

Wellhead Assembly, Valve, Manifold, etc.

# Wellhead Assembly, Valve, Manifold, etc.

## Wellhead Assembly

### Composition of Wellhead Assembly

#### Part A: Casing Head

The casing head, installed at the bottom of wellhead assembly connecting casings and various wellhead assemblies, is composed of a body, casing hanger and seal assembly. The casing head is used for supporting the weight of technical and production casing, sealing the annular space between the casing and providing a filtered connection for the installation of upper wellhead assemblies. These assemblies include a blowout preventer (BOP), tubing head and christmas tree. The surface casing is connected by a flange located below the casing head. The oil-string casing is connected by a screw thread inside of the casing head.

#### Part B: Tubing Head

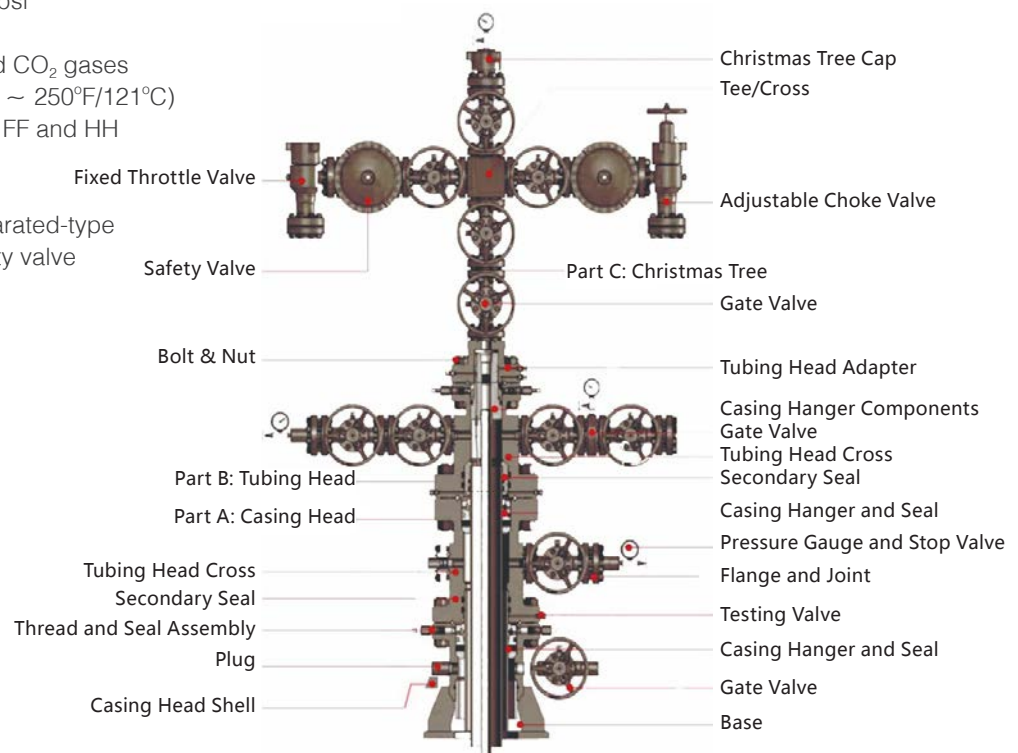
The tubing head is installed above the casing head and includes a tubing head spool and tubing hanger. The tubing hanger is used for hanging the internal tubing string and sealing the annular space between tubing and casing. This is used for conducting well flushing in direct circulation and reverse circulation, observing casing pressure, and for carrying out various tasks through the tubing and casing annular space.

#### Part C: Christmas Tree

The christmas tree is installed above the tubing head and is composed of a gate valve, choke valve, tee/cross, flange, christmas tree cap, etc. This is used for controlling and regulating well production, directing oil or gas from wellhead to pipelines, and achieving down-hole installation and removal of tools and equipment.

#### Specifications:

- Working pressure: 2000 psi ~ 20000 psi
- Nominal diameter:  $7\frac{1}{16}" \sim 21\frac{1}{4}"$
- Working media: oil, gas, mud,  $H_2S$  and  $CO_2$  gases
- Working temperature: LU ( $-51^{\circ}F/-46^{\circ}C \sim 250^{\circ}F/121^{\circ}C$ )
- Material grades: AA, BB, CC, DD, EE, FF and HH
- Specification level: PSL1 ~ 3G
- Performance level: PR1 ~ 2
- Structural type: integral-type and separated-type
- Installable (pneumatic) hydraulic safety valve

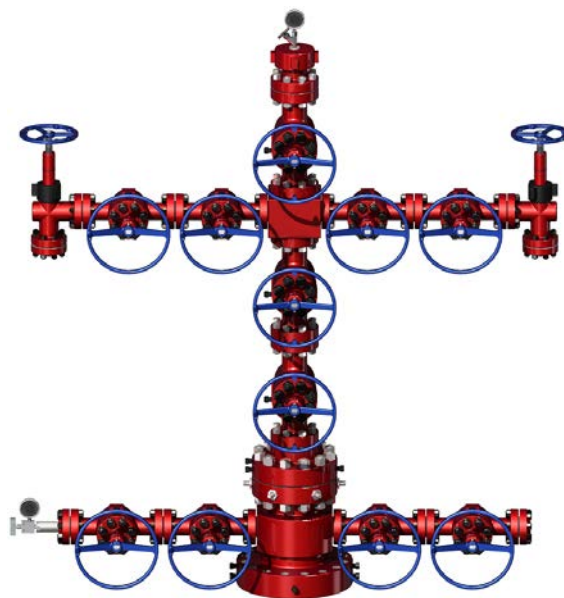


### Christmas Tree

The christmas tree is wellhead equipment used to direct and control oil & gas from the well. This key piece of equipment for controlling the upper part of an oil & gas well and production adjustment and consists of a casing head, tubing head and oil (gas) tree ontology.

Gas production christmas trees and tubing heads are mainly used to produce and inject gas. While the relative density and gas column pressure is low, well head pressure is high and is prone to leakage. Sometimes natural gas may also contain corrosive media such as  $H_2S$  and  $CO_2$ . As a result, gas production christmas trees have more stringent requirements for both materials and sealing characteristics. To ensure a safe operating environment, two gate valves are used on the tubing and casing respectively. Some gate valves, which are used for high pressure and ultra-high pressure gas wells, are integrated valves manufactured from high quality forged steel.

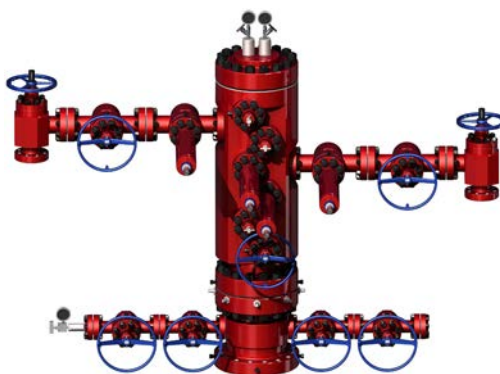
The christmas tree and tubing spools manufactured by Yancheng TSC are both safe and reliable with a high pressure-bearing made of forged or special smelt steel.



Typical Christmas Tree

#### Specifications:

- Working pressure: 2000 psi ~ 20000 psi
- Nominal diameter:  $2\frac{1}{16}$ " ~  $5\frac{1}{8}$ "
- Working media: oil, gas, mud,  $H_2S$  and  $CO_2$  gases
- Working temperature: LU (-51°F/-46°C ~ 250°F/121°C)
- Material grades: AA, BB, CC, DD, EE, FF, HH
- Specification level: PSL1 ~ 3G
- Performance level: PR1 ~ 2
- Installable (pneumatic) hydraulic safety valve



Dual-Tubing Integral-Type Christmas Tree

# Wellhead Assembly, Valve, Manifold, etc.

## Wellhead Assembly

### Ram BOP

The TSC ram BOP can effectively control wellhead pressure, preventing blowout related accidents during drilling and workover operations.

When equipped with a well string, the ram BOP can be coupled with a ram assembly to seal the annular space between the casing and tubing string. When not equipped with a well string, the ram BOP can be coupled with a full sealing disc assembly to close the wellhead.

When equipped with a tight type damper control device and the situation is urgent, the ram BOP can be coupled with a shear ram cut tubing string in the well to seal the entire mouth. In the event that the ram BOP has closed, sealing the well, it can be connected to the outlet side of the choke & choke manifold kill blowout to conduct well washing and other special operations.

The TSC ram BOP is available in EU, U and ES models. It is designed and manufactured in accordance to API 16A requirements and is available in a variety of sizes and specifications.

- Working pressure: 2000 psi ~ 20000 psi
- Nominal diameter:  $7\frac{1}{16}" \sim 30"$
- Working media: oil, gas, mud, including  $H_2S$  and  $CO_2$  gases
- Temp Class: T75, T20, T0
- Metal seal temperature level: A ~ D ( $-15^{\circ}F/-26^{\circ}C \sim 250^{\circ}F/121^{\circ}C$ )
- Rated hydraulic controlled working pressure: 3000 psi
- Recommended working pressure: 1200 psi ~ 1500 psi
- Upper and lower connection: the upper flange, planted wire, clamp connection; the lower flange, planted, clamp wire connection
- Lock: hydraulic and manual lock
- Fluid containment specifications: 1" NPT
- Optional ram: half sealing gate, sealing ram, shear ram
- Outlet side connection: flange, silk, clamp connection



**EU type Double Ram BOP-Lower Cavity with tandem booster**



**EU Type Single Ram BOP**



**EU Type Double Ram BOP**



**EU Type Pipe Ram**



**EU Type Shear Ram**



**EU Variable Ram**



**ES Type Double Ram BOP**



**ES Type Pipe Ram**



**EF Type Pipe Ram**



## Wellhead Assembly, Valve, Manifold, etc.

### Wellhead Assembly



ESL/ESLX Type Double Ram BOP



ELWS Type Double Ram BOP



EHF Type Pipe Ram

## Annular BOP

The TSC annular BOP is an important well control device that is mainly used for drilling, workover, and other tasks to effectively control wellhead pressure. This creates a safe working environment and prevents blowout accidents. The annular BOP must be equipped with a hydraulic control system. Typically, the annular BOP is used in conjunction with a ram BOP, but it can also be used individually, and can either be spherical or conical.

