



MN-PV-CIS-103

Hydrotesting Competency Manual

MN-PV-CIS-103 – Hydrotesting Competency Manual
Rev 2

Updated: January 10, 2023

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Training Expectation Letter

It is required that this document is completed prior to the Employee starting training on Hydro-Testing. This document will serve as formal record that all parties have reviewed and understand the expectations for training on the Hydro-Testing Operation.

Trainee Name:

Date of Discussion:

Expectations of Supervisor/Leader

- Ensuring trainee has scheduled time for training.
- Ensure trainee has reviewed and understand the technical documentation
- Ensure trainee has been provided a demonstration on equipment operation
- Verify field competency sign offs once completed
- Ensure trainee is working with a competent mentor until they are competent themselves
- Provide support for the assessor, mentor, trainer and trainee whenever possible.
- Ensure training documentation is sent to CEDA Training Department

Expectations of Trainer, Mentor, assessor

- Must be qualified in the position for which he/she is training.
- Educate and support trainee with technical review package.
- Ensure trainee has been provided a demonstration on equipment operation
- Review trainee's technical knowledge and verify acceptable understanding
- Educate and support trainee with field tasks identified in the competency check sheet
- Verify trainee has the ability to perform tasks identified in the competency check sheet
- Communicate to Supervisor that the technical review and field competency is complete

Expectations of Trainee

- Complete all prerequisites outlined within the training program.
- Understand the training process outlined in this document.
- Understanding systems and spending time in the field.
- Ensure all lessons and tasks are signed off by the appropriate personnel as indicated on the training documents.
- Inform Supervisor/Leader on progress of training through face to face meetings.
- Will utilize all the materials provided to ensure a comprehensive training program is followed.
- Provide feedback on the training process and any updates that are required to the training material.
- Inform Supervisor/Leader of any training barriers that may exist during the training process.

Training Expectation Acceptance Agreement

I, _____ understand the expectations of me as a trainee as outlined in this document

(Operator Name)

Operator\Trainee

Name

Signature

Date (MM\DD\YY)

Supervisor/Leader

Name

Signature

Date (MM\DD\YY)

Acknowledgement



This manual has been developed using information and knowledge obtained from manufacturer's documentation and input from experienced Operators. Additionally, this manual has been validated by numerous Subject Matter Experts at CEDA. We welcome any comments or suggestions pertaining to this manual and its contents.

Many thanks to those who have demonstrated a clear dedication to CEDA and our values by participating in the creation of this program.





Objective

Welcome to CEDA Hydro-Testing Training Process

This program is designed to provide you with the training necessary to carry out your job in a manner that safeguards yourself, those around you and our environment. Upon Completion of this Module you will be able to:

- 103.01 Review Hydro-Testing Operation
- 103.02 Perform Hydro-Testing Operation

Employee(s) will demonstrate knowledge & skill in the proper application of equipment through practical application.

Instructions

All material must be completed in the order presented to ensure that prerequisites are met.

Employees will demonstrate knowledge and skill in the proper application of equipment through practical demonstration and application.

NOTE: All forms and procedures included are those required by CEDA. Work must be performed in accordance with these standards. On Client work sites, there may be additional standards and modified work procedures that will also have to be met.

Description: This is a knowledge and practical skill that requires written material to be reviewed along with the completion of an on-the-job demonstration prior to the test being written.

Whenever possible, the on-the-job demonstration should be completed at a job site or the shop under controlled conditions.

Arrange a time with your Mentor/Supervisor/Trainer to complete the On-the-Job Demonstration, where you will observe the proper operation of the Steamer unit and its components.

Assessment of Competency: Successful completion of this competency requires:

- A score of 100% on the written examination.
- A successful demonstration by trainee requiring a sign-off from Trainer.



Prerequisites

- CEDA Orientation
- CEDA Introduction to High Pressure Water Blasting
- Specific work location Orientation

Below is a list of the learning resources that are included and others you must obtain the most recent version from your Supervisor.

- Equipment Specific Operator's Manuals
- MSDS SheetsSite specific documentation
- Job Hazard Analysis for the work
- CEDA FLHA
- Other CEDA procedures and practices that pertain to the job being completed
-

NOTE: All forms and procedures included are those required by CEDA. Work must be performed in accordance with these standards and can be found in CEDA Health, Safety and Environment Management System (HSEMS) or be requested from your Leader. On Client work sites, there may be additional standards and modified work procedures that will also have to be met.

Renewal Period

The entire Module must be redone after:

- Leaving the employ of SuprTest for a 6-month period,
- Leaving the hydro-testing operations for a period of 6 months, or
- As deemed required by SuprTest.

In addition, a refresher must be completed on an annual basis.

General Overview

Federal & Provincial Legislation

All work must be completed in accordance with applicable Municipal, Provincial, & Federal Acts & Regulations, including but not limited to:

Transportation of Dangerous Goods (TDG)

- Vehicle must be DOT Approved and be equipped with appropriate safety devices
- DOT approved vehicles will have sticker on side of unit
- Operator must place appropriate placards on side of vehicle
- Operator must prepare bill of lading prior to transporting materials

The Workplaces Hazardous Materials Information System (WHMIS)

- All CEDA field employees working with or around equipment will have WHMIS and TDG training prior to starting work.

Occupational Health & Safety (OH&S)

Seat Belts

Anytime a vehicle (CEDA owned or personal) is being operated during business hours for business use, or on CEDA property, the occupants must be wearing seatbelts.



Personal Protective Equipment (PPE)

To conduct a Hydro-Test, employees must have and utilize the following personal protective equipment (PPE):

- CSA Certified Hard Hat with Face Shield
- CSA Certified Safety Boots (Boot Grips when required)
- Fire Retardant Coveralls
- Hearing Protection (plugs or muffs)
- Approved Gloves for the Site/Task
- Safety Glasses with Side Shields.
- Rain Gear as Required



Workplace Organization

CEDA's goal is to reduce waste (time, energy and materials) by maintaining an orderly and clean workplace, including our trucks and equipment. We ask that you take pride in the equipment you operate; treat it as if it were your own. A clean and organized vehicle/workspace is a safer vehicle/workspace. There are many ways to eliminate waste:

Allocation & Utilization of Resources: Have the right people and equipment in the right place, at the right time. Use equipment and resources on tasks and activities that are required and add value to our business.

Improve Productivity: Eliminate redundant or unnecessary steps/tasks without negative impact to the safety or quality of our products and services.

Use of Materials: Ensure equipment is stocked with required supplies (filter bags, duct tape etc.) before leaving for jobsite – replace the materials you have used during the shift to ensure that the next crew is adequately stocked. Use the correct materials in the quantities required to do the job safely & correctly.

Preventative Maintenance: Tools and equipment should be assessed as per the performance maintenance schedule to ensure safe operation. Regular maintenance will reduce costly breakdowns in the field.

There are steps we can take to improve our current state and move towards a more productive, organized and safe work environment. Improving workplace organization will reduce costs, improve morale and create a safer work environment. The following steps outline how best to achieve an organized workplace:

Sort, organize and eliminate unnecessary items from the workplace to eliminate clutter. Keep only essential items.

- Tools and equipment that are not utilized for day-to-day operations should be repurposed within the organization or discarded.
- Garbage or loose items should be removed or properly stored.

Prioritize tools, parts and materials based on usage and keep them in easily-accessible places.

- A place for everything and everything in its place.

Create storage areas that are easy to access and clearly laid out:

- Tools and equipment should be stored clean and ready for use.
- Storage areas and stored items should be properly identified using signage, labels or a visual outline.

Set clear standards for workplace organization:

- Hold yourself and others accountable for keeping the work areas clean and safe. Make workplace organization a standard work rule in your area.
- Clean general work areas and equipment after each shift.



- Put clean tools away in the proper place.
- Note any spills, leaks or other messes – clean and report if equipment requires maintenance
- Inspect the area(s) regularly and immediately record and correct any infractions. Handle deviations from work rules in a timely manner.
- Review processes and procedures regularly and adjust as required.

Equipment Overview

Hydro-Testing

Hydro-testing is a way in which leaks can be found in pressure vessels such as pipelines and is the most common method used. The hydro-testing tools pressurize the pipe internally, so it can be inspected for leaks and other abnormalities. The operation uses a test medium like water or glycol to test the integrity of the piping system or vessel. Hydro-testing is done to ensure there are no leaks in existing pipes/systems, new pipes, or to test connections when a section of pipe is added on to a pre-existing segment of pipe.

Suprtest tools have the ability to test small segments of pipe systems, rather than having to test the entire system, which would prolong downtime and increase risk of damages to the piping system or injuries to personnel.

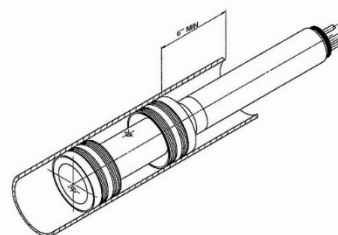
Ensuring the maximum test pressure does not exceed manufacture's rating for any pressurizing or measurement piping or component is mandatory. To reduce environmental impact, always ensure the test mediums are disposed of in an appropriate and approved manner.

Hydro-testing is performed with a **two-man crew**, typically a senior and junior technician. During hydro-testing:

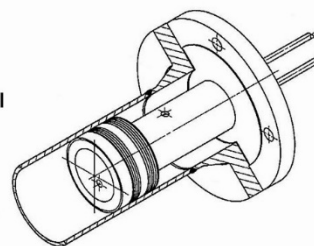
- only personnel involved in the testing are allowed in the area
- no other work can be carried out in the area
- adequate communication must be maintained among all personnel involved in the test

These rules must be followed until the area is returned to its normal operations.

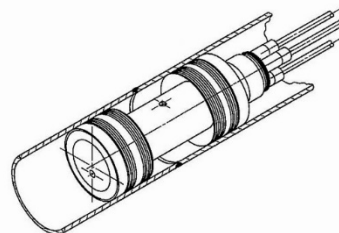
Isolation Tool



Test Flange Tool



Test Tool



Equipment and Components

There are four different types of hydro-testing tools that can be used to perform hydro-testing, these include:

- weld test tools
- flange test tools
- tee test tools and
- nozzle test tools.

Each of these tools comes in a variety of sizes depending on the job requirements. These tools differ so they can be used for different applications. It is important to note that many of the tool parts are similar and perform the same function.

Tool Components

Most hydro-testing tools utilize similar components. These components are described in more detail below:

Delrin/ Back-Up

The Delrin/backup is a ring that is cut half way. It expands and contracts in order to block the seals so that they do not push past the cones. These can be made from derlin, actel, or polosiphoam material.



Mandrel

The mandrel is the main component of tool assembly. It is a long solid cylinder with threads on the front, which attach to the fill and bleed connections. The mandrel joins all other parts of the tool. These other parts are assembled in a series of steps.

Mandrels come in various sizes and shapes depending on the use of the tool. An example of a mandrel is shown below as well as what it may look like on the inside and bottom.



Mandrel



Cone

A cone is built into the mandrel on tools 8" and smaller. On tools 10" and up there are two cones, which are separate from the tool. The seals rest on the cones, which keeps them in place.



Spacer

The spacer is an open ended cylinder with fill holes in the center. It creates a cavity between the seals and holds the seals in place. Spacers come in different sizes and materials. Shown below are examples of spacers used in hydro-testing tools.



Rings

There are two rings, one for each cone. They can be made from steel or aluminum. They must be installed so they are flush with the bottom part of the cone and must be the same schedule as the pipe that is being tested.

For example if the pipe is Schedule 40, you will need Schedule 40 rings, seals and delrins/backups.



Seals

The seal's main function is to contain the test medium within the segment of pipe that is being tested, and to push against the pipe walls achieving a pressure seal. The seals come in two different types: silicone and urethane.

Silicone seals are used for low pressure piping and heat. They have numerous

wiper seals which conform to the sides of the pipe. Silicone seals can be used for 10" pipe or smaller and are disposable once tearing is present. Urethane seals are good for high pressure



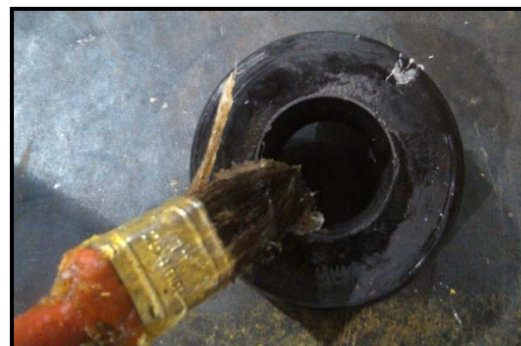


pipng systems and can be used on all sizes of pipe. Urethane seals are durable and not considered disposable.

Seals must match the size/schedule of pipe. For example a schedule 40 pipe needs a schedule 40 seal. On larger size tools, seal retainers are used in conjunction with seals to ensure the seal stays on the cone.



All seals must be lubricated (see pictures below) before each application of the tool. Lubricants used during hydro-testing include Clean and Clear or Silicone DM. These lubricants are considered food grade and therefore the risk of using them is lower than for typical lubricants.



An MSDS is available for each type of lubricant and should be referenced prior to use. Failure to lubricate could potentially cause equipment damage. ***Refer to page 13 for the CC-Lube MSDS.***

Nut

The nut is put onto the mandrel to contain the rest of the parts on the mandrel. It must only be tightened by hand (no wrenches). The female threads attached to the mandrel, and the male threads attach to a weld shield.



