Tianjin Pipe Corporation

Seamless pipe for

Offshore Structure

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2022 Version 01

Tianjin Pipe Corporation

TPCO

Offshore Structural Pipe
Choke & Kill, Boost Pipe

Offshore Structural Pipe

Offshore platform is the equipment to drill and extract oil from the sea. Based on different functions, offshore platform can be classified as drilling platform, production platform, service platform, oil storage, etc. There are bottom-supported, gravity, jack-up, semi-submersible, tension leg type, etc. According to different function, Pile foundation type, bottom-supported and gravity platform are used in shallow waters. Jack-up, semi-submersible, tension leg type, such as vertical cylinder type of offshore platform become the hotspot in the field of ocean engineering.

TPCO has developed the offshore structural pipes for offshore platform, supplied in normalized or quenched and tempered condition for yield strength 355~690 MPa.

- Bracing pipe
- Chord pipe

Jack-up drilling platform leg chord pipe is manufactured as with semicircle.
Its advantage is low cost and high efficiency that producing semicircle pipe with seamless pipe through longitudinal cutting process.

Characteristics of TPCO products

- Steel design with low carbon and micro alloyed
- Low carbon equivalent
- Excellent weldability
- Excellent low temperature toughness
- Lower ductile brittle transition
- Higher surface quality

Reference Standards

API SPEC 5L Specification for Line Pipe
EN 10210-1 Hot finished structural hollow sections of non-alloy and fine grain steels - Part 1: Technical delivery conditions.
EN 10210-2 Hot finished structural hollow sections of non-alloy and fine grain steels - Part 2: Tolerances, dimensions and sectional properties.
EN 10225 Weldable structural steels for fixed offshore structures - Technical delivery conditions
ABS RULES Material and Welding 2015 Part 2
ABS RULES Building and Classing Mobile Offshore Drilling units 2015 Part 3
DNV-OS-B101

The Grade of Offshore Structural Pipe of TPCO

Specification	API SPEC 5L	EN 10210	EN10225	ABS Rules	DNV Rules
Grade	X52Q	S355NH S355NLH	S355G1+N S355G14 +N S355G14 +QT S355G15 +N S355G15 +QT	AH36~FH36	NV A36~NV E36
	X60Q	S420NH S420NLH	S420G6+QT	AQ43~FQ43	NV A420~NV E420/ NV AO420~NV EO420
	X65Q	S460NH S460NLH	S460G6+QT	AQ47~FQ47	NV A460~NV E460/ NV AO460~NV EO460
	X70Q			AQ51~FQ51	NV A500~NE E500/ NV AO500~NE EO500
	X80Q			AQ56~FQ56	NV A550~NV E550/ NV AO550~NV OE550
	X90Q			AQ63~FQ63	NV A620~NV E620/ NV AO620~NV EO620
	X100Q			AQ70~FQ70	NV A690~NV E690/ NV AO690~NV EO690

Offshore Structural Pipe

Size range

Grade	Outside Diameter(mm)	Maximum Wall Thickness(mm)
B~X100	168.3	38
	219.1	35
	273.1	40
	323.9	64
	355.6	60
	406.4	60
	457	50
	508	50

Platform Type and Corresponding Pipe Sizes and Grades

Platform Type	O.D. (mm)	W.T. (mm)	ABS/DNV Grade	API SPEC 5L Grade
JU2000E	273.1	21.41	ABS EQ56	X80Q
	323.9	28.58	ABS EQ56	X80Q
	168.3	10.97	ABS EH36	X52Q
CJ46	273.1	14.00	ABS EQ70	X100Q
	273.1	17.50	ABS EQ70	X100Q
	141.3	9.38	ABS EH36	X52Q
CJ50	298.5	25	ABS EQ70	X100Q
	298.5	35	ABS EQ70	X100Q
	152.4	10	ABS EQ47	X70Q
CJ70	355.6	28.0	NV E690	X100Q
	355.6	35.0	NV E690	X100Q
	171.0	12.5	NV D460	X65Q
CJ80	368	28.0	NV E690	X100Q
	368	35.0	NV E690	X100Q
	202	25.0	NV D690	X100Q
R-550D	324	64	X100Q	X100Q
	273	19	X100Q	X100Q
	219	8.2	X52Q	X52Q

