



HydraTite

Internal Seal

Installation Procedure OPS-01



1.0 OBJECTIVE

- 1.1 The objective of this procedure is to describe the proper techniques for the installation of the HydraTite Internal Joint Seal System to ensure the highest quality is achieved by:
 - 1.1.1 Proper preparation of substrate.
 - 1.1.2 Proper training and qualification of installation personnel.
 - 1.1.3 Proper installation of the HydraTite Internal Joint Seal System components.
 - 1.1.4 Completion of installation and test reports.

2.0 REFERENCES

- 2.1 HydraTite Drawing Seal and Band Assembly Profile
- 2.2 HydraTite Drawing Seal Assembly Profile

3.0 PREREQUISITES

(Note: The following prerequisites do not have to be performed in the sequence listed.)

- 3.1 This procedure is intended to be used by personnel who have been trained in the proper installation techniques of the HydraTite Seal System. It is not intended to be used by personnel who have not received this training.
- 3.2 Inspect and certify that all materials are available and ensure correct labeling.
- 3.3 This procedure shall be performed while the piping has been removed from service and an adequate safety-tagging boundary has been established and verified.
- 3.4 All necessary tools and equipment are available.
- 3.5 All required pressure gauges have been verified as calibrated and operational.
- 3.6 All permits have been processed which cover the scope of work to be performed inside the pipe.
- 3.7 All lines have been dewatered and are at atmospheric pressure.
- 3.8 Access to the lines has been provided.
- 3.9 All consumables (i.e. hydraulic oil, lubricants, thread sealers, markers, etc) have been approved by the owner.
- 3.10 Verify the hydraulic expander has been provided for use in expanding the retaining bands.



- 3.11 Continuous forced air ventilation has been established and is sufficient to maintain the confined space safe for entry.
- 3.12 Training has been completed for personnel involved in installation activities.

4.0 PRECAUTIONS

- 4.1 If any unanticipated or unexpected alarm, noise, vibration, odor or excess leakage is observed, personnel shall immediately exit and remain outside the confined space until the condition is identified and rectified.
- 4.2 Preparation should be made for emergency rescue situations. In the event of an emergency, under no circumstance should the attendant enter the confined space until help has arrived, and then only with the proper rescue equipment. Attendants participating in the rescue effort must have received specialized training in confined space rescue techniques. Rescues are to be accomplished using emergency rescue carts or trolleys with a lifeline attached. At no time should the hole man (safety person) exert any pulling force on the anatomy of the person being rescued. The main must always be cleaned to the point that transportation carts (emergency and work carts) can ride on their wheels without encumbrance due to obstructions or main debris.

5.0 PROCEDURE

- 5.1 Verify that all prerequisites are completed and precautions noted.
- 5.2 Perform an inspection of pipe interior. Review all seal installation locations, paying particular attention to those at elbows, to verify that the piping/fitting geometry will allow the installation of the HydraTite Seal System.
- 5.3 Remove all dirt, scale, and other debris from the pipe walls in areas where the seal is to be installed. These cleaning operations shall be accomplished by hand brushing and scraping, pneumatic wire brushes, and/or oil-free air jet.
- 5.4 Mark the location of one edge of the lip seal on the pipe ID to clearly define the seal installation position(s).
- 5.5 All high/low surface imperfections (i.e. dirt, scale, and other debris) running axially through or part way through the sealing surface must be removed prior to installation of the seal. Any joint gaps or deep imperfections must be properly filled with an approved joint filling material and rendered smooth.
- 5.6 Load HydraTite Seal System rubber seal, associated bands and bolts into the piping.
- 5.7 Pre-assemble multi-piece bands and locate in piping to facilitate installation.
- 5.8 Lubricate (EaseOn™ Pipe Lubricant, MSDS attached) the rubber seal on the outside to facilitate location and seating of bands. This use of lubricant is to ensure even distribution of



hydraulic loading of the seal during band expansion. NOTE: limit amount of lubricant used to prevent excess movement.

