

BECHTEL
3RD UNIT X
Insulation

FORM PD-ED

ITEM NO.	QUAN.	SIZE & DESCRIPTION	CODE
		This requisition covers furnishing material and installation of insulation to pipe and equipment per attached specification, Insulation Estimate and Drawings. Installation completion at the jobsite May 1, 1957, except Power Plant Piping Phase 1 on Page 6 of enclosure must be completed by September 1, 1956.	#1
		ATTACHMENTS: Insulation Specification SP3-1003 Drawings: { INSULATION APPLICATION Sheets 1A thru 7A Insulation Estimate (deleted Sheets 2 thru 5) △ Addendum Sheets 1 thru 4 dated 8-8-56. (To SPEC. SP3-1003) INSULATION EQUIPMENT LIST RMC - 73	
			002944

002944



BECHTEL CORPORATION
SAN FRANCISCO • LOS ANGELES
NEW YORK

△							JOB NO	B. M. NO.	R
△	1-8-57	GENERAL REVISIONS	H	JE	SPM	2473		400	
△	10-12-56	REV. SKETCH SHEETS 2A thru 9A SPEC. SP3-1002 REVISED SH. 9, 10, 11	H	JE	SPM	2473		4-15	
△	8-31-56	Added Addendum & Misc. Rev.	HLE	JE	SPM	(phone)			
△	7/12/56	Issued for Purchase	HLE	JE	SPM				
NO.	DATE	REVISIONS	APPROVALS			SHEET 1 OF			

INSULATION ESTIMATE (SUMMARY)

THICKNESS

<u>EQUIPMENT</u>	<u>PP</u>	<u>1"</u>	<u>1 1/2"</u>	<u>2"</u>	<u>2 1/2"</u>	<u>Spec.</u>	<u>3 1/2"</u>
	5090 sq.ft.	5000 sq.ft.	42,400 sq.ft.	10,470 sq.ft.	37 sq.ft.	125 sq.ft. Ex.Lath	
3/4" Pipe	230'	120'					
1"	45'	300'	400'				
1 1/2"	300'	360'					
2"	30'		230'				
3"	570'		845'		10'		
4"	240'		410'		180'	200'-1" Traced	
6"	267'		1710'		155'		
8"	82'		1655'		80'		110'
10"	60'		575'		200'		95'
12"	310'		230'			90'-3"	100'
14"	120'		772'		180'	480'-3"	
16"	205'		70'				
18"							
20"			52'				
24"			390'				

This does not include steam pipe insulation
in the Process Areas which we estimate to be

1000 ft. of 16" with 3" insulation

1500 ft. of 24" with 1 1/2" insulation

002945

400

INSULATION ESTIMATE (MECHANICAL)

EQUIPMENT TAKE-OFF

Sq.Ft. Insul.Thickness

<u>EQUIPMENT</u>	<u>NO.</u>	<u>PP</u>	<u>1"</u>	<u>1 1/2"</u>	<u>2"</u>	<u>SIZE</u>
Digesters	30V22-7				8520	10' dia.x 30'
Flash Tanks	30V32-8			1300	1950	6,6,9 & 13' dia. x 25' cone
Digester Pre-Heater	30E11A-17C			3500		4' dia.± x 28'
Wash Water Coll.Tk.	33T24			1010		15' dia.x 29' cone
Red Mud Set.Tk.	33T25, 6			5100		90' dia. x 9'
Red Mud Washer	33T34			6800		50'dia.x 43-1/3
Red Mud Washer O, Flo Cloudy Filt. Tk.	33T23			3150		40'dia. x 25'
	35T42			475		10'dia. x 15'
Clear Filt. Tk.	35T43			1600		20'dia. x 20'
Filt.Feed Tk.	35T40, 1			6250		40'dia. x 25'
Filt.W.W. Tk.	35T44			1600		20' dia. x 20'
Kelly Filt.	35F29-38			3500		6' dia. x 18'
Elect. Precip.		3200				20x40x13 1/2
Multiclones		1000				13x14x13'
Diluter	33-V-5	335				6' dia.x17' 60° cone
Leaf Cl. Caus.Stor.	35T45	315				10' dia.x 10'
Leaf Ch. Vat	35T46	240				5x6x15'

002846

INSULATION ESTIMATE (MECHANICAL) (CONT'D.)

Sq.Ft. Insul. Thickness

<u>EQUIPMENT</u>	<u>NO.</u>	<u>PP</u>	<u>1"</u>	<u>1 1/2"</u>	<u>2"</u>	<u>SIZE</u>
Facil 50 #225 Hot Duct		1000				500'-8" dia.
Evaporators			5000	4300		
TOTAL (Sq.Ft.)		5090	5000	41580	10470	

SUPERSEDED BY APPENDUM. 

002947

INSULATION ESTIMATE (MECHANICAL)

PIPING TAKE OFF PROCESS AREA

Ft. of Insul. Thickness

<u>LINE SIZE</u>	<u>PP#</u>	<u>1"</u>	<u>1½"</u>	<u>2"</u>	<u>2½"</u>	<u>1"</u> <u>Traced</u>
3/4"						
1"						
1½"						
2"						
3"						
4"	193'		300'			200'
6"	267'		930'			
8"	52'		555'			
10"	61'		92'			
12"	310'		60'			
14"	120'		112'			
16"	205'					
18"	15"					
20"			52'			

* Estimated 10% of Line
Requires Personnel Prot.

This does not include Steam Pipe
in the Process Area see summary sheet - sheet # 2

002948

INSULATION - LINEAL FT. PHASE I ONLY

LINE SIZE	PP	INSULATION THICKNESS						
		<u>1"</u>	<u>1½"</u>	<u>2"</u>	<u>2½"</u>	<u>3"</u>	<u>3½"</u>	<u>OTHER</u>
¾"	80'	60'						
1"	10'							
1½"	150'	260'						
2"	20'		140'					
3"	50'		250'					
4"	20'		60'		90'			
6"			535'					
8"			700'					
10"			60'		200'			
12"			45'					
14"			150'		180'	480' Δ	300'	
16"								
18"								
20"								
24"			290'					

Note: Above figures are preliminary

002949

INSULATION LINEAL FT. - TOTAL
(Including Phase #1)

<u>LINE SIZE</u>	<u>FP</u>	<u>INSULATION THICKNESS</u>					
		<u>1"</u>	<u>1½"</u>	<u>2"</u>	<u>2½"</u>	<u>3"</u>	<u>3½"</u>
3/4"	230'	120'					
1"	45'						
1½"	300'	360'					
2"	30'		230'				
3"	570'		345'		10'		
4"	50'		110'		180'		
6"			810'		155'		
8"	30'		1100'		80'		110'
10"			485'		480'		95'
12"			170'			90'	100'
14"			760'		180'	480'	
16"			70'				
18"							
20"							
24"			390'				

Note: Above figures are preliminary.

INSULATION ESTIMATE (POWER PLANT)

EQUIPMENT TAKE-OFF

<u>EQUIPMENT</u>	<u>NO.</u>	<u>TEMP.</u>	<u>SIZE</u>	<u>Sq.Ft. Insul. Thickness</u>		<u>PP</u>
				<u>1 1/2"</u>	<u>2 1/2"</u>	
60# Flash Drum	V.	300°	36" dia.x 10'	110 sq.ft.		
Deaer.PreHtr.	V.	300°	10'dia.x 6'	405 "	"	
Deaer.Htr.Stor.	H.	300°	11'dia.x 30'	1227 "	"	
Blowdown Exchg.	H.	300°	14"dia.x 16'	60 "	"	
Feedwater Heater	H.	600°	20"dia.x 7'		37 sq.ft.	
Blowdown Drum	V.		5' dia.x 12' (+7')			125 sq.ft.Exp. Metal Lath
TOTAL				1802 sq.ft.	37 sq.ft.	

