



GRUPO VEMACERO, C.A.
RIF J295368682

API 5L / ASTM A53

NPS Designación	DN Designación	Diametro exterior, pulgadas [mm]	Espesor pared nominal, pulgadas [mm]	Peso Nominal [Masa] por unidad longitud, lb/ft [kg/m]	Weight Class	Schedul e No.	ASTM A53		API 5L Grado B		
							Presiones de prueba, psi [kPa] Grado A	Presiones de prueba, psi [kPa] Grado B	Presiones mínimas de prueba		
									psi	kPa	Kg/cm2
1/2	15	0.840 [21.3]	0.109 [2.77]	0.85 [1.27]	STD	40	700 [4800]	700 [4800]	700	4,800	48.95
			0.147 [3.73]	1.09 [1.62]	XS	80	850 [5900]	850 [5900]	850	5,900	60.16
3/4	20	1.050 [26.7]	0.113 [2.87]	1.13 [1.69]	STD	40	700 [4800]	700 [4800]	700	4,800	48.95
			0.154 [3.91]	1.48 [2.20]	XS	80	850 [5900]	850 [5900]	850	5,900	60.16
			0.219 [5.56]	1.95 [2.90]	...	160	950 [6500]	950 [6500]	950	6,600	67.30
1	25	1.315 [33.4]	0.308 [7.82]	2.44 [3.64]	XXS	...	1000 [6900]	1000 [6900]	1,000	6,900	70.36
			0.133 [3.38]	1.68 [2.50]	STD	40	700 [4800]	700 [4800]	700	4,800	48.95
			0.179 [4.55]	2.17 [3.24]	XS	80	850 [5900]	850 [5900]	850	5,900	60.16
1 -1/4	32	1.660 [42.2]	0.250 [6.35]	2.85 [4.24]	...	160	950 [6500]	950 [6500]	950	6,600	67.30
			0.358 [9.09]	3.66 [5.45]	XXS	...	1000 [6900]	1000 [6900]	1,000	6,900	70.36
			0.140 [3.56]	2.27 [3.39]	STD	40	1200 [8300]	1300 [9000]	1,300	9,000	91.77
1 -1/2	40	1.900 [48.3]	0.191 [4.85]	3.00 [4.47]	XS	80	1800 [12 400]	1900 [13 100]	1,900	13,100	133.58
			0.250 [6.35]	3.77 [5.61]	...	160	1900 [13 100]	2000 [13 800]	2,000	13,800	140.72
			0.382 [9.70]	5.22 [7.77]	XXS	...	2200 [15 200]	2300 [15 900]	2,300	15,900	162.14
2	50	2.375 [60.3] 2-3/8"	0.145 [3.68]	2.72 [4.05]	STD	40	1200 [8300]	1300 [9000]	1,300	9,000	91.77
			0.200 [5.08]	3.63 [5.41]	XS	80	1800 [12 400]	1900 [13 100]	1,900	13,100	133.58
			0.281 [7.14]	4.86 [7.25]	...	160	1950 [13 400]	2050 [14 100]	2,050	14,100	143.78
2 -1/2	65	2.875 [73.0] 2-7/8"	0.400 [10.16]	6.41 [9.56]	XXS	...	2200 [15 200]	2300 [15 900]	2,300	15,900	162.14
			0.154 [3.91]	3.66 [5.44]	STD	40	2300 [15 900]	2500 [17 200]	2,500	17,200	175.39
			0.218 [5.54]	5.03 [7.48]	XS	80	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
3	80	3.500 [88.9] 3-1/2"	0.344 [8.74]	7.47 [11.11]	...	160	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
			0.436 [11.07]	9.04 [13.44]	XXS	...	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
			0.203 [5.16]	5.80 [8.63]	STD	40	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
3 -1/2	90	4.000 [101.6]	0.276 [7.01]	7.67 [11.41]	XS	80	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
			0.375 [9.52]	10.02 [14.90]	...	160	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
