

SSAW & HFW

Spiral Submerged Arc Welded
High Frequency Welded

**Oil & Gas
Industry**



PT Steel Pipe Industry of Indonesia, Tbk.





SPINDO® provides line pipe for onshore applications, developed for severe working environments. Our products meet the oil industry's needs for onshore transportation and are ideal for use in extreme conditions such as corrosive environments, low and high temperatures, high pressure and sour service.

Industrial Standards
API Spec 5L | SNI 07- 0537



Onshore
Oil Industry



Onshore
Gas Industry

DIMENSION RANGE

WALL THICKNESS																				
NOMINAL DIAMETER		(inches)	0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.394	0.472	0.551	0.630	0.709	0.787	0.866	0.945	1.024	
(inches)	(mm)	(mm)	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	
1/4	8																			
3/8	10																			
1/2	15																			
3/4	20																			
1	25																			
1 1/4	32																			
1 1/2	40																			
2	50																			
2 1/2	65																			
3	80																			
3 1/2	90																			
4	100																			
5	125																			
6	150																			
7	175																			
8	200																			
12	300																			
16	300																			
20	500																			
24	600																			
28	700																			
32	800																			
36	900																			
40	1000																			
44	1100																			
48	1200																			
52	1300																			
56	1400																			
60	1500																			
80	2000																			
100	2500																			
120	3000																			

- HFW PIPES
- SPIRAL PIPES
- HFW PIPE & SPIRAL PIPES



HFW Oil & Gas Industry

Range of Diameter	3½" - 8 "
Range of Wall Thickness	4.00 mm - 8.20 mm
Classification	Grade A / B, X42, X46, X52, X56, X60 - API spec 5L
	other standard requirement

HFW Oil & Gas Industry

SPINDO® is a leading supplier of HFW line pipe for oil and gas transmission, API 5L grade. Based on the end user customer's requirement, HFW steel pipes & tube are available in various qualities, wall thicknesses, and diameters of the finished pipes. While manufacturing HFW steel pipes, only high-quality, continuous-cast, control-rolled, fine-grain, low-carbon steel is used.

HFW steel tubes and pipes are routed through numerous tests including hydro-test, ultrasonic weld inspection, micrometer check, straightness & evaluation to ensure it's quality.

SPINDO® merupakan supplier utama pipa HFW untuk minyak dan gas, dengan sertifikasi API 5L. Pipa HFW kami tersedia dalam berbagai kualitas, ketebalan dan diameter pipa sesuai kebutuhan pelanggan. Proses produksi pipa HFW menggunakan material berkualitas tinggi, pengecoran terus menerus, proses kontrol rol, fine-grain, serta baja karbon rendah yang digunakan.

Pipa HFW kami telah melalui berbagai tes sebelum didistribusikan, seperti hydro-test, inspeksi las ultrasonik, pengecekan mikrometer, kelurusan & evaluasi untuk memastikan kualitas yang terbaik.

SSAW Oil & Gas Industry

Range of Diameter	6" - 80"
Range of Wall Thickness	6.35 mm - 25.40 mm
Classification	Grade A / B, X42, X46, X52, X56, X65, X70 (PSL-1) - API spec 5L
	Grade A / B, X42, X46, X52, X56, X65, X70, X80 (PSL-2) - API spec 5L
	P 17-I, P 17-II, P21, P25 - SNI 07-0537
	other standard requirement

SSAW Oil & Gas Industry

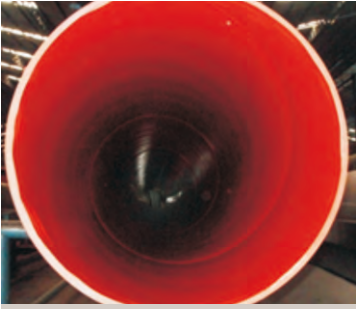
SPINDO® produce high quality large diameter SSAW pipe primarily for the Indonesian oil and gas industry. Our manufacture utilizes an advanced and automated two step process for making spiral pipe.

Our broad-size range, robust capacity, pipe-coating capabilities, and strategic location makes our pipe a strong presence in the rapidly growing Indonesia's line pipe market. Our superior resources enable us to meet our customer's demands for pipe precision and integrity.

SPINDO® memproduksi pipa SSAW berkualitas tinggi berdiameter besar untuk industri minyak dan gas Indonesia. Manufaktur kami menggunakan proses produksi berteknologi terkini dan otomatisasi sebagai langkah maju terdepan.

