₂	30	23
12	12	19	18	20 ¹ / ₂	24	22	24	24	36	26 ¹ / ₂
14 OD	18	21	18	23	24	23 ³ / ₄	24	25 ¹ / ₄	36	29 ¹ / ₂
16 OD	18	23 ¹ / ₂	18	25 ¹ / ₂	24	27	24	27 ³ / ₄	36	32 ¹ / ₂
18 OD	18	25	18	28	24	29 ¹ / ₄	30	31	-	-
20 OD	18	27 ¹ / ₂	18	30 ¹ / ₂	24	32	30	33 ³ / ₄	-	-
24 OD	18	32	24	36	30	37	36	41	-	-



APPLICATION

SERIES 100 - PIPE AND FITTINGS

MOLDED BLOCK AND PIPE INSULATION
WITH FIELD-APPLIED 8-OUNCE
CANVAS FINISH

THERMAL INSULATION
STANDARD ENGINEERING SPECIFICATION

ISSUED

OCT 1954

SN 100.03 A

REVISED

SEPT 1957

Page 1 of 4

1. SCOPE

1.1 This Specification covers application of Molded Block and Pipe Insulation listed below, with Field-applied 8-ounce Canvas Finish on all pipe, fittings, and valves.

2. MATERIALS

2.1 All materials shall be in accordance with the SN-M Section of the Standard Engineering Specifications governing.

2.2 Basic Insulation Materials - Molded*

Code 101 - 85% Magnesia
Code 102 - Calcium Silicate
Code 104 - Inorganic Silicas and Asbestos Fiber
Code 112.01 or 112.02 - Glass Fiber

2.3 Basic Insulation Materials - Fluid and Plastic

Code 502* - Insulation Cement
Code 502.1 - Insulation and Finishing Cement
(Limited to 800°F)

2.4 Accessory Materials

Code 704 - 8-oz. Canvas
Code 705 - Rosin-sized Paper
Code 712 - Finish Cement
Code 714 - Poultry Netting
Code 802 - Lagging Adhesive
Code 962 - Laggings Staples
Code 920 Series - Stainless Steel Wires and Bands
Code 930 Series - Monel Wires and Bands

3. PIPE - INSULATION APPLICATION

3.1 Pipe insulation shall be applied snugly on pipe with joints tightly butted together. Pipe insulation 2 1/2 inches or less in thickness shall be applied in a single layer. Pipe insulation over 2 1/2 inches in thickness shall be double-layer construction. Exception: Double-layer insulation shall be installed on all "Dowtherm" piping in sizes 2 inches and larger.

3.2 Pipe insulation on shared heat shall be of a size large enough to enclose both pipeline and chaser. The insulation shall be snug fit to the pipe and chaser or its ring spacer. See Figure 1.



FIGURE 1

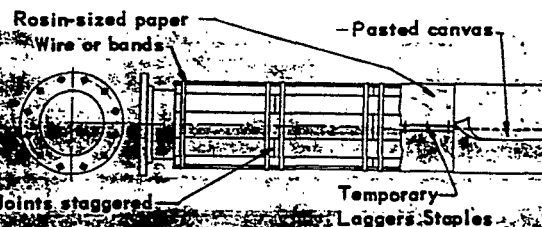
3.3 Single-layer construction single-layer sectional pipe insulation shall be applied with longitudinal

joints vertical whenever possible. The butt joints of sectional or segmental insulation shall be staggered. The insulation shall be held firmly in place by wires or bands installed in accordance with par. 4.1.

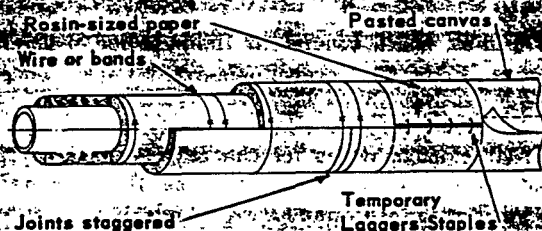
3.4 Double-layer Construction. The first or inner layer of sectional pipe insulation shall be applied with longitudinal joints horizontal whenever possible. The butt joints shall be staggered. The second or outer layer of sectional or segmental insulation shall be applied so that all joints of the first layer are covered by the second layer. Each layer shall be held firmly in place by wires or bands installed in accordance with par. 4.1

4. WIRES AND BANDS

4.1 Each layer of insulation shall be applied to the pipe and secured with wire or bands as specified in Table 1. Wire shall be applied with at least four separate loops per section, twisted, bent and hammered into the insulation. Bands shall be applied four per section of insulation, tightened, and held with band seals. Wire or bands shall be located 1 inch from the ends of the section. See Figures 2 and 3.



PLAN VIEW - FIGURE 2



PLAN VIEW - FIGURE 3

*Where Code 502 is specified herein, Code 502.1 can be substituted provided the temperature conditions do not exceed 800 degrees F.

Selection specified on project shall supersede this Specification. Sizes - See Table 1, Wires and Bands.

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.



5. INSULATION AT PIPE HANGERS

5.1 Pipe hangers attached to the pipe shall be insulated. Where possible, the pipe insulation should be cut out to fit snugly over the hanger with the outer surface of the insulation unbroken and free from bulging. Where the shape of the hanger does not permit this procedure, the pipe insulation can be butted up to the hanger and the void filled with Insulation Cement, Code 502, until flush with the pipe insulation. See Figures 4 and 5. The insulation around the hanger clamp and rod shall be sealed with Finish Cement, Code 712.

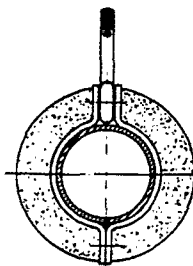


FIGURE 4

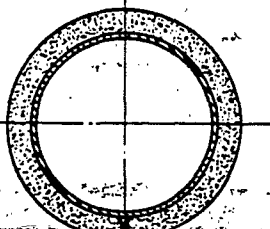


FIGURE 5

6. PIPE - FINISH APPLICATION

6.1 Finish shall consist of field applied 8-ounce Canvas, Code 704, over Rosin-sized Paper, Code 705.

6.2 All chipped edges, cracks or imperfections of each layer of insulation shall be filled in and smoothed with Insulation Cement, Code 502.

6.3 The pipe insulation shall be wrapped with Rosin-sized Paper, Code 705, cut to fit, drawn tight, and held temporarily in place with Lager's Staples, Code 962. 8-ounce Canvas, Code 704, shall be drawn snugly over the Rosin-sized Paper, Code 705. The canvas shall have lap joints at least 2 inches minimum. The staples shall be removed as the canvas is applied. The canvas laps shall be bonded with

Lagging Adhesive, Code 802. The canvas shall be tightly sealed and free of wrinkles and ragged edges. The longitudinal lap shall be located on the top or bottom whichever is least visible. See Figure 3.

7. FITTINGS - INSULATION APPLICATION

7.1 Welded and screwed fittings and valves 2 inches and smaller shall be insulated with Insulation Cement, Code 502, to a thickness equal to the adjacent pipe insulation. See Figures 6 and 7. Where screwed piping is over 2 inches the above procedure is to be followed.

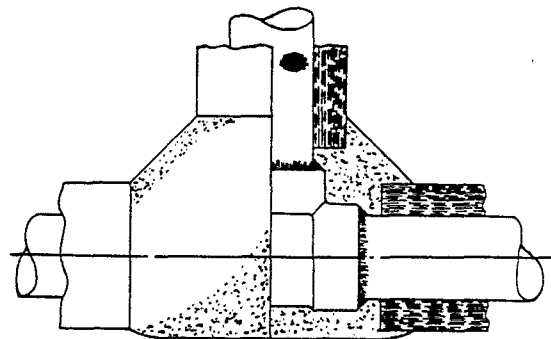


FIGURE 6

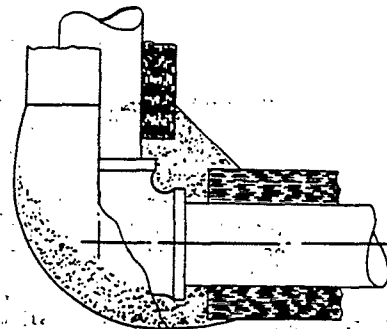


FIGURE 7

7.2 Welded fittings 3 inches and larger shall be insulated with block or pipe insulation at least equal in thickness and in same number of layers as adjacent pipe insulation. See Figure 8.

7.3 Flanged fittings and flanged valves shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe insulation or 2 inches, whichever is less, in accordance with Figures 9 and 10. The fitting insulation shall overlap the adjacent pipe insulation 2 inches or equal the pipe insulation thickness, whichever is greater. See Figures 9 and 10.



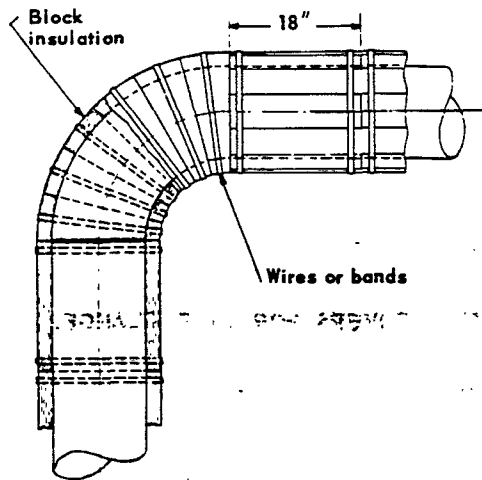


FIGURE 8

7.4 Line flanges shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe covering or 2 inches, whichever is less. The length to be in accordance with Figure 11 and Table 2.

7.5 Each section or segment of block or pipe insulation used for insulation of fittings shall be held securely by wires or bands as specified in Table 1.

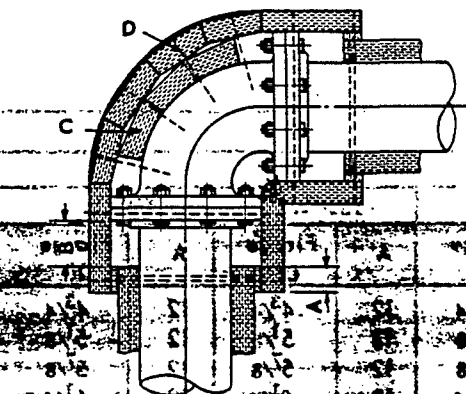


FIGURE 9

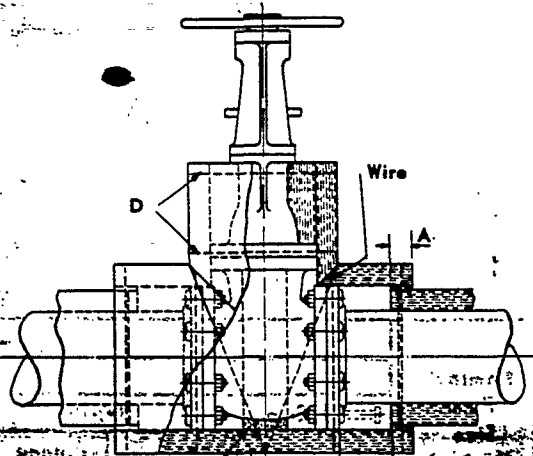


FIGURE 10

Legend Figures 9 and 10

- A — Not less than 2 inches
- B — Clearance to remove bolts
- C — Block support for cover
- D — Wires or bands not over 6-inch centers

For fittings over 12 inches in diameter, apply poultry netting over insulation to reinforce the Finish Cement, Code 712.

7.6 The outside of the insulation on all fittings, valves, and line flanges shall be given a 1/4-inch trowel coat of Finish Cement, Code 712, to present a smooth surface. For valves and fittings with insulation diameter exceeding 13 inches, apply two coats of finish cement reinforced with Poultry Netting, Code 714.

8. FITTINGS — FINISH APPLICATION

8.1 Finish shall consist of field-applied 8-ounce Canvas, Code 704, over the Finish Cement, Code 712, using Lagging Adhesive, Code 802, to completely cover the fittings smoothly and snugly.

TABLE 1

WIRES AND BANDS					
Pipe Insulation Diameter (in.)		920 Series Stainless Steel	930 Series Monel		
Minimum	Maximum				
—	6 ¹ / ₄	921	931		
Over 6 ¹ / ₄	12 ³ / ₄	922	932		
13	—	926	936		

LENGTH OF 1-INCH NOMINAL THICKNESS INSULATION COVERS FOR LINE FLANGES

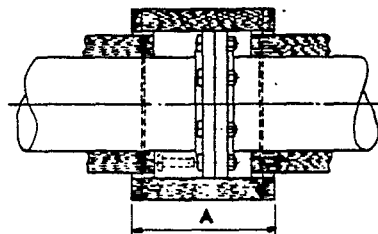


FIGURE 11

TABLE 2

Nominal Pipe Size (inches)	Length A (in.)									
	Flanges									
	150-lb.		300-lb.		600-lb.		900-lb.		1500-lb.	
	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD
1/2	9	3 ¹ / ₂	9	3 ³ / ₄	12	3 ³ / ₄	12	4 ³ / ₄	12	4 ³ / ₄
3/4	9	3 ⁷ / ₈	9	4 ⁵ / ₈	12	4 ⁵ / ₈	12	5 ¹ / ₈	12	5 ¹ / ₈
1	9	4 ¹ / ₄	9	4 ⁷ / ₈	12	4 ⁷ / ₈	12	5 ⁷ / ₈	12	5 ⁷ / ₈
1 1/4	9	4 ⁵ / ₈	9	5 ¹ / ₄	12	5 ¹ / ₄	12	6 ¹ / ₄	12	6 ¹ / ₄
1 1/2	9	5	9	5 ¹ / ₈	12	6 ¹ / ₈	18	7	18	7
2	9	6	9	6 ¹ / ₂	12	6 ¹ / ₂	18	8 ¹ / ₂	18	8 ¹ / ₂
2 1/2	9	7	12	7 ¹ / ₂	12	7 ¹ / ₂	18	9 ⁵ / ₈	18	9 ⁵ / ₈
3	12	7 ¹ / ₂	12	8 ¹ / ₄	12	8 ¹ / ₄	18	9 ¹ / ₂	18	10 ¹ / ₂
3 1/2	12	8 ¹ / ₂	12	9	18	9	18	11 ¹ / ₂	18	12 ¹ / ₄
4	12	9	12	10	18	10 ³ / ₄	18	13 ³ / ₄	24	14 ³ / ₄
5	12	10	12	11 ³ / ₈	18	13	18	15	24	15 ¹ / ₂
6	12	11 ¹ / ₂	12	12 ¹ / ₂	18	14	18	18 ¹ / ₂	24	19
8	12	13 ¹ / ₂	18	15	18	16 ¹ / ₂	24	21 ¹ / ₂	30	23
10	12	16	18	17 ¹ / ₂	24	20	24	24	36	26 ¹ / ₂
12	12	19	18	20 ¹ / ₂	24	22	24	25 ¹ / ₄	36	29 ¹ / ₂
14 OD	18	21	18	23	24	23 ³ / ₄	24	27 ³ / ₄	36	32 ¹ / ₂
16 OD	18	23 ¹ / ₂	18	25 ¹ / ₂	24	27	24	31	-	-
18 OD	18	25	18	28	24	29 ¹ / ₄	30	33 ³ / ₄	-	-
20 OD	18	27 ¹ / ₂	18	30 ¹ / ₂	24	32	30	41	-	-
24 OD	18	32	24	36	30	37	36	-	-	-

DUP 0838481

APPLICATION	THERMAL INSULATION	
	STANDARD ENGINEERING SPECIFICATION	
	ISSUED DEC 1954	SN 100.20 A
SERIES 100 - PIPE AND FITTINGS FACTORY-APPLIED ROOFING FELT FINISH FOR PIPE AND HIGH- TEMP MASTIC FINISH FOR FITTINGS	REVISED JULY 1960	Page 1 of 5

1. SCOPE

1.1 This Specification covers Application of Molded Block and Pipe Insulation listed below, with Factory-applied Roofing Felt on all Pipe; Fittings and Valves shall have high-temperature breathing mastic finish.

2. MATERIALS

2.1 All materials shall be in accordance with the SN-M Section of the Standard Engineering Specifications governing.

2.2 For this Specification, Series 100 pipe insulation shall be purchased with Roofing Felt, Code 701 or Code 702, applied by the manufacturer. A minimum of 2 inches lap shall be provided on the longitudinal seam. The lap shall not be cemented. A 4-inch wide butt lap of suitable length shall be furnished separately with each section of insulation and shall be of the same material as that on the insulation.

2.3 Basic Insulation Materials - Molded*

Code 112.11 or Code 112.12 - Glass Fiber

2.4 Basic Insulation Materials - Fluid and Plastic

Code 502[†] - Insulation Cement

Code 502.1 - Insulation and Finishing Cement
(Limited to 800°F)

2.5 Accessory Materials

Code 701 - Asbestos Roofing Felt

Code 702 - Rag Felt

Code 706 - High-temperature Breathing Mastic

Code 712 - Finish Cement

Code 714 - Poultry Netting

Code 801 - Lap Adhesive

Code 807 - Flashing Compound

Code 920 Series - Stainless Steel Wire and Bands*

Code 930 Series - "Monel" Wires and Bands*

Code 963 - Gun-type Staples

3. PIPE - INSULATION APPLICATION

3.1 Pipe insulation shall be applied snugly on pipe with joints tightly butted together. All pipe insulation shall be applied in single thickness. See Figures 1 and 2.

*Selection specified on project or job specification index.

Sizes - See Table 1, Wires and Bands.

SUBCOMMITTEE NO. 25



[†] Where Code 502 is specified herein, Code 502.1 can be substituted provided the temperature conditions do not exceed 800°F.

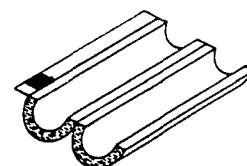
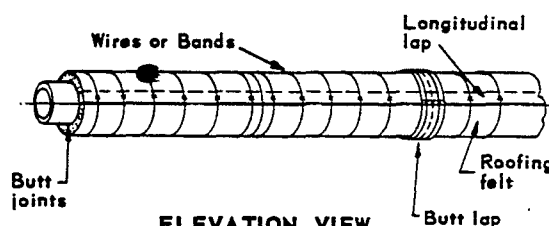


FIGURE 1



ELEVATION VIEW
FIGURE 2

3.2 Pipe insulation on chased lines shall be of a size large enough to enclose both pipeline and chaser. The insulation shall be a snug fit to the pipe and chaser or its ring spacer. See Figure 3.

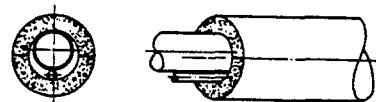


FIGURE 3

3.3 Insulation shall be applied to the pipe in 3-foot sections where possible, longitudinal joints will not be staggered. Ends shall be butted tightly against the adjacent sections of insulation. Bottom edge of longitudinal lap on outdoor insulation shall be slightly above the center line to provide a water shed and on the side of the pipe having maximum exposure to the sun. Bottom edge of longitudinal lap on indoor insulation shall be slightly above the horizontal center line to form a water shed. Orientation of lap is not critical on vertical pipe. Chipped edges, cracks, or imperfections shall be filled in and smoothed with Insulation Cement, Code 502. See Figure 2.

3.4 Lap Adhesive, Code 801, shall be brushed on the inside of the flap in sufficient quantity to provide thorough adhesion of the roofing felt. Lap Adhesive, Code 801, may be eliminated on inside work in dry areas where appearance is not a factor.

4. WIRES AND BANDS

4.1 The insulation may be applied to the pipe and secured with wire, bands, or staples. If wire or bands are used they shall be applied as specified in Table 1. Wires shall be applied on 4-inch centers along the longitudinal joint of the flap. Bands shall be applied on 4-inch centers along the longitudinal joint of the flap. See Figure 2.

5. INSULATION AT PIPE HANGERS

5.1 Pipe hangers attached to the pipe shall be insulated. Where possible, the pipe insulation should be cut out to fit snugly over the hanger with the outer surface of the insulation unbroken and free from bulging. Where the shape of the hanger does not permit this procedure, the pipe insulation can be butted up to the hanger and the voids filled with Insulation Cement, Code 502, until flush with the pipe insulation. See Figures 4 and 5. The insulation around the hanger clamp and rod shall be sealed with Finish Cement, Code 712. When the pipe hanger is attached directly to the pipe, a watershed cone should be installed as shown in Figure 15.

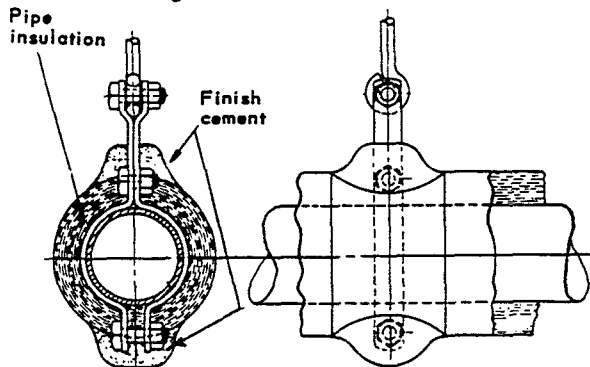


FIGURE 4

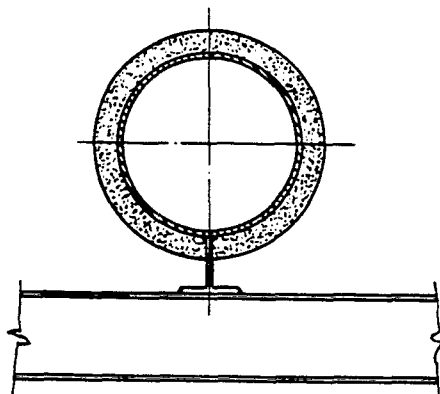


FIGURE 5

6. PIPE - FINISH APPLICATION

6.1 Finish shall consist of Factory-applied Roofing Felt, Code 701, or Code 702, over insulation.

6.2 After the flap has been coated with adhesive, it shall be drawn snugly around the pipe insulation and pressed into place. The flap may be secured by wires on 4-inch centers along the longitudinal joint of the flap, or it may be stapled using Gun-type Staples, Code 963. See SN202P. Staples should be placed on a maximum of 2-inch centers and Lap Adhesive, Code 801, should be daubed over them. A strip of roofing felt approximately 4 inches wide, supplied with the material, shall be placed circumferentially over the butt joint, bonded in place with Lap Adhesive, Code 801, and secured by staples, wires or bands. If staples are used lap adhesive should be daubed over them. See Figure 2.

7. FITTING - INSULATION APPLICATION

7.1 Welded fittings and valves of 2 inches or less and screwed fittings and valves of all sizes shall be insulated with Insulation Cement, Code 502 or Code 502.1, to a thickness equal to the adjacent pipe insulation. See Figures 6 and 7.

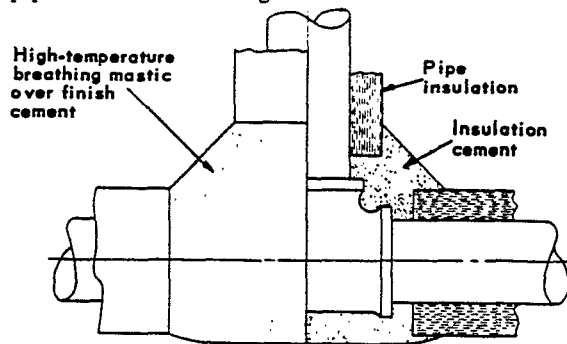


FIGURE 6

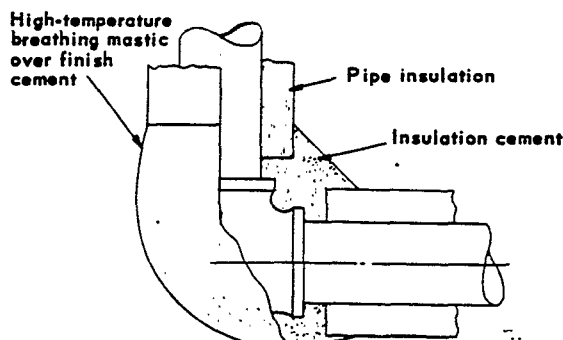


FIGURE 7



7.2 Welded fittings and valves 3 inches and larger shall be insulated with block or pipe insulation at least equal in thickness and in the same number of layers as adjacent pipe insulation. See Figures 8 and 9.

