

INTERCONNECTING COMPONENTS

- WING UNIONS
- RAILCAR COUPLINGS
- LPG REGO UNION & ADAPTORS
- CROSSOVERS
- SWIVELS

PIPING COMPONENTS

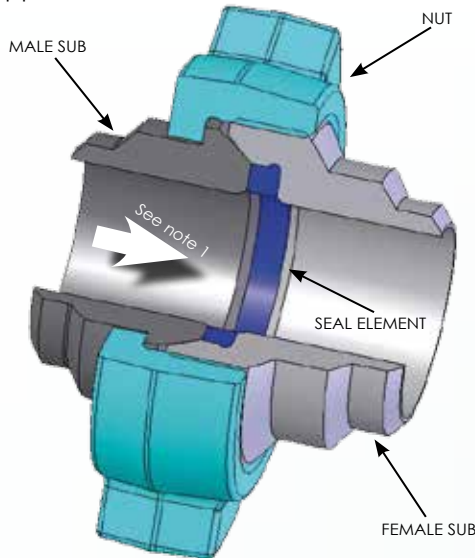
- PIPING
- DATA HEADERS
- ACCESSORIES
- FLEXIBLE HOSES
- TRANSPORT BASKETS

SPECIAL FABRICATION

- CASING SWAGES
- BUTTERFLY VALVES
- VALVE ACTUATORS

Wing unions are one of the most common "quick connection" methods used in the oilfield for joining together components in a temporary pipe work system. They also have expanding applications in fixed installations and also for industrial purposes.

FCE primarily manufactures unions for Sour Gas Service in Oilfield usage (*particularly Well Testing*) and special industrial applications.



Note 1: Usual flow direction for welltesting applications

Male & Female subs:

They are the pressure containing parts of the assembly that provide metal-to-metal secondary seal. This ball-and-cone seal remains leak-proof even when one surface is slightly pitted or misaligned.

Subs are manufactured per different assembly modes:

- Butt weld assembly
- NPT threaded assembly
- NPST threaded assembly
- Sub profiles are also machined / forged as an integral part of a piping element.

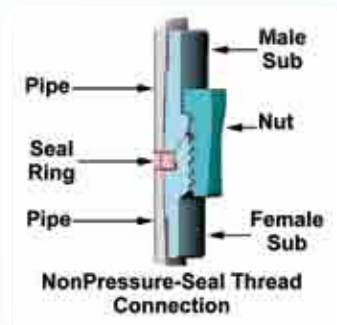
Nut:

This is a forged part of assembly that allows connection of the two subs through a specific Acme thread.

Seal Element:

Seal element is an elastomer component which acts as a primary seal to protect metal-to-metal seal against corrosion. Depending on the union figure it can be a lip type "Seal Ring" or an "O-Ring".

Different materials are available to suit fluid service (*Buna for Standard service or Viton for H₂S service*).



NPST (Non Pressure Seal Thread)

The NPST assembly is a special design for Higher Pressure service which can replace welded or conventionally Threaded union construction.

In this instance it can be seen from the illustration that the threads are not exposed to well effluent which is the case with conventional threaded (*ie L.P.*) components.

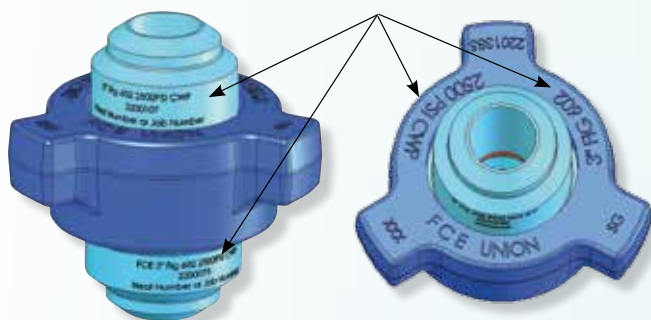
This type of construction, on straight flowline and pup joints, is generally more economically priced when compared to integral equipment.

SAFETY ALERT

Avoid the DANGER for interconnecting 2" Fig.602 and Fig.1002 with 2" Fig.1502.

The mixing of 2" Fig. 602 and 1002 with 2" Fig. 1502 components has been known to cause serious incidents over the years.

