API 5L Grade X52 Pipe Specification

For more info please visit https://www.octalsteel.com/resources/api-5l-x52-psl2-pipe
Inquiries please sent to info@octalsteel.com

Steel grade (Steel name)	Chemical Composition API 5L X52 PSL1							
	Mass fraction, based upon heat and product analyses [a, g]							
	%							
	C	Mn	P		S	V	Nb	Ti
	max[b]	max[b]	min	max	max	max	max	max
Seamless pipe								
L360 or X52	0.28	1.4	—	0.03	0.03	d	d	d
Welded pipe								
L360 or X52	0.26	1.4	—	0.03	0.03	d	d	d

a. Cu≤0.50%; Ni≤ 0.50% and Mo≤0.15 %

b. For each reduction of 0.01% below the specified maximum concentration for carbon, an increase of 0.05 % above the specified maximum concentration for Mn is permissible, up tp a maximum of 1.65 % for grade ≥ L245 or B, but ≤ L360 or X52; up to a maximum of 1.75% for grade > L360 or X52, but < L485 or X70; and up to a maximum of 2.00% for grade L485 or X70.

c. Unless otherwise agreed, Nb + V 0,06 %.

d. Nb + V + Ti 0,15 %.

e. Unless otherwise agreed.

f. Unless otherwise agreed, Nb + V +Ti ≤ 0.001%

g. No deliberate addition of B is permitted and the residual B ≤ 0.001 %.

Pipe grade	Mechanical Properties for API 5L X52 PSL1 pipe			
	Pipe body of seamless and welded pipes			Weld seam of EW, LW,
	Yield strength [a]	Tensile strength [a]	Elongation	Tensile strength [b]
	Rt0.5	Rm	Af	Rm
	MPa (psi)	MPa (psi)	%	MPa (psi)
	minimum	minimum	minimum	minimum
L360 or X52	360 (52 200)	570 (82 700)	c	460 (66 700)

a. For intermediate grades, the difference between the specified minimum tensile strength and minimum yield strength for the pipe body shall be as given in the table for the next higher grade.

b. For intermediate grades, the specified minimum tensile strength for the weld seam shall be the same value as was determined for the pipe body ung footnote a)

c. The specified minimum elongation, Af, expressed in percent and rounded to the nearest percent, shall be as determined using the following equation:

$$A_f = C\frac{A_{xc}^{0,2}}{U^{0,9}}$$

where

C is 1 940 for calculations using SI units and 625 000 for calculations using USC units;
Axc is the applicable tensile test piece cross-sectional area, expressed in square millimetres (square inches), as follows:
- for circular cross-section test pieces, 130 mm2 (0.20 in2) for 12,7 mm (0.500 in) and 8,9 mm (0.350 in) diameter test pieces; and 65 mm2 (0.10 in2) for 6,4 mm (0.250 in) diameter test pieces;
- for full-section test pieces, the lesser of a) 485 mm2 (0.75 in2) and b) the cross-sectional area of the test piece, derived using the specified outside diameter and the specified wall thickness of the pipe, rounded to the nearest 10 mm2 (0.01 in2);
- for strip test pieces, the lesser of a) 485 mm2 (0.75 in2) and b) the cross-sectional area of the test piece, derived using the specified width of the test piece and the specified wall thickness of the pipe, rounded to the nearest 10 mm2 (0.01 in2);
U is the specified minimum tensile strength, expressed in megapascals (pounds per square inch).

API 5L Grade X52 PSL2 Pipe Specification

Steel grade (Steel name)	Chemical Composition API 5L X52 PSL2										
	Mass fraction, based upon heat and product analyses									Carbon equivalent[a] % maximum	
	%										
	C[b]	Si	Mn[b]	P	S	V	Nb	Ti	Other	CE_{IIW}	CEp_{cm}
Seamless and welded pipe											
L360N or X52N	0.24	0.45	1.40	0.025	0.015	0.10	0.05	0.04	d,e,l	0.43	0.25
L360Q or X52Q	0.18	0.45	1.50	0.025	0.015	0.05	0.05	0.04	e,l	0.43	0.25
Welded pipe											
L360M or X52M	0.22	0.45	1.40	0.025	0.015	d	d	d	e,l	0.43	0.25

a. Based upon product analysis. For seamless pipe with t> 20.0 mm (0.787 in), the CE limits shall be agreed. The CEIIW limits apply if C> 0.12 % and the CEpcm limits apply if C ≤0.12%.

