GENERAL ELECTRIC

REP

DEV NO.	TITLE	233A9932
233A9932	GENERAL SPECIFICATIONS FOR REMOVABLE INSULATED COVERS	CONT ON SHEET 1 SH NO. A-1
CONT ON SHEET 1 SH NO. A-1	FIRST MADE FOR LARGE STEAM TURBINE	

REVISIONS

PLAINTIFF'S EXHIBIT
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1.0 INTRODUCTION

This specification applies to removable insulated covers for main and reheat flanges, all main and reheat valve heads, crossover flanges, hinge covers, crossunders and crossarounds where required by design.

The covers are to be made in accordance with the drawing list as furnished for each turbine unit and the following specifications.

Use of material other than specified must be referred to the Schenectady Turbine-Generator Marketing Operation for approval through usual District Office procedures.

2.0 DRAWING LIST AND QUOTATIONS

A list of all insulated covers and quantities required, as provided for each turbine unit, will reference individual cover construction drawings, each showing all necessary information required to fabricate and insulate the removable insulated covers. The drawings will be issued to the District Office or IGE (or its representatives) who have the responsibility for purchasing the covers through Vendor Quotations.

3.0 TYPES OF COVER INSULATING MATERIALS

3.1 PLASTIC INSULATION - TYPE A

3.1.1 DESCRIPTION

This is a mineral wool base material listed by various manufacturers as suitable up to 1800°F. The mineral wool is combined with clay or other inorganic binders and rust inhibitors to give it the required plasticity when mixed with water and good adhesive qualities to itself and metal surfaces. It is not a hydraulic setting type cement and hence can be reused by breaking up the hardened material and mixing with water.

The following makes of insulation are of this type:

Baldwin-Ehret - Hill #1 Plus
Eagle-Picher Super "66" Cement
Forty-Eight Insulation, Inc., "48" Cement
Johns-Manville #450 Cement

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3.2 BLOCK - TYPE D

3.2.1 DESCRIPTION
This is a pre-formed calcium-silicate base material in flat or curved block form or a material of comparable or higher quality.

The following makes of insulation are of this type:

Baldwin-Ehret - Hill Inc. "Thermasil" Block
Eagle-Picher "PV" Supertemp Block
Johns-Manville "Thermobestos"
Owens Corning "Kaylo"
Pittsburgh Corning "Unibestos"

3.3 BLANKET INSULATION

3.3.1 DESCRIPTION
These are high temperature blanket pads which contain a filler composed of one (1) or more layers of a spun refractory fiber of approximately eight (8) pounds density, made to conform to the inner contour of the cover.

The following makes of insulation are of this type:

Babcock & Wilcox Co. "Kaowool"
Eagle-Picher Co. Style 100 Blanket
Eastern Refractories, Inc. "Erco-Mat-1300"
Johns-Manville Co. "Cerafelt" Type MC
Pittsburgh-Corning Co. "Temp-Mat"
Union Asbestos & Rubber Co. "Unarco" & "Unimat"

4.0 COVER CONSTRUCTION

4.1 MATERIALS
All insulated covers will be constructed of #16, #20 or #22 gage stainless steel type 302, 304, or 430 with one exception, the exception applying to parting flange covers for crossover pipes. These may be carbon steel due to the lower temperatures involved. The drawings will specify when and where such material may be used. The thickness of material will depend on the size and location of the turbine unit. The cover construction drawings will state the material thickness for each cover.

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4.1.1 INSULATING MATERIALS

Plastic insulating cement Type A (3.1) may be used where specified on the drawings and special requirements are met.

Type D block (3.2) may be used. Where block is used, space limitations as shown on the cover drawings must be adhered to. The blocks are to be carefully mitered without gaps, curved to the cover inner diameter and cemented to the inner surface which has been coated with type A cement. The use of studs and stud welder or expanded metal lath is also permitted for holding the blocks to the inside of the covers. A suitable holding barrier of Johns-Manville "Marinite" or equivalent is permitted.

Blanket insulation (3.3) may be used. Methods of holding will be as recommended for block type insulation with the stud and speed washer method preferred.

The fabrication drawings will specify the recommended material based on design conditions and the Purchaser's preferences.

4.1.2 DISCUSSION

The cover dimensions as stated on each drawing are to be adhered to within a tolerance of + one eighth (1/8") inches to assure proper assembly to each turbine component.

Cover parts are to be joined by a one eighth (1/8") continuous fillet weld, provided the weld is not exposed to view. Pittsburgh seams may also be used.

Covers may be split into several sections to facilitate assembly and removal. They will be braced as necessary for sturdy construction with no bracing or anchors protruding through the insulation to any hot surface. Lifting devices will be provided and will be covered by inserts of insulating material.

When covers are split to accommodate removable pipes or valve linkage, the split must be faced on both sides with the same material as the cover.

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4.1.2 DISCUSSIONS (CONTINUED)

For each valve cover, when required by design, a one piece or split cover support ring will be made according to a drawing supplied with the turbine cover drawing package.

The allowable cover surface temperature will not exceed 135°F at an ambient of 80°F under turbine operating conditions of 100%.

A typical cross section of cover construction is shown on sheet 5.

5.0 SHIPMENT

Covers manufactured for foreign shipment are to be packaged in triwall cartons securely bound with wire straps. Shipping instructions will be provided by I.G.E. or its representatives.

Covers for domestic units will be packaged and shipped according to instructions provided by the District Office.

GENERAL ELECTRIC

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CONT ON SHEET FINAL SH NO. 5

REV NO. 0

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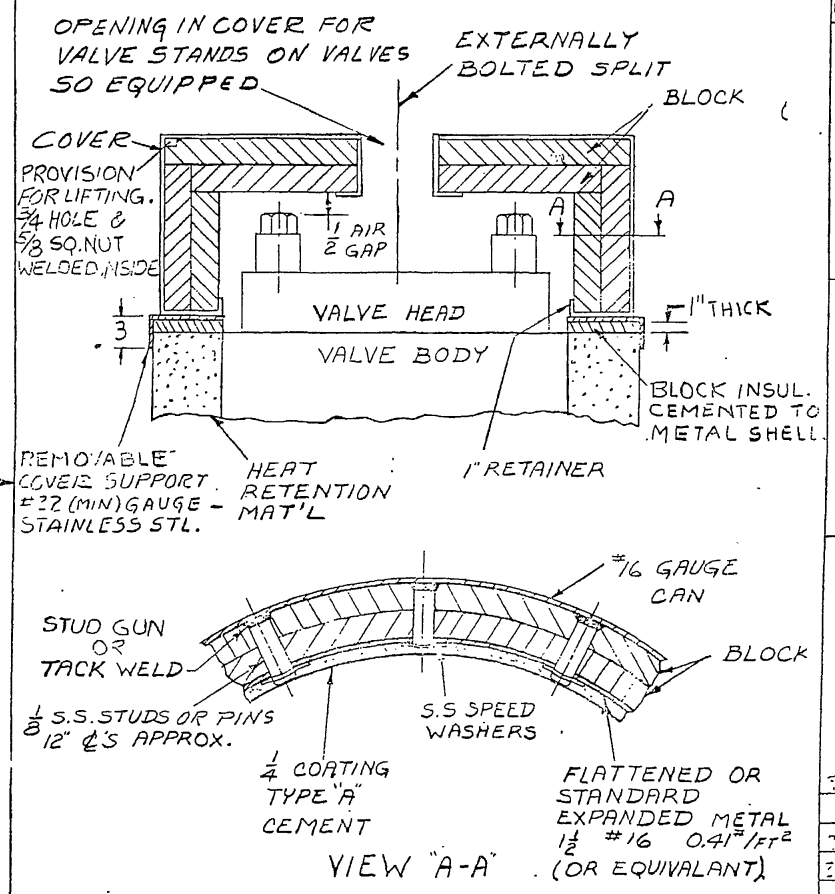
TITLE HEAT RETENTION-MAT'L. GENERAL SPECIFICATIONS

FIRST MADE FOR ST. TB. MPL D5 G30

REVISIONS



TYPICAL REMOVABLE & REUSABLE COVER

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REV NO.