- Working pressure: 2000 psi ~ 20000 psi
- Nominal diameter:  $7\frac{1}{16}$ " ~ 30"
- Working media: oil, gas, mud, including  $H_2S$  and  $CO_2$  gases
- Metal temp Class: T75, T20, T0
- Non metal seal temperature class: A ~ D (-15°F/-26°C ~ 250°F/121°C)
- Rated hydraulic controlled working pressure: 3000 psi
- Recommended working pressure: 1200 psi ~ 1500 psi
- Upper and lower connection: the upper flange, planted wire, clamp connection; the lower flange, planted, clamp wire connection
- Fluid containment specifications: 1" NPT



EB Type Annular BOP



EL Type Annular BOP



EW Type Annular BOP



EGK Type Annular BOP  
(Screw Head)



EGK Type Annular BOP  
(Latched Head)



Sealing Element EB Type  
Annular BOP



Steel Segment Reinforced  
Sealing Element  
EB Type Annular BOP



Sealing Element EW Type  
Annular BOP



Steel Segment Reinforce  
Sealing Element  
EW Type Annular BOP



Sealing Element EL Type  
Annular BOP



Drilling Spool



29 $\frac{1}{2}$ " 500psi Diverter



30" 1000psi Diverter

## Wellhead Assembly

### Tubing Spool

#### Tubing Head

The tubing head connects the upper casing head with the christmas tree and is used for hanging the tubing hanger and sealing the annular space for the string and oil-layer casing.

#### Side Outlet Connection Format

- Pipeline screw thread
- JHQ-A

#### Base Position

- PE seal
- Used for the secondary seal casing (secondary seal can be customized)

The tubing spool manufactured by Yancheng TSC is in full accordance with API 6A requirements. The body is constructed of forged, or special smelt steel, resulting in safe and reliable operations. Side outlets can be pipe threaded or of the studded variation. The studded side outlet is processed with VR internal thread and both valves offer convenient changing procedures.



Tubing Head Spool – Single Tubing

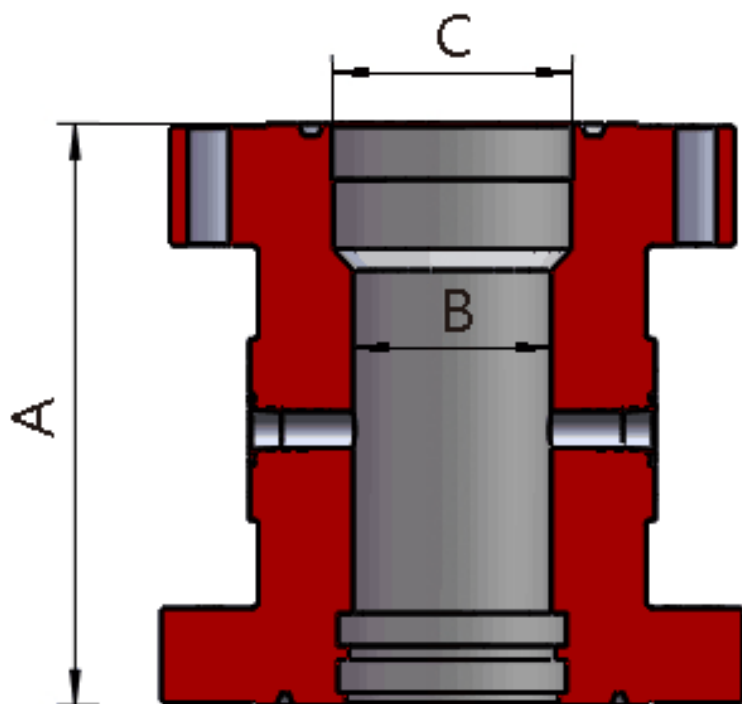


Tubing Head Spool – Dual Tubing



Tubing Head Spool – c/w Cable Penetrator

### Tubing Spool Specifications



Flange at the Bottom		Flange on the top		Dimensions			Weight (lbs)
				A (in)	B (in)	C (in)	
11"	2000	7 <sup>-1/16</sup> "	3000	23.12	6.76	7.00	550
	3000	7 <sup>-1/16</sup> "	3000	23.12	6.76	7.00	600
		9"	5000	26.25	6.76	7.00	670
			3000	26.25	8.25	8.75	750
	5000	9"	5000	26.25	8.25	8.75	800
			5000	26.25	6.76	7.00	880
		7 <sup>-1/16</sup> "	10000	31.25	6.76	7.00	856
			10000	31.25	8.25	8.75	1249
	10000	7 <sup>-1/16</sup> "	10000	32.62	6.76	7.00	1318
			15000	33.25	6.76	7.00	----
		9"	10000	32.62	8.25	8.75	1700
13 <sup>-5/8</sup> "	2000	7 <sup>-1/16</sup> "	3000	23.12	6.76	7.00	445
		9"	3000	23.12	8.25	8.75	655
	3000	7 <sup>-1/16</sup> "	3000	26.25	6.76	7.00	670
			5000	26.25	6.76	7.00	805
		9"	3000	26.25	8.25	8.75	705
			5000	26.75	8.25	8.75	715
	5000	11"	10000	30.25	10.00	10.88	1754

Note: The dimensions above are for reference only and can be designed according to customer requirements. Please contact Yancheng TSC for specific data and current product specifications.

# Wellhead Assembly, Valve, Manifold, etc.

## Wellhead Assembly

### Casing Head

The casing head is a component connecting casings and various wellhead assemblies and is used to support the weight of technical casing and production casing, sealing the annular space between the casing and installing BOP stacks. The casing head also provides a transition joint for the tubing head, christmas tree and other wellheads. The head can also supply cement, monitor & control a well's sinking and inject balance liquids via the two side outlets on the casing head housing.

#### Base Position

- PE seal
- Used for the secondary seal casing (secondary seal can be customized according customer needs)

#### Locking Device

- Casing head can provide locking nail used to wear bushing
- Casing head provides a set of lock screw for spindle casing hanger and sealing device

#### Side Outlet Connection Format

- Pipeline screw thread
- JHQ-A

The casing head produced by Yancheng TSC is a standard type composition and equipped with a casing hanger inside the shell. Casing hangers of varying dimensions can be provided according to casing programs and wellhead conditions. All casing heads are equipped with an API 6B or API 6BX flange on the top.



