

PRESSURE-TEMPERATURE RATINGS of Seamless Pipe Used in Power Plant Piping Systems

Prepared
by
**THE ENGINEERING COMMITTEE
OF THE
PIPE FABRICATION INSTITUTE**

This information is derived from the formula and stress values contained in the Power Piping Section ASME B31.1 of the American Society of Mechanical Engineers Code for Pressure Piping. Usage of these as maximum values is mandatory for piping systems within the jurisdiction of this Code.

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INTRODUCTION

This bulletin contains pressure-temperature ratings of carbon, low alloy and stainless steel pipe commonly used in power plant piping systems within the scope of the Power Piping Section of the American Society of Mechanical Engineers Code for Pressure Piping ASME B31.1, and for 4" nominal size and larger used under ASME Boiler and Pressure Vessel Code Section I. No allowances have been included in these ratings for

corrosion, erosion, or for fabrication tolerances, such as thinning due to bending. The allowable stress values and formulae used are in accordance with the B31.1 Code at the time of this publication. Pipe wall thicknesses and weights are as given in ANSI B36.10, except stainless steel in schedules 5S, 10S, 40S, and 80S which conform to ANSI B36.19.

The following formula, as given in Paragraph 104.1.2 of ASME B31.1, was used for the pressure temperature ratings published in this bulletin. This bulletin is applicable only to those Codes which use the following formula:

$$P = \frac{2SE (t_m - A)}{D_o - 2y (t_m - A)}$$

The above formula for allowable pressure can be rewritten in the form:

$$P = SE \times K$$

$$\text{where } K = \frac{2 (t_m - A)}{D_o - 2y (t_m - A)}$$

Values of K have been tabulated for various combinations D_o , t_m and y (in the tables on pages 3 through 22). To obtain allowable pressures for stress values other than those given in these Pressure-Temperature tables, multiply the allowable SE value by the appropriate K factor.

- t_m = Minimum pipe wall thickness in inches (87½% of nominal wall thickness expressed to three decimal places, in accordance with the Rounding-Off Method under ASTM Spec. E29).
- P = Maximum internal design pressure in pounds per sq. inch gauge.
- D_o = Outside diameter of pipe in inches.
- d = Maximum inside diameter of pipe in inches = $D_o - 2t_m$.
- SE = Maximum allowable stress in material due to internal pressure and joint efficiency at the design temperature, in psi. The value of SE shall not exceed that given in Appendix A of ASME B31.1, for the respective material and design temperature. These values include the weld joint efficiency E.
- A = 0.000" — Refer to paragraph 104.1.2. of ASME B31.1 for requirements. No allowance has been made herein for A. If such allowance is required, as determined by the designer, it shall be included in the formula above and the reduced allowable pressure calculated thereunder.
- y = A coefficient having values as follows

900(1)		950	1000	1050	1100	1150&above
Temperature °F	and below					
Ferritic Steels	0.4	0.5	0.7	0.7	0.7	0.7
Austenitic Steels	0.4	0.4	0.4	0.4	0.5	0.7

GENERAL NOTE: The value of y may be interpolated between the 50° values shown.

NOTE(1): For pipe with a D_o/t_m ratio less than 6, the value of y for ferritic and austenitic steels designed for temperatures of 900°F and below shall be taken as:

$$y = \frac{d}{d + D_o}$$

ASME B31.1 cautions that consideration should be given to the possibility of graphite formation under prolonged exposure of carbon steels to temperatures above 775°F. In view of this, ratings are not tabulated in this bulletin for temperatures above 775°F for carbon steels.

Ratings for low chrome-moly steels terminate at temperature limits which are dictated by general practice based on both economics and availability.

The ratings on pages 15 through 22 reflect the use of the higher of the two stress values permitted in ASME B31.1. Refer to note (9) in Table A-3 of Appendix A of this Code.

Pressure—Temperature Ratings

of Plain End

Seamless Carbon Steel Pipe to ASTM A53 Grade B and ASTM A106 Grade B

TEMPERATURE, DEGREES F. —————→				—20 TO 650	700	750	775
ALLOWABLE STRESS "S" PSI —————→				15,000	14,400	13,000	11,900
PIPE SIZE INCHES	SCHED- ULE NUMBER	WALL DESIG- NATION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI			
$\frac{1}{2}$ (0.840)	40	STD.	0.109	3730	3581	3233	2959
	80	XS	0.147	5252	5042	4552	4167
	160	—	0.188	6920	6643	5997	5490
	—	XXS	0.294	11073	10630	9597	8785
$\frac{3}{4}$ (1.050)	40	STD.	0.113	3059	2937	2651	2427
	80	XS	0.154	4299	4127	3726	3411
	160	—	0.219	6393	6137	5541	5072
	—	XXS	0.308	9273	8903	8037	7357
1 (1.315)	40	STD.	0.133	2847	2733	2468	2259
	80	XS	0.179	3960	3802	3432	3142
	160	—	0.250	5764	5534	4996	4573
	—	XXS	0.358	8538	8197	7400	6774
$1\frac{1}{4}$ (1.660)	40	STD.	0.140	2363	2268	2048	1875
	80	XS	0.191	3282	3151	2845	2604
	160	—	0.250	4425	4248	3835	3510
	—	XXS	0.382	7106	6821	6158	5637
$1\frac{1}{2}$ (1.900)	40	STD.	0.145	2119	2034	1836	1681
	80	XS	0.200	2983	2864	2585	2366
	160	—	0.281	4333	4160	3755	3438
	—	XXS	0.400	6446	6188	5586	5113
2 (2.375)	40	STD.	0.154	1787	1715	1548	1417
	80	XS	0.218	2579	2475	2235	2046
	160	—	0.344	4231	4062	3667	3357
	—	XXS	0.436	5538	5316	4799	4393
$2\frac{1}{2}$ (2.875)	40	STD.	0.203	1954	1876	1694	1550
	80	XS	0.276	2708	2599	2347	2148
	160	—	0.375	3766	3616	3264	2988
	—	XXS	0.552	5820	5588	5044	4617
3 (3.500)	40	STD.	0.216	1693	1625	1467	1343
	80	XS	0.300	2398	2303	2079	1903
	160	—	0.438	3598	3454	3118	2854
	—	XXS	0.600	5114	4909	4432	4057
$3\frac{1}{2}$ (4.000)	40	STD.	0.226	1546	1484	1340	1227
	80	XS	0.318	2208	2119	1913	1751
	160	—	0.438	3379	3244	2929	2681
	—	XXS	0.674	4394	4218	3808	3486
4 (4.500)	40	STD.	0.237	1433	1375	1242	1137
	80	XS	0.337	2076	1992	1799	1647
	120	—	0.438	2740	2630	2375	2174
	160	—	0.531	3379	3244	2929	2681
5 (5.563)	40	STD.	0.258	1260	1209	1092	999
	80	XS	0.375	1856	1782	1609	1473
	120	—	0.500	2521	2420	2185	2000
	160	—	0.625	3202	3074	2775	2540
	—	XXS	0.750	3906	3750	3385	3099

Pressure—Temperature Ratings

of Plain End

Seamless Carbon Steel Pipe to ASTM A53 Grade B
and ASTM A106 Grade B

TEMPERATURE, DEGREES F. —————>				—20 TO 650	700	750	775
ALLOWABLE STRESS "S" PSI —————>				15,000	14,400	13,000	11,900
PIPE SIZE INCHES	SCHEDULE NUMBER	WALL DESIGNA- TION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI			
6 (6.625)	40	STD.	0.280	1143	1098	991	907
	80	XS	0.432	1794	1722	1554	1423
	120	—	0.562	2369	2274	2053	1879
	160	—	0.719	3082	2959	2671	2445
	—	XXS	0.864	3767	3617	3265	2989
8 (8.625)	20	—	0.250	778	746	674	617
	30	—	0.277	861	827	746	683
	40	STD.	0.322	1007	967	873	799
	60	—	0.406	1277	1226	1107	1013
	80	XS	0.500	1588	1524	1376	1260
	100	—	0.594	1900	1824	1647	1508
	120	—	0.719	2323	2230	2014	1843
	140	—	0.812	2648	2542	2295	2100
	—	XXS	0.875	2868	2753	2486	2275
	160	—	0.906	2977	2858	2580	2362
10 (10.750)	20	—	0.250	621	596	538	493
	30	—	0.307	766	735	664	608
	40	STD.	0.365	912	875	790	723
	60	XS	0.500	1264	1213	1095	1002
	80	—	0.594	1510	1449	1308	1198
	100	—	0.719	1842	1768	1596	1461
	120	—	0.844	2182	2095	1891	1731
	140	XXS	1.000	2612	2507	2264	2072
	160	—	1.125	2963	2845	2568	2351
12 (12.750)	20	—	0.250	522	502	453	414
	30	—	0.330	693	665	600	549
	—	STD.	0.375	788	756	683	625
	40	—	0.406	854	820	740	678
	—	XS	0.500	1060	1017	918	841
	60	—	0.562	1195	1147	1035	948
	80	—	0.688	1472	1413	1276	1168
	100	—	0.844	1823	1750	1580	1447
	120	XXS	1.000	2178	2091	1888	1728
	140	—	1.125	2468	2369	2139	1958
	160	—	1.312	2911	2794	2523	2309
14 (14.000)	10	—	0.250	475	456	412	377
	20	—	0.312	594	570	515	471
	30	STD.	0.375	716	688	621	568
	40	—	0.438	839	806	727	666
	—	XS	0.500	963	924	834	764
	60	—	0.594	1148	1102	995	911
	80	—	0.750	1460	1402	1266	1159
	100	—	0.938	1846	1772	1600	1464
	120	—	1.094	2169	2083	1880	1721
	140	—	1.250	2501	2401	2167	1984
	160	—	1.406	2835	2722	2457	2249

Pressure—Temperature Ratings

of Plain End

Seamless Carbon Steel Pipe to ASTM A53 Grade B
and ASTM A106 Grade B

TEMPERATURE, DEGREES F. —————>				—20 TO 650	700	750	775
ALLOWABLE STRESS "S" PSI —————>				15,000	14,400	13,000	11,900
PIPE SIZE INCHES	SCHED- ULE NUMBER	WALL DESIG- NATION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI			
16 (16.000)	10	—	0.250	415	399	360	329
	20	—	0.312	519	498	450	412
	30	STD.	0.375	625	600	542	496
	40	XS	0.500	840	806	728	666
	60	—	0.656	1108	1064	960	879
	80	—	0.844	1439	1381	1247	1141
	100	—	1.031	1771	1700	1535	1405
	120	—	1.219	2113	2029	1832	1677
	140	—	1.438	2517	2416	2181	1997
	160	—	1.594	2812	2699	2437	2231
18 (18.000)	10	—	0.250	369	354	319	292
	20	—	0.312	461	442	399	365
	30	STD.	0.375	555	533	481	440
	40	XS	0.438	649	623	563	515
	60	—	0.500	744	715	645	591
	80	—	0.562	838	805	727	665
	100	—	0.750	1126	1081	976	893
	120	—	0.938	1420	1363	1231	1127
	140	—	1.156	1766	1695	1531	1401
	160	—	1.375	2118	2034	1836	1680
20 (20.000)	10	—	0.250	331	318	287	263
	20	STD.	0.375	499	479	432	396
	30	XS	0.500	669	642	580	531
	40	—	0.594	797	765	690	632
	60	—	0.812	1098	1054	951	871
	80	—	1.031	1404	1347	1216	1114
	100	—	1.281	1760	1690	1526	1397
	120	—	1.500	2079	1996	1802	1649
	140	—	1.750	2446	2348	2120	1941
	160	—	1.969	2776	2665	2406	2202
22 (22.000)	10	—	0.250	301	289	261	239
	20	STD.	0.375	453	435	392	359
	30	XS	0.500	607	583	526	482
	40	—	0.875	1074	1031	931	852
	60	—	1.125	1392	1336	1206	1104
	80	—	1.375	1715	1647	1487	1361
	100	—	1.625	2045	1963	1772	1622
	120	—	1.875	2380	2285	2062	1888
	140	—	2.125	2719	2610	2356	2157
	160	—	2.344	3058	2932	2642	2413
24 (24.000)	10	—	0.250	276	265	239	219
	20	STD.	0.375	415	398	359	329
	30	XS	0.500	556	533	482	441
	40	—	0.562	625	600	542	496
	60	—	0.688	768	737	666	609
	80	—	0.969	1091	1047	945	865
	100	—	1.219	1383	1328	1199	1097
	120	—	1.531	1753	1683	1520	1391
	140	—	1.812	2093	2009	1814	1661
	160	—	2.062	2399	2303	2079	1903
			2.344	2752	2642	2385	2183

