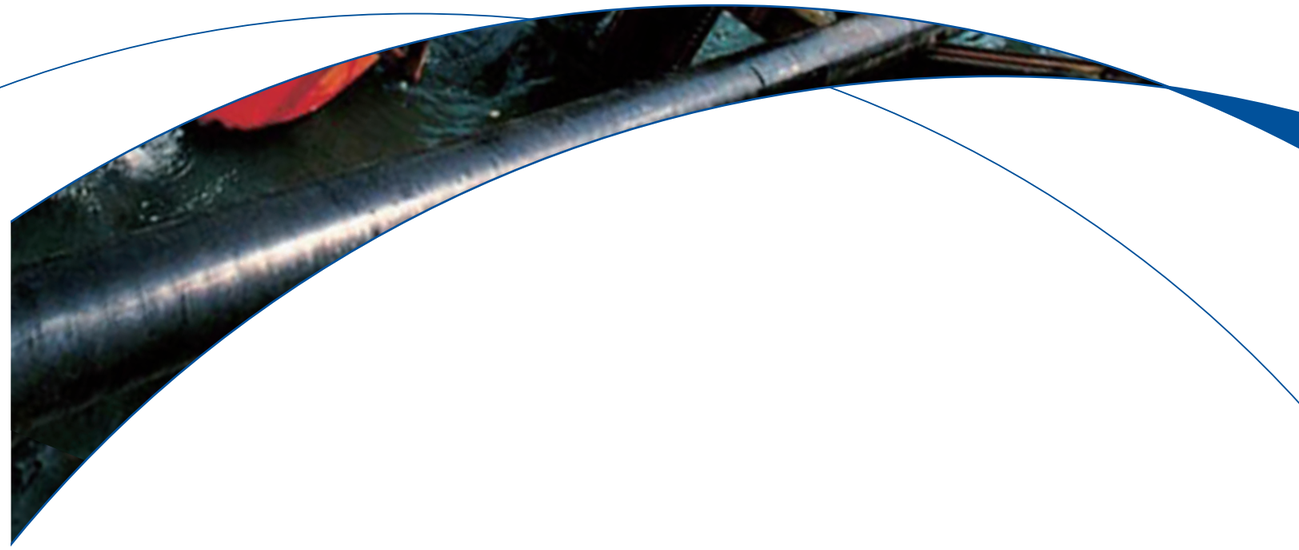
Tianjin Pipe Corporation

Seamless pipe for

Pipeline and Processing



www.tpcointernational.com

Tianjin Pipe International Economic & Trading Corporation
Add.: No.396, Jintang Road, Dongli District, Tianjin, P.R. China
Tel.: +8622 6628 0988
Fax: +8622 6628 2951
P.C.: 300301

2022 Version 01

Tianjin Pipe Corporation

TPCO

TPCO

Onshore Service

Offshore/Subsea Service

Sour Service

High Temperature Steam Service

Seamless Line Pipe for Onshore & Offshore/Subsea Service

TPCO produces both seamless (SMLS) and ERW (HFI/HFW) line pipes.
SMLS: O.D. from 2” to 28”, W.T. from 4.0mm to 65.0mm
ERW: O.D. from 5” to 26”, W.T. from 3.2mm to 22.2mm

TPCO manufactures full range of line pipes of superior quality, including those of high strength, high toughness, homogeneous material and corrosion resistance, for various services such as onshore, offshore, shallow water and deep water, non-sour and sour services.
The highest grades seamless line pipe TPCO can supply include:
- API X100Q for oil, gas, water and slurry services;
- X70QS for sour services;
- DNV 485 SFPDU under DNV-OS-F101 specification for subsea applications.

