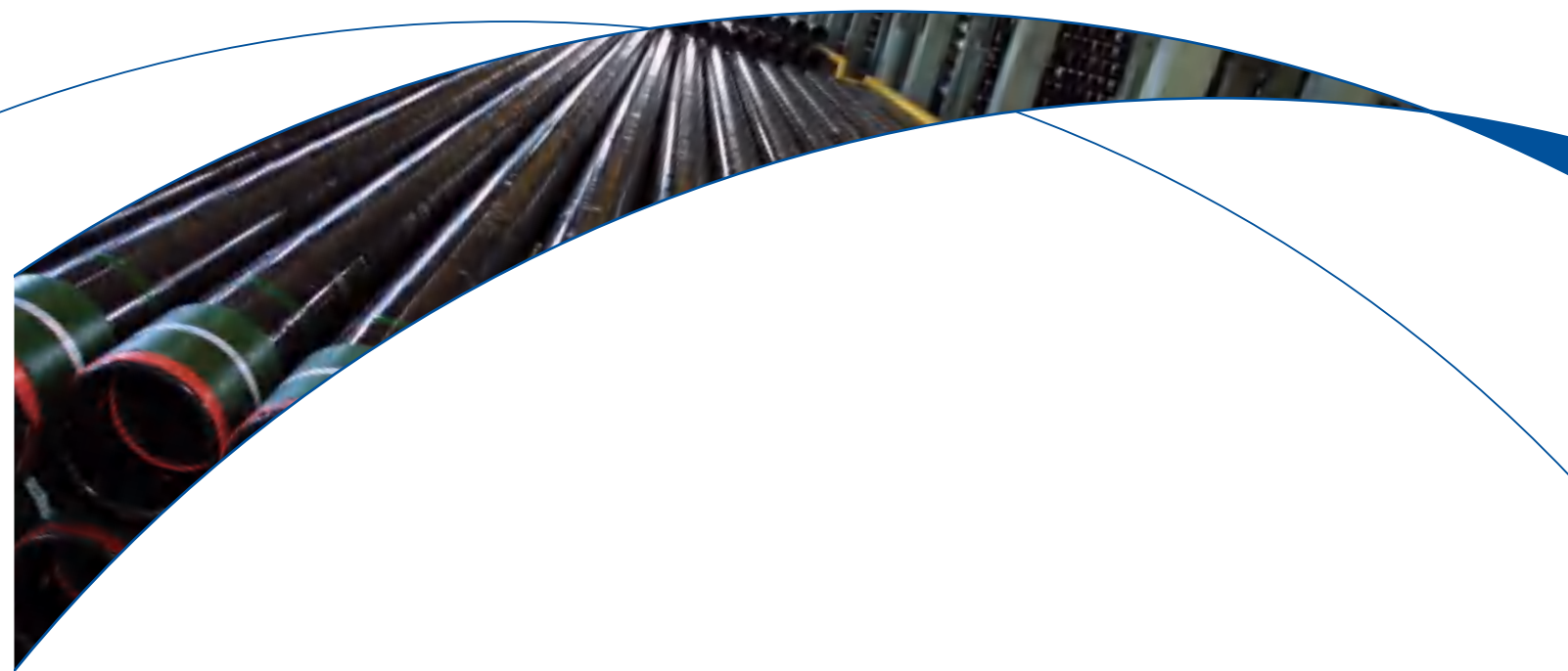


Tianjin Pipe Corporation

Seamless Pipes for
Casing and Tubing



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



API Casing

Labels a		Outside Diameter	Nominal Liner Mass b,c T&C	Wall Thick- ness	Type of End-finish ^d							
1	2	D in.	lb/ft	t in.	H40	J55 K55	L80 R95	N80 Type 1,Q	C90 T95	C110	P110	Q125
1	2	3	4	5	6	7	8	9	10	11	12	13
4 1/2	9.50	4.500	9.70	0.205	PS	PS	-	-	-	-	-	-
	10.50	4.500	10.60	0.224	-	PSB	-	-	-	-	-	-
	11.60	4.500	11.70	0.250	-	PSLB	PLB	PLB	PLB	P	PLB	-
	13.50	4.500	13.30	0.290	-	-	PLB	PLB	PLB	P	PLB	-
	15.10	4.500	15.30	0.337	-	-	-	-	-	-	PLB	PLB
5	11.50	5.000	11.60	0.220	-	PS	-	-	-	-	-	-
	13.00	5.000	13.20	0.253	-	PSLB	-	-	-	-	-	-
	15.00	5.000	15.30	0.296	-	PSLB	PLB	PLB	PLB	P	PLB	-
	18.00	5.000	18.30	0.362	-	-	PLB	PLB	PLB	P	PLB	PLB
	21.40	5.000	21.60	0.437	-	-	PLB	PLB	PLB	P	PLB	PLB
	23.20	5.000	23.40	0.478	-	-	PLB	PLB	PLB	P	PLB	PLB
5 1/2	24.10	5.000	24.30	0.500	-	-	PLB	PLB	PLB	P	PLB	PLB
	14.00	5.500	14.00	0.244	PS	PS	-	-	-	-	-	-
	15.50	5.500	15.80	0.275	-	PSLB	-	-	-	-	-	-
	17.00	5.500	17.30	0.304	-	PSLB	PLB	PLB	PLB	P	PLB	-
	20.00	5.500	20.20	0.361	-	-	PLB	PLB	PLB	P	PLB	-
	23.00	5.500	22.90	0.415	-	-	PLB	PLB	PLB	P	PLB	PLB
	26.80	5.500	27.00	0.500	-	-	-	-	P	P	-	-
	29.70	5.500	29.90	0.562	-	-	-	-	P	P	-	-
	32.60	5.500	32.70	0.625	-	-	-	-	P	P	-	-
	35.30	5.500	35.50	0.687	-	-	-	-	P	P	-	-
	38.00	5.500	38.20	0.750	-	-	-	-	P	P	-	-
6 5/8	40.50	5.500	40.80	0.812	-	-	-	-	P	P	-	-
	43.10	5.500	43.30	0.875	-	-	-	-	P	P	-	-
	20.00	6.625	20.00	0.288	PS	PSLB	-	-	-	-	-	-
	24.00	6.625	24.00	0.352	-	PSLB	PLB	PLB	PLB	P	PLB	-
	28.00	6.625	28.00	0.417	-	-	PLB	PLB	PLB	P	PLB	-
7	32.00	6.625	32.00	0.475	-	-	PLB	PLB	PLB	P	PLB	PLB
	17.00	7.000	17.20	0.231	PS	-	-	-	-	-	-	-
	20.00	7.000	20.10	0.272	PS	PS	-	-	-	-	-	-
	23.00	7.000	23.30	0.317	-	PSLB	PLB	PLB	PLB	P	-	-
	26.00	7.000	26.30	0.362	-	PSLB	PLB	PLB	PLB	P	PLB	-
	29.00	7.000	29.30	0.408	-	-	PLB	PLB	PLB	P	PLB	-
	32.00	7.000	32.20	0.453	-	-	PLB	PLB	PLB	P	PLB	-
	35.00	7.000	35.00	0.498	-	-	PLB	PLB	PLB	P	PLB	PLB
	38.00	7.000	37.70	0.540	-	-	PLB	PLB	PLB	P	PLB	PLB
	42.70	7.000	42.90	0.625	-	-	-	-	P	P	-	-
	46.40	7.000	46.60	0.687	-	-	-	-	P	P	-	-
	50.10	7.000	50.30	0.750	-	-	-	-	P	P	-	-
	53.60	7.000	53.90	0.812	-	-	-	-	P	P	-	-
	57.10	7.000	57.40	0.875	-	-	-	-	P	P	-	-
7 5/8	24.00	7.625	24.00	0.300	PS	-	-	-	-	-	-	-
	26.40	7.625	26.40	0.328	-	PSLB	PLB	PLB	PLB	P	-	-
	29.70	7.625	29.70	0.375	-	-	PLB	PLB	PLB	P	PLB	-
	33.70	7.625	33.70	0.430	-	-	PLB	PLB	PLB	P	PLB	-
	39.00	7.625	39.00	0.500	-	-	PLB	PLB	PLB	P	PLB	PLB
	42.80	7.625	42.80	0.562	-	-	PLB	PLB	PLB	P	PLB	PLB
	45.30	7.625	45.30	0.595	-	-	PLB	PLB	PLB	P	PLB	PLB
	47.10	7.625	47.10	0.625	-	-	PLB	PLB	PLB	P	PLB	PLB
	51.20	7.625	51.20	0.687	-	-	-	-	P	P	-	-
	55.30	7.625	55.30	0.750	-	-	-	-	P	P	-	-
7 3/4	46.10	7.750	46.10	0.595	-	-	P	P	P	P	P	P

