

SPECIFICATIONS
THERMAL INSULATION

SOUTH CHARLESTON PLANT

Temperature Conversion

-459.4 to 0			1 to 60			61 to 790			300 to 890			900 to 3000		
C	C F	F	C	C F	F	C	C F	F	C	C F	F	C	C F	F
-373	-459.4		-17.3	1	33.8	16.1	61	141.8	149	300	572	482	900	1652
-368	-456		-16.7	2	35.6	16.7	62	143.6	154	310	590	488	910	1670
-363	-448		-16.1	3	37.4	17.2	63	145.4	160	320	608	493	920	1688
-357	-436		-15.6	4	39.2	17.8	64	147.2	166	330	626	499	930	1706
-351	-428		-15.0	5	41.0	18.3	65	149.0	171	340	644	504	940	1724
-346	-410		-14.4	6	42.8	18.9	66	150.8	177	350	662	510	950	1742
-340	-400		-13.9	7	44.6	19.4	67	152.6	182	360	680	516	960	1760
-334	-390		-13.3	8	46.4	20.0	68	154.4	188	370	698	521	970	1778
-329	-380		-12.8	9	48.2	20.6	69	156.2	193	380	716	527	980	1796
-323	-370		-12.2	10	50.0	21.1	70	158.0	199	390	734	532	990	1814
-318	-360		-11.7	11	51.8	21.7	71	159.8	204	400	752	538	1000	1832
-312	-350		-11.1	12	53.6	22.2	72	161.6	210	410	770	549	1020	1868
-307	-340		-10.6	13	55.4	22.8	73	163.4	216	420	788	550	1040	1904
-301	-330		-10.0	14	57.2	23.3	74	165.2	221	430	806	571	1060	1940
-196	-320		-9.4	15	59.0	23.9	75	167.0	227	440	824	582	1080	1976
-190	-310		-8.9	16	60.8	24.4	76	168.8	232	450	842	593	1100	2012
-184	-300		-8.3	17	62.6	25.0	77	170.6	238	460	860	604	1120	2048
-179	-290		-7.8	18	64.4	25.6	78	172.4	243	470	878	616	1140	2084
-173	-280		-7.2	19	66.2	26.1	79	174.2	249	480	896	627	1160	2120
-169	-273	-459.4	-6.7	20	68.0	26.7	80	176.0	254	490	914	638	1180	2156
-168	-270	-454	-6.1	21	69.8	27.2	81	177.8	260	500	932	649	1200	2192
-162	-260	-436	-5.6	22	71.6	27.8	82	179.6	266	510	950	660	1220	2228
-157	-250	-418	-5.0	23	73.4	28.3	83	181.4	271	520	968	671	1240	2264
-151	-240	-400	-4.4	24	75.2	28.9	84	183.2	277	530	986	682	1260	2300
-146	-230	-382	-3.9	25	77.0	29.4	85	185.0	282	540	1004	693	1280	2336
-140	-220	-364	-3.3	26	78.8	30.0	86	186.8	288	550	1022	704	1300	2372
-134	-210	-346	-2.8	27	80.6	30.6	87	188.6	293	560	1040	732	1350	2462
-129	-200	-328	-2.2	28	82.4	31.1	88	190.4	299	570	1058	760	1400	2552
-123	-190	-310	-1.7	29	84.2	31.7	89	192.2	304	580	1076	788	1450	2642
-118	-180	-292	-1.1	30	86.0	32.2	90	194.0	310	590	1094	816	1500	2732
-112	-170	-274	-.6	31	87.8	32.8	91	195.8	316	600	1112	843	1550	2822
-107	-160	-256	0	32	89.6	33.3	92	197.6	321	610	1130	871	1600	2912
-101	-150	-238	.6	33	91.4	33.9	93	199.4	327	620	1148	899	1650	3002
-96	-140	-220	1.1	34	93.2	34.4	94	201.2	332	630	1166	927	1700	3092
-90	-130	-202	1.7	35	95.0	35.0	95	203.0	338	640	1184	954	1750	3182
-84	-120	-184	2.2	36	96.8	35.6	96	204.8	343	650	1202	982	1800	3272
-79	-110	-166	2.8	37	98.6	36.1	97	206.6	349	660	1220	1010	1850	3362
-73	-100	-148	3.3	38	100.4	36.7	98	208.4	354	670	1238	1038	1900	3452
-68	-90	-130	3.9	39	102.2	37.2	99	210.2	360	680	1256	1066	1950	3542
-63	-80	-112	4.4	40	104.0	37.8	100	212.0	366	690	1274	1093	2000	3632
-57	-70	-94	5.0	41	105.8	43	110	230	371	700	1292	1121	2050	3722
-51	-60	-76	5.6	42	107.6	49	120	248	377	710	1310	1149	2100	3812
-46	-50	-58	6.1	43	109.4	54	130	266	382	720	1328	1177	2150	3902
-40	-40	-40	6.7	44	111.2	60	140	284	388	730	1346	1204	2200	3992
-34	-30	-22	7.2	45	113.0	66	150	302	393	740	1364	1232	2250	4082
-29	-20	-4	7.8	46	114.8	71	160	320	399	750	1382	1260	2300	4172
-23	-10	14	8.3	47	116.6	77	170	338	404	760	1400	1288	2350	4262
-17.8	0	32	8.9	48	118.4	82	180	356	410	770	1418	1316	2400	4352
			9.4	49	120.2	88	190	374	416	780	1436	1343	2450	4442
			10.0	50	122.0	93	200	392	421	790	1454	1371	2500	4532
			10.6	51	123.8	99	210	410	427	800	1472	1399	2550	4622
			11.1	52	125.6	100	212	413.6	432	810	1490	1427	2600	4712
			11.7	53	127.4	104	220	428	438	820	1508	1454	2650	4802
			12.2	54	129.2	110	230	446	443	830	1526	1482	2700	4892
			12.8	55	131.0	116	240	464	449	840	1544	1510	2750	4982
			13.3	56	132.8	121	250	482	454	850	1562	1538	2800	5072
			13.9	57	134.6	127	260	500	460	860	1580	1566	2850	5162
			14.4	58	136.4	132	270	518	466	870	1598	1593	2900	5252
			15.0	59	138.2	138	280	536	471	880	1616	1621	2950	5342
			15.6	60	140.0	143	290	554	477	890	1634	1649	3000	5432

Locate temperature in middle column. If in degrees Centigrade, read Fahrenheit equivalent in right hand column; If in degrees Fahrenheit, read Centigrade equivalent in left hand column.

Abstracted from "Bethlehem Alloy Steels". (Albert Sauveur type of table. Values revised.) Courtesy Bethlehem Steel Company.

INTERNAL CORRESPONDENCE
CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF
UNION CARBIDE AND CARBON CORPORATION
LOCATION 514 - SOUTH CHARLESTON 3. W. VA.

TO
LOCATION

DATE October 9, 1956

ANSWERING LETTER DATE

ATTENTION
COPIES TO

SUBJECT Thermal Insulation Specifications

Originating Dept.: Works Engineering

Dear Sir:

Attached you will find a copy of the tentative Thermal Insulation Specifications for the South Charleston Plant. These specifications have been made up so that insulation in this plant can be installed in a uniform manner, using material available in Stores. Stores stock of insulating materials, cements, etc. is being changed to accommodate these new specifications. All necessary new materials will be added to the Stores stock.

Please understand that this does not constitute a formal issue of this book because it is incomplete in its present form. However, these specifications are complete enough, in their present form, so that the information can be used to advantage while the specifications are being put in their final form for formal issue. These specifications should be complete by December 1, 1956 and at that time will be issued formally.

If you have any questions regarding any of the foregoing, please contact the writer.

Very truly yours,



A. R. Giles.

ARG/ra

Attachment

INSTITUTE PLANT
THERMAL INSULATION SPECIFICATIONS

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<u>Service</u>	<u>Maximum Temp. °F</u>	<u>Insulation Specification</u>	<u>Page No.</u>
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C - Down to -40°F (-40°C) - - - - -	-40 - - -	10-L - - -	27
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THERMAL INSULATION SPECIFICATIONS

MATERIALS AND APPLICATION SPECIFICATIONS

IN NUMERICAL ORDER

I - ALL MATERIALS:

General Specifications

II - CELLULAR GLASS:

- 10-H - Material and Application Specification for cellular glass thermal insulation for use on equipment and piping normally operating at temperatures above 70°F and up to 800°F and a cushioning blanket is required. It is applicable to both indoor and outdoor service.
- 10-J - Material and Application Specification for cellular glass thermal insulation for use on equipment and piping normally operating at temperatures above 70°F and up to 600°F and a cushioning blanket is not required. It is applicable to both indoor and outdoor service.
- 10-L - Material and Application Specification for cellular glass thermal insulation for use on equipment and piping normally operating at temperatures below 70°F and including cycle operation and thawout service up to 400°F. It is applicable to both indoor and outdoor service.

III - CALCIUM SILICATE, STANDARD:

- 20-H - Material and Application Specification for standard calcium silicate insulation for use on equipment and piping normally operating at temperatures from 70°F up to and including 750°F. It is applicable to both indoor and outdoor service.

IV - ASBESTOS FIBER:

- 21-H - Material and Application Specification for asbestos fiber thermal insulation for use on piping normally operating at temperatures from 70°F up to and including 750°F. It is applicable to both indoor and outdoor service.

Note - Spec. 21-H covers piping only. For equipment requiring insulation use Spec. 20-H.

V - CALCIUM SILICATE, HIGH TEMPERATURE:

- 25-H - Material and Application Specification of "Kayle 20" insulation for use on high temperature equipment and piping operating between 750°F up to and including 1200°F. It is applicable to both indoor and outdoor service.

VI - CALCIUM SILICATE, HIGH TEMPERATURE:

- 32-H - Material and Application Specification of "Kayle 20" insulation for use on high temperature equipment and piping to be protected from fire exposure. It is applicable to both indoor and outdoor service.

THERMAL INSULATION SPECIFICATIONS

MATERIALS DESCRIPTION, MANUFACTURERS AND TRADE NAMES

Insulation Spec. No.	Material	Description	Manufacturer	Trade Names	Limits	
					Temp. Min. (F°)	Max. (F°)
10-B 10-C 10-D	Cellular Glass (Block and Pipe Covering)	Inorganic, pure glass containing millions of separate hermetically sealed cells, each filled with air. Unusually high resistance to moisture, vapor and acid atoms. Incombustible and vermin proof. Combines light weight and high compressive strength.	Pittsburgh - Corning Corp.	Pengloss	-400	900
20-B	Standard Calcium Silicate (Block and Pipe Covering)	Calcium silicate and asbestos fiber processed into rigid insulation. High compressive strength and relative hard surface. Does not disintegrate when wet.	Baldwin - Hill Johnsonville Kearby - Mattison Mundel Owens-Corning Palco Rubberoid	Calcium Silicate Thermax Kythorn Tri-Calite Kaylo Caltemp Calcillite	32 32 100 100 32 32 32	1200 1200 1500 1500 1200 1200 1250
21-B	Asbestos Fibers, Felted with Sodium Silicate Binder (Pipe Covering Only)	Amosite asbestos fibers bonded with sodium silicate and processed into pipe insulation. Has considerable mechanical strength, and will resist vibration. Will "bridge" voids.	Armstrong Dalen Asbestos and Rubber	Armabestos Unibestos #790	32 32	750 750
	Calcium Silicate (Block Covering Only)	Calcium silicate same as Spec. 20-B above.	See Spec. 20 above	See Spec. 20-B above		
22-B 22-C	High Temperature Calcium Silicate (Block and Pipe Covering)	Calcium silicate and asbestos fiber processed into rigid insulation. High compressive strength and relative hard surface. Does not disintegrate when wet. Low shrinkage.	Owens-Corning	Kaylo - 20	100	2000

ALL BOILER WATER - HOT CATT WATER - UNOFFICIAL SERVICE UP TO 255 °F
INDUSTRIAL SPECIFICATION NO. 1: 20-H
MANUFACTURE FOR THIS SPEC. 255 °F

LINE NO.	INSULATION MATERIAL	THICKNESS (IN.)	NO. LAYERS	MANUFACTURE	WIRE	BAND	REINFORCING	WEATHERING	PAINT
1/2	CALCIUM SILICATE (STD.)	2	1	FLD. FAB. or INS. CEM.	16 (2500, 1475) TYPE 304 SS. SOFT ANVIL	NONE	GLASS FABRIC - 12 x 12 MESH / 1/2" WIDE	VITACOC NO. 1 OR EQUIVALENT	FALP
3/4		1	1						
1		1	1						
1-1/2		1	1						
2		1	1						
2-1/2		1	1	SHOP PRE-FAB					
3		1	1						
3-1/2		1	1						
4		1	1						
5		1-1/2	1				1/2" WIDE x .020" THICK x TYPE 304 SS		
6		1-1/2	1						
7		1-1/2	1						
8		1-1/2	1						
9		1-1/2	1						
10		1-1/2	1						
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15		1-1/2	1						
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19		1-1/2	1						
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26		1-1/2	1						
27		1-1/2	1						
28		1-1/2	1						
29		1-1/2	1						
30		1-1/2	1						
31		1-1/2	1						
32		1-1/2	1						
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37		1-1/2	1						
38		1-1/2	1						
39		1-1/2	1						
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42		1-1/2	1						
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57		1-1/2	1						
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67		1-1/2	1						
68		1-1/2	1						
69		1-1/2	1						
70		1-1/2	1						
71		1-1/2	1						
72		1-1/2	1						
73		1-1/2	1						
74		1-1/2	1						
75		1-1/2	1						
76		1-1/2	1						
77		1-1/2	1						
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81		1-1/2	1						
82		1-1/2	1						
83		1-1/2	1						
84		1-1/2	1						
85		1-1/2	1						
86		1-1/2	1						
87		1-1/2	1						
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89		1-1/2	1						
90		1-1/2	1						
91		1-1/2	1						
92		1-1/2	1						
93		1-1/2	1						
94		1-1/2	1						
95		1-1/2	1						
96		1-1/2	1						
97		1-1/2	1						
98		1-1/2	1						
99		1-1/2	1						
100		1-1/2	1						

EQUIPMENT AND PIPING ACCESSORIES

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - North American Refractories Co., "Marocast", A. P. Green Fire Brick Co. "Insulation Adhesive", J. H. Franco Co. "Franset", or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Powerhouse", Eagle-Picher "One-Coat", or approved alternate.
- Heat Resistant Sealer - Benjamin-Foster #30-43 or approved alternate.

EQUIPMENT ACCESSORIES ONLY:

- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting one side, expanded metal lath on the other side. (To be used on equipment expansion joints of the bellows type.)
- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting on both sides. (To be used on very irregular shapes where metal lath type is not satisfactory.)
- Wire Netting - One inch, hexagonal mesh, #20 gage, galvanized after weaving.
- Finishing Cement - Hard surface, Eagle-Picher #106, J.H. #678, or approved alternate.

PIPING ACCESSORIES ONLY:

- Finishing Cement - J.H. #352 or approved alternate. (For pipe patching)

THICKNESS (IN.)	INSULATION MATERIAL	THICKNESS (IN.)	NO. LAYERS	MANUFACTURER OR INS. COM.	WIRE	FACE	FINISH	DETAILS NOTED	REMARKS
1/2	CALCIUM SILICATE (STD.)	1	1	FLD. FAB. OR INS. COM.	1/2" WIDE x .020" THICK x TYPE 304 SS.	NONE	1" x 10" PANEL, STANDARD	STANDARD	FLD.
3/4		1	1						
1		1	1						
1-1/2		1	1						
2		1	1						
2-1/2		1	1	SHOP PRE-FAB					
3		1	1						
3-1/2		1	1						
4		1	1						
6		1-1/2	1						
8		1-1/2	1						
10		1-1/2	1						
12		1-1/2	1						
14		1-1/2	1						
16		1-1/2	1						
18		1-1/2	1						
20		1-1/2	1						
22		1-1/2	1						
24		1-1/2	1						
26		1-1/2	1						
28		2	1						
30		2	1						
32		2	1						
34		2	1						
36		2	1						
EQUIP- MENT (PLAT or OTHER SET)		2	1	CUT FOR SIZE REQ'D. (FAB. MAN.)	SEE SPEC. 20-H, PAGE # , FOR CLARITY	SEE SPEC. 20-H, PAGE # , and GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - North American Refractories Co. "Narcoset", A. P. Green Fire Brick Co. "Insulation Adhesive", J. E. France Co. "Frasnet", or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Powerhouse", Eagle-Fisher "One-Coat", or approved alternate.
- Heat Resistant Sealer - Benjamin-Foster #30-43 or approved alternate.

EQUIPMENT ACCESSORIES ONLY:

- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting one side, expanded metal lath on the other side (To be used on equipment expansion joints of the bellows type.)
- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting on both sides. (To be used on very irregular shapes where metal lath type is not satisfactory.)
- Wire Netting - One inch, hexagonal mesh, #20 gage, galvanized after weaving.
- Finishing Cement - Hard surface, Eagle-Fisher #106, J.M. #678, or approved alternate.

PIPING ACCESSORIES ONLY:

- Finishing Cement - J.M. #352 or approved alternate. (For pipe patching)

NOTE: 200 PSI STEAM + HIGH PRESSURE CONDENSATE (200-400 PSI)

2012-7-16 Distribution to : 20-5
to 2012-12-16 7:30 PM Status: 499 97

ITEM NO.	DESCRIPTION	QTY.	UNIT	REMARKS	DATE	BY	REVIEW	APPROVAL	REVISION
1/2	CALCIUM SILICATE (STD.)	1-1/2	1	PLD. FAB. OF INS. CEMENT	2-1/2	1	2-1/2	2-1/2	2-1/2
1/4		1-1/2	1	SHOP PRE-FAB					
1		1-1/2	1						
1-1/2		2	1						
2		2	1						
2-1/2		2	1						
3		2	1						
3-1/2		2	1						
4		2	1						
6		2	1						
8		2	1						
10		2-1/2	1						
12		2-1/2	1						
14		2-1/2	1						
16		2-1/2	1						
18		2-1/2	1						
20		2-1/2	1						
22		2-1/2	1						
24		2-1/2	1						
26		2-1/2	1						
28		2-1/2	1						
30		2-1/2	1						
32		2-1/2	1						
34		2-1/2	1						
36		2-1/2	1						
38		2-1/2	1						
40		2-1/2	1						
42		2-1/2	1						
44		2-1/2	1						
46		2-1/2	1						
48		2-1/2	1						
50		2-1/2	1						
52		2-1/2	1						
54		2-1/2	1						
56		2-1/2	1						
58		2-1/2	1						
60		2-1/2	1						
62		2-1/2	1						
64		2-1/2	1						
66		2-1/2	1						
68		2-1/2	1						
70		2-1/2	1						
72		2-1/2	1						
74		2-1/2	1						
76		2-1/2	1						
78		2-1/2	1						
80		2-1/2	1						
82		2-1/2	1						
84		2-1/2	1						
86		2-1/2	1						
88		2-1/2	1						
90		2-1/2	1						
92		2-1/2	1						
94		2-1/2	1						
96		2-1/2	1						
98		2-1/2	1						
100		2-1/2	1						

REQUIREMENT AND FLYING ACCIDENTS

- a) Clips - 1/2" double pronged type 304 SS, A. J. Garrard or approved alternate.
b) Fabricating Cement - North American Refractories Co. "Marscoat", A. P. Green Fire Brick Co. "Insulation Adhesive", J. H. Francis Co. "Transet", or approved alternate.
c) Insulating Cement - Hydraulic setting, Baldwin-Kill "Powerhouse", Eagle-Fisher "One-Coat", or approved alternate.
d) Heat Resistant Sealer - Benjamin-Foster #30-43 or approved alternate.

