

Line Pipe Steels

Mechanical Properties of Line Pipe Steels Without Notch Toughness Requirements

Standard Designation	Grade, Class, Type, Symbol or Name	Steel Number	UNS Number	Product Form/Heat Treatment	Thickness		Yield Strength, min		Tensile Strength, min		Elongation, min, %	Other
					t, mm	t, in.	N/mm ² or MPa	ksi	N/mm ² or MPa	ksi		
API 5L-2004	A25 Class I - PSL 1 A25 Class II - PSL 1	---	---	see standard	---	---	172	25	310	45	see standard	---
ISO 3183-1:1996	L175, Class I L175, Class I	---	---	see standard	---	---	175	---	315	---	27	---
API 5L-2004	A - PSL 1	---	---	see standard	---	---	207	30	331	48	see standard	---
EN 10208-1:1997	L210GA	1.0319	---	see standard	---	---	210	---	335-475	---	25	---
ISO 3183-1:1996	L210	---	---	see standard	---	---	210	---	335	---	25	---
API 5L-2004	B - PSL 1	---	---	see standard	---	---	241	35	414	60	see standard	---
CSA Z245.1-2002	241 - Category I	---	---	see standard	---	---	241-495	---	414-760	---	see standard	---
EN 10208-1:1997	L245GA	1.0459	---	see standard	---	---	245	---	415-555	---	22	---
ISO 3183-1:1996	L245	---	---	see standard	---	---	245	---	415	---	21	---
API 5L-2004	X42 - PSL 1	---	---	see standard	---	---	290	42	414	60	see standard	---
CSA Z245.1-2002	290 - Category I	---	---	see standard	---	---	290-495	---	414-760	---	see standard	---
EN 10208-1:1997	L290GA	1.0483	---	see standard	---	---	290	---	415-555	---	21	---
ISO 3183-1:1996	L290	---	---	see standard	---	---	290	---	415	---	21	---
API 5L-2004	X46 - PSL 1	---	---	see standard	---	---	317	46	434	63	see standard	---
CSA Z245.1-2002	317 - Category I	---	---	see standard	---	---	317	---	434	---	see standard	---
ISO 3183-1:1996	L320	---	---	see standard	---	---	320	---	435	---	20	---
API 5L-2004	X52 - PSL 1	---	---	see standard	---	---	359	52	455	66	see standard	---
CSA Z245.1-2002	359 - Category I	---	---	see standard	---	---	359-530	---	455-760	---	see standard	---
EN 10208-1:1997	L360GA	1.0499	---	see standard	---	---	360	---	460-620	---	20	---
ISO 3183-1:1996	L360	---	---	see standard	---	---	360	---	460	---	19	---
API 5L-2004	X56 - PSL 1	---	---	see standard	---	---	386	56	490	71	see standard	---
CSA Z245.1-2002	386 - Category I	---	---	see standard	---	---	386-540	---	490-760	---	see standard	---
ISO 3183-1:1996	L390	---	---	see standard	---	---	390	---	490	---	18	---
API 5L-2004	X60 - PSL 1	---	---	see standard	---	---	414	60	517	75	see standard	---
CSA Z245.1-2002	414 - Category I	---	---	see standard	---	---	414-565	---	517-760	---	see standard	---
ISO 3183-1:1996	L415	---	---	see standard	---	---	415	---	520	---	17	---
API 5L-2004	X65 - PSL 1	---	---	see standard	---	---	448	65	531	77	see standard	---
CSA Z245.1-2002	448 - Category I	---	---	see standard	---	---	448-600	---	531-760	---	see standard	---
ISO 3183-1:1996	L450	---	---	see standard	---	---	450	---	535	---	17	---
API 5L-2004	X70 - PSL 1	---	---	see standard	---	---	483	70	565	82	see standard	---
CSA Z245.1-2002	483 - Category I	---	---	see standard	---	---	483-620	---	565-760	---	see standard	---
ISO 3183-1:1996	L485	---	---	see standard	---	---	485	---	570	---	16	---
CSA Z245.1-2002	550 - Category I	---	---	see standard	---	---	550-690	---	620-830	---	see standard	---
ISO 3183-1:1996	L555	---	---	see standard	---	---	555	---	625-825	---	15	27 J at 0°C see standard

