

# Heat Transfer Tables

*Heat Loss and Surface Temperatures*

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## HEAT TRANSFER TABLES

The following tables list the heat loss and surface temperature of bare and insulated pipes. The procedure described in ASTM C680 was used to generate the tables with the following parameters:

- Average Ambient Temperature = 75°F
- Surface Emittance of Bare Metal = 0.8
- Surface Emittance of Metal Jacket = 0.1
- Surface Emittance of Dull Surface = 0.8
- Average Wind Speed = 0 mph
- Pipe Insulation Dimensions are Industrial Insulation Group actual dimensions

### Heat Transfer Tables

HL = Heat Loss, Btu/hr/linear ft of pipe or  
Btu/hr/ft<sup>2</sup> of flat surface

ST = Surface Temperature, °F

Nominal Pipe Size 1/2" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	72.3	200	157	300	266	400	403	499	574	599	1049	799	1754	998	2767	1198
1	13.9	92	26.8	105	41.3	117	57.2	129	74.7	142	114	169	161	199	214	231
1.5	12.5	89	24.1	98	37.1	108	51.3	118	66.9	128	102	149	144	172	191	196
2	11.2	85	21.4	92	32.8	99	45.4	107	59.1	114	90.3	130	127	146	168	165
2.5	10.6	84	20.2	90	31	96	42.8	102	55.8	109	85.2	122	119	137	159	152
3	10.1	83	19.3	88	29.6	94	32.5	95	53.2	105	81.1	116	114	129	151	143
3.5	9.7	82	18.6	87	28.4	92	39.2	96	51	102	77.8	112	109	123	145	136
4	9.3	81	17.8	86	27.3	90	37.7	94	49	99	74.7	108	105	118	139	129
4.5	9	81	17.3	85	26.4	89	36.5	93	47.5	97	72.4	105	101	114	135	124
5	8.8	80	16.8	84	25.7	87	35.5	91	46.2	95	70.4	103	98.5	111	131	120
5.5	8.8	80	16.8	84	25.7	87	35.5	91	46.2	95	70.4	103	98.5	111	131	120
6	8.5	80	16.3	83	24.9	86	34.4	90	44.8	93	68.2	100	95.5	108	127	116
6.5	8.4	79	16	83	24.4	86	33.7	89	43.8	92	66.7	99	93.3	106	124	114
7	8.2	79	15.6	82	23.9	85	33	88	42.9	91	65.3	97	91.4	95	121	111
7.5	8	79	15.4	82	23.5	84	32.4	87	42.1	90	64.1	96	89.7	102	119	109
8	7.9	79	15.1	81	23	84	31.8	86	41.3	89	62.9	95	88.1	101	117	107
8.5	7.8	78	14.9	81	22.7	83	31.3	86	40.7	88	61.9	94	86.6	99	115	106
9	7.7	78	14.6	81	22.3	83	30.8	85	40	88	61	93	85.3	98	113	104
9.5	7.6	78	14.4	80	22	83	30.4	85	39.5	87	60.1	92	84.1	97	112	103
10	7.5	78	14.2	80	21.7	82	30	84	38.9	87	59.3	91	82.9	96	110	101

## HEAT TRANSFER TABLES

### Nominal Pipe Size 1/2" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	72.3	200	157	300	266	400	403	499	574	599	1049	799	1754	998	2767	1198
1	14.8	85	28.3	93	43.2	100	59.7	109	77.8	117	119	135	167	154	222	174
1.5	13.2	82	25.2	88	38.5	94	53.1	100	69.2	107	105	121	148	135	196	151
2	11.6	80	22.1	84	33.8	89	46.6	93	60.6	98	92.3	108	129	118	172	130
2.5	10.9	79	20.8	83	31.8	86	43.9	90	57	94	60.1	95	122	112	161	122
3	10.4	79	19.8	82	30.3	85	41.7	88	54.2	91	82.5	99	115	107	153	115
3.5	10	78	19	81	29	84	39.9	86	51.9	89	79	96	111	103	147	111
4	9.6	78	18.2	80	27.8	83	38.3	85	49.8	88	75.8	93	106	100	141	106
4.5	9.3	78	17.7	80	26.9	82	37.1	84	48.2	86	73.3	92	103	97	136	103
5	9	77	17.1	79	26.2	81	36	83	46.8	85	71.2	90	99.6	95	132	101
5.5	9	77	17.1	79	26.2	81	36	83	46.8	85	71.2	90	99.6	95	132	101
6	8.7	77	16.6	79	25.3	81	34.9	82	45.3	84	69	88	96.4	93	128	98
6.5	8.5	77	16.2	78	24.7	80	34.1	82	44.3	84	67.4	87	94.2	92	125	97
7	8.3	77	15.9	78	24.2	80	33.4	81	43.4	83	66	87	92.2	91	122	95
7.5	8.2	77	15.6	78	23.8	79	32.7	81	42.5	82	64.7	86	90.4	90	120	94
8	8	77	15.3	78	23.3	79	32.1	80	41.8	82	63.5	85	88.8	89	118	93
8.5	7.9	76	15.1	78	22.9	79	31.6	80	41.1	82	62.5	84	87.3	88	116	91
9	7.8	76	14.8	78	22.6	79	31.1	80	40.4	81	61.5	84	85.9	87	114	91
9.5	7.7	76	14.6	77	22.3	78	30.7	80	39.8	81	60.6	83	84.7	86	112	90
10	7.6	76	14.4	77	21.9	78	30.2	79	39.3	81	59.7	83	83.5	86	111	89

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F

### HEAT TRANSFER TABLES

Nominal Pipe Size 3/4" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL =	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	87.8	200	191	300	324	400	493	499	704	599	1291	799	2166	998	3425	1198
1	15.9	94	30.8	108	47.4	122	65.8	136	85.9	150	132	181	185	214	247	249
1.5	14.2	90	27.3	101	41.9	111	58.1	122	75.8	133	116	156	163	182	217	209
2	12.4	86	23.8	94	36.6	102	50.6	109	65.9	117	101	135	141	153	188	173
2.5	11.7	85	22.4	91	34.3	98	47.4	105	61.8	112	94.4	126	132	142	176	159
3	11.1	83	21.3	89	32.6	95	45	101	58.6	107	89.4	120	125	133	167	148
3.5	10.6	83	20.3	88	31.1	93	43	98	56	104	85.4	115	120	127	159	140
4	10.2	82	19.5	86	29.8	91	41.1	96	53.6	100	81.7	110	114	121	152	133
4.5	9.9	81	18.8	85	28.8	90	39.8	94	51.8	98	78.9	107	111	117	147	128
5	9.6	81	18.3	85	28	88	38.6	92	50.2	96	76.5	105	107	114	142	124
5.5	9.3	80	17.7	84	27	87	37.3	91	48.5	94	50.9	95	104	110	137	119
6	9	80	17.3	83	26.4	86	36.4	90	47.4	93	72.2	100	101	108	134	116
6.5	8.8	79	16.9	83	25.8	86	35.6	89	46.3	92	70.6	99	98.8	106	131	113
7	8.7	79	16.6	82	25.3	85	34.9	88	45.4	91	69.1	97	60.8	95	128	111
7.5	8.5	79	16.3	82	24.8	84	34.2	87	44.5	90	67.8	96	94.9	102	126	109
8	8.4	79	16	81	24.4	84	33.6	87	43.7	89	66.6	95	93.2	101	124	107
8.5	8.2	79	15.7	81	24	83	33.1	86	43	89	65.5	94	91.7	100	122	106
9	8.1	78	15.5	81	23.6	83	32.6	85	42.4	88	64.5	93	90.2	98	120	104
9.5	8	78	15.3	80	23.3	83	32.1	85	41.8	87	63.6	92	88.9	97	118	103
10	7.9	78	15.1	80	23	82	31.7	85	41.2	87	62.7	91	87.7	96	116	102

Nominal Pipe Size 3/4" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	87.8	200	191	300	324	400	493	499	704	599	1291	799	2166	998	3425	1198
1	17.1	86	32.7	95	50	104	69.1	113	90	122	137	142	193	164	257	186
1.5	15	83	28.6	90	43.7	96	60.4	103	78.6	111	120	126	168	142	223	159
2	13	81	24.7	85	37.7	90	52	95	67.7	100	103	111	144	122	192	135
2.5	12.1	80	23.1	84	35.3	88	48.7	92	63.3	96	96.4	105	135	115	179	126
3	11.5	79	21.9	82	33.4	86	46	89	59.8	93	91.1	101	127	110	169	119
3.5	11	79	20.9	81	31.8	84	43.9	87	57	91	86.8	98	121	105	161	114
4	10.5	78	19.9	81	30.4	83	41.9	86	54.5	89	82.9	95	116	102	154	109
4.5	10.1	78	19.3	80	29.4	82	40.5	85	52.6	87	80	93	112	99	148	106
5	9.8	78	18.7	80	28.5	82	39.2	84	51	86	77.5	91	108	97	144	103
5.5	9.5	77	18	79	27.5	81	37.9	83	49.2	85	74.8	90	105	95	139	100
6	9.2	77	17.6	79	26.8	80	36.9	82	48	84	73	88	102	93	135	98
6.5	9	77	17.2	78	26.2	80	36.1	82	46.9	84	71.3	87	99.7	92	132	96
7	8.8	77	16.8	78	25.6	80	35.3	81	45.9	83	69.8	87	97.6	91	129	95
7.5	8.7	77	16.5	78	25.1	79	34.6	81	45	82	68.5	86	95.7	90	127	94
8	8.5	77	16.2	78	24.7	79	34	81	44.2	82	67.2	85	94	89	125	93
8.5	8.4	76	15.9	78	24.3	79	33.4	80	43.5	82	66.1	85	92.4	88	123	92
9	8.2	76	15.7	78	23.9	79	32.9	80	42.8	81	65	84	90.9	87	121	91
9.5	8.1	76	15.4	77	23.5	78	32.4	80	42.1	81	64.1	84	89.6	87	119	90
10	8	76	15.2	77	23.2	78	32	79	41.5	81	63.2	83	88.3	86	117	89

