BECHTEL 4TH UNIT

[redacted]

#7

BECHTEL CORPORATION

San Francisco Office
220 Bush Street
San Francisco 4

Los Angeles Office
3780 Wilshire Blvd.
Los Angeles 5

SUBCONTRACT

Date: August 13, 1958
Subcontractor: THE GILMIN COMPANY, INC.
1207 Whelan Street
Corpus Christi, Texas

Contractor's Job No.: 2678
Subcontract No.: 2678-FS-14
Issuing Office: Corpus Christi, Texas

Principal Contract:
Date:
Owner: Reynolds Metals Company
Location of Work: Sherwin Plant near Gregory, Texas

BECHTEL CORPORATION, herein called "Contractor," and the above named Subcontractor, herein called Subcontractor, hereby agree that the portion of the Principal Contract work below specified shall be performed by Subcontractor in accordance with all the requirements of the Principal Contract applicable thereto and the provisions hereinafter stated, including the General Terms and Conditions printed on pages 3 and 4 hereof, which by this reference are incorporated herein. Subcontractor acknowledges that it is familiar with the requirements of the Principal Contract applicable to the work to be performed hereunder:

1. (a) Work to be performed:

Subcontractor shall provide all labor, tools, equipment, services, supervision and materials necessary to furnish and install insulation to the following equipment in Facility 50 at subject job:

Buell Mechanical Dust Collectors 50-X-7 and 50-X-14; Dustex Mechanical Dust Collectors 50-X-15, 50-X-16, 50-X-17, 50-X-18; Kiln I. D. Fans 50-TF-23, 50-TF-41, 50-TF-42, 50-TF-43 and 50-TF-44; and Duct Work for above equipment as indicated on the drawings.

All work shall be in accordance with the instructions of Contractor's construction superintendent, drawings, specifications and letters listed below in paragraph 1 (b). Specifications, drawings and letters are by this reference incorporated in this subcontract and become a part hereof.

(b) Plans, drawings, specifications:

~~See "Schedule A".~~

See "Exhibit "A".

2. Items to be furnished by Contractor:

(a) Water, electric power & lights at existing outlets.
(b) Sanitary Facilities
(c) Area for storage
(d) Mesh & Framing
(e) Air Tugger Hoist (bare)

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3. Time of Commencement:

Subcontractor shall commence its work when directed to do so by Contractor's construction superintendent.

Time of Completion:

Subcontractor shall prosecute its work with due diligence and in accordance with Contractor's project schedule. All work shall be completed prior to October 1, 1958.

4. Compensation:

Lump sum price of TWENTY NINE THOUSAND, NINE HUNDRED THIRTY FOUR AND NO CENTS ($29,934.00)

Additional Personnel Protection not noted on prints - $1.52 per square foot.

This lump sum amount is firm and no escalation will be considered, and invoices totaling in excess of this amount will not be paid unless so authorized by the Purchasing Department and a Change Order to this subcontract.

Terms of Payment:

At the end of each calendar month Contractor will pay Subcontractor 90% of the value of the work performed and/or materials delivered in that month. The balance will be paid not later than 35 days after final completion and acceptance of the work performed under this Subcontract.

5. Insurance Required:

Coverage	Amounts and Limits
Workmen's Compensation	Statutory Limits
Public Liability	$100,000. - $200,000.
Property Damage	50,000.
Automobile Public Liability	100,000. - 200,000.
Automobile Property Damage	25,000.

6. Bonds Required:

Performance and Payment Bond equal to 100% of the value of this Subcontract.

7. Special Provisions:

(a) Evidence of executed certificates of insurance to be in our hands before work commences. These certificates to be mailed to Bechtel Corporation, P. O. Box 2226, Corpus Christi, Texas.

(b) Subcontractor agrees that it understands Paragraphs 4 and 5 of the general terms and conditions of this Subcontract, whereby any work performed outside of the original scope of this Subcontract shall only be by prior written approval with agreed price and effect on schedule defined.

(c) Patents: Subcontractor will hold Contractor and Owner harmless from any cost or damages arising out of alleged or actual patent infringements of articles or material furnished by Subcontractor under this Subcontract.

IN WITNESS WHEREOF, the parties hereto have executed this Subcontract the day and year first above written.

REYNOLDS METALS COMPANY

By R. P. Christman

CONTRACTOR:

BECHTEL CORPORATION

By
Title Vice President

SUBCONTRACTOR:

THE GILMIN COMPANY, INC.

By C. J. Lopez
Title President

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BECHTEL CORPORATION

CHANGE ORDER

Owner: Reynolds Metals Company

Date: October 29, 1958

Job: 2678

Name: The Gilmin Company

Subcontract No. 2678-PS-14

Address: P.O. Box 4081

Change Order No. 1

Corpus Christi, Texas

Description of Change

This Change Order is issued to record final total amounts of this Subcontract as follows:

Contract	$29,334.00
E.W.A. No. 1	4,235.20
E.W.A. No. 2	101.02
E.W.A. No. 3	419.20
E.W.A. No. 4	3,373.18
Final Total	$38,667.60

Settlement shall be made with Subcontractor for the total amount of $38,667.60, less any and all progress payments previously made.

All other terms and conditions of the Subcontract remain unchanged.

Reason for Change

To record final total

Estimated Amount of Change

Extra $ -0- Credit

Authorized By
Reynolds Metals Company

Approved By
Bechtel Corporation

Approved By
Subcontractor
The Gilmin Company

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EXHIBIT "A"

SPECIFICATIONS:

2678-SP-M-1001-Rev.3
2678-SP-M-1002-Rev.0
Requisition 2678-M-42-Rev.2

DRAWINGS:

C-9672-01 (Buell Engrg. Co.)
50-M-2019-1
50-S-2025-1
50-S-2026-0
50-S-2028-0
M-42-SK-1-2
M-42-SK-2-0
M-42-SK-3-0
M-42-SK-4-0
M-42-SK-5-0
M-42-SK-6-0
872-C (Hahn & Clay Co.)
873-C (Hahn & Clay Co.)
874-C (Hahn & Clay Co.)
875-C (Hahn & Clay Co.)
876-C (Hahn & Clay Co.)
886-C (Hahn & Clay Co.)

LETTERS:

Letter from E. B. Skeels dated 6-27-58
Letter of Intent from W. J. Stubblefield dated 7-29-58
Gilmin's letter of Quotation dated 7-21-58
Gilmin's letter of Quotation dated 7-22-58
Gilmin's letter of Quotation dated 7-26-58

STRATHMORE DRAUGHT

Subject: Insulation of Dust Collectors

Gentlemen:

We are invited to submit your detailed proposal to provide all labor, equipment, services, supervision and materials necessary to furnish and apply insulation to mechanical and electrostatic dust collectors in Facility 2, at the subject job, located near Gregory, Texas. All work shall be in accordance with the following listed specifications and drawings, copies of which are enclosed:

Requisition 2674-M-42, Revision 2
Specification 2674-SP-M-108, Revision 2
Specification 2674-SP-M-106, Revision 0
Drawings: 50-9672-01 (Buell Engineering Company)
50-S-2019-0
50-S-2025-0
50-S-2026-0
50-S-2028-0
M-42-SK-1-0
M-42-SK-2-0
M-42-SK-3-0
M-42-SK-4-0
M-42-SK-5-0
M-42-SK-6-0
M-42-SK-7-0, Sheets 0 through 6

In order that you may understand the requirements for this work, we present the following:

1. The dust collectors are being insulated to prevent excessive moisture condensation on the steel plate walls, particularly on those portions of the units where this condensation would have a tendency to creep into dust collection hoppers. As you will note in the material requisition, the [illegible]

OPAQUE

RAG CONTENT US A

STRATHMORE BOND

THE Gilson COMPANY

July 21, 1958

The Bechtel Corporation
62 First Street
San Francisco, California

Attention: Mr. E. B. Skeels
Subject: Job 2678 - FAC -50, Insualtion

Gentlemen:

We respectfully furnish the following quotation on the furnishing of necessary labor, materials and equipment to insulate the four (4) Dustex Collectors, one (1) Mechanical Collector, one (1) Electrostatic Collector and five (5) I. D. Fans at the Reynolds Metals Company Sherwin Plant near Gregory, Texas.

With the exception of the Dustex hoppers and all roofs the entire surfaces to be insulated are to be either "boxed" or covered with 6" x 6" x 10 gage electric welded wire fabric (road mesh) by others. On areas such as the electrostatic collector where the columns extend further from the sides than the stiffeners additional supports and spacers such as Universal high chair bolsters will be required to form a rigid backing for the insulation. Number of supports and spacers to be determined from the size of the area being covered.

We then propose to tie on with 14 ga. wire 24" x 96" x 1½" thick Baldwin-Hill Type 2B blanket having 1" Hex Chix wire on one side and 3/8" hi-rib lath on the other. The hi-rib lath to face out which would give additional strenght to the insulation and an excellent base for the finish. These blankets will be in excess of 8 lb. density. We have approximately 4,800 square feet in stock to begin the work. All external corners & edges will be reinforced with expand metal lath corner bead. We will then apply one trowel coat of approximately ¼" thick Baldwin-Hill No. 1 insulating cement. one layer of 1" hex galvanized chix wire and finish coat ¼" thick when wet of Flintkote C-13A Weatherproofing.

The Dustex hoppers will be insulated with 1½" thick Kaylo insulating blocks, secured with criss-cross wiring, corner beads and finished as per above.

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On roof areas where walking is required to get to access doors, etc. 1½" "Kaylo" blocks will also be applied. All other areas will receive blankets.

THE Gilmin COMPANY

All personal protection will be 1½" "Kaylo" blocks and finished as above.

By applying insulation as recommended above we feel it will be very possible to improve on your estimated completion schedule.

Our price for the above will be Twenty-Nine Thousand Nine Hundred Thirty-Four Dollars and No Cents ($29,934.00). Unit price for any additional Personnel Protection not noted on prints will be $1.52 per square foot. Terms of payment to be 90% of all completed and accepted work monthly. Our price includes the furnishing of a performance bond to be issued by American Surety Company of New York. By separate letter from their local agent bond coverage is assured.

As discussed and agreed, The Gilmin Company, Inc. will be allowed to make use of the air tugger at the structure, but will furnish the operator. Should we require any welding to be done Bechtel Corporation will furnish us with the welder and machine and back charge The Gilmin Company, Inc. for cost of same.

With sufficient materials on hand to insulate approximately 35% of the total job and sufficient materials to apply the entire finish coats there would be no delay due to material delivery.

We thank you for the opportunity of submitting the above.

Yours very truly,

THE GILMIN COMPANY, INC.

C. J. Lopp

C. J. Lopp

CJL/bf

THE Gilpin COMPANY

July 22, 1958

The Bechtel Corporation
62 First Street
San Francisco, California

Attention: Mr. E. B. Skeels
Job 2678 - Fac-50 Insulation

Gentlemen:

Confirming telephone call this date the following is a breakdown of our firm price quoted July 21, 1958.