Pressure—Temperature Ratings

of Plain End

Seamless Carbon Steel Pipe to ASTM A106 Grade C

TEMPERATURE, DEGREES F. —————>				—20 TO 650	700	750	775
ALLOWABLE STRESS "S" PSI —————>				17,500	16,600	14,800	13,400
PIPE SIZE INCHES	SCHEDULE NUMBER	WALL DESIGNA- TION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI			
$\frac{1}{2}$ (0.840)	40	STD.	0.109	4352	4128	3681	3332
	80	XS	0.147	6128	5813	5182	4692
	160	—	0.188	8073	7658	6828	6182
	—	XXS	0.294	12918	12254	10925	9892
$\frac{3}{4}$ (1.050)	40	STD.	0.113	3569	3386	3019	2733
	80	XS	0.154	5016	4758	4242	3841
	160	—	0.219	7459	7075	6308	5711
	—	XXS	0.308	10819	10263	9150	8284
1 (1.315)	40	STD.	0.133	3322	3151	2809	2544
	80	XS	0.179	4620	4382	3907	3538
	160	—	0.250	6725	6379	5687	5149
	—	XXS	0.358	9961	9449	8424	7627
$1\frac{1}{4}$ (1.660)	40	STD.	0.140	2757	2615	2331	2111
	80	XS	0.191	3829	3632	3238	2932
	160	—	0.250	5162	4897	4366	3953
	—	XXS	0.382	8290	7864	7011	6348
$1\frac{1}{2}$ (1.900)	40	STD.	0.145	2472	2345	2090	1893
	80	XS	0.200	3480	3301	2943	2665
	160	—	0.281	5055	4795	4275	3871
	—	XXS	0.400	7520	7133	6360	5758
2 (2.375)	40	STD.	0.154	2084	1977	1763	1596
	80	XS	0.218	3008	2854	2544	2303
	160	—	0.344	4936	4682	4175	3780
	—	XXS	0.436	6461	6129	5464	4947
$2\frac{1}{2}$ (2.875)	40	STD.	0.203	2280	2163	1928	1746
	80	XS	0.276	3159	2996	2671	2419
	160	—	0.375	4394	4168	3716	3365
	—	XXS	0.552	6790	6441	5743	5200
3 (3.500)	40	STD.	0.216	1975	1874	1671	1513
	80	XS	0.300	2798	2654	2366	2143
	160	—	0.438	4197	3982	3550	3214
	—	XXS	0.600	5966	5659	5045	4568
$3\frac{1}{2}$ (4.000)	40	STD.	0.226	1804	1711	1526	1381
	80	XS	0.318	2576	2443	2178	1972
4 (4.500)	40	STD.	0.237	1672	1586	1414	1280
	80	XS	0.337	2421	2297	2048	1854
	120	—	0.438	3197	3032	2703	2448
	160	—	0.531	3943	3740	3334	3019
5 (5.563)	—	XXS	0.674	5127	4863	4336	3926
	40	STD.	0.258	1470	1394	1243	1125
	80	XS	0.375	2166	2054	1832	1658
	120	—	0.500	2941	2790	2487	2252
—	160	—	0.625	3735	3543	3159	2860
	—	XXS	0.750	4557	4323	3854	3489

Pressure—Temperature Ratings

of Plain End

Seamless Carbon Steel Pipe to ASTM A106 Grade C

TEMPERATURE, DEGREES F. →				—20 TO 650	700	750	775
ALLOWABLE STRESS "S" PSI →				17,500	16,600	14,800	13,400
PIPE SIZE INCHES	SCHED- ULE NUMBER	WALL DESIG- NATION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI			
6 (6.625)	40	STD.	0.280	1334	1265	1128	1021
	80	XS	0.432	2092	1985	1770	1602
	120	—	0.562	2763	2621	2337	2116
	160	—	0.719	3596	3411	3041	2754
	—	XXS	0.864	4395	4169	3717	3365
8 (8.625)	20	—	0.250	907	860	767	695
	30	—	0.277	1005	953	850	769
	40	STD.	0.322	1175	1115	994	900
	60	—	0.406	1490	1413	1260	1141
	80	XS	0.500	1853	1757	1567	1419
	100	—	0.594	2217	2103	1875	1698
	120	—	0.719	2711	2571	2292	2076
	140	—	0.812	3089	2930	2612	2365
	—	XXS	0.875	3346	3174	2830	2562
	160	—	0.906	3473	3295	2938	2660
10 (10.750)	20	—	0.250	725	688	613	555
	30	—	0.307	894	848	756	684
	40	STD.	0.365	1064	1009	900	815
	60	XS	0.500	1474	1398	1247	1129
	80	—	0.594	1761	1671	1489	1349
	100	—	0.719	2148	2038	1817	1645
	120	—	0.844	2546	2415	2153	1950
	140	XXS	1.000	3047	2891	2577	2333
	160	—	1.125	3457	3279	2924	2647
	—	—	—	—	—	—	—
12 (12.750)	20	—	0.250	610	578	516	467
	30	—	0.330	808	766	683	619
	—	STD.	0.375	919	872	777	704
	40	—	0.406	997	945	843	763
	—	XS	0.500	1236	1173	1046	947
	60	—	0.562	1394	1322	1179	1067
	80	—	0.688	1717	1629	1452	1315
	100	—	0.844	2127	2018	1799	1629
	120	XXS	1.000	2541	2411	2149	1946
	140	—	1.125	2879	2731	2435	2204
	160	—	1.312	3396	3221	2872	2600
	—	—	—	—	—	—	—
14 (14.000)	10	—	0.250	554	526	469	425
	20	—	0.312	693	658	586	531
	30	STD.	0.375	836	793	707	640
	40	—	0.438	979	929	828	750
	—	XS	0.500	1123	1065	950	860
	60	—	0.594	1340	1271	1133	1026
	80	—	0.750	1704	1616	1441	1305
	100	—	0.938	2154	2043	1821	1649
	120	—	1.094	2531	2401	2140	1938
	140	—	1.250	2917	2767	2467	2234
	160	—	1.406	3307	3137	2797	2533
	—	—	—	—	—	—	—

Pressure—Temperature Ratings

of Plain End

Seamless Carbon Steel Pipe to ASTM A106 Grade C

TEMPERATURE, DEGREES F. —————>				—20 TO 650	700	750	775
ALLOWABLE STRESS "S" PSI —————>				17,500	16,600	14,800	13,400
PIPE SIZE INCHES	SCHEDULE NUMBER	WALL DESIGNA- TION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI			
16 (16.000)	10	—	0.250	484	459	410	371
	20	—	0.312	605	574	512	464
	30	STD.	0.375	729	692	617	559
	40	XS	0.500	980	929	828	750
	60	—	0.656	1293	1226	1093	990
	80	—	0.844	1679	1592	1420	1285
	100	—	1.031	2066	1960	1748	1582
	120	—	1.219	2466	2339	2085	1888
	140	—	1.438	2937	2786	2484	2249
	160	—	1.594	3280	3112	2774	2512
18 (18.000)	10	—	0.250	430	408	364	329
	20	—	0.312	537	510	454	411
	30	STD.	0.375	647	614	547	496
	40	XS	0.438	758	719	641	580
	60	—	0.500	869	824	735	665
	80	—	0.562	978	928	827	749
	100	—	0.750	1314	1246	1111	1006
	120	—	0.938	1657	1572	1401	1269
	140	—	1.156	2060	1954	1743	1578
	160	—	1.375	2471	2344	2090	1892
20 (20.000)	10	—	0.250	387	367	327	296
	20	STD.	0.375	582	552	492	445
	30	XS	0.500	780	740	660	597
	40	—	0.594	929	882	786	712
	60	—	0.812	1281	1215	1083	981
	80	—	1.031	1638	1553	1385	1254
	100	—	1.281	2054	1948	1737	1573
	120	—	1.500	2425	2300	2051	1857
	140	—	1.750	2854	2707	2414	2185
	160	—	1.969	3238	3072	2739	2480
22 (22.000)	10	—	0.250	351	333	297	269
	20	STD.	0.375	528	501	447	404
	30	XS	0.500	708	672	599	542
	60	—	0.875	1254	1189	1060	960
	80	—	1.125	1624	1540	1373	1243
	100	—	1.375	2001	1898	1693	1533
	120	—	1.625	2386	2263	2018	1827
	140	—	1.875	2776	2634	2348	2126
24 (24.000)	10	—	0.250	322	305	272	246
	20	STD.	0.375	484	459	409	370
	30	XS	0.500	648	615	548	496
	40	—	0.562	729	692	617	559
	60	—	0.688	896	850	758	686
	80	—	0.969	1273	1207	1076	974
	100	—	1.219	1613	1530	1364	1235
	120	—	1.531	2046	1940	1730	1566
	140	—	1.812	2442	2316	2065	1870
	160	—	2.062	2799	2655	2367	2143
			2.344	3211	3045	2715	2458

Pressure—Temperature Ratings

of Plain End

Seamless Chromium-Molybdenum Alloy Steel Pipe
to ASTM A335 Grade P11

(1¼% CHROMIUM—½% MOLYBDENUM)

TEMPERATURE, DEGREES F. —————>				-20 to 700	750	800	850	900	950	1,000	1,050	1,100
ALLOWABLE STRESS "S" PSI —————>				15,000	14,800	14,400	14,000	13,600	9,300	6,300	4,200	2,800
PIPE SIZE INCHES	SCHED- ULE NUMBER	WALL DESIG- NATION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI								
½ (0.840)	40 80	STD. XS	0.109 0.147	3730 5252	3681 5182	3581 5042	3482 4902	3382 4762	2372 3375	1693 2465	1129 1643	752 1096
	160 —	— XXS	0.188 0.294	6920 11073	6828 10925	6643 10630	6458 10335	6274 10040	4547 8199	3414 6743	2276 4496	1517 2997
¾ (1.050)	40 80	STD. XS	0.113 0.154	3059 4299	3019 4242	2937 4127	2855 4013	2774 3898	1936 2744	1369 1976	912 1317	608 878
	160 —	— XXS	0.219 0.308	6393 9273	6308 9150	6137 8903	5967 8655	5796 8408	4162 6438	3097 5062	2065 3375	1376 2250
1 (1.315)	40 80	STD. XS	0.133 0.179	2847 3960	2809 3907	2733 3802	2657 3696	2582 3590	1799 2522	1268 1806	845 1204	564 803
	160 —	— XXS	0.250 0.358	5764 8538	5687 8424	5534 8197	5380 7969	5226 7741	3717 5810	2736 4498	1824 2999	1216 1999
1¼ (1.660)	40 80	STD. XS	0.140 0.191	2363 3282	2331 3239	2268 3151	2205 3063	2142 2976	1488 2081	1042 1475	694 984	463 656
	160 —	— XXS	0.250 0.382	4425 7106	4366 7011	4248 6822	4130 6632	4012 6443	2827 4685	2039 3529	1359 2353	906 1569
1½ (1.900)	40 80	STD. XS	0.145 0.200	2119 2983	2090 2943	2034 2864	1977 2784	1921 2704	1332 1887	929 1332	619 888	413 592
	160 —	— XXS	0.281 0.400	4333 6446	4275 6360	4160 6188	4044 6016	3929 5844	2766 4200	1993 3128	1328 2085	886 1390
2 (2.375)	40 80	STD. XS	0.154 0.218	1787 2579	1763 2544	1715 2475	1667 2407	1620 2338	1121 1627	778 1142	519 761	346 508
	160 —	— XXS	0.344 0.436	4231 5538	4175 5464	4062 5316	3949 5169	3836 5021	2699 3565	1941 2616	1294 1744	863 1162
2½ (2.875)	40 80	STD. XS	0.203 0.276	1954 2708	1928 2671	1876 2599	1824 2527	1772 2455	1228 1710	854 1202	569 802	380 534
	160 —	— XXS	0.375 0.552	3766 5820	3716 5743	3616 5588	3515 5432	3415 5277	2395 3756	1711 2768	1141 1845	760 1230
3 (3.500)	40 80	STD. XS	0.216 0.300	1693 2399	1671 2367	1625 2303	1580 2239	1535 2175	1062 1511	736 1058	491 705	327 470
	160 —	— XXS	0.438 0.600	3598 5114	3550 5045	3454 4909	3358 4773	3262 4636	2285 3282	1628 2392	1085 1595	724 1063
3½ (4.000)	40 80	STD. XS	0.226 0.318	1546 2208	1526 2178	1484 2119	1443 2061	1402 2002	969 1387	670 970	447 647	298 431
	160 —	— XXS	0.531 0.674	3379 4394	3334 4336	3244 4218	3154 4101	3064 3984	2143 2807	1522 2023	1015 1349	677 899
4 (4.500)	40 80 120	STD. XS —	0.237 0.337 0.438	1433 2076 2740	1414 2048 2703	1375 1993 2630	1337 1937 2557	1299 1882 2484	897 1305 1730	619 909 1217	413 606 812	275 404 541
	160 —	— XXS	0.531 0.674	3379 4394	3334 4336	3244 4218	3154 4101	3064 3984	2143 2807	1522 2023	1015 1349	677 899
5 (5.563)	40 80 120	STD. XS —	0.258 0.375 0.500	1260 1856 2521	1243 1832 2530	1209 1782 2420	1176 1733 2353	1142 1683 2285	788 1165 1590	543 810 1115	362 540 743	241 360 496
	160 —	— XXS	0.625 0.750	3202 3906	3159 3854	3074 3750	2988 3646	2903 3542	2028 2487	1437 1780	958 1186	639 791



NOTE: Economics and general practice dictate a maximum temperature range of 1050 F.