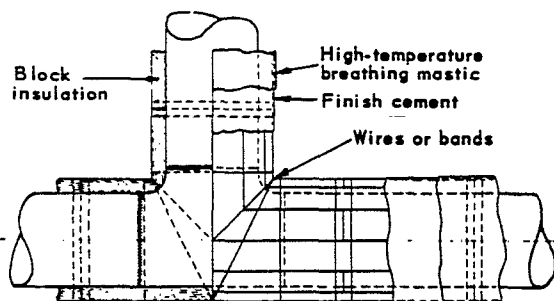


FIGURE 8

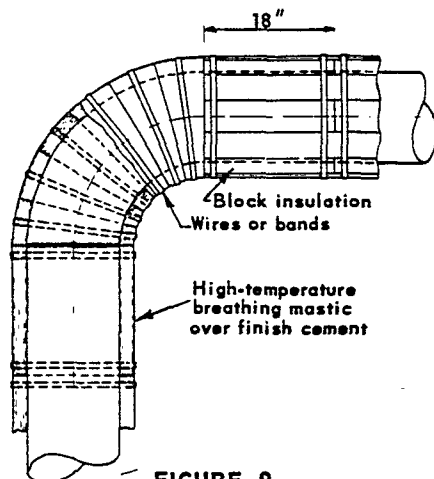


FIGURE 9

7.3 Flange fittings and flange valves shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe insulation, in accordance with Figures 10 and 11. The fitting insulation shall overlap the adjacent pipe insulation 2 inches or equal to the pipe insulation thickness, whichever is greater. See Figures 10 and 11.

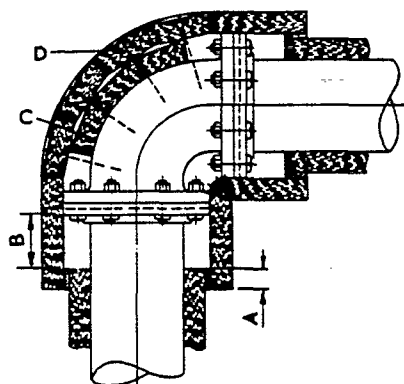


FIGURE 10

Legend Figures 10 and 11

- A — Not less than 2 inches
- B — Clearance to remove bolts
- C — Block support for cover
- D — Wires or bands not over 6-inch centers

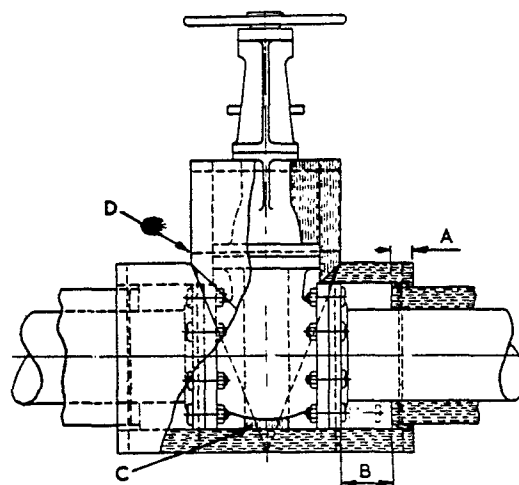


FIGURE 11

7.4 Line flanges shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe covering. The length to be in accordance with Figure 16 and Table 2.

7.5 Each section or segment of block or pipe insulation used for insulation of fittings shall be held securely by wires or bands as specified in Table 1.

7.6 All chipped edges, cracks, or imperfections of each layer of insulation shall be filled in and smoothed with Insulating Cement, Code 502, or Code 502.1.

7.7 For valves, fittings, and line flanges with insulation diameter exceeding 13 inches, Poultry Netting, Code 714, shall be applied and laced tight over the insulation.

8. FITTINGS — FINISH APPLICATION

8.1 Finish shall consist of a prime coat of Insulation Primer Paint, Code 707, applied by brushing or spraying. (Primer can be eliminated over Code 112 material.) Trowel over the surface of the insulation two 1/4-inch coats of High-temperature Breathing Mastic, Code 706.



9. FLASHING

9.1 Flashing Compound Code 807, shall be applied at all possible sources of moisture penetration such as the intersections of insulation at piers, nozzles, building walls, valve bonnets, supports, hangers, and other parts protruding through the surface of the finish. Prior to application, wipe down surfaces of talc-coated felts or other dusty surfaces with a damp cloth and allow to dry to gain maximum adhesion. The Flashing Compound, Code 807, shall be applied to provide a watershed in a $\frac{1}{4}$ -inch coating extending over all intersecting surfaces without feathering of edges. See Figures 12, 13, 14, and 15.

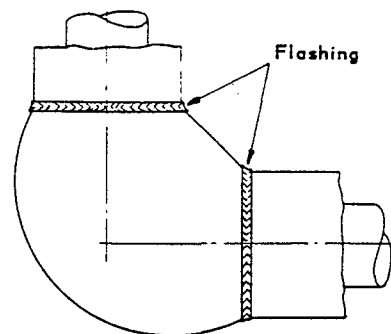


FIGURE 13

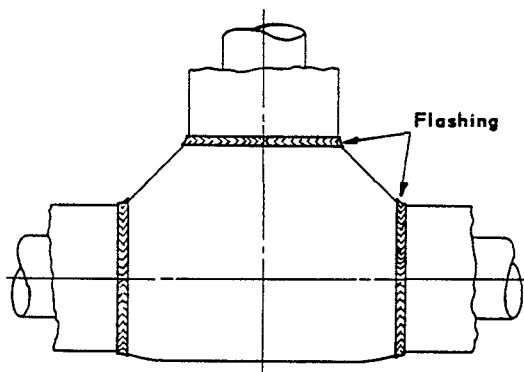


FIGURE 12

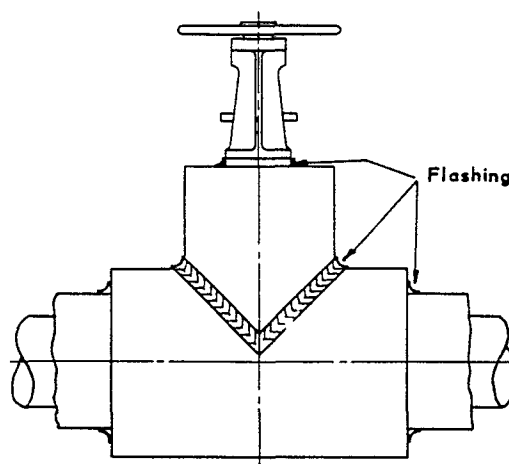


FIGURE 14

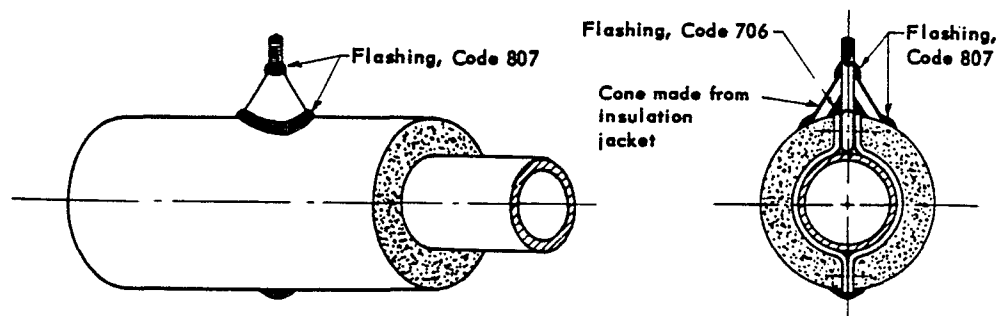


FIGURE 15



TABLE 1

WIRES AND BANDS					
Pipe Insulation Diameter (in.)		920 Series Stainless Steel	930 Series "Monel"		
Minimum	Maximum				
-	6 1/4	921	931		
Over 6 1/4	12 3/4	922	932		
13	-	926	936		

LENGTH OF 1-INCH NOMINAL THICKNESS INSULATION COVERS FOR LINE FLANGES

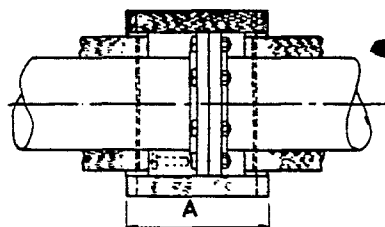


FIGURE 16

TABLE 2

Nominal Pipe Size (inches)	Length A (in.)									
	Flanges									
	150-lb.		300-lb.		600-lb.		900-lb.		1500-lb.	
	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD
1/2	9	3 1/2	9	3 3/4	12	3 3/4	12	4 3/4	12	4 3/4
3/4	9	3 7/8	9	4 5/8	12	4 5/8	12	5 1/8	12	5 1/8
1	9	4 1/4	9	4 7/8	12	4 7/8	12	5 7/8	12	5 7/8
1 1/4	9	4 5/8	9	5 1/4	12	5 1/4	12	6 1/4	12	6 1/4
1 1/2	9	5	9	6 1/8	12	6 1/8	18	7	18	7
2	9	6	9	6 1/2	12	6 1/2	18	8 1/2	18	8 1/2
2 1/2	9	7	12	7 1/2	12	7 1/2	18	9 5/8	18	9 5/8
3	12	7 1/2	12	8 1/4	12	8 1/4	18	9 1/2	18	10 1/2
3 1/2	12	8 1/2	12	9	18	9	-	-	-	-
4	12	9	12	10	18	10 3/4	18	11 1/2	18	12 1/4
5	12	10	12	11	18	13	18	13 3/4	24	14 3/4
6	12	11	12	12 1/2	18	14	18	15	24	15 1/2
8	12	13 1/2	18	15	18	16 1/2	24	18 1/2	24	19
10	12	16	18	17 1/2	24	20	24	21 1/2	30	23
12	12	19	18	20 1/2	24	22	24	24	36	26 1/2
14 OD	18	21	18	23	24	23 3/4	24	25 1/4	36	29 1/2
16 OD	18	23 1/2	18	25 1/2	24	27	24	27 3/4	36	32 1/2
18 OD	18	25	18	28	24	29 1/4	30	31	-	-
20 OD	18	27 1/2	18	30 1/2	24	32	30	33 3/4	-	-
24 OD	18	32	24	36	30	37	36	41	-	-

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.



APPLICATION

SERIES 100 - PIPE AND FITTINGS

CORRUGATED ALUMINUM JACKET ON
PIPE AND HIGH-TEMP MASTIC FINISH FOR
FITTINGS

THERMAL INSULATION

STANDARD ENGINEERING SPECIFICATION

ISSUED

OCTOBER 1954

REVISED

JULY 1957

SN 100.25 A

Page 1 of 5

1. SCOPE

1.1 This Specification covers application of Molded Block and Pipe Insulation listed below, with Corrugated Aluminum Jacket on all pipe. Fittings and Valves shall have High-temperature Breathing Mastic Finish plus Reflecting Aluminum Paint.

2. MATERIALS

2.1 All materials shall be in accordance with the SN-M Section of the Standard Engineering Specifications governing. 2 340017

2.2 Basic Insulation Materials - Molded*

Code 102 - Calcium Silicate

Code 104 - Inorganic Silicas and Asbestos

Code 112.01 - Glass Fiber of Inorganic Fibers

2.3 Basic Insulation Materials - Fluid and Plastic

Code 502 - Insulation Cement

Code 502.1 - Insulation and Finishing Cement
(Limited to 800°F)

2.4 Accessory Materials

Code 706 - High-temperature Breathing Mastic

Code 714 - Poultry Netting

Code 716.1 - Aluminum Jacket

Code 721 - Reflecting Paint

Code 807 - Flashing Compound

Code 920 Series - Stainless Steel Wires and Bands*

Code 930 Series - "Monel" Wires and Bands*

Code 956 - Aluminum Bands

Code 972 - Aluminum Metal Screws

3. PIPE INSULATION APPLICATION

3.1 Pipe insulation shall be applied snugly on pipe with joints tightly butted together. Pipe insulation 2 1/2 inches or less in thickness shall be applied in a single layer. All pipe insulation over 2 1/2 inches in thickness shall be double-layer construction. Exception: Double-layer insulation shall be installed on all "Dowtherm" piping in sizes 2 inches and larger.

3.2 Pipe insulation on chased lines shall be of a size large enough to enclose both pipeline and chaser. The insulation shall be a snug fit to the pipe and chaser or its ring spacer. See Figure 1.



FIGURE 1

*Where Code 502 is specified herein, Code 502.1 can be substituted provided the temperature conditions do not exceed 800°F.

SUBCOMMITTEE NO. 25

3.3 Single-layer Construction. Single-layer sectional pipe insulation shall be applied with longitudinal joints vertical whenever possible. The butt joints of sectional or segmental pipe shall be staggered. The insulation shall be held firmly in place by wires or bands installed in accordance with paragraph 4.1.

3.4 Double-layer Construction. The first or inner layer of sectional pipe insulation shall be applied with longitudinal joints horizontal whenever possible. The butt joints shall be staggered. The second or outer layer of sectional or segmental insulation shall be applied so that all joints of the first layer are covered by the second layer. Each layer shall be held firmly in place by wires or bands installed in accordance with paragraph 4.1.

4. WIRES AND BANDS

4.1 Each layer of insulation shall be applied to the pipe and secured with wire or bands as specified in Table 1. Wire shall be applied with at least four separate loops per section, twisted, bent, and hammered into the insulation. Bands shall be applied four per section of insulation, tightened and held with band seals. Wire or bands shall be located 1 inch from the ends of the section. See Figure 2.

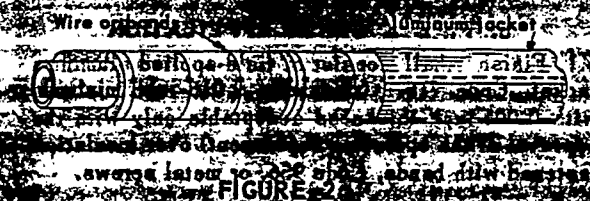


FIGURE 2

5. INSULATION AT PIPE HANGERS

5.1 Pipe hangers attached to the pipe shall be insulated where possible. The pipe insulation should be cut out around the hanger with the outer surface of the insulation unbroken and free from bulging. Where the shape of the hanger does not permit this procedure, the pipe insulation can be built up to the hanger and the void filled with insulation cement, Code 502, until flush with the pipe insulation. See Figure 3. The insulation around the hanger clamp and rod shall be sealed with Finishing Cement, Code 502.1. When the pipe hanger is attached directly to the pipe, a waterproof cone should be installed as shown in Figure 4.

Selection specified on project or in the Specification Index.
For sizes, see Table 1, Wires and Bands.

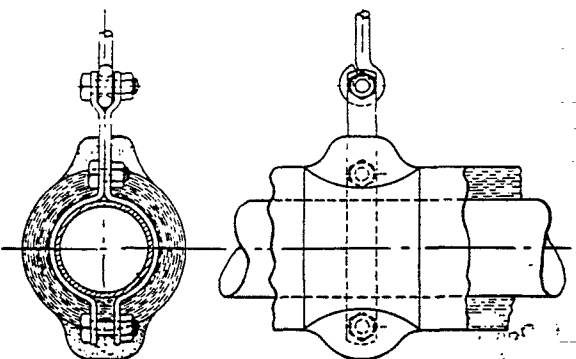


FIGURE 3

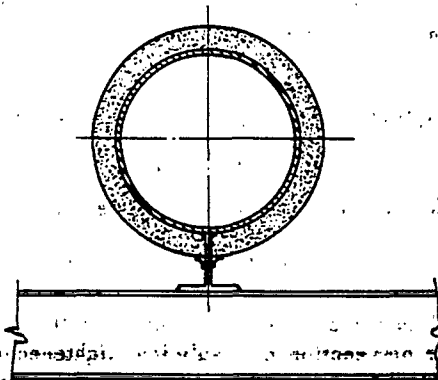


FIGURE 4

6. PIPE FINISH APPLICATION

6.1 Finish shall consist of field-applied aluminum jacket, Code 716.1 (thickness 0.016-inch minimum with 0.006-inch thickness acceptable only with the approval of the operating department) over insulation fastened with bands, Code 956, or metal screws.

6.2 All chipped edges, cracks, or imperfections of each layer of insulation shall be filled in and smoothed with Insulation Cement, Code 502.

6.3 The aluminum jacket shall be cut to fit the circumference of the insulation with longitudinal lap 2 inches minimum. Each section of jacket shall overlap adjacent jacket a minimum of 2 inches. Each section of jacket shall be drawn snugly around the pipe insulation and pressed into place. The lap shall be secured with bands on 8-inch centers along the longitudinal joint. Aluminum screws, Code 807, may be used if they are of the hardened self-tapping type. Flashing compound, Code 807, should be daubed over them. For outdoor service flashing compound shall also be applied to the butt lap on horizontal installations and to the longitudinal lap on vertical piping as a weather seal. The longitudinal lap shall be situated to form maximum

water shed and be least visible. A minimum of two screws per butt lap shall also be used on vertical piping to prevent vertical movement of jacket.

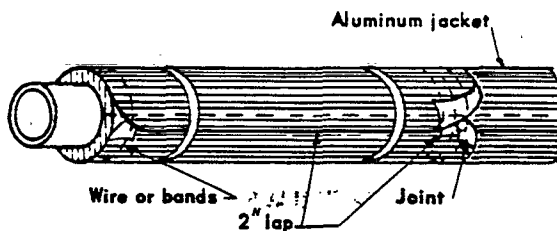


FIGURE 5

7. FITTINGS - INSULATION APPLICATION

7.1 Welded fittings and valves 2 inches and smaller shall be insulated with Insulation Cement, Code 502, to a thickness equal to the adjacent pipe insulation. See Figure 7. Screwed fittings and valves shall also be insulated with Code 502 Insulating Cement as shown in Figure 6.

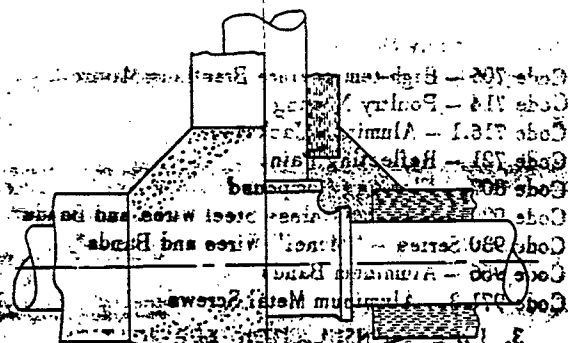


FIGURE 6

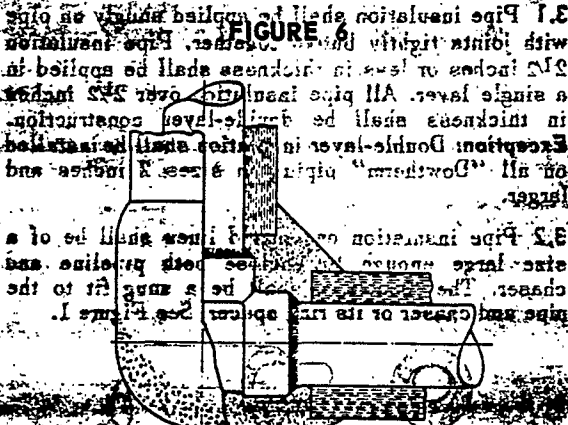


FIGURE 7

7.2 Welded fittings and valves 2 inches and larger shall be insulated with block or pipe insulation at least equal in thickness and in same number of layers as adjacent pipe insulation. See Figure 8.

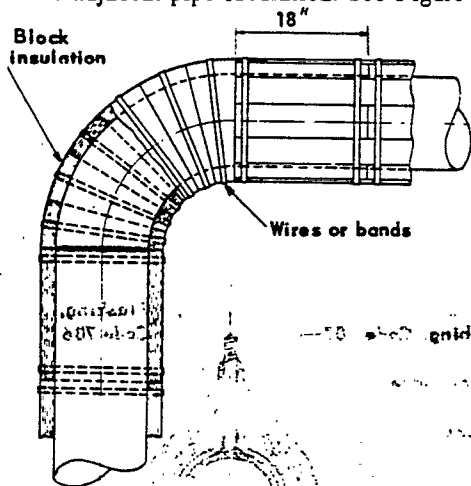


FIGURE 8

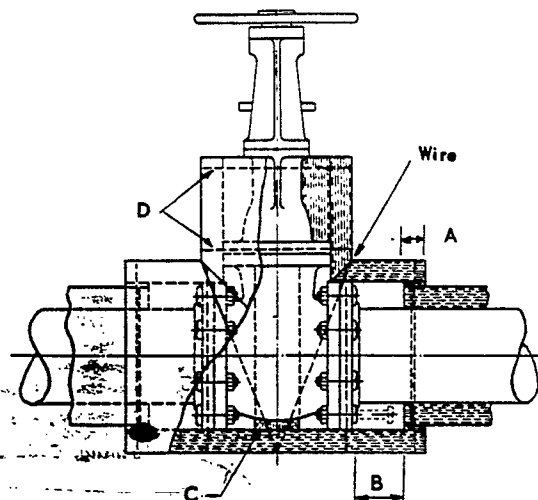


FIGURE 10

Legend Figure 10

- A — Not less than 2 inches
- B — Clearance to remove bolts
- C — Block support for cover
- D — Bands not over 8-inch centers

7.3 Flanged fittings and flanged valves shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe insulation or 2 inches, whichever is less. The fitting insulation shall overlap the adjacent pipe insulation 2 inches or equal the pipe insulation thickness, whichever is greater. See Figures 9 and 10.

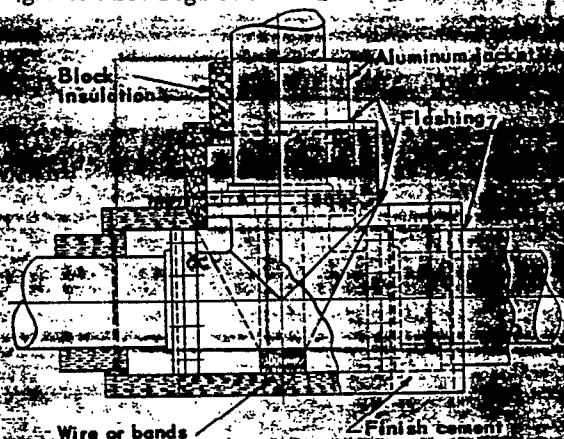


FIGURE 9

7.4 Line flanges shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe covering or 2 inches, whichever is less. The length to be in accordance with Figure 12 and Table 2.

7.5 Each section or segment of block or pipe insulation used for insulation of fittings shall be held securely by wires or bands as specified in Table 1.

7.6 All chipped edges, cracks, or imperfections of each layer of insulation shall be filled in and smoothed with Insulation Cement, Code 502 or Code 502A.

7.7 For valves, fittings, and line flanges with insulation diameter exceeding 13 inches, Poultry Netting, Code 714, shall be applied and laced tightly to the insulation.

8. FITTINGS — FINISH APPLICATION

8.1 Finish shall consist of a prime coat of Insulation Primer Paint, Code 707, applied by brushing or spraying. Trowel over the surface of the insulation two 1/4-inch coats of High-temperature Breathing Mastic, Code 706. After breather mastic has thoroughly dried, apply Code 721 Aluminum Reflecting Paint.

9. FLASHING

9.1 Flashing Compound, Code 807, shall be applied at all possible sources of moisture penetration such as the intersections of insulation at piers, nozzles, building walls, valve bonnets, supports, hangers, and other parts protruding through the surface of the finish. Prior to application, wipe down surfaces of galvanized, felt, or other dusty

No primer required on Code 112.01.



The diagrams illustrate a repair method for a pipe using a jacket and flashing. The left diagram shows a side view of a pipe with a jacket. A cone of insulation is applied to the end of the jacket, and a flashing is attached to the cone. The right diagram shows a cross-section of the pipe and jacket, with the cone and flashing clearly visible. Labels indicate the components: 'Flashing, Code 807' and 'Cone made from insulation jacket'.