Electrostatic Collector	$6,355.95
Mechanical Collector	6,487.93
Duct for above	509.66
(4) Dustex, Fans & Duct	15,765.19
(1) Additional Fan	815.27
	$29,934.00

We also wish to add to the specifications the corners will be fleshed with mastic and Perma Glas-Mesh for additional protection and sealing.

Yours very truly,

THE GILPIN COMPANY, INC.

C. J. Lopp

C. J. Lopp

CJL/bf

RECEIVED
JUL 24
BECHTEL CORP.

003053

THE Gilmin COMPANY

"F/ Insulation"
Jan 50 - Dec 60

July 26, 1958

The Bechtel Corporation
62 First Street
San Francisco, California

Attention: Mr. E. B. Skeels
Job 2678 - Fac-50 Insulation

Gentlemen:

The following is to become a part of our quotation of July 21, 1958 regarding the insulation of subject work at Reynolds Metals Company Sherwin Plant.

The Gilmin Company, Inc. will guarantee the provisions of Item No. 8 of your June 27, 1958 inquiry on the basis of The Bechtel Corporation and/or others providing us with a solid base as specified by us to which we will secure the insulation as outlined by us.

In discussing the base with the field we wish to advise the word "solid" refers to a base that is adequately rigid.

Yours very truly,

THE GILMIN COMPANY, INC.

C. J. Lopp

C. J. Lopp

CJL/me

cc: The Bechtel Corporation
P. O. Box 2226
Corpus Christi, Texas
Mr. J. H. Battin

003054

RECEIVED

JUL 28

BECHTEL CORP.

BECHTEL CORPORATION ENGINEERS-CONSTRUCTORS

TWO TWENTY BUSH STREET · · SAN FRANCISCO 4, CALIFORNIA

Please address reply to: P. O. Box 2226
Corpus Christi, Texas
July 29, 1958

The Gilmin Company, Inc.
1207 Whelan Street
Corpus Christi, Texas

ATTENTION: Mr. C. J. Lopp

SUBJECT: Reynolds Metals Company
Sherwin Plant Expansion No. 4
Bechtel Corporation Job 2678
Facility 50 - Dust Collector Insulation
Letter of Intent

Gentlemen:

This letter is your authority to proceed with the insulation of the following equipment in Facility 50.

Buell Mechanical Dust Collector	50-X-7
Buell Electrostatic Dust Collector	50-X-14
Dustex Mechanical Dust Collector	50-X-15
Dustex Mechanical Dust Collector	50-X-16
Dustex Mechanical Dust Collector	50-X-17
Dustex Mechanical Dust Collector	50-X-18
Kiln I. D. Fan	50-TF-23
Kiln I. D. Fan	50-TF-41
Kiln I. D. Fan	50-TF-42
Kiln I. D. Fan	50-TF-43
Kiln I. D. Fan	50-TF-44

Duct Work for above equipment as indicated on the drawings.

The above work is covered by the Bechtel Specifications and Drawings listed below which were used by you in the preparation of your written lump sum bid in the amount of $29,934.00.

Before proceeding with this work, we will require copies of your insurance policies and a performance and payment bond equal to 100% of the value of this subcontract.

In the near future you will receive a formal subcontract from this office for your signature. After it has been fully executed, you will be forwarded your copy.

In order to avoid any possible future misunderstanding, we would like to make the following points clear:

1. The actual insulation materials and techniques of application are to be as outlined in your quotation. You guarantee the finished system to withstand winds of up to 100 M.P.H. in velocity.

2. Insulation of ductwork, as shown on the drawings below, is included in your quotation.

3. Bechtel will install all framing after approval by you.

4. Gilmin Company is to supply and erect their own scaffolding.

If the above meets with your approval, please sign the attached copy and return to this office.

Specifications: 2678-SP-M-1001, Rev. 3
2678-SP-M-1002, Rev. 0
Requisition 2678-M-42, Rev. 2
Letter from E. H. Skeels, dated June 27, 1958

Drawings: C-9672-01 (Buell Engrg. Co.)
50-M-2019-1
50-S-2025-1
50-S-2026-0
50-S-2028-0
M-42-SK-1-2
M-42-SK-2-0
M-42-SK-3-0
M-42-SK-4-0
M-42-SK-5-0
M-42-SK-6-0
872-C (Hahn & Clay Co.)
873-C (Hahn & Clay Co.)
874-C (Hahn & Clay Co.)
875-C (Hahn & Clay Co.)
876-C (Hahn & Clay Co.)
886-C (Hahn & Clay Co.)

Drawings: (Cont.)

887-C (Hahn & Clay Co.)
888-C (Hahn & Clay Co.)
889-C (Hahn & Clay Co.)
890-C (Hahn & Clay Co.)
SW-39477 (Buffalo Forge Co.)

Yours very truly,

BECHTEL CORPORATION

W. J. Stubblefield

W. J. Stubblefield
Project Superintendent

JHS:lr

CC - J. P. Marvin
R. C. Roberts
H. T. Christmen
E. C. Rodgers
S. J. Martin
K. B. Skeels

APPROVED:

THE GILMIN CO., INC.

BY C. J. Lopez

TITLE President

DATE August 4, 1958

BECHTEL CORPORATION — POWER DIVISION ENGINEERING

REQUISITION

SHERWIN ALUMINA PLANT EXPANSION
UNIT NO. 4 - REYNOLDS METALS CO.

MATERIAL

PIPE AND EQUIPMENT INSULATION

ATTACHMENTS: SPEC. 2678-M-1001, 2678-M-1002
DWG. M-42-SK-1, M-42-SK-2, M-42-SK-3, M-42-SK-4 (2)

COST CODE

MATERIAL REQ'D AT JOB SITE NOT LATER THAN

REQUIRED FOR: REYNOLDS METALS CO.

SHOP INSPECTION REQ'D [ ] NOT REQ'D [X]

FURNISH AND DELIVER TO: Bechtel Corporation c/o Reynolds Metals Company, Sherwin Plant, Gregory, Texas.

△	ITEM NO.	QUAN. AND UNIT	DESCRIPTION	
			This requisition covers the furnishing and installation of insulation for piping and equipment per attached specifications and schedules and as described below.	
	1		Furnish and install thermal insulation on new piping in accordance with attached specification 2678-SP-M-1001, and as further described in this requisition.	
	2		Furnish and install thermal insulation on new tanks and vessels in accordance with attached specification 2678-SP-M-1001 and as further described in this requisition.	
	3		Furnish and install, or repair, thermal insulation on existing piping, tanks and pressure vessels in accordance with attached specification 2678-SP-M-1001 and as further described in this requisition.	
				003058

Rev	Date	Description			
△					
2	7-2-58	Added item 5 & SK-4 for Quotes. Rev Equip. List SK-1. Added Warranty. Rev Spec. SP-M-1001 as noted.	PMC HW		RLS
1	5/14/58	Added item 4, revised equipment list Dwg M-42-SK-1 & Issued for Subcontract			
0	[illegible]	Issued for quotation			

JOB NO. 2678

REQ'N NO. M-42

REV.

SHEET [illegible] OF [illegible] SHEETS

REQUISITION

	ITEM NO.	QUAN. AND UNIT	DESCRIPTION
	4		Insulation on steam traced instrument piping: A layer of 1/8" thick asbestos paper between steam and instrument piping, secured with tape and wire, and a layer of J-M Aerolag Duct Insulation (or approved equal) 1" thick, 1# density wrapped around both pipes and stapled in place and finished with J-M Flexstone (or approved equal) with final cover of Reynolds aluminum jacket. Finish bends and terminus ends with Glasfab and Insulkote (or approved equal). Where several lines are together or too close to insulate separately, they shall be insulated together, but in all cases instrument piping & steam tracing shall be separated by at least 1/8" at all points. Vendor shall quote a price per lineal foot for this work. Work shall be performed as directed by Purchaser's Field representative, per Specification SP-M-1001, Figure 19.
2	5	1	Furnish and install thermal insulation on Kiln No. 7, Buell, mechanical dust collector in accordance with attached Specification 2678-SP-M-1001, dwg. M-42-SK-4 and the following reference drawings:
			a. Insulation Framing: 50-S-2028
			b. Kiln Head House: 50-M-2019
			c. Kiln Head House: 50-S-2025
			d. Collector Platforms: 50-S-2026
			e. Buell Outline: C-9672-01

000059

NO.	DATE	REVISIONS	APPROVALS

JOB NO. 2678

REQ'N NO. M-42 REV. 7

SHEET 2 OF 6 SHEETS

G-321-B 8-16-56

REQUISITION

△	ITEM NO.	QUAN. AND UNIT	DESCRIPTION
		A.	SCOPE OF WORK:
			1. The Sherwin Plant of the Reynolds Aluminum Co. is an existing installation located near Corpus Christi, Texas. The plant includes complete facilities for receiving Bauxite ore from ocean going vessels and processing to produce alumina suitable for smelting. An expansion of this plant is in progress which shall be referred to in all correspondence etc. as "Sherwin Plant Unit No. 4". The insulation called for on this requisition shall include, but not be limited, to all new insulation required to complete this expansion project.
			2. Piping to be insulated will be indicated on the "Piping and Instrument Diagrams", which take precedence over any other drawings, and will be shown on the construction drawings where required for reference. These drawings will be furnished to the successful bidder in sufficient time for him to make material takeoffs and schedule his work.
			3. Equipment tanks and vessels to be insulated will be indicated on the attached "Equipment List" drawing M-42-SK-1. The successful bidder will be given equipment drawings showing the scope of insulation required

NO.	DATE	REVISIONS	APPROVALS
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△			
△			
△		003060	
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JOB NO. 2678

REQ'N NO. M-42 REV 2

SHEET 3 OF 6 SHEETS

8-321-8 8-16-56

REQUISITION

△	ITEM NO.	QUAN. AND UNIT	DESCRIPTION
			or will be otherwise directed by the Purchaser in sufficient time for him to make material takeoffs and schedule his work.
			4. Installation of new insulation, or repair to existing insulation on existing piping, equipment, tanks and vessels will be performed as required upon written request by the Purchaser.
			5. To assist the bidder to estimate the scope of work involved, a preliminary estimate of lineal feet of pipe to be insulated and square feet of tank, vessel, duct and equipment to be insulated has been prepared. See drawing M-42-SK-1 and M-42-SK-2 attached.
			6. Bidders are req'd. to visit the site to familarize themselves with the nature of the equipment, working spaces, storage spaces etc. before placing bids.
		B.	SCHEDULE OF WORK:
			Bidders attention is called to par. B-2b of specification M-1001 attached. To assist in preparing bids a "PRELIMINARY INSULATION SCHEDULE" drawing M-42-SK-3 has been prepared to indicate the approximate schedule of work required. This schedule is for estimating purposes only. The suc-

△ NO.	DATE	REVISIONS	APPROVALS

003061

JOB NO. 2678

REQ'N NO. M-42 REV 2

SHEET 84 OF 96 SHEETS

G-321-B 8-16-56

△	ITEM NO.	QUAN. AND UNIT	DESCRIPTION
			cessful bidder shall prepare his own schedule based on information received from the purchaser's construction representative on the jobsite.
		C.	METHOD OF PAYMENT:
			1. For item 1, payment shall be made on a unit price per lineal foot, for each pipe diameter and thickness, and for each type of external covering. This includes all new (not previously insulated) piping, valves and fittings thru 24" diameter. Pipe diameter over 24" shall be classed as a pressure vessel and payment made on a square foot basis.
			2. For item 2, payment shall be made on a square foot basis for each thickness and for each type of external covering.
			3. For item 3, payment shall be made on a labor and material basis.
			4. The quantities involved shall be established by actual field measurements in accordance with the Contractor's specification SP-M-1002 "Specification for Measuring Thermal Insulation for Payment".