Flange Nut



10" Nut



6" Nut - Side



6" Nut - Top

Sample CC-Lube MSDS

Health	0
Flammability	1
Reactivity	0
PPI	B

MATERIAL SAFETY DATA SHEET

CC-LUBE™



HMIS SYMBOL

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Product Name: **CC-LUBE™**
 Chemical Family: Mixture
 Use: Synthetic Based Lubricant for food equipment.
 Manufacturer/Supplier: Jet-Lube of Canada Ltd.
 3820 - 97 Street NW
 Edmonton, Alberta
 Canada T6E 5S8
 Phone: (780) 463-7441 Fax: (780) 463-7454
 CCOHS: 1-800-668-4284

Emergency:
 CANUTEC PH: (613) 996-6666 Cell: *666 TTY/TDD: 1-888-675-6863

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Components: **No Hazardous Components**
 CAS NO.
 WT %
 OSHA PEL
 ACGIH TLV
 LD50
 LC50
 OTHER:

SECTION 3 - HAZARDS IDENTIFICATION

Route of Entry: Eyes, Inhalation, Ingestion, Skin
 Eyes: May cause irritation to eyes.
 Inhalation: Viscous nature may block breathing passages if inhaled.
 Ingestion: May cause diarrhea if ingested.
 Skin: May cause irritation after prolonged skin exposure, especially for persons with hyper sensitivity.

SECTION 4 - FIRST AID MEASURES

Eyes: Flush with water until all residual material is gone. If irritation persists, seek medical help.
 Ingestion: Do not induce vomiting. Wash out mouth. Contact a physician immediately.
 Skin: Remove by wiping or with a waterless hand cleaner, followed by washing with soap and water.
 Inhalation: Clear air passage. If breathing difficulty continues seek medical help.

SECTION 5 - FIRE FIGHTING MEASURES

Flammability: Nil at ambient temp
 Extinguishing Media: Use dry chemicals, foam, halon, CO₂ and water mist
 Flash Point (COC): >232°C (450°F)
 Explosive Properties: LEL - 0.0% UEL - 7.0%
 Autoignition Temp: >260°C (500°F)
 Hazardous Combustion Products: Oxides of carbon, smoke and irritating vapors as products of incomplete combustion.
 Protective Equipment: Self-contained breathing apparatus.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spillage: Scoop up excess, then wipes down the affected area and pick up residue with diatomaceous earth to avoid a walking hazard.
 Environmental Precautions: Do not allow product to enter into drains.

SECTION 7 - HANDLING AND STORAGE

Handling Procedures: No special handling precautions necessary. Do not pressurize, cut, heat or weld empty containers.
 Storage Requirements: Store in a cool, well ventilated place.
 Engineering Controls: If user's operation generates vapors or mists, use ventilation to keep exposure to airborne contaminants below the exposure limit. Make up air should always be supplied to balance air removed by exhaust ventilation. Ensure eyewash station and safety shower are close to work station.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal Protective Equipment (PPE's):
 Respiratory Protection: None required.
 Hand Protection: Protective gloves for hypersensitive persons.
 Eye Protection: Protective glasses if applied to moving parts.
 Body Protection: Protective overalls.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Paste Odor: Petroleum
 Odor Threshold: Not Determined Specific Gravity: 0.88 Typical
 Vapor Pressure: <0.01 kPa Vapor Density: Not Determined
 Boiling Point: <316°C (600°F) Melting Point: 260°C (500°F)
 pH: Neutral
 Density: 0.88 g/cm³
 Evaporation Rate (Butyl Acetate = 1.0): <0.01

SECTION 10 - STABILITY AND REACTIVITY

Stability: Chemically stable under normal conditions. No photoreactive agents.
 Conditions to Avoid: Powerful sources of ignition and extreme temperatures.
 Materials to Avoid: Strong acids and oxidizing agents.
 Hazardous Decomposition Products: May release CO₂, smoke and irritating vapours when heated to decomposition.

SECTION 11 - TOXICOLOGICAL INFORMATION

Exposure Limit of Material: See Section 2
 LC50 of Ingredients, Species and Routes: See Section 2
 LD50 of Ingredients, Species and Routes: See Section 2
 Teratogenicity, Embryotoxicity and/or Fetotoxicity: Not Available
 Mutagenicity: Not Available
 Effects of Long-Term (Chronic) Exposure: Long term dermal application may produce possible skin irritation. Elevated temperatures or mechanical action may form vapors or fumes. Inhalation of oil mists or vapors may cause irritation of the upper respiratory tract.

Carcinogen: NTP: No IARC: No OSHA: No

SECTION 12 - ECOLOGICAL INFORMATION

Possible Effects: May generate oil fractions that could act as a marine pollutant, but is highly unlikely.
 Behavior: Relatively well behaved. Bioaccumulation potential almost nil.
 Environmental Fate: Highly unlikely to cause notable contamination.

SECTION 13 - DISPOSAL CONSIDERATIONS

Consult federal, provincial and local regulations for disposal of petroleum products. Do not incinerate.

SECTION 14 - TRANSPORT INFORMATION

TDG (Canada): The mixture is not specifically listed in the Canadian Transportation of Dangerous Goods regulations.
 Land & Rail: Not Regulated
 Marine: Not Regulated
 Shipping Name: N/A
 UN No.: N/A
 Packing Group: N/A
 Classification: N/A
 Labeling Requirements: N/A
 Placard Requirements: N/A

SECTION 15 - REGULATORY INFORMATION

WHMIS: Not Regulated
 DSL: All components listed
 CPR Compliance: This product has been classified in accordance with the hazard criteria of the Controlled Product Regulations and the MSDS contains all of the information required by those regulations.

SECTION 16 - OTHER INFORMATION

CPR - Controlled Product Regulations
 DSL - Domestic Substance List

As of issue date, the information contained herein is accurate and reliable to the best of Jet-Lube of Canada Ltd.'s knowledge. Jet-Lube of Canada Ltd. does not warrant or guarantee its accuracy or reliability and shall not be liable for any loss or damage arising out of the use thereof. It is the users' responsibility to satisfy themselves that the information offered for their consideration is suitable for their particular use.

Prepared by: Jet-Lube of Canada Ltd. - Laboratory
 Last Date of Revision: July 21, 2010

Sample Dow Corning 111 Valve Lubricant & Sealant MSDS

 	DOW CORNING CORPORATION Material Safety Data Sheet	Page: 1 of 7
DOW CORNING(R) 111 VALVE LUBRICANT & SEALANT		
1. IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY		
Dow Corning Corporation South Saginaw Road Midland, Michigan 48686	24 Hour Emergency Telephone: (989) 496-5900 Customer Service: (989) 496-6000 Product Disposal Information: (989) 496-6315 CHEMTREC: (800) 424-9300	
MSDS No.: 01889834	Revision Date: 2002/01/22	
Generic Description: Silicone grease. Physical Form: Grease Color: Translucent white Odor: Odorless NFPA Profile: Health 0 Flammability 1 Instability/Reactivity 0 Note: NFPA = National Fire Protection Association		
2. OSHA HAZARDOUS COMPONENTS		
None present. This is not a hazardous material as defined in the OSHA Hazard Communication Standard.		
3. EFFECTS OF OVEREXPOSURE		
<u>Acute Effects</u>		
Eye:	Direct contact may cause temporary redness and discomfort.	
Skin:	No significant irritation expected from a single short-term exposure.	
Inhalation:	No significant effects expected from a single short-term exposure.	
Oral:	Low ingestion hazard in normal use.	
<u>Prolonged/Repeated Exposure Effects</u>		
Skin:	No known applicable information.	
Inhalation:	No known applicable information.	
Oral:	No known applicable information.	
<u>Signs and Symptoms of Overexposure</u>		
No known applicable information.		
<u>Medical Conditions Aggravated by Exposure</u>		
No known applicable information.		
The above listed potential effects of overexposure are based on actual data, results of studies performed upon similar compositions, component data and/or expert review of the product. Please refer to Section 11 for the detailed toxicology information.		

DOW CORNING(R) 111 VALVE LUBRICANT & SEALANT**4. FIRST AID MEASURES**

Eye: Immediately flush with water.

Skin: No first aid should be needed.

Inhalation: No first aid should be needed.

Oral: No first aid should be needed.

Comments: Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flash Point: > 214 °F / > 101.1 °C (Closed Cup)

Autoignition Temperature: Not determined.

Flammability Limits in Air: Not determined.

Extinguishing Media: On large fires use dry chemical, foam or water spray. On small fires use carbon dioxide (CO₂), dry chemical or water spray. Water can be used to cool fire exposed containers.

Fire Fighting Measures: Self-contained breathing apparatus and protective clothing should be worn in fighting large fires involving chemicals. Determine the need to evacuate or isolate the area according to your local emergency plan. Use water spray to keep fire exposed containers cool.

Unusual Fire Hazards: None.

Hazardous Decomposition Products

Thermal breakdown of this product during fire or very high heat conditions may evolve the following hazardous decomposition products: Silicon dioxide. Carbon oxides and traces of incompletely burned carbon compounds. Formaldehyde.

6. ACCIDENTAL RELEASE MEASURES

DOW CORNING(R) 111 VALVE LUBRICANT & SEALANT

Containment/Clean up: Determine whether to evacuate or isolate the area according to your local emergency plan. Observe all personal protection equipment recommendations described in Sections 5 and 8. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbant. Clean area as appropriate since some silicone materials, even in small quantities, may present a slip hazard. Final cleaning may require use of steam, solvents or detergents. Dispose of saturated absorbant or cleaning materials appropriately, since spontaneous heating may occur. Local, state and federal laws and regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which federal, state and local laws and regulations are applicable. Sections 13 and 15 of this MSDS provide information regarding certain federal and state requirements.

Note: See section 8 for Personal Protective Equipment for Spills. Call Dow Corning Corporation, (989) 496-5900, if additional information is required.

7. HANDLING AND STORAGE

Use with adequate ventilation. Avoid eye contact.

Use reasonable care and store away from oxidizing materials.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION**Component Exposure Limits**

There are no components with workplace exposure limits.

Engineering Controls

Local Ventilation: None should be needed.
General Ventilation: Recommended.

Personal Protective Equipment for Routine Handling

Eyes: Use proper protection - safety glasses as a minimum.
Skin: Washing at mealtime and end of shift is adequate.
Suitable Gloves: No special protection needed.
Inhalation: No respiratory protection should be needed.
Suitable Respirator: None should be needed.

Personal Protective Equipment for Spills

Eyes: Use proper protection - safety glasses as a minimum.
Skin: Washing at mealtime and end of shift is adequate.



DOW CORNING

DOW CORNING CORPORATION
Material Safety Data Sheet

Page: 4 of 7

DOW CORNING(R) 111 VALVE LUBRICANT & SEALANT

Inhalation/Suitable No respiratory protection should be needed.
Respirator:

Precautionary Measures: Avoid eye contact. Use reasonable care.

Note: These precautions are for room temperature handling. Use at elevated temperature or aerosol/spray applications may require added precautions.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form: Grease
Color: Translucent white
Odor: Odorless
Specific Gravity @ 25°C: 1.1
Viscosity: Not determined.
Freezing/Melting Point: Not determined.
Boiling Point: Not determined.
Vapor Pressure @ 25°C: Not determined.
Vapor Density: Not determined.
Solubility in Water: Not determined.
pH: Not determined.
Volatile Content: Not determined.

Note: The above information is not intended for use in preparing product specifications. Contact Dow Corning before writing specifications.

10. STABILITY AND REACTIVITY

Chemical Stability: Stable.

Hazardous Hazardous polymerization will not occur.
Polymerization:
Conditions to Avoid: None.

Materials to Avoid: Oxidizing material can cause a reaction.

11. TOXICOLOGICAL INFORMATION

Special Hazard Information on Components

No known applicable information.

12. ECOLOGICAL INFORMATION

Environmental Fate and Distribution

Complete information is not yet available.

Environmental Effects

Complete information is not yet available.

DOW CORNING(R) 111 VALVE LUBRICANT & SEALANT**Fate and Effects in Waste Water Treatment Plants**

Complete information is not yet available.

Ecotoxicity Classification Criteria

Hazard Parameters (LC50 or EC50)	High	Medium	Low
Acute Aquatic Toxicity (mg/L)	<=1	>1 and <=100	>100
Acute Terrestrial Toxicity	<=100	>100 and <= 2000	>2000

This table is adapted from "Environmental Toxicology and Risk Assessment", ASTM STP 1179, p.34, 1993.

This table can be used to classify the ecotoxicity of this product when ecotoxicity data is listed above. Please read the other information presented in the section concerning the overall ecological safety of this material.

13. DISPOSAL CONSIDERATIONS**RCRA Hazard Class (40 CFR 261)**

When a decision is made to discard this material, as received, is it classified as a hazardous waste? No

State or local laws may impose additional regulatory requirements regarding disposal.

Call Dow Corning Corporate Environmental Management, (989) 496-6315, if additional information is required.

14. TRANSPORT INFORMATION**DOT Road Shipment Information (49 CFR 172.101)**

Not subject to DOT.

Ocean Shipment (IMDG)

Not subject to IMDG code.

Air Shipment (IATA)

Not subject to IATA regulations.

Call Dow Corning Transportation, (989) 496-8577, if additional information is required.

15. REGULATORY INFORMATION

Contents of this MSDS comply with the OSHA Hazard Communication Standard 29 CFR 1910.1200.

TSCA Status: All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

EPA SARA Title III Chemical Listings**Section 302 Extremely Hazardous Substances:**

None.

Sample Silicone DM MSDS

Health	0
Flammability	1
Reactivity	0
PPI	B

HMIS Symbol

MATERIAL SAFETY DATA SHEET

SILICONE COMPOUND DM™



NFPA Symbol

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

Product Name: **SILICONE COMPOUND DM™**
 Chemical Family: Mixture
 Use: Silicone based equipment lubricant.
 Manufacturer/Supplier: Jet-Lube of Canada Ltd.
 3820 – 97 Street NW
 Edmonton, Alberta
 Canada T6E 5S8
 Phone: (780) 463-7441 Fax: (780) 463-7454
 CCOHS: 1-800-668-4284

Emergency:
 CANUTEC PH: (613) 996-6666 Cell: *666 TTY/TDD: 1-888-675-6863

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Components: **No Hazardous Components**

CAS NO.
 WT %
 OSHA PEL
 ACGIH TLV
 LD50
 LC50
 OTHER:

SECTION 3 - HAZARDS IDENTIFICATION

Route of Entry: Eyes, Inhalation, Ingestion, Skin
 Eyes: May cause irritation to eyes.
 Inhalation: Viscous nature may block breathing passages if inhaled.
 Ingestion: May cause diarrhea if ingested.
 Skin: May cause irritation after prolonged skin exposure, especially for persons with hyper sensitivity.