Pressure—Temperature Ratings

of Plain End

**Seamless Chromium-Molybdenum Alloy Steel Pipe
to ASTM A335 Grade P11
(1¼% CHROMIUM—½% MOLYBDENUM)**

TEMPERATURE, DEGREES F. —————>				-20 to 700	750	800	850	900	950	1,000	1,050	1,100
ALLOWABLE STRESS "S" PSI —————>				15,000	14,800	14,400	14,000	13,600	9,300	6,300	4,200	2,800
PIPE SIZE INCHES	SCHED- ULE NUMBER	WALL DESIG- NATION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI								
6 (6.625)	40	STD.	0.280	1143	1128	1098	1067	1037	714	491	328	218
	80	XS	0.432	1794	1770	1722	1674	1626	1125	781	521	347
	120	—	0.562	2369	2337	2274	2211	2148	1492	1044	696	464
	160	XXS	0.719	3083	3041	2959	2877	2795	1951	1380	920	613
	—	—	0.864	3767	3717	3617	3516	3416	2396	1711	1141	761
8 (8.625)	20	—	0.250	778	767	746	726	705	485	332	221	147
	30	—	0.277	861	850	827	804	781	537	368	245	164
	40	STD.	0.322	1007	994	967	940	913	629	432	288	192
	60	—	0.406	1277	1260	1226	1192	1158	798	550	367	245
	80	XS	0.500	1588	1567	1525	1482	1440	995	689	459	306
	100	—	0.594	1900	1875	1824	1774	1723	1193	830	553	369
	120	—	0.719	2323	2292	2230	2168	2107	1463	1023	682	455
	140	—	0.812	2648	2612	2542	2471	2401	1671	1174	783	522
	—	XXS	0.875	2868	2830	2753	2677	2600	1813	1278	852	568
	160	—	0.906	2977	2938	2858	2779	2699	1883	1330	886	591
10 (10.750)	20	—	0.250	621	613	596	580	563	387	264	176	117
	30	—	0.307	766	756	735	715	695	477	327	218	145
	40	STD.	0.365	912	900	875	851	827	569	390	260	173
	60	—	0.500	1263	1247	1213	1179	1146	790	544	363	242
	80	XS	0.594	1510	1489	1449	1409	1369	945	654	436	291
	100	—	0.719	1842	1817	1768	1719	1670	1156	803	535	357
	120	—	0.844	2182	2153	2095	2037	1979	1373	958	639	426
	140	XXS	1.000	2612	2577	2507	2438	2368	1648	1157	772	514
	160	—	1.125	2963	2923	2844	2765	2686	1874	1323	882	588
	—	—	—	—	—	—	—	—	—	—	—	—
12 (12.750)	20	—	0.250	522	515	502	488	474	325	222	148	99
	30	—	0.330	693	683	665	646	628	431	295	197	131
	—	STD.	0.375	788	777	756	735	714	491	336	224	149
	40	—	0.406	854	843	820	797	775	533	365	243	162
	—	XS	0.500	1060	1046	1017	989	961	662	455	303	202
	60	—	0.562	1194	1179	1147	1115	1083	747	514	343	228
	80	—	0.688	1472	1452	1413	1374	1335	922	637	425	283
	100	—	0.844	1823	1799	1750	1702	1653	1144	795	530	353
	120	XXS	1.000	2178	2149	2091	2033	1975	1371	957	638	425
	140	—	1.125	2468	2435	2369	2303	2237	1556	1090	727	485
	160	—	1.312	2911	2872	2794	2717	2639	1840	1298	865	577
14 (14.000)	10	—	0.250	475	469	456	444	431	296	202	134	90
	20	—	0.312	594	586	571	555	539	370	253	168	112
	30	STD.	0.375	716	707	688	669	649	446	305	203	136
	40	—	0.438	839	828	806	783	761	523	358	239	159
	—	XS	0.500	963	950	924	899	873	601	412	275	183
	60	—	0.594	1148	1133	1102	1072	1041	717	494	329	219
	80	—	0.750	1460	1455	1402	1363	1324	914	632	421	281
	100	—	0.938	1846	1821	1772	1723	1674	1159	805	537	358
	120	—	1.094	2169	2140	2083	2025	1967	1365	952	635	423
	140	—	1.250	2501	2467	2401	2334	2267	1577	1106	737	491
	160	—	1.406	2835	2797	2722	2646	2570	1792	1262	842	561

NOTE: Economics and general practice dictate a maximum temperature range of 1050 F.

Pressure—Temperature Ratings

of Plain End

Seamless Chromium-Molybdenum Alloy Steel Pipe
to ASTM A335 Grade P11

(1/4% CHROMIUM—1/2% MOLYBDENUM)

TEMPERATURE, DEGREES F. —————>				-20 to 700	750	800	850	900	950	1,000	1,050	1,100
ALLOWABLE STRESS "S" PSI —————>				15,000	14,800	14,400	14,000	13,600	9,300	6,300	4,200	2,800
PIPE SIZE INCHES	SCHED- ULE NUMBER	WALL DESIG- NATION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI								
16 (16,000)	10	—	0.250	415	410	399	388	376	258	176	117	78
	20	—	0.312	519	512	498	484	471	323	220	147	98
	30	STD.	0.375	625	617	600	584	567	389	266	177	118
	40	XS	0.500	840	829	806	784	761	523	359	239	159
	60	—	0.656	1108	1093	1064	1034	1005	692	476	317	212
	80	—	0.844	1439	1420	1381	1343	1305	901	622	415	277
	100	—	1.031	1771	1748	1700	1653	1606	1111	771	514	343
	120	—	1.219	2113	2085	2029	1972	1916	1329	927	618	412
	140	—	1.438	2517	2483	2416	2349	2282	1587	1113	742	495
	160	—	1.594	2812	2774	2699	2624	2549	1777	1251	834	556
18 (18,000)	10	—	0.250	369	364	354	344	334	229	156	104	69
	20	—	0.312	461	455	442	430	418	286	195	130	87
	30	STD.	0.375	555	547	533	518	503	345	236	157	105
	40	XS	0.438	649	641	623	606	589	404	276	184	123
	60	—	0.500	744	735	715	695	675	464	317	212	141
	80	—	0.562	838	827	805	782	760	523	358	239	159
	100	—	0.750	1126	1111	1081	1051	1021	704	484	323	215
	120	—	0.938	1420	1401	1363	1326	1288	889	614	409	273
	140	—	1.156	1766	1743	1695	1648	1601	1108	769	513	342
	160	—	1.375	2118	2090	2034	1977	1921	1332	929	619	413
20 (20,000)	10	—	0.250	331	327	318	309	300	206	140	93	62
	20	STD.	0.375	486	480	467	454	441	310	211	141	94
	30	XS	0.500	669	660	642	624	606	416	285	190	127
	40	—	0.594	797	786	765	743	722	497	340	227	151
	60	—	0.812	1098	1083	1054	1025	995	686	471	314	209
	80	—	1.031	1404	1385	1348	1310	1273	878	607	404	270
	100	—	1.281	1760	1737	1690	1643	1596	1104	766	511	341
	120	—	1.500	2079	2051	1996	1940	1885	1307	911	607	405
	140	—	1.750	2446	2414	2348	2283	2218	1542	1080	720	480
	160	—	1.969	2776	2739	2665	2591	2517	1753	1234	823	549
22 (22,000)	10	—	0.250	301	297	289	281	273	187	127	85	57
	20	STD.	0.375	453	447	435	423	410	282	192	128	85
	30	XS	0.500	607	599	583	566	550	378	258	172	115
	40	—	0.875	1074	1060	1031	1003	974	671	461	307	205
	60	—	1.125	1392	1373	1336	1299	1262	871	601	401	267
	80	—	1.375	1716	1693	1647	1601	1555	1076	746	497	332
	100	—	1.625	2045	2018	1963	1908	1854	1285	895	597	398
	120	—	1.875	2380	2348	2285	2221	2158	1499	1049	700	466
	140	—	2.125	2719	2683	2610	2538	2465	1717	1208	805	537
	160	—	2.344	3044	3004	2926	2851	2776	1968	1408	948	628
24 (24,000)	10	—	0.250	276	273	265	257	250	171	116	78	52
	20	STD.	0.375	415	409	398	387	376	258	176	117	78
	30	XS	0.500	556	548	533	519	504	346	236	157	105
	40	—	0.562	625	617	600	584	567	389	266	177	118
	60	—	0.688	768	758	737	717	696	479	328	218	146
	80	—	0.969	1091	1076	1047	1018	989	681	468	312	208
	100	—	1.219	1383	1365	1328	1291	1254	865	597	398	265
	120	—	1.531	1753	1730	1683	1636	1590	1100	763	509	339
	140	—	1.812	2093	2065	2009	1954	1898	1316	918	612	408
	160	—	2.062	2399	2367	2303	2239	2175	1512	1058	706	470
26 (26,000)	10	—	0.250	246	243	235	227	220	156	106	72	48
	20	STD.	0.375	369	364	354	344	334	229	156	104	69
	30	XS	0.500	519	512	498	484	471	323	220	147	98
	40	—	0.656	671	661	644	626	607	416	285	190	127
	60	—	0.844	823	811	791	769	746	523	358	239	159
	80	—	1.031	975	961	938	914	889	614	409	273	181
	100	—	1.219	1127	1111	1081	1051	1021	704	484	323	215
	120	—	1.438	1279	1261	1228	1197	1166	811	556	377	251
	140	—	1.656	1431	1411	1374	1341	1308	927	632	422	281
	160	—	1.875	1583	1561	1519	1483	1447	1027	702	472	311

NOTE: Economics and general practice dictate a maximum temperature range of 1050 F.