Labels a		Outside Diameter	Nominal Liner Mass b,c T&C	Wall Thick- ness	Type of End-finish ^d							
1	2	D in.	lb/ft	t in.	H40	J55 K55	L80 R95	N80 Type 1,Q	C90 T95	C110	P110	Q125
1	2	3	4	5	6	7	8	9	10	11	12	13
8 5/8	24.00	8.625	24.00	0.264	-	PS	-	-	-	-	-	-
	28.00	8.625	28.00	0.304	PS	-	-	-	-	-	-	-
	32.00	8.625	32.00	0.352	PS	PSLB	-	-	-	-	-	-
	36.00	8.625	36.00	0.400	-	PSLB	PLB	PLB	PLB	P	-	-
	40.00	8.625	40.00	0.450	-	-	PLB	PLB	PLB	P	PLB	-
	44.00	8.625	44.00	0.500	-	-	PLB	PLB	PLB	P	PLB	-
9 5/8	49.00	8.625	49.00	0.557	-	-	PLB	PLB	PLB	P	PLB	PLB
	32.30	9.625	32.30	0.312	PS	-	-	-	-	-	-	-
	36.00	9.625	36.00	0.352	PS	PSLB	-	-	-	-	-	-
	40.00	9.625	40.00	0.395	-	PSLB	-	-	-	-	-	-
	43.50	9.625	43.50	0.435	-	-	PSB	PSB	PSB	P	PSB	-
	47.00	9.625	47.00	0.472	-	-	PSB	PSB	PSB	P	PSB	-
	54.50	9.625	54.50	0.545	-	-	-	-	PSB	P	PSB	PSB
	58.40	9.625	58.40	0.595	-	-	-	-	PSB	P	PSB	PSB
	59.40	9.625	59.40	0.609	-	-	-	-	P	P	-	-
	64.90	9.625	64.90	0.672	-	-	-	-	P	P	-	-
10 3/4	70.30	9.625	70.30	0.734	-	-	-	-	P	P	-	-
	75.60	9.625	75.60	0.797	-	-	-	-	P	P	-	-
	32.75	10.750	32.75	0.279	PS	-	-	-	-	-	-	-
	40.50	10.750	40.50	0.350	PS	PSB	-	-	-	-	-	-
	45.50	10.750	45.50	0.400	-	PSB	-	-	-	-	-	-
	51.00	10.750	51.00	0.450	-	PSB	PSB	PSB	PSB	P	PSB	-
	55.50	10.750	55.50	0.495	-	-	PSB	PSB	PSB	P	PSB	-
	60.70	10.750	60.70	0.545	-	-	-	-	PSB	P	PSB	PSB
	65.70	10.750	65.70	0.595	-	-	-	-	PSB	P	PSB	PSB
	73.20	10.750	73.20	0.672	-	-	-	-	P	P	-	-
11 3/4	79.20	10.750	79.20	0.734	-	-	-	-	P	P	-	-
	85.30	10.750	85.30	0.797	-	-	-	-	P	P	-	-
	42.00	11.750	42.00	0.333	PS	-	-	-	-	-	-	-
	47.00	11.750	47.00	0.375	-	PSB	-	-	-	-	-	-
	54.00	11.750	54.00	0.435	-	PSB	-	-	-	-	-	-
	60.00	11.750	60.00	0.489	-	PSB	PSB	PSB	PSB	P	PSB	PSB
	65.00	11.750	65.00	0.534	-	-	P	P	P	P	P	P
13 3/8	71.00	11.750	71.00	0.582	-	-	P	P	P	P	P	P
	48.00	13.375	48.00	0.330	PS	-	-	-	-	-	-	-
	54.50	13.375	54.50	0.380	-	PSB	-	-	-	-	-	-
	61.00	13.375	61.00	0.430	-	PSB	-	-	-	-	-	-
	68.00	13.375	68.00	0.480	-	PSB	PSB	PSB	PSB	P	PSB	-
16	72.00	13.375	72.00	0.514	-	-	PSB	PSB	PSB	P	PSB	PSB
	65.00	16.000	65.00	0.375	PS	-	-	-	-	-	-	-
	75.00	16.000	75.00	0.438	-	PSB	-	-	-	-	-	-
	84.00	16.000	84.00	0.495	-	PSB	-	-	-	-	-	-
18 5/8	109.00	16.000	109.00	0.656	-	P	P	P	-	-	P	P
	87.50	18.625	87.50	0.435	PS	PSB	-	-	-	-	-	-
	94.00	20.000	94.00	0.438	PSL	PSLB	-	-	-	-	-	-
20	106.50	20.000	106.50	0.500	-	PSLB	-	-	-	-	-	-
	133.00	20.000	133.00	0.635	-	PSLB	-	-	-	-	-	-

NOTE P=Plain-end,S=Short round thread,L=Long round thread,B=Buttress thread.

a Labels are for information and assistance in ordering.

b Nominal linear masses (Column 4) are shown for information only.

c The densities or martensitic chromium steels (L80 Types 9Cr and 13Cr) are different from carbon steels; The masses shown are therefore not accurate for martensitic chromium steels; A mass correction factor of 0.989 may be used.

d Buttress casing is available with regular,special clearance couplings or special clearance couplings with special bevel.