- 5.9 Position the rubber seal in the joint with the pressure test valve located at approximately either the 9 o'clock position or the 3 o'clock position. The seal must be positioned accurately on the joint area.
- 5.10 For multi-piece bands pre-assemble and install bolts. Leave bolts loose to allow movement of the bands while expanding.
- 5.11 Position the band in an outside channel in the rubber seal.
- 5.12 Install metal radiused shims underneath the wedge area(s) in the seal grooves for each band as necessary while installing and positioning the metal retaining bands in the seal groove.
- 5.13 For Multi-piece bands partially expand the band at one of the two expansion points and insert the appropriate sized wedge.
- 5.14 Position the seal expander in line with the retaining band while ensuring that the retaining band remains in the groove.
- 5.15 Expand the band using the hydraulic expander, holding pressure for at least two minutes.
- 5.16 For single and multi-piece bands (at the second expansion joint) expand the band to the recommended pressure and insert the appropriate wedge.
- 5.17 Install a radiused locking piece (wedge) in the exposed gap between the expanded band ends. The wedge size shall be selected so as to provide an interference fit.
- 5.18 From the outside edge of the rubber seal drive the wedge(s) fully into the slot-avoid damaging the seal body by utilizing the wedge tool.
- 5.19 Repeat installation steps for subsequent bands on the same seal.
- 5.20 Remove pressure from expansion tool and set aside. For multi piece bands, tighten down all machine bolts.
- 5.21 If specified, perform a second expansion of each of the retaining bands a minimum of 30 minutes after the first expansion using the same pressure range as the first expansion. Attachment C can be used as a guide for expander pressure. Replace wedge piece with larger size if required to provide interference fit.
- 5.22 On multi-piece bands remove bolts one at a time, coat with LocTite™ 242 and tighten the bolts in accordance with good practice. For ¼-20 bolts a torque of 10 ft-lbs may be used.
- 5.22 Perform an air test on the seal sections after a minimum of 30 minutes has elapsed after final fitting of the seal to be tested.



5.22.1 Pressurize to 5 PSIG through the seal test valve. Apply an approved soap test solution to the seal ends and inspect for leakage.

5.22.2 If the pressure test indicated leakage, determine cause and repeat air test.

NOTE: A pressure test will be negligible if there is a leak path within the pipe area (hole in the pipe) or joint being sealed. It is recommended to maintain a supply of 5 PSIG to the seal and apply an approved soap test solution to the seal ends and inspect for leakage around the end of the seal.

5.23 Depressurize seal and isolate test port. Using an approved thread sealing compound, install the threaded countersunk hex head completion plug. Remove all installation hardware, test band, and pressure gauges from the pipe.

6.0 RESPONSIBILITIES

6.1 The Director of Operations is responsible to ensure that personnel have the experience and qualifications necessary to perform the tasks assigned.

6.2 Only HydraTech trained personnel are approved to install seals.

6.3 Training

6.3.1 It should be noted that HydraTech utilizes certified contractors to install the HydraTite Seal System. HydraTech can also provide training services for other installation contractors or client employees at the job site or at office locations in order to install the seals.

6.3.2 This training performed is valid for one year and can not be assigned to other contractor personnel.

6.3.3 At the completion of training the authorized HydraTite training supervisor or his designee may issue to the contractor a certificate of training completed for each individual.

6.3.4 One copy of the certificate will be maintained by HydraTech Engineered Products, LLC.



Attachment A
TRAINEE SIGN-OFF SHEET

HydraTite Qualified Installer

I acknowledge that I have been given a copy and trained on the HydraTite Installation Procedure.