Positively identify figure numbers and pressure ratings before connecting together 2 union halves.



Identification gauges help to identify the figures.

Failure to follow this safety warning may result in death, serious personal injury and severe property damage.

Never mix or assemble components or end connections with different pressure ratings and different figure numbers.

Never strike, tighten, loosen or attempt repairs on pressurised components or connections.

Always apply essential care, handling and inspection to threaded components before, during and after make-up.



















Never use severely worn, eroded or corroded components.

Never strike wing union nuts having severely flattened and extruded ears.

Always use a bronze hammer in order to avoid sparking while striking onto a wing union nut.

Always follow safe practices, safety procedures and manufacturer instructions and remove non-acceptable components from service.

Always connect 2 elements having same pressure rating and same union figure.

Figure Number	Assembly Color Key Standard Service	Working pressure (PSI)		NPT	GAS	BW	SCH	Nominal Pipe Sizes, inches, MM											
		Standard	Sour Gas					1" 25MM	1" ¼ 32MM	1" ½ 40MM	2" 50MM	2" ½ 65MM	3" 80MM	4" 100MM	5" 125MM	6" 150MM	8" 200MM	10" 250MM	12" 300MM
50		500	500	•										•	•				
100		1,000	NA	•							•	•	•	•		•	•		
200		2,000	NA	•	•	•	80	•	•	•	•	•	•	•					
206		2,000	2,000	•	•	•	80	•	•	•	•	•	•	•		•	•	•	
207		2,000	NA	•		•	80						•	•		•	•	•	
400		2,500	2,500	•		•	XXS								•	•	•	•	•
400		4,000	4,000	•		•	XXS				•	•	•	•					
602		2,500*	2,500*			•	80				•		•	• (2,300 psi)					
602		5,000*	5,000*			•	XXS						•	•					
602		6,000	6,000	•		•	XXS	•	•	•	•	•	•	•					
1002		5,000*	5,000*			•	XXS				•		•	•	•				
1002		7,500	5,000	•		•	XXS								•	•			
1002		10,000	7,500	•		•	XXS	•	•	•	•	•	•	•					
1003		7,500	5,000	•		•	XXS							•	•				
1003		10,000	7,500	•		•	XXS				•		•						
1502		15,000	10,000	•		•	XXS	•		•	•	•	•	•	•				
2002		20,000	NA			•	XXS				•		•						
2202		NA	15,000			•	XXS				•		•						

*Material: A350 LF2.

NA – Not Available

PLUGS & TEST PLUGS

Male and female hammer union plugs are available in all figures and all sizes. When ported, plugs can be used for different purposes (*pressure testing, end of line drainage or venting*). Port is generally 1/2" NPT but can be threaded to client requirement.



SPECIAL ACCESSORIES

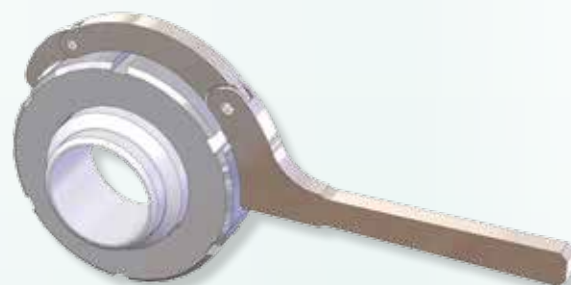
GROOVED NUTS

Grooved nuts are generally used in industrial applications where assembly operation is more popularly done by the use of wrench rather than hammer.

Grooved nuts provide many advantages such as:

- Fast tightening.
- Zero vibration, shock and deforming while tightening.
- Limited overall dimension for installation and storage.

FCE offers grooved nuts for figures 200, 206 and 602 in 2" and 3" as well as suitable "Tricoise" wrenches.



DRILLED HOLES NUTS

FCE also offers drilled holes nuts for Figure 602 in 2" and 3" diameters for industrial applications. With suitable "key fore" wrenches.



The railway coupling is an integral crossover mounted onto rail tanks or road tankers in order to allow quick and safe connection to loading arms or other terminal facilities.



Application:

Loading and unloading of various liquid and gaseous fluids (*hydrocarbons, refined products, chemicals, LPG, NH₃, etc.*).
Suitable to low temperature - 46°C.

