PLAINTIFF'S
EXHIBIT
DUP-1759

125

APPLICATION SERIES 100 – PIPE AND FITTINGS DOUBLE-LAYER INSULATION WITH FIELD APPLIED 8-OUNCE CANVAS FINISH FOR PIPE	THE [illegible] COMPANY STANDARD ENGINEERING SPECIFICATION ISSUED DEC 1954 — SN 100.04 A REVISED MAY 1956 — Page 1 of 4

1. SCOPE

1.1 This Specification covers Two Layer 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
and over
Code 103 Diatomaceous Earth

2.3 Basic Insulation Materials – Fluid and Plastic

Code 502 – Insulation Cement

2.4 Accessory Materials

Code 704 – 8-ounce Canvas
Code 705 – Rosin-sized Paper
Code 712 – Finish Cement
Code 714 – Poultry Netting
Code 715 – Asbestos Cloth
Code 802 – Lagging Adhesive
Code 962 – Laggers Staples
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.

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.

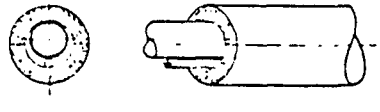
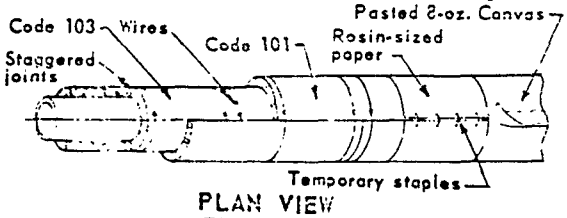


FIGURE 1

3.3 The first or inner layer of sectional pipe insulation, Code 103, 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, Code 101, shall be applied so that all joints of the first layer are covered by the second layer. See Figure 2. Each layer shall be held firmly in place by wires or bands installed in accordance with par. 4.1. All chipped edges, cracks, or imperfections shall be filled in and smoothed with Insulation Cement, Code 502.

4. WIRES AND BANDS

4.1 Each layer of insulation shall be applied to the pipe and secured with wires or bands as specified in Table 1. Wires 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 should be located 1 inch from the end of the section. See Figure 2.



PLAN VIEW
FIGURE 2

5. INSULATION AT PIPE HANGERS

5.1 Pipe hangers attached to the pipes 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 Figure 3 and 4. The insulation around the hanger clamp and rod shall be sealed with Finish Cement, Code 712.

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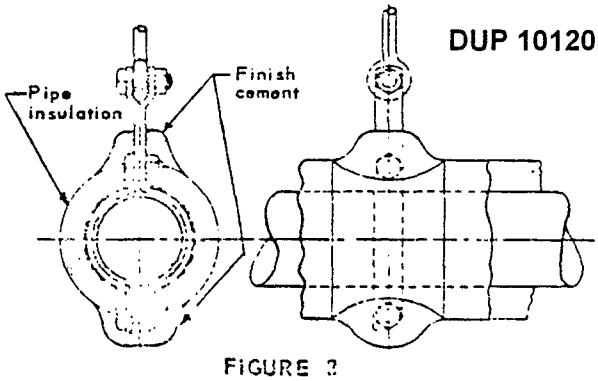

FIGURE 3

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

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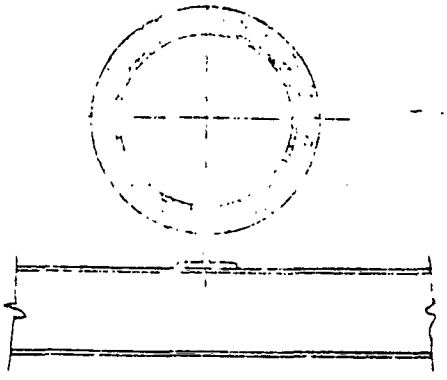

FIGURE 4

6. PIPE – FINISH APPLICATION

: Finish shall consist of a field-applied 8-ounce nvas, Code 704, over Rosin-sized Paper, Code 5.

: The pipe insulation shall be wrapped with sin-sized Paper, Code 705, cut to fit, drawn ht, and held temporarily in place with Lagger's ples, Code 914. Eight-ounce Canvas, Code 704 all be drawn snugly over the Rosin-sized Paper. e Canvas shall have laps that are 2 inches nimum. The staples shall be removed as the nvas is applied. The canvas laps shall be bonded ch Lagging Adhesive, Code 802. The canvas all be tightly sealed and free of wrinkles and ged edges. The longitudinal laps shall be cated on the top or bottom, whichever is least ible. See Figure 2.

3 Where pipelines are located indoors, operating 300 degrees F. and over, the following pre- utions should be taken to prevent burning of the nvas finish. Where exposed fittings (uninsulated) e located in the line, the bonded canvas applied er the insulation shall be stopped at least six ches short of the end of the insulation. Over the posed insulation, cement Asbestos Cloth, Code 5, with the ends of the asbestos cloth cemented er the end of the pipe insulation to approximately 2 inch of the pipe using Lagging Adhesive, de 802.

7. FITTINGS – INSULATION APPLICATION

1 Welded fittings and valves of 2 inches or ss and screwed fittings and valves of all sizes shall be insulated with Insulation Cement, Code 3[illegible], to a thickness equal to the adjacent pipe insulation. See Figures 5 and 6.

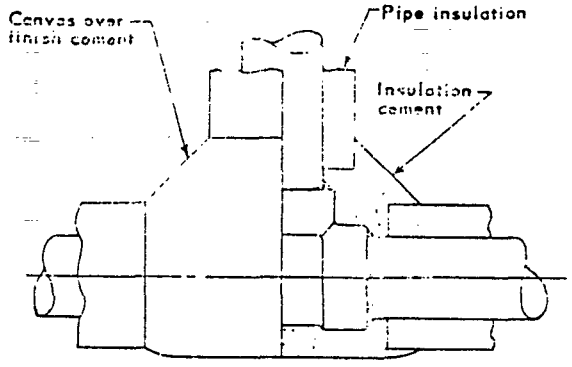

FIGURE 5

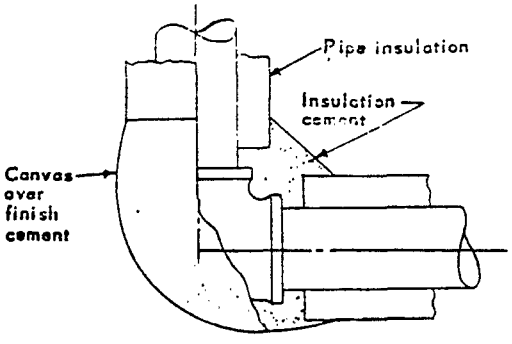

FIGURE 6

7.2 Welded fittings and valves three 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 7 and 8.

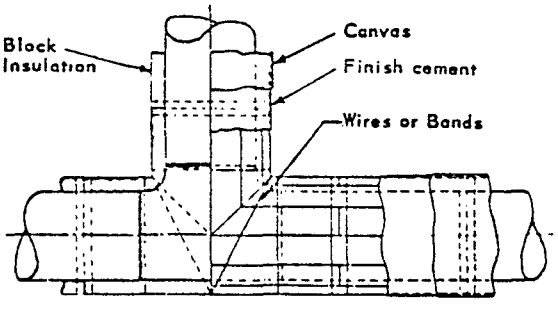

FIGURE 7

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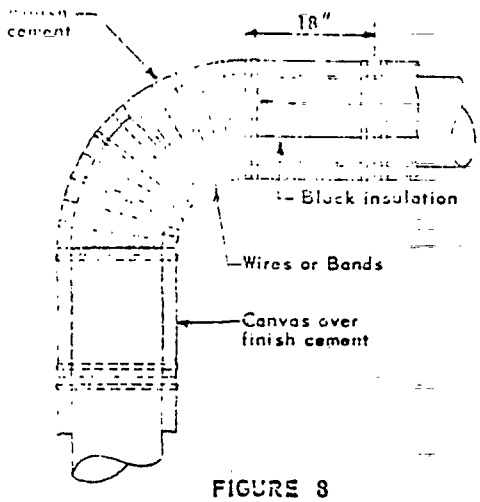