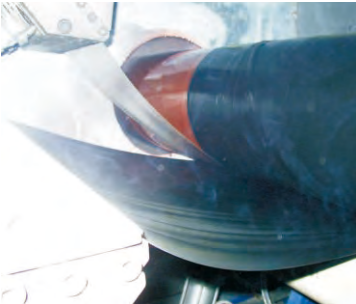
Beragam ukuran, kapasitas yang kokoh, kemampuan proses pelapisan pipa, dan lokasi strategis menjadi keunggulan kita dalam meraih pasar Indonesia yang sangat pesat. Untuk berbagai kebutuhan pelanggan dibutuhkan sumber daya yang unggul serta integritas.

Internal Coating



Internal Epoxy Coating

External Coating



Three Layer Polyethylene (3LPE)



Three Layer Polypropylene (3LPP)



Fusion Bond Epoxy Coating (FBE)



External Epoxy Coating

Galvanized



CERTIFICATE

API spec 5L : 5L-0313 (SSAW)
 API spec 5L : 5L-0475 (HFW)



American Petroleum Institute



Certificate of Authority to use the Official API Monogram
 License Number: **5L-0313** ORIGINAL

The American Petroleum Institute hereby grants to:

PT. STEEL PIPE INDUSTRY OF INDONESIA
 Unit IV
 Jalan Kabupaten Desa
 Cangkringmalang, Beji
 Pasuruan, Jawa Timur
 Indonesia

the right to use the Official API Monogram™ on manufactured products under the conditions in this official authorization or the American Petroleum Institute website under API Spec Q1™ and API Spec 5L and in accordance with the provisions of the License Agreement.

In all cases where the Official API Monogram is applied, the API Monogram should be used in conjunction with this certificate number: **5L-0313**

The American Petroleum Institute reserves the right to revoke this authorization to use the Official API Monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

The scope of this license includes the following: **Manufacturer of Line Pipe Plain End at PSL 1; Type of Pipe: SAWN / Delivery Condition: M / Highest Grade: X70; Manufacturer of Line Pipe Plain End at PSL 2; Type of Pipe: SAWN / Delivery Condition: M / Highest Grade: X80**

QMS Exclusions: Section 7.3, Design and Development

American Petroleum Institute
John Nichols
 Director of Quality Health & Safety

To verify the authenticity of this license, go to www.api.org/compliance.

API spec 5L : 5L-0313 (SSAW)



American Petroleum Institute



Certificate of Authority to use the Official API Monogram
 License Number: **5L-0475** ORIGINAL

The American Petroleum Institute hereby grants to:

P.T. STEEL PIPE INDUSTRY OF INDONESIA (SPINDO) UNIT III
 Jl. Mastrip No. 360 Ds. Warugunung Karangpilang
 Surabaya, Jawa Timur
 Indonesia

the right to use the Official API Monogram™ on manufactured products under the conditions in this official authorization or the American Petroleum Institute website under API Spec Q1™ and API Spec 5L and in accordance with the provisions of the License Agreement.

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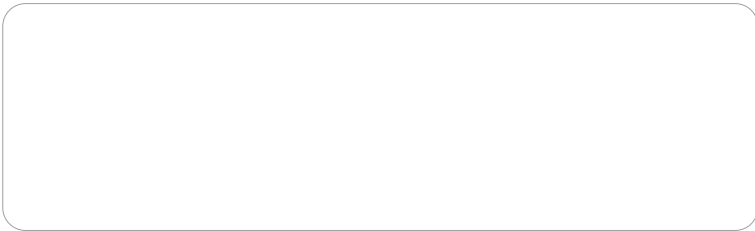
The scope of this license includes the following: **Manufacturer of Line Pipe Plain End at PSL 1; Type of Pipe: HFW / Delivery Condition: N / Highest Grade: X80; Manufacturer of Line Pipe Plain End at PSL 2; Type of Pipe: HFW / Delivery Condition: N / Highest Grade: X52**

QMS Exclusions: Section 7.3, Design and Development

American Petroleum Institute
John Nichols
 Director of Quality Health & Safety

To verify the authenticity of this license, go to www.api.org/compliance.

