

PLAINTIFF'S EXHIBIT

UC-2365

SPECIFICATIONS
THERMAL INSULATION

SOUTH CHARLESTON PLANT

Temperature Conversion

-459.4 to 0			1 to 60			61 to 250			250 to 500			500 to 3000		
C	F	F	C	F	F	C	F	F	C	F	F	C	F	F
-273	-459.4		-17.2	1	33.8	16.1	61	141.8	149	300	572	482	900	1652
-268	-456		-16.7	2	36.6	16.7	62	143.6	154	310	590	488	910	1670
-263	-452		-16.1	3	37.4	17.2	63	145.4	160	320	608	493	920	1688
-257	-448		-15.6	4	39.2	17.8	64	147.2	166	330	626	499	930	1706
-251	-444		-15.0	5	41.0	18.3	65	149.0	171	340	644	504	940	1724
-246	-440		-14.4	6	42.8	18.9	66	150.8	177	350	662	510	950	1742
-240	-436		-13.9	7	44.6	19.4	67	152.6	182	360	680	516	960	1760
-234	-432		-13.3	8	46.4	20.0	68	154.4	188	370	698	521	970	1778
-229	-428		-12.8	9	48.2	20.6	69	156.2	193	380	716	527	980	1796
-223	-424		-12.2	10	50.0	21.1	70	158.0	199	390	734	532	990	1814
-218	-420		-11.7	11	51.8	21.7	71	159.8	204	400	752	538	1000	1832
-212	-416		-11.1	12	53.6	22.2	72	161.6	210	410	770	544	1020	1868
-207	-412		-10.6	13	55.4	22.8	73	163.4	216	420	788	550	1040	1904
-201	-408		-10.0	14	57.2	23.3	74	165.2	221	430	806	571	1060	1940
-196	-404		-9.4	15	59.0	23.9	75	167.0	227	440	824	582	1080	1976
-190	-400		-8.9	16	60.8	24.4	76	168.8	232	450	842	593	1100	2012
-184	-396		-8.3	17	62.6	25.0	77	170.6	238	460	860	604	1120	2048
-179	-392		-7.8	18	64.4	25.6	78	172.4	243	470	878	616	1140	2084
-173	-388		-7.2	19	66.2	26.1	79	174.2	249	480	896	627	1160	2120
-169	-384	-459.4	-6.7	20	68.0	26.7	80	176.0	254	490	914	638	1180	2156
-164	-380	-454	-6.1	21	69.8	27.2	81	177.8	260	500	932	649	1200	2192
-162	-376	-450	-5.6	22	71.6	27.8	82	179.6	266	510	950	660	1220	2228
-157	-372	-446	-5.0	23	73.4	28.3	83	181.4	271	520	968	671	1240	2264
-151	-368	-442	-4.4	24	75.2	28.9	84	183.2	277	530	986	682	1260	2300
-146	-364	-438	-3.9	25	77.0	29.4	85	185.0	282	540	1004	693	1280	2336
-140	-360	-434	-3.3	26	78.8	30.0	86	186.8	288	550	1022	704	1300	2372
-134	-356	-430	-2.8	27	80.6	30.6	87	188.6	293	560	1040	732	1350	2462
-129	-352	-426	-2.2	28	82.4	31.1	88	190.4	299	570	1058	760	1400	2552
-123	-348	-422	-1.7	29	84.2	31.7	89	192.2	304	580	1076	788	1450	2642
-118	-344	-418	-1.1	30	86.0	32.2	90	194.0	310	590	1094	816	1500	2732
-112	-340	-414	0	31	87.8	32.8	91	195.8	316	600	1112	843	1550	2822
-107	-336	-410	0	32	89.6	33.3	92	197.6	321	610	1130	871	1600	2912
-101	-332	-406	0	33	91.4	33.9	93	199.4	327	620	1148	899	1650	3002
-96	-328	-402	1.1	34	93.2	34.4	94	201.2	332	630	1166	927	1700	3092
-90	-324	-398	1.7	35	95.0	35.0	95	203.0	338	640	1184	954	1750	3182
-84	-320	-394	2.2	36	96.8	35.6	96	204.8	343	650	1202	982	1800	3272
-79	-316	-390	2.8	37	98.6	36.1	97	206.6	349	660	1220	1010	1850	3362
-73	-312	-386	3.3	38	100.4	36.7	98	208.4	354	670	1238	1038	1900	3452
-68	-308	-382	3.9	39	102.2	37.2	99	210.2	360	680	1256	1066	1950	3542
-62	-304	-378	4.4	40	104.0	37.8	100	212.0	366	690	1274	1093	2000	3632
-57	-300	-374	5.0	41	105.8	43	110	230	371	700	1292	1121	2050	3722
-51	-296	-370	5.6	42	107.6	49	120	248	377	710	1310	1149	2100	3812
-46	-292	-366	6.1	43	109.4	54	130	266	382	720	1328	1177	2150	3902
-40	-288	-362	6.7	44	111.2	60	140	284	388	730	1346	1204	2200	3992
-34	-284	-358	7.2	45	113.0	66	150	302	393	740	1364	1232	2250	4082
-29	-280	-354	7.8	46	114.8	71	160	320	399	750	1382	1260	2300	4172
-23	-276	-350	8.3	47	116.6	77	170	338	404	760	1400	1288	2350	4262
-17.8	-272	-346	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 degree Centigrade, read Fahrenheit equivalent in right hand column; if in degree 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

A. R. Giles.

ARG/ra

Attachment

INSTITUTE PLANT
THERMAL INSULATION SPECIFICATIONS

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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 cyclic 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)	Inexpensive, pure glass containing millions of separate hermetically sealed cells, each filled with air. Unusually high resistance to moisture, vapor and acid attack. Insoluble and remains proof. Combines light weight and high compressive strength.	Pittsburgh - Corning Corp.	Pengoles	-400	800
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 - Mill John-Manville Kendall - Natelson Kendall Owens-Corning Fibres Rubert Rubert	Calcium Silicate Thermobestos Kyltherm Fris-Calite Kylite Caltemp Caloblite	32 32 100 100 32 32 32	1200 1200 1200 1200 1200 1200 1250
21-B	Asbestos Fibers, Felted with Sodium Silicate Binder (Pipe Covering Only)	Asbestos asbestos fibers bonded with sodium silicate and processed into pipe insulation. Has considerable mechanical strength, and will resist vibration. Will "bridge" voids. Calcium silicate same as Spec. 20-B above.	Armstrong Union Asbestos and Rubber See Spec. 20 above	Armstrong Unionbestos See Spec. 20-B above	32 32	750 750
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	Kylite - 20	100	2000

ALL BOILER WATER - BUT GATE WATER - UNOFFICIAL SERVICE UP TO 255 °F
INCLUDE IN SPECIFICATION PAGE 20-H
MAKING TAB. FOR THIS SHEET 256 °F

SIZE INCH	INSULATION MATERIAL	THICKNESS (IN.)	NO. OF LAYERS	WALLING MATERIAL	WIRE	BAND	REINFORCING	WATER-PROOFING	WATER-PROOFING MATERIAL
1/2	CALCIUM SILICATE (STD.)	2	1	FLD. FAB. OR INS. CEMENT	1/2" (STD.) 1475" A TYPE 304 SS. SOFT ANNEAL	NONE	GLASS FABRIC - 1/2" x 10" MESH / 1/2" x 10" MESH	VITACOC M-1 OR EQUIV. FLEXIBLE	FALP
3/4		2	1						
1		2	1						
1-1/2		2	1						
2		2	1						
2-1/2		2	1	SHOP PRE-PREP					
3		2	1						
3-1/2		2	1						
4		2	1						
4		1-1/2	1				1/2" WIDE x .020" THICK x TYPE 304 SS		
5		1-1/2	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						
40- 50- (FLAT or C-CH)		1-1/2	1	CLT FOR SITE REPAIR (VAN. PAN.)	See SPEC. 20-H, PAGE A, FOR CLARITY	See SPEC. 20-H, PAGE A, AND GEN. N.T.A. 44			

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-Coat", or approved alternate.
- Heat Resistant Sealer - Benjamin-Peterson #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-Picher #100, J.H. #678, or approved alternate.

