

# JEF TECH-PRV AND GAUGES CALIBRATION /REPAIR MOBILE WORKSHOP



## JEF TECH- PRV AND GAUGES TESTS AND REPAIR WORKSHOP TECHNICAL DETAILS

The Containerized Safety Relief Valve Test & Repair Workshop is designed to comply with the testing requirements of the important basic codes namely: -

- ASME Section VIII Div-1
- API-520/521/526/527/576
- ISO-4126
- ANSI-B-16.5(For Flanges)
- ANSI-B-2.1(r Screwed Valves)

It also complies with the requirement of an ASME authorized 'VR' Valve Repair Workshop. Duly certified to the latest DNV (or equivalent standard) the offered Test and Overhaul Container is a compact type package, completely piped, wired and assembled for easy operation and maintenance.

The container is equipped with lifting lugs on the four upper corners and forklift pockets on the bottom to enable easy removal & transportation from one Offshore Platform to another by the means of a platform crane, forklift& supply boats.

To enable the user perform trouble free testing& overhaul of Relief Valves, this container is equipped with the following:-

### **STANDARD**

- A single port Safety & Relief Valve Test Bench with a hydraulic Clamping system to enable testing of flanged valves from ½” to 8” inlet size & screwed valves from ¼” to 2” inlet with a pressure range to 5000psig on Air and from vacuum to 6000psig on water.
- ½ Ton (500kg) Hoist with a swivel Jib Crane.
- Instrument Air Manifold.
- Work Table with a 9” Table Vice.
- A 4 jaw true Chuck type Flange Repair 12” Vice.
- Storage Cabinets.
- Explosion proof fluorescent Lighting & Electricals.
- Explosion Proof Air Conditioner.
- Rubber Floor Matting.
- Tool Kit.
- Data Logging & Acquisition System.
- API 527 Electronic Bubble Counter- for Sit Leak Test.

- A HMU 1300 Series Power Unit- To enable testing of Screwed valves from ¼” to 2” inlet with a pressure range of vacuum to 15000psig. This unit is stored in the container, however, if required it can be moved.

## VALVE TEST BENCH

The Valve Test bench is configured to enable Testing of Safety & Relief Valves from ½” to 8” inlet and comprises of a hydraulic clamping assembly and an independent adjacent Control Panel.

### Hydraulic Clamping Assembly.

This Assembly is configured to enable High Pressure Hydraulic as well as pneumatic testing. Rated for flanged valves from ½” to 12” inlet & screwed valves from ½” to 2” inlet Test port comprises of

- A rigid structure.
- A thick steel top plate.
- A 3 Jaw Remote Controlled En-24 Chrome-Moly-Steel Hardened hydraulic proportional Clamping System to accommodate the entire range of valves just by replacing the intermediate flanges.
- Bulkhead for interconnection with the control console
- Stainless Steel Circuit Tubing.
- A buffed Stainless Steel/Painted Steel exterior body.

### Control Console

The Control console is ergonomically designed for optimum output & operator safety and comprises of the following.

- A High Pressure Stainless Steel Hydro Accumulator.
- A High Pressure Stainless Steel Air Accumulator
- Sprague USA make Air Hydro Pump with regulating accessories & Controls.
- Sprague USA make Gas Air Booster with regulating accessories & Controls.
- Stainless Steel Circuit Tubing.
- A Hydraulic Power Pack with a Reservoir, Pump& Controls for Hydraulic Clamping.
- Relief Valves on the accumulator to prevent overpressure.
- Valves & Controls for Test Operation
- Outlet & Control for external Testing
- External oxygen Cylinder Bulkhead.
- Safety Screen
- Electronic Overpressure Protection system with maximum pressure.
- Electronic Overpressure Protection system with maximum pressure presetting feature & safety Alarm Light.

### Testing with Nitrogen

- The system is provided with an adaptor for connecting an external N2 Cylinder. The testing procedure of the valves on the Test Bench remains the same as testing with the system air.

### The Hydraulic Clamping System

- This system comprises of a set of sliding clamps mounted on a T- Slot table coupled with an independent Hydraulic Pressure System. This Hydraulic System is installed with Independent Pump which is controlled by a Remote.

The System design enables the operator to quick clamp a valve without the use of any gaskets or bolting.

Each clamping System is equipped with a Safety Interlock Device to prevent the Clamping Pressure from being depressurized while a valve is under Test.