API spec 5L : 5L-0475 (HFW)



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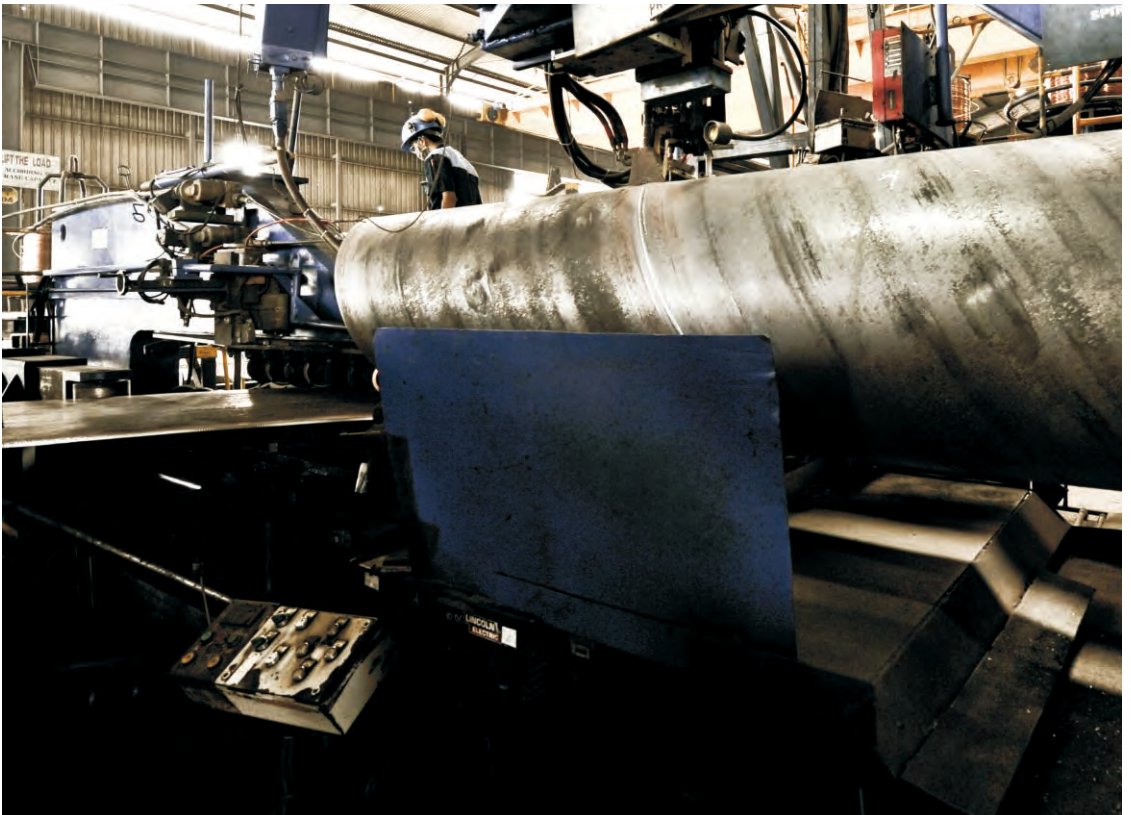
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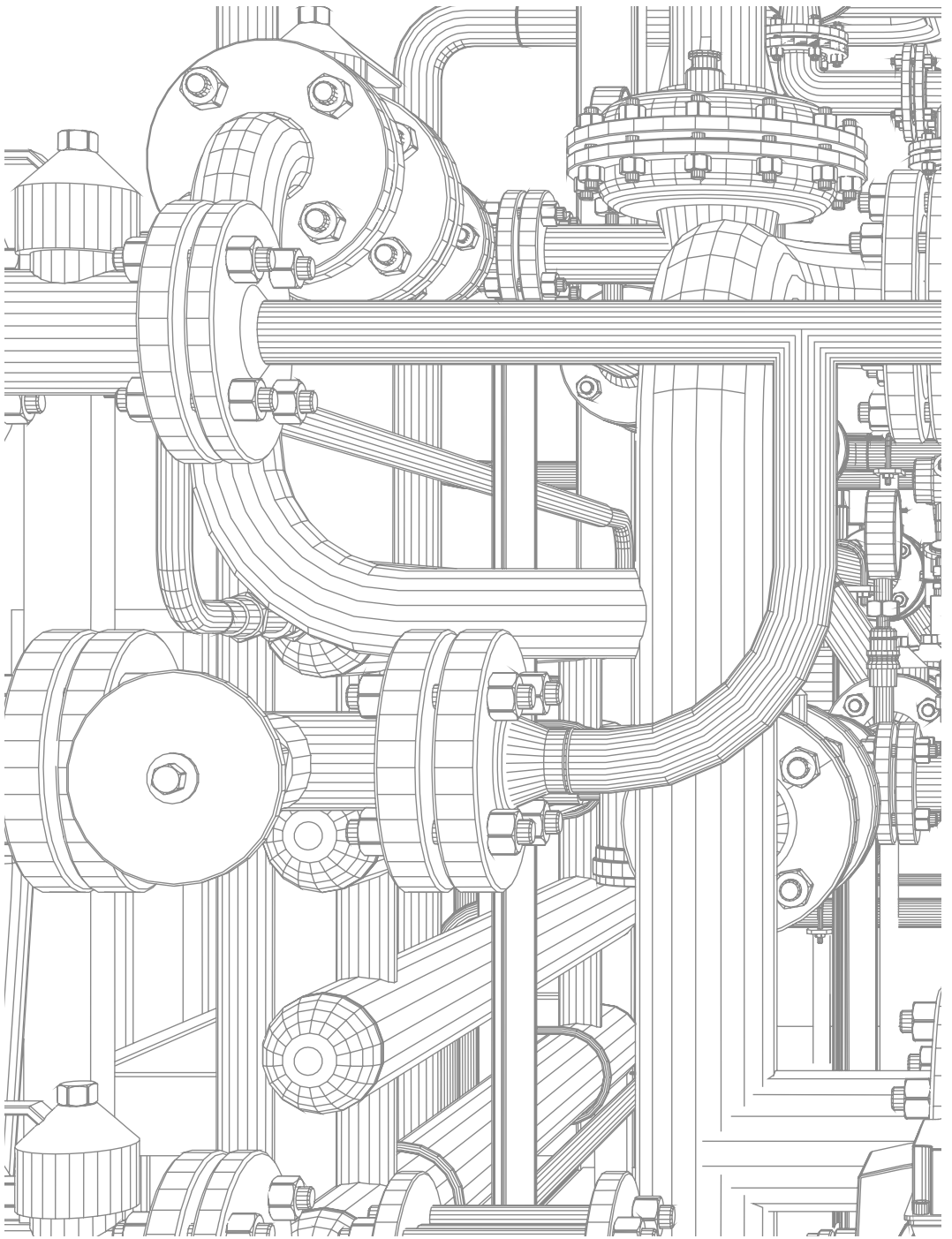