Casing Head – Slip Bottom



Casing Head – Threaded or Welded Bottom



We-Type Casing Hanger



W-Type Casing Hanger



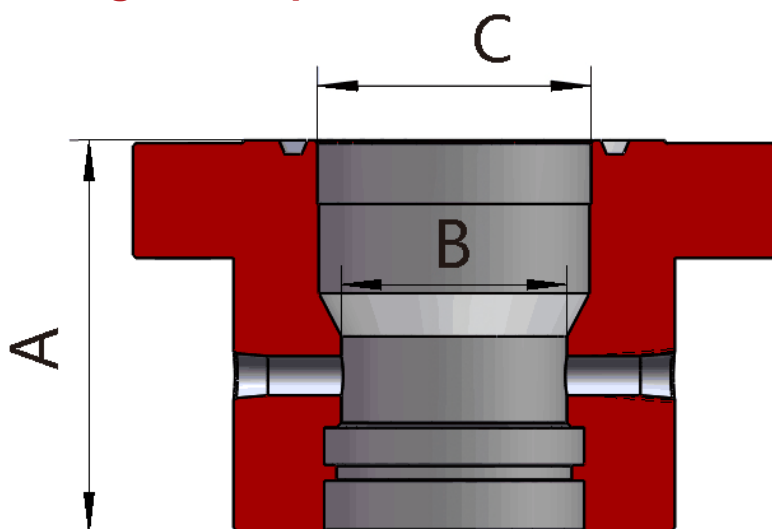
Wd-Type Casing Hanger



C-Type Casing Hanger



### Casing Head Specifications



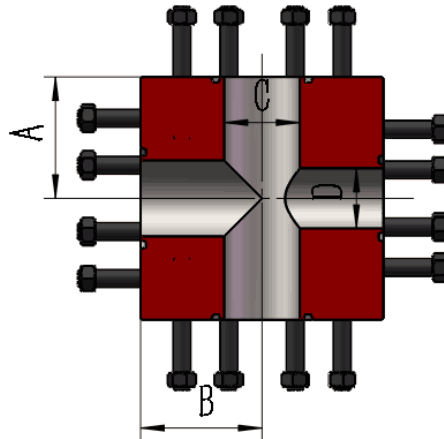
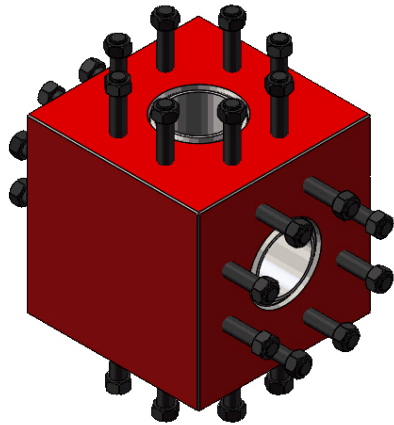
Dimension of Casing	Flange	Working Pressure (psi)	Dimensions			Weight (lbs)
			A ( in )	B ( in )	C ( in )	
8 <sup>-5/8</sup> "	11"	2000	17.25	8.00	10.88	340
		3000	17.25	8.00	10.88	460
		5000	17.50	8.00	10.88	710
9 <sup>-5/8</sup> "	11"	2000	17.25	9.00	10.88	320
		3000	17.25	9.00	10.88	430
		5000	17.50	9.00	10.88	680
10 <sup>-3/4</sup> "	11"	2000	17.25	10.00	10.88	300
		3000	17.25	10.00	10.88	410
		5000	17.50	10.00	10.88	560
11 <sup>-3/4</sup> "	13 <sup>-5/8</sup> "	2000	17.50	11.00	13.50	469
		3000	17.50	11.00	13.50	587
		5000	17.50	11.00	13.50	----
	16 <sup>-3/4</sup> "	3000	17.50	11.00	16.62	----
		5000	18.00	11.00	16.62	----
13 <sup>-3/8</sup> "	13 <sup>-5/8</sup> "	2000	17.50	12.56	13.50	380
		3000	17.50	12.56	13.50	500
		5000	17.50	12.56	13.50	750
	16 <sup>-3/4</sup> "	3000	17.50	12.56	16.62	----
		5000	18.00	12.56	16.62	----
16"	16 <sup>-3/4</sup> "	2000	17.50	15.37	16.62	980
		3000	17.50	15.37	16.62	995
		5000	18.00	15.37	16.62	----
20"	21 <sup>-1/4</sup> "	2000	19	19.12	20.12	1210
	20 <sup>-3/4</sup> "	3000	19	19.12	20.12	1331

Note: The dimensions above are for reference only and can be designed according to customer requirements. Please contact Yancheng TSC for specific data and current product specifications.

# Wellhead Assembly, Valve, Manifold, etc.

## Wellhead Assembly

### Tee & Cross Specifications



### Channel Specification

Channel Specification	Dimensions				Weight (lbs)	
	A (in)	B (in)	C (in)	D (in)	Tee	Cross
2 <sup>-1/16</sup> " 2000 psi	3.50	3.50	2.06	2.06	95	85
2 <sup>-1/16</sup> " 5000 psi	4.50	4.50	2.06	2.06	160	161
2 <sup>-9/16</sup> " 2000 psi	4.50	4.50	2.56	2.56	125	119
2 <sup>-9/16</sup> " 5000 psi	4.50	5.00	2.56	2.06	375	255
2 <sup>-9/16</sup> " 5000 psi	5.00	5.00	2.56	2.56	350	225
3 <sup>-1/8</sup> " 2000 psi	4.50	4.50	3.12	3.12	198	185
3 <sup>-1/8</sup> " 3000 psi	4.50	5.00	3.12	2.06	264	231
3 <sup>-1/8</sup> " 3000 psi	5.00	5.00	3.12	2.56	350	275
3 <sup>-1/8</sup> " 3000 psi	5.00	5.00	3.12	3.12	264	271
3 <sup>-1/8</sup> " 5000 psi	4.50	5.50	3.12	2.06	264	295
3 <sup>-1/8</sup> " 5000 psi	5.50	5.50	3.12	2.56	364	310
3 <sup>-1/8</sup> " 5000 psi	5.50	5.50	3.12	3.12	414	321
4 <sup>-1/16</sup> " 2000 psi	5.50	5.50	4.06	4.06	405	354
4 <sup>-1/16</sup> " 3000 psi	5.00	6.12	4.06	3.12	451	435
4 <sup>-1/16</sup> " 3000 psi	6.12	6.12	4.06	4.06	495	451
4 <sup>-1/16</sup> " 5000 psi	5.00	6.50	4.06	2.56	447	425
4 <sup>-1/16</sup> " 5000 psi	5.50	6.50	4.06	3.12	488	425
4 <sup>-1/16</sup> " 5000 psi	6.50	6.50	4.06	2.56	565	486
1 <sup>-13/16</sup> " 10000 psi	4.38	4.38	1.81	1.81	191	187
1 <sup>-13/16</sup> " 15000 psi	5.00	5.00	1.81	1.81	258	253
2 <sup>-1/16</sup> " 10000 psi	4.38	4.38	2.06	1.81	191	187
2 <sup>-1/16</sup> " 10000 psi	4.38	4.38	2.06	2.06	191	187
2 <sup>-1/16</sup> " 15000 psi	5.00	5.00	2.06	1.81	257	253
2 <sup>-1/16</sup> " 15000 psi	5.00	5.00	2.06	2.06	257	253
2 <sup>-9/16</sup> " 10000 psi	4.50	5.12	2.56	1.81	246	241
2 <sup>-9/16</sup> " 10000 psi	4.50	5.12	2.56	2.06	246	241
2 <sup>-9/16</sup> " 10000 psi	5.12	5.12	2.56	2.56	286	280
2 <sup>-9/16</sup> " 15000 psi	5.50	5.50	2.56	1.81	386	307
2 <sup>-9/16</sup> " 15000 psi	5.50	5.50	2.56	2.06	389	350
2 <sup>-9/16</sup> " 15000 psi	5.50	5.50	2.56	2.56	375	335
3 <sup>-1/16</sup> " 10000 psi	4.50	5.88	3.06	1.81	370	350
3 <sup>-1/16</sup> " 10000 psi	4.50	5.88	3.06	2.06	370	350
3 <sup>-1/16</sup> " 10000 psi	5.12	5.88	3.06	2.56	407	433
3 <sup>-1/16</sup> " 10000 psi	5.88	5.88	3.06	3.06	480	464
3 <sup>-1/16</sup> " 15000 psi	6.31	6.31	3.06	1.81	486	470
3 <sup>-1/16</sup> " 15000 psi	6.31	6.31	3.06	2.06	470	440
3 <sup>-1/16</sup> " 15000 psi	6.31	6.31	3.06	2.56	440	432
3 <sup>-1/16</sup> " 15000 psi	6.31	6.31	3.06	3.06	430	422

# Wellhead Assembly, Valve, Manifold, etc.

## Valve

### API 6A Valve Material Specification

Material Grade	Valve Body	Valve Bonnet	Valve Stem	Valve Plate	Valve Seat	Injection Valve
AA	4C	4130	4130+N2	4130+WC	4130+WC	Body 304
BB	4130	4130	4130+N2	410+WC	410+WC	Body 316
CC	ZG1Cr13	1Cr13	17-4PH+N2	1Cr13+WC	1Cr13+WC	Body 304
DD	4C	4130	4130+N2	4130+N2	4130+N	Body 304
DD-NL	4C/4130	4130	4130+N2	4130+N2	4130	Body 304
DD1-NL	4C/4130	4130	4130+N2	4130+WC	4130+WC	Body 304
EE	4C/4130	4130	17-4PH+N2	410+WC	410+WC	Body 316
EE 0,5	4C/4130	4130	17-4PH+N2	410+N2	410+N2	Body 316
EE1 0,5	4C/4130	4130	17-4PH+N2	410+WC	410+WC	Body 316
EE2 0,5	4C/4130	4130	17-4PH+N2	410+STL6	410+ STL6	Body 316
EE3 0,5	4C/4130	4130	17-4PH+N2	17-4PH+N2	17-4PH+N2	Body 316
EE 1,5	4C/4130	4130	410+N2	410+N2	410+N2	Body 316
EE1 1,5	4C/4130	4130	410+N2	410+WC	410+WC	Body 316
EE2 1,5	4C/4130	4130	410+N2	410+STL6	410+ STL6	Body 316
EE3 1,5	4C/4130	4130	410+N2	17-4PH+N2	17-4PH+N2	Body 316
EE-NL	4C/4130	4130	INCONEL 718	410+N2	410+N2	Body 316
EE1-NL	4C/4130	4130	INCONEL 718	410+WC	410+WC	Body 316
EE2-NL	4C/4130	4130	INCONEL 718	410+STL6	410+ STL6	Body 316
EE3-NL	4C/4130	4130	INCONEL 718	17-4PH+N2	17-4PH+N2	Body 316
FF	CA15	410	17-4PH+N2	410+WC	410+WC	Body 316
FF 0,5	CA15/ 410	410	17-4PH+N2	410+N2	410+N2	Body 316
FF1 0,5	CA15/410	410	17-4PH+N2	410+WC	410+WC	Body 316
FF2 0,5	CA15/410	410	17-4PH+N2	410+STL6	410+ STL6	Body 316
FF3 0,5	CA15/410	410	17-4PH+N2	17-4PH+N2	17-4PH+N2	Body 316
FF 1,5	CA15/410	410	410+N	410+N2	410+N2	Body 316
FF1 1,5	CA15/410	410	410+N	410+WC	410+WC	Body 316
FF2 1,5	CA15/410	410	410+N	410+STL6	410+ STL6	Body 316
FF3 1,5	CA15/410	410	410+N	17-4PH+N2	17-4PH+N2	Body 316
FF-NL	CA15/410	410	INCONEL 718	410+N2	410+N	Body 316
FF1-NL	CA15/410	410	INCONEL 718	410+WC	410+WC	Body 316
FF2-NL	CA15/410	410	INCONEL 718	410+STL6	410+ STL6	Body 316
FF3-NL	CA15/410	410	INCONEL 718	17-4PH+N2	17-4PH+N2	Body 316
HH	4130+625	718	INCONEL 718	INCONEL 718	INCONEL 718	Body 718
HH-NL	4130+625	4130+625	INCONEL 718	718+STL6	718+STL6	Body 718
HH1-NL	4130+625	4130+625	INCONEL 718	718+STL6	718+STL6	Body 718

## Valve

### Flat Gate Valve

The flat gate valve is a type of closure device for the parallel slide valve of a gate. The closure pieces can be single ram or double ram with open institution.

