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Linepipe Pressure and Temperature Ratings - Page 2

SEAMLESS CARBON STEEL PIPE to ASTM A106-B, API 5LB & ASTM A53

Maximum allowable pressure / temperature ratings** in kPa for chemical plant and petroleum refinery piping systems to ANSI / ASME B31.3A - 1981

Nominal Size DN	Wall Thickness			Temp C°	-29 to 38 C°	205 C°	260 C°	350 C°	370 C°	400 C°	430 C° *	450 C° *
	Schedule		mm	Stress (SE) in kPa	137800	137800	130221	117130	115752	89570	74412	59943
350		10	6.35		4361	4361	4120	3707	3665	2831	2356	1895
		20	7.92		5457	5457	5161	4644	4589	3548	2949	2377
	STD	30	9.53		6580	6580	6222	5595	5533	4279	3555	2866
		40	11.13		7717	7717	7310	6559	6477	5016	4168	3355
	XS		12.7		8833	8833	8351	7510	7421	5739	4768	3845
		60	15.09		10541	10541	9963	8964	8861	6855	5691	4589
		80	19.05		13421	13421	12684	11410	11272	8723	7248	5836
		100	23.83		16949	16949	16019	14407	14242	11017	9157	7372
		120	27.79		19933	19933	18837	16943	16743	12960	10762	8675
		140	31.75		22964	22964	21703	19519	19292	14931	12402	9990
		160	35.71		26051	26051	24618	22144	21883	16936	14069	11334
400		10	6.35		3810	3810	3603	3238	3197	2474	2060	1660
		20	7.92		4768	4768	4507	4051	4004	3100	2577	2074
	STD	30	9.53		5746	5746	5429	4885	4830	3734	3100	2501
	XS	40	12.7		7703	7703	7283	6545	6470	5009	4126	3349
		60	16.66		10176	10176	9618	8654	8550	6614	5498	4430
		80	21.44		13208	13208	12478	11224	11093	8585	7131	5746
		100	26.19		16274	16274	15378	13835	13670	10576	8785	7076
		120	30.96		19409	19409	18341	16481	16302	12616	10480	8440
		140	36.53		23130	23130	21855	19657	19430	15034	12492	10059
		160	40.49		25824	25824	24404	21952	21697	16784	13945	11238
450		10	6.35		3383	3383	3197	2873	2839	2198	1826	1474
		20	7.92		4230	4230	3996	3597	3555	2749	2287	1839
	STD		9.53		5099	5099	4816	4334	4286	3314	2756	2219
	XS	30	11.13		5967	5967	5643	5071	5016	3879	3225	2598
			12.7		6835	6835	6456	5808	5739	4437	3686	2969
		40	14.27		7696	7696	7276	6545	6463	5002	4155	3349
		60	19.05		10349	10349	9784	8799	8695	6725	5588	4499
		80	23.83		13043	13043	12326	11086	10955	8475	7042	5670
		100	29.36		16219	16219	15323	13787	13622	10542	8757	7055
		120	34.93		19464	19464	18389	16543	16350	12650	10507	8468
		140	39.67		22282	22282	21056	18941	18713	11483	12030	9694
		160	45.24		25638	25638	24225	21793	21531	16660	13842	11155
500		10	6.35		3038	3038	2873	2584	2556	1977	1640	1323
	STD	20	9.53		4582	4582	4327	3893	3852	2976	2474	1991
	XS	30	12.7		6139	6139	5801	5216	5154	3989	3314	2666
		40	15.09		7317	7317	6911	6215	6146	4754	3948	3183
		60	20.62		10080	10080	9522	8564	8468	6552	5443	4382
		80	26.19		12898	12898	12188	10962	10831	8385	6966	5608
		100	32.54		16171	16171	15287	13746	13580	10514	8730	7035
		120	38.1		19085	19085	18038	16226	16033	12409	10307	8302
		140	44.45		22475	22475	21242	19106	18879	14614	12140	9777
		160	50.01		25450	25450	24094	21675	21421	16577	13766	11093
600		10	6.35		2529	2529	2391	2150	2129	1647	1364	1102
	STD	20	9.53		3810	3810	3603	3238	3197	2474	2060	1660
	XS		12.7		5097	5097	4816	4334	4286	3314	2756	2219
		30	14.27		5739	5739	5423	4878	4823	3734	3100	2494
		40	17.48		7055	7055	6670	5994	5925	4589	3810	3066
		60	24.61		10018	10018	9467	8516	8420	6511	5409	4361
		80	30.96		12691	12691	12002	10783	10659	8254	6856	5519
		100	38.89		16102	16102	15220	13690	10525	10466	8695	7007
		120	46.02		19223	19223	18168	16336	16150	12491	10383	8364
		140	52.37		22048	22048	20835	18741	18520	14331	11906	9591
		160	59.54		25279	25279	23888	21489	21235	16433	13649	10996

* The ASME code for piping including allowable stress values (SE) for metal temperatures † up to 595ºC for Carbon Steel Pipe, but cautions that conversion of carbides to graphite (graphitization) may occur in Carbon Steel Pipes after prolonged exposures to temperatures over 425ºC. For this reason, with temperatures above 425ºC it is recommended that Alloy Steel Pipes should be used.

** Caution – Codes for the specific application may vary

For practical purposes, the metal temperature in a pipe can be considered to be equal to the temperature of the line fluid.
Allowable Stress values (SE) used in tabulated calculations are those approved for piping systems which come under Section B31.3 of the Code.

This Pressure/Temperature Chart lists maximum allowable pressure ratings for Seamless Carbon Steel Pipe to ASTM A106-B, API 5LB & ASTM A53, with plain ends, at temperatures up to 450ºC.

The pressures shown above can be used as the basis for calculating maximum allowable pressure ratings for other pipes by applying the following factors:

1. Seamless Grade A Pipes: Use 0.80 to 205ºC, 0.85 from 260 to 370ºC, 0.82 at 400ºC, 0.86 at 425ºC and .090 at 450ºC.
2. Electric Resistance Welded Pipes (ERW) : Grade A. - Use 0.68 to 205ºC, 0.72 from 260 to 370ºC, 0.70 at 400ºC, 0.73 at 425ºC, and .077 at 450ºC. Grade B. - Use 0.85 at all temperatures.
3. ASTM A333 Seamless Carbon Steel Pipes for Low Temperatures service: Grade 6 Use 1.0 for all temperatures down to -46ºC.
4. ASTM A333 Seamless Alloy Steel Pipes for Low Temperatures service: Grade 3. - Use 1.08 for -101 to +38ºC and 0.93 for 38 to 350ºC.
   Grade 4. - Use 1.00 for -101 to +38ºC and 0.86 for 38 to 350ºC.
   Grade 7. - Use 1.08 for -73 to +38ºC and 0.93 for 38 to 350ºC.

For other grades and temperatures above 350ºC refer Appendix A of ANSI B31.3.