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△	NO.	DATE	REVISIONS	APPROVALS
△				
△				
△				
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JOB NO. 2678

REQ'N NO. M-42 REV. 2Ø

SHEET 45 OF 6 SHEETS

G-321-B 8-16-56

REQUISITION

△	ITEM NO.	QUAN. AND UNIT	DESCRIPTION
		D.	INFORMATION REQUIRED WITH BIDS:
			1. Complete descriptive data of materials to be furnished; and method of application if not in exact accordance with the attached specification SP-M-1001.
			2. A COMPLETE table of prices by line size and thickness and external cover, 1/2" to 32" diameter, 1" through 3-1/2" thickness.
			3. A COMPLETE table of prices per square foot by thickness and external cover.
			4. A COMPLETE schedule for payment based on labor and material plus overhead and profit.
2		E.	WARRANTY
			Subcontractor warrants that it will perform all work under this subcontract to the best of its ability, within the limitations imposed by Specification 2678-SP-M-1001, and that it will make all reasonably necessary corrections and repairs resulting from defective workmanship or materials which are brought to its attention, in writing, within one year after the date of installation of the defective work.

003063

NO.	DATE	REVISIONS	APPROVALS
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JOB NO. 2678

REQ'N NO. M-42 REV. 2

SHEET 16 OF 60 SHEETS

0-321-B 8-16-56

G-231-E
5-24-56

REV.	DESCRIPTION	ENG	DR	CHK	SUPV	MATL	APPROVALS	DATE
2	Deleted 40-E-9&10; Rev. 50-X-7; Added 32-T-							6/12/58
1	REV AS NOTED & ISSUED FOR SUBCONTRACT							3/10/58
0	ISSUED FOR QUOTATION	DB						

BECHTEL CORPORATION
POWER DIVISION ENGINEERING

INSULATION
TANKS, VESSELS, & EQUIPMENT

UNIT 4 EXPANSION
REYNOLDS METALS CO. SHERWIN PLANT

JOB NO. 2678
DWG NO. M-42-80-SK-1
REV. 2
SCALE —

EQUIPMENT	NO. REQ.	EQPT. NO.	TEMP. °F	INSULATION	DIMENSIONS	VERT OR HORIZ	BOTT. ELEV.	EST. AREA SQ. FT. TOTAL	ESTIMATED NOZZLES	
DIGESTERS	3	30-V-28, 29 & 30	390	2" ALL	10'ϕ x 30' + ELLIPT. HDS.	V	10'	3670	Total: 5-6, 4-10", 9-12" 7-24" MH, 1-18" MH	
HIGH & MED. PRESS. FLASH TKS	2	30-V-33 & 35	390	2" ALL	6'ϕ x 25' + 60° CONE BOTT.	V	15'	1140	Total: 3-6", 6-8", 2-10", 2-12", 2-18" MH, 2-24" MH 1-28" MH, 1-32" MH	
LOW PRESS. FLASH TANK	1	30-V-37	329	2" ALL	9'ϕ x 25' + 60° CONE BOTT.	V	12½'	930	1-6", 1-8", 3-12", 1-14", 1-18" MH, 1-24" MH.	
VACUUM FLASH TANK	1	30-V-39	290	1½" ALL	13'ϕ x 25' + 60° CONE BOTT.	V	8'	1470	1-10", 1-12", 3-14", 1-16", 1-24", 1-24 MH, 2-18" MH	
HIGH PRESS. PREHEATERS	3	30-E-12A, B & C	368	2" ALL LESS HDS	4½'ϕ x 25'	H	3'	1050	Total: 3-4", 3-6", 6-8"	
MED. PRESS. PREHEATERS	2	30-E-14A & B	337	2" ALL LESS HDS	4½'ϕ x 25'	H	3'	700	Total: 2-4", 2-6", 4-8"	
LOW PRESS. PREHEATERS	2	30-E-16A & B	290	1½" ALL LESS HDS	4½'ϕ x 25'	H	3'	700	Total: 2-6", 4-8", 2-10"	
VACUUM PREHEATERS	3	30-E-18A, B & C	231	1½" SHELL ONLY	4½'ϕ x 25'	H	3'	1050	Total: 3-3", 3-6" 6-10", 3-14"	
DIGESTER FEED TANK	1	30-T-7	172	1½" PERS. PROTECT.	12'ϕ x 9' + 60° CONE BOTT	V	10'	680	2-2", 1-4", 3-6", 4-8", 1-12", 2-24" MH, 1-18" MH	
RED MUD SETTLERS	2	33-T-27 & 28	222	1½" SIDES & TOP	90'ϕ x 9'	—	12'	17,820	Total: 4-8", 2-10", 8-(3'-2') MH	
RED MUD WASHERS	2	33-T-35 & 36	217	1½" SIDES & TOP	55'ϕ x 50'	—	16'	22,040	Total: 12-6", 16-10", 20-(3'x2') MH	
DILUTER	1	33-V-6	222	1½" ALL	6'ϕ x 17' + 60° CONE BOTT	V	30'	420	1-4", 1-6, 3-8", 6-14" 2-18", 1-24" MH	
~~LIQ. TO LIQ. EXCHANGERS~~	~~2~~	~~40-E-9 & 10~~	~~212~~	~~1½" PERS. & PROTECT.~~	~~4½'ϕ x 25'~~	H	3'	~~570~~	~~Total: 4-8", 4-10"~~	2
EVAPORATORS - 5 EFFECT	2	42-EV-8, & 9	268	1½" ALL EFFECTS	10 VESSELS, 4 HTRS, 8 SEPARATORS	V	10'	15,810	Total: 5-8", 1-12", 4-18" 7-20", 3-22", 8-24", 2-32", 1-30", 19-20" MH	
MECHANICAL DUST COLLECTOR	1	50-X-7	700	1½" SPECIAL SEE SPEC	13' x 14' x 13' 60° HOPPERS	—	75'	2700	—	2
ELECTROSTATIC PRECIPITATOR	1	50-X-14	700	1½" TOP SIDES BOTTOM	20' x 40' x 13½' 60° HOPPERS	—	75'	2860	—	1
KILN FANS	5	50-TF-23 41, 42, 43, 44	700	1½" PERS. PROTECT.	6' x 10' x 6'	—	75'	2000	—	1
TURBINE	1	110-TG-4	825	Per G.E. SPECS	—	—	17'		—	
DUCTS	—	FAC. 50	700	1½" PERS. PROTECT.	Misc. Sections	—	75'	2000	—	1
3RD. STAGE DUST COLLECTORS, MECH., KILNS 1 thru 4	4	FAC. 50	700	1½" ALL	20' x 8' x 15' 60° HOPPERS	—	75'	6500	—	1
SETTLER OVERFLOW BOXES	2	33-V-7	222	1¼" SIDES	4'ϕ x 7'	V	18'	200	TOTAL 2-14"	1

G-231-E
5-24-56

REV.	DESCRIPTION	ENG	DR	CHK	SUPV	MATL	APPROVALS	DATE
0	ISSUED FOR QUOTATION	DB						

BECHTEL CORPORATION
POWER DIVISION ENGINEERING

INSULATION ESTIMATE

REYNOLDS METALS CO. — UNIT 4 EXPANSION — SHERWIN PLANT

JOB No. 2678
DWG NO. M-42-SK-2
REV.
SCALE

LINEAL FEET OF PIPE INSULATION – BY THICKNESS AND FINAL COVERING

PIPE SIZE	ASBESTOS FELT JACKET						CANVAS JACKET						ALUMINUM JACKET					
	1"	1½"	2"	2½"	3"	3½"	1"	1½"	2"	2½"	3"	3½"	1"	1½"	2"	2½"	3"	3½"
¾"	195	—	—	—	—	—	—	—	—	—	—	—	130	—	—	—	—	—
1"	275	—	—	—	—	—	—	—	—	—	—	—	30	—	—	—	—	—
1½"	230	—	—	—	—	—	—	—	30	—	—	—	190	—	80	—	—	—
2"	—	320	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3"	—	450	—	—	—	—	—	10	—	—	—	—	—	—	—	—	—	—
4"	—	1,110	—	—	—	—	—	15	—	—	—	—	—	5	—	—	—	—
6"	—	1,855	—	—	—	—	—	—	—	—	—	—	—	190	—	—	—	—
8"	—	1,225	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	175
10"	—	795	—	—	—	—	—	—	—	—	—	55	—	—	—	—	—	185
12"	—	1,625	—	—	—	—	—	5	—	—	—	—	—	5	—	—	—	30
14"	—	575	—	—	—	—	—	—	—	—	90	—	—	—	—	—	110	—
16"	—	915	—	—	—	—	—	—	—	—	—	—	—	15	—	—	—	—
18"	—	340	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20"	—	155	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22"	—	60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
24"	—	490	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
32"	—	70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

003065

FACILITY 110

REV.	DESCRIPTION	DATE	APPROVALS	MATL	SUPV	CHK	DR	ENG
0	ISSUED FOR QUOTATION						DB	

FACILITY	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.		% OF TOTA
24									4
30									16
33 (T-27 & 35)									15
33 (T-28 & 36)									15
35									2
40									6
42 (EV-9)									8
42 (EV-8)									8
45 (WEST)									7
45 (EAST)									2
50									8
110									10
MISC.									4
% TOTALS	6	12	17	20	21	22	2		100

NOTE: This is a preliminary schedule for estimating purposes only. The successful bidder shall prepare his own schedule based on information received from purchaser's construction representative on the jobsite.

003066

G-231-E 5-24-56

BECHTEL CORPORATION
POWER DIVISION ENGINEERING

INSULATION SCHEDULE

UNIT 4 EXPANSION
REYNOLDS METALS CO SHERWIN PLANT

JOB NO 2678
DWG NO. M-42-SK-3
SCALE
REV. 0

A. GENERAL

1. All payments shall be on a unit price basis in accordance with subcontract terms and conditions. Measurement procedures specified herein shall be considered as part of the subcontract conditions unless otherwise specified in writing.

2. The quantities of insulation applied shall be determined by actual measurement, and shall not be calculated from drawings or judged by visual gauging. A representative of each interested party shall be present when measurements are made.