Line Pipe Steels

Chemical Composition of Line Pipe Steels Without Notch Toughness Requirements

Standard Designation	Grade, Class, Type, Symbol or Name	Steel Number	UNS Number	Weight, %, max, Unless Otherwise Specified								
				C	Mn	Si	P	S	Cr	Ni	Mo	Others
API 5L-2004	A25, Class I, PSL 1 seamless	---	---	0.21	0.60	---	0.030	0.030	---	---	---	---
	A25, Class II, PSL 1 seamless	---	---	0.21	0.60	---	0.045-0.080	0.030	---	---	---	---
	A25, Class I, PSL 1 welded	---	---	0.21	0.60	---	0.030	0.030	---	---	---	---
	A25, Class II, PSL 1 welded	---	---	0.21	0.60	---	0.045-0.080	0.030	---	---	---	---
ISO 3183-1:1996	L175, Class I S/NE/CE*	---	---	0.21	0.30-0.60	---	0.030	0.030	---	---	---	see standard
	L175, Class II S/NE/CE*	---	---	0.21	0.30-0.60	---	0.045-0.080	0.030	---	---	---	see standard
	L175, Class I W/EW/CW*	---	---	0.21	0.30-0.60	---	0.030	0.030	---	---	---	see standard
	L175, Class II W/EW/CW*	---	---	0.21	0.30-0.60	---	0.045-0.080	0.030	---	---	---	see standard
API 5L-2004	A, PSL 1 seamless	---	---	0.22	0.90	---	0.030	0.030	---	---	---	---
	A, PSL 1 welded	---	---	0.22	0.90	---	0.030	0.030	---	---	---	---
EN 10208-1:1997	L210GA	1.0319	---	0.21	0.90	0.40	0.030	0.030	---	---	---	AL 0.015-0.060; Nb+V+Ti 0.15
ISO 3183-1:1996	L210 S/NE/CE*	---	---	0.22	0.90	---	0.030	0.030	---	---	---	see standard
	L210 W/NE/CE*	---	---	0.21	0.90	---	0.030	0.030	---	---	---	see standard
API 5L-2004	B, PSL 1 seamless	---	---	0.28	1.20	---	0.030	0.030	---	---	---	Cb+V 0.03; Ti 0.04; Cb+V+Ti 0.15
	B, PSL 1 welded	---	---	0.26	1.20	---	0.030	0.030	---	---	---	Cb+V 0.03; Ti 0.04; Cb+V+Ti 0.15
CSA Z245.1-2002	241 - Category I	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001 CE 0.40 (see standard)
EN 10208-1:1997	L245GA	1.0459	---	0.20	1.15	0.40	0.030	0.030	---	---	---	AL 0.015-0.060; Nb+V+Ti 0.15
ISO 3183-1:1996	L245 S/NE/CE*	---	---	0.27	1.15	---	0.030	0.030	---	---	---	see standard
	L245 W/NE/CE*	---	---	0.26	1.15	---	0.030	0.030	---	---	---	see standard
API 5L-2004	X 42, PSL 1 seamless	---	---	0.28	1.30	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
	X 42, PSL 1 welded	---	---	0.26	1.30	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
CSA Z245.1-2002	290 - Category I	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001 CE 0.40 (see standard)
EN 10208-1:1997	L290GA	1.0483	---	0.20	1.40	0.40	0.030	0.030	---	---	---	AL 0.015-0.060; Nb+V+Ti 0.15
ISO 3183-1:1996	L290 S/NE*	---	---	0.29	1.25	---	0.030	0.030	---	---	---	see standard
	L290 S/CE*	---	---	0.29	1.25	---	0.030	0.030	---	---	---	see standard
	L290 W/NE/CE*	---	---	0.28	1.25	---	0.030	0.030	---	---	---	see standard

Line Pipe Steels

Chemical Composition of Line Pipe Steels Without Notch Toughness Requirements (Continued)