			0.552 [14.02]	13.71 [20.39]	XXS	...	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
4	100	4.500 [114.3] 4-1/2"	0.125 [3.18]	4.51 [6.72]	...	...	1290 [8900]	1500 [1000]	1,500	10,300	105.03
			0.156 [3.96]	5.58 [8.29]	...	...	1600 [11 000]	1870 [12 900]	1,870	12,900	131.54
			0.188 [4.78]	6.66 [9.92]	...	...	1930 [13 330]	2260 [15 600]	2,260	15,600	159.08
			0.216 [5.49]	7.58 [11.29]	STD	40	2220 [15 300]	2500 [17 200]	2,500	17,200	175.39
			0.250 [6.35]	8.69 [12.93]	...	...	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
			0.281 [7.14]	9.67 [14.40]	...	...	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
			0.300 [7.62]	10.26 [15.27]	XS	80	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
			0.438 [11.13]	14.34 [21.35]	...	160	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
4	100	4.500 [114.3] 4-1/2"	0.600 [15.24]	18.60 [27.68]	XXS	...	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
			0.125 [3.18]	5.18 [7.72]	...	...	1120 [7700]	1310 [19 000]	1,310	9,000	91.77
			0.156 [3.96]	6.41 [9.53]	...	...	1400 [6700]	1640 [11 300]	1,640	11,300	115.23
			0.188 [4.78]	7.66 [11.41]	...	...	1690 [11 700]	1970 [13 600]	1,970	13,600	138.68
			0.226 [5.74]	9.12 [13.57]	STD	40	2030 [14 000]	2370 [16 300]	2,370	16,300	166.21
			0.250 [6.35]	10.02 [14.92]	...	...	2250 [15 500]	2500 [17 200]	2,500	17,200	175.39
			0.281 [7.14]	11.17 [16.63]	...	...	2500 [17 200]	2500 [17 200]	2,500	17,200	175.39
			0.318 [8.08]	12.52 [18.63]	XS	80	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81
4	100	4.500 [114.3] 4-1/2"	0.125 [3.18]	5.85 [8.71]	...	...	1000 [6900]	1170 [8100]	1,170	8,100	82.60
			0.156 [3.96]	7.24 [10.78]	...	...	1250 [8600]	1460 [10 100]	1,460	10,100	102.99
			0.188 [4.78]	8.67 [12.91]	...	...	1500 [10 300]	1750 [12 100]	1,750	12,100	123.39
			0.219 [5.56]	10.02 [14.91]	...	...	1750 [12 100]	2040 [14 100]	2,040	14,100	143.78
			0.237 [6.02]	10.80 [16.07]	STD	40	1900 [13 100]	2210 [15 200]	2,210	15,200	155.00
			0.250 [6.35]	11.36 [16.90]	...	...	2000 [13 800]	2330 [16 100]	2,330	16,100	164.17
			0.281 [7.14]	12.67 [18.87]	...	...	2250 [15 100]	2620 [18 100]	2,620	18,100	184.57
			0.312 [7.92]	13.97 [20.78]	...	...	2500 [17 200]	2800 [19 300]	2,800	19,300	196.81
			0.337 [8.56]	15.00 [22.32]	XS	80	2700 [18 600]	2800 [19 300]	2,800	19,300	196.81
			0.438 [11.13]	19.02 [28.32]	...	120	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81
			0.531 [13.49]	22.53 [33.54]	...	160	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81
0.674 [17.12]	27.57 [41.03]	XXS	...	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			