(S for Sour service, F for Fracture arrest, P for Plastic deformation, D for Dimension, U for high utilization)

Standard Grade & Application

Standard	Grade	Application
API SPEC 5L (PSL1, PSL2)	Up to X100 Up to L690	Transmission of petroleum & natural gas
ASTM A53/ASTM SA53 ASTM A106/ASTM SA106	A, B A, B, C	Transmission of low-pressure water, coal gas, air, oil & steam
DIN 1629	ST37.0, ST44.0, ST52.0	Regular line pipe
JIS G3454	STPG370, STPG410	Pressure pipe,100kg/m² (-10˚C~350˚C)
JIS G3455	STPG370, STPG410, STPG480	High pressure pipe, 100-1000kg/m² (-10˚C~350˚C)
JIS G3456	STPG370, STPG410, STPG480	High pressure pipe, 350˚C~400˚C
CAN/CSA Z245.1	172, 207, 241, 291, 317, 259, 414, 448, 483, 550	Transmission of oil & natural gas
ASTM A333	Gr.3,Gr.6,Gr.7,Gr.8,Gr.10	Low temperature
DNV-OS-F101	Up to 485	Transmission of petroleum & natural gas offshore

Note: TPCO can also supply the products according to customer Specification.

Grade Availability

Service	B	X42	X46	X52	X56	X60	X65	X70	X80	X90	X100	Strandard
	245	290	320	360	390	415	450	485	555	620	690	
Onshore	R,N,Q	R,N,Q	N,Q	N,Q	N,Q	N,Q	Q	Q	Q	Q	Q	API SPEC 5L
Sour(S)	N,Q	N,Q	N,Q	N,Q	Q	Q	Q	Q	/	/	/	API SPEC 5L
Offshore(O)	N,Q	N,Q	N,Q	N,Q	Q	Q	Q	Q	Q	Q	Q	API SPEC 5L
Plastic(P)	N,Q	N,Q	N,Q	N,Q	Q	Q	Q	Q	Q	/	/	API SPEC 5L
SFPDU	N,Q	N,Q	N,Q	N,Q	Q	Q	Q	Q	Q	/	/	DNV-OS -F101

Dimensions

To meet strict dimensional tolerances for offshore/subsea services, TPCO can supply products to API, ISO, DNV standards, specifications of contractors, clients and project-specific. For references, dimensional tolerances listed in the following tables are for standard sizes of pipes.

Diameter and Out of roundness tolerances for offshore/Subsea line pipe

Diameter mm(in)	Diameter Tolerance mm(in)		Out of Roundness Tolerance mm(in)	
	Pipe body	Pipe end(I.D.)	Pipe body	Pipe end(I.D.)
<60.3(2.375)	±0.5mm or ±0.0075D whichever is greater	±0.5mm or±0.005D whichever is greater but max is ±1.6(0.063)	0.9(0.036)	0.6(0.024)
≥60.3(2.375) to≤610(24.00)	±0.5mm or ±0.0075D whichever is greater	±0.5mm or±0.005D whichever is greater but max is ±1.6(0.063)	≤0.015D	≤0.01D

Note: stricter tolerances can be guaranteed based on specific agreement with customer.

Wall thickness, Straightness and length tolerances for offshore/Subsea line pipe

Wall Thickness t mm(in)	Tolerance mm(in)
< 4.0(0.157)	+0.6(0.024),-0.5(0.020)
4.0(0.157)≤t<10(0.394)	+0.150t , -0.125t
10.0(0.394)≤t<25.0(0.984)	±0.125t
t≥25(0.984)	+3.7(0.146)or+0.1t , which is larger , -3.0(0.120)or-0.1t , which is larger
Straightness, max for full length of pipe	≤0.15%L
Straightness, max deviation for pipe end	≤3mm/m
Length	±200mm for general, ±25.4mm for special

Note: stricter tolerances can be guaranteed based on specific agreement with customer.

Mechanical Properties (PSL 2, API Spec 5L/ ISO 3183)

Onshore Service

Grade	Yield Strength Rt0.5(MPa)		Tensile Strength Rm(MPa)		Ratio Rt/Rm (%)	Hardness HV10	Full Size CVN Absorbed Energy Ak J(0˚C,VT)
	min.	max.	min.	max.	max.	max.	min.
L245N/BN L245Q/BQ	245	450	415	655	0.85	250	30
L290N/X42N L290Q/X42Q	290	495	415	655	0.85	250	32
L320N/X46N L320Q/X46Q	320	530	435	655	0.85	250	36
L360N/X52N L360/X52Q	360	530	460	760	0.85	250	42
L390N/X56N L390Q/X56Q	390	545	490	760	0.85	250	42
L415N/X60N L415Q/X60Q	415	565	520	760	0.90	270	50
L450Q/X65Q	450	600	535	760	0.90	270	50
L485Q/X70Q	485	635	570	760	0.90	270	50
L555Q/X80Q	555	705	625	825	0.90	300	60
L625Q/X90Q	625	775	695	915	0.93	300	70
L690Q/X100Q(1)	690	840	760	990	0.93	300	80

(1) : For Grade L690Q or X100Q, Rp0.2 shall be applied.