PIPING ACCESSORIES ONLY:

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

INSULATION SPECIFICATION NO. 20-H
 REVISED EDITION OF THIS SPEC. 391 97

ITEM NO.	DESCRIPTION	QTY	UNIT	MANUFACTURER	NOTE	REMARKS	TESTING	INSULATION	FINISHING
1/2	CALCIUM SILICATE (STD.)	1	1	FLD. FAB. OF INS. CO.	IF INSULATED 475° F. TYPE 304 SS. CRYST. ANNEAL	NONE	1 x 10' MIN. 5' MIN. MIN.	WETTED WOOL NO. 1	PAUP
3/4		1	1						
1		1	1						
1-1/2		1	1						
2		1	1						
2-1/2		1	1	SHOP PRE-PAR					
3		1	1						
3-1/2		1	1						
4		1	1						
4		1-1/2	1						
6		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 30°)		2	1	CUT FOR SIZE REQ'D. (FAB. MAN.)	SAB SPEC. 20-H, PAGE 8, FOR CLARITY	SAB SPEC. 20-H, PAGE 8, and GEN. NOTE 14			

EQUIPMENT AND PIPING ACCESSORIES

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Insulating Cement - North American Refractories Co. "Marscoat", A. P. Green Fire Brick Co. "Insulation Adhesive", J. E. Franco Co. "Franset", or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Powerhouse", Eagle-Fisher "One-Coat", or approved alternate.
- Heat Resistant Sealer - Benjamin-Foster #30-41 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)

SPRINKLER: 200 PSI STEAM - HIGH PRESSURE CONDENSATE (200-400 PSI)

SPECIFICATIONS FOR INSULATION NO. 20-6
FOR SPRINKLER, FOR THIS SERVICE 400 °F

PIPE SIZE	INSULATION TYPE	THICKNESS (IN.)	NO. OF LAYERS	APPROX. WEIGHT PER SQ. FT.	WATER	STEAM	CONDENSATE	HEATING	Cooling
1/2"	CALCIUM SILICATE (STD.)	1-1/2"	1	FLD. FAB. 2 INCH. CEM.	2" MIN. 1475 °F	2" MIN. 1475 °F	2" MIN. 1475 °F	2" MIN. 1475 °F	2" MIN. 1475 °F
1/4"		1-1/2"	1						
3/8"		1-1/2"	1	SHOP PRE-FAB					
1-1/2"		2"	1						
2"		2"	1		NONE	1/2" WIDE x .020" THICK x TYPE 304 S.S.			
2-1/2"		2"	1						
3"		2"	1						
3-1/2"		2"	1						
4"		2"	1						
4-1/2"		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						
FLANGE		2-1/2"	1	SEE FOR SIZE REQ'D. (MAX. MAX.)	SEE SPEC. 20-6, PAGE 4, FOR CLAS. 17	SEE SPEC. 20-6, PAGE 4, AND OSM. NOTE 24			

EQUIPMENT AND PIPING ACCESSORIES

- Clips - 1/2" double pronged type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - North American Refractories Co. "Marecoat", A. P. Green Fire Brick Co. "Insulation Adhesive", J. M. Franco Co. "Fronset", or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Kill "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)

SERVICOR 400 PSI STEAM

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

LINE TYPE (INCH)	INS. LAYER MATERIAL	CLIP NO.	WIRE LAYER	WIRE SIZE	WIRE TYPE	WIRE THICKNESS	WIRE SPACING	WIRE MATERIAL	WIRE THICKNESS	WIRE SPACING	WIRE MATERIAL	WIRE THICKNESS	WIRE SPACING
1/2	CALCIUM SILICATE (STD.)	2	1	NONE	1/2" IPS x 2"	PLD. FAB. OF INS. CEMENT	18 USSWG (.0475") x TYPE 304 S.S. SOFT ANNEALED	NONE	GLASS FABRIC 17 x 17 MILY STAIN EINKLE	WIPASCO MC-1 or BOND-17 PGS. E. 21-1-77			
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 020" 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" x 1-1/2"		18 USSWG (.0475") x TYPE 304 S.S. SOFT ANNEALED						
5		3	2		5" IPS x 1-1/2" x 1-1/2"								
6		3	2		6" IPS x 1-1/2" x 1-1/2"								
7		3	2		7" IPS x 1-1/2" x 1-1/2"								
8		3	2		8" IPS x 1-1/2" x 1-1/2"								
9		3	2		9" IPS x 1-1/2" x 1-1/2"								
10		3	2		10" IPS x 1-1/2" x 1-1/2"								
11		3	2		11" IPS x 1-1/2" x 1-1/2"								
12		3	2		12" IPS x 1-1/2" x 1-1/2"								
13		3	2		13" IPS x 1-1/2" x 1-1/2"								
14		3	2		14" IPS x 1-1/2" x 1-1/2"								
15		3-1/2	2		15" IPS x 1-1/2" x 1-1/2"								
16		3-1/2	2		16" IPS x 1-1/2" x 1-1/2"								
17		3-1/2	2		17" IPS x 1-1/2" x 1-1/2"								
18		3-1/2	2		18" IPS x 1-1/2" x 1-1/2"								
19		3-1/2	2		19" IPS x 1-1/2" x 1-1/2"								
20		3-1/2	2		20" IPS x 1-1/2" x 1-1/2"								
21		3-1/2	2		21" IPS x 1-1/2" x 1-1/2"								
22		3-1/2	2		22" IPS x 1-1/2" x 1-1/2"								
23		3-1/2	2		23" IPS x 1-1/2" x 1-1/2"								
24		3-1/2	2		24" IPS x 1-1/2" x 1-1/2"								
25		3-1/2	2		25" IPS x 1-1/2" x 1-1/2"								
26		3-1/2	2		26" IPS x 1-1/2" x 1-1/2"								
27		3-1/2	2		27" IPS x 1-1/2" x 1-1/2"								
28		3-1/2	2		28" IPS x 1-1/2" x 1-1/2"								
29		3-1/2	2		29" IPS x 1-1/2" x 1-1/2"								
30		3-1/2	2		30" IPS x 1-1/2" x 1-1/2"								
31		3-1/2	2		31" IPS x 1-1/2" x 1-1/2"								
32		3-1/2	2		32" IPS x 1-1/2" x 1-1/2"								
33		3-1/2	2		33" IPS x 1-1/2" x 1-1/2"								
34		3-1/2	2		34" IPS x 1-1/2" x 1-1/2"								
35		3-1/2	2		35" IPS x 1-1/2" x 1-1/2"								
36		3-1/2	2		36" IPS x 1-1/2" x 1-1/2"								
37		3-1/2	2		37" IPS x 1-1/2" x 1-1/2"								
38		3-1/2	2		38" IPS x 1-1/2" x 1-1/2"								
39		3-1/2	2		39" IPS x 1-1/2" x 1-1/2"								
40		3-1/2	2		40" IPS x 1-1/2" x 1-1/2"								
41		3-1/2	2		41" IPS x 1-1/2" x 1-1/2"								
42		3-1/2	2		42" IPS x 1-1/2" x 1-1/2"								
43		3-1/2	2		43" IPS x 1-1/2" x 1-1/2"								
44		3-1/2	2		44" IPS x 1-1/2" x 1-1/2"								
45		3-1/2	2		45" IPS x 1-1/2" x 1-1/2"								
46		3-1/2	2		46" IPS x 1-1/2" x 1-1/2"								
47		3-1/2	2		47" IPS x 1-1/2" x 1-1/2"								
48		3-1/2	2		48" IPS x 1-1/2" x 1-1/2"								
49		3-1/2	2		49" IPS x 1-1/2" x 1-1/2"								
50		3-1/2	2		50" IPS x 1-1/2" x 1-1/2"								
51		3-1/2	2		51" IPS x 1-1/2" x 1-1/2"								
52		3-1/2	2		52" IPS x 1-1/2" x 1-1/2"								
53		3-1/2	2		53" IPS x 1-1/2" x 1-1/2"								
54		3-1/2	2		54" IPS x 1-1/2" x 1-1/2"								
55		3-1/2	2		55" IPS x 1-1/2" x 1-1/2"								
56		3-1/2	2		56" IPS x 1-1/2" x 1-1/2"								
57		3-1/2	2		57" IPS x 1-1/2" x 1-1/2"								
58		3-1/2	2		58" IPS x 1-1/2" x 1-1/2"								
59		3-1/2	2		59" IPS x 1-1/2" x 1-1/2"								
60		3-1/2	2		60" IPS x 1-1/2" x 1-1/2"								
61		3-1/2	2		61" IPS x 1-1/2" x 1-1/2"								
62		3-1/2	2		62" IPS x 1-1/2" x 1-1/2"								
63		3-1/2	2		63" IPS x 1-1/2" x 1-1/2"								
64		3-1/2	2		64" IPS x 1-1/2" x 1-1/2"								
65		3-1/2	2		65" IPS x 1-1/2" x 1-1/2"								
66		3-1/2	2		66" IPS x 1-1/2" x 1-1/2"								
67		3-1/2	2		67" IPS x 1-1/2" x 1-1/2"								
68		3-1/2	2		68" IPS x 1-1/2" x 1-1/2"								
69		3-1/2	2		69" IPS x 1-1/2" x 1-1/2"								
70		3-1/2	2		70" IPS x 1-1/2" x 1-1/2"								
71		3-1/2	2		71" IPS x 1-1/2" x 1-1/2"								
72		3-1/2	2		72" IPS x 1-1/2" x 1-1/2"								
73		3-1/2	2		73" IPS x 1-1/2" x 1-1/2"								
74		3-1/2	2		74" IPS x 1-1/2" x 1-1/2"								
75		3-1/2	2		75" IPS x 1-1/2" x 1-1/2"								
76		3-1/2	2		76" IPS x 1-1/2" x 1-1/2"								
77		3-1/2	2		77" IPS x 1-1/2" x 1-1/2"								
78		3-1/2	2		78" IPS x 1-1/2" x 1-1/2"								
79		3-1/2	2		79" IPS x 1-1/2" x 1-1/2"								
80		3-1/2	2		80" IPS x 1-1/2" x 1-1/2"								
81		3-1/2	2		81" IPS x 1-1/2" x 1-1/2"								
82		3-1/2	2		82" IPS x 1-1/2" x 1-1/2"								
83		3-1/2	2		83" IPS x 1-1/2" x 1-1/2"								
84		3-1/2	2		84" IPS x 1-1/2" x 1-1/2"								
85		3-1/2	2		85" IPS x 1-1/2" x 1-1/2"								
86		3-1/2	2		86" IPS x 1-1/2" x 1-1/2"								
87		3-1/2	2		87" IPS x 1-1/2" x 1-1/2"								
88		3-1/2	2		88" IPS x 1-1/2" x 1-1/2"								
89		3-1/2	2		89" IPS x 1-1/2" x 1-1/2"								
90		3-1/2	2		90" IPS x 1-1/2" x 1-1/2"								
91		3-1/2	2		91" IPS x 1-1/2" x 1-1/2"								
92		3-1/2	2		92" IPS x 1-1/2" x 1-1/2"								
93		3-1/2	2		93" IPS x 1-1/2" x 1-1/2"								
94		3-1/2	2		94" IPS x 1-1/2" x 1-1/2"								
95		3-1/2	2		95" IPS x 1-1/2" x 1-1/2"								
96		3-1/2	2		96" IPS x 1-1/2" x 1-1/2"								
97		3-1/2	2		97" IPS x 1-1/2" x 1-1/2"								
98		3-1/2	2		98" IPS x 1-1/2" x 1-1/2"								
99		3-1/2	2		99" IPS x 1-1/2" x 1-1/2"								
100		3-1/2	2		100" IPS x 1-1/2" x 1-1/2"								