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NPS Designacion	DN Designacion	Diametro exterior, pulgadas [mm]	Espesor pared nominal, pulgadas [mm]	Peso Nominal [Masa] por unidad longitud, lb/ft [kg/m]	Weight Class	Schedul e No.	ASTM A53		API 5L Grado B		
							Presiones de prueba, psi [kPa] Grado A	Presiones de prueba, psi [kPa] Grado B	Presiones minimas de prueba		
									psi	kPa	Kg/cm2
5	125	5.563 [141.3] 5-9/16"	0.156 [3.96]	9.02 [13.41]	...	...	1010 [7000]	1180 [8100]	1180	8,100	82.60
			0.188 [4.78]	10.80 [16.09]	...	...	1220 [8400]	1420 [9800]	1,420	9,800	99.93
			0.219 [5.56]	12.51 [18.61]	...	...	1420 [9800]	1650 [11 400]	1,650	11,400	116.25
			0.258 [6.55]	14.63 [21.77]	STD	40	1670 [11 500]	1950 [13 400]	1,950	13,400	136.64
			0.281 [7.14]	15.87 [23.62]	...	...	1820 [12 500]	2120 [14 600]	2,120	14,600	148.88
			0.312 [7.92]	17.51 [26.05]	...	...	2020 [13 900]	2360 [16 300]	2,360	16,300	166.21
			0.344 [8.74]	19.19 [28.57]	...	...	2230 [15 400]	2600 [17 900]	2,600	17,900	182.53
			0.375 [9.52]	20.80 [30.94]	XS	80	2430 [16 800]	2800 [19 300]	2,800	19,300	196.81
			0.500 [12.70]	27.06 [40.28]	...	120	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81
			0.625 [15.88]	32.99 [49.11]	...	160	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81
0.750 [19.05]	38.59 [57.43]	XXS	...	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
6	150	6.625 [168.3] 6-5/8"	0.188 [4.78]	12.94 [19.27]	...	...	1020 [7000]	1190 [8200]	1,190	8,200	83.62
			0.219 [5.56]	15.00 [22.31]	...	...	1190 [8200]	1390 [9600]	1,390	9,600	97.89
			0.250 [6.35]	17.04 [25.36]	...	...	1360 [9400]	1580 [10 900]	1,580	10,900	111.15
			0.280 [7.11]	18.99 [28.26]	STD	40	1520 [10 500]	1780 [12 300]	1,780	12,300	125.43
			0.312 [7.92]	21.06 [31.32]	...	...	1700 [11 700]	1980 [13 700]	1,980	13,700	139.70
			0.344 [8.74]	23.10 [34.39]	...	...	1870 [12 900]	2180 [15 000]	2,180	15,000	152.96
			0.375 [9.52]	25.05 [37.28]	...	...	2040 [14 100]	2380 [16 400]	2,380	16,400	167.23
			0.432 [10.97]	28.60 [42.56]	XS	80	2350 [16 200]	2740 [18 900]	2,740	18,900	192.73
			0.562 [14.27]	36.43 [54.20]	...	120	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81
			0.719 [18.26]	45.39 [67.56]	...	160	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81
0.864 [21.95]	53.21 [79.22]	XXS	...	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
8	200	8.625 [219.1] 8-5/8"	0.188 [4.78]	16.96 [25.26]	...	...	780 [5400]	920 [6300]	920	6,300	64.24
			0.203 [5.16]	18.28 [27.22]	...	...	850 [5900]	1000 [6900]	1,000	6,900	70.36
			0.219 [5.56]	19.68 [29.28]	...	...	910 [6300]	1070 [7400]	1,070	7,400	75.46
			0.250 [6.35]	22.38 [33.31]	...	20	1040 [7200]	1220 [8400]	1,220	8,400	85.66
			0.277 [7.04]	24.72 [36.31]	...	30	1160 [7800]	1350 [9300]	1,350	9,300	94.83
			0.312 [7.92]	27.73 [41.24]	...	...	1300 [9000]	1520 [10 500]	1,520	10,500	107.07
			0.322 [8.18]	28.58 [42.55]	STD	40	1340 [9200]	1570 [10 800]	1,570	10,800	110.13
			0.344 [8.74]	30.45 [45.34]	...	...	1440 [9900]	1680 [11 600]	1,680	11,600	118.29
			0.375 [9.52]	33.07 [49.20]	...	...	1570 [10 800]	1830 [12 600]	1,830	12,600	128.48
			0.406 [10.31]	35.67 [53.08]	...	60	1700 [11 700]	2000 [13 800]	2,000	13,800	140.72
0.438 [11.13]	38.33 [57.08]	...	...	1830 [12 600]	2130 [14 700]	2,130	14,700	149.90			
0.500 [12.70]	43.43 [64.64]	XS	80	2090 [14 400]	2430 [16 800]	2,430	16,800	171.31			
0.594 [15.09]	51.00 [75.92]	...	100	2500 [17 200]	2800 [19 300]	2,800	19,300	196.81			
0.719 [18.26]	60.77 [90.44]	...	120	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
0.812 [20.62]	67.82 [100.92]	...	140	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
0.875 [22.22]	72.49 [107.88]	XXS	...	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
0.906 [23.01]	74.76 [111.27]	...	160	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
10	250	10.750 [273.0] 10-3/4"	0.188 [4.78]	21.23 [31.62]	...	...	630 [4300]	730 [5000]	730	5,000	50.99
			0.203 [5.16]	22.89 [34.08]	...	...	680 [4700]	800 [5500]	800	5,500	56.08
			0.219 [5.56]	24.65 [36.67]	...	...	730 [5000]	860 [5900]	860	5,900	60.16
			0.250 [6.35]	28.06 [41.75]	...	20	840 [5800]	980 [6800]	980	6,800	69.34
			0.279 [7.09]	31.23 [46.49]	...	...	930 [6400]	1090 [7500]	1,090	7,500	76.48
			0.307 [7.80]	34.27 [51.01]	...	30	1030 [7100]	1200 [8300]	1,200	8,300	84.64
			0.344 [8.74]	38.27 [56.96]	...	...	1150 [7900]	1340 [9200]	1,340	9,200	93.81
			0.365 [9.27]	40.52 [60.29]	STD	40	1220 [8400]	1430 [9900]	1,430	9,900	100.95
			0.438 [11.13]	48.28 [71.87]	...	...	1470 [10 100]	1710 [11 800]	1,710	11,800	120.33
			0.500 [12.70]	54.79 [81.52]	XS	60	1670 [11 500]	1950 [13 400]	1,950	13,400	136.64
0.594 [15.09]	64.49 [95.97]	...	80	1990 [13 700]	2320 [16 000]	2,320	16,000	163.16			
0.719 [18.26]	77.10 [114.70]	...	100	2410 [16 600]	2800 [19 300]	2,800	19,300	196.81			
0.844 [21.44]	89.38 [133.00]	...	120	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
1.000 [25.40]	104.23 [155.09]	XXS	140	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
1.125 [28.57]	115.75 [172.21]	...	160	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			