EQUIPMENT ACCESSORIES ONLY:

- a) Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting one side, expanded metal lath on the other side. (To be used on equipment expansion joints of the bellows type.)
- b) Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting on both sides. (To be used on very irregular shapes where metal lath type is not satisfactory.)
- c) Wire Netting - One inch, hexagonal mesh, #20 gage, galvanized after weaving.
- d) Finishing Cement - Hard surface, Eagle-Fisher #106, J. M. #678 or approved alternate.

PIPING ACCESSORIES ONLY:

- a) Finishing Cement - J.J. #52 or approved alternate. (For pipe patching)

SERVICE: 400 PSI STEAM

INSULATION SPECIFICATION NO. 1 20-H
MAXIMUM TEMP. FOR THIS SERVICE 643 °F

LINE NO. (SEE P. 1)	INS. LAYER MATERIAL	THICK- NESS IN.	NO. OF LAYERS	LAYER DATA		VAL. FIT SPLICING DETAIL	WIRE (INNER LAYER)	BAND (OUTER LAYER)	REIN- FORCE- MENT	WIRE MESH DETAIL	WIRE MESH DETAIL
				INNER	OUTER						
1/2	CALCIUM SILICATE (STD.)	2	1	NONE	1/2" IPS x 2"	FLD. FAB. or INS. CEMENT	18 USSWG (.0475") x TYPE 304 S.S. SOFT ANNEALED	NONE	GLASS FABRIC 12 x 12 MESH STANCH BINDER	V.PASCO MC-1 or BRIDGEMAN PG-100 #10-12	PIPE
3/4		2	1		3/4" IPS x 2"						
1		2	1		1" IPS x 2"	SHOP PRE-FAB					
1-1/2		2-1/2	1		1-1/2" IPS x 2-1/2"		NONE	1/2" WIDE x 120" THICK x TYPE 304 S.S.			
2		2-1/2	1		2" IPS x 2-1/2"						
2-1/2		2-1/2	1		2-1/2" IPS x 2-1/2"						
3		2-1/2	1		3" IPS x 2-1/2"						
3-1/2		2-1/2	1		3-1/2" IPS x 2-1/2"						
4		3	2	4" IPS x 1-1/2"	7" IPS x 1-1/2"		18 USSWG (.0475") x TYPE 304 S.S. SOFT ANNEALED				
6		3	2	6" IPS x 1-1/2"	9" IPS x 1-1/2"						
6		3	2	8" IPS x 1-1/2"	11" IPS x 1-1/2"						
10		3	2	10" IPS x 1-1/2"	14" IPS x 1-1/2"						
12		3	2	12" IPS x 1-1/2"	16" IPS x 1-1/2"						
14		3	2	14" IPS x 1-1/2"	17" IPS x 1-1/2"						
16		3-1/2	2	16" IPS x 1-1/2"	19" IPS x 2"						
18		3-1/2	2	18" IPS x 1-1/2"	21" IPS x 2"						
20		3-1/2	2	20" IPS x 1-1/2"	23" IPS x 2"						
22		3-1/2	2	22" IPS x 1-1/2"	25" IPS x 2"						
24		3-1/2	2	24" IPS x 1-1/2"	27" IPS x 2"						
26		3-1/2	2	26" IPS x 1-1/2"	29" IPS x 2"						
28		3-1/2	2	28" IPS x 1-1/2"	31" IPS x 2"						
30		3-1/2	2	30" IPS x 1-1/2"	33" IPS x 2"						
32		3-1/2	2	32" IPS x 1-1/2"	35" IPS x 2"						
34		3-1/2	2	34" IPS x 1-1/2"	37" IPS x 2"						
36		3-1/2	2	36" IPS x 1-1/2"	39" IPS x 2"						
As per MINT PLAT or SPEC 20-H		2-1/2	2	1-1/2"	2"	CUT FOR SIZE (FAB. MAN.)	SEE SPEC. 20-H, PAGE 4, FOR CLARITY	SEE SPEC. 20-H, PAGE 4, AND GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - North American Refractories Co. "Mareoset", A. P. Green Fire Brick Co. "Insulation Adhesive", J. H. France Co. "Franset", or approved alternate.
- Insulating Cement - Hydraulic setting, Malcolmsmill "Powerhouse", Eagle-Picher "One-Coat", or approved alternate.
- Heat Resistant Sealer - Benjamin-Foster #30-43 or approved alternate.

EQUIPMENT ACCESSORIES ONLY

- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting one side, expanded metal lath on the other side. (To be used on equipment expansion joints of the bellows type.)
- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting on both sides. (To be used on very irregular shapes where metal lath type is not satisfactory.)
- Wire Netting - One inch, hexagonal mesh, #20 gage, galvanized after weaving.
- Finishing Cement - Hard surface, Eagle-Picher #106, J.M. #678, or approved alternate.

PIPING ACCESSORIES ONLY

- Finishing Cement - J.M. #352 or approved alternate. (For pipe patching)

SERVICE; 100 PSI SUPERHEATED STEAM AT 225

INSULATION SPECIFICATION NO. 2 25-H

MAXIMUM TEMP. FOR THIS SERVICE 1200 °F

PIPE SIZE (IN.)	INSULATION MATERIAL	THICKNESS (IN.)	NO. LAYERS	LAYER DATA			VALVE FIT. & FL. COVER	WIRE (INNER & MIDDLE LAY.)	BAND (OUTER LAYER)	REINFT. MESH	WEATHER-STRIPPING MATERIAL	WEATHER-CONTING. APPPL.
				INNER	MIDDLE	OUTER						
1/2	CALCIUM SILICATE (H.T.)	3-1/2	2	1/2" IPS x 1-1/2"	NONE	3-1/2" IPS x 3"	SHOP PRE-PAD	10 USSW (.0475") x TYPE 304 SS 50FT ANNUAL	1/2" WIDE x .020" THK x TYPE 304 SS	GLASS FABRIC - 16 x 20 MESH / STARCH BINDER	VINYLAC MC-1 or BUNJAC-4 POSTER #3007C	PAINT
3/4		3-1/2	2	1/2" IPS x 1-1/2"		1 1/2" IPS x 3"						
1		4	2	1 1/2" IPS x 3"		3" IPS x 3"						
1-1/2		4	2	1-1/2" IPS x 3"		3" IPS x 3"						
2		4-1/2	2	2" IPS x 3"		3" IPS x 3-1/2"						
2-1/2		4-1/2	2	2-1/2" IPS x 3"		3" IPS x 3-1/2"						
3		4-1/2	2	3" IPS x 3"		3" IPS x 3-1/2"						
3-1/2		5	2	3-1/2" IPS x 3-1/2"		3" IPS x 3-1/2"						
4		5	2	4" IPS x 3-1/2"		3" IPS x 3-1/2"						
6		5-1/2	2	4" IPS x 3-1/2"		4" IPS x 3"						
8		5-1/2	2	4" IPS x 3-1/2"		4" IPS x 3"						
10		6	2	4" IPS x 3-1/2"		4" IPS x 3"						
12		6	2	4" IPS x 3-1/2"		4" IPS x 3"						
14		6	2	4" IPS x 3-1/2"		4" IPS x 3"						
16		6	2	4" IPS x 3-1/2"		4" IPS x 3"						
18		6-1/2	2	4" IPS x 3-1/2"		4" IPS x 3"						
20		6-1/2	2	4" IPS x 3-1/2"		4" IPS x 3"						
22		6-1/2	2	4" IPS x 3-1/2"		4" IPS x 3"						
24		6-1/2	2	4" IPS x 3-1/2"		4" IPS x 3"						
26		6-1/2	2	4" IPS x 3-1/2"		4" IPS x 3"						
28		6-1/2	2	4" IPS x 3-1/2"		4" IPS x 3"						
30		7	2	4" IPS x 3-1/2"		4" IPS x 3"						
32		7	2	4" IPS x 3-1/2"		4" IPS x 3"						
34		7	2	4" IPS x 3-1/2"		4" IPS x 3"						
36		7	2	4" IPS x 3-1/2"		4" IPS x 3"						
EQUIP. FLAT or OVER 36"		8	2	2-1/2" 2-1/2" 3"			CUT FOR 317E REC'D. (PAR. MAN.)	SEE SPEC. 25-H, PAGE 5, FOR CLARITY	SEE SPEC. 25-H, PAGE 5, and GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES:

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - A. F. Green Fire Brick Co. "Insulation Adhesive", J. W. Francoe Co. "Transet" or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Superpowerhouse", Eagle-Fisher "One-Coat" or approved alternate.
- Heat Resistant Sealer - There is no heat resistant sealer available for this temperature. Use 24 MSG (.0239") steel sheet metal flashing instead.

EQUIPMENT ACCESSORIES ONLY:

- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting one side, expanded metal lath on the other side. (To be used on equipment expansion joints of the bellows type.)
- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting on both sides. (To be used on very irregular shapes where metal lath type is not satisfactory.)
- Wire Netting - One inch, hexagonal mesh, #20 gage, galvanized after weaving.
- Finishing Cement - Hard surface, Eagle-Fisher #106, J.M. #678, or approved alternate.

PIPING ACCESSORIES ONLY:

- Finishing Cement - J.M. #352 or approved alternate. (For pipe patching)

UCC 003359

SECTION: DOWTHURN

INSULATION SPECIFICATION NO.: 21-6

MAXIMUM TEMP. FOR THIS SHEET: 715 °F

NOTE:

The temperature at which the dowthurn line would be kept is over 100 °F if the procedure as shown below is followed and 75 PSI steam is used in the tracer. Dowthurn freezes at approximately 53 °F and this would keep it fluid over any extended shut-down period. Steam tracer details are per Engineering Standard P-24, page 44 of this book. Clamp and spacer details are per Engineering Standard I-644, page 45 of this book. For information on other sizes of tracers see Engineering Standard P-84.

LINE SIZE (IPS)	INSULATING MATERIAL	THICKNESS (IN.)	NO. LAYERS	TRACER SIZE	INSULATION DATA		VALVE, FITTING & V.D. COVER	PIPE (INNER)	BAND (OUTER LAYER)	REINF. RECK	WEATHER COATING (ROYAL)	WEATHER COATING (ATL)
					INNER LAYER	OUTER LAYER						
1/2	ASBESTOS FIBER	2-1/2	1	3/8" O.D.	NONE	2" IPS x 2-1/2"	FLD. PAR. SE. INE. CBL.	3" USS-6 (.0475") B TYPE 304 SS SO. ANN.	NONE	GLASS FABRIC- 10 x 10 MESH/ STARCH BINDER	VINYLCO MC-1 or BENJAMIN-POSTER #31-70	PALM
3/4		2-2/2	1	3/8" O.D.		2-1/4" IPS x 2-1/2"						
1		2-1/2	1	3/8" O.D.		2-1/2" IPS x 2-1/2"	SHO. PNE-FAB					
1-1/2		3	2	3/8" O.D.	3-1/2" IPS x 1-1/2"	5" IPS x 1-1/2"			1/2" WIRE x .070"			
2		3	2	3/8" O.D.	3" IPS x 1-1/2"	6" IPS x 1-1/2"			THICK x 304 SS			
2-1/2		3-1/2	2	3/8" O.D.	3-1/2" IPS x 1-1/2"	6" IPS x 2"						
3		3-1/2	2	3/8" O.D.	4" IPS x 1-1/2"	7" IPS x 2"						
4		3-1/2	2	3/8" O.D.	5" IPS x 1-1/2"	8" IPS x 2"						
6		4	2	3/8" O.D.	7" IPS x 2"	11" IPS x 2"						
8		4	2	3/8" O.D.	10" O.D. x 2"	12" IPS x 2"						
10		4	2	7/8" O.D.	12" O.D. x 2"	17" IPS x 2"						
12		4	2	7/8" O.D.	14" IPS x 2"	18" IPS x 2"						
EQUIP- FMENT (FLAT or OTHER)	CALCIUM SILICATE (SYN)	3	2	—	2-1/2"	2-1/2"	SEE FAB. MAN.	SEE SPEC. 20-1, PAGE 4 FOR CLARITY	SEE SPEC. 20-1, PAGE 4, and GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES

- Clips - 1/8" double pronged type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - A. F. Green Fire Brick Co. "Insulation Adhesive" or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Powerhouse", Eagle-Fisher "One-Coat" or approved alternate.
- Heat Resistant Sealer - Benjamin-Poster #10-41 or approved alternate.

EQUIPMENT ACCESSORIES ONLY

- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting one side, expanded metal lath on the other side (To be used on equipment expansion joints of the bellows type.)
- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting on both sides. (To be used on very irregular shapes where metal lath type is not satisfactory.)
- Wire Netting - One inch, hexagonal mesh, #20 gage, galvanized after weaving.
- Finishing Cement - Hard surface, Eagle-Fisher #106, J. M. #678, or approved alternate.

PIPING ACCESSORIES ONLY

- Finishing cement - J. M. #352 or approved alternate. (For pipe patching)

SERVICE: TETRALIN

INSULATION SPECIFICATION NO. 20-H
MAXIMUM TEMPERATURE FOR THIS SERVICE 535 OF

LINE NO.	INS. LATHING	INS. LATHING	NO. LAYERS	INS. DATA	VAL. FIT.	WIRE	SHEATH	REINF.	WALL LINING	WEATHERING
NO.	TYPE	THICK.		INS.	TYPE	(INNER LAYER)	(OUTER LAYER)	TYPE	THICK.	TYPE
1/2	CALCIUM SILICATE (STD)	2	1	NONE	1/2" IPS x 2"	FLD. FAB. OR INS. CEMENT	18 USSWG (.0475") x TYPE 304 SS SOFT ANNEALED	NONE	GLASS FIBER 10 x 10 Mesh STAINLESS STEEL	VITASCO MC-1 or BENJON POSTER #20-77
3/4		2	1		3/4" IPS x 2"					
1		2	1		1" IPS x 2"	STOP PRE-FAB				
1-1/2		2	1		1-1/2" IPS x 2"					
2		2	1		2" IPS x 2"					
2-1/2		2-1/2	1		2-1/2" IPS x 2-1/2"	NONE	1/2" WIDE x .020" THICK x TYPE 304 SS			
3		2-1/2	1		3" IPS x 2-1/2"					
3-1/2		2-1/2	1		3-1/2" IPS x 2-1/2"					
4		2-1/2	1		4" IPS x 2-1/2"					
5		2-1/2	1		5" IPS x 2-1/2"					
6		2	2		6" IPS x 1-1/2" x 1-1/2"	18 USSWG (.0475") x TYPE 304 SS SOFT ANNEALED				
10		2	2		10" IPS x 1-1/2" x 1-1/2"					
12		2	2		12" IPS x 1-1/2" x 1-1/2"					
14		2	2		14" IPS x 1-1/2" x 1-1/2"					
16		2	2		16" IPS x 1-1/2" x 1-1/2"					
18		2	2		18" IPS x 1-1/2" x 1-1/2"					
20		2	2		20" IPS x 1-1/2" x 1-1/2"					
22		2	2		22" IPS x 1-1/2" x 1-1/2"					
24		2	2		24" IPS x 1-1/2" x 1-1/2"					
26		2	2		26" IPS x 1-1/2" x 1-1/2"					
28		2	2		28" IPS x 1-1/2" x 1-1/2"					
30		2	2		30" IPS x 1-1/2" x 1-1/2"					
32		2	2		32" IPS x 1-1/2" x 1-1/2"					
34		2	2		34" IPS x 1-1/2" x 1-1/2"					
36		2	2		36" IPS x 1-1/2" x 1-1/2"					
4-1/2 MINUT FLAT or 30"		2-1/2	2		1-1/2" x 2"	CUT 105 S128 HEDCO (FAB. MAN.)	SEE SPEC. 20-H, PAGE 4, FOR CLARITY	SEE SPEC. 20-H, PAGE 4, and GEN. NOTE #4		

EQUIPMENT AND PIPING ACCESSORIES

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - North American Refractories Co. "Marocet", A. P. Green Fire Brick Co. "Insulation Adhesive", J. H. France Co. "Transect", or approved alternate.
- Insulating Cement - Hydraulic setting, Malowin-Hill "Powerhouse", Eagle-Fisher "One-Coat", or approved alternate.
- Heat Resistant Sealer - Benjamin-Postor #30-43 or approved alternate.

EQUIPMENT ACCESSORIES ONLY

- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting one side, expanded metal lath on the other side. (To be used on equipment expansion joints of the bellows type.)
- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting on both sides. (To be used on very irregular shapes where metal lath type is not satisfactory.)
- Wire Netting - One inch, hexagonal mesh #20 gage, galvanized after weaving.
- Finishing Cement - Hard surface, Eagle-Fisher #106, J.H. #478, or approved alternate.

PIPING ACCESSORIES ONLY

- Finishing Cement - J.H. #352 or approved alternate. (For pipe patching)

SERVICE: OIL AND PASTE LINES AT 250

INSULATION SPECIFICATION NO. 1 20-8

MAXIMUM TEMP. FOR THIS SPECS 750 °F

LINE NO. (INCH)	INS. LAYER MATERIAL	THICK- NESS (INCH)	NO. LAYERS	LAYER DATA		VAL. FIT. & FLG. TYPE	WIRE (INNER LAYER)	BARK (OUTER LAYER)	RAINF. MADE	WEATHER- RESISTING TYPE	WIND RESISTING TYPE
				INNER	OUTER						
1/2	CALCIUM SILICATE (STD.)	2-1/2	1	NONE	1/2" IPS x 2-1/2"	800P PRE-PAD	18 GAGE(.0475") x TYPE 304 SS SOFT ANNEALED	NONE	GLASS FIBRIC- 10 x 10 MESH/ STARCH BINDER	VIPASCO MC-1 or BENCO-10 POSTER PFC-77	PAIR
3/4		2-1/2	1		3/4" IPS x 2-1/2"						
1		2-1/2	1		1" IPS x 2-1/2"						
1-1/2		3	2	1-1/2" IPS x 1-1/2"	1-1/2" IPS x 1-1/2"			1/2" WIDE x .020" THICK x TYPE 304 SS			
2		3	2	2" IPS x 1-1/2"	5" IPS x 1-1/2"						
2-1/2		3	2	2-1/2" IPS x 1-1/2"	5" IPS x 1-1/2"						
3		3	2	3" IPS x 1-1/2"	6" IPS x 1-1/2"						
3-1/2		3	2	3-1/2" IPS x 1-1/2"	6" IPS x 1-1/2"						
4		3-1/2	2	4" IPS x 1-1/2"	7" IPS x 2"						
6		3-1/2	2	6" IPS x 1-1/2"	9" IPS x 2"						
8		3-1/2	2	8" IPS x 1-1/2"	11" IPS x 2"						
10		3-1/2	2	10" IPS x 1-1/2"	14" IPS x 2"						
12		4	2	12" IPS x 2"	17" IPS x 2"						
14		4	2	14" IPS x 2"	18" IPS x 2"						
16		4	2	16" IPS x 2"	20" IPS x 2"						
18		4	2	18" IPS x 2"	22" IPS x 2"						
20		4	2	20" IPS x 2"	24" IPS x 2"						
22		4	2	22" IPS x 2"	26" IPS x 2"						
24		4	2	24" IPS x 2"	28" IPS x 2"						
26		4	2	26" IPS x 2"	30" IPS x 2"						
28		4	2	28" IPS x 2"	32" IPS x 2"						
30		4	2	30" IPS x 2"	34" IPS x 2"						
32		4-1/2	2	32" IPS x 2"	36" IPS x 2-1/2"						
34		4-1/2	2	34" IPS x 2"	38" IPS x 2-1/2"						
36		4-1/2	2	36" IPS x 2"	40" IPS x 2-1/2"						
50-100 PLAT or OFF 30"		4-1/2	2	2"	2-1/2"	SEE SPEC. 20-E, PAGE 4, (FAB. MAN.)	SEE SPEC. 20-E, PAGE 4, FOR CLARITY	SEE SPEC. 20-E, PAGE 4, and GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - North American Refractories Co. "Mareoset", A. P. Green Fire Brick Co. "Insulation Adhesive", J. H. France Co. "Franset", or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Powerhouse", Eagle-Picher "One-Cast", or approved alternate.
- Heat Resistant Sealer - Benjamin-Foster #30-43 or approved alternate.