3. Measurements shall be recorded on forms (sample copy attached). Certified copies of the record shall be given to all interested parties, and all copies shall be signed by the persons measuring.

4. The basis for payment for patching, repair and replacement due to damage for which Bechtel Corporation is responsible shall be negotiated with Bechtel field supervision.

5. The attached drawing M-1002-SK-1, outlining method of measurement, shall be used as a guide in conjunction with this set of rules.

B. PIPING AND FITTINGS

1. Measurements shall be made through all insulated or uninsulated fittings in insulated lines. The length of bent piping shall be measured separately along the outside radius of insulation between tangent points.

2. Hangers, shoe type supports, guides, anchors, brackets, etc., which attach to the insulated line, shall be considered as normal piping practice and the unit price of line insulation will include same.

3. Each flange on fittings shall be counted as a flange and not as part of its fittings.

4. All fittings that connect two or more different sizes of pipe shall be counted as part of the largest size involved. Bosses shall be considered fittings and shall be priced at 2 x unit price for size of boss.

5. Unit prices for fittings and flanges listed below shall be the unit price of the adjacent pipe covering multiplied by the factor.

	Item	Factor
(a)	Pipe Bends over 1-1/2 diameters	2 x length
(b)	Flanges (Pair)	2
(c)	Fittings, including tees, reducers, valve bodies, traps, std. ells, unions, and end caps.	2

003067

FORM 292

△					
△					
△					
⚠	DATE 1/6/58	ISSUED FOR CONSTRUCTION			

BECHTEL CORPORATION

SPECIFICATION FOR
MEASURING THERMAL INSULATION FOR PAYMENT

JOB NO. 2678

SPECIFICATION	REV.
SP-M-1002	0

C. EQUIPMENT (When basis for payment is on unit prices rather than lump sums)

1. Equipment measurements shall be exact, and areas computed therefrom shall be to the nearest square foot.

2. The area of a cylindrical surface shall be computed from the length of the cylinder multiplied by the circumference. The circumference shall be measured outside the finished insulation for external application, and shall be measured inside the cylinder wall for internal application.

3. The area of standard dish and flat vessel heads shall be the square of the outside diameter of the insulation on the shell body. The actual outside surface area of insulation area shall be calculated for other shaped equipment and/or heads.

4. There shall be no deductions in area for manholes, nozzles, hand holes, etc. All projections shall be measured separately as piping.

5. Flat surfaces shall be measured outside the insulation. There shall be no deductions in area for expansion joints, ribs, controls, etc.

SAMPLE FORM

BECHTEL CORPORATION
INSULATION TABULATION

Owner: _____ Subcontract No. _____

Project: _____ Date: _____ Sheet _____ of _____

Line or Equipment Description of Location	Pipe Size	Thickness	Type	Lineal or Square Footage	Fittings 2 x ea.	Flanges 1 x ea.	Bends 2 X Per Ft.	Valves **	Effective Footage	Unit Price	Total Amount

Certified Correct: TOTAL _____

For Bechtel Corporation: _____

For Subcontractor: _____

**

Flanged Valves: Factor 8 - Totally insulated including line flanges and bonnet
Factor 2 - Valve body only

All Other Valves: Factor 2 - Totally insulated

SHEET 3 OF 3

G-231-E
5-24-56

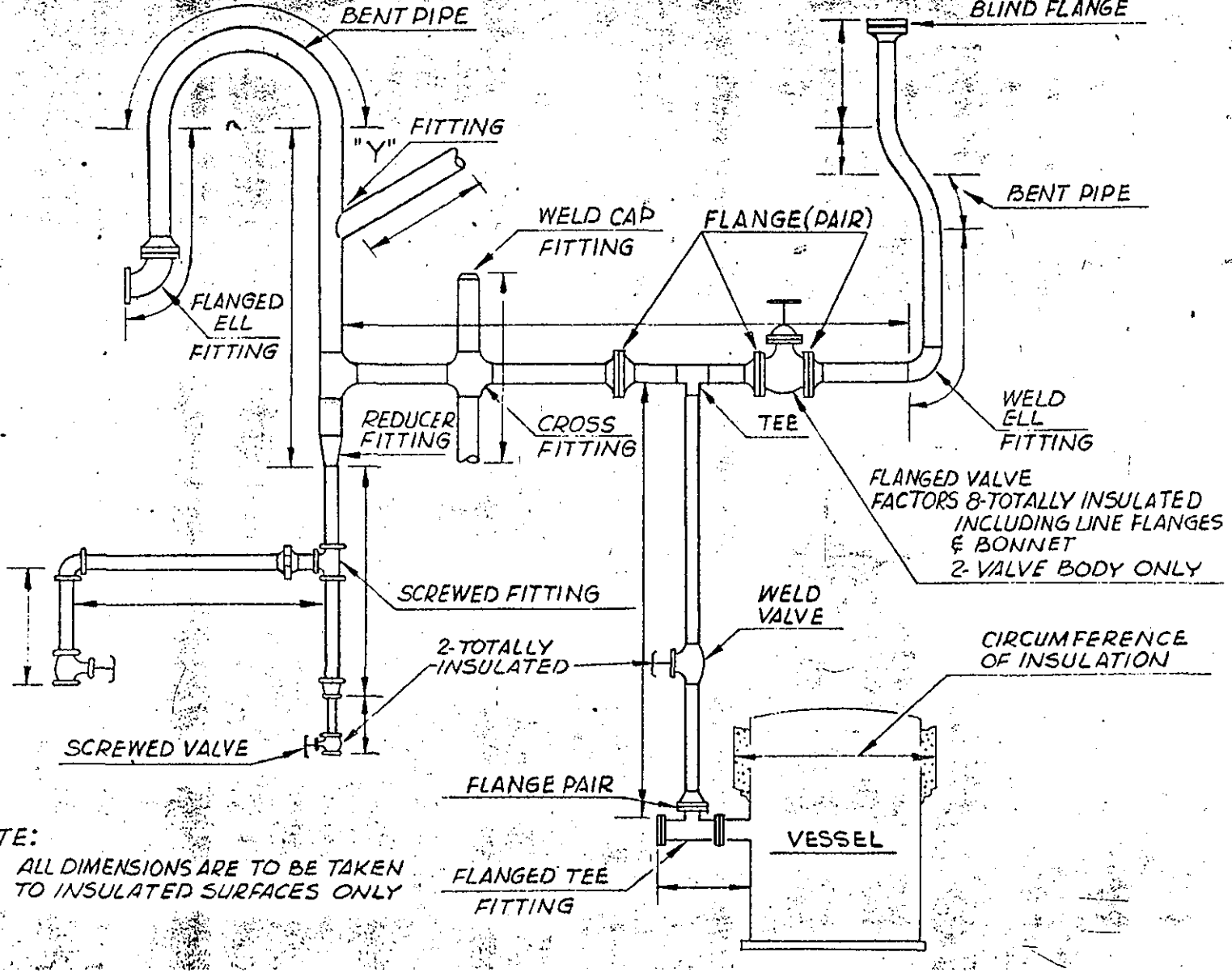
REV.	DESCRIPTION	ENG	DR	CHK	SUPV	MATL	APPROVALS	DATE
0	ISSUED FOR CONSTRUCTION	DB						

BECHTEL CORPORATION
POWER DIVISION ENGINEERING

METHOD FOR FIELD MEASUREMENT OF THERMAL INSULATION

REYNOLDS METALS CO. SHERWIN PLANT

JOB No. 2678
DWG NO. M-1002 SK-1
REV. 0
SCALE —



NOTE:
ALL DIMENSIONS ARE TO BE TAKEN TO INSULATED SURFACES ONLY

003070

A. SCOPE

1. This specification covers the furnishing and application of thermal insulation to piping, vessels, tanks and equipment.

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

B. GENERAL

1. Materials, facilities, and work furnished by Bechtel Corporation, hereinafter termed "Contractor."

a. 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.

b. 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.

c. The Contractor will properly prepare and thoroughly clean all surfaces to remove oil, grease, loose scale and dirt, before application of insulation materials.

2. Materials and work to be furnished by Subcontractor.

a. The Subcontractor shall furnish all labor, tools, implements, vehicles, facilities and materials for the complete installation of all insulation, unless specifically stated in this specification as being furnished by Contractor.

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

c. The Subcontractor shall furnish and install all required non-structural supports which are not part of the shop fabrication for holding insulation on the equipment and piping.

d. The Subcontractor shall furnish and erect at his own expense and risk, all scaffolding that he may require.

003071

3	6/58	REVISED PARAGRAPH #5	CHP	1-15	RCR M3/4c
2		Added Dust Collector Insulation-Para. 6 for Ducts - Para. 7 for Construction.	DNC	W/C	
1		HVAC - FIG 19, PAGE 18		W/C	
0	DATE 11/16/55	Issued for Construction	DB		EDJ

FORM 292

BECHTEL CORPORATION

SPECIFICATION FOR FURNISHING AND INSTALLING THERMAL INSULATION

JOB NO 2678

SPECIFICATION	REV.
SP-M-1001	3

e. The Subcontractor shall furnish and install all necessary steel flashing. Aluminum jacketing, where required, will be furnished in standard mill-run coils by Reynolds Metals Company for installation by the Subcontractor. Accessories for aluminum jacketing shall be furnished by the Subcontractor.

f. 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.

g. 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.

h. The Subcontractor shall plan and schedule his work as directed by the Contractor and be coordinated with the work of the other crafts. In particular he should schedule insulation sufficiently in advance of required painting to allow the insulation and its finish to completely dry.

i. It will be the Subcontractor's responsibility to furnish a job which will be satisfactory in all respects, and if the Subcontractor for this work believes that any of the requirements of this specification do not permit him to fulfill such responsibility, he must submit with his bid recommendation of changes for approval. Failure to meet this requirement will not relieve the Subcontractor of such responsibilities.

