

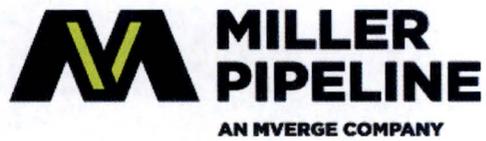
**NON-PROPRIETARY**

Serial No. 17-296  
Docket Nos. 50-280/281  
RAI Response - CFRP Alternative Request  
Enclosure 2

**Attachment E**

**WEKO-SEAL® - RECOMMENDED INSTALLATION PROCEDURES FOR WATER  
AND WASTE-WATER PIPING, MILLER PIPELINE, REVISED 06/05/17**

**VIRGINIA ELECTRIC AND POWER COMPANY  
(DOMINION ENERGY VIRGINIA)  
SURRY POWER STATION UNITS 1 AND 2**



# WEKO-SEAL<sup>®</sup>

## RECOMMENDED INSTALLATION PROCEDURES FOR WATER AND WASTE-WATER PIPING



### WEKO-SEAL<sup>®</sup> MATERIAL COMPONENTS

- 1 Internal Joint Seal (WEKO-SEAL)
- 2 Retaining Bands
- 3 Retaining Band Shims
- 4 Retaining Band Wedge Assortment
- 5 Retaining Band clips
- 6 Pipe Lubricant
- 7 Hydraulic Expander
- 8 Air Test Assembly

**1.0 OBJECTIVE:**

**WEKO-SEALS** are manufactured from a non-toxic (EPDM) rubber compound, which are designed to internally and economically stop joint leakage or infiltration. These seals are flexible internal rubber leak clamps that ensure a noncorrodible, bottle tight seal around the full inside circumference of the pipe joint area. The following procedures are recommended to ensure proper installation of the WEKO-SEALS.

**2.0 PREREQUISITES:**

- 2.1 These procedures will be performed during pipeline shutdown and/or flow bypass. If required, pipeline to be removed from service and an adequate safety-tagging boundary established and verified.
- 2.2 All pipelines have been de-watered and are at atmospheric pressure.
- 2.3 Pipeline access has been provided and established.
- 2.4 Confined Space Entry Permit has been processed which covers the scope of work to be performed inside the pipe.
- 2.5 All permits have been processed which cover the scope of work to be performed.
- 2.6 Continuous forced air ventilation has been established and is sufficient to maintain the confined space for safe entry.
- 2.7 The owner before use has approved all consumables (i.e. hydraulic oil, lubricants, thread sealers, markers etc.), and MSDS sheets are on the job site.

**NOTE: The above prerequisites do not have to be performed in the sequence listed.**

- 3.1 If any unanticipated or unexpected alarm, noise, vibration, odor, or excessive leakage is observed, immediately exit the pipe until the condition is identified and resolved.
- 3.2 All safety requirements as stated on the Confined Space Entry Permit shall be observed.

**4.0 PROCEDURE:**

- 4.1 **VERIFY** that all WEKO-SEALS have been packaged in a proper manner that has not caused deformation or harm. This care must be maintained until the seal(s) are delivered to the designated job site location.
- 4.2 **EXAMINATION** of the seals shall be performed by a qualified installation technician, paying particular attention to the ribbed (lip seal) section of the seal. If the quality of material construction or condition is in doubt, the seals shall not be used.
- 4.3 **PERFORM** an inspection of the pipe interior. Review all seal installation locations to determine the cleaning requirements and note any anomalies that

may need to be addressed with owner.

4.4 **REMOVE** dirt, scale, and other debris from the pipe walls in areas where the seals are to be installed. Cleaning shall be performed at least 3" beyond either side of proposed seal position. REMOVE all dirt and debris from the joint gaps, leaving a clean area for "JOINT FILLING." These cleaning operations shall be accomplished by hand brushing and scraping, pneumatic wire brush, pneumatic grinder, and/or oil free air jet.