FIGURE 11

WIRE AND BANDS					
Plated or Color Diameter (in)		#20 UTS Grade 30 Steel	#20 Series "Monel"	#50 Series Copper	#55 Series Aluminum
Minimum	Maximum				
1/8	7/16	921	981	X	X
5/16	2-1/8	922	982	X	X
3/4	2-1/2	923	983	X	X
1	3	924	984	X	X
1 1/8	3 1/2	925	985	X	X
1 1/2	4	926	986	X	X
1 3/4	4 1/2	927	987	X	X
2	5	928	988	X	X
2 1/4	6	929	989	X	X
2 1/2	6 1/2	930	990	X	X
2 3/4	7	931	991	X	X
3	8	932	992	X	X
3 1/2	9	933	993	X	X
4	10	934	994	X	X
4 1/2	11	935	995	X	X
5	12	936	996	X	X
5 1/2	13	937	997	X	X
6	14	938	998	X	X
6 1/2	15	939	999	X	X
7	16	940	1000	X	X
7 1/2	17	941		X	X
8	18	942		X	X
8 1/2	19	943		X	X
9	20	944		X	X
9 1/2	21	945		X	X
10	22	946		X	X
10 1/2	23	947		X	X
11	24	948		X	X
11 1/2	25	949		X	X
12	26	950		X	X
12 1/2	27	951		X	X
13	28	952		X	X
13 1/2	29	953		X	X
14	30	954		X	X
14 1/2	31	955		X	X
15	32	956		X	X
15 1/2	33	957		X	X
16	34	958		X	X
16 1/2	35	959		X	X
17	36	960		X	X
17 1/2	37	961		X	X
18	38	962		X	X
18 1/2	39	963		X	X
19	40	964		X	X
19 1/2	41	965		X	X
20	42	966		X	X
20 1/2	43	967		X	X
21	44	968		X	X
21 1/2	45	969		X	X
22	46	970		X	X
22 1/2	47	971		X	X
23	48	972		X	X
23 1/2	49	973		X	X
24	50	974		X	X
24 1/2	51	975		X	X
25	52	976		X	X
25 1/2	53	977		X	X
26	54	978		X	X
26 1/2	55	979		X	X
27	56	980		X	X
27 1/2	57	981		X	X
28	58	982		X	X
28 1/2	59	983		X	X
29	60	984		X	X
29 1/2	61	985		X	X
30	62	986		X	X
30 1/2	63	987		X	X
31	64	988		X	X
31 1/2	65	989		X	X
32	66	990		X	X
32 1/2	67	991		X	X
33	68	992		X	X
33 1/2	69	993		X	X
34	70	994		X	X
34 1/2	71	995		X	X
35	72	996		X	X
35 1/2	73	997		X	X
36	74	998		X	X
36 1/2	75	999		X	X
37	76	1000		X	X

Vendors and merchandise designations are given to describe material and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.

DUP 0838490

LENGTH OF 1-INCH NOMINAL THICKNESS INSULATION COVERS FOR LINE FLANGES

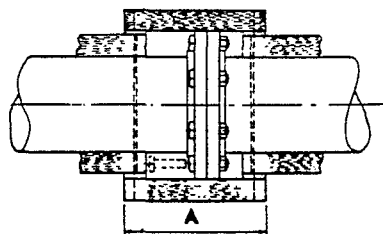


FIGURE 12

TABLE 2

Nominal Pipe Size (inches)	Length A (in.)									
	Flanges									
	150-lb.		300-lb.		600-lb.		900-lb.		1500-lb.	
	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD
1/2	9	3 1/2	9	3 3/4	12	3 3/4	12	4 3/4	12	4 3/4
3/4	9	3 7/8	9	4 5/8	12	4 5/8	12	5 1/8	12	5 1/8
1	9	4 1/4	9	4 7/8	12	4 7/8	12	5 7/8	12	5 7/8
1 1/4	9	4 5/8	9	5 1/4	12	5 1/4	12	6 1/4	12	6 1/4
1 1/2	9	5	9	6 1/8	12	6 1/8	18	7	18	7
2	9	6	9	6 1/2	12	6 1/2	18	8 1/2	18	8 1/2
2 1/2	9	7	12	7 1/2	12	7 1/2	18	9 5/8	18	9 5/8
3	12	7 1/2	12	8 1/4	12	8 1/4	18	9 1/2	18	10 1/2
3 1/2	12	8 1/2	12	9	18	9	-	-	-	-
4	12	9	12	10	18	10 3/4	18	11 1/2	18	12 1/4
5	12	10	12	11	18	13	18	13 3/4	24	14 3/4
6	12	11	12	12 1/2	18	14	18	15	24	15 1/2
8	12	13 1/2	18	15	18	16 1/2	24	18 1/2	24	19
10	12	16	18	17 1/2	24	20	24	21 1/2	30	23
12	12	19	18	20 1/2	24	22	24	24	36	26 1/2
14 OD	18	21	18	23	24	23 3/4	24	25 1/4	36	29 1/2
16 OD	18	23 1/2	18	25 1/2	24	27	24	27 3/4	36	32 1/2
18 OD	18	25	18	28	24	29 1/4	30	31	-	-
20 OD	18	27 1/2	18	30 1/2	24	32	30	33 3/4	-	-
24 OD	18	32	24	36	20	37 1/4	36	41	-	-



APPLICATION

SERIES 100 - PIPE AND FITTINGS

FIELD-APPLIED GLASS CLOTH AND LOW-TEMP VAPOR BARRIER MASTIC OVER PIPE AND FITTINGS

THERMAL INSULATION

STANDARD ENGINEERING SPECIFICATION

ISSUED

DEC 1954

REVISED

MARCH 1959

SN 100.28 A

Page 1 of 4

1. SCOPE

1.1 This Specification covers application of Molded Block and Pipe Insulation listed below, with Field-Applied Glass Cloth and Low-Temperature Vapor Barrier Mastic Finish on all pipe, fittings and valves.

2. MATERIALS

2.1 All materials shall be in accordance with the SN-M Section of the Standard Engineering Specifications governing.

2.2 Basic Insulation Materials - Molded

Code 111 - Cellular Glass

2.3 Accessory Materials

Code 709 - Low-Temperature Vapor Barrier Mastic

Code 710 - Glass Cloth

Code 717 - "Raymesh" Cloth

Code 807 - Flashing Compound

Code 808 - Seam Filler

Code 809 - Water Resistant Adhesive - Rubber*
Base - High Viscosity

Code 810 - Water Resistant Adhesive - Rubber*
Base - Low Viscosity

Code 811 - Water Resistant Adhesive - Asphalt*
Base

Code 920 Series - Stainless Steel Bands*

Code 930 Series - "Monel" Bands*

Code 961 - Skewers

3. PIPE - INSULATION APPLICATION

3.1 Pipe insulation shall be applied snugly on pipe with joints tightly butted together. All pipe insulation shall be applied in single thickness.

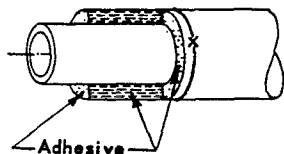


FIGURE 1

* Selection specified on project or job specification Index.
Sizes - See Table 1, Wires and Bands

SUBCOMMITTEE NO. 25

3.2 The pipe insulation shall be applied with longitudinal joints vertical whenever possible. The butt joints shall be staggered. See Figure 2. Each section shall be coated with an adhesive on all contact surfaces with the insulation. See Figure 1. The insulation shall be held firmly in place by bands installed in accordance with par. 4.1. All chipped edges, cracks, or imperfections shall be filled in and smoothed with Seam Filler, Code 808.

4. BANDS

4.1 The insulation shall be applied to the pipe and secured with bands as specified on the project or job specification index in accordance with Table 1. Bands shall be applied two per 18-inch section or four per 36-inch section of insulation. Bands shall be tightened and held with band seals.

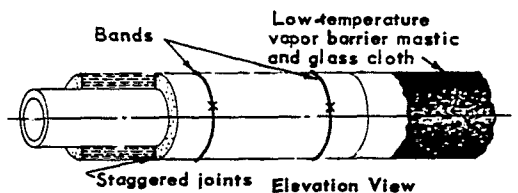


FIGURE 2

5. INSULATION AT PIPE HANGERS

5.1 Pipe hangers shall not be attached to the pipe but shall be placed over the insulation and have a protective finish as shown in Figure 3. The insulation under the hanger clamp shall be protected by a piece of roofing felt and a metal shield of 0.140 inch (No. 10 ga) galvanized iron extending for a distance equal to one-half the diameter of the insulation on either side of the hanger, and shall extend up the side of the insulation to the center line of the pipe. See Figures 3 and 4.

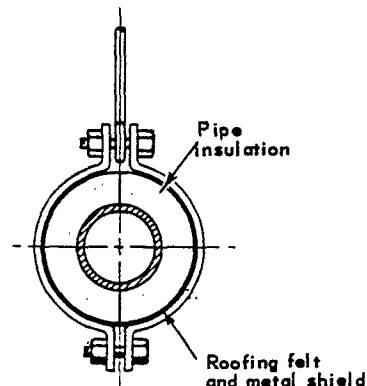


FIGURE 3

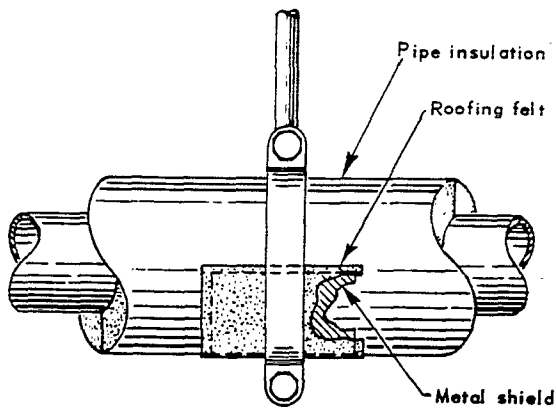


FIGURE 4

6. PIPE - FINISH APPLICATION

6.1 Finish shall consist of $\frac{3}{16}$ inch sprayed or hand-applied coat of Low-Temperature Vapor Barrier Mastic, Code 709, to provide a uniform protective coating of $\frac{1}{8}$ inch minimum thickness when dry. After the first coat of Low-Temperature Vapor Barrier Mastic has been applied, Glass Cloth, Code 710, or "Raymesh," Code 717, shall be embedded in it and the second coat shall be applied over the cloth. See Figure 2.

7. FITTINGS - INSULATION APPLICATION

7.1 Welded and screwed fittings shall be insulated with molded insulation snugly fitted to the surface

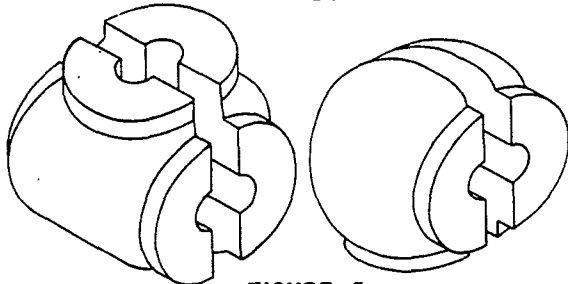


FIGURE 5

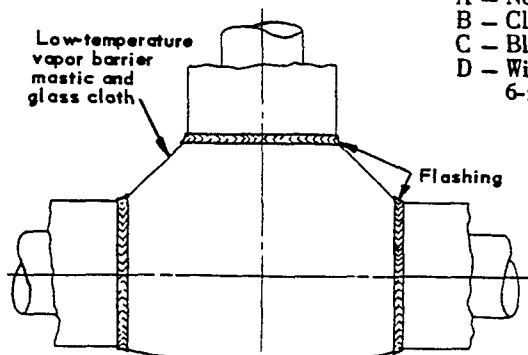


FIGURE 6

of the fitting. Thickness shall be at least equal to the adjacent pipe insulation. See Figures 5, 6 and 7.

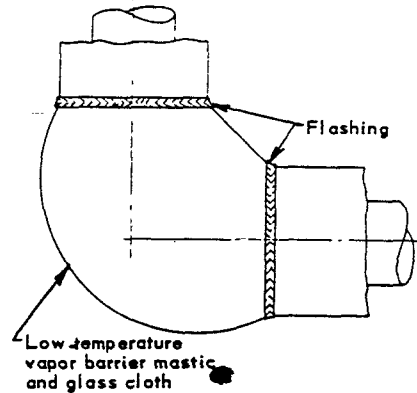


FIGURE 7

7.2 Line flanges, screwed valves, flanged fittings, and flanged valves shall be insulated with molded block or pipe insulation equal in thickness to the adjacent pipe insulation. The fitting insulation shall overlap the adjacent pipe insulation at least 2 inches or equal the pipe insulation thickness, whichever is greater. See Figures 8, 9, and 10.

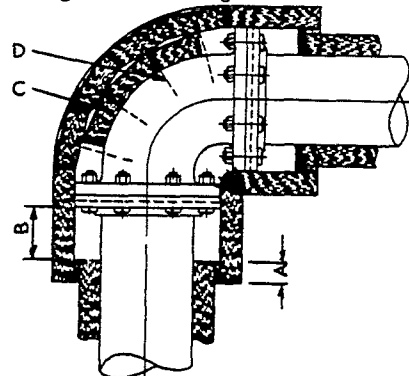


FIGURE 8

Legend Figures 8 and 9

- A - Not less than 2 inches
- B - Clearance to remove bolts
- C - Block support for cover
- D - Wires or bands not over 6-inch centers

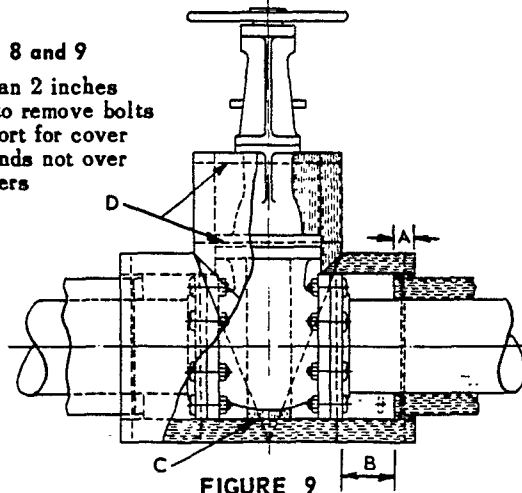


FIGURE 9



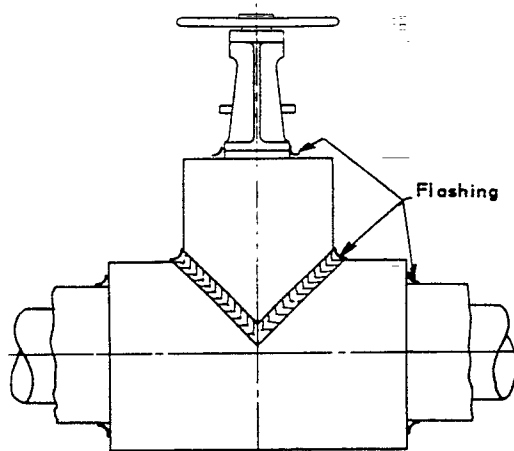


FIGURE 10

7.3 Line flanges shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe insulation. The length to be in accordance with Figure 11 and Table 2.

7.4 The insulation of all screwed, welded, and flanged fittings, valves, and line flanges shall be made in sections so as to be readily applied.

7.5 Each half of the insulation cover shall be applied to the pipe using an adhesive, coating the full contact faces of the insulation, and secured with wires or bands as covered by Table 1.

7.6 All chipped edges, cracks or imperfections shall be filled in and smoothed with Seam Filler, Code 808.

8. FITTINGS - FINISH APPLICATION

8.1 Finish shall consist of $\frac{3}{16}$ inch sprayed or hand-applied coat of Low-Temperature Vapor Barrier Mastic, Code 709, to provide a uniform protective coating of $\frac{1}{8}$ inch minimum thickness when dry. After the first coat of Low-Temperature Vapor Barrier Mastic has been applied, Glass Cloth, Code 710, or "Raymesh," Code 717, shall be embedded in it, and a second coat shall be applied over the cloth.

9. FLASHING

9.1 Flashing Compound, Code 807, shall be applied at all possible sources of moisture penetration such as the intersections of insulation at piers, nozzles, building walls, valve bonnets, supports, hangers, and other parts protruding through the surface of the finish. Prior to application, wipe down surfaces of talc-coated felts or other dusty surfaces with a damp cloth and allow to dry to gain maximum adhesion. The Flashing Compound, Code 807, shall be applied to provide a watershed in a $\frac{1}{4}$ -inch coating extending over all intersecting surfaces without feathering of edges. See Figures 6, 7, and 10.

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.



DUP 0838494

TABLE 1

WIRES AND BANDS					
Pipe Insulation Diameter (in.)		920 Series Stainless Steel	930 Series Monel	950 Series Copper	
Minimum	Maximum				
	6 1/4	926	936	952	

LENGTH OF 1-INCH NOMINAL THICKNESS INSULATION COVERS FOR LINE FLANGES

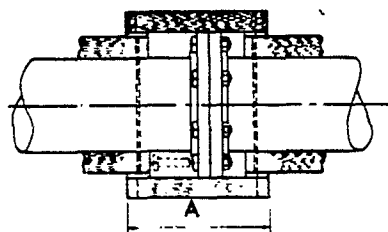


FIGURE 11

TABLE 2

Nominal Pipe Size (inches)	Length A (in.)									
	Flanges									
	150-lb.		300-lb.		600-lb.		900-lb.		1500-lb.	
	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD
1/2	9	3 1/2	9	3 3/4	12	3 3/4	12	4 3/4	12	4 3/4
3/4	9	3 7/8	9	4 5/8	12	4 5/8	12	5 1/8	12	5 1/8
1	9	4 1/4	9	4 7/8	12	4 7/8	12	5 7/8	12	5 7/8
1 1/4	9	4 5/8	9	5 1/4	12	5 1/4	12	6 1/4	12	6 1/4
1 1/2	9	5	9	6 1/8	12	6 1/8	18	7	18	7
2	9	6	9	6 1/2	12	6 1/2	18	8 1/2	18	8 1/2
2 1/2	9	7	12	7 1/2	12	7 1/2	18	9 5/8	18	9 5/8
3	12	7 1/2	12	8 1/4	12	8 1/4	18	9 1/2	18	10 1/2
3 1/2	12	8 1/2	12	9	18	9	-	-	-	-
4	12	9	12	10	18	10 3/4	18	11 1/2	18	12 1/4
5	12	10	12	11	18	13	18	13 3/4	24	14 3/4
6	12	11	12	12 1/2	18	14	18	15	24	15 1/2
8	12	13 1/2	18	15	18	16 1/2	24	18 1/2	24	19
10	12	16	18	17 1/2	24	20	24	21 1/2	30	23
12	12	19	18	20 1/2	24	22	24	24	36	26 1/2
14 OD	18	21	18	23	24	23 3/4	24	25 1/4	36	29 1/2
16 OD	18	23 1/2	18	25 1/2	24	27	24	27 3/4	36	32 1/2
18 OD	18	25	18	28	24	29 1/4	30	31	-	-
20 OD	18	27 1/2	18	30 1/2	24	32	30	33 3/4	-	-
24 OD	18	32	24	36	30	37	36	41	-	-



SERIES 100 - PIPE AND FITTINGS

WHITE FACTORY-APPLIED
VAPOR-BARRIER FINISH

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED JUNE 1956

SN 100.33 A

REVISED SEPT 1958

Page 1 of 2

1. SCOPE

1.1 This Specification covers application of Molded Pipe Insulation with White Factory-applied Vapor-barrier Finish.

2. FINISH

2.1 All materials shall be in accordance with the SN-M Section of the Standard Engineering Specifications governing.

2.2 For this Specification, Series 100 pipe insulation shall be purchased with vapor-barrier finish, supplied by the manufacturer. A minimum of 2-inch lap shall be provided on the longitudinal seam with no lap at either end of the section, see Figure 1.

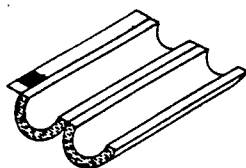


FIGURE 1

2.3 Basic Insulation Materials - Molded and Blanket

Code 112.22 - Glass Fiber - White Finish
Code 206 - Glass Fiber Blanket - Plain

2.4 Basic Insulation Materials - Fluid and Plastic

Code 503 - Urethane Foam

2.5 Accessory Materials

Code 709 - Low-temperature Vapor-barrier Mastic
Code 807 - Flashing Compound
Code 819 - White-finish Lap Adhesive
Code 920 Series - Stainless Steel Wire and Bands*
Code 930 Series - "Monel" Wire and Bands*

3. PIPE - INSULATION APPLICATION

3.1 Pipe insulation shall be applied snugly on pipe with joints tightly butted together, see Figures 2 and 3.

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.

* Selection specified on project or job specification index.
Sizes - See Table 1, Wires and Bands.

SUBCOMMITTEE NO. 25

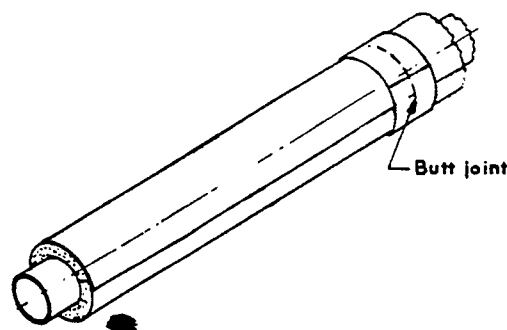


FIGURE 2

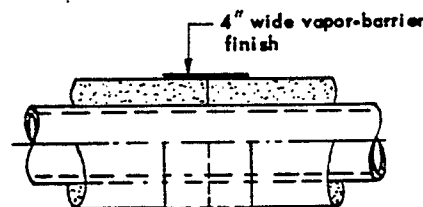


FIGURE 3

3.2 Where possible, insulation shall be applied to the pipe in three-foot sections, lateral joints shall not be staggered, and the ends of the sections shall be butted together. Insulation shall be applied to the pipe by opening section in hinged manner, see Figure 1. On horizontal pipe, hinge shall be at the bottom and flap at the top, turned in the direction in which it is least visible. Orientation of hinge and lap are not critical on vertical pipe except the lap shall be on the least visible side.

3.3 Lap adhesive shall be brushed on both contact surfaces in a thin even coat. After 1 to 2 minutes drying time, laps shall be pressed down free of air pockets. A 4-inch wide strip of vapor-barrier finish is supplied by the manufacturer and shall be placed circumferentially over the butt joints (see Figure 3), bonded in place with the appropriate lap adhesive applied in a light even coat to both contact surfaces.

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4. INSULATION AND FINISH AT PIPE HANGERS

4.1 Pipe hangers shall be attached to the pipe and shall be insulated. Where possible, the pipe insulation should be cut to fit snugly over the hanger with the outer surface of the insulation unbroken and free from bulging. Where the shape of the hanger does not permit this procedure, the pipe insulation can be butted up to the hanger. Fiber Glass Blanket, Code 206, is then cut to fit and lapped over adjoining covering two inches on each side. It is secured with wire or bands as specified in Table 1.

4.2 Finish shall consist of one coat, totaling $\frac{3}{16}$ inch, sprayed or hand-applied, Low-temperature Vapor-barrier Mastic, Code 709, to provide a uniform protective coating of $\frac{1}{8}$ inch minimum thickness when dry.

5. FITTINGS - INSULATION APPLICATION

5.1 Flanged fittings and flanged valves shall be insulated equal in thickness to the adjacent pipe insulation, see Figure 4.

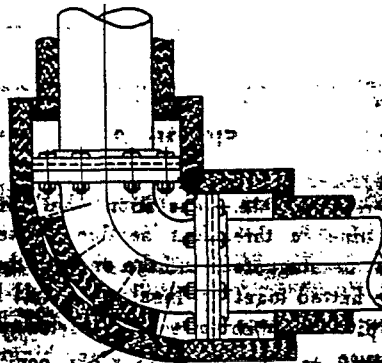


FIGURE 4

5.2 Poured-in-place, prethane foam, Code 503, insulation should be used on all valves and fittings 2 1/2-inch nominal size and above. Apply in accordance with Specification SN207P. (See Figure 5.)

For alternate method see par 5.3.

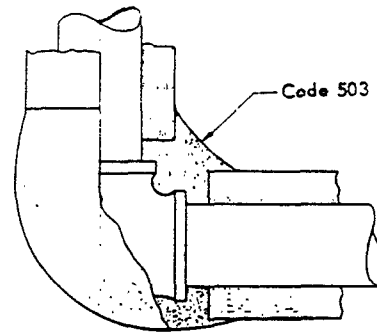


FIGURE 5

5.3 Fittings and valves may be insulated with sections of Glass Fiber Blanket, Code 206, slightly greater in thickness than the adjacent insulation. The fitting insulation shall overlap the adjacent pipe insulation at least two inches and be secured with wires or bands as specified in Wires and Bands, Table 1. To provide rigidity for vapor-barrier mastic, wrap spirally strips of "Raymesh" cloth around the insulation compressing the glass fiber blanket to the thickness of the adjacent insulation.

