

Quality work first time every time



# TSI Fabrication

A division of TSI Flow Products



## Table of Contents

Introduction	i
Product Data Sheets	ii
Three Phase Separator	1
Sand Separator	2
Monorail	3
Knock-out Drum	4
Supply Pot	5
Trailers	6
Piping	7
Structural Products	8
Heaters	9
Flare Stacks	10

## Introduction

We at TSI Fabrication stand behind our quality products. We have been involved in constructing oil and gas process and flow control equipment for more than twenty years. In order to assist you in running a successful operation, we constantly visit you at your office and field locations to gather customer feedback to continuously improve our products.

Placing ourselves in your shoes in order to design products that fit for your application is what we do best. For your next product solutions, rely on TSI to deliver.

### Products and Services:

- Production and midstream equipment
- Frac flow back and well testing equipment
- Structural products such as skids, trailers, pipe baskets
- Custom equipment fabrication
- Engineering services

### Shop Certifications:



American Society of Mechanical Engineers  
Section VIII Division 1 U Stamp Holder



The national Board of Boilers and Pressure  
Inspectors  
Certified Pressure Repair Organization



Trailer mounted flare stack –60 feet dual stack (6" & 3") unit



72" by 20 feet pressurized tank



A multi package project consisting of three phase separator, vertical low pressure separators, monorails, sand separators and four phase separators

---

---

# Product Data Sheets

The three phase separators are pressure vessels used to separate gas, oil, and water. TSI Fabrication is an ASME licensed shop capable of fulfilling client's three phase separator system needs. TSI can provide a turnkey solution from design, engineering calculations, 3D modeling to fabrication. Alternatively, clients can submit their design dossier for fabrication. In addition to following client's requirements TSI builds pressure vessels and associated piping using industry standards such as ASME Section VIII for pressure vessels, Section II for materials, Section V and IX for welding and testing procedures, ASME B31.3 for process piping, NBIC Repairs or alterations, API 6A for high pressure piping, and NACE MR0175 for sour service applications. Fabrication of separator systems is not limited to vessel and piping systems. TSI manufactures trailers and frames to package the separator system in either land or offshore modules (DNV 2-7.1).

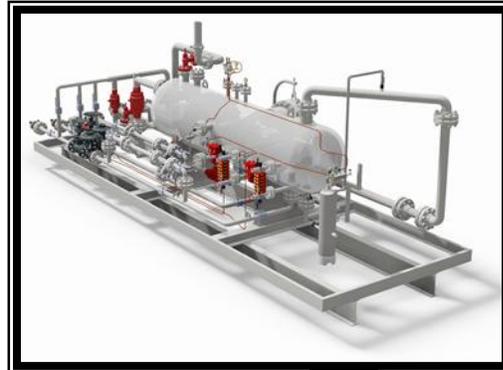
For other sizes, designs and applications such as production units and four phase separators consult TSI Fabrication.

## APPLICATIONS:

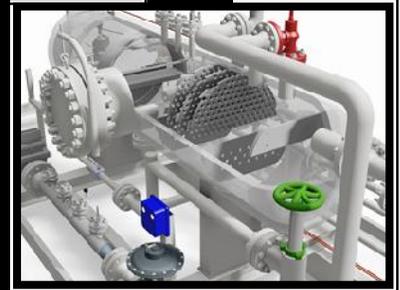
- Frack flow back
- Well clean up
- Production testing
- Pipeline clean up services
- Early production facilities
- Extended well testing

## CAPABILITIES:

- Qualified and experienced vessel fabricators and pipe fitters
- Process engineering support
- Drafting and modeling services
- Complete data book documentation
- Quality control program