EQUIPMENT ACCESSORIES ONLY:

- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting one side, expanded metal lath on the other side. (To be used on equipment expansion joints of the bellows type.)
- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting on both sides. (To be used on very irregular shapes where metal lath type is not satisfactory.)
- Wire Netting - One inch, hexagonal mesh #20 gage, galvanized after weaving.
- Finishing Cement - Hard surface, Eagle-Picher #106, J.M. #678, or approved alternate.

PIPING ACCESSORIES ONLY:

- Finishing Cement - J.M. #352 or approved alternate. (For pipe patching.)

UCC 003362

INSULATION SPECIFICATION NO. 9 25-H
MAXIMUM TEMP. FOR THIS SHEETS 1000 °F

LINE NO. (1-10)	INSULATION MATERIAL	THICKNESS (IN.)	NO. LAYERS	LAYER DATA			VAL. FIT. (INCHES)	WIRE (INNER & MIDDLE LAY.)	BAND (OUTER LAYER)	REINFORCING FABRIC	WEATHER-RESISTING MATERIAL	WEATHER-RESISTING APPL.
				INNER	MIDDLE	OUTER						
1/2	CALCIUM SILICATE (N.P.)	3	2	1/2" IPS x 1-1/2"	NONE	3-1/2" IPS x 1-1/2"	SHOP PRE-FAB	10 USMC (.0475") x TYPE 304 SS SOFT ANNEAL	1/2" WIDE x .020" THK x TYPE 304 SS	GLASS FABRIC - 10 x 10 MESH / STARCH BINDER	VITASCO MC-1 or BENJAMIN-POSTER #30-70	PALM
3/4		3-1/2	2	3/4" IPS x 1-1/2"		3-1/2" IPS x 2"						
1		3-1/2	2	1" IPS x 1-1/2"		4" IPS x 2"						
1-1/2		4	2	1-1/2" IPS x 2"		5" IPS x 2"						
2		4	2	2" IPS x 2"		6" IPS x 2"						
2-1/2		4	2	2-1/2" IPS x 2"		6" IPS x 2"						
3		4-1/2	2	3" IPS x 2"		7" IPS x 2-1/2"						
3-1/2		4-1/2	2	3-1/2" IPS x 2"		7" IPS x 2-1/2"						
4		4-1/2	2	4" IPS x 2"		8" IPS x 2-1/2"						
5		5	2	6" IPS x 2-1/2"		11" IPS x 2-1/2"						
6		5	2	8" IPS x 2-1/2"		14" IPS x 2-1/2"						
10		5-1/2	3	10" IPS x 1-1/2"	14" IPS x 2"	18" IPS x 2"						
12		5-1/2	3	12" IPS x 1-1/2"	16" IPS x 2"	20" IPS x 2"						
14		5-1/2	3	14" IPS x 1-1/2"	17" IPS x 2"	21" IPS x 2"						
16		6	3	16" IPS x 2"	20" IPS x 2"	24" IPS x 2"						
18		6	3	18" IPS x 2"	22" IPS x 2"	26" IPS x 2"						
20		6	3	20" IPS x 2"	24" IPS x 2"	28" IPS x 2"						
22		6	3	22" IPS x 2"	26" IPS x 2"	30" IPS x 2"						
24		6	3	24" IPS x 2"	28" IPS x 2"	32" IPS x 2"						
26		6	3	26" IPS x 2"	30" IPS x 2"	34" IPS x 2"						
28		6-1/2	3	28" IPS x 2"	32" IPS x 2"	36" IPS x 2-1/2"						
30		6-1/2	3	30" IPS x 2"	34" IPS x 2"	38" IPS x 2-1/2"						
32		6-1/2	3	32" IPS x 2"	36" IPS x 2"	40" IPS x 2-1/2"						
34		6-1/2	3	34" IPS x 2"	38" IPS x 2"	2-1/2"						
36		6-1/2	3	36" IPS x 2"	40" IPS x 2"	2-1/2"						
EQUIP- MENT (LAY ON OVER 36")		7-1/2	3	2-1/2"	2-1/2"	2-1/2"	CUT FOR SIZE RELD. (FAB. MAN.)	SEE SPEC. 25-H, PAGE 9, FOR CLARITY	SEE SPEC. 25-H, PAGE 9, and GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES:

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - A. F. Green Fire Brick Co. "Insulation Adhesive", J. R. France Co. "Transet" or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Superpowerhouse", Eagle-Picher "One-Coat" or approved alternate.
- Heat Resistant Sealer - There is no heat resistant sealer available for this temperature. Use 24 MSG (.0239") steel sheet metal flashing instead.

EQUIPMENT ACCESSORIES ONLY:

- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting one side, expanded metal lath on the other side. (To be used on equipment expansion joints of the bellows type.)
- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting on both sides. (To be used on very irregular shapes where metal lath type is not satisfactory.)
- Wire Netting - One inch, hexagonal mesh, #20 gage, galvanized after weaving.
- Finishing Cement - Hard surface, Eagle-Picher #100, J.M. #678, or approved alternate.

PIPING ACCESSORIES ONLY:

- Finishing Cement - J.M. #352 or approved alternate. (For pipe patching)

INSULATION SPECIFICATION No. 32-H

MAXIMUM TEMP. FOR THIS S-LITE PIPING: 535 °F

EQUIPMENT: 427 °F

LINE SIZE (IN.)	INS. LAYER MATERIAL	THICK. (IN.)	N. LAYERS	LAYER DATA		VAL. FIT. & JOINT COVER	WIRE	BAND (BOTH LAYERS)	REINF. MESH	W. FASCO. COATING PAINT	WEATHERING PROTECT.
				INNER	OTHER						
1/2	CALCIUM SILICATE (H.T.)	2	2	1/2" IPS x 1"	2-1/2" IPS x 1"	SHOP PRE-FAB	NONE	1/2" WIDE x .020" THICK x TYPE 304 SS	GLASS FABRIC- 10 x 10 MESH/ STANCH BINDER	V.FASCO MC-1 or BOND/HTL POSTER #20-77	PAINT
3/4		2	2	3/4" IPS x 1"	2-1/2" IPS x 1"						
1		2	2	1" IPS x 1"	3" IPS x 1"						
1-1/2		2	2	1-1/2" IPS x 1"	3-1/2" IPS x 1"						
2		2	2	2" IPS x 1"	4" IPS x 1"						
2-1/2		2	2	2-1/2" IPS x 1"	4-1/2" IPS x 1"						
3		2	2	3" IPS x 1"	5" IPS x 1"						
3-1/2		2	2	3-1/2" IPS x 1"	5" IPS x 1"						
4		2	2	4" IPS x 1"	6" IPS x 1"						
6		2-1/2	2	6" IPS x 1"	8" IPS x 1-1/2"						
8		3	2	8" IPS x 1-1/2"	11" IPS x 1-1/2"						
10		3	2	10" IPS x 1-1/2"	14" IPS x 1-1/2"						
12		3	2	12" IPS x 1-1/2"	16" IPS x 1-1/2"						
14		3	2	14" IPS x 1-1/2"	17" IPS x 1-1/2"						
16		3	2	16" IPS x 1-1/2"	19" IPS x 1-1/2"						
18		3	2	18" IPS x 1-1/2"	21" IPS x 1-1/2"						
20		3	2	20" IPS x 1-1/2"	23" IPS x 1-3/4"						
22		3	2	22" IPS x 1-1/2"	25" IPS x 1-1/2"						
24		3	2	24" IPS x 1-1/2"	27" IPS x 1-1/2"						
26		3	2	26" IPS x 1-1/2"	29" IPS x 1-1/2"						
28		3	2	28" IPS x 1-1/2"	31" IPS x 1-1/2"						
30		3	2	30" IPS x 1-1/2"	33" IPS x 1-1/2"						
32		3	2	32" IPS x 1-1/2"	35" IPS x 1-1/2"						
34		3	2	34" IPS x 1-1/2"	37" IPS x 1-1/2"						
36		3	2	36" IPS x 1-1/2"	39" IPS x 1-1/2"						
EQUIPMENT (FLAT or CURV. SURF.)		2	2	1"	1"	CUT FOR SIZE MISC. (FAB. MAN.)	SEE SPEC. 32-H, PAGE # 1 FOR CLARITY	SEE SPEC. 32-H, PAGE # 1, AND GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES:

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - J. H. France Co. "Fracet" or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Superpowerhouse", Eagle-Fisher "One-Coat", or approved alternate.
- Heat Resistant Sealer - Benjamin-Foster #30-43 or approved alternate.

EQUIPMENT ACCESSORIES ONLY:

- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting one side, expanded metal lath on the other side. (To be used on equipment expansion joints of the bellows type.)
- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting on both sides. (To be used on very irregular shapes where metal lath type is not satisfactory.)
- Wire Netting - One inch, hexagonal mesh, #20 gage, galvanized after weaving.
- Finishing Cement - Hard surface, Eagle-Fisher #106, J.M. #678, or approved alternate.

PIPING ACCESSORIES ONLY:

- Finishing Cement - J.M. #252 or approved alternate. (For pipe patching)

NOTE:

The above are minimum thicknesses that may be applied to lines or equipment in Ethylene Oxide service for fire protection purposes.

SERVICE: CARBONOX

INSULATION SPECIFICATION NO. 10-3
MAXIMUM TEMP. FOR THIS SHEET 555 °F

INSULATION THICKNESS	INSULATION MATERIAL	NO. OF LAYS	NO. OF LAYS	INSULATION SPECIFICATION	WIRE	BAND	RAINFALL	WEATHER- RESISTANT PAINT	WEATHER- RESISTANT PAINT
1/2	CELLULAR GLASS	1	1	SHOP PRE-FAB	1-1/2" x 1-1/2" x 1/2" A TYPE 304 SS. SOFT ANNEAL	NONE	GLASS FIBER 10 x 10 MESH / 5" x 10" MIN. EN	VITACOD MC-1 37 BENJAMIN- FOSTER #3-70	PAINT
1/4		1	1						
1		1	1						
1-1/2		1	1						
2		1	1						
2-1/2		1	1						
3		1	1						
3-1/2		1	1						
4		1	1						
6		1-1/2	1						
8		1-1/2	1						
10		1-1/2	1						
12		1-1/2	1						
14		1-1/2	1						
16		1-1/2	1						
18		1-1/2	1						
20		1-1/2	1						
22		1-1/2	1						
24		1-1/2	1						
26		1-1/2	1						
28		1-1/2	1						
30		1-1/2	1						
32		1-1/2	1						
34		1-1/2	1						
36		1-1/2	1						
EQUIP- MENT (FLAT or OVER 30°)		1-1/2	1	CUT FOR SIZE REQ'D. (VAC. MAN.)	SEE SPEC. 10-J, PAGE 7, FOR CLARITY	SEE SPEC. 10-J, PAGE 7, and GEN. NOTE #4			

CONTINUED INS. PIPING ACCESSORIES

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - Miracel Adhesive RT-100 up to 500 °F, HFR cement above 500 °F, or approved alternate.
- Antiabrasion Coating - Vinyl, Carlon #500-H up to 400 °F, HFR cement above 400 °F, or approved alternate.
- Heat Resistant Sealer - Benjamin-Foster #80-43 or approved alternate.
- Adhesive Cement - Miracel Adhesive Type H or approved alternate.

CONTINUED ACCESSORIES ONLY

- Die Out Strap - 1/4" wide x .022" thick x Type 304 SS 2" finger on 9" centers, A. J. Garrard or approved alternate.

NOTE:

All chemical lines and the 2"-200 PSI steam supply line to the neutralizer jet at the Carbonox unit to be insulated as shown above. However, the 2"-200 PSI steam supply line shall be insulated with one layer of two (2) inch thick cellular glass. This is good up to a temperature of 500 °F.

SERVICE: GENERAL SERVICE REQUIRING STEAM TRACING (75 PSI STEAM, OR UNDER, IN TRACER)

INSULATION SPECIFICATION NO.: 21-M
MAXIMUM TEMP. FOR THIS SHEET: 355 °F

NOTE:

The temperature, as shown below, at which the process line will be kept is based on using 75 PSI steam in the tracer. For lower pressure steam the process line will be kept at a proportionately lower temperature. Steam tracer details are per Engineering Standard P-84, page 44 of this book. Clamps and spacer details are per Engineering Standard P-84A, page 45 of this book. For other sizes see Engineering Standard P-84.

LINE SIZE (IPS)	INSULATION MATERIAL	THICKNESS (IN.)	NO. LAYERS	INSULATION & TRACER DATA			VALVE TRIMMING & VLB COVER	WIRE	BAND	REINFORCING MESH	WEATHER COATING PAINT	WEATHER COATING PAPER
				1/8" O.D. TRACER (PROCESS LINE TEMP.)	1/4" O.D. TRACER (PROCESS LINE TEMP.)	1/2" O.D. TRACER (PROCESS LINE TEMP.)						
1/2	ASBESTOS FIBER	1	1	2" IPS x 1" THK. (146 °F)	2" IPS x 1" THK. (175 °F)	- -	SHOP PRE-PAB	18 USDMG (.0475") x TYPE 304 SS 50. AND.	NONE	GLASS FABRIC- 10 x 10 MESH/ STARCH BINDER	WEATHER- MC-1 or BENJAMIN-POSTER #70-70	PALM
3/4		1	1	1-1/4" IPS x 1" THK. (141 °F)	1-1/2" IPS x 1" THK. (170 °F)	2" IPS x 1" THK. (193 °F)						
1		1	1	1-1/2" IPS x 1" THK. (136 °F)	2" IPS x 1" THK. (166 °F)	2-1/2" IPS x 1" THK. (188 °F)						
1-1/2		1	1	2-1/2" IPS x 1" THK. (119 °F)	3" O.D. x 1" THK. (154 °F)	3" IPS x 1" THK. (166 °F)						
2		1	1	3" IPS x 1" THK. (106 °F)	3" IPS x 1" THK. (144 °F)	3-1/2" IPS x 1" THK. (154 °F)						
2-1/2		1	1	3-1/2" IPS x 1" THK. (99 °F)	3-1/2" IPS x 1" THK. (133 °F)	4" IPS x 1" THK. (144 °F)						
3		1	1	4" IPS x 1" THK. (93 °F)	4" IPS x 1" THK. (122 °F)	5" O.D. x 1" THK. (133 °F)						
4		1	1	5" IPS x 1" THK. (79 °F)	5" IPS x 1" THK. (111 °F)	6" O.D. x 1" THK. (122 °F)						
6		1-1/2	1	7" IPS x 1-1/2" THK. (73 °F)	7" IPS x 1-1/2" THK. (106 °F)	8" O.D. x 1-1/2" THK. (122 °F)						
8		1-1/2	1	9" IPS x 1-1/2" THK. (61 °F)	10" O.D. x 1-1/2" THK. (97 °F)	10" O.D. x 1-1/2" THK. (106 °F)						
10		1-1/2	1	12" O.D. x 1-1/2" THK. (52 °F)	12" O.D. x 1-1/2" THK. (82 °F)	12" O.D. x 1-1/2" THK. (95 °F)						
12		1-1/2	1	14" IPS x 1-1/2" THK. (46 °F)	14" IPS x 1-1/2" THK. (73 °F)	14" IPS x 1-1/2" THK. (82 °F)						
EQUIP- MENT PLAT or OTHER)	CALCIUM SILICATE (STD.)	2	1	2"	2"	2"	CUT FOR SIZE REQ'D. (FAB. MAN.)	20-M, PAGE 7, FOR CLARITY	20-M, PAGE 7, and GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES:

- Clips - 1/2" double pronged Type 304 SS, A.J. Garrard or approved alternate.
- Fabricating Cement - A. P. Green Fire Brick Co. "Insulation Adhesive" or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Powerhouse", Eagle-Picher "One-Coat" or approved alternate.
- Heat Resistant Sealer - Benjamin-Porter #30-43 approved alternate.

EQUIPMENT ACCESSORIES ONLY:

- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting one side, expanded metal lath on the other side. (To be used on equipment expansion joints of the bellows type.)
- Mineral Wool Blanket - Black, spun rock wool, hexagonal wire netting on both sides. (To be used on very irregular shapes where metal lath type is not satisfactory.)
- Wire Netting - One inch, hexagonal mesh, #20 gage, galvanized after weaving.
- Finishing Cement - Hard surface, Eagle-Picher #106, J.M. #678, or approved alternate.

PIPING ACCESSORIES ONLY:

- Finishing Cement - J.M. #352 or approved alternate. (For pipe patching)

INSTALLATION SPECIFICATION NO. 1 10-1
MINIMUM TEMP. FOR THIS SHEET: DOWN TO 32 °F (0 °C)

LINE ITEM (Yr.)	INSULATION MATERIAL	THICK- NESS (IN.)	No. LAYER	VALVE SEAL A/F- SOLE	MINI	DAMP	REINF. FIBER	WEATHER- RESISTANT FABRIC	WEATHER- RESISTANT FABRIC
1/2	CELLULAR GLASS	1-1/2	2	SHOP PRE-PAD	28 USSMG1.0475" x TYPE 304 SS, SOFT ANNEAL	NONE	GLASS FIBRIC 10 x 10 MESH / STAIN BINDER	VIMASCO WC-1 or BENJAMIN- FOSTER #30-70	PALP
3/4		1-1/2	1						
1		1-1/2	1						
1-1/2		2	1						
2		2	1		NONE	1/2" WIDE x .020" THICK x TYPE 304 SS			
2-1/2		2	1						
3		2	1						
3-1/2		2	1						
4		2	1						
5		2	1						
6		2	1						
10		2-1/2	1						
12		2-1/2	1						
14		2-1/2	1						
16		2-1/2	1						
18		2-1/2	1						
20		2-1/2	1						
22		2-1/2	1						
24		2-1/2	1						
26		2-1/2	1						
28		2-1/2	1						
30		2-1/2	1						
32		2-1/2	1						
34		2-1/2	1						
36		2-1/2	1						
EQUIP- MENT (FLAT or OVER 36")		2-1/2	1	CUT FOR SIZE REQ'D. (VAL. MAN.)	SEE SPEC. 10-1, PAGE 4, FOR CLARITY	SEE SPEC. 10-1, PAGE 4, and GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES:

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - Miracle Adhesive Type H, or approved alternate.
- Anti-Abrasion Coating - Vinyl, Carlon #500, Insul-Mastic #601, or approved alternate.
- Joint Sealer - Vinyl asphalt, Carlon #49 or approved alternate.
- Caulking Mastic - Vinyl mastic, Vinasco WC-1, Benjamin-Foster #30-70 or approved alternate.
- Valve Sealer - Lion Oil Co. "Mokorede Low Temp" or approved alternate.

EQUIPMENT ACCESSORIES ONLY:

- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-308, Pine Fiber Felt, Ultralite, Superfine, or approved alternate.
- Die Cut Strap - 3/4" wide x .023" thick x Ty e 304 SS, 2" finger on 9" centers, A.J. Garrard or approved alternate.
- Expansion Strap - 3/4" wide x .023" thick x Type 304 SS, A. J. Garrard "Expand-R-Strap" or approved alternate.