Dimensions

Offshore/Subsea Services

Grade	Yield Strength Rt0.5(MPa)		Tensile Strength Rm(MPa)		Ratio Rt/Rm (%)	Hardness HV10	Full Size CVN Absorbed Energy Ak J(0°C,VT)
	min.	max.	min.	max.	max.	max.	min.
L245NO/BNO L245QO/BQO	245	450	415	655	0.90	220	30
L290NO/X42NO L290QO/X42QO	290	495	415	655	0.90	220	32
L320NO/X46NO L320QO/X46QO	320	520	435	655	0.90	250	36
L360NO/X52NO L360QO/X52QO	360	525	460	760	0.90	250	42
L390QO/X56QO	390	540	490	760	0.90	250	42
L415QO/X60QO	415	565	520	760	0.93	250	50
L450QO/X65QO	450	570	535	760	0.93	250	50
L485QO/X70QO	485	605	570	760	0.93	270	50
L555QO/X80QO	555	675	625	825	0.93	270	60
L625QO/X90QO	625	745	695	895	0.93	300	70
L690QO/X100QO(1)	690	810	760	960	0.93	300	80

Note:(1)For Grade L690QO or X100QO, Rp0.2 shall be applied.
The detail value can according to the order required.

Onshore and Offshore/Subsea for Sour Services

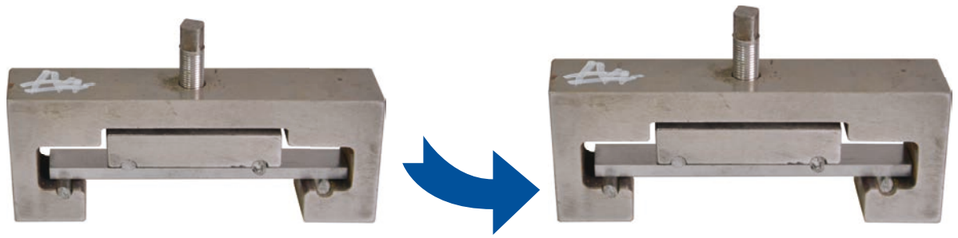
Grade	Yield Strength Rt0.5 (MPa)		Tensile Strength Rm (MPa)		Ratio Rt/Rm (%)	Hardness HV10	Full Size CVN Absorbed Energy Ak J(0°C,VT)
	min.	max.	min.	max.	max.	max.	min.
L245NS or BNS L245QS or BQS L245NO/L245NS or BNO/BNS L245QO/L245QS or BQO/BQS	245	450	415	655	0.85	220	30
L290NS or X42NS L290QS or X42QS L290NO/L290NS or X42NO/X42NS L290QO/L290QS or X42QO/X42QS	290	495	415	655	0.85	220	32
L320NS or X46NS L320QS or X46QS L320NO/L320NS or X46NO/X46NS L320QO/L320QS or X46QO/X46QS	320	520	435	655	0.85	220	36
L360NS or X52NS L360QS or X52QS L360NO/L360NS or X52NO/X52NS L360QO/L360QS or X52QO/X52QS	360	525	460	760	0.85	230	42
L390QS or X56QS L390QO/L390QS or X56QO/X56QS	390	540	490	760	0.85	240	42
L415QS or X60QS L415QO/L415QS or X60QO/X60QS	415	565	520	760	0.93	250	50
L450QS or X65QS L450QO/L450QS or X65QO/X65QS	450	570	535	760	0.93	250	50
L485QS or X70QS L485QO/L485QS or X70QO/X70QS	485	605	570	760	0.93	250	50

Sour Service Application

Resists Hydrogen Induced Cracking (HIC) and Sulphide Stress Corrosion Cracking (SSCC). The HIC test has a stringent criteria of 5% Crack Length Ratio (CLR) and 3% Crack Thickness Ratio (CTR).