FIGURE 8

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

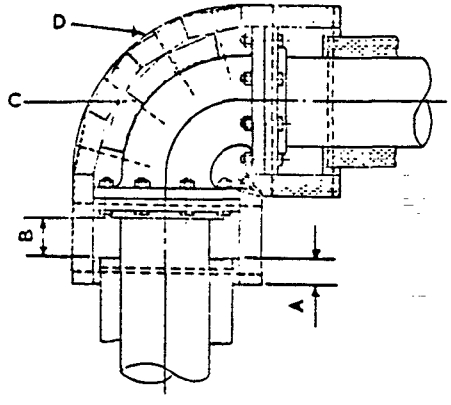

FIGURE 9

Legend Figures 9 and 10

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

For fittings over 12 inches in diameter, apply Poultry Netting, Code 714, over insulation to reinforce the Finish Cement, Code 712.

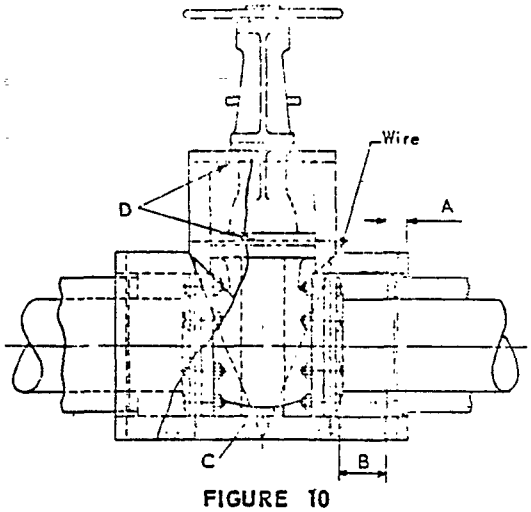

FIGURE 10

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 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.

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, Code 712, reinforced with Poultry Netting, Code 714.

8. FITTINGS – FINISH APPLICATION

8.1 Finish shall consist of a field-applied 8-ounce Canvas, Code 704, over the Finish Cement, Code 712, bonded with Lagging Adhesive, Code 802. The canvas should completely cover the fitting 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				
–	6¼	921	931		
Over 6¼	12¾	922	932		
13	–	923	933		

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

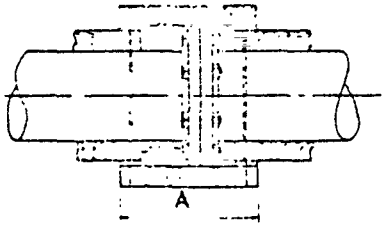

FIGURE 11

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
½	9	3½	9	3¾	12	3¾	12	4¾	12	4¾
¾	9	3⅞	9	4⅝	12	4⅝	12	5⅛	12	5⅛
1	9	4¼	9	4⅞	12	4⅞	12	5⅞	12	5⅞
1¼	9	4⅝	9	5¼	12	5¼	12	6¼	12	6¼
1½	9	5	9	6⅛	12	6⅛	18	7	18	7
2	9	6	9	6½	12	6½	18	8½	18	8½
2½	9	7	12	7½	12	7½	18	9⅝	18	9⅝
3	12	7½	12	8¼	12	8¼	18	9½	18	10½
3½	12	8½	12	9	18	9	-	-	-	-
4	12	9	12	10	18	10¾	18	11½	18	12¼
5	12	10	12	11	18	13	18	13¾	24	14¾
6	12	11	12	12½	18	14	18	15	24	15½
8	12	13½	18	15	18	16½	24	18½	24	19
10	12	16	18	17½	24	20	24	21½	30	23
12	12	19	18	20½	24	22	24	24	36	26½
14 OD	18	21	18	23	24	23¾	24	25¼	36	29½
16 OD	18	23½	18	25½	24	27	24	27¾	36	32½
18 OD	18	25	18	28	24	29¼	30	31	-	-
20 OD	18	27½	18	30½	24	32	30	33¾	-	-
24 OD	18	32	24	36	30	37	36	41	-	-

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1. [illegible]

[illegible]

2.1 [illegible] — [illegible]*

[illegible] — [illegible]

[illegible] 107 — [illegible]

2.2 [illegible] — Finish and Plastic [illegible]

[illegible] — [illegible]

(Limited to [illegible])

2.3 Accessory Materials

[illegible] — [illegible] Cement
Code 735 — Rosin-sized Paper
Code 712 — Finish Cement
Code 714 — Poultry Netting
Code 802 — Lagging Adhesive
Code 920 Series — Stainless Steel Wires and Bands*
[illegible] Series — "Monel" Wires and Bands*
Code 952 — Laggers 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.

3.2 Pipe insulation on closed lines shall be of a [illegible] enough to encase both pipe-line and closer. The insulation shall be a snug fit to the pipe and closer or [illegible]. See Figure 1.

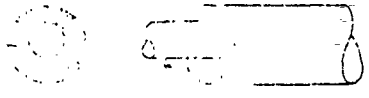
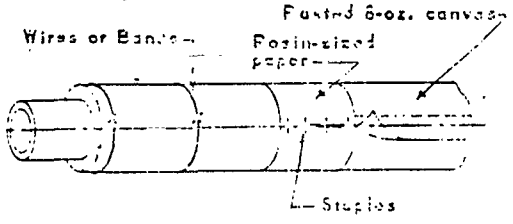


FIGURE 1

3.3 Insulation shall be applied to the pipe and [illegible] section of insulation. [illegible] If the butt joints of the insulation are torn or [illegible], they shall be squared off and the [illegible] insulation is torn or [illegible] in [illegible] the ends, and if it [illegible]

4. [illegible] AND [illegible]

[illegible] Wires shall be [illegible] separate bands per section [illegible] insulation, [illegible] and hold with hard seals. Wire or bands shall be located 1 inch from the end of the section. See Figure 2.



PLAN VIEW — FIGURE 2

5. INSULATION AT PIPE HANGERS

5.1 Pipe hangers attached to the pipe shall be insulated where possible, the pipe insulation shall be cut out to fit snugly over the hangers with the outer surface of the insulation [illegible] and [illegible] the size of the hanger does not permit this procedure, the pipe insulation can be butted up to the hanger and the void filled

*Where Code 802 is specified herein, Code 802.1 can be substituted provided the temperature conditions do not exceed 250 degrees F.

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

†Applied only to basic insulation material listed.

[illegible] only [illegible] of the [illegible] Specification.

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[illegible] 702, and [illegible]

[illegible] Code 702.