THREE PHASE SEPARATOR



SEP-INTERNALS

TECHNICAL SPECIFICATIONS						
VESSEL SIZE	30"x10' S/S	36"X10' S/S	36"X10' S/S	42"X15' S/S	42"X15' S/S	48"X15' S/S
<b>WORKING PRESSURE</b> psi (bar)	1440 (99)	1440 (99)	2000 (138)	1440 (99)	2000 (138)	1440 (99)
<b>TEMP RANGE</b> °F (°c)	-20 to 130 (-29 to 54)	-20 to 130 (-29 to 54)	-20 to 200 (-29 to 93)	-20 to 130 (-29 to 54)	-20 to 200 (-29 to 93)	-20 to 130 (-29 to 54)
<b>SERVICE OPTIONS</b>	Standard / Sour	Standard / Sour	Standard / Sour	Standard / Sour	Standard / Sour	Standard / Sour
<b>GAS METER</b> MMSCFD* (Mm <sup>3</sup> )**	4" 20 (566)	4" 24 (679)	4" 30 (850)	6" 50 (1,416)	6" 60 (1,700)	8" 80 (2,265)
<b>LIQUID METER</b> bbl/day (m <sup>3</sup> /day)	2" 4,500 (127)	2" 5,000 (142)	2" 6,000 (170)	2" & 3" 10,000 (283)	2" & 3" 10,000 (283)	2" & 3" 15,000 (425)
<b>WEIGHT</b> Lb (kg)	11,500 (5,220)	14,260 (6,468)	24,000 (10,900)	30,000 (13,620)	35,000 (15,890)	46,000 (20,880)
<b>DIMENSIONS §</b> WxLxH ft (m)	6.5x10x28 (2x3x8.5)	6.5x10x28 (2x3x8.5)	8x10x32 (2.4x3x9.75)	8x10x32 (2.4x3x9.75)	8x10x32 (2.4x3x9.75)	8x10x32 (2.4x3x9.75)
CODES AND STANDARDS: ASME SECTION VIII, ASME B31.3, NACE MR0175 & other standards as applicable						
*MMSCFD = million standard cubic feet per day						
**Mm <sup>3</sup> = thousand cubic meter						
§ Dimensions are trailer dimension						

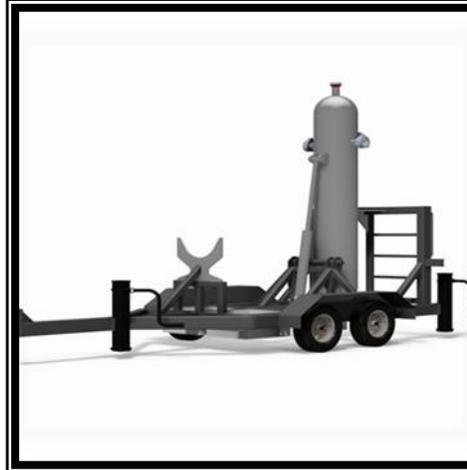
**TSI Fabrication's Standard Sand Separator is the most commonly utilized sand separator in the field.** Solids removal is accomplished by the gravitational method and centrifugal force. The Sand Separator may be used upstream or downstream of the choke manifold. Well stream is directed to the top of the separator, and at the inlet the flow enters tangentially in to the separator thereby creating a centrifugal motion. Fluids then are directed towards the outlet located at the middle point of the vessel. The differential density among fluids causes solids to gravitate toward the wall and fall to the bottom of the vessel. The internal components eliminate remaining solids before fluid exits from the outlet nozzles. The bottom nozzle on the vessel is connected to an adjustable choke and isolation valves. Well testing operators are able to drain accumulated solids at given time intervals depending on well sand production rate. For further details on available or customized Sand Separator Systems consult TSI Fabrication.

## FEATURES AND BENEFITS:

- Reduced damage to downstream equipment
- Forged heads and shell
- Clean-out Nozzles
- Relief Valve nozzles
- Double Inlets

## APPLICATION:

- Frac flow back operation
- Permanent production facilities
- Production well testing Operations



**TRAILER MOUNTED SAND SEPARATOR**



**SKID MOUNTED SAND SEPARATOR**

TECHNICAL SPECIFICATIONS							
WORKING PRESSURE psi (bar)	VESSEL SIZE	VESSEL LENGTH	INLET SIZE	SAND OUTLET	TEMP	DIMS HxWxL FT (m)	WEIGHT (Lbs/kg)
5800 (400)	20" (50.8 cm)	8 ft. (2.43 M)	3" 1502 F	3" 1502	-20 to 255°F (-29 to 124°C)	L-skid-4.5x4.5x14 (1.37x1.37x4.27)	6,700 / 3,040
						Trailer-8x6x17 (2.44x1.83x5.2)	8,680 / 3,937
10000 (689)	24" (50.8 cm)	8 ft. (2.43 M)	3-1/16" 10K FLANGE	2-9/16" 10K FLANGE	-20 to 255°F (-29 to 124°C)	L-skid-4.5x4.5x14 (1.37x1.37x4.27)	12,961 / 5,879
						Trailer-8x6x17 (2.44x1.83x5.2)	14,910 / 6,763
CODES AND STANDARDS	ASME SEC. VIII DIV. 1, ASME B31.3, NACE MR0175						

Note: Other sand separator options are available.

