

A high-contrast, black and white photograph of two workers in hard hats and safety gear working on a large, complex industrial machine, possibly a pump or engine, with a vertical shaft running through the center. The workers are positioned on either side of the shaft, and the machine's components are highly detailed and metallic.

# PRODUCT CATALOG





Sara manufactures a diverse range of oilfield equipment in its manufacturing facilities in India, using the latest design techniques and CNC machines. These products are available through distributors worldwide, including Sara's subsidiary company (STS Products, Inc.) in USA, Singapore and Dubai.

|   |    |
|---|----|
| 1. Quality & Innovation   | 1  |
| 2. Control Systems for Land Based<br>and Surface-Mounted BOP Stacks       | 2  |
| 3. Control Systems for Diverter Equipment                                 | 3  |
| 4. HCR Panel  | 4  |
| 5. Shear Boost System of BOP  | 4  |
| 6. Remote Panels  | 5  |
| 7. Solar Control Systems for Land Based<br>and Surface-Mounted BOP Stacks | 6  |
| 8. Rt138 - for workover Rig   | 7  |
| 9. Pipe Rack  | 8  |
| 10. High Pressure Test Units  | 9  |
| 11. PLC Test Unit   | 10 |
| 12. Containerised Pressure Testing Workshop                               | 11 |
| 13. Hydraulic Tongs   | 12 |
| 14. Power Units   | 13 |
| 15. Manifolds   | 14 |
| 16. HP Manifolds  | 15 |
| 17. Choke Consol  | 16 |
| 18. Plug Valve  | 17 |
| 19. Check Valve   | 18 |
| 20. Test Stump  | 19 |
| 21. Hammer Unions   | 20 |
| 22. Integral Union Fitting  | 24 |
| 23. Swivel Joints   | 26 |
| 24. Pup Joints  | 28 |
| 25. Spools & Adapters   | 29 |
| 26. Flanges, Tees & Crosses   | 30 |
| 27. Ring Gaskets  | 31 |
| 28. Pressure Wash Units   | 33 |
| 29. Manufacturing Facilities  | 34 |



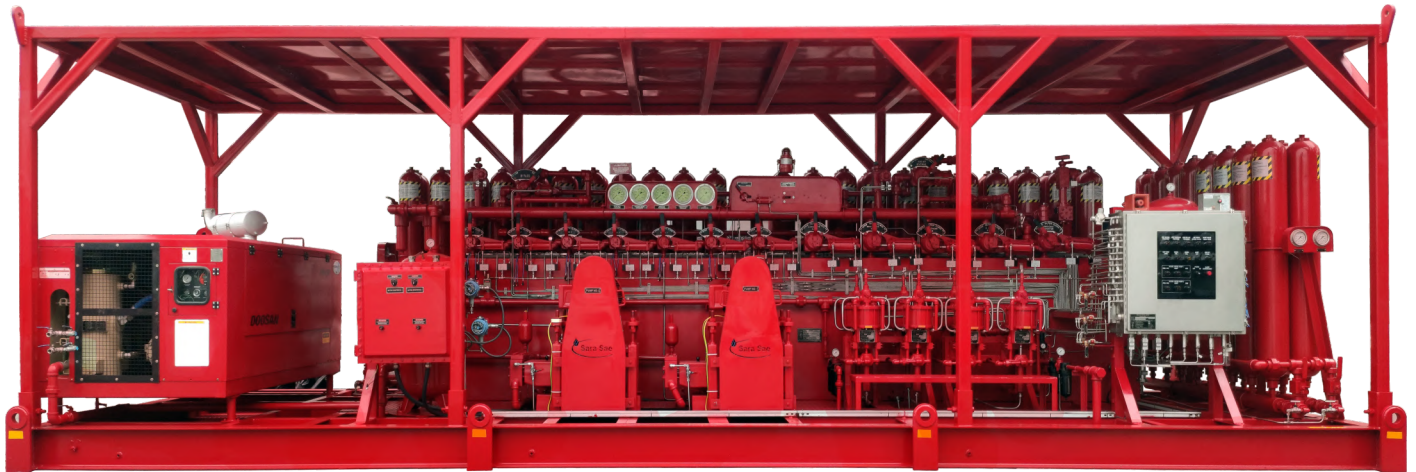
# Quality & Innovation



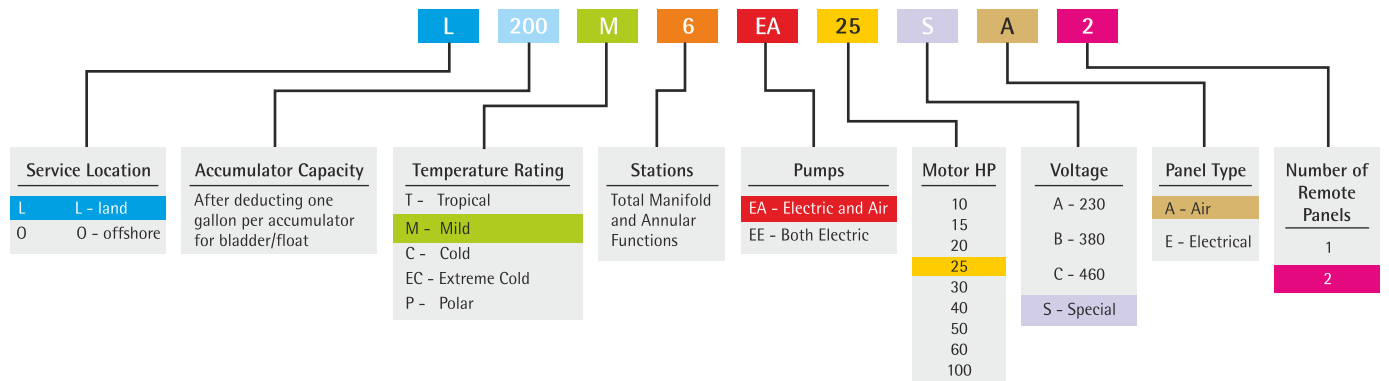


## Control Systems for Land Based and Surface-Mounted BOP Stacks

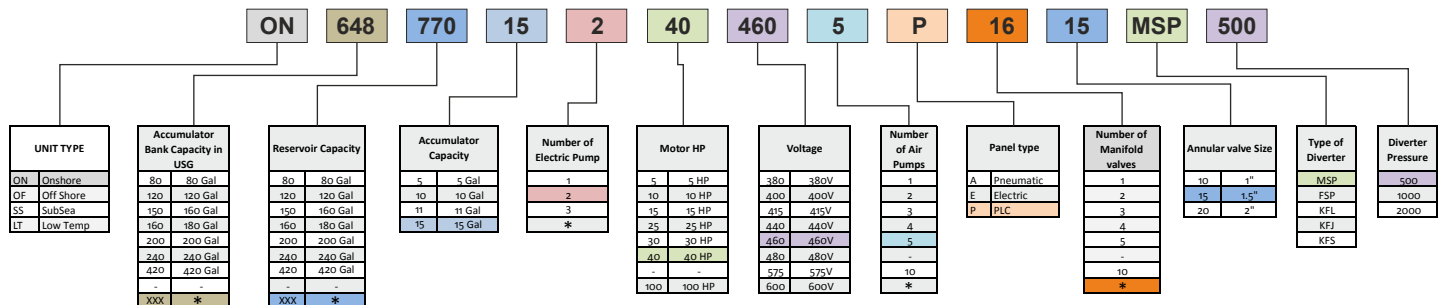
Sara Sae's Control Systems for Land Based and Surface-Mounted BOP Stacks meet or exceed the design specification as specified in API 16D. Each control system is specifically engineered to assure reliable control of the BOP stack with adequate reserve for continuous operation under emergency conditions. Sara Sae welcomes the opportunity to assist you in the proper selection of standard equipment or custom design to meet your application and certification requirements.



### Model Number Identification System (OLD SELECTION)









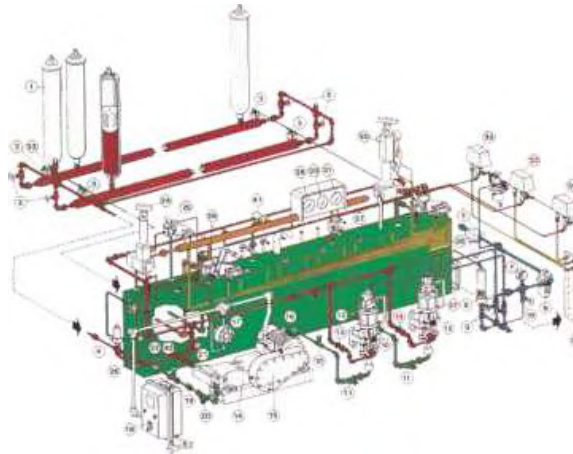
### CONTROL SYSTEMS FOR LAND BASED AND SURFACE-MOUNTED BOP STACKS MODEL SELECTION (NEW SELECTION)



\* As per API Calculation / Customer Specific



-  Rig Air Pressure
-  Fluid-regulated, 1500 PSI
-  Regulated Instrument Air, 18 PSI
-  Fluid-high Pressure, 3000 PSI
-  Fluid-atmospheric Pressure
-  Remote Air Signals



This system shown here is for air remote control operation. Sarasae systems that are designed to meet API 16D must have Air / Electrical / Smart Remote Control Panels if they are used on Offshore drilling Rigs.

## Control Systems for Diverter Equipment

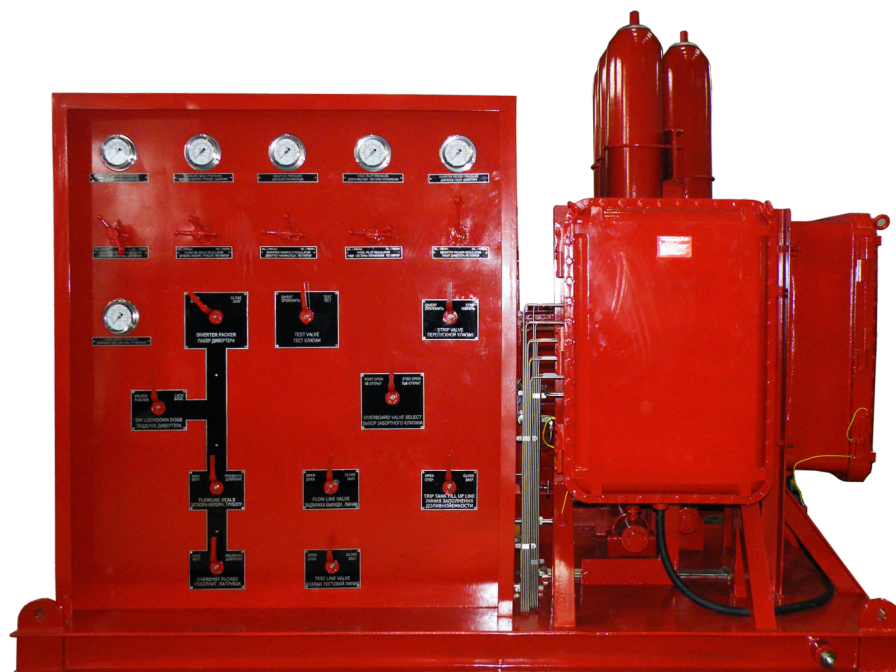
The diverter master panel controls the flowline seals, manifold functions, and diverter packer, which contains and directs wellbore pressure away from the drill floor. The pressure may consist of oil, gas, or water-cut mud, all of which must be diverted to a harmless area.

The diverter master panel has hydraulically-operated functions, air-operated functions, and an air-operated pressure regulator. The hydraulic pressure for the hydraulic functions is provided by the accumulator unit. The air-operated functions and regulators are supplied with rig instrument air.

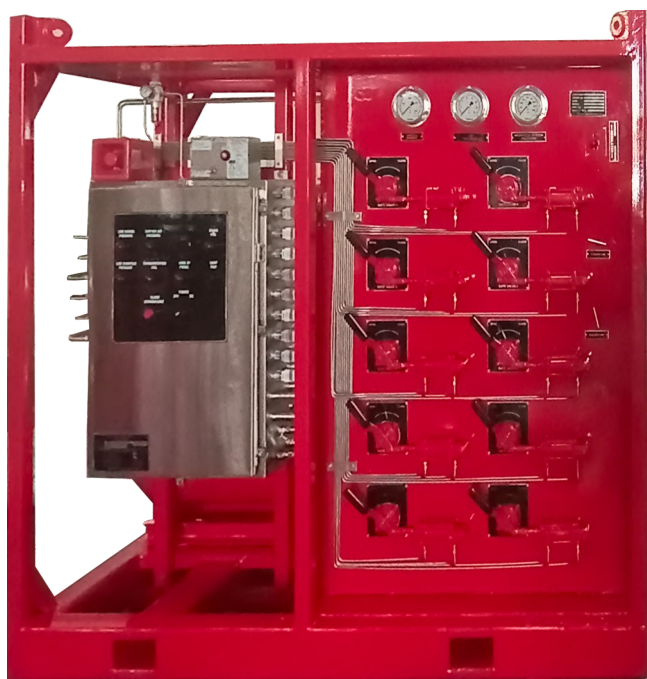
All diverter functions can be operated from the diverter master panel or remotely from the driller's control panel and the toolpusher's control panel.