SECTION 4 - FIRST AID MEASURES

Eyes: Flush with water until all residual material is gone. If irritation persists, seek medical help.
 Ingestion: Do not induce vomiting. Wash out mouth. Contact a physician immediately.
 Skin: Remove by wiping or with a waterless hand cleaner, followed by washing with soap and water.
 Inhalation: Clear air passage. If breathing difficulty continues seek medical help.

SECTION 5 - FIRE FIGHTING MEASURES

Flammability: Nil at ambient temp
 Extinguishing Media: Use dry chemicals, foam, halon, CO₂ and water mist
 Flash Point (COC): >260°C (500°F)
 Explosive Properties: LEL - Unknown UEL - Unknown
 Autoignition Temp: >316°C (600°F)
 Hazardous Combustion Products: Oxides of carbon, smoke and irritating vapors as products of incomplete combustion.
 Protective Equipment: Self-contained breathing apparatus.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Spillage: Scoop up excess, then wipes down the affected area and pick up residue with diatomaceous earth to avoid a walking hazard.
 Environmental Precautions: Do not allow product to enter into drains.

SECTION 7 - HANDLING AND STORAGE

Handling Procedures: No special handling precautions necessary. Do not pressurize, cut, heat or weld empty containers.
 Storage Requirements: Store in a cool, well ventilated place.
 Engineering Controls: If user's operation generates vapors or mists, use ventilation to keep exposure to airborne contaminants below the exposure limit. Make up air should always be supplied to balance air removed by exhaust ventilation. Ensure eyewash station and safety shower are close to work station.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal Protective Equipment (PPE's):
 Respiratory Protection: Breathing apparatus in confined spaces.
 Hand Protection: Protective gloves for hypersensitive persons.
 Eye Protection: Protective glasses if applied to moving parts.
 Body Protection: Protective Overalls.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Paste
 Odor Threshold: Not Determined
 Vapor Pressure: <0.01 kPa
 Boiling Point: Unknown
 pH: Neutral
 Density, Typical: 1.06 g/cm³
 Evaporation Rate (Butyl Acetate = 1.0): <0.01
 Odor: Petroleum
 Specific Gravity, Typical: 1.06
 Vapor Density: Not Determined
 Melting Point: Not Determined

SECTION 10 - STABILITY AND REACTIVITY

Stability: Chemically stable under normal conditions. No photoreactive agents.
 Conditions to Avoid: Powerful sources of ignition and extreme temperatures.
 Materials to Avoid: Strong acids and oxidizing agents.
 Hazardous Decomposition Products: May release CO_x, smoke and irritating vapours when heated to decomposition.

SECTION 11 - TOXICOLOGICAL INFORMATION

Exposure Limit of Material: See Section 2.
 LC50 of Ingredients, Species and Routes: See Section 2.
 LD50 of Ingredients, Species and Routes: See Section 2.
 Teratogenicity, Embryotoxicity and/or Fetotoxicity: Not Available
 Mutagenicity: Not Available
 Effects of Long-Term (Chronic) Exposure: Long term dermal application may produce possible skin irritation. Elevated temperatures or mechanical action may form vapors or fumes. Inhalation of oil mists or vapors may cause irritation of the upper respiratory tract.
 Carcinogen: NTP: No IARC: No OSHA: No

SECTION 12 - ECOLOGICAL INFORMATION

Possible Effects: May generate oil fractions that could act as a marine pollutant, but is highly unlikely.
 Behavior: Relatively well behaved. Bioaccumulation potential almost nil.
 Environmental Fate: Highly unlikely to cause notable contamination.

SECTION 13 - DISPOSAL CONSIDERATIONS

Consult federal, provincial and local regulations for disposal of petroleum products. Do not incinerate.

SECTION 14 - TRANSPORT INFORMATION

TDG (Canada): The mixture is not specifically listed in the Canadian Transportation of Dangerous Goods regulations. The mixture is not regulated.
 Land & Rail: Not Regulated
 Marine: Not Regulated
 Shipping Name: N/A
 UN No.: N/A
 Packing Group: N/A
 Classification: N/A
 Labeling Requirements: N/A
 Placard Requirements: N/A

SECTION 15 - REGULATORY INFORMATION

WHMIS: Not Regulated
 DSL: All components listed
 CPR Compliance: This product has been classified in accordance with the hazard criteria of the Controlled Product Regulations and the MSDS contains all of the information required by those regulations.

SECTION 16 - OTHER INFORMATION

CPR - Controlled Product Regulations
 DSL - Domestic Substance List

As of issue date, the information contained herein is accurate and reliable to the best of Jet-Lube of Canada Ltd.'s knowledge. Jet-Lube of Canada Ltd. does not warrant or guarantee its accuracy or reliability and shall not be liable for any loss or damage arising out of the use thereof. It is the users' responsibility to satisfy themselves that the information offered for their consideration is suitable for their particular use.

Prepared by: Jet-Lube of Canada Ltd. - Laboratory
 Last Date of Revision: August 9, 2010

Weld Test Tools

Weld test tools hydro-test the weld in a piping system. When the test medium is introduced, the tool will seal itself to the walls and pressurize to the predetermined hydro-test pressure. Weld test tools are purposely designed to test a specific welded area on a pressure vessel, pipe joint or pipe spool. Weld test tools range in size from half inch ($\frac{1}{2}$ ") to 24" and up. Weld test tools come in the following size categories:

- $\frac{1}{2}$ " to 2"
- 2" to 4"
- 6" to 8"
- 10" to 12"
- 14" to 20"
- 24" and up.

Weld test tools ranging from 14" and up require rigging for installation. Tools sized 24" and up are very large and require different components such as lifting lugs to assist with rigging procedures.

Weld Test Tool – $\frac{1}{2}$ " to 2" and 2" to 4"

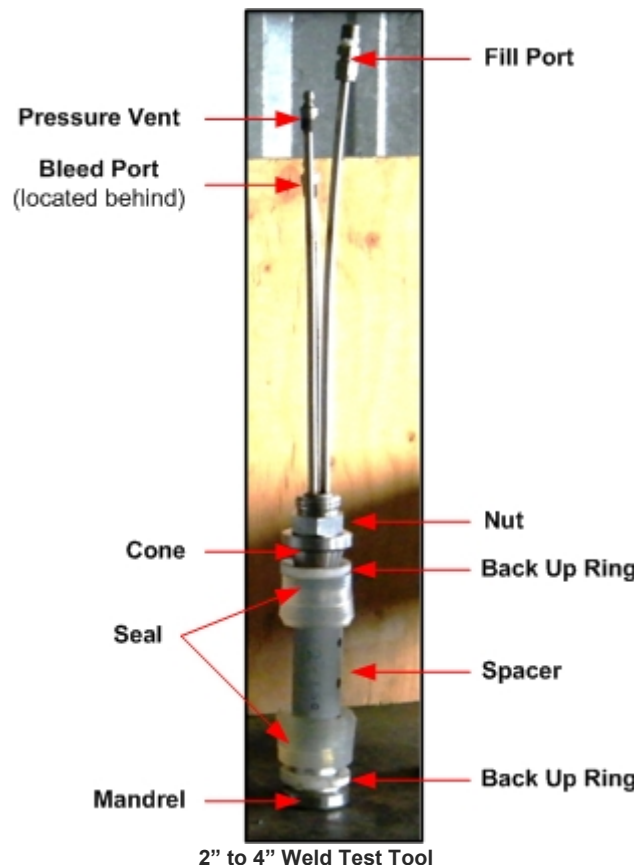


$\frac{1}{2}$ " to 2" Weld Test Tool

All weld test tools have three consistent parts (as seen to the right):

- fill port
- pressure vent
- bleed port.

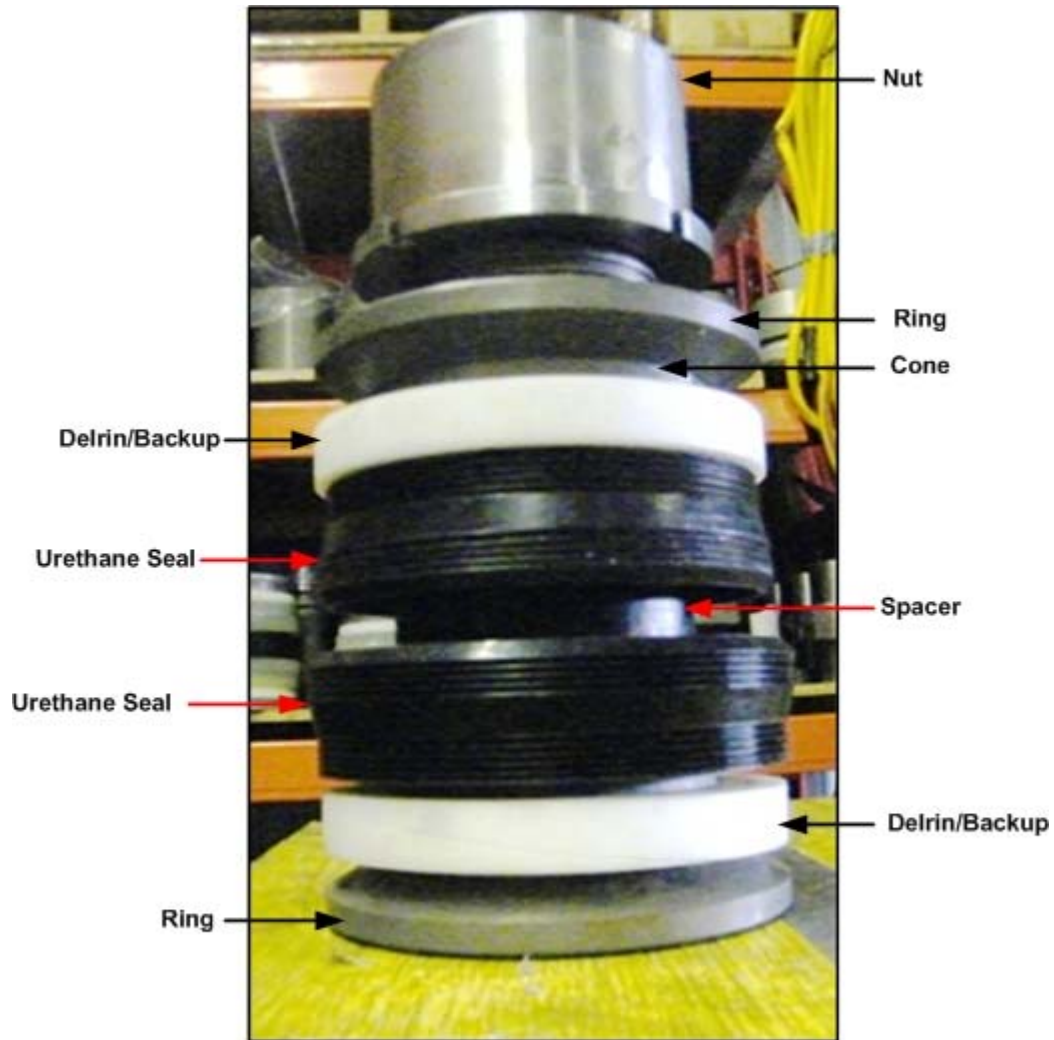
The fill port is connected to a hose that fills the tool and the pipe with the test medium. The bleed port is connected to a hose that drains the test medium from the tool and the pipe.



2" to 4" Weld Test Tool

Weld Test Tool – 6" to 8"

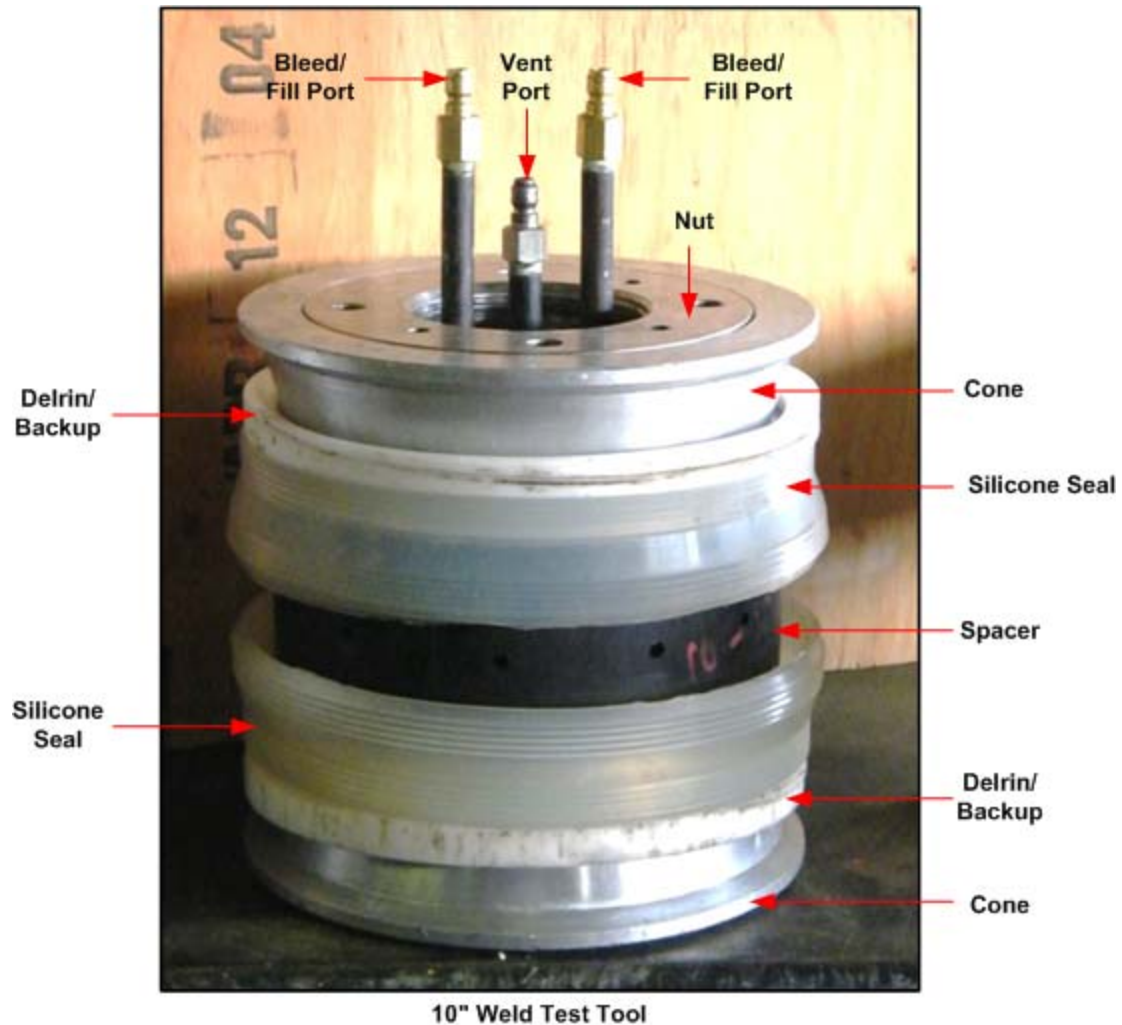
On the 6" to 8" weld test tool, the fill and bleed ports attached to the mandrel inside the tool. The nut located at the top of the tool is blocking them from being viewed in the picture below.