**Monorail trailer units are designed to transport piping and flow control products such as valves,** pipe fitting and manifolds. The Monorail utility trailer reduces transportation cost by allowing Service Company field operators to pull the units to the oil and gas well pads without a call to a third party transportation company. TSI Fabrication Monorails are designed in house. A monorail trailers are composed of side pipe racks, trailer bed and an overhead hoisting rail structure. A cage is built in to the trailer bed to store valves, pipe elbows, tees, crosses and other flow control products a part from flow line and manifolds. TSI offers both bumper pull and gooseneck Monorail trailers.

## FEATURES AND BENEFITS:

- Reduce transportation costs
- Custom rugged design
- Maintain good housekeeping on location
- Support Jacks
- Storage Box
- Document holder

## APPLICATION:

- Pipe transportation
- Choke manifold storage
- Piping and flow control products storage



**MONORAILE TRAILER**

TECHNICAL SPECIFICATIONS	
DIMENSIONS WxHxL ft (m)	WEIGHT Lbs (kg)
7 x 10 x 31.3 (2.1 x 3 x 9.5)	4,000 (1,815)
Other designs and options available. Consult TSI for more details.	

The **Knock-Out Drum (KO Drum) purpose** is to remove liquid droplets or mist from a gaseous stream. KO Drums have multiple applications. KO Drums are installed upstream of flare stacks, upstream of gas filters on gas transmission lines. Other applications are upstream of gas compressors, generators, engines or turbines.

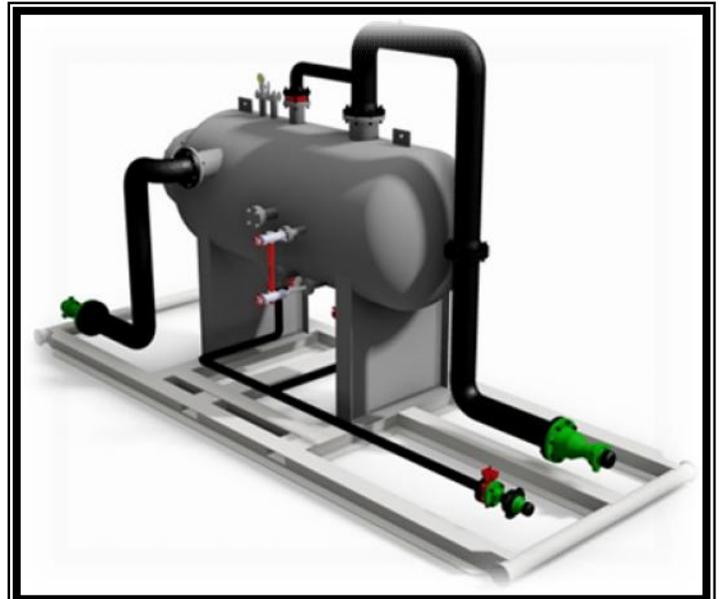
TSI Fabrication is able to fulfill your KN Drum needs. For more details on KO Drum products or custom fabrication of this product contact TSI Fabricators

## FEATURES AND BENEFITS:

- Minimum pressure drop across the KO Drum
- Removal efficiency of +99% for 5µm (micron)
- Turn down ratio per requirement
- Level gauges to monitor liquid accumulation
- Ample liquid accumulation space
- Inlet/Outlet tap option for differential pressure gauge

## APPLICATION:

- Flaring process in flow back, production and pipe line cleanup operations
- Natural transmission lines
- Fuel scrubbers for compressors, generators, engines and turbines



**KNOCK-OUT DRUM**

TECHNICAL SPECIFICATIONS					
VESSEL SIZE	WORKING PRESSURE psi (bar)	DESIGN TEMPERATURE °F (°C)	GAS FLOW RATE MMSCFD* (Mm <sup>3</sup> )**	LIQUID RATE	CONNECTIONS INLET/OUTLET
42"X 6' 107 cm x 1.8 m)	250 psi (17 bar)	-20 to 200 (-29 to 93)	30 MMSCFD (850 Mm <sup>3</sup> / day)	30 bbl/day (4.5 m <sup>3</sup> / day)	6" ANSI 150 RF Flange / 6" ANSI 150 RF Flange
<b>CODES AND STANDARDS</b>	ASME Sec. VIII Div. 1, ASME B31.3, NACE MR0175				
*For other vessel sizes, designs, frames and separation efficiency contact TSI					
**MMSCFD = Million standard cubic feet					
**Mm <sup>3</sup> = thousand meter cube					