Item	Criteria of Acceptauce	Test Method
SSCC	Based on ASTM G39, four-point bending, NACE TM 0177 solution A, 72%*SMYS, test time≥720h	NACE TM 0177
HIC	Solution A, CSR≤2%, CLR≤5%, CTR≤3%	NACE TM 0284

The product is based on NACE MR 0175/ISO 15156 to evaluate the properties of corrosion resistance.

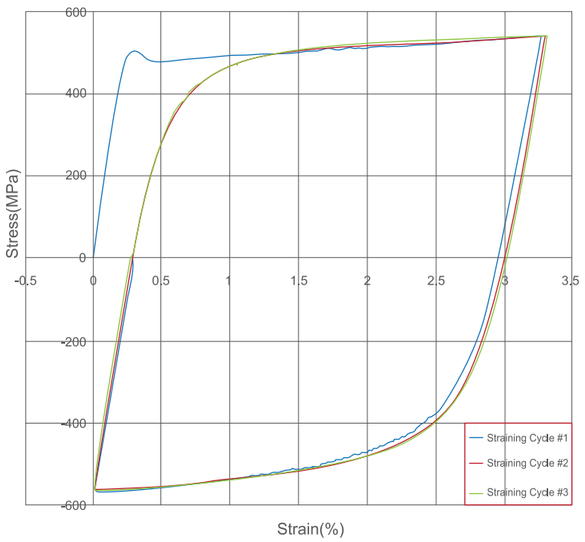


Subsea Reeling Linepipe

- Reeling lay is a rapid and efficient method to lay the linepipe for offshore or subsea project.
- This laying method requires the pipe body shall have excellent mechanical properties, weldability, exact dimension,and corrosion resistance performance (if required).
- TPCO had passed the reeling test and qulification by Technip on different size of X65Q Grade.
- TPCO line pipes are successfuly reel-laid in North Sea.

Sour Service Application

415SPD Offshore Project



3%T+C Curve

DNV Test Report

DNV·GL

APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No: AMHM000000DU
Revision No: 1

This is to certify:
That
Tianjin Pipe Corporation
No. 396 Jintang Road, Dongli District, Tianjin, China

is an approved manufacturer of
Steel Pipes and Fittings

in accordance with
DNV GL rules for classification – Ships
DNVGL-OS-B101 – Metallic materials

and the following particulars:

Product	**Pipes**
Application area	**Pipes for pressure systems**
Steel type	**Carbon and carbon-manganese, Alloy**
Manufacturing method	**Seamless**
Max. outer diameter	**See page 2**
Max. wall thickness	**See page 2**
Heat treatment condition	**See page 2**
Additional approval conditions	**See page 2**

Manufacturer(s) approved by this certificate is/are accepted to deliver according to DNV GL, DNV and GL rules. Materials to be applied to DNV GL classed object shall fulfill the material requirements in the applicable DNV GL class rules.

Issued at **Hamburg** on **2019-11-22**

This Certificate is valid until **2022-12-31**.
DNV GL local station: **Tianjin**

Approval Engineer: **Christian Wildhagen**

for **DNV GL**
Digitally Signed By: Roehr, Stefan
Location: DNV GL Hamburg, Germany
Signing Date: 09.07.2020 , on behalf of

Thorsten Lohmann
Head of Section

Form code: AM 311 Revision: 2018-03 www.dnvgl.com Page 1 of 2

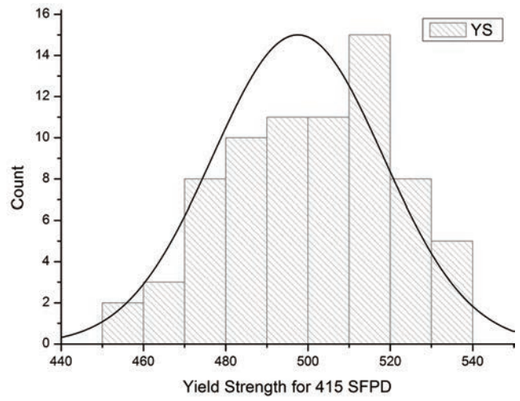
© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