PIPING ACCESSORIES ONLY:

- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-308, Pine Fiber Felt, Ultralite, Superfine, or approved alternate
(To be used on piping only where excessive vibration is likely to occur.)

COLD TEMPERATURE SERVICE (EXCEPT ETHYLENE OXIDE)
INSULATION SPECIFICATION NO. 10-1
MINIMUM TEMP. FOR THIS SPEC. -4 °F (-20 °C)

LINE ITEM (NO.)	INSULATION MATERIAL	THICK- NESS (IN.)	NO. LAYER	LAYER DATA		VALVE FIT- TING COVER	WIRE (INNER LAYER)	WIRE (OUTER LAYER)	RAINT. FAC.	WEATHER- RESISTING PAINT	WEATHER- RESISTING APPL.
				INNER	OUTER						
1/2	CELLULAR GLASS	2	1	NONE	1/2" IPS x 2"	SHOP PRE-FAB	18 USSWG (.0475") x TYPE 304 SS SOFT ANNEALED	NONE	GLASS FABRIC- 10 x 10 MESH/ STANCH EINCLAR	VIPASCO WC-1 or BENJAMIN- FOSTER #30-70	PAINT
3/4		2	1		3/4" IPS x 2"						
1		2-1/2	1		1" IPS x 2-1/2"		NONE	1/2" WIDE x .020" THICK x TYPE 304 S.S.			
1-1/2		2-1/2	1		1-1/2" IPS x 2-1/2"						
2		2-1/2	1		2" IPS x 2-1/2"						
2-1/2		2-1/2	1		2-1/2" IPS x 2-1/2"						
3		2-1/2	1		3" IPS x 2-1/2"						
3-1/2		3	2	3-1/2" IPS x 1-1/2"	7" IPS x 1-1/2"		18 USSWG (.0475") x TYPE 304 SS SOFT ANNEALED				
4		3	2	4" IPS x 1-1/2"	7" IPS x 1-1/2"						
6		3	2	6" IPS x 1-1/2"	9" IPS x 1-1/2"						
6		3	2	6" IPS x 1-1/2"	11" IPS x 1-1/2"						
10		3	2	10" IPS x 1-1/2"	14" IPS x 1-1/2"						
12		3-1/2	2	12" IPS x 1-1/2"	16" IPS x 2"						
14		3-1/2	2	14" IPS x 1-1/2"	17" IPS x 2"						
16		3-1/2	2	16" IPS x 1-1/2"	19" IPS x 2"						
18		3-1/2	2	18" IPS x 1-1/2"	21" IPS x 2"						
20		3-1/2	2	20" IPS x 1-1/2"	23" IPS x 2"						
22		3-1/2	2	22" IPS x 1-1/2"	25" IPS x 2"						
24		3-1/2	2	24" IPS x 1-1/2"	27" IPS x 2"						
26		3-1/2	2	26" IPS x 1-1/2"	29" IPS x 2"						
28		3-1/2	2	28" IPS x 1-1/2"	31" IPS x 2"						
30		3-1/2	2	30" IPS x 1-1/2"	33" IPS x 2"						
32		3-1/2	2	32" IPS x 1-1/2"	35" IPS x 2"						
34		3-1/2	2	34" IPS x 1-1/2"	37" IPS x 2"						
36		3-1/2	2	36" IPS x 1-1/2"	39" IPS x 2"						
See 10-1- FIBER (PLAT or PIPE 30")		4	2	3"	2"	CUT FOR SIZE REQ'D. (FAB. MAN.)	SEE SPEC. 10-1, PAGE 9, FOR CLARITY	SEE SPEC. 10-1, PAGE 9, and GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES:

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - Miracle Adhesive Type B, or approved alternate.
- Anti-Abrasion Coating - Vinyl, Carlon #500, Insul-Mastic #601 or approved alternate.
- Joint Sealer - Vinyl asphalt, Carlon #48 or approved alternate.
- Caulking Mastic - Vinyl mastic, Vinsaco WC-1, Benjamin-Foster #30-70 or approved alternate.
- Valve Sealer - Lion Oil Co. "Mokorede Low Temp" or approved alternate.

EQUIPMENT ACCESSORIES ONLY:

- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-308, Fine Fiber Felt, Ultralite, Superfine, or approved alternate.
- Die Cut Strap - 3/4" wide x .023" thick x Type 304 SS 7" finger on 9" centers, A. J. Garrard or approved alternate.
- Expansion Strap - 3/4" wide x .023" thick x Type 304 SS, A. J. Garrard "Expand-A-Strap" or approved alternate.

PIPING ACCESSORIES ONLY:

- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-308, Fine Fiber Felt, Ultralite, Superfine, or approved alternate.
 (To be used on piping only where excessive vibration is likely to occur.)

INSULATION SPECIFICATION NO. 1 10-L

MINIMUM TEMP. FOR THIS SPECS DOWN TO -40 °F (-40 °C)

LINE NO.	INSULATION MATERIAL	THICKNESS	NO. LAYERS	LAYER DATA		VALVE, FITTING, ETC.	WIRE (INNER LAYER)	BAND (OUTER LAYER)	PAINT, FILL	WEATHER-RESISTANT FINISH	WEATHER-RESISTANT COATING
				INNER	OUTER						
1/2	CELLULAR GLASS	2-1/2	1	NONE	1/2" IPS x 2-1/2"	SHOP PRE-PAD	18 USSWG (.0475") x TYPE 304 SS SOFT ANNEALED	NONE	GLASS PAINTIC-10 x 10 MESH/STAINLESS STEEL	VIPASCO MC-1 or BENJAMIN-POSTER MC-1	PAINT
3/4		2-1/2	1		3/4" IPS x 2-1/2"						
1		3	2	1" IPS x 1-1/2"	4" IPS x 1-1/2"			1/2" WIDE x .020" THICK x TYPE 304 SS			
1-1/2		3	2	1-1/2" IPS x 1-1/2"	4-1/2" IPS x 1-1/2"						
2		3	2	1-1/2" IPS x 1-1/2"	5" IPS x 1-1/2"						
2-1/2		3	2	2-1/2" IPS x 1-1/2"	5" IPS x 1-1/2"						
3		3-1/2	2	3" IPS x 1-1/2"	6" IPS x 2"						
3-1/2		3-1/2	2	3-1/2" IPS x 1-1/2"	7" IPS x 2"						
4		3-1/2	2	4" IPS x 1-1/2"	7" IPS x 2"						
5		4	2	6" IPS x 2"	10" IPS x 2"						
6		4	2	8" IPS x 2"	12" IPS x 2"						
8		4	2	10" IPS x 2"	15" IPS x 2"						
10		4	2	12" IPS x 2"	17" IPS x 2"						
12		4	2	14" IPS x 2"	19" IPS x 2"						
14		4	2	16" IPS x 2"	20" IPS x 2"						
16		4	2	18" IPS x 2"	22" IPS x 2"						
18		4-1/2	2	20" IPS x 2"	24" IPS x 2-1/2"						
20		4-1/2	2	22" IPS x 2"	26" IPS x 2-1/2"						
22		4-1/2	2	24" IPS x 2"	28" IPS x 2-1/2"						
24		4-1/2	2	26" IPS x 2"	30" IPS x 2-1/2"						
26		4-1/2	2	28" IPS x 2"	32" IPS x 2-1/2"						
28		4-1/2	2	30" IPS x 2"	34" IPS x 2-1/2"						
30		4-1/2	2	32" IPS x 2"	36" IPS x 2-1/2"						
32		4-1/2	2	34" IPS x 2"	38" IPS x 2-1/2"						
34		4-1/2	2	36" IPS x 2"	40" IPS x 2-1/2"						
36		4-1/2	2	38" IPS x 2"	42" IPS x 2-1/2"						
See 10-L PART 1 of 10-L		5	2	2-1/2"	2-1/2"	CUT FOR SIZE NEEDED (FAB. MAN.)	SEE SPEC. 10-L, PAGE 1, FOR CLARITY	SEE SPEC. 10-L, PAGE 1, and GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - Miracle Adhesive Type H, or approved alternate.
- Anti-abrasion Coating - Vinyl, Carlon #300, Insul-Mastic #601, or approved alternate.
- Joint Sealer - Vinyl asphalt, Carlon #49 or approved alternate.
- Caulking Mastic - Vinyl mastic, Vinsace MC-1, Benjamin-Foster #30-70 or approved alternate.
- Valve Sealer - Lion Oil Co. "Wakereds Low Temp" or approved alternate.

EQUIPMENT ACCESSORIES ONLY:

- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-308, Pine Pyber Felt, Ultralite, Superfine, or approved alternate.
- Die Out Strap - 3/4" wide x .023" thick x Type 304 SS, 2" finger on 9" centers, A. J. Garrard or approved alternate.
- Expansion Strap - 3/4" wide x .023" thick x Type 304 SS, A. J. Garrard "Expand-A-Strap" or approved alternate.

PIPING ACCESSORIES ONLY:

- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-308, Pine Pyber Felt, Ultralite, Superfine, or approved alternate. (To be used on piping only where excessive vibration is likely to occur.)

ALL COLD TEMPERATURE SERVICE (EXCEPT ETHYLENE OXIDE)

INSULATION SPECIFICATION NO. 10-1

MINIMUM TEMP. FOR THIS SPEC. DOWN TO -112 °F (-80 °C)

PIPE SIZE (IN.)	INSULATION MATERIAL	THICK- NESS (IN.)	NO. OF LAYERS	LAYER DATA			VALVE FIT- TING (IN.)	WIRE (INNER & MI- DDLE LAYER)	BAND (OUTER LAYER)	MAINT. MATERIAL	WEATHER- ING MATERIAL	
				INNER	MIDDLE	OUTER						
1/2	CELLULAR GLASS	3-1/2	2	1/2" IPS x 1-1/2"	NONE	3-1/2" IPS x 2"	SHOP PRE-FAB	16 USING 10415" x TYPE 304 SS 54T ANNUAL	1/2" WIDE x .020" THK x TYPE 304 SS	GLASS FABRIC- IC & 15 MESH / STARCH BINDER	VERMASCO MC-1 or BENJAMIN- FOSTER #30-70	PAINT
3/4		3-1/2	2	1/2" IPS x 1-1/2"		3-1/2" IPS x 2"						
1		3-1/2	2	1" IPS x 1-1/2"		4" IPS x 2"						
1-1/2		4	2	1-1/2" IPS x 2"		5" IPS x 2"						
2		4	2	2" IPS x 2"		6" IPS x 2"						
2-1/2		4-1/2	2	2-1/2" IPS x 2"		6" IPS x 2-1/2"						
3		4-1/2	2	3" IPS x 2"		7" IPS x 2-1/2"						
3-1/2		4-1/2	2	3-1/2" IPS x 2"		8" IPS x 2-1/2"						
4		4-1/2	2	4" IPS x 2"		8" IPS x 2-1/2"						
6		5	2	6" IPS x 2-1/2"		10" IPS x 2-1/2"						
8		5-1/2	3	8" IPS x 2-1/2"	1" IPS x 2"	16" IPS x 2"						
10		5-1/2	3	10" IPS x 2-1/2"	1 1/4" IPS x 2"	16" IPS x 2"						
12		5-1/2	3	12" IPS x 2-1/2"	1 1/2" IPS x 2"	20" IPS x 2"						
14		5-1/2	3	14" IPS x 2-1/2"	1 3/4" IPS x 2"	21" IPS x 2"						
16		6	3	16" IPS x 2"	2" IPS x 2"	24" IPS x 2"						
18		6	3	18" IPS x 2"	2 1/4" IPS x 2"	26" IPS x 2"						
20		6	3	20" IPS x 2"	2 1/2" IPS x 2"	28" IPS x 2"						
22		6	3	22" IPS x 2"	2 3/4" IPS x 2"	30" IPS x 2"						
24		6	3	24" IPS x 2"	3" IPS x 2"	32" IPS x 2"						
26		6-1/2	3	26" IPS x 2"	3 1/4" IPS x 2"	34" IPS x 2-1/2"						
28		6-1/2	3	28" IPS x 2"	3 1/2" IPS x 2"	36" IPS x 2-1/2"						
30		6-1/2	3	30" IPS x 2"	3 3/4" IPS x 2"	38" IPS x 2-1/2"						
32		6-1/2	3	32" IPS x 2"	4" IPS x 2"	40" IPS x 2-1/2"						
34		7	3	34" IPS x 2"	4 1/4" IPS x 2"	42" IPS x 2-1/2"						
36		7	3	36" IPS x 2"	4 1/2" IPS x 2"	44" IPS x 2-1/2"						
EQUIP- MENT (FLAT or CYL. 36")		7-1/2	3	2-1/2"	2-1/2"	2-1/2"	CUT FOR SITE LACED. FAB. MAN.	SEE SPEC. 10-L, PAGE P, FOR CLASST	SEE SPEC. 10-L, PAGE P, and DIM. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES:

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - Miracle Adhesive Type H, or approved alternate.
- Anti-Abrasion Coating - Vinyl, Carlon #500, Insul-Mastic #601, or approved alternate.
- Joint Sealer - Vinyl asphalt, Carlon #49 or approved alternate.
- Caulking Mastic - Vinyl mastic, Vermasco MC-1, Benjamin-Foster #30-70 or approved alternate.
- Valve Sealer - Lion Oil Co. "Mokorede Low Temp" or approved alternate.

EQUIPMENT ACCESSORIES ONLY:

- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-308, Fine Fiber Felt, Ultralite, Superfine, or approved alternate.
- Die Cut Strap - 3/4" wide x .023" thick x Type 304 SS, 2" finger on 9" centers, A. J. Garrard or approved alternate.
- Expansion Strap - 3/4" wide x .023" thick x Type 304 SS, A. J. Garrard "Expand-A-Strap" or approved alternate.

PIPING ACCESSORIES ONLY:

- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-308, Fine Fiber Felt, Ultralite, Superfine, or approved alternate.
(To be used on piping only where excessive vibration is likely to occur)

INSULATION SPECIFICATION NO. 1 10-1
MINIMUM TEMP. FOR THIS SHEET DOWN TO -148 °F (-100 °C)

LINE SIZE (IN.)	INSULATION MATERIAL	THICK- NESS (IN.)	LAYERS	LAYER DATA			VAL. FIT. & FL. COVER	WIRE (INNER & MIDDLE LAYER)	NAME (OUTER LAYER)	REINFT. MESH	WEATHER- ING MATERIAL	WEATHER- ING MATERIAL
				INNER	MIDDLE	OUTER						
1/2	CELLULAR GLASS	2-1/2	2	1/2" IPS x 1-1/2"	NONE	2-1/2" IPS x 3"	SHOP PRE-FAB	10 USSWG (.0475") x TYPE 304 SS SOFT ANNUAL	1/2" WIDE x .020" THK x TYPE 304 SS	GLASS FABRIC- AC x 10 MESH / STARCH BINDER	VINASCO MC-1 or BENJAMIN- FOSTER #30-70	PALM
3/4		4	2	3/4" IPS x 2"		4-1/2" IPS x 2"						
1		4	2	1" IPS x 2"		5" IPS x 2"						
1-1/2		4-1/2	2	1-1/2" IPS x 2"		5" IPS x 2-1/2"						
2		4-1/2	2	2" IPS x 2"		6" IPS x 2-1/2"						
2-1/2		4-1/2	2	2-1/2" IPS x 2"		6" IPS x 2-1/2"						
3		5	2	3" IPS x 2-1/2"		8" IPS x 2-1/2"						
3-1/2		5	2	3-1/2" IPS x 2-1/2"		9" IPS x 2-1/2"						
4		5	2	4" IPS x 2-1/2"		9" IPS x 2-1/2"						
6		5-1/2	3	6" IPS x 2-1/2"	9" IPS x 2"	14" IPS x 2"						
8		6	3	8" IPS x 2"	12" IPS x 2"	17" IPS x 2"						
10		6	3	10" IPS x 2"	15" IPS x 2"	19" IPS x 2"						
12		6-1/2	3	12" IPS x 2"	17" IPS x 2"	21" IPS x 2-1/2"						
14		6-1/2	3	14" IPS x 2"	18" IPS x 2"	22" IPS x 2-1/2"						
16		6-1/2	3	16" IPS x 2"	20" IPS x 2"	24" IPS x 2-1/2"						
18		6-1/2	3	18" IPS x 2"	22" IPS x 2"	26" IPS x 2-1/2"						
20		7	3	20" IPS x 2"	24" IPS x 2-1/2"	29" IPS x 2-1/2"						
22		7	3	22" IPS x 2"	26" IPS x 2-1/2"	31" IPS x 2-1/2"						
24		7	3	24" IPS x 2"	28" IPS x 2-1/2"	32" IPS x 2-1/2"						
26		7	3	26" IPS x 2"	30" IPS x 2-1/2"	35" IPS x 2-1/2"						
28		7	3	28" IPS x 2"	32" IPS x 2-1/2"	2-1/2"						
30		7-1/2	3	30" IPS x 2-1/2"	35" IPS x 2-1/2"	2-1/2"						
32		7-1/2	3	32" IPS x 2-1/2"	2-1/2"	2-1/2"						
34		7-1/2	3	34" IPS x 2-1/2"	2-1/2"	2-1/2"						
36		7-1/2	3	36" IPS x 2-1/2"	2-1/2"	2-1/2"						
EQUIP- MENT (1/4" or OVER 36")		8-1/2	3	2-1/2"	3"	3"	CUT FOR SIZE REQ'D. (FAB. MAN.)	SEE SPEC. 10-1, PAGE 9, FOR CLARITY	SEE SPEC. 10-1, PAGE 9, and GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES:

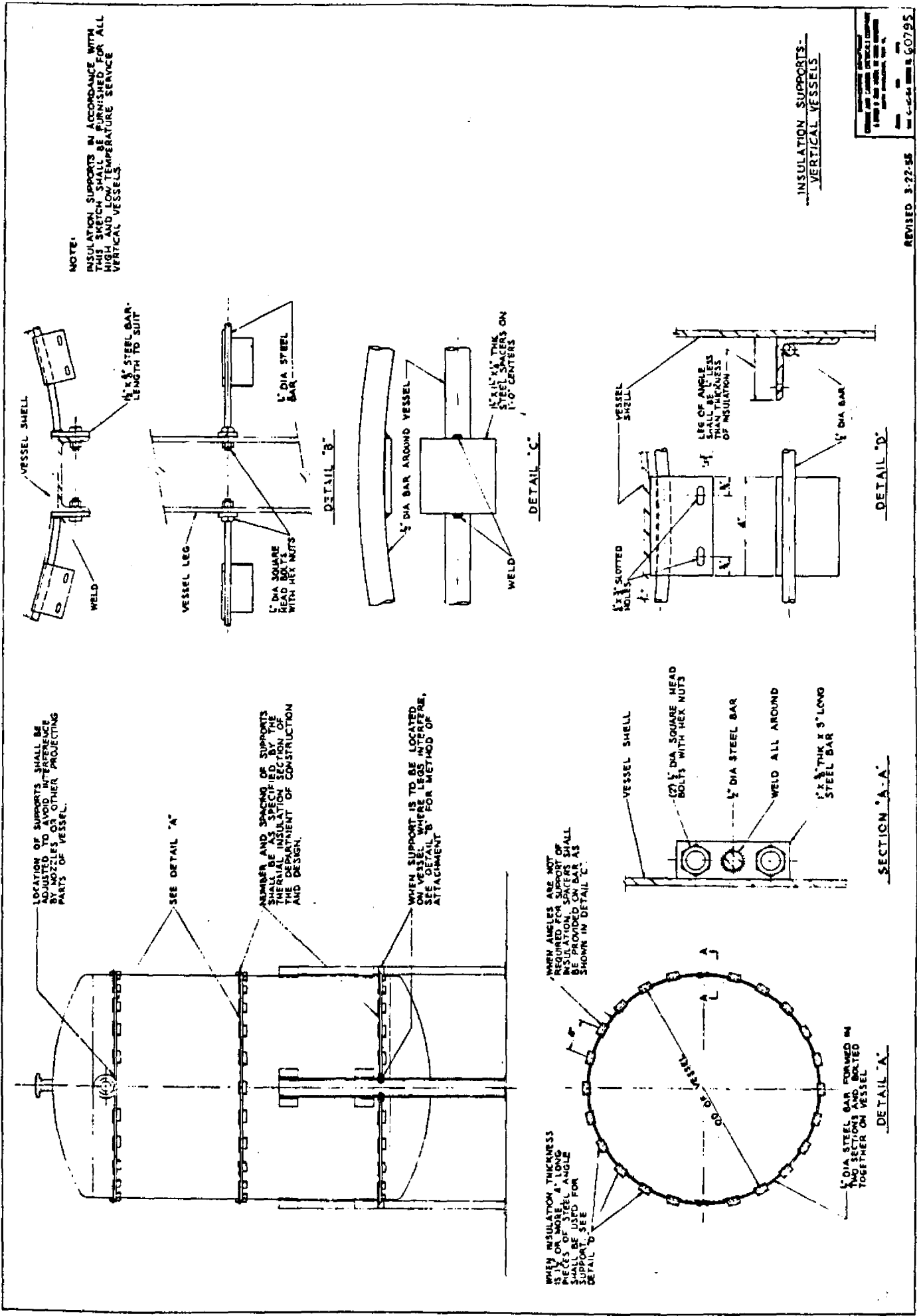
- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - Miracle Adhesive Type H or approved alternate.
- Anti-Abrasion Coating - Vinyl, Carlen #500, Insul-Mastic #601 or approved alternate.
- Joint Sealer - Vinyl asphalt, Carlen #49 or approved alternate.
- Caulking Mastic - Vinyl mastic, Vinasco MC-1, Benjamin-Foster #30-70 or approved alternate.
- Valve Sealer - Lion Oil Co. "Makorode Low Temp" or approved alternate.