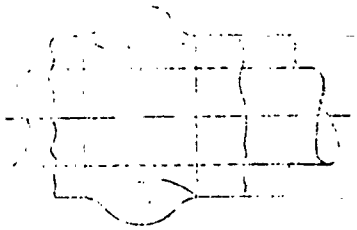

FIGURE 3

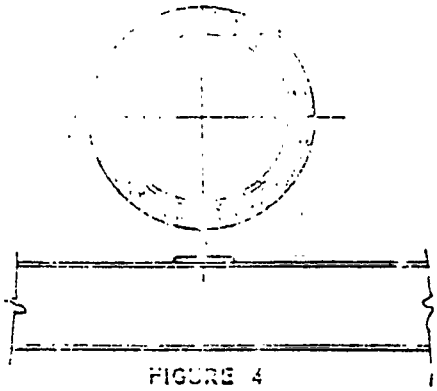

FIGURE 4

6. PIPE – FINISH APPLICATION

6.1 Finish shall consist of a field-applied 8-ounce Canvas, Code 704, over Rosin-sized Paper, Code 703.

6.2 The pipe insulation shall be wrapped with Rosin-sized Paper, Code 703, cut to fit, drawn [illegible], and held temporarily in place with Lacers [illegible], Code [illegible]. The 8-ounce Canvas, Code 704, shall be drawn snugly over the Rosin-sized Paper. The canvas shall have laps that are 2 inches minimum, the stapes shall be removed as the canvas is applied. The canvas laps shall be bonded with [illegible] Adhesive, Code 702. The canvas shall be tightly sealed and free of wrinkles and [illegible]. The longitudinal laps shall be located on the top or bottom whichever is least [illegible]. See Figure 2.

7. FITTINGS – INSULATION APPLICATION

7.1 [illegible] and [illegible] pipe valves or all sizes shall be [illegible] Code 702 to [illegible] equal to the adjacent pipe insulation. See [illegible] 5 and 6.

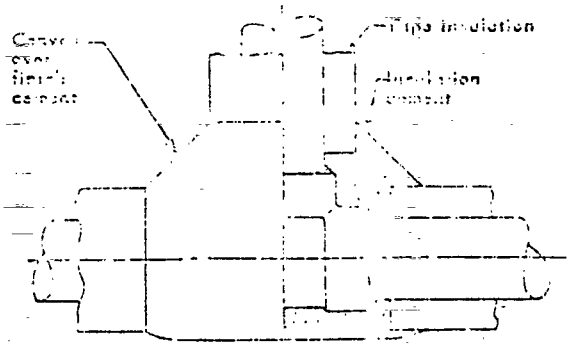

FIGURE 5

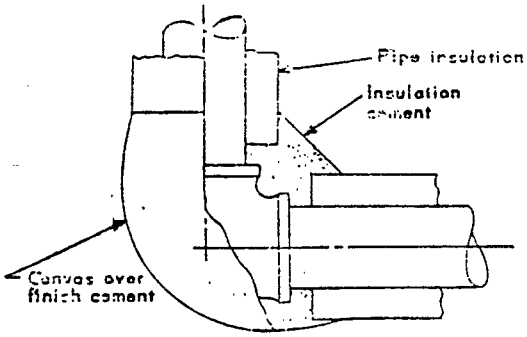

FIGURE 6

7.2 Welded fittings and valves, three 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 7 and 8.

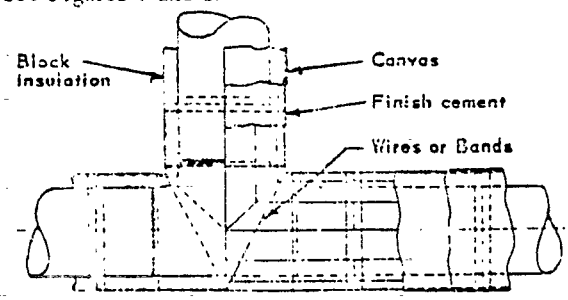

FIGURE 7

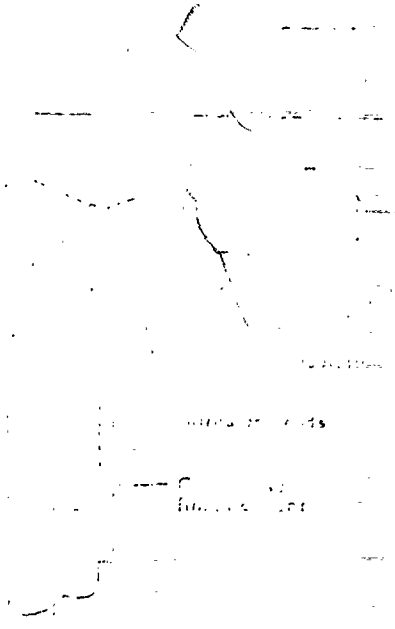

FIGURE 8

[illegible] valves shall be [illegible] block or pipe insulation cored in [illegible] pipe insulation, in accordance [illegible] 9 and 10. The fitting insulation shall overlap the adjacent pipe insulation [illegible] the pipe insulation thickness, [illegible] See Figures 9 and 10.

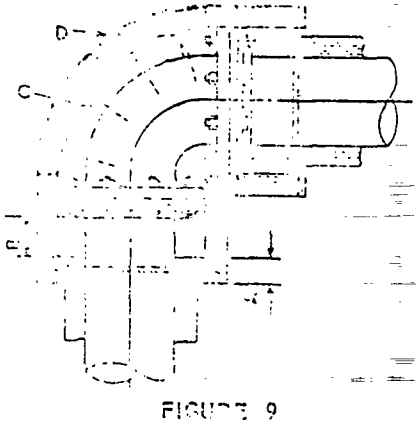

FIGURE 9

[illegible] Figures 9 and 10

A — Not less than 2 inches.
B — [illegible] to remove [illegible].
C — [illegible] for cover.
D — [illegible] not over six-inch centers.

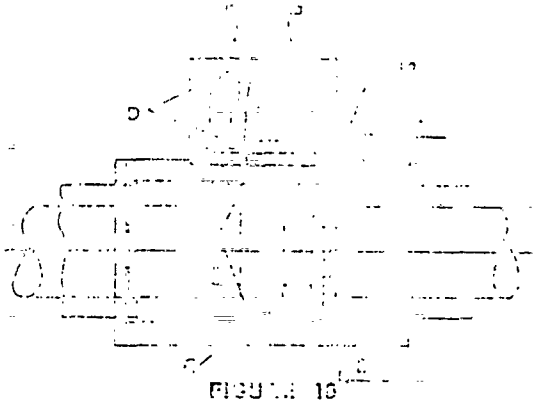

FIGURE 10

7.4 Line flanges shall be insulated with block or pipe insulation cored in thickness to the adjacent pipe covering. 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.

7.6 The outside of the insulation on all fittings, valves, and line flanges shall be given a [illegible]-inch trowel coat of Finish Cement, Code 712, to present a smooth surface. For valves and fittings with insulation diameter exceeding 10 inches, apply two coats of finish cement reinforced with Poultry Netting, Code 713.

8. FITTINGS – FINISH APPLICATION

8.1 Finish shall consist of field-applied 8-ounce Canvas, Code 721, over the Finish Cement, Code 712, bonded with Lagging Adhesive, Code 802. The canvas should completely cover the fitting smoothly and snugly.

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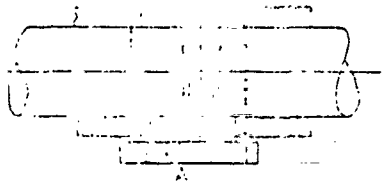
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]		

[illegible] OF [illegible] INSULATION COVERS FOR LINE FLANGES



[illegible] 11

TABLE 2

Nominal Pipe Size (inches)	[illegible] A (in.)									
	Flange									
	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
	A	Flange [illegible]	A	Flange [illegible]	A	Flange [illegible]	A	Flange [illegible]	A	Flange [illegible]
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	[illegible]	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	23	24	29 1/4	30	31	-	-
20 OD	18	27 1/2	18	30 1/2	24	32	30	33 3/4	-	-
[illegible]	[illegible]	32	24	[illegible]	[illegible]	37	36	41	-	-