6. FITTINGS - FINISH APPLICATION

6.1 Finish shall consist of Low-temperature Vapor Barrier Mastic, Code 709, applied $\frac{1}{8}$ -inch thick.

7. FLASHING

7.1 Flashing Compound, Code 807, shall be applied at intersections of the insulation at piers, nozzles, building walls, valve bonnets, supports, hangers, and other parts protruding through the surface of the finish. This shall be applied as a flashing or watershed in $\frac{1}{4}$ -inch coating extending several inches over all intersecting surfaces.

TABLE 1

WIRES AND BANDS			
Pipe Insulation Diameter (in.)		920 Series Stainless Steel	930 Series "Monel"
Minimum	Maximum		
-	6 1/4	921	931
Over 6 1/4	12 1/2	922	932
13	-	926	936

NOTATION

Insulation shall be applied in accordance with the following specifications:



APPLICATION	THERMAL INSULATION	
	STANDARD ENGINEERING SPECIFICATION	
	ISSUED	SN 100.64 A
SERIES 100 - EQUIPMENT AND DUCT WORK	NOV 1954	Page 1 of 3
	REVISED	
FIELD-APPLIED HIGH-TEMPERATURE BREATHING MASTIC FINISH	DEC 1959	

1. SCOPE

1.1 This Specification covers application of Molded Block Insulation with Field Applied High-temperature Breathing Mastic Finish on equipment and duct work.

2. MATERIALS

2.1 All materials shall be in accordance with the SN-M Section of the Standard Engineering Specifications governing.

2.2 Basic Insulation Materials - Molded*

Code 101 - 85% Magnesia
 Code 102 - Calcium Silicate
 Code 103 - Diatomaceous Earth
 Code 104 - Inorganic Silicas and Asbestos Fiber
 Code 106 - Asbestos and Diatomaceous Earth Molded
 Code 107 - Asbestos Sponge
 Code 109 - Corrugated Asbestos Preshrunk
 Code 112.61 or Code 112.66 - Glass Fiber †
 Code 114 - Mineral Wool (block only)

2.3 Basic Insulation Materials - Fluid and Plastic

Code 502* - Insulation Cement
 Code 502.1 - Insulation and Finishing Cement (Limited to 800° F)

2.4 Accessory Materials

Code 706 - High-temperature Breathing Mastic
 Code 706.1 - High-temperature Breathing Mastic (Cutback)
 Code 707 - Insulation Primer Paint
 Code 803 - Fibrous Adhesive
 Code 807 - Flashing Compound
 Code 920 Series - Stainless Steel Wires and Bands*
 Code 930 Series - "Monel" Wires and Bands*
 Code 964 - Spindle Anchors
 Code 714 - Poultry Netting

3. CURVED OR CYLINDRICAL EQUIPMENT - INSULATION APPLICATION

3.1 Insulation on equipment shall be applied snugly with joints tightly butted together. Insulation 2 1/2 inches or less in thickness shall be applied in a single layer except where the 2 1/2-inch thickness will not readily conform to the surface being insulated. In such case, more than one layer may be necessary. Insulation over 2 1/2 inches in thickness shall be double-layer construction.

3.2 Single-layer Construction. Single-layer block, curved, or segmental block insulation shall be

applied with joints tightly butted and lateral joints staggered. Bands shall be placed over blocks approximately 1 inch from each end of each block, thus providing four bands for each 36-inch length of insulation. All chipped edges, cracks or imperfections shall be filled and smoothed with Insulation Cement, Code 502. Over the insulation and bands apply Poultry Netting, Code 714, drawn tight and laced into place. See Figure 1.

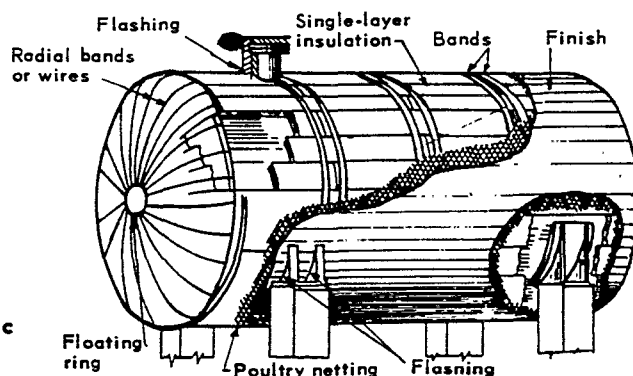


FIGURE 1

3.3 Double-layer Construction. The first or inner layer of curved block, or segmental block insulation shall be applied with joints tightly butted and lateral joints staggered. Bands shall be placed over blocks approximately 1 inch from each end of each block, thus providing four bands for each 36-inch length of insulation. The second or outer layer shall be applied so that all joints are staggered with the first layer and tightly butted together. Bands shall be placed over second layer of blocks approximately 1 inch from each end of each block, thus providing four bands for each 36-inch length of insulation. All chipped edges, cracks or imperfections shall be filled and smoothed with Insulation Cement, Code 502. Over the insulation and bands apply Poultry Netting, Code 714, drawn tight and laced into place. See Figure 2.

*Where Code 502 is specified herein, Code 502.1 can be substituted provided the temperature conditions do not exceed 800 degrees F.

*Selection specified on project or job specification index.
 Sizes - See Table 1, Bands.

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.



† Installation economies should be considered when selecting the optional board or block type.

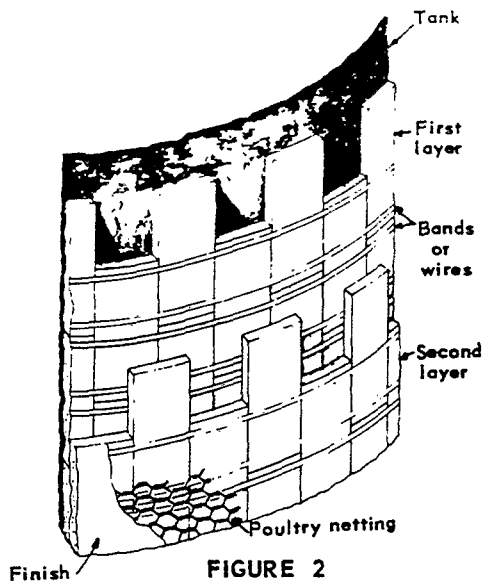


FIGURE 2

3.4 The insulation on heads or ends of cylindrical equipment shall be secured by tight bands or wires that are not over 4 inches apart and fastened to clips, angle iron bands or steel bands encircling the tank behind the rivet heads or circumferential head weld. See Figure 3. The insulation on the cylindrical tank shall be held in place at the center of the heads by radial wires or bands fastened to clips or a floating ring. Fibrous Adhesive, Code 803, can be used to support insulation on overhead surfaces until bands or wires can be applied. All chipped edges, cracks or imperfections shall be filled and smoothed with Insulation Cement, Code 502. Over the insulation and bands apply Poultry Netting, Code 714, drawn tight and laced into place.

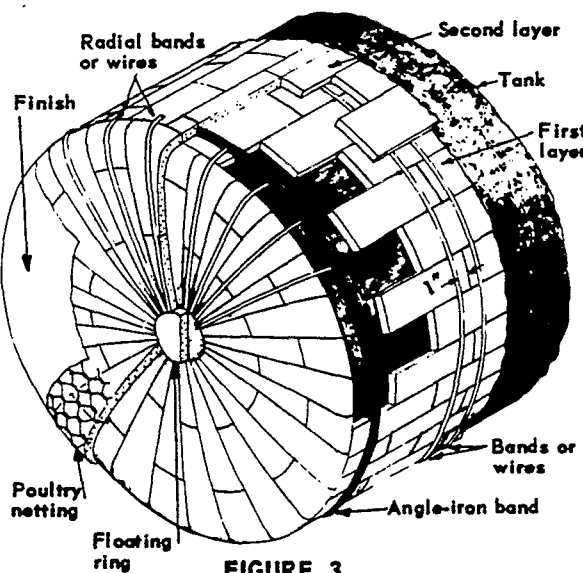


FIGURE 3

4. FLAT OR SQUARE-CORNERED EQUIPMENT - INSULATION APPLICATION

4.1 Insulation shall be applied snugly with joints tightly butted together. Thickness of insulation shall be in accordance with paragraph 3.1.

4.2 Block insulation shall be applied with joints tightly butted together and lateral joints staggered. Bands shall be placed over blocks approximately 1 inch from each end of each block, thus providing four bands for each 36-inch length of insulation. Where welding is permissible, the blocks may be supported by bands fastened to clips that are tacked on the metal surfaces. For either vertical surfaces or horizontal surfaces facing up, the bands shall be spaced at 2-foot intervals. For horizontal surfaces facing down, the bands shall be spaced at 1-foot intervals. At square corners of insulation of flat surfaces, metal corner angles or shields shall be placed under the bands to prevent cutting of insulation. All chipped edges, cracks or imperfections shall be filled and smoothed with Insulation Cement, Code 502. Over the insulation and bands apply Poultry Netting, Code 714, drawn tight and laced into place. See Figure 4.

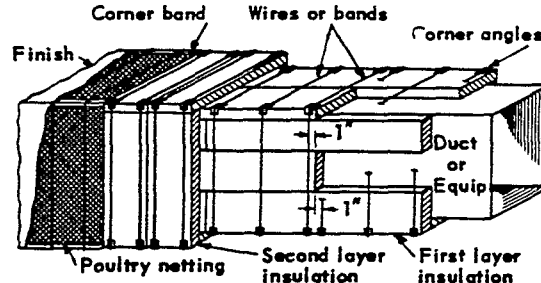


FIGURE 4

4.3 When specified on project or job specification, the blocks may be supported by Spindle Anchors, Code 964, applied to the metal surface by cementing, welding, or spot-welding. See Figure 5.

4.4 Spindle anchors, clips, rods, or bars may be welded or spot-welded to the metal surfaces of equipment or duct work ONLY with the written approval of Design, Construction and The Ind. Dept.

4.5 When the method of fastening is not specified on the project or job specification index, the applicator may choose the most economical or convenient method. However, written approval of welded fastenings must be obtained as outlined in paragraph 4.4.



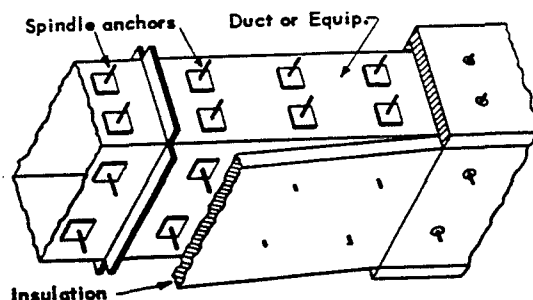


FIGURE 5

5. FINISH

5.1 Finish shall consist of a prime coat of Insulation Primer Paint, Code 707, applied by brushing or spraying over the insulation, bands, and Poultry Netting. (Primer can be eliminated over Code 112

material.) Trowel over the entire surface of the insulation, bands, and Poultry Netting two 1/4-inch coats of High-temperature Breathing Mastic, Code 706, to achieve a minimum 1/4-inch thickness when dry.

6. FLASHING

6.1 Flashing Compound, Code 807, shall be applied at all possible sources of moisture penetration such as the intersections of insulation at piers, nozzles, building walls, valve bonnets, supports, hangers, and other parts protruding through the surface of the finish. Prior to application, wipe down surfaces of talc-coated felts or other dusty surfaces with a damp cloth and allow to dry to gain maximum adhesion. The Flashing Compound, Code 807, shall be applied to provide a watershed in a 1/4-inch coating extending over all intersecting surfaces without feathering of edges. See Figure 1.

TABLE 1 - BANDS

Distance Around Outside Surface of Insulation		920	930		
Minimum (Ft.)	Maximum (Ft.)	Series Stainless Steel	Series Monel		
	4	922	932		
	8	926	936		
	20	927	937		
	50	928	938		

DUP 0838500



APPLICATION

SERIES 100 - EQUIPMENT AND DUCT WORK

FIELD-APPLIED ALUMINUM JACKETS
WITH MASTIC FLASHINGTHERMAL INSULATION
STANDARD ENGINEERING SPECIFICATION

ISSUED

NOV 1954

SN 100.68 A

REVISED

MAY 1959

Page 1 of 4

1. SCOPE

1.1 This Specification covers application of **Molded Block Insulation with Field-Applied Aluminum Jacket** on equipment and duct work.

2. MATERIALS

2.1 All materials shall be in accordance with the SN-M Section of the Standard Engineering Specifications governing.

2.2 Basic Insulation Materials - Molded*

- Code 102 - Calcium Silicate
- Code 104 - Inorganic Silicas and Asbestos Fiber
- Code 106 - Asbestos and Diatomaceous Earth Molded
- Code 112.61 - Glass Fiberboard, Plain †
- Code 112.66 - Glass Fiber Block †
- Code 114 - Mineral Wool (block only)

2.3 Basic Insulation Materials - Fluid and Plastic

- Code 502* - Insulation Cement
- Code 502.1 - Insulation and Finishing Cement (Limited to 800°F)

2.4 Accessory Materials

- Code 709 - Low-temperature Vapor-barrier Mastic
- Code 716 - Aluminum Jacket - 0.016-inch Thick
- Code 801 - Lap Adhesive
- Code 803 - Fibrous Adhesive
- Code 807 - Flashing Compound
- Code 920 Series - Stainless Steel Wires and Bands*
- Code 930 Series - "Monel" Wires and Bands*
- Code 964 - Spindle Anchors
- Code 971.1 - Stainless Steel Sheet Metal Screws
- Code 976 - 0.016-inch thick plain Aluminum Sheet
- Code 977 - Corrugated Expansion Bands 3/4-inch x 0.015-inch Type 304 Stainless Steel
- Code 978 - 9-inch x 0.032-inch Aluminum "S" Clips
- Code 979 - Graham Pins
- Code 980 - Breather Bands

3. CURVED OR CYLINDRICAL
EQUIPMENT - INSULATION APPLICATION

3.1 Insulation on equipment shall be applied snugly with joints tightly butted together. Insulation 2 1/2 inches or less in thickness shall be applied in a single layer except where the 2 1/2-inch thickness will not readily conform to the surface being

insulated. In such case, more than one layer may be necessary. Insulation over 2 1/2 inches in thickness shall be double-layer construction.

3.2 **Single-layer Construction.** Single-layer block, curved, or segmental block insulation shall be applied with joints tightly butted and lateral joints staggered. Bands (see Table 1) shall be placed over blocks approximately 1 inch from each end of each block, thus providing four bands for each 36-inch length of insulation. All chipped edges, cracks or imperfections shall be filled and smoothed with Insulation Cement, Code 502. See Figure 1.

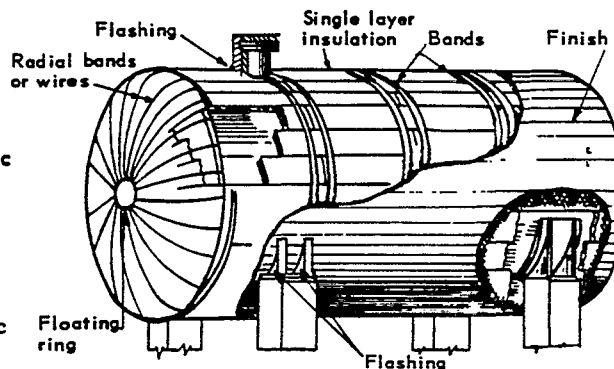


FIGURE 1

3.3 **Double-layer Construction.** The first or inner layer of curved block, or segmental block insulation shall be applied with joints tightly butted and lateral joints staggered. Bands (see Table 1) shall be placed over blocks approximately 1 inch from each end of each block, thus providing four bands for each 36-inch length of insulation. The second or outer layer shall be applied so that all joints are staggered with the first layer and tightly butted together. Bands shall be placed over second layer of block approximately 1 inch from each end of each block, thus providing four bands for each 36-inch length of insulation. All chipped edges, cracks or imperfections shall be filled and smoothed with Insulation Cement, Code 502. See Figure 2.

*Where Code 502 is specified herein, Code 502.1 can be substituted provided the temperature conditions do not exceed 800 degrees F.

*Selection specified on project or job specification index.

Sizes of Bands - See Table 1.

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.

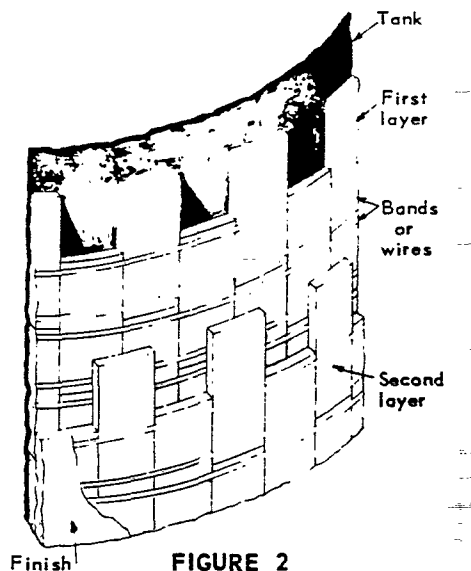


FIGURE 2

3.4 The insulation on heads or ends of cylindrical equipment shall be secured by tight bands or wires that are not over 4 inches apart and fastened to clips, angle iron bands, or steel bands encircling the tank behind the rivet heads or circumferential head weld. See Figure 3. The insulation on the cylindrical tank shall be held in place at the center of the head by radial wires or bands fastened to clips or a floating ring. Fibrous Adhesive, Code 803, can be used to support insulation on overhead surfaces until bands or wires can be applied. All chipped edges, cracks, or imperfections shall be filled and smoothed with Insulation Cement, Code 502.

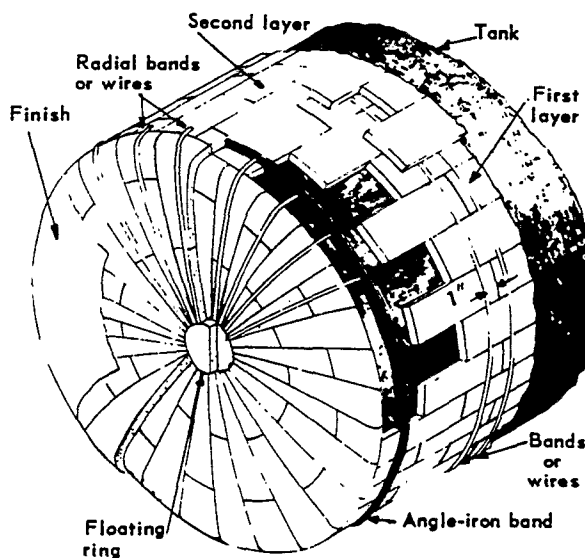


FIGURE 3

4. FLAT OR SQUARE-CORNERED EQUIPMENT - INSULATION APPLICATION

4.1 Insulation shall be applied snugly with joints tightly butted together. Single- versus double-layer construction shall be in accordance with paragraph 3.1.

4.2 Block insulation shall be applied with joints tightly butted together and lateral joints staggered. Bands shall be placed over blocks approximately 1 inch from each end of each block, thus providing 4 bands for each length of insulation.

4.2.1 Where welding is permissible, the blocks may be supported by bands fastened to clips that are tacked on the metal surfaces. For horizontal surfaces facing down, where spindle anchors are not specified, intermediate bands, held by clips, shall be installed.

4.2.2 At square corners of insulation of flat surfaces, metal corner angles or shields shall be placed under the bands to prevent cutting of insulation. All chipped edges, cracks, or imperfections shall be filled and smoothed with Insulation Cement, Code 502.

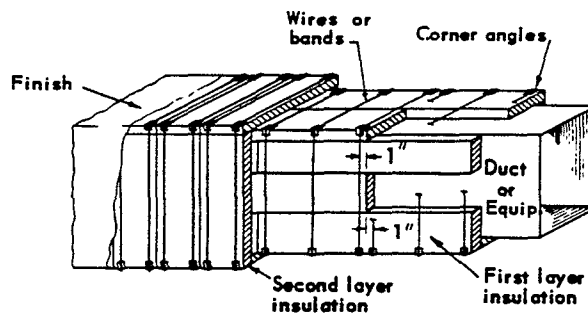


FIGURE 4

4.3 When specified on project or job specification, the blocks may be supported by Spindle Anchors, Code 964, applied to the metal surface by cementing, welding, or spot-welding.

4.4 Fastening devices may be welded or spot-welded to the metal surfaces of equipment or duct work ONLY with the written approval of Design, Construction and The Industrial Department.

4.5 When the method of fastening is not specified on the project or job specification index, the applicator may choose the most economical or convenient method. However, written approval of welded fastenings must be obtained as outlined in paragraph 4.4



5. FINISH

5.1 Vertical tanks and towers shall have an angle-support fastened by friction, see Fig 5, above the bottom knuckle weld, base or bottom head, directly under the insulation. The angle-iron support shall be in two sections for equipment less than 4-foot diameter and not less than 3 sections for equipment over 4-foot diameter. At any point where the steel angle-iron supports contact aluminum, apply Low-temperature Vapor-barrier Mastic, Code 709, to a dry thickness of $\frac{1}{8}$ inch to prevent metal-to-metal contact between the aluminum and steel surfaces. The angle leg shall extend $\frac{1}{2}$ inch beyond the surface of the insulation to provide a ledge to support the first course of corrugated aluminum.

5.2 Aluminum jacketing should be cut to wrap around the circumference of the equipment. Where long sheets are difficult to handle, they can be applied in two or more sections with a 3-inch horizontal and vertical lap. The lap shall be coated with Lap Adhesive, Code 801. The material shall be placed on the equipment with the laps located so as to shed water and present the least amount of resistance to the prevailing winds.

5.3 The sheets on vertical vessels shall be supported by using Aluminum "S" Clips, Code 978, placed on 36-inch centers. (See Figure 6.)

5.4 After the jacket has been installed and properly placed, two Stainless Steel Corrugated Expansion Bands, Code 977 or two Conventional Bands (see table 1) with "Techalloy" springs, Code 980, per circumferential sheets shall be placed over the jacket on $\frac{1}{4}$ point centers. Where Code 977 is selected, the bands shall be applied in two pieces with the clips on the opposite sides

of tower to insure an even pull and reduce crushing of the corrugation. On vertical vessels Stainless Steel Sheet Metal Screws, Code 971.1, shall be installed though the lapped sheets on the vertical joints on approximate 9-inch center line.

5.5 Stainless Steel Sheet Metal Screws, Code 971.1, shall be installed in the circumferential joints. To provide for vertical expansion of vertical vessels the screws shall be left out of circumferential lap joint in every third course, if the equipment is twelve feet high or greater. Screws shall be placed on 18-inch centers.

5.6 Tops of vertical or ends of horizontal equipment shall be finished with 0.016-inch thick plain Aluminum Sheet, Code 976. The sheet shall be cut into segments to conform to the radius of the curve of the head. Each segment shall overlap at least three inches. The lap shall be coated with Lap Adhesive, Code 801, and secured with Stainless Steel Sheet Metal Screws, Code 971.1, on 4-inch centers.

6. FLASHING

6.1 Flashing Compound, Code 807, shall be applied at all possible sources of moisture penetration, such as intersections of the insulation at piers, nozzles, etc., and other parts protruding through the surface of the finish. This shall be applied to provide a watershed in a $\frac{1}{4}$ -inch coating extending over all intersecting surfaces.

6.2 Where it is necessary to slit the aluminum jacket when forming around nozzles, etc., reinforce the slit joint with a backup piece of aluminum secured with Stainless Steel Sheet Metal Screws, Code 971.1.