Pressure—Temperature Ratings

of Plain End

Seamless Chromium-Molybdenum Alloy Steel Pipe
to ASTM A335 Grade P22

(2¼% CHROMIUM—1% MOLYBDENUM)

TEMPERATURE, DEGREES F. —————>				—20 to 800	850	900	950	1,000	1,050	1,100
ALLOWABLE STRESS "S" PSI —————>				15,000	14,400	13,100	11,000	7,800	5,800	4,200
PIPE SIZE INCHES	SCHEDULE NUMBER	WALL DESIGNA- TION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI						
½ (0.840)	40	STD.	0.109	3730	3581	3258	2805	2096	1559	1129
	80	XS	0.147	5252	5042	4587	3992	3052	2269	1643
	160	—	0.188	6920	6643	6043	5378	4227	3143	2276
	—	XXS	0.294	11073	10630	9670	9698	8349	6208	4496
¾ (1.050)	40	STD.	0.113	3059	2937	2672	2290	1695	1260	912
	80	XS	0.154	4299	4127	3755	3246	2446	1819	1317
	160	—	0.219	6393	6137	5583	4923	3834	2851	2065
	—	XXS	0.308	9273	8903	8099	7615	6268	4661	3375
1 (1.315)	40	STD.	0.133	2847	2733	2487	2128	1570	1167	845
	80	XS	0.179	3960	3802	3458	2983	2236	1663	1204
	160	—	0.250	5764	5534	5034	4396	3388	2519	1824
	—	XXS	0.358	8538	8197	7457	6872	5569	4141	2999
1¼ (1.660)	40	STD.	0.140	2363	2268	2064	1761	1290	959	694
	80	XS	0.191	3282	3151	2866	2461	1827	1358	984
	160	—	0.250	4425	4248	3864	3344	2524	1877	1359
	—	XXS	0.382	7106	6821	6206	5541	4370	3249	2353
1½ (1.900)	40	STD.	0.145	2119	2034	1850	1576	1150	855	619
	80	XS	0.200	2983	2864	2605	2232	1650	1227	888
	160	—	0.281	4333	4160	3784	3272	2467	1834	1328
	—	XXS	0.400	6446	6188	5629	4968	3872	2879	2085
2 (2.375)	40	STD.	0.154	1787	1715	1560	1326	963	716	519
	80	XS	0.218	2579	2475	2252	1924	1414	1051	761
	160	—	0.344	4231	4062	3695	3193	2404	1787	1294
	—	XXS	0.436	5538	5316	4836	4217	3238	2408	1744
2½ (2.875)	40	STD.	0.203	1954	1876	1707	1452	1058	786	569
	80	XS	0.276	2708	2599	2365	2022	1489	1107	802
	160	—	0.375	3766	3616	3289	2833	2118	1575	1140
	—	XXS	0.552	5820	5588	5083	4442	3427	2548	1845
3 (3.500)	40	STD.	0.216	1693	1625	1479	1256	911	678	491
	80	XS	0.300	2398	2303	2095	1787	1310	974	705
	160	—	0.438	3598	3454	3142	2703	2016	1499	1085
	—	XXS	0.600	5114	4909	4466	3882	2962	2203	1595
3½ (4.000)	40	STD.	0.226	1546	1484	1350	1146	830	617	447
	80	XS	0.318	2208	2119	1928	1643	1201	893	647
	160	—	0.438	3379	3244	2951	2535	1885	1401	1015
	—	XXS	0.674	4394	4218	3838	3320	2505	1863	1349
4 (4.500)	40	STD.	0.237	1433	1375	1251	1061	767	570	413
	80	XS	0.337	2076	1992	1813	1543	1126	837	606
	120	—	0.438	2740	2630	2393	2047	1507	1121	812
	160	—	0.531	3379	3244	2951	2535	1885	1401	1015
5 (5.563)	40	STD.	0.258	1260	1209	1100	932	672	500	362
	80	XS	0.375	1856	1782	1621	1378	1003	745	540
	120	—	0.500	2521	2420	2202	1880	1380	1026	743
	160	—	0.625	3202	3074	2796	2399	1779	1323	958
—	—	XXS	0.750	3906	3750	3411	2941	2203	1638	1186

NOTE: Economics and general practice dictate a maximum temperature range of 1100 F.

Pressure—Temperature Ratings

of Plain End

Seamless Chromium-Molybdenum Alloy Steel Pipe to ASTM A335 Grade P22

(2¼% CHROMIUM—1% MOLYBDENUM)

TEMPERATURE, DEGREES F. —————→				—20 to 800	850	900	950	1,000	1,050	1,100
ALLOWABLE STRESS "S" PSI —————→				15,000	14,400	13,100	11,000	7,800	5,800	4,200
PIPE SIZE INCHES	SCHED- ULE NUMBER	WALL DESIG- NATION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI						
6 (6.625)	40	STD.	0.280	1143	1098	998	845	608	452	328
	80	XS	0.432	1794	1722	1566	1331	967	719	521
	120	—	0.562	2369	2274	2069	1765	1293	961	696
	160	—	0.719	3082	2959	2692	2308	1708	1270	920
	—	XXS	0.864	3767	3617	3290	2834	2119	1575	1141
8 (8.625)	20	—	0.250	778	746	679	573	411	305	221
	30	—	0.277	861	827	752	635	456	339	245
	40	STD.	0.322	1007	967	880	744	535	397	288
	60	—	0.406	1277	1226	1115	944	681	507	367
	80	XS	0.500	1588	1524	1387	1177	853	634	459
	100	—	0.594	1900	1824	1660	1411	1027	764	553
	120	—	0.719	2323	2230	2029	1731	1267	942	682
	140	—	0.812	2648	2542	2312	1976	1454	1081	783
	—	XXS	0.875	2868	2753	2505	2144	1582	1176	852
	160	—	0.906	2977	2858	2600	2228	1646	1224	886
10 (10.750)	20	—	0.250	621	596	543	458	327	243	176
	30	—	0.307	766	735	669	565	405	301	218
	40	STD.	0.365	912	875	796	673	483	359	260
	60	XS	0.500	1264	1213	1103	934	674	501	363
	80	—	0.594	1510	1449	1318	1118	809	602	436
	100	—	0.719	1842	1768	1608	1367	994	739	535
	120	—	0.844	2182	2095	1906	1624	1187	882	639
	140	XXS	1.000	2612	2507	2281	1949	1433	1066	772
	160	—	1.125	2963	2845	2588	2217	1638	1218	882
12 (12.750)	20	—	0.250	522	502	456	384	275	204	148
	30	—	0.330	693	665	605	510	365	272	197
	—	STD.	0.375	788	756	688	581	416	310	224
	40	—	0.406	854	820	746	630	452	336	243
	—	XS	0.500	1060	1017	925	783	563	419	303
	60	—	0.562	1195	1147	1043	883	636	473	343
	80	—	0.688	1472	1413	1286	1090	789	586	425
	100	—	0.844	1823	1750	1592	1354	984	732	530
	120	XXS	1.000	2178	2091	1902	1621	1184	881	638
	140	—	1.125	2468	2369	2155	1840	1350	1004	727
14 (14.000)	20	—	0.250	475	456	415	350	249	186	134
	30	—	0.312	594	570	519	438	313	233	168
	—	STD.	0.375	716	688	626	528	378	281	203
	40	—	0.438	839	806	733	619	444	330	239
	—	XS	0.500	963	924	841	711	510	380	275
	60	—	0.594	1148	1102	1003	849	611	454	329
	80	—	0.750	1460	1402	1275	1082	782	582	421
	100	—	0.938	1846	1772	1612	1371	997	741	537
	120	—	1.094	2169	2083	1895	1614	1179	877	635
	140	—	1.250	2501	2401	2184	1865	1369	1018	737
	160	—	1.406	2835	2722	2476	2119	1563	1162	842

NOTE: Economics and general practice dictate a maximum temperature range of 1100 F.

Pressure—Temperature Ratings

of Plain End

Seamless Chromium-Molybdenum Alloy Steel Pipe
to ASTM A335 Grade P22
 (2¼% CHROMIUM—1% MOLYBDENUM)

TEMPERATURE, DEGREES F. —————>				—20 to 800	850	900	950	1,000	1,050	1,100
ALLOWABLE STRESS "S" PSI —————>				15,000	14,400	13,100	11,000	7,800	5,800	4,200
PIPE SIZE INCHES	SCHED- ULE NUMBER	WALL DESIG- NATION	WALL THICKNESS INCHES	MAXIMUM DESIGN PRESSURE, PSI						
16 (16.000)	10	—	0.250	415	399	363	305	218	162	117
	20	—	0.312	519	498	453	382	273	203	147
	30	STD.	0.375	625	600	546	460	329	245	177
	40	XS	0.500	840	806	733	619	444	330	239
	60	—	0.656	1108	1064	968	819	589	438	317
	80	—	0.844	1439	1381	1257	1065	770	573	415
	100	—	1.031	1771	1700	1547	1314	955	710	514
	120	—	1.219	2113	2029	1846	1572	1147	853	618
	140	—	1.438	2517	2416	2198	1877	1378	1025	742
	160	—	1.594	2812	2699	2456	2101	1549	1152	834
18 (18.000)	10	—	0.250	369	354	322	271	193	144	104
	20	—	0.312	461	442	402	339	242	180	130
	30	STD.	0.375	555	533	484	408	292	217	157
	40	XS	0.438	649	623	567	478	342	254	184
	60	—	0.500	744	715	650	549	393	292	212
	80	—	0.562	838	805	732	618	443	330	239
	100	—	0.750	1126	1081	984	832	599	445	323
	120	—	0.938	1420	1363	1240	1051	760	565	409
	140	—	1.156	1766	1695	1542	1311	952	708	513
	160	—	1.375	2118	2034	1850	1576	1150	855	619
20 (20.000)	10	—	0.250	331	318	289	244	173	129	93
	20	STD.	0.375	499	479	435	367	262	195	141
	30	XS	0.500	669	642	584	493	352	262	190
	40	—	0.594	797	765	696	587	421	313	227
	60	—	0.812	1098	1054	959	811	584	434	314
	80	—	1.031	1404	1347	1226	1039	751	558	404
	100	—	1.281	1760	1690	1537	1306	949	706	511
	120	—	1.500	2079	1996	1815	1546	1128	839	607
	140	—	1.750	2446	2348	2136	1824	1338	995	720
	160	—	1.969	2776	2665	2424	2074	1528	1136	823
22 (22.000)	10	—	0.250	301	289	263	221	157	117	85
	20	STD.	0.375	453	435	395	333	238	177	128
	30	XS	0.500	607	583	530	447	319	238	172
	40	—	0.875	1074	1031	938	794	571	425	307
	60	—	1.125	1392	1336	1215	1030	744	553	401
	80	—	1.375	1715	1647	1498	1273	924	687	497
	100	—	1.625	2045	1963	1786	1520	1109	824	597
	120	—	1.875	2380	2285	2078	1773	1299	966	700
	140	—	2.125	2719	2610	2374	2031	1495	1112	805
	160	—	2.125	2719	2610	2374	2031	1495	1112	805
24 (24.000)	10	—	0.250	276	265	241	203	144	107	78
	20	STD.	0.375	415	398	362	305	217	162	117
	30	XS	0.500	556	533	485	409	292	217	157
	40	—	0.562	625	600	546	460	329	245	177
	60	—	0.688	768	737	671	566	406	302	218
	80	—	0.969	1091	1047	953	806	580	431	312
	100	—	1.219	1383	1328	1208	1024	740	550	398
	120	—	1.531	1753	1683	1531	1301	945	703	509
	140	—	1.812	2093	2009	1828	1557	1136	845	612
	160	—	2.062	2399	2303	2095	1788	1311	974	706
24 (24.000)	10	—	2.344	2752	2642	2403	2056	1514	1126	815
	20	—	2.344	2752	2642	2403	2056	1514	1126	815
	30	—	2.344	2752	2642	2403	2056	1514	1126	815
	40	—	2.344	2752	2642	2403	2056	1514	1126	815
	60	—	2.344	2752	2642	2403	2056	1514	1126	815
	80	—	2.344	2752	2642	2403	2056	1514	1126	815
	100	—	2.344	2752	2642	2403	2056	1514	1126	815
	120	—	2.344	2752	2642	2403	2056	1514	1126	815
	140	—	2.344	2752	2642	2403	2056	1514	1126	815
	160	—	2.344	2752	2642	2403	2056	1514	1126	815

NOTE: Economics and general practice dictate a maximum temperature range of 1100 F.

