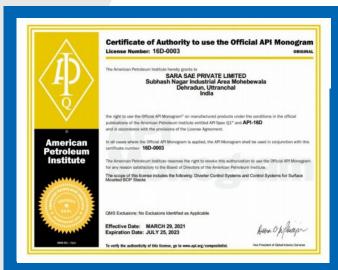


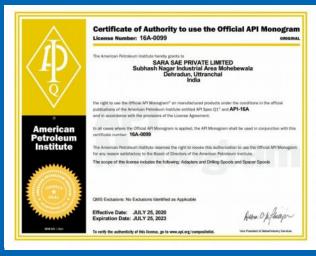


Sara manufactures a diverse range of oilfield equipment in its manufacturing facilities in India, using the latest design techniques and CNC machines. These products are available through distributors worldwide, including Sara's subsidiary company (STS Products, Inc.) in USA, Singapore and Dubai.

		4
	Quality & Innovation	1
	BOP Accumulator Units	3
	Remote Panels	4
	Solar BOP Control Unit	5
	High Pressure Test Units	6
	PLC Test Unit	7
	Containerised Pressure Testing Workshop	8
	Manifolds	9
	Pressure Wash Units	10
	Hydraulic Tongs	11
	Power Units	12
	Elevators	13
	Manual Tongs	16
	Slips	18
	API 6A Gate Valves	20
	Hammer Unions	24
	Integral Union Fitting	28
	Swivel Joints	30
	Pup Joints	32
	Plug Valves	33
	Chokes	34
	HP Manifolds	34
	Manifold Fittings	35
	Spools & Adapters	36
	Flanges, Tees & Crosses	37
	Ring Joint Gaskets	38
	Manufacturing Facilities	40
A A		

# **Quality & Innovation**











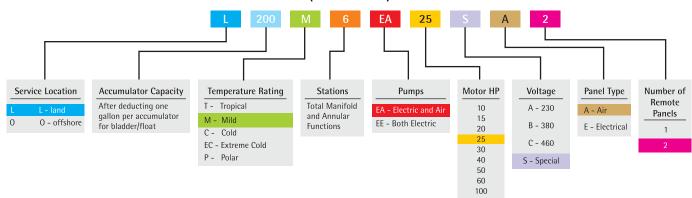
### **BOP Accumulator Units**



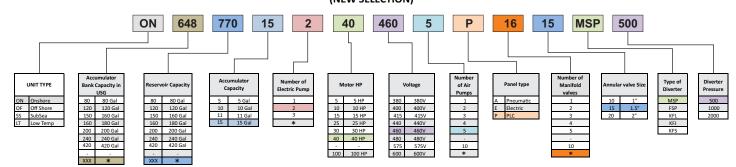
Sara Sae's BOP Accumulator Units meet or exceed the design specification as specified in API 16D. Each control system is specifically engineered to assure reliable control of the BOP stack with adequate reserve for continuous operation under emergency conditions. Sara Sae welcomes the opportunity to 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)



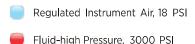
#### **BOP CONTROL UNIT MODEL SELECTION** (NEW SELECTION)



\* As per API Calculation / Customer Specific

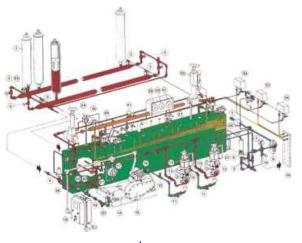


Fluid-regulated, 1500 PSI



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.



### **Remote Panels**







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 | Div. I or Class | 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 BOP Control Unit**

#### **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





# **High Pressure 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, skidmounted and high flow electric driven styles. Accessories include standmounted chart recorders and high pressure hose assemblies.

### **Specifications**





T. W.F.	
7	

X	
-	
4	1

Portable Test Units

			App	oroximat	e Dimen	sions		Approxi	mate
Model Maximum Number Pressure		Le	ngth	W	idth	Hei	ight	Weig	ght
	(PSI)	in.	cm.	in.	cm.	in.	cm.	lbs.	Kgs.
S 10G-M S 15G-M S 20G-M S 30G-M	15000 20000	42 42 42 42	107 107 107 107	30 30 30 30	76 76 76 76	46 46 46 46	117 117 117 117	430 430 430 445	195 195 195 202