Size & Rating:

Wing union size : 2" and 3" figure 602 (Acme & ISO thread).
Flange size..... : 2" (DN50) and 3" (DN80).
Flange rating : ISO PN40 raised face.
Pressure rating : 30 bars.
Pressure test : 45 bars.
Design rating..... : -46°C to 80°C.

Material:

Carbon steel A350 LF2.

Options:

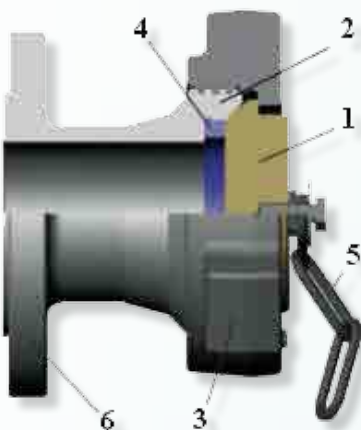
- 1/4" sampling point with special ball valve.
- Perforated nut for closure with standard pin-wrench instead of hammer.
- Position indicator on flange.

Standard:

- ASME B31.3
- PED 97/23/EC Group 1 / Cat. II
- NF EN12561-3 & AC T81-110
- Hydrostatic Pressure Test
- Quality book and Operating & Maintenance manual

The connection is a wing union Fig. 602

- 1 - The spherically profiled male plug provides a metal-to-metal secondary seal.
- 2 - Acme or ISO union thread.
- 3 - Forged wing union nut.
- 4 - The primary seal element can be supplied in different material to suit fluid service (*Viton or EPDM*).
- 5 - A chain retains the nut whilst the coupling is connected with the loading arm.
- 6 - Raised face flange.



The use of a 3 part body on the ball valve is innovative with a number of advantages from a safety & operational viewpoint. One flange of the valve is welded to the line thus alleviating effects of vibration or corrosion on a threaded connection.

Valve body repair & internal seal replacement can easily be carried out "in situ".

There is, due to the construction, a much lower risk of the valve being removed or lost. Also, the valve is always correctly orientated.

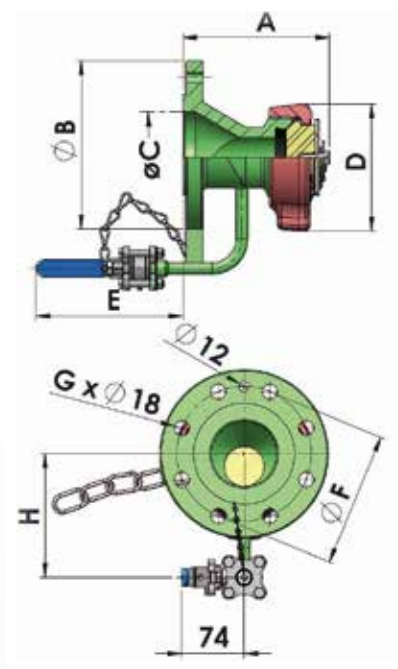
The installation of the valve encourages regular maintenance to guarantee safe operation by having repair kits on hand rather than replacing by a threaded valve.

SAFETY ALERT ⚠

Always use a brass hammer in order to avoid sparking whilst striking the wing union nut, in particular when operating in hazardous areas.

Always use an original FCE wing union. The use of a copy may seriously affect the safety of the operation.

Dim. in mm	Concentric		Eccentric
	2" union x DN50	3" union x DN80	2" union x DN80
A	175	185	185
B	165	200	200
C	48	78	78
D	200	240	240
E	180	175	175
F	125	160	160
G	4	8	8
H	129	147	147
Weight in kg	9.2	14.8	11.6



General application:

Generally used for cold temperature and gaseous fluids, the REGO union provides a safe, quick and efficient connection onto LPG trucks for domestic supply (*butane / propane*) and also onto loading arms or any rotating piping systems.

Assembly description:

The REGO union is similar to a wing union but the nut is attached to the female sub.

The nut is grooved for wrench tightening by a "Tricoise" wrench. 1^{3/4} and 3^{1/4} ACME Union threads are available. Union subs are available for several piping assemblies:

NPT or BSP thread or Buttweld (sch.40).

Size & Rating:

Nominal sizes..... : 1" and 2".