Standard Designation	Grade, Class, Type, Symbol or Name	Steel Number	UNS Number	Weight, %, max, Unless Otherwise Specified								
				C	Mn	Si	P	S	Cr	Ni	Mo	Others
API 5L-2004	X46, PSL 1 seamless	---	---	0.28	1.40	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
	X46, PSL 1 welded	---	---	0.26	1.40	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
CSA Z245.1-2002	317 - Category I	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001 CE 0.40 (see standard)
ISO 3183-1:1996	L320, S/NE*	---	---	0.31	1.35	---	0.030	0.030	---	---	---	see standard
	L320 S/CE*	---	---	0.29	1.25	---	0.030	0.030	---	---	---	see standard
	L320 W/NE*	---	---	0.30	1.25	---	0.030	0.030	---	---	---	see standard
	L320 W/CE*	---	---	0.28	1.25	---	0.030	0.030	---	---	---	see standard
API 5L-2004	X52, PSL 1 seamless	---	---	0.28	1.40	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
	X52, PSL 1 welded	---	---	0.26	1.40	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
CSA Z245.1-2002	359 - Category I	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001 CE 0.40 (see standard)
EN 10208-1:1997	L360GA	1.0499	---	0.22	1.45	0.55	0.030	0.030	---	---	---	AL 0.015-0.060; Nb+V+Ti 0.15
ISO 3183-1:1996	L 360 S/NE*	---	---	0.31	1.35	---	0.030	0.030	---	---	---	see standard
	L360 S/CE*	---	---	0.29	1.25	---	0.030	0.030	---	---	---	see standard
	L360 W/NE*	---	---	0.30	1.25	---	0.030	0.030	---	---	---	see standard
	L360 W/CE*	---	---	0.28	1.25	---	0.030	0.030	---	---	---	see standard
API 5L-2004	X56, PSL 1 seamless	---	---	0.28	1.40	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
	X56, PSL 1 welded	---	---	0.26	1.40	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
CSA Z245.1-2002	386 - Category I	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001 CE 0.40 (see standard)
ISO 3183-1:1996	L390, S/NE/CE*	---	---	0.26	1.35	---	0.030	0.030	---	---	---	see standard
	L390, W/NE/CE*	---	---	0.26	1.35	---	0.030	0.030	---	---	---	see standard
API 5L-2004	X60, PSL 1 seamless	---	---	0.28	1.40	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
	X60, PSL 1 welded	---	---	0.26	1.40	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
CSA Z245.1-2002	414 - Category I	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001 CE 0.40 (see standard)
ISO 3183-1:1996	L415 S/NE/CE*	---	---	0.26	1.35	---	0.030	0.030	---	---	---	see standard
	L415 W/NE/CE*	---	---	0.26	1.35	---	0.030	0.030	---	---	---	see standard
API 5L-2004	X65, PSL 1 seamless	---	---	0.28	1.40	---	0.030	0.030	---	---	---	Ti 0.06; Cb+V+Ti 0.15
	X65, PSL 1 welded	---	---	0.26	1.45	---	0.030	0.030	---	---	---	Ti 0.06; Cb+V+Ti 0.15
CSA Z245.1-2002	448 - Category I	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001 CE 0.40 (see standard)
ISO 3183-1:1996	L450 S/NE/CE*	---	---	by agreement								
	L450 W/NE/CE*	---	---	0.26	1.40	---	0.030	0.030	---	---	---	see standard

Line Pipe Steels

Chemical Composition of Line Pipe Steels Without Notch Toughness Requirements (Continued)

Standard Designation	Grade, Class, Type, Symbol or Name	Steel Number	UNS Number	Weight, %, max, Unless Otherwise Specified								
				C	Mn	Si	P	S	Cr	Ni	Mo	Others
API 5L-2004	X70, PSL 1 seamless	---	---	0.28	1.40	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
	X70, PSL 1 welded	---	---	0.26	1.65	---	0.030	0.030	---	---	---	Ti 0.04; Cb+V+Ti 0.15
CSA Z245.1-2002	483 - Category I	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001 CE 0.40 (see standard)
ISO 3183-1:1996	L485, S/NE/CE*	---	---	by agreement								
	L485 W/NE/CE*	---	---	0.23	1.60	---	0.030	0.030	---	---	---	see standard
CSA Z245.1-2002	550 - Category I	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001 CE 0.40 (see standard)
ISO 3183-1:1996	L555 S/NE/CE*	---	---	by agreement								
	L555 W/NE/CE*	---	---	0.18	1.80	---	0.030	0.030	---	---	---	see standard