			Apı	oroximat	e Dimen	sions		Appro	ximate
Model Maximum Number Pressure		Le	ngth	W	idth	He	ight	We	eight
	(PSI)	in.	cm.	in.	cm.	in.	cm.	lbs.	Kgs.
T 10G-M T 15G-M T 20G-M T 30G-M	10,000 15,000 20,000 30,000	54 54 54 54	137 137 137 137	30 30 30 30	122 122 122 122	61 61 61 61	132 132 132 132	920 920 920 920	418 418 418 418

			Арј	proximat	e Dimen	sions		Appro	ximate	
Model Maximum Number Pressure		Le	ngth	W	idth	Не	ight	We	veight  Kgs.  101 101	
	(PSI)	in.	cm.	in.	cm.	in.	cm.	lbs.	Kgs.	
P05 G-M P06 G-T	5,000 6,000	38 38	97 97	28 28	71 71	42 42	107 107	223 223		

### **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.



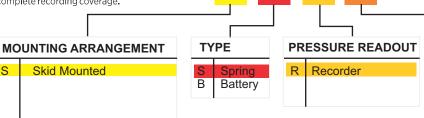
S 1	5	G	T
MAXIMUM	   PRE	SSURE	

M	AXIMUM PRESSURE		
05	5,000		G
06	6,000	П	R
10	10,000		
15	15,000		
20	20,000		
30	30,000		

	PRESSUR	E READOUT		SERIES
G	Gauge		Т	T Series
R	Recorder	and Gauge	M E	M Series E Series

#### **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.



S

JT	MAXI	MUM PRESSURE
	06 10 15	6,000 psi 10,000 psi 15,000 psi
	20 30	20,000 psi 30,000 psi



### **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.



### **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 blast panels (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

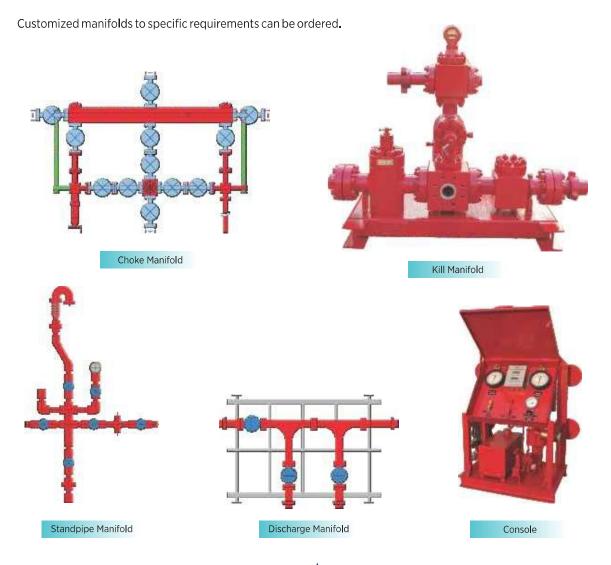


# **Manifolds**



Choke Manifold

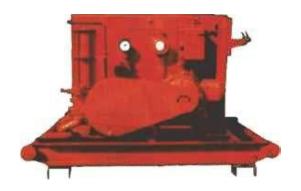
Sara Sae manufactures a range of Manifolds for applications like choke & kill, standpipe and high pressure pumping in sizes up to 4-1/16" and pressures up to 15,000 PSI.



### **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.

### **Test Stump**





# **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 Specificat	ion	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
	STANDARD	LOW TORQUE	STANDARD	MEDIUM TORQUE	HIGH TORQUE	STANDARD	MEDIUM TORQUE	HIGH TORQUE	STANDARD	HIGH TORQUE
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 30 TO 50	130 TO 140 40 TO 50	85 TO 95 10 TO 20	40 TO 50 5 TO 10	40 TO 60 5 TO 15	50 TO 65 5 TO 15	35 TO 50 05 TO 15	25 TO 35 2 TO 5	50 TO 65 5 TO 15	35 TO 50 05 TO 15
RPM at Low Gear (Approx) 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 as
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 S	pecification
	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
	HYDRA SHIFT	STANDARD TORQUE	HIGH TORQUE	STANDARD	HIGH TORQUE	STANDARD	HIGH TORQUE	STANDARD	HIGH TORQUE
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 We\.ht-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.	1	✓	✓	✓	✓	✓	✓	✓	<b>√</b>
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 as
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 E	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 minute)

#### **Dimensions**

- Size: 4' 9" long x 4' 9" wide x 4' x 9" high (1,500mm long x 1,500mm 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: 8' 9" 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).