Pressure rating..... : Up to 50 bars (725 PSI).

Temperature rating... : - 46°C to 80°C.

Material:

Carbon steel A350 LF2 (*other on request*).

O-ring seal:

The O-ring seal provides many advantages:

- Better sealing than a flat gasket.
- No seal loss whilst disconnecting.

Seal material: Buna (*other material on request*).



Adaptors:

Adaptors between REGO union and other connections are available as follow:

REGO x wing union.

REGO x flange (ANSI, DIN, ISO).

REGO x reduced REGO.

REGO x Flange adaptor		
Reference	Flange rating	L in mm
REG2 - 25	2" PN 25	110
REG2 - 50	2" PN 50	115
REG3 - 25	3" PN 25	120
REG3 - 50	3" PN 50	135

REGO 3" 1/4 ACME F x 1" 3/4 ACME M	
L in mm	65

General application:

In any piping system there are always interface points between:

- 2 different pressure ratings,
- 2 different pipe sizes,
- 2 different end connection types,
- ...and some times, all three interfaces together!

Interface points may be a critical and conflictual issue when they also connect between the scope of supply of different companies.

Range:

It is essential before you buy a crossover (or X-over) to specify and anticipate all interface points you may need before starting a piping installation.

The following specifications shall be given:

- fluid service (*Standard, Sour gas, chemicals, etc.*),
- fluid & ambient temperature service,
- pressure ratings of both sides,
- connection type and sizes for both sides,
- codes and standards applicable to the design.

A crossover pressure rating is always the lowest rating of the two piping systems (*or equipment rating*).

Construction:

- Buttweld ends.
- Threaded assembly.
- Integral-machined.
- Material per fluid service (*carbon steel, stainless steel*).

Norms and Standards:

NACE MR 01-75, ANSI B16-5, B31-3, API 6A.
PED and CE compliance on request.
Other standards on request.

End Connections & Nominal Size:

- Wing Union.
- REGO Union.
- "Grayloc" type or API 16A Hub.
- Flange (*ANSI B16-5 or API 6A*).
- Todo Union.
- Guillemin Union.
- Kamlock Union.
- Threaded Ends (*NPT/LP, other threads on request*).
- Common sizes up to 6".

Special requirements can be designed such as:

- ported crossovers.
- manufacturing to a required bore or special I.D.
- special flow direction.
- multi-direction flow (*more than 2 ends*).
- etc.

DETACHABLE NUTS

Detachable nuts are used when fabrication mode doesn't allow the insertion of standard nut onto integral body.

It can also be used when maintenance cost is concerned. The detachable nut kit consists of 1 replaceable nut, 3 segments and 1 retainer ring.



A swivel joint is a component in a piping system that allows fluid circulation whilst maintaining articulation and inbuilt rotation between 2 fixed ends of the piping system. Applications can be for temporary and fixed installations. Most common swivels employ male/female housings, a bearing - usually of ball race design and a sealing mechanism between the male and the female components of the housing.

Applications:

- loading systems.
- temporary piping systems around the wellhead (cementing operations, BOP and choke lines, etc.).
- flare lines.
- hoses.
- hydraulically powered machinery, sewer units, etc.

How to select the swivel joint required:

In order to provide the specific swivel joint to match your application, it is essential to specify several parameters:

1 - Flow conditions:

- Max operating pressure.
- Min and Max operating temperature (fluid).
- Max flow rate.

2 - Fluid characteristics: abrasive & corrosive content.

3 - Mechanical constraints:

- Radial & axial loads.
- Rotating speed.

4 - Service and environmental conditions:

- Ambient temperature & environment (indoor, outdoor).
- Service frequency (cycles / day).
- Piping system configuration & line size.
- Swivel style.

Configuration (style):



Swivels are sold loose (buttweld or threaded) or fully assembled with end connections to be specified (flange, wing union, etc.).