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NPS Designacion	DN Designacion	Diametro exterior, pulgadas [mm]	Espesor pared nominal, pulgadas [mm]	Peso Nominal [Masa] por unidad longitud, lb/ft [kg/m]	Weight Class	Schedul e No.	ASTM A53		API 5L Grado B			
							Presiones de prueba, psi [kPa] Grado A	Presiones de prueba, psi [kPa] Grado B	Presiones minimas de prueba			
									psi	kPa	Kg/cm2	
12	300	12.750 [323.8] 12-3/4"	0.203 [5.16]	27.23 [40.55]	...	...	570 [3900]	670 [4600]	670	4,600	46.91
			0.219 [5.56]	29.34 [43.63]	...	...	620 [4300]	720 [5000]	720	5,000	50.99
			0.250 [6.35]	33.41 [49.71]	...	20	710 [4900]	820 [5700]	820	5,700	58.12	
			0.281 [7.14]	37.46 [55.75]	...	...	790 [5400]	930 [6400]	930	6,400	65.26
			0.312 [7.92]	41.48 [61.69]	...	...	880 [6100]	1030 [7100]	1,030	7,100	72.40
			0.330 [8.38]	43.81 [65.18]	...	30	930 [6400]	1090 [7500]	1,090	7,500	76.48	
			0.344 [8.74]	45.62 [67.90]	...	...	970 [6700]	1130 [7800]	1,130	7,800	79.54
			0.375 [9.52]	49.61 [73.78]	STD	...	1060 [7300]	1240 [8500]	1,240	8,500	86.68	
			0.406 [10.31]	53.57 [79.70]	...	40	1150 [7900]	1340 [9200]	1,340	9,200	93.81	
			0.438 [11.13]	57.65 [85.82]	...	...	1240 [8500]	1440 [9900]	1,440	9,900	100.95
			0.500 [12.70]	65.48 [97.43]	XS	...	1410 [9700]	1650 [11 400]	1,650	11,400	116.25	
			0.562 [14.27]	73.22 [108.92]	...	60	1590 [11 000]	1850 [12 800]	1,850	12,800	130.52	
			0.688 [17.48]	88.71 [132.04]	...	80	1940 [13 400]	2270 [15 700]	2,270	15,700	160.10	
			0.844 [21.44]	107.42 [159.86]	...	100	2390 [16 500]	2780 [19 200]	2,780	19,200	195.79	
			1.000 [25.40]	125.61 [186.91]	...	XXS	120	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81
			1.125 [28.57]	139.81 [208.00]	140	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81
1.312 [33.32]	160.42 [238.68]	...	...	160	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81		
14	14.000 [355.6]	0.210 [5.33]	30.96 [46.04]	...	...	540 [3700]	630 [4300]	630	4,300	43.85	
		0.219 [5.56]	32.26 [47.99]	...	...	560 [3900]	660 [4500]	660	4,600	46.91	
		0.250 [6.35]	36.75 [54.69]	...	10	640 [4400]	750 [5200]	750	5,200	53.03		
		0.281 [7.14]	41.21 [61.35]	...	...	720 [5000]	840 [5800]	840	5,800	59.14	
		0.312 [7.92]	45.65 [67.90]	...	20	800 [5500]	940 [6500]	940	6,500	66.28		
		0.344 [8.74]	50.22 [74.76]	...	...	880 [6100]	1030 [7100]	1,030	7,100	72.40	
		0.375 [9.52]	54.62 [81.25]	STD	30	960 [6600]	1120 [7700]	1,120	7,700	78.52		
		0.438 [11.13]	63.50 [94.55]	...	40	1130 [7800]	1310 [9000]	1,310	9,000	91.77		
		0.469 [11.91]	67.84 [100.94]	...	...	1210 [8300]	1410 [9700]	1,410	9,700	98.91	
		0.500 [12.70]	72.16 [107.39]	XS	...	1290 [8900]	1500 [10 300]	1,500	10,300	105.03		
		0.594 [15.09]	85.13 [126.71]	...	60	1530 [10 500]	1790 [12 300]	1,790	12,300	125.43		
		0.750 [19.05]	106.23 [158.10]	...	80	1930 [13 300]	2250 [15 500]	2,250	15,500	158.06		
		0.938 [23.83]	130.98 [194.96]	...	100	2410 [16 600]	2800 [19 300]	2,800	19,300	196.81		
		1.094 [27.79]	150.93 [224.65]	...	120	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81		
		1.250 [31.75]	170.37 [253.56]	...	140	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81		
		1.406 [35.71]	189.29 [281.70]	...	160	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81		
2.000 [50.80]	256.56 [381.83]	...	...	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
2.125 [53.97]	269.76 [401.44]	...	...	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
2.200 [55.88]	277.51 [413.01]	...	...	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
2.500 [63.50]	307.34 [457.40]	...	...	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
16	400	16.000 [406.4]	0.219 [5.56]	36.95 [54.96]	...	...	490 [3400]	570 [3900]	570	3,900	39.77
			0.250 [6.35]	42.09 [62.64]	...	10	560 [3900]	660 [4500]	660	4,600	46.91	
			0.281 [7.14]	47.22 [70.30]	...	...	630 [4300]	740 [5100]	740	5,100	52.01
			0.312 [7.92]	52.32 [77.83]	...	20	700 [4800]	820 [5700]	820	5,700	58.12	
			0.344 [8.74]	57.57 [85.71]	...	...	770 [5300]	900 [6200]	900	6,200	63.22
			0.375 [9.52]	62.64 [93.17]	STD	30	840 [5800]	980 [6800]	980	6,800	69.34	
			0.438 [11.13]	72.86 [108.49]	...	...	990 [6800]	1150 [7900]	1,150	7,900	80.56
			0.469 [11.91]	77.87 [115.86]	...	...	1060 [7300]	1230 [8500]	1,230	8,500	86.68
			0.500 [12.70]	82.85 [123.30]	XS	40	1120 [7700]	1310 [9000]	1,310	9,000	91.77	
			0.656 [16.66]	107.60 [160.12]	...	60	1480 [10 200]	1720 [11 900]	1,720	11,900	121.35	
			0.844 [21.44]	136.74 [203.53]	...	80	1900 [13 100]	2220 [15 300]	2,220	15,300	156.02	
			1.031 [26.19]	164.98 [245.56]	...	100	2320 [16 000]	2710 [18 700]	2,710	18,700	190.69	
			1.219 [30.96]	192.61 [286.64]	...	120	2740 [18 900]	2800 [19 300]	2,800	19,300	196.81	
			1.438 [36.53]	223.85 [333.19]	...	140	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81	
			1.594 [40.49]	245.48 [365.35]	...	160	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81	