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. M. France Co. "Franset", or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Powerhouse", Eagle-Fisher "One-Coat", or approved alternate.
- Heat Resistant Sealer - Benjamin-Foster #10-43 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)

SERVICE: 100 PSI SUPERHEATED STEAM AT 225

INSULATION SPECIFICATION NO. 8 SS-H

MAXIMUM TEMP. FOR THIS SERVICE 1200 °F

PIPE SIZE (IN.)	INSULATION MATERIAL	THICKNESS (IN.)	NO. LAYERS	LAYER DATA			WIRE & FIT. COVER	WIRE (INNER & MIDDLE LAY.)	BAND (OUTER LAYER)	REINFT. MESH	WEATHER-RESIST. MESH	WEATHER-RESIST. TYPE
				INNER	MIDDLE	OUTER						
1/2	CALCIUM SILICATE (N.Y.)	3-1/2	2	1/2" IPS x 1-1/2"	NONE	3-1/2" IPS x 2"	SHOP PRE-FAB	20 USSAWO (.0475") x TYPE 304 SS SOFT ANNUAL	1/2" WIDE x .020" THK x TYPE 304 SS	GLASS FABRIC - 12 x 12 MESH / STARCH BINDER	VITACRO MC-1 or BAKJAC-4 POSTER #3067C	PALP.
3/4		3-1/2	2	1/2" IPS x 1-1/2"		3-1/2" IPS x 2"						
1		4	2	1" IPS x 2"		3" IPS x 2"						
1-1/2		4	2	1-1/2" IPS x 2"		3" IPS x 2"						
2		4-1/2	2	2" IPS x 2"		3" IPS x 2-1/2"						
2-1/2		4-1/2	2	2-1/2" IPS x 2"		3" IPS x 2-1/2"						
3		4-1/2	2	3" IPS x 2"		3" IPS x 2-1/2"						
3-1/2		5	2	3-1/2" IPS x 2-1/2"		3" IPS x 2-1/2"						
4		5	2	4" IPS x 2-1/2"		3" IPS x 2-1/2"						
6		5-1/2	3	4" IPS x 1-1/2"	11" IPS x 2"	14" IPS x 2"						
8		5-1/2	3	4" IPS x 1-1/2"	11" IPS x 2"	16" IPS x 2"						
10		6	3	4" IPS x 2"	15" IPS x 2"	18" IPS x 2"						
12		6	3	4" IPS x 2"	17" IPS x 2"	21" IPS x 2"						
14		6	3	4" IPS x 2"	18" IPS x 2"	22" IPS x 2"						
16		6	3	4" IPS x 2"	20" IPS x 2"	24" IPS x 2"						
18		6-1/2	3	4" IPS x 2"	22" IPS x 2"	26" IPS x 2-1/2"						
20		6-1/2	3	4" IPS x 2"	24" IPS x 2"	28" IPS x 2-1/2"						
22		6-1/2	3	4" IPS x 2"	26" IPS x 2"	30" IPS x 2-1/2"						
24		6-1/2	3	4" IPS x 2"	28" IPS x 2"	32" IPS x 2-1/2"						
26		6-1/2	3	4" IPS x 2"	30" IPS x 2"	34" IPS x 2-1/2"						
28		6-1/2	3	4" IPS x 2"	32" IPS x 2"	36" IPS x 2-1/2"						
30		7	3	4" IPS x 2"	34" IPS x 2"	38" IPS x 2-1/2"						
32		7	3	4" IPS x 2"	36" IPS x 2"	40" IPS x 2-1/2"						
34		7	3	4" IPS x 2"	38" IPS x 2-1/2"	42" IPS x 2-1/2"						
36		7	3	4" IPS x 2"	40" IPS x 2-1/2"	44" IPS x 2-1/2"						
END OF PLANT (FLAT OR OVER 36")		8	3	2-1/2" x 2-1/2"	2-1/2" x 2"	2"	CUT FOR SIZE RECORDED. PAR. MAN.	SEE SPEC. 25-LL, PAGE 6, FOR CLARITY	SEE SPEC. 25-LL, 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 - A. P. Green Fire Brick Co. "Insulation Adhesive", J. W. France Co. "Transit" 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 #116, J.M. #678, or approved alternate.

PIPING ACCESSORIES ONLY:

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

UCC 003359

SECTION: DOWNTURN

INSULATION SPECIFICATION NO.: 21-6

MAXIMUM TEMP. FOR THIS SHEET: 715 °F

NOTE:

The temperature at which the downturn 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. Downturn freezes at approximately 53 °F and this would keep it fluid over any extended start-down period. Steam tracer details are per Engineering Standard P-64, 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-64.

LINE SIZE (IPS)	INSULATION MATERIAL	THICK. (IN.)	NO. LAYERS	TRACER SIZE	INSULATION DATA		VALVE, FITTING & V.P. COVE.	PIPE (INNER)	BAND (OUTER LAYER)	REINFORCING	WEATHER-CLAYING	WEATHER-PAVING
					INNER DATE	OUTER DATE						
1/2	ASBESTOS FIBER	2-1/2	1	3/8" O.D.	NONE	2" IPS ± 2-1/2"	FLD. FAB. OR 1/2" CBL.	2" USSING (.0475") ± TYPE 304 SS SO. ANN.	NONE	GLASS FABRIC-10 x 10 MESH/STARCH FINISH	VERMASCO MC-1 or BENJAMIN-POSTER #31-75	PALM
3/4		2-1/2	1	3/8" O.D.		2-1/4" IPS ± 2-1/2"						
1		2-1/2	1	3/8" O.D.		2-1/2" IPS ± 2-1/2"	SHOW ME-TAB					
1-1/2		3	2	3/8" O.D.	2-1/2" IPS ± 1-1/2"	3" IPS ± 1-1/2"			1/2" WIRE ± 2"			
2		3	2	3/8" O.D.	3" IPS ± 1-1/2"	3" IPS ± 1-1/2"			THICK ± 2"			
2-1/2		3-1/2	2	3/8" O.D.	3-1/2" IPS ± 1-1/2"	6" IPS ± 2"						
3		3-1/2	2	3/8" O.D.	4" IPS ± 1-1/2"	7" IPS ± 2"						
4		3-1/2	2	3/8" O.D.	5" IPS ± 1-1/2"	8" IPS ± 2"						
6		4	2	3/8" O.D.	7" IPS ± 2"	11" IPS ± 2"						
8		4	2	3/8" O.D.	10" O.D. ± 2"	12" IPS ± 2"						
10		4	2	7/8" O.D.	12" O.D. ± 2"	17" IPS ± 2"						
12		4	2	7/8" O.D.	14" IPS ± 2"	18" IPS ± 2"						
EQUIP-FLAT (FLAT or OTHER)	CALCIUM SILICATE (STC)	3	3	—	2-1/2"	2-1/2"	C/T FOR SIZE REQ'D. (FAB. MAN.)	SEE SPEC. FOR PAGE # FOR CLARITY	SEE S.I.E. FOR PAGE # AND GEN. NOTE #4			

EQUIPMENT AND PIPING ACCESSORIES

- Clips - 1/2" double pronged Type 304 SS, A. J. Carrard of 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 #31-41 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.F. #678, or approved alternate.