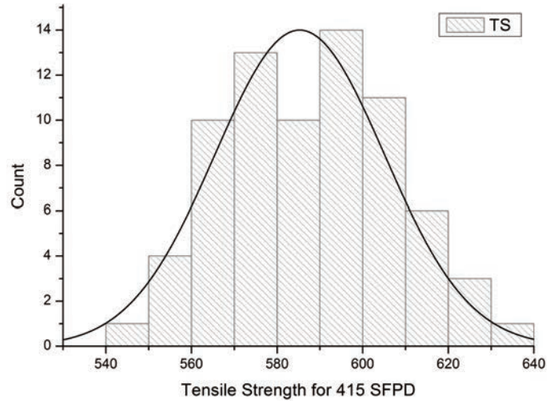
3%T+C Test Report

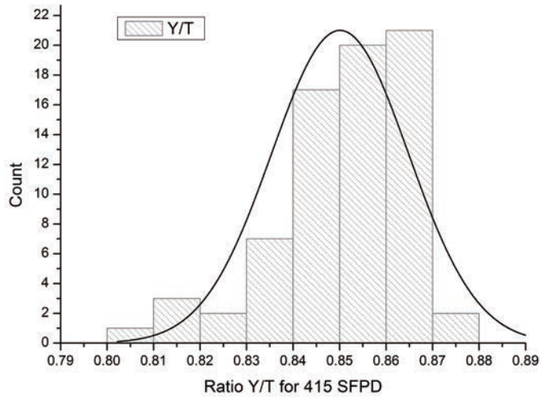
3 times for 3% T+C straining and ageing test results

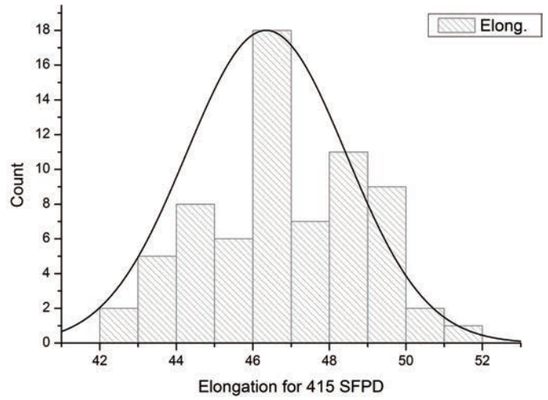
Size	Tensile				VL, Full Size,-28°C(J)				Hardness (HV10)				
	YS (MPa)	TS (MPa)	A (%)	ψ (%)	1	2	3	Aver.	1	2	3	4	Aver.
219.1×14.3	435	568	27	82	294	298	298	297	199	200	200	200	200
219.1×15.9	450	568	23	81	298	296	298	297	203	200	203	200	202
219.1×18.3	452	552	24	81	296	294	298	296	201	203	200	197	200
406.4×22.2	427	545	26	81	258	267	244	256	195	196	194	198	196
251.3×32.0	436	545	26	71	247	270	231	249	194	194	196	192	194
406.4×25.4	443	559	26	80	292	291	295	293	205	206	204	200	204
406.4×28.6	456	578	25	77	292	292	293	292	204	202	199	200	201

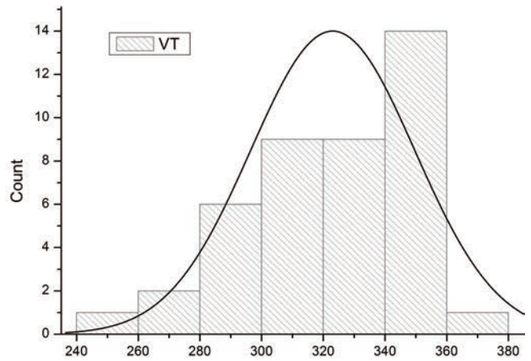
Manufacturing Statistics

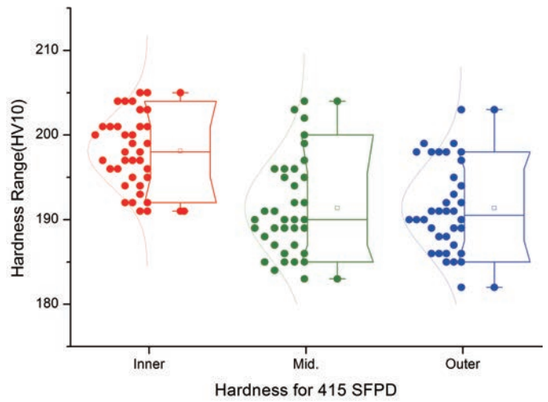












Product Supply References

TPCO linepipe products have been exported to more than 100 countries and regions in various projects of refineries and long distance pipe lines.

