

Failure Investigation Report – Pig Trap Gas Release – Activity ID 127555

Principal Investigator David Hippchen WV PSC
Regional Director Byron Coy
Date of Report 02/17/2011
Subject Failure Investigation Report – Pig Trap Gas Release

Summary:

On March 24, 2009, Hampshire Gas Company personnel were performing pipeline cleaning operations with a scraper pig on the 10" main storage line. The crew was going through the procedure to receive the pig in the trap, blow down the barrel, equalize the pressure, open the door, and retrieve the pig when the abnormal operation occurred. After the gas stopped venting from the equalizing bleed valves ahead and behind the pig, personnel removed the safety interlock device to allow opening the door on the barrel. No gas was venting from either the bleed valves or the safety interlock. The crew loosened the restraining clamp on the door, and as they were doing this, residual pressure in the barrel caused the door to swing open abruptly. The door struck one of the crew in the abdomen. The injuries were considered serious enough to warrant observation at the local hospital. The individual was kept overnight for observation and released the next day.

The operator determined during the post-incident investigation that the ¾" ball valves and the safety interlock on the door became fouled with pipeline debris during pressure equalization, which caused a pressure differential great enough on the pig door to force the door open abruptly.

Operator, Location, & Consequences

Date & Time of Failure: 3/24/2009
Commodity Released: Natural Gas
City/County & State: Hampshire County, WV
OpID & Operator Name 7050 Hampshire Gas
Unit # & Unit Name 2581 Hampshire Gas Storage Field
SMART Activity #: 127555
Milepost / Location Briar Lick, Romney, WV
Lat: 39.18775
Long: -78.75006
Type of Failure: No failure occurred
Fatalities: 0
Injuries 1
Description of area impacted Rural
Property damage Minimal – Not estimated

Failure Investigation Report – Pig Trap Gas Release – Activity ID 127555

System Details

The pipeline system is a natural gas storage field located in Hampshire County, West Virginia, near the Town of Romney. The system MAOP is 2467 psig. There were no impacts on the ability of the storage field to receive and send natural gas.

The natural gas storage system consists of 18.25 miles of pipeline (NPD of 10", 8", and 6") 12 storage wells, and the Grassy Lick compressor station. There are two HCA segments with a total of 0.47 miles of pipeline. There is no plastic pipe in the system.

Events Leading up to the Failure

On March 24, 2009, Hampshire Gas Company personnel were performing pipeline cleaning operations with a scraper pig on the 10" main storage line. The crew was going through the procedure to receive the pig in the trap, blow down the barrel, equalize the pressure, open the door, and retrieve the pig when the abnormal operation occurred. After the gas stopped venting from the equalizing bleed valves ahead and behind the pig, personnel removed the safety interlock device to allow opening the door on the barrel. No gas was venting from either the bleed valves or the safety interlock. The crew loosened the restraining clamp on the door, and as they were doing this, residual pressure in the barrel caused the door to swing open abruptly. The door struck one of the crew in the abdomen.

Emergency Response

After the door abruptly opened, there was no further release of product and no emergency response was needed.

Summary of initial start-up plan and return-to-service, including preliminary safety measures

The 2007 Pigging Operations Procedure (Appendix 3) was reviewed and modified on April 21, 2009 (Appendix 6). They now require opening of door from catwalk above instead of off to the side. Safety plug to be opened from side as per current procedure. A 2" ball valve was added to the 2" crossover line on the 14" receiver. This will allow a larger flow for blowdown of barrel. Hampshire Gas installed the same configuration on the other receivers after further discussion with safety department.

Investigation Findings & Contributing Factors

The ¾" ball valves and the safety interlock on the door became fouled with pipeline debris during pressure equalization, which caused a pressure differential great enough on the pig door to force the door open abruptly. Personnel standing in the door "operating area" were put at risk for being struck by the door.

Appendices

0	WV_DAH_Hampshire Gas_7050_Storage Field_2581_I03_05062009
1	NRC Report #901003
2	HGCo Incident Report 03-24-09
3	Pigging Operations Procedures 03312007
4	TDW SD-85 Clamp-Ring Closure
5	TDW SD-85 Drawing
6	10303 Pigging Operations 04212009

127555 Appendix 1 - NRC Incident Report #901003

NATIONAL RESPONSE CENTER 1-800-424-8802

*** For Public Use ***

Information released to a third party shall comply with any applicable federal and/or state Freedom of Information and Privacy Laws

Incident Report # 901003

INCIDENT DESCRIPTION

*Report taken at 13:26 on 26-MAR-09

Incident Type: PIPELINE

Incident Cause: EQUIPMENT FAILURE

Affected Area:

The incident occurred on 24-MAR-09 at 10:15 local time.

Affected Medium: AIR TO THE AIR

SUSPECTED RESPONSIBLE PARTY

Organization: HAMPSHIRE GAS COMPANY
SPRINGFIELD, VA 22151

Type of Organization: PUBLIC UTILITY

INCIDENT LOCATION

COUNTY 10/5 County: HAMPSHIRE

City: ROMNEY State: WV

Distance from City: 10 MILES

Direction from City: S

Latitude: 39 Degrees 11' 16" N

Longitude: 78 Degrees 45' 11" W

RELEASED MATERIAL(S)

CHRIS Code: ONG Official Material Name: NATURAL GAS

Also Known As:

Qty Released: 0 UNKNOWN AMOUNT

DESCRIPTION OF INCIDENT

CALLER STATED THERE WAS A SMALL AMOUNT OF NATURAL GAS RELEASED FROM A 10 INCH STEEL PIPELINE AND AN INJURY TO AN EMPLOYEE THAT REQUIRED AN OVERNIGHT STAY AT THE HOSPITAL. THE EMPLOYEE WAS HIT BY A HINGE CLOSURE FROM PIG BARREL. WHEN THIS OCCURRED THERE WAS A SMALL RELEASE OF NATURAL GAS. THIS TOOK PLACE DURING A PIGGING OPERATION.