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TITLE

GENERAL SPECIFICATIONS
FOR HEAT RETENTION MATERIAL

FIRST MADE FOR LARGE STEAM TURBINE

REP

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CHANGES MADE TO THESE SHTS. MUST ALSO BE MADE TO DESIGN DATA PGS 172.02

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233A9930

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TITLE GENERAL SPECIFICATIONS FOR HEAT RETENTION MATERIAL

FIRST MADE FOR LARGE STEAM TURBINE REP

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1.0 INSTRUCTION

Heat retention material to be used on large steam turbine units shall be in accordance with the heat retention material drawing list made for each turbine unit and the following general specifications.

Use of material other than that specified must be referred to the Schenectady Turbine-Generator Marketing Operation for approval through usual District Office Procedures.

2.0 HEAT RETENTION MATERIAL DRAWING LIST

A heat retention material drawing list giving all drawings and specifications will be made for each turbine unit showing all parts to be insulated. Individual drawings will be made for such parts as high pressure shell, stop valve, etc. In the left column on this list is the total number of components which make up the complete turbine unit.

The drawings are issued to the G.E. District Office or to I.G.E by the Turbine Requisition Section through the Product Service Section.

The following is a typical heat retention material drawing list:

	QTY.	DESCRIPTION	DRAWING
Item 1		Removable Insulated Covers per Spec	233A9932
	1	Covers	000L000
Item 2		Removable Shell Joint Blankets per Spec	233A9931
A	1	High Pressure Shell, drawing ref.	Item 3A
Item 3		Heat Retention Material per Spec	233A9930
A	1	High Pressure Shell	000E000
B	1	Bypass Control Valve (Nuclear Only)	000B000
C	1	Control Valve Chest and M.S.V.	000D000
D	4	Combined Reheat Valve	000C000
E	4	Relief Valve	000A000
F	4	Moisture Separator/Reheater (Nuclear Only)	000B000
L	1	Pipes - Reducers	000A000
M	1	Pipes - Misc. Steam	000A000
P	2	Drain Tank (Nuclear Only)	000A000
R	1	Steam Seal Regulator	000A000
S	1	Steam Packing Exhauster	000A000
Note 1:		Drawing aids and component location	
A		Arrangement of Steam Pipes and Valves	000E000
B		Forward End Piping	000E000
C		Steam Seal Piping	000E000
D		Control Leakoff Piping	000E000
E		Installation of Manway Covers	000C000

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CONT ON SHEET 2 SH NO. 1

2.1 INSULATION THICKNESSES AND TEMPERATURES

The drawings will give the hot surface temperature of all areas to be insulated. Sufficient dimensions will be given so that the vendor can calculate the quantity of material required based on the cold surface temperatures as specified in 4.1.2, 4.2.2, 4.3.2, 4.4.2 and 6.1.2 and quote on this amount. The thermal conductivity (K factor) of materials quoted must be low enough to meet the specified cold surface temperature without exceeding the maximum thickness specified since these thicknesses are used in design to provide sufficient clearance around power plant equipment and turbine metal lagging.

2.2 MATERIALS

In cases where materials other than standard, as given in 1.0 INTRODUCTION of these general specifications are to be used, the drawings will specifically note the exceptions.

Use of other materials should be approved as noted in Section 1.0.

2.3 HORIZONTAL AND VERTICAL SHELL JOINT FLANGES

In general, all joint insulation is to be fabricated in such a fashion that it may be reused with minimum labor.

Bolting nuts are to be protected from insulation compounds to facilitate ease in dissassembly.

When the insulation is to be different from that used on the shell body, the drawing list will specify the General Specification For Removable Shell Joint Insulation.

2.4 REMOVABLE COVERS FOR VALVE HEADS AND PIPE FLANGES

The drawings will specify where removable covers as described in 5.2 are required. The covers are to be supplied by the District Office or IGE (or its representatives). Other flange areas where removable covers are not indicated are judged to require such infrequent dis-assembly that use of special removable insulation is not justified.

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CONT ON SHEET 4 SH NO. 3

TITLE GENERAL SPECIFICATIONS FOR HEAT RETENTION MATERIAL

FIRST MADE FOR LARGE STEAM TURBINE

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3.0 QUOTATIONS

The vendor submitting a quotation for heat retention material should calculate the quantities including an allowance for waste, cutting etc. in accordance with standard practice. Ten percent (10%) additional is usually supplies.

The quotation will follow a format which lists separately the component(s) and its drawing number, the quantities and unit price of all the materials in square feet, thickness, linear feet, weight, gallons, etc., required to complete the installation and the total price.

The vendor quotation should be of sufficient detail to allow those responsible for installation to readily identify the material for each individual drawing and the amounts to be applied.

The purchase of heat retention materials as specified on the drawings for all domestic units is the responsibility of the District Office and for all foreign units, the responsibility of I.G.E. (or its representatives).

3.1 QUOTATION FORMAT

The following is the format for a typical vendor quotation:

Removable Shell Joint Blankets - Material only Area 400 sq. ft.		Not Fabricated	Unit Price	Total
1020 sq. ft.	1" Blanket	@	0000	0000
200 sq. ft.	1/2" Blanket			
130 sq. yds.	5350 Asbestos Cloth			
350	4" Hooks			
500	2-1/2" Hooks			
15	Hog Rings			
850	Washers			
50	Tags			
15 lbs.	Stainless Steel Wire			
				0000

High Pressure Shell - Drawing 000E000				
70 bags	Type A Cement	@	0000	0000
450 sq. ft.	Galvanized Wire Mesh			
10 lbs.	Stainless Steel Wire			
400	2" Studs			
1 roll	50 lbs. Asbestos Paper			
				0000

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3.1 QUOTATION FORMAT (CONTINUED)

		Unit Price	Total
By-Pass Control Valve Casing - Drawing 000B000			
21 sq. ft.	3" Calcium Silicate Block @	0000	0000
20 sq. ft.	Stainless Steel 1" Mesh		
1 bag	Type K Cement		
3 sq. yds.	C-2225 Asbestos Cloth		
			0000
Control Valve Chest and M.S.V. Assembly - Drawing C00B-C00			
560 sq. ft.	3" Calcium Silicate Block @	0000	0000
600 sq. ft.	1" Stainless Steel Mesh		
10 lbs.	Stainless Steel Wire		
20 bags	Type A Cement		
80 sq. ft.	C-2225 Asbestos Cloth		
5 gals.	Type G Adhesive		
400	2-1/2" Studs		
			0000
Four (4) Combined Reheat Valves - Drawing 0000C00			
560 sq. ft.	2-1/2" Calcium Silicate Block @	0000	0000
600 sq. ft.	1" Stainless Steel Mesh		
10 lbs.	Stainless Steel Wire		
20 bags	Type K Cement		
80 sq. yds.	C-2225 Asbestos Cloth		
5 gals.	Type G Adhesive		
400	2" Studs		
			0000
Four (4) Relief Valves - Drawing C00A000			
96 sq. ft.	2-1/2" Calcium Silicate Block @	0000	0000
96 sq. ft.	1" Stainless Steel Wire Mesh		
2 lbs.	Stainless Steel Wire		
3 bags	Type K Cement		
12 sq. yds.	C-2225 Asbestos Cloth		
1 gal.	Type G Adhesive		
			0000

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3.1 QUOTATION FORMAT (CONTINUED)