Pressure—Temperature Ratings

of Plain End

Seamless Stainless Alloy Steel Pipe
to ASTM A312 & A376 Grade TP-304 & TP-304H

Temperature Degrees F →			—20 to 100	200	300	400	500	600	650	700
Allowable Stress "S" PSI →			18,800	17,800	16,600	16,200	15,900	15,900	15,900	15,900
Pipe Size	Schedule Number	Wall Thickness	MAXIMUM DESIGN PRESSURE, PSI							
1/2 (0.840)	10S	.083	3512	3325	3101	3026	2970	2970	2970	2970
	40S	.109	4675	4427	4128	4029	3954	3954	3954	3954
	80S	.147	6583	6233	5813	5673	5568	5568	5568	5568
	160	.188	8673	8212	7658	7473	7335	7335	7335	7335
	XXS	.294	13878	13140	12254	11959	11737	11737	11737	11737
3/4 (1.050)	10S	.083	2768	2621	2444	2385	2341	2341	2341	2341
	40S	.113	3834	3630	3386	3304	3243	3243	3243	3243
	80S	.154	5389	5102	4758	4643	4557	4557	4557	4557
	160	.219	8013	7587	7075	6905	6777	6777	6777	6777
	XXS	.308	11623	11004	10263	10015	9830	9830	9830	9830
1 (1.315)	10S	.109	2883	2730	2546	2484	2438	2438	2438	2438
	40S	.133	3569	3379	3151	3075	3018	3018	3018	3018
	80S	.179	4963	4699	4382	4277	4198	4198	4198	4198
	160	.250	7224	6840	6379	6225	6110	6110	6110	6110
	XXS	.358	10701	10132	9449	9221	9050	9050	9050	9050
1 1/4 (1.660)	10S	.109	2255	2135	1991	1943	1907	1907	1907	1907
	40S	.140	2962	2804	2615	2552	2505	2505	2505	2505
	80S	.191	4114	3895	3632	3545	3479	3479	3479	3479
	160	.250	5546	5251	4897	4779	4690	4690	4690	4690
	XXS	.382	8906	8432	7864	7674	7532	7532	7532	7532
1 1/2 (1.900)	10S	.109	1958	1854	1729	1687	1656	1656	1656	1656
	40S	.145	2655	2514	2345	2288	2246	2246	2246	2246
	80S	.200	3739	3540	3301	3222	3162	3162	3162	3162
	160	.281	5431	5142	4795	4680	4593	4593	4593	4593
	XXS	.400	8078	7649	7133	6961	6832	6832	6832	6832
2 (2.375)	10S	.109	1554	1471	1372	1339	1314	1314	1314	1314
	40S	.154	2239	2120	1977	1929	1894	1894	1894	1894
	80S	.218	3232	3060	2854	2785	2733	2733	2733	2733
	160	.344	5303	5021	4682	4570	4485	4485	4485	4485
	XXS	.436	6941	6572	6129	5981	5870	5870	5870	5870
2 1/2 (2.875)	10S	.120	1415	1339	1249	1219	1196	1196	1196	1196
	40S	.203	2449	2319	2163	2111	2071	2071	2071	2071
	80S	.276	3393	3213	2996	2924	2870	2870	2870	2870
	160	.375	4721	4469	4168	4068	3992	3992	3992	3992
	XXS	.552	7295	6907	6441	6286	6170	6170	6170	6170
3 (3.500)	10S	.120	1156	1094	1020	996	977	977	977	977
	40S	.216	2122	2009	1874	1829	1795	1795	1795	1795
	80S	.300	3006	2846	2654	2590	2542	2542	2542	2542
	160	.438	4509	4269	3982	3886	3814	3814	3814	3814
	XXS	.600	6409	6068	5659	5523	5420	5420	5420	5420
3 1/2 (4.000)	10S	.120	1008	955	890	869	853	853	853	853
	40S	.226	1938	1835	1711	1670	1639	1639	1639	1639
	80S	.318	2767	2620	2443	2384	2340	2340	2340	2340

NOTE: These ratings reflect the use of the higher of two stress values permitted under ASME B31.1. Power Piping Section, see note in introduction.

Pressure—Temperature Ratings

of Plain End

Seamless Stainless Alloy Steel Pipe
to ASTM A312 & A376 Grade TP-304 & TP-304H

Temperature Degrees F →			750	800	850	900	950	1,000	1,050	1,100	1,150	1,200
Allowable Stress "S" PSI →			15,600	15,200	14,900	14,700	14,400	13,800	12,200	9,800	7,700	6,100
Pipe Size	Sched- ule No.	Wall Thick- ness	MAXIMUM DESIGN PRESSURE, PSI									
1/2 (0.840)	10S	.083	2914	2839	2783	2746	2690	2578	2279	1865	1524	1207
	40S	.109	3880	3780	3705	3656	3581	3432	3034	2499	2069	1639
	80S	.147	5463	5322	5217	5147	5042	4832	4272	3556	3013	2387
	160	.188	7197	7012	6874	6781	6712	6432	5686	4791	4172	3305
	XXS	.294	11516	11221	10999	10851	11667	11181	9885	8640	8242	6529
3/4 (1.050)	10S	.083	2297	2238	2194	2164	2120	2032	1796	1464	1186	940
	40S	.113	3182	3100	3039	2998	2937	2815	2488	2040	1673	1325
	80S	.154	4471	4357	4271	4213	4127	3955	3497	2892	2415	1913
	160	.219	6649	6478	6351	6265	6169	5912	5226	4386	3785	2998
	XXS	.308	9644	9397	9212	9088	9324	8935	7899	6785	6187	4902
1 (1.315)	10S	.109	2392	2331	2285	2254	2208	2116	1871	1526	1238	981
	40S	.133	2961	2885	2828	2790	2733	2620	2316	1896	1550	1228
	80S	.179	4118	4013	3934	3881	3802	3643	3221	2657	2208	1749
	160	.250	5995	5841	5726	5649	5534	5303	4688	3916	3345	2650
	XXS	.358	8880	8652	8481	8367	8467	8115	7174	6123	5497	4355
1 1/4 (1.660)	10S	.109	1871	1823	1787	1763	1727	1655	1463	1190	958	759
	40S	.140	2457	2394	2347	2316	2268	2174	1922	1569	1273	1009
	80S	.191	3414	3326	3260	3217	3151	3020	2670	2192	1803	1429
	160	.250	4602	4484	4395	4336	4248	4071	3599	2979	2492	1974
	XXS	.382	7390	7200	7058	6964	6906	6619	5851	4937	4314	3417
1 1/2 (1.900)	10S	.109	1625	1583	1552	1531	1500	1437	1271	1032	828	656
	40S	.145	2203	2147	2104	2076	2034	1949	1723	1404	1136	900
	80S	.200	3102	3023	2963	2923	2864	2744	2426	1988	1628	1290
	160	.281	4506	4391	4304	4246	4160	3986	3524	2915	2435	1929
	XXS	.400	6703	6531	6403	6317	6222	5963	5272	4426	3823	3028
2 (2.375)	10S	.109	1289	1256	1231	1215	1190	1140	1008	817	653	517
	40S	.154	1858	1810	1775	1751	1715	1644	1453	1181	951	753
	80S	.218	2682	2613	2561	2527	2475	2372	2097	1714	1396	1106
	160	.344	4400	4288	4203	4146	4062	3893	3441	2845	2373	1880
	XXS	.436	5759	5612	5501	5427	5316	5095	4504	3757	3197	2533
2 1/2 (2.875)	10S	.120	1174	1144	1121	1106	1083	1038	918	743	593	470
	40S	.203	2032	1980	1941	1915	1876	1798	1589	1294	1044	827
	80S	.276	2816	2744	2689	2653	2599	2491	2202	1801	1469	1164
	160	.375	3917	3817	3741	3691	3616	3465	3063	2524	2091	1656
	XXS	.552	6053	5898	5782	5704	5590	5357	4736	3958	3383	2680
3 (3.500)	10S	.120	959	934	916	904	885	848	750	606	482	382
	40S	.216	1761	1716	1682	1659	1625	1558	1377	1119	900	713
	80S	.300	2494	2430	2382	2350	2303	2207	1951	1592	1293	1025
	160	.438	3742	3646	3574	3526	3454	3310	2926	2408	1990	1577
	XXS	.600	5318	5182	5080	5011	4909	4705	4159	3459	2924	2316
3 1/2 (4.000)	10S	.120	837	815	799	788	772	740	654	528	420	332
	40S	.226	1608	1557	1536	1515	1484	1423	1258	1021	819	649
	80S	.318	2296	2237	2193	2164	2119	2031	1795	1464	1186	939

NOTE: These ratings reflect the use of the higher of two stress values permitted under ASME B31.1. Power Piping Section, see note in introduction.

NOTE: 2. Grade 304 may be used at Temperatures over 1000°F, provided the carbon is 0.04 percent or higher.

Pressure—Temperature Ratings

of Plain End

Seamless Stainless Alloy Steel Pipe
to ASTM A312 & A376 Grade TP-304 & TP-304H

Temperature Degrees F →			—20 to 100	200	300	400	500	600	650	700
Allowable Stress "S" PSI →			18,800	17,800	16,600	16,200	15,900	15,900	15,900	15,900
Pipe Size	Schedule Number	Wall Thickness	MAXIMUM DESIGN PRESSURE, PSI							
4 (4.500)	10S	.120	894	846	789	770	756	756	756	756
	40S	.237	1796	1700	1586	1547	1519	1519	1519	1519
	80S	.337	2601	2463	2297	2242	2200	2200	2200	2200
	120	.438	3434	3251	3032	2959	2904	2904	2904	2904
	160	.531	4235	4010	3740	3650	3582	3582	3582	3582
	XXS	.674	5507	5214	4863	4746	4658	4658	4658	4658
5 (5.563)	10S	.134	804	762	710	693	680	680	680	680
	40S	.258	1579	1495	1394	1360	1335	1335	1335	1335
	80S	.375	2327	2203	2054	2005	1968	1968	1968	1968
	120	.500	3159	2991	2790	2722	2672	2672	2672	2672
	160	.625	4013	3799	3543	3458	3394	3394	3394	3394
	XXS	.750	4896	4635	4323	4219	4141	4141	4141	4141
6 (6.625)	10S	.134	674	638	595	580	570	570	570	570
	40S	.280	1433	1357	1265	1235	1212	1212	1212	1212
	80S	.432	2248	2128	1985	1937	1901	1901	1901	1901
	120	.562	2969	2811	2621	2558	2511	2511	2511	2511
	160	.719	3863	3658	3411	3329	3267	3267	3267	3267
	XXS	.864	4722	4471	4169	4069	3993	3993	3993	3993
8 (8.625)	10S	.148	574	543	507	494	485	485	485	485
	20	.250	975	923	860	840	824	824	824	824
	30	.277	1079	1022	953	930	913	913	913	913
	40S	.322	1262	1195	1115	1088	1068	1068	1068	1068
	60	.406	1600	1515	1413	1379	1353	1353	1353	1353
	80S	.500	1990	1884	1757	1715	1683	1683	1683	1683
	100	.594	2382	2255	2103	2052	2014	2014	2014	2014
	120	.719	2912	2757	2571	2509	2463	2463	2463	2463
	140	.812	3318	3142	2930	2859	2807	2807	2807	2807
	XXS	.875	3595	3404	3174	3098	3040	3040	3040	3040
10 (10.750)	10S	.165	509	482	450	439	431	431	431	431
	20	.250	779	737	688	671	659	659	659	659
	30	.307	960	909	848	827	812	812	812	812
	40S	.365	1143	1082	1009	985	967	967	967	967
	80S	.500	1584	1499	1398	1365	1339	1339	1339	1339
	80	.594	1892	1791	1671	1630	1600	1600	1600	1600
	100	.719	2308	2185	2038	1989	1952	1952	1952	1952
	120	.844	2735	2590	2415	2357	2313	2313	2313	2313
	140	1.000	3274	3100	2891	2821	2769	2769	2769	2769
	160	1.125	3714	3516	3279	3200	3141	3141	3141	3141
12 (12.750)	10S	.180	471	446	416	406	398	398	398	398
	20	.250	655	620	578	564	554	554	554	554
	30	.330	868	822	766	748	734	734	734	734
	40S	.375	988	935	872	851	835	835	835	835
	40	.406	1071	1014	945	923	906	906	906	906
	80S	.500	1328	1258	1173	1144	1123	1123	1123	1123
	60	.562	1497	1417	1322	1290	1266	1266	1266	1266
	80	.688	1845	1747	1629	1590	1560	1560	1560	1560
	100	.844	2285	2164	2018	1969	1933	1933	1933	1933
	120	1.000	2730	2585	2411	2353	2309	2309	2309	2309
	140	1.125	3093	2928	2731	2665	2616	2616	2616	2616
	160	1.312	3648	3454	3221	3144	3085	3085	3085	3085

NOTE: These ratings reflect the use of the higher of two stress values permitted under ASME B31.1, Power Piping Section, see note in introduction.