INCIDENT DETAILS

Pipeline Type: TRANSMISSION

DOT Regulated: YES

Pipeline Above/Below Ground: ABOVE

Exposed or Under Water: NO

Pipeline Covered: UNKNOWN

127555 Appendix 1 - NRC Incident Report #901003

DAMAGES

Fire Involved: NO Fire Extinguished: UNKNOWN
 INJURIES: YES Hospitalized: 1 Empl/Crew: Passenger:
 FATALITIES: NO Empl/Crew: Passenger: Occupant:
 EVACUATIONS: NO Who Evacuated: Radius/Area:
 Damages: NO

<u>Closure Type</u>	<u>Description of Closure</u>	<u>Length of Closure</u>	<u>Direction of Closure</u>
Air:	N		
Road:	N		M
Waterway:	N		Ar
Track:	N		

Passengers Transferred: NO
 Environmental Impact: UNKNOWN
 Media Interest: NONE Community Impact due to Material:

REMEDIAL ACTIONS

CALLER STATED THE VALVE WAS CLOSED PRIOR TO VENTING. THE EMPLOYEE HAS SINCE BE RELEASED FROM THE HOSPITAL.

Release Secured: YES
 Release Rate:
 Estimated Release Duration:

WEATHER

Weather: CLEAR, °F

ADDITIONAL AGENCIES NOTIFIED

Federal: NONE
 State/Local: WV PSC
 State/Local On Scene: NONE
 State Agency Number: NONE

NOTIFICATIONS BY NRC

ATLANTIC STRIKE TEAM (MAIN OFFICE)
 26-MAR-09 13:38
 USCG ICC (ICC ONI)
 26-MAR-09 13:38
 CG INVESTIGATIVE SERVICE BALTIMORE (MAIN OFFICE)
 26-MAR-09 13:38
 INFO FOR CRITICAL MFG SECTOR (MAIN OFFICE)
 26-MAR-09 13:38
 DOT CRISIS MANAGEMENT CENTER (MAIN OFFICE)
 26-MAR-09 13:38
 U.S. EPA III (MAIN OFFICE)
 26-MAR-09 13:41
 NATIONAL INFRASTRUCTURE COORD CTR (MAIN OFFICE)
 26-MAR-09 13:38

127555 Appendix 1 - NRC Incident Report #901003

NOAA RPTS FOR WV (MAIN OFFICE)

26-MAR-09 13:38

PIPELINE & HAZMAT SAFETY ADMIN (OFFICE OF PIPELINE SAFETY (AUTO))

26-MAR-09 13:38

SECTOR OHIO VALLEY (COMMAND CENTER)

26-MAR-09 13:38

MD DEPT OF ENV (MAIN OFFICE)

26-MAR-09 13:38

VA DEPT EMERGENCY MANANGEMENT (MAIN OFFICE)

26-MAR-09 13:38

WEST VIRGINIA DEP (MAIN OFFICE)

26-MAR-09 13:38

WV DEP ATTN: DUTY OFFICER (MAIN OFFICE)

26-MAR-09 13:38

WV DEP SPILL LINE (MAIN OFFICE)

26-MAR-09 13:38

ADDITIONAL INFORMATION

CALLER DID NOT HAVE ANY ADDITIONAL INFORMATION.

*** END INCIDENT REPORT # 901003 ***

NOTICE: This report is required by 49 CFR Part 191. Failure to report can result in a civil penalty not to exceed \$25,000 for each violation for each day that such violation persists except that the maximum civil penalty shall not exceed \$500,000 as provided in 49 USC 1678. Form Approved OMB No. 2137-0522



INCIDENT REPORT - GAS TRANSMISSION AND GATHERING SYSTEMS

Report Date _____
 No. _____
 (DOT Use Only)

INSTRUCTIONS

Important: Please read the separate instructions for completing this form before you begin. They clarify the information requested and provide specific examples. If you do not have a copy of the instructions, you can obtain one from the Office Of Pipeline Safety Web Page at <http://ops.dot.gov>.

PART A - GENERAL REPORT INFORMATION

Check one or more boxes as appropriate:

Operator Name and Address

Original Report **Supplemental Report** **Final Report**

- a. Operator's 5-digit Identification Number (when known) / _____ /
- b. If Operator does not own the pipeline, enter Owner's 5-digit Identification Number (when known) / _____ /
- c. Name of Operator _____
- d. Operator street address _____
- e. Operator address _____
 City, County or Parrish, State and Zip Code

2. Time and date of the incident

/_____/ /_____/ /_____/ /_____/
 hr. month day year

3. Location of incident

- a. _____
 Nearest street or road
- b. _____
 City and County or Parrish
- c. _____
 State and Zip Code
- d. Mile Post/Valve Station _____
- e. Survey Station No. _____
- f. Latitude: _____ Longitude: _____
 (if not available, see instructions for how to provide specific location)
- g. Class location description
 Onshore: Class 1 Class 2 Class 3 Class 4
 Offshore: Class 1 (complete rest of this item)
 Area _____ Block # _____
 State /_____/ or Outer Continental Shelf
- h. Incident on Federal Land other than Outer Continental Shelf
 Yes No
- i. Is pipeline Interstate Yes No

4. Type of leak or rupture

- Leak: Pinhole Connection Failure (complete sec. F5)
 Puncture, diameter (inches) _____
- Rupture: Circumferential - Separation
 Longitudinal - Tear/Crack, length (inches) _____
 Propagation Length, total, both sides (feet) _____
- N/A
- Other: _____

5. Consequences (check and complete all that apply)

- a. Fatality Total number of people: /_____/
 Employees: /_____/ General Public: /_____/
 Non-employee Contractors: /_____/
- b. Injury requiring inpatient hospitalization Total number of people: /_____/
 Employees: /_____/ General Public: /_____/
 Non-employee Contractors: /_____/
- c. Property damage/loss (estimated) Total \$ _____
 Gas loss \$ _____ Operator damage \$ _____
 Public/private property damage \$ _____
- d. Release Occurred in a 'High Consequence Area'
- e. Gas ignited - No explosion f. Explosion
- g. Evacuation (general public only) /_____/ people
 Reason for Evacuation:
 Emergency worker or public official ordered, precautionary
 Threat to the public Company policy

6. Elapsed time until area was made safe:

/_____/ hr. /_____/ min.