Peninsular
Steel Tubes

Line Pipe Steels

Mechanical Properties of Line Pipe Steels With Notch Toughness Requirements

Standard Designation	Grade, Class, Type, Symbol or Name	Steel Number	UNS Number	Product Form/ Heat Treatment	Thickness		Yield Strength, min		Tensile Strength, min		Elongation, min, %	Other
					t, mm	t, in.	N/mm ² or MPa	ksi	N/mm ² or MPa	ksi		
ASTM A 1005/A 1005M-00	35	---	---	---	---	---	240-450	35-65	415	60	see standard	see standard
API 5L-2004	B - PSL 2	---	---	see standard	---	---	241-448	35-65	414-758	60-110	see standard	L: 41 J at 0°C; T: 27 J at 0°C see standard
CSA Z245.1-2002	241 - Category II or III	---	---	see standard	---	---	241-495	---	414-760	---	see standard	OD < 457 mm: 27 J at temp OD ≥ 457 mm: 40 J at temp see standard
ASTM A 984/A 984M-03	35	---	---	see standard	---	NPS < 8	240	35	415	60	see standard	see standard
					---	NPS ≤ 8	240-450	35-65	415	60	see standard	see standard
EN 10208-2:1996	L245NB	1.0457	---	see standard	---	---	245-440	---	415	---	22	see standard
	L245MB	1.0418	---	see standard	---	---	245-440	---	415	---	22	see standard
ISO 3183-2:1996	L245NB	---	---	see standard	---	---	245-440	---	415	---	22	see standard
	L245MB	---	---	see standard	---	---	245-440	---	415	---	22	see standard
API 5L-2004	X42 - PSL 2	---	---	see standard	---	---	290-496	42-72	414-758	60-110	see standard	L: 41 J at 0°C; T: 27J at 0°C see standard
CSA Z245.1-2002	290 - Category II or III	---	---	see standard	---	---	290-495	---	414-760	---	see standard	OD < 457 mm: 27 J at temp OD ≥ 457 mm: 40 J at temp see standard
EN 10208-2:1996	L290NB	1.0484	---	see standard	---	---	290-440	---	415	---	21	see standard
	L290MB	1.0429	---	see standard	---	---	290-440	---	415	---	21	see standard
ISO 3183-2:1996	L290NB	---	---	see standard	---	---	290-440	---	415	---	21	see standard
	L290MB	---	---	see standard	---	---	290-440	---	415	---	21	see standard
API 5L-2004	X46 - PSL 2	---	---	see standard	---	---	317-524	46-76	434-758	63-110	see standard	L: 41 J at 0°C; T: 27J at 0°C see standard;
CSA Z245.1-2002	317 - Category II or III	---	---	see standard	---	---	317	---	434	---	see standard	OD < 457 mm: 27 J at temp OD ≥ 457 mm: 40 J at temp see standard

Line Pipe Steels

Mechanical Properties of Line Pipe Steels With Notch Toughness Requirements (Continued)

