

PRESSURE/TEMPERATURE RATINGS

Please note:

The allowable working pressures for ASTM A106 Seamless Pipe are calculated from the stress values and relevant formulae as detailed in ASME B31.3. In 1982 the following chart was derived from ASME B31.3 to provide customers with a general comparative guide to working pressures for different pipe wall thicknesses. The chart is reproduced here on the explicit understanding that:

- It is a general guide only.
- It has not been updated to reflect any subsequent changes to ASME B31.3.
- It is not intended as a recommendation of allowable working pressures. Customers wishing to establish exact working pressures should refer to ASME B31.3, as well as any other relevant piping codes or industry regulations.

THE ASME CODE FOR PRESSURE 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.

Allowable Stress values (SE) used in tabulated calculations are those approved for piping systems which come under Section B31.3 of the code.

The Pressure/Temperature Chart lists maximum allowable pressure ratings for Seamless Carbon Steel Pipe Grade B, with plain ends, at temperatures up to 450°C. The pressures shown 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 205°C, 0.85 from 260 to 370°C, 0.82 at 400°C, 0.86 at 425°C, and 0.90 at 450°C.
2. Electric Resistance Welded Pipes:
 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 0.77 at 450°C.
 Grade B. Use 0.85 at all temperatures.

† For practical purposes, the metal temperature in a pipe can be considered to be equal to the temperature of the line fluid.

PRESSURE/TEMPERATURE RATINGS											
SEAMLESS CARBON STEEL PIPE. GRADE B, with plain ends. ASTM A106, API 5L & ASTM A53											
Nominal Size DN MM	Temp. °C ➤			-29 to 38	205	260	350	370	400	430	450
	Stress (SE) in kPa ➤			137800	137800	130221	117130	115752	89570	74412	59943
MM	Wall Thickness			MAXIMUM ALLOWABLE PRESSURE/TEMPERATURE RATINGS IN kPa FOR CHEMICAL PLANT AND PETROLEUM REFINERY PIPING SYSTEMS TO ANSI/ASME B31.3a — 1981							
	Sched. No.	mm									
15	STD	40	2.77	34416	34416	32528	29255	28910	22372	18589	14972
	XS	80	3.73	48092	48092	45446	40878	40396	31260	25969	20918
	XXS	160	4.78	62830	62830	59378	53404	52777	40837	33926	27333
20	STD	40	2.87	28070	28070	26526	23860	23578	18245	15158	12209
	XS	80	3.91	39418	39418	37247	33506	33106	25617	21283	17142
	XXS	160	5.56	58152	58152	54955	49429	48843	37799	31398	25293
25	STD	40	3.38	26251	26251	24804	22310	22048	17060	14173	11417
	XS	80	4.55	36283	36283	34285	30862	30474	23584	19595	15785
	XXS	160	6.35	52481	52481	49594	44606	44082	34112	28339	22827
32	STD	40	3.56	21614	21614	20421	18369	18155	14049	11672	9404
	XS	80	4.85	30178	30178	28518	25651	25348	19616	16295	13125
	XXS	160	6.35	40596	40596	38364	34505	34099	26389	21924	17659
40	STD	40	3.68	19444	19444	18375	16529	16329	12636	10500	8454
	XS	80	5.08	27402	27402	25900	23295	23019	17811	14800	11919
	XXS	160	7.14	39783	39783	37599	33816	33416	25858	21483	17308
50	STD	40	3.91	16378	16378	15468	13925	13759	10645	8847	7124
	XS	80	5.54	23653	23653	22351	20105	19871	15378	12774	10287
	XXS	160	8.74	38866	38866	36731	33037	32652	25266	20987	16908
65	STD	40	5.16	17914	17914	16929	15227	15048	11644	9674	7793
	XS	80	7.01	24818	24818	23447	21097	20849	16129	13401	10797
	XXS	160	9.53	34615	34615	32714	29420	29076	22503	18693	15055
80	STD	40	5.49	15558	15558	14696	13222	13063	10108	8399	6766
	XS	80	7.62	21986	21986	20780	18693	18472	14290	11871	9563
	XXS	160	11.13	33079	33079	31253	28111	27780	21497	17859	14386
			15.24	46976	46976	44392	39928	39459	30536	25369	20436

* For temperatures above 425°C, see caution on graphitization.

PRESSURE/TEMPERATURE RATINGS

SEAMLESS CARBON STEEL PIPE. GRADE B, with plain ends. ASTM A106, API 5L & ASTM A53												
Nominal Size DN MM	Temp. °C ▶			-29 to 38	205	260	350	370	400	430	450	
	Stress (SE) in kPa ▶			137800	137800	130221	117130	115752	89570	74412	59943	
DN MM	Wall Thickness			MAXIMUM ALLOWABLE PRESSURE/TEMPERATURE RATINGS IN kPa FOR CHEMICAL PLANT AND PETROLEUM REFINERY PIPING SYSTEMS TO ANSI/ASME B31.3a — 1981								
		Sched. No.	mm									
100	STD	40	6.02	13187	13187	12464	11210	11079	8571	7124	5739	
		XS	80	8.56	19058	19058	18010	16198	16012	12388	12094	8289
	XXS	120	11.13	25190	25190	23805	21407	21159	16371	13601	10955	
		160	13.49	31019	31019	29310	26368	26058	20160	16750	13208	
		XXS	17.12	40348	40348	38129	34298	33892	26230	21786	17549	
			125	12.70	23130	23130	21855	19657	19430	15034	12492	10059
125	STD	40	6.55	11561	11561	10921	9825	9708	7517	6243	5038	
		XS	80	9.53	17060	17060	16122	14503	14331	11093	9212	7421
	XXS	120	12.70	23130	23130	21855	19657	19430	15034	12492	10059	
		160	15.88	29407	29407	27787	24997	24701	19113	15881	12795	
		XXS	19.05	35897	35897	33926	30516	30158	23337	19388	15620	
			150	7.11	10500	10500	9928	8924	8819	6828	5670	4568
150	STD	40	7.11	10500	10500	9928	8924	8819	6828	5670	4568	
		XS	80	10.97	16474	16474	15571	14007	13842	10707	8895	7165
	XXS	120	14.27	21745	21745	20553	18486	18265	14138	11747	9460	
		160	18.26	28325	28325	26768	24074	23784	18410	15296	12319	
		XXS	21.95	34608	34608	32707	29420	29069	22496	18686	15054	
			200	6.35	7138	7138	6745	6063	5994	4637	3852	3100
200	STD	30	7.04	7924	7924	7489	6732	6656	5147	4279	3445	
		40	8.18	9246	9246	8737	7855	7765	6008	4995	4024	
		XS	60	10.31	11741	11741	11093	9977	9860	7627	6339	5105
	80		12.70	14572	14572	13766	12388	12237	9474	7868	6338	
	100		15.09	17452	17452	16488	14834	14655	11341	9426	7593	
	250	XXS	120	18.26	21345	21345	20174	18148	17935	13876	11527	9288
140			20.62	24308	24308	22971	20656	20415	15799	13125	10569	
XXS			22.23	26334	26334	24887	22386	22124	17115	14221	11458	
		160	23.01	27340	27340	25838	23240	22964	17769	14765	11892	
		250	STD	20	6.35	5698	5698	5388	4844	4789	3707	3080
30				7.80	7028	7028	6642	5974	5905	4568	3796	3059
40	9.27			8385	8385	7923	7131	7048	5450	4527	3652	
XS	60		12.70	11596	11596	10955	9853	9736	7538	6263	5043	
	80		15.09	13863	13863	13098	11781	11644	9012	7483	6028	
	100		18.26	16922	16922	15992	14386	14214	10996	9136	7359	
300	XXS	120	21.44	20036	20036	18934	17032	16825	13022	10817	8716	
		140	25.40	23998	23998	16474	20394	20153	15599	12960	10438	
		160	28.58	27229	27229	25734	23143	22875	17700	14703	11844	
	300	STD	20	6.35	4795	4795	4534	4072	4024	3114	2591	2088
			30	8.38	6359	6359	6008	5402	5540	4134	3431	2763
			40	9.53	7241	7241	6842	6153	6084	4706	3914	3149
XS		60	10.31	7854	7854	7421	6676	6601	5105	4244	3417	
		80	12.70	9722	9722	9191	8268	8165	6318	5250	4230	
		100	14.27	10969	10969	10363	9322	9212	7131	5925	4768	
350	XXS	80	17.48	13525	13525	12850	11492	11362	8792	7303	5884	
		100	21.44	16736	16736	15819	14227	14062	10879	9040	7283	
		120	25.40	20015	20015	18913	17011	16811	13008	10804	8702	
	350	STD	140	28.58	22682	22682	21435	19278	19051	14744	12244	9866
			160	33.32	26740	26740	25273	22730	22461	17383	14441	11630
			350	STD	10	6.35	4361	4361	4120	3707	3665	2831
20		7.92			5457	5457	5161	4644	4589	3548	2949	2377
30		9.53			6580	6580	6222	5595	5533	4279	3555	2866
XS		40		11.13	7717	7717	7310	6559	6477	5016	4168	3355
	60	12.70		8833	8833	8351	7510	7421	5739	4768	3845	
	80	15.09		10541	10541	9963	8964	8861	6855	5691	4589	
XXS	100	19.05	13421	13421	12684	11410	11272	8723	7248	5836		
	120	23.83	16949	16949	16019	14407	14242	11017	9157	7372		
	140	27.79	19933	19933	18837	16943	16743	12960	10762	8675		
XXS	140	31.75	22964	22964	21703	19519	19292	14931	12402	9990		
	160	35.71	26051	26051	24618	22144	21883	16936	14069	11334		

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