Mechanical Properties

Performance Data as per EN 10225

Grade	YS（MPa）		TS (MPa)	min. $5.65\sqrt{S_o}$(%)	Impact Energy of VL, Full Size （J）		
	t≤25mm	25mm<t≤65mm			W.T.(mm)	Temp.(℃)	min.(J)
S355G1+N S355G14 +N S355G14 +QT S355G15 +N S355G15 +QT	360~530	345~530	470~620	22	t≤40	-40	100
					40<t≤65	-40	80
S420G6+QT	420~565	400~565	500~690	22	t≤40	-40	100
					40<t≤65	-40	80
S460G6+QT	460~600	440~600	550~700	19	t≤40	-40	100
					40<t≤65	-40	80

note:t = wall thickness

Performance Data as per API SPEC 5L

Grade	YS(MPa)		TS (MPa)	min. A50(%)	Impact Energy of VL, Full Size (J)		
	t≤40mm	40mm<t≤65mm			W.T.(mm)	Temp.(℃)	min.(J)
X52Q	360~530	345~530	470~760	22	t≤40	-40	100
					40<t≤65	-40	80
X65Q	450~600	440~600	535~760	19	t≤40	-40	100
					40<t≤65	-40	80
X70Q	485~635	465~635	570~760	18	t≤40	-40	100
					40<t≤65	-40	80
X80Q	550~705	520~705	625~825	18	t≤40	-40	80
					40<t≤65	-40	60
X100Q	690~840	650~840	760~990	16	t≤40	-40	80
					40<t≤65	-40	60

note:t = wall thickness

Offshore Structural Pipe

Chemical Composition (%, API Spec 5L)

Grade	C	Si	Mn	P	S	Cu+Cr+Ni+Mo*	V+Nb+Ti	Ceq	Pcm
X52Q	≤0.18	≤0.45	≤1.50	≤0.020	≤0.015	≤0.50	≤0.15	≤0.43	≤0.25
X60Q	≤0.18	≤0.45	≤1.70	≤0.020	≤0.015	≤0.80	≤0.15	≤0.43	≤0.25
X65Q	≤0.18	≤0.45	≤1.70	≤0.020	≤0.010	≤1.00	≤0.15	≤0.43	≤0.25
X70Q	≤0.18	≤0.45	≤1.70	≤0.020	≤0.010	≤1.20	≤0.15	≤0.43	≤0.25
X80Q	≤0.18	≤0.45	≤1.70	≤0.015	≤0.008	≤1.20	≤0.15	≤0.48	≤0.28
X100Q	≤0.16	≤0.35	≤1.70	≤0.015	≤0.006	≤1.50	≤0.15	≤0.62	≤0.33

* other technical requirement as per API SPEC 5L and Customer's requirement.

Customer Weldability

X80Q Weldability test

Welding Specification	AWS D1.1/D1.1M:2010、ABS MODU RULES
Company	SWS
Welding Process	SMAW
Size	323.85 x 28.58mm
Grade	PSL2 X80Q
Position	6GR
Root	LB52U
Filling/Cap	TENACITO 65R

Serial Number	Test Item	Quantity	Result					Status
1	Tensile	2	654 MPa，Fracturein Base metal 657 MPa，Fracturein Base metal					Qualified
2	Side bend	4	No crack					Qualified
3	-40℃ impact(J)	5×3	Center of weld	82	78	93	84	Qualified
			FL	89	172	164	142	
			FL+1mm	70	210	44	108	
			FL+3mm	54	240	162	152	
			FL+5mm	110	260	268	213	
4	Metallography	3	No imperfection					Qualified
5	Hardness	1	≤325 HV10					Qualified