EQUIPMENT ACCESSORIES ONLY:

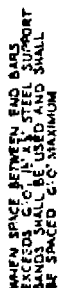
- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-306, Pine Fiber Felt, Ultralite, Superfine, or approved alternate.
- Die Cut Strap - 3/4" wide x .023" thick x Type 304 SS, 2" finger on 9" centers, A. J. Garrard or approved alternate.
- Expansion Strap - 3/4" wide x .023" thick x Type 304 SS, A. J. Garrard "Expand-R-Strap" or approved alternate.

PIPING ACCESSORIES ONLY:

- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-306, Pine Fiber Felt, Ultralite, Superfine, or approved alternate.
(To be used on piping only where excessive vibration is likely to occur.)



INSULATION SUPPORTS IN ACCORDANCE WITH THIS SKETCH SHALL BE FURNISHED FOR ALL HIGH AND LOW TEMPERATURE SERVICE HORIZONTAL VESSELS 4'-0" DIAMETER AND LARGER.



SEE DETAIL 'E'

SEE DETAIL "B"

SEE DETAIL 2.

SEE DETAIL "A"

LOCATE BAR BACK
OF HEAD-TO-SHELL
SEAM--



SPACERS CENTERS

DETAIL "D"

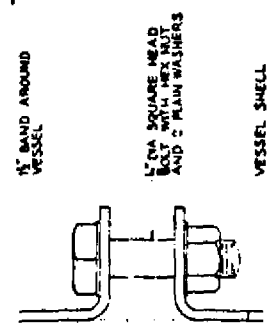
WELD BOTH SIDES

DETAIL 'a'

1" DIA STEEL BAR

1" x 1/2" TUB x 3" LONG
STEEL BARS

DETAIL 'C'



15" BAND AROUND

1" x 1/4" SQUARE HEAD
BOLT WITH HEX NUT
AND 2 PLAIN WASHERS

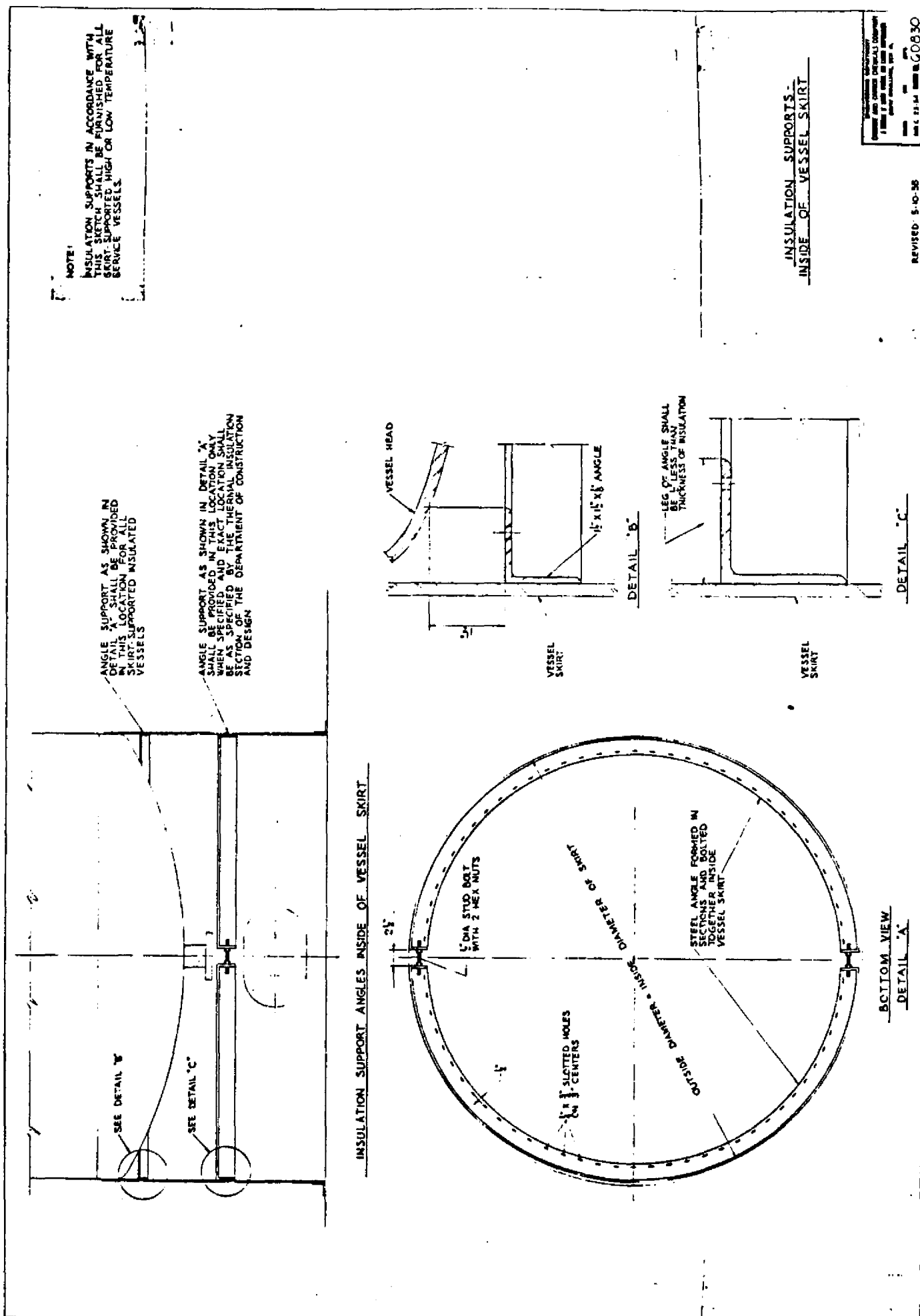
THOMAS TASSAN

DETAIL "E"

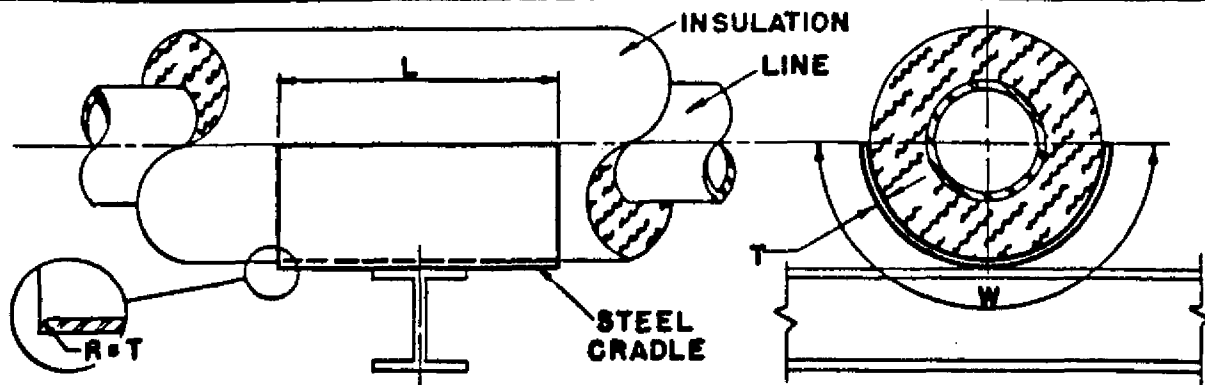
CARDINE AND CARDON CHEMICALS COMPANY
 20000 13th Avenue S.E.
 Bellevue, WA 98006
 (206) 835-1100

**RESILATION SUPPORTS
HORIZONTAL VESSELS**

3X-60829



PREPARED BY: []
 CHECKED BY: []
 DATE: []
 REVISED: 5-10-35
 60830



Pipe Size Nominal - in.	Insulation Thickness - in.	T - Cradle Thickness - in.	L - Length of Cradle - in.				
			10' Span	12' Span	15' Span	18' Span	20' Span
1/2 & 3/4	1-1/2 & 2	14 Ga	10	-	-	-	-
	2-1/2 to 4	1/8	10	-	-	-	-
	4-1/2 & 5	3/16	10	-	-	-	-
1 to 1-1/2	1-1/2 & 2	14 Ga	10	10	-	-	-
	2-1/2 to 4	1/8	10	10	-	-	-
	4-1/2 to 6	3/16	10	10	-	-	-
2 to 3-1/2	2 to 3	1/8	10	10	10	-	-
	3-1/2 to 5	3/16	10	10	10	-	-
	5-1/2 & 6	1/4	10	10	10	-	-
4 & 5	2	1/8	10	10	10	12	-
	2-1/2 to 4	3/16	10	10	10	12	-
	5 to 7	1/4	10	10	10	12	-
6 & 8	2-1/2 & 3	3/16	10	12	16	16	20
	3-1/2 to 5-1/2	1/4	10	12	16	16	20
	6 to 7	5/16	10	12	16	16	20
10 & 12	2-1/2 to 3-1/2	1/4	12	16	20	24	24
	4 to 6	5/16	12	16	20	24	24
	6-1/2 to 8	3/8	12	16	20	24	24
14 & 16	3 to 4	5/16	16	20	24	36	36
	4-1/2 to 7	3/8	16	20	24	36	36
	7-1/2 & 8	7/16	16	20	24	36	36
18 & 20	3 to 5	3/8	20	24	30	36	36
	5-1/2 to 7-1/2	7/16	20	24	30	36	36
	8	1/2	20	24	30	36	36
24	3	3/8	24	30	36	42	42
	3-1/2 to 5-1/2	7/16	24	30	36	42	42
	6 to 8	1/2	24	30	36	42	42
30	To 5	1/2	30	36	42	48	54
	5 to 9	5/8	30	36	42	48	54
36	To 7	5/8	36	42	48	54	60
	7 to 9	3/4	36	42	48	54	60

NOTE

W=WIDTH OF SADDLE BEFORE FORMING= O.D.
OF INSULATION X 1.57.

PIPING DESIGN DRAWINGS SHALL REFER TO
THIS STANDARD, IS-19, FOR ALL SEMI-RIGID
PIPE INSULATION, TO WHICH SERVICE THIS
STANDARD IS LIMITED.

ENGINEERING DEPARTMENT
CARBIDE AND CARBON CHEMICALS DIVISION
UNION CARBIDE AND CARBON CORPORATION
SOUTH CHARLESTON, WEST VIRGINIA

**STANDARD
CRADLES FOR
SEMI-RIGID PIPE
INSULATION**

**No
IS-19**

CLASSIFICATION: DETAIL

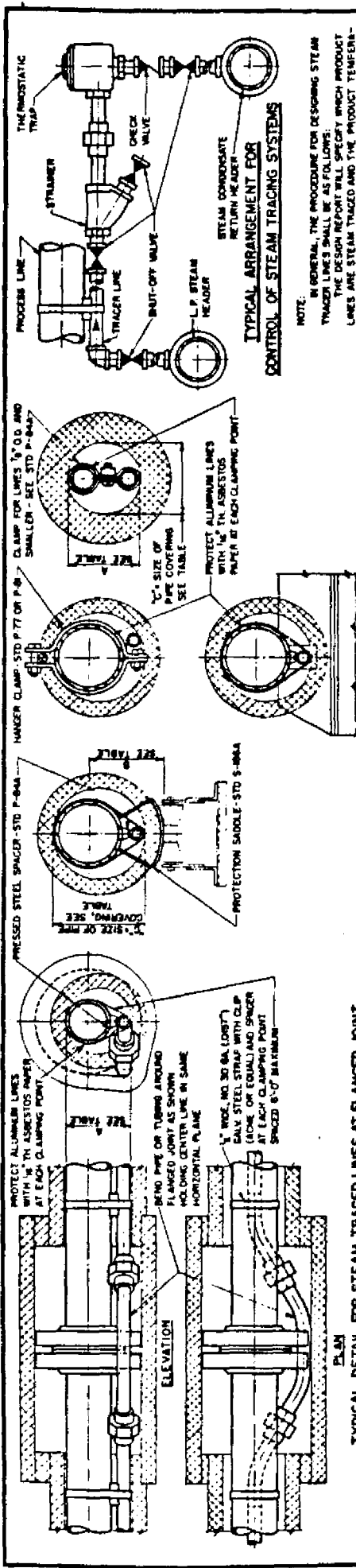
SPONSOR: H2B BY: OVE DATE: 5/25/51

APPROVED: JH DATE: 5-25-51

REVISED: 4-28-53

FORM A

UCC 003375

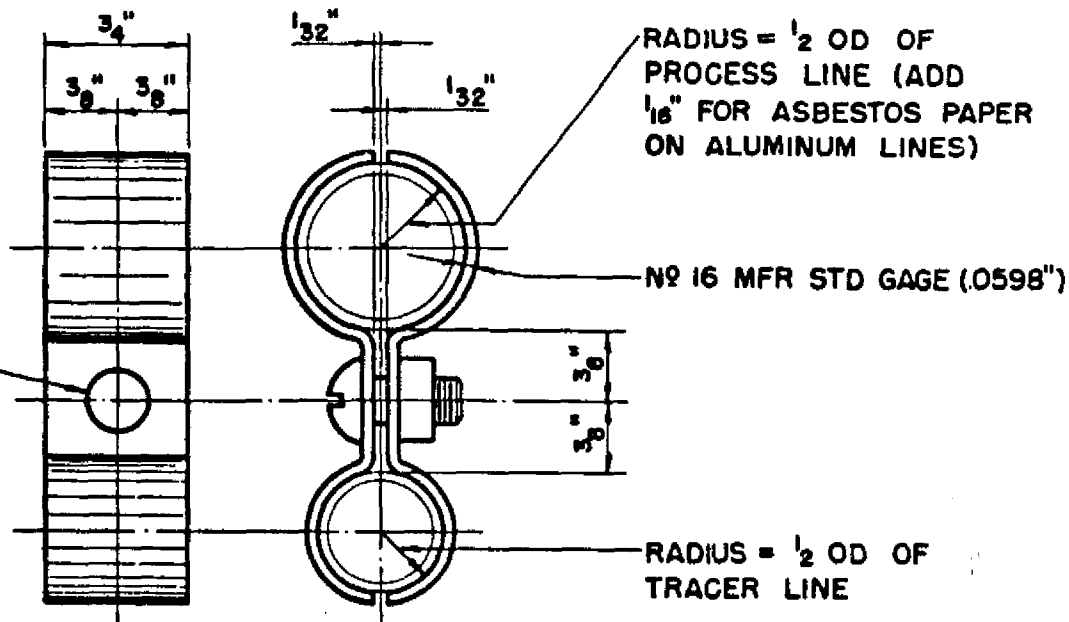


TYPICAL DETAIL FOR STEAM TRACED LINES AT FLANGED JOINT

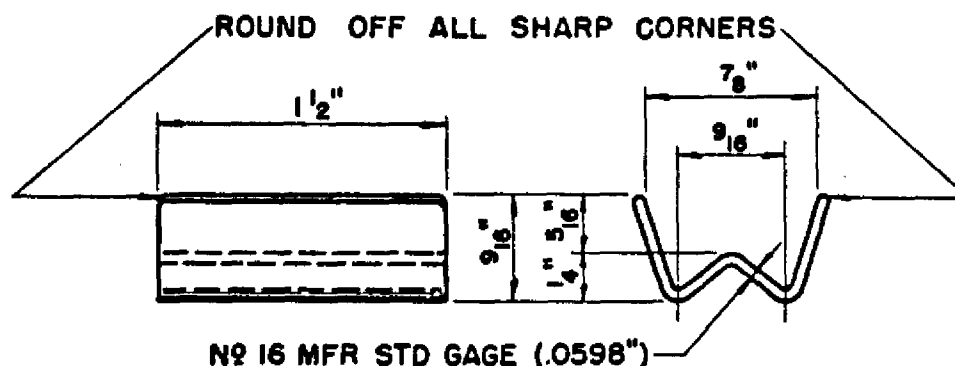
TABLE NO. 1 - OVERALL DIMENSIONS OF TRACER AND PROCESS LINE ASSEMBLY, SIZE OF INSULATION REQUIRED

PROCESS LINE SIZE		TRACER LINE SIZE												
		1" O.D.			1 1/2" O.D.			2" O.D.			3" O.D.			
A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.	1" O.D.	1 1/2" O.D.	2" O.D.
1" O.D.	1 1/2" O.D.</													

5/16" DIA DRILL FOR
1/4" DIA X 1/2" LONG
CADMIUM PLATED
MACHINE SCREW
AND SQUARE NUT



PRESSED STEEL CLAMP
FOR PROCESS LINES 7/8" OD
AND SMALLER



PRESSED STEEL SPACER

NOTE:

MATERIAL SHALL BE ASTM A7 CARBON STEEL.

THIS STANDARD IS MANDATORY ONLY WHEN INCORPORATED,
WHOLLY OR WITH EXCEPTIONS, INTO DESIGN REPORTS,
DESIGN DRAWINGS OR OTHER DESIGN DATA, OR INTO
BILLS-OF-MATERIAL OR PURCHASE ORDERS.

ENGINEERING DEPARTMENT
CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF
UNION CARBIDE AND CARBON CORPORATION
SOUTH CHARLESTON, WEST VIRGINIA

STANDARD CLAMPS AND SPACERS FOR STEAM TRACED LINES	Nº P-84A
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CLASSIFICATION: DETAIL

SPONSOR: H2B BY: *OTC* DATE: 8/7/53

APPROVED: *JH* DATE: 4-17-47

REVISED: 8-3-53

**THICKNESS OF INSULATION REQUIRED FOR ASBESTOS FIBER IN
GENERAL SERVICE, STANDARD CALCIUM SILICATE, AND CELLULAR GLASS (IN
HOT SERVICE) TO MAINTAIN A SURFACE TEMPERATURE OF NOT OVER 130 °F**

(Air Temperature at 90 °F and Air Movement at 0 M.P.H.)