#### Specifications:

- Working pressure: 2000 psi ~ 20000 psi
- Nominal diameter:  $2\frac{1}{16}$ " ~  $7\frac{1}{16}$ "
- Working media: oil, gas, mud, H<sub>2</sub>S and CO<sub>2</sub> gases
- Working temperature: LU (-51°F/-46°C ~ 250°F/121°C)
- Material grades: AA, BB, CC, DD, EE, FF, HH
- Specification level: PSL1 ~ 3G
- Performance level: PR1 ~ 2

#### Features:

- Utilize API 6A, 6D and NACE MR0175 standard design and manufacture;
- Seating and sealing face of valve plate heap (spray) are a welded hard alloy;
- Valve seat and valve plate are sealed, stem seal uses a safe and reliable lip type combination wellhead sealing structure;
- The switch valve has low torque;
- Inverted stem seal design, packing can be replaced under pressure;
- Gate structure has a rising stem and a non-rising stem, the opening of the valve is clearly marked;
- Valve plate structure has integral or expandable forms;
- The seat structure has floating and fixed forms;
- Drive has manual, hydraulic and gear transmission forms;
- Connections have flange thread and clamp.



**Manual Gate Valve - Rising Stem**



**Hydraulic Gate Valve - Manual Locking**



**Manual Gate Valve - Non Rising Stem**



**Hydraulic Flat Valve**

# Wellhead Assembly, Valve, Manifold, etc.

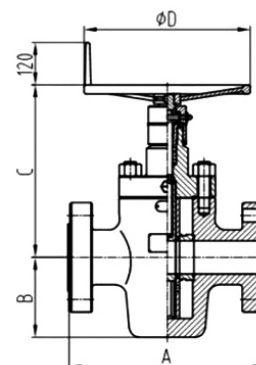
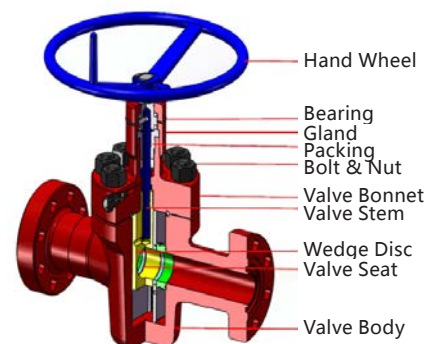
## Valve

### FC-Type Flat Gate Valve

The FC-type flat gate valve is a type of one-gate valve as well as a full-bore gate valve. It can be used for double-flange, threaded-end and special connection configuration. Pressure ranges from 2000 to 15000 psi and aperture sizes from 1-<sup>13</sup>/<sub>16</sub>" to 7-<sup>1</sup>/<sub>16</sub>". In addition, it can be utilized with the actuator manufactured by Yancheng TSC.

#### Features:

- Bi-directional downstream seal structure, improved service life;
- Fixed metallic seal (between value plate and valve seat, and between valve seat and valve body);
- Simple and reliable design for wedge disc and valve seat, which can reduce on-site service and minimize spare and accessory parts inventory;
- Seal ring between valve seat and valve body can facilitate low-pressure sealing and prevent particulate contamination entering into valve body cavity and sealing area.
- Valve stem seal design covers all pressure ratings, full temperature range and all possible fluid conditions in wellhead and manifold environment;
- Metallic seal is applied between valve bonnet and valve body;
- Valve stem's rear seal structure allows for valve to be replaced when valve stem seal is under pressure;
- In order to ensure safety, a grease injection device can be placed behind the valve stem's rear seal and set on the valve bonnet to eliminate leakage into valve body;
- Small switch working torque is easy to be turned on and off.



### FC-Type Flat Gate Valve Specifications:

Nominal Diameter (in)	Nominal Pressure (psi)	Dimensions				Weight (lbs )	Number of Switch Turns
		A (in)	B (in)	C (in)	D (in)		
1- <sup>13</sup> / <sub>16</sub> "	10000	18	6	17	14	240.5	12- <sup>1</sup> / <sub>3</sub>
	15000	18	6	17	14	280.2	12- <sup>1</sup> / <sub>3</sub>
2- <sup>1</sup> / <sub>16</sub> "	2000	12	5	15	14	101.5	12- <sup>1</sup> / <sub>3</sub>
	3000	15	6	15	14	185.3	12- <sup>1</sup> / <sub>3</sub>
	5000	15	6	17	14	185.3	12- <sup>1</sup> / <sub>3</sub>
	10000	21	6	17	18	271.4	12- <sup>1</sup> / <sub>3</sub>
	15000	19	6	17	18	300.1	12- <sup>1</sup> / <sub>3</sub>
2- <sup>9</sup> / <sub>16</sub> "	2000	13	6	16	14	150.0	15- <sup>1</sup> / <sub>8</sub>
	3000	17	6	16	14	229.5	15- <sup>1</sup> / <sub>8</sub>
	5000	17	7	19	14	229.5	15- <sup>1</sup> / <sub>8</sub>
	10000	22	7	18	20	370.7	15- <sup>1</sup> / <sub>8</sub>
	15000	21	8	20	20	562.7	15- <sup>3</sup> / <sub>4</sub>
3- <sup>1</sup> / <sub>8</sub> "	2000	14	7	19	14	211.8	18- <sup>1</sup> / <sub>8</sub>
	3000	17	7	19	14	280.2	18- <sup>1</sup> / <sub>8</sub>
	5000	19	7	19	18	342.0	18- <sup>1</sup> / <sub>8</sub>
3- <sup>1</sup> / <sub>16</sub> "	10000	24	8	18	20	529.6	18- <sup>1</sup> / <sub>8</sub>
	15000	24	8	22	22	893.6	22- <sup>7</sup> / <sub>8</sub>
4- <sup>1</sup> / <sub>16</sub> "	2000	17	9	21	20	350.8	23- <sup>1</sup> / <sub>4</sub>
	3000	20	9	21	20	452.3	23- <sup>1</sup> / <sub>4</sub>
	5000	22	9	21	20	540.6	23- <sup>1</sup> / <sub>4</sub>
	10000	26	10	21	24	871.6	23- <sup>1</sup> / <sub>4</sub>
	15000	29	12	36	24	1557.8	23- <sup>1</sup> / <sub>4</sub>
5- <sup>1</sup> / <sub>8</sub> "	3000	24	11	23	24	933.3	27- <sup>1</sup> / <sub>2</sub>
	5000	29	121	24	24	1101.0	27- <sup>1</sup> / <sub>2</sub>
	10000	29	13	25	24	1312.9	29
7- <sup>1</sup> / <sub>16</sub> "	3000	28	15	48	43	1875.5	46- <sup>1</sup> / <sub>2</sub>
	5000	32	15	48	43	1977.0	46- <sup>1</sup> / <sub>2</sub>



# Wellhead Assembly, Valve, Manifold, etc.

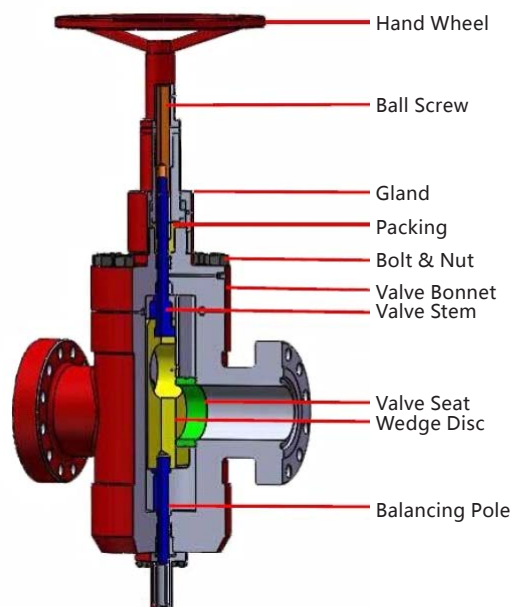
## Valve

### Ball Screw Gate Valve

The TFLS ball screw gate valve was designed by Yancheng TSC for large-diameter, high-pressure manual valves. The valve is combined with a rear balancing pole and unique ball balance creating an easy to use, low torque device.

#### Features:

- Bi-directional downstream seal structure, improved service life;
- Fixed metallic seal (between value plate and valve seat, and between valve seat and valve body);
- Simple and reliable design for wedge disc and valve seat, which can reduce on-site service and minimize spare and accessory parts inventory;
- Seal ring between valve seat and valve body can facilitate low-pressure sealing and prevent particulate contamination entering into valve body cavity and sealing area;
- Valve stem seal design covers all pressure ratings, full temperature range and all possible fluid conditions in wellhead and manifold environment;
- Metallic seal is applied between valve bonnet and valve body;
- Valve stem's rear seal structure allows for valve to be replaced when valve stem seal is under pressure;
- In order to ensure safety, a grease injection device can be placed behind the valve stem's rear seal and set on the valve bonnet to eliminate leakage into valve body;
- Ball screw can effectively improve switch efficiency, reduce switch working torque, and facilitate easy and quick opening and closing of valves.