It is a failsafe clamping wherein depending on the Size/ Class Rating of the Valve under Test, the clamping force can be varied by the means of Touch Screen HMI

### Test Valve Type

1. Direct Spring Operated Safety & Relief Valves
2. Pilot Operated Safety & Relief Valves
3. Thermal Relief Valves
4. Shut Off Valves.

### Test Type

- Safety & Relief
  - Seat Leak Test
  - Set Pressure Test or Pop Test
  - Back Pressure Test
- Shut Off Valves
  - Seat Test
- Size Range
  - Flanged Valves from 1/2" to 8"
  - Threaded Valves from 1/2" to 2"
- System Pressure.
  - High Pressure Hydraulic Testing from 0 to 414 Bar (6000psig)
  - High Pressure Pneumatic Testing from 0 to 345 Bar (5000psig)

### Test Valves Class Range

Inlet Size	Max Test Pressure
1/4" to 2"	400 Bar
2- 1/2"	300 Bar
3"	250 Bar
4"	175Bar
5"	145 Bar
6"	100 Bar
8"	60 Bar

Although, bigger safety valves can be handled by the standard test & lifting equipment, we normally use 1/2" to 6".

### Standard Accessories.

- Intermediate Flanges with O-Rings to cover the entire Range.
- Outlet Flanges with O-Rings, to cover the entire Range.
- API-527 Digital Bubble Counter with set of 3C Clamps
- A set of Male & Female NPT Screwed Adaptors ½” to 2.
- 1 set of 5 ea. 6” Analogue Pressure Gauges having an accuracy of  $\pm(-) 0.50\%$  of FSD to cover entire Pressure range.

### Utilities Pre-requisite for Operating the Equipment

- Clean Water Supply with a head of 10 feet close to location of Test Bench
- Compressed Air supply- between 7 bar to 10 bar for drive Air supply to the Gas & Hydro Boosters.
- Compressed Air/Nitrogen Supply-between 35 Bar to 150 Bar for pre charged Air Supply to the Gas Booster( Minimum 35 Bar required to reach the desired output pressure of 345 Bar/5000psig)
- AC Power Supply
  - 415 Volts 3 Phase power connection - To be advised post confirmation from the customer on available power ratings.
  - 240 VAC 5 Amp single phase power connection for Electronic over pressure protection System & Data Acquisition System.

### FEATURES

- Remote Controlled En 24 Chrome Moly-Steel Hardened, hydraulic Proportional Clamping System- For quick & Safe Clamping of Valves.
- Safety Valves on Accumulators- To avoid overpressure in the system.
- Electronic Overpressure Protection & Safety Interlock- To preset the maximum pressure limit & avoid accidents due to over pressure or Clamping Failure.
- Safety Screen- To protect the Operator from exposure.
- Priming By-pass facility-To fill up the test valve & air bubble removal prior to testing.
- Sprague USA make Gas & Hydro Boosters- To ensure that the Unit is further upgradeable for higher pressure if so desired.
- External N2 Cylinder Connection Ports.-To facilitate testing with Nitrogen as the test media in both test ports.
- Air Gun for cleaning of Valves & the Test Bench during & after testing.
- Pressure Gauge Adaptors- to enable.
- Pressure Outlets- for testing of external assemblies like vessels, seals etc.
- Optional Data Acquisition System-to store test results & print test reports.
- Optional HP Air Supply System- to provide all pneumatic utilities to the test Bench & make it self sufficient.
- Optional Digital Bubble Counter – To facilitate Seat Leak Test of Relief Valve on Air, in accordance with API-527.



**THE OFFSHORE READY MOBILE CONTAINERIZED SAFETY RELIEF VALVE TESTS  
AND REPAIR WORKSHOP**



**THE HYDRAULIC DEAD WEIGHT TESTER TECHNICAL DETAILS****1.1 BASEPLATE:**

The main components of the tester are fixed on a rigid aluminium baseplate. The base plate is provided with 4 levelling screws. The instrument should be levelled using the levelling screws and a spirit level placed on the bell or carrier of the measuring piston that is in use. A sheet metal cover is provided for protecting the interconnecting pipes against damage.

**1.2 OIL RESERVOIR WITH RELEASE VALVE:**

This is mounted on the front of the top of the tester and is the hydraulic fluid fill point for the tester. Release valve when opened releases pressure from the system.