PIPING ACCESSORIES ONLY

- Finishing cement - J. F. #752 or approved alternate. (For pipe patching)

SEPT/02: TETRAID

INSULATION SPECIFICATION NO. 20-H
 MAXIMUM TAMP. FOR TUBE SPACERS 535 OF

LINE NO.	INS. LAYER	THICK. (IN.)	N. LAYERS	INS. LAYER	THICK. (IN.)	VAL. FIT. (IN.)	WIRE (INNER LAYER)	WIRE (OUTER LAYER)	REINF. (IN.)	WIRE (OUTER LAYER)	WIRE (OUTER LAYER)
1/2	CALCIUM SILICATE (STD)	2	1	NONE	1/2" IPS x 2"	FLD. FAB. OR INS. CIP.	18 USSWG (.0475") x TYPE 304 SS SOFT ANNEALED	NONE	GLASS FIBER 10 x 10 Mesh STAINLESS STEEL	V.PASCO MC-1 or BENCOR POST-1-22500	WIRE
3/4		2	1		3/4" IPS x 2"						
1		2	1		1" IPS x 2"	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		3	2		10" IPS 14" IPS x 1-1/2" x 1-1/2"						
12		3	2		12" IPS 16" IPS x 1-1/2" x 1-1/2"						
14		3	2		14" IPS 17" IPS x 1-1/2" x 1-1/2"						
16		3	2		16" IPS 19" IPS x 1-1/2" x 1-1/2"						
18		3	2		18" IPS 21" IPS x 1-1/2" x 1-1/2"						
20		3	2		20" IPS 23" IPS x 1-1/2" x 1-1/2"						
22		3	2		22" IPS 25" IPS x 1-1/2" x 1-1/2"						
24		3	2		24" IPS 27" IPS x 1-1/2" x 1-1/2"						
26		3	2		26" IPS 29" IPS x 1-1/2" x 1-1/2"						
28		3	2		28" IPS 31" IPS x 1-1/2" x 1-1/2"						
30		3	2		30" IPS 33" IPS x 1-1/2" x 1-1/2"						
32		3	2		32" IPS 35" IPS x 1-1/2" x 1-1/2"						
34		3	2		34" IPS 37" IPS x 1-1/2" x 1-1/2"						
36		3	2		36" IPS 39" IPS x 1-1/2" x 1-1/2"						
4-1/2" MIN. FLAT or 5" x 3"		2-1/2	2	1-1/2"	2"	CUT FOR SIZE WELD. (FAB. MAN.)	SEE SPEC. 20-H, PAGE 4, FOR CLARITY	SEE SPEC. 20-H, PAGE 4, AND WELD. NOTE #4			

EQUIPMENT AND FILING & TIE WIRE

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - North American Refractories Co. "Mafroset", A. F. Green Fire Brick Co. "Insulation Adhesive", J. H. Franco Co. "Transet", or approved alternate.
- Insulating Cement - Hydraulic setting, Malcor-Hill "Powerhouse", Eagle-Fisher "One-Coat", or approved alternate.
- Most 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.H. #678, or approved alternate.

PIPING ACCESSORIES ONLY

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

UCC 003361

SERVICE: OIL AND PASTE LINES AT 220

OPERATION SPECIFICATION NO. 20-5

MAXIMUM TEMP. FOR THIS SERVICE 750 °F

LINE TYPE (NO.)	INS. LAYER NAME (NO.)	THICKNESS (IN.)	NO. LAYERS	LAYER DATA	VAL. SPEC. (IN.)	WIRE (INNER LAYER)	WIRE (OUTER LAYER)	RAINF. PASTE	WIRE (INNER LAYER)	WIRE (OUTER LAYER)	RAINF. PASTE	WIRE (INNER LAYER)	WIRE (OUTER LAYER)
1/2	CALCIUM SILICATE (STD.)	2-1/2	2	NONE	1/2" IPS	20 GAGE (.0475") TYPE 304 SS SOFT ANNEALED	NONE	GLASS FIBRIC 10 x 10 MESH/STANCHI EINGAS	V.F. PASCO MC-1 or BENJAMIN POS-TEK PCE-10	RAIN			
3/4		2-1/2	2		3/4" IPS								
1		2-1/2	2		1" IPS								
1-1/2		3	2	1-1/2" IPS	1-1/2" IPS								
2		3	2	2" IPS	2" IPS								
2-1/2		3	2	2-1/2" IPS	2-1/2" IPS								
3		3	2	3" IPS	3" IPS								
3-1/2		3	2	3-1/2" IPS	3-1/2" IPS								
4		3-1/2	2	4" IPS	4" IPS								
5		3-1/2	2	5" IPS	5" IPS								
6		3-1/2	2	6" IPS	6" IPS								
8		3-1/2	2	8" IPS	8" IPS								
10		3-1/2	2	10" IPS	10" IPS								
12		4	2	12" IPS	12" IPS								
14		4	2	14" IPS	14" IPS								
16		4	2	16" IPS	16" IPS								
18		4	2	18" IPS	18" IPS								
20		4	2	20" IPS	20" IPS								
22		4	2	22" IPS	22" IPS								
24		4	2	24" IPS	24" IPS								
26		4	2	26" IPS	26" IPS								
28		4	2	28" IPS	28" IPS								
30		4	2	30" IPS	30" IPS								
32		4-1/2	2	32" IPS	32" IPS								
34		4-1/2	2	34" IPS	34" IPS								
36		4-1/2	2	36" IPS	36" IPS								
6-1/2" MIN. (FLAT or PIPE JOINT)		4-1/2	2		4-1/2" IPS	SEE SPEC. 20-5, PAGE 9, FOR CLARITY	SEE SPEC. 20-5, 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 - North American Refractories Co. "Marocet", A. P. Green Fire Brick Co. "Insulation Adhesive", J. H. France Co. "Franco", 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.F. #678, or approved alternate.

PIPING ACCESSORIES ONLY:

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

UCC 003362

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

LAYER NO. (IN.)	INSULATION MATERIAL	THICK- NESS (IN.)	NO. OF LAYERS	LAYER DATA			VAL. FIT. & J. L. TYPE	WIRE (INNER & MIDDLE LAY.)	BAND (OUTER LAYER)	REIN- FORCE- MENT	WEATHER- ING MATERIAL	WEATHER- ING APPL.
				INNER	MIDDLE	OUTER						
1/2	CALCIUM SILICATE (N.F.)	3	2	1/8" IPS 1 1/2"	NONE	3-1/8" IPS 1-1/2"	SMOOTH PRE-FAB	10 USSWG (.0475") x TYPE 304 SS SOFT ANNEAL	1/2" WIDE x .020" THK x TYPE 304 SS	GLASS FABRIC- AC x 10 MESH / STARCH BINDER	VERASCO MC-1 or BENJAMIN- POSTER PSC-7C	PALM
2/4		3-1/2	2	3/4" IPS 11-1/2"		3-1/2" IPS x 2"						
3		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	5" IPS x 2-1/2"		11" IPS x 2-1/2"						
6		5	2	6" IPS x 2-1/2"		14" IPS x 2-1/2"						
10		5-1/2	2	10" IPS x 1-1/2"	14" IPS x 2"	18" IPS x 2"						
12		5-1/2	2	12" IPS x 1-1/2"	16" IPS x 2"	20" IPS x 2"						
14		5-1/2	2	14" IPS x 1-1/2"	17" IPS x 2"	21" IPS x 2"						
16		6	2	16" IPS x 2"	20" IPS x 2"	24" IPS x 2"						
18		6	2	18" IPS x 2"	22" IPS x 2"	26" IPS x 2"						
20		6	2	20" IPS x 2"	24" IPS x 2"	28" IPS x 2"						
22		6	2	22" IPS x 2"	26" IPS x 2"	30" IPS x 2"						
24		6	2	24" IPS x 2"	28" IPS x 2"	32" IPS x 2"						
26		6	2	26" IPS x 2"	30" IPS x 2"	34" IPS x 2"						
28		6-1/2	2	28" IPS x 2"	32" IPS x 2"	36" IPS x 2-1/2"						
30		6-1/2	2	30" IPS x 2"	34" IPS x 2"	38" IPS x 2-1/2"						
32		6-1/2	2	32" IPS x 2"	36" IPS x 2"	40" IPS x 2-1/2"						
34		6-1/2	2	34" IPS x 2"	38" IPS x 2"	42" IPS x 2-1/2"						
36		6-1/2	2	36" IPS x 2"	40" IPS x 2"	44" IPS x 2-1/2"						
EQUIP- MENT (LAYER NO. 36)		7-1/2	2	2-1/2"	2-1/2"	2-1/2"	CUT FOR SIZE P.L.D. (FAB. MAN.)	SEE SPEC. 25-H, PAGE 9, FOR CLARITY	SEE SPEC. 25-H, PAGE 9, and GEN. NOTE #6			

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. H. France 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, #70 gage, galvanized after weaving.
- Finishing Cement - Hard surface, Eagle-Fisher #100, J.H. #678, or approved alternate.