API Tubing

Labels				Nominal Linear masses ^{a,b}			Wall Thickness (in)	Type of End- finish							
1	2			O.D. (in)	Non-upset T&C (lb/ft)	Ext. upset T&C (lb/ft)		Integ. Joint (lb/ft)	H40	J55	L80/R95	N80 Type1.Q	C90	T95	P110
	NU T&C	EU T&C	IJ												
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2-3/8	4.00	-	-	2.375	4.00	-	-	0.167	PN	PN	PN	PN	PN	PN	-
	4.60	4.70	-	2.375	4.60	4.70	-	0.190	PNU	PNU	PNU	PNU	PNU	PNU	PNU
	5.80	5.95	-	2.375	5.80	5.95	-	0.254	-	-	PNU	PNU	PNU	PNU	PNU
	6.60	-	-	2.375	6.60	-	-	0.295	-	-	P	-	P	P	-
	7.35	7.45	-	2.375	7.35	7.45	-	0.336	-	-	PU	-	PU	PU	-
2-7/8	6.40	6.50	-	2.875	6.40	6.50	-	0.217	PNU	PNU	PNU	PNU	PNU	PNU	PNU
	7.80	7.90	-	2.875	7.80	7.90	-	0.276	-	-	PNU	PNU	PNU	PNU	PNU
	8.60	8.70	-	2.875	8.60	8.70	-	0.308	-	-	PNU	PNU	PNU	PNU	PNU
	9.35	9.45	-	2.875	9.35	9.45	-	0.340	-	-	PU	-	PU	PU	-
	10.50	-	-	2.875	10.50	-	-	0.392	-	-	P	-	P	P	-
	11.50	-	-	2.875	11.50	-	-	0.440	-	-	P	-	P	P	-
3-1/2	7.70	-	-	3.500	7.70	-	-	0.216	PN	PN	PN	PN	PN	PN	-
	9.20	9.30	-	3.500	9.20	9.30	-	0.254	PNU	PNU	PNU	PNU	PNU	PNU	PNU
	10.20	-	-	3.500	10.20	-	-	0.289	PN	PN	PN	PN	PN	PN	-
	12.70	12.95	-	3.500	12.70	12.95	-	0.375	-	-	PNU	PNU	PNU	PNU	PNU
	14.30	-	-	3.500	14.30	-	-	0.430	-	-	P	-	P	P	-
	15.50	-	-	3.500	15.50	-	-	0.476	-	-	P	-	P	P	-
	17.00	-	-	3.500	17.00	-	-	0.530	-	-	P	-	P	P	-
4	9.50	-	-	4.000	9.50	-	-	0.226	PN	PN	PN	PN	PN	PN	-
	10.70	11.00	-	4.000	-	11.00	-	0.262	PU	PU	PU	PU	PU	PU	-
	13.20	-	-	4.000	13.20	-	-	0.330	-	-	P	-	P	P	-
	16.10	-	-	4.000	16.10	-	-	0.415	-	-	P	-	P	P	-
	18.90	-	-	4.000	18.90	-	-	0.500	-	-	P	-	P	P	-
	22.20	-	-	4.000	22.20	-	-	0.610	-	-	P	-	P	P	-
4-1/2	12.60	12.75	-	4.500	12.60	12.75	-	0.271	PNU	PNU	PNU	PNU	PNU	PNU	-
	15.20	-	-	4.500	15.20	-	-	0.337	-	-	P	-	P	P	-
	17.00	-	-	4.500	17.00	-	-	0.380	-	-	P	-	P	P	-
	18.90	-	-	4.500	18.90	-	-	0.430	-	-	P	-	P	P	-
	21.50	-	-	4.500	21.50	-	-	0.500	-	-	P	-	P	P	-
	23.70	-	-	4.500	23.70	-	-	0.560	-	-	P	-	P	P	-
	26.10	-	-	4.500	26.10	-	-	0.630	-	-	P	-	P	P	-

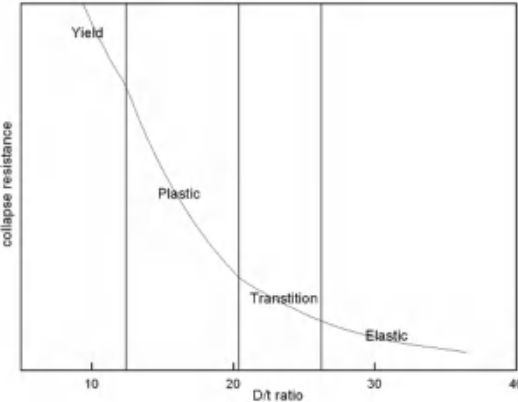
Collapse & High Collapse Requirements

OCTG basically serves to maintain the well hole integrity during drilling, completion and production lifecycle of wells. Among them, the Casing, in particular, provides resistance to collapse caused by high-strength external load.The source of external

load includes, pressure coming from stratum or reservoir flow in process of exploration and development, pressure from poor drillability mud and salt layer, mud system pressure, cement or seawater pressure under conductor or line pipe.

What is Collapse

Collapse resistance is a property of pipe body and defined as the limit exceeding which pipe fails in the circumferential direction when external pressure is applied. Collapse calculation formulas were addressed in the API 5C3 or ISO 10400. Four failure modes have been defined based on failure pattern observation and mechanical rules (refer to figure below). These four domains are continuously positioned as a function of the ratio of the outside diameter to the wall thickness, or D/t ratio.



Influencing Factor

Collapse resistance is influenced by a complex combination of geometrical characteristics, material properties, applied loads, and load conditions: Geometry: Outer Diameter(D), Wall thickness(t),Ovality, Eccentricity or wall thickness variation . Mechanical properties: Yield strength,

Residual stress
Applied loads: Tension-Compression, Bending ,Torsion
Testing parameters: Length / D of tested sample, Parasite load due to testing equipment, Pressure gradient.