~~Turbine Insulation by Supplier~~

002951

REYNOLDS METALS COMPANY
La Quinta Plant Expansion
Job 2473

BM 2473-4-15
Insulation Equipment List
Revised As Of 1/8/57

Equipment	No.	Vendor	BM	Size	Insul.	# Reqd.	FP No.
Soda Ash	24T-9	CB&I	3-6	25' dia x 25'	1-1/2" Sides	1	X
Digesters	30Y22-7	CB&I	3-25A	10' dia x 30' E Hds.	2" All	6	3-25A-8
Flash Tks.	30V32, 4	Gunthard	3-25B	6' dia x 25, 60° B	2" All	2	3-25B-8
Flash Tks.	30V36	Gunthard	3-25B	9' dia x 25, 60° B	2" All	1	
Flash Tks.	30V38	Metal Fab.	3-25C	13' dia x 25, 60° B	1-1/2" All	1	3-25C-1
Dig. P. Htrs.	30E15	Braun	3-43	4-1/2' dia x 25'	1-1/2" All	3	3-43-1
Dig. P. Htrs.	13	Braun	3-43	4-1/2' dia x 25'	1-1/2" All	2	3-43-2
Dig. P. Htrs.	11	Braun	3-43	4-1/2' dia x 25'	2" All	3	3-43-1
Dig. P. Htrs.	30E17	Braun	3-43	4-1/2' dia x 25'	1-1/2" Shell only	2	X
WW Coll. Tk.	33T24	CB&I	3-6	15' dia x 24' 45° C	1-1/2" S&B	1	3-6
W.O'flo. Col. Tk.	33T23	CB&I	3-6	40' dia x 25'	1-1/2" S	1	
Mud Settler	33T25, 6	CB&I	3-6	90' dia x 9' & Co.	1-1/2" S	2	X
Red Mud Wash	33T34	CB&I	3-6	55' dia x 50' & Co.	1-1/2" S	2	X
Fl. Baro. Hot W.	33T43	Howard	3-44C	12' dia x 12' 45° Co.	1-1/2" S & B	1	3-44C-17
Set.O'flow Relay	33T44	Howard	3-44C	12' dia x 12' 45° Co.	1-1/2" S & B	1	3-44C-20
Diluter	33V5	Metal Fab	3-25	6' dia x 17' 60° Co.	1-1/2" All	1	3-25C-2
Kelly Filters	33F29-38	Coal-In-Bir	3-8	6' dia x 18'	1-1/2" S&I Bd.	10	3-8-1
Filter Fd. Tk.	35T40, 1	CB&I	3-6	40' dia x 25'	1-1/2" S	2	X
Cloudy Filtrate	35T42	Howard	3-44C	10' dia x 15'	1-1/2" S	1	3-44C-1
Clear Filtrate	35T43	CB&I	3-6	20' dia x 20'	1-1/2" S	1	3-6-51
Fil. WW. Ht. Tk.	35T44	CB&I	3-6	20' dia x 20'	1-1/2" S	1	3-6-13
Lf. Cl. Caus.Tk.	35T45	Gurdon	3-44A	10' dia x 10'	1-1/2" S	1	3-44A-1
Lf. Cl. Vats	35T46	Gurdon	3-44A	5' x 6' x 15'	PP	1	3-44A-2
Evaporator	42EV5	CB&I	3-27		1-1/2"	5 Effects	3-27-3
Evaporator	6	CB&I	3-27		1-1/2"	5 Effects	4
Evaporator	7	CB&I	3-27		1-1/2"	2 Effects	15
El. Precip.	50X12, 13	Res-Cottrell	3-21B	20' x 40' x 13-1/2'	1-1/2" S&B	2	3-21B-3 & 5
Multiclones	50X5, 6	West.Precip.	3-21A	13' x 14' x 13'	1-1/2" All	2	3-21A-3
Kiln Fan	50TF21, 2	Buffalo	3-24		1-1/2" PP	2	
Multiclones	225X3	West.Precip.	3-163	12' x 10' x 6'	1-1/2" PP S	1	X
El. Precip.	225X2	Res-Cottrell	3-21B		1-1/2" S&B	1	X
Kiln Fan	225TF2	Buffalo	3-83		1-1/2" PP	1	
Cooler Fan	225TF5	Buffalo	3-83		1-1/2" PP	1	

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REYNOLDS METALS
COMPANY
CORPUS CHRISTI, TEXAS

ALUMINA PLANT
INSULATION APPLICATION

SHEET 1A
JOB 2473

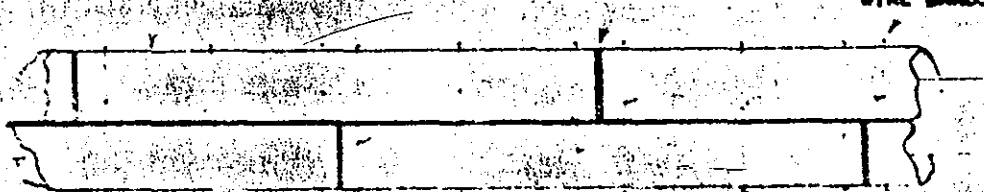
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SKETCH SHEET 1

PIPE INSULATION

POINT JOINTS

WIRE BANDS

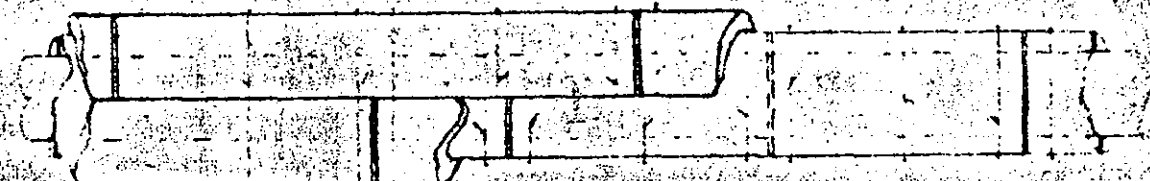


SINGLE LAYER PIPE INSULATION

FIGURE 1

WIRE BANDS

SIDE JOINT

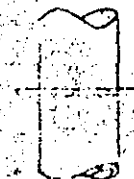


DOUBLE LAYER PIPE INSULATION

FIGURE 2



1/8-INCH PLATE



TACK WELD TO PIPE

INSULATION SUPPORT FOR VERTICAL PIPE

FIGURE 3

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SH/LE 7-14-1

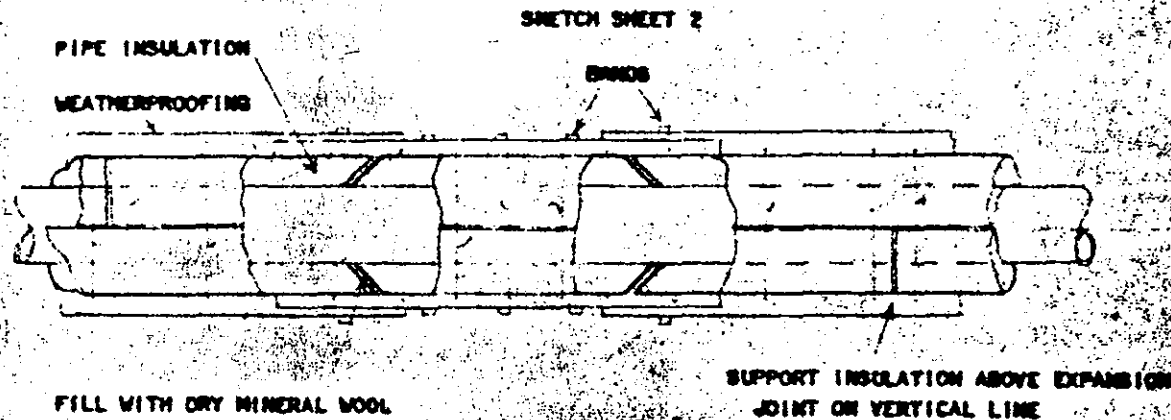
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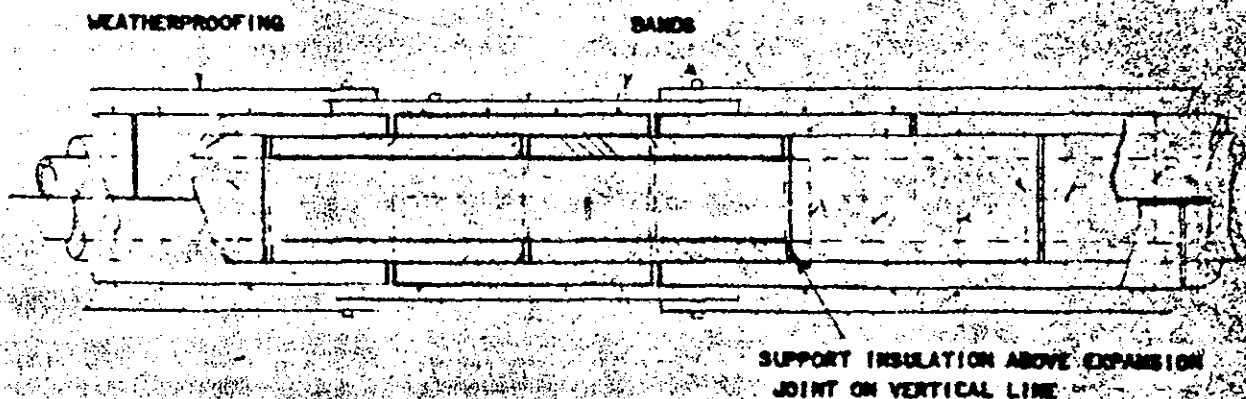
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SINGLE LAYER EXPANSION JOINT