PIPING ACCESSORIES ONLY:

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

INSULATION SPECIFICATION NO. 32-M

MAXIMUM TEMP. FOR THIS SILENT PIPING: 538 °F

EQUIPMENT: 427 °F

LINE SIZE (IN.)	INS. LAYER	NO. OF LAYERS	NO. OF JOINTS	INNER DIA.	OUTER DIA.	VALVE, FIT, & ELEV.	WIRE	BAND (BOTH LAYERS)	REINFT. MAT.	WINDING MATERIAL	WINDING METHOD
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 12 MESH/ STARCH BINDER	VIPASCO MC-1 or BENJ/FOS 4200	WIND
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"	6" 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 1-1/2"						
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"						
42" FLAT or 20"		2	2	1"	2"	CUT FOR SIZE NEG'D. (FAB. MAN.)	SEE SPEC. 32-M, PAGE 4, FOR CLARITY	SEE SPEC. 32-M, 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 - J. H. Franco Co. "Transect" or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Superpowerhouse", 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)

NOTE:

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

UCC 003364

SERVICE: CARBONAX

INSULATION SPECIFICATION NO. 10-J
 MAINTENANCE FOR THIS SPEC. 855 97

INS. TYPE	INSULATION	THICKNESS (IN.)	NO. LAYERS	MANUFACTURER'S NAME	WIND	BAND	REINFORCING	WEATHER-RESISTANT	WEATHER-RESISTANT
1/2	CELLULAR GLASS	1	1	SHOP PRE-PAR	1-1/2" (38.1mm) TYPE 304 SS 500T AVAILABLE	NONE	GLASS FIBER 16 x 10 MESH / 5" x 10" MIN. EA.	VEMACO MC-1 30 PENETRANT FOSTER #31-72	PALP
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 CURVED)		1-1/2	1	CUT FOR SIZE REQ'D. (P.A.S. MAN.)	SEE SPEC. 10-J, PAGE 8, FOR CLARITY	SEE SPEC. 10-J, PAGE 8, and OAK. M.T.E. #6			

REQUIREMENT AND PIPING ACCESSORIES

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - Miracle Adhesive RT-100 up to 300 °F, HVR cement above 300 °F, or approved alternate.
- Anti-abrasion Coating - Vinyl, Carlon #500-H up to 400 °F, HVR cement above 400 °F, or approved alternate.
- Heat Resistant Sealer - Benjamin-Foster #80-43 or approved alternate.
- Adhesive Cement - Miracle Adhesive Type II or approved alternate.

REQUIREMENT ACCESSORIES ONLY

- Die Cut Strip - 1/4" wide x .025" 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 Carbonax 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 300 °F.

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

INSULATION SPECIFICATION NO.: 21-4
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-84, 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 FITTING & VLB COVER	WIRE	BAND	REINFORCING MESH	WEATHER-RESISTANT COATING MATERIAL	WEATHER-RESISTANT COATING METHOD
				1/2" O.D. TRACER (PROCESS LINE TEMP.)	3/4" O.D. TRACER (PROCESS LINE TEMP.)	1" 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-PAN	18 USSAG (.0475") x TYPE 304 SS 30. AMR.	NONE	GLASS FABRIC- 30 x 30 MESH/ STARCH BINDER	VINASCO MC-1 or EQUIP-TE POSTER 490-70	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. (191 °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. (108 °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. (85 °F)						
12		1-1/2	1	14" IPS x 1-1/2" THK. (46 °F)	14" IPS x 1-1/2" THK. (79 °F)	14" IPS x 1-1/2" THK. (82 °F)						
EQUIP- MENT (FLAT OR OTHER)	CALCIUM SILICATE (STD.)	2	1	2"	2"	2"	CUT FOR SIZE REQ'D. (FAB. MAX.)	SEE SPEC. 20-M, PAGE 9 FOR CLARITY	SEE SPEC. 20-M, 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. P. Green Fire Brick Co. "Insulation Adhesive" or approved alternate.
- Insulating Cement - Hydraulic setting, Baldwin-Hill "Powerhouse", Eagle-Picher "One-Cent" or approved alternate.
- Heat Resistant Sealer - Benjamin-Foster #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)

INSTITUTE SPECIFICATION NO. 1 20-1
MINIMUM TEMP. FOR THIS SHEET DOWN TO 22 °F (0 °C)

LIN. NO. (IN.)	INS. LATE M. (IN.)	THICK. (IN.)	N. LATE	VALVE SEAL	WIRE	BRACE	REINFORCING	WEATHERING	WEATHERING
1/2	CELLULAR GLASS	1-1/2	2	SHOP PRE-PAD	18 LBS/M ² (4.75) TYPE 304 S.S. SOFT ANNEAL	NONE	GLASS FABRIC 10 x 10 MESH / STAIN RESISTANT	VITASCO MC-1 OR EQUIV. 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 (PLAT or OVER 30")		2-1/2	1	CUT FOR REPAIR (PAB. 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, Vitasco 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 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, Fine 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 SIZE (INCH)	INSULATION MATERIAL	GENERAL THICKNESS (INCH)	NO. OF LAYERS	LAYER DATA		VALVE FIT & FLG COVER	WIRE (INNER LAYER)	WIRE (OUTER LAYER)	RAINF. FLASH	WEATHER- RESISTING MATERIAL	WEATHER- RESISTING APPL.
				INNER	OUTER						
1/2	CELLULAR GLASS	2	1	NONE	1/2" IPS x 2"	SHOP PRE-FAB	28 USSMG (.0475") x TYPE 304 SS SOFT ANNEALED	NONE	GLASS FABRIC- 10 x 10 MESH/ STANCH ELECTRIC	VIPASCO MC-1 OF BENJAMIN- FOSTER	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"		28 USSMG (.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	16" 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"						
FLY or PIPE 36"		4	2	4"	4"	CUT FOR SIZE MIL. C. (TAB. MAN.)	SEE SPEC. 10-2, 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, Carlen #500, Insul-Mastic #601 or approved alternate.
- Joint Sealer - Vinyl asphalt, Carlen #48 or approved alternate.
- Caulking Mastic - Vinyl mastic, Vinsaco 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 8" centers, A. J. Garrard or approved alternate.
- Expansion Strap - 2/4" 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, Fine Fiber Felt, Ultralite, Superfine, or approved alternate.
 (To be used on piping only where excessive vibration is likely to occur.)

SECTION 10-1 ALL COLD TEMPERATURE SERVICE (EXCEPT ETHYLENE OXIDE)

INSULATION SPECIFICATION NO. 10-1

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

LINE NO. (10-1)	INSULATION TYPE	THICKNESS (INCHES)	NO. LAYERS	LAYER DATA		VALVE, FLANGE ACCESSORY	WIRE (INNER LAYER)	BAND (OUTER LAYER)	PAINT TYPE	VALVE, FLANGE ACCESSORY	WIRE (INNER LAYER)
				TYPE	SIZE						
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	CLASS PAINT MC-1 or EQUIV. FOR STAINLESS		
3/4		2-1/2	1		3/4" IPS x 2-1/2"						
2		3	2	1" IPS x 1-1/2"	4" IPS x 1-1/2"			2" WIDE x .020" THICK x TYPE 304 SS			
1-1/2		3	2	1-1/2" IPS x 1-1/2"	1-1/2" IPS x 1-1/2"						
2		3	2	1-1/2" IPS x 1-1/2"	3" 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 1-1/2"						
1-1/2		3-1/2	2	3-1/2" IPS x 1-1/2"	7" IPS x 1-1/2"						
4		3-1/2	2	4" IPS x 1-1/2"	7" IPS x 2"						
6		4	2	6" IPS x 2"	10" IPS x 2"						
8		4	2	8" IPS x 2"	12" IPS x 2"						
10		4	2	10" IPS x 2"	15" 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		4-1/2	2	18" IPS x 2-1/2"	22" IPS x 2-1/2"						
20		4-1/2	2	20" IPS x 2-1/2"	24" IPS x 2-1/2"						
22		4-1/2	2	22" IPS x 2-1/2"	26" IPS x 2-1/2"						
24		4-1/2	2	24" IPS x 2-1/2"	30" IPS x 2-1/2"						
26		4-1/2	2	26" IPS x 2-1/2"	32" IPS x 2-1/2"						
28		4-1/2	2	28" IPS x 2-1/2"	34" IPS x 2-1/2"						
30		4-1/2	2	30" IPS x 2-1/2"	36" IPS x 2-1/2"						
32		4-1/2	2	32" IPS x 2-1/2"	38" IPS x 2-1/2"						
34		4-1/2	2	34" IPS x 2-1/2"	40" IPS x 2-1/2"						
36		4-1/2	2	36" IPS x 2-1/2"	42" IPS x 2-1/2"						
See 10-1 PART 1 (PLATE or PAGE 10-1)		5	2	2-1/2" x 2-1/2"		SEE 10-1, PAGE 10-1, FOR CLARITY	SEE SPEC. 10-1, PAGE 10-1, FOR CLARITY				