6" to 8" Weld Test Tool

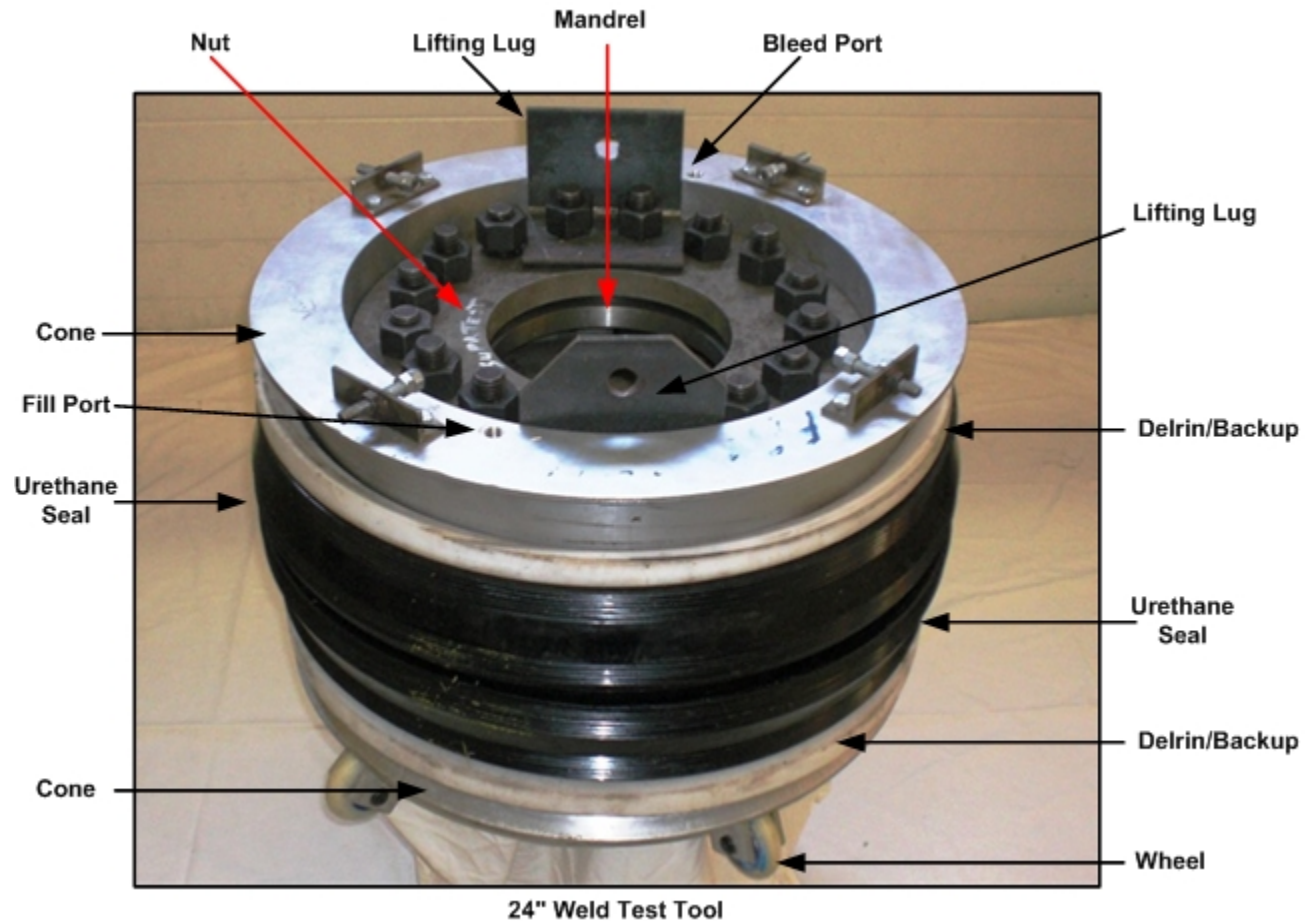
Weld Test Tool – 10" to 20"

Note: The unlabeled connection is a vent port and is not used for hydro-testing.



Weld Test Tool – 24”

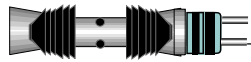
The fill and bleed port connections are not built into the above weld test tool. The two connections are threaded and can be screwed into the ports on the cone.



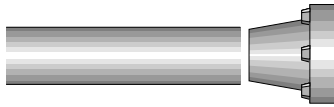
Lifting Lugs

Lifting lugs are used to assist with rigging, so the tool can be lifted into place. Lifting lugs come in many different shapes and sizes as seen below and in the picture above.

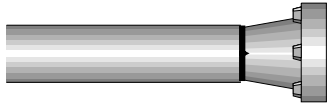




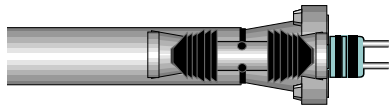
SuprTest Weld Test Tool



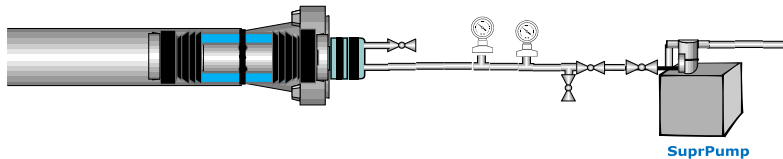
A new flange is add to a piping system.



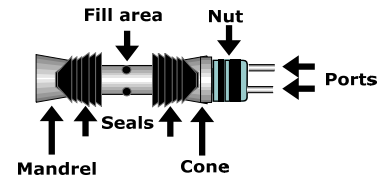
After new weld joint is completed. Weld is required to be tested.



SuprTest test tool is inserted without bolting to new flange.



As fluid is introduced Suprtest patented seal, self energizes against piping wall providing a seal. As pressure is released seal retracts allowing tool to be removed.



Flange Test Tools

A flange test tool can be inserted into an open flange, pipe, tube or 90° elbow to perform a hydro-test. Flange test tools are designed to test a specific welded area on a pressure vessel, pipe joint or pipe spool. These test tools contain a mating flange that is attached to the clients flange ensuring the nozzle can be tested.

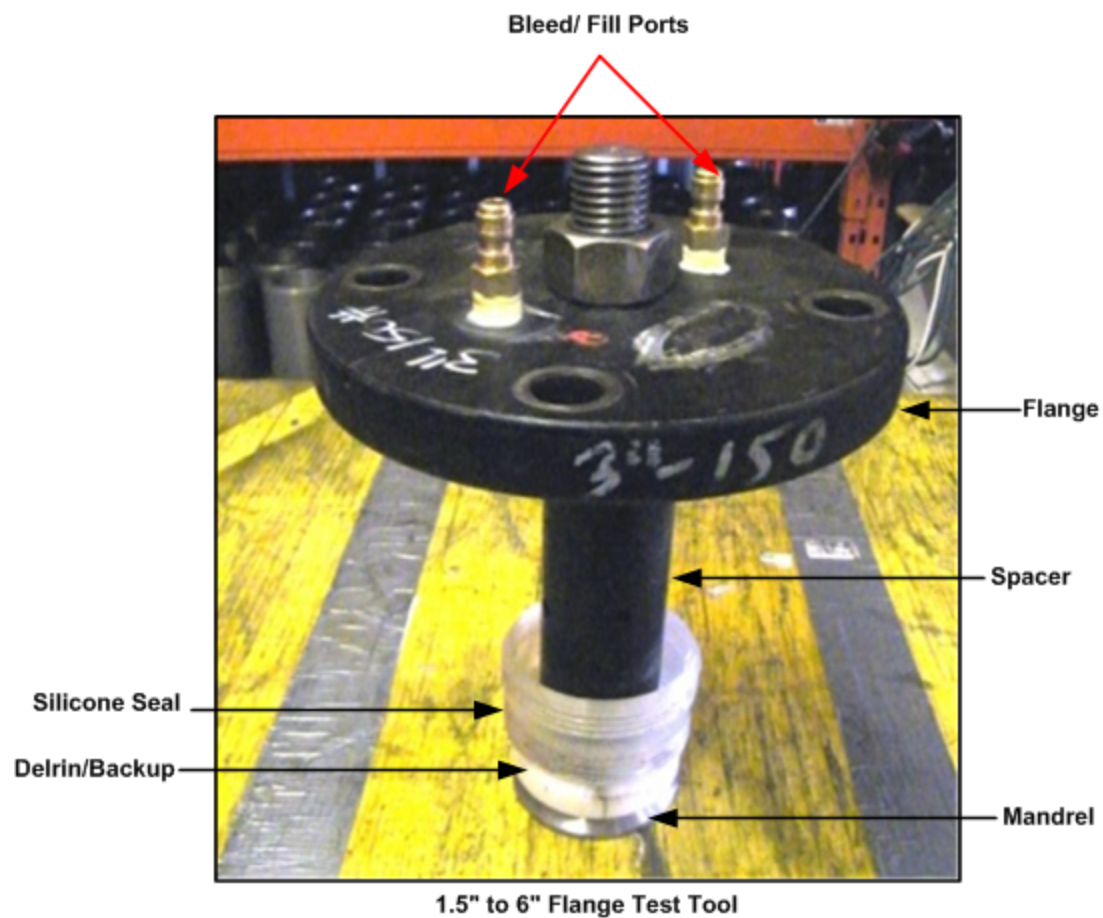
The most common applications involve Tie-ins to existing pipe assemblies, repair or replacement of flange, tees, and spool assemblies, nozzles off of vessels, heat exchanger tubes and boiler tubes. Flange test tools come in the following size categories:

- ½" to 1.5"
- 1.5" to 8"
- 10" to 20"
- 24" and up.

Flange test tools ranging in size from 6" and up require rigging for installation. Tools sized 24" tools and up are very large and require different components such as lifting lugs to assist with rigging procedures.

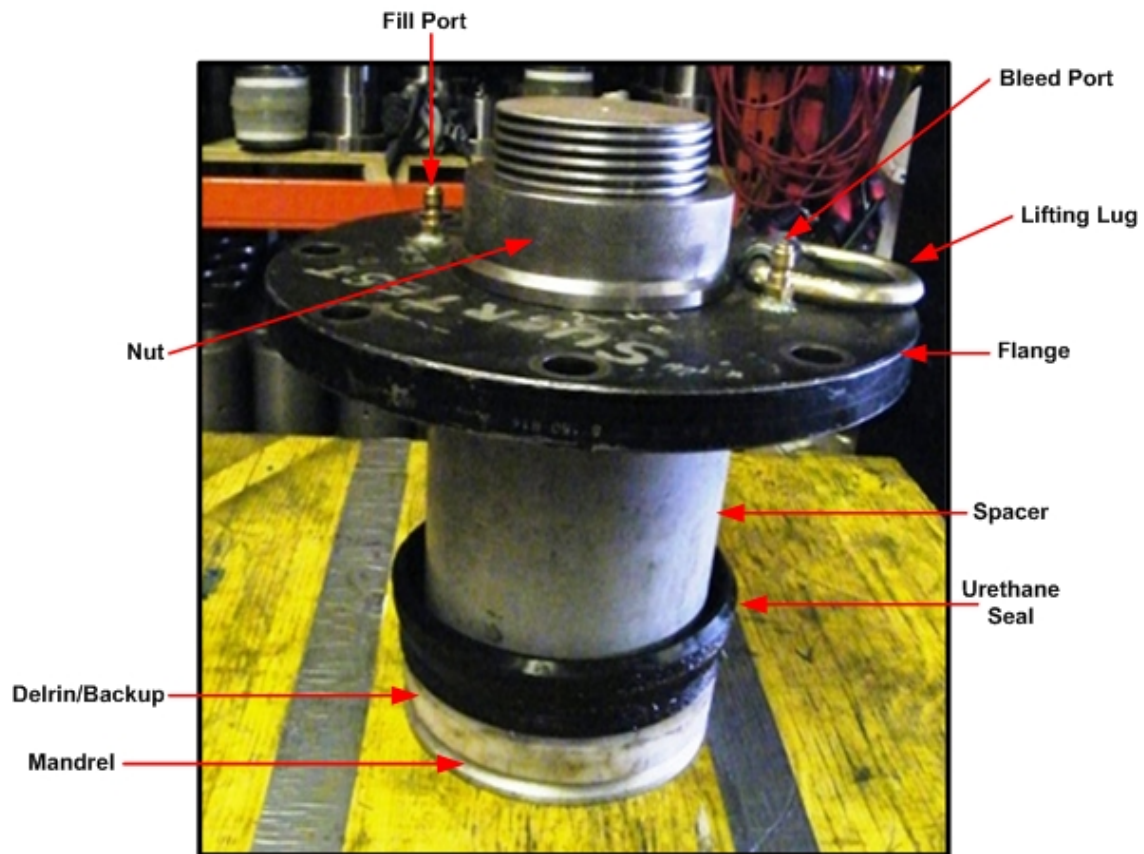


½" to 1.5" Flange Test Tool

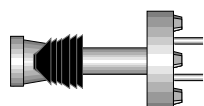




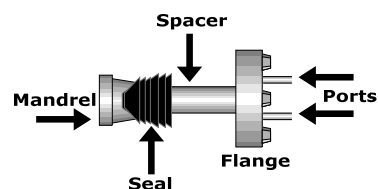
The flange test tool shown below only has two port connections because it is only used for hydro-testing. A mating flange is attached to the client's flange so the nozzle can be tested.