FIGURE 4



DOUBLE LAYER EXPANSION JOINT

FIGURE 5

TYPICAL 6" TO 16" OVER 650°F. Δ
EXPANSION JOINTS ARE INSTALLED AS LISTED

002954

21

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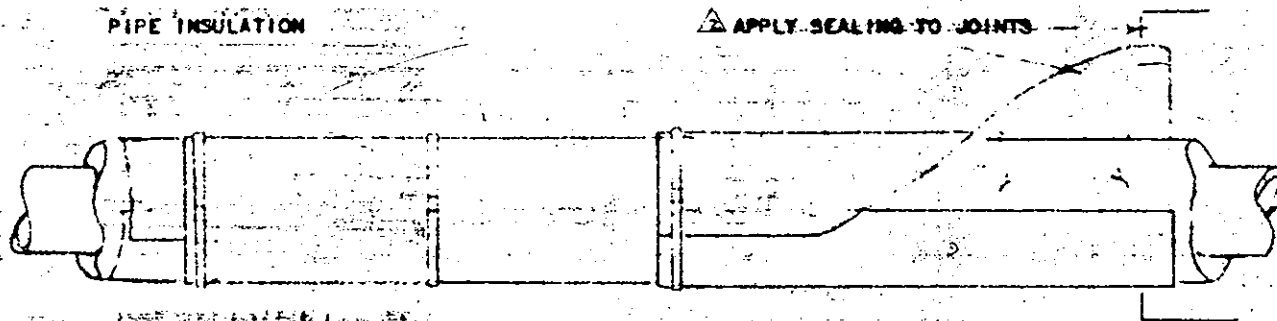
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JOB 2473

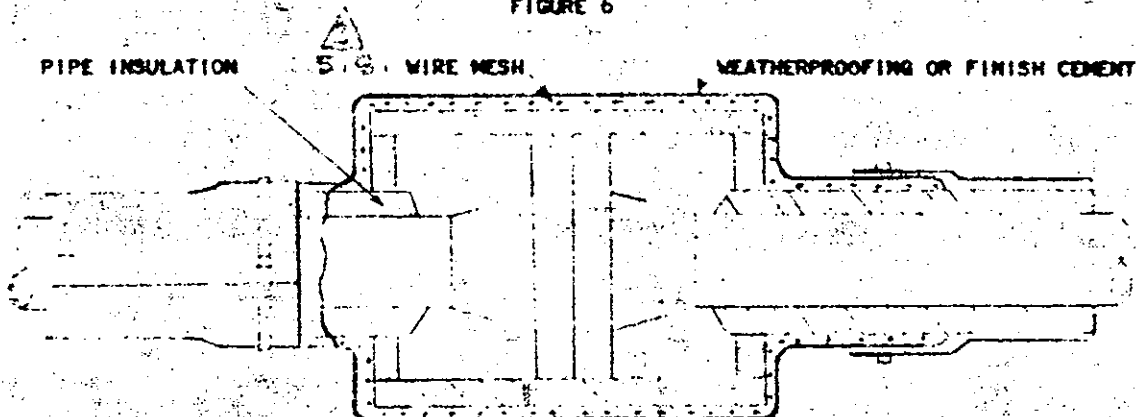
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SKETCH SHEET 3



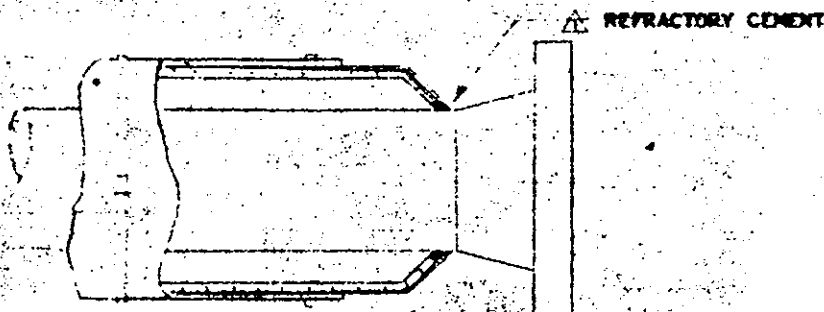
WEATHERPROOFING

FIGURE 6



STEAM LINE FLANGE INSULATION

FIGURE 7



UNINSULATED FLANGE

FIGURE 8

002955

3A

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SKETCH SHEET 4

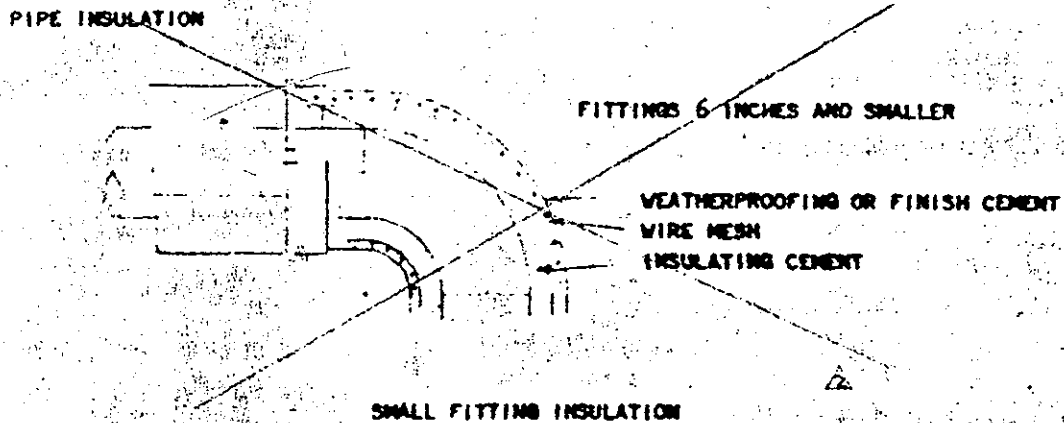
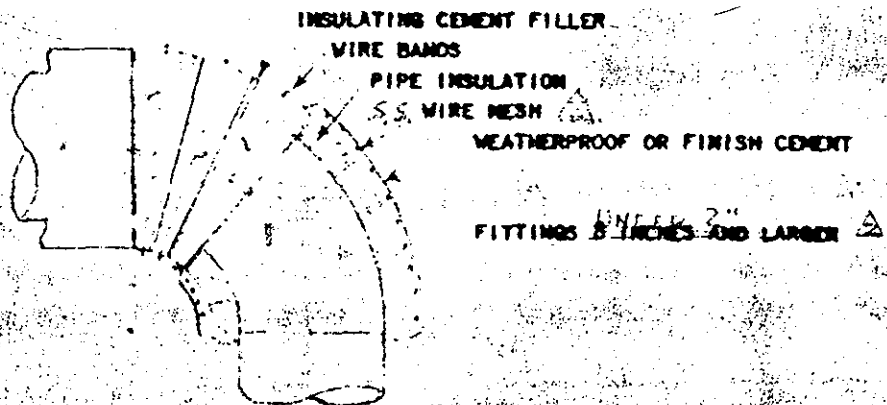


FIGURE 9



LARGE FITTING INSULATION

FIGURE 10

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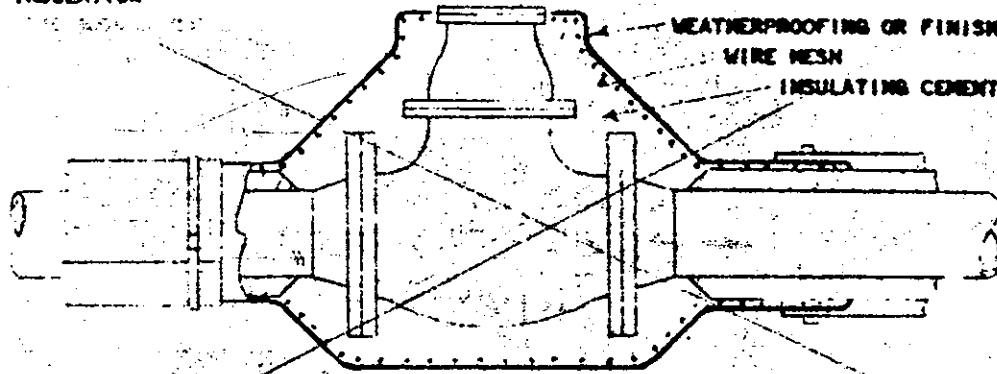
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INSULATION APPLICATION