API spec 5L : 5L-0313 (SSAW)
API spec 5L : 5L-0475 (HFW)

www.spindo.com



OUTSIDE DIAMETER		WALL THICKNESS	PLAIN END WEIGHT per UNIT LENGTH	CALCULATED INSIDE DIAMETER	Minimum Test Pressure ^b (Kpa x 100) ^c							
					GRADE							
inch	mm	mm	kg/m	mm		A	B	X42	X46	X52	X56	X60
3½	88.90	4.00	8.37	80.90	Std	112	130	157	171	194	207	207
					Alt	140	163	196	214	242	261	279
		4.40	9.17	80.10	Std	123	143	172	188	207	207	207
					Alt	154	172	215	235	267	287	307
		4.80	9.95	79.30	Std	134	156	188	205	207	207	207
					Alt	168	172	235	257	291	313	335
		5.50	11.31	77.90	Std	154	172	207	207	207	207	207
					Alt	172	172	269	294	333	358	384
4½	114.30	4.40	11.92	105.50	Std	96	111	134	146	166	178	191
					Alt	120	139	167	183	207	223	239
		4.80	12.96	104.70	Std	104	121	146	160	181	195	207
					Alt	130	152	183	200	226	243	261
		5.20	13.99	103.90	Std	113	132	158	173	196	207	207
					Alt	141	164	198	216	245	263	283
		5.60	15.01	103.10	Std	122	142	170	286	207	207	207
					Alt	152	177	213	233	264	284	304
		6.00	16.02	102.30	Std	130	152	183	200	207	207	207
					Alt	163	190	228	250	283	304	326
6¾	168.30	4.40	17.78	159.50	Std	65	76	114	124	141	151	162
					Alt	81	95	114	124	141	151	162
		4.80	19.35	158.70	Std	71	82	124	136	154	165	177
					Alt	89	103	124	136	154	165	177
		5.20	20.91	157.90	Std	77	89	134	147	166	179	192
					Alt	96	112	134	147	166	179	192
		5.60	22.47	157.10	Std	83	96	145	158	179	193	207
					Alt	103	120	145	158	179	193	207
6.40	25.55	155.50	Std	94	110	165	181	205	207	207		
			Alt	118	137	165	181	205	220	236		
7.10	28.22	154.10	Std	105	122	184	201	207	207	207		
			Alt	-	-	-	-	-	-	-		
8¾	219.10	4.80	25.37	209.50	Std	54	63	95	104	118	127	136
					Alt	68	79	95	104	118	127	136
		5.20	27.43	208.70	Std	59	69	103	113	128	137	147
					Alt	74	86	103	113	128	137	147
		5.60	29.48	207.90	Std	63	74	111	122	138	148	159
					Alt	79	92	111	122	138	148	159
		6.40	33.57	206.30	Std	73	84	127	139	157	169	181
					Alt	91	106	127	139	157	169	181
		7.00	36.61	205.10	Std	79	92	139	152	172	185	198
					Alt	99	115	139	152	172	185	198
7.90	41.14	203.30	Std	90	104	157	171	194	207	207		
			Alt	112	130	157	171	194	209	224		
8.20	42.65	202.70	Std	95	108	163	178	202	207	207		
			Alt	116	135	163	178	202	217	232		