7. Telephone Report

/_____/ /_____/ /_____/ /_____/
 NRC Report Number month day year

8. a. Estimated pressure at point and time of incident:

_____ PSIG
 b. Max. allowable operating pressure (MAOP): _____ PSIG

- c. MAOP established by 49 CFR section:
 192.619 (a)(1) 192.619 (a)(2) 192.619 (a)(3)
 192.619 (a)(4) 192.619 (c)

d. Did an overpressurization occur relating to the incident? Yes No

PART B - PREPARER AND AUTHORIZED SIGNATURE

 (type or print) Preparer's Name and Title Area Code and Telephone Number

 Preparer's E-mail Address Area Code and Facsimile Number

 Authorized Signature (type or print) Name and Title Date Area Code and Telephone Number

PART C - ORIGIN OF THE INCIDENT

- | | |
|---|--|
| <p>1. Incident occurred on
Transmission System
Gathering System
Transmission Line of Distribution System</p> <p>2. Failure occurred on
Body of pipe Pipe Seam
Joint
Component
Other: _____</p> | <p>3. Material involved (<i>pipe, fitting, or other component</i>)
Steel
Plastic (If plastic, complete all items that apply in a-c)
Plastic failure was: a.ductile b.brittle c.joint failure
Material other than plastic or steel: _____</p> <p>4. Part of system involved in incident
Pipeline Regulator/Metering System
Compressor Station Other: _____</p> <p>5. Year the pipe or component which failed was installed: / ____ /</p> |
|---|--|

PART D - MATERIAL SPECIFICATION (if applicable)

1. Nominal pipe size (NPS) / ____ / in.
 2. Wall thickness / ____ / in.
 3. Specification SMYS / ____ /
 4. Seam type _____
 5. Valve type _____
 6. Pipe or valve manufactured by _____ in year / ____ /

PART E - ENVIRONMENT

1. Area of incident In open ditch
Under pavement Above ground
Under ground Under water
Inside/under building Other: _____
 2. Depth of cover: _____ inches

PART F - APPARENT CAUSE

Important: There are 25 numbered causes in this section. Check the box to the left of the **primary** cause of the incident. Check one circle in each of the supplemental items to the right of or below the cause you indicate. See the instructions for this form for guidance.

F1 - CORROSION

If either F1 (1) External Corrosion, or F1 (2) Internal Corrosion is checked, complete all subparts a - e.

- | | |
|---|--|
| <p>1. External Corrosion</p> <p>2. Internal Corrosion</p> | <p>a. Pipe Coating b. Visual Examination c. Cause of Corrosion</p> <p>Bare Localized Pitting Galvanic Stray Current</p> <p>Coated General Corrosion Improper Cathodic Protection</p> <p>Other: _____ Microbiological</p> <p>Stress Corrosion Cracking</p> <p>Other: _____</p> <p>d. Was corroded part of pipeline considered to be under cathodic protection prior to discovering incident?
No Yes, Year Protection Started: / ____ /</p> <p>e. Was pipe previously damaged in the area of corrosion?
No Yes, How long prior to incident: / ____ / years / ____ / months</p> |
|---|--|

F2 - NATURAL FORCES

3. Earth Movement => Earthquake Subsidence Landslide Other: _____
 4. Lightning
 5. Heavy Rains/Floods => Washouts Flotation Mudslide Scouring Other: _____
 6. Temperature => Thermal stress Frost heave Frozen components Other: _____
 7. High Winds

F3 - EXCAVATION

8. Operator Excavation Damage (*including their contractors*) / Not Third Party
9. Third Party Excavation Damage (*complete a-d*)
- a. Excavator group
General Public Government Excavator other than Operator/subcontractor
- b. Type: Road Work Pipeline Water Electric Sewer Phone/Cable Landowner Railroad
Other: _____
- c. Did operator get prior notification of excavation activity?
No Yes: Date received: / ____ / mo. / ____ / day / ____ / yr.
Notification received from: One Call System Excavator Contractor Landowner
- d. Was pipeline marked?
No Yes (*If Yes, check applicable items i - iv*)
i. Temporary markings: Flags Stakes Paint
ii. Permanent markings: Yes No
iii. Marks were (*check one*) Accurate Not Accurate
iv. Were marks made within required time? Yes No

F4 - OTHER OUTSIDE FORCE DAMAGE

10. Fire/Explosion as primary cause of failure => Fire/Explosion cause: Man made Natural
11. Car, truck or other vehicle not relating to excavation activity damaging pipe
12. Rupture of Previously Damaged Pipe
13. Vandalism

F5 – MATERIAL AND WELDS

Material

- 14. Body of Pipe => Dent Gouge Wrinkle Bend Arc Burn Other: _____
- 15. Component => Valve Fitting Vessel Extruded Outlet Other: _____
- 16. Joint => Gasket O-Ring Threads Other: _____

Weld

- 17. Butt => Pipe Fabrication Other: _____
- 18. Fillet => Branch Hot Tap Fitting Repair Sleeve Other: _____
- 19. Pipe Seam => LF ERW DSAW Seamless Flash Weld Other: _____
 HF ERW SAW Spiral

Complete a-g if you indicate **any** cause in part F5.



a. Type of failure:

- Construction Defect => Poor Workmanship Procedure not followed Poor Construction Procedures
- Material Defect

b. Was failure due to pipe damage sustained in transportation to the construction or fabrication site? Yes No

c. Was part which leaked pressure tested before incident occurred? Yes, complete d-g No

d. Date of test: / / mo. / / day / / yr.

e. Test medium: Water Natural Gas Inert Gas Other: _____

f. Time held at test pressure: / / hr.

g. Estimated test pressure at point of incident: _____ PSIG

F6 – EQUIPMENT AND OPERATIONS

- 20. Malfunction of Control/Relief Equipment => Valve Instrumentation Pressure Regulator Other: _____
- 21. Threads Stripped, Broken Pipe Coupling => Nipples Valve Threads Mechanical Couplings Other: _____
- 22. Ruptured or Leaking Seal/Pump Packing