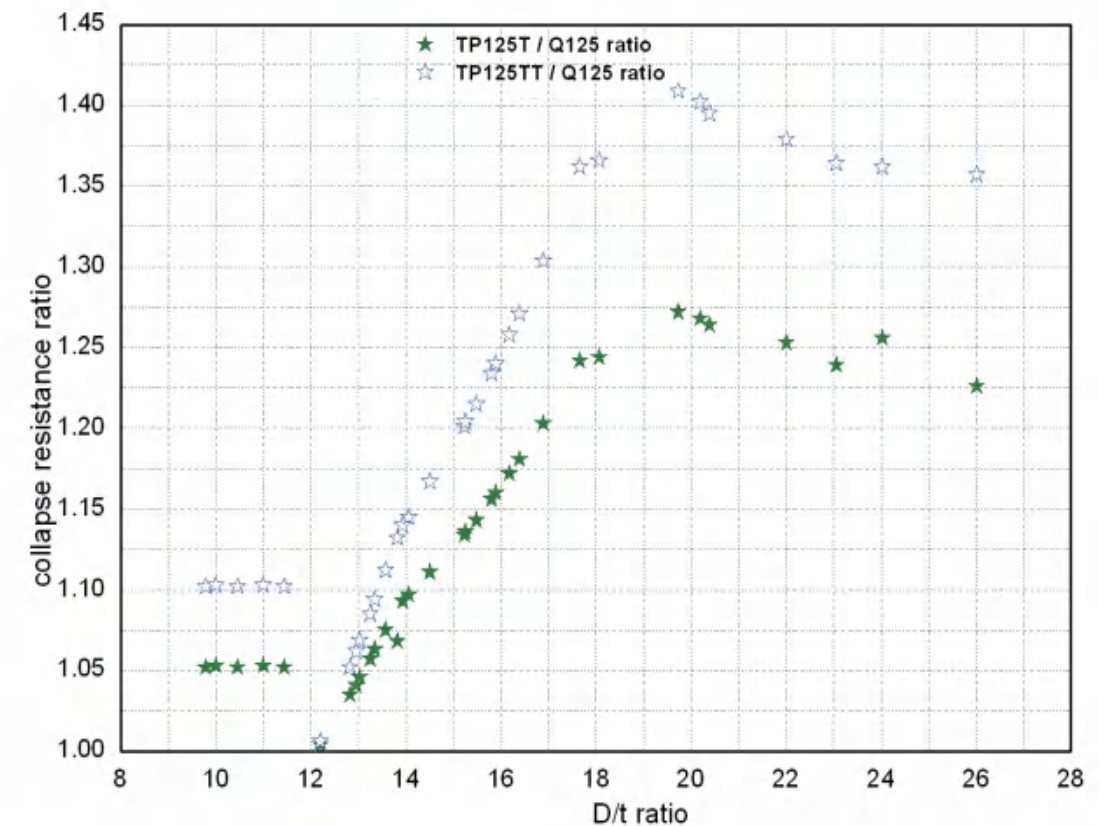
TPCO High Collapse Casing

TPCO high collapse casing covers full range from 4-1/2" to 13-3/8" in O.D.
 Grades from 80ksi to 130ksi (refer to below table).
 TP-T Series: the collapse value greater than API 5C3.
 TP-TT Series: the collapse value greater than TP-T Series for the same size.

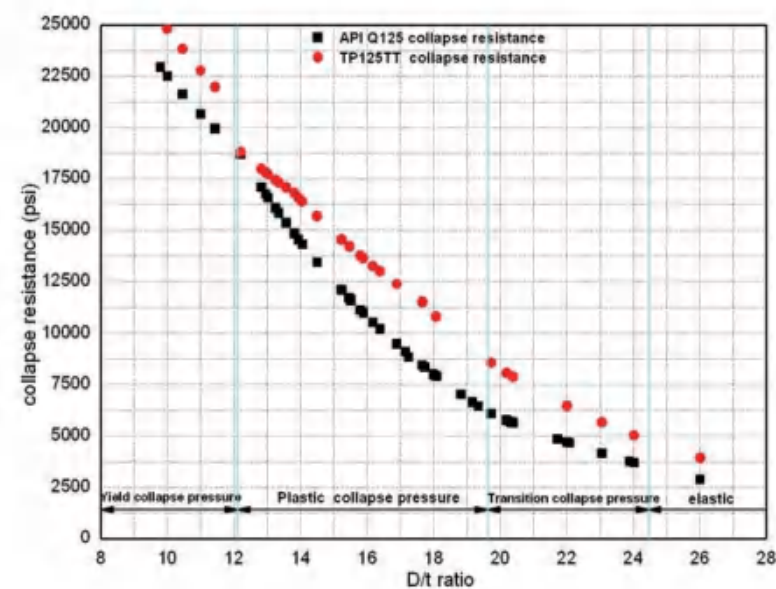
Steel Grade	YS Range(ksi-MPa)	UTS min (ksi-MPa)	Elongation
TP80T	80 (621) ~ 110 (758)	100 (689)	According to API formula
TP95T	95(655) ~ 125 (862)	110 (758)	
TP95TT			
TP110T	110 (758) ~ 140 (965)	125 (862)	
TP110TT			
TP125T	125 (862) ~ 150 (1034)	135 (931)	
TP125TT			
TP130T	130 (896) ~ 155 (1068)	140 (965)	
TP130TT			

TPCO high collapse casings are designed by selecting and controlling the most influential parameters.
 Also ,TPCO high collapse casings are delivered with the guarantee of their

minimum high collapse rating,
 for example : TP125TT(refer to figure below) .
 On average ,TPCO casing provides guaranteed High collapse performance values that exceed API by 20% to 35%.



External pressure chamber



As oil and gas exploration goes with deeper and deeper wells, working environment of Casing is getting more and more complex. TP-V series products designed for deep and

complex well service are remarkable for their high yield and tensile strengths while maintaining good ductility and fracture.

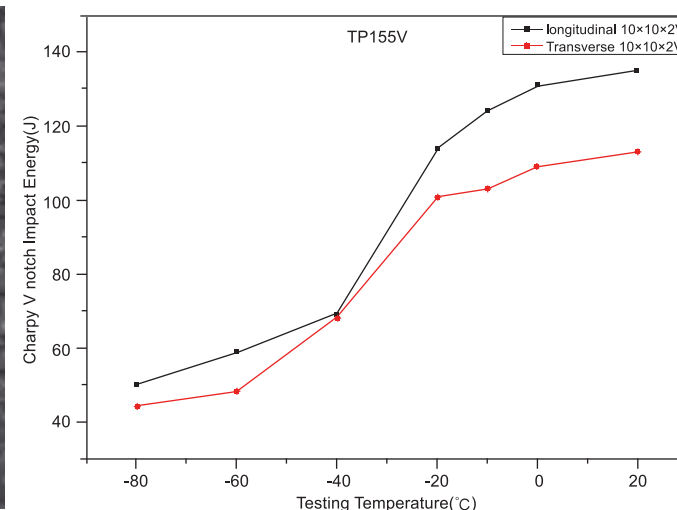
Over past years TP-V products have been used in Tarim Oilfield, Northwest oil field, Sinopec Southwest, Xinjiang Oilfield, ZhongYuan oil field by dozens of users. From 2003, TPCO has developed a series of non-standard steel grades for high strength oil

casing with premium connections according to the special geological conditions of oilfields. Many problems of drilling and well cementing had been solved by using TPCO designs and products.