X100Q Weldability

Welding Specification	AWS D1.1/D1.1M:2010、ABS MODU RULES
Company	China Petroleum Pipeline Bureau,CNPC
Welding Process	SMAW
Size	356 x 35mm
Grade	PSL2 x 100Q
Position	6GR
Root	LB-62U
Filling/Cap	TENACITO 80CL

Serial Number	Test Ltem	Quantity	Result					Wheather Qualified
1	Tensile	2	Tensile Strength: 844MPa Tensile Strength: 840MPa					Qualified
2	Side bend	4	180°with 63.5mm, No crack					Qualified
3	-40℃ impact(J)	5×3	Center of weld	77	58	76.5	70.5	Qualified
			FL at bevel	68.5	70	60.5	66.5	
			FL at straight	66.5	76.5	53	65	
			FL+1mm	196	190.5	190.5	192.5	
			FL+2mm	180	179.5	172.5	177.5	
			FL+5mm	202.5	205	212	206.5	
4	Metallography	2	No imperfection					Qualified
5	Hardness	1	≤325 HV10					Qualified

At present TPCO's products from X70Q to X100Q had passed weldability evaluation by Singapore keppel corporation.

Ductile Brittle Transition

323.85mm×28.58mm X80Q FATT for Longitudinal

273.05mm×21.41mm X80Q FATT for Transverse

356mm×35mm X100Q FATT for Transverse

Conclusion: Impact toughness of TPCO products is better. The temperature of ductile brittle transition is lower than minus 40˚C for X100Q , minus 80˚C for X80Q. So it is safer when TPCO's products are used in low temperature environment.

Manufacturing Statistics X80Q - X100Q

Manufacturing Statistics X80Q of TPCO

Manufacturing Statistics X100Q of TPCO

Certification of Offshore Structural Pipe

ABS

Certificate Number 20-4350141
Effective Date 25-December-2020
Expiration Date 16-February-2026
ABS Port Office Tianjin, P.R.China
Website www.tpco.com.cn

CERTIFICATE OF

Manufacturing Assessment

This is to certify that the Undersigned evaluated the manufacturing quality procedures of

Tianjin Pipe Corporation

located at

Tianjin, P.R.China

The quality monitoring systems during production were verified to satisfy the specific surveys, required by the ABS Rules, Guides, the associated Specifications and Standards for the manufacture of

Seamless Steel Pipe and Tubes

This manufacturer presented a sample or specimen of the product, representative of the "type" approved for the purpose of verifying that the "type" has been manufactured in conformance with the Manufacturer's Product Design Assessment(s).

This Certificate is manufacturer and location specific and is subject to annual audits. Consult the ABS Type Approval website to confirm the continued validity of this certificate and the status of products.

The ABS Office issuing the certificate is to be kept updated with changes to the production methods, quality control systems, products and models and any changes made.

Yao Chen, Surveyor

Annual Endorsement
First Second Third Fourth

Surveyor

WO and Date

NOTE: This Certificate evidences compliance with one or more of the Rules, guides, standards or other criteria of American Bureau of Shipping and is issued solely for the use of the Bureau, its committees, its clients or other authorized entities. This Certificate is a representation only that the structures, item of material, equipment, machinery or any other item covered by this Certificate has met one or more of the Rules, guides, standards or other criteria of American Bureau of Shipping as of the date of issue. Parties are advised to review the Rules for the scope and conditions of classification and to review the survey records for a fuller description of any restrictions or limitation on the vessel's service or surveys. The validity, applicability and interpretation of this Certificate is governed by the Rules and standards of American Bureau of Shipping, who shall remain the sole judge thereof. Nothing contained in this Certificate or in any notation made in contemplation of this Certificate shall be deemed to relieve any designer, builder, owner, manufacturer, seller, supplier, repairer, operator or other entity of any warranty express or implied.

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中国船级社
CHINA CLASSIFICATION SOCIETY
工厂认可证书
CERTIFICATE OF WORKS APPROVAL

证书编号/Certificate No. TJ21PWA00022_01

This is to certify that the manufacturer stated in the certificate meets the requirements of the standards listed below and is available with the ability and conditions to produce the products described in the certificate.