			Unit Price	Total
Four (4) Moisture Separators - Drawing 000B0000				
3240	sq. ft.	2-1/2" Calcium Silicate Block @	0000	0000
3400	sq. ft.	1" Galvanized Wire Mesh		
80	bags	Type A Cement		
25	bags	Type K Cement		
400	sq. yds	C-2225 Asbestos Cloth		
15	gals.	Type G Adhesive		
1200		3" Graham Pins		
1200		Split Washers		
50	lbs.	No. 16 Iron Wire		
				0000
Calcium Silicate Pipe Covering - Drawing 000AC00				
126	ft.	3/4" X 1" thick @	0000	0000
42	ft.	1" X 1"		
33	ft.	3" X 1"		
33	ft.	3-1/2" X 1"		
66	ft.	1/2" X 1-1/2" thick		
492	ft.	1" X 1-1/2"		
255	ft.	1-1/2" X 1-1/2"		
216	ft.	2" X 1-1/2"		
69	ft.	2-1/2" X 1-1/2"		
42	ft.	3" X 1-1/2"		
45	ft.	4" X 1-1/2"		
207	ft.	5" X 1-1/2"		
204	ft.	6" X 1-1/2"		
117	ft.	8" X 1-1/2"		
138	ft.	10" X 1-1/2"		
63	ft.	12" X 1-1/2"		
96	ft.	16" X 1-1/2"		
534	ft.	1" X 2"		
36	ft.	2" X 2"		
108	ft.	3" X 2"		
81	ft.	5" X 2-1/2"		
357	ft.	18" X 3"		
				0000
ental Block for Large Diameter Piping				
		30" X 2-1/2" @	0000	0000
		36" X 2-1/2"		0000

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3.1 QUOTATION FORMAT (CONTINUED)

Pipe Covering Accessories		Unit Price	Total
420 gals.	Type G Adhesive @	0000	0000
2000 sq. yds.	C-2225 Asbestos Cloth		
200 lbs.	No. 16 Iron Wire		
200 bags	Type A Cement		
50 bags	Type K Cement		
			0000

One (1) Pipe Reducer - Drawing 000A000		Unit Price	Total
24 sq. ft.	3" Calcium Silicate Block @	0000	0000
24 sq. ft.	1" Stainless Steel Mesh		
1 lbs.	Stainless Steel Wire		
1 bag	Type K Cement		
3 sq. yds.	C-2225 Asbestos Cloth		
			0000

Two (2) Drain Tanks - Drawing 000A000			
180 sq. ft.	2-1/2" Calcium Silicate Block @	0000	0000
180 sq. ft.	1" Galvanized Wire Mesh		
4 lbs.	Stainless Steel Wire		
6 bags	Type K Cement		
24 sq. yds.	C-2225 Asbestos Cloth		
80	3" Graham pins		
80	Split Washers		
			0000

One (1) Steam Seal Regulator - Drawing 000A000			
20 sq. ft.	3" Calcium Silicate Block @	0000	0000
20 sq. ft.	1" Stainless Steel Mesh		
1 bag	Type K Cement		
3 sq. yds.	C-2225 Asbestos Cloth		
			0000

One (1) Steam Pack Exhauster - Drawing 000A000			
12 ft.	20" X 1-1/2" Cal Sil @	0000	0000
3 ft.	16" X 1-1/2" Cal Sil		
10 sq. yds.	C-2225 Asbestos Cloth		
1 gal.	Type G Adhesive		
1 bag	Asbestos Cement		
2 lbs.	No. 16 Iron Wire		
			0000

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3.1 QUOTATION FORMAT (CONTINUED)

Weights of Materials	lbs
Blanket Material	0000
1" Galvanized Mesh	
Stainless Steel Wire Mesh	
No. 16 Iron Wire	
Asbestos Paper	
Graham Pins and Washers	
1/2" Studs.	
C-2225 Asbestos Cloth	
Asbestos Cement	
Type A Cement	
Type K Cement	
Type G Adhesives	
Calcium Silicate	0000

4.0 TYPES OF INSULATING MATERIALS USED ON TURBINE SHELL AND VALVE BODIES

4.1 PLASTIC INSULATION - TYPE A

4.1.1 DESCRIPTION

This is a mineral wool base material listed by various manufacturers as suitable up to 1800°F. The mineral wool is combined with clay or other inorganic binders and rust inhibitors to give it the required plasticity when mixed with water and good adhesive qualities to itself and metal surfaces. It is not a hydraulic setting type cement and hence can be reused by breaking up the hardened material and mixing with water.

The following makes of insulation are of this type:

Baldwin-Ehret-Hill #1 Plus
Eagle-Picher Super "66" Cement
Forty-Eight Insulation, Inc., "48" Cement
Johns-Manville #450 Cement

4.1.2 THICKNESSES OF PLASTIC INSULATING CEMENT - TYPE A

Steam Temp °F.	Max. Cold Surface Temp. With 80° Ambient	Max. Insulation Thickness
Below 250	100	2
250 - 349	110	2 1/2
350 - 449	115	3 1/2
450 - 549	120	4
550 - 649	125	5
650 - 749	125	6
750 - 849	130	6
850 - 949	135	6 1/2
950 - 1049	135	7
1050 - 1149	140	8
1150 - 1250	145	9

Note 1: Applied in layers approximately 2" thick.

Note 2: Additional 1/2" thickness of plastic insulating cement to be used on areas exposed to the weather on outdoor installations.

Note 3: Equipment not covered by metal lagging such as stop valve casings will have additional 1/2" of finishing cement type E (4.5) over the plastic.

Note 4: Maximum insulation thickness is used for design purposes. The thickness can be less than stated here provided that the maximum cold surface temperature as stated is maintained.

4.2 SPRAYED ASBESTOS - TYPE C

4.2.1 DESCRIPTION

This is a dry blend of mineral wool fibers, asbestos fibers and inorganic binders pneumatically applied with water added at the spray nozzle. This type of insulation can be sprayed on to any desired thickness without seams or joints. It is used preferably on large diameter equipment of sixteen (16) inch outer diameter or greater and flat surfaces.

The following makes of insulation are of this type:

Armstrong Contracting and Supply Corp. - "Armaspray"
Asbestospray Corp. - Asbestospray
Babcock and Wilcox 1350 Spray Mix
Baldwin-Ehret-Hill Inc. - "Mono-Spray"
United States Mineral Products Co. - "Cafco Power Shield"

4.2.2 THICKNESSES OF SPRAYED ASBESTOS - TYPE C

Same as 4.1.1.

4.3 BLOCK - TYPE D

4.3.1 DESCRIPTION

This is a pre-formed calcium-silicate base material in flat or curved block form or a material of comparable or higher quality.

The following makes of insulation are of this type:

Baldwin-Ehret - Hill Inc. "Thermasil" Block
Eagle-Picher "PV" Supertemp Block
Johns-Manville "Thermobestos"
Owens Corning "Kaylo"
Pittsburgh Corning "Unibestos"

4.3.2 THICKNESSES OF INSULATING BLOCK (CALCIUM SILICATE) TYPE 5

(EQUIPMENT WITH DIAMETER OF 16" OR GREATER)

Steam Temp. °F	Max. Cold Surface Temp. with 80° Ambient	Max. Insulation Thickness
Below 250°	100	1 1/2
250 - 349	110	2
350 - 449	115	2 1/2
450 - 549	120	3
550 - 649	125	3 1/2
650 - 749	125	3 1/2
750 - 849	130	4
850 - 949	130	4 1/2
950 - 1049	135	4 1/2
1050 - 1149	140	5
1150 - 1200	140	5 1/2

Note 1: Single layer below 550° steam temp. For 550° and above use double layer with staggered joints. Layers to be of approx. equal thickness.

Note 2: Additional thickness of 1/2" to be used on areas exposed to the weather on outdoor installations.