EQUIPMENT AND PIPING ACCESSORIES

- Clips - 1/2" double pronged Type 304 SS, A. J. Garrard or approved alternate.
- Fabricating Cement - Miracle Adhesive Type K, or approved alternate.
- Anti-abrasion Coating - Vinyl, Carlon #500, Insul-Plastic #601, or approved alternate.
- Joint Sealer - Vinyl asphalt, Carlon #49 or approved alternate.
- Caulking Mastic - Vinyl mastic, Vinsaco MC-1, Benjamin-Foster #30-70 or approved alternate.
- Valve Sealer - Lion Oil Co. "Wakeread 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 Out Strap - 1/4" wide x .023" thick x Type 304 SS, 2" finger on 9" corners, A. J. Garrard or approved alternate.
- Expansion Strap - 1/4" 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 Fiber 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 LAYS	LAYER DATA			VALVE FIT- TING	GASKET (INNER & MID- DLE LAYERS)	GASKET (OUTER LAYER)	GASKET MATERIAL	VALVE FITTING MATERIAL	WEATHER- ING
				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"	BRON PRE-FAB	10 USLNG 10415" x TYPE 304 SS 5 47 ANNUAL	1/2" WIDE x .023" THK x TYPE 304 SS	GLASS FIBRIC- 10 x 10 MESH / STARCH BINDER	VINYL- MC-1 or BENJAMIN- FOSTER 30-70	PAINT
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"		1" 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" 1" x 1" IPS x 1-1/2" x 2"		16" IPS x 2"						
10		5-1/2	3	10" IPS 1 1/2" x 2"		18" IPS x 2"						
12		5-1/2	3	12" IPS 1 1/2" x 2"		20" IPS x 2"						
14		5-1/2	3	14" IPS 1 1/2" x 2"		21" IPS x 2"						
16		6	3	16" IPS 2" x 2"		24" IPS x 2"						
18		6	3	18" IPS 2" x 2"		26" IPS x 2"						
20		6	3	20" IPS 2" x 2"		28" IPS x 2"						
24		6	3	24" IPS 2" x 2"		30" IPS x 2"						
28		6	3	28" IPS 2" x 2"		32" IPS x 2"						
36		6-1/2	3	36" IPS 2" x 2"		34" IPS x 2-1/2"						
42		6-1/2	3	42" IPS 2" x 2"		36" IPS x 2-1/2"						
48		6-1/2	3	48" IPS 2" x 2"		38" IPS x 2-1/2"						
60		7	3	60" IPS 2" x 2"		40" IPS x 2-1/2"						
72		7	3	72" IPS 2" x 2"		42" IPS x 2-1/2"						
84		7-1/2	3	84" IPS 2-1/2" x 2-1/2"		44" IPS x 2-1/2"						
100		7-1/2	3	100" IPS 2-1/2" x 2-1/2"		46" IPS x 2-1/2"						
EQUIP- MENT (FLAT or PIPE 36")							CUT FOR SIZE 10-L, FACE 10-L, FACE 10-L, FACE 10-L, FACE	SEE SPEC. 10-L, FACE 10-L, FACE 10-L, FACE 10-L, FACE	SEE SPEC. 10-L, FACE 10-L, FACE 10-L, FACE 10-L, FACE			

PAINTING AND FINISHING ACCESSORIES:

- Clips - 1/2" double pronged Type 304 SS, A. J. Gerrard 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 MC-1, Benjamin-Foster #30-70 or approved alternate.
- Valve Sealer - Lion Oil Co. "Mokoro Low Temp" or approved alternate.

EQUIPMENT ACCESSORIES ONLY:

- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-308, Fine Pyber Felt, Ultralite, Superfine, or approved alternate.
- Die Cut Strap - 3/4" wide x .023" thick x Type 304 SS, 2" finger on 8" centers, A. J. Gerrard or approved alternate.
- Expansion Strap - 3/4" wide x .023" thick x Type 304 SS, A. J. Gerrard "Expand-R-Strap" or approved alternate.

PIPING ACCESSORIES ONLY:

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

UCC 003370

INSULATION SPECIFICATION NO. 2 20-1
MINIMUM TEMP. FOR THIS SHEET DOWN TO -148 °F (-100 °C)

LIST SIZE (IN.)	INSULATION MATERIAL	THICK- NESS (IN.)	No. LAYERS	LAYER DATA			VAL. FIT & PL. COVER	WIRE (INNER & MI- DOLE LAYER)	NAME (OUTER LAYER)	REIN- FORCE- MENT	WEATHER- RESIST- ANCE	WEATHER- RESIST- ANCE
				INNER	MIDDLE	OUTER						
1/2	CELLULAR GLASS	3-1/2	2	1/4" IPS x 1-1/2"	NONE	2-1/4" 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 FRESH / STARCH BINDER	VIRASLO MC-1 or BENJAMIN POSTER #30-70	PALM
3/4		4	2	3/4" IPS x 2"		4-1/4" IPS x 3"						
1		4	2	1" IPS x 2"		5" IPS x 3"						
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"	SEE GENERAL NOTE #3	SEE GENERAL SPECIFICATION, PAGES AND , FOR SPACING			SEE GENERAL NOTE #3	
14		6-1/2	3	14" IPS x 2"	19" IPS x 2"	23" 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 2-1/2"	28" IPS x 2-1/2"	32" IPS x 2-1/2"						
26		7	3	26" IPS x 2-1/2"	30" IPS x 2-1/2"	35" IPS x 2-1/2"						
28		7	3	28" IPS x 2-1/2"	32" IPS x 2-1/2"	3-1/4"						
30		7-1/2	3	30" IPS x 2-1/2"	35" IPS x 2-1/2"	2-1/4"	SEE GENERAL NOTE #3					
32		7-1/2	3	32" IPS x 2-1/2"	2-1/2"	2-1/4"						
34		7-1/2	3	34" IPS x 2-1/2"	2-1/4"	2-1/4"						
36		7-1/2	3	36" IPS x 2-1/2"	2-1/2"	2-1/2"						
BOULE- MENT (11-17 or OVER 36")		8-1/2	3	2-1/2"	3"	3"	CUT FOR SIZE REC'D. (FAB. MAN.)	SEE SPEC. 10-16, PAGE 9, FOR CLARITY	SEE SPEC. 10-16, PAGE 9, and GEN. NOTE #4			

EXHAUST 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, Vinnoco MC-1, Benjamin-Foster #30-70 or approved alternate.
- Valve Sealer - Lion Oil Co. "Mokrode Low Temp" or approved alternate.

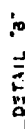
EQUIPMENT ACCESSORIES ONLY:

- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-308, Fine Pyber 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:

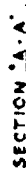
- Cushioning Blanket - 1-1/2 lb. density Aerowrap P-308, Fine Pyber Felt, Ultralite, Superfine, or approved alternate.
 (To be used on piping only where excessive vibration is likely to occur.)