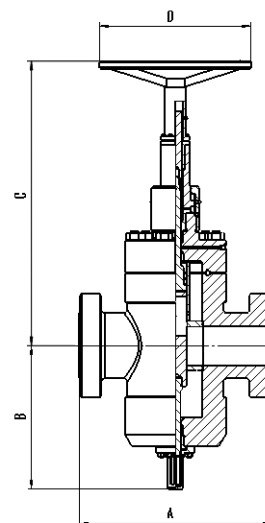


#### TFLS Ball Screw Gate Valve Specifications:

Nominal Diameter (in)	Nominal Pressure (psi)	Dimensions				Weight (lbs)		Number of Switch Turns
		A (in)	B (in)	C (in)	D (in)			
4- <sup>1</sup> / <sub>16</sub> "	15000	29	24	42	24	1721	19	19
5- <sup>1</sup> / <sub>8</sub> "	10000	29	30	43	24	1898	23	23
	15000	31	31	43	31	3133	24	24
7- <sup>1</sup> / <sub>16</sub> "	10000	35	35	48	43	3972	31	31
	15000	41	37	58	31	5792	31	31

#### Switch Working Torque Comparison:

Torque ( 7- <sup>1</sup> / <sub>16</sub> -10000 psi)	FC Flat Wedge Disc	TFLS Ball Screw Gate
Opening torque (full differential pressure)	2035 Nm (1500 fl. lbs.)	205 Nm (151 fl. lbs.)
Operating torque (without differential pressure)	75 Nm (55 fl. lbs.)	21 Nm (15 fl. lbs.)



### Choke Valve

A major component of the christmas tree and manifold, the choke valve is mainly used for controlling the production rate of an oil well at a working pressure of up to 20,000 psi. The choke valve can be classified as an adjustable choke valve or a positive choke valve. The adjustable choke valve is designed to adjust the effective area available, for the flow to control the production rate, through rotating the hand wheel. The positive choke valve is designed to control the production rate through changing flow beans.

#### Features:

- Use API 6A, 6D and NACE MR0175 standard design and manufacturing;
- The structure is simple, convenient to manufacture and maintain and low cost;
- The coupling nut used for connecting the bonnet and body allows for fast make-up and break-out;
- The stem tip and bean adaptor are fabricated from special carbide allows for corrosive and abrasive resistance;
- The indicator lens with scale marks allows the operator to know the stem's position and actual orifice area.

#### Specifications:

- Working pressure: 2000 psi ~ 20000 psi
- Working pressure:  $2\frac{1}{16}" \sim 3\frac{1}{16}"$
- Working media: oil, gas and various drilling fluids
- Working temperature: LU (-51°F/-46°C ~ 250°F/121°C)
- Material grades: AA, BB, CC, DD, EE, FF, HH
- Specification level: PSL1 ~ 3G
- Performance level: PR1 ~ 2

#### Positive Choke Valve

- Choke bean material is fabricated from ceramic and tungsten carbide, which has sufficient corrosion resistance, anti-erosion and wearable capacity;
- The valve adopts a union bonnet so as to change choke quickly;
- The valve can be applied to wellheads, christmas trees and choke lines.



Manual Choke Valve

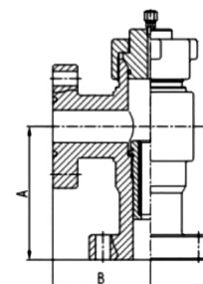
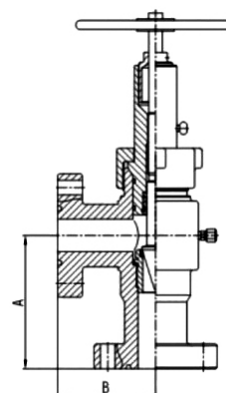


Hydraulic Choke Valve



Fixed Choke Valve

Inner Cavity of Valve Seat	Inspection (flange type)	Dimensions	
		A (in)	B (in)
1"Choke diameter	$2\frac{1}{16}"$ 5000psi	8	7
	$2\frac{9}{16}"$ 5000psi	8	7
	$2\frac{1}{16}"$ 10000psi	9	8
	$2\frac{9}{16}"$ 10000psi	9	8
	$2\frac{1}{16}"$ 15000psi	10	9
	$2\frac{9}{16}"$ 15000psi	12	11
2"Choke diameter	$2\frac{9}{16}"$ 5000psi	10	8
	$2\frac{9}{16}"$ 10000psi	12	10
	$2\frac{9}{16}"$ 15000psi	12	10
	$3\frac{1}{8}"$ 3000psi	12	9
	$3\frac{1}{8}"$ 5000psi	12	9
	$3\frac{1}{16}"$ 10000psi	12	10
	$3\frac{1}{16}"$ 15000psi	12	10
	$4\frac{1}{16}"$ 3000psi	12	10
	$4\frac{1}{16}"$ 5000psi	12	10
	$4\frac{1}{16}"$ 10000psi	14	11
3"choke diameter	$4\frac{1}{16}"$ 3000psi	12	10
	$4\frac{1}{16}"$ 5000psi	12	10



# Wellhead Assembly, Valve, Manifold, etc.

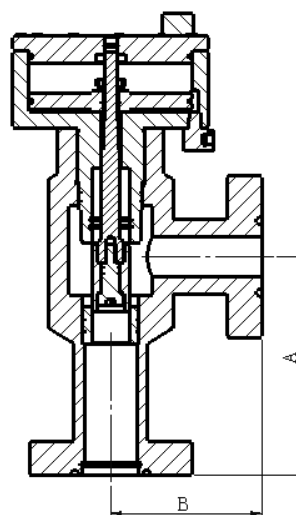
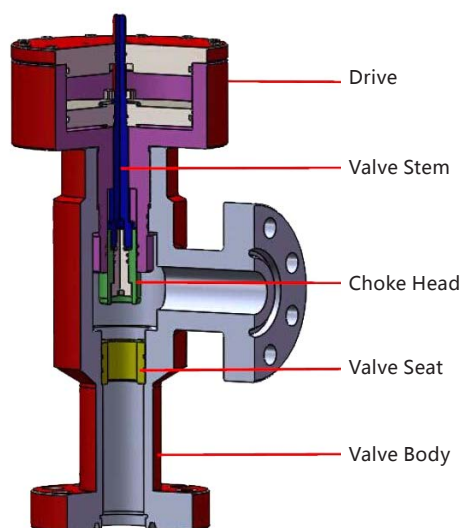
## Valve

### Adjustable Choke Valve

- The valve needle and spool are constructed of tungsten carbide, which has sufficient corrosion resistance, anti-erosion and wearable capacity;
- The two kinds of adjustable choke, needle type and external sleeve type, can be applied to wellheads, christmas trees and choke manifolds;
- There are two manual hydraulic drive modes.

### Barrel-Type Choke Valve

The Yancheng TSC designed barrel-type choke valve is used for choking is the choke manifold or other high-pressure pipelines. The valve is flush resistant, has a simple structure, long service life and a remote control for assembly actuator.



Inner Cavity of Valve Seat	Inspection (flange type)	Dimensions (mm/in)	
		A (in)	B (in)
1"Choke diameter	2 <sup>-1/16</sup> " 5000 psi	8	7
	2 <sup>-9/16</sup> " 5000 psi	8	7
	2 <sup>-1/16</sup> " 10000 psi	9	8
	2 <sup>-9/16</sup> " 10000 psi	9	8
2"Choke diameter	2 <sup>-9/16</sup> " 5000 psi	10	8
	2 <sup>-9/16</sup> " 10000 psi	12	10
	3 <sup>-1/8</sup> " 3000 psi	12	9
	3 <sup>-1/8</sup> " 5000 psi	12	9
	3 <sup>-1/16</sup> " 10000 psi	12	10
	4 <sup>-1/16</sup> " 3000 psi	12	10
	4 <sup>-1/16</sup> " 5000 psi	12	10
	4 <sup>-1/16</sup> " 10000 psi	14	11
3"Choke diameter	4 <sup>-1/16</sup> " 3000 psi	12	10
	4 <sup>-1/16</sup> " 5000 psi	12	10

### Orifice Choke Valve

The orifice choke valve is molded from two pieces of special carbon tungsten plates that are erosion resistant. One of the plates rotate to alter the concentricity between the upper orifice and lower orifice so as to adjust the flow rate of the fluid or gas.

The valve has an advantageous long working life and is erosion/corrosion resistant when compared to other choke valves.

### Unique Design

The orifice plate is molded from two pieces of special carbon tungsten and is ground by a diamond bruiting wheel. The opening dimensions of orifice plate are regulated by rotating the valve stem.

### Positive Closure

A 17° overlap type sealing tape beyond the full-close position was designed to ensure closure. This will protect the sealing in the event of a sudden increase in pressure or abrasion.

### Tungsten-Carbide Wear Brushing

The overlay applied to the face of the wear brushing increases the service life and improves the extensibility of wear brushing. This helps to accept abrasive downstream turbulence, especially during unbalanced drilling operations.

### Multiple Applications

Both remote control and on-site manual operation are available during onshore and offshore operations.

### Features:

- Built for oil fields;
- Precision manufacturing;
- One-way plate to plate design;
- Wear-resistance tungsten carbide wear bushing increases its service life;
- Versatile for onshore and offshore operations;
- On-site control or remote control available.