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SKETCH SHEET 5

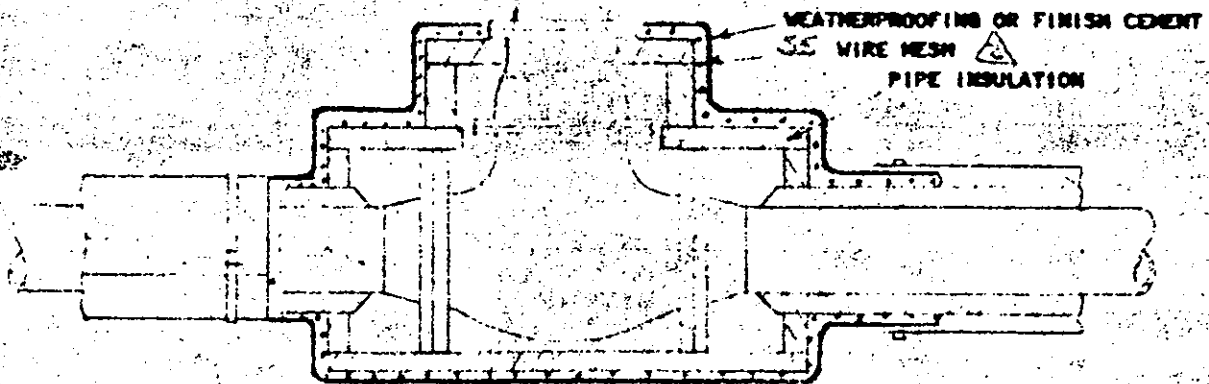
PIPE INSULATION



VALVES 4 INCHES AND SMALLER

STEAM VALVE INSULATION

FIGURE 11



VALVES 6 INCHES AND LARGER

STEAM VALVE INSULATION

FIGURE 12

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5A

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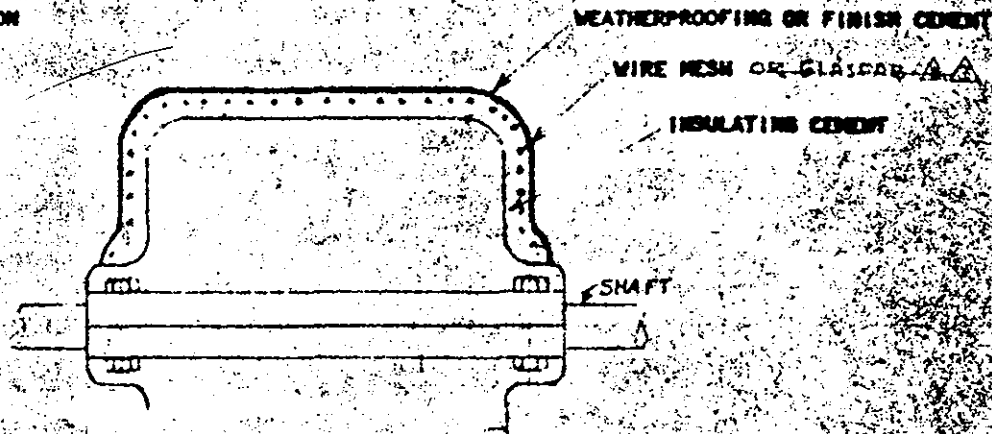
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SKETCH SHEET 6

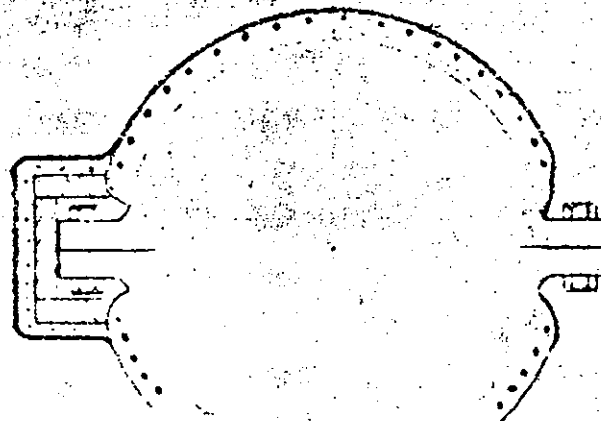
MACHINE INSULATION



MACHINE CASE INSULATION

FIGURE 13

TURBINE FLANGE



PUMP FLANGE

CASE FLANGE INSULATION

FIGURE 14

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ALUMINA PLANT
INSULATION APPLICATION

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SKETCH SHEET 7

TANK AND VESSEL INSULATION

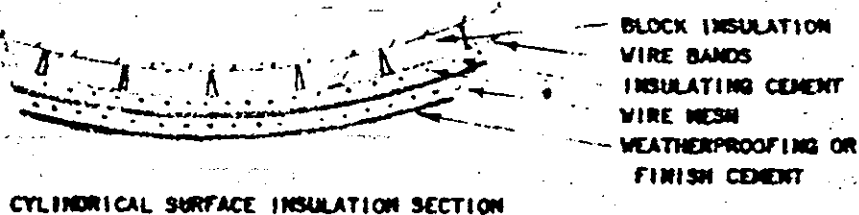


FIGURE 15

SUPPORT RINGS ON VESSEL



FIGURE 16

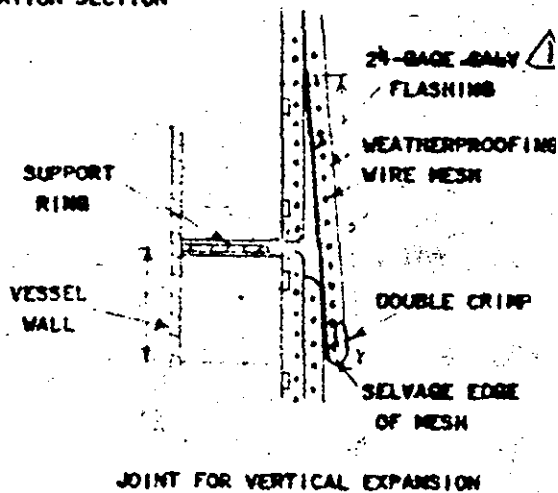


FIGURE 17

ALTERNATE FOR ASBESTOCITE COVERING

002959

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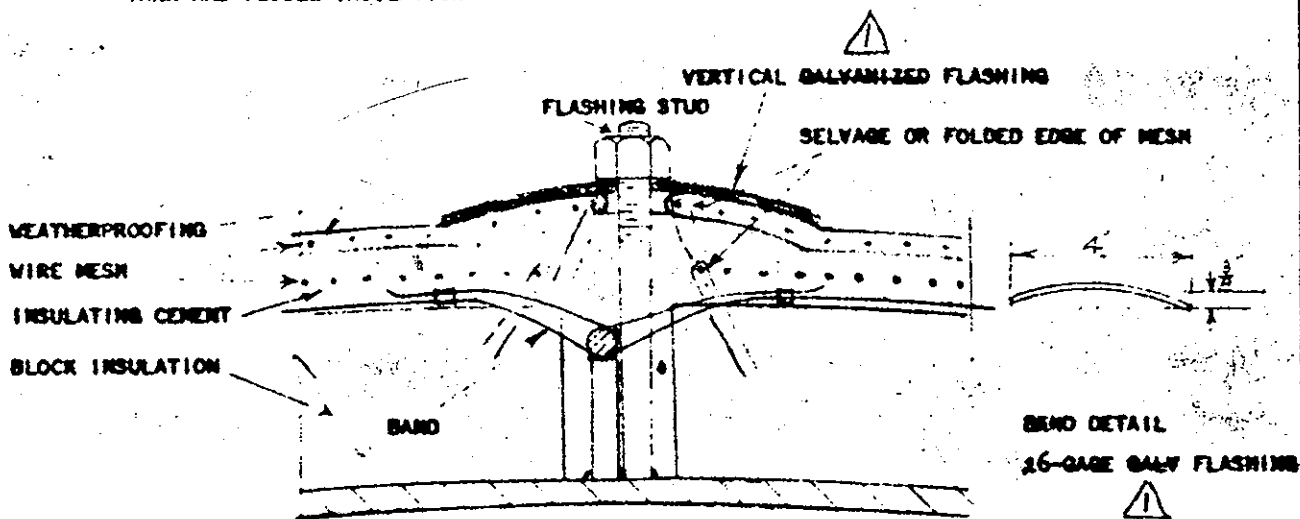
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INSULATION APPLICATION