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2.2 [illegible] – Molded

Code 102 – Calcium Silicate

over

Code [illegible] – Diatomaceous Earth

2.3 Basic Insulation Materials – Fluid and Plastic

Code 702 – Insulation Cement

2.4 Accessory Materials

Code 704 – 8-Oz. Canvas

Code 705 – Rosin-sized Paper

Code 712 – Finish Cement

Code 714 – Poultry Setting

Code [illegible] – Asbestos Cloth

Code [illegible] – Lagging Adhesive

Code [illegible] – Lagger's Staples

Code 900 Series – Stainless Steel Wires and Bands *

Code [illegible] Series – Monel Wires and Bands *

3. PIPE – INSULATION APPLICATION

3.1 Pipe insulation shall be applied snugly on pipe [illegible]

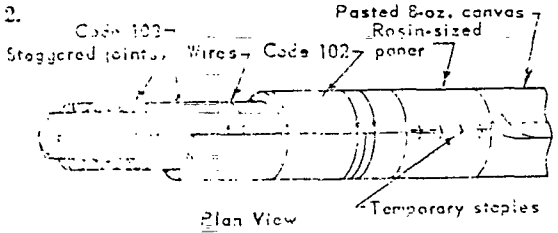
3.2 Pipe insulation on elevated lines shall be of a [illegible] specification [illegible]

[illegible] fit to the [illegible]

3.3 [illegible] sectional pipe insulation [illegible] and with longer and [illegible] or outer layer of [illegible] Code 102, shall [illegible] of the first layer are [illegible] See Figure 2. Each [illegible] be wires or bands [illegible] paragraph 4.1. All [illegible] or imperfections shall be [illegible] Insulation Cement, [illegible]

4. WIRES AND BANDS

4.1 Each layer of insulation shall be applied to the pipe and secured with wires or bands as specified in Table I. Wires 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 should be located 1 inch from the end of the section. See Figure 2.



Plan View

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 [illegible]. 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 [illegible], until flush with the pipe insulation. See Figures 3 and 4. The insulation [illegible] shall be sealed with [illegible] Cement, Code [illegible].

* Applies only to basic insulation material listed.

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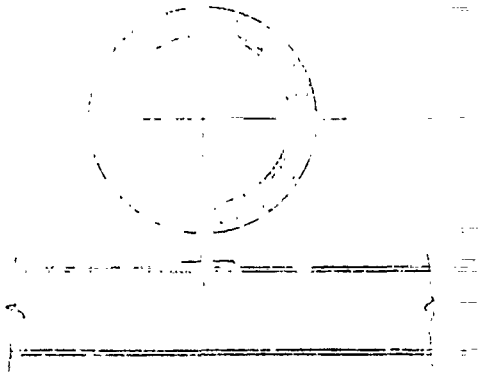

FIGURE 4

6. PIPE – FINISH APPLICATION

6.1 Finish shall consist of a Field Applied 8-Oz. [illegible], Code 704, over Rosin-sized Paper, Code 705.

[illegible] The pipe insulation shall be wrapped with Rosin-sized Paper, Code 705, cut to fit, drawn tight, [illegible] in place with Lacquer's Staples, [illegible] Lightweight Canvas, Code 704, shall be [illegible] the Rosin-sized Paper. The [illegible] that are 2 inches minimum. [illegible] removed as the canvas is [illegible] shall be bonded with Lacquer [illegible] Code [illegible]. The canvas shall be tightly [illegible] free of wrinkles and ragged edges. The [illegible] be located on the top or [illegible] is least visible. See Figure 2.

6.3 [illegible] are located indoors, operating at [illegible] Degrees F. and over, the following pre[illegible] shall be taken to prevent burning of the [illegible] fittings [illegible] shall be located in a line, the bonded canvas applied [illegible]

[illegible] Over [illegible] cemented [illegible]

[illegible] – [illegible]

[illegible] 2 inches [illegible] above procedure is to be [illegible]

FIGURE 5

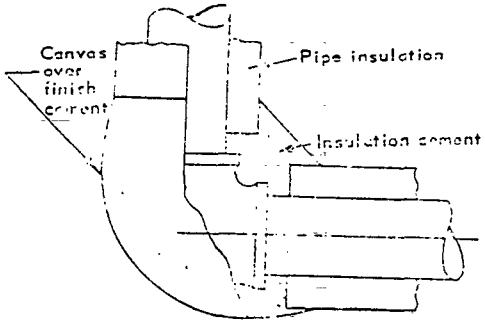

FIGURE 6

7.2 Welded fittings and valves 3 inches and larger shall be insulated with block or pipe insulation at

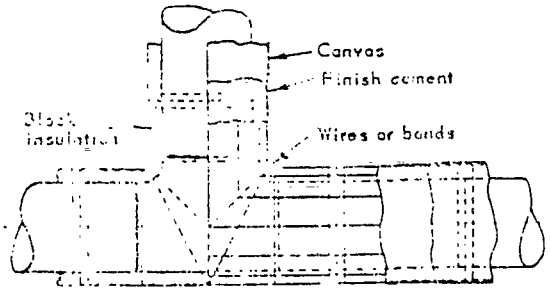

FIGURE 7

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least equal in thickness and in the same number of layers as adjacent pipe insulation. See Figures 7 and 8.

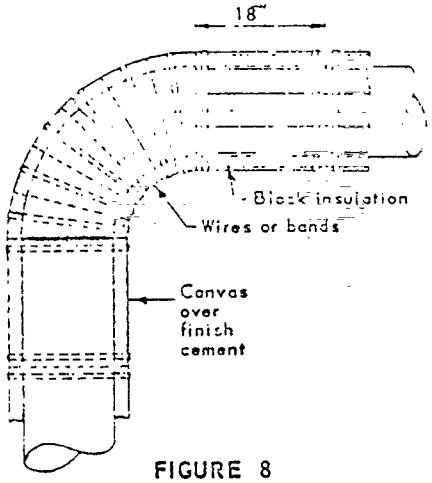

FIGURE 8

7.3 Flanged fittings and flanged valves shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe insulation, 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.

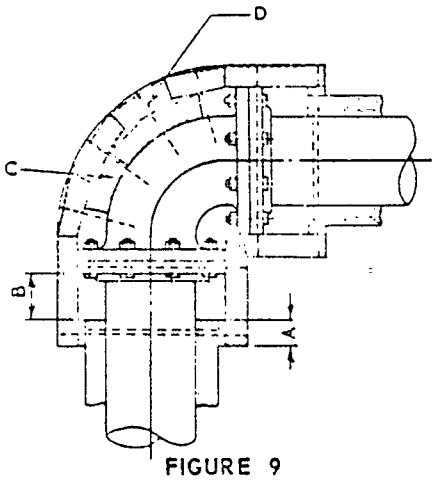

FIGURE 9

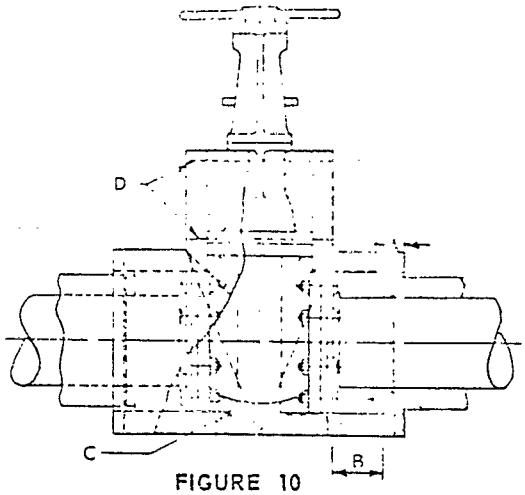

FIGURE 10

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, Code 714, over insulation to reinforce the Finish Cement, Code 712.

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 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.

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, Code 712, reinforced with Poultry Netting, Code 714.

8. FITTINGS – FINISH APPLICATION

8.1 Finish shall consist of a Field-applied 8-Oz. Canvas, Code 704, over the Finish Cement, Code 712, bonded with Lagging Adhesive, Code 802. The canvas should completely cover the fitting smoothly and snugly.