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API 5L / ASTM A53

NPS Designación	DN Designación	Diametro exterior, pulgadas [mm]	Espesor pared nominal, pulgadas [mm]	Peso Nominal [Masa] por unidad longitud, lb/ft [kg/m]	Weight Class	Schedul e No.	ASTM A53		API 5L Grado B		
							Presiones de prueba, psi [kPa] Grado A	Presiones de prueba, psi [kPa] Grado B	Presiones mínimas de prueba		
									psi	kPa	Kg/cm2
18	450	18.000 [457]	0.250 [6.35]	47.44 [70.60]	...	10	500 [3400]	580 [4000]	580	4,000	40.79
			0.281 [7.14]	53.23 [79.24]	...	...	560 [3900]	660 [4500]	660	4,600	46.91
			0.312 [7.92]	58.99 [87.75]	...	20	620 [4300]	730 [5000]	730	5,000	50.99
			0.344 [8.74]	64.93 [96.66]	...	...	690 [4800]	800 [5500]	800	5,500	56.08
			0.375 [9.52]	70.65 [105.10]	STD	...	750 [5200]	880 [6100]	880	6,100	62.20
			0.406 [10.31]	76.36 [113.62]	...	...	810 [5600]	950 [6500]	950	6,600	67.30
			0.438 [11.13]	82.23 [122.43]	...	30	880 [6100]	1020 [7000]	1,020	7,000	71.38
			0.469 [11.91]	87.89 [130.78]	...	...	940 [6500]	1090 [7500]	1,090	7,500	76.48
			0.500 [12.70]	93.54 [139.20]	XS	...	1000 [6900]	1170 [8100]	1170	8,100	82.60
			0.562 [14.27]	104.76 [155.87]	...	40	1120 [7700]	1310 [9000]	1,310	9,000	91.77
			0.750 [19.05]	138.30 [205.83]	...	60	1500 [10 300]	1750 [12 100]	1,750	12,100	123.39
			0.938 [23.83]	171.08 [254.67]	...	80	1880 [13 000]	2190 [15 100]	2,190	15,100	153.98
			1.156 [29.36]	208.15 [309.76]	...	100	2310 [15 900]	2700 [18 600]	2,700	18,600	189.67
1.375 [34.92]	244.37 [363.64]	...	120	2750 [19 000]	2800 [19 300]	2,800	19,300	196.81			
1.562 [39.67]	274.48 [408.45]	...	140	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
1.781 [45.24]	308.79 [459.59]	...	160	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
20	500	20.000 [508]	0.250 [6.35]	52.78 [78.55]	...	10	450 [3100]	520 [3600]	520	3,600	36.71
			0.281 [7.14]	59.23 [88.19]	...	...	510 [3500]	590 [4100]	590	4,100	41.81
			0.312 [7.92]	65.66 [97.67]	...	...	560 [3900]	660 [4500]	660	4,600	46.91
			0.344 [8.74]	72.28 [107.60]	...	...	620 [4300]	720 [5000]	720	5,000	50.99
			0.375 [9.52]	78.67 [117.02]	STD	20	680 [4700]	790 [5400]	790	5,400	55.06
			0.406 [10.31]	84.04 [126.53]	...	...	730 [5000]	850 [5900]	850	5,900	60.16
			0.438 [11.13]	91.59 [136.37]	...	...	790 [5400]	920 [6300]	920	6,300	64.24
			0.469 [11.91]	97.92 [145.70]	...	...	850 [5900]	950 [6500]	950	6,600	67.30
			0.500 [12.70]	104.23 [155.12]	XS	30	900 [6200]	1050 [7200]	1,050	7,200	73.42
			0.594 [15.09]	123.23 [183.42]	...	40	1170 [8100]	1250 [8600]	1,250	8,600	87.70