Pressure—Temperature Ratings

of Plain End

Seamless Stainless Alloy Steel Pipe
to ASTM A312 & A376 Grade TP-304 & TP-304H

Temperature Degrees F →			750	800	850	900	950	1,000	1,050	1,100	1,150	1,200
Allowable Stress "S" PSI →			15,600	15,200	14,900	14,700	14,400	13,800	12,200	9,800	7,700	6,100
Pipe Size	Sched- ule No.	Wall Thick- ness	MAXIMUM DESIGN PRESSURE, PSI									
4 (4.500)	10S	.120	742	723	709	699	685	656	580	468	371	294
	40S	.237	1490	1452	1423	1404	1375	1318	1165	945	757	600
	80S	.337	2159	2103	2062	2034	1992	1909	1688	1375	1112	881
	120	.438	2849	2776	2722	2685	2630	2521	2228	1823	1488	1179
	160	.531	3515	3424	3357	3312	3244	3109	2749	2259	1860	1474
	XXS	.674	4570	4453	4365	4306	4218	4043	3574	2958	2473	1959
5 (5.563)	10S	.134	667	650	637	629	616	590	522	421	334	264
	40S	.258	1310	1277	1251	1235	1209	1159	1025	830	663	526
	80S	.375	1931	1881	1844	1819	1782	1708	1510	1228	990	784
	120	.500	2622	2554	2504	2470	2420	2319	2050	1675	1363	1080
	160	.625	3330	3244	3180	3138	3074	2946	2604	2137	1756	1391
	XXS	.750	4062	3958	3880	3828	3750	3594	3177	2620	2175	1723
6 (6.625)	10S	.134	559	545	534	527	516	494	437	352	279	221
	40S	.280	1189	1158	1136	1120	1098	1052	930	753	601	476
	80S	.432	1865	1817	1782	1758	1722	1650	1459	1186	955	757
	120	.562	2463	2400	2353	2321	2274	2179	1927	1572	1276	1011
	160	.719	3206	3124	3062	3021	2959	2836	2507	2056	1686	1336
	XXS	.864	3918	3818	3742	3692	3617	3466	3064	2525	2091	1657
8 (8.625)	10S	.148	476	464	455	449	439	421	372	300	237	188
	20	.250	809	788	772	762	746	715	632	511	405	321
	30	.277	896	873	855	844	827	792	700	566	450	356
	40S	.322	1048	1021	1000	987	967	927	819	662	528	418
	60	.406	1328	1294	1268	1251	1226	1175	1038	841	673	533
	80S	.500	1652	1609	1577	1556	1524	1461	1292	1049	842	667
10 (10.750)	100	.594	1976	1926	1888	1862	1824	1748	1546	1257	1014	803
	120	.719	2416	2354	2308	2277	2230	2138	1890	1542	1251	991
	140	.812	2754	2683	2630	2595	2542	2436	2153	1761	1435	1137
	XXS	.875	2983	2906	2849	2811	2753	2639	2333	1910	1562	1237
	160	.906	3096	3017	2957	2918	2858	2739	2421	1985	1625	1287
12 (12.750)	10S	.165	422	412	404	398	390	374	330	266	210	167
	20	.250	646	630	617	609	596	572	505	408	323	256
	30	.307	797	776	761	751	735	705	623	503	399	316
	40S	.365	948	924	906	894	875	839	742	599	477	378
	60	.406	1048	1021	1000	987	967	927	819	662	528	418
	80S	.500	1314	1280	1255	1238	1213	1162	1028	833	665	527
14 (14.750)	80	.594	1570	1530	1500	1479	1449	1389	1228	996	799	633
	100	.719	1915	1866	1829	1805	1768	1694	1498	1218	981	778
	120	.844	2270	2211	2168	2139	2095	2008	1775	1447	1171	928
	140	1.000	2716	2647	2595	2560	2507	2403	2124	1737	1415	1121
	160	1.125	3082	3003	2943	2904	2845	2726	2410	1975	1617	1281
16 (16.750)	10S	.180	391	380	373	368	360	345	305	246	194	154
	20	.250	543	529	519	512	502	481	425	343	271	215
	30	.330	720	702	688	679	665	637	563	455	361	286
	40S	.375	820	798	783	772	756	725	641	518	411	326
	60	.406	888	866	849	837	820	786	695	561	446	353
18 (18.750)	80S	.500	1102	1074	1053	1039	1017	975	862	697	556	440
	60	.562	1242	1210	1187	1171	1147	1099	972	787	628	498
	80	.688	1531	1492	1462	1443	1413	1354	1197	971	779	617
	100	.844	1896	1848	1811	1787	1750	1678	1483	1206	971	770
	120	1.000	2266	2207	2164	2135	2091	2004	1772	1444	1169	926
20 (20.750)	140	1.125	2566	2501	2451	2418	2369	2270	2007	1639	1332	1056
	160	1.312	3027	2950	2891	2853	2794	2678	2367	1939	1587	1257

NOTE: These ratings reflect the use of the higher of two stress values permitted under ASME B31.1, Power Piping Section, see note in introduction.

NOTE: 2. Grade 304 may be used at Temperatures over 1000°F. provided the carbon is 0.04 percent or higher.

Pressure—Temperature Ratings

of Plain End

Seamless Stainless Alloy Steel Pipe
to ASTM A312 & A376 Grade TP-316 & TP-316H

Temperature Degrees F →			20 to 100	200	300	400	500	600	650	700
Allowable Stress "S" PSI →			18,800	18,800	18,400	18,100	18,000	17,000	16,700	16,300
Pipe Size	Schedule Number	Wall Thickness	MAXIMUM DESIGN PRESSURE, PSI							
1/2 (0.840)	10S	.083	3512	3512	3437	3381	3362	3176	3119	3045
	40S	.109	4675	4675	4576	4501	4476	4228	4153	4054
	80S	.147	6583	6583	6443	6338	6303	5953	5848	5708
	160	.188	8673	8673	8488	8350	8304	7842	7704	7520
	XXS	.294	13878	13878	13583	13361	13288	12549	12328	12033
3/4 (1.050)	10S	.083	2768	2768	2709	2665	2650	2503	2459	2400
	40S	.113	3834	3834	3753	3692	3671	3467	3406	3324
	80S	.154	5389	5389	5274	5188	5159	4873	4787	4672
	160	.219	8013	8013	7842	7714	7672	7246	7118	6947
	XXS	.308	11623	11623	11375	11190	11128	10510	10324	10077
1 (1.315)	10S	.109	2883	2883	2822	2776	2760	2607	2561	2500
	40S	.133	3569	3569	3493	3436	3417	3227	3170	3094
	80S	.179	4963	4963	4858	4778	4752	4488	4409	4303
	160	.250	7224	7224	7071	6955	6917	6533	6417	6264
	XXS	.358	10701	10701	10473	10303	10246	9677	9506	9278
1 1/4 (1.660)	10S	.109	2255	2255	2207	2171	2159	2039	2003	1955
	40S	.140	2962	2962	2899	2851	2836	2678	2631	2568
	80S	.191	4114	4114	4026	3961	3939	3720	3654	3567
	160	.250	5546	5546	5428	5339	5310	5015	4926	4808
	XXS	.382	8906	8906	8716	8574	8527	8053	7911	7722
1 1/2 (1.900)	10S	.109	1958	1958	1917	1885	1875	1771	1740	1698
	40S	.145	2655	2655	2599	2556	2542	2401	2359	2302
	80S	.200	3739	3739	3659	3599	3580	3381	3321	3241
	160	.281	5431	5431	5315	5229	5200	4911	4824	4709
	XXS	.400	8078	8078	7907	7778	7735	7305	7176	7004
2 (2.375)	10S	.109	1554	1554	1521	1496	1488	1405	1380	1347
	40S	.154	2239	2239	2191	2156	2144	2025	1989	1941
	80S	.218	3232	3232	3163	3111	3094	2922	2871	2802
	160	.344	5303	5303	5190	5106	5077	4795	4711	4598
	XXS	.436	6941	6941	6793	6682	6645	6276	6165	6018
2 1/2 (2.875)	10S	.120	1415	1415	1384	1362	1354	1279	1257	1226
	40S	.203	2449	2449	2397	2358	2345	2215	2176	2124
	80S	.276	3393	3393	3321	3267	3249	3069	3014	2942
	160	.375	4721	4721	4620	4545	4520	4269	4193	4093
	XXS	.552	7295	7295	7140	7023	6984	6596	6480	6325
3 (3.500)	10S	.120	1156	1156	1131	1113	1107	1045	1027	1002
	40S	.216	2122	2122	2077	2043	2032	1919	1885	1840
	80S	.300	3006	3006	2942	2894	2878	2718	2670	2606
	160	.438	4509	4509	4413	4341	4317	4078	4006	3910
	XXS	.600	6409	6409	6273	6170	6136	5795	5693	5557
3 1/2 (4.000)	10S	.120	1008	1008	987	971	965	912	896	874
	40S	.226	1938	1938	1897	1866	1855	1752	1721	1680
	80S	.318	2767	2767	2708	2664	2649	2502	2458	2399

NOTE: These ratings reflect the use of the higher of two stress values permitted under ASME B31.1. Power Piping Section, see note in introduction.

Pressure—Temperature Ratings

of Plain End

Seamless Stainless Alloy Steel Pipe
to ASTM A312 & A376 Grade TP-316 & TP-316H

Temperature Degrees F →			750	800	850	900	950	1,000	1,050	1,100	1,150	1,200
Allowable Stress "S" PSI →			16,100	15,900	15,700	15,600	15,400	15,300	14,500	12,400	9,800	7,400
Pipe Size	Sched- ule No.	Wall Thick- ness	MAXIMUM DESIGN PRESSURE, PSI									
1/2 (0.840)	10S	.083	3007	2970	2933	2914	2877	2858	2709	2360	1939	1464
	40S	.109	4004	3954	3904	3880	3830	3805	3606	3162	2634	1989
	80S	.147	5638	5568	5498	5463	5393	5357	5077	4500	3834	2895
	160	.188	7427	7335	7243	7197	7178	7131	6758	6062	5310	4010
	XXS	.294	11885	11737	11590	11516	12477	12396	11748	10932	10490	7921
3/4 (1.050)	10S	.083	2371	2341	2312	2297	2267	2253	2135	1853	1510	1140
	40S	.113	3284	3243	3202	3182	3141	3121	2957	2582	2129	1608
	80S	.154	4615	4557	4500	4471	4414	4385	4156	3659	3073	2321
	160	.219	6862	6777	6691	6649	6597	6554	6212	5550	4817	3637
	XXS	.308	9953	9830	9706	9644	9971	9906	9388	8585	7875	5946
1 (1.315)	10S	.109	2469	2438	2408	2392	2362	2346	2224	1931	1575	1190
	40S	.133	3056	3018	2980	2961	2923	2904	2752	2399	1973	1490
	80S	.179	4250	4198	4145	4118	4066	4039	3828	3362	2810	2122
	160	.250	6187	6110	6033	5995	5918	5879	5572	4955	4257	3214
	XXS	.358	9164	9050	8937	8880	9055	8997	8526	7747	6997	5283
1 1/4 (1.660)	10S	.109	1931	1907	1883	1871	1847	1835	1739	1505	1219	921
	40S	.140	2536	2505	2473	2457	2426	2410	2284	1985	1620	1224
	80S	.191	3523	3479	3435	3414	3370	3348	3173	2774	2295	1733
	160	.250	4749	4690	4631	4602	4543	4513	4277	3769	3172	2395
	XXS	.382	7627	7532	7437	7390	7386	7338	6954	6247	5490	4146
1 1/2 (1.900)	10S	.109	1677	1656	1635	1625	1604	1594	1510	1305	1054	796
	40S	.145	2274	2246	2217	2203	2175	2161	2048	1776	1445	1091
	80S	.200	3202	3162	3122	3102	3062	3043	2884	2516	2073	1565
	160	.281	4651	4593	4535	4506	4449	4420	4189	3689	3100	2340
	XXS	.400	6918	6832	6746	6703	6654	6611	6265	5600	4865	3674
2 (2.375)	10S	.109	1331	1314	1298	1289	1273	1264	1198	1033	831	627
	40S	.154	1918	1894	1870	1858	1834	1822	1727	1495	1210	914
	80S	.218	2768	2733	2699	2682	2647	2630	2493	2169	1776	1341
	160	.344	4541	4485	4429	4400	4344	4316	4090	3599	3020	2280
	XXS	.436	5944	5870	5796	5759	5686	5649	5353	4753	4069	3072
2 1/2 (2.875)	10S	.120	1211	1196	1181	1174	1159	1151	1091	940	754	570
	40S	.203	2097	2071	2045	2032	2006	1993	1889	1637	1329	1003
	80S	.276	2906	2870	2834	2816	2780	2762	2617	2279	1870	1412
	160	.375	4043	3992	3942	3917	3867	3842	3641	3194	2661	2009
	XXS	.552	6247	6170	6092	6053	5978	5939	5628	5008	4305	3251
3 (3.500)	10S	.120	990	977	965	959	947	941	891	767	614	463
	40S	.216	1817	1795	1772	1761	1738	1727	1637	1416	1145	865
	80S	.300	2574	2542	2510	2494	2462	2446	2319	2015	1646	1243
	160	.438	3862	3814	3766	3742	3694	3670	3478	3047	2533	1913
	XXS	.600	5489	5420	5352	5318	5250	5216	4943	4376	3722	2810
3 1/2 (4.000)	10S	.120	863	853	842	837	826	820	778	669	534	403
	40S	.226	1660	1639	1618	1608	1587	1577	1495	1292	1042	787
	80S	.318	2370	2340	2311	2296	2267	2252	2134	1852	1509	1139

NOTE: These ratings reflect the use of the higher of two stress values permitted under ASME B31.1, Power Piping Section, see note in introduction.