Note 3: Equipment not covered by metal lagging such as stop valves, will have an additional layer 1/2" thick of finishing cement type E (4.5) over the insulation.

Note 4: Maximum insulation thickness is used for design purposes. The thickness can be less than stated here provided that the maximum cold surface temperature as stated is maintained.

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4.4 BLOCK AND PLASTIC COMBINATION

4.4.1 DESCRIPTION
See 4.3.1 and 4.1.1.

4.4.2 THICKNESSES OF BLOCK AND PLASTIC COMBINATION
Same as 4.1.2.

4.5 FINISHING CEMENT - TYPE E

4.5.1 DESCRIPTION
This material is composed of asbestos shorts and binders. It is a non-hydraulic setting cement used as a finishing coat (approx. 1/2" thick) over insulating cement to achieve a relatively smooth surface which can be covered with asbestos cloth. Eagle-Picher #20 and Johns-Manville #352 are of this type.

4.6 ASBESTOS CLOTH - TYPE F

4.6.1 DESCRIPTION
This cloth shall be used as an outer covering for insulated piping, valve bodies, etc. It is an 80% commercial grade as described in Federal Specifications SS-C-466A "Cloth, Thread and Tape Asbestos" as Type 1, Grade A, Class 1 (2.23 #/sq.yd).

4.7 ADHESIVES - TYPE G

4.7.1 DESCRIPTION
These are used to attach asbestos cloth or canvas to insulation materials. Adhesives are preferable to sewing because of their ability to shrink the cloth tightly over the insulation.

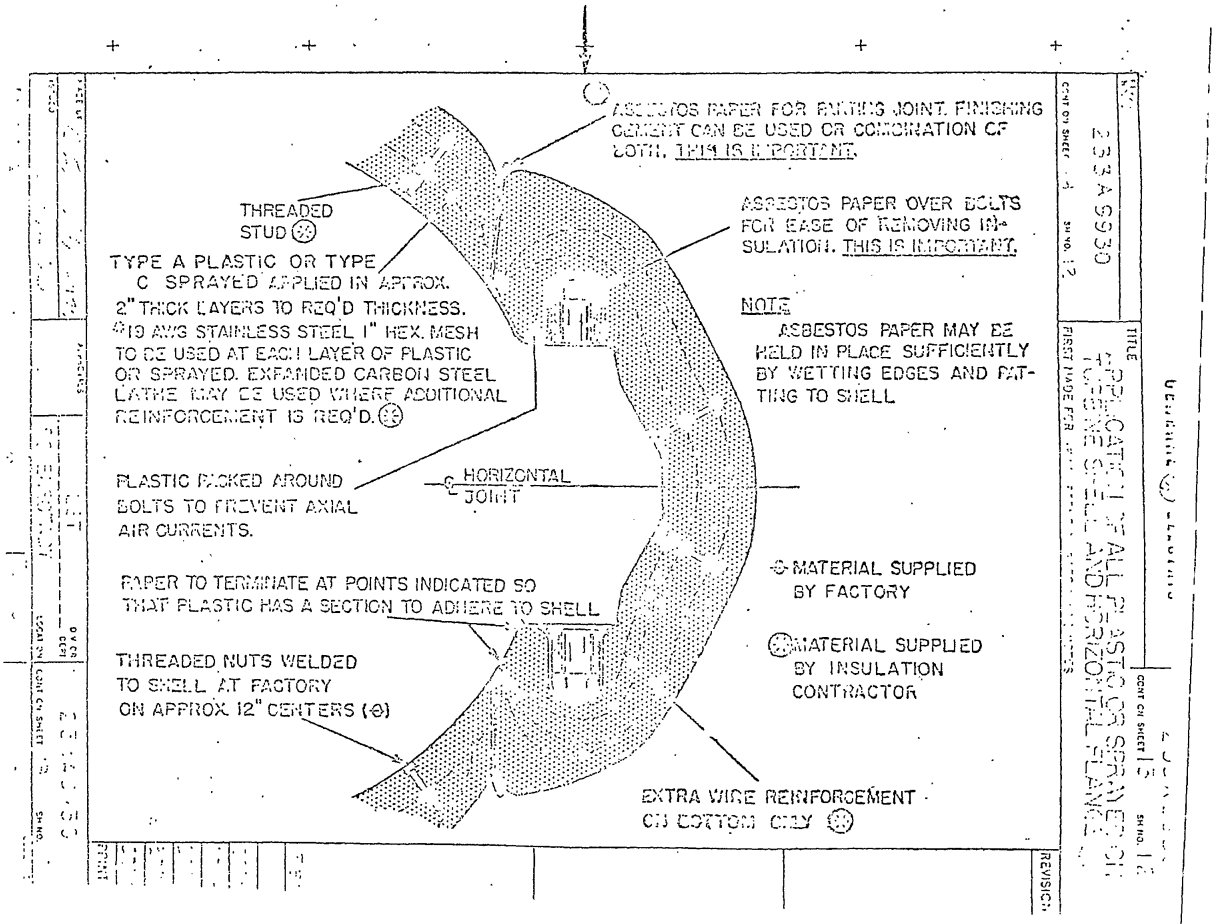
The following products are suitable:

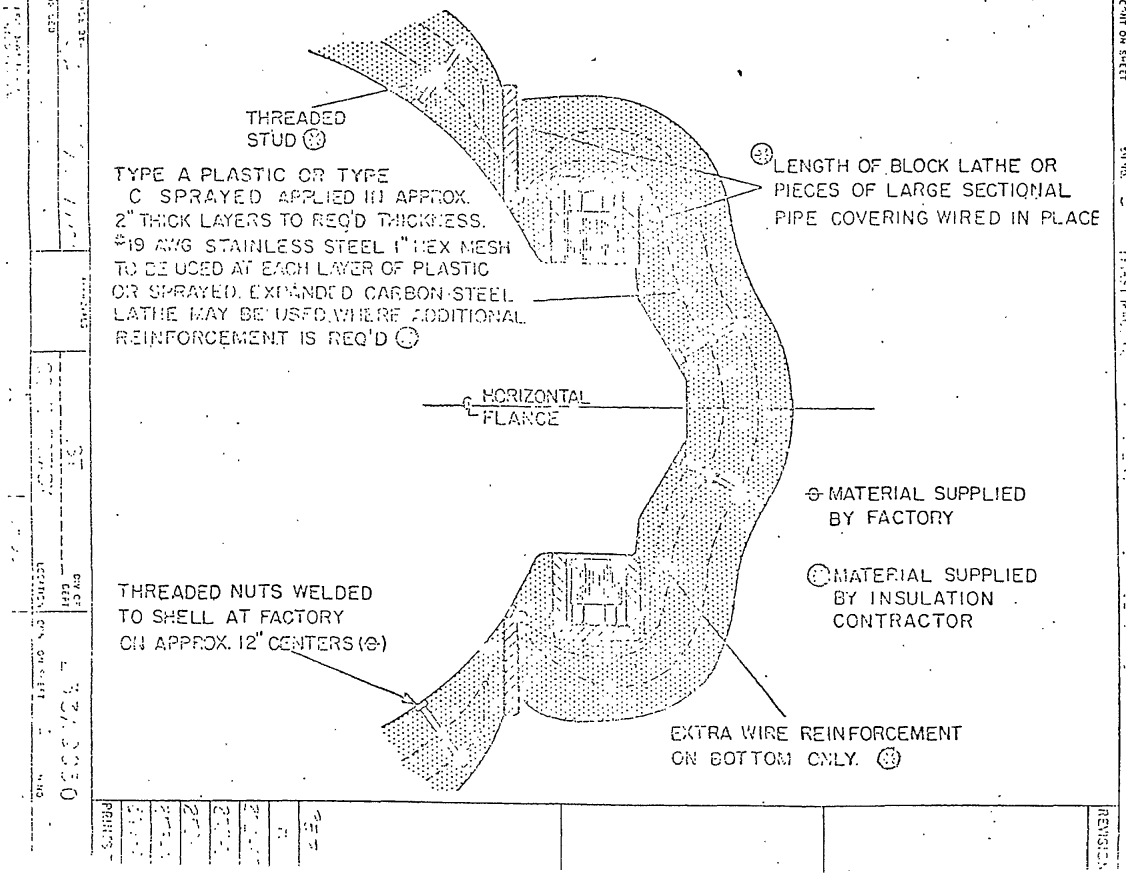
Arabol Mfg. Co. Arabol Lagging Adhesives
Benjamin Foster Co. No. 30-36 Sealfas
Benjamin Foster Co. No. 81-42W Lagfas