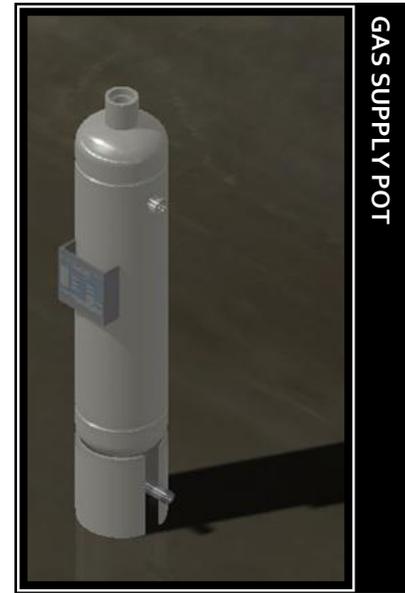
**TSI Fabrication offers ASME Section VIII Div. 1 coded and stamped gas supply pots.** Supply pots are pressure vessels that require a relief under the ASME code. Supply pot as its name indicates supplies gas for operation of pneumatic instrumentation, valve actuators, Hi/Lo alarms and shut down systems. A supply pot is required whenever a supply gas is taken from a higher pressure using a regulator to drop pressure using a regulator to drop pressure within working pressure of the supply pot. The supply pot acts as a drain sink for the liquids formed during the pressure reduction process. The typical operating pressure of the supply pots are between 100 to 250 psi.

## FEATURES AND BENEFITS:

- ASME stamped plates
- Higher pressure rated pots
- Improved drain nozzle
- Generous material allowances

## CAPABILITIES:

- Produce in bulk quantities
- Include customer options



TECHNICAL SPECIFICATIONS					
DESIGN PRESSURE psi (bar)	DESIGN TEMPERATURE °F (°C)	DIAMETER x HEIGHT in x in (cm x cm)	INLET / OUTLET SIZE in (cm)	DRAIN / RE- LIEF SIZE in (cm)	WEIGHT Lb (kg)
250psi (17)	350 (177)	8" x 28" (20.3 x 71.1)	1" (2.54) / 2" (5.08)	1 (2.54)	106 (48)
DESIGN CODE	ASME Sec. VIII Div. 1				

**TSI Fabrication offers trailers specifically designed for oil and gas applications.** TSI offers utility, pipe, monorail and custom trailers. TSI has manufacturing and design expertise to provide trailer that fit your exact application. TSI is capable of customizing trailers to fit your equipment for example sand separators, flare stacks, three phase separators, flow control manifolds.

TSI Fabrication is committed to safety of trailers that we manufacture. TSI follows Federal Motor Vehicle Safety Standards (FMVSS) per the National Highway Traffic Safety Administration (NHTSA) requirements. We issue a Vehicle Identification Number to our each of our trailers per NHTSA requirements.

For your next trailer requirement to fit your oil and gas transportation needs call TSI for consultation.

## FEATURES AND BENEFITS:

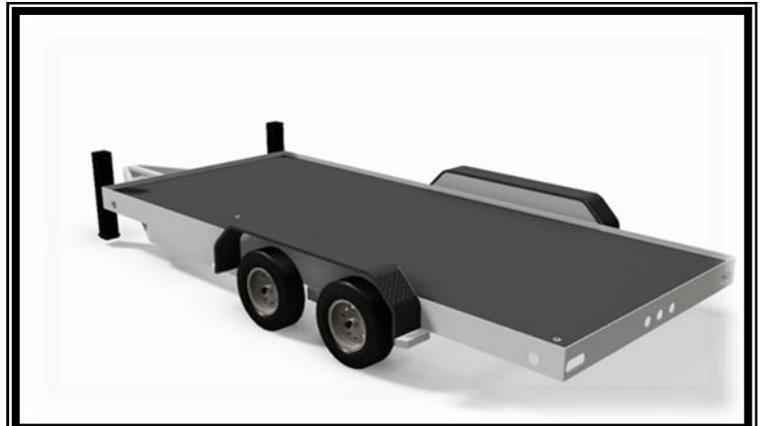
- Designed for durability
- Very functional
- High degree of mobility
- Customizable for your application