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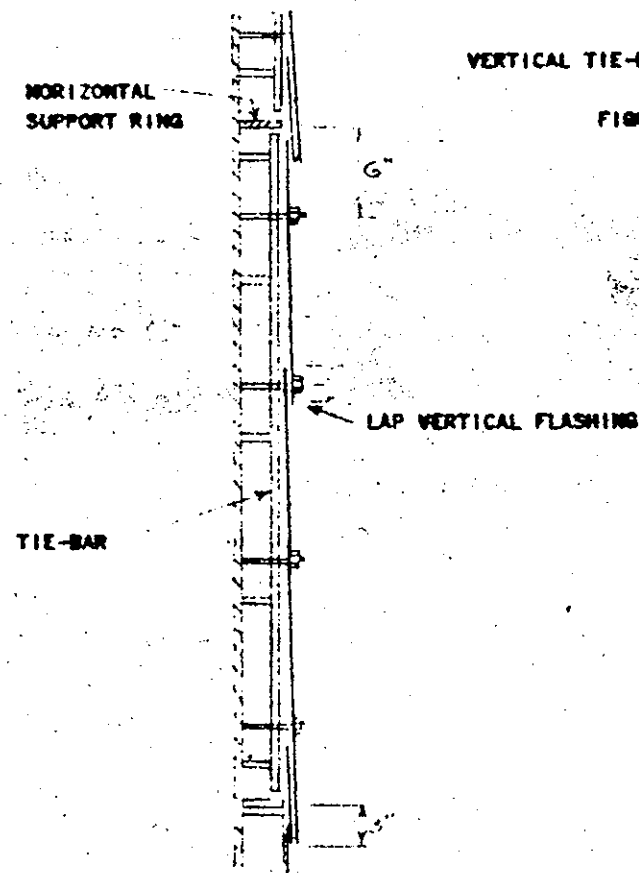
SKETCH SHEET 8

TANK AND VESSEL INSULATION



VERTICAL TIE-BAR FOR BANDING

FIGURE 18



ALTERNATE FOR ASBESTOCITE - CYER 12' 4" Δ
ELEVATION OF VERTICAL TIE-BAR

FIGURE 19

002960

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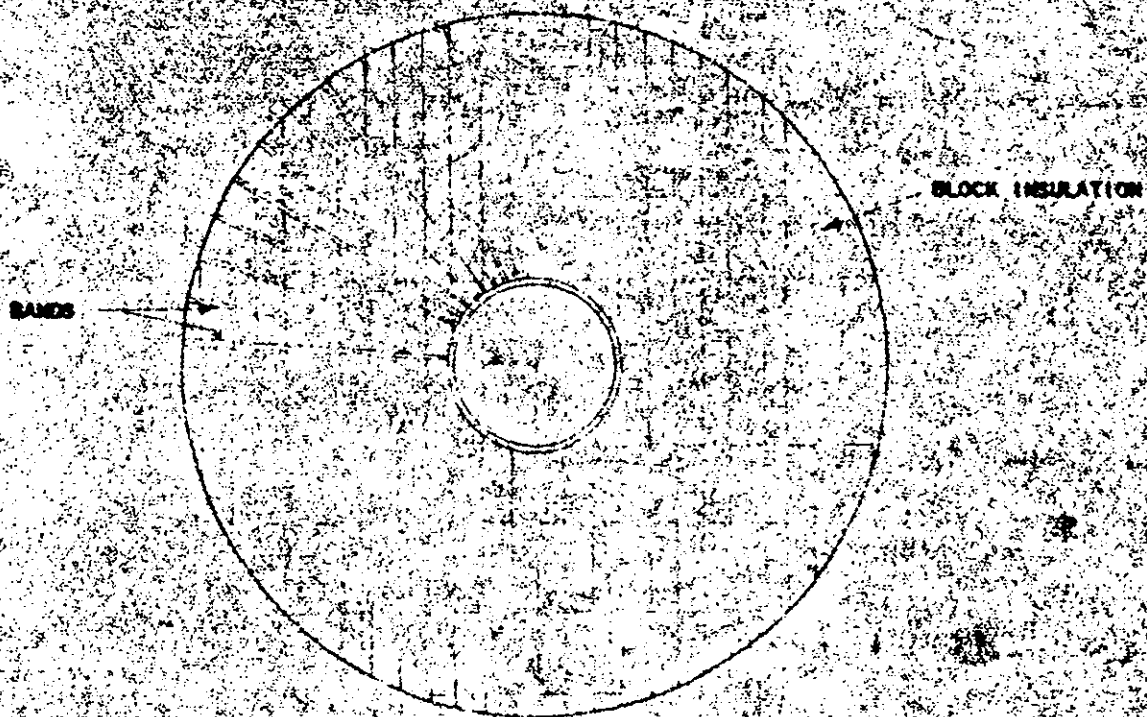
ALUMINA PLANT
INSULATION APPLICATION

SHEET 7A
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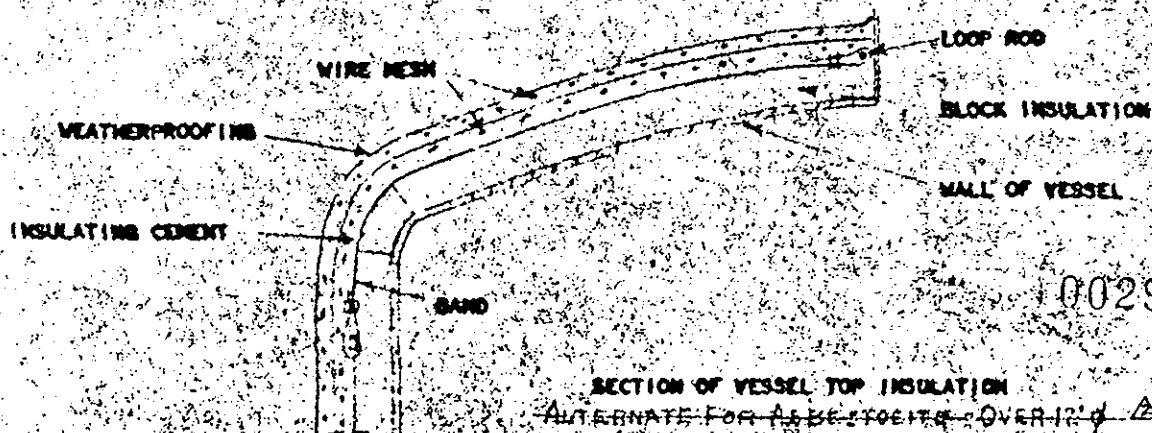
BM4-15

SKETCH SHEET 9

TANK AND VESSEL INSULATION



PLAN VESSEL TOP INSULATION



002961

7A

INSULATION

1.0 SCOPE

1.1 This specification covers the furnishing and application of thermal insulation to vessels, exchangers, equipment, tankage and piping.

1.2 The type, thickness and method of application of insulation shall be in accordance with this specification and the attached drawings and schedules.

2.0 GENERAL

2.1 Materials, facilities and work furnished by Bechtel Corporation hereinafter termed "contractor." (except as noted)

2.11 Any additional bracing or altering of existing staging shall be done by the subcontractor at his own expense and risk.

2.12 The contractor will furnish at the jobsite all necessary water, electric current at 110 and 220 volt single phase, 60 cycles. These utilities will be furnished at existing outlets only. Any extension shall be furnished by the subcontractor at his own expense.

2.13 The contractor will provide the subcontractor with necessary working space and material storage space at the jobsite, but will not furnish a warehouse or other means of protection from the elements. The location of this space will be designated by the contractor's construction superintendent.

00296

3-5-57	Deleted structural supports as furn. by Subcontractor	12	me	—
1-8-57	DELETED TANKS OVER 12' & MISC. REVISIONS	16	me	10/25/56
10-12-56	CHANGED "GLASS FIB" TO 304 OR EQ. HEX. MESH SH. 9, 10 & 11	16	me	10/25/56
8-31-56	Revised banding. Also added Addendum dated 8/8/56.	1	113	10/25/56
DATE 7/13/56	Issued for Construction	16	me	10/25/56



BECHTEL CORPORATION

INSULATION SPECIFICATION
SP3-1003
REYNOLDS METALS COMPANY

LA QUINTA ALUMINA PLANT EXPANSION, CORPUS CHRISTI, TEX.

JOB NO.	2473
SPECIFICATION	REV.
SP3-1003	40

non structural supports ⁴

⁴ 2.14 All ~~support rings and clips~~ for holding insulation on the equipment and piping as required and not part of the shop fabrication to be furnished by subcontractor. ⁴ Structural type supports to be furnished by contractor.

2.15 All surfaces shall be properly prepared and thoroughly cleaned to remove oil, grease, loose scale and dirt, by the contractor, before application of insulation materials.

2.2 Materials and work to be furnished by subcontractor.

2.21 The subcontractor shall furnish all labor, tools, implements, vehicles, facilities and materials for the complete installation of all insulation.

2.22 The subcontractor shall be responsible for unloading all materials from the cars or trucks and do all the necessary handling of such materials.