SPINDO® MAJOR EXPERIENCE PROJECTS

No.	Customer / Project	OD (inch)	Thickness (mm)	Volume	Spec	Year
1	CHEVRON PASIFIC INDONESIA	3" - 8"	5.49 - 8.18	6.072 ton	API 5L	2011 - 2013
2	PERTAMINA	3" - 6"	5.49 - 7.11	5.263 ton	API 5L	2011 - 2013
3	PERUSAHAAN GAS NEGARA (PGN)	4" & 8"	6.02 - 8.18	1.329 ton	API 5L	2011 - 2014
4	PERTAGAS	8"	8.18	2.891 ton	API 5L	2011
5	VICO INDONESIA	4"	6.02	965 ton	API 5L	2013

OUTSIDE DIAMETER		WALL THICKNESS		WEIGHT		Test Pressure, kPa x 100											
						GRADE A		GRADE B		GRADE							
inch	mm	inch	mm	lb/ft	kg/m	STD	ALT	STD	ALT	X42	X46	X52	X56	X60	X65	X70	X80
6%	168.3	0.280	7.11	18.99	28.22	105	131	122	153	184	201	207	207	207	207	307	352
		0.375	9.53	25.05	37.20	140	175	163	193	207	207	207	207	207	207	207	412
8%	219.1	0.250	6.35	22.35	33.31	72	90	84	105	126	138	156	167	180	195	211	241
		0.375	9.53	33.03	49.23	108	135	126	157	189	207	207	207	207	207	207	316
10%	273.1	0.250	6.35	28.03	41.77	58	72	6	8	114	125	142	152	163	177	192	219
		0.365	9.27	40.47	60.32	84	105	99	123	17	183	207	207	207	207	207	280
12%	323.8	0.250	6.35	33.36	49.71	49	61	56	71	96	105	119	129	138	150	162	185
		0.375	9.53	49.53	73.82	73	91	85	106	145	158	179	193	207	207	243	278
14	355.6	0.250	6.35	36.70	54.69	44	55	52	65	88	96	109	117	125	136	147	168
		0.375	9.53	54.54	81.29	66	83	77	97	12	144	163	176	188	204	221	253
		0.438	11.13	63.41	94.51	78	97	90	113	154	169	191	205	207	207	258	295
16	406.4	0.250	6.35	42.03	62.64	39	48	45	56	77	84	95	103	110	119	129	147
		0.375	9.53	62.55	93.22	58	72	68	85	115	126	143	154	165	178	193	221
		0.500	12.70	82.73	123.30	77	97	90	113	154	168	190	205	207	207	258	295
18	457.2	0.250	6.35	47.37	70.60	34	43	40	50	68	75	85	91	98	105	115	131
		0.375	9.53	70.56	105.15	52	65	61	75	103	112	127	136	146	158	172	197
		0.500	12.70	93.41	139.21	69	86	81	101	136	150	169	182	195	207	229	262
20	508	0.250	6.35	52.71	78.55	31	39	36	45	65	72	81	87	93	101	103	118
		0.375	9.53	78.56	117.09	47	58	54	68	98	107	121	130	139	151	155	177
		0.500	12.70	104.08	155.12	62	77	72	90	130	143	161	174	186	202	206	236
22	558.8	0.250	6.35	58.05	86.51	28	35	33	41	59	65	73	79	85	92	99	114
		0.375	9.53	86.57	129.02	42	53	5	61	89	97	110	119	127	137	149	170
		0.500	12.70	114.76	171.03	56	70	65	82	119	130	147	158	169	172	198	227
24	609.6	0.250	6.35	63.39	94.46	26	32	30	38	54	59	68	72	77	84	91	104
		0.375	9.53	94.58	140.95	39	48	45	56	81	89	101	109	116	126	136	156
		0.500	12.70	125.44	186.94	52	65	61	75	109	119	134	145	155	158	182	208
26	660.4	0.250	6.35	68.72	102.42	24	30	28	34	50	55	62	67	72	77	84	96
		0.375	9.53	102.58	152.88	36	45	42	52	75	82	93	100	107	116	126	144
		0.500	12.70	136.11	202.85	48	60	56	70	100	110	124	134	138	138	168	192
28	711.2	0.250	6.35	74.06	110.37	22	28	25	32	47	51	58	62	66	72	78	89
		0.375	9.53	110.59	164.81	33	41	39	48	70	76	86	93	100	108	117	134
		0.500	12.70	146.79	218.76	44	55	52	65	93	102	115	124	133	144	156	178
30	762	0.250	6.35	79.40	118.33	21	25	24	30	43	48	54	58	62	68	73	83
		0.375	9.53	118.60	176.75	31	39	36	45	65	72	81	87	93	101	109	125
		0.500	12.70	157.46	234.67	41	52	48	61	87	95	107	116	124	134	146	167
		0.625	15.88	195.99	292.09	52	65	61	75	109	119	134	145	155	168	182	208
32	812.8	0.250	6.35	84.74	126.28	19	24	23	28	41	45	50	54	58	63	68	78
		0.375	9.53	126.60	188.68	29	37	34	43	61	67	76	81	88	94	102	117
		0.500	12.70	168.14	250.58	39	48	45	56	81	89	101	109	116	126	136	156
		0.625	15.88	209.34	311.98	48	61	56	71	102	112	126	136	145	158	171	195