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



### HEAT TRANSFER TABLES

Nominal Pipe Size 1" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	200	ST	300	ST	400	ST	500	ST	600	ST	800	ST	1000	ST	1200	ST
Bare	107	200	234	300	397	400	605	499	867	599	1594	798	2680	998	4247	1197
1	17.3	94	33.6	108	51.7	121	71.7	135	93.6	149	144	179	202	212	269	247
1.5	15.3	90	29.6	100	45.4	111	63	121	82.1	132	126	156	177	181	235	208
2	14	87	26.9	96	41.3	104	57.2	113	74.5	122	114	141	160	161	213	183
2.5	13.1	86	25.1	93	38.5	100	53.2	107	69.3	115	106	131	149	148	198	167
3	12.3	84	23.7	91	36.3	97	50.1	103	65.3	110	99.7	124	140	139	186	155
3.5	11.8	83	22.5	89	34.5	94	47.7	100	62.1	106	94.7	118	133	132	176	146
4	11.2	82	21.5	87	32.9	92	45.4	97	59.1	102	90.2	113	126	125	168	138
4.5	10.8	82	20.7	86	31.7	91	43.7	95	43.1	95	86.8	110	122	121	162	132
5	10.5	81	20	85	30.6	89	42.3	94	55	98	83.9	107	118	117	156	127
5.5	10.1	81	19.3	84	29.5	88	40.8	92	53	96	80.8	104	113	113	150	122
6	9.9	80	18.8	84	28.8	87	39.7	91	51.6	94	54.2	95	110	110	146	119
6.5	9.6	80	18.4	83	28.1	86	38.8	90	50.4	93	76.8	100	107	108	143	116
7	9.4	79	18	83	27.5	86	37.9	89	49.3	92	75.1	99	105	106	140	114
7.5	9.2	79	17.6	82	26.9	85	37.1	88	48.3	91	73.5	97	103	104	137	111
8	9.1	79	17.3	82	26.4	85	36.4	87	47.4	90	72.1	96	101	103	134	109
8.5	8.9	79	17	81	25.9	84	35.8	87	46.5	89	70.9	95	99.1	101	132	108
9	8.8	79	16.7	81	25.5	84	35.2	86	45.8	89	69.7	94	97.5	100	129	106
9.5	8.6	78	16.5	81	25.1	83	34.6	86	45	88	68.6	93	95.9	99	127	105
10	8.5	78	16.2	81	24.8	83	34.1	85	44.4	88	67.6	92	94.5	98	125	103

Nominal Pipe Size 1" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	200	ST	300	ST	400	ST	500	ST	600	ST	800	ST	1000	ST	1200	ST
Bare	107	200	234	300	397	400	605	499	867	599	1594	798	2680	998	4247	1197
1	18.6	86	35.6	95	54.4	103	75.2	112	98	121	150	141	210	162	279	184
1.5	16.2	83	31	90	47.4	96	65.4	103	85.2	110	130	125	182	141	242	158
2	14.7	81	28	86	42.8	92	59	97	76.8	103	117	115	164	128	218	142
2.5	13.6	80	26	85	39.7	89	54.7	93	71.1	98	108	108	152	119	201	131
3	12.8	80	24.4	83	37.3	87	51.4	91	66.8	95	102	104	142	113	189	123
3.5	12.2	79	23.2	82	35.4	85	48.7	89	63.4	92	96.5	100	135	108	179	117
4	11.6	78	22	81	33.6	84	46.3	87	60.2	90	91.6	97	128	104	170	112
4.5	11.1	78	21.2	80	32.3	83	44.5	86	57.9	88	88.1	94	123	101	164	108
5	10.8	78	20.5	80	31.2	82	43	85	55.9	87	85.1	93	119	99	158	105
5.5	10.3	77	19.7	79	30.1	81	41.4	84	53.8	86	81.9	91	114	96	152	102
6	10.1	77	19.2	79	29.2	81	40.3	83	52.4	85	79.6	90	111	94	148	100
6.5	9.8	77	18.7	79	28.5	80	39.3	82	51.1	84	77.7	88	109	93	144	98
7	9.6	77	18.3	78	27.9	80	38.4	82	49.9	84	75.9	87	106	92	141	96
7.5	9.4	77	17.9	78	27.3	80	37.6	81	48.8	83	74.3	87	104	91	138	95
8	9.2	77	17.6	78	26.8	79	36.9	81	47.9	82	72.8	86	102	90	135	94
8.5	9.1	77	17.2	78	26.3	79	36.2	81	47	82	71.5	85	100	89	133	93
9	8.9	77	16.9	78	25.8	79	35.6	80	46.2	82	70.3	85	98.2	88	130	92
9.5	8.8	76	16.7	78	25.4	79	35	80	45.5	81	69.2	84	96.7	87	128	91
10	8.6	76	16.4	77	25	79	34.5	80	44.8	81	68.1	84	95.2	87	126	90

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F

### HEAT TRANSFER TABLES

Nominal Pipe Size 1 1/2" Metal Jacket

Insulation Thickness (Inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	200	ST	300	ST	400	ST	500	ST	600	ST	800	ST	1000	ST	1200	ST
Bare	149	200	327	300	557	400	851	499	1222	599	2258	798	3812	998	6059	1197
1	21.6	96	41.9	111	64.7	126	89.7	141	117	157	180	191	253	227	338	266
1.5	17.7	90	34.2	100	52.5	110	72.8	121	95	132	145	155	204	179	272	206
2	16.3	88	31.3	96	48	105	66.4	114	86.6	123	132	142	186	163	247	185
2.5	15.1	86	29.1	93	44.6	101	61.7	108	80.4	116	123	133	172	150	229	169
3	14.3	85	27.4	91	42	98	58	104	75.5	111	115	126	162	141	215	158
3.5	13.5	83	25.8	89	39.6	95	54.7	101	71.2	107	109	119	152	133	202	148
4	12.9	83	24.7	88	37.8	93	52.3	98	68	104	104	115	145	127	193	141
4.5	12.4	82	23.8	87	36.4	91	50.2	96	65.4	101	99.7	112	140	123	186	135
5	11.9	81	22.8	86	34.8	90	48.1	94	62.5	99	95.4	108	134	118	177	129
5.5	11.5	81	22.1	85	33.7	89	46.6	93	60.6	97	92.4	106	129	115	172	125
6	11.2	80	21.5	84	32.8	88	45.3	92	58.9	95	89.8	104	126	112	167	122
6.5	10.9	80	20.9	84	32	87	44.1	91	57.4	94	87.4	102	122	110	163	119
7	10.7	80	20.4	83	31.2	86	43.1	90	56	93	85.4	100	119	108	159	116
7.5	10.5	80	20	83	30.5	86	42.1	89	54.8	92	83.5	99	117	106	155	114
8	10.3	79	19.6	82	29.9	85	41.3	88	53.7	91	81.7	97	114	104	152	112
8.5	10.1	79	19.2	82	29.3	85	40.5	87	52.6	90	80.2	96	112	103	149	110
9	9.9	79	18.9	82	28.8	84	39.8	87	51.7	90	78.7	95	110	101	146	108
9.5	9.7	79	18.6	81	28.3	84	39.1	86	50.8	89	77.4	94	108	100	144	107
10	9.6	79	18.3	81	27.9	83	38.5	86	50	88	76.2	93	107	99	141	105

Nominal Pipe Size 1 1/2" Dull Surface

Insulation Thickness (Inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	149	200	327	300	557	400	851	499	1222	599	2258	798	3812	998	6059	1197
1	23.4	87	44.8	97	68.5	107	94.8	117	123	127	189	149	265	172	353	196
1.5	18.8	83	35.9	89	54.8	96	75.6	102	98.4	109	150	124	210	140	280	157
2	17.1	82	32.6	87	49.8	92	68.6	97	89.3	103	136	115	191	129	253	143
2.5	15.8	80	30.2	85	46	89	63.5	94	82.6	99	126	109	176	120	234	132
3	14.8	80	28.3	83	43.1	87	59.5	91	77.4	96	118	105	165	114	219	125
3.5	14	79	26.6	82	40.6	86	55.9	89	72.7	93	111	101	155	109	206	118
4	13.3	79	25.4	81	38.7	84	53.4	87	69.4	91	106	98	148	105	196	114
4.5	12.8	78	24.3	81	37.1	83	51.2	86	66.5	89	101	96	142	102	188	110
5	12.2	78	23.3	80	35.5	82	48.9	85	63.6	88	96.7	93	135	99	179	106
5.5	11.8	78	22.5	80	34.4	82	47.4	84	61.5	86	93.6	92	131	97	174	104
6	11.5	77	21.9	79	33.4	81	46	83	59.8	86	90.9	90	127	96	169	101
6.5	11.2	77	21.3	79	32.5	81	44.8	83	58.2	85	88.5	89	124	94	164	100
7	10.9	77	20.8	79	31.7	80	43.7	82	56.7	84	86.3	88	121	93	160	98
7.5	10.7	77	20.3	78	31	80	42.7	82	55.5	84	84.4	87	118	92	156	96
8	10.5	77	19.9	78	30.3	80	41.8	81	54.3	83	82.6	87	115	91	153	95
8.5	10.2	77	19.5	78	29.7	79	41	81	53.2	83	81	86	113	90	150	94
9	10.1	77	19.1	78	29.2	79	40.2	81	52.2	82	79.5	85	111	89	147	93
9.5	9.9	77	18.8	78	28.7	79	39.5	80	51.3	82	78.1	85	109	88	145	92
10	9.7	76	18.5	78	28.2	79	38.9	80	50.5	81	76.8	84	107	88	142	91

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



### HEAT TRANSFER TABLES

Nominal Pipe Size 2" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	183	200	402	300	686	399	1049	499	1508	599	2794	798	4726	998	7524	1197		
1	24.5	97	47.5	112	73.3	127	102	143	133	159	204	193	287	230	383	270		
1.5	21.2	92	40.9	104	63	116	87.3	128	114	141	175	167	245	196	327	227		
2	19.1	89	36.8	99	56.5	109	78.3	119	102	129	156	151	219	175	292	200		
2.5	17.6	87	33.8	96	51.8	104	71.7	113	93.5	121	143	140	201	160	267	182		
3	16.4	86	31.5	93	48.3	100	66.8	108	87	115	133	132	186	149	248	168		
3.5	15.4	84	29.5	91	45.1	97	62.4	104	81.3	110	124	124	174	140	231	156		
4	14.6	83	28	89	42.9	95	59.3	101	77.2	107	118	119	165	133	219	148		
4.5	14	83	26.8	88	41	93	56.6	98	73.7	104	113	115	158	128	209	141		
5	13.3	82	25.5	87	39	91	53.9	96	70.2	101	107	111	150	122	199	134		
5.5	12.9	81	24.7	86	37.7	90	52.1	94	67.7	99	103	108	145	119	192	130		
6	12.5	81	23.9	85	36.5	89	50.4	93	65.6	97	100	106	140	116	186	126		
6.5	12.1	81	23.2	84	35.5	88	49	92	63.7	96	97.1	104	136	113	181	122		
7	11.8	80	22.6	84	34.6	87	47.7	91	62.1	95	94.6	102	132	111	176	119		
7.5	11.6	80	22.1	83	33.7	87	46.5	90	60.5	93	92.2	101	129	108	171	117		
8	11.3	80	21.6	83	33	86	45.5	89	59.2	92	90.1	99	126	107	168	115		
8.5	11.1	79	21.1	82	32.3	85	44.5	88	57.9	92	88.2	98	123	105	164	113		
9	10.9	79	20.7	82	31.7	85	43.7	88	56.8	91	86.5	97	121	104	161	111		
9.5	10.7	79	20.3	82	31.1	84	42.9	87	55.7	90	84.9	96	119	102	158	109		
10	10.5	79	20	81	30.5	84	42.1	87	54.8	89	83.4	95	117	101	155	107		