4.5 **FILL** joints to the full depth of the gap with a quick-setting cement mortar and render flush with the surrounding joint surface. All surplus material spillage shall be removed from the joint area. Surface preparation, mixing, placement, and curing of the quick-setting cement mortar shall be performed in accordance with the manufacturer's placement guidelines.

**NOTE** It is acceptable to use a 16 gage stainless steel backing band to cover the joint area if infiltration is too great for a mortar to be placed.

4.6 **ALL** high/low surface imperfections running axially through or part way through the sealing surface must be removed before installation of the seals. Any joint gaps, low areas, or deep imperfections must be properly filled with approved non-toxic joint filler and rendered smooth to suite the prepared surface of the joint area. When the pipe is concrete or reinforced concrete, it may be necessary to apply a thin layer of quick-setting cement mortar to the preparation area where the seal will be placed. This cement will control pipe porosity and irregularities to provide an effective leak test on the completed seal.

4.7 **VERIFY** that the sealing surface surrounding the joint area and the area where the "lip seals" are to be seated is free of debris and smooth. It CAN NOT be overemphasized the importance of good surface preparation.

4.8 **MARK** the locations of the lip seals on the pipe ID to clearly define the seal installation position.

4.9 **LUBRICATE** prepared seal area with "Ease-On Pipe Lubricant." The lubricant shall be hand applied (using a brush or hand applied with nitrile rubber gloves) over the prepared area. Care must be taken not to acquire debris from the surrounding unprepared surfaces into the lubricant and thereby reintroducing debris to the prepared surface. The lubricant functions as an aid in fitting the seal and is not credited with pressure retention. "Ease-On Pipe Lubricant" is a brand name typically used by Miller Pipeline; however, other approved lubricant of equivalent composition is acceptable.

4.10 **POSITION** the WEKO-SEAL parallel to the joint gap with the pressure test valve located at approximately 3 o'clock or 9 o'clock position. The seal must be positioned accurately on the joint areas guided by the marks established in step 4.8.

**NOTE** when positioning a wider seal that requires more than two bands, the seal may need to be offset more to one side of the joint than the other to accommodate middle retaining bands.

- 4.11 **INSTALL** a metal radius shim underneath the wedge area in the seal grooves for each retaining band before placement of the stainless steel bands on the seal. These shims enable radial loads to be transmitted evenly to the seal as the bands are expanded.
- 4.12 **INSTALL** the upstream and downstream stainless steel retaining bands into position by placing in designated seal grooves. Since retaining bands can be of one-piece, two-piece, or three-piece construction depending on pipe diameter, a retainer clip is to be used to restrain band movement during expansion. In certain design applications, a special mechanical locking device shall be used to temporarily lock the bands before expansion. (See attached reference drawing details)
- 4.13 **INSTALL** middle-retaining band(s) if required per design, between the upstream and downstream bands. Verify that the middle retaining band(s) are not placed directly on the joint. If placed on the joint, then reference 4.10.1. Install the middle-retaining band(s) in accordance with steps 4.11 through 4.17.
- 4.13.1 The middle-retaining band(s) can be installed at 500psi less than the minimum expansion pressure for the upstream/downstream bands. The sole purpose of the middle band is to keep the ballooning on the seal to a minimum from external pressures. This allows air to flow underneath the middle band when you get to step 4.19 and the testing of the seal.
- NOTE** that the seals do not have a designated positioning groove for the middle-retaining band. Install the middle-retaining band upstream of the test port.
- 4.14 **POSITION** the hydraulic expander device in line with the retaining bands while ensuring that the retaining bands remain in position and do not become moved or dislodged. Care must be taken to ensure that the expander is positioned correctly on the bands.
- 4.15 **EXPAND** the stainless steel retaining bands using the hydraulic expander, holding pressure for at least two minutes. Expansion pressure range should be known before performing this operation and is available via expansion pressure chart for the designated seal size. Extreme caution should be taken to ensure that recommended expansion pressures are not exceeded, resulting in pipe and/or seal damage.
- 4.16 **INSTALL** a radius-locking piece (wedge) in the exposed gap between the expanded band ends. The wedge size shall be selected to provide interference fit. Tap the wedge into position, locking in the compression of the seal. **RELEASE** the pressure from the hydraulic expander after wedge is secure.
- 4.17 **PERFORM** a second expansion for each of the retaining bands a minimum of 30 minutes after the first expansion using the same pressure range as the first expansion. This allows for any seal relaxation that may occur. If required, replace wedge piece with a larger size to provide interference fit.
- 4.18 **TORQUE** the mechanical locking device to 15 inch-pounds, if required per seal

design as noted in step 4.12.