b. For each reduction of 0.01% below the specified maximum concentration for carbon, an increase of 0.05 % above the specified maximum for Mn is permissible, up tp a maximum of 1.65 % for grade ≥ L245 or B, but ≤ L360 or X52; up to a maximum of 1.75% for grade > L360 or X52, but < L485 or X70; and up to a maximum of 2.00% for grade L485 or X70, but ≤ L555 or X80, and up to a maximum of 2.20 % for grades > L555 or X80.

c. Unless otherwise agreed, Nb + V 0,06 %.
d. Nb + V + Ti 0,15 %.
e. Unless otherwise agreed, Cu 0,50 %; Ni 0,30 %; Cr 0,30% and Mo 0,15 %.
f. Unless otherwise agreed.
g. Unless otherwise agreed, Nb + V + Ti ≤ 0.15 %.
h. Unless otherwise agreed, Cu ≤ 0.50%; Ni ≤ 0.50%; Cr ≤ 0.50 % and Mo ≤ 0.15 %
i. Unless otherwise agreed, Cu ≤ 0.50%; Ni ≤ 1.00%; Cr ≤ 0.50 % and Mo≤0.50 %
j. B 0,004 %.
k. Unless otherwise agreed, Cu 0,50 %; Ni 1,00 %; Cr 0,55% and Mo 0, 80 %.

l. For all PSL 2 pipe grades except those grades to which footnote j already applies, the following applies. Unless otherwise agreed no intentional addition of B is permitted and residual B 0,001%.

Mechanical Properties for API 5L X52 PSL2 pipe							
Pipe grade	Pipe body of seamless and welded pipes						Weld seam of EW, LW, SAW
	Yield strength [a]		Tensile strength [a]		Ratio a, c	Elongation	Tensile strength d
	Rt0.5		Rm		Rt0.5/Rm	Af	Rm
	MPa (psi)		MPa (psi)			%	MPa (psi)
	minimum	maximum	minimum	maximum	maximum	minimum	minimum
L360N or X52N L360Q or X52Q L360M or X52M	360 (52 200)	530 (76 900)	460 (66 700)	760 (110 200)	0.93	f	460 (66 700)

a. For intermediate grades, the difference between the specified maximum yield strength and the specified minimum yield strength shall be as given in the table for the next higher grade, and the difference between the specified minimum tensile strength and the specified minimum yield strength shall be as given in the table for the next higher grade. For intermediate grades up to Grade L320 or X46, the tensile strength shall be 655 MPa (95 000 psi). For intermediate grades greater than Grade L320 or X46 and lower than Grade L555 or X80, the tensile strength shall be 760 MPa (110 200 psi).For intermediate grades higher than Grade L555 or X80, the maximum permissible tensile strength shall be obtained by interpolation. For SI units, the calculated value shall be rounded to the nearest 5 MPa. For USC units, the calculated value shall be rounded to the nearest 100 psi.

b. For grades , L625 or X90, Rp0,2 applies.
c. This limit applies for pipe with OD above 323,9 mm (12.750 in).

d. For intermediate grades, the specified minimum tensile strength for the weld seam shall be the same value as was determined for the pipe body using footnote a).

e. For pipe requiring longitudinal testing, the maximum yield strength shall be ≤ 495 MPa (71 800 psi).
f. The specified minimum elongation, Af, shall be as determined using the following equation:

$$A_f = C\frac{A_{xc}^{0,2}}{U^{0,9}}$$

where

C is 1 940 for calculations using SI units and 625 000 for calculations using USC units;
Axc is the applicable tensile test piece cross-sectional area, expressed in square millimetres (square inches), as follows:
- for circular cross-section test pieces, 130 mm2 (0.20 in2) for 12,7 mm (0.500 in) and 8,9 mm (0.350 in) diameter test pieces; and 65 mm2 (0.10 in2) for 6,4 mm (0.250 in) diameter test pieces;
- for full-section test pieces, the lesser of a) 485 mm2 (0.75 in2) and b) the cross-sectional area of the test piece, derived using the specified outside diameter and the specified wall thickness of the pipe, rounded to the nearest 10 mm2 (0.01 in2);
- for strip test pieces, the lesser of a) 485 mm2 (0.75 in2) and b) the cross-sectional area of the test piece, derived using the specified width of the test piece and the specified wall thickness of the pipe, rounded to the nearest 10 mm2 (0.01 in2);
U is the specified minimum tensile strength, expressed in megapascals (pounds per square inch).

g Lower values of Rt0,5/Rm may be specified by agreement.
h For grades > L625 or X90, Rp0,2 /Rm applies. Lower values of Rp0,2 /Rm may be specified by agreement.