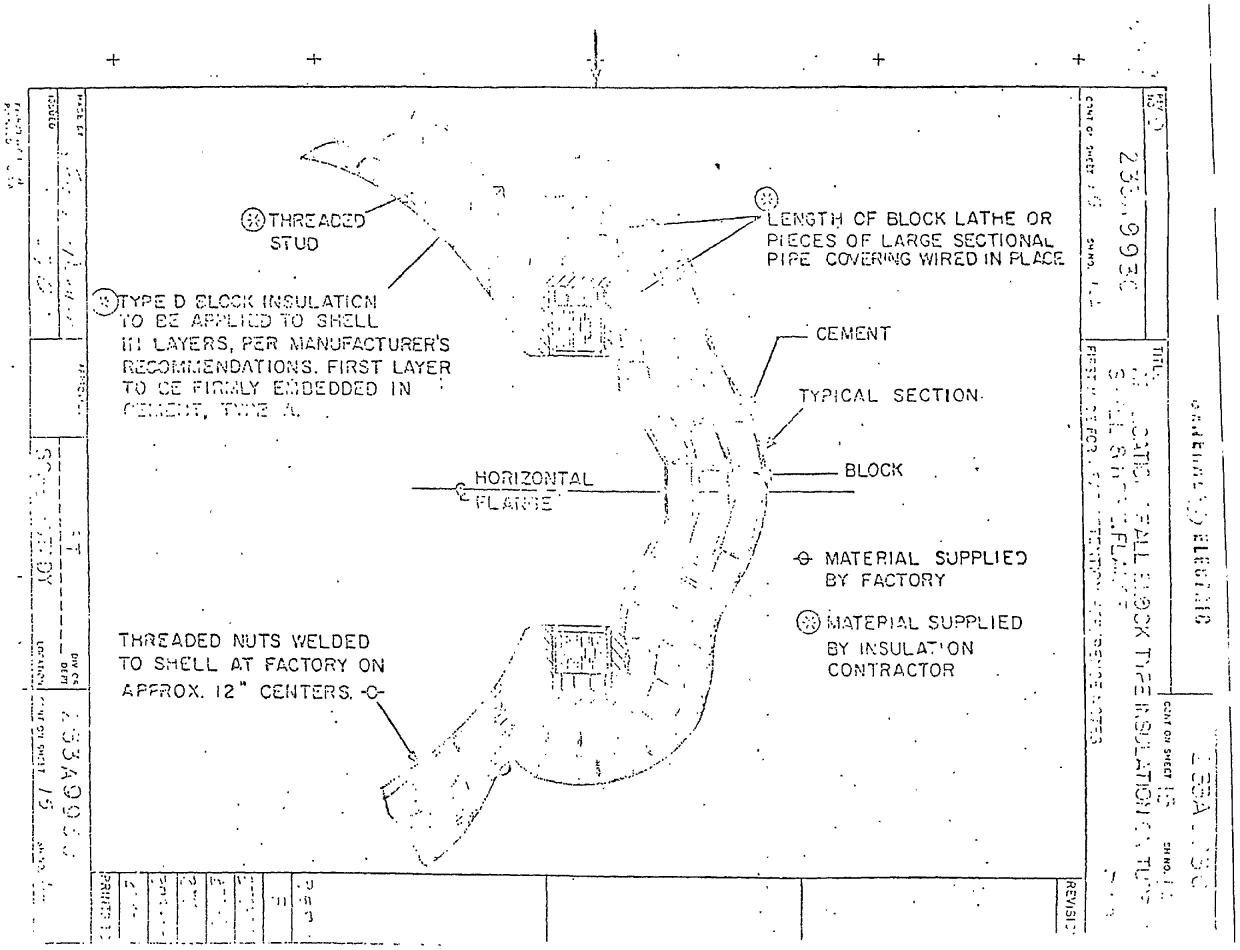
5.0 DISCUSSION-TURBINE SHELLS AND VALVE BODIES

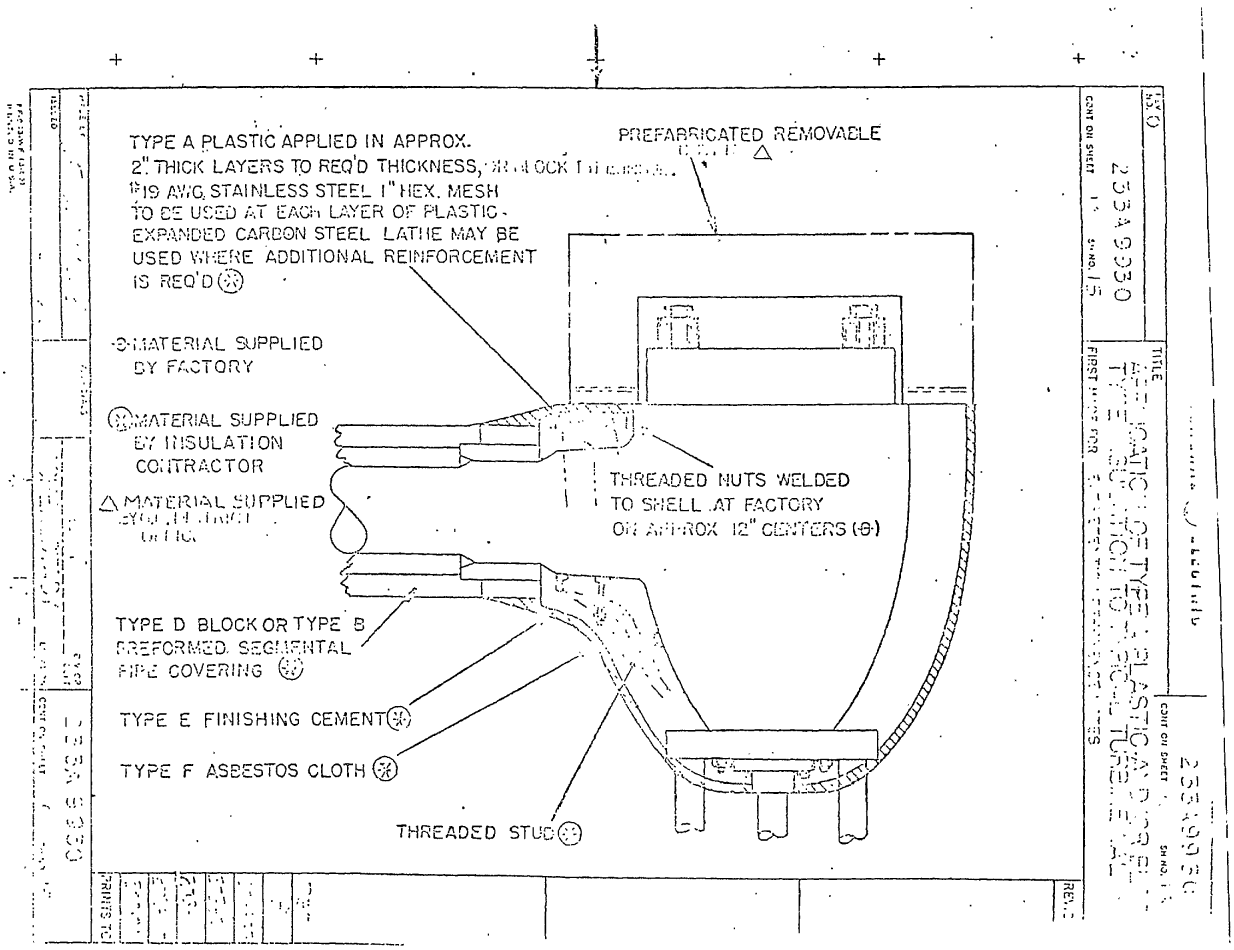
Upper and lower shells (except flanges,, steam valve bodies, control valve chests and exhaust casing shall be insulated with the materials noted above. (Material for horizontal and vertical flange joints will be indicated per 2.3.)