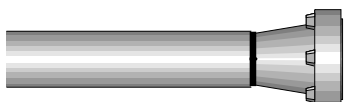
8" Flange Test Tool



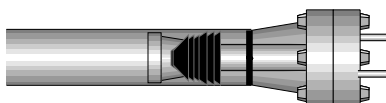
SuprTest Flange Test Tool



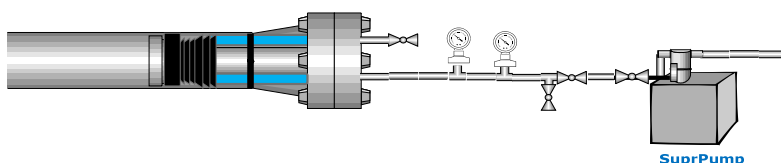
A new flange is add to a piping system.



After new weld joint is completed. Weld and flange is required to be tested.



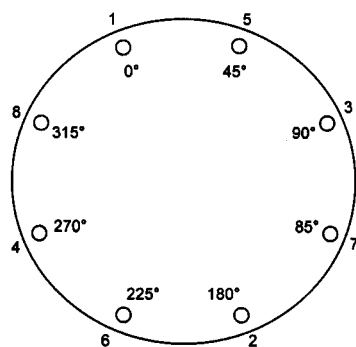
SuprTest Flange test tool is inserted and bolted to new flange.



As fluid is introduced Suprtest patented seal, self energizes against piping wall providing a seal. As pressure is released seal retracts allowing tool to be removed.

Bolted Joints

Flange test tools require the following bolting patterns when installing the tool. If improper bolting is performed during the use of flange test tool the risks could potentially include overstressing the pipe or vessel, warping and excess pressure. The information below provides layouts and sequencing for a number of standard bolted joints.

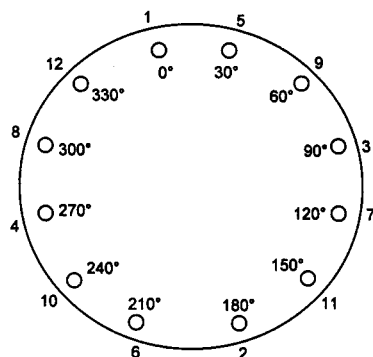


Sequential Order

1-2
3-4
5-6
7-8

Rotational Order

1
5
3
7
2
6
4
8

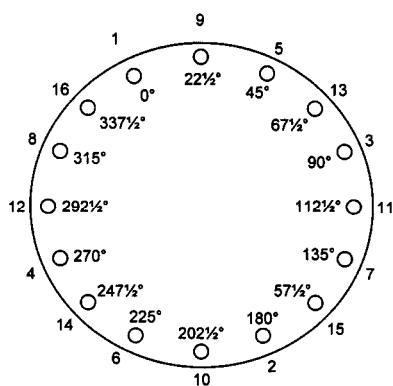


Sequential Order

1-2
3-4
5-6
7-8
9-10
11-12

Rotational Order

1
5
9
3
7
11
2
6
10
4
8
12



Sequential Order

1-2
3-4
5-6
7-8
9-10
11-12
13-14
15-16

Rotational Order

1 → 2
9 → 10
5 → 6
13 → 14
3 → 4
11 → 12
7 → 8
15 → 16



Bolt/ Torque Pattern Reference Chart

All bolt patterns are to be numbered in a clockwise direction. Bolt torquing should occur in numerical order.

No. of Bolts	Sequence
8	1-5-3-7-2-6-4-8
12	1-5-9-3-7-11-2-6-10-4-8-12
16	1-9-5-13-3-11-7-15-2-10-6-14-4-12-8-16
20	1-13-5-17-9-3-15-7-19-11-2-14-6-18-10-4-16-8-20-12
24	1-9-17-5-13-21-3-11-19-7-15-23-2-10-18-6-14-22-4-12-20-8-16-24
28	1-13-21-5-17-25-9-15-23-7-19-27-11-2-14-22-6-18-26-10-4-16-24-8-20-28-12
32	1-9-17-25-5-13-21-29-3-11-19-27-7-15-23-31-2-10-18-26-6-14-22-30-4-12-20-28-8-16-24-32
36	1-13-21-29-5-17-25-33-9-3-15-23-31-7-19-27-35-11-2-14-22-30-6-18-26-34-10-4-16-24-32-8-20-28-36-12
40	1-9-17-25-33-5-13-21-29-37-3-11-19-27-35-7-15-23-31-39-2-10-18-26-34-6-14-22-30-38-4-12-20-28-36-8-16-24-32-40
44	1-29-13-37-5-25-17-33-9-41-21-3-31-15-39-7-27-19-35-11-43-23-2-30-14-38-6-26-18-34-10-42-22-4-32-16-40-8-28-20-36-12-44-24
48	1-9-17-25-33-41-5-13-21-29-37-45-3-11-19-27-35-43-7-15-23-31-39-47-2-10-18-26-34-42-6-14-22-30-38-46-4-12-20-28-36-44-8-16-24-32-40-48
52	1-13-21-29-37-45-5-17-25-33-41-49-9-3-15-23-31-39-47-7-19-27-35-43-51-11-2-14-22-30-38-46-6-18-26-34-42-50-10-4-16-24-32-40-48-8-20-28-36-44-52-12
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60	1-13-21-29-37-45-53-5-17-25-33-41-49-57-9-3-15-23-31-39-47-55-7-19-27-35-43-51-59-11-2-14-22-30-38-46-54-6-18-26-34-42-50-58-10-4-16-24-32-40-48-56-8-20-28-36-44-52-60-12
66	1-17-33-49-65-9-25-41-57-5-21-37-53-13-29-45-61-3-19-35-51-67-11-27-43-59-7-23-39-55-15-31-47-63-2-18-34-50-66-10-26-42-58-6-22-38-54-14-30-46-62-4-20-36-52-68-12-28-44-60-8-24-40-56-16-32-48-64
72	1-9-17-25-33-41-49-57-65-5-13-21-29-37-45-53-61-69-3-11-19-27-35-43-51-59-67-7-15-23-31-39-47-55-63-71-2-10-18-26-34-42-50-58-66-6-14-22-30-38-46-54-62-70-4-12-20-28-36-44-52-66-68-8-16-24-32-40-48-56-64-72
88	1-98-17-25-33-41-49-57-65-73-81-5-13-21-29-37-45-53-61-69-77-85-3-11-19-27-35-43-51-59-67-75-83-7-15-23-31-39-47-55-63-71-79-87-2-10-18-26-34-42-50-58-66-74-82-6-14-22-30-38-46-54-62-70-78-86-4-12-20-28-36-44-52-60-68-76-84-8-16-24-32-40-48-56-64-72-80-88

The following charts provide information on specific tools (wrench, size/ length of studs) required for hydro-testing according to flange size. For more information regarding these charts, speak to your supervisor.



FLANGE SIZE	Number of studs	Size & length of studs	Wrench size	Diameter Of bolt circle	Flange Outside diameter	Gasket Inside diameter	Slip Blind & Gasket Outside diameter	150 FLANGE SERIES (IN INCHES)
½"	4	½ x 2 1/2	7/8	2 3/8	3 3/4	3/4	1 7/8	
¾"	4	½ x 2 1/4	7/8	2 3/4	3 7/8	1	2 1/4	
1"	4	½ x 2 1/2	7/8	3 1/8	4 1/4	1	2 5/8	
1 1/2"	4	½ x 2 3/4	7/8	3 7/8	5	1 1/2	3 3/8	
2"	4	5/8 x 3 1/4	1 1/16	4 3/4	6	2	4 1/8	
3"	4	5/8 x 3 1/2	1 1/16	6	7 1/2	3	5 3/8	
4"	8	5/8 x 3 1/2	1 1/16	7 1/2	9	4	6 7/8	
6"	8	¾ x 4	1 1/4	9 1/2	11	6	8 3/4	
8"	8	¾ x 4 1/4	1 1/4	11 3/4	13 1/2	8	11	
10"	12	7/8 x 4 3/4	1 7/16	14 1/4	16	10	13 3/8	
12"	12	7/8 x 4 3/4	1 7/16	17	19	12	16 1/8	
14"	12	1 x 5 1/4	1 5/8	18 3/4	21	13 1/4	17 3/4	
16"	16	1 x 5 1/2	1 5/8	21 1/4	23 1/2	15 7/8	20 1/4	
18"	16	1 1/8 x 6	1 13/16	22 3/4	25	17 7/8	21 7/8	
20"	20	1 1/8 x 6 1/4	1 13/16	25	27 1/2	19 1/4	23 7/8	
24"	20	1 1/4 x 7	2	29 1/2	32	23 1/4	28 1/4	

FLANGE SIZE	Number of studs	Size & length of studs	Wrench size	Diameter Of bolt circle	Flange Outside diameter	Gasket Inside diameter	Slip Blind & Gasket Outside diameter	300 FLANGE SERIES (IN INCHES)
½"	4	½ x 2 ½	7/8	2 5/8	3 ¾	3/4	2 1/8	
¾"	4	5/8 x 2 ¾	1 1/16	3 ¾	4 5/8	1	2 5/8	
1"	4	5/8 x 3 ¼	1 1/16	3 ¾	4 7/8	1	2 7/8	
1 1/2"	4	¾ x 3 ½	1 ¼	4 ½	6 1/8	1 ½	3 ¾	
2"	8	5/8 x 3 ½	1 1/16	5	6 1/2	2	4 3/8	
3"	8	¾ x 4 ¼	1 ¼	6 5/8	8 1/4	3	5 7/8	
4"	8	¾ x 4 ½	1 ¼	7 7/8	10	4	7 1/8	
6"	12	¾ x 4 ½	1 ¼	10 5/8	12 1/2	6	9 7/8	
8"	12	7/8 x 5 ½	1 7/16	12 15/16	15	8	12 1/8	
10"	16	1 x 6 ½	1 5/8	15 ½	17 1/2	10	14 ¾	
12"	16	1 1/8 x 6 ¾	1 13/16	17 ¾	20 1/2	12 7/8	16 5/8	
14"	20	1 1/8 x 7	1 13/16	20 ¾	23	14 1/8	19 1/8	
16"	20	1 ¼ x 7 ½	2	22 ½	25 1/2	16	21 ¾	
18"	24	1 ¼ x 7 ¾	2	24 ¾	28	18	23 ½	
20"	24	1 ½ x 8 ¼	2	27	30 1/2	19	25 ¾	
24"	24	1 ½ x 9 ½	2 3/8	32	36	23	30 1/2	

FLANGE SIZE	Number of studs	Size & length of studs	Wrench size	Diameter Of bolt circle	Flange Outside diameter	Gasket Inside diameter	Slip Blind & Gasket Outside diameter	400 FLANGE SERIES (IN INCHES)
½"	4	½ x 3	7/8	2 5/8	3 ¾	¾	2 1/8	
¾"	4	5/8 x 3 1/4	1 1/16	3 ¾	4 5/8	1	2 5/8	
1"	4	5/8 x 3 1/2	1 1/16	3 ¾	4 7/8	1 5/16	2 7/8	
1 1/2"	4	¾ x 4 1/4	1 ¼	4 ½	6 1/8	1 29/32	3 ¾	
2"	8	5/8 x 4 1/4	1 1/16	5	6 1/2	2	4 3/8	
3"	8	¾ x 5	1 ¼	6 5/8	8 1/4	3	5 7/8	
4"	8	7/8 x 5 ½	1 7/16	8 ½	10 ¾	4	7 1/8	
6"	12	7/8 x 6	1 7/16	11 7/8	12 ½	6	9 7/8	
8"	12	1 x 6 ¾	1 5/8	12 15/16	15	8	12 1/8	
10"	16	1 1/8 x 7 ½	1 13/16	15 ¾	17 ½	10	14 ¾	
12"	16	1 ½ x 8	2	17 ¾	20 ½	12 7/8	16 5/8	
14"	20	1 ¼ x 8 ¾	2	20 ¾	23	14 1/8	19 1/8	
16"	20	1 3/8 x 8 ¾	2 3/16	22 ½	25 ½	16	21 ¾	
18"	24	1 3/8 x 9	2 3/16	24 ¾	28	18	23 ½	
20"	24	1 ½ x 9 3/4	2 3/8	27	30 ½	19	25 ¾	
24"	24	1 ¾ x 10 3/4	2 3/4	32	36	23	30 1/2	