### **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 Socket weld ends can be provided. The customer should specify the schedule of pipe while ordering.

### **Sour Services**

Sour service is available and all H<sub>2</sub>S 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 3 hammer 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**

Assembly	F	Pressure	Rating (p	osi)				No	omina	ıl Pipe	e Size	(in In	ich)			
Colour Key for Standard Service	Stan Ser			Gas vice	1	1 1/4	1 1/2	2	21/2	3	4	5	6	8	10	12
Fig. No.	Co <b>l</b> d Working	Test	Co <b>l</b> d Working	Test	25	32	40	50	65	80	100	125	150	200	250	30
50 -	500	750	NA	NA							<b>/</b>	1				
100 —	1,000	1,500	NA	NA				1	1	1	1	1	1	✓		
200	2,000	3,000	NA	NA	✓	<b>✓</b>	1	1	<b>/</b>	✓	<b>/</b>	1	1	<b>✓</b>	<b>/</b>	
206	2,000	3,000	NA	NA	1		1	1	1	1	1	1	1	1	1	
207	2,000	3,000	NA	NA						✓	<b>✓</b>		✓			
211 —	2,000	3,000	NA	NA				1		✓						
400	2,500	3,750	2,500	3,750									1			<b>/</b>
400	4,000	6,000	4,000	6,000				1		1	✓					
600	6,000	9,000	NA	NA	1			1		✓	<b>✓</b>					
602	6,000	9,000	6,000	9,000	1	✓	1	1		✓	✓					
1002	10,000	15,000	7,500	11,250	1	✓	✓	1		✓	<b>/</b>	<b>✓</b>	✓			
1003	10,000	15,000	7,500	11,250						/	1	1				
1502 -	15,000	22,500	10,000	15,000	1			1		✓	<b>/</b>	1				
2002	20,000	30,000	NA	NA				1		✓	1					
2202	► NA	NA	15,000	22,500				1		1	1					



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 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 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 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<sup>1/2</sup>", 3", 4", 5", 6", 8"

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 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  $4^{\prime\prime}$  are rated to 2,500 PSI NSCWP. Also available with a lip-type seal in  $2^{\prime\prime}$  size only as Fig 402 and butt weld end connections .

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

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 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  $15^{\circ}$  ( $\pm 712^{\circ}$ ) angular adjustment. An 'O' ring seal in addition to the metal-to-metal seat assures a pressure tight connection.

Sizes - 3", 4", 5" 5" size rated at 7,500 PSI CWP & 11,250 PSI Test 5" Union for sour gas rated at 5,000 PSI CWP & 7,500 PSI Test

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 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 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 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 7º 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.











# **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.



### **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
Longsweep Elbow		F x M Wt. (Kg.)	-	-	10	12.6	-	24,5	22,9	-	40.4	40.4	-
		F x M Wt. (Kg.)	-	-	12,4	14.7	-	45.6	46.3	100	-	-	-
Elbows		M x M Wt. (Kg.)	-	-	16.3	18.5	-	52.2	54.9	-	-	-	-
		F x F Wt. (Kg.)	-	-	8,2	10.9	-	38.1	39 <b>.</b> 5	-	-	-	-
		F x F x F Wt. (Kg.)	13,2	15,4	12	13,2	14.5	50.8	51.7	99 <u>.</u> 8	44.9	45.8	90.7
Tees		F x F X M Wt. (Kg.)	14.4	18	14.2	17	19	56.2	58	115	51.7	52.6	106
	الم	F x M x F Wt. (Kg.)	14.4	18	14.2	17	19	56.2	58	115	51.7	52.6	106
		F x M x M	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	L	M x M x F Wt. (Kg.)	15.9	21.1	16.3	20.9	23.6	61,7	64.4	129	57.6	59	122
Tees		M x M x M 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 Wt. (Kg.)	-	-	12.2	34 15.4	-	30	29.5	-	46.3	46.3	-
		F x F x F x F Wt. (Kg.)	-	31.8	26.3	26.8	-	71.2	61.7	-	65.3	65.5	-
		F x F x M x F Wt. (Kg.)	-	35	28.1	30	-	76.2	80.7	-	71.2	71.2	-
Crosses		F x F x M x M Wt. (Kg.)	-	37.6	30,4	33,1	-	81,6	83	-	77.1	77.1	-
		F x M x M x F Wt. (Kg.)	-	37.6	30.4	33.1	-	81.6	83	-	77.1	77.1	-
Crosses		F x M x M X M Wt. (Kg.)	-	40.4	32.7	36.3	-	87.1	89.4	-	83	83	-
Crosses		M x M x M x M Wt. (Kg.)	-	142.6	35	39 <b>.</b> 5	-	92.1	95.7	-	89.4	89.4	-
Laterals	3	M x F x F Wt. (Kg.)	26.3	27.9	21.5	24.3	-	-	40.1	-	53.1	78.9	141
Ediciuis		F x F x F Wt. (Kg.)	25.4	-	-	-	-	-	40.9	-	-	-	-
Wyes		M x F x F Wt. (Kg.)	-	20	12.7	12.2	12.7	-	-	-	-	-	-