OUTSIDE DIAMETER		WALL THICKNESS		WEIGHT		Test Pressure, kPa x 100											
						GRADE A		GRADE B		GRADE							
inch	mm	inch	mm	lb/ft	kg/m	STD	ALT	STD	ALT	X42	X46	X52	X56	X60	X65	X70	X80
34	863.6	0.250	6.35	90.07	134.24	18	23	21	27	39	42	48	51	54	59	64	73
		0.375	9.53	134.61	200.61	28	34	32	40	57	63	71	76	82	89	96	110
		0.500	12.70	178.81	266.49	37	45	42	53	76	84	95	102	110	119	128	147
		0.625	15.88	222.68	331.87	45	57	53	67	96	105	119	127	137	148	161	184
36	914.4	0.250	6.35	95.41	142.19	17	21	2	25	36	40	45	48	52	56	61	69
		0.375	9.53	142.62	212.54	26	32	30	38	54	59	68	72	77	84	91	104
		0.500	12.70	189.49	282.40	34	42	40	50	72	79	90	9	103	112	121	139
		0.625	15.88	236.03	351.75	43	54	50	63	90	99	112	121	130	140	152	173
38	965.2	0.375	9.53	150.62	224.48	25	30	28	36	52	56	63	68	74	79	86	99
		0.500	12.70	200.16	298.31	32	41	38	48	68	75	85	92	98	106	115	131
		0.625	15.88	249.37	371.64	41	51	48	59	85	94	105	107	123	132	144	164
40	1016	0.375	9.53	158.63	236.41	23	29	27	34	49	54	61	65	70	76	82	94
		0.500	12.70	210.84	314.22	31	39	36	45	65	72	81	87	93	101	109	125
		0.625	15.88	262.71	391.53	39	48	45	56	81	89	101	109	116	136	136	156
		0.688	17.48	288.73	430.30	43	53	50	62	90	98	111	119	128	138	150	172
		0.750	19.05	314.22	468.28	47	58	54	68	98	107	121	130	139	151	164	187
42	1066.8	0.375	9.53	166.64	248.34	22	28	26	32	47	51	58	62	66	72	78	89
		0.500	12.70	221.51	330.13	30	37	34	43	62	68	76	83	89	96	104	119
		0.625	15.88	276.06	411.41	37	46	43	54	77	85	96	103	111	120	130	149
		0.688	17.48	303.42	452.19	41	51	48	59	85	94	105	114	122	132	143	164
		0.750	19.05	330.27	492.20	44	55	52	65	93	102	115	124	133	144	156	178
44	1117.6	0.375	9.53	174.64	260.27	21	26	25	31	44	49	55	59	63	69	74	85
		0.500	12.70	232.19	346.03	28	35	33	41	59	65	73	79	85	92	99	114
		0.625	15.88	289.40	431.30	35	44	41	52	74	81	92	99	105	114	124	142
		0.688	17.48	318.11	474.09	39	48	45	56	81	89	101	109	116	126	137	156
		0.750	19.05	346.28	516.07	42	53	50	61	89	97	110	119	127	137	149	170
46	1168.4	0.375	9.53	182.65	272.20	20	25	23	30	43	47	52	56	61	65	71	81
		0.500	12.70	242.86	361.94	27	34	32	39	56	62	70	76	81	88	95	109
		0.625	15.88	302.75	451.19	34	42	39	49	71	77	88	94	101	101	119	136
		0.688	17.48	332.80	495.98	37	46	43	54	78	85	96	104	112	121	131	149
		0.750	19.05	362.30	539.93	41	50	47	59	85	93	105	113	121	132	142	163
48	1219.2	0.375	9.53	190.66	284.14	19	24	23	28	41	45	50	54	58	63	68	78
		0.500	12.70	253.54	377.85	26	32	30	38	54	59	68	72	77	84	91	104
		0.625	15.88	316.09	471.07	32	41	38	47	68	74	84	90	97	105	114	130
		0.688	17.48	347.49	517.87	36	44	41	52	74	82	92	99	107	116	125	143
		0.750	19.05	378.31	563.80	39	48	45	56	81	89	101	109	116	126	136	156
52	1320.8	0.375	9.53	206.67	308.00	18	22	21	26	38	41	47	50	54	58	63	72
		0.500	12.70	274.89	409.67	24	30	28	34	50	55	62	67	72	78	84	96
		0.625	15.88	342.78	510.85	30	37	34	43	63	69	78	83	90	97	105	120
		0.688	17.48	376.87	561.65	33	41	39	48	69	76	85	92	99	107	116	132
		0.750	19.05	410.33	611.53	36	45	42	52	75	82	93	100	107	116	126	144