FLANGE SIZE	Number of studs	Size & length of studs	Wrench size	Diameter Of bolt circle	Flange Outside diameter	Gasket Inside diameter	Slip Blind & Gasket Outside diameter	600 FLANGE SERIES (IN INCHES)
½"	4	½ x 3	7/8	2 5/8	3 ¾	¾	2 1/8	
¾"	4	5/8 x 3 1/4	1 1/16	3 ¾	4 5/8	1	2 5/8	
1"	4	5/8 x 3 1/2	1 1/16	3 ¾	4 7/8	1 5/16	2 7/8	
1 1/2"	4	¾ x 4 1/4	1 ¼	4 ½	6 1/8	1 29/32	3 ¾	
2"	8	5/8 x 4 1/4	1 1/16	5	6 1/2	2	4 3/8	
3"	8	¾ x 5	1 ¼	6 5/8	8 1/4	3	5 7/8	
4"	8	7/8 x 5 ¾	1 7/16	8 ½	10 ¾	4	7 5/8	
6"	12	1 x 6 ¾	1 5/8	11 1/2	14	6	10 ½	
8"	12	1 1/8 x 7 ¾	1 13/16	13 ¾	16 ½	7 7/8	12 5/8	
10"	16	1 ¼ x 8 ½	2	17	20	9 ¾	15 ¾	
12"	20	1 1/4 x 8 ¾	2	19 ¼	22	11 ¾	18	
14"	20	1 3/8 x 9 ¼	2 3/16	20 ¾	23 ¾	12 7/8	19 3/8	
16"	20	1 ½ x 10	2 3/8	23 ¾	27	14 ¾	22 ¾	
18"	20	1 5/8 x 10 ¾	2 9/16	25 ¾	29 ¼	16 ½	24 1/8	
20"	24	1 5/8 x 11 ½	2 9/16	28 ½	32	18 ¾	26 7/8	
24"	24	1 7/8 x 13 ¼	2 15/16	33	37	22	31 1/8	

FLANGE SIZE	Number of studs	Size & length of studs	Wrench size	Flange Outside diameter	Gasket Inside diameter	Slip Blind & Gasket Outside diameter	900 FLANGE SERIES (IN INCHES)
½"	4	¾ x 4	1 ¼	4 ¾	¾	2 ½	
¾"	4	¾ x 4 ¼	1 ¼	5 1/8	1	2 ¾	
1"	4	7/8 x 4 ¾	1 7/16	5 7/8	1 ¼	3 1/8	
1 1/2"	4	1 x 5 ½	1 5/8	7	1 7/8	3 7/8	
2"	8	7/8 x 5 ½	1 7/16	8 ½	2 5/16	5 5/8	
3"	8	7/8 x 5 ¾	1 7/16	9 ½	3 ¾	6 5/8	
4"	8	1 1/8 x 6 ½	1 13/16	11 ½	4 ¾	8 1/6	
6"	12	1 1/8 x 7 ½	1 13/16	15	6 7/8	11 3/8	
8"	12	1 3/8 x 8 ½	2 3/16	18 ½	8 7/8	14 1/8	
10"	16	1 3/8 x 9	2 3/16	21 ½	10 13/16	17 1/8	
12"	20	1 3/8 x 9 ¾	2 3/16	24	12 7/8	19 5/8	
14"	20	1 ½ x 10 ½	2 3/8	25 ¾	14 ¾	20 ½	
16"	20	1 5/8 x 11 ½	2 9/16	27 ¾	16 ¾	22 5/8	
18"	20	1 7/8 x 12 ¾	2 15/16	31	18 ¾	25 1/8	
20"	20	2 x 13 ½	3 1/8	33 ¾	20 ¾	27 ½	
24"	20	2 ½ x 17	3 7/8	41	24 ¾	33	

FLANGE SIZE	Number of studs	Size & length of studs	Wrench size	Flange Outside diameter	Gasket Inside diameter	Slip Blind & Gasket Outside diameter	1500 FLANGE SERIES (IN INCHES)
½"	4	¾ x 4	1 ¼	4 ¾	¾	2 ½	
¾"	4	¾ x 4 ¼	1 ¼	5 1/8	1	2 ¾	
1"	4	7/8 x 4 ¾	1 7/16	5 7/8	1 ¼	3 1/8	
1 1/2"	4	1 x 5 ½	1 5/8	7	1 7/8	3 7/8	
2"	8	7/8 x 5 ½	1 7/16	8 ½	2 5/16	5 5/8	
3"	8	1 1/8 x 6 ¾	1 13/16	10 ½	3 5/8	6 7/8	
4"	8	1 ¼ x 7 ½	2	12 ¾	4 5/8	8 ¾	
6"	12	1 3/8 x 10	2 3/16	15 ½	6 ¾	11 1/8	
8"	12	1 5/8 x 11 ¼	2 9/16	19	8 ½	13 7/8	
10"	12	1 7/8 x 13 ¼	2 15/16	23	10 5/8	17 1/8	
12"	16	2 x 14 ¾	3 1/8	26 ½	12 ¾	20 ½	
14"	16	2 ½ x 16	3 ½	29 ½	14 ¾	22 ¾	
16"	16	2 ½ x 17 ½	3 7/8	32 ½	16 ¾	25 ¾	
18"	16	2 ¾ x 19 ¼	4 ¼	36	18 ¾	27 ¾	
20"	16	3 x 21	4 5/8	38 ¾	20 ¾	29 ¾	
24"	16	3 ½ x 24	5 3/8	46	24 ¾	35 ½	

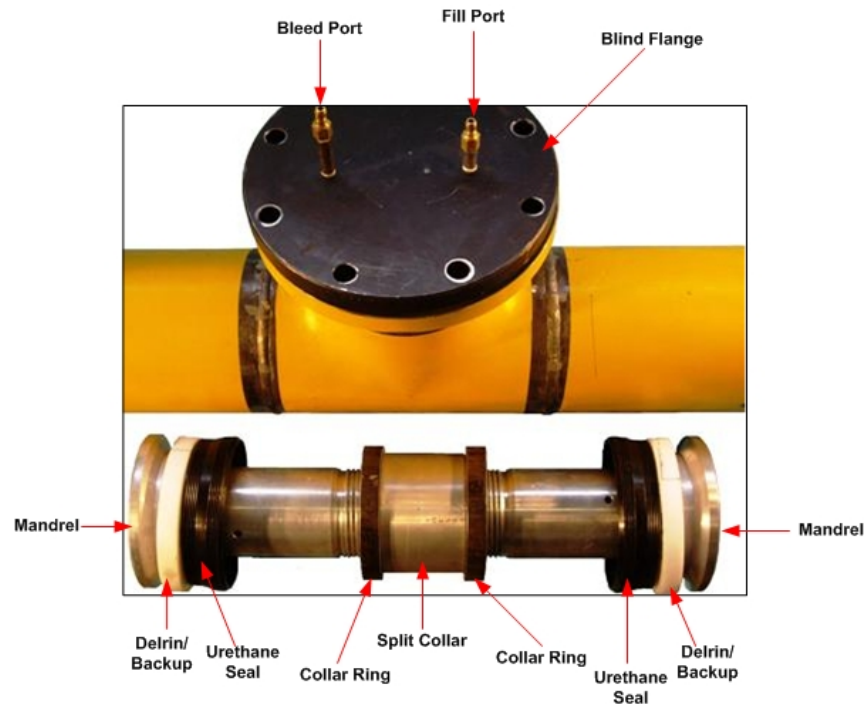
FLANGE SIZE	Number of studs	Size & length of studs	Wrench size	Flange Outside diameter	Gasket Inside diameter	Slip Blind & Gasket Outside diameter	2500 FLANGE SERIES (IN INCHES)
½"	4	¾ x 4 ¾	1 ½	5 ½	¾	2 ¾	
¾"	4	¾ x 4 ¾	1 ½	5 ½	1	3	
1"	4	7/8 x 5 ½	1 7/16	6 ½	1 ¼	3 3/8	
1 1/2"	4	1 1/8 x 6 ½	1 13/16	8	1 7/8	4 5/8	
2"	8	1 x 6 ¾	1 5/8	9 ¼	2 5/16	5 ¼	
3"	8	1 ¼ x 8 ½	2	12	3 5/8	7 ½	
4"	8	1 ½ x 9 ¾	2 3/8	14	4 5/8	9 ¼	
6"	8	2 x 13 ½	3 1/8	19	6 ¾	12 ½	
8"	12	2 x 15	3 1/8	21 ¾	8 ½	15 ¼	
10"	12	2 ½ x 19	3 7/8	26 ½	10 5/8	18 ¼	
12"	12	2 ¾ x 21	4 ¼	30	12 ¾	21 5/8	

Tee Test Tools

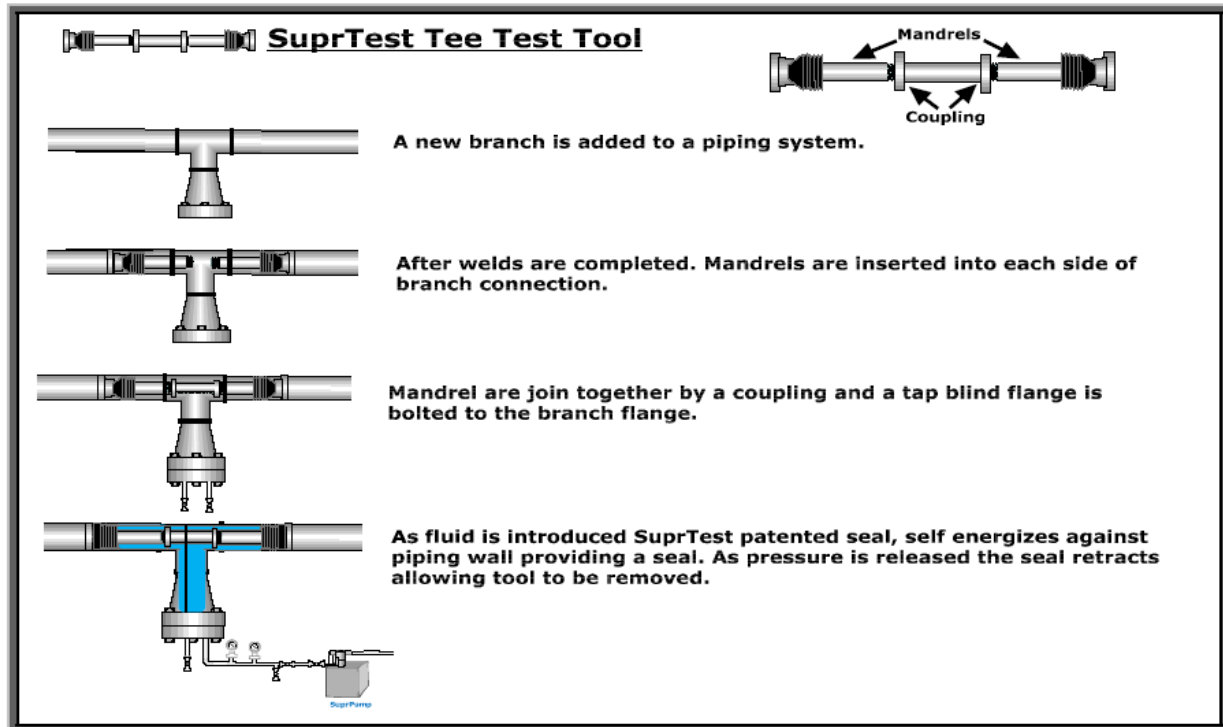
The tee test tool is used to hydro-test welds that are located on a tee section of pipe. Tee test tools can only be inserted into a 6" or larger horizontal tee. It cannot be used on vertical pipes because parts may become lost in the piping system.

The tee test tool is really two tools that are joined together inside the pipe with the split collar. Tee test tools are broken up into the following size categories:

- 2" to 6"
- 8" to 12"
- 14" and up (rigging is required for installation).