Company Name

Employee Signature

Date

Qualified HydraTech Engineered Products Trainer Signature

Date



Attachment B – HydraTite Equipment Checklist

- | | |
|--|---|
| <input type="checkbox"/> First aid Kit | <input type="checkbox"/> Fire extinguisher |
| <input type="checkbox"/> SCBA | <input type="checkbox"/> Hard Hats |
| <input type="checkbox"/> Hearing Protection | <input type="checkbox"/> Safety Glasses |
| <input type="checkbox"/> Gloves | <input type="checkbox"/> Air Monitor |
| <input type="checkbox"/> Safety Shirts & Vests | <input type="checkbox"/> Eye Wash |
| <input type="checkbox"/> Dust/Nuisance Masks | <input type="checkbox"/> Traffic Cones |
| <input type="checkbox"/> Air Mover | <input type="checkbox"/> Ladders |
| <input type="checkbox"/> Intruder & Winches | <input type="checkbox"/> Rope Wheel |
| <input type="checkbox"/> Safety Harnesses | <input type="checkbox"/> Rubber Boots |
| <input type="checkbox"/> Insect Spray | <input type="checkbox"/> Respirators |
| <input type="checkbox"/> Drinking Water & Cooler | <input type="checkbox"/> Lights & Charger |
| <input type="checkbox"/> Trash Containers & Bags | <input type="checkbox"/> Knives – Utility & Hawkbill |
| <input type="checkbox"/> Hydraulic Expander, Pump & Fluid | <input type="checkbox"/> Bug Sprayer |
| <input type="checkbox"/> Hack Saw | <input type="checkbox"/> Circumference Tape |
| <input type="checkbox"/> Wrenches (Adjustable, Pipe & Combo) | <input type="checkbox"/> Socket Wrenches |
| <input type="checkbox"/> Welder/Generator | <input type="checkbox"/> Tape Measures (16' & 25') |
| <input type="checkbox"/> Screwdrivers (Phillips & Straight) | <input type="checkbox"/> Hole Punches |
| <input type="checkbox"/> 6" Scrapers | <input type="checkbox"/> Coal Shovels |
| <input type="checkbox"/> Vise Grips | <input type="checkbox"/> Wire Brushes |
| <input type="checkbox"/> Slag Hammer | <input type="checkbox"/> Metal Files |
| <input type="checkbox"/> Dead Blow Hammer | <input type="checkbox"/> Extension Cords & Pigtails |
| <input type="checkbox"/> Grinders and Sanding Disks | <input type="checkbox"/> Chop Saw & Blades |
| <input type="checkbox"/> Water Pumps | <input type="checkbox"/> Drill Motor & Bits |
| <input type="checkbox"/> Air Compressor | <input type="checkbox"/> Welder & Weld Rod |
| <input type="checkbox"/> Zip Gun & Bits | <input type="checkbox"/> Hose Rubbers |
| <input type="checkbox"/> Marking Pens | <input type="checkbox"/> Ease-On Pipe Lube |
| <input type="checkbox"/> Duct Tape | <input type="checkbox"/> Non-Toxic Thread Dope |
| <input type="checkbox"/> Rags | <input type="checkbox"/> WD-40 |
| <input type="checkbox"/> 5 Gallon Mixing Buckets | <input type="checkbox"/> Epoxy |
| <input type="checkbox"/> Punch Lock Clamps | <input type="checkbox"/> Mixing Paddles |
| <input type="checkbox"/> Strap Tape | <input type="checkbox"/> Paint Brushes |
| <input type="checkbox"/> Marking Chalk | <input type="checkbox"/> Wisk Brooms |
| <input type="checkbox"/> Hose Clips | <input type="checkbox"/> Mechanics Wire |
| <input type="checkbox"/> Whip Hose | <input type="checkbox"/> Test Hose & Brass Test Fitting |
| <input type="checkbox"/> Blower Hose | <input type="checkbox"/> Quick Connects |
| <input type="checkbox"/> Air Regulators | <input type="checkbox"/> Hydraulic Cement |
| <input type="checkbox"/> Ball Valve | <input type="checkbox"/> Liquid Gages |
| <input type="checkbox"/> Welding Hood & Gloves | <input type="checkbox"/> Wedge Extractor & Wedge Tray |
| <input type="checkbox"/> Allen Wrench Kit | <input type="checkbox"/> Worm Clamps |
| <input type="checkbox"/> Hammer – 4 lb. | <input type="checkbox"/> Workman & Cleaning Carts |
| <input type="checkbox"/> Wedges & Shims | <input type="checkbox"/> Band Bolts |



Attachment C - Recommended Expander Pressure

Size (inches)	Max. Expander Pressure (psi)	Recommended Band Thickness (inches)				
		AL6XN	304 Stainless Steel	316L Stainless Steel	A36 Carbon Steel	1020 Carbon Steel
Standard Expander						
12	1100	1/8	1/8	1/8	1/8	1/8
12	1500	3/16	3/16	3/16	3/16	3/16
16	1500	1/8	1/8	1/8	1/8	1/8
16	2000	3/16	3/16	3/16	3/16	3/16
18	1500	1/8	1/8	1/8	1/8	1/8
18	2000	3/16	3/16	3/16	3/16	3/16
20	2500	3/16	3/16	3/16	3/16	3/16
20	3000	1/4	1/4	1/4	1/4	1/4
24	3200	3/16	3/16	3/16	3/16	3/16
24	3500	1/4	1/4	1/4	1/4	1/4
30	3200	3/16	3/16	3/16	3/16	3/16
30	3500	1/4	1/4	1/4	1/4	1/4
36	3500	3/16	3/16	3/16	3/16	3/16
36	3800	1/4	1/4	1/4	1/4	1/4
42	3500	3/16	3/16	3/16	3/16	3/16
42	3800	1/4	1/4	1/4	1/4	1/4
48	3800	3/16	3/16	3/16	3/16	3/16
48	4000	1/4	1/4	1/4	1/4	1/4
54	4000	3/16	3/16	3/16	3/16	3/16
54	4300	1/4	1/4	1/4	1/4	
60	4400	1/4	1/4	1/4	1/4	
72	4500	1/4	1/4	1/4	1/4	
78	4500	1/4	1/4	1/4	1/4	
84	4600	1/4	1/4	1/4	1/4	
96	4600	1/4	1/4	1/4	1/4	
108	4800	1/4	1/4	1/4	1/4	
120	4800	3/8	3/8	3/8	3/8	
138	4800	3/8	3/8	3/8	3/8	
216	5000	3/8	3/8	3/8	3/8	
Material Yield Strength (psi)		45000	30000	25000	36000	63700
Band Width 2 inches						
Shims – 18 Gauge Material						