23. Incorrect Operation

a. Type: Inadequate Procedures Inadequate Safety Practices Failure to Follow Procedures Other: _____

b. Number of employees involved who failed post-incident drug test: / / Alcohol test: / /

c. Were most senior employee(s) involved qualified? Yes No d. Hours on duty: / /

F7 – OTHER

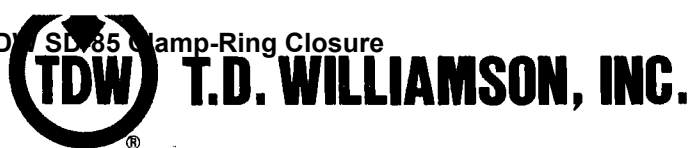
- 24. Miscellaneous, describe: _____
- 25. Unknown
 Investigation Complete Still Under Investigation (submit a supplemental report when investigation is complete)

PART G – NARRATIVE DESCRIPTION OF FACTORS CONTRIBUTING TO THE EVENT (Attach additional sheets as necessary)

Appendix 3 - Pigging Operations Procedures

HAMPSHIRE GAS CO
PIGGING OPERATIONS

This document is on file at PHMSA



Installation, Operation, and Maintenance TDW SD-85 Clamp-Ring Closure (4-14")

1.0 Purpose

To provide instructions for the installation, operation, and maintenance of the TDW SD-85 Clamp-Ring closure, 4" through 14".

2.0 Discussion

The TDW clamp-ring closure is a quick-opening closure which can be operated easily by one person. It contains a pressure-warning lock which must be opened prior to opening the closure. This alerts the operator to any pressure in the vessel before the closure is opened. The closure is designed primarily for horizontal installation. Figure 1 shows the clamp-ring closure.

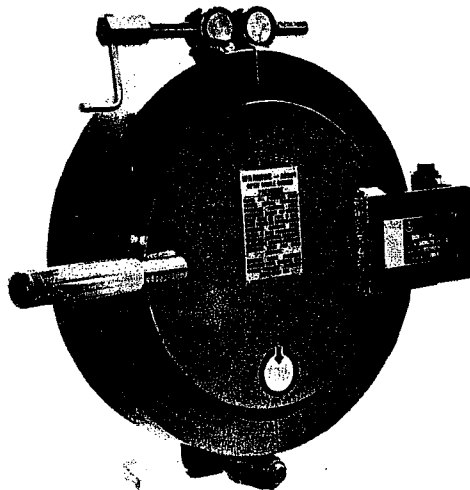


Fig. 1. TDW SD-85 Clamp-Ring Closure

3.0 Installation

3.1 General

A. It is imperative that the welding instructions and preventive maintenance instructions are carefully followed by those making the shop or field installation in order to maintain the closure in proper working order.

- B. It is important that the closure be leveled during the installation process, the collar properly aligned, and the hinge be in the vertical position (horizontal on a vertical installation) to permit easy opening and closing of the door.
- C. A bleeder valve and a pressure gauge must be installed on the vessel. An operator must be able to bleed the vessel and determine when there is zero (0) psig within the vessel.

3.2 Welding Procedures

A. The same welding procedures are to be used whether post-weld heat treatment is required or not.

1. Remove closure door O-ring and pressure-warning lock O-ring before welding.
2. If post-weld heat treatment is required, it is recommended that it be accomplished by localized stress relieving if at all possible. If not, the closure door and clamp-ring assembly will have to be removed prior to heat treatment. See Section 5.0 for removal instructions.

B. Barrel Collar—Materials:

ASTM A694 Grade F42

Carbon maximum 0.30%; Manganese maximum 1.50%

Minimum tensile strength: 60,000 psi

Minimum yield strength: 42,000 psi

1. TDW refers the welder to the applicable codes such as ASME, API, ANSI, etc. These codes require that the welder and the weld procedure be previously qualified.
2. These codes recommend the proper preheat and post-weld heat treatment procedures. The welder should refer to these codes and follow the recommended welding procedures for the materials being welded.

NOTE: Any practical welding process (manual, submerged arc, etc.) can be used. Use of as low a heat range as possible is recommended to help avoid warpage of the collar sealing surface.

C. Procedures for welding are:

1. Position barrel collar to align properly with the vessel. Make sure the hinge pin is in a vertical position.

CAUTION: When welding to a vessel of high yield strength steel (over 60,000 psi) preheating may be required to avoid cracking. Refer to proper ASME, API or ANSI codes. A preheat of 50° F minimum is a good practice when ambient temperatures are below 50° F.

2. Tack weld approximately every four inches around the circumference, and check again for proper alignment.

CAUTION: When welding on the collar, a low welding heat range and the following proper sequence of welds will help to avoid possible warping of the collar sealing surface.

3. Weld stringer bead and immediately start the hot pass. Figure 2 shows the recommended welding sequence.
4. When the welding process is completed, replace O-rings on the closure door and pressure-warning lock.

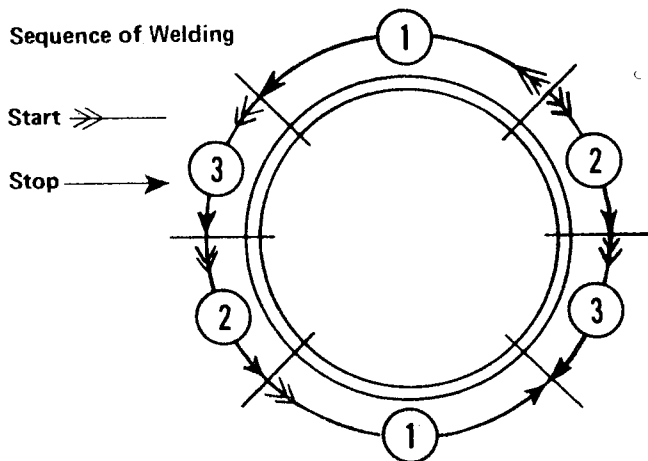


Fig. 2. Recommended Welding Pass Sequence

D. If post-weld heat treatment is required, it is recommended that a localized heat-treatment procedure be followed.

1. Coat the O-ring groove with heat resistant material (such as *TURCO PRETREAT* or *WATER NO SCALE*) for protection during post-weld heat treatment.
2. Precautions such as interior braces should be used during treatment so that the collar does not "warp" or "droop."
3. Remove O-rings from the door and pressure-warning lock. After post-weld heat treatment, clean the barrel collar and reinstall O-rings. Open and close the door to check for proper actuation and alignment.
4. If a localized heat treatment procedure is not possible, the closure door and clamp-ring assembly will have to be removed prior to heat treatment. Refer to Section 5.0 for removal instructions.