4.19 **PERFORM** a pressure test on the seal sections after a minimum of 30 minutes has elapsed after final fitting of the seal to be tested. A restraining device called a “test band” is to be utilized when needed for standard and extra-wide seal sizes to prevent excessive ballooning.

4.19.1 Pressurize seal to 10 psig (See Note 1) through the seal test valve. Apply an approved soap and water solution to the seal edges and center bladder section. Inspect for leakage.

4.19.2 If the pressure test indicates leakage, determine cause and repeat step 4.7 and higher. **THE ROOT CAUSE FOR MOST LEAKAGE IS INADEQUATE SURFACE PREPARATION.**

4.20 **DEPRESSURIZE** seal and isolate test port. SEAL the “test valve” with a countersunk hex head completion screw using an approved thread sealing compound. Remove all installation hardware, and pressure gauges.

4.21 When it is necessary to cover a wider area on the pipe than can be provided by standard, extra-wide, or double-wide seals, it is common and permissible to use a “sleeve” with a WEKO-SEAL at each end or overlapping of seals typically using extra-wide seals. This scenario will require prior design considerations by Miller Pipeline and the Engineering Firm/Owner.

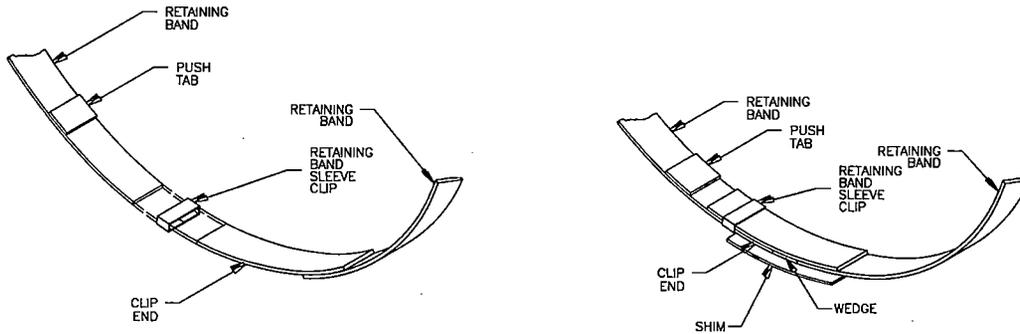
**Note 1:** Testing to 10 psi is normal for seals ranging in size up to 84”. For seal diameters of 84” through 96”, testing should be reduced to 7 psi due to safety concerns resulting from the increase in area and resulting force. Testing of seals above 96” diameter should not exceed 4-5 psi.

## EXPANSION PRESSURE GUIDELINE

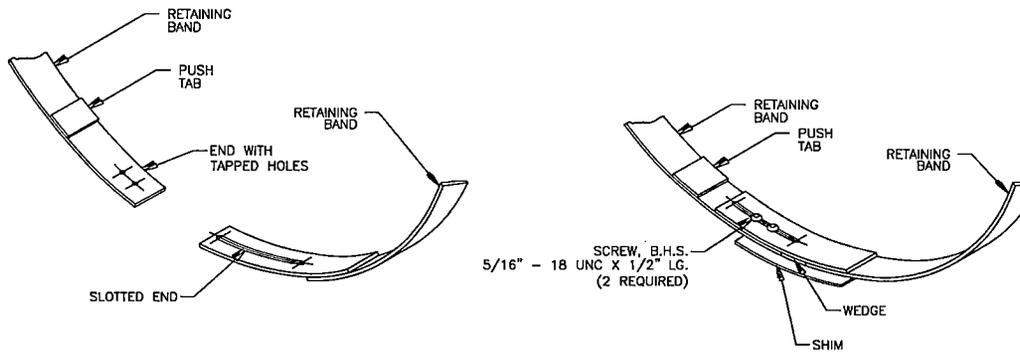
**The expansion pressures offered represent guideline expansion pressures only. Factors such as pipe condition, pipe type, pipeline age, and any other extenuating circumstances that may exist must be considered. Miller Pipeline shall not be responsible for damages resulting from use of this pressure chart.**