C. INSULATION APPLICATION

1. Piping

a. All lines 24" in O.D. and under (Reference Fig. 1 and Fig. 2, Sheet 11) shall be covered with sectional or segmental pipe insulation in 3 foot lengths, and shall be Owens Illinois "Kaylo" or approved equal, when approved by contractor 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 independently. 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, without "overspread" onto the surface of the pipe insulation, with monolithic insulation which shall be Johns-Manville No. 352, or approved equal, approved by CONTRACTOR Piping insulation shall be secured in the following manner:

Lines 8" and smaller - Minimum of 4 ties per joint - 14 ga. galv. iron wire

Lines 10" to 16" - 4 ties per joint - 14 ga. galv. iron wire

Lines 18" and larger - 4 bands per joint - 1/2" x .020", Galvanized Gerrard or Signode type bands

b. All lines over 24" in diameter shall be covered with the same type of insulation, and secured in the same manner as is specified in the previous paragraph, except that block insulation may be used, mitered to fit the pipe to which it is applied.

c. A metal stop or support shall be provided at the bottom 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. (Reference Fig. 3, Sheet 11)

d. 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.

e. Final covering for pipe lines except those in powerhouse area shall be 50-pound asphalt saturated asbestos felt, Johns-Manville double-coated "Flexstone" roofing felt or approved equal. It 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 .020" 304 stainless steel bands on approximate 12" centers. (Reference Fig. 4, Sheet 12)

f. Final covering for pipe lines inside the powerhouse building (in Facility 110) shall be 6 oz. white canvas secured with paste. Final covering for pipe lines outside the powerhouse building and up to plot limits of Facility 110 shall be Reynolds Metals Company .020" x 3S half-hard mill finish flat aluminum, furnished by Reynolds Metals Company, and which will be machine rolled to fit OD of pipe insulation by the Subcontractor. Before applying the aluminum jacketing, the pipe insulation shall be wrapped with "Sisalkraft" type paper, lapped 3", and fastened with glue or plastic covered staples. The aluminum jacketing shall then be installed with approximately 3" laps at longitudinal and circumferential joints. The jacket shall be secured in place with 1/2" x .020" 3S aluminum bands spaced on 12" centers. Jackets on vertical lines shall be supported with two "Z" clips per section of jacket. The laps in metal shall be placed or located in such a manner as to be "away from the weather" and where least conspicuous. (Reference Fig. 4, Sheet 12)

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

h. Thickness of pipe insulation shall be in accordance with Table I, Sheet 9, of this specification.

2. Valves and Fittings

a. Special pattern slurry valves shall not be insulated.

b. Flanges, valves, and unions shall be insulated only in steam lines within the powerhouse area (Fac. 110), except when required for personnel protection. Such valves and fittings 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 14 ga. galvanized iron wire loops, using not less than two loops per flange. These wire loops are to be counter-sunk flush with the insulation surface. The surfaces of the insulation shall be reinforced with one layer of galvanized iron, 20 ga. (min.), 1" hex mesh neatly fitted and securely laced and covered with a light coat of Johns-Manville Insulkote-ET or equal approved by Contractor. The flange, valve, or union insulation shall then be finished with a 1/4" wet coat (1/8" dry) of Insulkote-ET or equal. (Reference Fig. 5 and Fig. 6, Sheet 12)

b. In the case of uninsulated flanges, valves, and unions, pipe insulation shall be stopped short of the flange, valve or union a sufficient distance to permit removal of the flange bolts, the valve, or slipping of the union nut. Terminus ends are to be finished off to a 45° bevel and reinforced with galvanized iron, 20 ga. (min.), 1" hex mesh secured in place with a light coat of finishing material. In cases where pipe insulation is covered with roofing felt, these terminus ends shall be finished with Eagle-Picher "Stalastic" or ~~approved~~ equal approved by contractor. In cases where pipe insulation is jacketed with aluminum, these terminus ends are to be finished with Alumiseal. (Reference Fig. 5, Sheet 12)

c. Weld ells, 2" pipe size and larger, shall be insulated with prefabricated covers made in two half-sections from insulation material of the same type and thickness as the adjacent pipe insulation. These ell covers are to be 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 14 ga. galvanized iron 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 counter-sunk flush with the surface of the insulation. The surface of the weld ell cover shall be reinforced with galvanized iron, 20 ga. (min.), 1" hex mesh neatly fitted and securely laced, and covered with a light coat of Johns-Manville Insulkote-ET or equal and then finished with a 1/4" wet coat (1/8" dry) of Insulkote-ET or equal. (Reference Fig. 7, Sheet 13)

d. Weld tees, caps and reducers shall be insulated and finished with the same material as the adjacent pipe insulation, except that these fittings in aluminum jacketed lines shall be finished with 1/4" wet coat of Johns-Manville Insulkote-ET, or equal, reinforced with galvanized iron, 20 ga. (min.), 1" hex mesh, neatly fitted and securely laced.

e. Weld ells and screwed fittings 1-1/2" pipe size and smaller shall be insulated with a combination of Johns-Manville No. 352, or approved equal, and pipe insulation, and finished in a manner similar to the flange insulation. (Reference Fig. 8, Sheet 13)

f. Expansion joints shall be installed as required, and constructed in accordance with Fig. 9 and Fig. 10, Sheet 14. In straight runs of pipe, intervals between joints shall not exceed 50' for pipe operating at temperature in excess of 500°F, and 100' for pipe operating at temperature up to 500°F.

g. Thickness of valve and fitting insulation shall be in accordance with Table I, Sheet 9, of this specification.

3. Vessels

a. Vessels requiring insulation shall be insulated with block type insulation, which shall be Baldwin-Hill "Mono-Block," or Eagle Picher "Super Temp," Owens-Illinois "Kaylo" or ~~approved equal~~ approved by contractor. For vessel shell diameters up through 10', the blocks shall be 6" x 36", mitered to fit the vessel to which they are to be applied. However, for vessels diameter 24" OD and smaller, molded sectional pipe insulation or curved segments may be used on vessel shell. For vessels larger than 10' OD, flat rectangular blocks 12" wide x 36" long shall be used.

b. Blocks shall be securely cemented to the vessel with Baldwin-Hill "Bondtite," or equal, with staggered joints, starting at bottom of vertical vessel or end of horizontal vessels, with alternate half-length and full length blocks or lags. For vessels with single layer construction, insulation shall be secured with 3/4" x .020 S.S. Signode or Gerrard type bands with seals, machine stretched and fastened on approximately 9" centers. 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 .020" S.S. bands spaced on approximately 12" centers, and outer layer shall be secured with 3/4" x .020 S.S. bands, with seals, on 9" centers. Bands are not to be tightened and fastened beyond a point of removing "slack" in the course of blocks. (Reference Fig. 11 and Fig. 12, Sheet 15)

c. Approximately 1" space is to be left for expansion under the circumferential angle support rings, if provided. This 1" space shall be packed with loose mineral wool. If support rings are not provided, expansion joints shall be constructed on 9' vertical centers to prevent buckling or pulling apart of the insulation during operation. Openings through insulation resulting from support rings or expansion joints shall be flashed with 24 ga. stainless steel. (Reference Fig. 13, Sheet 15)

d. Where required, the vessel heads shall be insulated with rectangular 6" wide blocks, neatly fitted, of the same material as was specified for vessel sides. Insulation on top heads shall be cemented to vessel with Baldwin-Hill "Bondtite," or approved equal,

galv. iron
and secured by 14 gage wire fastened to studs or lugs tack welded on a 18" square pitch (maximum). (Reference Fig. 14 and Fig. 15, Sheet 16). Insulation on bottom heads shall be similarly applied and then secured by 14 gage galv. iron wire fastened to 1/2" studs tack-welded on 12" square pitch.

e. Where required, necks of nozzles and manways shall be insulated with pipe insulation or mitered blocks leaving sufficient distance for removal of bolts. Terminus of insulation shall be beveled and sealed with Eagle-Picher "Stalastic" or approved equal.

f. Manufacturer's nameplates shall not be covered. Insulation shall be cut on 45° angle to the nameplate edge and the insulation properly sealed with Eagle-Picher "Stalastic" or approved equal.

g. After the blocks have been applied and secured in place, care shall be exercised to be certain that any open joints, other than expansion joints, are filled with insulating cement, which shall be Johns-Manville No. 352, or approved equal.

h. After the operations described in the foregoing paragraphs are completed, the insulating blocks shall be covered with a 1/4" thickness of Johns-Manville No. 352 or approved equal, to give a dry thickness of not less than 1/8". This cement coat shall be troweled to a neat, smooth finish. Vessels shall then be finished with a layer of galvanized iron, 20 ga. (min.), 1" hex mesh neatly fitted and securely laced and covered by a light coat of Johns-Manville Insulkote-ET or equal, and followed by a 1/4" wet coat of Insulkote-ET or equal. (Reference Fig. 12 and Fig. 13, Sheet 15). Vessels not exposed to weather in Facility 110 only shall be finished with a 1/4" wet (1/8" dry) coat of Johns-Manville No. 352, or approved equal, applied over a layer of galv. iron 20 ga. (min), 1" hex mesh carefully fitted and securely laced.

i. Thickness of vessel insulation shall be in accordance with Table II, Sheet 10.

4. Tanks

a. For tanks 10' diameter and under the material and method of application shall be the same as specified for vessels.

b. Tanks over 10' diameter shall be insulated with flat rectangular blocks, 12" wide by 36" long, which shall be Baldwin-Hill "Mono-Block," or Eagle-Picher Super Temp, Owens-Illinois "Kaylo," or approved equal. Blocks shall be cemented to the tank with Baldwin-Hill "Bondtite," or equal, with staggered joints, starting at bottom of tank side. Blocks shall be secured between vertical tie bars with stainless steel bands in the same manner as was specified for vessels (Reference Fig. 16 and Fig. 17, Sheet 17).

c. Tank roofs that require insulation shall be insulated with the same material as was specified for tank sides, cemented to tank top with Baldwin-Hill "Bondtite," or approved equal, and secured by 14 ga. wire fastened to studs tack welded on 18" square pitch (maximum). The insulating blocks shall be covered with a 1/4" thickness of Johns-Manville No. 352 or approved equal, 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 Johns-Manville Insulkote-ET or approved equal shall then be applied to a thickness of 1/4" wet (1/8" dry) and shall be reinforced with galvanized steel, 20 ga. (min.), 1" hex mesh carefully fitted and securely laced.

d. Approximately 1" space is to be left for expansion under circumferential angle support rings, if provided. This space shall be packed with loose mineral wool. If support rings are not provided, expansion joints shall be constructed on 9' vertical centers to prevent buckling or pulling apart of the insulation during operation. Stainless steel 24 ga. flashing shall be provided at the edge of tank roofs to prevent roof run-off from creeping behind insulation on vertical walls of tank (Reference Fig. 17, Sheet 17).

e. After blocks have been applied and secured, care shall be exercised to be certain any open joints, other than expansion joints, are filled with insulating cement, which shall be Johns-Manville No. 352, or approved equal.

f. After the operations described in the foregoing paragraphs are completed, the insulating blocks shall be covered with a 1/4" thickness of Johns-Manville No. 352 or approved equal, to give a dry thickness of not less than 1/8". This cement coat shall be troweled to a neat, smooth finish. Tanks shall then be finished with a layer of galvanized iron, 20 ga. (min.), 1" hex mesh neatly fitted and securely laced and covered by a light coat of Johns-Manville Insulkote-ET or equal, and followed by a 1/4" wet coat of Insulkote-ET or equal. (Reference Fig. 16 and Fig. 17, Sheet 17).

g. Thickness of tank insulation shall be in accordance with Table II, Sheet 10, of this specification.