CAUTION: When cleaning the barrel collar, be very careful not to damage the O-ring sealing surfaces. Damage to these surfaces may prevent the O-ring from sealing.

- E.** Before placing in service, all surfaces should be clean, with the O-ring and O-ring sealing surfaces covered with a thin film of grease. The closure door face should be parallel and concentric to the face of the collar.
- F.** Lubricate the closure at the three grease fittings; two are on the clamp-ring pivot pin and one is on the door hinge. See Figure 3.

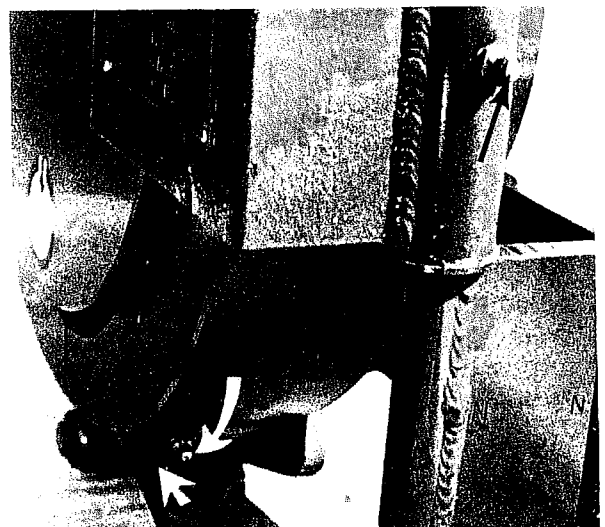


Fig. 3. Lubrication Points

4.0 Operation

4.1 General

- A. A warning plate is attached to the front of the closure door as shown in Figure 1. This warning concerns personal safety precautions and must be observed to prevent injury to personnel. Always keep this plate legible.
- B. The closure contains a pressure-warning lock, as shown in Figure 4, to alert the operator to pressure in the vessel before the closure is opened. The pressure-warning lock is integral to the clamp rings and must be opened before the clamp rings can be spread.

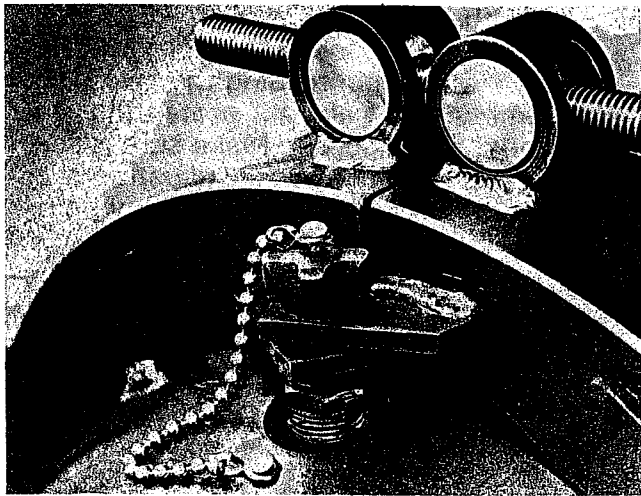


Fig. 4. Pressure-Warning Lock

- C. Always clean the O-rings and O-ring surfaces and coat with a thin film of grease each time the closure is open. Inspect for cuts, scratches, or deterioration. Replace if there is any sign of damage. See Figure 5.

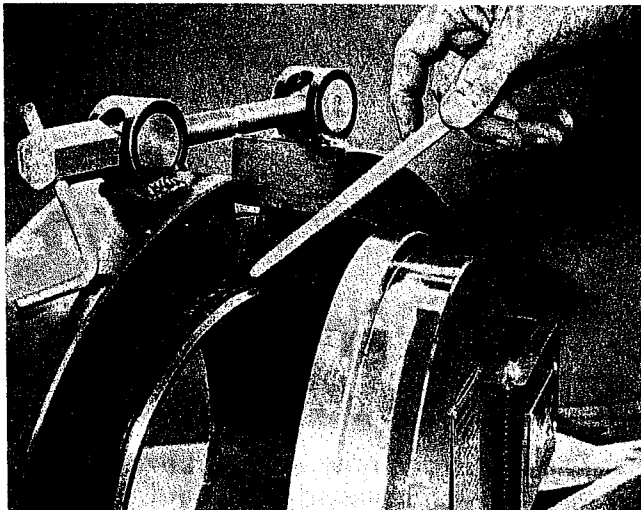


Fig. 5. Inspect and Lubricate O-ring

WARNING: Replace damaged O-rings immediately.

A damaged O-ring will cause leakage of hazardous gases or fluids which can lead to serious injury and/or property damage.

- D. Always clean interior surfaces of clamp rings and apply a thin film of lubricant. When opening, check lubrication of all hinge points on the clamp-ring assembly. These include two on the clamp-ring pivot pin and one on the door hinge, as shown in Figure 3. Keep threads on the clamp-ring operating screw lightly lubricated.

4.2 Opening Procedures

WARNING: To avoid serious personal injury, do not open closure while vessel is under pressure.

Bleed all pressure from vessel before opening the pressure-warning lock. Pressure gauge on vessel must read zero (0) psig. If product vents or sprays from pressure warning lock, vessel is still pressurized. When all internal pressure is relieved, open the pressure warning lock and open the closure.

Do not stand in front of the closure while opening.

- A. Isolate vessel from line pressure, bleed pressure to 0 psig, and drain.
- B. Open pressure-warning lock by turning counterclockwise. See Figure 6.



Fig. 6. Open Pressure-Warning Lock

NOTE: The pressure-warning lock is not designed, or intended to be used as a pressure bleed down valve and should never be used as such.

- C. Once the pressure-warning lock is completely unthreaded, open the clamp rings by turning the operating screw counter-clockwise, spreading the clamp rings so that the closure door can be opened. See Figure 7.