NOTE:



SEE DETAIL "A"

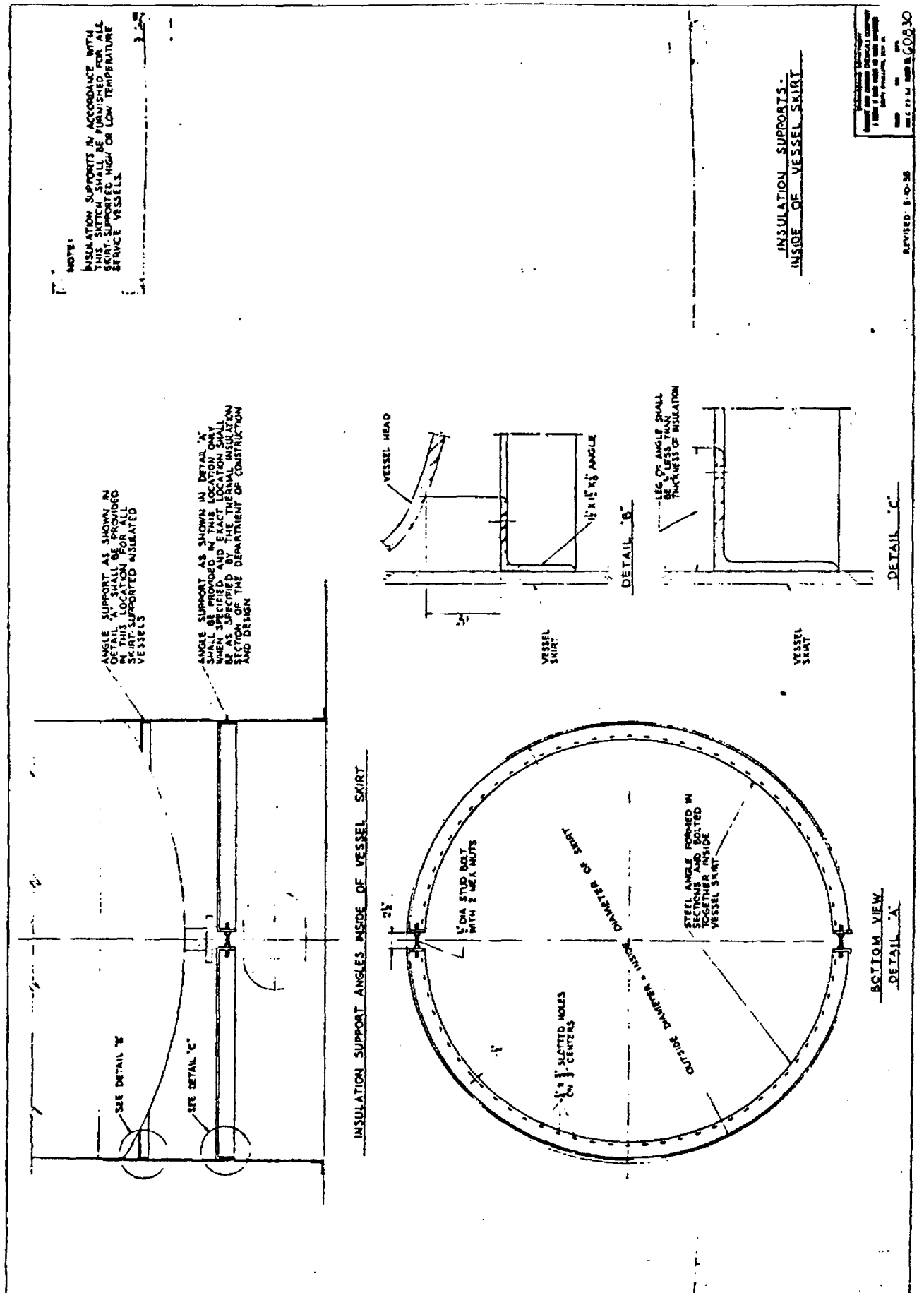
WHEN SUPPORT IS TO BE LOCATED
ON VESSEL WHERE LEGS INTERFERE.
SEE DETAIL "B" FOR METHOD OF
ATTACHMENT

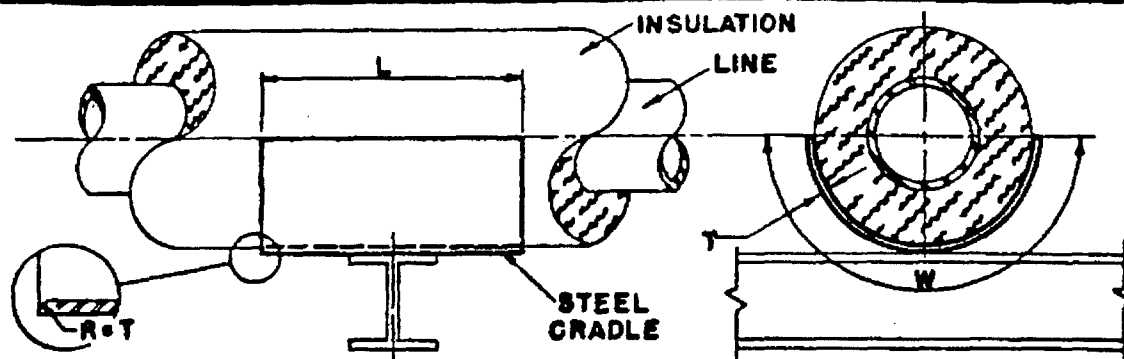


INSULATION SUPPORTS-
VERTICAL VESSELS

RECEIVED 9-27-55

TO THE HONORABLE
MEMBERS OF THE
HOUSE OF REPRESENTATIVES
IN SENATE CHAMBERS
WASHINGTON, D.C.





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**

**№
IS-19**

CLASSIFICATION: DETAIL

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

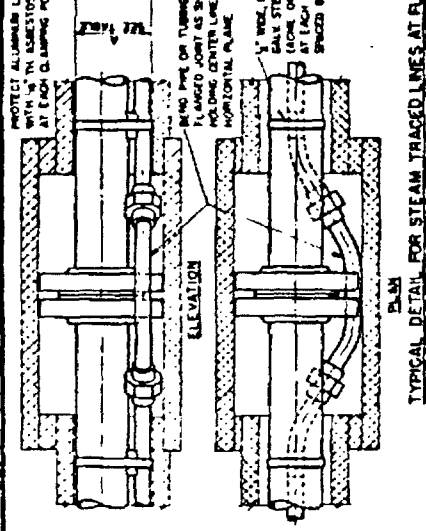
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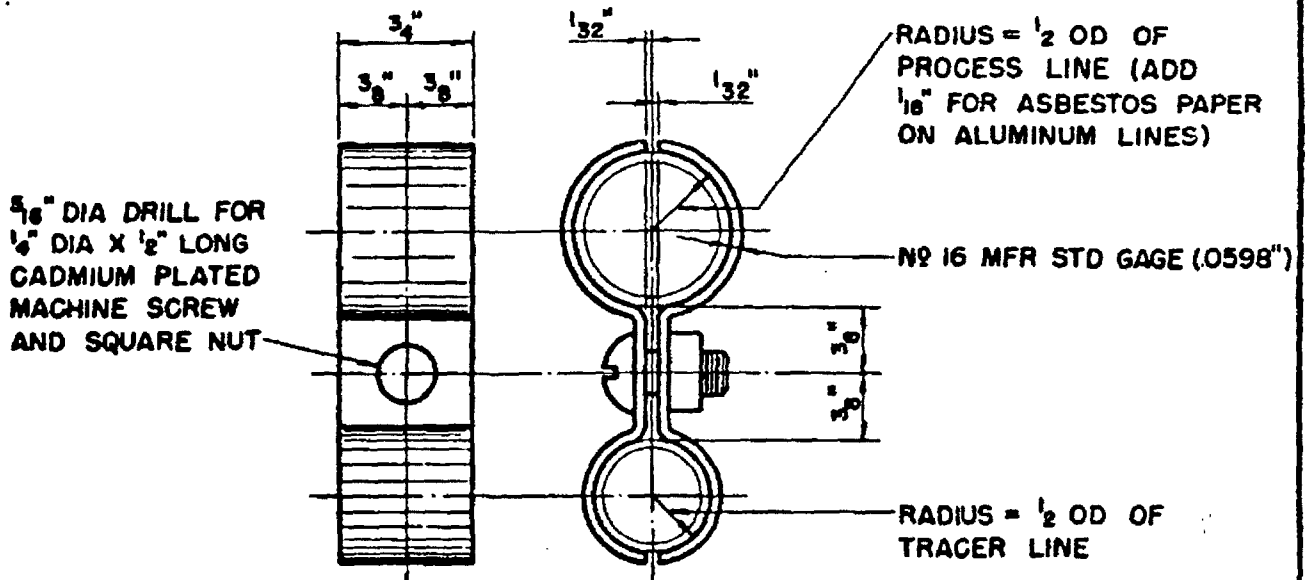
REVISED: 4-28-53

FORM A

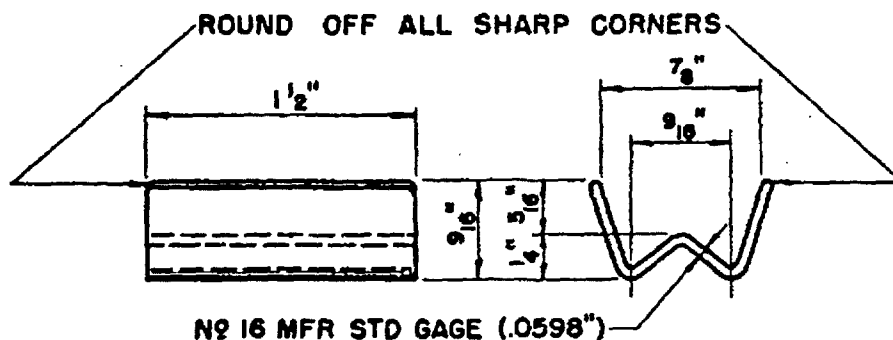
UCC 003375

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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
CLASSIFICATION: DETAIL	
SPONSOR: H2B BY: <i>OTE</i> DATE: 8/7/53	
APPROVED: <i>[Signature]</i> 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	120 TO	140 TO	160 TO	180 TO	200 TO	220 TO	240 TO	260 TO	280 TO	300 TO	320 TO	340 TO	360 TO	380 TO	400 TO	420 TO	440 TO	460 TO	480 TO	500 TO	520 TO	538 TO	212 TO	248 TO	284 TO	320 TO	356 TO	392 TO	428 TO	464 TO	500 TO	536 TO	572 TO	608 TO	644 TO	680 TO	716 TO	752 TO	788 TO	824 TO	860 TO	896 TO	932 TO	968 TO	247 TO	283 TO	319 TO	355 TO	391 TO	427 TO	463 TO	499 TO	535 TO	571 TO	607 TO	643 TO	679 TO	715 TO	751 TO	787 TO	823 TO	859 TO	895 TO	931 TO	967 TO	1003 TO																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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.