Sara Sae Manufacture different type of Diverter :- MSP Type, KFDJ Type others

Sara Sae welcomes the opportunity to assist you in the proper selection of standard equipment or custom design to meet your application and certification requirements.







**Hydraulic Power Unit**

## HCR Panel

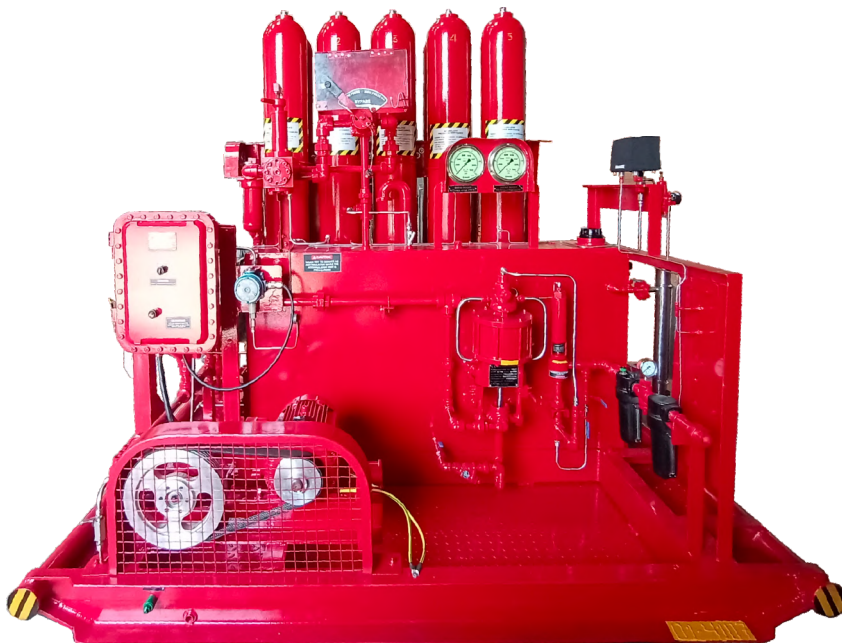
Sara Sae's HCR Panels is a high pressure fitted with directional control valves to provide hydraulic power to operate gate valve. The Hydraulic Power Unit is a skid mounted assembly consisting of fluid storage tank, control valves, regulators and various control components. Sara Sae welcomes the opportunity to assist you in the proper selection of standard equipment or custom design to meet your application and certification requirements.

## Shear Boost system of BOP

A Shear Boost of Blowout Preventer (BOP) Control System is a high pressure hydraulic power unit fitted with directional control valves to boost the shear pressure to safely control kicks and prevent blowouts during drilling operations. The Shear Boost System is mounted on BOP control unit and consisting of fluid storage tank, hydraulic pumps, control valves, regulators and various control components. The Shear Boost System provides pressurized fluid for the Shear Boost system using the electric driven hydraulic triplex pumps & Air Pumps. Hydraulic pressure from all the pumps is stored in the accumulator bottles mounted on the separate mounted skid. The accumulator bottles have a working pressure of 5,000 psi (352 Kg/Cm Sq.) dedicated to the Shear Boost system.

In addition to the above, Shear Boost valves is also Operated by electric remote control panel . It should be noted the Electric Operated remote panel does not interfere with the manual operation of the control valves at the Shear Boost System. The valves may be remotely operated at the Electric Operated remote control panel or manually at the Shear Boost System.

Sara Sae welcomes the opportunity to assist you in the proper selection of standard equipment or custom design to meet your application and certification requirements.



**Shear Boost**



## Remote Panels



System Configuration



Alarm Logs and Pressure Trends



System Setting

### Air Remote Panels

Air Remote Panels control rig air pressure to the hydraulic control manifold to operate the manifold functions. An air interface module is required on the accumulator unit and an air interconnect is required to connect the air remote panel to the interface module. Air remote offered in several standard models to meet usual requirements and are available for any special application upon request. Air-electric panels additionally have explosion proof light stations for each BOP stack function (bypass/ internal override included, when applicable) to indicate open or close status of the hydraulic control manifold valves.



### PLC Panel with Touchscreen Display

- Programmable Logic Controls (PLC) based system
- LCD color touchscreen provides pressure readout
- Electrical indication lights for valve position
- Audible and visual alarm for low system pressure, low rig-air and low reservoir fluid level.
- 24 VDC electrical backup
- Wireless and wired configurations
- Logs, functions, and alarms

### Features

- Explosion proof for Class I Div. I or Class I Div. II
- Air cooler for higher temperatures
- Logging of functions and alarms
- Air and battery back up
- Minimum rig-up time; no air hose
- Printer port for report generation

### Functions

- Visual indications of valve position
- Audible and visual alarm for low accumulator pressure, low manifold pressure, low rig air pressure and low reservoir fluid level
- Push buttons from open/close function with master push button for two hand operation
- Push buttons for high/low function of bypass valve
- Push buttons for raise/lower annular regulator pressure setting
- Push button for lamp test

### Options

- Wireless modem for remote communications allows unit status to be monitored remotely
- Communication via optic fiber cable
- Sunlight viewable screen





# Solar Control Systems for Land Based and Surface-Mounted BOP Stacks

## Salient Features

1. Can run both on Solar PV power & Grid Power.
2. Easy to operate, useful for rigs in remote areas.
3. Smart Inverter to prioritize PV power over Grid.
4. Protection against overloading, under voltage, phase imbalance, cut cable.
5. Provided with battery backup sufficient to charge accumulator 5 times in a day.
6. Adjustable & Removable high efficiency solar Panel mounted on the unit itself.
7. 3 HP motor with robust Pump supported by Maximum power point tracker for fail safe operation.
8. Single time investment with negligible running cost.

## Technical Specification

|                          |                                       |
|--------------------------|---------------------------------------|
| Fluid Reservoir Capacity | : 30 Gallons                          |
| Operating Temperature    | : Mild, Tropical (-40° to 60° Deg<)   |
| Accumulator Capacity     | : 4 X 2.5 Gallons                     |
| Pumping Capacity         | : 4.5 GPM @ 3000 PSI                  |
| Pipe Line                | : SCH 160                             |
| Batter Bank              | : 2 Sets of 400AH Gel based C10 rated |

Alternate Hand Pump module for Manual operation.

Compliant to ASME U-1A, API 16D





# RT138 – For Workover Rig

## 1. Description

A Workover Rig Monitoring System (RT138) is a comprehensive solution designed to monitor and optimize the operations of workover rigs, which are essential in the oil and gas industry for well intervention and maintenance. This monitoring system leverages advanced technology and data analysis to enhance the safety, efficiency, and productivity of workover rig operations. The RT138 system typically consists of sensors, data acquisition devices, communication infrastructure, and software applications. These components work together to collect real-time data from various aspects of the workover rig, including hydraulic systems, power units, drilling fluid parameters, and overall rig performance. The collected data is transmitted to a centralized control centre or a digital platform (HMI), where it is processed, analysed, and visualized in a user-friendly format. Operators, supervisors, and engineers can access this information to gain valuable insights into the rig's performance, identify any operational issues or anomalies, and make data-driven decisions to optimize rig operations.

The workover rig monitoring system offers several key benefits. Firstly, it improves safety by continuously monitoring critical parameters such as weight on bit, hook load, wellbore pressures, toxic & combustible gas and fluid levels, thereby helping to prevent accidents and equipment failures. It also enables proactive maintenance by detecting early signs of equipment wear or malfunction, allowing for timely repairs and reducing downtime.

Furthermore, the system enhances operational efficiency by providing real-time performance metrics, allowing operators to optimize drilling parameters, adjust equipment settings, and make informed decisions to increase overall productivity. It also facilitates better resource allocation and scheduling by providing visibility into the utilization of rig assets and personnel. Additionally, the workover rig monitoring system enables remote monitoring and control, reducing the need for personnel to be physically present on-site. This capability is particularly valuable in remote or hazardous environments, as it minimizes risks and improves operational flexibility.

Overall, a workover rig monitoring system is a powerful tool that enables real-time monitoring, analysis, and optimization of workover rig operations. By leveraging data-driven insights, it helps improve safety, efficiency, and productivity, leading to cost savings and enhanced performance in the oil and gas industry.

## 2. System Architecture

The Workover Rig Monitoring System consists of several interconnected components. These include:

- **Sensors and Data Acquisition:** Various pressure sensors, Flow & Level Sensors, Gas detection sensors, are strategically placed throughout the rig to collect data on key parameters such as hook load, fluid pressures, temperatures, H2S & HC detectors. Data acquisition devices capture this information and transmit it to a central hub for processing.
- **PLC System & Communication Infrastructure:** The sensors installed on the BOP Control Unit talk to a PLC based system. The PLC system acquires raw signal from the sensors and conditions it in a format which is understandable by the RT138 local system. The system relies on a robust communication infrastructure, to transmit data from the rig to the central monitoring station (HMI). This ensures timely and seamless data transfer.
- **RT138 Central Monitoring and Control:** At the heart of the system, a centralized monitoring station receives, processes, and analyses the data. This station is equipped with powerful software applications that provide real-time visualization, analytics, and control capabilities. The RT138 System is a standalone unit that is installed on the Rig Side and talks to the PLC system described above. This system captures the processed sensor data from the PLC unit and displays it in an intuitive UI format. The system samples and logs all the data at a rate of 1Hz and is capable of maintaining a continuous log of up to 5 years.
- **Visualization and User-Interface:** The monitoring system includes user-friendly visualization tools and a graphical user interface (GUI) that display the real-time rig data and analysis results. These visualizations can include interactive dashboards, charts, graphs, and alarms to provide operators with a comprehensive overview of the rig's performance and status.

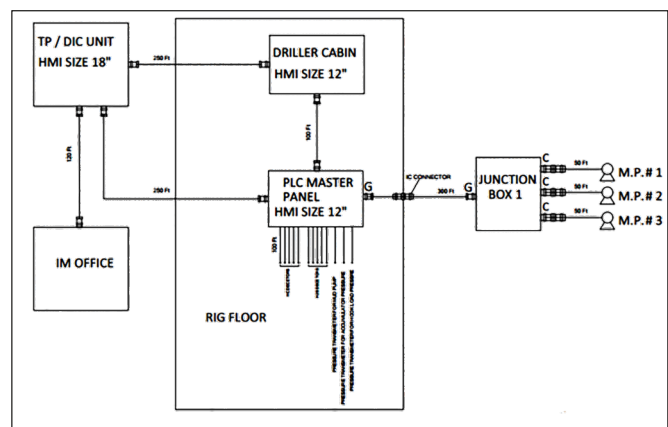


Fig.1 Block Diagram



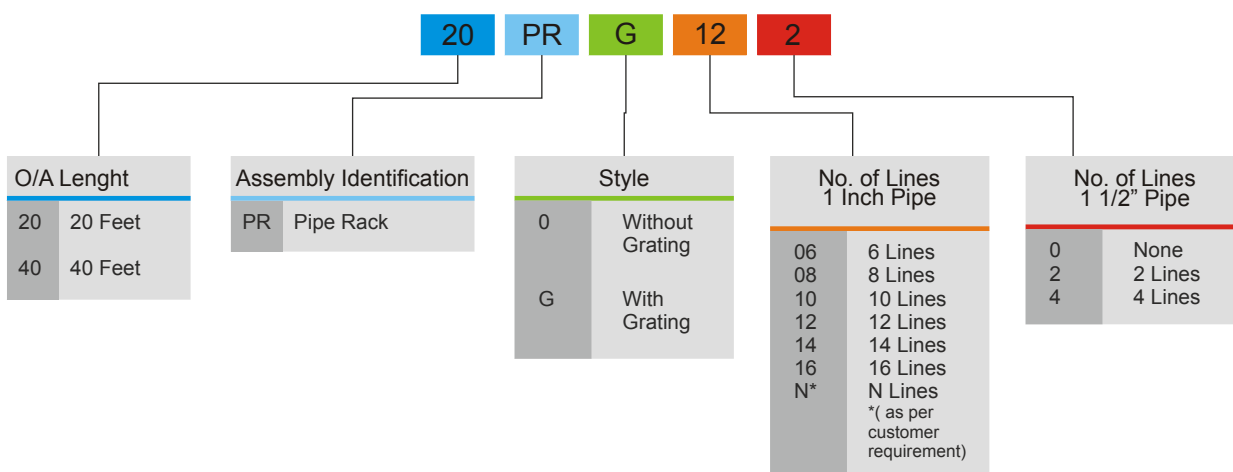
## Pipe Rack



PIPE RACK is specially designed for reliable operation of a BOP stack during blowout condition. These Pipe Rack are used for connection between the control lines from the accumulator unit and the operating inlet of blowout preventers. These critical lines are located in the blowout hazard zone of the rig. this mean that in the case of a blowout (wellfire) these lines would be subjected to extremely high temperature. the entire rig could be destroyed should the fire destroy these lines before the controls system is utilized.

This pipe racks either standard i.e. as per below tables or customized i.e. as per customer requirement.

### PIPE RACK ASSEMBLY MODEL NUMBER IDENTIFICATION SYSTEM



### SPECIFICATIONS FOR PIPE RACK ASSEMBLIES

| Model Number | Approximate Dimensions |     |        |     |        |    | Approximate Dry Weight |      |
|--------------|------------------------|-----|--------|-----|--------|----|------------------------|------|
|              | Length                 |     | Width  |     | Height |    |                        |      |
|              | Inches                 | cm  | Inches | cm  | Inches | cm | Lbs.                   | Kgs. |
| 20PRO-06-0   | 240                    | 609 | 40     | 102 | 12     | 30 | 1080                   | 490  |
| 20PRO-08-0   | 240                    | 609 | 40     | 102 | 12     | 30 | 1180                   | 536  |
| 20PRO-10-0   | 240                    | 609 | 56     | 142 | 12     | 30 | 1280                   | 581  |
| 20PRO-12-0   | 240                    | 609 | 56     | 142 | 12     | 30 | 1380                   | 627  |
| 20PRO-14-0   | 240                    | 609 | 72     | 183 | 12     | 30 | 1480                   | 672  |
| 20PRO-16-0   | 240                    | 609 | 72     | 183 | 12     | 30 | 1580                   | 717  |
| 20PRG-06-0   | 240                    | 609 | 40     | 102 | 12     | 30 | 1280                   | 581  |
| 20PRG-08-0   | 240                    | 609 | 40     | 102 | 13     | 33 | 1380                   | 627  |
| 20PRG-10-0   | 240                    | 609 | 56     | 142 | 13     | 33 | 1480                   | 672  |
| 20PRG-12-0   | 240                    | 609 | 56     | 142 | 13     | 33 | 1580                   | 717  |
| 20PRG-14-0   | 240                    | 609 | 72     | 183 | 13     | 33 | 1680                   | 763  |
| 20PRG-16-0   | 240                    | 609 | 72     | 183 | 13     | 33 | 1780                   | 808  |



# High Pressure Test Units



Skid-mounted Self-contained  
Test Unit Model No. T 15g-m



Portable Test Units

High Pressure Test Units are provided in working pressure ranges from 5,000 to 30,000 PSI.

These units are recommended for high pressure testing of BOP stacks, choke and kill lines, Christmas trees and any other type of equipment requiring high pressure static testing. Test Units are available in unit-mounted, portable, skid-mounted and high flow electric driven styles. Accessories include stand-mounted chart recorders and high pressure hose assemblies.

## Specifications

| Model Number | Maximum Pressure (PSI) | Approximate Dimensions |     |       |     |        |     | Approximate Weight |      |
|--------------|------------------------|------------------------|-----|-------|-----|--------|-----|--------------------|------|
|              |                        | Length                 |     | Width |     | Height |     | lbs.               | Kgs. |
|              |                        | in.                    | cm. | in.   | cm. | in.    | cm. |                    |      |
| S 10G-M      | 10000                  | 42                     | 107 | 30    | 76  | 46     | 117 | 430                | 195  |
| S 15G-M      | 15000                  | 42                     | 107 | 30    | 76  | 46     | 117 | 430                | 195  |
| S 20G-M      | 20000                  | 42                     | 107 | 30    | 76  | 46     | 117 | 430                | 195  |
| S 30G-M      | 30000                  | 42                     | 107 | 30    | 76  | 46     | 117 | 445                | 202  |

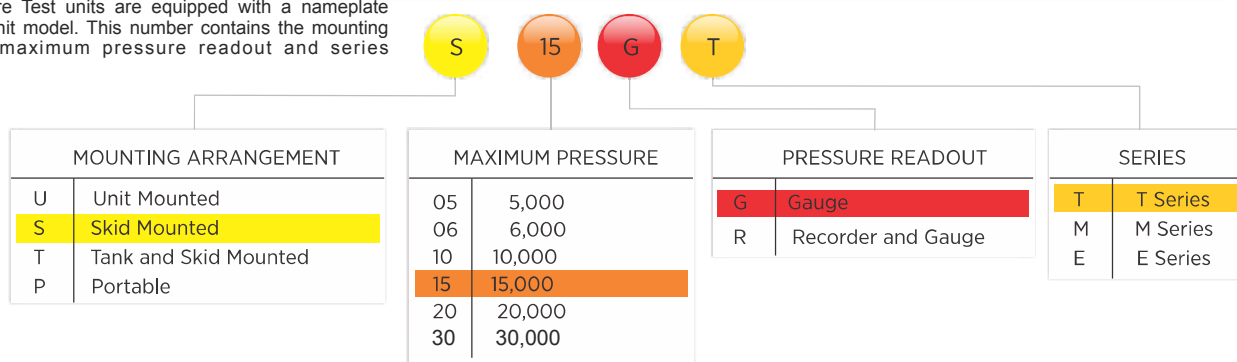
| Model Number | Maximum Pressure (PSI) | Approximate Dimensions |     |       |     |        |     | Approximate Weight |      |
|--------------|------------------------|------------------------|-----|-------|-----|--------|-----|--------------------|------|
|              |                        | Length                 |     | Width |     | Height |     | lbs.               | Kgs. |
|              |                        | in.                    | cm. | in.   | cm. | in.    | cm. |                    |      |
| T 10G-M      | 10,000                 | 54                     | 137 | 30    | 122 | 61     | 132 | 920                | 418  |
| T 15G-M      | 15,000                 | 54                     | 137 | 30    | 122 | 61     | 132 | 920                | 418  |
| T 20G-M      | 20,000                 | 54                     | 137 | 30    | 122 | 61     | 132 | 920                | 418  |
| T 30G-M      | 30,000                 | 54                     | 137 | 30    | 122 | 61     | 132 | 920                | 418  |

| Model Number | Maximum Pressure (PSI) | Approximate Dimensions |     |       |     |        |     | Approximate Weight |      |
|--------------|------------------------|------------------------|-----|-------|-----|--------|-----|--------------------|------|
|              |                        | Length                 |     | Width |     | Height |     | lbs.               | Kgs. |
|              |                        | in.                    | cm. | in.   | cm. | in.    | cm. |                    |      |
| P05 G-M      | 5,000                  | 38                     | 97  | 28    | 71  | 42     | 107 | 223                | 101  |
| P06 G-T      | 6,000                  | 38                     | 97  | 28    | 71  | 42     | 107 | 223                | 101  |

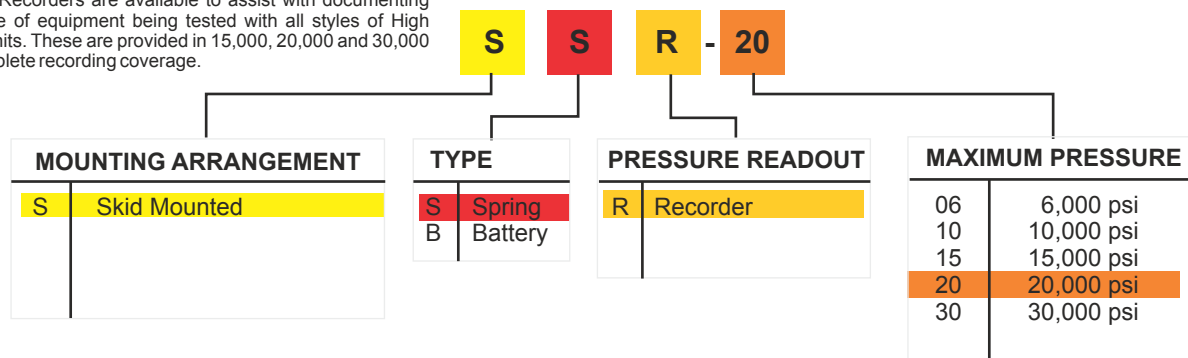
## Model Number Identification

All High Pressure Test units are equipped with a nameplate containing the unit model. This number contains the mounting arrangement, maximum pressure readout and series identification.



## Stand Mounted Recorder

Stand Mounted Recorders are available to assist with documenting test performance of equipment being tested with all styles of High Pressure Test Units. These are provided in 15,000, 20,000 and 30,000 PSI models complete recording coverage.





## PLC Test Unit

Sara Sae Hydraulic PLC Test unit is self-contained air-driven unit of proven design with Computer/Notebook control cabinet. It can be used to pressurize & Test valves, fittings, hoses, piping, vessels and wellhead equipment etc. to be define/defined Hydraulic pressure.

All components, including the necessary connecting materials and tubing are built together on epoxy painted frame complete with reservoir.

### Key Features

- Work shop pressure test unit.
- Easy and low cost maintenance.
- Ergonomic operating design.
- Pressure ranges available up to 2068 bar/30,000 PSI.
- Flow up to 10 liters/minutes or 2.4 GPM.
- Real time v/s Pressure recording.
- Optional Battery Backup
- Can be retrofitted on existing unit.
- Option of secondary units eg. PSI, KPA, Kg/cm2, Bar.
- Settable Min Max pressure limit.
- Settable time zone for accurate login.
- Proven reliability.
- All operating features and gauges at workable height.
- All parts are made out of non-corrosive materials.
- Auto/Manual operation.
- Show test procedure on Computer/Notebook screen and print test result.



### DIESEL POWER TEST UNIT

Test Pressure generated by using Triplex pump which is operated or powered by Diesel Engine. Test pressure generated upto 15,000 PSI.

### OPTIONAL ACCESSORIES (CONTINUED)

High Pressure Test Hoses are available to use with the test units. These hoses are equipped with swivel-type end fittings on each end. Some Test Units can produce pressures beyond the working pressure ratings of these hoses. For these Ultra- High Pressure Test, 316 stainless steel tubing is recommended.





# Containerised Pressure Testing Workshop

Sara Sae Pressure Testing Workshop has been designed to provide a safe and controlled environment for pressure testing and maintenance operations.



The workshop allows testing to be carried out on location or on a company base. The cabin gives the operator full control of testing and monitoring up to maximum 30,000 psi working pressure.



Workshop with test unit, Baker vice and chain hoist

## Weights and Dimensions

Weights 18,000kg (39,672lbs)

Dimensions MTR (FT) (H) L 6.10 (20.00)

W 2.44 (8.00)

H 2.44 (8.00)

(Approx)

## Features

- Max-Safe (30,000 psi WP) pressure test unit
- Colour camera CCTV system and recorder
- Wall mounted air conditioners (Optional)
- 10ft work bench complete with vice (Optional)
- Removable Baker vice (Optional)
- Chain hoist rated to (1) tonne
- 220V/110V electrical system
- Removable steel(internal)
- Manual Door locks
- Warning & Emergency light
- Operator's control cabin
- Designed, built in accordance with DNV.2.7-1 (2007)
- Internals lined with wood
- Fully load tested



Air Pump Assembly

## Max-safe Pressure Test Unit (30,000 PSI) Wall Mounted Panel

### Features

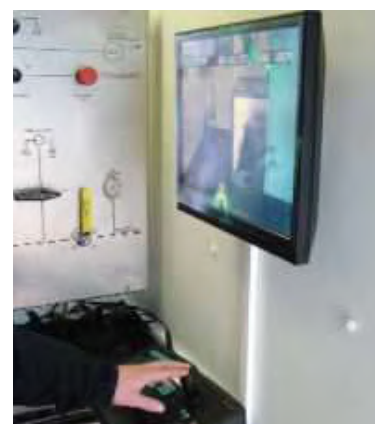
- Air driven high volume and high pressure pump system
- 50 gallon stainless steel reservoir(Optional)
- Wall mounted "wet centre" reel(Optional)
- Battery/Spring chart recorder



Wall mounted "Max-Safe" pressure test unit

## Monitoring System

- Colour camera CCTV system
- 24 hour recorder
- Flat screen monitor (Optional)



Flat Screen Monitor and CCTV controls (Optional)