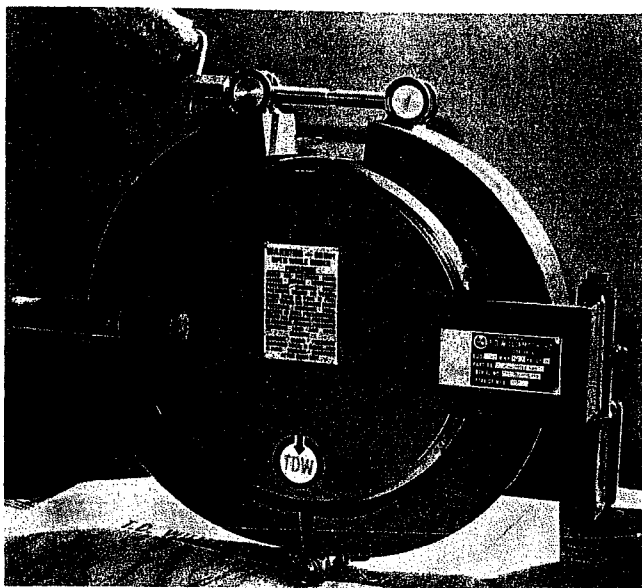


Fig. 7. Clamp Rings Spread, Door Can Be Opened

4.3 Closing Procedures

- A. Inspect, clean, and lubricate the O-ring, O-ring grooves and sealing surfaces, and the pressure-warning lock. Replace O-ring if damaged.

WARNING: Replace damaged O-rings immediately.

A damaged O-ring will cause leakage of hazardous gases or fluids which can lead to serious injury and/or property damage.

- B. Push the door firmly shut. Before the clamp rings can be closed, the door must be completely closed, showing no gap between the door face and the hub face.
- C. Close the clamp rings by turning the operating screw clockwise until the clamp rings are closed and the clamp-ring brackets are aligned over the pressure-warning vent hole. See Figure 8.

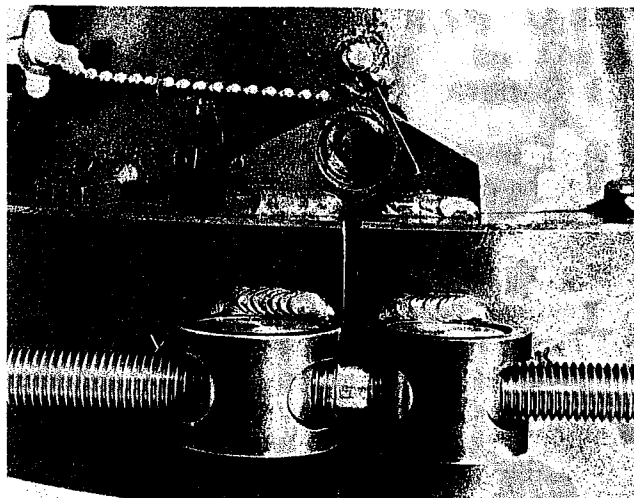


Fig. 8. Align Clamp-Ring Brackets

- D. Install the pressure-warning lock. Hand tighten only. If too much torque is applied, a spring pin holding the two-piece assembly will shear, protecting the threads. See Figure 9. Make sure it does not cross-thread. Minor adjustment to align the clamp-ring brackets may be required. Slightly turn the operating screw.

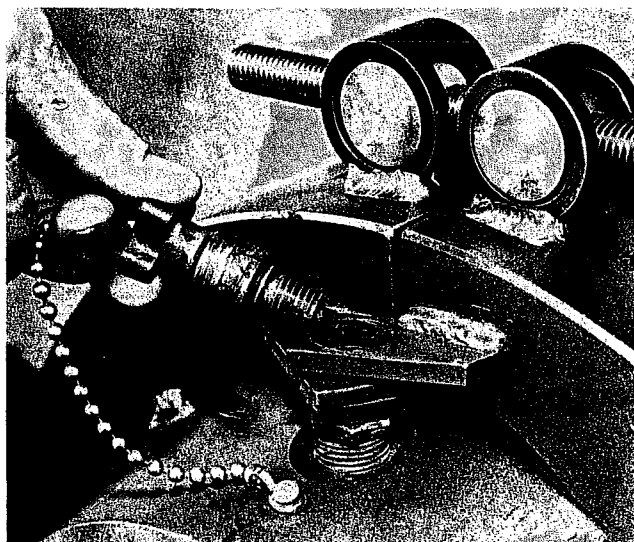


Fig. 9. Install Pressure-Warning Lock

WARNING: Make sure door clamp rings and pressure-warning lock are fully closed and secured before attempting to pressurize vessel.

Spraying line fluids or sudden door opening may result in serious personal injury and/or property damage.

- E. The vessel can now be pressurized to line pressure and placed onstream.

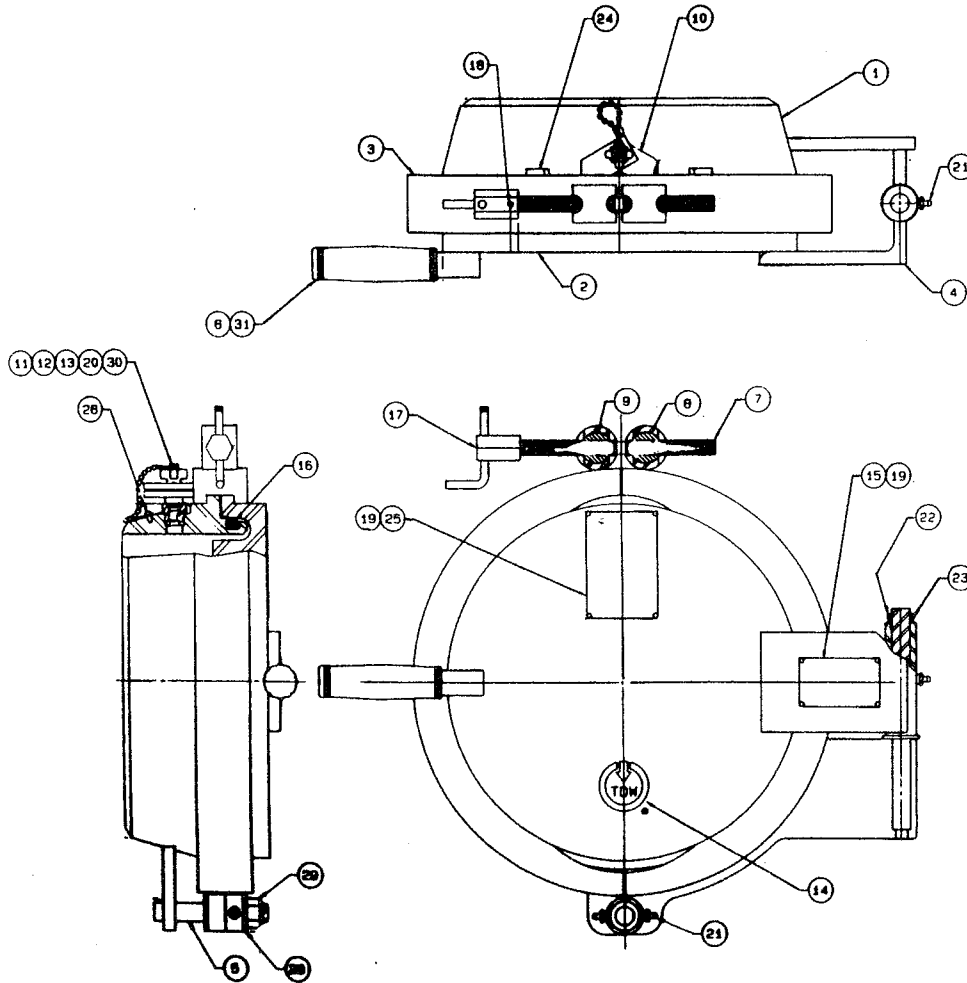
5.0 Closure Door Removal/ Installation Instructions