TABLE 1 - BANDS

Distance Around Outside Surface Of Insulation		920 Series	930 Series	
Minimum (Ft)	Maximum (Ft)	Stainless Steel	"Monel"	
	8	926	936	
8	20	927	937	
20		928	938	

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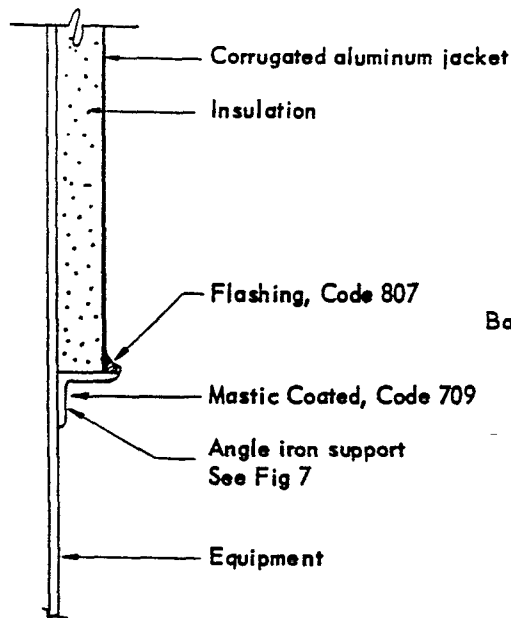


Figure 5

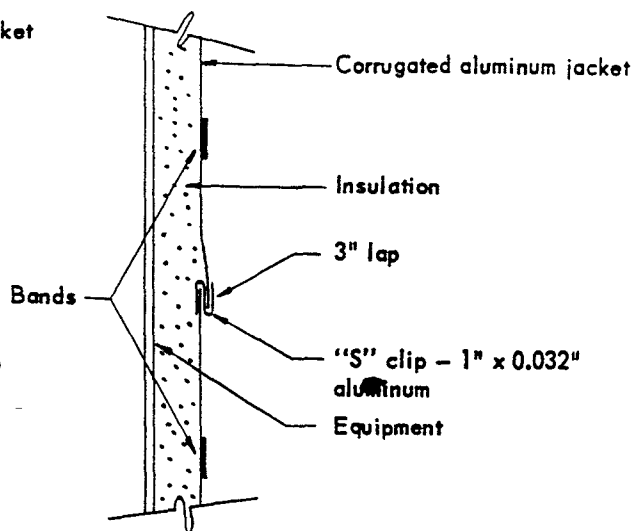


Figure 6

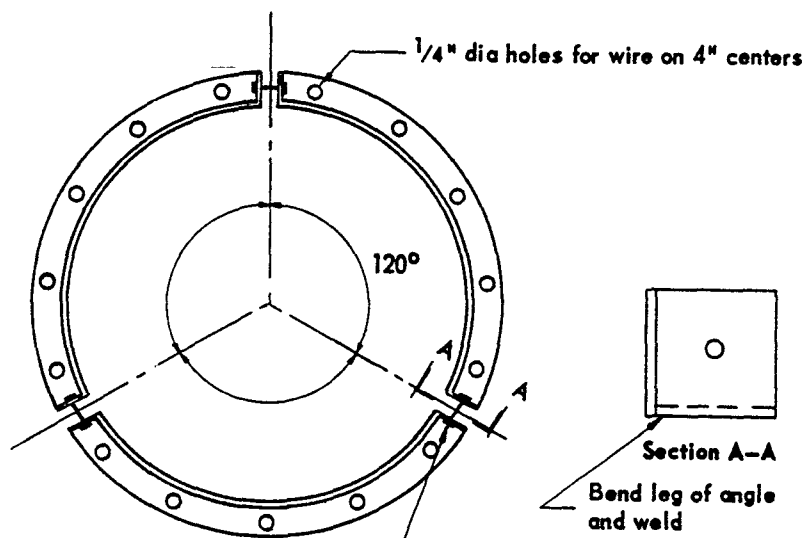


Figure 7 - Angle Detail

Drill 1/2" holes for 3/8" bolts -
1" and 1 1/2" angles
Drill 5/8" holes for 1/2" bolts -
2" and 3" angles
Drill 3/4" holes for 5/8" bolts in 4" angles



APPLICATION

SERIES 100 - PIPE AND FITTINGS

FIELD-APPLIED ROOFING FELT FINISH FOR
PIPE AND HIGH-TEMP MASTIC FINISH
FOR FITTINGS

THERMAL INSULATION

STANDARD ENGINEERING SPECIFICATION

ISSUED

OCTOBER 1954

REVISED

SEPT 1957

SN 100.21 A

Page 1 of 4

1. SCOPE

1.1 This Specification covers application of Molded Block and Pipe Insulation listed below, with Field-applied Roofing Felt on all pipe. Fittings and valves shall have High-temperature Breathing Mastic Finish.

2. MATERIALS

2.1 All materials shall be in accordance with the SN-M Section of the Standard Engineering Specifications governing.

2.2 Basic Insulation Materials - Molded*

- Code 101 - 85% Magnesia
- Code 102 - Calcium Silicate
- Code 103 - Diatomaceous Earth
- Code 104 - Inorganic Silicas and Asbestos Fiber
- Code 112.01 - Glass Fiber

2.3 Basic Insulation Materials - Fluid and Plastic

- Code 502* - Insulation Cement
- Code 502.1 - Insulation and Finishing Cement (Limited to 800°F)

2.4 Accessory Materials

- (Code 701 - Asbestos Roofing Felt or
- (Code 702 - Rag Felt
- Code 706 - High-temperature Breathing Mastic
- Code 712 - Finish Cement
- Code 714 - Poultry Netting
- Code 801 - Lap Adhesive
- Code 807 - Flashing Compound
- Code 920 Series - Stainless Steel Wires and Bands*
- Code 930 Series - "Monel" Wires and Bands*
- Code 963 - Gun-type Staples

3. PIPE - INSULATION APPLICATION

3.1 Pipe insulation shall be applied snugly on pipe with joints tightly butted together. Pipe insulation $2\frac{1}{2}$ inches or less in thickness shall be applied in a single layer. Pipe insulation over $2\frac{1}{2}$ inches in thickness shall be double-layer construction.

3.2 Pipe insulation on chased lines shall be of a size large enough to enclose both pipeline and chaser. The insulation shall be a snug fit to the pipe and chaser or its ring spacer. See Figure 1.

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.

*Selection specified on project or job specification index.

SUBCOMMITTEE NO 25

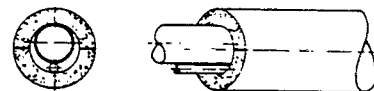


FIGURE 1

3.3 Single-layer Construction. Single-layer sectional pipe insulation shall be applied with longitudinal joints vertical whenever possible. The butt joints of sectional or segmental pipe shall be staggered. The insulation shall be held firmly in place by wires or bands installed in accordance with paragraph 4.1.

3.4 Double-layer Construction. The first or inner layer of sectional pipe insulation shall be applied with longitudinal joints horizontal whenever possible. The butt joints shall be staggered. The second or outer layer of sectional or segmental insulation shall be applied so that all joints of the first layer are covered by the second layer. Each layer shall be held firmly in place by wires or bands installed in accordance with paragraph 4.1.

4. WIRES AND BANDS

4.1 Each layer of insulation shall be applied to the pipe and secured with wire or bands as specified in Table 1. Wire shall be applied with at least four separate loops per section, twisted, bent, and hammered into the insulation. Bands shall be applied four per section of insulation; tightened and held with band seals. Wire or bands shall be located 1 inch from the ends of the section. See Figures 2, 3, and 4.

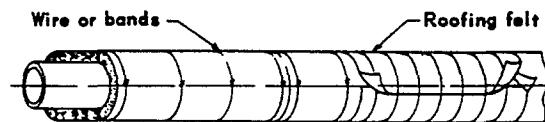


FIGURE 2

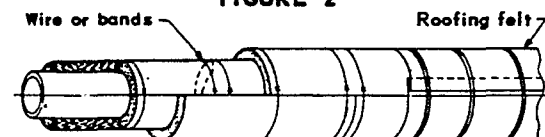


FIGURE 3

* Where Code 502 is specified herein, Code 502.1 can be substituted provided the temperature conditions do not exceed 800°F.



For sizes, see Table 1, Wires and Bands.

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DUP 0838505

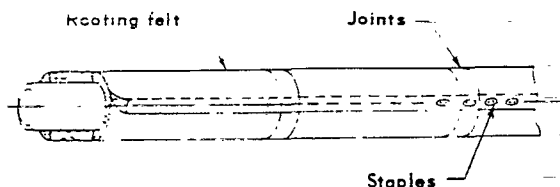


FIGURE 4

5. INSULATION AT PIPE HANGERS

5.1 Pipe hangers attached to the pipe shall be insulated. Where possible, the pipe insulation should be cut out to fit snugly over the hanger with the outer surface of the insulation unbroken and free from bulging. Where the shape of the hanger does not permit this procedure, the pipe insulation can be butted up to the hanger and the void filled with Insulation Cement, Code 502 or Code 502.1, until flush with the pipe insulation. See Figures 5 and 6. The insulation around the hanger clamp and rod shall be sealed with Finish Cement, Code 712. When the pipe hanger is attached directly to the pipe, a watershed cone should be installed as shown in Figure 5.

6. PIPE - FINISH APPLICATION

6.1 Finish shall consist of field-applied 45-pound Roofing Felt, Code 701 or Code 702, over insulation, wiring, stapling, or banding.

6.2 All chipped edges, cracks, or imperfections of each layer of insulation shall be filled in and smoothed with Insulation Cement, Code 502 or Code 502.1.

6.3 The roofing jacket shall be cut to fit the circumference of the pipe with allowance of at least 2 inches for flap. It shall be lapped over the Roofing Felt, Code 701 or Code 702, on the adjacent section of pipe covering and shall be applied to the outer surface of the insulation and drawn tight. All flaps shall be coated with Lap Adhesive, Code 801. After the flap has been coated with adhesive, it shall be drawn snugly around the pipe insulation and pressed into place. The flap may be secured by wires on 4-inch centers along the longitudinal joint of the flap, or it may be stapled by using Gun-type Staples, Code 963. See SN202P. Staples should be placed on a maximum of 2-inch centers and Lap Adhesive, Code 801, should be daubed over them. See Figures 3 and 4. Lap adhesive may be eliminated on inside work in dry areas where appearance is not a factor.

7. FITTINGS - INSULATION APPLICATION

7.1 Welded and screwed fittings and valves 2 inches and smaller shall be insulated with Insulation Cement, Code 502 or Code 502.1, to a thickness at least equal to the adjacent pipe insulation. See Figures 7 and 8. Where screwed piping is over 2 inches, the above procedure is to be followed.

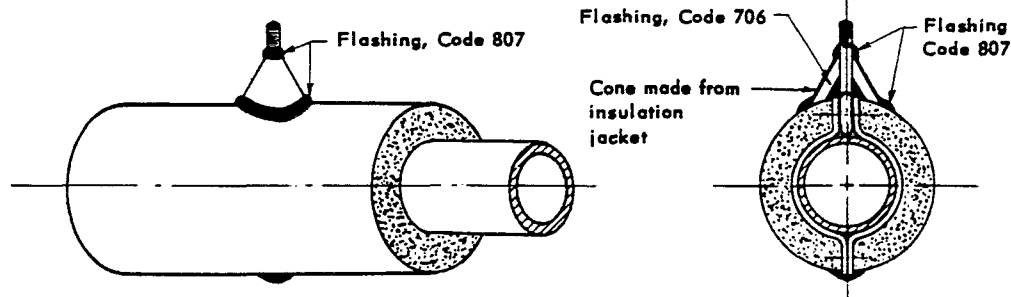


FIGURE 5

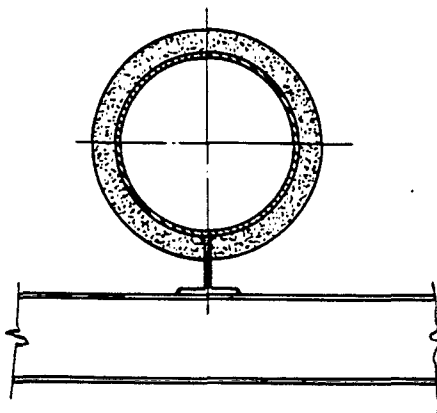


FIGURE 6

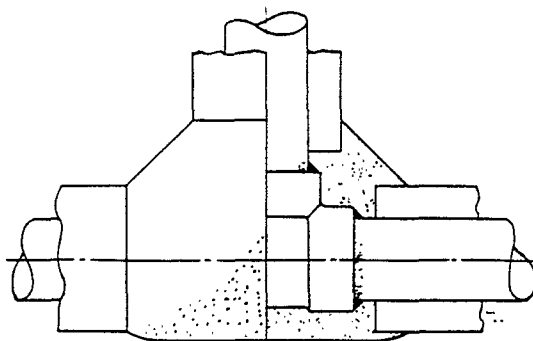
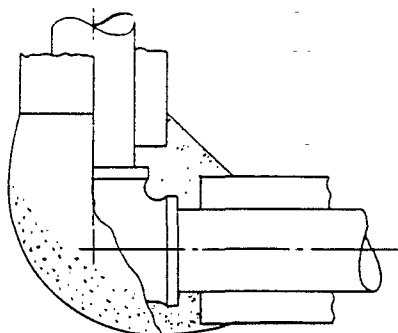


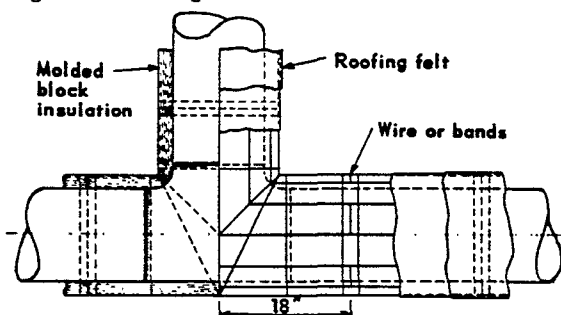
FIGURE 7



**FIGURE 8**

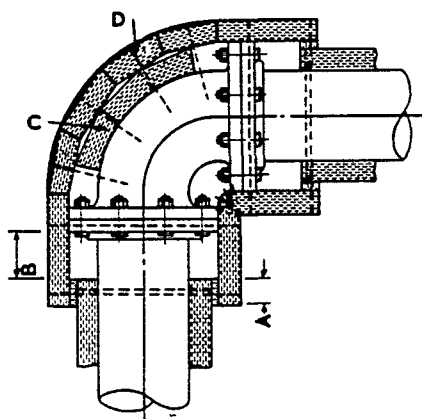
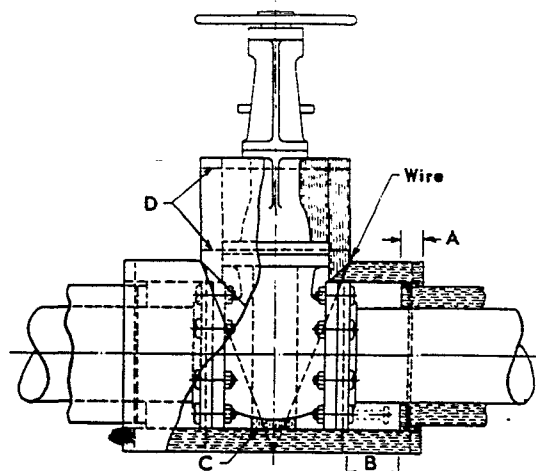
7.2 Welded fittings and valves 3 inches and larger shall be insulated with block or pipe insulation at least equal in thickness and in same number of layers as adjacent pipe insulation. See Figure 9.

7.3 Flanged fittings and flanged valves shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe insulation or 2 inches, whichever is less. The fitting insulation shall overlap the adjacent pipe insulation 2 inches or equal the pipe insulation thickness, whichever is greater. See Figures 10 and 11.

**FIGURE 9**

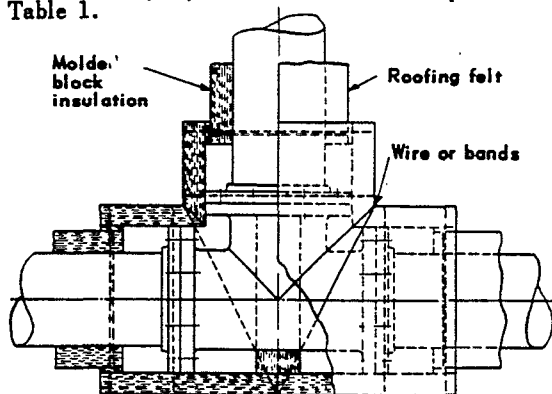
Legend Figure 10 and 11

- A - Not less than 2 inches
- B - Clearance to remove bolts
- C - Block support for cover
- D - Wires or bands not over 6-inch centers

**FIGURE 10****FIGURE 11**

7.4 Line flanges shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe insulation or 2 inches, whichever is less. The length to be in accordance with Figure 13 and Table 2.

7.5 Each section or segment of block or pipe insulation used for insulation of fittings shall be held securely by wires or bands as specified in Table 1.

**FIGURE 12**

7.6 All chipped edges, cracks, or imperfections of each layer of insulation shall be filled in and smoothed with Insulation Cement, Code 502, or Code 502.1.

7.7 For valves, fittings, and line flanges with insulation diameter exceeding 13 inches, Poultry Netting, Code 714, shall be applied and laced tight over the insulation.

8. FITTINGS - FINISH APPLICATION

8.1 Finish shall consist of a prime coat of Insulation Primer Paint, Code 707, applied by brushing or spraying. (Primer can be eliminated over Code 112 material.) Trowel over the surface of the insulation two, 1/4-inch coats of High-temperature Breathing Mastic, Code 706.



9. FLASHING

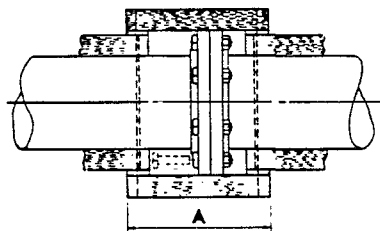
9.1 Flashing Compound, Code 807, shall be applied at all possible sources of moisture penetration such as the intersections of insulation at piers, nozzles, building walls, valve bonnets, supports, hangers, and other parts protruding through the surface of the finish. Prior to application, wipe

surfaces of talc-coated felts or other dust surfaces with a damp cloth and allow to dry to gain maximum adhesion. The Flashing Compound, Code 807, shall be applied to provide a watershed in a 1/4-inch coating extending over all intersecting surfaces without feathering of edges. See Figures 5, 6, 9, 10, 11, and 12.

TABLE 1

WIRES AND BANDS					
Pipe Insulation Diameter (in.)		920 Series	930 Series		
Minimum	Maximum	Stainless Steel	"Monel"		
—	6 1/4	921	931		
Over 6 1/2	12 3/4	922	932		
13	—	926	936		

LENGTH OF 1-INCH NOMINAL THICKNESS INSULATION COVERS FOR LINE FLANGES

FIGURE 13
TABLE 2

Nominal Pipe Size (inches)	Length A (in.)									
	Flanges									
	150-lb.		300-lb.		600-lb.		900-lb.		1500-lb.	
	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD	A	Flange OD
1/2	9	3 1/2	9	3 3/4	12	3 3/4	12	4 3/4	12	4 3/4
3/4	9	3 7/8	9	4 5/8	12	4 5/8	12	5 1/8	12	5 1/8
1	9	4 1/4	9	4 7/8	12	4 7/8	12	5 7/8	12	5 7/8
1 1/4	9	4 5/8	9	5 1/4	12	5 1/4	12	6 1/4	12	6 1/4
1 1/2	9	5	9	6 1/8	12	6 1/8	18	7	18	7
2	9	6	9	6 1/2	12	6 1/2	18	8 1/2	18	8 1/2
2 1/2	9	7	12	7 1/2	12	7 1/2	18	9 5/8	18	9 5/8
3	12	7 1/2	12	8 1/4	12	8 1/4	18	9 1/2	18	10 1/2
3 1/2	12	8 1/2	12	9	18	9	-	-	-	-
4	12	9	12	10	18	10 3/4	18	11 1/2	18	12 1/4
5	12	10	12	11	18	13	18	13 3/4	24	14 3/4
6	12	11	12	12 1/2	18	14	18	15	24	15 1/2
8	12	13 1/2	18	15	18	16 1/2	24	18 1/2	24	19
10	12	16	18	17 1/2	24	20	24	21 1/2	30	23
12	12	19	18	20 1/2	24	22	24	24	36	26 1/2
14 OD	18	21	18	23	24	23 3/4	24	25 1/4	36	29 1/2
16 OD	18	23 1/2	18	25 1/2	24	27	24	27 3/4	36	32 1/2
18 OD	18	25	18	28	24	29 1/4	30	31	-	-
20 OD	18	27 1/2	18	30 1/2	24	32	30	33 3/4	-	-
24 OD	18	32	24	36	30	37	36	41	-	-



APPLICATION

SERIES 100
EQUIPMENT AND DUCT WORK
FIELD-APPLIED VAPOR-BARRIER FINISH

HERMAL INSULATION

STANDARD ENGINEERING SPECIFICATION

ISSUED

NOV 1954

REVISED

JUNE 1960

SN 100.70 A

Page 1 of 4

1. SCOPE

1.1 This Specification covers application of **Molded Block Insulation with Field-Applied Vapor-Barrier Finish** on equipment and duct work reinforced with **Glass Cloth**.

2. MATERIALS

2.1 All materials shall be in accordance with the SN-M Section of the Standard Engineering Specifications governing.

2.2 Basic Insulation Materials - Molded*

Code 110 - Vegetable Cork

Code 111 - Cellular Glass

2.3 Accessory Materials

Code 401 - Granulated Cork

Code 709 - Low-temperature Vapor-Barrier Mastic

Code 710 - Glass Cloth

Code 807 - Flashing Compound

Code 808 - Seam Filler

Code 809 - Water-Resistant Adhesive - Rubber

Base - High Viscosity

Code 810 - Water-Resistant Adhesive - Rubber

Base - Low Viscosity

Code 811 - Water-Resistant Adhesive - Asphalt

Base

Code 920 Series - Stainless Steel Wires and Bands*

Code 930 Series - "Monel" Wires and Bands*

Code 964 - Spindle Anchors

3. CURVED OR CYLINDRICAL
EQUIPMENT - INSULATION APPLICATION

3.1 Insulation on equipment shall be cut and applied singly with joints tightly butted together. See Figure 1. Insulation 4 inches or less in thickness shall be applied in a single layer except where the 4-inch thickness will not readily conform to the surface being insulated. In such case, more than one layer may be necessary. Insulation over 4 inches in thickness shall be double-layer construction.

* Selection specified on project or job specification index. Sizes - See Table 1, Bands.

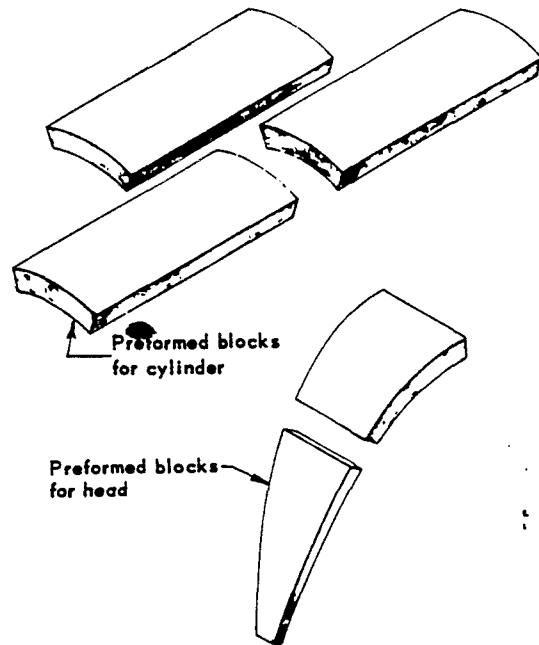


FIGURE 1

3.2 **Single-Layer Construction.** The insulation shall be blocks cut into lags or curved segmental blocks applied with joints tightly butted and lateral joints staggered. Each block shall be coated with an adhesive on all contact surfaces with the insulation and the equipment. Granulated Cork, Code 401, shall be used to fill void between the insulation and the shell when Vegetable Cork, Code 110, is applied. Bands shall be placed two per 18-inch section of four bands for each 36-inch length of insulation. Bands shall be tightened and held with band seals. All chipped edges, cracks, or imperfections shall be smoothed with Seam Filler, Code 808. After the first coat of Low-temperature Vapor-Barrier Mastic, Code 709, has been applied over the insulation and while it is still tacky, apply Glass Cloth, Code 710, so that it is drawn

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tight and firmly embedded in the Vapor-Barrier Mastic, Code 709. A final or finish coat of Vapor-Barrier Mastic, Code 709, shall be applied over the Glass Cloth, Code 710, in accordance with paragraph 5 (see Figure 2).