2.23 The subcontractor shall protect the insulation against injury during all stages of application, until the final weatherproof coat is applied. Any insulation so damaged shall be replaced to the satisfaction of the contractor. In addition, he shall handle and apply insulation in a manner resulting in the minimum of debris and keep his work area policed at all times.

2.24 The subcontractor shall clean all splatter from equipment and machinery and shall make a daily clean-up of the area to remove wrappers, cartons, sacks and other large debris.

2.25 The subcontractor shall plan and schedule his work as directed by the contractor and be coordinated with the work of the other crafts.

002963

2.26 The subcontractor shall furnish and install all necessary steel flashing and metal jackets.

2.3 It will be the subcontractor's responsibility to furnish a job which will be satisfactory in all respects and if the bidders for this work believe that any of the requirements of this specification do not permit them to fulfill such responsibility they must submit with their bids recommendation of changes for approval. Failure to meet this requirement will not relieve the successful bidder of such responsibilities.

2.4 Any insulation on existing facilities which may become damaged by others during construction or tie-in work shall be repaired or replaced by the subcontractor on written orders from contractor. Payment for this repair work shall be on a time and material basis as provided by Paragraph 2.61.

2.5 Manufacturer's nameplates shall not be covered. Insulation shall be cut on 45° angle to the nameplate edge and the insulation properly sealed off.

3
2.6 Basis of Bids

2.61 ~~Equipment: The bidder shall quote unit prices based on square footage of insulation. These prices shall be based on the attached drawings.~~

2.62 ~~Piping: The bidder shall quote unit prices based on lineal footage of pipe insulation in each size piping.~~

2.63 Payment

002964

2.631 The quantities of insulation shown on the attached drawings are an estimate, and the final price paid to the successful bidder shall be determined at

the completion of the job by actual field measurements based on unit costs.

2.632 Methods of measuring insulation for payment shall be as outlined in Paragraph 2.81 of this specification.

2.7 Information to be Furnished by Subcontractor

The subcontractor shall furnish the contractor the following information.

2.71 Complete data concerning the insulation he intends to use.

2.72 Names of insulating and finishing cements and weatherproof coating he intends to use.

2.73 The size of metal sections he intends to use for metal jacketing.

2.74 The method of supporting the overall shell jacket, complete with sketches and/or drawings, also the method of supporting the sheathing section on vertical vessels at and between the insulation support rings, with sketches and/or drawings.

2.75 The typical method or methods of application and fastening of flashing at expansion joints and between shell insulation and skirt fireproofing, complete with sketches and/or drawings.

2.76 The type and method of application as well as the number and position of "S" and/or "J" clips applied to a metal sheath.

2.8 Method of Measuring Thermal Insulation for Payment

002965

2.81 The method of measurement shall be in accordance with the contractor's "Standard Method of Measuring Thermal Insulation

for Payment", which is a part of this specification.

3.0 ACCEPTABLE MATERIALS

3.1 Pipe covering shall be Owens Illinois "Kaylo" or approved equal.

3.2 Block insulation shall be Baldwin-Hill "Mono-Block", or Eagle Picher Super Temp, Kaylo or approved equal.

3.3 Blanket insulation shall be suitable for use on temperatures up to 1000° F and shall be Baldwin-Hill "Rockwool" or equal.

3.4 Monolithic insulation shall be Baldwin-Hill No. 1 Insulating Cement, Eagle-Picher Super "66" or approved equal.

3.5 Finishing Cement shall be Baldwin-Hill Powerhouse Cement, Johns-Manville No. 352 or approved equal.

3.6 Weatherproof compound shall be Baldwin-Hill "Weatherseal", Johns-Manville "Insul Kote ET" or approved equal.

3.7 Final Covering

3.7.1 Final covering for pipe lines in the Powerhouse (Facility 110) shall be Reynolds Metals Company .020" x 36 half-hard felt lined mill finish flat aluminum, manufactured by and furnished by Reynolds Metals Company. In all other areas, final covering for pipe lines shall be 55-pound asphalt saturated asbestos felt, Johns-Manville double-coated "Flexstone" roofing felt or approved equal. Valves and fittings with insulating cement shall be weatherproofed with "Weatherseal" or equal.

002966

3.7.2 Final covering for vessels, tanks and equipment shall be Baldwin-Hill "Weatherseal" or equal, ~~except where flexboard is used as final covering~~

3.8 Insulation Securement

3.81 Piping (Insulation Securement)

Lines 8" and under - 16 ga.	galvanized iron wire
Lines 10" through 16" - 14 ga.	galvanized iron wire
Lines 18" and larger - 1/2" x .02"	galvanized Signode or Gerrard Type bands

3.82 Piping (Jacket Securement)

Aluminum jacket - .020 x 1/2" 3S aluminum bands spaced
(Facility 110 on 12' centers. Jackets on vertical
only) lines shall be supported with two "Z"
clips per section of jacket.

Felt Jacket - .02 x 1/2" SS TP304 bands on 12" ctrs.

3.83 Vessels and Tanks (Insulation Securement)

Insulation securement for vessels and tanks with single S.S. layer construction shall be 3/4" x .020 ~~galvanized~~ Signode ¹ or Gerrard type bands with seals, on 9" centers.

Insulation securement for vessels and tanks with double layer construction shall have the inner layer secured with 3/4" x .060" ~~galvanized~~ S.S. bands on 12" centers. The outer layer shall be secured with 3/4" x .020" ~~galvanized~~ S.S. bands, with seals, on 9" centers.

A 1/4" single ~~sincora~~ trowel coat of finish cement shall be applied over the layer of blocks. Weather-proof compound finishes shall be reinforced with 19 ga. x 1" galvanized hex mesh carefully fitted and securely laced.

Where horizontal insulation support rings are provided.

002967

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such rings shall be flashed with 24 ga. ^{S.S.}galvanized iron. Stainless steel flashing shall be provided at the edge of tank roofs to prevent roof run-off from creeping behind insulation on vertical walls of tank.

Where vertical tie bars are provided, such bars shall be

flashed with 16 ga. ^{S.S.}galvanized iron.

3.84 Equipment

Baldwin-Hill No. 1

Mineral wool insulating cement or approved equal shall be used to insulate equipment on which blocks can not be used. Monolithic insulation 1-1/2" and thicker shall be reinforced at mid-thickness with a layer of galvanized hex mesh 19 ga. x 1".

Equipment not exposed to the weather shall be finished with Baldwin-Hill Powerhouse Cement. Equipment exposed to the weather shall be weather-proofed with Baldwin-Hill "Weatherseal" or approved equal reinforced with 19 ga. x 1" galvanized hex mesh carefully fitted and securely laced.

~~Glaofab may be substituted for reinforcement of the weather coat.~~

Thickness of insulation shall be in accordance with Tables I, II, III, attached, except where Insulation Schedule Sheets differ.

4.0 METHODS OF APPLICATION

4.1 Application of Piping Insulation

4.1.1 All lines 23" in O.D. and under shall be covered with sectional or segmental pipe covering in three foot joints. When pipe covering is of combination or two layer construction, the second layer shall be applied with full staggered joints, and each layer shall be secured

002968

independently. All lines over 23" in diameter shall be covered in accordance with specifications for tanks and vessels. Circumferential joints shall be staggered and longitudinal joints shall be 45° off from normal centerline except where hangers or supports require otherwise. Ragged or open joints shall be "filled" with monolithic insulation, but without "overspread" onto the surface of the pipe insulation.

Piping insulation shall be tied in the following manner:

Lines 8" and smaller	-	Minimum of 4 ties per joint
Lines 10" to 16"	-	4 ties per joint
Lines 18" and larger	-	4 bands per joint

4.12 Metal jackets shall be machine rolled to fit OD of pipe insulation and applied with approximately 3" laps at longitudinal and circumferential joints. The metal jacket shall be secured in place with aluminum bands. The laps in metal shall be placed or located in such a manner as to be "away from the weather" and where least conspicuous. Where metal jackets must be applied, a protective barrier shall be installed between the insulation and the metal. This barrier may be either an asphalt saturated felt paper applied between metal and insulation, or a coat of asphalt cut back material applied directly to the metal prior to its application.

002969

The roofing jacket for pipe insulation shall be cut to fit with a lap of approximately 3" both at longitudinal and end laps and applied with laps "away from the weather."

The roofing jacket shall be secured in place with
1/2" x .02 TP304 SS bands on approximate 12" centers.

- 4.13 Flanges and valves shall be insulated only in steam lines, and in process lines when required for personnel protection.