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TABLE 1

WIRES AND BANDS					
Pipe Insulation Diameter (in.)		900 Series	930 Series		
Minimum	Maximum	Stainless Steel	Monel		
–	6¼	921	931		
Over 6¼	12¾	922	932		
13	–	923	936		

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

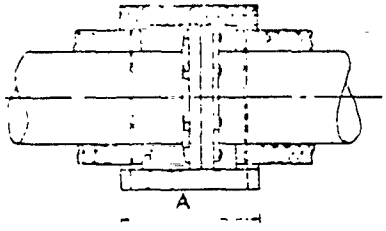

FIGURE 11

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
½	9	3½	9	3¾	12	3¾	12	4¾	12	4¾
¾	9	3⅞	9	4⅝	12	4⅝	12	5⅛	12	5⅛
1	9	4¼	9	4⅞	12	4⅞	12	5⅞	12	5⅞
1¼	9	4⅝	9	5¼	12	5¼	12	6¼	12	6¼
1½	9	5	9	6⅛	12	6⅛	18	7	18	7
2	9	6	9	6½	12	6½	18	8½	18	8½
2½	9	7	12	7½	12	7½	18	9⅝	18	9⅝
3	12	7½	12	8¼	12	8¼	18	9½	18	10½
3½	12	8½	12	9	18	9	-	-	-	-
4	12	9	12	10	18	10¾	18	11½	18	12¼
5	12	10	12	11	18	13	18	13¾	24	14¾
6	12	11	12	12½	18	14	18	15	24	15½
8	12	13½	18	15	18	16½	24	18½	24	19
10	12	16	18	17½	24	20	24	21½	30	23
12	12	19	18	20½	24	22	24	24	36	26½
14 OD	18	21	18	23	24	23¾	24	25¼	36	29½
16 OD	18	23½	18	25½	24	27	24	27¾	36	32½
18 OD	18	25	18	28	24	29¼	30	31	-	-
20 OD	18	27½	18	30½	24	32	30	33¾	-	-
24 OD	18	32	24	36	30	37	36	41	-	-

1. SCOPE

1.1 This Specification covers two layer 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-1 Section of the Standard Engineering Specifications governing.

2.2 Basic Insulation Materials – Molded

Code 101 – 85% Magnesia
and over
Code 103 – Diatomaceous Earth

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.

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.

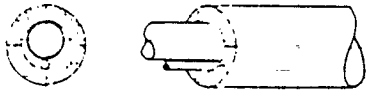

FIGURE 1

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

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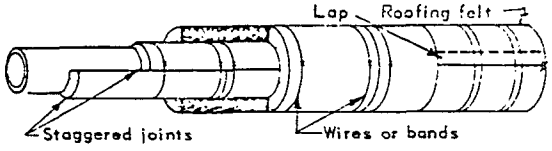
3.3 The first or inner layer of sectional pipe insulation, Code 103, shall be applied with longitudinal joints horizontal whenever possible. The butt joints shall be staggered. The second or outer layer of sectional or segmental insulation, Code 101, shall be applied so that all joints of the first layer are covered by the second layer. See Figure 2. Each layer shall be held firmly in place by wires or bands installed in accordance with paragraph 4.1. All chipped edges, cracks or imperfections shall be filled in and smoothed with Insulation Cement, Code 502 or Code 502.1.

4. WIRES AND BANDS

4.1 Each layer of insulation shall be applied to pipe and secured with wires or bands as specified in Table I. Wires 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 should be located 1 inch from the end of the section. See Figure 2.



Elevation View

FIGURE 2

5. INSULATION AT PIPE HANGERS

5.1 Pipe hangers attached to the pipe shall be insulated. Wherever 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

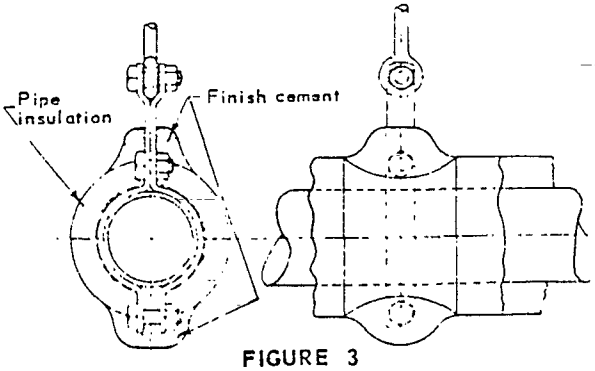


FIGURE 3

*Where Code 502 is specified herein, Code 502.1 can be substituted provided the temperature [illegible] 300°F.

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[illegible] this procedure, the pipe insulation [illegible] with the pipe insulation. See Figures 3 and [illegible] be sealed with Finish Cement, Code 712. [illegible] The pipe hanger is attached directly to the [illegible] should be installed, as shown in Figure 14.

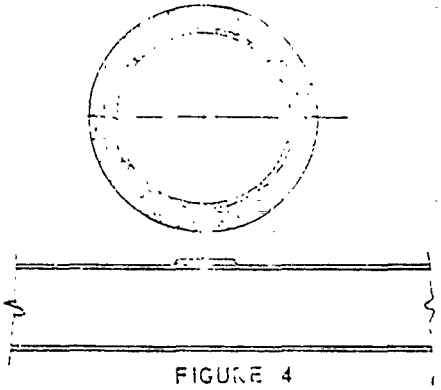

FIGURE 4

6. PIPE – FINISH APPLICATION

1 Finish shall consist of Field-applied 45-pound roofing Felt, Code 701 or Code 702, over insulation, wiring, stapling, or banding.

2 The roofing jacket shall be cut to fit the circumference of the pipe with allowance of at least [illegible] inches for flap. It shall be lapped over the roofing [illegible] it 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 [illegible] Adhesive, Code 801. After the flap has been [illegible] with adhesive, it shall be drawn snugly around the pipe insulation and pressed into place. [illegible] flap may be wired by placing the wire on 4 [illegible] centers along the longitudinal joint of the flap, [illegible] may be stapled by using Gun-type Staples, [illegible] 963. See SN202P. Staples should be placed on [illegible] greater than 2-inch centers. If staples are used, [illegible] Adhesive, Code 801, should be daubed over [illegible]. See Figure 2. Lap Adhesive may be eliminated on inside work in dry areas where appearance is not a factor.

7. FITTINGS – INSULATION APPLICATION

1 Welded fittings and valves of 2 inches or [illegible], and screwed fittings and valves of all sizes shall be insulated with Insulation Cement, Code [illegible] or Code 502.1, to a thickness equal to the adjacent pipe insulation. See Figures 5 and 6.

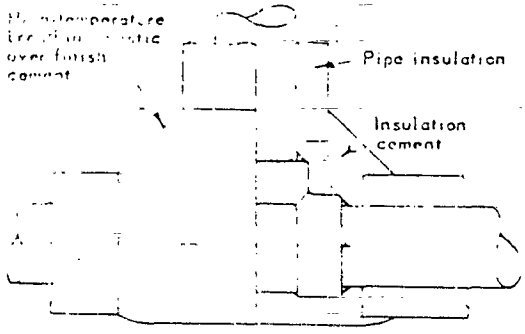

FIGURE 5

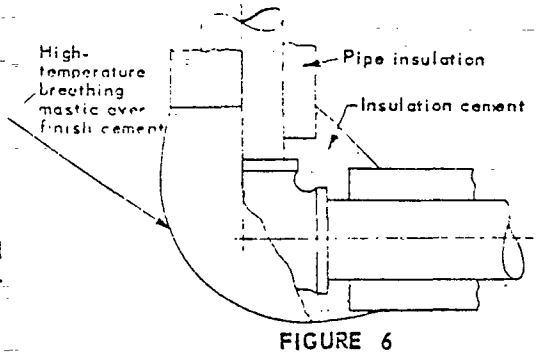

FIGURE 6

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 7 and 8.