Standard Designation	Grade, Class, Type, Symbol or Name	Steel Number	UNS Number	Product Form/ Heat Treatment	Thickness		Yield Strength, min		Tensile Strength, min		Elongation, min, %	Other
					t, mm	t, in.	N/mm ² or MPa	ksi	N/mm ² or MPa	ksi		
API 5L-2004	X52 - PSL 2	---	---	see standard	---	---	359-531	52-77	455-758	66-110	see standard	L: 41 J at 0°C; T: 27J at 0°C see standard
CSA Z245.1-2002	359 - Category II or III	---	---	see standard	---	---	359-530	---	455-760	---	see standard	OD < 457 mm: 27 J at temp OD ≥ 457 mm: 40 J at temp see standard
EN 10208-2:1996	L360NB	1.0582	---	see standard	---	---	360-510	---	460	---	20	see standard
	L360QB	1.8948										
	L360MB	1.0578										
ISO 3183-2:1996	L360NB	---	---	see standard	---	---	360-510	---	460	---	20	see standard
	L360QB											
	L360MB											
ASTM A 984/A 984M-03	50	---	---	see standard	---	NPS < 8 NPS ≤ 8	345 345-530	50 50-77	485	70	see standard	see standard
API 5L-2004	X56 - PSL 2	---	---	see standard	---	---	386-544	56-79	490-758	71-110	see standard	L: 41 J at 0°C; T: 27J at 0°C see standard
CSA Z245.1-2002	386 - Category II or III	---	---	see standard	---	---	386-540	---	490-760	---	see standard	OD < 457 mm: 27 J at temp OD ≥ 457 mm: 40 J at temp see standard
API 5L-2004	X60 - PSL 2	---	---	see standard	---	---	414-565	60-82	517-758	75-110	see standard	L: 41 J at 0°C; T: 27J at 0°C see standard
CSA Z245.1-2002	414 - Category II or III	---	---	see standard	---	---	414-565	---	517-760	---	see standard	OD < 457 mm: 27 J at temp OD ≥ 457 mm: 40 J at temp see standard
ASTM A 1005/A 1005M-00	60	---	---	---	---	---	415-550	60-80	515	75	see standard	see standard
EN 10208-2:1996	L415NB	1.8972	---	see standard	---	---	415-565	---	520	---	18	see standard
	L415QB	1.8947										
	L415MB	1.8973										
ISO 3183-2:1996	L415NB	---	---	see standard	---	---	415-565	---	520	---	18	see standard
	L415QB											
	L415MB											

Line Pipe Steels

Mechanical Properties of Line Pipe Steels With Notch Toughness Requirements (Continued)

Standard Designation	Grade, Class, Type, Symbol or Name	Steel Number	UNS Number	Product Form/Heat Treatment	Thickness		Yield Strength, min		Tensile Strength, min		Elongation, min, %	Other
					t, mm	t, in.	N/mm ² or MPa	ksi	N/mm ² or MPa	ksi		
API 5L-2004	X65 - PSL 2	---	---	see standard	---	---	448-600	65-87	531-758	77-110	see standard	L: 41 J at 0°C; T: 27J at 0°C see standard
CSA Z245.1-2002	448 - Category II or III	---	---	see standard	---	---	448-600	---	531-760	---	see standard	OD < 457 mm: 27 J at temp OD ≥ 457 mm: 40 J at temp see standard
ASTM A 984/A 984M-03	60	---	---	see standard	---	NPS < 8	415	60	515	75	see standard	see standard
					---	NPS ≤ 8	415-550	60-80				
EN 10208-2:1996	L450QB	1.8952	---	see standard	---	---	450-570	---	535	---	18	see standard
	L450MB	1.8975										
ISO 3183-2:1996	L450QB	---	---	see standard	---	---	450-570	---	535	---	18	see standard
	L450MB	---										
API 5L-2004	X70 - PSL 2	---	---	see standard	---	---	483-621	70-90	565-758	82-110	see standard	L: 41 J at 0°C; T: 27J at 0°C see standard
CSA Z245.1-2002	483 - Category II or III	---	---	see standard	---	---	483-620	---	565-760	---	see standard	OD < 457 mm: 27 J at temp OD ≥ 457 mm: 40 J at temp see standard
ASTM A 1005/A 1005M-00	70	---	---	---	---	---	485-600	70-87	550	80	see standard	see standard
EN 10208-2:1996	L485QB	1.8955	---	see standard	---	---	485-605	---	570	---	18	see standard
	L485MB	1.8977										
ISO 3183-2:1996	L485QB	---	---	see standard	---	---	485-605	---	570	---	18	see standard
	L485MB	---										
ASTM A 984/A 984M-03	80	---	---	see standard	---	NPS < 8	550	80	620	90	see standard	see standard
					---	NPS ≤ 8	550-670	80-97				
CSA Z245.1-2002	550 - Category II or III	---	---	see standard	---	---	550-690	---	620-830	---	see standard	OD < 457 mm: 27 J at temp OD ≥ 457 mm: 40 J at temp see standard
API 5L-2004	X80 - PSL 2	---	---	see standard	---	---	552-690	80-100	621-827	90-120	see standard	L: 101 J at 0°C; T: 68 J at 0°C see standard
EN 10208-2:1996	L555QB	1.8957	---	see standard	---	---	555-675	---	625	---	18	see standard
	L555MB	1.8978										
ISO 3183-2:1996	L555QB	---	---	see standard	---	---	555-675	---	625	---	18	see standard
	L555MB	---										
ASTM A 1005/A 1005M-00	80	---	---	---	---	---	550-670	80-97	620	90	see standard	see standard