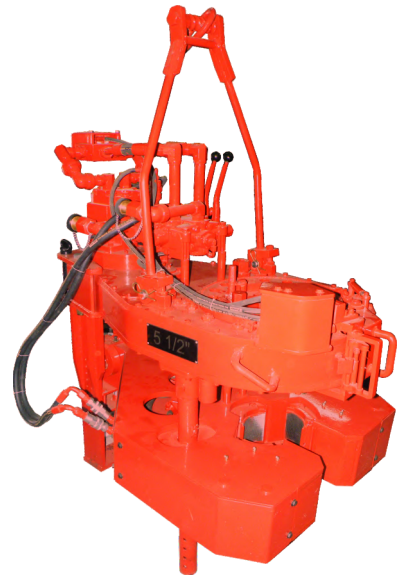


CCTV Camera



# Hydraulic Tongs

Sara Sae tongs are available in a variety of models, size and types to handle casings, drill collars, sucker rods and tubing including chrome tubular and can be supplied with hydraulic or manual backup assemblies



|   | 4-1/2" Tong Specification | 5-1/2" Tong Specification |                    |                    |                    | 7-5/8" Tong Specification |                    |                    | 8-5/8" Tong Specification |                    |
|---|---------------------------|---------------------------|--------------------|--------------------|--------------------|---------------------------|--------------------|--------------------|---------------------------|--------------------|
|   | 4-1/2" TONG               | 5-1/2" LT TONG            | 5-1/2" STD TONG    | 5-1/2" MT TONG     | 5-1/2" HT TONG     | 7-5/8" STD TONG           | 7-5/8" MT TONG     | 7-5/8" HT TONG     | 8-5/8" STD TONG           | 8-5/8" HT TONG     |
| Pipe size range   | 1" to 4-1/2"              | 1" to 5-1/2"              | 2-3/8" to 5-1/2"   | 2-3/8" to 5-1/2"   | 2-3/8" to 5-1/2"   | 2-3/8" to 7-5/8"          | 2-3/8" to 7-5/8"   | 2-3/8" to 7-5/8"   | 2-3/8" to 8-5/8"          | 2-3/8" to 8-5/8"   |
| Torque at High Gear                                       | 2000                      | 2000                      | 2000               | 4000               | 5100               | 2500                      | 5100               | 6000               | 2500                      | 5100               |
| Torque at Low Gear  | 8000                      | 8000                      | 15000              | 20000              | 25000              | 15000                     | 25000              | 30000              | 15000                     | 25000              |
| RPM at High Gear (Approx)                                 | 120 TO 140                | 130 TO 140                | 85 TO 95           | 40 TO 50           | 40 TO 60           | 50 TO 65                  | 35 TO 50           | 25 TO 35           | 50 TO 65                  | 35 TO 50           |
| RPM at Low Gear (Approx)                                  | 30 TO 50                  | 40 TO 50                  | 10 TO 20           | 5 TO 10            | 5 TO 15            | 5 TO 15                   | 05 TO 15           | 2 TO 5             | 5 TO 15                   | 05 TO 15           |
| Tong Dimensions - Length X Width X Height (inch)          | 39"X23"X42"               | 39"X23"X42"               | 55"X32"X50"        | 55"X32"X50"        | 59"X32"X50"        | 59"X32"X50"               | 59"X32"X50"        | 59"X32"X50"        | 59"X32"X50"               | 59"X32"X50"        |
| Tong w/BackUp Dimensions - Length X Width X Height (inch) | 39"X23"X72"               | 39"X23"X72"               | 55"X34"X79"        | 55"X34"X79"        | 59"X36"X81"        | 59"X36"X81"               | 59"X36"X81"        | 59"X36"X81"        | 59"X36"X81"               | 59"X36"X81"        |
| Tong Dry Weight - approx.(Kg)                             | 272                       | 272                       | 560                | 560                | 700                | 700                       | 700                | 700                | 700                       | 700                |
| Tong w/BackUp Dry Weight - approx.(Kg)                    | 452                       | 452                       | 960                | 960                | 1200               | 1200                      | 1200               | 1200               | 1200                      | 1200               |
| Torque arm Length   | 24"                       | 24"                       | 36"                | 36"                | 36"                | 36"                       | 36"                | 36"                | 36"                       | 36"                |
| Includes :  |                           |                           |                    |                    |                    |                           |                    |                    |                           |                    |
| Safety Door Interlock.                                    | ✓                         | ✓                         | ✓                  | ✓                  | ✓                  | ✓                         | ✓                  | ✓                  | ✓                         | ✓                  |
| Lift Cylinder Assembly                                    | ✓                         | ✓                         | ✓                  | ✓                  | ✓                  | ✓                         | ✓                  | ✓                  | ✓                         | ✓                  |
| Spring Hanger assembly                                    | Single spring assy        | Single spring assy        | Single spring assy | Single spring assy | Single spring assy | Single spring assy        | Single spring assy | Single spring assy | Single spring assy        | Single spring assy |
| Hydraulic Backup  | ✓                         | ✓                         | ✓                  | ✓                  | ✓                  | ✓                         | ✓                  | ✓                  | ✓                         | ✓                  |
| Backup Dies   | 1" to 4-1/2"              | 1" to 5-1/2"              | 2-3/8" to 5-1/2"   | 2-3/8" to 5-1/2"   | 2-3/8" to 5-1/2"   | 2-3/8" to 7-5/8"          | 2-3/8" to 7-5/8"   | 2-3/8" to 7-5/8"   | 2-3/8" to 8-5/8"          | 2-3/8" to 8-5/8"   |
| DIE HEADS (per set)                                       | 1" to 4-1/2"              | 1" to 5-1/2"              | 2-3/8" to 5-1/2"   | 2-3/8" to 5-1/2"   | 2-3/8" to 5-1/2"   | 2-3/8" to 7-5/8"          | 2-3/8" to 7-5/8"   | 2-3/8" to 7-5/8"   | 2-3/8" to 8-5/8"          | 2-3/8" to 8-5/8"   |

|   | 9-5/8" Tong Specification                                   | 10-3/4" Tong Specification |                    | 13-3/8" Tong Specification |                    | 13-5/8" Tong Specification |                    | 20" Tong Specification |                    |
|---|---|----------------------------|--------------------|----------------------------|--------------------|----------------------------|--------------------|------------------------|--------------------|
|   | 9-5/8" HS TONG  | 10-3/4" STD TONG           | 10-3/4" HT TONG    | 13-3/8" STD TONG           | 13-3/8" HT TONG    | 13-5/8" STD TONG           | 13-5/8" HT TONG    | 20" TONG               | 20" TONG           |
| Pipe size range   | 2-7/8" to 9-5/8"  | 4" to 10-3/4"              | 4" to 10-3/4"      | 4" to 13-3/8"              | 4" to 13-3/8"      | 4" to 13-5/8"              | 4" to 13-5/8"      | 8-5/8" to 20"          | 8-5/8" to 20"      |
| Torque at High Gear                                       | 3500  | 4000                       | 5000               | 4000                       | 7100               | 4000                       | 7100               | 7500                   | 8300               |
| Torque at Low Gear  | 18000   | 20000                      | 25000              | 24000                      | 35000              | 24000                      | 35000              | 35000                  | 45000              |
| RPM at High Gear (Approx)                                 | 47/95   | 70 TO 100                  | 35 TO 45           | 70 TO 100                  | 40 TO 50           | 80 TO 100                  | 40 TO 50           | 15 TO 30               | 15 TO 30           |
| RPM at low Gear (Approx)                                  | 9/18  | 10 TO 25                   | 5 TO 10            | 10 TO 20                   | 5 TO 10            | 10 TO 20                   | 5 TO 10            | 5 TO 10                | 5 TO 10            |
| Tong Dimensions - Length X Width X Height (inch)          | 49"X28"X48"   | 56"X36"X50"                | 56"X36"X50"        | 61"X36"X54"                | 61"X36"X54"        | 61"X36"X54"                | 61"X36"X54"        | 76"X44"X58"            | 76"X44"X58"        |
| Tong w/BackUp Dimensions - Length X Width X Height (inch) |   |                            |                    | 61"X36"X90"                | 61"X36"X90"        | 61"X36"X90"                | 61"X36"X90"        |                        |                    |
| Tong Dry Weight - approx.(Kg)                             | 800   | 620                        | 620                | 750                        | 750                | 750                        | 750                | 1300                   | 1300               |
| Tong w/BackUp Dry Weight - approx.(Kg)                    | 500   |                            |                    | 1250                       | 1250               | 1250                       | 1250               |                        |                    |
| Torque arm Length   | 32"   | 34"                        | 34"                | 36"                        | 36"                | 36"                        | 36"                | 52"                    | 52"                |
| Includes :  |   |                            |                    |                            |                    |                            |                    |                        |                    |
| Safety Door Interlock.                                    | ✓   | ✓                          | ✓                  | ✓                          | ✓                  | ✓                          | ✓                  | ✓                      | ✓                  |
| Lift Cylinder Assembly                                    | ✓   | ✓                          | ✓                  | ✓                          | ✓                  | ✓                          | ✓                  | ✓                      | ✓                  |
| Spring Hanger assembly                                    | Single spring assy  | Single spring assy         | Single spring assy | Single spring assy         | Single spring assy | Single spring assy         | Single spring assy | Double spring assy     | Double spring assy |
| Hydraulic Backup  | ✓   |                            |                    | ✓                          | ✓                  | ✓                          | ✓                  |                        |                    |
| Backup Dies   | 2-7/8" to 9-5/8"  |                            |                    | 4" to 13-3/8"              | 4" to 13-3/8"      | 4" to 13-5/8"              | 4" to 13-5/8"      |                        |                    |
| DIE HEADS (per set)                                       | 2-7/8" to 9-5/8"  | 4" to 10-3/4"              | 4" to 10-3/4"      | 4" to 13-3/8"              | 4" to 13-3/8"      | 4" to 13-5/8"              | 4" to 13-5/8"      | 8-5/8" to 20"          | 8-5/8" to 20"      |
| Notes:-   |   |                            |                    |                            |                    |                            |                    |                        |                    |
| • Lift Cylinder   | Lift Cylinder (54"Stroke Length X Lift Cylinder Height 96") |                            |                    |                            |                    |                            |                    |                        |                    |
| • Hanger assembly   | Rigid Bail assembly or Bridle Chain assembly                |                            |                    |                            |                    |                            |                    |                        |                    |



## Computerized Torque Control System

Microprocessor based systems for providing computerized analysis of each joint and complete string. Provides graphic analysis of torque Vs. turn, torque Vs. time and various other options.



## Power Units

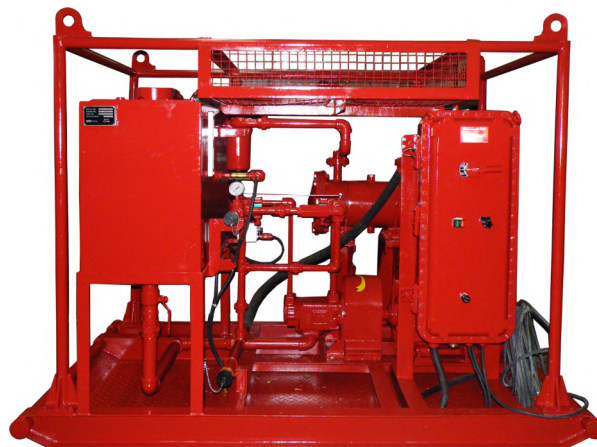
### Zone I - Electric Power Unit

#### Technical Specifications

- Pump: Variable delivery axial piston pump .
- Engine: 50/60 hp (37/45KW) Eexd electric motor.
- Cooler: thermostatically controlled hydraulic oil cooler .
- Electric Supply: 3 phase 415/480 volts 50/60 Hz.
- Hydraulic Output: 2,500 psi (172 bar) or 35 gpm (160 litres per amminute)

#### Dimensions

- Size: 4' 9" long x 4' 9" wide x 4' x 9" high (1,500mm long x1,500mm wide x 1,500mm high)
- Weight: 5,060 lbs (2,300 kg)



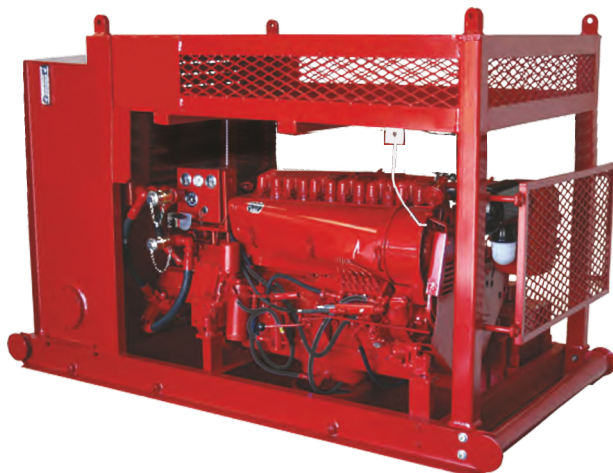
### Zone II- Diesel Power Unit

#### Technical Specifications

- Cooler: Combined water cooled manifold/exhaust cooler
- Flame Arrester: Exhaust gas flame and spark arrester, inlet air flame arrester, crank case vent flame arrester
- Fan and Fan Belts: Non-metallic radiator fan and antistatic fan belts
- Protection Device: Over-speed protection device operating an inlet air cut-off
- Pressure and Temperature Trips: Low lubricating oil pressure, high cooling water temperature and high exhaust temperature trips
- Caps: Screw caps to dipstick and oil filter caps
- Engine: 6 Cylinder Diesel
- Hydraulic Output: 2,500 psi (172 bar) or 35 gpm (160 litres per minute)
- Starter: Air-operated

#### Dimensions

- Size: 89 long x 4'3" wide x 5' 6" high (2,700mm long x 1,300mm wide x 1,700mm high)
- Weight: 6,600 lbs (3,000 kg)



### Non-Zoned Diesel Power Unit

#### Technical Specifications

- Engine: 6 cylinder diesel
- Hydraulic Output: 2,500 psi (172 bar) or 35 gpm.
- (160 litres per minute)
- Starter: Air or spring-operated.

#### Dimensions

- Size: 7' 8" long x 4' 3" wide x 4' 9" high(2,400 long x 1,300 mm wide x 1,500 mm high)
- Weight: 4,510 lbs (2,050 kg).



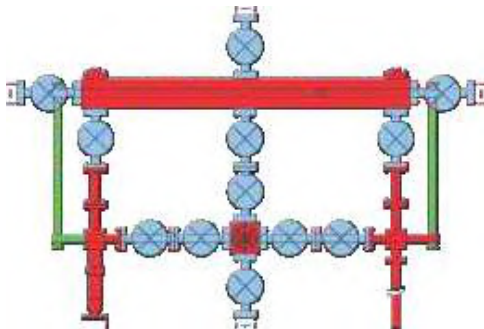
## Manifolds



Choke Manifold

Sara Sae manufactures a range of Manifolds for applications like choke & kill, standpipe and high pressure pumping in sizes up to 4-1/16" and pressures up to 15,000 PSI.

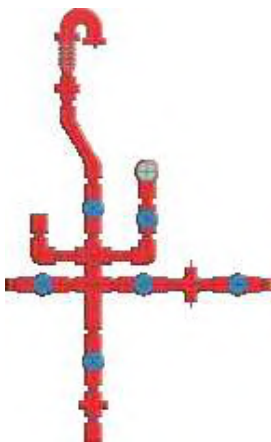
Customized manifolds to specific requirements can be ordered.



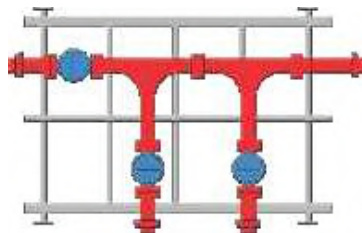
Choke Manifold



Kill Manifold



Standpipe Manifold



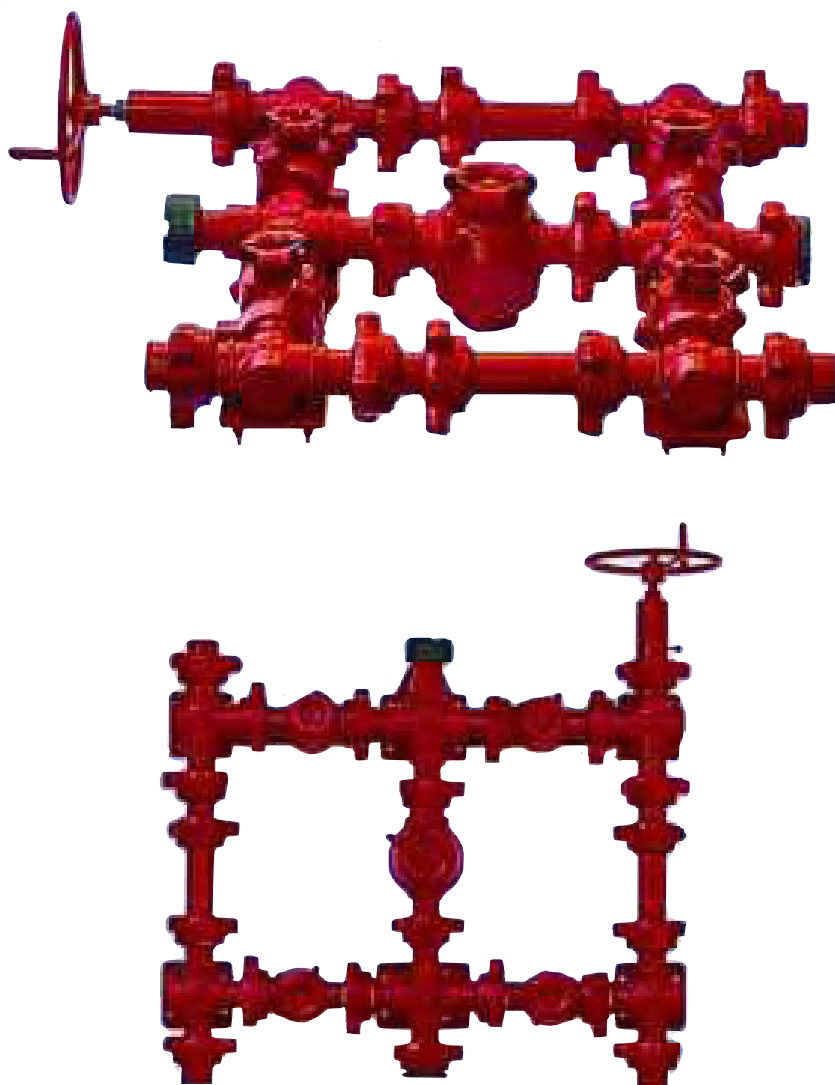
Discharge Manifold



Console



## HP Manifolds



Sara can supply manifolds: Choke and kill, frac, cement, multi-well, discharge, flow thru, test and circulation manifolds. Manifold to customer specific engineered designs are also manufactured. Sara Manifolds are available in pressure ratings upto 15000 PSI CWP.

Manifolds are available in both standard and sour service. Sara manifolds can be skidded as per customer request and manufactured with 1x2, 2x2, 3x3 1502 Plug Valves.

Manifolds can be custom made for bottom entry Low Torque Plug Valves or Top Entry Premium Plug Valves. Complete data package is provided including Material Test Reports, UT, MPI, and Pressure Test Charts. Plug Catcher manifolds also available upon request as well as Actuated Plug Valve Manifolds. Control panels are available based on in house engineering designs.



## Choke Console

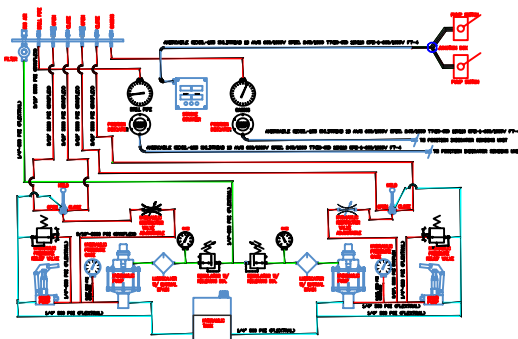


The control panel is normally used to operate the Choke from a remote location. The panel is portable and may be located at any safe location to satisfy specific needs or requirements that the customer may have.

The control panel is a completely self-contained unit with the exception of an air supply. The air input requirements are a minimum of 30 PSI, however 50-125 PSI with an available 10 cubic ft/min. (CFM) is recommended for maximum performance.

There are no electrical requirements for the panel or choke. The stroke counter assembly has a 6 Volt battery pack located inside the counter box. The battery pack is a replaceable/expendable item that should last approximately 36 months under normal conditions.

If the air operated hydraulic pump fail, the choke may still be operated by using the manual hydraulic pump located on the control panel base. This method of operation will work only if the remaining hydraulic systems are intact. If air pressure is lost the position indicator gauge will not work and the hydraulic system have a complete failure, provisions have been made for manual choke operation by inserting a bar into the indicator head. The indicator head features an indicator band so adjustment of the orifice size is still possible.



The position indicator gauge is used in conjunction with a position transmitting unit that is mounted to the choke, so that the relative opening of the choke orifice can be determined, shown as a scale of percent open. The choke is actuated/ controlled by the control panel.

For multiple choke installations, SARA SAE also offers a Dual Choke Control Console . Two chokes can be operated with this console without the need for an auxiliary panel or two single consoles.

Incase of emergency hydraulic backup as accumulator bottles is also available.

Choke console also provided with customized specification.





## Plug Valves



Sara Plug valves are built to the highest standards using advanced manufacturing techniques to ensure optimum performance and reliability

Sara Plug valves are used throughout the oil and gas industry worldwide in Standard and H25 service environments

Sara Plug valves can be offered specifically with the end connections or combinations to suit the specific field application. Applications for the Sara plug valves include:

- Blow-Out Preventer systems.
- Snubbing
- Cementing
- Well Stimulation)
- Sand Separator Systems
- Gravel Pack applications
- Coiled Tubing systems
- Production Testing
- Flow Back operations

Sara Plug Valve is a lubricated, tapered seated, quarter turn plug valve for roped full open or dose operation. The valve cavity is tapered to ensure uniform seating of the seating inserts, providing a reliable seat at the full range of pressures. Sara Plug Valves are presently offered in 2 x 1.2 x 2 and 3x3 configurations with Fig. 1502 Hammer Unions ends. Sara Plug valves can be offered specifically with the end connections to suit the specific field application



# Check Valve

## I. Product Description:

Sara Sae Flapper Type Check Valves are flow control devices that permit flow in one direction but stop flow in the opposite direction. Generally used in well service applications, the Flapper check valve is placed in the treating line to allow flow to the well but isolates any back flow to go upstream in the valve. This provides a safety device at various locations in the flow line and assures that pressure and fluid cannot backup into the manifold area or into the pumps. Sara Sae Flapper check valves are manufactured in 2", 3". Each size is offered with hammer union end connections. In addition, the check valves with hammer union end connections are available in standard flow.

The check valves are available in pressure ranges from 6,000 psi to 15,000\* psi for well service applications such as acidizing, cementing and fracturing. These valves are designed for fluids that are heavily laden with materials such as proppants, solids and ball sealers.

## II. Pressure/Temperature Ratings:

The Sara Sae Flapper Type Check Valves are available in the following configurations:

**Table 1. Sara Sae Flapper Type Check Valves**

| Valve Size | End Connection (Upstream/Downstream)          | NSCWP (PSI*) | Color | Type of Service  | Temp. Range     |
|------------|---|--------------|-------|------------------|-----------------|
| 2"         | 2" 1502 Female x 2" 1502 Male (Standard Flow) | 15000        | Red   | Standard Service | -30°C<br>+100°C |
| 3"         | 3" 1502 Female x 3" 1502 Male (Standard Flow) | 15000        | Red   | Standard Service | -30°C<br>+100°C |

\* Non-Shock Cold Working Pressure

### \*\*\*CAUTION\*\*\*

**SINCE CHECK VALVES MAY BE REPAINTED IN DIFFERENT COLORS FOR VARIOUS APPLICATIONS, DO NOT USE FACTORY COLOR AS PRIMARY MEANS OF IDENTIFICATION.**

\*\*\*\*\*

**Table 2. Recommended Flow Rates.**

| Valve Size | NSCWP (PSI) | Bore | Flow Rate* |
|------------|-------------|------|------------|
|            |             |      | GPM        |
| 2"         | 15000       | 1.75 | 315        |
| 3"         | 15000       | 2.75 | 778        |

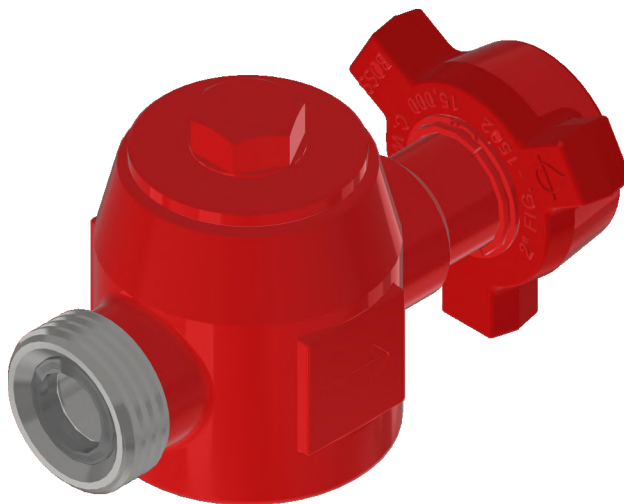


### III. End Connections:

#### A. Hammer Union Connections

Sara Sae Flapper Type Check Valves are available with the Sara Sae Wing Union Connections on the inlet and outlet sides (See Fig. 1). The inlet side will have a female wing union connection if a standard flow is specified or a male wing union connection for a reverse flow. The outlet side will always have the opposite gender.

Each valve has a size and pressure code designated on the valve. The nameplate will indicate the cold working pressure allowable for each assembly. This working pressure corresponds to the maximum pressure acceptable for either end connection. Use this information for proper mating and pressure limits:



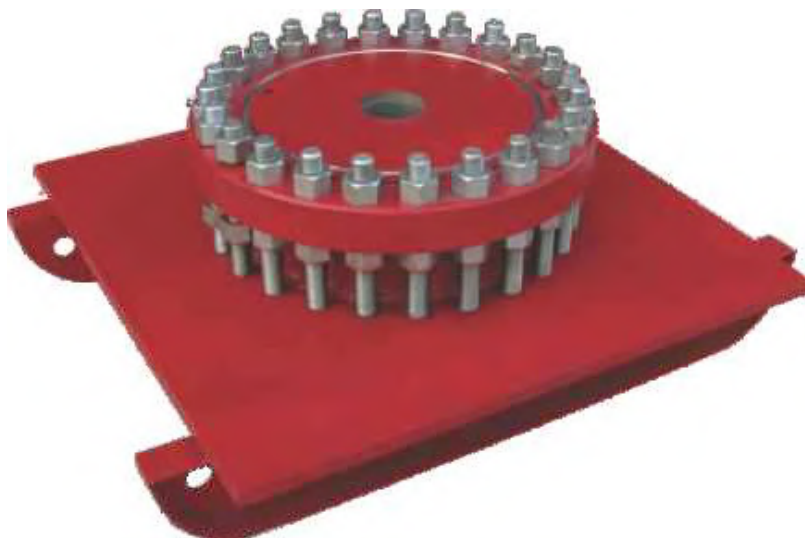
Wing union connections on the check valves are interchangeable with other union connections of the same size and figure (pressure rating). Caution must be taken to avoid mixing different ratings of wing connections. There are various sizes and figures that are capable of making marginal connections. These connections must also match the service of the designated string they are installed in. Failure to observe good judgment may lead to damage to components and danger to life and limb. Always verify working pressure ratings of each connection before use.

#### \*\*\*CAUTION\*\*\*

**DURING INSTALLATION CAUTION MUST BE TAKEN IN ENSURING THE  
ARROW INDICATED ON THE VALVE BODY AGREES WITH THE DIRECTION OF  
FLOW. (See Fig. 1)**

\*\*\*\*\*

### Test Stump





# Hammer Unions

## Material

Sara Sae unions are manufactured from steel forgings using materials appropriate to specific pressure ratings.

## End Connections

Sara Sae Unions are available in a choice of end connections. API line pipe threads are standard. Butt weld ends and Socketweld ends can be provided. The customer should specify the schedule of pipe while ordering.

## Sour Services

Sour service is available and all HS service parts of Sara Sae unions conform to the latest NACE specifications.

## Low Temperature Service

Sara Sae unions can be supplied for low temperature applications with suitable impact value testing.

## Interchangeability

All Sara Sae union components of the same size and figure number are Weco interchangeable. All Sara Sae union nuts have 3hammer lugs.

## Traceability

Sara Sae unions are supplied with full traceability documentation for each component.
















## Integral Union Connections

Sara Sae manufactures a line of high pressure integral union connections in pressure ratings to 15,000 PSI CWP, including but not limited to Crosses, Ells, Tees, Wyes.

## Other Wing Unions

Sara Sae also manufactures a range of Hex Unions, Hammerseal Tank Unions and Flat Face Unions where the sealing is dependent on an O-Ring fitted between the grooves machined on the mating metal parts.

## Hammer Union Quick Reference Chart

| Fig. No. | Assembly Colour Key for Standard Service  | Pressure Rating (psi) |        |                  |        | Nominal Pipe Size (in Inch) |                  |                  |    |                  |    |     |     |     |     |     |     |
|----------|---|-----------------------|--------|------------------|--------|-----------------------------|------------------|------------------|----|------------------|----|-----|-----|-----|-----|-----|-----|
|          |   | Standard Service      |        | Sour Gas Service |        | 1                           | 1 <sup>1/4</sup> | 1 <sup>1/2</sup> | 2  | 2 <sup>1/2</sup> | 3  | 4   | 5   | 6   | 8   | 10  | 12  |
|          |   | Cold Working          | Test   | Cold Working     | Test   | 25                          | 32               | 40               | 50 | 65               | 80 | 100 | 125 | 150 | 200 | 250 | 300 |
| 50       |  | 500                   | 750    | NA               | NA     |                             |                  |                  |    |                  |    | ✓   | ✓   |     |     |     |     |
| 100      |  | 1,000                 | 1,500  | NA               | NA     |                             |                  |                  | ✓  | ✓                | ✓  | ✓   | ✓   | ✓   | ✓   |     |     |
| 200      |  | 2,000                 | 3,000  | NA               | NA     | ✓                           | ✓                | ✓                | ✓  | ✓                | ✓  | ✓   | ✓   | ✓   | ✓   | ✓   |     |
| 206      |  | 2,000                 | 3,000  | NA               | NA     | ✓                           |                  | ✓                | ✓  | ✓                | ✓  | ✓   | ✓   | ✓   | ✓   | ✓   |     |
| 207      |  | 2,000                 | 3,000  | NA               | NA     |                             |                  |                  |    |                  | ✓  | ✓   |     | ✓   |     |     |     |
| 211      |  | 2,000                 | 3,000  | NA               | NA     |                             |                  |                  | ✓  |                  | ✓  |     |     |     |     |     |     |
| 400      |  | 2,500                 | 3,750  | 2,500            | 3,750  |                             |                  |                  |    |                  |    |     |     | ✓   |     |     | ✓   |
| 400      |  | 4,000                 | 6,000  | 4,000            | 6,000  |                             |                  |                  | ✓  |                  | ✓  | ✓   |     |     |     |     |     |
| 600      |  | 6,000                 | 9,000  | NA               | NA     | ✓                           |                  |                  | ✓  |                  | ✓  | ✓   |     |     |     |     |     |
| 602      |  | 6,000                 | 9,000  | 6,000            | 9,000  | ✓                           | ✓                | ✓                | ✓  |                  | ✓  | ✓   |     |     |     |     |     |
| 1002     |  | 10,000                | 15,000 | 7,500            | 11,250 | ✓                           | ✓                | ✓                | ✓  |                  | ✓  | ✓   | ✓   | ✓   |     |     |     |
| 1003     |  | 10,000                | 15,000 | 7,500            | 11,250 |                             |                  |                  |    |                  | ✓  | ✓   | ✓   |     |     |     |     |
| 1502     |  | 15,000                | 22,500 | 10,000           | 15,000 | ✓                           |                  |                  | ✓  |                  | ✓  | ✓   | ✓   |     |     |     |     |
| 2002     |  | 20,000                | 30,000 | NA               | NA     |                             |                  |                  | ✓  |                  | ✓  | ✓   |     |     |     |     |     |
| 2202     |  | NA                    | NA     | 15,000           | 22,500 |                             |                  |                  | ✓  |                  | ✓  | ✓   |     |     |     |     |     |

\*Refer notes with each Union for pressure rating variances.



**Fig 50 Union - 500 PSI CWP**



Recommended for air, water, oil, or gas service to 500 PSI NSCWP. Standard subs are threaded for API line pipe.

**Sizes-4", 5"**

**Fig 100 Union - 1,000 PSI CWP**



Recommended for air, water, oil, or gas service to 1,000 PSI NSCWP. Standard subs are threaded for API line pipe and are Weco interchangeable. Also available with butt weld ends.

**Sizes-2", 2,3,4", 5"6", 8"**

**Fig 200 Union - 2,000 PSI CWP**



Recommended for air, water, oil, or gas service to 2000 PSI NSCWP. A union of great utility meeting most requirements in the medium pressure ranges. Precision seating surfaces assure dependable pressure seal. Standard subs are threaded for API line pipe and are Weco interchangeable. Also available with butt weld end connections.

**Sizes - 1, 1-1/4", 1-1/2", 2", 2-1/2" 3", 4", 5", 6", 8", 10"**

**Fig 206 Union - 2,000 PSI CWP**



Recommended for air, water, oil or gas service to 2,000 PSI NSCWP. A Buna-N 'O' ring is mounted on the plain sub to provide an additional seal. Subs and nuts of the Fig. 206 union are interchangeable with the Fig. 200 union. Standard subs are threaded for API line pipe. Also available with butt weld end connections.

**Sizes-1", 1-1/2", 2", 2-1/2" 3", 4", 5", 6", 8", 10"**

**Fig 207 Union - 2,000 PSI CWP**



Recommended for air, water, oil, or gas service to 2,000 PSI NSCWP. A blanking cap with Buna-N'O' ring seal provides an efficient and dependable closure. The threaded sub is interchangeable with Fig. 200 threaded sub. Also available with butt weld ends.

**Sizes - 3", 4", 6"**

**Fig 211 Union - 2,000 PSI CWP**



Recommended for production systems with electrolytic corrosion problems. Laminated insulating rings provide 35 million Ohms resistance across the union. O-ring in male sub provides a positive primary seal. Seal ring in female sub delivers a positive secondary seal.

**Sizes - 2", 3"**



**Fig 400 Union - 4,000 PSI CWP**



Recommended for air, water, oil, or gas service to 4,000 PSI NSCWP. Utilizes precision ball and cone seating surfaces for easy alignment and dependable pressure seal. Sizes over 4" are rated to 2,500 PSI NSCWP. Also available with a lip-type seal in 2" size only as Fig 402 and butt weld end connections.

**Sizes - 2", 3", 4", 6", 12"**

**Fig 600 Union - 6,000 PSI CWP**



Recommended for air, oil, gas or steam service to 6,000 PSI NSCWP. Rugged and fast 2 pitch acme thread makes this the quickest union to make-up or break out (only two turns). The threaded sub is fitted with a bronze seat insert for added effectiveness in pressure sealing.

**Sizes - 1", 2", 3", 4"**

**Fig 602 Union - 6,000 PSI CWP**



Recommended for air, water, oil, gas or mud service to 6,000 PSI NSCWP. This union has a replaceable lip-type seal ring of Buna-N specifically designed to minimize fluid flow turbulence. Lip-type ring provides a pressure seal and protection for metal-to-metal seating surfaces. Smaller and lighter than Fig. 600 unions and are recommended for manifold and truck mounting where size and weight are critical.

**Sizes - 1, 1-1/4", 1-1/2", 2" 3", 4"**

**Fig 1002 Union - 10,000 PSI CWP**



Recommended for air, water, oil, gas and mud service to 10,000 PSI NSCWP. This union has a replaceable lip-type seal ring of Buna-N specifically designed to minimize fluid flow turbulence. The lip-type ring works similarly as in the Fig. 602 union. These unions are for use on high pressure systems and trucks.

**Sizes - 1, 1-1/4", 1-1/2", 2", 2-1/2" 3", 4", 5", 6" 5 & 6" sizes rated at 7,500 PSI CWP & 11,250 PSI Test 5 & 6" sizes for sour gas rated at 5,000 PSI CWP & 7,500 PSI Test**

**Fig 1003 Union - 10,000 PSI CWP**



Recommended for high pressure manifolding and drilling rig use where alignment of piping components is a problem. Recommended for air, water, oil, gas or mud service to 10,000 PSI NSCWP. This union has a ball seat that allows a total of 15' (+7%) angular adjustment. An 'O' ring seal in addition to the metal-to-metal seat assures a pressure tight connection.

**Sizes - 3", 4", 5", 3" size rated at 10,000 PSI CWP & 15,000 PSI Test Pressure 4" & 5" size rated at 7,500 PSI CWP & 11,250 PSI Test Pressure 4" & 5" Union for sour gas rated at 5000 PSI CWP & 7500 PSI Test Pressure**

**Fig 1502 Union - 15,000 PSI CWP**



Recommended for air, water, oil, gas and mud service to 15,000 PSI NSCWP. This union has a replaceable lip-type seal ring of Buna-N specifically designed to minimize fluid flow turbulence. The lip-type ring also provides a pressure seal and protection for metal-to-metal seating surface and are recommended for manifold and truck mounting or other installations where high pressure is encountered.

**Sizes - 1, 2, 3, 4", 5"**



**Fig 2002 Union - 20,000 PSI CWP  
& Fig 2202 Union - 15,000 PSI CWP**



Recommended for standard service to 20,000 PSI NSCWP. Available in butt weld end connections only. Available as Fig 2202 for sour service (15,000 PSI WP).

**Sizes - 2", 3", 4"**

**Fig YH-300 Union - 500-12,500 PSI CWP**



It is a flat face Union with 'O'-Ring fitted into the groove of Q the female sub. The 'O'-Ring is completely enclosed with the flat face of mating part and becomes more effective as additional pressure is applied.

**Sizes - 1/2", 1, 2, 3, 4"**

**Mud Tank Seal Union - 150 PSI CWP**

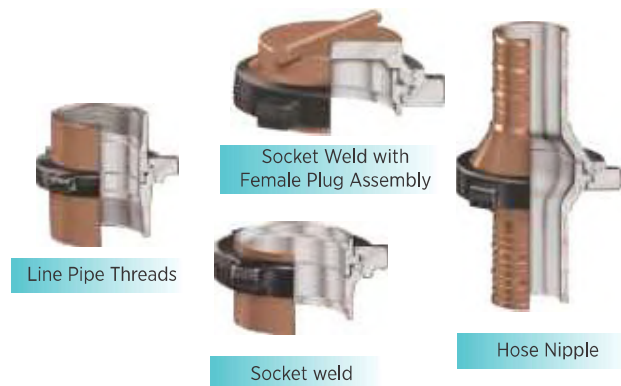


Recommended for Mud tanks, mud tank connecting lines, and pump suction flanges

- Nitrile seal provides a compression seal.
- Elongated cross-section of seal ring ensures greater sealing surface when in contact with the pipe.
- Accepts up to 7° pipe misalignment.
- 6, 8, and 10-inch sizes require butt-weld.