## CAPABILITIES:

- Gooseneck or bumper-pull trailers
- Fit oil field equipment on trailers
- Tandem duals with/without air ride
- Tri axle with/without air ride



**GOOSENECK TRAILER**



**BUMPER PULL TRAILER**

In the upstream oil and gas operations, well service operators utilize temporary piping system to connect a well or series of wells to the downstream process plants. Piping system size and type depend on pressure, temperature, service type and flow rates. Rely on TSI to fabricate piping system per your flow parameters requirements. TSI Fabrication has fabricated temporary piping, adaptors. We have used the most common connections such as hammer unions, ANSI and API flanges, Grayloc® to fabricate the flow lines.

Consult your TSI representative for your piping needs.

## FEATURES AND BENEFITS:

- Provide material and engineering support
- Manufacturing expertise in NPST, forged high pressure flow line
- Fabrication of ANSI and API high pressure piping
- Certification in and build to API and ASME codes standards: API and ASME 31.3
- Fulfill NACE MR0175 standard on sour service
- TSI is one stop shop for manufacturing, fabrication, recertification, and iron management

## APPLICATION:

- Oil and gas production operations
- Oil and gas stimulation frack flow back
- Oil and gas drilling operations



PROCESS PIPING



TEMPORARY PIPING



GAS/RELIEF LINES

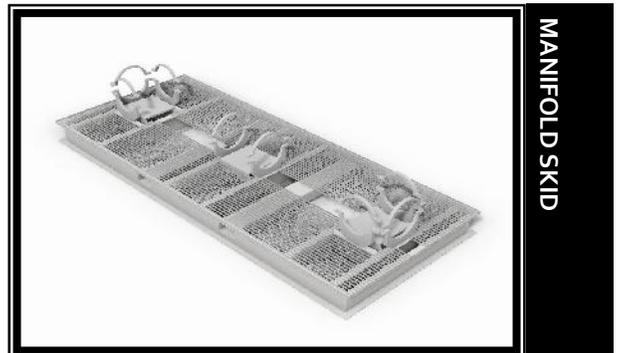
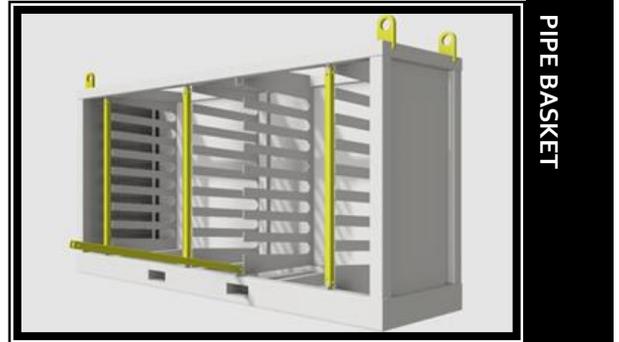
TECHNICAL SPECIFICATIONS	
<b>PRESSURE RANGE</b>	285 TO 15,000 PSI (20 to 1034 bar)
<b>TEMPERATURE RANGE</b>	-50 TO 350 °F (-58 to 662°C)
<b>SIZES</b>	1 to 12" ANSI 1-13/16" TO 7-1/16" API
<b>CONNECTION TYPE</b>	ANSI FLANGES, API FLANGES, HAMMER UNIONS, GRAYLOC®
<b>FITTINGS</b>	ELBOWS, TEES, CROSSES, Y
<b>CODES AND STANDARDS</b>	API 6A, API 5B & API 5CE, ASME 31.3 AND NACE MR0175
<b>NOTES</b>	CODES, STANDARDS, PRESSURE, TEMPERATURE SIZES AND CONNECTION TYPES ARE NOT LIMITED TO THE LISTED SPECIFICATIONS GRAYLOC® is registered trademark of Oceaneering International

**TSI Fabrication builds structures such as workbenches, pipe racks, support skids, valve repair** platforms. TSI offers custom frames and skids to install your choke manifolds, drilling pressure control manifolds, frac stimulation manifolds and other unique process equipment. TSI can assemble and install your unique equipment on frames of your design or our well-crafted products.