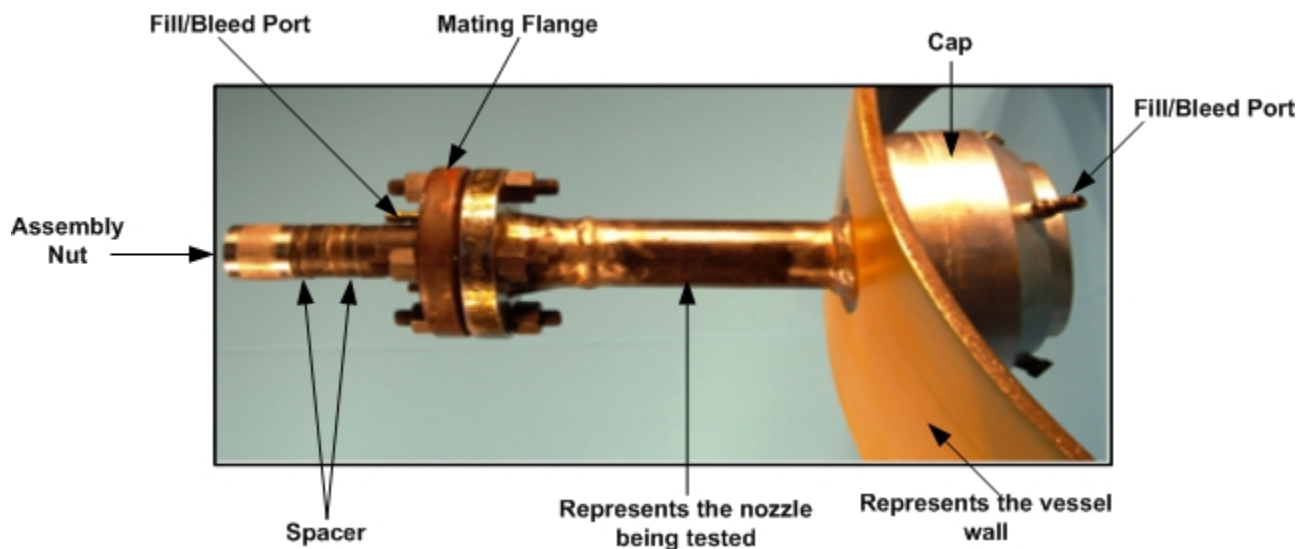


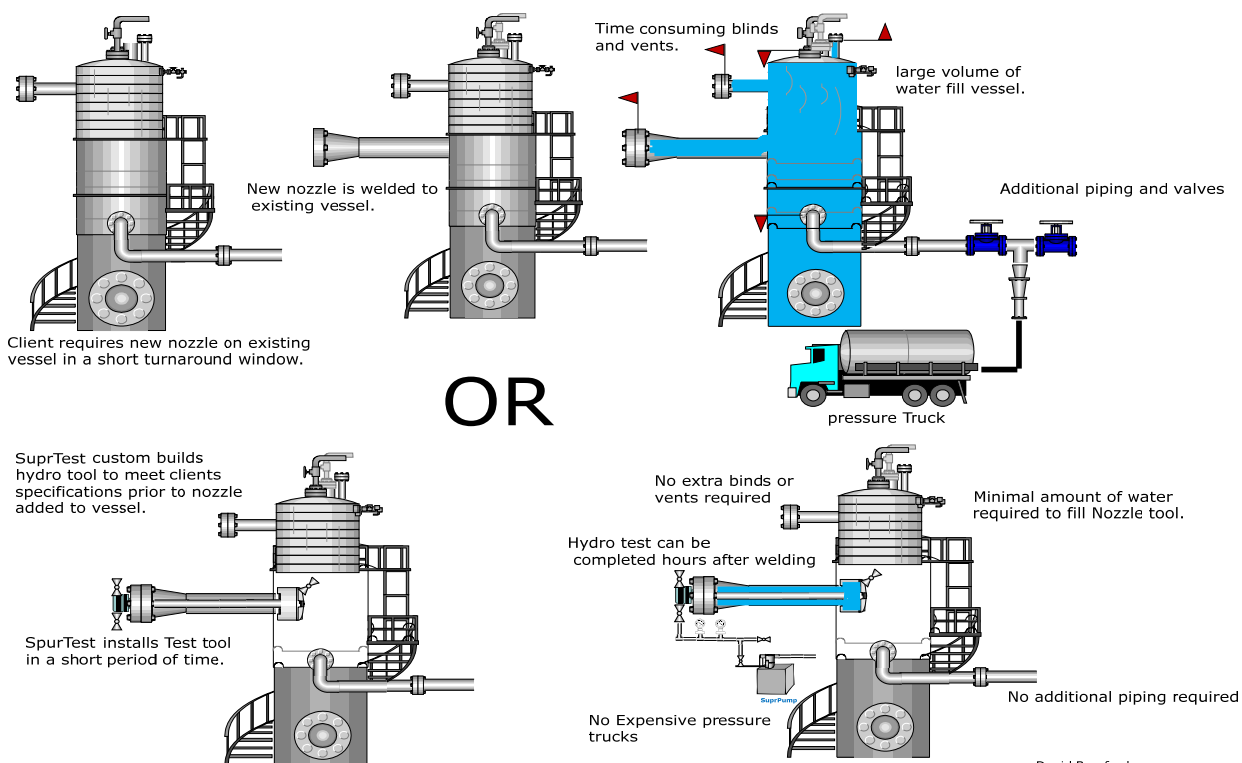
The tee test tool only has two port connections because it is only used for a hydro-testing, never for isolations.



Nozzle Test Tools

The Nozzle Test tool allows for the testing of nozzle welds without filling the entire vessel with test medium. Each nozzle tool is custom built to meet specific job requirements. As seen below, the cap contains a seal that energizes against the vessel wall that is being tested.





Test Pump

All hydro-testing tools rely on a test pump and test header. The SuprPump uses water or another test medium to induce pressure in the tool. The manual lever is pushed down to push the test medium inside the tool. The pump can pressurize tools up to 5000 psi. Test pumps range in size from 3 gallon tanks to 5 gallon tanks.

Test Header

The test header displays pressure inside the tool or area being tested. There are two pressure gauges for quality assurance purposes. If the gauges have two different readings, one of the gauges is faulty. If one gauge reads the appropriate pressure and the other one does not, it must be replaced until an accurate reading is obtained.

If the pressure gauges continually decrease, there may be a leak in the pipe, weld or tool. Speak with your supervisor before replacing gauges.



Test Header

The test header and pressure gauges must be calibrated at least yearly or more often depending on client specifications. Certification sheets for the test header and each pressure gauge must be present when the test header is in use. A sample Test Header Certificate of Calibration as well as Pressure Gauge Certificate of Calibration is shown below.



CERTIFICATE OF CALIBRATION

SUPRTEST
2220-119 AVE .N.E. EDMONTON, ALBERTA, T6S1B3

CERTIFICATE # 060

SERIAL NUMBER 060 OPERATING PRESSURE 5000 PSI AMBIENT TEMPERATURE RANGE -40 F TO 250 F
MANUFACTURER SUPRTEST TEST GAUGES ST-100 (CAL 8/26/10) AND ST-102 (CAL 8/26/10)
SIZE .25" TEST HEADER HYDRO TESTED TO 7500 PSI DATE AUG 27/2010 DWG #ST 5000-02 R0
LOCATION TESTED 2220-119 AVE INSPECTOR DAVID BAMFORD EDMONTON, ALBERTA, T6S1B3

I HEREBY CERTIFY THAT THE ABOVE TEST HEADER HAS AN OPERATING PRESSURE OF 5000PSI

This 27 Day of AUGUST 2010

Signature

Sample 'Test Header – Certification of Calibration'

Sample 'Pressure Gauge – Certification of Calibration'

Certificate of Calibration

Report number

Company	Location	Date of P.O.	P.O. Number
Supr Test	Edmonton	8/25/2010	238

Manufacturer	Model	Serial Number	Calibration Date	Expiration Date
Western Gauge	Western Gauge 0-10000PSI	ST-102	8/26/2010	8/26/2011

Model Uncertainty
+/- ASME 1A of span (1%)

All instrument calibrations are verified for accuracy before they are shipped. The recommended calibration interval for this instrument is 12 months from the date of verification. Your particular quality assurance requirements may supersede this recommendation.

As Received Condition: In tolerance

As Left Condition: In tolerance

All calibrations are performed in a controlled environment by qualified personnel using instrumentation and methods which guarantee that specifications claimed are reliable. Calibrations conform to ANSI/NCSL Z540-1-1994, MIL-STD 45662A, 10CFR21 and 10CFR50 when specified by customer documentation.

Definitions:	Temperature	Measured temperature of test during data collection.
	Reference Reading	True value according to our reference standards.
	Gauge Reading	Displayed reading from test unit.
	Condition	Pass or Fail.
	Difference	Indicated reading minus reference reading.
	Relative Difference	(Difference / reference reading) x 100
	Allowable Tolerance	± according to manufacturer's specifications.
	Water column	Referenced at 20° C and 1 atmosphere.
	Test Accuracy Ratio	At least 4:1 unless otherwise stated.

Laboratory ambient conditions throughout this calibration were:

Temperature	20 to 24° C
Humidity	30 to 55% RH
Pressure	100 to 103 kPa

Reference Standards used in this calibration are traceable to the National Institute of Standards and Technology of the United States, through the following report numbers:

Manufacturer	Model	Serial Number	Report Number	Due Date	Reference Uncertainty
Crystal Engineering	10KPSIXP2I	649269	J3615	9-Jun-11	0-20% of FS: +/- 0.02% FS, 20%-100% of FS: +/- 0.1% reading

This certificate shall not be reproduced except in full, without written approval.

Laboratory Representative

Quality Representative



Test Results

Report number

As Received Test Results

10000 PSI

Reference Reading	Gauge Reading	Allowable Tolerance	Difference	Difference (% of FS)	Condition
934	1000	100	66	0.66%	Pass
2948	3000	100	52	0.52%	Pass
4957	5000	100	43	0.43%	Pass
6963	7000	100	37	0.37%	Pass
9980	10000	100	20	0.20%	Pass

As Left Test Results

10000 PSI

Reference Reading	Gauge Reading	Allowable Tolerance	Difference	Difference (% of FS)	Condition
934	1000	100	66	0.66%	Pass
2948	3000	100	52	0.52%	Pass
4957	5000	100	43	0.43%	Pass
6963	7000	100	37	0.37%	Pass
9980	10000	100	20	0.20%	Pass

AR Head correction: 0 PSI
AL Head correction: 0 PSI



Safety Considerations

Potential Job Hazards

- Heat burns
- Heat exposure
- Inadequate ventilation
- Working at heights
- Hoisting
- Sharp edges on cut pipe
- Exposure to chemicals or hazardous gases.

Steps to Minimize Hazard

- Always wear required PPE
- Read and refer to MSDS before using any chemicals
- Maintain housekeeping at all times
- Ensure work area is adequately ventilated
- Take regular breaks
- Wear gas/ LEL monitor in operating plants

Personal Protective Equipment (PPE)

Personal protective equipment must be worn when performing hydro-testing operations. PPE must not be altered in any way and must be worn properly. Also, if the equipment does not fit properly, notify your supervisor. The minimum PPE required is:

- Approved hard hat
- Approved safety boots
- Approved safety glasses
- Approved face shield
- Hearing protection
- Cutting Kevlar gloves
- Nomex coveralls

Additional PPE may include Tyvex coveralls, monogoggles, barrier cream, latex gloves for tool assembly and proper respiratory protection (half or full mask). Always review what PPE is required prior to commencing any job. If you are unsure, speak with your Supervisor. Special PPE may also be required by the client while working in special areas such as ALKY units.

Job Documentation



INSPECTION & TEST REPORT

Date:	Address:	Phone #: 780.437.6464
Client:	Weather / Temp:	W.O.:

QUIK CUTS			ISOLATIONS				
SIZE	LINE NUMBER	QTY	SIZE	LINE NUMBER	QTY	TIME IN	TIME OUT

HYDRO TEST						
SIZE	LINE NUMBER	QTY	TIME ON	TIME OFF	GAUGE I.D. & CAL. DATE	QA / QC SIGNATURE

Inspector: _____ Seal _____

Sample "Inspection & Test Report"



Hydro-Testing Tool Installation

Installation methods may vary depending on the tool being used to perform hydro-testing. Below are the detailed procedures for installing weld test, flange test, and tee test tools. There is no standard installation procedure for nozzle test tools, as each tool is custom built to meet specific job requirements.

Weld Test Tool Installation Procedure

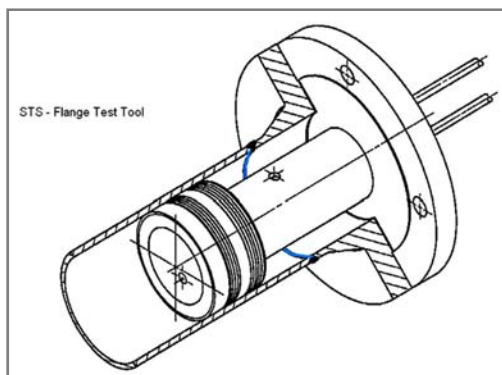
ACTION	NOTES
Installation	
1. INSTALL the tool so the seals straddle the weld...	<i>... the tool should be equal on both sides of the weld. ... all weld test tools 14" and larger must be installed using rigging.</i>
2. CONNECT hoses...	<i>... to the supply line connection. ... to the bleed port connection. ... as seen below.</i>



3. CENTRALIZE tool...	<i>... the gap between the tool and the pipe should be equal all the way around the tool. ... holding the hoses in place with a clip or tie will help to centralize the tool.</i>
4. CONNECT hoses to the test header.	
5. CONNECT test header to the pump.	
6. CONNECT hoses to the bleed port connection and fill port connection.	

Flange Test Tool Installation Procedure

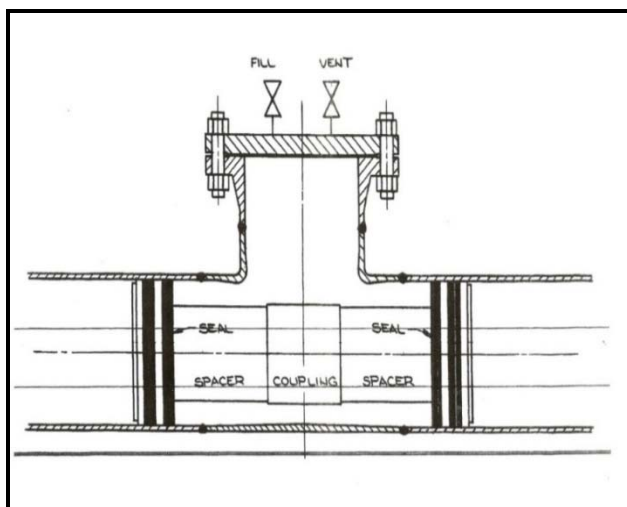
Installation	
1. ENSURE the bleed port is on the top and the fill port is on the bottom...	<i>... if the tool is being installed in a vertical pipe ensure the tool is tight to the pipe flange. ... if the flange test tool is 6" or larger rigging must be used. ... follow the proper bolting pattern.</i>



2. CONNECT the hoses to the test header	
3. CONNECT test header to the pump.	
4. CONNECT hose to the bleed port connection.	
5. CONNECT hose to the fill port connection.	

Tee Test Tool Installation Procedure

ACTION	NOTES
Installation	
1. INSTALL the mandrel.	<i>... if the tee test tool is 14" or larger rigging must be used.</i>
2. INSTALL the delrin/backup on the mandrel...	<i>... slide the delrin/backup to the bottom ridge of the mandrel</i>
3. INSTALL seal on the mandrel...	<i>... lubricate the seal for easy installation.</i>
4. INSTALL support chair under the mandrel...	<i>... place the chair under the mandrel in front of the seal.</i>
5. INSTALL spacer on the mandrel.	
6. ADJUST the tool so that the seal sits just behind the weld.	
7. INSTALL mandrel on the opposite weld.	
8. REPEAT steps 2 to 6.	
9. PLACE a collar ring on the end of each mandrel.	
10. INSTALL split coupling on the threaded end of one of the mandrels.	
11. CONNECT both mandrels to the split coupling...	<i>... ensure both sides meet equally.</i>
12. SLIDE the collar rings so they fit over both sides of the split collar.	