Nominal Pipe Size 2" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	183	200	402	300	686	399	1049	499	1508	599	2794	798	4726	998	7524	1197		
1	26.5	88	50.8	97	77.8	107	108	118	140	128	214	150	301	174	401	199		
1.5	22.6	84	43.2	92	66	99	91.2	107	119	115	181	132	254	150	338	170		
2	20.2	83	38.5	89	58.8	95	81.2	101	106	108	161	122	226	137	300	152		
2.5	18.4	81	35.2	86	53.7	91	74.1	97	96.4	102	147	114	206	127	273	140		
3	17.1	80	32.6	85	49.8	89	68.7	93	89.3	98	136	108	191	119	253	131		
3.5	15.9	80	30.4	83	46.4	87	64	91	83.2	95	127	104	177	113	235	123		
4	15.1	79	28.8	82	44	86	60.6	89	78.8	93	120	100	168	109	223	118		
4.5	14.4	79	27.5	81	42	84	57.8	88	75.2	91	114	98	160	105	212	114		
5	13.7	78	26.1	81	39.9	83	54.9	86	71.4	89	109	95	152	102	202	109		
5.5	13.2	78	25.2	80	38.4	83	53	85	68.9	88	105	93	147	100	194	106		
6	12.8	78	24.4	80	37.2	82	51.3	84	66.6	87	101	92	142	98	188	104		
6.5	12.4	77	23.7	79	36.1	81	49.8	84	64.7	86	98.4	91	138	96	183	102		
7	12.1	77	23	79	35.1	81	48.4	83	62.9	85	95.7	90	134	95	178	100		
7.5	11.8	77	22.5	79	34.3	81	47.2	82	61.3	84	93.3	89	130	93	173	98		
8	11.5	77	22	79	33.5	80	46.1	82	59.9	84	91.1	88	127	92	169	97		
8.5	11.3	77	21.5	78	32.7	80	45.1	82	58.6	83	89.2	87	125	91	165	96		
9	11.1	77	21	78	32.1	80	44.2	81	57.4	83	87.4	86	122	90	162	95		
9.5	10.8	77	20.6	78	31.5	79	43.4	81	56.3	82	85.7	86	120	89	159	93		
10	10.7	77	20.3	78	30.9	79	42.6	80	55.3	82	84.2	85	118	89	156	93		

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F

### HEAT TRANSFER TABLES

Nominal Pipe Size 2 1/2" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	219	200	479	300	820	399	1256	499	1807	599	3352	798	5676	997	9045	1196		
1	25.4	95	49.2	109	75.8	123	105	137	137	151	211	182	297	216	395	252		
1.5	22.5	91	43.3	102	66.6	114	92.4	125	121	137	185	162	259	189	346	218		
2	20.4	89	39.2	98	60.2	108	83.4	117	109	127	166	148	234	171	311	196		
2.5	18.8	87	36.2	95	55.5	103	76.7	112	100	120	153	138	215	158	285	179		
3	17.4	85	33.5	92	51.3	100	71	107	92.5	114	141	130	198	147	264	165		
3.5	16.5	84	31.6	91	48.4	97	66.9	103	87.2	110	133	124	187	139	248	155		
4	15.7	83	30.1	89	46	95	63.6	101	82.8	107	126	119	177	133	236	147		
4.5	14.9	83	28.5	88	43.6	93	60.2	98	78.4	103	120	114	167	127	223	140		
5	14.9	83	28.5	88	43.6	93	60.2	98	78.4	103	120	114	167	127	223	140		
5.5	14.3	82	27.4	87	41.9	91	57.9	96	75.3	101	115	111	161	123	214	134		
6	13.8	81	26.5	86	40.5	90	55.9	95	72.7	99	111	109	155	119	206	130		
6.5	13.4	81	25.6	85	39.2	89	54.1	93	70.4	98	107	106	150	116	200	126		
7	13	81	24.9	84	38.1	88	52.5	92	68.4	96	104	104	146	113	194	123		
7.5	12.7	80	24.2	84	37.1	87	51.1	91	66.5	95	101	103	142	111	188	120		
8	12.4	80	23.7	83	36.1	87	49.9	90	64.9	94	98.9	101	138	109	184	118		
8.5	12.1	80	23.1	83	35.3	86	48.7	89	63.4	93	96.6	100	135	107	179	115		
9	11.8	79	22.6	83	34.6	86	47.7	89	62	92	94.5	98	132	106	176	113		
9.5	11.6	79	22.2	82	33.9	85	46.7	88	60.8	91	92.5	97	130	104	172	111		
10	11.4	79	21.8	82	33.2	85	45.8	87	59.6	90	90.8	96	127	103	169	110		

Nominal Pipe Size 2 1/2" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	200	ST	300	ST	400	ST	500	ST	600	ST	800	ST	1000	ST	1200	ST		
Bare	219	200	479	300	820	399	1256	499	1807	599	3352	798	5676	997	9045	1196		
1	27.4	86	52.4	95	80.2	104	111	113	144	122	220	142	309	163	412	186		
1.5	23.9	84	45.6	91	69.8	98	96.3	105	125	113	191	129	268	146	357	164		
2	21.5	82	41	88	62.6	94	86.4	100	112	106	171	119	240	134	319	149		
2.5	19.7	81	37.6	86	57.4	91	79.2	96	103	101	157	113	220	125	292	138		
3	18.2	80	34.7	84	52.9	88	73	93	94.9	97	145	107	202	118	269	129		
3.5	17.1	80	32.6	83	49.8	87	68.6	91	89.2	95	136	103	190	113	252	123		
4	16.2	79	30.9	82	47.2	85	65.1	89	84.6	92	129	100	180	109	239	118		
4.5	15.3	79	29.2	81	44.6	84	61.4	87	79.9	90	122	97	108	95	226	113		
5	15.3	79	29.2	81	44.6	84	61.4	87	79.9	90	122	97	108	95	226	113		
5.5	14.7	78	28.1	81	42.8	83	59	86	76.7	89	117	95	163	102	217	110		
6	14.2	78	27.1	80	41.3	83	56.9	85	73.9	88	113	94	157	100	212	95		
6.5	13.8	78	26.2	80	39.9	82	55	84	71.5	87	109	92	152	98	202	104		
7	13.3	78	25.4	79	38.7	81	53.4	84	69.4	86	106	91	148	96	196	102		
7.5	13	77	24.7	79	37.7	81	51.9	83	67.5	85	103	90	144	95	190	100		
8	12.6	77	24.1	79	36.7	81	50.6	83	65.7	85	100	89	140	94	185	99		
8.5	12.4	77	23.5	79	35.9	80	49.4	82	64.2	84	97.6	88	136	92	181	97		
9	12.1	77	23	78	35.1	80	48.3	82	62.8	83	95.5	87	133	91	177	96		
9.5	11.8	77	22.5	78	34.3	80	47.3	81	61.5	83	93.5	87	131	91	173	95		
10	11.6	77	22.1	78	33.7	79	46.4	81	60.3	83	91.7	86	128	90	170	94		

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



### HEAT TRANSFER TABLES

Nominal Pipe Size 3" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	262	200	576	300	987	399	1513	499	2179	599	4050	798	6869	997	10957	1196		
1	32.1	99	62.3	116	96.2	132	134	150	175	167	269	205	378	246	504	289		
1.5	27.4	94	53.1	107	81.8	121	113	134	148	148	227	178	320	210	426	244		
2	24.4	91	47	102	72.3	113	100	124	131	136	200	160	281	186	375	215		
2.5	22.1	89	42.7	98	65.5	107	90.7	117	118	127	181	147	254	170	338	194		
3	20.3	87	39	95	59.8	103	82.7	111	108	119	165	137	231	156	308	177		
3.5	19	85	36.5	93	55.9	100	77.3	107	101	114	154	130	216	147	287	165		
4	17.9	84	34.4	91	52.7	97	72.9	104	94.9	110	145	124	203	139	270	156		
4.5	16.9	83	32.3	89	49.5	95	68.4	100	89.1	106	136	119	190	132	253	147		
5	16.2	83	30.9	88	47.4	93	65.4	98	85.2	104	130	115	182	127	242	141		
5.5	15.5	82	29.8	87	45.5	92	62.9	97	81.8	102	125	112	175	123	232	136		
6	15	82	28.7	86	43.9	90	60.6	95	78.9	100	120	109	169	120	224	131		
6.5	14.5	81	27.8	85	42.5	89	58.7	94	76.3	98	116	107	163	117	217	127		
7	14.1	81	27	85	41.2	89	56.9	93	74.1	97	113	105	158	114	210	124		
7.5	13.7	80	26.2	84	40.1	88	55.4	92	72	95	110	103	154	112	204	121		
8	13.4	80	25.6	84	39.1	87	53.9	91	70.2	94	73.8	95	150	110	199	119		
8.5	13.1	80	25	83	38.2	86	52.7	90	68.5	93	104	100	146	108	194	116		
9	12.8	80	24.4	83	37.3	86	51.5	89	67	92	102	99	143	106	190	114		
9.5	12.5	79	23.9	82	36.5	85	50.4	88	65.6	92	99.9	98	140	105	186	112		
10	12.3	79	23.5	82	35.8	85	49.4	88	64.3	91	97.9	97	137	104	182	111		

Nominal Pipe Size 3" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	262	200	576	300	987	399	1513	499	2179	599	4050	798	6869	997	10957	1196		
1	35	89	67.1	100	103	111	142	122	185	133	284	158	399	183	531	210		
1.5	29.5	86	56.4	94	86.3	102	119	111	155	120	237	139	333	159	443	181		
2	25.9	84	49.5	90	75.6	97	104	104	136	111	207	127	291	144	386	161		
2.5	23.3	82	44.6	88	68.1	93	94	99	122	105	186	119	261	133	347	148		
3	21.2	81	40.5	86	61.8	90	85.3	95	111	101	169	112	237	124	314	137		
3.5	19.8	80	37.7	84	57.6	88	79.5	93	103	97	157	107	220	118	293	129		
4	18.6	80	35.5	83	54.2	87	74.7	91	97.2	95	148	103	207	113	275	123		
4.5	17.5	79	33.3	82	50.7	85	70	89	90.9	92	138	100	194	108	257	117		
5	16.7	79	31.8	81	48.5	84	66.8	87	86.8	91	132	98	185	105	245	113		
5.5	16	78	30.5	81	46.5	83	64.1	86	83.3	89	127	96	177	103	235	110		
6	15.4	78	29.4	80	44.8	83	61.8	85	80.3	88	122	94	171	100	227	107		
6.5	14.9	78	28.4	80	43.3	82	59.7	85	77.6	87	118	93	165	99	219	105		
7	14.5	78	27.5	80	42	82	57.9	84	75.2	86	114	91	160	97	212	103		
7.5	14.1	77	26.8	79	40.8	81	56.2	83	73.1	85	111	90	155	95	206	101		
8	13.7	77	26.1	79	39.7	81	54.7	83	71.1	85	108	89	151	94	201	99		
8.5	13.4	77	25.4	79	38.8	80	53.4	82	69.4	84	106	88	148	93	196	98		
9	13.1	77	24.8	78	37.9	80	52.2	82	67.8	84	103	88	144	92	191	97		
9.5	12.8	77	24.3	78	37.1	80	51.1	81	66.4	83	101	87	141	91	187	96		
10	12.5	77	23.8	78	36.3	80	50	81	65	83	98.9	86	138	90	183	95		

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F

### HEAT TRANSFER TABLES

Nominal Pipe Size 4" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	332	200	731	300	1253	399	1923	499	2773	599	5163	798	8770	997	14006	1195		
1	38.4	100	74.8	117	115	135	160	153	210	171	323	211	454	253	606	299		
1.5	32.6	95	63.1	109	97.2	123	135	137	176	152	270	183	380	216	507	253		
2	28.7	92	55.4	103	85.2	115	118	126	154	139	236	164	332	192	442	222		
2.5	25.6	89	49.3	99	75.8	108	105	118	137	128	209	150	294	173	392	198		
3	23.6	87	45.4	96	69.6	104	96.3	113	126	122	192	140	269	161	359	182		
3.5	22	86	42.2	94	64.7	101	89.5	109	117	117	178	133	250	151	333	170		
4	20.4	85	39.1	91	59.9	98	82.8	105	108	111	165	126	231	142	307	158		
4.5	19.3	84	37.1	90	56.8	96	78.5	102	102	108	156	121	219	136	291	151		
5	18.5	83	35.4	89	54.2	94	74.8	100	97.5	106	149	118	208	131	277	145		
5.5	17.7	82	33.9	88	51.9	93	71.7	98	93.3	103	142	114	200	126	265	139		
6	17.1	82	32.6	87	49.9	91	69	96	89.8	101	137	112	192	123	255	135		
6.5	16.5	82	31.5	86	48.2	90	66.6	95	86.6	99	132	109	185	120	246	131		
7	16	81	30.5	85	46.7	89	64.4	94	83.8	98	128	107	179	117	238	127		
7.5	15.5	81	29.6	85	45.3	89	62.5	93	81.3	97	124	105	174	114	231	124		
8	15.1	80	28.8	84	44	88	60.8	92	79.1	95	121	103	169	112	224	121		
8.5	14.7	80	28.1	84	42.9	87	59.2	91	77.1	94	117	102	164	110	218	119		
9	14.4	80	27.4	83	41.9	87	57.8	90	75.2	93	115	101	160	108	213	117		
9.5	14	80	26.8	83	41	86	56.5	89	73.5	93	112	99	157	107	208	115		
10	13.7	79	26.3	82	40.1	86	55.3	89	72	92	110	98	153	105	204	113		

Nominal Pipe Size 4" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	332	200	731	300	1253	399	1923	499	2773	599	5163	798	8770	997	14006	1195		
1	42.1	90	80.8	101	124	112	171	124	223	136	342	161	481	188	640	216		
1.5	35.1	86	67.2	95	103	104	142	113	185	122	283	142	397	163	528	186		
2	30.6	84	58.5	91	89.4	98	123	106	161	113	245	130	344	147	457	166		
2.5	27	82	51.6	88	78.9	94	109	100	142	107	216	120	303	135	402	150		
3	24.7	81	47.2	86	72.1	91	99.5	97	129	102	197	114	276	127	367	140		
3.5	23	80	43.8	85	66.8	89	92.2	94	120	99	183	109	256	120	340	132		
4	21.2	80	40.4	83	61.7	87	85	91	111	95	168	104	236	114	313	125		
4.5	20.1	79	38.2	83	58.3	86	80.4	90	105	93	159	102	223	110	296	120		
5	19.1	79	36.4	82	55.5	85	76.5	88	99.5	92	151	99	212	107	281	116		
5.5	18.3	79	34.8	81	53.1	84	73.2	87	95.1	90	145	97	203	104	269	112		
6	17.6	78	33.4	81	51	83	70.3	86	91.4	89	139	95	195	102	258	110		
6.5	16.9	78	32.2	80	49.2	83	67.8	85	88.1	88	134	94	187	100	249	107		
7	16.4	78	31.2	80	47.6	82	65.5	84	85.2	87	130	92	181	98	240	105		
7.5	15.9	78	30.2	80	46.1	82	63.5	84	82.6	86	126	91	176	97	233	103		
8	15.4	77	29.4	79	44.8	81	61.7	83	80.2	85	122	90	171	95	226	101		
8.5	15	77	28.6	79	43.6	81	60.1	83	78.1	85	119	89	166	94	220	100		
9	14.7	77	27.9	79	42.6	80	58.6	82	76.2	84	116	88	162	93	215	98		
9.5	14.3	77	27.3	79	41.6	80	57.3	82	74.4	84	113	88	158	92	210	97		
10	14	77	26.7	78	40.7	80	56.1	82	72.8	83	111	87	155	91	205	96		

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



### HEAT TRANSFER TABLES

Nominal Pipe Size 6" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	479	200	1056	299	1813	399	2787	499	4025	598	7514	797	12788	996	20452	1195
1	53.1	102	103	121	160	141	223	160	291	180	448	224	632	270	843	320
1.5	43.2	96	83.8	111	129	126	179	141	235	157	360	190	507	226	675	265
2	37.6	93	72.8	105	112	118	155	130	203	143	311	171	437	201	583	233
2.5	33.7	90	64.9	101	99.8	112	138	122	181	134	276	157	388	183	517	210
3	30	88	57.8	97	88.8	106	123	115	160	125	245	145	344	166	458	190
3.5	27.8	87	53.5	95	82	103	114	111	148	120	226	137	317	156	422	177
4	26	86	50	93	76.6	100	106	108	138	115	211	131	296	148	394	167
4.5	24.5	85	47.1	91	60.7	95	99.7	105	130	112	198	126	278	142	370	159
5	23.3	84	44.6	90	68.4	96	94.5	102	123	109	188	122	263	136	350	152
5.5	22.2	83	42.6	89	65.1	95	90	100	117	106	179	118	251	132	333	146
6	21.3	83	40.8	88	62.4	93	86.1	98	112	104	171	115	240	128	319	141
6.5	20.5	82	39.2	87	59.9	92	82.8	97	108	102	164	113	230	124	306	136
7	19.7	82	37.8	86	57.8	91	79.8	96	104	100	158	110	222	121	295	133
7.5	19.1	81	36.5	86	55.8	90	77.1	94	100	99	153	108	214	118	285	129
8	18.5	81	35.4	85	54.1	89	74.7	93	97.2	98	148	106	208	116	276	126
8.5	18	81	34.4	85	52.6	88	72.5	92	94.4	96	144	105	201	114	268	124
9	17.5	80	33.5	84	51.1	88	70.6	91	91.8	95	140	103	196	112	260	121
9.5	17.1	80	32.6	84	49.8	87	68.8	91	89.5	94	136	102	191	110	253	119
10	16.7	80	31.8	83	48.7	87	67.1	90	87.3	93	133	101	186	108	247	117

Nominal Pipe Size 6" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	479	200	1056	299	1813	399	2787	499	4025	598	7514	797	12788	996	20452	1195
1	58.7	91	113	103	173	116	239	129	312	142	479	169	673	198	897	228
1.5	46.8	87	89.7	96	137	106	190	115	247	126	378	147	531	169	707	193
2	40.3	85	77.1	92	118	100	163	108	212	116	324	134	454	152	604	172
2.5	35.7	83	68.3	90	104	96	144	103	188	110	286	125	401	141	533	158
3	31.6	82	60.4	87	92.2	92	127	98	166	104	252	117	354	130	470	144
3.5	29.2	81	55.6	86	84.9	90	117	95	152	101	232	112	325	124	432	136
4	27.2	80	51.8	84	79.1	89	109	93	142	98	216	108	302	118	402	130
4.5	25.5	80	48.7	83	74.3	87	102	91	133	95	203	104	284	114	377	125
5	24.2	79	46	83	70.2	86	96.8	90	126	93	192	102	268	111	356	120
5.5	23	79	43.8	82	66.8	85	92.1	88	120	92	182	99	255	108	338	117
6	22	79	41.9	81	63.8	84	88	87	114	91	174	98	244	105	323	113
6.5	21.1	78	40.2	81	61.3	84	84.4	86	110	89	167	96	234	103	310	111
7	20.3	78	38.7	80	59	83	81.3	86	106	88	161	94	225	101	298	108
7.5	19.6	78	37.3	80	57	82	78.5	85	102	87	155	93	217	99	288	106
8	19	78	36.2	80	55.1	82	76	84	98.8	87	150	92	210	98	279	104
8.5	18.4	78	35.1	79	53.5	82	73.7	84	95.8	86	146	91	204	96	270	102
9	17.9	77	34.1	79	52	81	71.7	83	93.2	85	142	90	198	95	263	101
9.5	17.5	77	33.2	79	50.7	81	69.8	83	90.7	85	138	89	193	94	256	99
10	17	77	32.4	79	49.4	80	68.1	82	88.5	84	135	88	188	93	250	98

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



### HEAT TRANSFER TABLES

Nominal Pipe Size 8" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	616	200	1359	299	2336	399	3595	499	5196	598	9713	797	16547	995	26484	1194		
1.5	53.1	97	103	113	159	128	221	144	289	160	443	195	624	232	832	272		
2	44.5	93	86.1	105	132	118	184	131	240	144	368	171	517	201	689	233		
2.5	39.8	91	76.7	101	118	112	163	123	213	134	327	158	459	184	611	212		
3	36.2	89	69.7	98	107	108	148	117	193	127	296	148	415	171	553	195		
3.5	33.3	87	64.1	96	98.4	104	136	113	178	122	272	141	381	161	507	182		
4	31	86	59.7	94	91.5	102	127	109	165	117	252	134	354	152	470	172		
4.5	29.1	85	56	92	85.8	99	119	106	155	114	236	129	331	146	440	163		
5	27.6	84	52.9	91	81	97	112	104	146	111	223	125	312	140	415	156		
5.5	26.2	84	50.2	90	76.9	96	106	102	138	108	211	121	296	135	394	150		
6	25	83	47.9	89	73.4	94	101	100	132	106	201	118	282	131	375	145		
6.5	24	83	45.9	88	70.3	93	97.1	98	126	104	193	115	270	127	359	140		
7	23.1	82	44.2	87	67.6	92	93.3	97	121	102	185	112	260	124	345	136		
7.5	22.3	82	42.6	86	65.1	91	89.9	96	117	100	179	110	250	121	332	133		
8	21.5	81	41.2	86	63	90	86.9	94	113	99	173	108	242	119	321	129		
8.5	20.9	81	39.9	85	61	89	84.2	93	110	98	167	107	234	116	311	127		
9	20.3	81	38.8	85	59.2	89	81.8	93	106	97	162	105	227	114	302	124		
9.5	19.7	80	37.7	84	57.6	88	79.5	92	103	96	158	104	221	112	293	122		
10	19.2	80	36.7	84	56.1	87	77.5	91	101	95	154	102	215	111	286	120		

Nominal Pipe Size 8" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	616	200	1359	299	2336	399	3595	499	5196	598	9713	797	16547	995	26484	1194		
1.5	57.8	88	111	97	169	107	234	117	305	127	467	149	655	173	873	197		
2	47.7	85	91.2	92	139	100	193	108	251	116	383	134	537	152	714	172		
2.5	42.3	83	80.7	90	123	96	170	103	222	110	338	125	474	141	630	158		
3	38.2	82	72.9	88	111	93	154	99	200	106	305	119	427	133	568	148		
3.5	35	81	66.8	86	102	91	141	96	183	102	279	114	391	126	519	140		
4	32.5	81	61.9	85	94.6	89	130	94	170	99	258	110	362	121	481	133		
4.5	30.4	80	57.9	84	88.4	88	122	92	159	97	242	106	338	116	449	127		
5	28.6	80	54.6	83	83.3	87	115	91	149	95	227	103	318	113	423	123		
5.5	27.2	79	51.8	82	79	86	109	89	142	93	215	101	302	110	400	119		
6	25.9	79	49.3	82	75.2	85	104	88	135	92	205	99	287	107	381	116		
6.5	24.8	79	47.2	81	71.9	84	99.2	87	129	90	196	97	274	105	364	113		
7	23.8	78	45.3	81	69.1	83	95.2	86	124	89	188	96	263	103	350	110		
7.5	22.9	78	43.6	80	66.5	83	91.7	86	119	88	181	94	254	101	337	108		
8	22.1	78	42.1	80	64.2	82	88.5	85	115	87	175	93	245	99	325	106		
8.5	21.4	78	40.8	80	62.2	82	85.7	84	111	87	169	92	237	98	314	104		
9	20.8	78	39.6	79	60.3	82	83.1	84	108	86	164	91	230	97	305	103		
9.5	20.2	77	38.5	79	58.6	81	80.8	83	105	85	160	90	223	95	296	101		
10	19.7	77	37.4	79	57.1	81	78.7	83	102	85	156	89	217	94	288	100		

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F

### HEAT TRANSFER TABLES

Nominal Pipe Size 10" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	761	200	1680	299	2890	399	4450	498	6435	598	12039	796	20523	995	32863	1193
1.5	62.2	97	121	113	186	128	259	144	339	161	520	195	732	233	976	273
2	53.7	94	104	107	160	120	222	133	290	147	445	176	626	208	835	242
2.5	47.6	91	92	103	142	114	196	126	256	138	392	163	551	190	735	219
3	43.1	90	83	100	128	109	177	120	231	130	353	152	496	176	660	202
3.5	39.5	88	67.5	95	117	106	162	115	211	124	322	144	452	165	602	188
4	36.6	87	70.4	95	108	103	149	111	195	120	298	138	418	157	556	177
4.5	34.2	86	65.7	93	101	101	139	108	182	116	278	132	389	150	518	168
5	32.2	85	61.9	92	94.8	99	131	105	171	113	261	127	366	143	486	161
5.5	30.5	84	58.5	91	89.7	97	124	103	161	110	247	124	346	138	460	154
6	29.1	84	55.7	89	85.3	95	118	101	153	107	234	120	328	134	437	149
6.5	27.8	83	53.2	89	81.4	94	113	100	147	105	224	117	313	130	416	144
7	26.6	83	51	88	78.1	93	108	98	140	103	214	115	300	127	399	140
7.5	25.6	82	49.1	87	75.1	92	104	97	135	102	206	112	288	124	383	136
8	24.7	82	47.3	86	72.4	91	100	96	130	100	198	110	278	121	369	133
8.5	23.9	81	45.8	86	70	90	96.7	94	126	99	192	108	269	119	357	130
9	23.2	81	44.4	85	67.8	89	93.6	94	122	98	186	107	260	116	346	127
9.5	22.5	81	43.1	85	65.9	89	90.9	93	118	97	180	105	252	114	335	124
10	21.9	81	41.9	84	64	88	88.4	92	115	96	175	104	245	113	326	122

Nominal Pipe Size 10" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	761	200	1680	299	2890	399	4450	498	6435	598	12039	796	20523	995	32863	1193
1.5	67.8	88	130	97	199	107	275	117	358	128	548	150	769	173	1024	197
2	57.8	85	111	93	169	101	234	110	304	119	465	137	652	157	868	177
2.5	50.8	84	97.1	90	148	97	205	105	267	112	407	128	571	145	759	163
3	45.6	83	87.1	88	133	94	184	101	239	107	365	121	511	136	679	152
3.5	41.6	82	79.4	87	121	92	167	98	218	103	332	116	465	129	617	143
4	38.4	81	73.2	85	112	90	154	95	201	100	306	111	428	123	569	136
4.5	35.8	80	68.2	84	104	89	144	93	187	98	284	108	398	119	529	130
5	33.6	80	64	84	97.7	87	135	92	175	96	267	105	373	115	496	126
5.5	31.7	79	60.4	83	92.2	86	127	90	165	94	252	103	352	112	468	122
6	30.1	79	57.4	82	87.5	86	121	89	157	93	239	100	334	109	444	118
6.5	28.7	79	54.7	82	83.5	85	115	88	150	91	228	99	319	106	423	115
7	27.5	79	52.4	81	79.9	84	110	87	143	90	218	97	305	104	405	112
7.5	26.4	78	50.3	81	76.8	83	106	86	138	89	209	96	293	102	388	110
8	25.5	78	48.5	80	74	83	102	86	132	88	202	94	282	101	374	108
8.5	24.6	78	46.8	80	71.4	82	98.4	85	128	87	195	93	272	99	361	106
9	23.8	78	45.3	80	69.2	82	95.3	84	124	87	188	92	264	98	350	104
9.5	23.1	78	44	80	67.1	82	92.4	84	120	86	183	91	256	97	339	103
10	22.5	77	42.7	79	65.2	81	89.8	83	117	86	178	90	248	96	329	101

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



### HEAT TRANSFER TABLES

Nominal Pipe Size 12" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	897	200	1981	299	3410	399	5254	498	7601	598	14232	796	24276	995	38890	1193		
1.5	71.7	98	139	114	215	129	299	146	391	162	600	198	845	236	1127	277		
2	61.7	94	120	108	184	121	256	135	334	149	512	179	720	211	960	246		
2.5	54.5	92	105	103	162	115	225	127	294	139	450	165	632	193	842	223		
3	49.2	90	94.8	100	146	110	202	121	263	132	403	154	566	179	754	205		
3.5	44.9	88	86.5	98	133	107	184	116	240	126	367	146	515	168	686	192		
4	41.5	87	79.9	96	123	104	170	112	221	121	338	139	475	159	631	180		
4.5	38.7	86	74.4	94	114	101	158	109	206	117	315	134	441	152	587	171		
5	36.4	85	69.9	92	107	99	148	106	193	114	295	129	413	146	550	163		
5.5	34.4	85	66	91	101	98	140	104	182	111	278	125	390	140	518	157		
6	32.7	84	62.6	90	95.9	96	133	102	173	108	264	122	370	136	491	151		
6.5	31.2	83	59.7	89	91.4	95	126	100	165	106	251	119	352	132	468	146		
7	29.8	83	57.2	88	87.5	93	96.7	95	157	104	240	116	337	128	447	142		
7.5	28.7	82	54.9	87	84	92	116	98	151	103	230	114	323	125	429	138		
8	27.6	82	52.9	87	80.9	91	112	96	145	101	222	112	311	123	413	135		
8.5	26.7	82	51.1	86	78.1	91	108	95	137	99	214	110	300	120	398	132		
9	25.8	81	49.4	86	75.5	90	104	94	136	99	207	108	290	118	385	129		
9.5	25	81	47.9	85	73.2	89	101	93	132	98	201	106	281	116	373	126		
10	24.3	81	46.5	85	71.1	89	98.2	93	128	97	195	105	273	114	362	124		

Nominal Pipe Size 12" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	897	200	1981	299	3410	399	5254	498	7601	598	14232	796	24276	995	38890	1193		
1.5	78.3	88	150	98	230	108	318	118	414	129	633	151	889	175	1184	200		
2	66.6	86	127	94	195	102	269	111	351	120	535	138	751	158	999	180		
2.5	58.3	84	111	91	145	95	235	105	306	113	467	129	655	147	871	165		
3	52.2	83	99.6	89	152	95	210	101	273	108	417	122	584	138	777	154		
3.5	47.4	82	90.5	87	138	93	191	98	248	104	378	117	530	131	704	145		
4	43.6	81	83.2	86	127	91	175	96	228	101	348	113	487	125	646	138		
4.5	40.5	80	77.3	85	118	89	163	94	212	99	322	109	451	120	600	132		
5	38	80	72.4	84	110	88	152	92	198	97	302	106	422	116	561	127		
5.5	35.8	80	68.2	83	104	87	143	91	187	95	284	103	398	113	528	123		
6	33.9	79	64.6	82	98.6	86	136	89	177	93	269	101	376	110	500	120		
6.5	32.3	79	61.5	82	93.8	85	129	88	168	92	256	99	358	108	475	116		
7	30.8	79	58.8	81	89.6	84	124	87	161	91	245	98	342	105	454	114		
7.5	29.6	78	56.4	81	86	84	118	87	154	90	234	96	328	103	435	111		
8	28.5	78	54.2	81	82.7	83	114	86	148	89	225	95	315	102	418	109		
8.5	27.4	78	52.3	80	79.7	83	110	85	143	88	217	94	304	100	403	107		
9	26.5	78	50.5	80	77.1	82	106	85	138	87	210	93	294	99	390	105		
9.5	25.7	78	49	80	74.6	82	103	84	134	87	203	92	284	98	377	104		
10	24.9	78	47.5	79	72.4	82	99.8	84	130	86	197	91	276	96	366	102		

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



### HEAT TRANSFER TABLES

Nominal Pipe Size 14" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	982	200	2170	299	3735	399	5756	498	8329	598	15603	796	26625	995	42663	1193
1.5	81.1	99	158	116	244	133	339	150	443	167	681	205	959	245	1279	289
2	69.1	95	134	109	206	124	287	138	374	153	575	184	808	218	1078	255
2.5	60.6	93	117	105	180	117	250	129	327	142	501	169	704	198	938	230
3	54.3	91	105	101	161	112	223	123	291	134	446	158	626	183	834	211
3.5	49.4	89	95.1	99	146	108	202	118	264	128	404	149	567	172	755	196
4	45.4	88	87.5	96	134	105	186	114	242	123	371	142	520	163	692	185
4.5	42.2	87	81.2	95	125	102	172	110	225	119	343	136	482	155	641	175
5	39.6	86	76	93	117	100	161	108	210	115	321	131	450	148	599	167
5.5	37.3	85	71.6	92	110	98	152	105	198	112	302	127	423	143	563	160
6	35.4	84	67.8	90	104	97	144	103	187	110	286	123	400	138	532	154
6.5	33.7	84	64.5	89	98.8	95	137	101	178	107	271	120	380	134	506	149
7	32.2	83	61.6	89	94.4	94	130	100	170	105	259	117	363	130	483	144
7.5	30.9	83	59.1	88	90.4	93	125	98	163	104	248	115	348	127	462	140
8	29.7	82	56.8	87	86.9	92	120	97	156	102	238	113	334	124	444	137
8.5	28.6	82	54.8	87	83.8	91	116	96	151	101	230	111	322	122	428	133
9	27.7	82	52.9	86	81	90	112	95	146	99	222	109	311	119	413	131
9.5	26.8	81	51.3	85	78.4	90	108	94	141	98	215	107	301	117	400	128
10	26	81	49.7	85	76.1	89	105	93	137	97	208	106	292	115	387	125

Nominal Pipe Size 14" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	982	200	2170	299	3735	399	5756	498	8329	598	15603	796	26625	995	42663	1193
1.5	89	89	171	99	261	110	362	121	471	132	721	156	1013	181	1349	207
2	74.8	86	143	95	219	104	303	113	394	122	602	142	845	163	1125	185
2.5	64.9	84	124	92	190	99	262	107	341	115	521	132	731	150	972	169
3	57.7	83	110	89	169	96	233	103	303	110	462	125	647	141	861	157
3.5	52.2	82	99.7	88	152	93	210	99	273	106	417	119	584	133	776	148
4	47.8	81	91.3	86	139	91	192	97	250	102	381	114	534	127	709	141
4.5	44.3	81	84.5	85	129	90	178	95	231	100	352	110	494	122	655	134
5	41.3	80	78.8	84	120	88	166	93	216	97	329	107	460	118	611	129
5.5	38.9	80	74.1	83	113	87	156	91	203	96	309	105	432	114	574	125
6	36.7	79	70	83	107	86	147	90	191	94	204	95	408	111	542	121
6.5	34.9	79	66.5	82	101	85	140	89	182	93	277	100	387	109	514	118
7	33.3	79	63.4	82	96.7	85	133	88	173	91	264	99	369	107	490	115
7.5	31.9	79	60.7	81	92.6	84	128	87	166	90	253	97	226	95	469	113
8	30.6	78	58.3	81	88.9	84	123	86	159	89	242	96	339	103	450	110
8.5	29.5	78	56.1	80	85.6	83	118	86	153	88	233	95	326	101	433	108
9	28.5	78	54.2	80	82.6	83	114	85	148	88	225	93	315	100	418	106
9.5	27.5	78	52.4	80	80	82	110	85	143	87	218	92	305	98	404	105
10	26.7	78	50.8	80	77.5	82	107	84	139	86	211	92	295	97	392	103

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F

### HEAT TRANSFER TABLES

Nominal Pipe Size 16" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	1117	200	2470	299	4255	399	6558	498	9494	598	17795	796	30379	995	48697	1193
1.5	91.1	99	177	117	274	133	381	151	498	169	765	207	1078	248	1438	292
2	77.4	96	150	110	231	124	321	139	420	154	644	186	906	220	1208	257
2.5	67.7	93	131	105	202	118	280	130	365	143	560	171	787	201	1048	232
3	60.5	91	117	102	180	113	249	124	325	135	497	159	699	185	931	214
3.5	54.9	89	106	99	163	109	225	119	294	129	449	150	631	174	841	199
4	50.4	88	97.1	97	149	106	206	115	269	124	412	143	578	164	769	187
4.5	46.8	87	90	95	138	103	191	111	249	120	381	137	534	157	711	177
5	43.8	86	84.1	93	129	101	178	108	232	116	355	132	498	150	663	169
5.5	41.2	85	79.1	92	121	99	168	106	218	113	334	128	468	144	622	162
6	39	84	74.8	91	115	97	158	104	206	110	315	125	442	140	587	156
6.5	37	84	71	90	109	96	150	102	196	108	299	121	419	135	557	151
7	35.4	83	67.8	89	104	95	143	100	187	106	285	118	399	132	531	146
7.5	33.9	83	64.9	88	99.3	93	110	95	179	104	273	116	382	128	508	142
8	32.5	82	62.3	87	95.3	92	132	98	171	103	262	114	367	126	487	138
8.5	31.3	82	60	87	91.8	92	127	96	165	101	252	112	353	123	469	135
9	30.3	82	57.9	86	88.6	91	122	95	159	100	243	110	340	121	452	132
9.5	29.3	81	56	86	85.7	90	118	94	154	99	235	108	329	118	437	129
10	28.4	81	54.3	85	83	89	115	94	149	98	227	107	319	116	423	127

Nominal Pipe Size 16" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	1117	200	2470	299	4255	399	6558	498	9494	598	17795	796	30379	995	48697	1193
1.5	100	89	192	99	294	110	407	121	530	133	811	157	1140	182	1518	209
2	83.9	86	161	95	246	104	339	113	442	123	676	143	948	164	1262	187
2.5	72.6	85	139	92	212	100	293	108	382	116	583	133	818	151	1088	171
3	64.4	83	123	90	188	96	260	103	338	110	516	125	723	142	961	159
3.5	58.1	82	111	88	170	94	234	100	304	106	464	120	650	134	864	149
4	53.1	81	101	87	155	92	214	97	278	103	424	115	593	128	788	142
4.5	49.1	81	93.7	85	143	90	197	95	257	100	391	111	547	123	727	136
5	45.8	80	87.3	84	133	89	184	93	239	98	364	108	509	119	677	130
5.5	42.9	80	81.9	84	125	88	172	92	224	96	341	105	478	115	634	126
6	40.5	79	77.2	83	118	87	163	90	211	94	322	103	450	112	598	122
6.5	38.4	79	73.3	82	112	86	154	89	200	93	305	101	427	110	567	119
7	36.6	79	69.8	82	106	85	147	88	191	92	290	99	406	107	539	116
7.5	35	79	66.7	81	102	84	140	87	182	91	278	98	388	105	515	114
8	33.6	78	64	81	97.6	84	134	87	175	90	266	96	372	103	494	111
8.5	32.3	78	61.5	81	93.8	83	129	86	168	89	256	95	358	102	475	109
9	31.1	78	59.3	80	90.5	83	125	85	162	88	247	94	345	100	458	107
9.5	30.1	78	57.3	80	87.4	82	120	85	157	87	238	93	333	99	442	106
10	29.2	78	55.5	80	84.7	82	117	84	152	87	231	92	323	98	428	104

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



### HEAT TRANSFER TABLES

Nominal Pipe Size 18" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	1253	200	2770	299	4773	399	7360	498	10657	598	19985	796	34131	995	54728	1193
1.5	101	100	197	117	304	134	422	152	553	170	849	208	1196	250	1596	295
2	80.3	95	166	111	256	125	356	140	465	155	713	187	1004	222	1338	260
2.5	74.7	93	145	106	223	118	309	131	403	144	618	172	870	202	1159	235
3	66.7	91	129	102	198	113	274	125	358	136	549	161	771	187	1027	216
3.5	60.4	90	116	99	179	109	248	119	323	130	495	152	695	175	926	201
4	55.4	88	107	97	164	106	227	115	296	125	452	144	635	166	846	189
4.5	51.3	87	98.7	95	151	103	210	112	273	120	418	139	586	158	780	179
5	47.9	86	92.1	94	141	101	195	109	255	117	389	133	546	151	726	171
5.5	45	85	86.5	92	133	99	183	106	239	114	365	129	512	146	681	164
6	42.6	85	81.7	91	125	98	173	104	225	111	344	126	483	141	642	157
6.5	40.4	84	77.5	90	119	96	164	102	214	109	326	122	457	137	608	152
7	38.5	83	73.9	89	113	95	156	101	204	107	311	119	435	133	579	147
7.5	36.9	83	70.6	88	108	94	149	99	195	105	297	117	416	130	553	143
8	35.4	83	67.8	88	104	93	143	98	186	103	285	115	399	127	530	140
8.5	34	82	65.2	87	99.7	92	138	97	179	102	274	113	383	124	509	136
9	32.8	82	62.9	87	96.1	91	133	96	173	101	264	111	369	122	491	133
9.5	31.7	82	60.7	86	92.9	90	128	95	167	100	255	109	357	119	474	131
10	30.7	81	58.8	85	89.9	90	124	94	162	98	246	108	345	117	458	128

Nominal Pipe Size 18" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	1253	200	2770	299	4773	399	7360	498	10657	598	19985	796	34131	995	54728	1193
1.5	111	89	213	100	327	111	452	122	589	133	901	158	1266	183	1687	210
2	92.9	87	178	95	272	104	376	114	490	123	749	144	1051	165	1399	188
2.5	80.3	85	154	92	235	100	324	108	422	116	645	134	904	152	1203	172
3	71.1	83	136	90	208	97	287	104	373	111	569	126	798	143	1061	160
3.5	64	82	122	88	187	94	258	100	335	107	512	120	717	135	952	151
4	58.4	82	112	87	170	92	235	98	306	103	466	116	653	129	867	143
4.5	53.9	81	103	86	157	90	217	95	282	101	429	112	601	124	799	137
5	50.2	80	95.7	85	146	89	201	94	262	98	399	109	559	120	742	132
5.5	47	80	89.6	84	137	88	189	92	245	97	374	106	523	116	694	127
6	44.3	80	84.4	83	129	87	178	91	231	95	352	104	492	113	654	123
6.5	42	79	80	83	122	86	168	90	219	93	333	102	466	110	619	120
7	39.9	79	76.1	82	116	85	160	89	208	92	317	100	443	108	588	117
7.5	38.1	79	72.6	82	111	85	153	88	199	91	302	98	423	106	561	114
8	36.5	79	69.6	81	106	84	146	87	190	90	290	97	405	104	537	112
8.5	35.1	78	66.9	81	102	83	141	86	183	89	278	96	389	103	516	110
9	33.8	78	64.4	80	98.2	83	135	86	176	88	268	94	375	101	497	108
9.5	32.7	78	62.2	80	94.8	83	131	85	170	88	259	93	362	100	480	106
10	31.6	78	60.2	80	91.7	82	126	85	164	87	250	93	350	98	464	105

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



### HEAT TRANSFER TABLES

Nominal Pipe Size 20" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	1388	200	3070	299	5291	399	8160	498	11819	598	22174	796	37881	995	60755	1193
1.5	111	100	216	117	334	135	464	152	607	171	933	209	1315	251	1754	297
2	93.9	96	182	111	281	125	390	140	510	156	782	188	1101	224	1468	262
2.5	81.8	93	158	106	244	119	338	132	442	145	677	173	952	204	1269	236
3	72.9	91	141	103	216	114	300	125	392	137	600	162	843	189	1123	217
3.5	65.9	90	127	100	195	110	271	120	353	131	540	153	759	177	1011	203
4	60.4	88	116	98	179	107	247	116	322	125	493	145	692	167	922	191
4.5	55.8	87	107	96	165	104	228	112	297	121	455	139	638	159	850	181
5	55.8	87	107	96	165	104	228	112	297	121	455	139	638	159	850	181
5.5	52.1	86	100	94	154	102	212	109	277	118	423	134	594	153	790	172
6	48.9	86	93.9	93	144	100	199	107	259	114	396	130	556	147	739	165
6.5	46.1	85	88.6	91	136	98	188	105	244	112	373	126	524	142	696	159
7	43.8	84	84	90	129	97	178	103	232	109	354	123	496	138	659	154
7.5	41.7	84	79.9	90	122	95	169	101	220	107	336	120	471	134	626	149
8	39.8	83	76.3	89	117	94	161	100	210	106	321	118	450	131	598	145
8.5	38.2	83	73.2	88	112	93	155	99	201	104	307	115	431	128	572	141
9	36.7	82	70.3	87	108	92	149	97	193	103	295	113	414	125	549	138
9.5	35.4	82	67.8	87	104	91	143	96	186	101	284	111	398	123	529	135
10	34.2	82	65.4	86	100	91	138	95	137	95	274	110	384	120	510	132