PIPE SIZE	OPERATING TEMPERATURE °C																		OPERATING TEMPERATURE °F															
	100 TO 119	120 TO 139	140 TO 159	160 TO 179	180 TO 199	200 TO 219	220 TO 239	240 TO 259	260 TO 279	280 TO 299	300 TO 319	320 TO 339	340 TO 359	360 TO 379	380 TO 399	400 TO 419	420 TO 439	440 TO 459	460 TO 479	480 TO 499	500 TO 519	520 TO 539												
1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
3/4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
1 1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
2 1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
3 1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
32	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
36	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
FLAT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												
	212 TO 247	248 TO 283	284 TO 319	320 TO 355	356 TO 391	392 TO 427	428 TO 463	464 TO 499	500 TO 535	536 TO 572	573 TO 608	609 TO 644	645 TO 680	681 TO 716	717 TO 752	753 TO 788	789 TO 824	825 TO 860	861 TO 896	897 TO 932	933 TO 968													

ASBESTOS FIBER:

Spec. 21-H

CALCIUM SILICATE, STD

Spec. 20-H

CELLULAR GLASS:

Spec. 10-H

Spec. 10-J

NOTES:

A-This chart must not be used for temperatures in excess of 750 °F for Spec. 20-H and 21-H and 800 °F for Specs. 10-H and 10-J.

B-For determining thicknesses to be used on Dowtherm, or any other critical heat process, see page 51. For all other services requiring asbestos fiber use the chart at the left.

THICKNESS OF INSULATION REQUIRED FOR ASBESTOS FIBER WHEN INSULATING DOWTHERM, OR WHERE THE HEAT PROCESS IS CRITICAL, TO MAINTAIN A SURFACE TEMPERATURE OF NOT OVER 125° F.

(Air Temperature at 90° F and Air Movement at 0 M.P.H.)

PIPE SIZE	OPERATING TEMPERATURE °C																			
	100 TO 119	120 TO 139	140 TO 159	160 TO 179	180 TO 199	200 TO 219	220 TO 239	240 TO 259	260 TO 279	280 TO 299	300 TO 319	320 TO 339	340 TO 359	360 TO 379	380 TO 399	400 TO 419	420 TO 439	440 TO 459	460 TO 479	480 TO 499
1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3/4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1 1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2 1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3 1/2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
36	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
FLAT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
212 TO 248	284	320	356	392	428	464	500	536	572	608	644	680	716	752	788	824	860	896	932	968
247 TO 283	319	355	391	427	463	499	535	571	607	643	679	715	751	787	823	859	895	931	967	1003
OPERATING TEMPERATURE °F																				

ASBESTOS FIBER:

Spec. 21-H

NOTES:

A-This chart must not be used for temperatures in excess of 750° F -- the upper limit of Spec. 21-H.

B-The chart at the left is to be used only when determining thicknesses for use on Dowtherm, or where the heat process is critical. For all other applications of asbestos fiber see chart on page 50

THICKNESS OF INSULATION REQUIRED FOR HIGH
TEMPERATURE CALCIUM SILICATE (KAYLO 20) TO
MAINTAIN A SURFACE TEMPERATURE OF NOT
OVER 130° F.

(AIR TEMPERATURE AT 900 F. AND AIR MOVEMENT AT 0 M.P.H.)

HIGH TEMPERATURE CALCIUM SILICATE

Spec. 25-H
Spec. 32-H

PIPE	OPERATING TEMPERATURE °C.																												PIPE	OPERATING TEMPERATURE °F.																											
	UP TO 178	180 TO 198	200 TO 218	220 TO 238	240 TO 258	260 TO 278	280 TO 298	300 TO 318	320 TO 338	340 TO 358	360 TO 378	380 TO 398	400 TO 418	420 TO 438	440 TO 458	460 TO 478	480 TO 498	500 TO 518	520 TO 538	540 TO 558	560 TO 578	580 TO 598	600 TO 618	620 TO 638	640 TO 658	660 TO 678	680 TO 698	700 TO 718																													
1/2"	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
3/4"	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
1"	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
1-1/2"	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
2"	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
2-1/2"	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
3"	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
3-1/2"	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
4"	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
6"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
8"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
10"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
12"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
14"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
16"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
18"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
20"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
22"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
24"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
26"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
28"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
30"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
32"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
34"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
36"	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
FLAN	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2																												
UP	358	382	428	464	500	536	572	608	644	680	716	752	788	824	860	896	932	968	1004	1040	1076	1112	1148	1184	1220	1256	1292	1328	1364																												
TO	358	382	428	464	500	536	572	608	644	680	716	752	788	824	860	896	932	968	1004	1040	1076	1112	1148	1184	1220	1256	1292	1328	1364																												
358	382	428	464	500	536	572	608	644	680	716	752	788	824	860	896	932	968	1004	1040	1076	1112	1148	1184	1220	1256	1292	1328	1364	1400																												

BASIC DIMENSIONAL STANDARDS FOR HIGH TEMPERATURE PIPE INSULATION

Standard Sizes and Thicknesses

IRON PIPE SIZES -

Nominal Pipe Size	Pipe O.D.	1" Nominal		1½" Nominal		2" Nominal		2½" Nominal		3" Nominal		3½" Nominal		4" Nominal	
		Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.
1/2"	.84	1.00	2.88	1.56	4.00	2.06	5.00	2.35	5.56	2.88	6.63				
3/4"	1.05	.90	2.88	1.46	4.00	1.96	5.00	2.24	5.56	2.77	6.63				
1"	1.32	1.08	3.50	1.58	4.50	2.11	5.56	2.64	6.63	3.14	7.63				
1-1/4"	1.66	.90	3.50	1.40	4.50	1.94	5.56	2.47	6.63	2.97	7.63				
1-1/2"	1.90	1.03	4.00	1.58	5.00	1.82	5.56	2.35	6.63	2.85	7.63				
2"	2.38	1.03	4.50	1.56	5.56	2.09	6.63	2.59	7.63	3.09	8.63	3.59	9.63	4.16	10.75
2-1/2"	2.88	1.08	5.00	1.31	5.56	1.84	6.63	2.34	7.63	2.84	8.63	3.34	9.63	3.91	10.75
3"	3.50	1.00	5.56	1.53	6.63	2.03	7.63	2.53	8.63	3.03	9.63	3.59	10.75	4.09	11.75
3-1/2"	4.00	.75	5.56	1.28	6.63	1.78	7.63	2.28	8.63	2.78	9.63	3.34	10.75	3.84	11.75
4"	4.50	1.03	6.63	1.53	7.63	2.03	8.63	2.53	9.63	3.09	10.75	3.59	11.75	4.09	12.75
4-1/2"	5.00	.78	6.63	1.28	7.63	1.78	8.63	2.28	9.63	2.84	10.75	3.34	11.75	3.84	12.75
5"	5.56	1.00	7.63	1.50	8.63	2.00	9.63	2.56	10.75	3.06	11.75	3.56	12.75	4.19	14.00
6"	6.63	.94	8.63	1.44	9.63	2.00	10.75	2.50	11.75	3.00	12.75	3.63	14.00	4.13	15.00
7"	7.63			1.50	10.75	2.00	11.75	2.50	12.75	3.13	14.00	3.63	15.00	4.13	16.00
8"	8.63			1.50	11.75	2.00	12.75	2.63	14.00	3.13	15.00	3.63	16.00	4.13	17.00
9"	9.63			1.50	12.75	2.13	14.00	2.63	15.00	3.13	16.00	3.63	17.00	4.13	18.00
10"	10.75			1.56	14.00	2.06	15.00	2.56	16.00	3.06	17.00	3.56	18.00	4.06	19.00
11"	11.75			1.56	15.00	2.06	16.00	2.56	17.00	3.06	18.00	3.56	19.00	4.06	20.00
12"	12.75			1.55	16.00	2.05	17.00	2.55	18.00	3.05	19.00	3.55	20.00	4.05	21.00
14"	14.00			1.42	17.00	1.92	18.00	2.42	19.00	2.92	20.00	3.42	21.00	3.92	22.00
15"	15.00			1.42	18.00	1.92	19.00	2.42	20.00	2.92	21.00	3.42	22.00	3.92	23.00
16"	16.00			1.41	19.00	1.91	20.00	2.41	21.00	2.91	22.00	3.41	23.00	3.91	24.00
17"	17.00			1.41	20.00	1.91	21.00	2.41	22.00	2.91	23.00	3.41	24.00	3.91	25.00
18"	18.00			1.41	21.00	1.91	22.00	2.41	23.00	2.91	24.00	3.41	25.00	3.91	26.00
19"	19.00			1.41	22.00	1.91	23.00	2.41	24.00	2.91	25.00	3.41	26.00	3.91	27.00
20"	20.00			1.41	23.00	1.91	24.00	2.41	25.00	2.91	26.00	3.41	27.00	3.91	28.00
21"	21.00			1.41	24.00	1.91	25.00	2.41	26.00	2.91	27.00	3.41	28.00	3.91	29.00
22"	22.00			1.41	25.00	1.91	26.00	2.41	27.00	2.91	28.00	3.41	29.00	3.91	30.00
23"	23.00			1.41	26.00	1.91	27.00	2.41	28.00	2.91	29.00	3.41	30.00	3.91	31.00
24"	24.00			1.41	27.00	1.91	28.00	2.41	29.00	2.91	30.00	3.41	31.00	3.91	32.00
25"	25.00			1.41	28.00	1.91	29.00	2.41	30.00	2.91	31.00	3.41	32.00	3.91	33.00
26"	26.00			1.41	29.00	1.91	30.00	2.41	31.00	2.91	32.00	3.41	33.00	3.91	34.00
27"	27.00			1.41	30.00	1.91	31.00	2.41	32.00	2.91	33.00	3.41	34.00	3.91	35.00
28"	28.00			1.41	31.00	1.91	32.00	2.41	33.00	2.91	34.00	3.41	35.00	3.91	36.00
29"	29.00			1.41	32.00	1.91	33.00	2.41	34.00	2.91	35.00	3.41	36.00	3.91	37.00
30"	30.00			1.41	33.00	1.91	34.00	2.41	35.00	2.91	36.00	3.41	37.00	3.91	38.00
31"	31.00			1.41	34.00	1.91	35.00	2.41	36.00	2.91	37.00	3.41	38.00	3.91	39.00
32"	32.00			1.41	35.00	1.91	36.00	2.41	37.00	2.91	38.00	3.41	39.00	3.91	40.00
33"	33.00			1.41	36.00	1.91	37.00	2.41	38.00	2.91	39.00	3.41	40.00	3.91	41.00
34"	34.00			1.41	37.00	1.91	38.00	2.41	39.00	2.91	40.00	3.41	41.00	3.91	42.00
35"	35.00			1.41	38.00	1.91	39.00	2.41	40.00	2.91	41.00	3.41	42.00	3.91	43.00
36"	36.00			1.41	39.00	1.91	40.00	2.41	41.00	2.91	42.00	3.41	43.00	3.91	44.00
37"	37.00			1.41	40.00	1.91	41.00	2.41	42.00	2.91	43.00	3.41	44.00	3.91	45.00
38"	38.00			1.41	41.00	1.91	42.00	2.41	43.00	2.91	44.00	3.41	45.00	3.91	46.00
39"	39.00			1.41	42.00	1.91	43.00	2.41	44.00	2.91	45.00	3.41	46.00	3.91	47.00
40"	40.00			1.41	43.00	1.91	44.00	2.41	45.00	2.91	46.00	3.41	47.00	3.91	48.00
41"	41.00			1.41	44.00	1.91	45.00	2.41	46.00	2.91	47.00	3.41	48.00	3.91	49.00

This standard dimensional sheet covers the following insulation specifications:

- A - Calcium Silicate, Standard - - - - - Spec. 20-H
- B - Calcium Silicate, High Temperature - - - - - Spec. 25-H & 32-H
- C - Asbestos Fiber - - - - - Spec. 21-H

The blank spaces shown above indicate that the insulation is not made standard in the thicknesses for that particular line size.

THICKNESS OF INSULATION REQUIRED FOR CELLULAR GLASS (FOAMGLAS)
IN COLD TEMPERATURE SERVICE TO MAINTAIN A SURFACE TEMPERATURE
OF NOT OVER 83 OF

(Air Temperature at 90 OF and Air Movement at 0 M.P.H.)

PIPE SIZE			OPERATING TEMPERATURE °C																												OPERATING TEMPERATURE °F																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
			30 TO 20	19 TO 10	18 TO 9	17 TO 8	16 TO 7	15 TO 6	14 TO 5	13 TO 4	12 TO 3	11 TO 2	10 TO 1	9 TO 0	8 TO -1	7 TO -2	6 TO -3	5 TO -4	4 TO -5	3 TO -6	2 TO -7	1 TO -8	0 TO -9	-1 TO -10	-2 TO -11	-3 TO -12	-4 TO -13	-5 TO -14	-6 TO -15	-7 TO -16	-8 TO -17	-9 TO -18	-10 TO -19	-11 TO -20	-12 TO -21	-13 TO -22	-14 TO -23	-15 TO -24	-16 TO -25	-17 TO -26	-18 TO -27	-19 TO -28	-20 TO -29	-21 TO -30	-22 TO -31	-23 TO -32	-24 TO -33	-25 TO -34	-26 TO -35	-27 TO -36	-28 TO -37	-29 TO -38	-30 TO -39	-31 TO -40	-32 TO -41	-33 TO -42	-34 TO -43	-35 TO -44	-36 TO -45	-37 TO -46	-38 TO -47	-39 TO -48	-40 TO -49	-41 TO -50	-42 TO -51	-43 TO -52	-44 TO -53	-45 TO -54	-46 TO -55	-47 TO -56	-48 TO -57	-49 TO -58	-50 TO -59	-51 TO -60	-52 TO -61	-53 TO -62	-54 TO -63	-55 TO -64	-56 TO -65	-57 TO -66	-58 TO -67	-59 TO -68	-60 TO -69	-61 TO -70	-62 TO -71	-63 TO -72	-64 TO -73	-65 TO -74	-66 TO -75	-67 TO -76	-68 TO -77	-69 TO -78	-70 TO -79	-71 TO -80	-72 TO -81	-73 TO -82	-74 TO -83	-75 TO -84	-76 TO -85	-77 TO -86	-78 TO -87	-79 TO -88	-80 TO -89	-81 TO -90	-82 TO -91	-83 TO -92	-84 TO -93	-85 TO -94	-86 TO -95	-87 TO -96	-88 TO -97	-89 TO -98	-90 TO -99	-91 TO -100	-92 TO -101	-93 TO -102	-94 TO -103	-95 TO -104	-96 TO -105	-97 TO -106	-98 TO -107	-99 TO -108	-100 TO -109	-101 TO -110																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/

CELLULAR GLASS

Spec. 10-L

BASIC DIMENSIONAL STANDARDS FOR LOW TEMPERATURE PIPE INSULATION

Standard Sizes and Thicknesses

IRON PIPE SIZES -

Nominal Pipe Size	Pipe O.D.	I.D. of Insul.	1" Nominal		1½" Nominal		2" Nominal		2½" Nominal		3" Nominal		3½" Nominal		4" Nominal	
			Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.
1/4"	0.540	0.556	1.159	2.875	1.472	3.500	1.972	4.500	2.503	5.563	3.034	6.625	3.534	7.625	4.034	8.625
3/8"	0.675	0.681	1.097	2.875	1.663	4.000	2.163	5.000	2.440	5.563	2.972	6.625	3.472	7.625	3.972	8.625
1/2"	0.840	0.856	1.009	2.875	1.572	4.000	2.072	5.000	2.354	5.563	2.890	6.625	3.384	7.625	3.884	9.625
3/4"	1.050	1.066	0.904	2.875	1.467	4.000	1.967	5.000	2.249	5.563	2.780	6.625	3.779	8.625	4.279	9.625
1"	1.315	1.331	1.084	3.500	1.584	4.500	2.115	5.563	2.665	6.625	3.147	7.625	3.647	8.625	4.147	9.625
1-1/4"	1.660	1.676	0.904	3.500	1.400	4.500	1.944	5.563	2.493	6.625	2.974	7.625	3.474	8.625	3.974	9.625
1-1/2"	1.900	1.916	1.042	4.000	1.542	5.000	1.824	5.563	2.355	6.625	2.855	7.625	3.354	8.625	3.854	9.625
2"	2.375	2.406	1.047	4.500	1.578	5.563	2.109	6.625	2.609	7.625	3.109	8.625	3.609	9.625	4.172	10.750
2-1/2"	2.875	2.961	1.019	5.000	1.301	5.563	1.832	6.625	2.332	7.625	2.832	8.625	3.332	9.625	3.894	10.750
3"	3.500	3.531	1.016	5.563	1.547	6.625	2.047	7.625	2.547	8.625	3.047	9.625	3.610	10.750	4.109	11.750
3-1/2"	4.000	4.031	1.297	6.625	1.797	7.625	2.297	8.625	2.797	9.625	3.360	10.750	3.859	11.750	4.359	12.750
4"	4.500	4.531	1.047	6.625	1.547	7.625	2.047	8.625	2.547	9.625	3.109	10.750	3.610	11.750	4.109	12.850
4-1/2"	5.000	5.063	1.281	7.625	1.781	8.625	2.281	9.625	2.844	10.750	3.344	11.750	3.843	12.750	4.467	14.000
5"	5.563	5.636	0.994	7.625	1.494	8.625	1.994	9.625	2.557	10.750	3.057	11.750	3.557	12.750	4.182	14.000
6"	6.625	6.688	0.968	8.625	1.468	9.625	2.031	10.750	2.531	11.750	3.031	12.750	3.656	14.000	4.156	15.000
7"	7.625	7.688			1.531	10.750	2.031	11.750	2.531	12.750	3.156	14.000	3.656	15.000	4.156	16.000
8"	8.625	8.688			1.531	11.750	2.031	12.750	2.656	14.000	3.156	15.000	3.656	16.000	4.156	17.000
9"	9.625	9.688			1.531	12.750	2.156	14.000	2.656	15.000	3.056	16.000	3.656	17.000	4.156	18.000
10"	10.750	10.844			1.576	14.000	2.078	15.000	2.578	16.000	3.078	17.000	3.578	18.000	4.078	19.000
11"	11.750	11.844			1.578	15.000	2.078	16.000	2.578	17.000	3.078	18.000	3.578	19.000	4.078	20.000
12"	12.750	12.844			1.578	16.000	2.078	17.000	2.578	18.000	3.078	19.000	3.500	20.000	4.078	21.000
14"	14.000	14.094			1.500	17.094	2.000	18.094	2.500	19.094	3.000	20.094	3.500	21.094	4.000	22.094
15"	15.000	15.094			1.500	18.094	2.000	19.094	2.500	20.094	3.000	21.094	3.500	22.094	4.000	23.094
16"	16.000	16.094			1.500	19.094	2.000	20.094	2.500	21.094	3.000	22.094	3.500	23.094	4.000	24.094
17"	17.000	17.094			1.500	20.094	2.000	21.094	2.500	22.094	3.000	23.094	3.500	24.094	4.000	25.094
18"	18.000	18.094			1.500	21.094	2.000	22.094	2.500	23.094	3.000	24.094	3.500	25.094	4.000	26.094
19"	19.000	19.094			1.500	22.094	2.000	23.094	2.500	24.094	3.000	25.094	3.500	26.094	4.000	27.094
20"	20.000	20.125			1.500	23.125	2.000	24.125	2.500	25.125	3.000	26.125	3.500	27.125	4.000	28.125
21"	21.000	21.125			1.500	24.125	2.000	25.125	2.500	26.125	3.000	27.125	3.500	28.125	4.000	29.125
22"	22.000	22.125			1.500	25.125	2.000	26.125	2.500	27.125	3.000	28.125	3.500	29.125	4.000	30.125
23"	23.000	23.125			1.500	26.125	2.000	27.125	2.500	28.125	3.000	29.125	3.500	30.125	4.000	31.125
24"	24.000	24.125			1.500	27.125	2.000	28.125	2.500	29.125	3.000	30.125	3.500	31.125	4.000	32.125
25"	25.000	25.125			1.500	28.125	2.000	29.125	2.500	30.125	3.000	31.125	3.500	32.125	4.000	33.125
26"	26.000	26.125			1.500	29.125	2.000	30.125	2.500	31.125	3.000	32.125	3.500	33.125	4.000	34.125
27"	27.000	27.125			1.500	30.125	2.000	31.125	2.500	32.125	3.000	33.125	3.500	34.125	4.000	35.125
28"	28.000	28.125			1.500	31.125	2.000	32.125	2.500	33.125	3.000	34.125	3.500	35.125	4.000	36.125
29"	29.000	29.125			1.500	32.125	2.000	33.125	2.500	34.125	3.000	35.125	3.500	36.125	4.000	37.125
30"	30.000	30.125			1.500	33.125	2.000	34.125	2.500	35.125	3.000	36.125	3.500	37.125	4.000	38.125
31"	31.000	31.125			1.500	34.125	2.000	35.125	2.500	36.125	3.000	37.125	3.500	38.125	4.000	39.125
32"	32.000	32.125			1.500	35.125	2.000	36.125	2.500	37.125	3.000	38.125	3.500	39.125	4.000	40.125
33"	33.000	33.125			1.500	36.125	2.000	37.125	2.500	38.125	3.000	39.125	3.500	40.125	4.000	41.125
34"	34.000	34.125			1.500	37.125	2.000	38.125	2.500	39.125	3.000	40.125	3.500	41.125	4.000	42.125
35"	35.000	35.125			1.500	38.125	2.000	39.125	2.500	40.125	3.000	41.125	3.500	42.125	4.000	43.125
36"	36.000	36.125			1.500	39.125	2.000	40.125	2.500	41.125	3.000	42.125	3.500	43.125	4.000	44.125

This standard dimensional sheet covers the following insulation specifications:

Cellular Glass - - - - - Specs. 10-H, 10-J & 10-L

The blank spaces shown above indicate that the insulation is not made standard in the thicknesses for that particular line size.