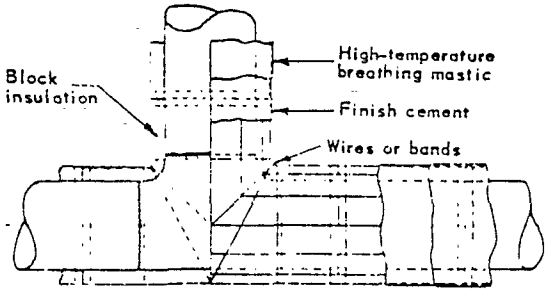

FIGURE 7

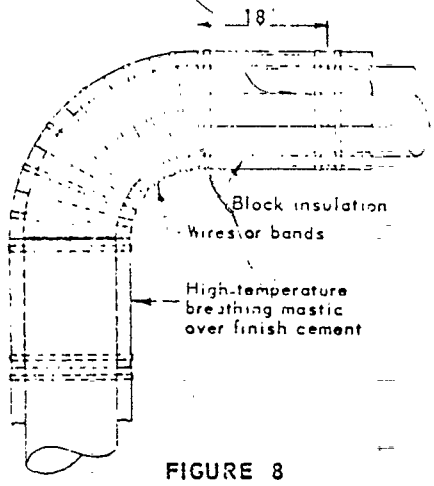

FIGURE 8

7.3 Flanged fittings and flanged valves shall be insulated with block or pipe insulation equal in thickness to the adjacent pipe insulation, 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.

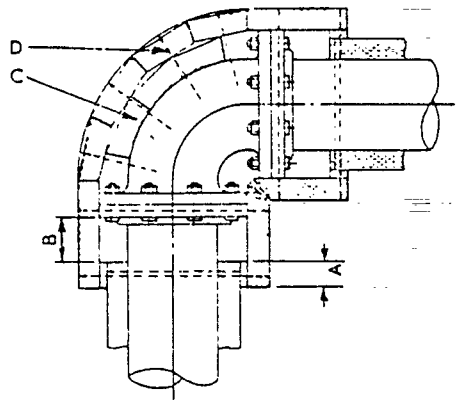

FIGURE 9

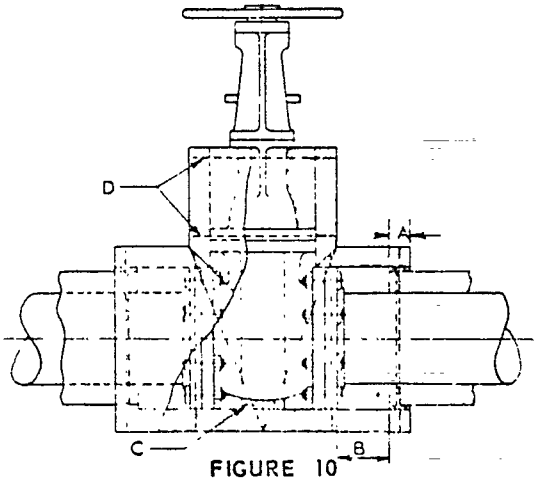

FIGURE 10

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, Code 714, over insulation to reinforce the Finished Cement, Code 712.

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 15 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 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. 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 1/4-inch coating extending over all intersecting surfaces without feathering of edges. See Figures 11, 12, 13, and 14.

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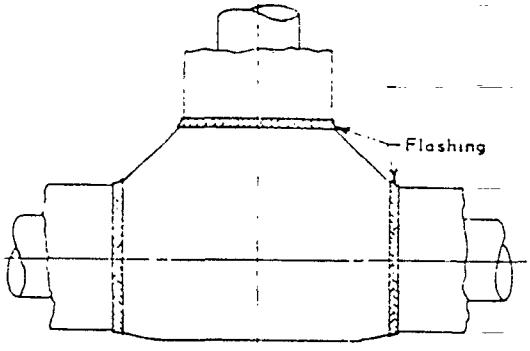