ACTION	NOTES
Installation continued	
13. FILL the pipe tee with water...	<i>... if the water stays in place the seal is complete.</i>
14. BOLT the blind flange.	
15. INSTALL fill and bleed port connections...	<i>... they can be threaded onto the flange.</i>
16. CONNECT hoses to the test header.	
17. CONNECT test header to the pump.	
18. CONNECT hose to the bleed port connection.	
19. CONNECT hose to the fill port connection.	

Hydro-Testing Operation

The following procedure should be followed regardless of the tool being used to hydro-test.

ACTION	NOTES
Pre-Start	
1. DON required PPE.	
2. COMPLETE FLHA, Tool Box Talk, etc.	
3. REMOVE all debris from inside the pipe, vessel wall or tube...	<i>... use a wire brush. ... clean up an arm's length of space inside the pipe.</i>



4. ENSURE seals and Delrins/backup are the correct schedule for the pipe...	<i>...schedule refers to the diameter of the pipe, seals and Delrins/backups. ... if the schedule is unknown, place the seal inside the pipe, if it fits snugly against the pipe walls it is the correct schedule.</i>
5. LUBRICATE the walls of the pipe and the seals on the outside of the tool...	<i>... this will ease installation.</i>
6. INSTALL the appropriate tool for the job...	<i>... refer to tool specific installation procedures.</i>
Hydro-Test	
7. PUMP test medium into tool...	<i>... until the test medium starts to bleed out.</i>
8. CLOSE bleed valve.	
9. INCREASE pressure to 100 psi to check your setup...	<i>... if it will not reach 100 psi there could be a faulty seal. (refer to troubleshooting section.) ... allow the pressure to stabilize for 1-2 minutes.</i>
10. INCREASE pressure in 25% increments...	<i>... until desired pressure is reached. ... as per the client's specifications.</i>



ACTION	NOTES
Hydro-Test continued	
11. PULL OUT pump pin...	<i>... if going above 300 psi or once there is too much resistance and the pump lever will no longer move. ... this will allow you to continue pumping. pump until maximum pressure is reached.</i>
12. MONITOR the pump's pressure gauge for 10 minutes.	
13. ALLOW seals to settle...	<i>... for 10 – 15 minutes. ... psi may drop during this time.</i>
14. RECORD pressure rating...	<i>... from the pressure gauges on the test header. ... on the test report.</i>
15. CONTACT a QC Inspector to inspect the weld.	
16. SUBMIT test report to the client.	
Clean-Up	
1. OPEN bleed valve...	<i>... drain the test medium into the pump by placing the bleed port into the pump's bucket.</i>
2. LIP hose ends together.	
3. REMOVE tool...	<i>... place bucket under the pipe to collect the test medium as it pours out from the sides of the tool. ... follow Bolting Pattern if applicable. ... tee test tool will have to be taken out in the opposite order from how it was installed. ... dismantle according to job specific procedures (if necessary.)</i>
4. CLEAN/ INSPECT tool...	<i>... clean debris, grease, scale and all other foreign matter. ... inspect for damage.</i>
5. PERFORM final housekeeping/ rig out.	
6. SIGN-OFF permits, etc.	

Hydro-Testing Maintenance

Each tool must be thoroughly cleaned and inspected after each use. It is important to inspect tools for scratches, dents, wear and rust.

Under some circumstances tools will be contaminated with gas or other contaminants residing in pipes, etc. The removal of these contaminants must take place whether they are cleaned using steam provided by the client or with the use of soap and water.

Once tools are cleaned and dried, always ensure they are stored appropriately to ensure optimum use for the next job.



Dismantle Hydro-Testing Tools

There may be times when the tool needs to be taken apart in the field. If it is installed properly, but it is still not functioning correctly it will need to be dismantled, inspected and cleaned. Sometimes the seals are faulty and need to be replaced, or the tool may not have been put together correctly. After the problem is identified the tool must be put back together and you can proceed with the test.

Model STS 5002 Test Pump Troubleshooting Chart

To efficiently run the test pump, the technician must be aware of the failures that might prevent smooth operation. The following is a list of problems that can be encountered.

SYMPTOM	REMEDY
No flow when handle is used	
Air sucked into pump due to low fluid level.	Check fluid in tank. If low, prime pump. <i>(Priming Instructions: Set the pump to high volume/ low pressure and ensure top of switch sleeve and upper rod are flush. Insert pin and pump until flow is established. Ensure hose is open to atmosphere or back into the tank. (Do not connect to anything as this will cause back pressure and cause an air lock in the pump.)</i>
Flow exists but no high pressure	
Foot valve could be leaking due to missing o-ring or debris in the foot valve. <i>(Sometimes the high volume/ low pressure mode will still work but a problem will appear when the pin is removed to put the pump into low volume/ high pressure mode.)</i>	Inspect and repair if necessary.

SYMPTOM	REMEDY
Pressure on the down stroke, but handle rises on its own	
Faulty check valve	Inspect and repair if necessary.
Missing o-ring	
Debris on valve seat	
Value seat damage	
Fluid appears on the top of pump housing	
Leak in poly pac on rod or piston	Repair
Handle won't move in high volume/ low pressure mode	



Piston binding in the housing (corrosion fluid or fluid that leaves a hard deposit)	Clean out, repair and replace seal.
---	-------------------------------------

Mechanical Damage

Another issue that can occur includes mechanical damage. Pump function may be impaired by damage caused by the following:

- freezing
- using handle extensions (snipes)
- dropping from heights
- striking with a hammer, or
- other pump abuse.

Remedy: If pump parts are bent or deformed they must be replaced; seals may need to be replaced as well.

Fluid Contamination

It is imperative that fluids are clean and free from solid debris that could impair pump function. Always ensure that hydro-test fluid from the pipe is not returned to the tank without being filtered first.

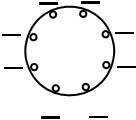


Multiple Choice Questions (Technical Quiz)

Complete the following test, and have it graded by your assessor. If any questions are answered incorrectly, your assessor will explain what the correct answer is, and why it is correct. Once you understand the correct answer, both the assessor and students initials are required to indicate that mentoring or coaching has taken place.

Question	Assessor's Initials	Student's Initials
1. During hydro-testing: a. other work can be performed in the testing area, and anyone who works at the site is allowed access. b. other work can be performed in the testing area, but only personnel involved in hydro-testing are allowed in the area. c. no other work can be performed in the testing area, and only personnel involved in hydro-testing are allowed access. d. no other work can be performed in the testing area, but anyone who works at the site can access the area.		
2. It is permissible for the test pressure to exceed manufacturer's ratings for the vessel, as long the testing is not prolonged. a. True b. False		
3. A delrin/back-up: a. is placed onto the mandrel that contains the rest of the parts and must only be tightened by hand. b. is a long cylinder with threads on the front, which attach to the fill and bleed connections. c. is an open ended cylinder with fill holes in the center that creates a cavity between seals. d. is a ring that is cut half way which expands and contracts in order to block seals so they do not push past the cones.		
4. A spacer: a. is put onto the mandrel to contain the rest of the parts on the mandrel and must only be tightened by hand. b. is a long cylinder with threads on the front, which attach to the fill and bleed connections. c. is an open ended cylinder with fill holes in the center. d. is an ring that is cut half way which expands and contracts in order to block seals so they do not push past the cones.		
5. Rigging is mandatory for any hydro-test tool that is too large for regular installation. a. True b. False		
6. All hydro-testing tools rely on a test pump and test header. The test header displays _____ inside the test area and has _____ gauges for quality assurance. a. pressure; two b. saturation; two c. pressure; three d. saturation; three		
7. Fill in the blanks with the proper order of bolting for installing a flange test tool on an eight bolts flange. (The 1st bolt torque is shown next page)		



		
8. List the minimum PPE required when performing hydro-testing.		
9. Maintaining housekeeping at all times and taking regular breaks are two important steps to minimizing hazards. a. True b. False		
10. Depending on the size of various hydro-testing tools, rigging is mandatory for installation. When must weld test tools use rigging for installation? a. Weld test tools do not require rigging for installation b. 12" weld test tool c. all weld test tools 14" and larger d. None of the above		
11. Before starting a hydro-test, the following steps must be done. Place the steps in the correct order by writing 1 to 6 on the appropriate line. a. Remove all debris from inside the pipe, vessel wall, or tube. b. Ensure seals and Delrins/backup are the correct schedule for the pipe. c. Don the required PPE. d. Install the appropriate tool for the job. e. Complete FLHA, Tool Box Talk, etc. f. Lubricate the walls of the pipe and the seals on the outside of the tool.		
12. During hydro-testing, after you have increased the pressure to 100 psi and allowed it to stabilize for 1 – 2 minutes, you should increase the pressure in 50% increments. a. True b. False		
13. Choose the proper statement regarding dismantling hydro-test tools. a. Hydro-test tools should never be taken apart in the field. b. If a tool is installed properly but not functioning correctly it should be dismantled, inspected, and cleaned. c. If a tool is contaminated with gas, it should be dismantled and put into storage. d. If a tool is installed properly but not functioning correctly you should keep using it until a replacement arrives.		
14. During a hydro-test the pump is running but the handle won't move in high volume / low pressure. What could be the cause? a. Foot valve could be leaking due to a missing p-ring or debris in the foot valve. b. Leak in the poly pac on the rod or piston. c. Air is sucked into pump due to low fluid level. d. Piston binding in the housing (corrosion fluid or fluid that leaves a hard deposit).		
15. It is a requirement that all hydro-test fluid is filtered before returning fluid to the tank. a. True b. False		



Practical Assessment – Hydrotesting Operations

This form is to be filled out by the assessor as they observe the student successfully demonstrate these items in order to be deemed competent.

Assessment Check List

Section 1			
The following items must be identified and their purpose, inspection requirements, and preventative maintenance must be explained. Failure to successfully explain inspection and maintenance requirements does not constitute a FAIL, but will require a mentorship agreement to bring the employees level of knowledge to an acceptable level.			
ITEM		YES	NO
1	Delrin/ Back Up		
2	Mandrel		
3	Cone		
4	Spacer		
5	Rings		
6	Seals		
7	Nuts		
8	Weld Test Tools (various sizes)		
9	Flange Test Tools (various sizes)		
10	Tee Test Tools (various sizes)		
11	Nozzle Test Tool		
12	Test Pump		
13	Test Header		
Section 2			



The following tasks must be completed in the prescribed sequence. Any exceptions must be noted in the comments section with justification. Assessor will check YES column if the item was actioned satisfactorily, or circle the number in the NO column if it was not. If enough demerits are accumulated to warrant a fail, or employee performs an unsafe or dangerous action, the assessment may be terminated immediately. If necessary, all near-miss/incident reporting requirements must be met.

**Copies of the completed Daily Inspection, FLHA and Procedure must be attached to the assessment.*

TASK		YES	NO
Pre-Start			
1	Don proper PPE for hydro-testing operation: -approved safety “hard hat”, approved safety footwear, glasses and faceshield, “Nomex” coveralls, latex gloves, hearing protection.		
2	Review job specific procedures.		
3	Complete FLHA and other required job documentation.		
4	Check general job conditions: - visual inspection of complete job site. - acknowledge performance parameters removal of debris from pipe, vessel, wall or tube.		
5	Set up for hydro-testing operation: - ensure correct equipment (correct schedule for pipe). - lubricate walls of pipe, etc. and outer diameter of tool		
6	Install appropriate tool according to procedure.		
Operation			
7	Demonstrate familiarity with hydro-testing tools - no hesitation or inability to recognize faulty pressure gauges, operate the pump, etc.		
8	Perform effective pressure increase according to procedure.		
9	Use proper and efficient operating techniques: - remain within job specific procedures and parameters. - remain within equipment design limits as stated in the operator’s manual(s).		
10	Apply smooth operation of pump.		
11	Perform ongoing and sufficient checks of all equipment: - throughout each shift.		
12	Recognize problem symptoms.		
13	Ability to effectively troubleshoot equipment: - if and when required - anytime throughout operation.		
14	Respond to problems in a timely and effective manner.		



15	Use effective communication with team members, inspectors and clients throughout operations.		
16	Correctly follow procedures (observed throughout the observation period).		
Shut Down			
17	Follow proper clean up procedure.		
18	Remove tool properly ensuring test medium is appropriately contained.		
19	Follow safe housekeeping, inspection procedures.		
20	Observe safety considerations: - shut down equipment during inspection. - follow all procedures.		
Comments:			



Assessment Sign Off

All boxes must be completed before signing an employee competent.

- ☐ Expectation Letter Signed
- ☐ Minimum 100 hours of on the job training completed
- ☐ On the Job Practical Assessment Completed by an approved Assessor
- ☐ Has reviewed and understands the operator manuals
- ☐ Reviewed and understands Procedures and Safety Documentation
- ☐ Technical review and Knowledge Exam complete
- ☐ Training documentation sent to CEDA Training Department

Assessor

I, _____ have taken the below named employee through this Assessment, and he/she has successfully demonstrated competence in the areas identified.

Signature Date

Student

I, _____ have completed this competency, including the on-job demonstration, practical assessment and multiple-choice questions. I understand the information presented and agree to follow all of the rules and procedures set out by CEDA.

Signature Date



Revision Log

Revision Date	Section Affected	Changes Made
January 10, 2023	All	Updated Template, multiple changes throughout.



Training Change Request Form

Date: _____

Location: _____

Name: _____

Contact information: _____

Email/Phone number

Description

Please use the back of this sheet to make additional comments.

Section Name: _____

Page Number: _____

Description of Problem/ Suggested Resolution:
