

KDS011 Pressure-Temperature Ratings for Selected Seamless Grade B, Carbon Steel Pipes in Accordance with ASME B31.3-2004

(The values shown are valid only for Grade B materials to ASTM A106; API 5L & ASTM A53. Correction factors must be applied for other material grades and methods of manufacture. Refer to "Notes" for details.)

Nominal Size (mm)	Schedule		Wall Thickness (mm)	Maximum Allowable Pressure (kPa)							
				Temperature (°C)							
				-67	205	260	350	370	400	430	450
				Maximum Allowable Stress (SE) from ASME B31.3 (kPa)							
SE	137800	137800	130221	117130	115752	89570	74412	59943			
15	STD	40	2.77	34416	34416	32528	29255	28910	22372	18589	14972
	XS	80	3.73	48092	48092	45466	40878	40396	31260	25969	20918
	XXS	160	4.78	62830	62830	59378	53404	52777	40837	33929	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	10550	8454
	XS	80	5.08	27402	27402	25900	23295	23019	17811	14800	11919
	XXS	160	7.14	39738	39738	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	14969	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
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	160	13.49	31019	31019	29310	26368	26058	20160	16750	13208
125	STD	40	6.55	11561	11561	10921	9825	9708	7510	6243	5038
	XS	80	9.53	17060	17060	16122	14503	14331	11093	9212	7421
	XXS	160	15.88	29407	29407	27787	24997	24701	19113	15881	12795
150	STD	40	7.11	10550	10550	9928	8924	8819	6828	5370	4568
	XS	80	10.97	16474	16474	15571	14007	13842	10707	8895	7165
	XXS	160	18.26	28325	28325	26768	24074	23784	18410	15296	12319
200	STD	20	6.35	7138	7138	6745	6063	5994	4637	3852	3100
	STD	30	7.04	7924	7924	7489	6732	6656	5147	4279	3445
	STD	40	8.18	9246	9246	8737	7855	7765	6008	4995	4024
	XS	60	10.31	11741	11741	11093	9977	9860	7627	6339	5105
	XS	80	12.7	14572	14572	13766	12388	12237	9474	7868	6338
	XS	100	150.9	17452	17452	16488	14834	14655	11341	9426	7593
	XS	120	18.26	21345	21345	20174	18148	17935	13876	11527	9288
	XS	140	20.62	24308	24308	22971	20656	20415	15799	13125	10569
	XXS	160	22.23	26334	26334	24877	22386	22124	17115	14221	11458
XXS	160	23.01	27340	27340	25838	23240	22964	17769	14765	11892	

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Maximum Allowable Pressure (kPa)											
Nominal Size (mm)	Schedule		Wall Thickness (mm)	Temperature (°C)							
				-67	205	260	350	370	400	430	450
				Maximum Allowable Stress (SE) from ASME B31.3 (kPa)							
			SE	137800	137800	130221	117130	115752	89570	74412	59943
250		20	6.35	5698	5698	5388	4844	4789	3707	3080	2480
		30	7.8	7028	7028	6642	5974	5905	4568	3796	3059
	STD	40	9.27	8385	8385	7923	7131	7048	5450	4527	3652
	XS	60	12.7	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
		120	21.44	20036	20036	18934	17032	16825	13022	10817	8716
	XXS	140	25.4	23998	23998	16474	20394	20153	15599	12960	10438
	160	28.58	27229	27229	25734	23143	22875	17700	14703	11844	
300		20	6.35	4795	4795	4534	4072	4024	3114	2591	2088
		30	8.38	6359	6359	6008	5402	5540	4134	3431	2763
	STD		9.53	7241	7241	6842	6153	6084	4706	3914	3149
		40	10.31	7854	7854	7421	6676	6601	5015	4244	3417
	XS		12.7	9722	9722	9191	8268	8165	6318	5250	4230
		60	14.27	10969	10969	10363	9322	9212	7131	5925	4768
		80	17.48	13525	13525	12850	11492	11362	8792	7303	5884
		100	21.44	16736	16736	15819	14227	14062	10879	9040	7283
	XXS	120	25.4	20015	20015	18913	17011	16811	13008	10804	8702
		140	28.58	22682	22682	21435	19278	19051	14744	12244	9866
		160	33.32	26740	26740	25273	22730	22461	17383	14441	11630
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	9723	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

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Maximum Allowable Pressure (kPa)											
Nominal Size (mm)	Schedule		Wall Thickness (mm)	Temperature (°C)							
				-67	205	260	350	370	400	430	450
				Maximum Allowable Stress (SE) from ASME B31.3 (kPa)							
		SE	137800	137800	130221	117130	115752	89570	74412	59943	
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	2574	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	18037	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	10528	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	

Notes:

- Pipes from carbon steel should not be used when temperatures exceed 425 °C for prolonged periods of time. Above this temperature, alloy steel pipes should be employed. Carbon steels exhibit graphitisation (i.e. conversion of carbides to graphite) above 425 °C.
- The loads applied to the pipe have been assumed to be from internal pressure only. No allowance has been made for any bending moments or external loads imposed due to supports, thermal expansion etc.
- The Tables are only valid for Seamless Carbon Steel, Grade B with plain ends of materials conforming to ASTM A106, API 5L and ASTM A53. However, Seamless Grade A and Electric Resistance Weld Grades A & B maximum allowable pressures can be found by multiplying by the appropriate de-rating factors as tabulated on the following page...

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De-Rating Factors to Find the Maximum Allowable Pressures for Other Pipe Types

(The factors presented in the following tables are to be applied to the Maximum Allowable Pressures)

De-Rating Factors for Seamless and Electric Resistance Welded (ERW) Pipes to ASTM A106, API 5L and ASTM A53

Type	Temperature (°C)				
	≤ 205	260 to 370	400	425	450
Seamless Grade A	0.80	0.85	0.82	0.86	0.90
ERW Grade A	0.68	0.72	0.70	0.73	0.77
ERW Grade B	0.85	0.85	0.85	0.85	0.85

De-Rating Factors for Seamless Pipes to ASTM A333 (Low Temperature Service)

Type	Temperature (°C)				
	-101	-73	-46	38	39 to 350
Carbon Steel Grade 6	Do Not Use	Do Not Use	1.00	1.00	1.00
Alloy Steel Grade 3	1.08	1.08	1.08	1.08	0.93
Alloy Steel Grade 4	1.00	1.00	1.00	1.00	0.86
Alloy Steel Grade 7	Do Not Use	1.08	1.08	1.08	0.93

Notes:

- These grades and types are generally the most commonly used in Australia.