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

• 51

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-B
Spec. 32-B

PIPE		OPERATING TEMPERATURE °F.																						HIGH TEMPERATURE CALCIUM SILICATE	
		175	180	200	240	260	300	360	420	480	500	520	540	560	580	600	620	640	660	680	700				
1/2	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
3/4	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
1	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
1-1/2	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
2	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
2-1/2	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
3	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
3-1/2	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
4	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
5	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
6	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
8	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
10	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
12	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
14	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
16	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
18	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
20	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
22	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
24	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
26	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
28	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
30	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
32	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
34	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
36	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
38	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
40	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
42	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
44	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
46	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
48	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
50	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
52	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
54	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
56	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
58	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
60	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
62	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
64	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
66	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
68	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
70	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
72	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
74	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
76	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
78	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
80	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
82	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
84	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
86	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
88	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
90	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
92	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
94	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
96	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
98	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3	3	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	4-1/2	4-1/2			
100	1	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	2	2	2-1/2	2-1/2	2-1/2	3	3</												

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.

BASIC DIMENSIONAL STANDARDS FOR LOW TEMPERATURE PIPE INSULATION

Standard Sizes and Thicknesses

DNOW 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	4.384	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
1-1/8"	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	1.942	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	1.947	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	1.947	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	25.90	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	47.30	23.56
8'-0"	50.27	53.85	25.13
8'-6"	56.75	60.85	26.70
9'-0"	63.62	68.10	28.27
9'-6"	70.88	76.00	29.85
10'-0"	78.54	84.15	31.42
10'-6"	86.59	92.71	32.99
11'-0"	95.03	101.85	34.56
11'-6"	103.87	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"	113.10	121.18	37.70
12'-6"	122.72	131.49	39.27
13'-0"	132.73	142.22	40.84
13'-6"	143.14	153.36	42.41
14'-0"	153.94	164.84	43.98
14'-6"	165.13	176.93	45.55
15'-0"	176.31	189.34	47.12
15'-6"	188.69	202.18	48.70
16'-0"	201.06	215.43	50.27
16'-6"	213.83	-	51.84
17'-0"	224.98	-	53.41
17'-6"	240.53	-	54.98
18'-0"	254.47	-	56.55
18'-6"	268.80	-	58.12
19'-0"	283.53	-	59.69
19'-6"	298.85	-	61.26
20'-0"	314.16	-	62.83
21'-0"	344.36	-	64.40
22'-0"	380.13	-	66.11
23'-0"	418.58	-	72.26
24'-0"	460.79	-	73.40
25'-0"	480.86	-	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)

NOML. 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"	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	2.8	3.6	3.9	4.3	5.5	5.9	6.3	7.8	
2	6	1.6	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	2.8	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	6.5	6.9	8.5	8.9	
3-1/2	8-1/2	2.9	3.0	3.3	4.4	4.8	6.1	6.5	6.9	8.5	8.9	9.4	
4	9	2.9	3.1	4.2	4.6	4.8	6.3	6.7	7.1	8.7	9.2	9.6	
5	10	3.1	3.4	4.6	4.9	5.2	6.7	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	7.8	9.8	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	15	4.7	6.2	6.5	6.8	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	16.8	17.3	
16	23-1/2	8.4	8.7	10.8	11.2	11.6	14.0	14.4	14.9	17.5	18.1	19.6	
18	25	8.8	11.0	11.4	11.8	14.2	14.7	15.1	17.8	18.3	19.8	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	17.8	21.0	21.6	22.0	23.8	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	1.2	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	4.6
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	4.8	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	39.2	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	5.1
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	5.1
1-1/4	.435	1.0	1.3	1.5	1.9	2.0	2.3	2.6	2.8	3.1	3.4	3.6	3.9	4.1	4.4	4.7	4.9	5.2
1-1/2	.498	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	5.3
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	5.4
2-1/2	.753	1.3	1.6	1.8	2.1	2.4	2.6	2.9	3.1	3.4	3.7	3.9	4.2	4.5	4.7	5.0	5.3	5.6
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	5.7
3-1/2	1.047	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	5.3	5.6	5.9
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	6.0
4-1/2	1.309	1.9	2.1	2.4	2.6	2.9	3.2	3.4	3.7	4.0	4.2	4.5	4.8	5.0	5.3	5.5	5.8	6.1
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	6.2
6	1.734	2.2	2.5	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
7	1.996	2.3	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	6.8
8	2.257	2.5	2.9	3.3	3.5	3.8	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	2.6	3.0	3.4	3.6	4.0	4.3	4.6	4.9	5.2	5.4	5.7	6.0	6.2	6.5	6.7	7.0	7.3
10	2.817	2.8	3.2	3.6	4.1	4.4	4.7	4.9	5.2	5.4	5.7	6.0	6.3	6.5	6.7	7.0	7.3	7.6
11	3.073	2.9	3.3	3.7	4.0	4.4	4.7	4.9	5.2	5.4	5.7	6.0	6.3	6.5	6.7	7.0	7.3	7.6
12	3.337	3.0	3.4	3.8	4.1	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.5	6.7	7.0	7.3	7.6	7.9
14	3.683	3.2	3.6	4.0	4.3	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.4	7.6	7.9	8.2
16	4.188	3.4	3.8	4.2	4.5	4.9	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5
18	4.718	3.6	4.0	4.4	4.7	5.1	5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7
20	5.215	3.8	4.2	4.6	4.9	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.4	7.7	8.0	8.3	8.6	8.9
22	5.747	4.0	4.4	4.8	5.1	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.1
24	6.286	4.2	4.6	5.0	5.3	5.7	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3
26	6.807	4.4	4.8	5.2	5.5	5.9	6.2	6.5	6.8	7.1	7.4	7.7	8.0	8.3	8.6	8.9	9.2	9.5
28	7.331	4.6	5.0	5.4	5.7	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.1	9.4	9.7
30	7.854	4.8	5.2	5.6	5.9	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3	9.6	9.9
36	9.425	5.2	5.6	6.0	6.3	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.1	9.4	9.7	10.0	10.3

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	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	
½	.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	
¾	.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	
1½	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	
2½	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	
3½	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 FURNACE

031713392 2A, PARTS NO. 3RIW

LOCATION OF JOINTS

NOITAJU2MI 3919 JANOITC32

3919

031706 STMOL JANOUTICNOJ

2.7. УМНИМ А ТЕСТНО
СТНОЛ ОНЗ ЛА МОН
НАЗМНОМ

НО НОМЗЛ ЗНТ
МОТАЛУСНИ ЗНП

НАТУ МО СТНОЛ ЛАМОУТНОМ
УМНИМ А ТЕСТНО ЗНАЛ
ЛАМОУТНОМ ЛА МОН'С РО
НАЗМНОМ СТНОЛ

СТНОЛ РО МОТАСОЛ

ОЗНРОЗЕ СЛ, ЗНП РО, НАТЕ
МОТАЛУСНИ ЗНП НАЛ НАТУ
ИМНИ МТИН ОЗНРОЗЕ НАЛ МНИ
МОТАЛУСНИ ЗНП НАЛ МНИ

ОЗНРОЗЕ РО МОТАСОЛ

ЗНАМЕНТ ОЗ МТИН НАЛ ЗНАПНОМ РО ТИМЕНРОЗЕ

3-00.019

ПОИТАЈУСИ РЯТУА ЭДЖИС : ЭТОИ
 .О.О"Э РО ЭИС ЭРЯР Э'1 ОТ КУ
 .ПОИТАЈУСИ

СНИМКИ ЗА ДО МОЛТАСОЛ

RENT300T Q3TTUB SNOIT32S 70 SQM3

SECTION JANUARY 1919

STIMUL TO MOTACOL

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Q31710392 2A, 9AST2 MO, 3RIW

E-A-3