Steel Grade	YS Range ksi (MPa)	UTS min ksi (MPa)	Elongation	Charpy V notch Impact Energy(0°C) (J)	
				Transverse	Longitudinal
TP110V	110 (758) ~ 140 (965)	125 (862)	According to API formula	40	60
TP125V	125 (862) ~ 155 (1068)	135(931)		50	70
TP140V	140(965) ~ 170 (1172)	150 (1034)		60	80
TP150V	150 (1034) ~ 180(1241)	160 (1103)		60	80
TP155V	155 (1068) ~ 185 (1275)	165(1138)		60	80



Photo Tempered Macrostructure of TP155V (x500)



Typical Longitudinal and Transverse Impact Properties

Specially designed deep well casing of TP-V series (incomplete statistic)

Grade	O.D. (mm)	W.T. (mm)	Connection	Collapse Resistance (MPa)	Inner Yield Pressure (MPa)	Connection Intensity (KN)
TP110V	182.08	12.50	TP-FJ	83.8	57.2	2770
	365.13	13.88	BC	24.0	33.1	11420
TP125V	346.08	13.84	BC	24.1	34.3	8880
TP140V	182.00	14.80	BC	145.0	87.0	6255
	193.68	18.30	TP-FJ	165.0	130.3	5396
	196.85	12.70	TP-CQ	90.0	105.5	7240
	206.38	13.50	TP-FJ	88.5	70.8	3630
	206.38	16.00	TP-FJ	127.1	77.4	5043
	273.05	26.24	TP-FJ	180.0	130.0	8355
	282.58	18.64	TP-CQ	103.0	100.4	12180
	346.08	15.40	BC	31.2	33.1	12400
	346.08	15.88	BC	41.0	34.1	15320
TP155V	374.65	18.65	BC	42.0	33.1	15230
	193.68	19.05	TP-FJ	203.1	142.7	6145
	206.38	17.25	TP-FJ	162.0	141.0	6150

TP-V series products provide remarkable advantages to casing string design of ultra-deep wells. TP-140V $\phi 273.05 \times 13.84$ mm casing with TP-CQ connection had been used as intermediate casing in KS-7 extra-deep well of Tarim Oilfield, which was completed on March 12, 2010.

It created a new world record – cumulatively 656 casing joints weighing 630 tons run down to the depth of 7087 meters in a single well. Once again TPCO product performances were proven reaching the leading level in the world.

Heavy Oil Recovery Casing

Corrosion Resistance Casing

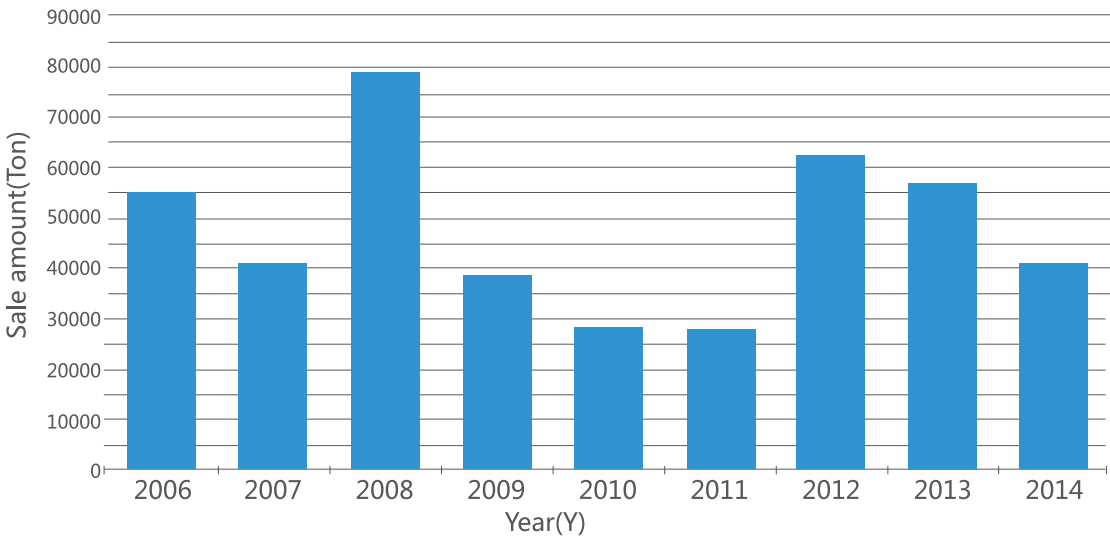
TPCO has created thermal service (TP-H) grades for application at higher temperature due to working conditions.

Steel Grade	YS Range ksi (MPa)	UTS min ksi (MPa)	Elongation	Well Depth (m)	Operating Temperature (°C)
TP90H	90 (621) ~ 120 (827)	100 (689)	According to API formula	500 ~ 700	320 ~ 350
TP90H-3Cr				500 ~ 700	350 ~ 550
TP90H-9Cr				500 ~ 700	350 ~ 550
TP100H	100 (689) ~ 130 (896)	110 (758)		800 ~ 1200	320 ~ 350
TP110H	110 (758) ~ 140 (965)	120 (827)		800 ~ 1200	350 ~ 375
TP110H-3Cr				2500 ~ 3000	350 ~ 600
TP110H-HP13Cr				2500 ~ 3000	350 ~ 600
TP125H	125 (862) ~ 150 (1034)	135 (931)		1200 ~ 1500	320 ~ 350

Heavy oil reservoirs of China are widely distributed. More than 70 reservoirs had been founded at 12 basins with prognostic reserves of 30 billion tons. TP-H casings are widely used for heavy oil extraction.

When in-situ-combustion is applied during heavy oil extraction, it is a perfect choice of using TP-H Chromium rich casing as inner casing for steam-injection well and production well.

Quantity of supply



TPCO provides a complete range of steel grades for all kinds of oil and gas operations. To improve the corrosion resistance for the demanding conditions of particular oil and gas wells, TPCO has developed a variety of proprietary steel grades that extend

the life span of pipe products reducing corrosion rates

- Sour service
- Sweet service
- Corrosion Resistant Alloy (CRA)

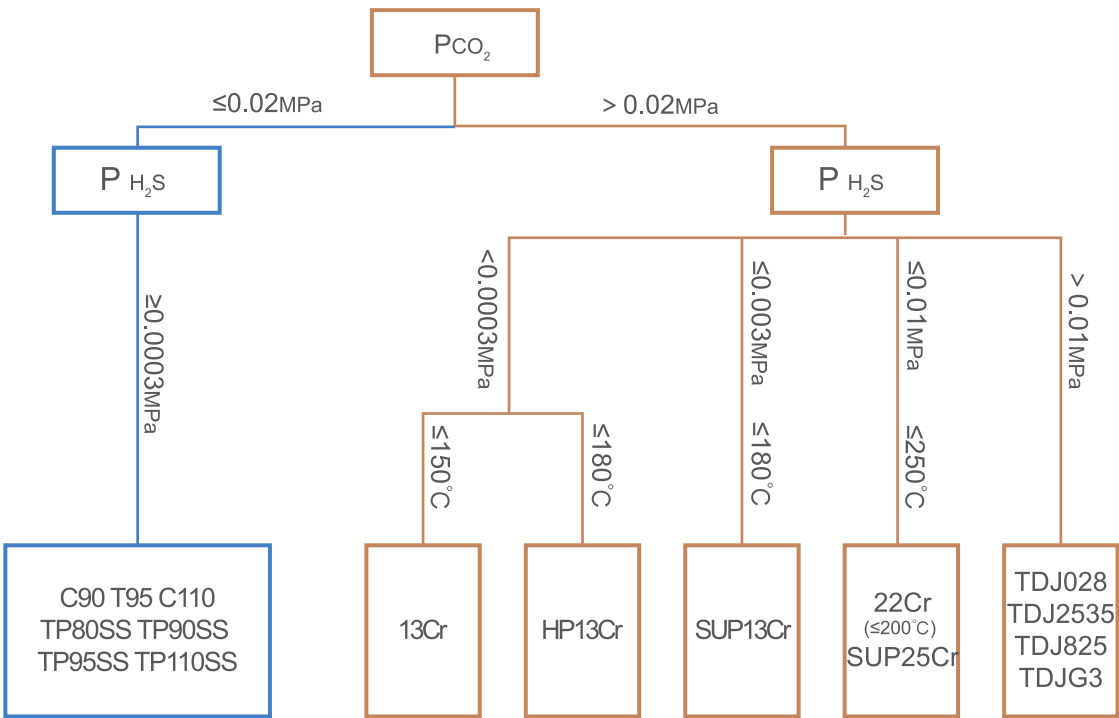
TPCO Product Table for corrosive environments