5.1 Removal

Refer to Figure 10.

- A. Unthread pressure-warning lock and O-ring (12) and (13).
- B. Open the closure door and remove the O-ring carefully to prevent damage (16).

- C. Remove retainer ring (22) and seal (23) from hinge. Carefully lift the door up and off hinge pin.
- D. Remove nut (29) and washer (28) from pivot pin (5). Before removing clamp rings, brace or wedge the clamp rings in an open position. Carefully slide clamp-ring assembly off pivot while inserting a .750" diameter stay pin to keep the clamp rings together.



31	1	GRIP, HANDLE
30	1	SCREW, DRIVE
29	1	NUT,
28	1	WASHER,
27	1	INSTRUCTIONS (NOT SHOWN)
26	1	SCREW, DRIVE
25	1	PLATE, WARNING, DOOR
24	2	STOP, CLAMP RING
23	1	SEAL, FORSHEDA
22	1	RING, RETAINER
21	3	FITTING, GREASE
20	1	CHAIN ASSEMBLY
19	8	SCREW, DRIVE
18	1	PIN, SPRING,
17	1	HANDLE, CR ACTUATOR
16	1	O-RING,
15	1	NAMEPLATE
14	1	DECAL, TRADEMARK
13	1	O-RING,
12	1	SCREW, PRESSURE WARNING
11	1	BUSHING
10	2	LUG, CR LOCKING
9	1	NUT, BARREL LH
8	1	NUT, BARREL RH
7	1	SCREW, OPERATING
6	1	HANDLE, DOOR
5	1	PIN, PIVOT
4	1	ARM, DOOR HINGE
3	1	RING, CLAMP
2	1	DOOR
1	1	COLLAR, BARREL
ITEM NO.	QTY.	DESCRIPTION

Fig. 10. Closure Assembly

5.2 Installation

- A. To reinstall the closure door, follow the reverse of the removal instructions.

NOTE: Shims may be used on lower clamp-ring pivot pin and door hinge pin. Make sure these shims are reinstalled in their original position.

6.0 Maintenance

6.1 General

Little maintenance is required on TDW closures. Most is preventive-type maintenance and can be performed each time the closure is opened.

6.2 O-ring/O-ring Surfaces

There are two O-rings on the SD-85 Closure. One is on the pressure-warning lock and one is on the barrel collar, making a seal when the door is closed. Always clean and coat these with a thin film of grease each time the closure is open. Inspect for cuts and scratches or deterioration. Replace O-rings if there is any sign of damage.