NOTE: 2. Grade 316 may be used at Temperatures over 1000°F. provided the carbon is 0.04 percent or higher.

Pressure—Temperature Ratings

of Plain End

Seamless Stainless Alloy Steel Pipe
to ASTM A312 & A376 Grade TP-316 & TP-316H

Temperature Degrees F —————>			—20 to 100	200	300	400	500	600	650	700
Allowable Stress "S" PSI —————>			18,800	18,800	18,400	18,100	18,000	17,000	16,700	16,300
Pipe Size	Schedule Number	Wall Thickness	MAXIMUM DESIGN PRESSURE, PSI							
4 (4.500)	10S	.120	894	894	875	861	856	808	794	775
	40S	.237	1796	1796	1757	1729	1719	1624	1595	1557
	80S	.337	2601	2601	2546	2504	2491	2352	2311	2255
	120	.438	3434	3434	3361	3306	3288	3105	3050	2977
	160	.531	4235	4235	4145	4078	4055	3830	3762	3672
	XXS	.674	5507	5507	5390	5302	5273	4980	4892	4775
5 (5.563)	10S	.134	804	804	787	774	770	727	714	697
	40S	.258	1579	1579	1545	1520	1512	1428	1402	1369
	80S	.375	2327	2327	2277	2240	2228	2104	2067	2017
	120	.500	3159	3159	3092	3042	3025	2857	2807	2739
	160	.625	4013	4013	3927	3863	3842	3629	3565	3479
	XXS	.750	4896	4896	4792	4713	4687	4427	4349	4245
6 (6.625)	10S	.134	674	674	659	648	645	609	598	584
	40S	.280	1433	1433	1402	1380	1372	1296	1273	1242
	80S	.432	2248	2248	2200	2164	2152	2033	1997	1949
	120	.562	2969	2969	2906	2858	2842	2684	2637	2574
	160	.719	3863	3863	3781	3719	3699	3493	3432	3350
	XXS	.864	4722	4722	4621	4546	4521	4270	4194	4094
8 (8.625)	10S	.148	574	574	561	552	549	519	510	497
	20	.250	975	975	954	938	933	881	866	845
	30	.277	1079	1079	1056	1039	1033	976	959	936
	40S	.322	1262	1262	1236	1215	1209	1142	1121	1095
	60	.406	1600	1600	1566	1541	1532	1447	1422	1387
	80S	.500	1990	1990	1948	1916	1906	1800	1768	1726
	100	.594	2382	2382	2331	2293	2280	2154	2116	2065
	120	.719	2912	2912	2850	2804	2788	2633	2587	2525
	140	.812	3318	3318	3248	3195	3177	3001	2948	2877
	XXS	.875	3595	3595	3518	3461	3442	3251	3193	3117
10 (10.750)	10S	.165	509	509	498	490	487	460	452	441
	20	.250	779	779	762	750	746	704	692	675
	30	.307	960	960	940	924	919	868	853	832
	40S	.365	1143	1143	1119	1100	1094	1033	1015	991
	80S	.500	1584	1584	1550	1525	1516	1432	1407	1373
	80	.594	1892	1892	1852	1822	1811	1711	1681	1640
	100	.719	2308	2308	2259	2222	2210	2087	2050	2001
	120	.844	2735	2735	2677	2633	2619	2473	2430	2371
	140	1.000	3274	3274	3204	3152	3134	2960	2908	2838
	160	1.125	3714	3714	3635	3575	3556	3358	3299	3220
12 (12.750)	10S	.180	471	471	461	453	451	426	418	408
	20	.250	655	655	641	630	627	592	582	568
	30	.330	868	868	850	836	831	785	771	753
	40S	.375	988	988	967	951	946	893	877	856
	40	.406	1071	1071	1048	1031	1025	968	951	928
	80S	.500	1328	1328	1300	1279	1272	1201	1180	1152
	60	.562	1497	1497	1465	1441	1433	1354	1330	1298
	80	.688	1845	1845	1806	1776	1766	1668	1639	1600
	100	.844	2285	2285	2237	2200	2188	2066	2030	1981
	120	1.000	2730	2730	2672	2629	2614	2469	2425	2367
	140	1.125	3093	3093	3027	2978	2961	2797	2747	2682
	160	1.312	3648	3648	3571	3512	3493	3299	3241	3163

NOTE: These ratings reflect the use of the higher of two stress values permitted under ASME B31.1. Power Piping Section, see note in introduction.

Pressure—Temperature Ratings

of Plain End

Seamless Stainless Alloy Steel Pipe
to ASTM A312 & A376 Grade TP-316 & TP-316H

Temperature Degrees F →			750	800	850	900	950	1,000	1,050	1,100	1,150	1,200
Allowable Stress "S" PSI →			16,100	15,900	15,700	15,600	15,400	15,300	14,500	12,400	9,800	7,400
Pipe Size	Sched- ule No.	Wall Thick- ness	Maximum Design Pressure, PSI									
4 (4.500)	10S	.120	766	756	747	742	732	728	690	592	473	357
	40S	.237	1538	1519	1500	1490	1471	1461	1385	1196	964	728
	80S	.337	2228	2200	2172	2159	2131	2117	2006	1740	1415	1068
	120	.438	2941	2904	2868	2849	2813	2795	2649	2307	1894	1430
	160	.531	3627	3582	3537	3515	3469	3447	3267	2858	2368	1788
	XXS	.674	4716	4658	4599	4570	4511	4482	4248	3742	3148	2377
5 (5.563)	10S	.134	689	680	672	667	659	655	620	533	425	321
	40S	.258	1352	1335	1318	1310	1293	1285	1218	1050	844	638
	80S	.375	1993	1968	1943	1931	1906	1894	1795	1554	1260	951
	120	.500	2706	2672	2638	2622	2588	2571	2437	2119	1734	1310
	160	.625	3436	3394	3351	3330	3287	3266	3095	2704	2235	1688
	XXS	.750	4193	4141	4088	4062	4010	3984	3776	3315	2768	2090
6 (6.625)	10S	.134	577	570	562	559	552	548	519	446	355	268
	40S	.280	1227	1212	1197	1189	1174	1166	1105	952	764	577
	80S	.432	1925	1901	1877	1865	1841	1829	1734	1501	1215	918
	120	.562	2542	2511	2479	2463	2432	2416	2290	1989	1624	1227
	160	.719	3308	3267	3226	3206	3165	3144	2980	2602	2146	1621
	XXS	.864	4044	3993	3943	3918	3868	3843	3642	3195	2662	2010
8 (8.625)	10S	.148	491	485	479	476	470	467	442	380	302	228
	20	.250	835	824	814	809	798	793	752	646	516	390
	30	.277	924	913	901	896	884	878	832	716	572	432
	40S	.322	1081	1068	1054	1048	1034	1027	974	838	672	507
	60	.406	1370	1353	1336	1328	1311	1302	1234	1065	856	646
	80S	.500	1704	1683	1662	1652	1630	1620	1535	1327	1072	809
	100	.594	2040	2014	1989	1976	1951	1938	1837	1591	1291	975
	120	.719	2494	2463	2432	2416	2385	2370	2246	1951	1592	1202
	140	.812	2842	2807	2771	2754	2718	2701	2559	2228	1827	1379
	XXS	.875	3078	3040	3002	2983	2945	2925	2773	2417	1988	1501
	160	.906	3196	3156	3116	3096	3057	3037	2878	2511	2068	1562
10 (10.750)	10S	.165	436	431	425	422	417	414	393	337	268	202
	20	.250	667	659	650	646	638	634	601	516	411	310
	30	.307	822	812	802	797	786	781	740	637	508	384
	40S	.365	979	967	954	948	936	930	881	758	607	458
	80S	.500	1356	1339	1322	1314	1297	1289	1221	1053	847	639
	80	.594	1620	1600	1580	1570	1550	1540	1459	1261	1017	768
	100	.719	1977	1952	1927	1915	1891	1878	1780	1541	1249	943
	120	.844	2342	2313	2284	2270	2241	2226	2110	1831	1491	1126
	140	1.000	2803	2769	2734	2716	2682	2664	2525	2197	1801	1360
	160	1.125	3180	3141	3101	3082	3042	3022	2864	2499	2058	1554
12 (12.750)	10S	.180	403	398	393	391	386	383	363	311	247	187
	20	.250	561	554	547	543	536	533	505	433	345	260
	30	.330	743	734	725	720	711	706	669	575	459	346
	40S	.375	846	835	825	820	809	804	762	655	523	395
	40	.406	917	906	894	888	877	871	826	710	568	429
	80S	.500	1137	1123	1109	1102	1088	1081	1024	882	707	534
	60	.562	1282	1266	1250	1242	1226	1218	1155	995	800	604
	80	.688	1580	1560	1541	1531	1511	1502	1423	1229	991	748
	100	.844	1957	1933	1908	1896	1872	1860	1763	1526	1236	934
	120	1.000	2338	2309	2280	2266	2237	2222	2106	1827	1488	1124
	140	1.125	2649	2616	2583	2566	2533	2517	2385	2074	1696	1281
	160	1.312	3124	3085	3047	3027	2988	2969	2814	2454	2019	1525

NOTE: These ratings reflect the use of the higher of two stress values permitted under ASME B31.1. Power Piping Section, see note in introduction.

NOTE: 2. Grade 316 may be used at Temperatures over 1000°F. provided the carbon is 0.04 percent or higher.

K-FACTOR

For use in obtaining the allowable pressures for stress values other than those given in the Pressure-Temperature Tables on Pages 3 thru 22.

Multiply the allowable SE Value by the appropriate K Factor.

NOTE: $\frac{D_o}{t_m}$ ratio is less than 6 for these pipe sizes and wall thicknesses. For temperatures of 900°F and below, the y coefficient has been calculated in accordance with Note (1) of the Introduction.

PIPE SIZE	SCHEDULE NUMBER	WALL DESIG.	WALL THICKNESS (INCHES)	K — FACTOR (SEE NOTE)			
				Y = 0.4	Y = 0.5	Y = 0.7	Y K
$\frac{1}{2}$ (0.840)	40	STD.	0.109	0.24869	0.25503	0.26874	
	80	XS	0.147	0.35016	0.36287	0.39126	
	160	—	0.188	0.46610	0.48889	0.54187	.378 .46132
	—	XXS	0.294	0.81021	0.88165	1.07039	.280 .73820
$\frac{3}{4}$ (1.050)	40	STD.	0.113	0.20396	0.20820	0.21725	
	80	XS	0.154	0.28662	0.29508	0.31359	
	160	—	0.219	0.42838	0.44755	0.49155	.388 .42621
	—	XXS	0.308	0.64748	0.69231	0.80357	.327 .61823
1 (1.315)	40	STD.	0.133	0.18982	0.19349	0.20128	
	80	XS	0.179	0.26400	0.27116	0.28671	
	160	—	0.250	0.38428	0.39964	0.43435	.344 .56921
	—	XXS	0.358	0.58801	0.62475	0.71396	
$1\frac{1}{4}$ (1.660)	40	STD.	0.140	0.15753	0.16005	0.16534	
	80	XS	0.191	0.21882	0.22371	0.23419	
	160	—	0.250	0.29499	0.30396	0.32363	.374 .47372
	—	XXS	0.382	0.47961	0.50377	0.56021	
$1\frac{1}{2}$ (1.900)	40	STD.	0.145	0.14124	0.14326	0.14749	
	80	XS	0.200	0.19886	0.20290	0.21148	
	160	—	0.281	0.28887	0.29746	0.31628	.387 .42970
	—	XXS	0.400	0.43210	0.45161	0.49645	
2 (2.375)	40	STD.	0.154	0.11910	0.12054	0.12351	
	80	XS	0.218	0.17190	0.17491	0.18125	
	160	—	0.344	0.28207	0.29026	0.30815	
	—	XXS	0.436	0.36919	0.38334	0.41517	
$2\frac{1}{2}$ (2.875)	40	STD.	0.203	0.13028	0.13200	0.13558	
	80	XS	0.276	0.18050	0.18382	0.19084	
	160	—	0.375	0.25109	0.25756	0.27155	.399 .38803
	—	XXS	0.552	0.38817	0.40385	0.43933	
3 (3.500)	40	STD.	0.216	0.11288	0.11416	0.11683	
	80	XS	0.300	0.15990	0.16250	0.16795	
	160	—	0.438	0.23985	0.24575	0.25845	
	—	XXS	0.600	0.34091	0.35294	0.37975	
$3\frac{1}{2}$ (4.000)	40	STD.	0.226	0.10308	0.10416	0.10637	
	80	XS	0.318	0.14718	0.14938	0.15398	
4 (4.500)	40	STD.	0.237	0.09551	0.09644	0.09833	
	80	XS	0.337	0.13837	0.14031	0.14436	
	120	—	0.438	0.18266	0.18606	0.19325	
	160	—	0.531	0.22529	0.23048	0.24162	
	—	XXS	0.674	0.29295	0.30179	0.32118	
5 (5.563)	40	STD.	0.258	0.08398	0.08469	0.08615	
	80	XS	0.375	0.12376	0.12531	0.12853	
	120	—	0.500	0.16805	0.17093	0.17698	
	160	—	0.625	0.21345	0.21810	0.22805	
	—	XXS	0.750	0.26041	0.26737	0.28248	

K-FACTOR

For use in obtaining the allowable pressures for stress values other than those given in the Pressure-Temperature Tables on Pages 3 thru 22.