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Standard Designation	Grade, Class, Type, Symbol or Name	Steel Number	UNS Number	Weight, %, max, Unless Otherwise Specified								
				C	Mn	Si	P	S	Cr	Ni	Mo	Others
ASTM A 1005/A 1005M-00	35	---	---	0.16	---	---	---	---	---	---	---	B 0.0007; CE 0.40 (see standard)
API 5L-2004	B, PSL 2 seamless	---	---	0.24	1.20	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Cb+V 0.06; Ti 0.04
	B, PSL 2 welded	---	---	0.22	1.20	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Cb+V 0.06; Ti 0.04
CSA Z245.1-2002	241 - Category II or III	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001; CE 0.40 (see standard)
ASTM A 984/A 984M-03	35	---	---	0.22	---	---	0.025	0.015	---	---	---	B 0.0007; CE 0.40 (see standard)
EN 10208-2:1996	L245NB seamless and welded	1.0457	---	0.16	1.1	0.40	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Al:N ≥ 2; CEV 0.42 (see standard)
	L245MB welded	1.0418	---	0.16	1.5	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; V 0.04; Nb 0.04; Al:N ≥ 2; CEV 0.40 (see standard)
ISO 3183-2:1996	L245NB seamless and welded	---	---	0.16	1.1	0.40	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Al:N ≥ 2; CEV 0.42 (see standard)
	L245MB welded	---	---	0.16	1.5	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; V 0.04; Nb 0.04; Al:N ≥ 2; CEV 0.40 (see standard)
API 5L-2004	X 42, PSL 2 seamless	---	---	0.24	1.30	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.04
	X 42, PSL 2 welded	---	---	0.22	1.30	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.04
CSA Z245.1-2002	290 - Category II or III	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001; CE 0.40 (see standard)
EN 10208-2:1996	L290NB seamless and welded	1.0484	---	0.17	1.2	0.40	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Ti 0.04; V 0.05; Nb 0.05; Al:N ≥ 2; CEV 0.42 (see standard)
	L290MB welded	1.0429	---	0.16	1.5	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; V 0.04; Nb 0.04; Al:N ≥ 2; CEV 0.40 (see standard)
ISO 3183-2:1996	L290NB seamless and welded	---	---	0.17	1.2	0.40	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Ti 0.04; V 0.05; Nb 0.05; Al:N ≥ 2; CEV 0.42 (see standard)
	L290MB welded	---	---	0.16	1.5	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; V 0.04; Nb 0.04; Al:N ≥ 2; CEV 0.40 (see standard)
API 5L-2004	X46, PSL 2 seamless	---	---	0.24	1.40	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.04
	X46, PSL 2 welded	---	---	0.22	1.40	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.04
CSA Z245.1-2002	317 - Category II or III	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001; CE 0.40 (see standard)

Line Pipe Steels

Chemical Composition of Line Pipe Steels With Notch Toughness Requirements (Continued)