Medium Head Expander Data				Large Head Expander Data				Mega Head Expander Data				Band Thickness
Pipe Diameter	Low Pressure Range (psig)	High Pressure Range (psig)	Middle Retaining Bands (psig)	Pipe Diameter	Low Pressure Range (psig)	High Pressure Range (psig)	Middle Retaining Bands (psig)	Pipe Diameter	Low Pressure Range (psig)	High Pressure Range (psig)	Middle Retaining Bands (psig)	
16	2000	3000	1500	16				16				
18	2200	3200	1700	18				18				
20	4000	6000	3500	20	2000	3000	1500	20				0.125
24	4400	6400	3900	24	2200	3200	1700	24				0.125
30	6000	8000	5500	30	3000	4000	2500	30				0.125
36				36	3300	4300	2800	36				0.188
42				42	3500	4500	3000	42				0.188
48				48	4000	6000	3500	48				0.188
54				54	4000	6000	3500	54				0.188
60				60	5000	7000	4500	60				0.188
66				66	5000	7000	4500	66				0.250
72				72	5000	7000	4500	72				0.250
78				78	5000	7000	4500	78				0.250
84				84	5000	7000	4500	84				0.250
90				90	5000	7000	4500	90				0.250
96				96	7000	9000	6500	96				0.250
108				108	7000	9000	6500	108				0.250
120				120	7000	9000	6500	120	2600	4200	2100	0.250
132				132	7000	10000	6500	132	2875	4300	2375	0.375
138				138	7000	10000	6500	138	3000	4350	2500	0.375
144				144	7000	10000	6500	144	3125	4350	2625	0.375
148				148	7000	10000	6500	148	3200	4350	2700	0.375
156				156	7000	10000	6500	156	3375	4350	2875	0.375
178				178				178	3850	5800	3350	0.5
210				210				210	4550	5800	4050	0.5
216				216				216	4700	5800	4200	0.5

## Retaining Bands



DETAIL - RETAINING BAND SLEEVE CLIP  
OVERLAP RETAINER



DETAIL - RETAINING BAND MECHANICAL LOCK  
OVERLAP SCREW LOCK

**NON-PROPRIETARY**

Serial No. 17-296  
Docket Nos. 50-280/281  
RAI Response - CFRP Alternative Request  
Enclosure 2

**Attachment F**

*The information contained in this attachment is requested to be withheld in its entirety because:*

- *It reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) whose use by any of the submitter's competitors, without a license from the submitter, would constitute a competitive economic disadvantage to the submitter.*
- *Use by a competitor of the information requested to be withheld would reduce the competitor's expenditure of resources, or improve its competitive position, in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.*
- *The information requested to be withheld reveals commercial strategies of the submitter or customers or suppliers.*
- *It reveals aspects of privately funded development plans or programs of commercial value to the submitter or owner of the information.*

**TYPICAL CROSS SECTION OF THE REPAIRED PIPE**  
**INCLUDING CONCRETE ENCASEMENT**

**VIRGINIA ELECTRIC AND POWER COMPANY**  
**(DOMINION ENERGY VIRGINIA)**  
**SURRY POWER STATION UNITS 1 AND 2**

**NON-PROPRIETARY**

Serial No. 17-296  
Docket Nos. 50-280/281  
RAI Response - CFRP Alternative Request  
Enclosure 2, Attachment F