In cases where flanges and valves require insulation they shall be insulated with molded sectional pipe insulation of the same material as the adjacent pipe insulation neatly cut to fit and secured in place with wire loops, using not less than two loops per flange. These wire loops are to be countersunk flush with the insulation surface. The

surface of the insulation shall be reinforced with one
304 OR EQUAL HEX. MESH
② layer of ~~Glasfab~~ neatly cut to fit and secured in place with a light coat of Johns-Manville Insulkote-ET or equal.

The flange insulation shall then be finished with a 1/4" wet coat (1/8" dry) of Insulkote-ET or equal. Pipe insulation shall be stopped short of uninsulated flanges and unions a sufficient distance to permit removal of bolts or slipping of the union nut. In cases where pipe insulation is finished with Aluminum, these terminus ends are to be finished with Alumaseal. In cases where pipe insulation is finished with roofing paper, these terminus ends shall be finished with Insulkote-ET or equal. Terminus ends are to be finished off to a 45°

② *304 OR EQUAL HEX. MESH*
bevel and reinforced with ~~Glasfab~~ secured in place with a light coat of specified finishing material.

002970

Weld ells, 2" pipe size and larger, shall be insulated with prefabricated covers made in two half-sections

from molded pipe insulation of the same type and thickness as the adjacent pipe insulation. These ell covers are to be made of proper length to extend 1" onto the pipe for pipe size 2", this overlap to increase as pipe size increases, progressing to a 2" overlap at 8" pipe size. The ell covers shall be secured in place with 16 gage galvanized steel wire loops, not less than two loops per cover for 3" pipe size and below and not less than 3 loops per pipe sizes 4" through 12", 4 loops for pipe sizes 14" and larger. The wire loops are to be neatly countersunk flush with the surface of the insulation.

The surface of the weld ell cover shall be reinforced

②

304 OR EQUAL HEX. MESH -
with ~~Glasfab~~ and finished with the same type and thickness material as that specified for flange and valve insulation.

Weld tees, caps and reducers shall be insulated and finished with the same material as the adjacent pipe insulation. Weld ells and screwed fittings 1-1/2" pipe size and smaller shall be insulated with a combination of insulation cement and pipe insulation, and finished in a manner similar to the flange and weld ell insulation. All possible care should be exercised in an effort to prevent the necessity of any painting of the finished fitting until the insulation and its finish is dry.

- 4.14 A metal stop or support shall be provided at the bottoms of all pipe insulation on vertical lines in sizes 4" and over and where lengths involved exceed 10 feet. These stops shall be furnished in place by contractor.

002971

4.15 Steam traps and outlet piping from steam traps shall not be insulated except where required for personnel protection. Piping leading from drip legs to traps for superheated steam lines should be insulated. Piping from drip leg to trap for saturated steam lines should not be insulated.

4.16 No insulation shall be applied to any piping prior to completion of hydrostatic testing without the written consent of Contractor.

4.17 Steam traced piping shall be insulated as indicated on Drawing. Steam tracer will be installed by contractor.

4.2 Application of Insulation for Pumps and Turbines

4.21 Pumps and turbines requiring insulation shall be insulated with insulation plastic (Monolithic) applied in several layers to the total specified thickness and reinforced at midthickness with galvanized mesh in an approved manner. The final coat of plastic is to be troweled to a true and even surface. Over the final layer of plastic shall be applied a layer of ~~Glasfab~~ *304 OR EQUAL HEX. MESH* neatly fitted and secured in place by a light coat (1/8") of Insulkote-ET or equal, and followed by a 3/8" wet coat of Insulkote-ET or equal.

4.3 Application of Tower and Vessel Insulation

4.31 Towers and vessels requiring insulation shall be insulated with block type insulation. For vessel shell diameters up through 10', the blocks shall be 6" x 36" installed to fit the vessel to which they are to be applied. For vessels larger than 10' OD, flat rectangular blocks 12"

002972

wide x 36" long shall be used. For vessels diameter 23" OD and smaller molded sectional pipe insulation or curved segments may be used on vessel shell. The wide, or outside dimension of the beveled lag shall conform closely to the following:

<u>Vessel Diameter</u>	<u>Outside Maximum Width of Lag</u>
12" to 24"	3"
25" to 30"	3-1/2"
31" to 36"	4"
37" to 42"	4-1/2"
43" to 48"	5"
49" to 54"	5-1/2"
55" to 72"	6"

4.32 Blocks shall be applied to vessel shells with staggered joints, starting at bottom of vertical vessel or end of horizontal vessels, with alternate half-length and full length blocks or lags, and secured in place with the specified bands, machine stretched and fastened on approximately 9" centers. Bands are not to be tightened and fastened beyond a point of removing "slack" in the course of blocks. In cases where two layers of blocks are required on either vertical or horizontal vessels, the inner layer of blocks shall be secured with 3/4" x S.S.

① .020" ~~galvanized~~ bands spaced on approximately 12" centers.

Blocks ^{shall} be installed by cementing to the vessel with Baldwin-Hill "Bondtite" or equal. Where required, necks of nozzles and manways shall be insulated with pipe covering or mitered blocks leaving sufficient distance for removal of bolts. Terminus of insulation shall be beveled and sealed with Eagle Picker "Stalastic." ^{OR EQUAL} ③

Such joints in the blocks as are not closely fitted shall

002973

be filled with insulating cement.

Where required, the vessel heads shall be insulated with rectangular 6" wide blocks neatly fitted. Insulation on top heads is to be secured by 14 gage wire securely fastened to studs or lugs as required. Insulation on bottom heads is to be secured by 14 gage wire securely fastened to, 1/2" studs tack welded on 12" square pitch.

After the blocks have been applied and secured in place on vessel heads, care shall be exercised to be certain that any and all open joints are filled with insulating cement.

Approximately 1" expansion space is to be left for insulation under the circumferential angle support rings provided. This 1" space shall be packed with loose mineral wool. Vertical expansion joints shall be provided where required to prevent buckling or pulling apart of the insulation during operation.

- 4.33 After the insulating blocks are secured in place and the operations described in the foregoing paragraphs are completed, the insulating blocks shall be covered with a 1/4" thickness of quick-setting insulating cement to give a dry thickness of not less than 1/8". The cement coat shall be troweled to a neat, smooth finish.

A weatherproofing finish of Baldwin-Hill "Weatherseal" OR EQUAL shall be applied to a thickness of 1/4" wet (1/8" dry) over 19 ga. x 1" galvanized hex mesh reinforcement neatly stretched and laced in place.

002974

All openings through the insulation shall be flashed weather-

tight by methods acceptable to the Contractor.

Expansion joints shall be constructed in accordance with details approved by Contractor.

4.4 Application of Tankage Insulation

4.41 For tanks ~~under 12 ft. in diameter~~, the material and method of application shall be the same as specified for vessels.

4.42 ~~Tanks 12 ft. in diameter and over all shall be covered with blanket insulation of the type specified.~~

4.43 Blanket insulation shall be applied in standard 24" x 96" sections with longest dimension horizontal. Each blanket of insulation shall be held in place by two .02 x 3/4" S.S.

 ~~galvanized steel Signode or Gerrard bands.~~

4.44 Final covering shall consist of standard Johns-Manville Flexboard sheets, or equal, 3/16" x 48" x 96", secured over insulation by means of shoulder studs welded to sides of tank, and further secured by means of stainless steel "S" clips and 3/4" x .020" stainless steel bands. Shoulder studs shall have stainless steel tips for stainless steel nuts and washers. Three shoulder studs and three "S" clips shall be used for each 48" x 96" Flexboard sheet. Flexboard sheet shall be lapped 3" at horizontal joint with upper sheet overlapping lower sheet so as to shed water. Two circumferential stainless steel bands, one at lap and one spaced equal distance between the laps shall be placed over the Asbestocite sheets, drawn tight and held in tension by special tension units spaced on 75 ft. to 100 ft. centers. Vertical joints shall be sealed by means of

002975

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~~stainless steel battens 4" wide x 48" long placed over
the space between the ends of the sheets and secured by
the studs. Lower end of each batten shall overlap ad-
jacent lower batten 3". Shoulder plates on shoulder
studs shall hold Asbestocite sheets a distance from tank
shell equal to thickness of insulation.~~

4.45 Roofs will not be insulated unless so specified.

002976

TABLE I - PIPE INSULATION

PIPE SURFACE TEMPERATURE

PIPE SIZE	to 480 F	to 780 F	to 980 F
1/2-inch	1-inch	1 1/2-inch	2-inch
3/4	1	1 1/2	2
1	1	1 1/2	2
1 1/2	1	2	2 1/2*
2	1 1/2	2	2 1/2*
3	1 1/2	2 1/2*	3*
4	1 1/2	2 1/2*	3*
6	1 1/2	2 1/2*	3*
8	1 1/2	2 1/2 △	3 1/2*
10	1 1/2	2 1/2 △	3 1/2*
12	1 1/2	3*	3 1/2*
14	1 1/2	3*	3 1/2*
16	1 1/2	3*	3 1/2*
18	1 1/2	3*	3 1/2*
20	1 1/2	3*	3 1/2*
24	1 1/2	3*	3 1/2*
DUCTS	1 1/2"	—	—

*Indicates double-layer construction required.