For more details and fulfillment of your unique structural products contact TSI Fabrication.

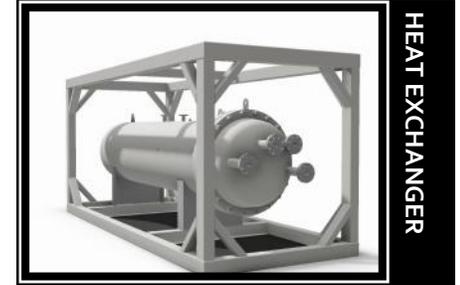
## CAPABILITIES:

- In house water automated plasma cutter
- In house pipe profiler
- Extensive structural experience
- 3D modeling software
- Engineering analysis services

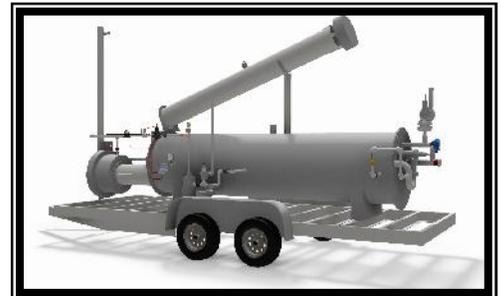


**TSI Fabrication's Line Heater is part of process equipment that supplies heat to oil and gas streams.** In gas processing operations, the heater raises the temperature of a gas well stream to minimize or eliminate hydrate formation. In oil production, the heater raises oil temperature to lower viscosity for improved flow, assist in minimizing wax and asphaltene formation and break oil/water emulsion.

There are two types of heaters typically used in this application, indirect fired heater and heat exchanger. Indirect heaters are mostly in use on land. In an indirect fired heater, a firing tube provides the heating source to a liquid bath such as water. The water bath is at ambient pressure. The liquid temperature rises and heats piping coils in which the well stream flows under pressure up to 15,000 psi. On the other hand to completely eliminate flame source near an offshore well, a heat exchanger is used to heat well stream. The heat exchanger uses steam to raise temperature of piping coils. Steam chamber can be pressured up to 350 psi. Steam is typically provided by a boiler or a utility steam on location.



HEAT EXCHANGER



INDIRECT FIRED HEATER

TSI Fabrication offers various size and heat duty heaters. For your heater needs, either indirect fired or heat exchangers contact your TSI representative.

## INDIRECT FIRED

### HEATER FEATURES:

- Flame arrestors
- Fuel scrubber pots
- Relief valves on coils
- Oil or gas fuel options
- Stack spark arrestors (optional)
- Coil bypass Manifold
- Adjustable chokes for pressure control

### STEAM HEAT EXCHANGER:

- Relief valve on coil and steam sides
- Steam temperature controller
- Steam condensate trap
- Coil bypass manifold
- ISO frame
- Adjustable chokes for pressure control

### APPLICATION:

- Gas hydrate elimination
- Flowing heavy crude
- Breaking emulsions
- Minimizing wax, paraffin and asphaltene formation

TECHNICAL SPECIFICATIONS			
TYPE	INDIRECT FIRED HEATER		HEAT EXCHANGER
SIZE	36"X12' (91.4 cm x 3.7 m)	4"X15' (106.7 cm x 4.5 m)	48"X14' ( 121.9 cm x 4.3 m)
HEAT CAPACITY BTU/HR. (W)	750,000 (220,000)	1,000,000 (293,000)	6,000,000 (1,758,000)
STEAM REQ'D	N/A	N/A	4,000-6,9000 lb/hr (1814 to 3130 kg/hr)
UPSTREAM COILS SIZE & PRESSURE	2-1/2" 10,000	3" 10,000	4" 10,000
DOWNSTREAM COILS SIZE & PRESSURE	2" 3,000 psi	3" 5,000 psi	4" 5,000 psi
PRESSURE CONTROL	ADJUSTABLE CHOKE	ADJUSTABLE CHOKE	ADJUSTABLE CHOKE
BATH/VESSEL PRESSURE	ATMOSPHERIC	ATMOSPHERIC	350 psi
FRAME OPTIONS	TRAILER	SKID/TRAILER	SKID c/w ISO FRAME
CONNECTIONS	PER CLEINT'S SPECS	PER CLEINT'S SPECS	PER CLEINT'S SPECS
SERVICE OPTIONS	STANDARD/ SOUR	STANDARD/ SOUR	STANDARD/ SOUR
CODES AND STANDARDS	API 12K ASME B31.3 NACE MR0175*	API 12K ASME B31.3 NACE MR0175	ASME SECT VIII ASME B31.3 NACE MR0175

\*For Sour service option NACE MR0175 is followed.