Grade (ksi)	API Grade	TPCO Proprietary Grade					
		S	SS	TS	TSS	Cr	CRA
Application		Sour	Severe Sour	High collapse & sour	High collapse & severe sour	Sweet service	Highly Corrosive
<80							TP65-22Cr TP75-25Cr
80		TP80S	TP80SS	TP80TS	TP80TSS	TP80-1Cr TP80-3Cr L80-9Cr L80-13Cr	TP80-SUP25Cr
90	C90	TP90S	TP90SS	TP90TS	TP90TSS	TP90-1Cr TP90-3Cr	TP90-SUP25Cr
95	T95	TP95S	TP95SS	TP95TS	TP95TSS	TP95-1Cr TP95-3Cr TP95-13Cr TP95-HP13Cr TP95-SUP13Cr	
110	C110	TP110S	TP110SS	TP110TS	TP110TSS	TP110-1Cr TP110-3Cr TP110-13Cr TP110-HP13Cr TP110-SUP13Cr TP110-SUP15Cr	TP110-22Cr TP110-25Cr TP110-SUP25Cr TP110-TDJ028 TP110-TDJ2535 TP110-TDJ825 TP110-TDJG3
125			TP125SS		TP125TSS	TP125--SUP13Cr TP125--SUP15Cr	TP125-22Cr TP125-25Cr TP125-SUP25Cr TP125-TDJ028 TP125-TDJ2535 TP125-TDJ825 TP125-TDJG3

Corrosion Resistance Casing

Material selection guidelines and their applications to corrosive well.

This material selection chart helps you choose the appropriate material for your application depending on H₂S and CO₂ partial pressure, and temperature range in the well.If you need more details,please contact TPCO for finer material recommendations.



TPCO offers a full range of standard API and proprietary grades covering most of the the needs of the OCTG industry. From standard applications to the most severe environments, TPCO is your worldwide guarantee for quality and reliability. Check out the grade summary table below and material selection chart inside to find out what grade will best fit your need.

Sour Service

API steel grades

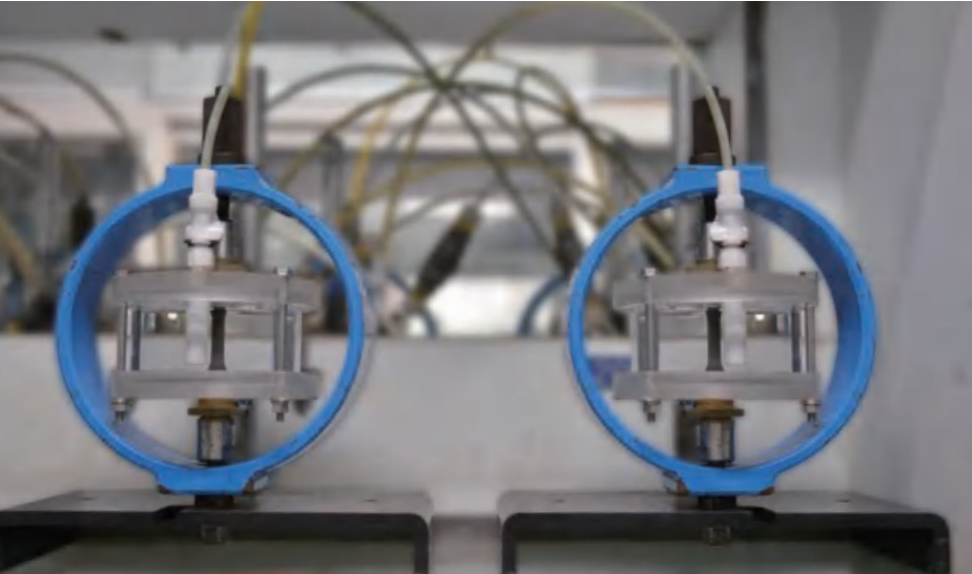
TPCO manufactures all API steel grades including all the additional Supplementary Requirements (SR) and/or Product Specification Levels (PSLs).

API standard sour service grades

Grade	Mechanical Properties					SSC Test	
	Yield Strength		Tensile Strength	Hardness	Impact	Method A	Method D
	(ksi)		(ksi)	(HRC)	Toughness (J)	(SMYS)	(MPa•√m)
	min.	max.	min.	max.	min.	min.	min.(average)
C90	90	105	100	25.4	API 5CT	80%	33.0
T95	95	110	105	25.4	API 5CT	80%	33.0
C110	110	120	115	29.0	API 5CT	85%	26.4

C90, T95 and C110 are the dedicated API grades suitable for sour service environments. They comply with the following requirements:

- Chemical composition
- Grain size finer than ASTM 5 (C90 T95)
- Grain size finer than ASTM 6 (C110)
- Hardness limitation
- NACE tests (TM 0177), methods A or D



TPCO proprietary steel grades

Sour service grades

Grade	Mechanical Properties					SSC Test
	Yield Strength (ksi)		Tensile Strength (ksi)	Hardness (HRC)	Impact Toughness (J)	Method A (SMYS)
	min.	max.	min.	max.	min.	min.
TP80S	80	95	95	23	API 5CT	85%
TP90S	90	105	100	25.4	API 5CT	85%
TP95S	95	110	105	25.4	API 5CT	85%
TP110S	110	120	115	29	API 5CT	80%

Severe sour service grades

Grade	Mechanical properties					SSC Test
	Yield Strength (ksi)		Tensile Strength (ksi)	Hardness (HRC)	Impact Toughness (J)	Method A (SMYS)
	min.	max.	min.	max.	min.	min.
TP80SS	80	95	95	23	API 5CT	90%
TP90SS	90	105	100	25.4	API 5CT	90%
TP95SS	95	110	105	25.4	API 5CT	90%
TP110SS	110	120	115	29	API 5CT	85%
TP125SS	125	135	130	34	AP15CT	85% ⁽¹⁾

(1) Method A,Solution B, the H₂S partial pressure is 3% atm.

High collapse & sour service grades

TPCO proprietary products combining High Collapse and Sour Service. TPCO offers a complete range of OCTG High Collapse grades, to meet the most challenging collapse conditions of well environment and load cases scenarios.