5. Equipment (Excluding Dust Collectors)

a. Pumps and other equipment requiring insulation shall be first covered with monolithic insulation which shall be Baldwin-Hill No. 1 Insulating Cement, Johns-Manville No. 352, or equal approved by Contractor. It shall be applied in several layers to the total specified thickness and if 1-1/2" or thicker, shall be reinforced at mid-thickness with a layer of galvanized iron, 20 ga. (min), 1" hex mesh. The final coat of cement is to be troweled to a true and even surface. (Reference Fig. 18, Sheet 18).

b. Equipment shall be finished with a layer of galvanized iron, 20 ga. (min), 1" hex mesh neatly fitted and secured in place by a light coat of Johns-Manville Insulkote-ET or equal, and followed by a 1/4" wet coat of Insulkote-ET or equal. (Reference Fig. 19, Sheet 18). Equipment not exposed to the weather in Facility 110 shall be finished with a light coat (1/8") of Johns-Manville No. 352 or approved equal, applied over a layer of galv. iron, 20 ga. (min), 1" hex mesh carefully fitted and securely laced.

c. Insulation shall be stopped short of casing flanges a sufficient distance to permit removal of bolts, finished off to a 45° bevel, and properly sealed.

d. Manufacturer's nameplates shall not be covered. Insulation shall be beveled at 45° to nameplate edge and insulation properly sealed.

e. Thickness of equipment insulation shall be in accordance with Table III, Sheet 10, of this specification.

6. Buell Mechanical Dust Collector (50-X-7)

a. The cyclones and plenums will be "boxed-in" as shown on Bechtel Drawing 50-S-2028 with insulation support framing supplied and installed by Bechtel. Support framing will consist of 6 x 6 x 10 x 10 wire mesh tack welded to 1-1/2" channels. Hoppers will be boxed in by tack welding wire mesh across the backs of the hopper stiffeners and supplying intermediate stiffeners where required for rigidity. Roof will be covered with wire mesh tack welded to 1/8" spacers.

b. Insulation

Insulation shall consist of Baldwin-Hill type 2-B Blankets, 1-1/2" thick, density in excess of 8 lbs./cu. ft. Blankets are to have 1" hex-chix wire on one side and 3/8" hi-rib lath on the other, with the lath facing out. All external corners and edges are to be reinforced with expanded metal lath corner bead. A 1/2" thick trowel coat of Baldwin-Hill No. 1 Insulating Cement will then be applied to the entire surface.

c. Weatherproofing

Weatherproofing shall consist of one layer of 1" galvanized hex-chix wire and one 1/4" thick coat, when wet, of Flintkote C-13A Weatherproofing.

Through Sheet 8b

7. Buell Electrostatic Dust Collector (50-X-14)

a. The top, sides and hoppers will be boxed in with insulation support framing supplied and installed by Bechtel. Insulation support framing on the roofs and sides will consist of 6 x 6 x 10 x 10 welded wire mesh tack welded to the backs of the beam and column stiffeners. Extra channel stiffeners will be added between the existing beams and columns to provide rigidity. Hoppers will be "boxed in" in same manner as on Mechanical Collector.

b. Insulation

Same as paragraph 6b above.

c. Weatherproofing

Same as paragraph 6c above.

8. "Dustex" Dust Collectors (50-X-15, 16, 17, 18)

a. The sides and top will be "boxed in" with insulation support framing supplied and installed by Bechtel. Support framing will consist of 6 x 6 x 10 x 10 wire mesh tack welded across the backs of existing stiffeners. Intermediate stiffeners will be added where required for rigidity.

b. Insulation

Insulation on sides and top shall be the same as in paragraph 6b above.

Hoppers will be insulated with 1-1/2" thick "Kaylo" blocks secured to existing Nelson Studs with 14 ga. galvanized wire. Wiring shall be done in a diagonal pattern. All external corners and edges are to be reinforced with expanded metal lath corner bead. A 1/4" thick trowel coat of Baldwin-Hill No. 1 Insulating Cement will then be applied to the entire surface. Hopper stiffeners are not to be insulated.

c. Weatherproofing

Same as paragraph 6c above.

TABLE I - PIPE INSULATION

Pipe Size	Pipe Surface Temperature to 480°F	481° to 780°F	781° 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	3*	3 1/2*
10	1 1/2	3*	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*
over 24"-See Table II			
Ducts	1 1/2	1 1/2	

*Indicates double-layer construction required.

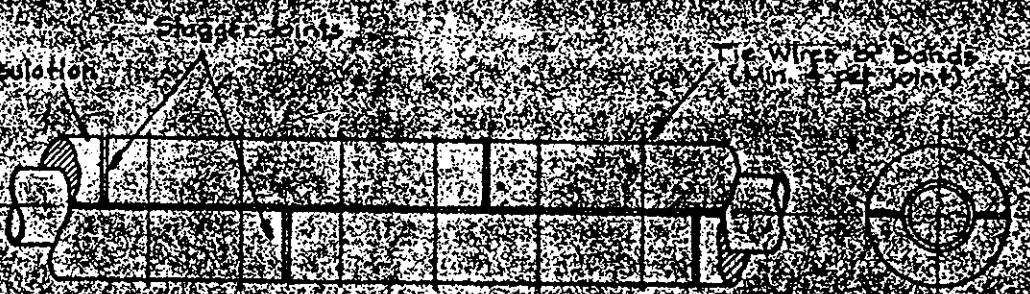
Personnel Protection. Insulation for personnel protection is required on any line or duct having a temperature of over 140°F within three feet of a working space, and shall be insulated for a length sufficient to protect a man working in that space. Insulation shall be as tabulated in column for surface temperature to 480°F, and applied in the same manner as thermal insulation.

TABLE II - VESSEL AND TANK INSULATION

Vessel or Tank Surface Temperature	Thickness
Up to 300 F	1 1/2-inch
301 to 450 F	2
451 to 600 F	3

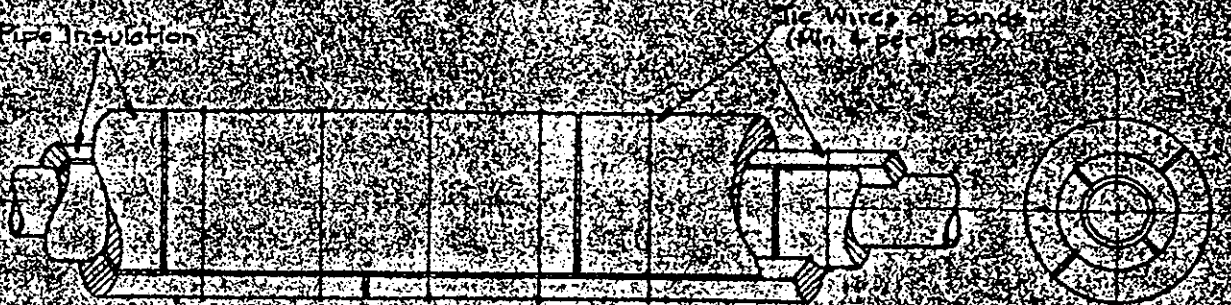
TABLE III - EQUIPMENT INSULATION

Machine Surface Temperature	Thickness
150 to 175 F	1-inch
176 to 325 F	1 1/2
326 to 550 F	2
551 to 750 F	2 1/2
751 to 950 F	3