The application of block, combination insulation or sprayed should in accordance with vendor's specifications. Application ings on sheets 12, 13, 14 and 15 show the recommended method of ng turbine shell and valve insulation.


ASBESTOS PAPER FOR PAINTING JOINT. FINISHING CEMENT CAN BE USED OR COMBINATION OF BOTH. THIS IS IMPORTANT.
THREADED STUD ⊗
TYPE A PLASTIC OR TYPE C SPRAYED APPLIED IN APPROX. 2" THICK LAYERS TO REQ'D THICKNESS. #19 AWG STAINLESS STEEL 1" HEX. MESH TO BE USED AT EACH LAYER OF PLASTIC OR SPRAYED. EXPANDED CARBON STEEL LATHE MAY BE USED WHERE ADDITIONAL REINFORCEMENT IS REQ'D. ⊗
ASBESTOS PAPER OVER BOLTS FOR EASE OF REMOVING INSULATION. THIS IS IMPORTANT.
NOTE
ASBESTOS PAPER MAY BE HELD IN PLACE SUFFICIENTLY BY WETTING EDGES AND PATTING TO SHELL
PLASTIC PACKED AROUND BOLTS TO PREVENT AXIAL AIR CURRENTS.
℄ HORIZONTAL JOINT
PAPER TO TERMINATE AT POINTS INDICATED SO THAT PLASTIC HAS A SECTION TO ADHERE TO SHELL
⊖ MATERIAL SUPPLIED BY FACTORY
⊗ MATERIAL SUPPLIED BY INSULATION CONTRACTOR
THREADED NUTS WELDED TO SHELL AT FACTORY ON APPROX. 12" CENTERS (⊖)
EXTRA WIDE REINFORCEMENT ON BOTTOM ONLY ⊗


THREADED STUD Ⓜ
TYPE A PLASTIC OR TYPE C SPRAYED APPLIED IN APPROX. 2" THICK LAYERS TO REQ'D THICKNESS. #19 AWG STAINLESS STEEL 1" HEX MESH TO BE USED AT EACH LAYER OF PLASTIC OR SPRAYED EXPANDED CARBON STEEL LATHE MAY BE USED WHERE ADDITIONAL REINFORCEMENT IS REQ'D Ⓒ
Ⓜ LENGTH OF BLOCK LATHE OR PIECES OF LARGE SECTIONAL PIPE COVERING WIRED IN PLACE
℄ HORIZONTAL FLANGE
⊖ MATERIAL SUPPLIED BY FACTORY
Ⓒ MATERIAL SUPPLIED BY INSULATION CONTRACTOR
THREADED NUTS WELDED TO SHELL AT FACTORY ON APPROX. 12" CENTERS (⊖)
EXTRA WIRE REINFORCEMENT ON BOTTOM ONLY. Ⓒ


THREADED STUD
TYPE D BLOCK INSULATION TO BE APPLIED TO SHELL IN LAYERS, PER MANUFACTURER'S RECOMMENDATIONS. FIRST LAYER TO BE FIRMLY EMBEDDED IN CEMENT, TYPE A.
THREADED NUTS WELDED TO SHELL AT FACTORY ON APPROX. 12" CENTERS. -O-
LENGTH OF BLOCK LATHE OR PIECES OF LARGE SECTIONAL PIPE COVERING WIRED IN PLACE
CEMENT
TYPICAL SECTION
BLOCK
HORIZONTAL FLANGE
MATERIAL SUPPLIED BY FACTORY
MATERIAL SUPPLIED BY INSULATION CONTRACTOR


TYPE A PLASTIC APPLIED IN APPROX.
2" THICK LAYERS TO REQ'D THICKNESS,
19 AWG STAINLESS STEEL 1" HEX. MESH
TO BE USED AT EACH LAYER OF PLASTIC -
EXPANDED CARBON STEEL LATHE MAY BE
USED WHERE ADDITIONAL REINFORCEMENT
IS REQ'D
PREFABRICATED REMOVABLE
MATERIAL SUPPLIED
BY FACTORY
MATERIAL SUPPLIED
BY INSULATION
CONTRACTOR
THREADED NUTS WELDED
TO SHELL AT FACTORY
ON APPROX 12" CENTERS
TYPE D BLOCK OR TYPE B
PREFORMED SEGMENTAL
PIPE COVERING
TYPE E FINISHING CEMENT
TYPE F ASBESTOS CLOTH
THREADED STUD

5.0 DISCUSSION- TURBINE SHELLS AND VALVE BODIES (CONTINUED)

Nuts (½" - 13) are provided on the turbine shell and valve casings to accomodate studs used to anchor the heat retention material.

In no case should extra nuts or any other heat retention material securing device be welded to the turbine shell or valve bodies. Welding on the alloy steel shell or valve body may cause these parts to crack during operation. When valve bodies are separated from the turbine shells by long pipe runs and thus will not be covered by the metal appearance lagging, plastic insulation will be finished by the application of ½" layer of finishing cement type E (4.5) covered by type F (4.6) asbestos cloth using type G (4.7) adhesives. No finishing materials should be used on shells or valves covered by metal appearance lagging.

5.1 APPLICATION

The following is a suggested method of applying type D block insulation (4.3) to turbine shells and valve bodies.