Multiply the allowable SE Value by the appropriate K Factor.

PIPE SIZE	SCHEDULE NUMBER	WALL DESIG.	WALL THICKNESS (INCHES)	K — FACTOR		
				Y = 0.4	Y = 0.5	Y = 0.7
6 (6.625)	40	STD.	0.280	0.07622	0.07680	0.07800
	80	XS	0.432	0.11957	0.12102	0.12402
	120	—	0.562	0.15791	0.16044	0.16576
	160	—	0.719	0.20550	0.20981	0.21900
	—	XXS	0.864	0.25115	0.25762	0.27162
8 (8.625)	20	—	0.250	0.05184	0.05211	0.05265
	30	—	0.277	0.05740	0.05774	0.05841
	40	STD.	0.322	0.06715	0.06760	0.06853
	60	—	0.406	0.08512	0.08585	0.08735
	80	XS	0.500	0.10587	0.10700	0.10934
	100	—	0.594	0.12669	0.12832	0.13170
	120	—	0.719	0.15489	0.15733	0.16244
	140	—	0.812	0.17651	0.17968	0.18638
	—	XXS	0.875	0.19121	0.19494	0.20284
10 (10.750)	160	—	0.906	0.19848	0.20250	0.21105
	20	—	0.250	0.04142	0.04159	0.04194
	30	—	0.307	0.05107	0.05133	0.05186
	40	STD.	0.365	0.06079	0.06116	0.06192
	60	XS	0.500	0.08423	0.08495	0.08642
	80	—	0.594	0.10064	0.10166	0.10377
	100	—	0.719	0.12277	0.12430	0.12746
	120	—	0.844	0.14549	0.14764	0.15213
	140	XXS	1.000	0.17413	0.17722	0.18373
12 (12.750)	160	—	1.125	0.19753	0.20152	0.20998
	20	—	0.250	0.03483	0.03495	0.03520
	30	—	0.330	0.04617	0.04638	0.04682
	—	STD.	0.375	0.05253	0.05281	0.05337
	40	—	0.406	0.05695	0.05728	0.05794
	—	XS	0.500	0.07065	0.07115	0.07218
	60	—	0.562	0.07963	0.08027	0.08158
	80	—	0.688	0.09814	0.09911	0.10112
	100	—	0.844	0.12156	0.12305	0.12616
14 (14.000)	120	XXS	1.000	0.14523	0.14737	0.15184
	140	—	1.125	0.16451	0.16726	0.17305
	160	—	1.312	0.19406	0.19790	0.20605
	10	—	0.250	0.03168	0.03178	0.03199
	20	—	0.312	0.03962	0.03978	0.04009
	30	STD.	0.375	0.04775	0.04798	0.04845
	40	—	0.438	0.05594	0.05625	0.05689
	—	XS	0.500	0.06418	0.06459	0.06544
	60	—	0.594	0.07656	0.07715	0.07836
16 (16.000)	80	—	0.750	0.09736	0.09832	0.10029
	100	—	0.938	0.12306	0.12459	0.12778
	120	—	1.094	0.14462	0.14675	0.15118
	140	—	1.250	0.16671	0.16953	0.17548
	160	—	1.406	0.18900	0.19264	0.20036

K-FACTOR

For use in obtaining the allowable pressures for stress values other than those given in the Pressure-Temperature Tables on Pages 3 thru 22.

Multiply the allowable SE Value by the appropriate K Factor.

PIPE SIZE	SCHEDULE NUMBER	WALL DESIG.	WALL THICKNESS (INCHES)	K — FACTOR		
				Y = 0.4	Y = 0.5	Y = 0.7
16 (16,000)	10	—	0.250	0.02768	0.02775	0.02791
	20	—	0.312	0.03460	0.03472	0.03496
	30	STD.	0.375	0.04168	0.04186	0.04221
	40	XS	0.500	0.05598	0.05629	0.05693
	60	—	0.656	0.07387	0.07442	0.07554
	80	—	0.844	0.09592	0.09685	0.09876
	100	—	1.031	0.11808	0.11949	0.12241
	120	—	1.219	0.14089	0.14290	0.14711
	140	—	1.438	0.16780	0.17067	0.17670
	160	—	1.594	0.18745	0.19103	0.19862
18 (18,000)	10	—	0.250	0.02457	0.02463	0.02475
	20	—	0.312	0.03071	0.03080	0.03099
	30	STD.	0.375	0.03698	0.03712	0.03740
	40	XS	0.500	0.04329	0.04348	0.04386
	60	—	0.656	0.04963	0.04988	0.05038
	80	—	0.844	0.05589	0.05620	0.05684
	100	—	1.031	0.07508	0.07565	0.07681
	120	—	1.219	0.09468	0.09558	0.09744
	140	—	1.438	0.11774	0.11914	0.12205
	160	—	1.594	0.14122	0.14324	0.14746
20 (20,000)	10	—	0.250	0.02209	0.02214	0.02224
	20	STD.	0.375	0.03324	0.03335	0.03357
	30	XS	0.500	0.04458	0.04478	0.04519
	40	—	0.656	0.05310	0.05339	0.05396
	60	—	0.844	0.07318	0.07372	0.07482
	80	—	1.031	0.09358	0.09446	0.09628
	100	—	1.219	0.11736	0.11876	0.12165
	120	—	1.438	0.13858	0.14053	0.14459
	140	—	1.657	0.16309	0.16579	0.17148
	160	—	1.969	0.18505	0.18854	0.19593
22 (22,000)	10	—	0.250	0.02007	0.02011	0.02019
	20	STD.	0.375	0.03018	0.03027	0.03045
	30	XS	0.500	0.04046	0.04063	0.04096
	40	—	0.656	0.07163	0.07215	0.07320
	60	—	0.844	0.09277	0.09364	0.09543
	80	—	1.031	0.11437	0.11569	0.11843
	100	—	1.219	0.13632	0.13821	0.14213
	120	—	1.438	0.15865	0.16121	0.16658
	140	—	1.657	0.18125	0.18460	0.19168
24 (24,000)	10	—	0.250	0.01838	0.01842	0.01849
	20	STD.	0.375	0.02764	0.02771	0.02787
	30	XS	0.500	0.03704	0.03718	0.03746
	40	—	0.656	0.04168	0.04186	0.04221
	60	—	0.844	0.05119	0.05146	0.05199
	80	—	1.031	0.07272	0.07325	0.07434
	100	—	1.219	0.09220	0.09305	0.09482
	120	—	1.438	0.11689	0.11827	0.12114
	140	—	1.657	0.13954	0.14152	0.14564
	160	—	2.062	0.15995	0.16255	0.16801
	180	—	2.344	0.18346	0.18689	0.19414

APPENDIX

Nominal Weights (Lb. Per Ft.) of Plain End Seamless Carbon, Alloy and Stainless Steel Pipe

Taken from Tables in ANSI B36.10— and ANSI B36.19—

NOM. PIPE SIZE	STANDARD WALL	XS WALL	XXS WALL	SCHEDULE NUMBER													
				* 5S	10	* 10S	20	30	40	* 40S	60	80	* 80S	100	120	140	160
1/8	0.24	0.31	—	—	—	0.19	—	—	0.24	0.24	—	0.31	0.31	—	—	—	—
1/4	0.42	0.54	—	—	—	0.33	—	—	0.42	0.42	—	0.54	0.54	—	—	—	—
3/8	0.57	0.74	—	—	—	0.42	—	—	0.57	0.57	—	0.74	0.74	—	—	—	—
1/2	0.85	1.09	1.71	0.54	—	0.67	—	—	0.85	0.85	—	1.09	1.09	—	—	—	1.31
3/4	1.13	1.47	2.44	0.69	—	0.86	—	—	1.13	1.13	—	1.47	1.47	—	—	—	1.94
1	1.68	2.17	3.66	0.87	—	1.40	—	—	1.68	1.68	—	2.17	2.17	—	—	—	2.84
1 1/4	2.27	3.00	5.21	1.11	—	1.81	—	—	2.27	2.27	—	3.00	3.00	—	—	—	3.76
1 1/2	2.72	3.63	6.41	1.28	—	2.09	—	—	2.72	2.72	—	3.63	3.63	—	—	—	4.86
2	3.65	5.02	9.03	1.61	—	2.64	—	—	3.65	3.65	—	5.02	5.02	—	—	—	7.46
2 1/2	5.79	7.66	13.69	2.48	—	3.53	—	—	5.79	5.79	—	7.66	7.66	—	—	—	10.01
3	7.58	10.25	18.58	3.03	—	4.33	—	—	7.58	7.58	—	10.25	10.25	—	—	—	14.32
3 1/2	9.11	12.50	—	3.48	—	4.97	—	—	9.11	9.11	—	12.50	12.51	—	—	—	—
4	10.79	14.98	27.54	3.92	—	5.61	—	—	10.79	10.79	—	14.98	14.98	—	19.00	—	22.51
5	14.62	20.78	38.55	6.36	—	7.77	—	—	14.62	14.62	—	20.78	20.78	—	27.04	—	32.96
6	18.97	28.57	53.16	7.60	—	9.29	—	—	18.97	18.97	—	28.57	28.57	—	36.39	—	45.35
8	28.55	43.39	72.42	9.93	—	13.40	22.36	24.70	28.55	28.55	35.64	43.39	43.39	50.95	60.71	67.76	74.69
10	40.48	54.74	104.13	15.19	—	18.65	28.04	34.24	40.48	40.48	54.74	64.43	54.74	77.03	89.29	104.13	115.64
12	49.56	65.42	125.49	20.98	—	24.17	33.38	43.77	53.52	49.56	73.15	88.63	65.42	107.32	125.49	139.67	160.27
14	54.57	72.09	—	23.07	36.71	27.73	45.61	54.57	63.44	—	85.05	106.13	—	130.85	150.79	170.21	189.11
16	62.58	82.77	—	27.90	42.05	31.75	52.27	62.58	82.77	—	107.50	136.61	—	164.82	192.43	223.64	245.25
18	70.59	93.45	—	31.43	47.39	35.76	58.94	82.15	104.67	—	138.17	170.92	—	207.96	244.14	274.22	308.50
20	78.60	104.13	—	39.78	52.73	46.06	78.60	104.13	123.11	—	166.40	208.87	—	256.10	296.37	341.09	379.17
22	86.61	114.81	—	43.80	58.07	50.71	86.61	114.81	—	—	197.41	250.81	—	302.88	353.61	403.00	451.06
24	94.62	125.49	—	55.37	63.41	63.41	94.62	140.68	171.29	—	238.35	296.58	—	367.39	429.39	483.12	542.13

*These Stainless Steel Schedules and Weights are in accordance ANSI B 36.19.

The different grades of stainless steel permit considerable variations in weight. The ferritic stainless steels may be about 5 per cent less, and the austenitic stainless steels about 2 per cent greater than the values shown in this table which are based on weights for carbon steel.

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