Personnel Protection. Standard insulation applied as shown on drawings
 OR DUCT
 to any line having a temperature of over 140° F within three feet of a
 working space, shall be insulated for a length sufficient to protect a
 man working in that space.

002977

TABLE II - EQUIPMENT INSULATION

<u>MACHINE SURFACE TEMPERATURE</u>	<u>THICKNESS</u>
150 to 175 F	1-inch
175 to 325 F	1 1/2
325 to 550 F	2
550 to 750 F	2 1/2
750 to 950 F	3

TABLE III - ^{TANK} VESSEL INSULATION

<u>VESSEL SURFACE TEMPERATURE</u>	<u>THICKNESS</u>
Up to 300 F	1 1/2-inch
300 to 450 F	2
450 to 600 F	3

002978

002979

002980

002981

ADDENDUM
TO
INSULATION SPECIFICATION
SF3-1003
REYNOLDS METALS CO.
JOB 2473

Steam-lines are insulated for heat-conservation. Process and utility lines are, in general, not insulated with the following exceptions:

<u>DESCRIPTION</u>	<u>I - INSULATION</u> <u>P - PROTECTION</u>
Strong-Liquor to Digester-Preheaters 145°	P ok
Strong-Liquor from Preheaters to Digesters 335°	P ok
Strong-Liquor from Preheaters to Rod-Mill 200°	I -
Slurry from Rod-Mill to Digester Feed-Tank 175°	P
Digester Feed-Tank to Digesters 175°	P
Vapor-Lines from Flash-Tanks to Preheaters —	I
Digesters to Flash-Tanks —	P
Digester Relief-Header	P
Flash-Tanks to Diluters 231°	P ✓
Condensate-Bypass to Wash-Water Collect-Tank	I ✓
Condensate from Digester-Preheaters to	
Condensate-Collect Tank 186°	I ✓
Causticized-Starch to Diluters —	P ✓
Diluters to Liquor-Settlers 231	P
Liquor-Settler Underflow to Washers 210 —	P
Liquor-Settler Overflow to Filter Feed-Tank 216	I
Wash-Water to Washers 212	I ✓
Washer-Overflow to Vacuum Flash-Tank 200	I
Washer-Underflow to Mud-Relay Tank 200	P
Condensate-Lines from Evaporator-Preheaters to	
Wash-Water Collect Tank 145	I
Filter Feed-Tank to Filters 216	P
Filters to Cloudy-Filtrate Tank	P
Cloudy-Filtrate Tank to Filter Feed-Tank	P
Filters to Clear-Filtrate Tank 214	P
Clear-Filtrate Tank to Exchangers 214	P
All Hot Piping at Evaporators with exception	
of Barometric-Unit	I
Vacuum E-5 Exchanger to Barometric Condenser	I

OVER 1400 FOR PERSONNEL PROTECTION

Title: Equipment Insulation Revision

August 8, 1956

Subject: B/M 4-15

Job No. 2473

Equipment	Number	Bottom El.	Vert. or Horiz.	Size	°F Temp.	Estimated Nozzles	Insul.
Digesters (6)	30V22-7	About 10'	V	10' 1/2 x 30' + El 1	390°	2-12", 1-10", 2-24" MH 1-4" All in Hds.	2"
Flash Tanks (2)	30V32, 34	About 15'	V	6' 0" x 25' + 60°C	358 390°	1-18", 1-24", SMH, 1-12" 2-8", 1-6", 2-1", 1-24" + 1-12" V-34	2"
" "	30V36	About 12 1/2'	V	9' 0" x 25' + 60°C	329°	2-24" SMH 1-24", 2-12", 1-18", 4-8" & 1-1"	2"
" "	30V38	About 8'	V	13' 1/2 x 25' + 60°C	290°	3-24", 2-18" MH 1-20", 1-16", 2-14", 2-8", 1-10", 2-1"	1 1/2"
Digester Pre-Htr. (2)	30E17	About 3'	H	1 1/2' x 25'	150°	2-6", 1-10", 1-8"	None
" " " (3)	30E25A	About 3'	H	"	220°	Same	1 1/2"
(1) " " " (2)	30E25A, B	About 3'	H	"	290°	Same	1 1/2"
(1) " " " (3)	30E25A, B, C	About 3'	H	"	330°	Same	2"
Wash. W. Coll. Tks.	33T24	About 6'	V	15' 1/2 x 20' + 60° Cone	210°	3-12", 1-30" MH	1 1/2" S&B
Wash O'Flo. Coll. Tk.	33T23	About 0'	V	40' 1/2 x 25'	200°	4-12", 1-16", 1-20" + 1-24" MH	1 1/2" S
Red Mud Settler (2)	33T25 & 6	"	Cone B	30' 1/2 x 20'	230°	1-10" Bott.	1 1/2" S
Red Mud Washer	33T34	" 0'		55' 1/2 x 50'	210°	4-3' x 2' MH	1 1/2" S
x Flash Baro. Hot Well	33T43	" 9 1/2'	V	12' 1/2 x 12' + 40° Co.	208°	1-12", 1-8"	1 1/2" S&B
x Settler O'Flo. Re. Tk.	33T44	" 8'	V	12' 1/2 x 12' + 15° Co.	230°	2-16", 1-14", 1-12", 1-10", 1-6", 1-24" MH	1 1/2" S&B
Filter Feed Tk. (2)	35T40, 1	" 0'	FB	40' 1/2 x 30'	220°	2-14" 2- MH	1 1/2" S
Filter Wk. Ht. Tk.	35T44	" 0'	FB	20' 1/2 x 20'	210°	1-6", 2-2" S 4-3", 1-1" Roof	1 1/2" S
Cloudy Filtrate Tank	35T42	"	FB	10' 1/2 x 15'	211°	2-12", 1-8", 1-6", 1-4", 1-24" MH	1 1/2" S

002983

Equipment	Number	Bottom Elev.	Vertical Hops.	Size	Temp. °F	Estimated Nozzles	Insul.
Clear, Filtrate Tk.	35743	About 0"	VS	20" x 20"	214°	3-12", 1-16", 4-4", 1-12", 2-24" + 1-20" MH	1 1/2" S
Kelly Filters (10)	35722-38	About 34"	H	6" x 18"	216°	Shell & 1 Head	1 1/2"
Elec. Precip. (2)	50x15, 6	About 75"		20x10x13 1/2"			1 1/2"
Multicolumns (2)	50x15, 6	About 75"		13x11x13"			1 1/2"
Diluters	33V5	"		6" x 17" + 60° Co.	230°	1-16", 4-24", 4-3", 1-4", 1-24" MH	1 1/2"
Leaf Cl., Cause. Stor.	35745	"		10" x 10"		1-6", 4-4", 1-2", 2-2 1/2", 1-24" MH	1 1/2"
Leaf Clean Vats.	35746	"		5x6x15		2-4", 2-2", 2-2 1/2"	(PP) 5 (6)
1/2 Flash Drums	110	"	V	3" x 10"	300°		1 1/2" All
DeAir Pre.Htr.	110	"	V	10" x 6"	300°		1 1/2" "
DeAir.Htr.Stor.	110	"	H	11" x 30"	300°		1 1/2" "
Blowdown XChgr.	110	"	H	14" x 16"	300°		1 1/2" "
Feedwater Htr.	110	"	H	20" x 7"	600°		2 1/2" "
Evaporators 5-Effect. (2)	42	" 11"	V	5 1/2" x 28" 2-60° Co.	190- 220°	2-24" + 22"	1 1/2" "
Evaporators SOD (1)	42	" 11"	V	7 1/2" x 28" 2-60° Co.	168°	2-30" + 1-28"	1" "
Hotwells (3)	42	" 16 1/2"	V	12, 17, 19" ø x 10	125° 160°	2-24" + 1-28" 2-30" + 1-42" 2-30" + 1-54"	None " " " "
Hotwells (2)	42	" 48 1/2"	V	30" x 10"	190°	2-24" + 1-22"	" "

The following equipment is not to be contract insulated:

Evap. Preheaters	Not supplied
Air Comp. Aftercoolers	Not required
Steam Turbines	By Suppliers
Boilers and Breechings	" "
Turbo Generators	" "
Pumps, Coolers, Hoppers and Ducts	Not required

(1) Except Ends

x Insulate Roof

S Sides

B Bottoms