			0.812 [20.62]	166.56 [247.83]	...	60	1460 [10 100]	1710 [11 800]	1,710	11,800	120.33
			1.031 [26.19]	209.06 [311.17]	...	80	1860 [12 800]	2170 [15 000]	2,170	15,000	152.96
			1.281 [32.54]	256.34 [381.53]	...	100	2310 [15900]	2690 [18 500]	2,690	18,500	188.65
1.500 [38.10]	296.65 [441.49]	...	120	2700 [18600]	2800 [19 300]	2,800	19,300	196.81			
1.750 [44.45]	341.41 [508.11]	...	140	2800 [19300]	2800 [19 300]	2,800	19,300	196.81			
1.969 [50.01]	379.53 [564.81]	...	160	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
24	600	24.000 [610]	0.250 [6.35]	63.47 [94.46]	...	10	380 [2600]	440 [3000]	440	3,000	30.59
			0.281 [7.14]	71.25 [106.08]	...	...	420 [2900]	490 [3400]	490	3,400	34.67
			0.312 [7.92]	79.01 [117.51]	...	...	470 [3200]	550 [3800]	550	3,800	38.75
			0.344 [8.74]	86.99 [129.50]	...	...	520 [3600]	600 [4100]	600	4,100	41.81
			0.375 [9.52]	94.71 [140.88]	STD	20	560 [3900]	660 [4500]	660	4,600	46.91
			0.406 [10.31]	102.40 [152.37]	...	...	610 [4200]	710 [4900]	710	4,900	49.97
			0.438 [11.13]	110.32 [164.26]	...	...	660 [4500]	770 [5300]	770	5,300	54.05
			0.469 [11.91]	117.98 [175.54]	...	...	700 [4800]	820 [5700]	820	5,700	58.12
			0.500 [12.70]	125.61 [186.94]	XS	...	750 [5200]	880 [6100]	880	6,100	62.20
			0.562 [14.27]	140.81 [209.50]	...	30	840 [5800]	980 [6800]	980	6,800	69.34
			0.688 [17.48]	171.45 [255.24]	...	40	1030 [7100]	1200 [8300]	1,200	8,300	84.64
			0.938 [23.83]	231.25 [344.23]	...	...	1410 [9700]	1640 [11 300]	1,640	11,300	115.23
			0.969 [24.61]	238.57 [355.02]	...	60	1450 [10 000]	1700 [11 700]	1,700	11,700	119.31
1.219 [30.96]	296.86 [441.78]	...	80	1830 [12 600]	2130 [14 700]	2,130	14,700	149.90			
1.531 [38.89]	367.74 [547.33]	...	100	2300 [15 900]	2680 [18 500]	2,680	18,500	188.65			
1.812 [46.02]	429.79 [639.58]	...	120	2720 [18 800]	2800 [19 300]	2,800	19,300	196.81			
2.062 [52.37]	483.57 [719.63]	...	140	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
2.344 [59.54]	542.64 [807.63]	...	160	2800 [19 300]	2800 [19 300]	2,800	19,300	196.81			
26	650	26.000 [660]	0.250 [6.35]	68.82 [102.42]	...	...	350 [2400]	400 [2800]	400	2,800	28.55
			0.281 [7.14]	77.26 [115.02]	...	...	390 [2700]	450 [3100]	450	3,100	31.61
			0.312 [7.92]	85.68 [127.43]	...	10	430 [3000]	500 [3400]	500	3,400	34.67
			0.344 [8.74]	94.35 [140.45]	...	...	480 [3300]	560 [3900]	560	3,900	39.77
			0.375 [9.52]	102.72 [152.80]	STD	...	520 [3600]	610 [4200]	610	4,200	42.83
			0.406 [10.31]	111.08 [165.28]	560 [3900]	660 [4500]	660	4,600	46.91