Onshore High grade supply records (Min. & Max. W.T.)

O.D. (mm)	W.T. (mm)	Grade	End User
88.9	8	L450Q	Changqing, CNPC
88.9	17.0	X65QS	ADCO
114.3	4.78	X65Q	Timimoun, Algeria
114.3	17.48	X60QS	SAUDI ARAMCO
168.3	5.16	X65Q	Timimoun, Algeria
168.3	18.26	X70QS	CNOOD / Nigeria
193.7	17.5	X100Q	ZMPC
219.1	6.35	X60Q	Timimoun, Algeria
219.1	25.4	X70Q	Groupement Berkine, Algeria
219.1	39.63	X65Q	SONATRACH
273.1	6.40	X65Q	KOC
273.05	21.44	X80Q	Shanghai Waigaoqiao Shipping
273.1	40.0	X65Q	SONATRACH
323.8	7.14	X65Q	Timimoun, Algeria
323.85	28.58	X80Q	Shanghai Waigaoqiao Shipping
323.9	40.0	X65Q	SONATRACH
406.4	9.53	X70Q	Cosider
406.4	53.5	X70Q	SONATRACH
508	10.31	X70Q	Cosider
508	46.5	X65Q	SONATRACH
609.6	9.53	X60Q	SAUDI ARAMCO
609.6	24.61	X60Q	SAUDI ARAMCO

Offshore/Subsea High grade supply records

O.D. (mm)	W.T. (mm)	Grade	End User
406.4	11.1	X60QS/X60QO	DUBAI PETROLEUM
355.6	20.6	X60QS/X60QO	DUBAI PETROLEUM
323.9	19.1	X60QS/X60QO	DUBAI PETROLEUM
323.9	27	X60QS/X60QO	DUBAI PETROLEUM
219.1	15.9	DNV SMLS 415SPDF	Maersk Oil/ Rolf Replacement Project North Sea
251.3	32	DNV SMLS 415SPD	Maersk Oil/ Tyra South East Project, North Sea
406.4	22.2	DNV SMLS 415SPD	Maersk Oil/ Tyra South East Project, North Sea
406.4	28.6	DNV SMLS 415SPD	Maersk Oil/ Tyra South East Project, North Sea
219.1	15.9	DNV SMLS 415SPD	Maersk Oil/ Tyra South East Project, North Sea
168.3	17.5	DNV SMLS 415SD	Maersk Oil/ Valdemar Roar North Sea
219.1	15.9	DNV SMLS 415SD	Maersk Oil/ Valdemar Roar North Sea
219.1	18.3	DNV SMLS 415SD	Maersk Oil/ Valdemar Roar North Sea
252.5	35	DNV SMLS 415SD	Maersk Oil/ Valdemar Roar North Sea
406.4	12.7	X65QO	Mobile Nigeria
406.4	20.6	X65QO	Mobile Nigeria
323.85	11.13	X65QO	Mobile Nigeria
323.85	18.7	X65QO	Mobile Nigeria
355.6	15.9	X65QS/X65QO	PTTEP/ZAWTIKA PHASE 1B
355.6	17.5	X65QS/X65QO	PTTEP/ZAWTIKA PHASE 1B
406.4	14.27	X65QO	Shell Nigeria
406.4	10.5	X65QO	Shell Nigeria
219.1	14.3	X52QO	Shell Nigeria
406.4	12.7	X65QO	SPDC, Nigeria
168.3	12.7	X52QO	SPDC, Nigeria
323.9	15.9	X60QOS	CNOOC CACT/HuiZhou19-1/19-2
219.1	9.5	X65QO	CNOOC/ SuiZhou36-1/LiaoDong5-2
406.4	11.1	X65QO	CNOOC/ SuiZhou36-1/LiaoDong5-2
406.4	17.5	X65QOS	CNOOC/ WeiZhou12-1
323.9	12.7	X65QOS	CNOOC/PanYu4-5
508	31.8	X65QS/X65QO	CNOOC/Lingshui 25-1
508	34.9	X65QS/X65QO	CNOOC/Lingshui 25-1
219.1	25.4	X65QS/X65QO	CNOOC/Bozhong 19-1
273.1	17.5	X65QO	CNOOC/Bozhong 19-1

Offshore/Subsea High grade supply records(cont.)