**1.3 PRIMING PUMP:**

This is a vertically reciprocating pump used to fill up oil in the system and can also generate priming pressure, normally 20 to 30 bar. This pump is not meant to withstand high pressure and should be isolated by closing the priming valve before high pressure is developed by the screw pump.

**1.4 DISTRIBUTION MANIFOLD:**

This is not visible from outside and serves to distribute hydraulic pressure to all the points.

**1.5 SCREW PUMP:**

The screw pump provides the main pressure generation mechanism of the tester. It consists of a plunger operating inside a cylinder and increases pressure when the handle is turned clockwise.

**1.6 PISTON BLOCK:**

This is the manifold that houses the column on which the low pressure or high pressure piston can be fitted. Oil from the screw pump enters this block and pressurises the high pressure piston.

**1.7 PISTON CYLINDER UNITS (PCU):**

Oil from the block flows through the mounting column and the pressure acts below the piston. A weight carrier is fixed on the piston to provide a loading surface on which weights are stacked. A weight marked 'carrier' (if supplied) must also be loaded on the carrier each time before use.

The piston and weights should be rotated before any readings are taken. Oil pressure generated by the screw pump acts on the bottom of the free piston, producing a force that pushes the loaded piston vertically upwards. This force is balanced by dead weights which are marked in pressure units. The piston should be vertical before use. This is ensured by using levelling screws and placing a spirit level on the weight carrier. The tester is provided with separate LP and HP PCUs stored in a carry case. The LP PCU is direct top loading type whereas HP PCU is provided with a bell for loading weights in an overhang fashion. Any one PCU (LP or HP) can be fitted on the tester at one time. Special C type pin spanners are provided for changing the PCUs.

**1.8 UNION CONNECTORS:**

The gauge connector on the gauge block is a union connector which may be rotated in any direction even after the gauge is tightened on it. The connector has soft seating washers that allow hand tightening of the gauge on them. There is no need to use Teflon tape on the union connector or the BSP adaptors, Teflon tapes are useful only when tightening gauges on NPT adaptors as the sealing in NPT threads is on the thread, while the sealing in BSP thread is on the washer and gauge bottom face. Use of Teflon tape is to be avoided

on the union connector as loose tape may clog the tubing in the system. In any case, Teflon is not effective above 10000 psi.

### 1.9 SET OF WEIGHTS:

The top face of each weight including carriers are marked with the pressure equivalent of the weight and the bottom side has serial number of the tester. The weights have a projection on the top face and a recess on the bottom face to maintain concentric stacking of the weights on the carrier or elsewhere.

### 1.10 ELECTRICAL POWER ROTATION (if ordered):

The rotation of the PCU is accomplished by the electrical system provided. The mechanism is designed to transmit only torque and no vertical or horizontal forces. The rotation is designed for approximately 30 rpm. The motors run on standard mains 220VAC single supply.

### A DEAD WEIGHT TESTER





## COMPARITY/ COMPARISON TEST PUMP TECHNICAL DESCRIPTION

### 1.1 BASEPLATE:

The main components of the tester are fixed on a rigid aluminium baseplate. The baseplate is provided with 4 leveling screws. A sheet metal cover is provided for protecting the interconnecting piping from damage.

### 1.2 SCREW PUMP:

The screw pump provides the main pressure generation mechanism of the tester. It consists of 2 plungers of different areas moving along the same axis in their respective cylinders developing low and high pressures respectively.

Clockwise rotation of the screw pump handle initially engages only the low pressure plunger which increases pressure in the tester until the relief valve set pressure is reached. Continued rotation of the screw pump handle eventually engages the high pressure plunger in its cylinder and high pressures start developing in the gauge connectors.

### 1.3 MAIN BLOCK:

This is the manifold that connects the screw pump to the tester. It has both low pressure circuit and high pressure circuit connections. The comparison test pump utilizes only the high pressure portion going towards the two gauge connectors.

### 1.4 UNION CONNECTORS:

The union connectors provide a 1/2" BSPH thread for mounting gauges and adaptors. Soft PU/Nylon/Rubber or dowty seals should be used for sealing, Teflon tape should be avoided.

### 1.5 RELEASE VALVE:

This is the only user operated valve, leave it open after use.

### A COMPARISON TEST PUMP



## Location

**JEF TECH LTD** Is well positioned to execute its business in all states within Nigeria, and virtually any country due to its strong Local & foreign alliances. The business HQ is in Port Harcourt, Rivers State with logistic base offices across Nigeria & W/Africa.

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