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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 | | |
| | | 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 | 2501 |
| | | | 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 | 1991 | |
| | | 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 | 2219 |
| | | | 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 | 2219 |
| | | | 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 | 2219 |
| | | | 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 | 2219 |
| | | | 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 | 2219 |
| | | | 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 | 2219 |
| | | | 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 350°C.
Grade 4. - Use 1.00 for -101 to +38°C and 0.86 for