API 5L Grade X52 Sour Service Pipe Data Sheet

Steel grade (Steel name)	Chemical Composition API 5L X52 Sour Service										
	Mass fraction, based upon heat and product analyses									Carbon equivalent[a] % maximum	
	%										
	C[b]	Si	Mn[b]	P	S	V	Nb	Ti	Other[c,d]	CE_{IIW}	CEp_{cm}
Seamless pipe											
L360NS or X52NS	0.16	0.45	1.65	0.020	0.003[e]	0.10	0.05	0.04	g	0.42	0.22[h]
L360QS or X52QS	0.16	0.45	1.65	0.020	0.003[e]	0.07	0.05	0.04	g	0.42	0.20[h]
Welded pipe											
L360MS or X52MS	0.10	0.45	1.45	0.020	0.002[e]	0.050	0.060	0.040	g,i,j	—	0.20

a. Based upon product analysis (see 9.2.4 and 9.2.5). The CEIIW limits apply if C > 0,12 % and the CEPcm limits apply if C ≤ 0,12 %.

b. For each reduction of 0,01 % below the specified maximum for C, an increase of 0,05 % above the specified maximum for Mn is permissible, up to a maximum increase of 0,20 %.

c. Altotal 0,060 %; N 0,012 %; Al/N 2:1 (not applicable to titanium-killed or titanium-treated steel); Cu 0,35 % (if agreed, Cu ≤ 0,10 %); Ni 0,30 %; Cr 0,30 %; Mo 0,15 %; B 0,0005 %.

d. For welded pipe where calcium is intentionally added, unless otherwise agreed, Ca/S 1,5 if S , 0,0015 %. For SMLS and welded pipes, Ca 0,006 %.

e. The maximum limit for S may be increased to 0,008 % for SMLS pipe and, if agreed, to 0,006 % for welded pipe. For such higher S levels in welded pipe, lower Ca/S ratios may be agreed.

f. Unless otherwise agreed, Nb + V 0,06 %.
g. Nb + V + Ti 0,15 %.
h. For SMLS pipe, the listed CEPcm value may be increased by 0,03.
i. If agreed, Mo 0,35 %
j. If agreed, Cr 0,45 %.
k. If agreed, Cr 0,45% and Ni 0,50%.

Mechanical Properties for API 5L X52 SOUR SERVICE							
Pipe grade	Pipe body of seamless and welded pipes						Weld seam of HFW and SAW pipes
	Yield strength [a]		Tensile strength [a]		Ratio [b]	Elongation (on 50 mm or 2	Tensile strength [c]
	Rt0.5		Rm		Rt0.5/Rm	Af	Rm
	MPa (psi)		MPa (psi)			%	MPa (psi)
	minimum	maximum	minimum	maximum	maximum	minimum	minimum
L360NS or X52NS L360QS or X52QS L360MS or X52MS	360 52 20)	530 (76 900)	460 (66 700)	760 (110 200)	0.93	e	460 (66 700)

a. For intermediate grades, the difference between the specified maximum yield strength and the specified minimum yield strength shall be as given in the table for the next higher grade, and the difference between the specified minimum tensile strength and the specified minimum yield strength shall be as given in the table for the next higher grade. For intermediate grades, the tensile strength shall be 760 MPa (110 200 psi).

b. This limit applies for pipe with D , 323,9 mm (12.750 in).

c. For intermediate grades, the specified minimum tensile strength for the weld seam shall be the same value as was determined for the pipe body using footnote a).

d. For pipe requiring longitudinal testing, the maximum yield strength shall be 495 MPa (71 800 psi).

e. The specified minimum elongation, Af, on 50 mm or 2 in, expressed in percent and rounded to the nearest percent, shall be as determined using the following equation:

$$A_f = C\frac{A_{xc}^{0,2}}{U^{0,9}}$$

where

C is 1 940 for calculations using SI units and 625 000 for calculations using USC units;
Axc is the applicable tensile test piece cross-sectional area, expressed in square millimetres (square inches), as follows:
- for circular cross-section test pieces, 130 mm2 (0.20 in2) for 12,7 mm (0.500 in) and 8,9 mm (0.350 in) diameter test pieces; and 65 mm2 (0.10 in2) for 6,4 mm (0.250 in) diameter test pieces;
- for full-section test pieces, the lesser of a) 485 mm2 (0.75 in2) and b) the cross-sectional area of the test piece, derived using the specified outside diameter and the specified wall thickness of the pipe, rounded to the nearest 10 mm2 (0.01 in2);
- for strip test pieces, the lesser of a) 485 mm2 (0.75 in2) and b) the cross-sectional area of the test piece, derived using the specified width of the test piece and the specified wall thickness of the pipe, rounded to the nearest 10 mm2 (0.01 in2);
U is the specified minimum tensile strength, expressed in megapascals (pounds per square inch).