**TSI Fabrication manufactures flare stacks typically used during the frack flow back**, cleanup and other well servicing operations on land. Flare stack's function is to temporarily combust natural gas, vented hydrocarbons or sour gas during initial phase of production operations. A flare stack's height and distance away from the separation equipment reduce hazards from heat radiation and flue gases produced from combustion of hydrocarbons including sour gases. Flare stacks are also recommended as a safe relief point for the pressure vessel relief valves during sour oil and gas production and well testing operations. To reduce transportation costs, flare stacks are installed on either bumper pull or goose neck trailers based on gross trailer weights and flare stack sizes.

TSI has capabilities to procure, build and deliver custom flare stacks, turnkey. Customers may also provide flare stack design to TSI Fabrication to build. As a part of the manufacturing process, TSI will create design data book for each flare stack. All relevant design and fabrication processes are documented in the flare stack data book.

## APPLICATIONS:

- Frac flow back
- Well clean up
- Production testing
- Pipeline clean up services
- Early production facilities
- Extended well testing

## CAPABILITIES:

- Turnkey or customer provided design
- Qualified and experienced vessel
- Fabricators and pipe fitters
- Drafting and modeling services
- Complete data book documentation



TECHNICAL SPECIFICATIONS			
FLARE TYPE	4"X40' (15.25 cm x 12.2 m)	4"X30' (10.25 cm x 9.125 m)	6"X60' (15.25 cm x 18.25 m)
FLARE LINE SIZE	4" (10.16cm)	4" (10.16cm)	6" (15.24cm)
AUXILIARY LINES	3" SECONDARY 1" PILOT FUEL LINE	- 1" PILOT FUEL LINE	3" SECONDARY 1" PILOT FUEL LINE
WORKING PRESSURE psi (bar)	285 psi (19.4)	285 psi (19.4)	285 psi (19.4)
GAS FLOW RATE MMSCFD* (Mm <sup>3</sup> )**	30 MMSCFD (850Mm <sup>3</sup> )	5 MMSCFD (141 Mm <sup>3</sup> )	30 MMSCFD (850 Mm <sup>3</sup> )
PILOT FUEL	NATURAL GAS/BUTANE	NATURAL GAS/BUTANE	NATURAL GAS/BUTANE
IGNITION SYSTEM	CONTINUOUS ELECTRIC IGNITION PILOT	CONTINUOUS ELECTRIC IGNITION PILOT	CONTINUOUS ELECTRIC IGNITION PILOT
STACK SUPPORT SYSTEM	GUY LINES SIDE ARMS HYDRAULIC JACK TO RAISE STACK	GUY LINES SIDE ARMS HYDRAULIC JACK TO RAISE STACK	GUY LINES SIDE ARMS HYDRAULIC JACK TO RAISE STACK
DIMENSION WxHxL ft (m)	TRAILER MOUNTED 5 x 7.5 x 35 (1.5 x 2.28 x 10.66)	TRAILER MOUNTED 5 x 7.5 x 30 (1.5 x 2.28 x 9.14)	TRAILER MOUNTED 7.5 x 6 x 30.75 (2.28 x 1.82 x 9.37)
WEIGHT lb (kg)	3,900 (1,769)	3,000 (1,361)	9,300 (4,218)
SERVICE TYPE	STANDARD SOUR	STANDARD SOUR	STANDARD SOUR

CODES AND STANDARDS: ASME B31.3, NACE MR0175, AWS  
 \*MMSCFD = million standard cubic feet per day  
 \*\*Mm<sup>3</sup> = thousand cubic meter



## TSI Fabrication

A division of TSI Flow Products

322 South Longview St.

Kilgore, Texas 75662

USA

Toll Free: 877.984.2870

Phone: +1.903.984.2870

Fax: +1.903.983.3750

Contact us by Email:

[fabinfo@tsi-supply.com](mailto:fabinfo@tsi-supply.com)

For details on other divisions visit:

[www.tsi-supply.com](http://www.tsi-supply.com)