RBP	RMP	RHP
Low Pressure Swivel	Medium Pressure Swivel	High Pressure Swivel
16 bars / 230 PSI CWP	30 bars / 435 PSI CWP to 345 bars / 5000 PSI CWP	417 bars / 6000 PSI CWP
-30°C to +150°C	-20°C to +200°C	-29°C to +115°C
Standard: style 20	All styles	
2" - 2" 1/2 - 3" - 4"	2" - 3" - 4"	3/8" - 1/2" - 3/4" - 1" 1" 1/4 - 1" 1/2 - 2"
Buttweld (sch.40) NPT thread F x F	Buttweld (sch.40, 80, XXH)	NPT Thread F x F BSP (GAZ) Thread F x F
Carbon or stainless steel	Carbon or stainless steel	Carbon steel
Spring loaded PTFE seal	Buna or Viton	Buna or Viton
One ball race	Two ball races	Two ball races
General use for low pressure mobile piping and hoses. The most economical swivel! Warning: for limited axial load.	Designed for Industrial and general use under load. Low torque, Medium Pressure application.	Designed for High Pressure and heavy load conditions. The most commonly used swivel in the Industry for Hydraulic lines.



Piping hook-up on a Welltest operation



Factory pressure test prior to shipment

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General application:

Prefabricated piping components are used for temporary operations and removable piping systems. Each component is fitted with wing union ends for fast and easy installation.

Commonly used in upstream Oil & Gas well sites it can be useful in all industrial applications.

Fluid Service: (Standard or Sour gas)

Multiphase oil and gas well effluent, drilling fluids, water, chemicals, abrasive and corrosive fluids, cement, refined hydrocarbons, hydraulic oil, etc...

Norms & standards:

API 14E , NACE MR 01-75, ANSI B31-3
PED, CE compliance on request.

Temperature Rating (depending on material choice):

Standard (NON PED) : -29°C (-20°F) to 177°C (350°F).
Low & High Temperature (PED) : -40°C (-40°F) to 177°C (350°F).

Construction:

- Buttweld ends to ANSI B31-3.
- NPT Threaded ends.
- NPST Threaded ends.
- Integral (see FMC products in section C).

End connections :

- Wing Unions.
- Flanges (ANSI B16-5 or API 6A).
- Hubs (API 6A or Grayloc® type).

Do not hesitate to contact us for urgent needs as we have a large stock of unionised piping figure 206, 602 and 1502.

**Large
STOCK**

Quality:

- Radiography (% per client specification).
- Liquid Penetrant test (% per client specification).
- Hardness Testing where required.
- Charpy impact tests for low temperature service.
- Pressure Test.
- Serialisation.
- Full Traceability.
- Third party witness & inspection as an Option.

Sour Gas Specifications:

- Minimum 10% hardness test or to client specification.
- Viton seals.
- Material characteristics per NACE MR01-75.

Painting:

- 3 Coat Polyurethane paint system.
- Painting to client specifications on request.

Identification:

Each component is serialised and data is engraved onto an individual stainless steel collar.

The pressure rating is easily identified with stencilled or painted colour band(s) and rating markings.



PRESSURE RATING

Pressure PSI/bar	Pipe size	Pipe material	Pipe Sch.	Union figure		Comments
				Std Service	H2S Service	
2000/138	up to 6"	A333	80	206	206	Up to 8" with 1860 PSI Max
2500/172	up to 3"	A333	80	602	602	Up to 4" with 2300 PSI Max
5000/344	up to 4"	A333	XXH	602/1002	602/1002	6" in X52 / Fig. 602 up to 4"
7500/517	up to 4"	4130	XXH	1002		
10000/689	up to 4"	4130	XXH	1002	1502	
15000/1034	up to 3"	Integral construction with forged steel & extra thickness		1502	2002	
20000/1379	up to 2"			2002	Not Applicable	

BASIC COMPONENTS FOR PIPING SYSTEMS

Straight pipe (*pup joint*)

Standard lengths 0.5m, 1m, 2m, 3m, 4m & 5m.
Length in feet available on request.

Elbow

Generally Long Radius (1.5 D) 90° and 45° with short radius on special request.

Target Elbow

90° elbow made of a tee and a cap on the opposite end to inlet. The cap can be lead filled in order to protect the elbow against extreme erosion.

Tee (*Equal*)

Six combinations of equal tee fittings are available.

When ordering tees, specify your requested position of male and female ends from left to right and perpendicular branch (*M* for male, *F* for female) as shown on figure: 1 x 2 x 3.