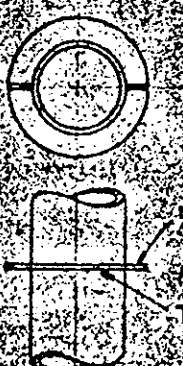
SINGLE LAYER PIPE INSULATION

FIGURE 1



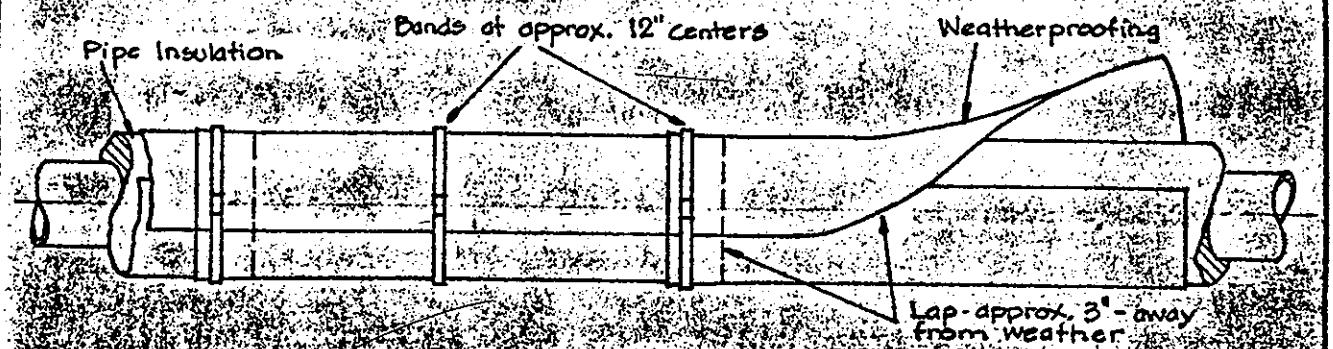
DOUBLE LAYER PIPE INSULATION

FIGURE 2



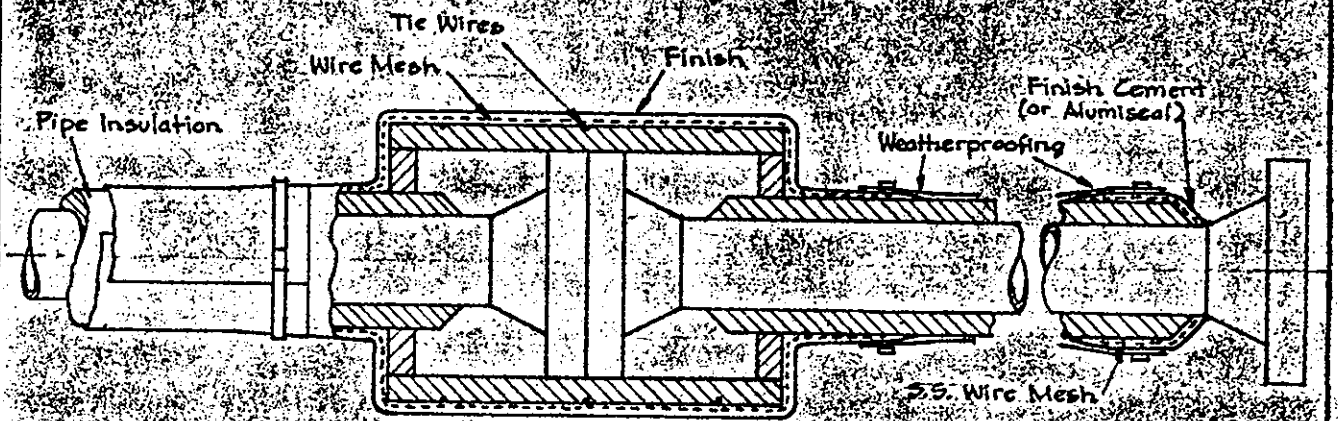
INSULATION SUPPORT FOR VERTICAL PIPE

FIGURE 3



WEATHERPROOFING

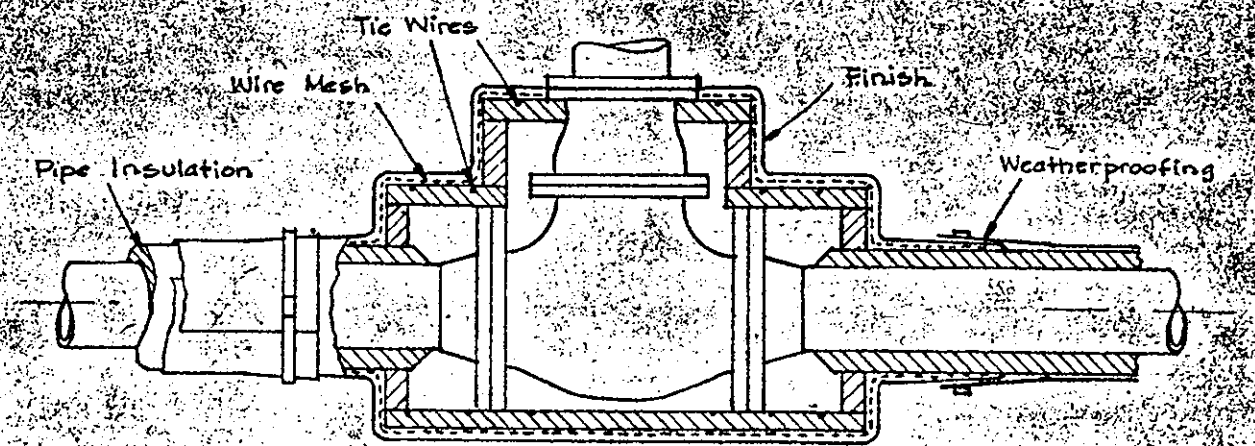
FIGURE 4



INSULATED FLANGE

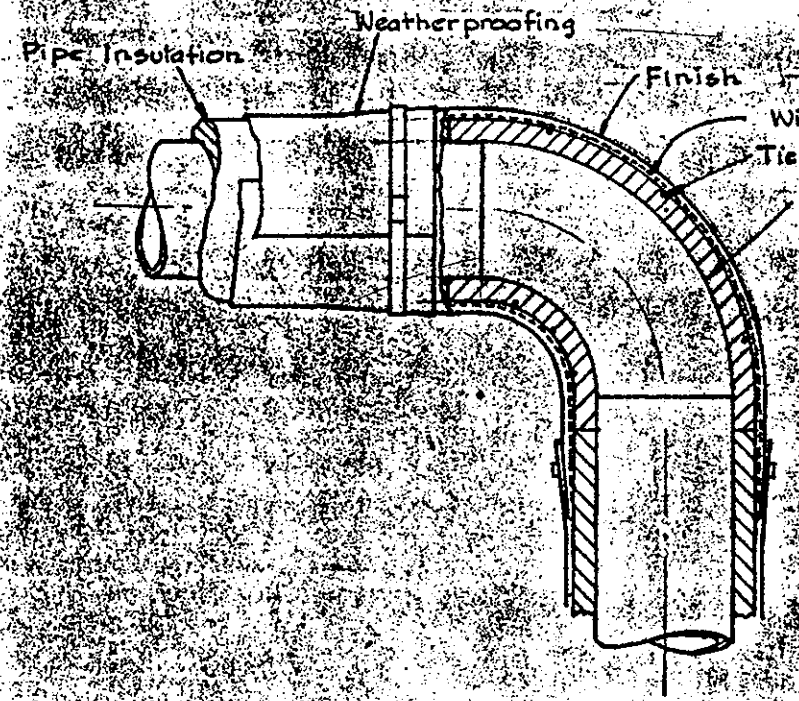
UNINSUALTED FLANGE

FIGURE 5



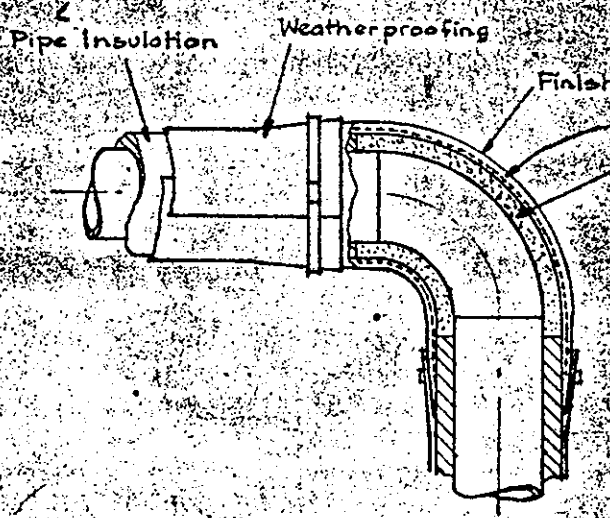
VALVE INSULATION

FIGURE 6



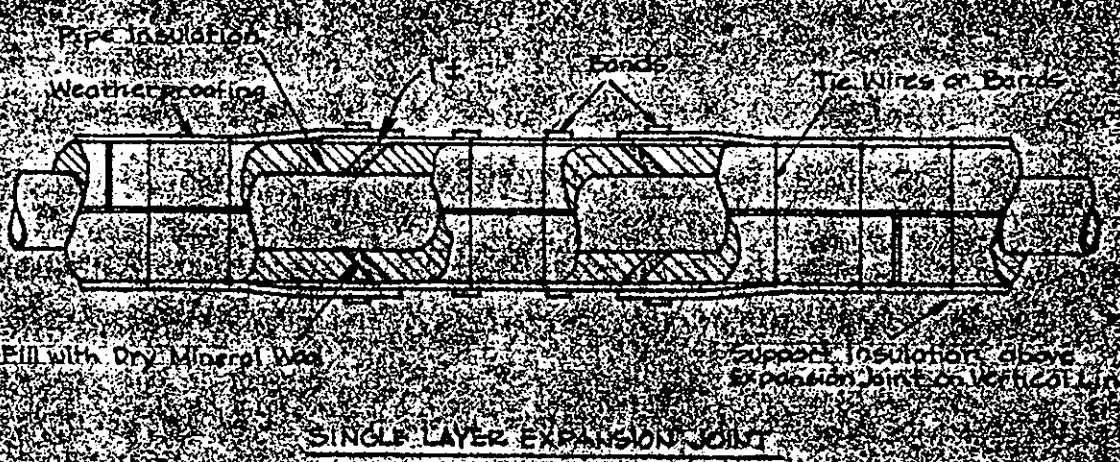
LARGE FITTING INSULATION

FIGURE 7



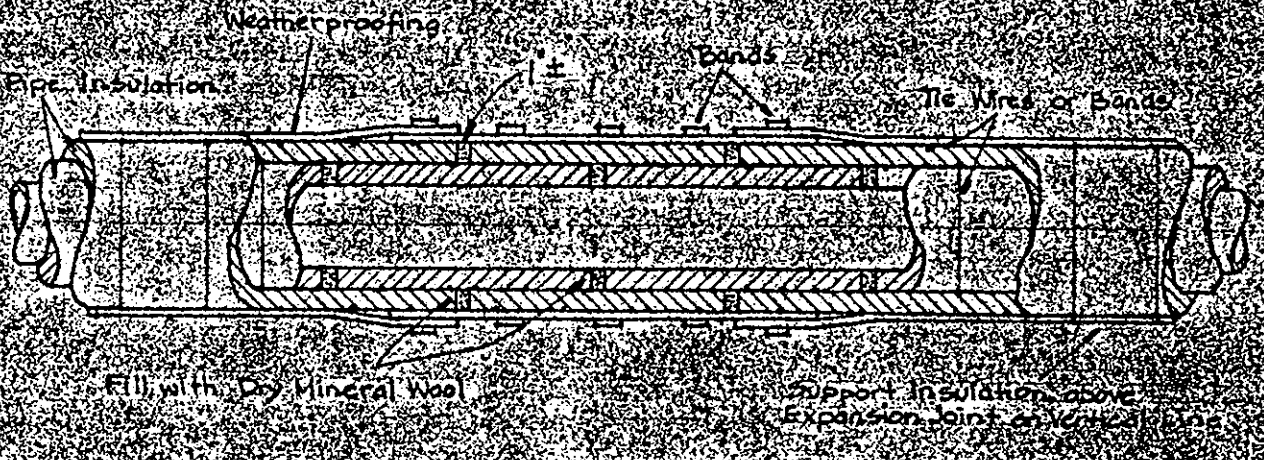
SMALL FITTING INSULATION

FIGURE 8