Standard Designation	Grade, Class, Type, Symbol or Name	Steel Number	UNS Number	Weight, %, max, Unless Otherwise Specified								
				C	Mn	Si	P	S	Cr	Ni	Mo	Others
API 5L-2004	X52, PSL 2 seamless	---	---	0.24	1.40	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.04
	X52, PSL 2 welded	---	---	0.22	1.40	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.04
CSA Z245.1-2002	359 - Category II or III	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001; CE 0.40 (see standard)
EN 10208-2:1996	L360NB seamless and welded	1.0582	---	0.20	1.6	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Ti 0.04; V 0.10; Nb 0.05; Al:N \geq 2; Nb+V+Ti 0.15; CEV 0.45 (see standard)
	L360QB seamless	1.8948	---	0.16	1.4	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Ti 0.04; V 0.05; Nb 0.05; Al:N \geq 2; CEV 0.42 (see standard)
	L360MB welded	1.0578	---	0.16	1.6	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Ti 0.04; V 0.05; Nb 0.05; Al:N \geq 2; CEV 0.41 (see standard)
ISO 3183-2:1996	L360NB seamless and welded	---	---	0.20	1.6	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Ti 0.04; V 0.10; Nb 0.05; Al:N \geq 2; CEV 0.45 (see standard)
	L360QB seamless	---	---	0.16	1.4	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Ti 0.04; V 0.05; Nb 0.05; Al:N \geq 2; Nb+V+Ti 0.15; CEV 0.42 (see standard)
	L360MB welded	---	---	0.16	1.6	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Ti 0.04; V 0.05; Nb 0.05; Al:N \geq 2; CEV 0.41 (see standard)
ASTM A 984/A 984M-03	50	---	---	0.22	---	---	0.025	0.015	---	---	---	B 0.0007; CE 0.40 (see standard)
API 5L-2004	X56, PSL 2 seamless	---	---	0.24	1.40	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.04
	X56, PSL 2 welded	---	---	0.22	1.40	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.04
CSA Z245.1-2002	386 - Category II or III	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001; CE 0.40 (see standard)

Line Pipe Steels

Chemical Composition of Line Pipe Steels With Notch Toughness Requirements (Continued)

Standard Designation	Grade, Class, Type, Symbol or Name	Steel Number	UNS Number	Weight, %, max, Unless Otherwise Specified									Others
				C	Mn	Si	P	S	Cr	Ni	Mo		
API 5L-2004	X60, PSL 2 seamless	---	---	0.24	1.40	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.04	
	X60, PSL 2 welded	---	---	0.22	1.40	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.04	
CSA Z245.1-2002	414 - Category II or III	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001; CE 0.40 (see standard)	
ASTM A 1005/A 1005M-00	60	---	---	0.16	---	---	---	---	---	---	---	B 0.0007; CE 0.40 (see standard)	
EN 10208-2:1996	L415NB seamless and welded	1.8972	---	0.21	1.6	0.45	0.025	0.020	0.30	0.30	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.04; V 0.15; Nb 0.05; Al:N ≥ 2; CEV by agreement (see standard)	
	L415QB seamless	1.8947	---	0.16	1.6	0.45	0.025	0.020	0.30	0.30	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.04; V 0.08; Nb 0.05; Al:N ≥ 2; CEV 0.43 (see standard)	
	L415MB welded	1.8973	---	0.16	1.6	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.06; V 0.08; Nb 0.05; Al:N ≥ 2; CEV 0.42 (see standard)	
ISO 3183-2:1996	L415NB seamless and welded	---	---	0.21	1.6	0.45	0.025	0.020	0.30	0.30	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.04; V 0.15; Nb 0.05; Al:N ≥ 2; CEV by agreement (see standard)	
	L415QB seamless	---	---	0.16	1.6	0.45	0.025	0.020	0.30	0.30	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.04; V 0.08; Nb 0.05; Al:N ≥ 2; CEV 0.43 (see standard)	
	L415MB welded	---	---	0.16	1.6	0.45	0.025	0.020	0.30	0.30	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.06; V 0.08 Nb 0.05; Al:N ≥ 2; CEV 0.42 (see standard)	
API 5L-2004	X65, PSL 2 seamless	---	---	0.24	1.40	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.06	
	X65, PSL 2 welded	---	---	0.22	1.45	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.06	
CSA Z245.1-2002	448 - Category II or III	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001; CE 0.40 (see standard)	
ASTM A 984/A 984M-03	60	---	---	0.22	---	---	0.025	0.015	---	---	---	B 0.0007; CE 0.40 (see standard)	
EN 10208-2:1996	L450QB seamless	1.8952	---	0.16	1.6	0.45	0.025	0.020	0.30	0.30	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; CEV 0.45 (see standard); Al:N ≥ 2;	
	L450MB welded	1.8975	---	0.16	1.6	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; CEV 0.43 (see standard); Al:N ≥ 2;	
ISO 3183-2:1996	L450QB seamless	---	---	0.16	1.6	0.45	0.025	0.020	0.30	0.30	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.06; V 0.09; Nb 0.05; Al:N ≥ 2; CEV 0.45 (see standard)	
	L450MB welded	---	---	0.16	1.6	0.45	0.025	0.020	0.30	0.30	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.06; V 0.10; Nb 0.05; Al:N ≥ 2; CEV 0.43 (see standard)	