Nominal Pipe Size 20" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	1388	200	3070	299	5291	399	8160	498	11819	598	22174	796	37881	995	60755	1193
1.5	122	89	234	100	359	111	497	122	648	134	991	158	1393	184	1855	211
2	102	87	195	96	299	105	413	114	538	124	822	144	1154	166	1536	189
2.5	88	85	168	92	257	100	355	108	463	117	707	134	991	153	1318	173
3	77.7	84	149	90	227	97	314	104	408	111	623	127	873	143	1160	161
3.5	69.9	83	134	88	204	94	282	101	366	107	559	121	783	136	1040	152
4	63.7	82	122	87	186	92	256	98	333	104	508	116	712	130	946	144
4.5	58.7	81	112	86	171	91	236	96	307	101	468	112	655	125	870	138
5	58.7	81	112	86	171	91	236	96	307	101	468	112	655	125	870	138
5.5	54.5	80	104	85	159	89	219	94	285	99	434	109	608	120	807	132
6	51	80	97.3	84	149	88	205	92	266	97	406	106	568	117	754	128
6.5	48.1	80	91.6	83	140	87	193	91	251	95	382	104	534	114	709	124
7	45.5	79	86.7	83	132	86	182	90	237	94	361	102	505	111	671	121
7.5	43.2	79	82.4	82	126	85	173	89	225	92	343	100	480	109	637	118
8	41.2	79	78.6	82	120	85	165	88	215	91	327	99	457	107	607	115
8.5	39.5	79	75.2	81	115	84	158	87	206	90	313	97	438	105	581	113
9	37.9	78	72.2	81	110	84	152	86	197	89	300	96	420	103	557	111
9.5	36.5	78	69.5	81	106	83	146	86	190	89	289	95	404	102	536	109
10	35.2	78	67	80	102	83	141	85	183	88	279	94	390	100	517	107

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F

### HEAT TRANSFER TABLES

Nominal Pipe Size 24" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	1658	200	3668	299	6325	399	9759	498	14141	598	26547	796	45375	995	72804	1193		
1.5	131	100	255	118	394	136	547	154	716	172	1101	211	1551	254	2070	300		
2	110	97	214	111	330	126	459	141	600	157	920	190	1295	226	1728	265		
2.5	95.9	94	186	107	286	120	397	133	518	146	795	175	1118	206	1490	240		
3	85.2	92	165	103	253	115	351	126	458	138	702	164	987	191	1314	220		
3.5	76.9	90	148	100	228	111	316	121	412	132	631	154	886	179	1180	205		
4	70.3	89	135	98	208	107	288	117	375	126	574	147	807	169	1074	193		
4.5	64.8	88	125	96	192	105	265	113	346	122	529	141	742	161	987	183		
5	60.3	87	116	95	178	102	246	110	321	119	491	136	689	155	916	175		
5.5	56.5	86	109	93	167	100	230	108	300	116	459	132	643	149	856	167		
6	53.3	85	102	92	157	99	217	106	282	113	431	128	605	144	804	161		
6.5	50.4	84	96.8	91	148	97	205	104	267	110	408	125	572	140	760	156		
7	47.9	84	91.9	90	141	96	195	102	253	108	387	122	543	136	721	151		
7.5	45.7	83	87.7	89	134	95	186	101	242	107	369	119	517	132	687	147		
8	43.8	83	83.9	88	128	94	177	99	231	105	353	117	494	129	657	143		
8.5	42	83	80.5	88	123	93	170	98	222	103	338	115	474	127	630	140		
9	40.5	82	77.5	87	119	92	164	97	213	102	325	113	455	124	605	136		
9.5	39	82	74.7	87	114	91	158	96	205	101	313	111	439	122	583	134		
10	37.7	82	72.2	86	110	91	152	95	198	100	303	109	424	120	563	131		

Nominal Pipe Size 24" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)																	
	200		300		400		500		600		800		1000		1200			
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST		
Bare	1658	200	3668	299	6325	399	9759	498	14141	598	26547	796	45375	995	72804	1193		
1.5	144	89	277	100	424	111	587	123	765	135	1171	159	1645	185	2192	213		
2	120	87	230	96	352	105	486	115	634	125	968	145	1359	167	1809	191		
2.5	103	85	198	93	302	101	417	109	544	117	830	135	1164	154	1549	175		
3	91	84	174	90	266	97	367	105	478	112	729	128	1022	145	1359	163		
3.5	81.7	83	156	89	238	95	329	101	428	108	653	122	915	137	1216	153		
4	74.3	82	142	87	216	93	299	98	389	105	593	117	830	131	1103	146		
4.5	68.2	81	130	86	199	91	274	96	357	102	544	113	762	126	1012	139		
5	63.3	81	121	85	184	90	254	94	331	99	504	110	705	122	937	134		
5.5	59.1	80	113	84	172	88	237	93	309	98	470	107	658	118	874	129		
6	55.5	80	106	84	162	87	223	91	290	96	441	105	618	115	820	125		
6.5	52.5	79	100	83	153	87	210	90	274	94	417	103	583	112	774	122		
7	49.8	79	94.8	82	145	86	200	89	259	93	395	101	553	110	734	119		
7.5	47.4	79	90.3	82	138	85	190	88	247	92	376	99	526	108	698	116		
8	45.3	79	86.3	81	132	84	181	88	236	91	359	98	502	106	667	114		
8.5	43.4	78	82.7	81	126	84	174	87	226	90	344	97	481	104	639	112		
9	41.7	78	79.5	81	121	83	167	86	217	89	331	96	462	102	614	110		
9.5	40.2	78	76.6	80	117	83	161	86	209	88	318	95	445	101	591	108		
10	38.8	78	73.9	80	113	83	155	85	202	88	307	94	430	100	563	105		

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



### HEAT TRANSFER TABLES

Nominal Pipe Size 30" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	2061	200	4564	299	7873	399	12154	498	17617	598	33098	796	56606	995	90863	1193
1.5	160	101	313	119	483	136	672	155	880	174	1352	214	1905	257	2543	303
2	135	97	262	112	404	127	561	143	734	159	1127	192	1587	229	2116	268
2.5	117	94	227	107	349	121	484	134	633	148	970	177	1365	209	1819	243
3	104	92	200	104	308	115	427	127	558	140	855	166	1202	193	1601	223
3.5	93.3	90	180	101	277	111	383	122	500	133	766	156	1076	181	1434	208
4	85	89	164	99	252	108	349	118	455	128	696	149	977	172	1301	196
4.5	78.3	88	151	97	231	105	320	114	418	124	639	143	897	164	1194	186
5	72.7	87	140	95	214	103	297	111	387	120	592	138	830	157	1105	177
5.5	67.9	86	131	94	200	101	277	109	361	117	552	133	774	151	1030	170
6	63.9	85	123	92	188	99	260	107	339	114	518	129	726	146	966	164
6.5	60.4	85	116	91	149	95	245	105	320	112	488	126	685	142	911	158
7	57.3	84	110	90	168	97	233	103	303	109	463	123	649	138	862	154
7.5	54.5	84	105	90	160	96	221	101	288	108	440	120	617	134	820	149
8	52.1	83	99.9	89	153	94	211	100	275	106	420	118	589	131	782	145
8.5	49.9	83	95.7	88	146	94	162	95	263	104	402	116	563	128	749	142
9	48	82	91.9	88	141	93	194	98	253	103	386	114	541	126	718	139
9.5	46.2	82	88.5	87	135	92	187	97	243	102	371	112	520	124	691	136
10	44.6	82	85.4	87	131	91	180	96	235	101	358	111	501	122	666	133

Nominal Pipe Size 30" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	2061	200	4564	299	7873	399	12154	498	17617	598	33098	796	56606	995	90863	1193
1.5	177	90	340	101	522	112	722	124	941	136	1440	161	2024	187	2697	214
2	147	87	282	96	431	106	596	115	777	125	1187	147	1667	169	2219	192
2.5	126	85	241	93	369	101	510	110	664	118	1015	137	1423	156	1893	177
3	111	84	212	91	324	98	448	105	583	113	889	129	1246	146	1657	164
3.5	99.2	83	190	89	290	95	400	102	520	109	794	123	1112	139	1478	155
4	90	82	172	88	262	93	292	95	471	105	718	118	1006	132	1337	147
4.5	82.5	81	157	86	240	92	332	97	432	103	658	114	921	127	1224	141
5	76.3	81	146	85	222	90	307	95	306	95	608	111	851	123	1130	136
5.5	71.1	80	136	85	207	89	286	93	371	98	566	108	792	119	1052	131
6	66.7	80	127	84	194	88	268	92	348	96	530	106	742	116	985	127
6.5	62.9	80	120	83	183	87	252	91	328	95	499	104	699	113	928	124
7	59.5	79	113	83	173	86	239	90	310	94	473	102	661	111	878	121
7.5	56.6	79	108	82	165	85	227	89	295	92	449	100	628	109	834	118
8	54	79	103	82	157	85	216	88	281	91	428	99	599	107	795	115
8.5	51.6	79	98.4	81	150	84	207	87	269	91	409	98	573	105	760	113
9	49.5	78	94.4	81	144	84	198	87	258	90	393	96	549	104	729	111
9.5	47.7	78	90.8	81	138	83	191	86	248	89	377	95	528	102	701	110
10	45.9	78	87.5	80	133	83	184	86	239	88	364	94	509	101	675	108

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F

### HEAT TRANSFER TABLES

Nominal Pipe Size 36" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	2464	200	5457	299	9418	399	14544	498	21089	598	39642	797	67827	995	108911	1193
1.5	190	101	371	119	573	137	797	156	1043	175	1604	215	2259	259	3015	306
2	160	97	310	113	478	128	664	144	868	160	1334	194	1877	231	2504	271
2.5	138	94	267	108	412	121	572	135	747	149	1146	179	1612	211	2148	245
3	122	92	236	104	363	116	503	128	657	141	1007	167	1416	195	1887	226
3.5	110	91	212	101	325	112	451	123	588	134	901	158	1266	183	1686	211
4	99.7	89	192	99	295	109	409	119	534	129	817	150	1147	173	1528	198
4.5	91.7	88	177	97	271	106	375	115	489	124	749	144	1051	165	1399	188
5	85	87	164	95	251	104	347	112	453	121	692	139	971	159	1293	180
5.5	79.3	86	152	94	234	102	323	110	422	118	645	135	904	153	1203	172
6	74.4	86	143	93	219	100	303	107	395	115	604	131	847	148	1127	166
6.5	70.2	85	135	92	207	99	286	105	372	112	569	127	797	143	1061	160
7	66.5	84	128	91	196	97	270	104	352	110	538	124	754	139	1003	155
7.5	63.3	84	121	90	186	96	257	102	335	108	511	122	716	136	952	151
8	60.4	83	116	89	177	95	245	101	319	107	487	119	682	133	907	147
8.5	57.8	83	111	89	170	94	234	100	305	105	465	117	652	130	867	144
9	55.5	83	106	88	163	93	225	98	292	104	446	115	625	127	831	140
9.5	53.3	82	102	87	156	92	216	97	281	103	429	113	601	125	798	138
10	51.4	82	98.4	87	151	92	208	96	271	101	413	112	578	123	769	135