SPECIAL FITTINGS FOR PIPING SYSTEM

Special formats may be required in some piping systems such as wyes, laterals and crosses.

FCE manufactures special fittings to client requirement comprising special shapes or specific materials.

SPECIAL FITTINGS FOR MOVABLE SYSTEM

Rotating elements (*swivel joints*) are commonly used in some oilfield applications (*pumping, cementing, etc.*).

FCE also manufactures cementing and circulating hoses up to 6000 PSI.



C&C Hose



Pup joint



90° LR Elbow



Target elbow



Tee M x F x M

General application:

Commonly used in well testing operations, the data header is an instrumented piping "sub" for fluid data collection.

Construction:

- Buttweld ends (mainly long pattern up to 2 m).
- Integral machined (mainly short pattern 0.5 to 1 m).

Port size & type:

- ½" NPT – Straight or 45° to flow direction.
- ¾" NPT – Straight or 45° to flow direction.
- Autoclave - Straight or 45° to flow direction.
- Other types and sizes per API 6A.

Notes: - ½" NPT threads are limited to 10000 PSI CWP.

- 45° to flow direction on long welded pattern only.

Norms and Standards:

NACE MR 01-75, ANSI B16-5, B31-3, API 6A.
PED and CE compliance on request.

Pressure Rating:

Up to 20000 PSI for Standard Service.
Up to 15000 PSI for H2S Service.

Temperature Rating:

Standard (NON PED) : -29°C (-20°F) to 177°C (350°F).
Low & High Temperature (PED) : -40°C (-40°F) to 177°C (350°F).

End Connections & nominal size:

- Wing Unions.
- Flanges (ANSI B16-5 or API 6A).
- Hubs (API 6A or Grayloc® type).
- Common sizes: 2", 3" or 4".

OPTIONS

- 4, 6 or 8-port connections depending on header style.
- With or without needle valves.
- With or without thermowells.
- With or without gauges (PI, PT, TI, TT, etc.).
- With or without stands.



Integral construction



Welded construction

TIE-DOWN CLAMPS ⚠

Correctly fixed, the use of tie-down clamps may protect against severe damage and serious personal injury in case of unexpected failure under pressure and flowing conditions.

OPTIONS:

- With or without shackle.
- Cable can be supplied at client request.



Reference	Pipe size	Outside diameter	Weight	Rating	Hole dia.
2" C200	2" (60.3 mm)	5.12" (130 mm)	1.8 kg	4 000 kg	21 mm
3" C300	3" (88.9 mm)	6.30" (160 mm)	3.2 kg	5 500 kg	24 mm
4" C400	4" (114.3 mm)	7.76" (197 mm)	4.2 kg	6 000 kg	24 mm
5" C500	5" (141.3 mm)	10.04" (255 mm)	7.9 kg	8 000 kg	24 mm
6" C600	6" (168.4 mm)	10.24" (260 mm)	6.8 kg	7 500 kg	24 mm
8" C800	8" (203.2 mm)	15.35" (390 mm)	22 kg	10 000 kg	31 mm
10" C1000	10" (273.1 mm)	16.54" (420 mm)	23 kg	10 000 kg	31 mm

ACME THREAD PROTECTORS ⚠

Incorrectly tightened unions because of damaged threads make their use and operation itself unsafe. Essential care by protecting threads during handling will improve your safety level.

Hard plastic ACME thread protectors for hammer unions are available.



WING UNION IDENTIFICATION CASE ⚠

"Are you sure of your equipment?"

The identification kit is a necessary tool in order to avoid mismatching of union figure numbers and therefore accidents!



Portable testing case with identification gauge kit
2" & 3" Fig. 602 ACME & ISO Threads
3" 1/4 REGO ACME Thread

Flexible hoses are supplied to specified lengths with end couplings built-in as part of the hose:

- L.P. hoses (100 to 1000 PSI) Dia. 2" to 12".
- M.P. / H.P. hoses (1000 to 15 000 PSI) Dia. 2" to 4".
- Any type of connection (threaded, flanged, unionised, etc.).

APPLICATIONS

- Oil & Gas including H2S service.
- Drilling (Rotary, Choke & Kill, Vibrator).
- Well Services (welltesting, cementing, etc.).
- General & Industrial (chemical, fuel, hydraulic oil, etc.).
- Fire resistant where applicable.