**Sizes - 3", 4", 6", 8", 10", 12", 14", 16"**

**Suction Hose Unions - 500 PSI (34 bar)  
Maximum Line Pressure, 4", 5" & 6" sizes**



Sara manufactures a range of Suction-hose and Frac Tank Unions in 4", 6" and 8" sizes in pressures ranging from 500 to 1,000 PSI CWP.

## Frac Subs/Hose Unions

Sara Sae manufactures an assortment of other products having usage in varied oilfield applications. In addition to the Frac Subs shown below, Sara Sae also manufactures Flange to Wing Adapters, Wing to Wing Adapters, Flanged Tees and Crosses.



Frac Subs













# Integral Union Fitting

Sara Sae also manufactures Flange to Wing Adapters, Wing to Wing Adapters, Flanged Tees and Crosses and an assortment of other products having usage in varied oilfield applications








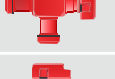






Flange to Union Crossover

## Integral Fitting Specifications

| Nom. Size in. |  | 1      | 1.5    | 2     |        |        | 3     |        |        | 4     |        |        |
|---------------|--|--------|--------|-------|--------|--------|-------|--------|--------|-------|--------|--------|
| Figure No.    |  | 1502   | 1502   | 602   | 1502   | 2002   | 602   | 1502   | 2002   | 602   | 1002   | 1502   |
| CWP (PSI)     |  | 15,000 | 15,000 | 6,000 | 15,000 | 20,000 | 6,000 | 15,000 | 20,000 | 6,000 | 10,000 | 15,000 |
| Elbows        |  F x M<br>Wt. (Kg.)     | -      | -      | 10    | 12.6   | -      | 24.5  | 22.9   | -      | 40.4  | 40.4   | -      |
|               |  F x M<br>Wt. (Kg.)     | -      | -      | 12.4  | 14.7   | -      | 45.6  | 46.3   | 100    | -     | -      | -      |
|               |  M x M<br>Wt. (Kg.)     | -      | -      | 16.3  | 18.5   | -      | 52.2  | 54.9   | -      | -     | -      | -      |
|               |  F x F<br>Wt. (Kg.)     | -      | -      | 8.2   | 10.9   | -      | 38.1  | 39.5   | -      | -     | -      | -      |
| Tees          |  F x F x F<br>Wt. (Kg.) | 13.2   | 15.4   | 12    | 13.2   | 14.5   | 50.8  | 51.7   | 99.8   | 44.9  | 45.8   | 90.7   |
|               |  F x F X M<br>Wt. (Kg.) | 14.4   | 18     | 14.2  | 17     | 19     | 56.2  | 58     | 115    | 51.7  | 52.6   | 106    |
|               |  F x M x F<br>Wt. (Kg.) | 14.4   | 18     | 14.2  | 17     | 19     | 56.2  | 58     | 115    | 51.7  | 52.6   | 106    |
|               |  F x M x M<br>Wt. (Kg.) | 15.9   | 21.1   | 16.3  | 20.9   | 23.6   | 61.7  | 64.4   | 129    | 57.6  | 59     | 122    |



| Nom. size in.   |  | 1      | 1.5    | 2     |         |        |       | 3      |        | 4     |        |        |
|-----------------|--|--------|--------|-------|---------|--------|-------|--------|--------|-------|--------|--------|
| Figure No.      |  | 1502   | 1502   | 602   | 1502    | 2002   | 602   | 1502   | 2002   | 602   | 1002   | 1502   |
| CWP (PSI)       |  | 15,000 | 15,000 | 6,000 | 15,000  | 20,000 | 6,000 | 15,000 | 20,000 | 6,000 | 10,000 | 15,000 |
| Tees            |  M x M x F<br>Wt. (Kg.)       | 15.9   | 21.1   | 16.3  | 20.9    | 23.6   | 61.7  | 64.4   | 129    | 57.6  | 59     | 122    |
|                 |  M x M x M<br>Wt. (Kg.)       | 17.2   | 23.6   | 18.6  | 24.7    | 28.1   | 67.1  | 70.8   | 144    | 64    | 64.9   | 137    |
| Longsweep Elbow |  M X M<br>Wt. (Kg.)           | -      | -      | 12.2  | 34 15.4 | -      | 30    | 29.5   | -      | 46.3  | 46.3   | -      |
| Crosses         |  F x F x F x F<br>Wt. (Kg.)   | -      | 31.8   | 26.3  | 26.8    | -      | 71.2  | 61.7   | -      | 65.3  | 65.5   | -      |
|                 |  F x F x M x F<br>Wt. (Kg.)   | -      | 35     | 28.1  | 30      | -      | 76.2  | 80.7   | -      | 71.2  | 71.2   | -      |
|                 |  F x F x M x M<br>Wt. (Kg.)   | -      | 37.6   | 30.4  | 33.1    | -      | 81.6  | 83     | -      | 77.1  | 77.1   | -      |
|                 |  F x M x M x F<br>Wt. (Kg.)   | -      | 37.6   | 30.4  | 33.1    | -      | 81.6  | 83     | -      | 77.1  | 77.1   | -      |
| Crosses         |  F x M x M x M<br>Wt. (Kg.)  | -      | 40.4   | 32.7  | 36.3    | -      | 87.1  | 89.4   | -      | 83    | 83     | -      |
|                 |  M x M x M x M<br>Wt. (Kg.) | -      | 142.6  | 35    | 39.5    | -      | 92.1  | 95.7   | -      | 89.4  | 89.4   | -      |
| Laterals        |  M x F x F<br>Wt. (Kg.)     | 26.3   | 27.9   | 21.5  | 24.3    | -      | -     | 40.1   | -      | 53.1  | 78.9   | 141    |
|                 |  F x F x F<br>Wt. (Kg.)     | 25.4   | -      | -     | -       | -      | -     | 40.9   | -      | -     | -      | -      |
| Wyes            |  M x F x F<br>Wt. (Kg.)     | -      | 20     | 12.7  | 12.2    | 12.7   | -     | -      | -      | -     | -      | -      |



## Swivel Joints

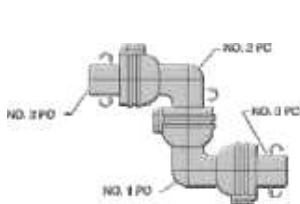
Available in sizes" through 3" up to 15,000 PSI non-shock cold working pressure, Sara Sae Swivel Joints offer the following features:

- Minimum flow restriction
- Heavy duty hex head style ball loading plug
- Grease retainer ring (ensures clean ball race).
- Standard packing units (operating temperature to 2250°F).

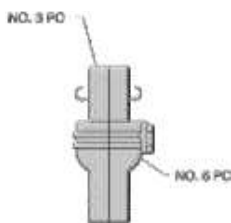


- High temperature packing units (operating temperature to 450°F).
- Superior hardened ball races ensure uniform surface hardness and depth for longer life under severe thrust and radial loading
- Standard Swivel Joints are provided with API line pipe threads.
- Other end connections are available on request.
- Available for standard and sour service
- All sizes are available in 8 styles, for 360° rotation in 1,2 or 3 planes

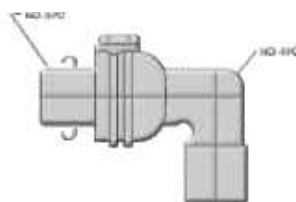
### Short Radius Swivel Joints



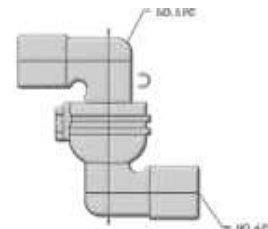
**Style No. 10**  
(Three Planes of Rotation)



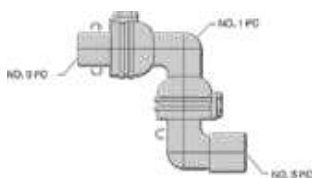
**Style No. 20**  
(One Plane of Rotation)



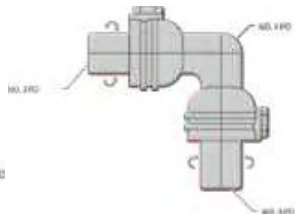
**Style No. 30**  
(One Plane of Rotation)



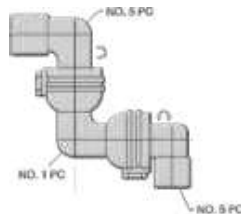
**Style No. 40**  
(One Plane of Rotation)



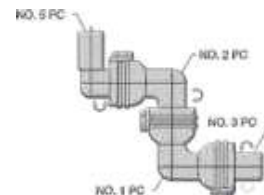
**Style No. 50**  
(Two Planes of Rotation)



**Style No. 60**  
(Two Planes of Rotation)



**Style No. 70**  
(Two Planes of Rotation)



**Style No. 80**  
(Three Planes of Rotation)



## Quick Reference Chart

| Model                             | Color Code  | NSCWP | End Connections          | Standard Service<br>SIZE (in) |                  |                  |   |   |   | Sour Service<br>SIZE (in) |                  |                  |   |   |   |
|-----------------------------------|-------------|-------|--------------------------|-------------------------------|------------------|------------------|---|---|---|---------------------------|------------------|------------------|---|---|---|
|                                   |             |       |                          | 3/4                           | 1 <sup>1/4</sup> | 1 <sup>1/2</sup> | 1 | 2 | 3 | 3/4                       | 1 <sup>1/4</sup> | 1 <sup>1/2</sup> | 1 | 2 | 3 |
| Low Pressure                      | BLUE        | 1000  | Female Line Pipe Threads |                               |                  |                  |   | ✓ | ✓ |                           |                  |                  |   |   |   |
| High Pressure                     | OLIVE GREEN | 6000  | Fig. 602 Union           |                               |                  |                  |   |   |   |                           |                  |                  |   | ✓ | ✓ |
|                                   | SILVER      | 6000  | Female Line Pipe Threads | ✓                             | ✓                | ✓                | ✓ | ✓ | ✓ |                           |                  |                  |   |   |   |
| Extra High Pressure<br>Long Sweep | OLIVE GREEN | 7500  | Fig. 1002 Union          |                               |                  |                  |   |   |   |                           |                  |                  |   | ✓ | ✓ |
|                                   | OLIVE GREEN | 10000 | Fig. 1502 Union          |                               |                  |                  |   |   |   |                           |                  |                  |   | ✓ | ✓ |
|                                   | BLACK       | 10000 | Female Line Pipe Threads |                               |                  |                  |   | ✓ | ✓ |                           |                  |                  |   |   |   |
|                                   | OLIVE GREEN | 15000 | Fig. 2202 Union          |                               |                  |                  |   |   |   |                           |                  |                  |   | ✓ | ✓ |
|                                   | RED         | 15000 | Fig. 1502 Union          |                               |                  |                  |   | ✓ | ✓ |                           |                  |                  |   |   |   |
|                                   | LIGHT BLUE  | 20000 | Fig. 2002 Union          |                               |                  |                  |   | ✓ | ✓ |                           |                  |                  |   |   |   |

## Steel Hose Assemblies

High pressure cementing and circulating hoses incorporate swivel joints of forged steel with superior quality hardened ball races and high pressure type packing units.



One wing union and two style 50 or style 10 swivel joints with threaded ends



- One wing union and one each style 50 and style 10 swivel joints with integral wing union ends
- Four wing unions and two style 50 or style 10 swivel joints with integral wing union ends
- Four wing unions and two style 50 or style 10 swivel joints

## Long Radius Swivel Joints



STYLE NO. 10  
MxM Union Ends



STYLE NO. 10  
MxF Union Ends



STYLE NO. 50  
Threaded Ends



STYLE NO. 50  
MxF Union Ends



STYLE NO. 10  
Threaded Ends



## Plug Joints



### Integral Pup Joints

- Integral Pup joints are made of high quality alloy steel, integrally constructed, forged ended, and features seamless upset construction
- Detachable wing union and connections enable fast, easy make-up and break-out of temporary flow lines
- Eliminates all welds or threads
- Uniform bore for greater flow capacity
- Pup joints are hydrostatically tested at 15 times the rated cold working pressure
- Available from 2" to 3" sizes, lengths for pup joints range from 1 foot to 12 feet to 15.000 ps working pressure
- Integral pup joints can be made available with two models, one is plain integrat pup joints, another is pup joints withretaining shoulder, integral pup joints with retention shoulder features specially machined shoulder to prevent nut from sliding down pup joints when held vertically

### NPST Pup Joints

- NPST Pup joints are made of high quality seamless @eline with male and female detachable Hammer Unions
- Uniform bore for greater flow capacity.
- Available from 2 to 3 sizes, lengths for puo joints range from 1 feet to 20 feet to 15.000 ps working pressure

### Butt weld Pup Joints

- Butt weld Pup joints are made of high quality seamless pipeline with male and female Hammer Unions welded to pupJoint pipeline
- Detachable wing union end connections enable fast easy make-up and break-out of temporary flow lines
- Pup joints are hydrostatically tested at 1.5 times the rated cold working pressure
- Available from 2 to 4 sizes, lengths for pup joints range from 1 feet to 20 feet to 6,000 ps working pressure



## Spools & Adapters



### Adapter Spools

Order Formula: Nominal size and working pressure

Sara Sae manufactures a wide range of Drilling Spools and Double Studded Adapter Flanges conforming to API-16 A and 6A in line with specific customer requirements.