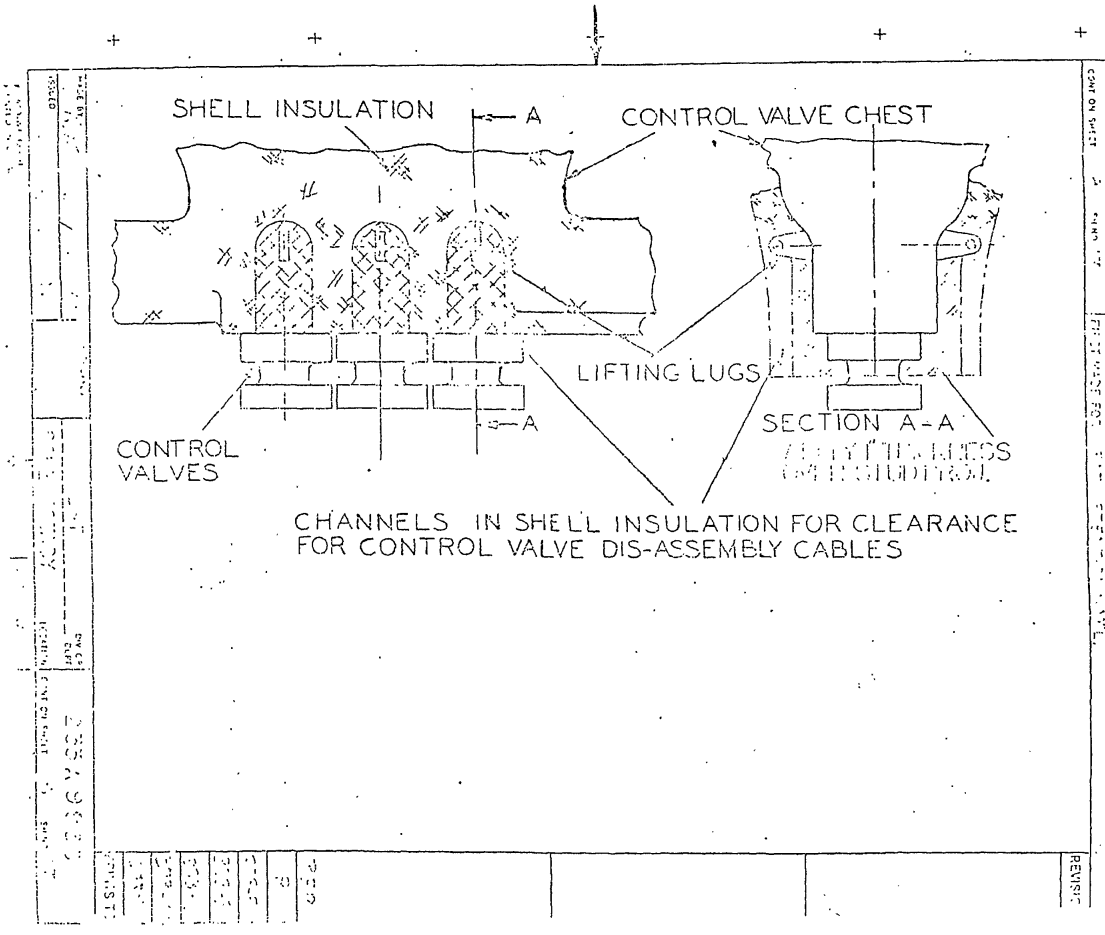
Carbon steel studs of sufficient length, provided by insulation vendor, are screwed into the nuts provided by the factory, on the shell or valve body. These studs act as the securing device to which the tie wires are attached.

The blocks in each layer are to be butted tightly together and secured to the studs with stainless steel tie wire. After the blocks are secured in place they are to be pointed with type A plastic (4.1). Each succeeding layer is to overlap the layer below and is to be secured and pointed in the same manner.

The top layer may be finished with a ½" thick coat of plastic type A to achieve a firm outer surface.

It may be advantageous to reinforce portions of the lower shell insullation by securing stainless steel wire mesh between layers of block in the high temperature regions where insulation is thick.

On various units with shell mounted control valves, lugs have been provided on the shell and valve stand at the centerline of each lower control valve for the purpose of rigging hoists between the two in order to facilitate lowering the individual valves. The heat retention material in this area should be arranged with the necessary provisions (readily removable plug or dishing) to make the lugs accessable. Refer to application sheet 17 for a typical example of method and to the applicable shell drawing for the area involved.


SHELL INSULATION
A
CONTROL VALVE CHEST
LIFTING LUGS
CONTROL VALVES
A
SECTION A-A
CHANNELS IN SHELL INSULATION FOR CLEARANCE FOR CONTROL VALVE DIS-ASSEMBLY CABLES

5.2 REMOVABLE COVERS FOR VALVE HEADS, MAIN AND REHEAT INLET FLANGES AND CROSS OVER PIPE HINGE AND FLANGE COVERS

The heat retention material drawing list for the particular units requiring removable covers will show the proper positioning of the covers by the insulating contractor. Except for the installation of the covers, no other work is required at this assembly unless so specified on the drawing.

The removable covers are made and provided according to General Specifications For Removable Insulated Covers.

6.0 TYPES OF INSULATING MATERIALS USED ON PIPING

6.1 PRE-FORMED SECTIONAL PIPE INSULATION - TYPE B

6.1.1 DESCRIPTION

This is a pre-formed calcium-silicate base insulation combined with a small amount of asbestos or mineral fiber to add mechanical strength. This type of pipe insulation is preferred to other types (such as magnesia) because of its higher strength and broad temperature range. The following makes of insulation are of this type:

Baldwin-Ehret - Hill "Thermasil"
Johns-Manville "Thermobestos"
Owens Corning "Kaylo"
Pittsburgh Corning "Unibestos"

"Unibestos" has similar strength and insulating qualities and although not a calcium silicate material, it is therefore, included in this type.

Eagle-Picher "Tablock" although not pre-formed or a calcium silicate material is also suggested.

6.1.2 THICKNESSES OF PIPE INSULATION - TYPE B (CALCIUM SILICATE)

Steam Temp °F	Max. Cold Surface Temp. with 80° Ambient	Max. Insulation Thickness Pipe Size (in inches)						
		1½ or less	2	2½	3	3½	4	5
Below 250	100	1	1	1	1	1	1½	1½
250 - 349	110	1½	1½	1½	1½	1½	1½	1½
350 - 449	115	1½	1½	1½	2	2	2	2
450 - 549	120	2	2	2	2	2	2	2½
550 - 649	125	2	2	2	2½	2½	2½	2½
650 - 749	125	2	2½	2½	2½	2½	3	3
750 - 849	130	2	2½	2½	3	3	3	3
850 - 949	130	2½	3	3	3	3	3½	3½
950 - 1049	135	2½	3	3	3	3½	3½	3½
1050 - 1149	140	2½	3	3	3½	3½	3½	3½
1150 - 1200	140	3	3½	3½	3½	3½	4	4

Steam Temp °F	Max. Cold Surface Temp. with 80° Ambient	Max. Insulation Thickness Pipe Size (in inches)				
		6	8	10	12	14
Below 250	100	1½	1½	1½	1½	1½
250 - 349	110	1½	1½	1½	2	2
350 - 449	115	2	2	2	2	2½
450 - 549	120	2½	2½	2½	2½	3
550 - 649	125	2½	2½	3	3	3
650 - 749	125	3	3	3½	3½	3½
750 - 849	130	3½	3½	3½	3½	4
850 - 949	130	3½	4	4	4	4½
950 - 1049	135	4	4	4	4½	4½
1050 - 1149	140	4	4	4½	4½	5
1150 - 1200	140	4½	4½	5	5	5½

Note: Single layer insulation may be used on all pipes where steam temperature is less than 550°F. Single layer insulation may be used on all pipes sizes 2½" and smaller regardless of steam temperature. Double layer insulation with staggered joints on all other piping. Additional thickness of ½" to be used on piping exposed to the weather on outdoor installations. Maximum insulation thickness is used for design purposes. The thickness can be less than stated here provided that the maximum cold surface temperature as stated is maintained. In the case of pipe covering, the vendor should not include additional material for waste allowance as specified in 3.0. This is because the tabulated pipe lengths are computed as, "actual length plus 10% in multiples of 3 feet."

6.2 ALUMINUM JACKETING - TYPE J
This is a 10 mil maximum thickness aluminum sheet metal with a protective moisture barrier liner.

The following materials are of this type:

Aljon Manufacturing Co. "Aljorjac"
Childers Manufacturing Co. - Childers Aluminum Jacketing

6.3 WEATHERPROOFING MASTIC - TYPE L
The following materials are of this type:

Benjamin Foster Co. H.I. Mastic 90-07
Eagle-Picher All Purpose Insulseal
Johns-Manville Insulkote ET

6.4 FIRE RESISTANT MASTIC - TYPE M (INDOOR AND OUTDOOR USE)
The following materials are of this type:

Benjamin Foster Co. Sealfas Mastic 31-49 (Aluminum Color)
Vimasco Corp. Vimasco WC-1

6.5 FINISHING CEMENT - TYPE K
The following materials are of this type:

Baldwin-Ehret-Hill Super Powerhouse Cement
Eagle-Picher One Cote Cement
Johns-Manville Type 301

6.6 PAINT (NON-VAPOR BARRIER) TYPE H INDOOR USE ONLY
Foster Lagton - can be purchased in various colors:
White
Aluminum

INDOOR OR OUTDOOR USE
Foster Vitect - Vinyl Coating
50-56 medium gray
50-15 white (may be tinted to suit station color scheme)
57-16 aluminum

7.0 DISCUSSION-PIPING
Main and reheat steam piping, crossunder piping and all other steam piping furnished as part of the turbine unit shall be insulated with pre-formed sectional pipe insulation type B (6.1), applied per manufacturers recommendations. Large diameter piping, sixteen (16") inch or over, may be insulated with type A plastic (4.1) or with flat or segmental type B blocks (4.3) with all gaps to be filled in with plastic insulating cement type A. Sprayed asbestos type C (4.2) may also be used.