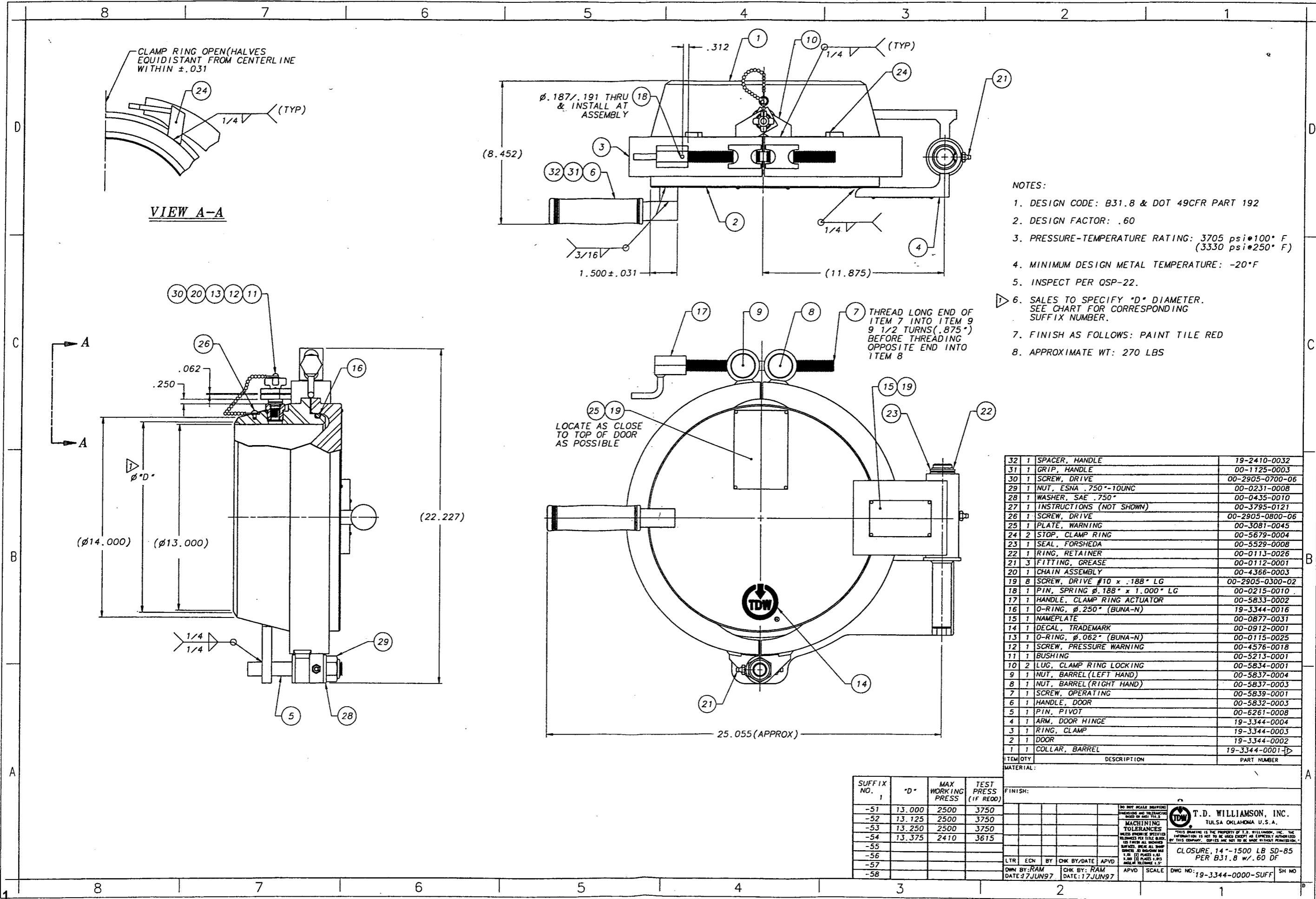
6.3 Clamp Rings

Always clean interior surfaces of clamp rings and apply a thin film of lubricant. At regular intervals:

- A. Keep threads on the operating screw lightly lubricated.
- B. Check the three grease fittings regularly for lubrication.
- C. Keep all exterior surfaces painted to prevent rust.

6.4 Pressure-Warning Lock

- A. Make sure threads are clean and free of nicks.
- B. Inspect O-ring and bushing.
- C. Keep assembly free of paint.



- NOTES:
1. DESIGN CODE: B31.8 & DOT 49CFR PART 192
 2. DESIGN FACTOR: .60
 3. PRESSURE-TEMPERATURE RATING: 3705 psi@100° F (3330 psi@250° F)
 4. MINIMUM DESIGN METAL TEMPERATURE: -20° F
 5. INSPECT PER QSP-22.
 6. SALES TO SPECIFY "D" DIAMETER. SEE CHART FOR CORRESPONDING SUFFIX NUMBER.
 7. FINISH AS FOLLOWS: PAINT TILE RED
 8. APPROXIMATE WT: 270 LBS

ITEM QTY	DESCRIPTION	PART NUMBER
32	1 SPACER, HANDLE	19-2410-0032
31	1 GRIP, HANDLE	00-1125-0003
30	1 SCREW, DRIVE	00-2905-0700-06
29	1 NUT, ESNA .750"-10UNC	00-0231-0008
28	1 WASHER, SAE .750"	00-0435-0010
27	1 INSTRUCTIONS (NOT SHOWN)	00-3795-0121
26	1 SCREW, DRIVE	00-2905-0800-06
25	1 PLATE, WARNING	00-3081-0045
24	2 STOP, CLAMP RING	00-5679-0004
23	1 SEAL, FORSHEDA	00-5529-0008
22	1 RING, RETAINER	00-0113-0026
21	3 FITTING, GREASE	00-0112-0001
20	1 CHAIN ASSEMBLY	00-4366-0003
19	8 SCREW, DRIVE #10 x .188" LG	00-2905-0300-02
18	1 PIN, SPRING φ.188" x 1.000" LG	00-0215-0010
17	1 HANDLE, CLAMP RING ACTUATOR	00-5833-0002
16	1 O-RING, φ.250" (BUNA-N)	19-3344-0016
15	1 NAMEPLATE	00-0877-0031
14	1 DECAL, TRADEMARK	00-0912-0001
13	1 O-RING, φ.062" (BUNA-N)	00-0115-0025
12	1 SCREW, PRESSURE WARNING	00-4576-0018
11	1 BUSHING	00-5213-0001
10	2 LUG, CLAMP RING LOCKING	00-5834-0001
9	1 NUT, BARREL (LEFT HAND)	00-5837-0004
8	1 NUT, BARREL (RIGHT HAND)	00-5837-0003
7	1 SCREW, OPERATING	00-5839-0001
6	1 HANDLE, DOOR	00-5832-0003
5	1 PIN, PIVOT	00-6261-0008
4	1 ARM, DOOR HINGE	19-3344-0004
3	1 RING, CLAMP	19-3344-0003
2	1 DOOR	19-3344-0002
1	1 COLLAR, BARREL	19-3344-0001

SUFFIX NO.	"D"	MAX WORKING PRESS	TEST PRESS (IF RECD)
-51	13.000	2500	3750
-52	13.125	2500	3750
-53	13.250	2500	3750
-54	13.375	2410	3615
-55			
-56			
-57			
-58			

DO NOT SCALE DRAWING DIMENSIONS AND INTERFERING DIMENSIONS PER TITLE BLOCK TOLERANCES UNLESS SPECIFIED OTHERWISE PER ALL DIMENSIONS SURFACES UNLESS SPECIFIED OTHERWISE BY SHOP DRAWING TO WHICH THIS DRAWING IS REFERRED

T.D. WILLIAMSON, INC.
TULSA OKLAHOMA U.S.A.

THIS DRAWING IS THE PROPERTY OF T.D. WILLIAMSON, INC. THE INFORMATION IS NOT TO BE USED EXCEPT AS EXPRESSLY AUTHORIZED BY THIS COMPANY. COPIES ARE NOT TO BE MADE WITHOUT PERMISSION.

CLOSURE, 14"-1500 LB SD-85 PER B31.8 W/.60 DF

LTR ECN BY CHK BY/DATE APVD
DWN BY:RAM DATE:17JUN97 CHK BY:RAM DATE:17JUN97 APVD SCALE DWG NO: 19-3344-0000-SUFF SH NO

Appendix 6 - Pigging Operations

HAMPSHIRE GAS CO

PIPELINE PIGGING OPERATIONS

This document is on file at PHMSA