### Drilling Spools

Order Formula: Nominal Size, Working Pressure, end connections and outlet sizes

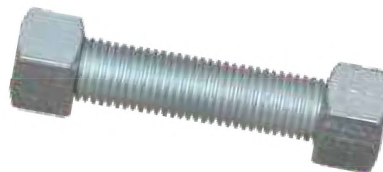


**Double Studded**  
Adapter Flanges



### Spacer Spools

Order Formula : Nominal size, working pressure and connections



### Studs and Nuts

Order Formula : Nominal size, working pressure and end connections



## Flanges, Tees & Crosses

Sara Sae manufactures a wide range of High Pressure Flanges, Tees, Crosses conforming to API 6A and in line with specific customer requirements.



### Weld Neck Flanges

Order Formula: Nominal size, working pressure and pipe schedule

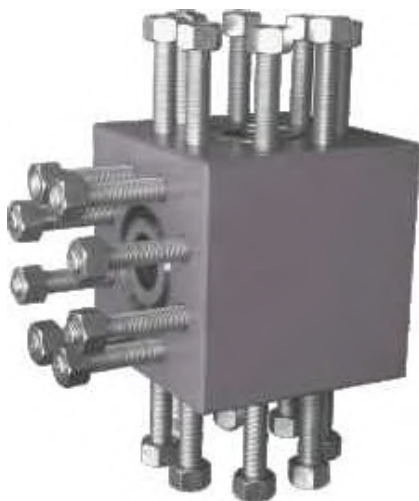
### Studded Crosses and Tees

Sara manufactures Studded Crosses and Tees according to the designs and tables in API Spec 6A.

### Flanged Crosses and Tees

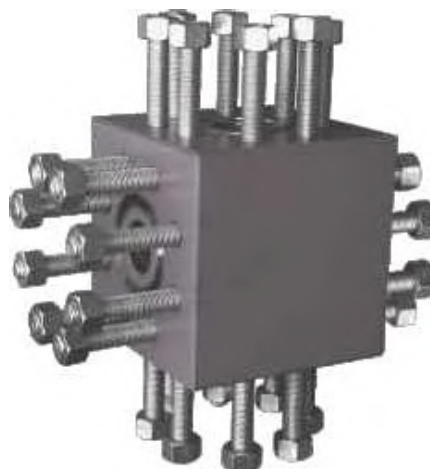
Sara manufactures Flanged Crosses and Tees according to the design requirements and face to centerline requirements of API Spec 6A.

When specific nominal sizes and combinations of nominal sizes do not appear in API Spec 6A, Sara shall manufacture Studded/Flanged Crosses and Tees according to the design criteria provided in API Spec 6A



### Studded Tees

Order Formula: Nominal size and working pressure



### Studded Crosses

Order Formula: Nominal size and working pressure



## Ring Gaskets

Sara Metallic Ring Gaskets are suitable for high pressure and high temperature applications. The Gaskets are available in R, RX, BX styles and in oval/octagonal profiles. Sara manufactures gaskets in accordance with specific tolerances on CNC machines.

Sara Ring Gaskets fully comply with the ASME B16.20 standard and API spec 6A requirements (where applicable). Sara Sae is authorized to monogram Ring Gaskets as per API-6A

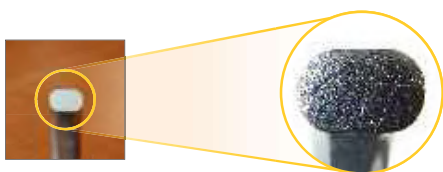


### Prime Features

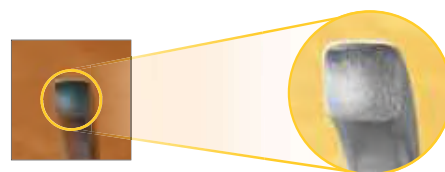
- R type (oval and octagonal) solid sections to fit standard ring flanges with trapezoidal grooves.
- Types RX and BX with complex beveled edge sections for wellhead pressures above 700 bar.
- Combination Gaskets - Used where two flanges of different sizes are to be joined together.
- Split Gaskets Used where an API flange is to be joined with a low pressure ANSI Flange where a spiral wound gasket is used.
- Special metal gaskets made to customer specifications

### Materials

- Standard: Soft iron, low carbon steel, alloy steels F5 and 410, stainless steels 304, 304L, 316, 316L, 321 and 347.
- Non-standard: high nickel alloys, super alloy steels, and other stainless grades.
- Rubber coated ring gaskets soft iron metal ring joint gaskets are coated with nitrile rubber for testing wellhead assemblies and valves, Rings can be reused and do not damage flange grooves.



R-Oval



BX Type



R-Octagonal



RX Type



## Model R or RX

For flanges in accordance with  
ASME B16.5 and BS 1560

| Nominal<br>Pipe Dimension<br>(inches) | Ring Number at Pressure Rating (lbs) |        |        |        |        |        |        |
|---------------------------------------|--------------------------------------|--------|--------|--------|--------|--------|--------|
|                                       | 150                                  | 300    | 400    | 600    | 900    | 1500   | 2500   |
| ½                                     | -                                    | R11    | -      | R11    | -      | R12    | R13    |
| ¾                                     | -                                    | R13    | -      | R13    | -      | R14    | R16    |
| 1                                     | R15                                  | R16    | -      | R16    | -      | R16    | R18    |
| 1¼                                    | R17                                  | R18    | -      | R18    | -      | R18    | R21    |
| 1½                                    | R19                                  | R/RX20 | -      | R/RX20 | -      | R/RX20 | R/RX23 |
| 2                                     | R22                                  | R/RX23 | -      | R/RX23 | -      | R/RX24 | R/RX26 |
| 2½                                    | R/RX25                               | R/RX26 | -      | R/RX26 | -      | R/RX27 | R28    |
| 3                                     | R29                                  | R/RX31 | -      | R/RX31 | R/RX31 | R/RX35 | R32    |
| 3½                                    | R33                                  | R34    | -      | R34    | -      | -      | -      |
| 4                                     | R36                                  | R/RX37 | R/RX37 | R/RX37 | R/RX37 | R/RX39 | R38    |
| 5                                     | R40                                  | R/RX41 | R/RX41 | R/RX41 | R/RX41 | R/RX44 | R42    |
| 6                                     | R43                                  | R/RX45 | R/RX45 | R/RX45 | R/RX45 | R/RX46 | R/RX47 |
| 8                                     | R48                                  | R/RX49 | R/RX49 | R/RX49 | R/RX49 | R/RX50 | R51    |
| 10                                    | R53                                  | R/RX53 | R/RX53 | R/RX53 | R/RX53 | R/RX54 | R55    |
| 12                                    | R56                                  | R/RX57 | R/RX57 | R/RX57 | R/RX57 | R58    | R60    |
| 14                                    | R59                                  | R61    | R61    | R61    | R62    | R/RX63 | -      |
| 16                                    | R64                                  | R/RX65 | R/RX65 | R/RX65 | R/RX66 | R67    | -      |
| 18                                    | R68                                  | R/RX69 | R/RX69 | R/RX69 | R/RX70 | R71    | -      |
| 20                                    | R72                                  | R/RX73 | R/RX73 | R/RX73 | R/RX74 | R75    | -      |
| 24                                    | R76                                  | R77    | R77    | R77    | R78    | R79    | -      |

## Model BX

For flanges in accordance with  
API spec 6A, model 6BX

| Nominal<br>Pipe Dimension<br>(inches) | Ring Number at Pressure Rating (lbs) |       |       |        |        |        |
|---------------------------------------|--------------------------------------|-------|-------|--------|--------|--------|
|                                       | 2,000                                | 3,000 | 5,000 | 10,000 | 15,000 | 20,000 |
| 1 <sup>11/16</sup>                    | -                                    | -     | -     | BX150  | BX150  | -      |
| 1 <sup>13/16</sup>                    | -                                    | -     | -     | BX151  | BX151  | BX151  |
| 2 <sup>1/16</sup>                     | -                                    | -     | -     | BX152  | BX152  | BX152  |
| 2 <sup>9/16</sup>                     | -                                    | -     | -     | BX153  | BX153  | BX153  |
| 3 <sup>1/16</sup>                     | -                                    | -     | -     | BX154  | BX154  | BX154  |
| 4 <sup>1/16</sup>                     | -                                    | -     | -     | BX155  | BX155  | BX155  |
| 5 <sup>1/8</sup>                      | -                                    | -     | -     | BX169  | -      | -      |
| 7 <sup>1/16</sup>                     | -                                    | -     | -     | BX156  | BX156  | BX156  |
| 9                                     | -                                    | -     | -     | BX159  | BX157  | BX157  |
| 11                                    | -                                    | -     | -     | BX158  | BX158  | BX158  |
| 13 <sup>5/8</sup>                     | -                                    | -     | BX160 | BX159  | BX159  | BX159  |
| 16 <sup>3/4</sup>                     | -                                    | -     | BX162 | BX162  | -      | -      |
| 18 <sup>3/4</sup>                     | -                                    | -     | BX163 | BX164  | BX164  | -      |
| 21 <sup>1/4</sup>                     | -                                    | -     | BX165 | BX166  | -      | -      |
| 26 <sup>3/4</sup>                     | BX167                                | BX168 | -     | -      | -      | -      |
| 30                                    | BX303                                | BX303 | -     | -      | -      | -      |

## Model R or RX

For flanges in accordance with API spec 6A  
model 6B

| Nominal<br>Pipe Dimension (inches) | Ring Number at Pressure Rating (lbs) |        |        |
|------------------------------------|--------------------------------------|--------|--------|
|                                    | 2000                                 | 3000   | 5000   |
| 2 <sup>1/8</sup>                   | R/RX23                               | R/RX24 | R/RX24 |
| 2 <sup>9/16</sup>                  | R/RX26                               | R/RX27 | R/RX27 |
| 3 <sup>1/8</sup>                   | R/RX31                               | R/RX31 | R/RX35 |
| 4 <sup>1/16</sup>                  | R/RX37                               | R/RX37 | R/RX39 |
| 5 <sup>1/8</sup>                   | R/RX41                               | R/RX41 | R/RX44 |
| 7 <sup>1/16</sup>                  | R/RX45                               | R/RX45 | R/RX46 |
| 9                                  | R/RX49                               | R/RX49 | R/RX50 |
| 11                                 | R/RX53                               | R/RX53 | R/RX54 |
| 13 <sup>5/8</sup>                  | R/RX57                               | R/RX57 | -      |
| 16 <sup>3/8</sup>                  | R/RX65                               | R/RX66 | -      |
| 20 <sup>3/4</sup>                  | -                                    | R/RX74 | -      |
| 21 <sup>1/4</sup>                  | R/RX73                               | -      | -      |

## Model R or RX

For flanges in accordance with  
ASME B16.47 series A (MSS-SP44)

| Nominal<br>Pipe Dimension (inches) | Ring Number at Pressure Rating (lbs) |        |
|------------------------------------|--------------------------------------|--------|
|                                    | 300 - 600                            | 900    |
| 12                                 | R/RX57                               | R/RX57 |
| 14                                 | R61                                  | R62    |
| 16                                 | R/RX65                               | R/RX66 |
| 18                                 | R/RX69                               | R/RX70 |
| 20                                 | R/RX73                               | R/RX74 |
| 22                                 | R81                                  | -      |
| 24                                 | R77                                  | R78    |
| 26                                 | R93                                  | R100   |
| 28                                 | R94                                  | R101   |
| 30                                 | R95                                  | R102   |
| 32                                 | R96                                  | R103   |
| 34                                 | R97                                  | R104   |
| 36                                 | R98                                  | R105   |



BX Type Ring



R Type Ring



RX Type Ring



Combination Ring



Split Ring



Buna Coated Ring



## Pressure Wash Units

Pressure Wash Units are specifically designed to provide an efficient and versatile method of cleaning heavy equipment by means of a high pressure jet of water.

The unit consists of a triplex reciprocating plunger type pump driven by an explosion proof electric motor to pressurize water, an accumulator to prevent pressure surge, auto electric pressure switch to adjust the water at desired pressure (1500 psi max.), a rectangular reservoir for storage of the atmospheric water supply for the pressure pumps, relief valve, shut off valves, strainer, filter and pressure gauge, all manifolded and mounted on an oil field type skid. The unit is provided with a hand control pressure gun with a 50-foot hose.



Air operated units, not requiring electric power, are also available.



## Manufacturing Facilities











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