O.D. (mm)	W.T. (mm)	Grade	End User
273.1	19.1	X65QO	CNOOCLiuhua 16-2
298	32.55	X65QO	CNOOCLiuhua 16-2
355.6	19.1	X65QO	CNOOCLiuhua 16-2
365	23.8	X65QO	CNOOCLiuhua 16-2
377	29.8	X65QO	CNOOCLiuhua 16-2
168.3	11	X65QO	Husky/CNOOC Liuhua 29-1
323.9	19.1	X65QO	Husky/CNOOC
219.1	27	X65QO	Liuhua 29-1
406.4	22.23	X65QS/X65QO	SAUDI ARAMCO
406.4	17.48	X60QS/X60QO	SAUDI ARAMCO
406.4	20.62	X60QS/X60QO	SAUDI ARAMCO
323.9	12.7	X60QS/X60QO	SAUDI ARAMCO
406.4	15.88	X60QS/X60QO	SAUDI ARAMCO
168.3	12.7	X65QS/X65QO	SAUDI ARAMCO
323.9	15.88	X65QS/X65QO	SAUDI ARAMCO
114.3	17.48	X65QS	SAUDI ARAMCO
219.1	12.7	X65QO	CNOOC/SuiZhong-Two
168.3	14.3	X65QO	CNOOC/WenChang8-3
219.1	14.3	X65QO	CNOOC/WenChang8-3
323.9	12.7	X65QO	CNOOC/WenChang8-3
219	12	X60QO	SINOPEC/Shengli Oil Field
406.4	19.1	X60QO	SINOPEC/Shengli Oil Field
406.4	22.2	X56QO	SINOPEC/Shengli Oil Field
406.4	19.1	X60QO	SINOPEC/Shengli Oil Field
88.9	15.2	X65QS	ADCO
88.9	17.1	X65QS	ADCO
114.3	6.02	X65QS	ADCO
168.3	6.35	X60QS	ADCO
168.3	22.23	X65QS	ADCO
251.3	32	DNVSMLS 415SPD	MAERSK OIL, North Sea
252.5	35	DNVSMLS 415SD	MAERSK OIL, North Sea
323.9	7.9	X60QS	CNOOC

Reference Standards

CSA Z245.1 Steel Line Pipe
CSA Z662 Oil and Gas Pipeline Systems
Customer's Specification:
GS 2924 from Devon
OSHB-PL-SP-0002 from Husky Energy
MRCP-SPE-PI-00010 from WorleyParsons

Product Chemical Analysis (max. wt%)

Grade	C	Si	Mn	P	S	Ni	Cr	Mo
448	0.14	0.50	1.50	0.025	0.010	0.50	0.50	0.30
	Cu	Al	V	Nb	Ti	B	Cu+Ni+Cr+Mo	CE(CSA)
	0.50	0.060	0.10	0.06	0.03	0.0010	0.75	0.35

Mechanical Properties Test

Tensile test

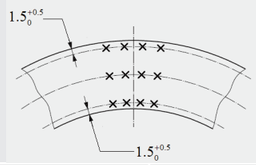
Test Frequency		1pc/Lot	
Tensile Test		Requirement	
		min.	max.
At RT	Yield strength (MPa)	448	-
	Tensile strength (MPa)	552	-
	Ratio of YS/TS	≤0.93	
	Elongation	≥25%	
	Direction	Longitudinal	
	Specimen	Strip specimen in accordance with CSA Z245.1-14	
	Test method	ASTM A 370	
At 360˚C	Yield strength (MPa)	448	-
	Tensile strength (MPa)	552	-
	Ratio of YS/TS	-	
	Elongation	≥20%	
	Direction	Longitudinal	
	Specimen	Round bar specimen in accordance with Mill's standard	
	Test method	ASTM E21	
Retest		According to Section 7.2.6 of CSA Z245.1-14	

Seamless Linepipe for High Temperature Steam Service

Impact test

Test Frequency	1set/lot
Temperature	-29℃
Direction	Transverse
Type	Charpy V
Size	full size
Requirement	Avg ≥ 40J
	Single ≥ 27J
Test Method	ASTM A 370
Retest	According to Section 7.6.4 of CSA Z245.1-14