### Orifice Choke Valve

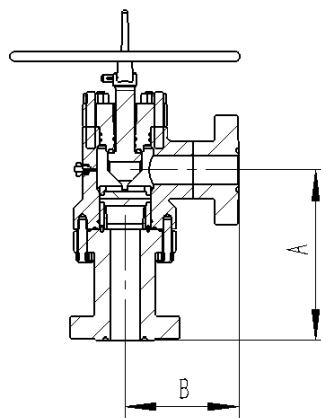
Inner cavity of valve seat	Inspection (flange-type)	Dimensions	
		A (in)	B (in)
1"choke diameter	2 <sup>-1</sup> / <sub>16</sub> " 5000 psi	8	7
	2 <sup>-9</sup> / <sub>16</sub> " 5000 psi	8	7
	2 <sup>-1</sup> / <sub>16</sub> " 10000 psi	9	8
	2 <sup>-9</sup> / <sub>16</sub> " 10000 psi	9	8
	2 <sup>-7</sup> / <sub>16</sub> " 15000 psi	10	9
	2 <sup>-9</sup> / <sub>16</sub> " 15000 psi	12	11
2"choke diameter	2 <sup>-9</sup> / <sub>16</sub> " 5000 psi	10	8
	2 <sup>-9</sup> / <sub>16</sub> " 10000 psi	12	10
	2 <sup>-9</sup> / <sub>16</sub> " 15000 psi	12	10
	4 <sup>-1</sup> / <sub>16</sub> " 5000 psi	12	10



**Manual Orifice  
Choke Valve**



**Hydraulic Orifice  
Choke Valve**



## Valve

### Mud Valve

The mud valve is a new product that was developed in accordance with API 6A requirements to improve on the standard ram flat gate valve. When compared to the standard ram flat gate valve, the mud valve's height was reduced by one third, opening and closing time was reduced by one half, and production costs were reduced dramatically. The mud valve is suitable for a variety of complex applications such as oil and gas wellheads and christmas trees.

The Yancheng TSC mud valve has two sealing types: metal to metal seal and rubber seal.

#### Metal to Metal Seal Features:

- Gate's seal face and seat are spray coated with a long service life hard allow;
- Rising stem structure makes it easy to check the status of the valve;
- Can change stem packing without removing the bonnet;
- Designed with on-sight maintenance in mind, allowing inspection and/or replacement of internal parts by opening the bonnet, without needing to remove it from the pipe.

#### Rubber Seal Mud Valve Features:

- All parts are interchangeable with Cameron manufactured DEMCO gate valve;
- On-site repair ability: The bonnet can be easily removed for internal parts inspection and/or replacement without requiring to remove it from the pipe;
- Simple design allows for fast and easy service without special tools;
- Floating gate design: The place connected by T-type grooved valve stem allows the wedge disc to float to the valve seat, and the valve seat to tighten the pressure sealing.



**Metal To Metal Seal Mud Valve – Welded End**



**2"5,000 psi Rubber Seal Mud Valve – Welded End**



**2"5,000 psi Rubber Seal Mud Valve – Threaded End**



**Metal To Metal Seal Mud Valve – Union End**



**4"5,000 psi Rubber Seal Mud Valve – Welded End**



**4"5,000 psi Rubber Seal Mud Valve – Threaded End**



### Check Valve

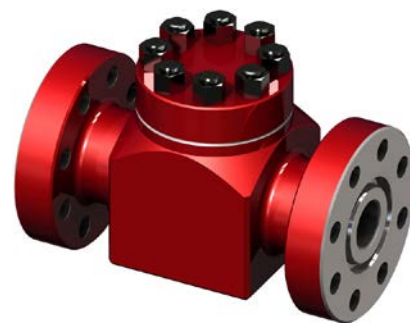
The check valve creates a seal between the valve core and body via fluid pressure. The higher the pressure the better the seal and the cavity can contain pressure in all pipes at all times. The body is constructed of a forged alloy steel which has good mechanical properties, pressure endurance and is safe and reliable.

The valve bonnet and valve body are bolted together. Sealing elements include a seal ring on the valve bonnet and an inner wall seal in the valve body.

Cemented carbide is overlapped on sealing faces of valve and the body, providing favorable wear-resistance and corrosion-resistance performance.

#### Specifications:

- Working pressure: 2000 psi ~ 15000 psi
- Nominal diameter:  $2\frac{1}{16}" \sim 7\frac{1}{16}"$
- Working temperature: LU (-51°F/-46°C ~ 250°F/121°C)
- Material grades: AA, BB, CC, DD, EE and FF
- Specification level: PSL1 ~ 3G
- Performance level: PR1 ~ 2
- Working media: oil and gas



### Plug Valve

The plug valve is an indispensable component that is utilized with a high pressure manifold during well cementing and fracturing services as well as high pressure fluid control systems. It has a compact structure, is easy to maintain, and has low torque and quick opening making it an ideal valve for cementing and fracturing manifolds.

Inlets and outlets of all plug valves adopt a union connection (which can be customized according to customer requirements). The cylinder fits between the body and seal segment and seal rings are inlaid into the outside of the seal segment for optimal sealing.

#### Specifications:

- Working pressure: 2000 psi ~ 15000 psi
- Nominal diameter: 2" and 3"
- Working temperature: LU (-51°F ~ 250°F)
- Material grades: AA, BB, CC, DD, EE and FF
- Specification level: PSL1 ~ 3G
- Performance level: PR1 ~ 2
- Working media: oil and gas



## Manifold

### Choke Manifold

#### Application:

The choke manifold is a necessary piece of equipment used for controlling the well kick and implementing oil-gas well pressure control technologies.

Through opening and closing the choke valve, it can control certain pressure maintaining a bottom hole pressure that is higher than the formation pressure. This aids preventing fluid formation from further entering the well. It is also used for blowout protection (BOP) to protect the wellhead in the event that in-hole pressure exceeds certain limits.

#### Composition and Structure:

The throttle manifold is composed of a choke valve, gate valve, pipeline, fittings, pressure gauge, etc.

#### Working Principle:

As the in-hole pressure increases, the in-hole fluid can be released by opening and closing the choke valve located on the choke manifold, to control casing pressure. In case of excessively high casing pressure, it can be directly blown out via the gate valve.

#### Specifications:

The pressure of the choke manifold produced by Yancheng TSC can be divided into six classes: 2000 psi, 3000 psi, 5000 psi, 10000 psi, 15000 psi and 20000 psi. It also can be designed according to customer requirements.

#### Usage Requirements:

- Working pressure of all choke manifold components shall be matched with that of the blowout preventer unit used;
- The choke manifold shall be installed in an accessible place for operation personnel, and pressure tests must be conducted during installation. Its seal test pressure shall be equal to the rated working pressure;
- The pipelines shall be as straight as possible with sufficient apertures. 120 degree forged-steel bends shall be applied at turnings of the pipelines;
- A working pressure gauge must be installed;
- For winter construction, the choke manifold shall have good performance in cold conditions.

The choke manifold meets the requirements of API Standard Spec 16C:

- Working pressure: 2000 psi ~ 20000 psi
- Nominal diameter:  $2\frac{1}{16}$ "- $4\frac{1}{16}$ "



### Kill Manifold

#### Application:

As the wellhead pressure increases, the kill manifold can be used to pump heavy drilling fluid into the well, balancing the bottom hole pressure and avoid well kick and blowout. The bottom hole pressure can also be released via the relief pipeline connected to kill manifold. The kill manifold can also be used for injecting water and fire extinguishing agents into the well during cement squeeze and well cementing operations. Kill fluid or other fluids can only be injected into the well via the check valve of the kill manifold, but cannot back flow, achieving aims of well killing and other operations.

#### Composition:

The kill manifold is mainly composed of check valves, gate valves, pressure gauges, and pipelines. One end is connected to the drilling spool and the other end is connected to the injection pump. Both the kill manifold and choke manifold are designed in accordance to API standards. Currently, kill manifolds produced by Yancheng TSC cover the following pressure classes: 2000 psi, 3000 psi, 5000 psi, 10000 psi, 15000 psi and 20000 psi.



#### Instructions for Use:

- Working pressure of all pipelines, gate valve, check valve, etc. shall be matched with that of blowout preventer unit used;
- The kill manifold shall not be used as the main pipeline for daily injection of drilling fluid.

### Standpipe Manifold

- Vertical Structure: Can be used on a deck as it takes up limited space;
- Proper Match: The choke manifold is combined with two sets of kill manifolds, and is fabricated with two layers of drilling floor for easy operation;
- Complete Functions: It is equipped with all the functions of a horizontal manifold. The hard supporting frame is totally enclosed and corrosion proof;
- Easy Assembly: As a result of excessively large volume, it is designed as four components which are easy to transport.



# Wellhead Assembly, Valve, Manifold, etc.

## High Pressure Movable Bend

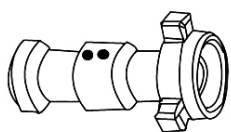
### High Pressure Swivel Joints

The Yancheng TSC produced high pressure swivel joint is a metal joint containing a integral ball bearing. Size ranges from 1" to 4" , and rated working pressure ranges from 2000 psi to 20000 psi. Various types of swivel joints and repair kits which can be used in normal and low temperature ranges, and sulfurous gas environments can be provided.

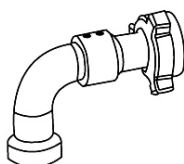
The swivel joint is divided into two types: long radius and short radius.