FIGURE 11

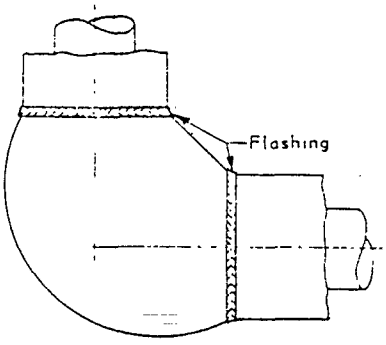

FIGURE 12

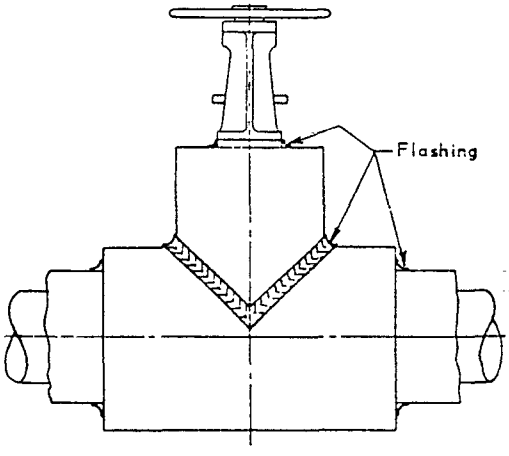

FIGURE 13

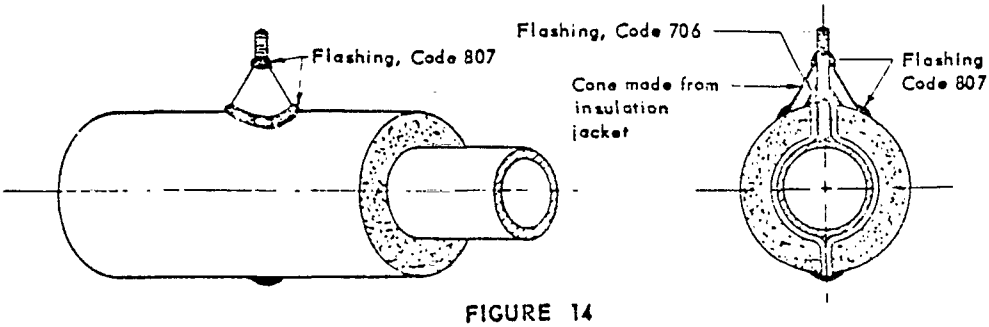

FIGURE 14

TABLE 1

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

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

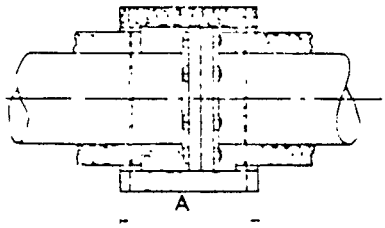

FIGURE 15

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
$\frac{1}{2}$	9	$3\frac{1}{2}$	9	$3\frac{3}{4}$	12	$3\frac{3}{4}$	12	$4\frac{3}{4}$	12	$4\frac{3}{4}$
$\frac{3}{4}$	9	$3\frac{7}{8}$	9	$4\frac{5}{8}$	12	$4\frac{5}{8}$	12	$5\frac{1}{8}$	12	$5\frac{1}{8}$
1	9	$4\frac{1}{4}$	9	$4\frac{7}{8}$	12	$4\frac{7}{8}$	12	$5\frac{7}{8}$	12	$5\frac{7}{8}$
$1\frac{1}{4}$	9	$4\frac{5}{8}$	9	$5\frac{1}{4}$	12	$5\frac{1}{4}$	12	$6\frac{1}{4}$	12	$6\frac{1}{4}$
$1\frac{1}{2}$	9	5	9	$6\frac{1}{8}$	12	$6\frac{1}{8}$	18	7	18	7
2	9	6	9	$6\frac{1}{2}$	12	$6\frac{1}{2}$	18	$8\frac{1}{2}$	18	$8\frac{1}{2}$
$2\frac{1}{2}$	9	7	12	$7\frac{1}{2}$	12	$7\frac{1}{2}$	18	$9\frac{5}{8}$	18	$9\frac{5}{8}$
3	12	$7\frac{1}{2}$	12	$8\frac{1}{4}$	12	$8\frac{1}{4}$	18	$9\frac{1}{2}$	18	$10\frac{1}{2}$
$3\frac{1}{2}$	12	$8\frac{1}{2}$	12	9	18	9	-	-	-	-
4	12	9	12	10	18	$10\frac{3}{4}$	18	$11\frac{1}{2}$	18	$12\frac{1}{4}$
5	12	10	12	11	18	13	18	$13\frac{3}{4}$	24	$14\frac{3}{4}$
6	12	11	12	$12\frac{1}{2}$	18	14	18	15	24	$15\frac{1}{2}$
8	12	$13\frac{1}{2}$	18	15	18	$16\frac{1}{2}$	24	$18\frac{1}{2}$	24	19
10	12	16	18	$17\frac{1}{2}$	24	20	24	$21\frac{1}{2}$	30	23
12	12	19	18	$20\frac{1}{2}$	24	22	24	24	36	$26\frac{1}{2}$
14 OD	18	21	18	23	24	$23\frac{3}{4}$	24	$25\frac{1}{4}$	36	$29\frac{1}{2}$
16 OD	18	$23\frac{1}{2}$	18	$25\frac{1}{2}$	24	27	24	$27\frac{3}{4}$	36	$32\frac{1}{2}$
18 OD	18	25	18	28	24	$29\frac{1}{4}$	30	31	-	-
20 OD	18	$27\frac{1}{2}$	18	$30\frac{1}{2}$	24	32	30	$33\frac{3}{4}$	-	-
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.

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1. SCOPE

[illegible]

2. MATERIALS

[illegible] in accordance with [illegible] Engineering Specifications.

[illegible] Material – Molded*

[illegible]

[illegible] Materials

Code [illegible] – Granulated Cork
Code 709 – Low-temperature Vapor-Barrier Mastic
Code 710 – Glass Cloth
Code [illegible] – [illegible] Compound
Code [illegible] – Seam Filler
Code [illegible] – Water-Resistant Adhesive – Rubber Base – High Viscosity
Code 810 – Water-Resistant Adhesive – Rubber Base – Low Viscosity
Code [illegible] – Water-Resistant Adhesive – Asphalt Base
Code 9[illegible] Series – Stainless Steel Wires and Bands*
Code [illegible] Series – "Monel" Wires and Bands*
Code [illegible] – Spindle Anchors

3. CURVED OR CYLINDRICAL EQUIPMENT – INSULATION APPLICATION

3.1 [illegible] on equipment shall be cut and applied [illegible] with joints tightly butted together. [illegible] insulation 4 inches or less in thickness [illegible] in a single layer except [illegible] thickness will not readily conform to the [illegible] be installed. In such case, more than [illegible] may be necessary. Insulation over [illegible] thickness shall be double-layer construction.

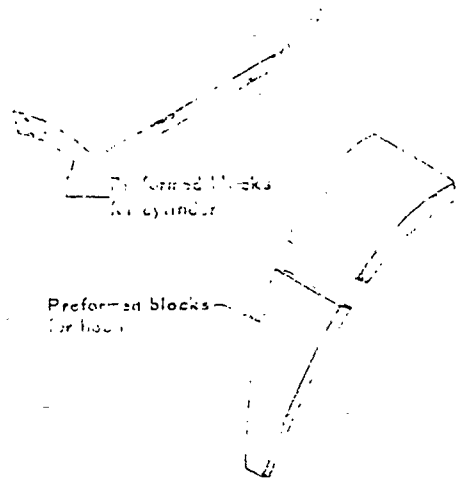

FIGURE 1

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 [illegible], 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. Bands shall be tightened and held with band seals. All chipped edges, cracks, or imperfections shall be smoothed with Seam Filler, Code 808. Over the 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

* Selection specified on project or job specification index. Sizes – See Table I, Bands.

Vendors and merchandise designations are given to describe materials [illegible]

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FIGURE 5

See Figure 1. Granulated Cork, Code 101, shall be used to fill void between the first layer 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 bands fastened to clips or a floating ring. All chipped edges, cracks, or imperfections shall be patched with cement filler, Code 103.

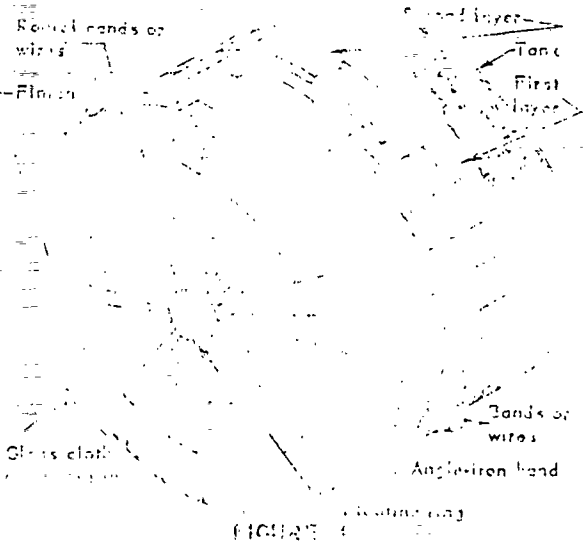

FIGURE 6

DUP 1012072

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[illegible]

[illegible] 12-inch [illegible] or [illegible] of insulation. [illegible] be [illegible] in [illegible] that are locked on the [illegible] either vertical surfaces or horizontal [illegible] the bands shall be spaced [illegible] intervals. [illegible] horizontal surfaces such as [illegible] the bands shall be spaced at 1-foot intervals. [illegible] of insulation of flat surfaces, [illegible] or [illegible] shall be placed under the bands to prevent cutting of insulation. [illegible] chip, [illegible] cracks, or imperfections shall be smoothed with Seam Filled, Code 808. Over the

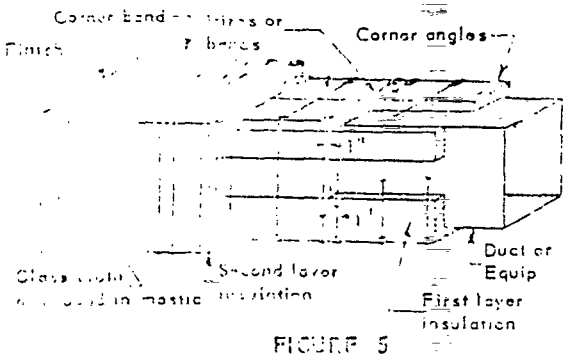

FIGURE 5

[illegible] Glass Cloth, Code 710, [illegible] coat of Low-temperature Vapor Barrier Mastic, Code 709, has been applied [illegible] while it is still tacky, apply [illegible] so that it is drawn tight [illegible] in the Vapor Barrier Mastic, [illegible]. A [illegible] finish coat of Vapor Barrier Mastic, Code 709, shall be applied over the Glass [illegible] with [illegible] 3 [illegible]

[illegible] in [illegible]