BASIC DIMENSIONAL STANDARDS FOR LOW TEMPERATURE PIPE INSULATION

Standard Sizes and Thicknesses

STANDARD TUBING SIZES -

Nominal Tube Size	Fract. O.D.	O.D.	1" Nominal		1½" Nominal		2" Nominal		2½" Nominal		3" Nominal		3½" Nominal		4" Nominal	
			Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.	Thk.	O.D.
1/4"	1/4	0.250	1.31	2.88	1.62	3.50	2.12	4.50	2.66	5.56	3.19	6.63	3.69	7.63	4.19	8.63
1/4"	3/8	0.375	1.25	2.88	1.56	3.50	2.06	4.50	2.59	5.56	3.12	6.63	3.62	7.63	4.12	8.63
1/2"	1/2	0.500	1.19	2.88	1.50	3.50	2.00	4.50	2.53	5.56	3.06	6.63	3.56	7.63	4.06	8.63
1/2"	5/8	0.625	1.12	2.88	1.44	3.50	1.94	4.50	2.47	5.56	3.00	6.63	3.50	7.63	4.00	8.63
3/4"	3/4	0.750	1.06	2.88	1.62	4.00	2.12	5.00	2.40	5.56	3.44	7.63	3.94	8.63	4.44	9.63
3/4"	7/8	0.875	1.36	3.50	1.56	4.00	2.06	5.00	2.34	5.56	3.37	7.63	3.87	8.63	4.37	9.63
1"	1	1.000	1.25	3.50	1.50	4.00	2.00	5.00	2.81	6.63	3.31	7.63	3.81	8.63	4.31	9.63
1"	1-1/8	1.125	1.24	3.50	1.44	4.00	1.94	5.00	2.75	6.63	3.25	7.63	3.75	8.63	4.25	9.63
1-1/4"	1-1/4	1.250	1.12	3.50	1.62	4.50	2.15	5.56	2.87	6.63	3.19	7.63	3.69	8.63	4.19	9.63
1-1/4"	1-3/8	1.375	1.11	3.50	1.56	4.50	2.09	5.56	2.62	6.63	3.12	7.63	3.62	8.63	4.12	9.63
1-1/2"	1-1/2	1.500	1.25	4.00	1.50	4.50	2.03	5.56	2.56	6.63	3.06	7.63	3.56	8.63	4.06	9.63
1-1/2"	1-5/8	1.625	1.19	4.00	1.44	4.50	1.97	5.56	2.50	6.63	3.00	7.63	3.50	8.63	4.00	9.63
2"	2	2.000	1.00	4.00	1.50	5.00	2.31	6.63	2.81	7.63	3.31	8.63	3.81	9.63	4.31	10.75
2"	2-1/8	2.125	1.19	4.50	1.44	5.00	2.25	6.63	2.75	7.63	3.25	8.63	3.75	9.63	4.25	10.75
2-1/2"	2-1/2	2.500	1.00	4.50	1.53	5.56	2.06	6.63	2.56	7.63	3.06	8.63	3.56	9.63	4.12	10.75
2-1/2"	2-5/8	2.625	1.19	5.00	1.47	5.56	2.00	6.63	2.50	7.63	3.00	8.63	3.50	9.63	4.06	10.75
3"	3	3.000	1.00	5.00	1.81	6.63	2.31	7.63	2.81	8.63	3.31	9.63	3.81	10.75	4.31	11.75
3"	3-1/8	3.125	1.22	5.56	1.75	6.63	2.25	7.63	2.75	8.63	3.25	9.63	3.82	10.75	4.32	11.75
3-1/2"	3-5/8	3.625	0.97	5.56	1.50	6.63	2.00	7.63	2.50	8.63	3.50	9.63	3.56	10.75	4.06	11.75
4"	4	4.000	1.31	6.63	1.81	7.63	2.31	8.63	2.81	9.63	3.37	10.75	3.87	11.75	4.37	12.75
4"	4-1/8	4.125	1.25	6.63	1.75	7.63	2.25	8.63	2.75	9.63	3.31	10.75	3.81	11.75	4.31	12.75
5"	5	5.000	1.31	7.63	1.81	8.63	2.31	9.63	2.82	10.75	3.37	11.75	3.87	12.75	4.50	14.00
5"	5-1/8	5.125	1.25	7.63	1.75	8.63	2.25	9.63	2.81	10.75	3.31	11.75	3.81	12.75	4.43	14.00
6"	6	6.000	1.25	8.63	1.81	9.63	2.37	10.75	2.87	11.75	3.37	12.75	4.00	14.00	4.50	15.00
6"	6-1/8	6.125	1.25	8.63	1.75	9.63	2.31	10.75	2.81	11.75	3.31	12.75	3.93	14.00	4.43	15.00
8"	8	8.000			1.82	11.75	2.32	12.75	2.99	14.00	3.48	15.00	3.98	16.00	4.48	17.00
8"	8-1/8	8.125			1.81	11.75	2.31	12.75	2.94	14.00	3.44	15.00	3.98	16.00	4.44	17.00
10"	10	10.000			1.38	12.75	1.99	14.00	2.49	15.00	2.99	16.00	3.49	17.00	3.99	18.00
10"	10-1/8	10.125			1.31	12.75	1.94	14.00	2.44	15.00	2.94	17.00	3.44	17.00	3.94	18.00
12"	12-1/8	12.125			1.44	15.00	1.99	16.00	2.44	17.00	3.00	18.09	3.44	19.09	3.99	20.09

This standard dimensional sheet covers the following insulation specifications:

Cellular Glass - - - - - Specs. 10-H, 10-J & 10-L

The blank spaces shown above indicate that the insulation is not made standard in the thicknesses for that particular tubing size.

EXTERNAL AREAS OF TANKS

TANK DIAMETER	FLAT HEAD AREA (SQ. FT.)	DISHED HEAD AREA (SQ. FT.)	AREA PER L. F. OF CYL. (SQ. FT.)
1'-0"	.79	.84	3.14
1'-6"	1.77	1.89	4.71
2'-0"	3.14	3.37	6.28
2'-6"	4.91	5.21	7.85
3'-0"	7.07	7.54	9.42
3'-6"	9.62	10.30	11.00
4'-0"	12.57	13.45	12.57
4'-6"	15.90	17.05	14.14
5'-0"	19.64	21.10	15.71
5'-6"	23.76	25.80	17.28
6'-0"	28.27	30.20	18.85
6'-6"	33.17	35.60	20.42
7'-0"	38.49	41.30	21.99
7'-6"	44.16	47.50	23.56
8'-0"	50.27	53.85	25.13
8'-6"	56.75	60.65	26.70
9'-0"	63.62	68.10	28.27
9'-6"	70.88	76.00	29.85
10'-0"	79.54	84.18	31.42
10'-6"	88.59	92.71	32.99
11'-0"	98.03	101.89	34.56
11'-6"	107.87	111.72	36.13

TANK DIAMETER	FLAT HEAD AREA (SQ. FT.)	DISHED HEAD AREA (SQ. FT.)	AREA PER L. F. OF CYL. (SQ. FT.)
12'-0"	119.10	121.18	37.70
12'-6"	122.72	131.49	39.27
13'-0"	132.73	142.22	40.84
13'-6"	143.14	153.38	42.41
14'-0"	153.94	164.94	43.98
14'-6"	165.13	176.93	45.55
15'-0"	176.81	189.34	47.12
15'-6"	188.89	202.18	48.70
16'-0"	201.06	215.43	50.27
16'-6"	213.63	-	51.84
17'-0"	226.98	-	53.41
17'-6"	240.53	-	54.98
18'-0"	254.47	-	56.56
18'-6"	268.80	-	58.12
19'-0"	283.53	-	59.69
19'-6"	298.65	-	61.26
20'-0"	314.16	-	62.83
21'-0"	344.86	-	64.40
22'-0"	360.13	-	66.11
23'-0"	415.54	-	72.26
24'-0"	450.79	-	75.40
25'-0"	490.86	-	78.54

NOTE:

Areas listed above are approximate and should be used for estimating purposes only.

EXTERNAL AREAS OF INSULATED FLANGES
(Square Feet Per Flange)

NOM. PIPE SIZE (INCHES)	O.D. FLANGE (INCHES)	INSULATION THICKNESS										
		1"	1-1/2"	2"	2-1/2"	3"	3-1/2"	4"	4-1/2"	5"	5-1/2"	6"
1/2	3-1/2	1.1	1.3	1.5	2.2	2.5	2.7	3.0	4.1	4.4	5.7	6.1
3/4	3-7/8	1.2	1.3	1.5	2.3	2.6	2.8	3.0	4.2	4.5	5.8	6.2
1	4-1/4	1.3	1.4	2.2	2.4	2.7	3.7	4.0	4.3	5.6	6.0	6.4
1-1/4	4-5/8	1.3	1.5	2.3	2.5	2.8	3.8	4.2	4.5	5.7	6.1	6.5
1-1/2	5	1.4	2.1	2.4	2.6	3.6	3.8	4.3	5.5	5.9	6.3	7.8
2	6	1.5	2.4	2.6	2.9	3.9	4.2	4.6	5.9	6.3	6.7	8.3
2-1/2	7	2.4	2.6	2.9	3.9	4.2	4.6	5.9	6.3	6.7	8.2	8.7
3	7-1/2	2.5	2.8	3.0	4.1	4.4	4.8	6.1	6.6	6.9	8.5	8.9
3-1/2	8-1/2	2.9	3.0	3.3	4.4	4.6	5.1	6.5	6.9	7.5	8.9	9.4
4	9	2.9	3.1	4.2	4.6	4.9	5.3	6.7	7.1	8.7	9.2	9.6
5	10	3.1	3.4	4.5	4.9	5.2	5.7	7.1	7.4	9.2	9.6	10.1
6	11	3.4	3.7	5.0	5.3	5.6	7.1	7.4	7.9	9.6	10.1	10.5
8	13-1/2	4.1	5.4	5.7	6.1	7.7	8.1	8.5	10.3	10.6	11.2	13.4
10	16	4.7	6.2	6.6	6.9	8.6	9.0	9.4	11.5	11.9	12.4	14.7
12	19	6.9	7.2	7.5	9.4	9.8	10.2	12.4	12.8	13.3	15.7	16.2
14	21	7.5	7.9	8.2	10.2	10.6	11.1	13.3	13.7	14.2	16.6	17.2
16	23-1/2	8.4	8.7	10.8	11.2	11.6	14.0	14.4	14.9	17.5	18.1	18.6
18	25	8.8	11.0	11.4	11.8	14.2	14.7	15.1	17.8	18.3	18.8	21.9
20	27-1/2	9.7	12.0	12.4	12.8	15.4	15.9	16.3	19.1	19.6	20.2	23.2
24	32	13.4	13.7	14.1	17.0	17.4	17.9	21.0	21.6	22.0	25.6	25.9

NOTE

Areas listed above are approximate and should be used for estimating purposes only.

EXTERNAL AREAS OF INSULATED FITTINGS
(Square Feet Per Fitting)

NOM. PIPE SIZE (INCHES)	INSULATION THICKNESS										
	1	1-1/2	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6
1/2	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4
3/4	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.5	0.5
1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7
1-1/4	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.8	0.9
1-1/2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	0.8	0.9	1.0	1.1
2	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
2-1/2	0.6	0.8	0.9	1.0	1.1	1.3	1.4	1.5	1.6	1.8	1.9
3	0.8	1.0	1.2	1.3	1.5	1.6	1.8	1.9	2.1	2.2	2.4
3-1/2	1.1	1.3	1.4	1.6	1.8	2.0	2.1	2.3	2.5	2.7	2.9
4	1.3	1.5	1.7	1.9	2.1	2.3	2.6	2.8	3.0	3.2	3.4
4-1/2	1.6	1.8	2.1	2.3	2.5	2.8	3.0	3.2	3.4	3.7	3.9
5	1.9	2.2	2.5	2.7	3.0	3.2	3.6	3.7	4.0	4.2	4.5
6	2.6	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7
7	3.4	3.8	4.2	4.5	4.9	5.2	5.6	5.9	6.3	6.7	7.0
8	4.3	4.6	5.2	5.6	6.0	6.4	6.8	7.2	7.6	8.0	8.4
9	5.3	5.8	6.3	6.7	7.2	7.6	8.1	8.6	9.0	9.5	9.9
10	6.5	7.0	7.5	8.0	8.5	9.1	9.6	10.1	10.6	11.1	11.6
12	9.0	9.7	10.3	10.9	11.5	12.1	12.7	13.3	13.9	14.6	15.2
14	11.4	12.1	12.9	13.6	14.3	15.0	15.7	16.4	17.2	17.9	18.6
16	14.7	15.5	16.3	17.1	18.0	18.8	19.6	20.4	21.2	22.0	22.8
18	18.4	19.3	20.2	21.1	22.0	23.0	23.9	24.8	25.7	26.6	27.5
20	22.4	23.5	24.5	25.5	26.5	27.6	28.6	29.6	30.6	31.6	32.6
22	27.0	28.1	29.2	30.3	31.4	32.6	33.7	34.8	35.9	37.0	38.1
24	31.8	33.0	34.2	35.5	36.7	38.0	39.3	40.4	41.7	42.9	44.1

NOTE:

Areas listed above are approximate and should be used for estimating purposes only.

EXTERNAL AREA OF INSULATED PIPE
(Square Feet Per Lineal Foot)

NOM. PIPE SIZE (INCHES)	AREA OF BARE PIPE PER L. F. (SQ. FT.)	INSULATION THICKNESS																	
		1	1-1/2	2	2-1/2	3	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-1/2	8	8-1/2	9	
1/8	.106	0.7	0.9	1.2	1.5	1.7	2.0	2.2	2.5	2.8	3.0	3.3	3.5	3.8	4.1	4.3	4.6	4.8	
1/4	.141	0.7	1.0	1.2	1.5	1.8	2.0	2.3	2.5	2.8	3.1	3.3	3.6	3.9	4.1	4.3	4.6	4.8	
3/8	.177	0.7	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8	3.1	3.4	3.6	3.9	4.2	4.4	4.7	4.9	
1/2	.220	0.8	1.0	1.3	1.6	1.8	2.1	2.4	2.6	2.9	3.1	3.4	3.7	3.9	4.2	4.4	4.7	5.0	
3/4	.275	0.8	1.1	1.4	1.6	1.9	2.1	2.4	2.7	2.9	3.2	3.5	3.7	4.0	4.2	4.5	4.8	5.0	
1	.344	0.9	1.2	1.4	1.7	2.0	2.2	2.5	2.7	3.0	3.3	3.5	3.8	4.0	4.3	4.5	4.8	5.0	
1-1/4	.435	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8	3.1	3.4	3.6	3.9	4.1	4.4	4.7	4.9	5.1	
1-1/2	.488	1.1	1.3	1.6	1.8	2.1	2.4	2.6	2.9	3.2	3.4	3.7	3.9	4.2	4.5	4.7	5.0	5.1	
2	.622	1.2	1.4	1.7	2.0	2.2	2.5	2.8	3.0	3.3	3.5	3.8	4.1	4.3	4.6	4.8	5.1	5.2	
2-1/2	.753	1.3	1.5	1.8	2.1	2.4	2.6	2.9	3.1	3.4	3.7	3.9	4.2	4.5	4.7	5.0	5.2	5.3	
3	.917	1.5	1.7	2.0	2.3	2.5	2.8	3.0	3.3	3.6	3.8	4.1	4.4	4.6	4.9	5.1	5.4	5.5	
3-1/2	1.047	1.6	1.8	2.1	2.4	2.7	2.9	3.2	3.4	3.7	4.0	4.2	4.5	4.8	5.0	5.3	5.6	5.7	
4	1.178	1.7	2.0	2.3	2.5	2.8	3.0	3.3	3.6	3.8	4.1	4.4	4.6	4.9	5.1	5.4	5.7	5.8	
4-1/2	1.309	1.9	2.1	2.4	2.7	2.9	3.2	3.4	3.7	4.0	4.2	4.5	4.8	5.0	5.3	5.5	5.8	5.9	
5	1.456	2.0	2.3	2.5	2.8	3.1	3.3	3.6	3.8	4.1	4.4	4.7	4.9	5.2	5.4	5.7	5.9	6.0	
6	1.734	2.3	2.6	2.8	3.1	3.3	3.6	3.9	4.1	4.4	4.7	4.9	5.2	5.4	5.7	6.0	6.2	6.3	
7	1.996	2.6	2.7	3.1	3.3	3.6	3.9	4.1	4.4	4.7	4.9	5.2	5.4	5.7	6.0	6.2	6.5	6.6	
8	2.257	2.8	3.1	3.3	3.6	3.9	4.1	4.4	4.7	4.9	5.2	5.4	5.7	6.0	6.2	6.5	6.7	7.0	
9	2.519	3.1	3.4	3.6	3.9	4.1	4.4	4.7	4.9	5.2	5.4	5.7	6.0	6.2	6.5	6.7	7.0	7.2	
10	2.817	3.4	3.6	3.9	4.1	4.4	4.7	4.9	5.2	5.4	5.7	6.0	6.2	6.5	6.7	7.0	7.3	7.5	
11	3.073	3.6	3.9	4.1	4.4	4.7	4.9	5.2	5.4	5.7	6.0	6.2	6.5	6.7	7.0	7.3	7.6	7.8	
12	3.337	3.9	4.2	4.4	4.7	4.9	5.2	5.4	5.7	6.0	6.2	6.5	6.7	7.0	7.3	7.6	7.9	8.1	
14	3.683	4.2	4.5	4.8	5.0	5.3	5.5	5.8	6.1	6.3	6.6	6.8	7.1	7.4	7.6	7.9	8.2	8.4	
16	4.188	4.8	5.0	5.3	5.5	5.8	6.1	6.3	6.6	6.8	7.1	7.4	7.6	7.9	8.2	8.4	8.7	8.9	
18	4.716	5.3	5.5	5.8	6.1	6.3	6.6	6.8	7.1	7.4	7.6	7.9	8.2	8.4	8.7	8.9	9.2	9.4	
20	5.235	5.8	6.1	6.3	6.6	6.8	7.1	7.4	7.6	7.9	8.2	8.4	8.7	8.9	9.2	9.4	9.7	10.0	
22	5.747	6.3	6.6	6.8	7.1	7.4	7.6	7.9	8.2	8.4	8.7	8.9	9.2	9.5	9.7	10.0	10.2	10.5	
24	6.286	6.8	7.1	7.4	7.6	7.9	8.2	8.4	8.7	8.9	9.2	9.5	9.7	10.0	10.2	10.5	10.8	11.0	
26	6.807	7.4	7.6	7.9	8.2	8.4	8.7	8.9	9.2	9.5	9.7	10.0	10.2	10.5	10.8	11.0	11.3	11.5	
28	7.331	7.9	8.2	8.4	8.7	8.9	9.2	9.5	9.7	10.0	10.2	10.5	10.8	11.0	11.3	11.6	11.8	12.0	
30	7.854	8.4	8.7	8.9	9.2	9.5	9.7	10.0	10.2	10.5	10.8	11.0	11.3	11.6	11.8	12.1	12.3	12.5	
36	9.425	10.0	10.2	10.5	10.8	11.0	11.3	11.6	11.8	12.1	12.3	12.6	12.8	13.1	13.4	13.7	13.9	14.1	