GRADE		CHEMICAL COMPOSITIONS (%)				MECHANICAL PROPERTIES			ON LINE TEST	
		C Max	Mn Max	P Max	S Max	OTHERS	Yield Strength MPa	Tensile Strength MPa	ELONGATION (%) Min	HYDROSTATIC
A	PSL1	0.22	0.90	0.030	0.030	-	207	331	$P = \frac{2000 S T}{D}$ <p>A^{0.2} U^{0.9}</p> <p>e = 1,944</p> <p>A = Specimen area (mm²)</p> <p>U = Minimum Ultimate Tensile Strength (MPa)</p> <p>e = Elongation in 50.8 mm</p> <p>P = Hydrostatic test pressure (kPa)</p> <p>S = Hoop stress in MPa</p> <p>T = Wall thickness (mm)</p> <p>D = Outside diameter (mm)</p>	
B	PSL1	0.26	1.20	0.030	0.030	Ti,V,Nb0.15% max	241	414		
	PSL2	0.22	1.20	0.025	0.015		241-448	414-758		
X42	PSL1	0.26	1.30	0.030	0.030	Ti,V,Nb0.15% max	290	414		
	PSL2	0.22	1.30	0.025	0.015		290-496	414-758		
X46	PSL1	0.26	1.40	0.030	0.030	Ti,V,Nb0.15% max	317	434		
	PSL2	0.22	1.40	0.025	0.015		317-524	434-758		
X52	PSL1	0.26	1.40	0.030	0.030	Ti,V,Nb0.15% max	359	455		
	PSL2	0.22	1.40	0.025	0.015		359-531	455-758		
X56	PSL1	0.26	1.40	0.030	0.030	Ti,V,Nb0.15% max	386	490		
	PSL2	0.22	1.40	0.025	0.015		386-544	490-758		
X60	PSL1	0.26	1.40	0.030	0.030	Ti,V,Nb0.15% max	414	517		
	PSL2	0.22	1.40	0.025	0.015		414-565	517-758		
X65	PSL1	0.26	1.45	0.030	0.030	Ti,V,Nb0.15% max	448	531		
	PSL2	0.22	1.45	0.025	0.015		448-600	531-758		
X70	PSL1	0.26	1.65	0.030	0.030	Ti,V,Nb0.15% max	483	565		
	PSL2	0.22	1.65	0.025	0.015		483-621	565-758		
X80	PSL2	0.22	1.85	0.025	0.015	Ti,V,Nb0.15% max	552	621		