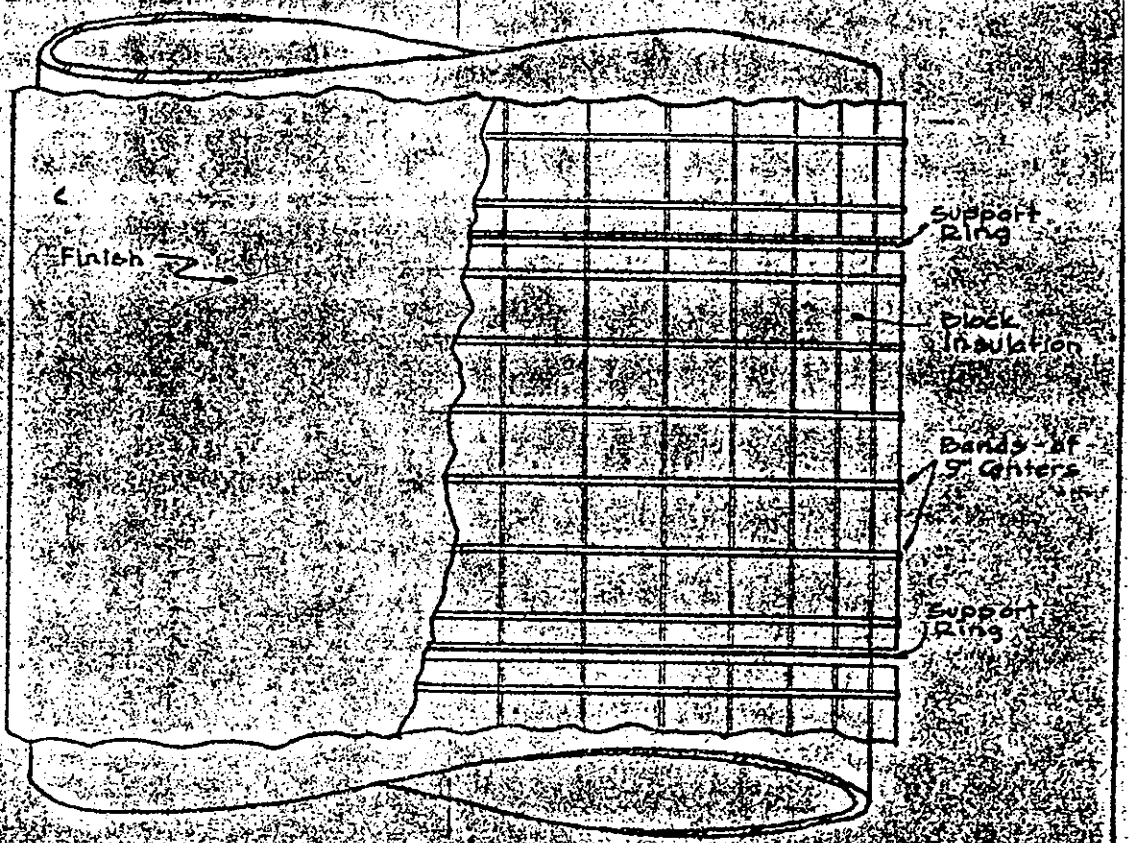
SINGLE LAYER EXPANSION JOINT

FIGURE 9



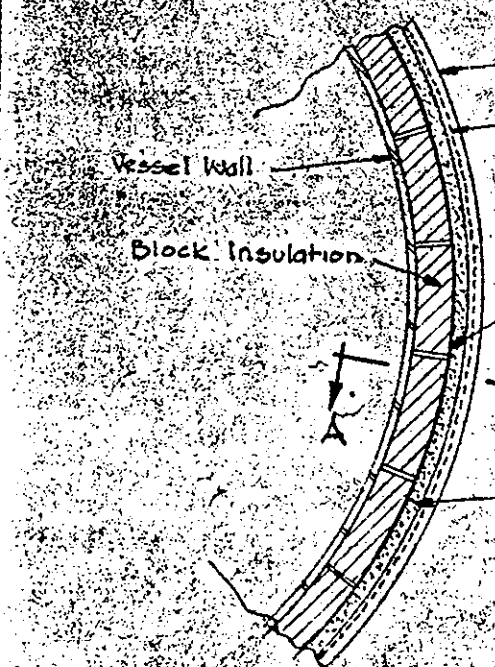
DOUBLE LAYER EXPANSION JOINT

FIGURE 10



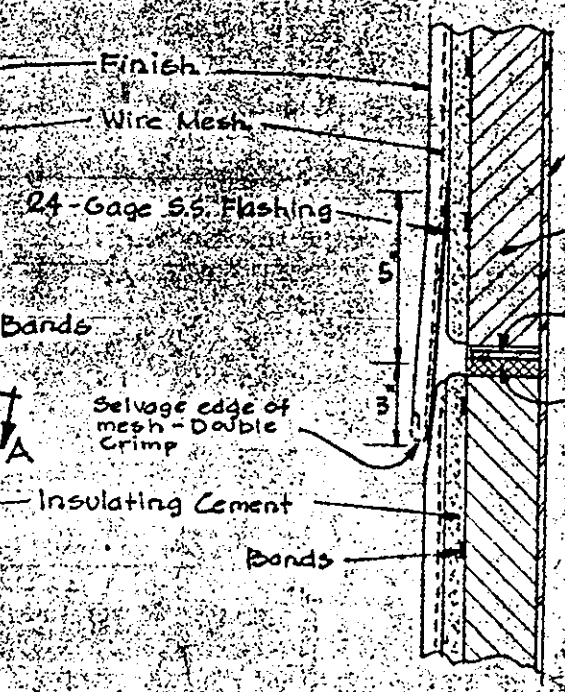
VESSEL INSULATION - ELEVATION

FIGURE 11



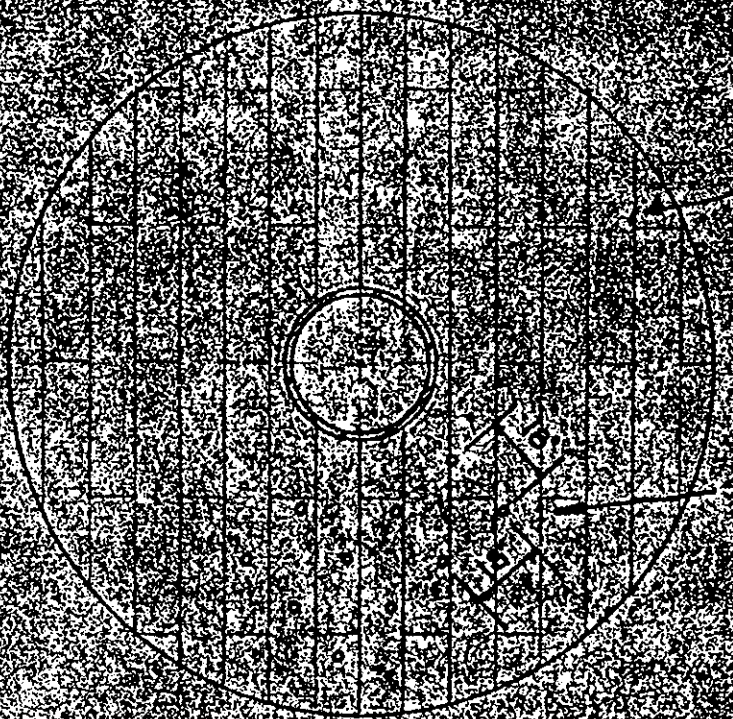
VESSEL INSULATION - PLAN

FIGURE 12



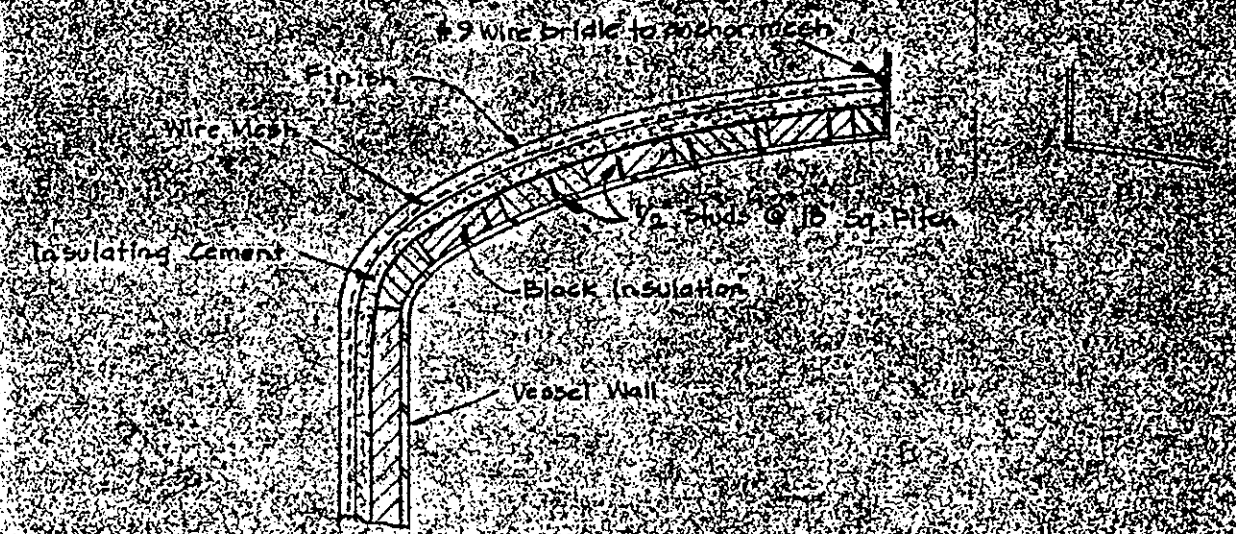
VESSEL INSULATION - SECTION AA

FIGURE 13



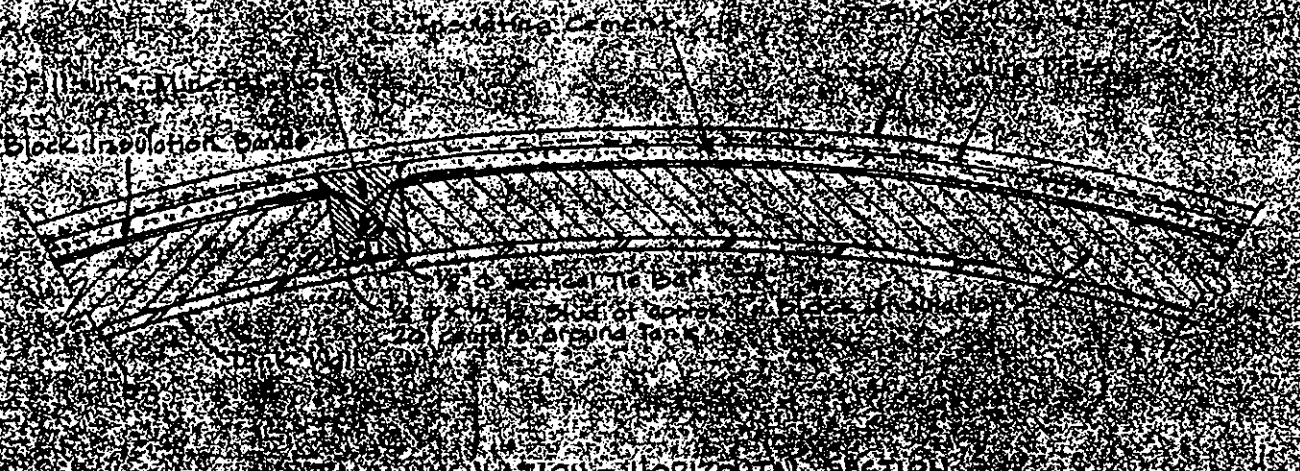
VESSEL TOP INSULATION - PLAN

FIGURE 14



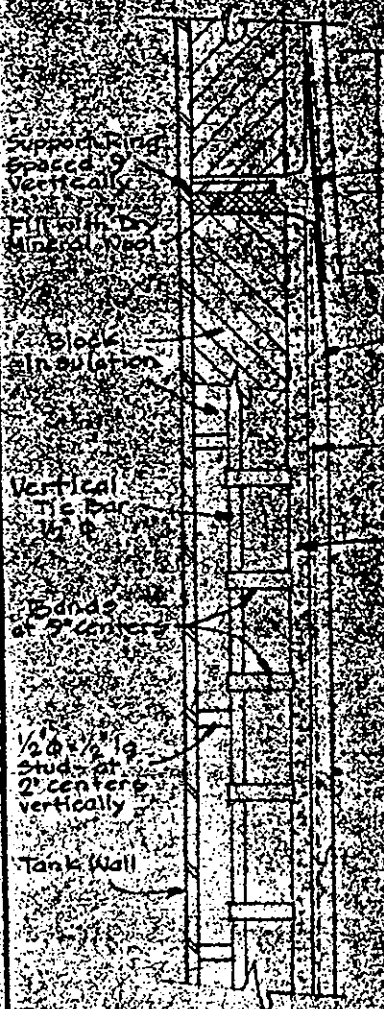
VESSEL TOP INSULATION - SECTION

FIGURE 15



TANK INSULATION – HORIZONTAL SECTION

FIGURE 16



TANK INSULATION - VERTICAL SECTION

FIGURE 17