制造厂/Manufacturer
天津钢管制造有限公司
Tianjin Pipe Corporation

地址/Address
天津市东丽区津塘公路396号
396# Jintang Road,Dongli District,Tianjin,China

产品名称/Product
管材
Pipes
无缝钢管
Seamless Steel Pipes and Tubes

附加标志/Notations
无/NIL

认可标准/Approval Standard
1. 中国船级社《材料与焊接规范》（2021）及其修改单相关第1篇第4章
Chapter 4, Part One of China Classification Society Rules for Materials and Welding 2021 and its Amendments.

用于/Intended for
船舶与海上设施/Ships and Offshore Installations

产品明细/Product Description
无缝钢管/Seamless Steel Pipes and Tubes /3000吨

名称/Name	级性（值）/Value	单位/Unit
产品名称/Product Name	无缝压力管/Seamless Pressure Pipes	
钢材种类/Steel Type	碳钢/碳锰钢/Carbon steel/Carbon manganese steel	
强度级别/Strength Grade	410	N/mm²
规格/Specification	中48.0～中211.2（外径）×3.5～13.0（壁厚）/中48.0～中211.2（Outer diameter）×3.5～13.0（Wall thickness）	mm
交货状态/Condition of Supply	轧制、正火、N	
制造方法/Method of Manufacture	热轧/Hot Finished	

证书有效期至/This Certificate is valid until 2025年09月12日/Sep. 12,2025

发证机构/Issued by 中国船级社天津分社 CCS Tianjin Branch

签发日期/Date 2021年09月18日 Sep. 18,2021

UTN:P021-45090005

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№ 21182992

证书编号/Certificate No. TJ21PWA00022_01

批准的图纸/Approved Drawings
图纸批准号/ Drawings Approval No. : TJ21PWA00022

产品认可试验报告/ Approval Test Report
试验报告编号/ Test Report No. : TPCO-CCS-2014
试验报告日期/ Test Report Date : 2014-02-02
试验报告编号/ Test Report No. : CCS20-201708
试验报告日期/ Test Report Date : 2017-08-01

认可后的产品检验方式/Method of Product Inspection after Approval
按规范认可后的产品检验的产品/The product should be inspected in term of the rules:
认可后的产品检验应由本社验船师根据本社规范规定按批准的产品检验计划进行检验，经检验合格后由本社颁发船用产品证书。
After approval, product inspection should be carried out by the Surveyor of the Society in accordance with the approved product inspection scheme, and the Marine Product Certificate will be issued by the Society upon satisfactory inspection.

认可保持条件/Maintenance Requirements of Approval
1. 工厂认可后，如果图纸、技术文件、工艺规程有较大改变，应提每本社同意。若改变涉及到本社产品的技术条件以及材料、试验工艺或产品的特性，特别，将与特性有关的图纸和技术文件向经过本社审核/产品检验人员在检验人员的必要时，经本社检验人员到厂进行检查和见证有关试验，其结果应提证实的符合认可条件。
After works approval, if there are any major changes to the drawings, technical documents, specifications, prior consent should be obtained from the approval office of the Society. If the changes involve or affect product design, major construction materials, key parts, shop or product characteristics and properties, drawings and technical documents related to properties are to be examined and approved by the Society and, where deemed necessary by the survey office, the surveyors to the Society will go to the manufacturer to witness or witnessed relevant tests and the results of the tests should be able to demonstrate compliance with the approval conditions.
2. 工厂的质量管理体系应保持有效运行，本社与认可证书，质量管理体系发生改变，应经过体系的审核并报本社批准。
The quality management system of the factory shall be maintained effective operation, and shall be the same as the initial approval. If there are any changes to the quality management system, auditing of the quality certification organization for quality management system and the Society's approval shall be carried out.
3. 工厂认可证书获得者应按本社每一年的三月和审核，定期审核日为认可证书颁发之日起向的每一周年日，检查工作应在定期审核日期前后三个月内进行。/Those who have obtained the certificate of works approval shall receive periodical audit done by the Society on an annual basis. The date of periodical audit shall be such anniversary date which corresponds to the date of expiry of the relevant certificate and the periodical audit should be done within a time span of three months before and after the annual anniversary date.
4. 在认可证书有效期内，本社检验人员可在不经事先通知的情况下对工厂的产品制造过程进行审核，以验证产品的生产是否符合要求和批准的图纸和文件。工厂应予以配合。
Within the validity of the approval certificate, the surveyor to the Society may pay unannounced audit to the manufacturing process of the product in order to confirm whether it is in compliance with the drawings and documents approved by the Society. The factory should provide an active cooperation and necessary for the surveyor.
5. 认可证书有效期内，如果出现可能导致本社暂停或撤消认可的情况，工厂应及时采取有效的纠正措施。
Within the validity of the approval certificate, if cases occur that may cause the Society to suspend or withdraw the certificate, the manufacturer should take corrective actions in a prompt and effective manner.