### **Swivel Joints**

Available in sizes 3/4" through 3" up to 15,000 PSI nonshock cold working pressure, Sara Sae Swivel Joints offer the following features:

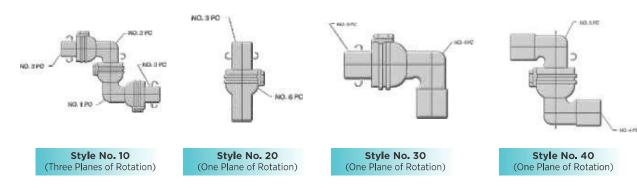
- Minimum flow restriction
- Heavy duty hex head style ball loading plug
- Grease retainer ring (ensures clean ball race)
- Standard packing units (operating temperature to 2250°F)

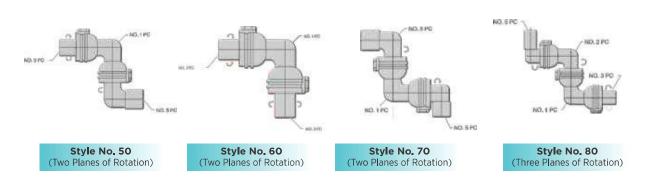




- High temperature packing units (operating temperature to 450°F)
- Superior hardened ball races ensure uniform surface hardness and depth for longer life under severe thrust and radial loading
- Standard Swivel Joints are provided with API line pipe threads
- Other end connections are available on request
- 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**





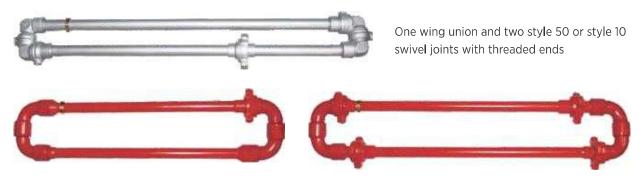


#### **Quick Reference Chart**

					8	Standa SI	rd Sen ZE (in)	/ice					Servio		
Model	Color Code	NSCWP	End Connections	3/4	1 1/4	1 1/2	1	2	3	3/4	1 1/4	1 1/2	1	2	3
Low Pressure	BLUE	1000	Female Line Pipe Threads					1	1						
High Pressure	OLIVE GREEN	6000	Fig. 602 Union											1	1
High Fressure	SILVER	6000	Female Line Pipe Threads	1	1	1	1	1	1						
	OLIVE GREEN	7500	Fig. 1002 Union											1	1
	OLIVE GREEN	10000	Fig. 1502 Union											1	1
Extra High Pressure	BLACK	10000	Female Line Pipe Threads					1	1						
Long Sweep	OLIVE GREEN	15000	Fig. 2202 Union											1	1
	RED	15000	Fig. 1502 Union					1	1						
	LIGHT BLUE	20000	Fig. 2002 Union					1	1						

### **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 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**





## **Pup 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 end 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 1.5 times the rated cold working pressure
- Available from 2" to 3" sizes, lengths for pup joints range from 1 feet to 12 feet to 15,000 psi working pressure
- Integral pup joints can be made available with two models, one is plain integral pup joints, another is pup joints with retaining 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 pipeline with male and female detachable Hammer Unions
- Uniform bore for greater flow capacity
- Available from 2" to 3" sizes, lengths for pup joints range from 1 feet to 20 feet to 15,000 psi 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 pup joint 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 psi working pressure



## **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 H2S 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 seal, quarter-turn plug valve for rapid full open or close operation. The valve cavity is tapered to ensure uniform seating of the sealing inserts, providing a reliable seal at the full range of pressures. Sara Plug Valves are presently offered in  $2 \times 1$  and  $2 \times 2$  configurations with Fig. 1502 Hammer unions ends. Sara Plug valves can be offered specifically with the end connections or combinations to suit the specific field application.



## **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.

# **Manifold Fittings**



Sara Manifold fittings are available in both standard pressure and high pressure mud manifolds. These are offered for standard buttweld connections - Sch XXH and Sch 160.

However other configurations and end connections are also available on specific request.

Sizes - 2", 3", 4" and 5".





# **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 Joint Gaskets**

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



#### **Prime Features**

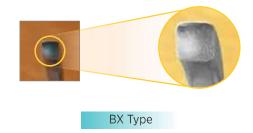
- R type (oval and octagonal) solid sections to fit standard ring joint flanges with trapezoidal grooves.
- Types RX and BX with complex beveled edge sections for wellhead pressures above 700 bar
- Combination Gaskets Used where two flanges of different sizes are to be joined together.
- Split Gaskets 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.

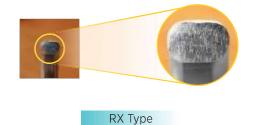
#### **Materials**

- 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 joint 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-Octagonal







### **Model R or RX**

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

Nominal Pipe Dimension		Ring N	umber at F	Pressure I	Rating (It	os)	
(inches)	150	300	400	600	900	1500	2500
1/2	-	R11	-	R11	-	R12	R13
3/4	-	R13	-	R13	-	R14	R16
1	R15	R16	-	R16	-	R16	R18
11/4	R17	R18	-	R18	-	R18	R21
11/2	R19	R/RX20	-	R/RX20	-	R/RX20	R/RX23
2	R22	R/RX23	-	R/RX23	-	R/RX24	R/RX26
21/2	R/RX25	R/RX26	-	R/RX26	-	R/RX27	R28
3	R29	R/RX31	-	R/RX31	R/RX31	R/RX35	R32
31/2	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 Pipe Dimension		Ring Nu	mber at Pi	ressure Ra	iting (lbs)	
(inches)	2,000	3,000	5,000	10,000	15,000	20,00
111/16	-	-	-	BX150	BX150	-
1 13/16	-	-	-	BX151	BX151	BX15
21/16	-	-	-	BX152	BX152	BX15
29/16	-	-	-	BX153	BX153	BX15
31/16	-	-	-	BX154	BX154	BX15
41/16	-	-	-	BX155	BX155	BX15
51/8	-	-	-	BX169	-	-
71/16	-	-	-	BX156	BX156	BX15
9	-	-	-	BX159	BX157	BX15
11	-	-	-	BX158	BX158	BX15
135/8	-	-	BX160	BX159	BX159	BX15
163/4	-	-	BX162	BX162	-	-
183/4	-	-	BX163	BX164	BX164	-
211/4	-	-	BX165	BX166	-	-
263/4	BX167	BX168	-	-	-	-
30	BX303	BX303	-	-	-	-

### **Model R or RX**

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

Nominal Pipe Dimension (inches)	Ring Numl	ber at Pressure Ra	ting (lbs)
	2000	3000	5000
2 <sup>1,8</sup> 2 <sup>81</sup> 16 3 <sup>1,18</sup> 4 <sup>1,116</sup> 5 <sup>1,18</sup>	R/RX23 R/RX26 R/RX31 R/RX37 R/RX41	R/RX24 R/RX27 R/RX31 R/RX37 R/RX41	R/RX24 R/RX27 R/RX35 R/RX39 R/RX44
7 <sup>//16</sup> 9 11 13 <sup>5/8</sup> 16 <sup>3/4</sup>	R/RX45 R/RX49 R/RX53 R/RX57 R/RX65	R/RX45 R/RX49 R/RX53 R/RX57 R/RX66	R/RX46 R/RX50 R/RX54 -
20³ <sup>34</sup> 21 <sup>1/4</sup>	- R/RX73	R/RX74 -	-

### **Model R or RX**

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

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



**BX** Type Ring



**Combination Ring** 



R Type Ring



Split Ring



RX Type Ring



**Buna Coated Ring** 



# **Manufacturing Facilities**

















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