SPINDO® MAJOR EXPERIENCE PROJECTS

No.	CUSTOMER / PROJECT	OD (inch)	THICKNESS (mm)	VOLUME	SPEC.	YEAR
1	PERUSAHAAN GAS NEGARA (PGN)	24	14.3	18.883 ton	API 5L Gr X-65 PSL-2	2013
2	PERTAGAS	24	12.7	4.137 ton	API 5L Gr X-65 PSL-2	2013
3	SENORO GAS	30	17.5	1.203 ton	API 5L Gr X-65 PSL-2	2013
4	TOTAL E & P INDONESIA	14	9.52	496 ton	API 5L Gr X-60	2012
5	CHEVRON PASIFIC INDONESIA	30 & 36	6.35 & 7.92	362 ton	API 5L Gr B	2012

OUTSIDE DIAMETER		WALL THICKNESS		WEIGHT		Test Pressure, kPa x 100											
						GRADE A		GRADE B		GRADE							
inch	mm	inch	mm	lb/ft	kg/m	STD	ALT	STD	ALT	X42	X46	X52	X56	X60	X65	X70	X80
56	1422.4	0.375	9.53	222.68	331.87	17	21	19	24	35	38	43	46	50	54	58	67
		0.500	12.70	296.24	441.49	22	28	26	32	47	51	58	62	66	72	78	89
		0.625	15.88	369.47	550.62	28	34	32	41	58	63	72	77	83	90	97	112
		0.688	17.48	406.25	605.44	30	38	36	45	64	70	79	85	92	99	107	123
		0.750	19.05	442.36	659.26	33	41	39	48	70	76	86	93	100	108	117	134
60	1524.0	0.375	9.53	238.69	355.73	16	19	18	23	32	36	41	43	47	50	55	62
		0.500	12.70	317.59	473.31	21	26	24	30	43	48	54	58	62	68	73	83
		0.625	15.88	396.16	590.40	26	32	30	38	54	59	68	72	78	84	91	104
		0.688	17.48	435.63	649.22	28	36	33	41	60	65	74	80	85	92	100	115
		0.750	19.05	474.39	706.98	31	39	37	45	65	71	81	87	93	101	109	125
64	1625.6	0.375	9.53	254.71	379.59	14	18	17	21	30	34	38	41	43	48	51	59
		0.500	12.70	338.94	505.13	19	24	23	28	41	45	50	54	58	63	68	78
		0.625	15.88	422.84	630.17	24	30	28	35	51	56	63	68	72	79	85	98
		0.688	17.48	465.00	693.00	27	33	31	39	56	61	70	74	80	87	94	107
		0.750	19.05	506.41	754.71	29	37	34	43	61	67	76	81	88	94	102	117
68	1727.2	0.500	12.70	360.29	536.95	18	23	21	27	39	42	48	51	54	59	64	73
		0.625	15.88	449.53	669.95	23	28	27	33	48	52	59	64	68	74	80	92
		0.688	17.48	494.38	736.79	25	32	29	37	52	58	65	70	75	81	88	101
		0.750	19.05	538.44	802.44	28	34	32	40	47	63	71	76	82	89	96	110
72	1828.8	0.500	12.70	381.64	568.77	17	21	20	25	37	39	45	48	52	56	61	69
		0.625	15.88	476.22	709.72	21	27	25	32	45	50	56	60	65	70	76	87
		0.688	17.48	523.76	780.57	23	30	28	34	50	54	61	66	71	77	83	95
76	1930.4	0.500	12.70	403.00	600.59	17	21	19	24	34	37	43	45	49	53	57	66
		0.625	15.88	502.91	749.49	21	25	24	30	43	47	53	57	61	66	72	82
		0.688	17.48	553.14	824.35	23	28	26	33	47	52	59	63	68	73	79	90
		0.750	19.05	602.49	897.90	25	30	28	36	52	56	63	68	74	79	86	99
80	2032.0	0.625	15.88	529.60	789.27	19	24	23	28	41	45	50	54	58	63	68	78
		0.688	17.48	582.52	868.14	21	27	25	31	45	49	55	60	64	70	75	86
		0.750	19.05	634.52	945.63	23	29	27	34	49	54	61	65	70	76	82	94