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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 ^o	-29 to 38 C ^o	205 C ^o	260 C ^o	350 C ^o	370 C ^o	400 C ^o	430 C ^o *	450 C ^o *
	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	
		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
			7.92	4768	4768	4507	4051	4004	3100	2577	2074
		STD	30	9.53	5746	5746	5429	4885	4830	3734	3100
40			12.7	7703	7703	7283	6545	6470	5009	4126	3349
XS		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
			7.92	4230	4230	3996	3597	3555	2749	2287	1839
STD		30	9.53	5099	5099	4816	4334	4286	3314	2756	2219
		40	11.13	5967	5967	5643	5071	5016	3879	3225	2598
XS	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	22262	22262	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	
		7.92	3810	3810	3603	3238	3197	2474	2060	1660	
	STD	30	9.53	4582	4582	4327	3893	3852	2976	2474	
		40	12.7	6139	6139	5801	5216	5154	3989	3314	2666
	XS	60	15.09	7317	7317	6911	6215	6146	4754	3948	3183
		80	20.62	10080	10080	9522	8564	8468	6552	5443	4382
	100	26.19	12898	12898	12188	10962	10831	8385	6966	5608	
	120	32.54	16171	16171	15287	13746	13580	10514	8730	7035	
	140	38.1	19085	19085	18038	16226	16033	12409	10307	8302	
	160	44.45	22475	22475	21242	19106	18879	14614	12140	9777	
	180	50.01	25450	25450	24094	21675	21421	16577	13766	11093	
	600	10	6.35	2529	2529	2391	2150	2129	1647	1364	1102
			7.92	3810	3810	3603	3238	3197	2474	2060	1660
		STD	30	9.53	5097	5097	4816	4334	4286	3314	2756
40			12.7	5967	5967	5643	5071	5016	3879	3225	2598
XS		60	14.27	7317	7317	6911	6215	6146	4754	3948	3183
		80	20.62	10080	10080	9522	8564	8468	6552	5443	4382
100		26.19	12898	12898	12188	10962	10831	8385	6966	5608	
120		32.54	16171	16171	15287	13746	13580	10514	8730	7035	
140		38.1	19085	19085	18038	16226	16033	12409	10307	8302	
160		44.45	22475	22475	21242	19106	18879	14614	12140	9777	
180		50.01	25450	25450	24094	21675	21421	16577	13766	11093	
600		10	6.35	2529	2529	2391	2150	2129	1647	1364	1102
			7.92	3810	3810	3603	3238	3197	2474	2060	1660
		STD	30	9.53	5097	5097	4816	4334	4286	3314	2756
	40		12.7	5967	5967	5643	5071	5016	3879	3225	2598
	XS	60	14.27	7317	7317	6911	6215	6146	4754	3948	3183
		80	20.62	10080	10080	9522	8564	8468	6552	5443	4382
	100	26.19	12898	12898	12188	10962	10831	8385	6966	5608	
	120	32.54	16171	16171	15287	13746	13580	10514	8730	7035	
	140	38.1	19085	19085	18038	16226	16033	12409	10307	8302	
	160	44.45	22475	22475	21242	19106	18879	14614	12140	9777	
	180	50.01	25450	25450	24094	21675	21421	16577	13766	11093	
	600	10	6.35	2529	2529	2391	2150	2129	1647	1364	1102
			7.92	3810	3810	3603	3238	3197	2474	2060	1660
		STD	30	9.53	5097	5097	4816	4334	4286	3314	2756
40			12.7	5967	5967	5643	5071	5016	3879	3225	2598
XS		60	14.27	7317	7317	6911	6215	6146	4754	3948	3183
		80	20.62	10080	10080	9522	8564	8468	6552	5443	4382
100		26.19	12898	12898	12188	10962	10831	8385	6966	5608	
120		32.54	16171	16171	15287	13746	13580	10514	8730	7035	
140		38.1	19085	19085	18038	16226	16033	12409	10307	8302	
160		44.45	22475	22475	21242	19106	18879	14614	12140	9777	
180		50.01	25450	25450	24094	21675	21421	16577	13766	11093	
600		10	6.35	2529	2529	2391	2150	2129	1647	1364	1102
			7.92	3810	3810	3603	3238	3197	2474	2060	1660
		STD	30	9.53	5097	5097	4816	4334	4286	3314	2756
	40		12.7	5967	5967	5643	5071	5016	3879	3225	2598
	XS	60	14.27	7317	7317	6911	6215	6146	4754	3948	3183
		80	20.62	10080	10080	9522	8564	8468	6552	5443	4382
	100	26.19	12898	12898	12188	10962	10831	8385	6966	5608	
	120	32.54	16171	16171	15287	13746	13580	10514	8730	7035	
	140	38.1	19085	19085	18038	16226	16033	12409	10307	8302	
	160	44.45	22475	22475	21242	19106	18879	14614	12140	9777	
	180	50.01	25450	25450	24094	21675	21421	16577	13766	11093	
	600	10	6.35	2529	2529	2391	2150	2129	1647	1364	1102
			7.92	3810	3810	3603	3238	3197	2474	2060	1660
		STD	30	9.53	5097	5097	4816	4334	4286	3314	2756
40			12.7	5967	5967	5643	5071	5016	3879	3225	2598
XS		60	14.27	7317	7317	6911	6215	6146	4754	3948	3183
		80	20.62	10080	10080	9522	8564	8468	6552	5443	4382
100		26.19	12898	12898	12188	10962	10831	8385	6966	5608	
120		32.54	16171	16171	15287	13746	13580	10514	8730	7035	
140		38.1	19085	19085	18038	16226	16033	12409	10307	8302	
160		44.45	22475	22475	21242	19106	18879	14614	12140	9777	
180		50.01	25450	25450	24094	21675	21421	16577	13766	11093	
600		10	6.35	2529	2529	2391	2150	2129	1647	1364	1102
			7.92	3810	3810	3603	3238	3197	2474	2060	1660
		STD	30	9.53	5097	5097	4816	4334	4286	3314	2756
	40		12.7	5967	5967	5643	5071	5016	3879	3225	2598
	XS	60	14.27	7317	7317	6911	6215	6146	4754	3948	3183
		80	20.62	10080	10080	9522	8564	8468	6552	5443	4382
	100	26.19	12898	12898	12188	10962	10831	8385	6966	5608	
	120	32.54	16171	16171	15287	13746	13580	10514	8730	7035	
	140	38.1	19085	19085	18038	16226	16033	12409	10307	8302	
	160	44.45	22475	22475	21242	19106	18879	14614	12140	9777	
	180	50.01	25450	25450	24094	21675	21421	16577	13766	11093	

* The ASME code for piping including allowable stress values (SE) for metal temperatures † up to 595°C 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 425°C. For this reason, with temperatures above 425°C 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 450°C.

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

- Seamless Grade A Pipes: Use 0.80 to 205°C, 0.85 from 260 to 370°C, 0.82 at 400°C, 0.86 at 425°C and .090 at 450°C.
- Electric Resistance Welded Pipes (ERW) : Grade A. - Use 0.68 to 205°C, 0.72 from 260 to 370°C, 0.70 at 400°C, 0.73 at 425°C, and .077 at 450°C. Grade B. - Use 0.85 at all temperatures.
- ASTM A333 Seamless Carbon Steel Pipes for Low Temperatures service: Grade 6 Use 1.0 for all temperatures down to -46°C.
- ASTM A333 Seamless Alloy Steel Pipes for Low Temperatures service: Grade 3. - Use 1.08 for -101 to +38°C and 0.93 for 38 to 35