Grade	Mechanical Properties					SSC test
	Yield Strength (ksi)		Tensile Strength (ksi)	Hardness (HRC)	Impact Toughness (J)	Method A (SMYS)
	min.	max.	min.	max.	min.	min.
TP80TS	80	95	95	23	API 5CT	85%
TP90TS	90	105	100	25.4	API 5CT	85%
TP95TS	95	110	105	25.4	API 5CT	85%
TP110TS	110	120	115	29	API 5CT	80%

High collapse & severe sour service grades

Grade	Mechanical Properties					SSC test
	Yield Strength (ksi)		Tensile Strength (ksi)	Hardness (HRC)	Impact Toughness (J)	Method A (SMYS)
	min.	max.	min.	max.	min.	min.
TP80TSS	80	95	95	23	API 5CT	90%
TP90TSS	90	105	100	25.4	API 5CT	90%
TP95TSS	95	110	105	25.4	API 5CT	90%
TP110TSS	110	120	115	29	API 5CT	85%
TP125TS	125	135	130	34	API 5CT	85% ⁽¹⁾

(1) Method A,Solution B,the H₂S partial pressure is 3% atm.

Corrosion Resistance Casing

Sweet Service

The growing demand of energy has resulted in a general need to produce fields with a tangible CO₂ content. In most conditions when the partial pressure of CO₂ is above 0.02 MPa, carbon steels present high corrosion rates. Steel grades alloyed with high contents of Chromium (Cr),

Molybdenum (Mo) and Nickel (Ni) are able to effectively resist corrosion. TPCO can offer 1Cr, 3Cr and 13Cr tubular products. The sweet corrosion service series can be divided into:

- Low chromium pipes
- Martensite stainless steel pipes

Low chromium pipes

Grade (ksi)	Low Chromium Pipes	Martensite Stainless Steel Pipes		
		13Cr	HP13Cr	SUP13Cr
80	TP80-1Cr/3Cr	L80-9Cr L80-13Cr		
90	TP90-1Cr/3Cr			
95	TP95-1Cr/3Cr	TP95-13Cr	TP95-HP13Cr	TP95-SUP13Cr
110	TP110-1Cr/3Cr		TP110-HP13Cr	TP110-SUP13Cr

TPCO can offer a cost effective alternative in case of mild sweet corrosion. Low chromium grades are carbon steel designed for improved performance in mild sweet corrosion environments. The performance can be further improved when combined with TPCO's premium connections or a proper inhibitor program. Low chromium grades also being used in water injection applications,

as a good improvement for carbon steels, although retaining some of their limitations. The corrosion film, although not producing complete protection, provides a higher resistance level when compared with standard API L80 grade, always in combination with a proper water treatment in order to provide controlled dissolved oxygen levels in the injected water.

Series	Grade	Yield Strength (ksi)		Tensile Strength (ksi)	Hardness (HRC)
		min.	max.	min.	max.
Low chromium pipes	TP80-1Cr/3Cr	80	95	95	23
	TP90-1Cr /3Cr	90	105	100	26
	TP95-1Cr /3Cr	95	110	105	27
	TP110-1Cr /3Cr	110	140	125	34

Martensite stainless steel pipes

In oil and gas fields for future development, gas which includes CO₂ is an increasingly common occurrence. Corrosion has become the major problem for fields with more severe conditions such as high temperature

and containing not only CO₂ but also small amount of H₂S, TPCO developed HP13Cr、SUP13Cr and SUP15Cr material which has higher strength and outstanding anti-corrosion property.

Series	Grade	Yield Strength (ksi)		Tensile Strength (ksi)	Hardness (HRC)
		min.	max.	min.	max.
Martensite stainless steel pipes	L80-13Cr	80	95	95	23
	TP95-13Cr	95	110	105	27
	TP95-HP13Cr	95	110	105	28
	TP110-13Cr	110	140	115	32
	TP110-HP13Cr	110	140	115	32
	TP95-SUP13Cr	95	110	105	28
	TP110-SUP13Cr	110	140	115	32
	TP110-SUP15Cr	110	140	115	34
	TP125-SUP15Cr	125	150	130	36

TPCO's 13Cr series is a martensitic stainless steel which has high performance in such kind of corrosive condition. SUP13Cr、SUP15Cr can be used in mild sour conditions.

HP13Cr、SUP13Cr and SUP15Cr have better performance with regards to corrosion resistance and excellent low-temperature toughness.



Corrosion Resistance Casing

Corrosion Resistant Alloy (CRA)

Manufacturing process

These CRA materials are needed when there is a combination of the following factors: presence of CO₂, presence of H₂S, low pH, chlorides and high temperature.

CRA products

Structure	Material	Grade	Number	Group & Category	Delivery Condition
Duplex (Austenitic/ Ferritic)	22Cr	TP65-22Cr TP110-22Cr TP125-22Cr	S31803	2 & 22-5-3	SA/CH ⁽¹⁾
	25Cr	TP75-25Cr TP110-25Cr TP125-25Cr	S31260	2 & 25-7-3	
	SUP25Cr	TP80-SUP25Cr TP90-SUP25Cr TP110-SUP25Cr TP125-SUP25Cr	S32750 S32760 S39274	2 & 25-7-4	SA/CH
Austenitic Fe-base	TDJ028	TP110-TDJ028 TP125-TDJ028	N08028	3 & 27-31-4	CH
	TDJ2535	TP110-TDJ2535 TP125-TDJ2535	N08535	3 & 25-32-3	
Austenitic Ni-base	TDJ825	TP110-TDJ825 TP125-TDJ825	N08825	4 & 21-42-3	CH
	TDJG3	TP110-TDJG3 TP125-TDJG3	N06985	4 & 22-50-7	CH

(1): SA: Solution annealed
CH: Cold hardened

Specified mechanical properties

Material	Grade	Yield Strength(ksi) Rp0.2		Tensile Strength (ksi)	Elongation (%)	Mean HRC
		min.	max.	min.	min.	max.
22Cr	TP65	65	90	90	25	26
	TP110	110	140	125	11	36
	TP125	125	145	130	10	36
25Cr	TP75	75	100	90	25	26
	TP110	110	140	125	11	36
	TP125	125	145	130	10	36
SUP25Cr	TP80	80	105	110	20	28
	TP90	90	105	115	20	30
	TP110	110	140	125	12	36
	TP125	125	145	130	10	36
TDJ028/ TDJ2535	TP110	110	140	115	11	33
	TP125	125	145	130	10	35
TDJ825	TP110	110	140	115	11	35
	TP125	125	145	130	10	35
TDJG3	TP110	110	140	115	11	35
	TP125	125	150	130	10	37

Handling, packaging, storage for CRA pipes

- As per ISO13680: Petroleum and natural gas industries-Corrosion resistant alloy seamless tubes for use as casing, tubing and coupling stock-Technical delivery conditions.
- As per Q/TGGB30-2021(mill specs) : TDJG3 Ni-base alloy pipe Handling, packaging, storage-Technical conditions.