Vickers hardness test(HV10)

Test Frequency	1pc/lot	
Test Method	ISO 6507	
Sampling Location		
Acceptance Criteria	max.	280
	min.	190
	max variation	45

Annex 1:

Nominal Diameter		Outside Diameter		Schedule											
mm	inch	mm	inch	20	30	STD	40	60	XS	80	100	120	140	160	XXS
50	2	60.3	2.375			3.91 5.44	3.91 5.44		5.54 7.48	5.54 7.48				8.74 11.11	11.07 13.44
65	2 1/2	73.0	2.875			5.16 8.63	5.16 8.63		7.01 11.41	7.01 11.41				9.53 14.92	14.02 20.39
80	3	88.9	3.500			5.49 11.29	5.49 11.29		7.62 15.27	7.62 15.27				11.13 21.35	15.24 27.68
90	3 1/2	101.6	4.000			5.74 13.57	5.74 13.57		8.08 18.63	8.08 18.63					
100	4	114.3	4.500			6.02 16.07	6.02 16.07		8.56 22.32	8.56 22.32		11.13 28.32		13.49 33.54	17.12 41.03
125	5	141.3	5.563			6.55 21.77	6.55 21.77		9.53 30.97	9.53 30.97		12.70 40.28		15.88 49.11	19.05 57.43
150	6	168.3	6.625			7.11 28.26	7.11 28.26		10.97 42.56	10.97 42.56		14.27 54.20		18.26 67.56	21.95 79.22
200	8	219.1	8.625	6.35 33.31	7.04 36.81	8.18 42.55	8.18 42.55	10.31 53.08	12.70 64.64	12.70 64.64	15.09 75.92	18.26 90.44	20.62 100.92	23.01 111.27	22.23 107.92
250	10	273.1	10.750	6.35 41.77	7.80 51.03	9.27 60.31	9.27 60.31	12.70 81.55	12.70 81.55	15.09 96.01	18.26 114.75	21.44 133.06	25.40 155.15	28.58 172.33	25.40 155.15
300	12	323.9	12.750	6.35 49.73	8.38 65.20	9.53 73.88	10.31 79.73	14.27 108.96	12.70 97.46	17.48 132.08	21.44 159.91	25.40 186.97	28.58 208.14	33.32 238.76	25.40 186.97
350	14	355.6	14.000	7.92 67.90	9.53 81.33	9.53 81.33	11.13 94.55	15.09 126.71	12.70 107.39	19.05 158.10	23.83 194.96	27.79 224.65	31.75 253.56	35.71 281.70	
400	16	406.4	16.000	7.92 77.83	9.53 93.27	9.53 93.27	12.70 123.30	16.66 160.12	12.70 123.30	21.44 203.53	26.19 245.56	30.96 286.64	36.53 333.19	40.49 365.35	
450	18	457	18.000	7.92 87.71	11.13 122.38	9.53 105.16	14.27 155.80	19.05 205.74	12.70 139.15	23.88 254.55	29.36 309.62	34.93 363.56	39.67 408.26	45.24 459.37	
500	20	508	20.000	9.53 117.15	12.70 155.12	9.53 117.15	15.09 183.42	20.62 247.83	12.70 155.12	26.19 311.17	32.54 381.53	38.10 441.49	44.45 508.11	50.01 564.81	
550	22	559	22.000	9.53 129.13	12.70 171.09	9.53 129.13		22.23 294.25	12.70 171.09	28.58 373.83	34.93 451.42	41.28 527.02	47.63 600.63	53.98 672.26	
600	24	610	24.000	9.53 141.12	14.27 209.64	9.53 141.12	17.48 255.41	24.61 355.26	12.70 187.06	30.96 442.08	38.89 547.71	46.02 640.03	52.37 720.15	59.54 808.22	
650	26	660	26.000	12.70 202.72		9.53 152.87			12.70 202.72						
700	28	711	28.000	12.70 218.69	15.88 271.21	9.53 164.85			12.70 218.69						

Unit: -Wall Thickness(mm) -Weight(kg/m)

All line pipes and process pipes mentioned above can meet NACE MR-01-75 upon customer's request.