备注/Remarks
本证书由第2厂认可证书（No. TJ20PWA00038_01）换新并替代原证书。
This certificate is issued from and supersedes the previous Works Approval Certificate No.
中国船级社天津分社
CCS Tianjin Branch

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№ 21410282

Offshore Structural Pipe

Construction Site Pictures

JU2000E Platform Before Sailing(By SWS)

JU2000E Platform After Penetrating Legs (By SWS)

Supply Record of Jack-up Drilling Platform Pipe

O.D. (mm)	W.T. (mm)	Grade/Standard	Ship Survey	Platform Type	Delivery
323.85	28.58	PSL2 X80Q /API 5L	ABS	JU2000E	4 platforms Total 5400 tons
273.05	21.41	PSL2 X80Q /API 5L			
323.85	28.58	PSL2 X80Q /API 5L	ABS	JU2000E	4 platforms Total 5400 tons
273.05	21.41	PSL2 X80Q /API 5L			
323.85	28.58	PSL2 X80Q /API 5L	CCS	CP400	1 platform Total 1350 tons
273.05	21.41	PSL2 X80Q /API 5L			
219.1	18.3	PSL2 X52Q /API 5L	CCS	DSJ300	1 platform Total 700 tons
219.1	22.2	PSL2 X52Q /API 5L			
355.5	35.7/27.8	PSL2 X52Q /API 5L	ABS	CP-101	1 platform Total 950 tons
219.1	23/15	PSL2 X52Q /API 5L			
356 168.3	25/30/35 20/28	PSL2 X100Q/API 5L	ABS		2 platforms Total 935 tons
298.5 152.4	25/35 10	PSL2 X100Q/API 5L PSL2 X70Q/API 5L	ABS	CJ50	2 platforms Total 2400 tons

Note:2010-2015 year.

Choke & kill, Boost Pipe

Choke & Kill, Boost pipe should be produced in accordance with ASTM A519 and A370, latest editions. API 16C and API spec 5L shall be used as a reference only. Material shall comply with NACE MR-01-75(ISO 15156-2).

Chemical Composition as per 4130 of ASTM A 519

(%)	C	Si	Mn	P	S	Ni	Cr	Mo	Cu
TPCO	0.30	0.21	0.48	0.008	0.001	0.030	1.04	0.19	0.040
Other	0.30	0.24	0.52	0.012	0.0014	0.058	0.98	0.20	0.155
(%)	V	Nb	Ti	Ca	N	Sn	As	Al	Ceq
TPCO	/	/	/	0.0006	0.0080	0.0040	0.0040	0.022	0.629
Other	0.018	/	0.015	0.0018	0.0060	0.0113	0.0041	0.021	0.641

Mechanical Property

	Impact 0℃, Full Size, VT（J）			Hardness (HRC)		
	min.	max.	aver.	inner	mid.	outer
TPCO	177	239	207.6	20.29	20.36	20.36
Other	160	205	187.5	18.11	19.44	19.13

Manufacturing Statistics