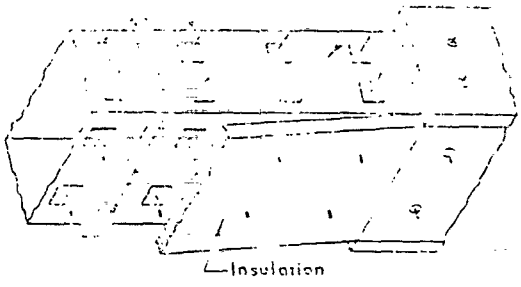

FIGURE 6

5. FINISH

5.1 Finish shall consist of one coat, totaling 3/16 inch, sprayed or hand applied Low-temperature Vapor Barrier Mastic, Code 709, to provide a uniform protective coating of 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 [illegible] Compound, Code [illegible], shall be applied at all possible sources of moisture penetration such as the intersections of insulation at piers, [illegible] walls, valve bonnets, supports, hangers, [illegible] other parts protruding through the [illegible] first [illegible]. Prior to applying flashing, 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 [illegible] [illegible] surfaces [illegible] for fastening of valves. See [illegible]

DUP 1012073

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DU 053368

1. SCOPE

1.1 This Specification covers application of Molded Block Insulation, Code 71.12 A, plus 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
and over
Code 103 – Diatomaceous Earth

2.3 Basic Insulation Materials – Fluid and Plastic

Code 502 – Insulation Cement

2.4 Accessory Materials

Code 706 – High Temperature Breathing Mastic
Code 707 – Insulation Primer Paint
Code 714 – Poultry Netting
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 965 – Hardware Cloth

3. CURVED OR CYLINDRICAL EQUIPMENT – INSULATION APPLICATION

3.1 Insulation on equipment shall be applied snugly with joints butted together. Two layers are required: the first, Code 103, and the second, Code 101.

3.2 The first or inner layer of curved block, or segmental block insulation, Code 103, 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, Code 101, 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, [illegible] imperfections shall be filled and smoothed with Insulation Cement, Code 502. Over the insulation and bands apply Poultry Netting, Code 714, drawn tight and fastened into place. See Figure 1.

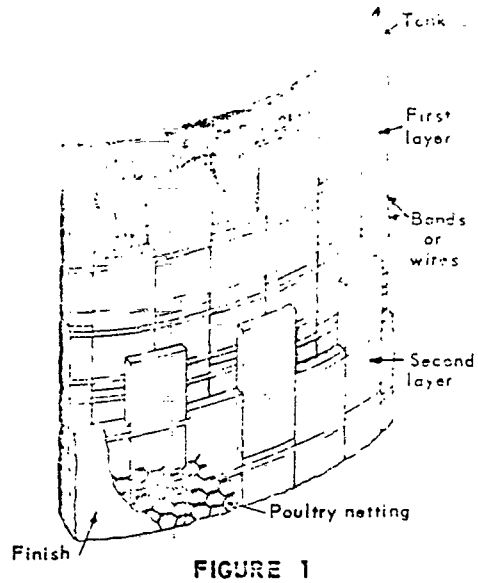

FIGURE 1

3.3 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 tank behind

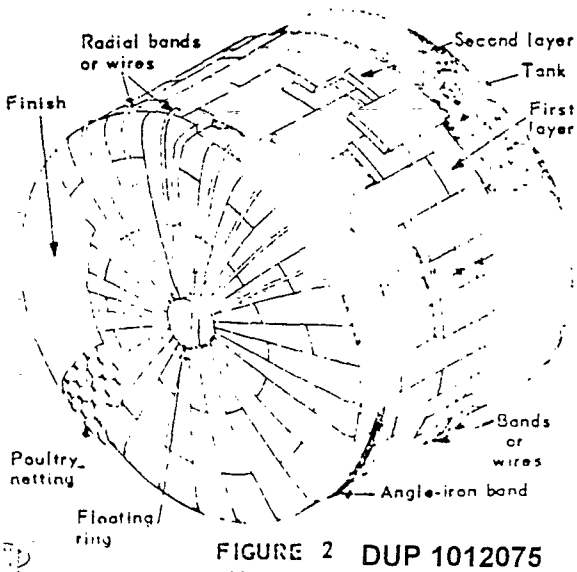

FIGURE 2

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

[illegible]

[illegible]

[illegible] – Low-Temperature Vapor Barrier Mastic

[illegible] – Water Resistant Adhesive – Rubber Base – [illegible] Viscosity

Code 810 – Water Resistant Adhesive – Rubber Base – Low Viscosity

Code 811 – Water Resistant Adhesive – Asphalt Base

Code 820 Series – Stainless Steel Wires and Bands*

Code 830 Series – "Monel" Wires and Bands*

Code 954 – Spindle Anchors

3. CURVED OR CYLINDRICAL EQUIPMENT – INSULATION APPLICATION

3.1 Insulation on equipment shall be cut and applied snugly 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 [illegible]

3.2 Single-Layer Construction. The insulation shall [illegible] segmented blocks [illegible] and lateral joints [illegible] be coated with an [illegible] with the insulation [illegible] Granulated Cork Code 101 [illegible] specification index [illegible]

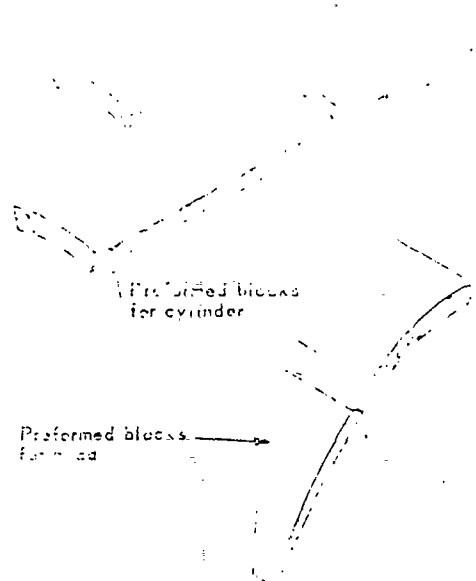

FIGURE 1

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. Bands shall be tightened and held with band seals. All chipped edges, cracks or imperfections shall be smoothed with Seam Filler, Code 800. See Figure 2.

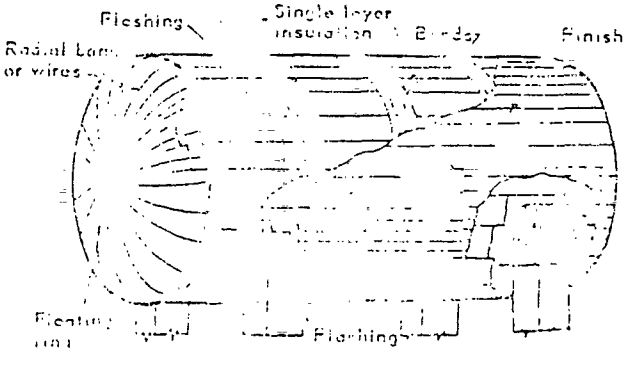

FIGURE 2

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[illegible] the application.

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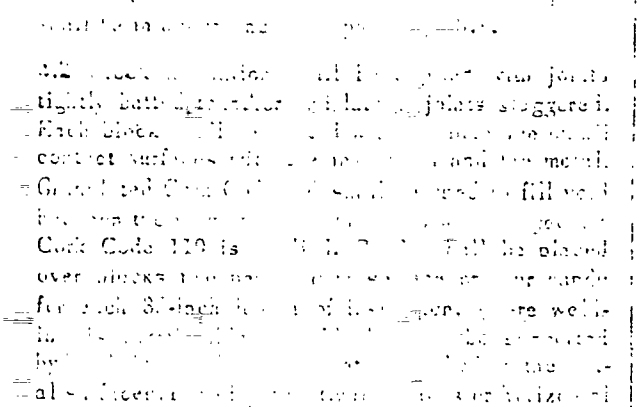

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