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Especificaciones de Producto

Tubos para Conducción de Fluidos (Líquidos y Gases)

Alta Presión

Propiedades Mecánicas

Norma de Fabricación	Grado del Acero	Límite de Fluencia		Resistencia a la Tracción			
		Mínimo		Mínimo		Máximo	
		Mpa	psi	Mpa	psi	Mpa	psi
ASTM A 53 Tipo E (ERW)	A	205	30,000	330	48,000	-	-
	B	240	35,000	415	60,000	-	-

Requerimientos Químicos

Norma de Fabricación	Grado del Acero	Porcentaje Máximo de los Elementos			
		C Carbono	Mn Manganeso	P Fósforo	S Azufre
ASTM A 53 Tipo E (ERW)	A	0,25	0,95	0,05	0,045
	B	0,30	1,20	0,05	0,045

El porcentaje máximo de Cobre (Cu), Níquel (Ni) y Cromo (Cr) no debe exceder al 0,40%; para Molibdeno (Mo) no debe ser mayor a 0,15% y para Vanadio (V) no debe ser mayor a 0,08%. Adicionalmente, la combinación de estos 5 elementos en el acero no debe exceder al 1%.

Especificaciones de Producto

Tubos para Gasoductos / Oleoductos / Acueductos, Revestimiento y Producción de Pozos Petroleros. Tubos de Línea

Normas de Fabricación

Los tubos de línea se fabrican de acuerdo a la norma API 5L

Nivel de Especificación de Producto

La norma API 5L establece dos niveles de especificación de producto, PSL 1 y PSL 2 (Product Specification Level, PSL por sus siglas en inglés). Estas dos designaciones definen diferentes niveles de requerimientos de especificaciones técnicas.