Drill Pipe Stock

Manufacture specifications

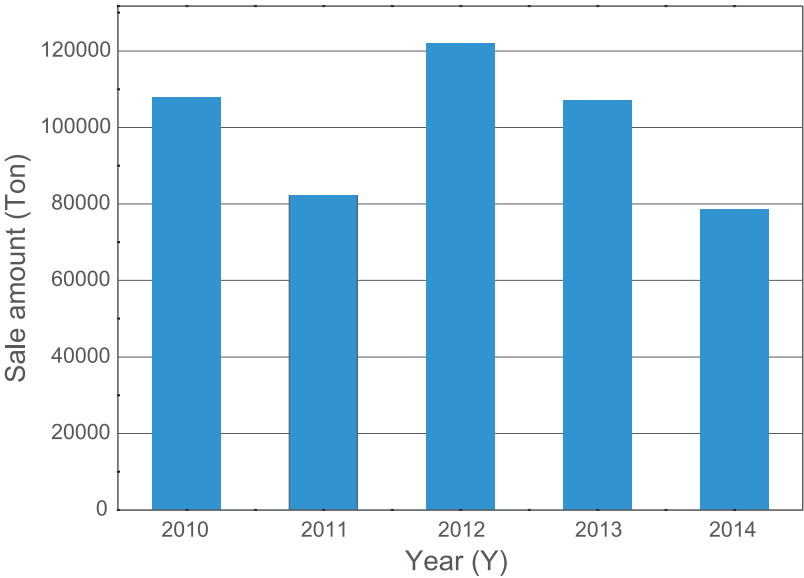
API SPEC 5DP: Specification for Drill Pipe
ISO 11961: Petroleum and natural gas industries -Steel drill pipe
SY/T-5200: Drill stem subs
IRP VOLUME 1 : CRITICAL SOUR DRILLING

Mechanical properties

Specification	Grade		Yield Strength		Tensile Strength	Elongation	Charpy Impact Average	SSC Requirement
			min.	max.	min.	min.	min.	
			ksi(MPa)	ksi(MPa)	ksi(MPa)	(%)	ft-lb (J)	
API 5DP	Group 1	E-75	75 (517)	105 (724)	100 (689)	API formula	32 (43)	-
	Group 3	X-95	95 (655)	125 (862)	105 (724)	API formula	32 (43)	-
		G-105	105 (724)	135 (931)	115 (793)	API formula	32 (43)	-
		S-135	135 (931)	165(1138)	145(1000)	API formula	32 (43)	-
TP series	High strength	TP135D	135(931)	165 (1138)	145 (1000)	API formula	59(80) ⁽¹⁾	-
		TP150D	150 (1034)	165 (1138)	160 (1102)	API formula	59(80) ⁽¹⁾	-
		TP165D	165(1137)	-	175(1206)	API formula	59(80) ⁽¹⁾	-
	Sour Services	TP95DS	95(655)	110(758)	105(724)	17	59(80)	70%SMYS
		TP95DSS	95(655)	110(758)	105(724)	17	59(80)	85%SMYS
		TP105DS	105(724)	120(827)	115(793)	17	59(80)	70%SMYS
		TP105DSS	105(724)	120(827)	115(793)	17	59(80)	85%SMYS
	Low Temperature	TP135DLT	135(931)	165 (1138)	145 (1000)	API formula	44(60) ⁽²⁾	-

SMYS: Specified Minimum Yield Strength
SSC requirement: NACE test as per NACE TM0177 Method A Solution A
Charpy Impact Average: Minimum average Charpy Impact Value at room temperature, 3/4 standard size (7.5 X 10mm²)
(1)Minimum average Charpy Impact Value at -20°C, 3/4 standard size (7.5 X 10mm²)
(2)Minimum average Charpy Impact Value at -60°C, 3/4 standard size (7.5 X 10mm²)

Quantity of supply



Heavy thickness pipe for sour service tool joint

TPCO has researched and offered heavy thickness pipe for sour service tool joint. Tool joint is essential to provide the necessary H₂S resistance within the steel and ensure the safety of those working in such harsh environments.

The heavy pipe is quenched and tempered, and has passed NACE test as per NACE TM0177 Method A Solution A. The product need to be machined to tool joint by drill pipe manufacturers.

Specification Reference	Grade	Yield Strength		Tensile Strength	Elongation	Charpy Impact Average ⁽¹⁾	SSC Requirement
		min.	max.	min.	min.	min.	
		ksi(MPa)	ksi(MPa)	ksi(MPa)	(%)	ft-lb (J)	
IRP 1.8	TP 105DSSJ	110(758)	125(862)	125(862)	17	59(80)	65%SMYS

(1)Charpy Impact Average: Minimum average Charpy Impact Value at room temperature, standard size (10 X 10mm²)

Manufacture specifications

US standard: ASTM A519
Q/TGGB26: TPCO internal standard
API SPEC 5CT: Casing and Tube
EN standards: EN 10210、EN 10216
DIN standard: DIN 1629

Mechanical properties

Steel Grade	Yield Strength (MPa)	Tensile Strength (MPa)	Elongation (%)	Full Size,CVN (-L, 0℃, J)	Product Standard
TP-Q750	750~965	≥800	≥14	≥70	Q/TGGB26(mill spec)
TP-Q850	850~1035	≥900	≥14	≥70	Q/TGGB26
TP-Q900	900~1103	≥970	≥12	≥70	Q/TGGB26
TP-Q1000	1000~1172	≥1034	≥12	≥70	Q/TGGB26
TP110P	758~965	≥800	≥14	≥80	customer spec
TP125P	862~1034	≥900	≥14	≥80	customer spec
TP130P	896~1103	≥950	≥12	≥80	customer spec
TP135P	931~1138	≥970	≥12	≥80	customer spec
TP140P	965~1160	≥1000	≥12	≥80	customer spec
TP150P	1034~1200	≥1068	≥12	≥80	customer spec
TP155P	1068~1250	≥1100	≥12	≥80	customer spec
TP165P	1137~1300	≥1172	≥12	≥80	customer spec

Review of product

10,000 tons annually per ASTM A519 and agreements.
Size range from 50.8mm to 177.8mm, including cold
rolled(drawn) & hot rolled tubes.

Product supply and rolling mode

O.D. (mm)	W.T. (mm)	Steel Grade	Rolling Mode	Supplied To
50.8	5.8	TP155P	cold rolling	USA
69.85	7.92	TP-Q900	hot rolling	USA
73.03	8.38	TP110P	hot rolling	USA
73	9	TP-Q850	hot rolling	China
79.38	7.95	TP-Q900	hot rolling	USA
85.73	9.53	TP-Q850	hot rolling	China
85.73	9.53	TP130P	hot rolling	Canada
88.9	9.53	TP110P	hot rolling	USA
101.6	9	TP-Q900	hot rolling	China
101.6	9.53	TP130P	hot rolling	Canada
114.3	8.5	TP110P	hot rolling	USA
79.38	7.37	TP110P	cold rolling	USA
71	7.8	TP150P	cold rolling	USA
85.73	8.5	TP150P	cold rolling	USA
114.3	8.5	TP155P	hot rolling	USA
127	9.5	TP-Q900	hot rolling	China
120	11	TP150P	hot rolling	USA
178	12.65	TP-Q750	hot rolling	China
178	13	TP110P	hot rolling	USA
178	13	TP150P	hot rolling	USA