Line Pipe Steels

Chemical Composition of Line Pipe Steels With Notch Toughness Requirements

Standard Designation	Grade, Class, Type, Symbol or Name	Steel Number	UNS Number	Weight, %, max, Unless Otherwise Specified									Others
				C	Mn	Si	P	S	Cr	Ni	Mo		
API 5L-2004	X70, PSL 2 seamless	---	---	0.24	1.40	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.06	
	X70, PSL 2 welded	---	---	0.22	1.65	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.06	
CSA Z245.1-2002	483 - Category II or III	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001; CE 0.40 (see standard)	
ASTM A 1005/A 1005M-00	70	---	---	0.16	---	---	---	---	---	---	---	B 0.0007; CE 0.40 (see standard)	
EN 10208-2:1996	L485QB seamless	1.8955	---	0.16	1.7	0.45	0.025	0.020	0.30	0.30	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.06; V 0.10; Nb 0.05; Al:N \geq 2 CEV 0.45 (see standard)	
	L485MB welded	1.8977	---	0.16	1.7	0.45	0.025	0.020	0.30	0.30	0.10	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.06; V 0.10; Nb 0.06; Al:N \geq 2 CEV 0.43 (see standard)	
ISO 3183-2:1996	L485QB seamless	---	---	0.16	1.7	0.45	0.025	0.020	0.30	0.30	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.06; V 0.10; Nb 0.05; Al:N \geq 2 CEV 0.45 (see standard)	
	L485MB welded	---	---	0.16	1.7	0.45	0.025	0.020	0.30	0.30	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15; Ti 0.06; V 0.10; Nb 0.06; Al:N \geq 2 CEV 0.43 (see standard)	
ASTM A 984/A 984M-03	80	---	---	0.22	---	---	0.025	0.015	---	---	---	B 0.0007; CE 0.40 (see standard)	
CSA Z245.1-2002	550 - Category II or III	---	---	0.26	2.00	0.50	0.030	0.035	---	---	---	Nb 0.11; Ti 0.11; V 0.11; B 0.001; CE 0.40 (see standard)	
API 5L-2004	X80, PSL 2 seamless	---	---	0.24	1.40	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.06	
	X80, PSL 2 welded	---	---	0.22	1.85	---	0.025	0.015	---	---	---	Cb+V+Ti 0.15; Ti 0.06	
EN 10208-2:1996	L555QB seamless	1.8957	---	0.16	1.8	0.45	0.025	0.020	0.50	0.60	0.35	Al 0.015-0.060; N 0.0012; Cu 0.25; Al:N \geq 2; Nb+V+Ti 0.15; CEV by agreement (see standard)	
	L555MB welded	1.8978	---	0.16	1.8	0.45	0.025	0.020	0.30	0.30	0.10	V 0.10; Nb 0.06; Ti 0.06; Al:N \geq 2; Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15 CEV by agreement (see standard)	
ISO 3183-2:1996	L555QB seamless	---	---	0.16	1.8	0.45	0.025	0.020	0.50	0.60	0.35	V 0.10; Nb 0.05; Ti 0.06; Al:N \geq 2; Nb+V+Ti 0.15; CEV by agreement (see standard)	
	L555MB welded	---	---	0.16	1.8	0.45	0.025	0.020	0.30	0.30	0.10	V 0.10; Nb 0.06; Ti 0.06; Al:N \geq 2; Al 0.015-0.060; N 0.0012; Cu 0.25; Nb+V+Ti 0.15 CEV by agreement (see standard)	
ASTM A 1005/A 1005M-00	80	---	---	0.16	---	---	---	---	---	---	---	B 0.0007; CE 0.40 (see standard)	