NOTE:

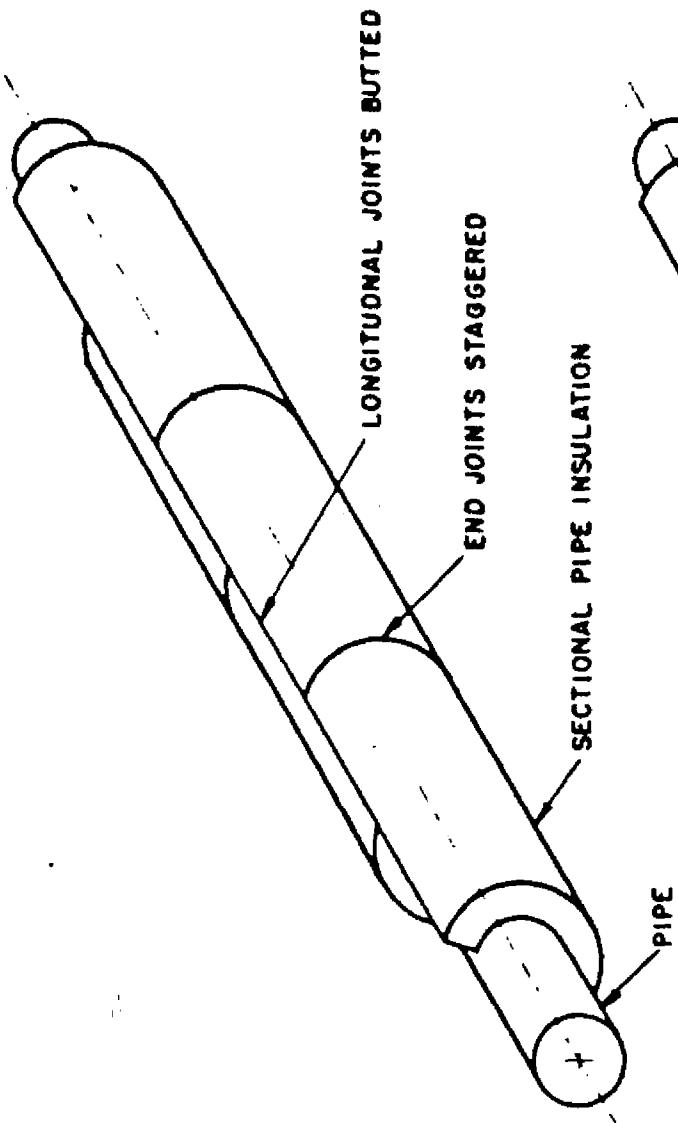
Area listed above are approximate and should be used for estimating purposes only.

CIRCUMFERENCES OF INSULATED LINES
(In Lineal Feet)

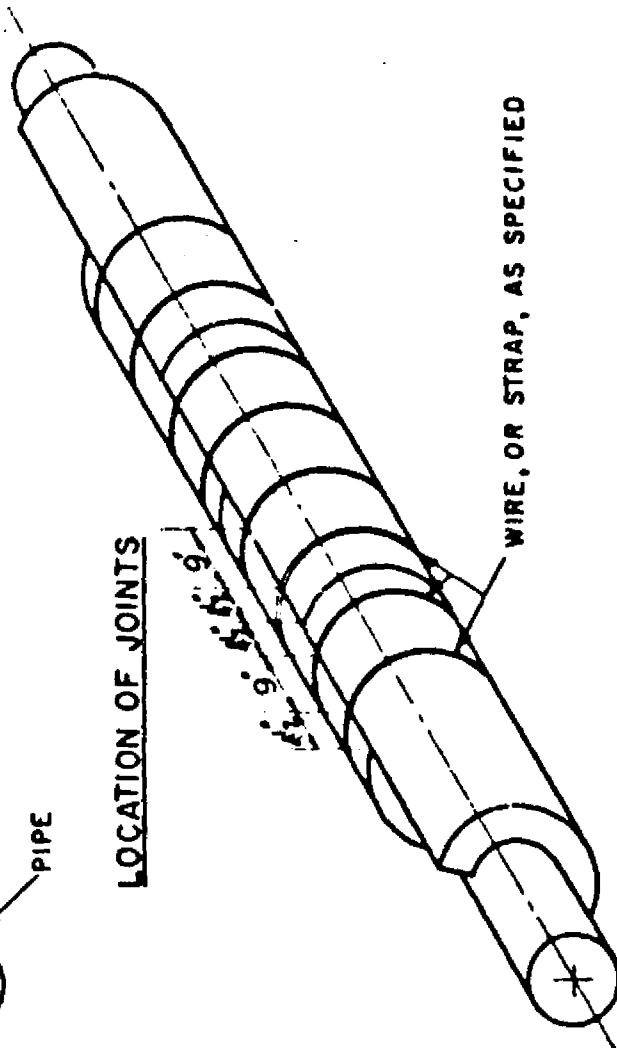
LINE SIZE (INCHES)	INSULATION THICKNESS																
	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9
1/2	.74	1.0	1.3	1.5	1.8	2.1	2.3	2.6	2.8	3.1	3.4	3.6	3.9	4.2	4.4	4.7	4.9
3/4	.80	1.1	1.3	1.6	1.9	2.1	2.4	2.7	2.9	3.2	3.4	3.7	4.0	4.2	4.5	4.8	5.0
1	.90	1.1	1.4	1.7	1.9	2.2	2.4	2.7	3.0	3.2	3.5	3.7	4.0	4.3	4.5	4.8	5.1
1 1/2	1.0	1.3	1.5	1.8	2.1	2.3	2.6	2.9	3.1	3.4	3.6	3.9	4.2	4.4	4.7	4.9	5.2
2	1.1	1.4	1.7	1.9	2.2	2.5	2.7	3.0	3.2	3.5	3.8	4.0	4.3	4.6	4.8	5.1	5.3
2 1/2	1.3	1.5	1.8	2.1	2.3	2.6	2.9	3.1	3.4	3.6	3.9	4.2	4.4	4.7	4.9	5.2	5.5
3	1.4	1.7	2.0	2.2	2.5	2.8	3.0	3.3	3.5	3.8	4.1	4.3	4.6	4.8	5.1	5.4	5.6
3 1/2	1.6	1.8	2.1	2.4	2.6	2.9	3.1	3.4	3.7	3.9	4.2	4.4	4.7	5.0	5.2	5.5	5.8
4	1.7	2.0	2.2	2.5	2.8	3.0	3.3	3.5	3.8	4.1	4.3	4.6	4.8	5.1	5.4	5.6	5.9
6	2.3	2.5	2.8	3.0	3.3	3.6	3.8	4.1	4.4	4.6	4.9	5.1	5.4	5.7	5.9	6.2	6.5
8	2.8	3.0	3.3	3.6	3.8	4.1	4.4	4.6	4.9	5.1	5.4	5.7	5.9	6.2	6.5	6.7	7.0
10	3.3	3.6	3.9	4.1	4.4	4.7	4.9	5.2	5.4	5.7	6.0	6.2	6.5	6.7	7.0	7.3	7.5
12	3.9	4.1	4.4	4.7	4.9	5.2	5.4	5.7	5.9	6.2	6.5	6.7	7.0	7.3	7.5	7.8	8.0
14	4.2	4.5	4.7	5.0	5.2	5.5	5.8	6.0	6.3	6.5	6.8	7.1	7.3	7.6	7.9	8.1	8.4
16	4.7	5.0	5.2	5.5	5.8	6.0	6.3	6.6	6.8	7.1	7.3	7.6	7.8	8.1	8.4	8.7	8.9
18	5.2	5.5	5.8	6.0	6.3	6.5	6.8	7.1	7.3	7.6	7.9	8.1	8.4	8.7	8.9	9.2	9.4
20	5.8	6.0	6.3	6.6	6.8	7.1	7.3	7.6	7.9	8.1	8.4	8.6	8.9	9.2	9.4	9.7	9.9
22	6.3	6.6	6.8	7.1	7.3	7.6	7.9	8.1	8.4	8.6	8.9	9.2	9.4	9.7	9.9	10.2	10.4
24	6.8	7.1	7.3	7.6	7.9	8.1	8.4	8.6	8.9	9.2	9.4	9.7	9.9	10.2	10.4	10.7	11.0
26	7.3	7.6	7.9	8.1	8.4	8.6	8.9	9.2	9.4	9.7	9.9	10.2	10.4	10.7	11.0	11.3	11.5
28	7.9	8.1	8.4	8.6	8.9	9.2	9.4	9.7	9.9	10.2	10.4	10.7	11.0	11.3	11.5	11.8	12.0
30	8.4	8.6	8.9	9.2	9.4	9.7	9.9	10.2	10.4	10.7	11.0	11.3	11.5	11.8	12.0	12.3	12.6
32	8.9	9.2	9.4	9.7	9.9	10.2	10.4	10.7	11.0	11.3	11.5	11.8	12.0	12.3	12.6	12.8	13.1
34	9.4	9.7	9.9	10.2	10.4	10.7	11.0	11.3	11.5	11.8	12.0	12.3	12.6	12.8	13.1	13.3	13.6
36	9.9	10.2	10.4	10.7	11.0	11.3	11.5	11.8	12.0	12.3	12.6	12.8	13.1	13.3	13.6	13.9	14.2

NOTE:

The circumferences listed above are approximate and should be used for estimating purposes only when determining band and wire requirements.



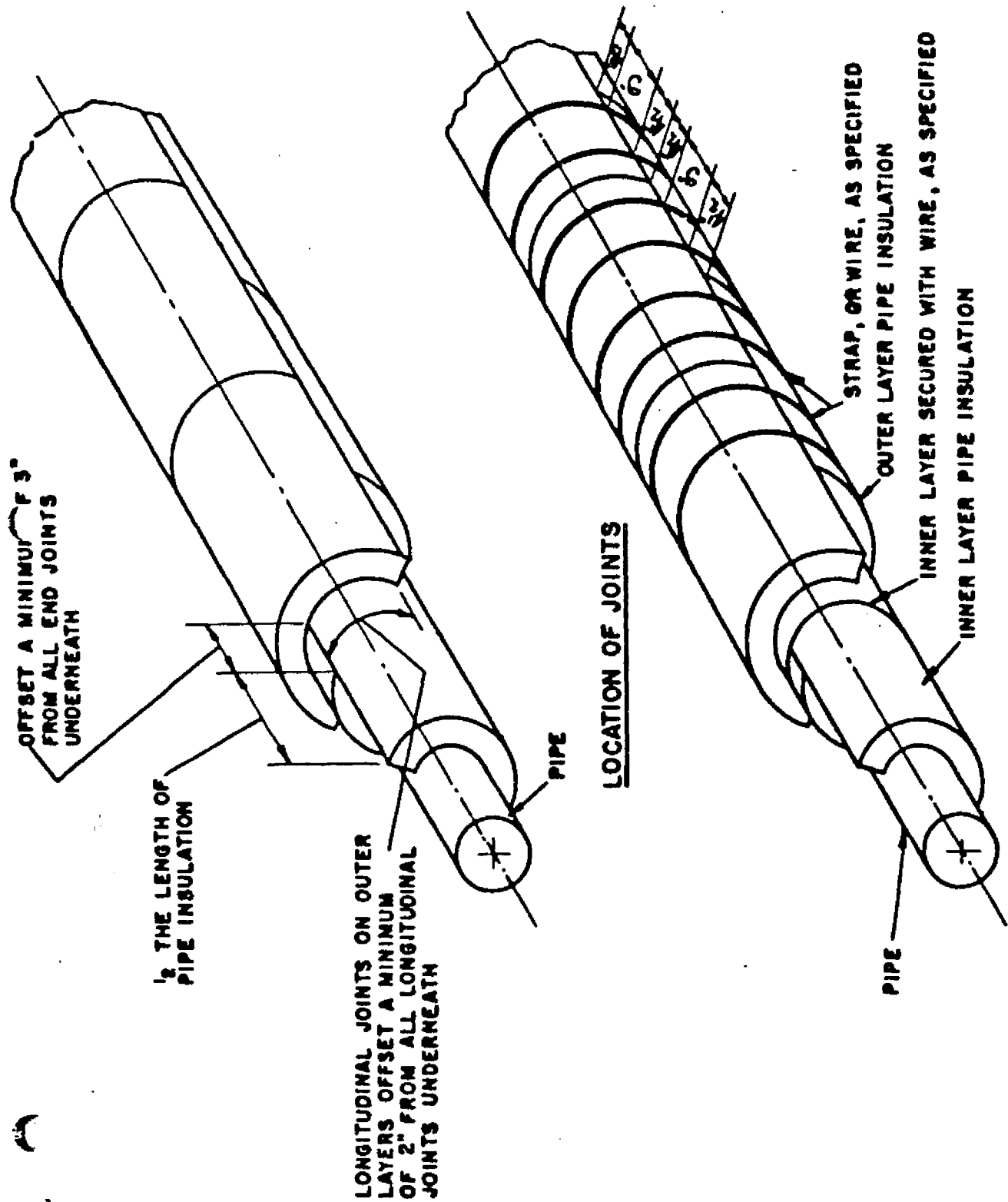
LOCATION OF JOINTS



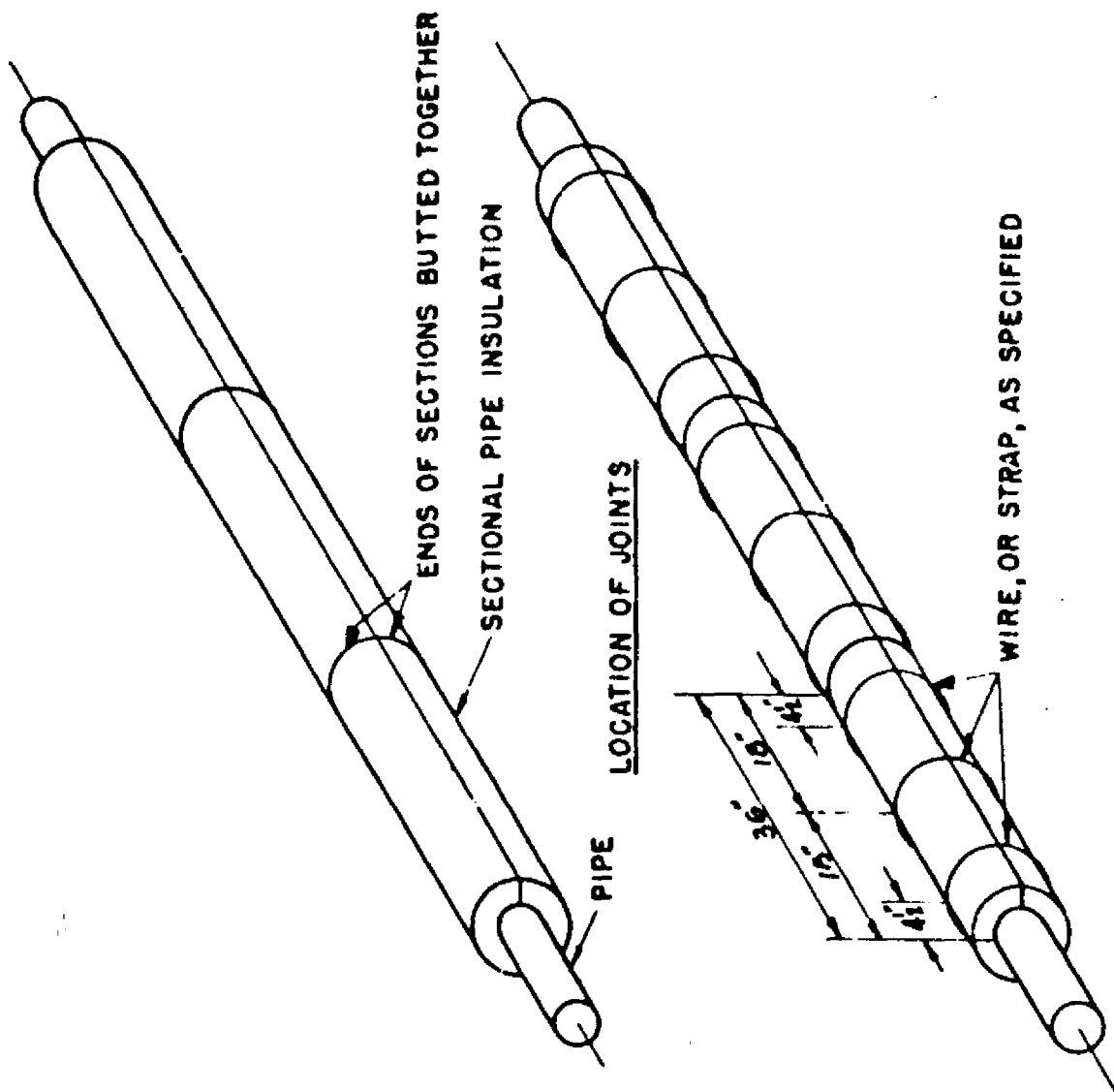
LOCATION OF FASTENING

SECUREMENT OF SINGLE LAYER INSULATION TO PIPE

FIG. 6A-1



LOCATION OF FASTENING
SECUREMENT OF MULTIPLE LAYER INSULATION TO PIPE



NOTE: SINGLE LAYER INSULATION
UP TO 1 1/2" PIPE SIZE OR 6" O.D.
INSULATION.

LOCATION OF FASTENING