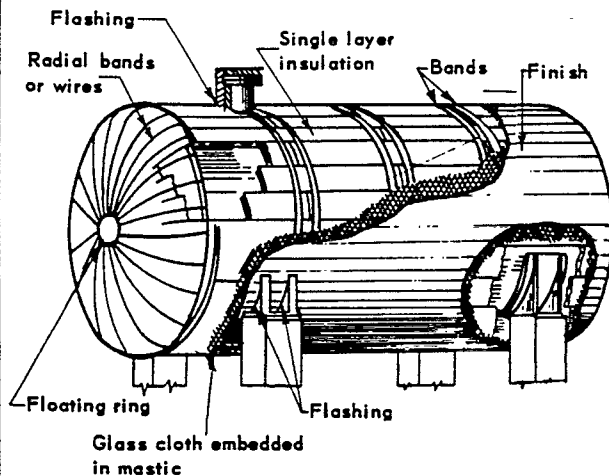


FIGURE 2

3.3 Double-Layer Construction. The first or inner layer of curved block, or segmental block insulation shall be applied with joints tightly butted and lateral joints staggered. Each block shall be coated with an adhesive on all contact surfaces with the insulation and the equipment. Granulated Cork, Code 401, shall be used to fill void between the insulation and the shell when Vegetable Cork, Code 110, is applied. Bands shall be placed two per 18-inch section or four bands for each 36-inch length of insulation. The second or outer layer shall be applied so that all joints are staggered with the first layer and tightly butted together. Bands shall be placed over second layer of block, two per 18-inch section or four bands for each 36-inch length of insulation. All chipped edges, cracks, or imperfections shall be smoothed with Seam Filler, Code 808. After the first coat of Low-Temperature Vapor-Barrier Mastic, Code 709, has been applied over the insulation and while it is still tacky, apply Glass Cloth, Code 710 so that it is drawn tight and firmly embedded in the Vapor-Barrier Mastic, Code 709. A final or finish coat of Vapor-Barrier Mastic, Code 709, shall be applied over the glass Cloth, Code 710, in accordance with paragraph 5 (see Figures 3 and 4).

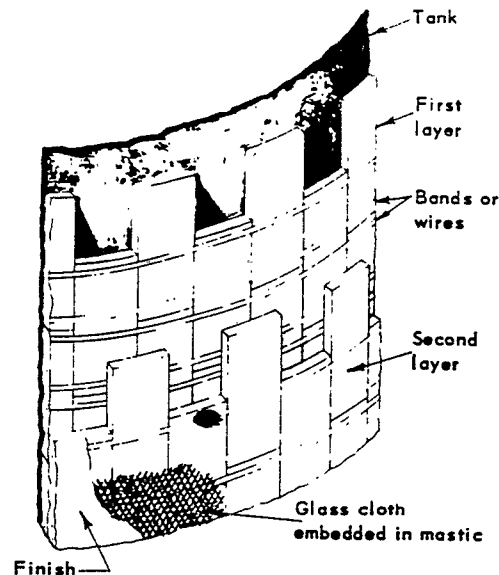


FIGURE 3

3.4 The insulation on heads or ends of cylindrical equipment shall be secured by tight bands, that are not over 4 inches apart and fastened to clips, angle iron bands, or steel bands encircling the tanks behind the rivet heads or circumferential head weld. See Figure 4. Granulated Cork, Code 401, shall be used to fill void between the insulation and the shell when Vegetable Cork, Code 110, is applied. The insulation on the heads of cylindrical tanks shall be held in place at the center of the heads by radial wires or bands fastened to clips or a floating ring. All chipped edges, cracks, or imperfections shall be smoothed with Seam Filler, Code 808.

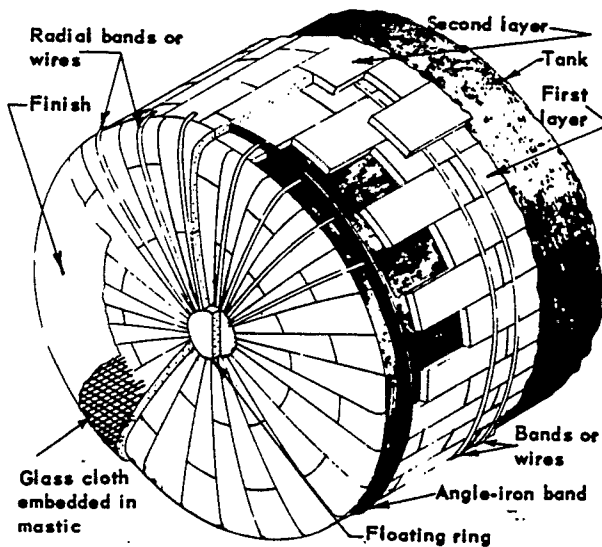


FIGURE 4

4. FLAT OR SQUARE-CORNERED EQUIPMENT - INSULATION APPLICATION

4.1 Insulation shall be applied snugly with joints tightly butted together. Thickness of insulation shall be in accordance with paragraph 3.1.

4.2 Block insulation shall be applied with joints tightly butted together and lateral joints staggered. Each block shall be coated with an adhesive on all contact surfaces with the insulation and the metal. When cemented anchors are used, adhesive shall be spotted in such a manner to avoid contact with anchor base. Granulated Cork, Code 401, shall be used to fill void between the insulation and the shell when Vegetable Cork, Code 110, is applied. Bands shall be placed over blocks two per 18-inch section or four bands for each 36-inch length of insulation. Where welding is permissible, the blocks may be supported by bands fastened to clips that are tacked on the metal surfaces. For either vertical surfaces or horizontal surfaces facing up, the bands shall be spaced at 2-foot intervals. For horizontal surfaces facing down, the bands shall be spaced at 1-foot intervals. At square corners of insulation of flat surfaces, metal corner angles or shields shall be placed under the bands to prevent cutting of insulation. All chipped edges, cracks, or imperfections shall be smoothed with Seam Filled, Code 808. Over the

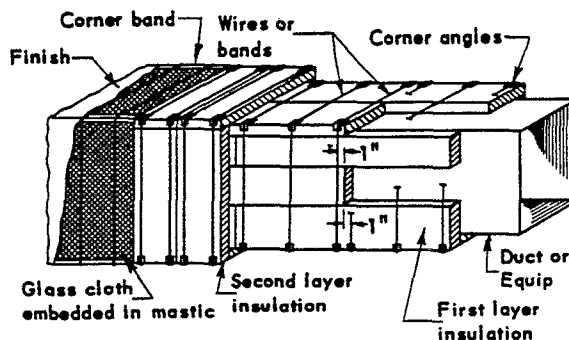


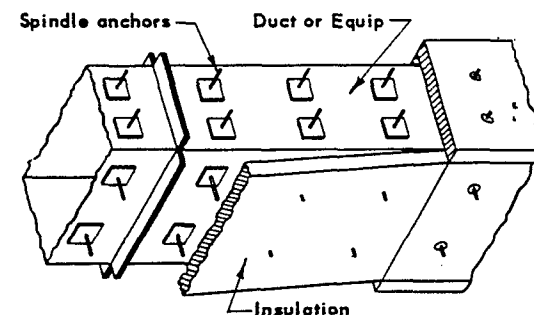
FIGURE 5

insulation and bands apply Glass Cloth, Code 710, as follows: after the first coat of Low-temperature Vapor Barrier Mastic, Code 709, has been applied over the insulation and while it is still tacky, apply Glass Cloth, Code 710, so that it is drawn tight and firmly embedded in the Vapor Barrier Mastic, Code 709. A final or finish coat of Vapor Barrier Mastic, Code 709, shall be applied over the Glass Cloth, Code 710, in accordance with paragraph 5 (see Figure 5).

4.3 When specified on project or job specification, the blocks may be supported by Spindle Anchors, Code 964, applied to the metal surface by cementing, welding, or spot-welding (see Figure 6).

4.4 Spindle anchors, clips, rods, or bars may be welded or spot-welded to the metal surfaces of equipment or duct work **ONLY** with the written approval of Design, Construction, and the Industrial Department.

4.5 When the method of fastening is not specified on the project or job specification index, the applicator may choose the most economical or convenient method. However, written approval of welded fastenings must be obtained as outlined in paragraph 4.4.

FIGURE 6
5. FINISH

5.1 Finish shall consist of one coat, totaling $\frac{3}{16}$ inch, sprayed or hand applied Low-temperature Vapor Barrier Mastic, Code 709, to provide a uniform protective coating of $\frac{1}{8}$ -inch minimum thickness when dry. The finish coat shall be applied over the Glass Cloth, Code 710, that has been embedded in the first coat of Vapor Barrier Mastic, Code 709, in accordance with applicable sections of paragraphs 3.2, 3.3, or 4.2.

6. FLASHING

6.1 Flashing Compound, Code 807, shall be applied at all possible sources of moisture penetration such as the intersections of insulation at piers, nozzles, building walls, valve bonnets, supports, hangers, and other parts protruding through the surface of the finish. Prior to application, wipe down surfaces of talc-coated felts or other dusty surfaces with a damp cloth and allow to dry to gain maximum adhesion. The Flashing Compound, Code 807, shall be applied to provide a watershed in a $\frac{1}{4}$ -inch coating extending over all intersecting surfaces without feathering of edges. See Figure 2.

TABLE 1 - BANDS

Distance Around Outside Surface of Insulation		920 Series Stainless Steel	930 Series Monel		
Minimum (Ft.)	Maximum (Ft.)				
	4	922	932		
4	8	926	936		
8	20	927	937		
20		928	938		

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DUP 0838512



APPLICATION

**SERIES 200
EQUIPMENT AND DUCT WORK
FLEXIBLE BLANKET INSULATION WITH
HIGH-TEMPERATURE BREATHING MASTIC
FINISH**

**THERMAL INSULATION
STANDARD ENGINEERING SPECIFICATION**

ISSUED JUNE 1958

SN 200.70 A

REVISED

Page 1 of 3

1. SCOPE

1.1 This Specification covers the storage and application of glass fiber blanket insulation on equipment and duct work with a reinforced field-applied high-temperature breathing mastic finish.

2. MATERIALS

2.1 All materials shall be in accordance with the SN-M Section of the Standard Engineering Specifications governing.

2.2 Basic Insulation Materials

Code 206 - Glass Fiber Blanket (minimum of 2-pound density applicable)

2.3 Accessory Materials

Code 706 - High-Temperature Breathing Mastic (emulsion)

Code 706.1 - High-Temperature Breathing Mastic (cutback)

Code 714 - Poultry Netting

Code 807 - Flashing Compound

Code 817 - Adhesive

Code 963 - Staples

Code 964 - Spindle Anchors

Code 966 - Jute Twine

Code 979 - Graham Pins

Code 981 - Finger Straps

3. STORAGE OF INSULATION

3.1 Insulation blanket, Code 206, shall be stored in a dry area with adequate protection to prevent moisture accumulating in the insulation before application.

4. CURVED OR CYLINDRICAL EQUIPMENT OR DUCT WORK INSULATION**4.1 APPLICATION**

4.1.1 Glass fiber blanket insulation, Code 206, shall be applied in a single layer. The blanket shall be cut in lengths to encircle and fit snugly to the equipment shell with a minimum 6-inch longitudinal lap. On the horizontal equipment or duct work the longitudinal laps shall be staggered on the right and left side of the vessel approximately 4 to 6 inches from the horizontal center line. On the vertical equipment or duct work the longitudinal laps

shall be staggered 180 degrees. Circumferential laps shall butt firmly together, thus avoiding cracks and imperfections.

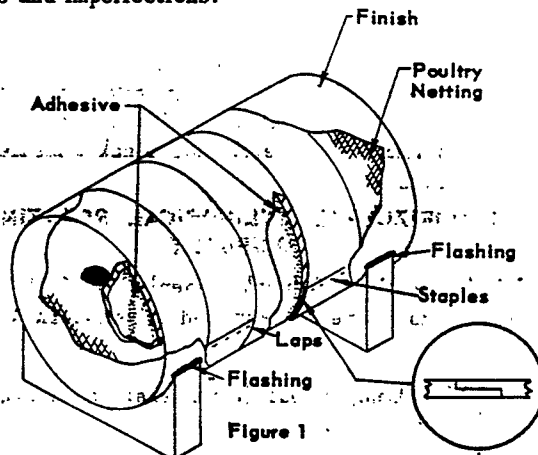


Figure 1

4.2 Blanket Insulation shall be applied to dished or flat heads on equipment or cylindrical duct bends with joints firmly butted together; with a minimum number of sections of insulation and be relatively free of wrinkles, voids, and imperfections (see Figure 1). The insulation on the heads shall meet snugly the insulation on the shell.

4.3 Fastening or securing the blanket insulation, Code 206, shall be accomplished by one of the following methods:

4.3.1 Alternate 1, Adhesive and Staples

Adhesive, Code 817, shall be applied to the metal surface, and the insulation in strips approximately 3 inches wide on 16-inch centers. The 6-inch overlapping section of the blanket insulation shall be feathered to provide a smooth joint (see Figure 1). After waiting a minimum of approximately five minutes after application of the adhesive, the insulation shall be pressed firmly into the tacky cement. (Applying this pressure with a clean, flat trowel or roller is preferred over use of bare hands.) Outward clinching staples, Code 963, shall be applied on approximately 4-inch centers, along the longitudinal laps to draw the insulation into the lap.

4.3.2 Alternate 2, Jute Twine and Staples. After draping the blanket insulation, Code 206, around the equipment, temporarily secure it with outward clinching staples, Code 963, and spiral strap the insulation with jute twine, Code 966. Twine shall be located

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on approximately 12-inch centers and shall be stretched firmly tight but avoiding excessive depressions or wrinkles on the surface of the insulation.

4.4 After the blanket insulation has been applied by either of the above methods, it shall be additionally secured by applying poultry netting, Code 714, over the entire surface with edges and ends tightly laced together and staggered away from the joints of the blanket insulation. See Figure 1. Application of the insulation and poultry netting on the shell of the vessel first will permit utilization of wire or jute twine to temporarily secure the blanket insulation to the heads.

5. HORIZONTAL CYLINDRICAL ROTATING EQUIPMENT

5.1 Application of blanket insulation, Code 206, shall be the same as described in paragraph 4 with the following exceptions.

5.1.1 Longitudinal joints shall be staggered 180 degrees.

5.1.2 The blanket shall be additionally secured by the application of stainless steel finger straps (A. J. Gerrard, Melrose Park, Illinois) and stainless steel spring-type washers (A. J. Gerrard No 1151). The finger strap shall be banded tightly to the vessel wall and tack welded at one point. Finger straps shall be spaced on approximately 12-inch centers with fingers on the strap also on 12-inch centers. The blanket insulation shall be imbedded over the fingers and the washers applied firmly against the insulation surface. The finger strap shall then be bent down, opposite to the direction of rotation of the vessel.

6. FLAT OR SQUARE CORNERED EQUIPMENT OR DUCT WORK

6.1 Glass fiber blanket insulation, Code 206, shall be applied to flat or square cornered equipment or duct work in single layers. The blanket shall be cut in lengths to encircle and fit snugly to the metal surface. Longitudinal joints shall overlap approximately 2 inches with the overlap section feathered to present a smooth appearance. See Figure 2. The circumferential joints shall be butted together to form a snug fit. On horizontal duct work or equipment, the longitudinal lap shall be located on the top surface. On vertical surfaces the longitudinal lap shall be located where least visible. Fastening or securing the blanket to this type of equipment shall be by one of the following methods:

The use of adhesive and spindle anchors is limited to a maximum temperature of 250 degrees F.

6.1.1 Alternate No 1, Adhesives* Spindle Anchors*, Graham Pins, Finger Straps, and Staples. On horizontal equipment or duct work, where the width is greater than 18 inches, spindle anchors, Code 964, shall be applied in accordance with Specification SN205P to the bottom. Where vertical dimensions are greater than 18 inches, spindle anchors will be required on the sides. Graham pins on 12-inch centers can be used instead of spindle anchors if welding is permissible. The insulation shall be adhered to the top surface with spots of adhesive, Code 817. See Figure 2. Finger straps on 18-inch centers may be used on large square or rectangular equipment and will occasionally require metal screws or tack welds to prevent sagging.

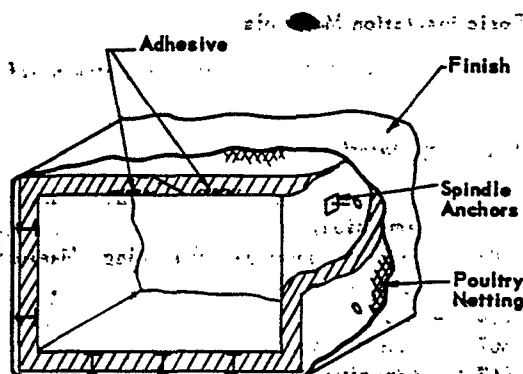


Figure 2

6.1.2 Alternate No 2, Staples and Jute Twine. On vertical equipment or runs of duct work and on horizontal runs 18 inches or less in width, the insulation shall be secured by spiral wrapping with jute twine, Code 966, on 12-inch centers and the longitudinal lap feathered and stapled on approximately 4-inch centers with outward clinching staples, Code 963. See Figure 3.

6.2 After the blanket insulation has been applied in accordance with either of the above methods, it shall be additionally secured by the application of poultry netting, Code 714, drawn snug against the surface with edges and ends laced tightly in place and staggered with adjacent joints of the insulation. See Figures 2 and 3.

7. FINISH

Before applying the finish, cut the jute twine used as a temporary fastener to permit the blanket to return to its normal shape. Finish shall consist of either two 1/4-inch trowel applied coats of high-temperature breathing mastic, Code 706, to

allow for a minimum of $\frac{1}{4}$ -inch thick coating upon drying and curing, or apply by spray or glove high-temperature breathing mastic (cutback), Code 706.1, to a minimum dried and cure thickness of $\frac{1}{8}$ -inch or approximately 10 gallons per 100 square feet.

8. FLASHING

8.1 Flashing compound, Code 807, shall be applied at all possible sources of moisture penetration into the insulation, such as the intersections of insulation at piers, nozzles, building walls, supports, hangers, and inside of right angles. Prior to application, wipe down dusty surfaces with a damp cloth and allow to dry before applying flashing compound. The flashing compound, Code 807, shall be applied a minimum of $\frac{1}{4}$ -inch thick and extend over the intersecting surfaces without excessive feathering of edges.

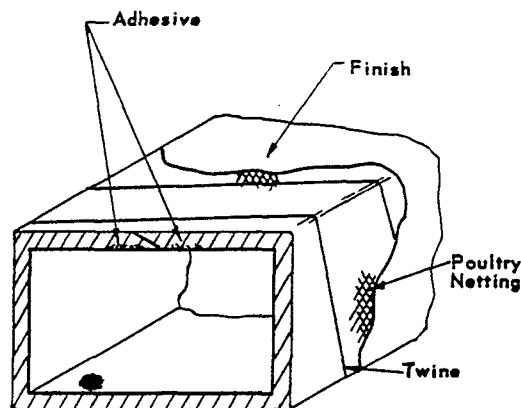


Figure 3

DUP 0838515



MATERIALS		THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION	
MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE		ISSUED OCT 1954	SN 100 M Page 1 of 14
		REVISED APRIL 1960	
Code	101*	102*†	103
Material	85% Magnesia	Calcium silicate	Diatomaceous earth
Material Description	Hydrated basic magnesium carbonate 80% by weight minimum	Staple, cellular, calcined fire clay base	Diatomaceous earth, asbestos fiber, with bonding clay and cementing materials
Filler	Asbestos or glass fiber		
Binder	Clay or other cementing materials 5% by weight		
Temperature Range	100°F to 500°F	100°F to 1200°F	500°F to 1800°F
K Factor	200°F - 0.4, 500°F - 0.5	500°F - 0.54 max	500°F - 0.77 max
Density	11-14 lb per cu ft	11 lb per cu ft	24-27 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded or extru. Pipe mach cut on diameter.	Machine extruded. Pipe mach cut on diameter.	Machine molded. Pipe mach cut on diameter.
Resistance to Breakage in Handling	Good	Good	Good
Dimensions	ASTM **	ASTM **	To Specification
Other Qualifications		Good mechanical strength with low shrinkage.	
†The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
*Bands are supplied at extra cost. Order must state "without bands" if not required. For 11" IPS and larger there is an additional charge for 2-oz canvas cover. Material should be specified "without 2-oz canvas" to avoid extra charge. **New Simplified Dimensional System sponsored by ASTM ***Fiber Board Paper Products Corp † Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.	85% Mag Philip Carey Mfg Co	Calcilite The Ruberoid Co	High Temp No. 19 Philip Carey Mfg Co
	Thermalite 85% Baldwin-Ehret-Hill, Inc	Kaylo Owens-Corning Corp	Enduro Hi-Temp. Baldwin-Ehret-Hill, Inc
	85% Mag. Johns-Manville Sales Corp	Thermobestos Johns-Manville Sales Corp	J/M Superex Johns-Manville Sales Corp
		Kaytherm Keasby & Mattison Co	High Temp. Keasby & Mattison Co
	Featherweight Keasby & Mattison Co	Tricalite Mundet Cork Corp	
	85% Mag Mundet Cork Corp	Caltemp Pabco Ind Ins Div ***	
	Precision-molded Pabco Ind Ins Div ***	Careytemp Philip Carey Mfg Co	
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SUBCOMMITTEE NO. 28			

DUP 0838516



SN 100 M		OCTOBER 1954	
Page 2		Rev April 1960	
MATERIAL SPECIFICATION - SERIES 100			
Code	104		106
Material	Inorganic silicates		Asbestos and diatomaceous earth molded
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy asbestos sprayed with sodium silicate and diatomaceous earth sprinkled on the asbestos mat. External finish consists of an integral refractory coating*
Filler			
Binder			
Temperature Range	100°F to 1600°F**		200°F to 1200°F
K Factor	Pipe covering - 500°F - 0.64 max Block - 500°F - 0.58 max		500°F - 0.54 max
Density	Pipe covering - 15 lb per cu ft Block - 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		11 PSI at 5% deformation - Dry
Manufacturing Process			Formed and comp on mandrel. Pipe mach cut on dia
Resistance to Breakage in Handling	Good		Good
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandril to a predetermined wt. Pressed to obtain the desired density, and baked.
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
* Available for field mixing to repair joints and seams. ** Max temp of Kaylo 20 is 1800°F			Unibestos Union Asbestos & Rubber Co
	Kaylo 20 Owens-Corning Corp		
			

OCTOBER 1954		SN 100 M	
Rev April 1960		Page 3	
MATERIAL SPECIFICATION - SERIES 100			
Code	107	108	109
Material	Asbestos sponge		Corrugated asbestos preshrunk
Material Description	Asbestos sheets separated by finely ground sponged material bonded with adhesive strips.		Alternate layers of plain and corrugated asbestos sheets. Outer covering asbestos felt.
Filler			
Binder			
Temperature Range	100°F to 700°F		100°F to 400°F
K Factor	500°F - 0.60 max		200°F - 0.58 max
Density	30 lb max		
Compressive Strength			
Manufacturing Process	Laminated - 38 to 42 layers per in. of thickness		3-ply laminate
Resistance to Breakage in Handling	Very good		Good
Dimensions	To Specification		
Other Qualifications	Must be a flexible product		Preshrunk
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
* Aircell -4-ply Excel -6-ply Cavocel-8-ply	Asbestos Sponge Johns-Manville Sales Corp		Preshrunk Asbestocel Johns-Manville Sales Corp
	Asbestos Sponge Philip Carey Mfg Co		Aircell Philip Carey Mfg Co
	Sponge Felt The Ruberoid Co		K & M - Aircell Keasbey & Mattison Co
	Sponge Felt Baldwin-Ehret-Hill, Inc		B-H Aircell Baldwin-Ehret-Hill, Inc
	Sponge Felt Smith and Kanzler Corp		
DUP 0838518			
			