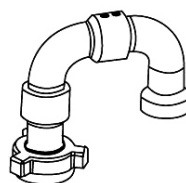
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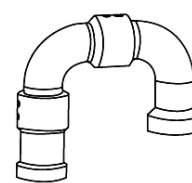
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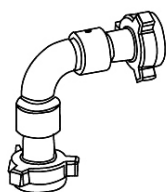
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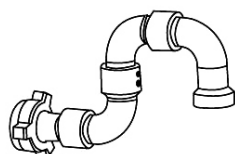
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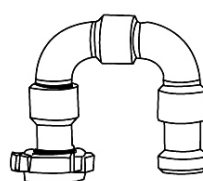
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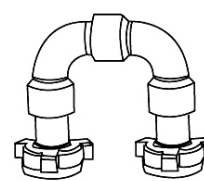
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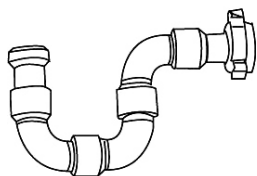
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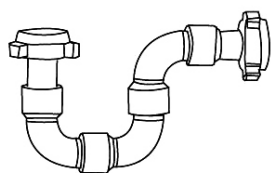
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■ Style 100 M x M



# Wellhead Assembly, Valve, Manifold, etc.

## Union

### Union

As an advanced technology, the high pressure union uses advanced technology and is forged with high-strength alloy steel through a strict heat treatment process ensuring the nipple has a uniform metallurgical structure and pressing ability. The materials used conform to ASTM and AISI standards and technical specifications conform to API 6A standards. The union can be connected with a pipeline thread, tubing head, butt-weld or compress-seal.

#### 100-Type

Precision sealing ensures a reliable pressure seal. Recommend using low-pressure manifold when working pressure is equal to or less than 1000 psi.

100-type 1000 psi NSCWP, test pressure at 1500 psi, black nut, yellow part.



Nominal Pipe Size (in)	Overall Length (in)	Nut Radius (in)	Materials		Weight (lbs)
			Nut	Part	
2	$3\frac{5}{8}$	$2\frac{15}{16}$	SF	SF	5.25
$2\frac{1}{2}$	$4\frac{1}{4}$	$3\frac{5}{8}$	SF	SF	8.0
3	$4\frac{15}{16}$	$4\frac{1}{16}$	SF	SF	14.0
4	$5\frac{15}{16}$	$4\frac{25}{32}$	SF	SF	23.0
6	$6\frac{5}{8}$	$6\frac{7}{16}$	SF	SF	44.5
8	$7\frac{1}{4}$	$7\frac{11}{16}$	SF	SF	61.0

#### 200-Type

Compact union structure is widely applied to low-pressure pipelines, and also can meet requirements of air, water, oil or gas within a medium-pressure range. Available models include butt-welded Sch.40.

200-type 2000 psi NSCWP, test pressure at 3000 psi, blue nut, gray part.



Nominal pipe size (in)	Overall Length (in)	Nut Radius (in)	Materials		Weight (lbs)
			Nut	Part	
1	$2\frac{11}{16}$	$1\frac{15}{16}$	SC/SF	CDB/SF	1.75
$1\frac{1}{4}$	$2\frac{7}{8}$	$2\frac{3}{8}$	SF	SF	2.37
$1\frac{1}{2}$	$2\frac{7}{8}$	$2\frac{3}{8}$	SF	SF	2.37
2	$3\frac{5}{16}$	$2\frac{29}{32}$	SF	SF	2.25
$2\frac{1}{2}$	$4\frac{1}{16}$	$3\frac{11}{16}$	SF	SF	10.0
3	$4\frac{13}{8}$	$3\frac{7}{8}$	SF	SF	15.25
4	$4\frac{13}{16}$	5	SF	SF	20.0
6	$6\frac{5}{8}$	$6\frac{7}{16}$	SF	SF	44.5
8	$7\frac{1}{4}$	$7\frac{11}{16}$	SF	SF	61.0



# Wellhead Assembly, Valve, Manifold, etc.

## Union

### 206-Type

Male connector is equipped with an O-ring sealing surface enabling the connector to seal more tightly. Available models include butt-welded Sch.40.

Recommended for use of connection of manifolds and pipes in negative-pressure and corrosive environments.



206-type 2000 psi NSCWP, test pressure at 3000 psi, blue nut, gray part.

Nominal Pipe Size (in)	Overall Length (in)	Nut Radius (in)	Materials		Weight (lbs)
			Nut	Part	
1	$2^{11}/_{16}$	$1^{15}/_{16}$	SC/SF	CDB/SF	1.75
$1\frac{1}{2}$	$2\frac{7}{8}$	$2\frac{3}{8}$	SF	SF	2.37
2	$3\frac{5}{16}$	$2\frac{29}{32}$	SF	SF	5.25
$2\frac{1}{2}$	$4\frac{1}{16}$	$3\frac{11}{16}$	SF	SF	10.0
3	$4\frac{3}{8}$	$3\frac{7}{8}$	SF	SF	15.25
4	$4\frac{13}{16}$	5	SF	SF	20.0
6	$6\frac{5}{8}$	$6\frac{7}{16}$	SF	SF	44.5
8	$7\frac{1}{4}$	$7\frac{11}{16}$	SF	SF	61.0

### 207-Type

Union head cap is equipped with rubber O-ring providing effective sealing. The screwed joint can be interchanged with 200-type and 206-type screwed joints. Available models include butt-welded Sch.40.

Recommended for air, water, oil or gas applications to seal manifold connections and protect the pipeline joint thread.



207-type 2000 psi NSCWP, test pressure at 3000 psi, blue nut, gray part.

Nominal Pipe Size (in)	Overall Length (in)	Nut Radius (in)	Materials		Weight (lbs)
			Nut	Part	
3	$3\frac{3}{4}$	$2\frac{7}{8}$	SC	SF	9.8
4	$4\frac{5}{16}$	$3\frac{19}{32}$	SC	SF	16.25
6	$5\frac{13}{16}$	$4\frac{31}{32}$	SC	SF	38.0

### 211-Type

Union joints insular design eliminates metal to metal contact connector. The compound wear-resistance synthetic rubber is precisely manufactured to provide effective sealing. The annular seal assembly can be replaced extending the life of the union.

Recommended for use in existing electrolytic corrosion situations, or those requiring electrostatic isolation for pipeline sections.



211-type 2000 psi NSCWP, test pressure at 3000 psi, grey nut light blue part.

Nominal Pipe Size (in)	Overall Length (in)	Nut Radius (in)	Materials		Weight (lbs)
			Nut	Part	
2	$3\frac{1}{2}$	$3\frac{1}{8}$	SF	SF	6.25
3	$4\frac{1}{2}$	4	SF	SF	12.50

# Wellhead Assembly, Valve, Manifold, etc.

## Union

### 300-Type

300-type union precision sealing ensures a reliable pressure seal. Recommended for use in oil, water, mud, gas or air applications.

300-type 3000 psi NSCWP, test pressure at 4500 psi, black nut, green part.



Nominal Pipe Size (in)	Overall Length (in)	Nut Radius (in)	Materials		Weight (lbs)
			Nut	Part	
1	$2^{11}/_{16}$	$1^{15}/_{16}$	SC/SF	SF	1.75
2	$3^5}/_{16}$	$2^{29}/_{32}$	SF	SF	5.25

### 400-Type

400-type union adopts a thick wall and solid design with a conical seal ring which is easy to pair and is a reliable seal.

400-type 4000 psi NSCWP, test pressure at 6000 psi, black nut, red part.



Nominal Pipe Size (in)	Overall Length (in)	Coutersink (in)	Nut Radius (in)	Materials		Weight (lbs)
				Nut	Part	
2	$5^3}/_{16}$	$1/4$	$3^9}/_{16}$	SF	SF	11.0
3	$6^1}/4$	$3/8$	$4^3}/_{16}$	SF	SF	19.25
4	$8^1}/8$	$3/8$	5	SF	SF	32.0

### 402-Type

402-type black nut and black joint piece is available only in a 2-inch model – with nitrile rubber seal ring.



### 600-Type

600-type union bronze seat provides primary seal.

Recommended for use in steam systems for production, drilling and workover of manifolds and pipeline connections.

600-type 6000 psi NSCWP, test pressure at 9000 psi, black nut, silver part.



Nominal Pipe size (in)	Overall Length (in)	Countersink (in)	Nut Radius (in)	Materials		Weight (lbs)
				Nut	Part	
1	$3^{17}/_{32}$	$1/4$	$2^5}/_{16}$	SF	SF	3.5
2	$6^1}/4$	$3/16$	$3^3}/4$	SF	SF	15.0

# Wellhead Assembly, Valve, Manifold, etc.

## Union

### 602-Type

602-type union is fitted with elastic nitrile rubber seal ring for sealing and protecting union metal on metal connection.

Recommended for use in connection of manifolds and pipelines, automotive and mud transportation, and non-pressure sealing unions. Available models include butt-welded Sch.80.

602-type 6000 psi NSCWP, test pressure at 9000 psi, black nut, orange part.