Requerimientos Químicos por Colada y Análisis de Producto en Porcentaje en Peso

PSL 1						
Grado	C Carbono % Máximo ^a	Mn Manganeso % Máximo ^a	P Fósforo % Máximo	S Azufre % Máximo	Ti Titanio % Máximo	Otros % Máximo
B	0,26	1,20	0,030	0,030	0,04	b, c, d
X42	0,26	1,40	0,030	0,030	0,04	c, d
X52	0,26	1,40	0,030	0,030	0,04	c, d
X60 ^f	0,26	1,40	0,030	0,030	0,04	c, d

PSL 2						
Grado	C Carbono % Máximo ^a	Mn Manganeso % Máximo ^a	P Fósforo % Máximo	S Azufre % Máximo	Ti Titanio % Máximo	Otros % Máximo
B	0,22	1,20	0,025	0,015	0,04	d, e
X42	0,22	1,30	0,025	0,015	0,04	c, d
X52	0,22	1,40	0,025	0,015	0,04	c, d
X60 ^f	0,22	1,40	0,025	0,015	0,04	c, d

Notas:

a) Por cada reducción de 0,01% por debajo del máximo contenido de carbono especificado, se permite un incremento de 0,05% por encima del contenido máximo de Mn especificado, hasta un máximo de 1,50% para los grados X42 a X52 y hasta un máximo de 1,65% para el grado X60.

b) La suma de Columbio (Niobio) y Vanadio no debe exceder de 0,03% excepto que, por acuerdo entre el fabricante y el comprador, se establezca una alternativa máxima.

c) A juicio de **Industrias Unicon, C.A.**, se pueden utilizar Columbio (Niobio), Vanadio o una combinación de éstos.

d) La suma de Columbio (Niobio), Vanadio y Titanio no debe exceder de 0,15%.

e) La suma de Columbio (Niobio) y Vanadio no debe exceder de 0,06% excepto que, por acuerdo entre el fabricante y el comprador, se establezca una alternativa máxima.

f) Otras composiciones químicas pueden ser suministradas previo acuerdo entre la acería e **Industrias Unicon, C.A.**

Fuente: API 5L, 43a edición.

Especificaciones de Producto

Tubos para Gasoductos / Oleoductos / Acueductos,
Revestimiento y Producción de Pozos Petroleros.
Tubos de Línea

Propiedades Mecánicas y Requerimientos de Tracción

PSL 1					
Grado	Límite de Fluencia		Resistencia a la Tracción		Alargamiento en 50,8 mm (2 pulg) mínimo %
	psi	Mpa	psi	Mpa	
B	35,000	241	60,000	414	a
X42	42,000	290	60,000	414	a
X52	52,000	359	66,000	455	a
X60	60,000	414	75,000	517	a

PSL 2									
Grado	Límite de Fluencia				Resistencia a la Tracción				Alargamiento en 50,8 mm (2 pulg) mínimo %
	Mínimo		Máximo ^b		Mínimo		Máximo ^c		
	psi	Mpa	psi	Mpa	psi	Mpa	psi	Mpa	
B	35,000	241	65,000 ^d	448	60,000	414	110,000	758	a
X42	42,000	290	72,000	496	60,000	414	110,000	758	a
X52	52,000	359	77,000	531	66,000	455	110,000	758	a
X60	60,000	414	82,000	565	75,000	517	110,000	758	a

Notas:

a) El alargamiento mínimo en 50,8 mm (2 pulg) se determinará según la fórmula siguiente:

Ecuación en unidades SI

$$e = 1,944 * (A^{0,2} / U^{0,9})$$

Ecuación en unidades inglesas

$$e = 625,000 * (A^{0,2} / U^{0,9})$$

donde:

e = Alargamiento mínimo en 50,8 mm (2 pulg) expresado en porcentaje y redondeado a 0,5%.

A = Área de la sección transversal de la probeta, basándose en el diámetro externo y espesor de pared especificados con aproximación de 6,5 mm² (0.01 pulg²) ó 484 mm² (0.75 pulg²), el menor valor.

U = Resistencia a la tracción especificada en Mpa (psi).

b) El esfuerzo de fluencia máximo para un grado intermedio debe ser el máximo del grado superior inmediato.

c) Todos los grados intermedios deben tener un esfuerzo máximo de tracción de 758 Mpa (110,000 psi).

d) El esfuerzo de fluencia máximo para la tubería de Grado B para ensayos con orientación longitudinal es de 496 Mpa (72,000 psi).

Fuente: API 5L, 43a edición.