Code	110	111	111.1
Material	Vegetable cork	Cellular glass	Cellular glass
Material Description	Vegetable cork, granulated and compressed into cork-board or molded forms, from material of vegetable origin for low and medium temperature insulation.	Cellular glass foamed and fused into unicellular form.	Cellular glass foamed and fused into unicellular form. Factory-applied jacket having white kraft paper outer jacket (60 lb per 3000 sq ft) backed by 0.00035" aluminum foil
Filler			
Binder	Natural resin in cork		
Temperature Range	-200°F to 100°F	-200°F to 100°F (+300°F for dual temp)	+35°F to +300°F
K Factor	100°F - 0.29 max	100°F - 0.43 max	100°F - 0.43 max
Density	9 - 11 lb per cu ft	10 - 11 lb per cu ft	9 lb per cu ft
Compressive Strength	15 lb per sq in. min	100 lb per sq in. min	100 lb per sq in. min
Manufacturing Process	Machine comp or molded. Baked at moderate temp		
Resistance to Breakage in Handling	Good		
Dimensions			
Other Qualifications	Pipe covering shall be coated on the outside with heavy mastic		

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

	<i>Cork</i> Armstrong Cork Co	<i>Foamglas</i> Pittsburgh Corning Corp	<i>Foamglas Stay-Dry</i> Pittsburgh Corning Corp
	<i>Cork</i> Mundet Cork Co		



OCTOBER 1954

MATERIAL SPECIFICATION - SERIES 100

SN 100 M

Rev April 1960

Page 4.1

Code	111.2	111.3	112
Material	Cellular glass	Cellular glass	Glass fiber
Material Description	Cellular glass foamed and fused into unicellular form. Factory applied jacket having 0.00035" aluminum foil outer jacket backed by kraft paper (60 lb per 3000 sq ft)	Cellular glass foamed and fused into unicellular form. Plain - without jacket.	See Codes 112.01 through 112.81.
Filler			
Binder			
Temperature Range	+35°F to +300°F	+35°F to +300°F	
K Factor			
Density	9 lb per cu ft	9 lb per cu ft	
Compressive Strength	100 lb per sq in. min	100 lb per sq in. min	
Manufacturing Process			
Resistance to Breakage in Handling			
Dimensions			
Other Qualifications			
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
	Foamglas Stay-Dry Pittsburgh Corning Corp	Foamglas Stay-Dry Pittsburgh Corning Corp	
			

DUP 0838520

OCTOBER 1954		SN 100 M	
Rev April 1960		MATERIAL SPECIFICATION - SERIES 100	
Page 5			
Code	112.01	112.02	
Material	Glass fiber	See Code 112.01	
Material Description	Textile type fine glass fiber pipe insulation, plain, with medium-temperature binder.		
Filler			
Binder	Phenol-formaldehyde or Di-Cy		
Temperature Range	80°F to 350°F		
K Factor	100°F - 0.25		
Density	3* and 6** lb per cu ft		
Compressive Strength			
Manufacturing Process	Machine molded		
Resistance to Breakage in Handling	Very good		
Dimensions			
Other Qualifications	Specify whether for iron pipe or copper tubing		
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
	*Ultrafine Snap-on Gustin-Bacon Mfg Co		
	*Mono-Kover Baldwin-Ehret-Hill, Inc		
	*Thermoglas Philip Cary Mfg Co		
	**Fiberglas Owens-Corning Corp		
	**Armoglas PF Pipe Insu Armstrong Cork Co		
	*Micro-Lok Johns-Manville Sales Corp		
			

DUP 0838521

Code	112.11	112.12	
Material	Glass fiber	See 112.11	
Material Description	Textile type fine glass fiber bonded pipe insulation with 30-lb factory-applied roofing felt finish on sizes 6" and smaller and 45-lb felt on sizes above 6" outside diameter.		
Filler			
Binder	Phenol-formaldehyde or Di-Cy		
Temperature Range	80°F to 350°F		
K Factor	100°F - 0.25		
Density	3* and 6** lb per cu ft		
Compressive Strength			
Manufacturing Process	Machine molded		
Resistance to Breakage in Handling	Very good		
Dimensions			
Other Qualifications	Specify whether for iron pipe or copper tubing, 30-lb felt used up to 6" OD of insulation		

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

♦ Order must specify finish noted under Material Description.	*Ultrafine Snap-on Gustin-Bacon Mfg Co		
	*Mono-Kover Baldwin-Ehret-Hill, Inc		
	*Thermoglas Philip Carey Mfg Co		
	**Fiberglas Owens-Corning Corp		
	**Armoglas PF Pipe Insu Armstrong Cork Co		
	Micro-Lok Johns-Manville Sales Corp		
	*PPG Glass Fiber Pitts Plate Glass Co		



DUP 0838522

OCTOBER 1954

MATERIAL SPECIFICATION - SERIES 100

SN 100 M

Rev April 1960

Page 7

Code	112.16	112.17	
Material	Glass fiber	Glass fiber	
Material Description	Textile type fine glass fiber bonded pipe insulation with 4-oz factory-applied canvas finish.	Textile type fine glass fiber bonded pipe insulation with 8-oz factory-applied canvas finish.	
Filler			
Binder	Phenol-formaldehyde or Di-Cy	Phenol-formaldehyde or Di-Cy	
Temperature Range	80°F to 300°F	80°F to 300°F	
K Factor	100°F - 0.25	100°F - 0.25	
Density	3* and 6** lb per cu ft	3* and 6** lb per cu ft	
Compressive Strength			
Manufacturing Process	Machine molded	Machine molded	
Resistance to Breakage in Handling	Very good	Very good	
Dimensions			
Other Qualifications	Specify whether for iron pipe or copper tubing	Specify whether for iron pipe or copper tubing	

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

	*Ultrafine Snap-on Gustin-Bacon Mfg Co	*Ultrafine Snap-on Gustin-Bacon Mfg Co	
	*Mono-Kover Baldwin-Ehret-Hill, Inc	*Mono-Kover Baldwin-Ehret-Hill, Inc	
	*Thermoglas Philip Carey Mfg Co	*Thermoglas Philip Carey Mfg Co	
	**Fiberglas Owens-Corning Corp	**Fiberglas Owens-Corning Corp	
	**Armoglas PF Pipe Insu Armstrong Cork Co	**Armoglas PF Pipe Insu Armstrong Cork Co	
	*Micro-Lok Johns-Manville Sales Corp	*Micro-Lok Johns-Manville Sales Corp	
	*PPG Glass Fiber Pitts Plate Glass Co	*PPG Glass Fiber Pitts Plate Glass Co	

DUP 0838523



Code	112.21	112.22	112.23
Material	Glass fiber	Glass fiber	Glass fiber
Material Description	Textile type fine glass fiber bonded pipe insulation with black factory-applied aluminum laminate vapor-barrier finish.	Textile type fine glass fiber bonded pipe insulation with white factory-applied aluminum laminate vapor-barrier finish.	Textile type fine glass fiber bonded pipe insulation with factory-applied white bleached kraft paper, laminated to the outer face of aluminum foil.
Filler			
Binder	Phenol-formaldehyde or Di-Cy	Phenol-formaldehyde or Di-Cy	Phenol-formaldehyde
Temperature Range	40°F to 200°F	40°F to 200°F	100°F to 250°F
K Factor	100°F - 0.25	100°F - 0.25	100°F - 0.25
Density	3* and 6** lb per cu ft	3* and 6** lb per cu ft	3 lb per cu ft min
Compressive Strength			Very low
Manufacturing Process	Machine molded	Machine molded	Machine molded
Resistance to Breakage in Handling	Very good	Very good	Very good
Dimensions			1/2 and 3/4 thick 3 ft sections
Other Qualifications	Specify whether for iron pipe or copper tubing. Weather protection is required for outside service.	Specify whether for iron pipe or copper tubing. Weather protection is required for outside service.	Low cost insulation for limited services such as hot water.

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

	*Ultrafine Snap-on Gustin-Bacon Mfg Co	*Ultrafine Snap-on Gustin-Bacon Mfg Co	Universal Jacket Owens-Corning Corp
	*Mono-Kover Baldwin-Ehret-Hill, Inc	*Mono-Kover Baldwin-Ehret-Hill, Inc	
	*Thermoglas Philip Carey Mfg Co	*Thermoglas Philip Carey Mfg Co	
	**Fiberglas Owens-Corning Corp	**Fiberglas Owens-Corning Corp	
	**Armaglas PF Pipe Insu Armstrong Cork Co	**Armaglas PF Pipe Insu Armstrong Cork Co	
	*Micro-Lok Johns-Manville Sales Corp	*Micro-Lok Johns-Manville Sales Corp	
	*PPG Glass Fiber Pitts Plate Glass Co	*PPG Glass Fiber Pitts Plate Glass Co	



OCTOBER 1954

MATERIAL SPECIFICATION - SERIES 100

SN 100 M

Rev April 1960

Page 9

Code	112.61		112.66
Material	Glass fiber		Glass fiber
Material Description	Plain semi-rigid board, formed from fibrous glass or mineral fibers.		Short, coarse steam-blown glass fibers preformed into semi-rigid board, sanded on one side and cut into lagging sizes for ease of application to curved surfaces.
Filler			
Binder	Phenol-formaldehyde		Phenol-formaldehyde
Temperature Range	40°F to 350°F		40°F to 350°F
K Factor	100°F - 0.25 to 0.30		100°F - 0.25
Density	6 and 9 lb per cu ft		9 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded		Machine molded
Resistance to Breakage in Handling	Very good		Very good
Dimensions	Std 24" x 48" Thickness PF615 (6-lb density) 1/2" through 3". PF617 (9-lb density), 1/2" through 2 1/4".		Length - 36" Width - 6" or 12" Thickness - 3/4", 1", 1 1/4", 1 1/2", and 2".

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

	<i>Fiberglas PF615 or 617 Insulation</i> Owens-Corning Corp		<i>Fiberglas Block Insulation</i> Owens-Corning Corp
			<i>Armoglas Block Insulation</i> Armstrong Cork Co
	<i>Armatemp Spun Wool Duct - Plain</i> Armstrong Cork Co		
	<i>Spintex No. 414 or 415</i> Johns-Manville Sales Corp		
	<i>Spunduct</i> Baldwin-Ehret-Hill, Inc		

DUP 0838525



MATERIAL SPECIFICATION - SERIES 100

Rev April 1960

Code	112.71		112.81
Material	Glass fiber		Glass fiber
Material Description	Bonded board insulation formed from fibrous glass or mineral fibers, with asphalt and kraft paper vapor-barrier finish.		Bonded acoustical board formed from fibrous glass or mineral fibers with a thin neoprene compound on one surface.
Filler			
Binder	Phenol-formaldehyde		Phenol-formaldehyde
Temperature Range	40°F to 150°F		40°F to 150°F
K Factor	100°F - 0.26		100°F - 0.26
Density	6 lb per cu ft		6 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded		Machine molded
Resistance to Breakage in Handling	Very good		Very good
Dimensions	24" x 48" boards 3/4" to 2" thickness		24" x 48" boards 5/8" to 2" thickness
Other Qualifications			Neoprene coating on side of board exposed to air flow

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

	<i>Fiberglas Vapor Seal Duct Insu</i> Owens-Corning Corp		<i>Fiberglas Coated Duct Insu</i> Owens-Corning Corp
	<i>Armatemp Spun Wool Duct - Faced VB</i> Armstrong Cork Co		<i>Armatemp Spun Wool Duct - Coated</i> Armstrong Cork Co
	<i>Spintex No. 414VS</i> Johns-Manville Sales Corp		<i>Coated Duct Insulation</i> Baldwin-Ehret-Hill, Inc
	<i>Spunduct</i> Baldwin-Ehret-Hill, Inc		



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MATERIALS		THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION	
MATERIAL SPECIFICATION SERIES 200 BLANKET AND BAT		ISSUED	SN 200 M Page 1 of 3
		OCT 1954	
		REVISED MAY 1958	
Code	201	202	203
Material		Glass wool (plain)	Mineral wool felt
Material Description		Pure glass wool bats or rolls without binder.	Impregnated mineral wool felt with a waterproof binder.
Filler			
Binder		None	Waterproof binder
Temperature Range		100°F to 1000°F	-180°F to 180°F
K Factor		100°F - 0.30 max	75°F - 0.35 max
Density			
Compressive Strength			
Manufacturing Process			
Resistance to breakage in handling			
Dimensions			
Other Qualifications			
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
		Fiberglas Owens-Corning Corp	Zerotex Johns-Manville Sales Corp
Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification. 			

MATERIAL SPECIFICATION - SERIES 200

Rev July 1960

Code	204	205	206
Material	Mineral wool (plain)	Hair felt	Glass fiber blanket
Material Description	Slag wool obtained from lead smelting encased in mesh wire, mesh screen, window screen, metal lath or rib lath.	Selected cattle hair intertwined and felted into sheets.	Plain glass fibers laminated into blanket form.
Filler			
Binder			Phenolic
Temperature Range	110° F to 1100° F	to 180° F	10° F to 350° F
K Factor	500° F - 0.65 max	75° F - 0.25 max	70° F - 0.21 to 0.30
Density	15-lb max		2 to 3 lb per cu ft
Compressive Strength			Low
Manufacturing Process			
Resistance to breakage in handling			Very good
Dimensions			
Other Qualifications		Shall be 100% selected cattle hair "Navy Std"	* See notes **

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

* Indicates fine short glass fibers. These materials should not be stapled below 2-pound density. ** Indicates long, large diameter glass fibers. These materials can be stapled at 1-pound densities and above. ♦ Blanket-type pipe covering is available as Eagle Picher "Tab-Lok" † Max temperature 1000°F	Style 201A *	Hair Felt	Ultralite **
	Eagle-Picher Sales Corp	Johns-Manville Sales Corp	Gustin-Bacon Co
	Rockwool Blanket Style 2A	Hair Felt	Ultrafine *
	Baldwin-Ehret-Hill Inc	Philip Carey Mfg Co	Gustin-Bacon Co
	Armatemp Blanket	Hair Felt	Thermoglas *
	Armstrong Cork Co	Armstrong Cork Co	Philip Carey Mfg Co
	Fiberglas Metal Mesh Blanket †	Hair Felt	Fyne Fyber *
	Owens-Corning Corp	Keasbey & Mattison Co	Baldwin-Ehret-Hill Inc
		Hair Felt	Microtex** or Microlite*
		Rubberoid Co	Johns-Manville Sales Corp
		Standard Felt	Aerocor *
		Baldwin-Ehret-Hill Inc	Owens-Corning Corp
			Armaglas *
			Armstrong Cork Co
			PPG - Superfine Fiber Glass*
			Pittsburgh Plate Glass Co



DUP 0838528

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MATERIALS		THERMAL INSULATION	
FLUID AND PLASTIC		STANDARD ENGINEERING SPECIFICATION	
		ISSUED OCT 1954	SN 500 M
		REVISED AUG 1959	Page 1 of 2
Code	501	502	502.1
Material	Gran Cork-asphalt Mix.	Insulating Cement	Insulating and Finishing Cement
Material Description	An asphalt "cutback" material containing 65% to 70% of cork by volume - wet. The consistency shall be suitable for spraying.	A dry cement mixture containing mineral wool pellets, asbestos fibers and bonding clays; conforming to ASTM Spec C 195 or as qualified below.	Hydraulic setting insulation cement composed of mineral wool, portland cement, and selected clay
Filler	Cork, asbestos fiber and clay	Mineral wool pellets and asbestos fiber	Selected clays
Binder	Asphalt	Heat resisting clay	Portland cement
Temperature Range	+40°F to 150°F	100°F to 1500°F	100°F to 800°F
K Factor	0.70 at 100°F	0.80 at 500°F max	0.86 at 500°F
Density	Approx 6 lb per gal	Approx 24 lb per cu ft	32 lb per cu ft
Compressive Strength		At 10% deformation 30 psi	
Manufacturing Process			
Resistance to Breakage in handling			
Dimensions			
Other Qualifications	Shall not absorb water, check or crack; sag of 1/4" thick sprayed wet film on clean dry vertical metal surface shall not exceed 1/4" at 75°F. Water vapor transmission rate shall not exceed 0.2 perms (wet cup test). Dry film shall resist alkali and dilute acid solutions (except nitric)	Material shall not corrode steel; minimum adhesive strength (measured per ASTM C 195) 4 psi; shall not check, crack or powder upon drying. Shall be applied in max 3/4" thick layers with each layer permitted to dry before next application.	Shall not be applied to heated surfaces above 140°F. Do not expose to rain or freezing within approx 2 hr of installation. Shelf life approx 90 days shall not be applied over bare aluminum or stainless steel below 250°F to 300°F
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
	<i>Insul-Mastic No. 553</i> Type D Insul-Mastic Corp of America	<i>JM 450</i> Johns-Manville Sales Corp	<i>Armatemp No. 10</i> Armstrong Cork Co
	<i>United Mastic 3X</i> United Mastics Corp	<i>Eagle-Picher 66</i> Eagle-Picher Sales Co	<i>Eagle-Picher-One Cote</i> Eagle-Picher Sales Co
	<i>Nokorode K-Kote</i> Lion Oil Co	<i>Baldwin Hill No. 1</i> Baldwin-Hill Co	<i>Super Powerhouse Cement</i> Baldwin-Hill Co
		<i>MW50</i> Philip Carey Mfg. Co	
		<i>Armatemp No. 166</i> Armstrong Cork Co	
		<i>No. 1711 Insulating Cement</i> M. H. Detrick Co	
Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.			
SUBCOMMITTEE NO. 25			

DUP 0838531

DUP 0838532



MATERIALS ACCESSORY MATERIALS		THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION	
SERIES 700		ISSUED OCT 1954	SN 700 M
FINISH, COVERINGS, AND COATINGS		REVISED APRIL 1958	Page 1 of 9
Code	701	702	703
Trade Designation	Asbestos Roofing Felt	Rag Felt	Canvas Drilling 3.8-oz
Purpose	To provide a weather- and chemical-resistant covering for thermal insulation.	To provide a weather- and chemical-resistant covering for thermal insulation at a lower cost than Code 701 materials.	To provide a non-weatherproof cover for thermal insulation.
Material Description	Asphalt-saturated asbestos fiber in sheet form coated on both sides with asphalt.	Asphalt-saturated vegetable or animal fiber felts in sheet form coated on both sides with asphalt.	Light weight canvas weighing approximately 3.8 oz per sq yd. The roll width shall be 38 in.
Qualifications and Limitations	See specifications below.	See specifications below.	
Specifications	ASTM Specification D 655-47 except that the minimum weight shall be not less than 45 lb per 100 sq ft.	ASTM Specification D 224-52, except that the minimum weight shall be not less than 45 lb per 100 sq ft.	Material shall have a warp count of 60 ± 5 (2 ply) and a filler count of 30 ± 4 .
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
* 45-lb <i>Fiberock Asbestos</i> base sheet is a more economical alternate that can be used subject to design approval.	<i>Double-Coated Flextone</i> Johns-Manville Sales Corp.	Barrett Co.	Available from most insulation distributors and applicators.
	<i>45-lb. Fiberock Asbestos*</i> <i>Base Sheet</i> Philip Carey Mfg. Co.	Philip Carey Mfg. Co.	
		Johns-Manville Sales Corp.	
		Ruberoid Co.	
Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.			
SUBCOMMITTEE NO 25		DUP 08385	

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DUP 0838533

Code	704	705	706*
Trade Designation	Canvas 8-oz	Rosin Sized Paper	High Temperature Breathing Mastic
Purpose	To provide a non-weatherproof cover for thermal insulation.	To establish a smooth base over thermal insulation for the subsequent application of canvas (Code 704) covering.	To provide a weather- and chemical-resistant breathing mastic finish for thermal insulation.
Material Description	Canvas weighing approximately 8 oz per sq yd.	Sheathing paper sized with rosin and weighing 40 lb per roll of 500 sq ft.	Mastic, consisting of an asphalt emulsion vehicle, fibers and fillers, of uniform quality, and of spraying or trowelling consistency.
Qualifications and Limitations			Normally applied to equipment operating at temperatures above 70°F. Keep from freezing.
Specifications	Material shall have a warp count of 85 ± 5 (2 ply) and a filler count of 28 ± 1 .		

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

*For winter use, Code 706.1 can be substituted for Code 706 material.	Available from most insulation distributors and applicators.	Available from most insulation distributors and applicators.	HI Mastic No 90-7 Benjamin Foster Co.
			Thermotex BX Philip Carey Mfg. Co.



OCTOBER 1954		ACCESSORY MATERIALS - SERIES 700		SN 700 M
Rev Dec 1959				Page 3
Code	707	708	709 **	
Trade Designation	Insulation Primer Paint	Weather Resisting Paint	Low temperature vapor barrier mastic.	
Purpose	To prime surfaces of thermal insulation and thus promote adhesion of a subsequent application of finish.	To protect finishes or coatings applied over thermal insulation against deterioration due to weathering in outdoor service.	To provide a weather- and chemical-resistant vapor-barrier mastic finish for thermal insulation.	
Material Description	Asphalt-solvent cutback priming paint of low viscosity and good penetration characteristics which develops a suitable bond with insulation materials, metals, and asphalt mastic coatings.	Durable coal-tar base paint which bonds well to insulation finishes and to metals.	Mastic, consisting of an asphalt-solvent cutback vehicle, fibers, and fillers, of uniform quality, and of spraying or hand application consistency as specified on order.	
Qualifications and Limitations		Keep from freezing.	Normally applied to equipment operating at temperatures below 70°F or varying intermittently from below 70°F up to 150°F. Will not resist solvents and oils.	
Specifications	Shall be suitable for brush or spray applications.			
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.				
* Medium grade for winter spray use. Heavy grade for summer spray and trowel or glove application	<i>Gilsonite Primer No. 4132</i> Insul-Mastic Corp of Am.	<i>Bituplastic 28</i> Koppers Co	<i>Insul-Mastic No. 4010</i> Insul-Mastic Corp of Am.	
	<i>Carbozite Primer</i> Carbozite Protective Ctgs		<i>United Mastic 2X</i> United Mastic Corp	
	<i>Asphalt Primer No. 50-29</i> Benjamin Foster Co		<i>Seaboard Mastic</i> Seaboard Asphalt Prod Co	
			<i>Nokorode Seal-Kote *</i> Lion Oil Company	
			<i>C. I. Mastic 60-26</i> Benjamin Foster Co	
** For fire-retardant vapor barrier mastic see Code 718.				



SN 700 M		OCTOBER 1954	
Page 4		Rev Aug 1959	
ACCESSORY MATERIALS - SERIES 700			
Code	710	711	712
Trade Designation	Glass Cloth - Open Weave	Glass Cloth - Close Weave	Finish Cement
Purpose	To provide reinforcement in low temperature vapor barrier mastic finishes for thermal insulation.	To provide a protective covering for thermal insulation.	To provide a hard finish for thermal insulation.
Material Description	Open weave asphalt-coated cloth produced from glass fiber yarns and compatible with accepted waterproofing and coating compounds.	Close weave cloth produced from glass fiber yarns.	Asbestos and a heat-resistant binder mixed with water in the field to a troweling consistency.
Qualifications and Limitations			Used where surface to be insulated is in continuous service at temperatures over 200°F and where water, chemical spillage, and high humidity are not involved in exposure conditions.
Specifications	Thread count shall be 20 x 20 per sq in and the weight shall be 12.5 lb per 100 sq yd. The tensile strength by strip method shall be 84 ± 8.4 lb per in. width in both warp and fill directions, samples to be conditioned and tested at 65% relative humidity and 70°F temp	Thread count 24 x 32 Wt per sq yd 5.5 oz Weave - plain. Min average breaking strength lbs per inch: Warp - 90 lb Fill - 130 lb	ASTM Specifications C 194-48
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
Code 302 long fiber cement is an acceptable alternate.	Glasfab Insul-Mastic Corp of Am	HC 26 Hess, Goldsmith	352 Johns-Manville Sales Corp
	Glass Cloth Pittsburgh Corning Corp	No. 150126 United Merchants	707 Philip Carey Mfg Co
		No. 1526 J P Schwebel	150 Ehret Magnesia Mfg Co
		No. 126 St George	152 Keasbey & Mattison Co
		#26 J Weber Mfg Co	



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ACCESSORY MATERIALS - SERIES 700

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Code	713	714	715												
Trade Designation	Glass Cloth	Poultry Netting	Asbestos Cloth												
Purpose	To provide a protective covering for thermal insulation.	To provide reinforcement in high temperature breathing mastic finishes for thermal insulation.	To provide an indoor covering for thermal insulation.												
Material Description	Close weave cloth produced from glass fiber yarns.	Galvanized iron or steel 20-gage wire mesh, with hexagonal openings nominally 1 in. in size.	Asbestos cloth. <table border="1"> <thead> <tr> <th>Grade</th><th>Percent Asbestos</th></tr> </thead> <tbody> <tr> <td>Commercial</td><td>75 through 79</td></tr> <tr> <td>Underwriters</td><td>80 through 84</td></tr> <tr> <td>AA</td><td>90 through 94</td></tr> <tr> <td>AAA</td><td>95 through 98</td></tr> <tr> <td>AAAA</td><td>99 through 100</td></tr> </tbody> </table>	Grade	Percent Asbestos	Commercial	75 through 79	Underwriters	80 through 84	AA	90 through 94	AAA	95 through 98	AAAA	99 through 100
Grade	Percent Asbestos														
Commercial	75 through 79														
Underwriters	80 through 84														
AA	90 through 94														
AAA	95 through 98														
AAAA	99 through 100														
Qualifications and Limitations			Percent asbestos in cloth shall not be below minimum specifications on respective grades.												
Specifications	Thread count 28 x 28 Wt. per sq. yd. 3 oz. Weave - plain. Min. average breaking strength lbs. per inch: Warp - 120 lb. Fill - 120 lb.		(Reference: ASTM D 677-50) <table border="1"> <thead> <tr> <th>Grade</th><th>Temperature Limits °F</th></tr> </thead> <tbody> <tr> <td>Commercial</td><td>400</td></tr> <tr> <td>Underwriters</td><td>450</td></tr> <tr> <td>AA</td><td>600</td></tr> <tr> <td>AAA</td><td>750</td></tr> <tr> <td>AAAA</td><td>900</td></tr> </tbody> </table> Weight will vary with thickness. Standard usage 2.25 lb. per square yard and 0.070 in. thick.	Grade	Temperature Limits °F	Commercial	400	Underwriters	450	AA	600	AAA	750	AAAA	900
Grade	Temperature Limits °F														
Commercial	400														
Underwriters	450														
AA	600														
AAA	750														
AAAA	900														
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.															
	HG 10 Hess Goldsmith Na. 131 J. Weber Mfg. Corp. 														