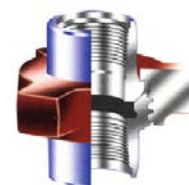
Nominal Pipe Size (in)	Overall Length (in)	Countersink (in)	Nut Radius (in)	Materials		Weight (lbs)
				Nut	Part	
1	$3\frac{17}{32}$	$\frac{1}{4}$	$2\frac{5}{16}$	SF	SF	3.5
2	$5\frac{1}{4}$	$\frac{1}{4}$	$3\frac{9}{16}$	SF	SF	13.25
3	$6\frac{3}{8}$	$\frac{3}{8}$	$4\frac{5}{8}$	SF	SF	21.0
4	$8\frac{1}{16}$	$\frac{3}{8}$	$5\frac{1}{4}$	SF	SF	33.0

### 1002-Type

1002-type union is fitted with an elastic nitrile rubber seal.

Recommended for cementing, fracturing, acidification, testing, plugging and kill lines. Designed for high pressure systems, including on-board systems. Available models include butt-welded Sch.160 or XXH.

1002-type 10000 psi NSCWP, test pressure at 15000 psi, red nut, blue part.



Nominal Pipe Size (in)	Overall Length (in)	Countersink (in)	Nut Radius (in)	Materials		Weight (lbs)
				Nut	Part	
1	$3\frac{1}{2}$	$\frac{1}{4}$	$2\frac{1}{4}$	SF	SF	3.5
2	$5\frac{3}{16}$	$\frac{1}{4}$	$3\frac{11}{16}$	SF	SF	13.25
3	$6\frac{3}{8}$	$\frac{3}{8}$	$4\frac{3}{8}$	SF	SF	21.0
4	$8\frac{1}{16}$	$\frac{3}{8}$	$5\frac{1}{4}$	SF	SF	39.5

### 1003-Type

1003-type union has a spherical seat capable of providing a deflection of 15 degrees or an angular adjustment of  $7\frac{1}{2}$  degrees off center. In addition to the steel-on-steel fit, the nitrile rubber O-ring also ensures an air tight connection at any deflection position.

Recommended to use for high-pressure pipelines as well as air, water, oil, mud or gas situations.

It adopts 1003-type 10000 psi NSCWP (7500 psi NSCWP, 4in and 5in), black nut, green part.



Nominal Pipe Size (in)	Conjunctive Mode	Countersink (in)	Nut Radius (in)	Materials		Weight (lbs)
				Nut	Part	
3	NPT	$9\frac{7}{8}$	$4\frac{7}{8}$	SC	AS	45.0
3	SCH160	$8\frac{7}{8}$	$4\frac{7}{8}$	SC	AS	47.5
3	XXHVY	$9\frac{7}{8}$	$4\frac{7}{8}$	SC	AS	48.5
4	NPT	$10\frac{15}{16}$	$5\frac{3}{4}$	SF	SF	72.0
4	SCH160	$10\frac{11}{16}$	$5\frac{3}{4}$	SF	AS	76.0
4	XXHVY	$10\frac{15}{16}$	$5\frac{3}{4}$	SF	AS	78.0
5	SCH160	$10\frac{3}{4}$	$5\frac{3}{4}$	SF	AS	74.0
5	XXHVY	$10\frac{15}{16}$	$5\frac{3}{4}$	SF	AS	76.5

# Wellhead Assembly, Valve, Manifold, etc.

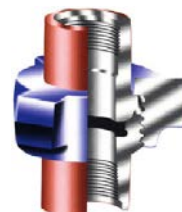
## Union

### 1502-Type

1502-type union is equipped with a replaceable elastic nitrile rubber sealing ring, and a sturdy wall thickness design used for high-pressure systems.

Recommended for cementing, fracturing, acidification, testing, as well as plugging and kill lines. Also can be used for non-pressure sealed connections. also apply to non-pressure sealing connection. Available models include butt-welded Sch. XXH.

1502-type 15000 psi NSCWP, test pressure at 22500 psi, blue nut, red part.



Nominal Pipe Size (in)	Overall Length (in)	Countersink (in)	Nut Radius (in)	Materials		Weight (lbs)
				Nut	Part	
1 $\frac{1}{2}$	5 $\frac{13}{32}$	$\frac{1}{4}$	3 $\frac{21}{32}$	SF	SF	12.0
2	7	$\frac{15}{64}$	3 $\frac{3}{4}$	SF	SF	21.0
3	7 $\frac{3}{8}$	$\frac{3}{8}$	4 $\frac{1}{2}$	SF	SF	31.0

### 2002-Type

2002-type union is only 2" in size. Union is equipped with a replaceable elastic nitrile rubber sealing ring assembled in a stainless-steel liner tube, to provide complete squeeze protection in the event of an overpressure situation. Detachable nut/fan-shaped ring/carrier ring design simplifies removal of nut from pipelines.

2002-type 20000 psi NSCWP, test pressure at 30000 psi, red nut, red part.



Nominal Pipe Size (in)	Overall Length (in)	Countersink (in)	Nut Radius (in)	Materials		Weight (lbs)
				Nut	Part	
2	7 $\frac{3}{8}$	$\frac{15}{64}$	3 $\frac{11}{16}$	SF	AS	49.60

### 2202-Type

400-type union is equipped with a fluorinated rubber sealing ring, 15000 psi NSCWP. Its heat treated components have 100% passed the hardness test, and are in accordance with NACE MR-01-75 and API RP-14E standards.

It is specially used for acid gas situations. Adopting a green nut and green part.

Note: DIC=malleable cast iron; SC=cast steel; SF=forged steel; AS=alloy steel



## North America

### TSC Corporation

12550 N. Houston Rosslyn Rd. Houston, TX 77086  
T +1 832 448 6100  
T +1 832 448 6101  
E sales.usa@t-s-c.com

### TSC Manufacturing & Supply, LLC

13788 West Rd., Suite #100  
Houston, TX 77041  
T +1 832 456 3974  
F +1 832 456 3901  
E sales.mro@t-s-c.com

### TSC Manufacturing and Supply de Mexico, S.A. De C.V.

Carretera Carmen – Puerto Real, Km 14.5  
Ciudad del Carmen, Campeche 24157, Mexico  
T +52 938 131 4676  
E sales.mexico@t-s-c.com

### TSC Manufacturing and Service (Canada) Ltd.

900, 505 – 3rd Street SW, Calgary,  
Alberta T2P 3E6, Canada  
T +1 403 455 8886  
F +1 403 455 8980  
E sales.canada@t-s-c.com

## South America

### TSC Offshore Ltda (Macae)

Rua K1 Quadra W Lotes 26 e 27, Novo  
Cavaleiro, Macae-RJ/Brazil  
T +55 22 2123 8200  
F +55 22 2123 8200  
E sales.brazil@t-s-c.com

### TSC Manufacturing and Supply de Colombia SAS

Carrera 14 No.89-48 Oficina 304 Edificio Novanta  
Bogotá D.C. – Colombia  
T +571 7432290  
E ventas@t-s-c.com

### TSC Representative Office

Av. 2A, No. 59-129 Edif  
Maracaibo, Venezuela  
T +58 0261 793 4111  
F +58 0261 791 4848  
E sales.venezuela@t-s-c.com

### TSC Representative Office

Sector Chaparral, Calle Orinoco  
Anaco, Venezuela  
T +58 0282 424 1633  
F +58 0282 422 1391  
E sales.venezuela@t-s-c.com

## Europe

### TSC Engineering Ltd. (Shipley)

Units D & E Shipley Wharf, Wharf St,  
Shipley, West Yorkshire, BD17 7DW, UK  
T +44 (0) 1274 531862  
F +44 (0) 1274 531716  
E sales.europe@t-s-c.com

### Ansell Jones Ltd.

Units D & E Shipley Wharf, Wharf St,  
Shipley, West Yorkshire, BD17 7DW, UK  
T +44 (0) 1274 531862  
F +44 (0) 1274 531716  
E sales.europe@t-s-c.com

## Asia Pacific

### TSC Group Holdings Ltd.

Unit 910, China Merchants Tower, Shun  
Tak Centre, 200 Connaught Road Central  
Hong Kong  
T +852 2857 3667  
F +57 571 646 7451 +852 2857 3381  
E tsc.group@t-s-c.com

### TSC Offshore China, Ltd.

10/F, No. 1 Beichentaiyue Office Building  
Jia-13 Beiyuan Road, Beijing, China  
T +86 10 6447 9600  
F +86 10 6447 9600  
E sales.china@t-s-c.com

### Alliance Offshore Drilling (AOD)

48 Toh Guan Road East, #02-144  
Enterprise Hub, Singapore, 608586  
T +65 6763 0328  
F +65 6763 3280  
E enquiry@aodpl.com

### TSC Group Pte Ltd.

48 Toh Guan Road East, #02-144  
Enterprise Hub, Singapore, 608586  
T +65 6763 0328  
F +65 6763 3280  
E sales.singapore@t-s-c.com

### PT TSC Offshore Indonesia

P + 62 813 10 999 539  
E sales.indonesia@t-s-c.com

## Russia, Central Asia

### TSC Industrial Group, LLC

Office 301A, Pollars BC, 11 Derbenevskaya Nab.,  
Moscow, 115114, Russian Federation  
T +7 495 662 9466  
F +7 495 662 9466  
E sales.russia@t-s-c.com

## Middle East, Africa

### TSC Middle East DMCC

Office 1108, JBC2 Tower,  
Jumeirah Lake Towers Cluster V.  
P.O Box 211933, Dubai, United Arab Emirates  
T +971 4 5521505  
F +971 4 5521504  
E sales.mideast@t-s-c.com

### TSC Offshore FZE

P.O. Box 262947, WT01FC02, Jebel Ali Free Zone  
Dubai, United Arab Emirates  
T +971 4 887 0168  
F +971 4 887 0169  
E MENAM@t-s-c.com

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