Nominal Pipe Size 36" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	2464	200	5457	299	9418	399	14544	498	21089	598	39642	797	67827	995	108911	1193
1.5	210	90	404	101	619	112	856	124	1117	136	1709	161	2402	188	3201	216
2	174	87	334	97	511	106	706	116	920	126	1406	147	1974	170	2628	194
2.5	149	85	285	93	436	102	603	110	785	119	1199	137	1682	157	2238	178
3	131	84	250	91	382	98	528	106	687	113	1049	130	1470	147	1955	166
3.5	117	83	223	89	341	96	471	102	612	109	934	124	1309	140	1740	156
4	106	82	202	88	308	94	425	100	554	106	844	119	1182	133	1571	148
4.5	96.7	82	185	87	282	92	389	97	506	103	771	115	1080	128	1435	142
5	89.3	81	170	86	260	90	359	95	467	101	712	112	996	124	1323	137
5.5	83.1	80	159	85	242	89	334	94	434	99	661	109	926	120	1229	132
6	77.8	80	148	84	226	88	312	92	406	97	619	107	866	117	1150	128
6.5	73.2	80	140	83	213	87	294	91	382	95	582	104	814	114	1081	125
7	69.2	79	132	83	201	86	278	90	361	94	550	103	769	112	1021	122
7.5	65.7	79	125	82	191	86	263	89	342	93	521	101	730	110	969	119
8	62.6	79	119	82	182	85	251	88	326	92	497	99	695	108	922	117
8.5	59.8	79	114	82	174	85	240	88	312	91	474	98	663	106	880	114
9	57.3	79	109	81	167	84	230	87	298	90	454	97	635	104	843	112
9.5	55.1	78	105	81	160	84	220	86	287	89	436	96	610	103	810	111
10	53	78	101	81	154	83	212	86	276	89	420	95	587	102	779	109

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



### HEAT TRANSFER TABLES

Nominal Pipe Size 48" Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	3267	200	7241	299	12503	399	19317	498	28023	598	52716	797	90250	995	144982	1193
1.5	249	101	486	120	752	138	1046	157	1369	176	2105	217	2966	262	3959	309
2	209	98	405	113	626	129	869	145	1137	161	1746	196	2458	233	3279	274
2.5	180	95	349	108	538	122	746	136	975	150	1496	181	2105	213	2806	248
3	159	93	307	105	473	117	655	129	856	142	1312	169	1844	198	2458	229
3.5	142	91	275	102	422	113	585	124	764	136	1171	160	1645	186	2191	214
4	129	90	249	100	383	110	530	120	692	130	1059	152	1487	176	1980	201
4.5	118	89	228	98	350	107	485	116	633	126	968	146	1359	168	1809	191
5	109	88	211	96	323	105	448	113	584	122	893	141	1253	161	1667	182
5.5	102	87	196	95	301	103	416	111	543	119	829	136	1164	155	1548	175
6	95.5	86	184	93	281	101	389	108	507	116	775	132	1088	150	1447	169
6.5	89.9	85	173	92	265	99	366	106	477	114	729	129	1022	145	1359	163
7	85	85	163	91	210	95	346	105	450	112	688	126	965	141	1283	158
7.5	80.7	84	155	91	237	97	328	103	427	110	652	123	914	138	1215	154
8	76.8	84	147	90	226	96	312	102	406	108	620	121	869	135	1156	150
8.5	73.4	83	141	89	215	95	298	100	388	106	592	119	829	132	1102	146
9	70.3	83	135	88	206	94	285	99	371	105	566	117	793	129	1055	143
9.5	67.5	83	129	88	198	93	273	98	356	104	543	115	761	127	1011	140
10	64.9	82	124	87	190	92	263	97	342	102	522	113	731	125	972	137

Nominal Pipe Size 48" Dull Surface

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	3267	200	7241	299	12503	399	19317	498	28023	598	52716	797	90250	995	144982	1193
1.5	277	90	531	101	813	113	1126	125	1468	137	2247	162	3158	189	4209	217
2	228	87	437	97	669	107	925	116	1206	127	1843	148	2588	171	3446	196
2.5	195	86	373	94	570	102	788	111	1026	120	1568	138	2199	158	2926	180
3	170	84	326	91	498	99	688	106	896	114	1367	131	1917	149	2549	167
3.5	152	83	290	90	443	96	612	103	796	110	1215	125	1702	141	2263	158
4	137	82	262	88	400	94	552	100	718	107	1095	120	1534	135	2038	150
4.5	125	82	239	87	365	92	503	98	655	104	998	116	1398	130	1858	144
5	115	81	220	86	336	91	463	96	603	101	919	113	1286	125	1709	138
5.5	107	81	204	85	312	90	430	94	559	99	852	110	1193	121	1584	134
6	100	80	191	84	291	89	401	93	522	98	795	108	1113	118	1478	130
6.5	93.9	80	179	84	273	88	377	92	490	96	746	105	1044	115	1386	126
7	88.6	80	169	83	258	87	355	91	462	95	703	104	984	113	1307	123
7.5	83.9	79	160	83	244	86	336	90	437	94	666	102	932	111	1237	120
8	79.8	79	152	82	232	85	320	89	416	93	633	100	885	109	1175	118
8.5	76.1	79	145	82	221	85	305	88	396	92	603	99	844	107	1120	116
9	72.8	79	139	81	211	84	291	88	379	91	577	98	807	105	1071	114
9.5	69.8	78	133	81	203	84	279	87	363	90	553	97	773	104	1026	112
10	67	78	128	81	195	84	268	86	349	89	531	96	743	103	986	110

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F

### HEAT TRANSFER TABLES

#### Vertical Flat, Metal Jacket

Insulation Thickness (inches)	Pipe Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	261	200	579	300	1000	399	1545	499	2241	599	4217	798	7222	997	11606	1196
1	32.8	116	64.4	146	100	175	140	206	184	237	285	304	402	375	538	451
1.5	23.9	108	46.9	130	72.8	153	102	176	133	200	205	251	289	307	386	366
2	18.9	102	37	121	57.2	139	79.6	159	104	178	160	220	226	266	302	314
2.5	15.7	98	30.5	114	47.1	130	65.5	147	85.7	164	132	199	185	238	247	280
3	13.4	96	26	110	40.1	124	55.7	138	72.8	153	112	184	157	218	210	255
3.5	11.7	93	22.7	106	34.9	119	48.4	132	63.3	145	97	173	136	203	182	236
4	10.4	92	20.1	103	30.9	115	42.9	126	56	138	85.8	164	121	191	161	221
4.5	9.4	90	18.1	101	27.8	111	38.5	122	50.2	133	76.9	156	108	181	144	208
5	8.5	89	16.4	99	25.2	109	34.9	119	45.5	129	69.6	150	97.8	173	130	198
5.5	7.8	88	15	97	23	107	31.9	116	41.6	125	63.7	145	89.4	167	119	190
6	7.2	88	13.8	96	21.2	105	29.4	113	38.3	122	58.6	141	82.3	161	110	183
6.5	6.7	87	12.8	95	19.7	103	27.3	111	35.5	119	54.3	137	76.3	156	101	176
7	6.2	86	12	94	18.4	101	25.4	109	33.1	117	50.6	134	71	151	94.5	171
7.5	5.8	86	11.2	93	17.2	100	23.8	107	31	115	47.4	131	66.5	148	88.4	166
8	5.5	85	10.6	92	16.2	99	22.4	106	29.2	113	44.6	128	62.5	144	83.1	162
8.5	5.2	85	10	91	15.3	98	21.1	104	27.5	111	42	126	59	141	78.4	158
9	4.9	84	9.4	91	14.5	97	20	103	26.1	110	39.8	123	55.8	138	74.2	154
9.5	4.7	84	9	90	13.7	96	19	102	24.7	108	37.8	121	53	136	70.4	151
10	4.5	84	8.5	89	13.1	95	18.1	101	23.6	107	36	120	50.4	133	67	148

#### Vertical Flat, Dull Surface

Insulation Thickness (inches)	Operating Temperature (°F)															
	200		300		400		500		600		800		1000		1200	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
Bare	261	200	579	300	1000	399	1545	499	2241	599	4217	798	7222	997	11606	1196
1	38.3	101	74.1	120	114	140	159	159	208	179	320	221	453	263	606	307
1.5	27.2	94	52.3	109	80.3	123	111	138	145	154	223	185	314	219	419	253
2	21.1	90	40.4	102	62	114	85.8	126	112	139	171	165	241	192	321	221
2.5	17.2	88	33	98	50.5	108	69.8	118	91	129	139	151	195	175	260	200
3	14.6	86	27.9	95	42.6	103	58.9	112	76.7	122	117	141	164	162	219	184
3.5	12.6	85	24.1	92	36.9	100	50.9	108	66.3	116	101	134	142	152	189	172
4	11.1	84	21.3	90	32.5	97	44.9	105	58.4	112	89.1	128	125	145	166	163
4.5	10	83	19	89	29.1	95	40.1	102	52.2	109	79.6	123	112	138	148	155
5	9	82	17.2	88	26.3	94	36.3	100	47.2	106	71.9	119	101	133	134	149
5.5	8.2	82	15.7	87	24	92	33.1	98	43	104	65.6	116	91.9	129	122	143
6	7.6	81	14.4	86	22.1	91	30.4	96	39.6	102	60.3	113	84.5	125	112	139
6.5	7	81	13.4	85	20.4	90	28.2	95	36.6	100	55.8	111	78.1	122	104	135
7	6.5	80	12.4	85	19	89	26.2	94	34.1	98	51.9	108	72.7	120	96.5	131
7.5	6.1	80	11.6	84	17.8	88	24.5	93	31.9	97	48.6	107	68	117	90.3	128
8	5.7	80	10.9	84	16.7	88	23	92	29.9	96	45.6	105	63.8	115	84.7	126
8.5	5.4	80	10.3	83	15.7	87	21.7	91	28.2	95	43	103	60.1	113	79.8	123
9	5.1	79	9.8	83	14.9	86	20.5	90	26.7	94	40.6	102	56.9	111	75.5	121
9.5	4.9	79	9.3	82	14.1	86	19.5	89	25.3	93	38.5	101	53.9	110	71.6	119
10	4.6	79	8.8	82	13.4	85	18.5	89	24.1	92	36.7	100	51.3	108	68.1	117

HL = Heat Loss of Piping, Btu/hr/linear ft of pipe  
 ST = Surface Temperature, °F



For current information such as Safety Data Sheets (SDS), product data sheets, and other pertinent information, please go to the website at [www.jm.com/industrial.com](http://www.jm.com/industrial.com)

Industrial Insulation Group, LLC manufactures MinWool-1200<sup>®</sup> mineral fiber pipe, block and a variety of other insulations; Thermo-12<sup>®</sup> Gold Calcium Silicate pipe and block insulation; Microporous Blanket Insulation; Super Firetemp<sup>®</sup> fireproofing board; SprouleWR-1200<sup>®</sup> Perlite pipe and block insulation; high-temperature adhesives, and insulating finishing cement. The physical and chemical properties presented herein represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Numerical flame spread and smoke developed ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions. Check with the Customer Service Office to assure current information. All Industrial Insulation Group products are sold subject to the Johns Manville Limited Warranty and Limitation of Remedy. For a copy of the Johns Manville Limited Warranty and Limitation of Remedy, email [info.industrial@jm.com](mailto:info.industrial@jm.com).

**CUSTOMER SERVICE**  
**TECHNICAL & GENERAL INFORMATION**  
**(800) 866-3234**

The logo for Johns Manville Industrial Insulation Group, featuring a stylized 'JM' monogram to the left of the company name and address.

**Johns Manville**  
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