AVAILABLE ACCESSORIES:

- Lifting collars.



Unionised hose with lifting collars



PB DNV model – Piping Basket

Dimensions: 4.10 x 1.91 x 1.95 m

2 Storage areas for fittings (Elbow, Tee, X-over ...)

Weight of Skid: 3410 Kgs

Maximum MGW: 12610 Kgs

Quantity: Example of Arrangements FIG 602 or 206

DN3" SCH XXS / 180m Piping – 80 Elbows or 60 Elbows and 10 Tees (Example of distribution: 50 x 3M / 10 x 2M / 10 x 1M)

DN4" SCH XXS / 120m Piping – 70 Elbows or 50 Elbows and 10 Tees (Example of distribution: 40 x 3M / 10 x 2M / 10 x 1M)

DN6" SCH 80 / 90m Piping – 40 Elbows or 20 Elbows and 15 Tees (Example of distribution: 20 x 3M / 12 x 2M / 6 x 1M).

PC1 model - Piping Container

Straight pipes storage with lockable tool box at one end.

2 lift points.

Approx 115 m (380') pipe storage capacity.

Overall dimensions L 3.96 m x W 1.65 x H 1.60 m.

Max gross weight 4500 Kgs (1000 Kgs empty).



PB1 model - Piping Basket

Simple metal box for general use.

4 lift points and 2 forklift channels.

Supplied with cover.

Approx 80m (260') pipe storage capacity.

Overall dimensions L 3.66 m x W 1.20 x H 1.20 m.

Max gross weight 5000 Kgs (850 Kgs empty).

PB1 Piping Basket is the most economic and commonly used model for piping element storage and transport.



PC10 model - Piping Container

Straight pipes, fittings and valves storage.

Built to DNV 2.7.1. / EN12079 standard for offshore use.

4 lift points and 2 forklift channels.

Variable storage capacity depending nominal size.

Overall dimensions L 5.00 m x W 1.60 x H 1.95 m.

Max gross weight 6000 Kgs (1700 Kgs empty).

Meanwhile, FCE supplies racked containers to customer requirement which offer easier storage and ergonomic access. Proper racking also provides care and easier visual check of piping elements.

Special fabrication on request

Casing size OD in in.	Cold Working Pressure PSI	Short casing thread		Buttress casing thread	
		Height in in.	Weight in lbs	Height in in.	Weight in lbs
4" ½	10000	7.75	28	8.75	31
5" ½	10000	7.75	29	8.75	32
7"	10000	6.88	31	8	34
7" ⅝	10000	7	34	8.12	38
8" ⅝	10000	5.87	44	7	48
9" ⅝	10000	5.96	57	7.09	62
10" ¾	5000	5.93	59	6.94	64
11" ¾	5000	6	72	7.01	77
13" ⅜	5000	6.1	99	7.11	106
16"	1500	6.32	104	6.93	108
18" ⅝	1500	6.14	147	7.03	154
20"	1500	6.47	175	7.08	180

General application:

A circulating swage is an adapter that enables a temporary circulating line to be rigged to the top of the casing string, allowing circulation of fluids during casing installation. It is generally required as a contingency option to enable any obstruction or fill to be circulated clear during the running process.



Casing swage

Union plug
onto casing
swage

Lifting Device

In particular cases, the original valves may not match specific client requirements for low temperature service or chemical compatibility with the fluid (H_2S , etc.).

FCE manufactures special butterfly valve bodies specifically engineered and using materials selected for compatibility to your application or specific requirement (PED , etc).

VALVE ACCESSORIES

FCE offers useful accessories such as:

- Stem extension:

Can be equipped with a manual handle or a gear actuator.

- "ARO" Position Indicator:

Can be supplied with an extended handle for valves from 2" to 6".

The position indicator is fitted with a light refractant arrow.



For specific applications, manually operated valves may require actuators not available from the original manufacturer. FCE provides, on a case by case basis, engineering, assembly and testing for specific interfaces between valves or chokes and operators, which can be pneumatic, hydraulic or electrically powered.

Examples:



Hydraulic operator onto a plug valve



Pneumatic actuator onto an adjustable choke



*Electric actuator
onto a butterfly valve*