Code	716	716.1	716.2
Trade Designation	Aluminum Jacket for Equipment Insulation	Aluminum Jacket for Pipe Insulation Finish	Aluminum Jacket for Pipe Insulation Finish Black
Purpose	To provide fire- and weather-resistant finish over thermal insulation on equipment operating above ambient temperatures.	To provide fire- and weather-resistant finish over thermal insulation on pipe operating above ambient temperatures.	For use as an alternate to Code 716.1 where lower surface temperatures are desirable or where resistance to corrosive atmosphere or spills is required.
Material Description	Corrugated Aluminum; supplied in roll form with moisture barrier firmly adhered to inner surface. Preferred as insulation finish where cleanliness, appearance, oil or solvent spills or fumes, and fire resistance are factors.	Corrugated Aluminum; supplied in roll form with moisture barrier attached to inner surface. Preferred as insulation finish where cleanliness, appearance, oil or solvent spills or fumes and fire resistance are factors.	Corrugated Aluminum; supplied in roll form with moisture barrier and black polyethylene finish.
Qualifications and Limitations	See SN700.00D, pg 3, Code 716; most acids, chlorides, and some hydroxides will attack aluminum, check exposure before specifying. Caution during application. 1. Glare from polished surface in hot sun tiring to eyes - wear sunglasses. 2. Avoid using large sections on high scaffold on windy days.	Same as Code 716.	Avoid using large sections on high scaffold on windy days.
Specifications	Corrugation Spacing $\frac{3}{16}$ ". (1 $\frac{1}{4}$ " corrugation may be used on vertical surfaces.) Thickness 0.010" min. Width roll - 36" min. Roll length 50' min. Alloy 3003H14 or equal. Finish A moisture barrier shall consist of kraft paper weighing at least 40 lb per 3000 sq ft plus 1 mil polyethylene or finish B, 2 sheets of kraft paper weighing at least 30 lb per 3000 sq ft laminated together with a film of oxidized asphalt weighing at least 90 lb per sq ft. Softening point of asphalt 180°F min. Barrier shall be firmly adhered to inner surface and shall not loosen or tear when jacket is flattened out.	Corrugation Spacing $\frac{3}{16}$ ". Thickness 0.010" min. Width roll - 36" min. Roll length 100'. Alloy 3003H14 or equal. Finish A moisture barrier shall consist of kraft paper weighing at least 40 lb per 3000 sq ft plus 1 mil polyethylene, or Finish B 2 sheets of kraft paper each weighing at least 30 lb per 3000 sq ft laminated together with a film of oxidized asphalt weighing at least 90 lb per 3000 sq ft. Softening point of asphalt 180°F min.	Corrugation Spacing $\frac{3}{16}$ ". Thickness 0.010" min. Width roll - 36" min. Roll length 100'. Alloy 3003H14 or equal. Finish C 0.0015" black polyethylene exterior coating with moisture-barrier kraft paper weighing at least 40 lb per 3000 sq ft bonded to inner surface of aluminum by 0.001" polythene, or Finish D 0.004" epoxy coal-tar enamel exterior coating with moisture barrier either kraft paper weighing at least 40 lb per 3000 sq ft cemented to inner surface of aluminum and coated with 1 mil polyethylene or 2 sheets of kraft paper each weighing at least 30 lb per 3000 sq ft laminated together with a film of high-melting oxidized asphalt weighing at least 90 lb per 3000 sq ft.

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

* Finish A polyethylene is next to aluminum	* <i>Al-Cor-Jac</i> Aljon Mfg Co, Inc Roselle, New Jersey	* <i>Al-Cor-Jac</i> Aljon Mfg Co, Inc Roselle, New Jersey	* <i>Black Jac</i> Aljon Mfg Co, Inc Roselle, New Jersey
** Paper is next to aluminum	** <i>Premetco</i> Preformed Metal Prod Co, Shreveport, La	*** <i>Childers Jacket</i> Childers Mfg Co Houston, Texas	† <i>Premetco Arocoat Finish</i> Preformed Metal Prod Co Shreveport, La
*** Finish B	*** <i>Childers Jacket</i> Childers Mfg Co Houston, Texas	* <i>Premetco</i> Preformed Metal Prod Co, Shreveport, La	
◆ Finish A or B paper is next to aluminum			
◆◆ Finish C			
† Finish D			



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OCTOBER 1954		ACCESSORY MATERIALS - SERIES 700		SN 700 M
Rev July 1959				Page 7
Code	717	718	718.1	
Trade Designation	"Raymesh" Cloth	Fire-Resistive Vapor-Barrier Mastic - Dark Brown	Fire-Resistive Vapor-Barrier Mastic - Aluminum	
Purpose	To provide a reinforcing agent in high-temperature breathing mastic finishes or in vapor-barrier mastics.	To provide a fire-resisting vapor-barrier mastic finish for thermal insulation, and to furnish weather and corrosion protection with "fireproof" insulation systems, or in critical areas where fire retardance is important.	To provide a fire-resisting vapor-barrier mastic finish for thermal insulation, and to furnish weather and corrosion protection with "fireproof" insulation systems, or in critical areas where fire retardance is important.	
Material Description	Neoprene-coated, 6 x 10 weave, rayon cloth. Supplied in 100-yd rolls, nominally 42" wide.	Homogeneous blend of synthetic monomeric and polymeric resins with asbestos fillers and thinned per one of the following four alternates: (1) With nonflammable solvent to trowel consistency, or (2) to spray consistency. (3) With flammable solvents to trowel consistency, or (4) to spray consistency.	Homogeneous blend of synthetic monomeric and polymeric resins with asbestos fillers, pigmented with aluminum powder, and thinned to a consistency which may be either brushed, gloved, or sprayed with nonflammable solvent.	
Qualifications and Limitations		Good ventilation is necessary during application of all four alternates. Grades with nonflammable (chlorinated) solvent minimizes fire hazards during application, but solvent vapors are toxic. For spray application, contact vendor for preferred spray equipment and technique. Service temp limits: minus 40°F to plus 200°F.	Good ventilation is necessary during application. Nonflammable (chlorinated) solvent minimizes fire hazards during application, but solvent vapors are toxic. For spray application, contact vendor for preferred spray equipment and technique. Service temp limits: minus 40°F to plus 200°F.	
Specifications	Open weave cloth, 6 threads per inch in one direction and 10 threads per inch in the other direction. Made from neoprene-coated high-tenacity rayon.	On 1/8" dry film: Underwriters' Laboratories Inc rating from tunnel test on sample cured 30 days (wherein uncoated red oak = 100 and asbestos board = 0) shall not exceed 30 for flame spread and 0.5 for fuel contribution; water vapor permeability rating by wet cup test shall not exceed 0.2 perms; coating shall remain pliable in temperature range from minus 20°F to plus 200°F.	On 1/8" dry film: Underwriters' Laboratories Inc rating from tunnel test on sample cured 30 days (wherein uncoated red oak = 100 and asbestos board = 0) shall not exceed 30 for flame spread and 0.5 for fuel contribution; water vapor permeability rating by wet cup test shall not exceed 0.2 perms; coating shall remain pliable in temperature range from minus 20°F to plus 200°F.	
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.				
* Selection of alternate to be made in field. Numbers in parentheses relate to alternates shown under Material Description.	Raymesh Style 610-N The Glas-Mesh Co Westtown, Pa.	Fire-Resistive Mastic (1) 60-30N* Benjamin Foster Co.	Fire-Resistive Mastic 60-65 Benjamin Foster Co.	DUP 0838539
		Fire-Resistive Mastic (2) 60-60N* Benjamin Foster Co.		
		Fire-Resistive Mastic (3) 60-30* Benjamin Foster Co.		
		Fire-Resistive Mastic (4) 60-60* Benjamin Foster Co.		
				

Code	721	722	
Trade Designation	Reflecting Paint - Aluminum	Reflecting Paint - White	
Purpose	To provide a heat-reflecting surface for thermal insulation systems.	To provide a heat-reflecting surface for thermal insulation systems.	
Material Description	Asphalt vehicle aluminum paint ready mixed.	Polystyrene vehicle suitable for application over mastic surfaces.	
Qualifications and Limitations		Must have good hiding power and good wetting and moisture resistance. Keep from freezing.	
Specifications		Du Pont No. 6904.1.	

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

	<i>Asphalt Aluminum Paint</i> Flinkote Company	<i>Erkote Finisher</i> Earl Paint Company	
	<i>Asphalt Aluminum Paint</i> Benjamin Foster Company		
	<i>Gilsonite Aluminum</i> Insul-Mastic Corp. of Am.		



DUP 0838540

MATERIALS		PROCESS INSULATION	
ACCESSORY MATERIALS SERIES 800 ADHESIVES AND SEALERS		STANDARD ENGINEERING SPECIFICATION	
		ISSUED OCT 1954	SN 800 M
		REVISED AUG 1959	Page 1 of 6
Code	801	802	802.1
Trade Designation	Lap Adhesive Roofing Felt	Lagging Adhesive	Lagging Adhesive
Purpose	To provide a liquidtight seal between lapped surfaces of roofing felt finishes	To bond canvas covering to thermal insulation	To bond canvas and asbestos cloth to thermal insulation, and thermal insulation to itself in high-temperature service
Material Description	An asphalt-solvent cut-back vehicle with inorganic fillers of troweling consistency which will bond well to roofing felt	An adhesive, based on polyvinyl acetate emulsion and containing a suitable mold inhibitor, brushing consistency	A solution of sodium silicate in water; to be of brushable consistency
Qualifications and Limitations	To be used on all joints where roofing felt is used as a finish for insulation over austenitic stainless steel or aluminum, and on butt straps on vertical lines where factory-applied roofing felt is used		Protective clothing must be worn when handling this material. Do not use on austenitic stainless steel, aluminum, or silicate-based glass insulations
Specifications			Sp Gr - 38° to 41° Be' Ratio - Na ₂ O to SiO ₂ 1:3.22 - 3.25 Viscosity - 1.6 to 1.8 poise
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
* Will not yellow with age	Laptite Johns-Manville Sales Corp	Lagging Cement No. 81-42W* Benjamin Foster Co	Sodium Silicate, Technical Grade F I&B Dept
		Lagging Cement No. 70-86-03 Arabul Mfg Co	Sodium Silicate, N Brand Philadelphia Quartz Co
		Lagging Adhesive No. 2947 Swift & Co	
Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.			

SN 800 M	ACCESSORY MATERIALS		OCTOBER 1954
Page 2	SERIES 800 - ADHESIVES AND SEALERS		Rev Aug 1959
Code	803	804	805
Trade Designation	Fibrous Adhesive	High-Temperature Adhesive	Nonsetting Sealer
Purpose	To bond thermal insulation to itself or to substrates in high-temperature service	A water-resistant adhesive to bond asbestos cloth to thermal insulation in high-temperature service	To provide a nonsetting liquid-tight and vaportight seal for joints in low- or dual-temperature services. Also used for joints to be broken in removable insulation in low-temperature service
Material Description	An adhesive consisting principally of a sodium-silicate vehicle and an asbestos fiber filler, of a thick troweling consistency	A light-colored adhesive consisting of an organic resin, an inert filler, and a solvent	A sealer consisting of an organic vehicle and inorganic fillers, of troweling consistency. Available packaged in caulking gun cartridges
Qualifications and Limitations	Resistant to temperatures in the range of 200°F to 800°F. Paint must be removed from surfaces to which fibrous adhesive is to be applied. Do not use on austenitic stainless steel, aluminum, or with silicate-based glass insulation		Effective over a temperature range of -100°F to +250°F. Material, which has not been allowed to skin over sufficiently by exposure to air after installation and before exposure to heat, will flow vertically down surfaces over 150° F. Will bleed through asphalt coatings. This can be prevented by coating over the sealer with Code 802 prior to application of the asphalt
Specifications		Flash point of solvent - 85°F	
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
* Where water resistance is not a requirement, Codes 802.1 or 803 may be used	Fibrous Adhesive Johns-Manville Sales Corp	Hi-Temp Cement No. 81-33* Benjamin Foster Co	Foamseal No. 30-45 Benjamin Foster Co
	Fibrous Adhesive Philip Carey Mfg Co		
	Fibrous Adhesive Ehret Magnesia Mfg Co		
	Fibrous Adhesive 81-93 Benjamin Foster Co		

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ACCESSORY MATERIALS SERIES 800 - ADHESIVES AND SEALERS

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Code	807	808	809
Trade Designation	Flashing compound	Seam Filler	Water-Resistant Adhesive - Rubber-Based
Purpose	To provide a durable vapor and liquid seal at joints between thermal insulation and projections through the insulation and its coating or finish	To fill chipped edges and small joints between thermal insulation	A general-purpose adhesive to bond cellular glass insulation to itself and to steel in low-temperature service. Also used to bond cork and high-density glass fiber to ducts
Description	A sealing compound, consisting of an organic vehicle and inorganic fillers, of troweling consistency. Available packaged in calking gun cartridges	A compound consisting of asphalt or pitch, asbestos fibers, and solvent	A black, medium-bodied, medium-setting, reclaimed rubber-based adhesive containing aliphatic hydrocarbons of consistency suitable for troweling and for calking gun application. It is noncorrosive and water resistant
Qualifications and Limitations	Effective over a temperature range of -100°F to +250°F. Material, which has not been allowed to skin over sufficiently by exposure to air after installation and before exposure to heat, will flow vertically down surfaces over 150°F		Recommended for use at temperatures above 50°F. For use below 50°F, thin with white gasoline or mineral spirit. Tensile strength - direct pull; 25 psi after 40 hours, increasing to 100 psi after full cure. Starts to soften at 120°F. Shrinkage approx 25%. Freshly coated surfaces must be placed in immediate contact to prevent loss of adhesion from surface film formation. Highly flammable.
Specifications			Coverage: 40 sq ft per gal (for spot application, 150 sq ft per gal) Packaged in 1- and 5-gal pails (other sizes available but not recommended)

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

	<i>Foamseal No. 30-45</i> Benjamin Foster Co	<i>Uniseal</i> Johns-Manville Sales Corp	<i>Miracle Adhesive, Type M</i> Miracle Adhesive Corp
		<i>Seam Filler 27B</i> Armstrong Cork Co	
		<i>Seam Filler 30-14</i> Benjamin Foster Co	

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Code	810	811	814
Trade Designation	Water-Resistant Adhesive Rubber-Based	Water-Resistant Adhesive Asphalt Base	Anchor Adhesive (up to +80°F)
Purpose	To bond glass fiber blanket insulation to steel in moderate temperature service	A black asphalt cutback mastic to bond low- and moderate-temperature insulation to steel and insulation to itself, and provide a durable liquid and vapor seal	To bond metal spindle anchors to bare metal surfaces
Description	Off-white heavy paint consistency, reclaimed rubber-based adhesive containing aliphatic hydrocarbon solvents. Application by brush or serrated trowel. Drying time 1 to 5 minutes. Highly flammable.	A mastic consisting of an asphalt-solvent vehicle, asbestos fibers and fillers, of troweling or sprayable consistency as specified on order	A black, reclaimed rubber-based adhesive, containing aliphatic hydrocarbon solvents of suitable consistency for troweling. It is resistant to water
Qualifications and Limitations	Maximum service limit: +200°F DO NOT THIN	Suitable for use to an upper temperature limit of 270°F. Will not resist solvents and oils	Suitable for bonding metal spindle anchors to metal surfaces in the temperature range of from -60°F to +80°F. Contains flammable solvents. Must be stored 24 hours at room temperature before application DO NOT THIN Setting time before use: 72 hours at room temperature, 6 to 8 days at low temperatures
Specifications	Coverage: 150 to 225 sq ft per gal Packaged in 1- and 5-gal pails (other sizes available but not recommended)		Coverage: 50 sq ft per gal Available in 1- and 5-gal pails (other sizes available but not recommended)

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

* Medium grade for spray. Heavy grade for trowel or glove	Miracle Adhesive P749 Miracle Adhesive Corp	Insul-Mastic 4010 Insul-Mastic Corp of Am	LT 153 Miracle Adhesive Corp
		United Mastics 2X United Mastics Corp	
		Nokorode Seal-kote* Lion Oil Co	



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Code	815	816	817
Trade Designation	Anchor Adhesive (up to +225°F)	Anchor Adhesive (up to +325°F)	Anchor Adhesive (for nylon anchors)
Purpose	To bond metal spindle anchors to bare metal surfaces	To bond metal spindle anchors to bare metal surfaces	To bond nylon and metal spindle anchors to bare metal surfaces
Description	A dark tan fast-setting synthetic rubber-based adhesive of heavy dough consistency, containing aromatic hydrocarbon solvents	A yellow two-part catalized epoxy resin adhesive of heavy mastic consistency, contains no solvents	Neoprene-base solvent-type adhesive of brushing consistency, contains 26% solids
Qualifications and Limitations	DO NOT THIN Suitable for bonding metal spindle anchors to metal surfaces in the temperature range of -30°F to +225°F, contains flammable solvents. Store at room temperature for 24 hours before using in cold weather. Allow 48 hours drying time. Do not apply to surfaces below +40°F or above 120°F	DO NOT THIN Suitable for bonding metal spindle anchors to bare metal surfaces in the temperature range of -30°F to +325°F. Precautions must be taken to minimize skin contact since materials may cause irritation. Pot life of the mixed components is 45 to 90 minutes, depending upon amount mixed and temperature	Suitable for metal temperature range of -30°F to +250°F, volatile and flammable. At time of application, air and metal temperature must be above 40°F
Specifications	Coverage: 17 sq ft per gal Available in 1- and 5-gal pails (other sizes available but not recommended)	Coverage: 17 sq ft per gal Available in 2- and 4-gal units (other sizes available but not recommended)	Coverage: Approx 2500 nylon spindle anchors per gal. For safe loads and application procedures, follow manufacturer's instructions

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

	HT 4620 Miracle Adhesive Corp	ER 475 Miracle Adhesive Corp	Tuff-Bond® Quik-Set Goodloe E. Moore, Inc

DUP 0838545



Code	818	819	
Trade Designation	Joint Adhesive	Lap Adhesive Dual Temperature	
Purpose	To bond flexible urethane foam insulation to itself or to metal substrates	A lap adhesive for bonding kraft laminate dual-temperature jacket to itself	
Description	A yellow fast-tack, brushable, neoprene-base adhesive containing flammable solvents	A yellow fast-tack, brushable, neoprene-base adhesive containing flammable solvents	
Qualifications and Limitations	Suitable for bonding urethane foam blanket and pipe covering in the temperature range from -30°F to +250°F contains volatile and flammable solvents. At time of application, air and metal temperature must be above 40°F	Contains volatile and flammable solvents. Temperature must be above 40°F at time of application	
Specifications		Coverage: 100 sq ft per gal	

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

	Tuff-Bond® Quik-Set Goodloe E. Moore, Inc	Tuff-Bond® Quik-Set Goodloe E. Moore, Inc	



DUP 0838546

MATERIALS		THERMAL INSULATION	
ACCESSORY MATERIALS		STANDARD ENGINEERING SPECIFICATION	
SERIES 900		ISSUED	SN 900 M
FASTENINGS		REVISED	
		OCT 1954	
		JAN 1960	
Code 900 — Materials are available from most insulation distributors and applicators.			
Code		Code	
910	— Galvanized-iron wire and bands	964.3	— TWU "Tuff-Weld" hanger and washer unit. Nylon one-piece molded unit with 1 ⁵ / ₈ -inch dia base plate and a 2 ¹ / ₂ -inch spindle. Self-locking nylon washer 1 ³ / ₈ inch dia
920	— Stainless steel wire and bands, general Type 430 min 16% chrome preferred Type 304 acceptable	965	— 1/2-inch hardware cloth
921	— 18-gage wire	966	— Jute twine
922	— 15-gage wire	967	— Friction tape (3 inches wide)
923	— 12-gage wire	968	— Glass fiber cord
926	— 3/8-inch x 0.015-inch bands and seals	969	— Glass fiber tape
927	— 3/4-inch x 0.015-inch bands and seals	970	— Corner beading
928	— 1 1/4-inch x 0.020-inch bands and seals	971	— Sheet metal screws
930	— "Monel" wire and bands, general	971.1	— Stainless steel sheet metal screws
931	— 18-gage wire	971.2	— Cadmium-plated metal screws
932	— 15-gage wire	971.3	— Aluminum metal screws
933	— 12-gage wire	972	— 24-gage galvanized steel sheet
936	— 3/8-inch x 0.015-inch bands	973	— Black Hi Rib lath (2-inch square mesh with vee ribs)
937	— 3/4-inch x 0.015-inch bands	974	— "Polyken" ® Tape No. 940 (12 mil thick)
938	— 1 1/4-inch x 0.020-inch bands	975	— 2-pound lead sheet
940	— Steel wire and bands	976	— 0.016-inch thick plain aluminum sheet
941	— 18-gage black-iron wire	977	— Corrugated expansion bands 3/4 inch x 0.015 inch Type 304 stainless steel ("Expand-R" strap, A. J. Gerrard & Co)
950	— Copper wire, general	978	— 1 inch x 0.032 inch aluminum "S" clips
951	— 14-gage soft wire	979	— Graham pins
952	— 16-gage soft wire	980	— "Techalloy" all-weather breather springs (Techalloy Co Inc, Rahns, Pa)
955	— Aluminum wires and bands	981	— Finger straps — 3/4 inch x 0.015 inch Type 430 stainless steel (A. J. Gerrard & Co)
956	— Aluminum band, 3/8 inch wide, 0.020 inch thick	982	— No. 320 Aluminum D/BS "Pop Rivets" for installation with "Pop Rivet" pliers — United Shoe Machinery Corp
960	— Miscellaneous		
961	— Skewers, wood pins		
962	— Loggers staples		
963	— Gun-type staples		
964	— Spindle anchors and lock washers*		
964.1	— "Gemco" No. 1H-A — 2-inch x 2-inch metal plate with 1 5/8-inch long, 12-gage wire spindle, and 1-inch square No. WB self-locking metal washer (Goodloe E. Moore Co, Danville, Ill., or Miracle Adhesives Corp)		
964.2	— "Tuff-Weld" nylon insulation hangers No. TW-A with 1 5/8-inch OD round nylon base fitted with 1 5/8-inch long wire spindle, and Gemco No. WB — 1-inch square self-locking washer. (Goodloe E. Moore Co, Danville, Ill.)		

*Note — Nylon spindle anchors can be purchased disassembled. For other spindle lengths and types of washers available, consult vendors' catalogs.

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this Specification.



SPEC. 4239

DUP 0838548