7.0 DISCUSSION-PIPING (CONTINUED)

Pipe insulation will be finished with type F asbestos cloth (4.6) using type G adhesives (4.7). Aluminum jacketing of type J (6.2) or stainless steel may be used when requested.

Where the use of mitered block or plastic insulation is required in insulating a large diameter pipe or irregular surfaces such as elbows, flanges etc., a coating not to exceed one half ($\frac{1}{2}$") inch thick of type E finishing cement (4.5) shall be trowelled on before covering with asbestos cloth.

Gland steam exhausters shall be insulated in the same manner as pipe.

On outdoor units all insulated parts not under the metal lagging or otherwise protected from weather shall be weather-proofed. For these conditions all short radium bends (less than 3 feet radius), fittings, and valve bodies shall be given a $\frac{1}{2}$" coating of hard finish cement of type K (6.5) over the insulation. This will be covered according to manufacturer's recommendations with a coating of mastic type L (6.3) or M (6.4). Asbestos cloth will not be used in addition to the above weatherproofing materials.

An extra $\frac{1}{2}$" of insulation shall be added to all types of insulation exposed to the weather to reduce wind losses.

Aluminum pipe jacketing shall be applied to steam piping where it passes under operating oil cylinder or other devices where oil drippage may occur.

7.1 EXPOSED CROSSOVER PIPES

Special care shall be taken in insulating exposed crossover pipes not covered by metal appearance lagging.

Sheet 22 is an application drawing showing how the lifting lugs and the clamping bolts on the exposed crossover pipes are to be covered. The method to be used in insulating the expansion joint area is also shown on an application drawing issued by the District Office.

Some crossover pipes contain a hinge to relieve stresses caused by the difference in movement between high and low pressure units. The hinge should be kept free of insulation material. When removing the crossover a strong-back has to be bolted across the hinge. In order to attach the strong-back with a minimum disturbance to the insulation, a removable cover is to be installed as shown on the cross-over insulation drawing.

MADE BY [illegible] APPROVALS LST DIV OR DEPT. 233A9930
ISSUED [illegible] SCHENECTADY LOCATION CONT ON SHEET 22 SH NO. 21

7.1 EXPOSED CROSSOVER PIPES (CONTINUED)

After the insulation has been installed, level the insulation with insulating cement and make joints tight to insure a uniform surface. Apply a bending coat of 81-42W "Lagfas" (4.7.1) to the insulation prior to wrapping with asbestos cloth.

Apply a uniform brush coat of Foster Sealfas 30-36 (4.7.1) on all longitudinal and butt joint laps of asbestos cloth. Immediately bond laps of asbestos cloth. Pull fabric tight and smooth out to avoid wrinkles and gaps.

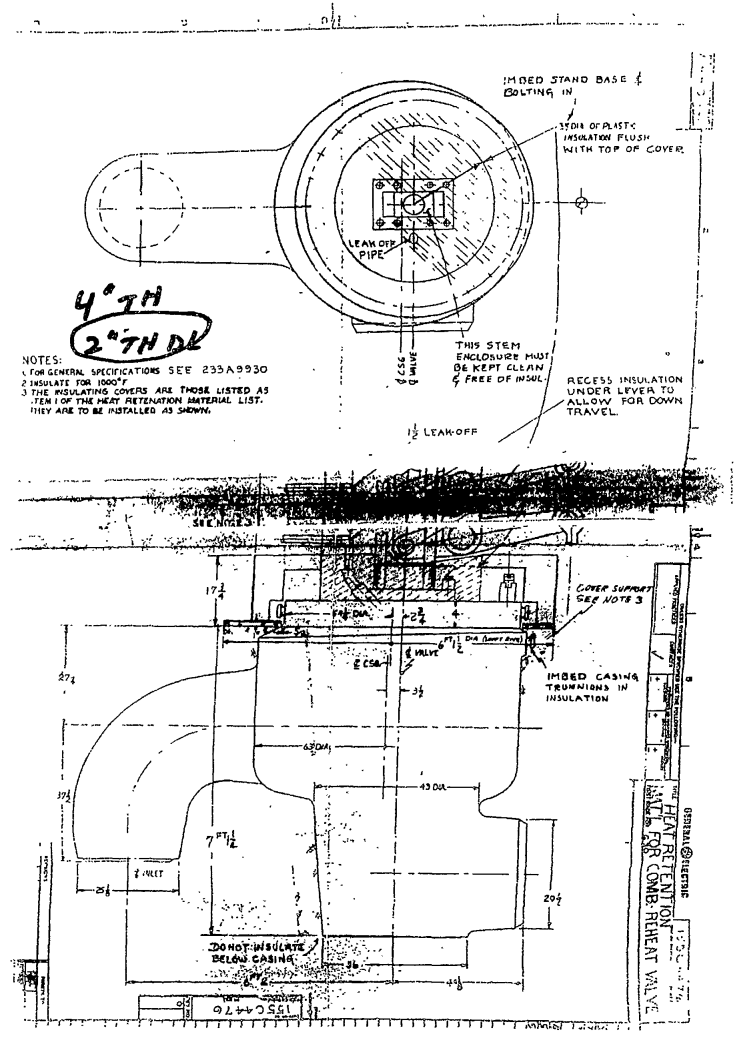
Immediately apply a uniform coating of Foster Sealfas 30-36 (4.7.1) to the entire surface at the rate of 70 sq. ft. per gallon.

Where the pipeline is outdoors and exposed to the weather, allow 24 hrs. drying time, then apply to the entire surface, two uniform coats of Foster Vitect vinyl coating (6.6, color as selected) at the rate of 150 to 200 sq. ft. per gallon per coat. Allow a minimum of 4 hrs. drying time between coats. For indoor use see (6.6).

Foster Vitect vinyl coating is available in three basic colors, 50-56 medium gray, 50-15 white, and 57-16 aluminum.

7.2 EXPOSED STEAM PIPING

Exposed steam leads not covered by metal lagging above the operating floor, shall be finished in the same manner as described for "Exposed Crossover Pipes" (7.1), to achieve a satisfactory appearance. Expansion joints shall be included in the pipe covering above the operating floor to prevent cracking in the outer layer and scorching the painted asbestos cloth.


IMBED STAND BASE & BOLTING IN
3 DIA OF PLASTIC INSULATION FLUSH WITH TOP OF COVER
LEAK OFF PIPE
4" TH
2" TH DL
NOTES:
1 FOR GENERAL SPECIFICATIONS SEE 233A9930
2 INSULATE FOR 1000°F
3 THE INSULATING COVERS ARE THOSE LISTED AS ITEM 1 OF THE HEAT RETENATION MATERIAL LIST. THEY ARE TO BE INSTALLED AS SHOWN.
THIS STEM ENCLOSURE MUST BE KEPT CLEAN & FREE OF INSUL.
RECESS INSULATION UNDER LEVER TO ALLOW FOR DOWN TRAVEL.
1½ LEAK-OFF
COVER SUPPORT SEE NOTE 3
IMBED CASING TRUNNIONS IN INSULATION
DO NOT INSULATE BELOW CASING
HEAT RETENTION MATL FOR COMB. REHEAT VALVE
GENERAL ELECTRIC