

TM



PRODUCT INFORMATION

Product Bulletin No.: D99-RRV2015-PIB-001

Rev 04

Titan 'BX' Automatic Pressure Relief Valves

Issue Date: April 22, 2016

- Subject:** Structural failure of a Titan Type BX pneumatically-operated pressure relief valve, and required upgrade, periodic inspection, testing, and maintenance of such valves.
- Product:** This bulletin applies to all Titan 'BX' pneumatically-actuated pressure relief valves, typically installed in mud pump systems.
- Affected Assemblies** All valve assembly part numbers for the Titan 'BX' are affected.
- Objectives:** Advise owners/operators of a structural failure of a Titan 'BX' relief valve, and to advise owners/operators:
- (1) of the necessity to visually inspect Titan 'BX' relief valves in service weekly for evidence of leakage; and
 - (2) of NOV recommendations for a preventive maintenance program for Titan 'BX' valve systems.
 - (3) to verify that the Titan BX relief valve has either a safety clamp installed on it or that the actuator vent ports have been added. It is acceptable to have both the safety clamp and the vent ports added.
 - (4) consideration should be given to the drain line to verify that the drain line is clear from any obstruction at all times and the drain line is inspected on a regular basis as determined by the rig operator/owner.
- Issue:** NOV received a report that a Titan 'BX' relief valve failed at a pressure less than the relief pressure setting, and the valve piston was ejected through the discharge bore of the valve, and the cap, actuator piston, and actuator stem were ejected off the actuator housing. There were no injuries reported as a result of this incident.

Solutions:

As a result of its investigation of the incident, NOV has determined that the upper piston seal failed, allowing drilling mud to pass by it. Unbalanced pressure on the top of the valve piston sheared the stem portion at the pin connection hole. NOV is recommending both (1) visual inspection and (2) preventative maintenance of all Titan 'BX' relief valves as described below.

1. Visual inspection

The Titan BX relief valve should be visually inspected every seven (7) days as a minimum for external evidence of leakage. **If the upper seals on the valve piston becomes damaged or badly worn, and continuous leakage occurs, the valve may not function properly to relieve pressure.**

Figure 1 shows the normal operating mode, with mud and mud line pressure shaded red. Figure 2 shows the intrusion of mud above the valve piston that can occur if the upper piston seal allows substantial leakage. Specific locations to monitor for leakage of the upper piston seal are also shown in Figure 2:

- a) For all Titan BX valves leakage of drilling fluid from the slot for the position indicator pin is indicative of leakage of the valve piston upper seal.
- b) Titan BX valves manufactured after April 1, 2015 will have ports located just below the bonnet flange to improve venting of fluid and pressure that leaks past the valve piston upper seal. Leakage of drilling fluid visible at the gap between the valve body and bonnet flange is indicative of leakage of the valve piston upper seal.
- c) If leakage of the valve piston upper seal is indicated as described above, immediate action must be taken to repair or replace the valve and eliminate the leak.
- d) Existing Titan BX valves will have the vent ports added when returned to an NOV facility for inspection, seal replacement, and OEM repairs. (See Table 1). If the vent ports have not been added, then the NOV safety clamp (NOV P/N: 51027708) must be installed on the actuator.

The Titan BX relief valve is designed to be pressure-balanced, with no pressure above the valve piston. If leakage of the valve piston upper seal occurs and continues unchecked, it is possible for drilling mud volume and/or pressure to build above the valve piston. This could prevent the valve piston from opening to relieve pressure at the intended relief pressure.

Figure 1: BX Valve Normal Operation:

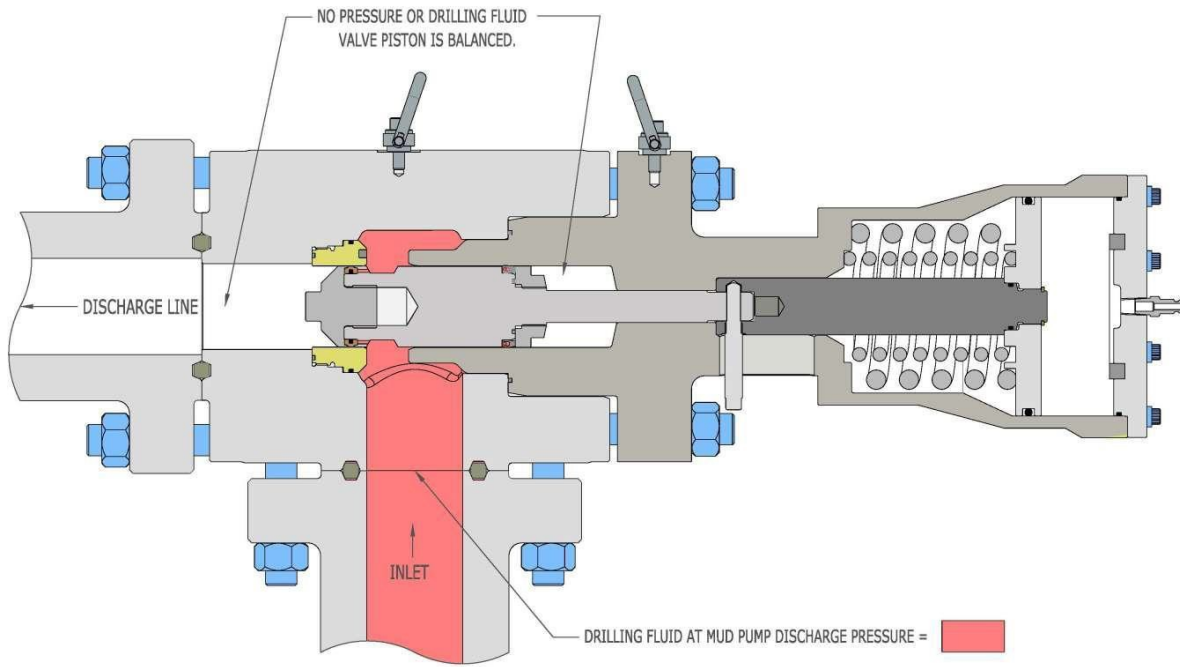
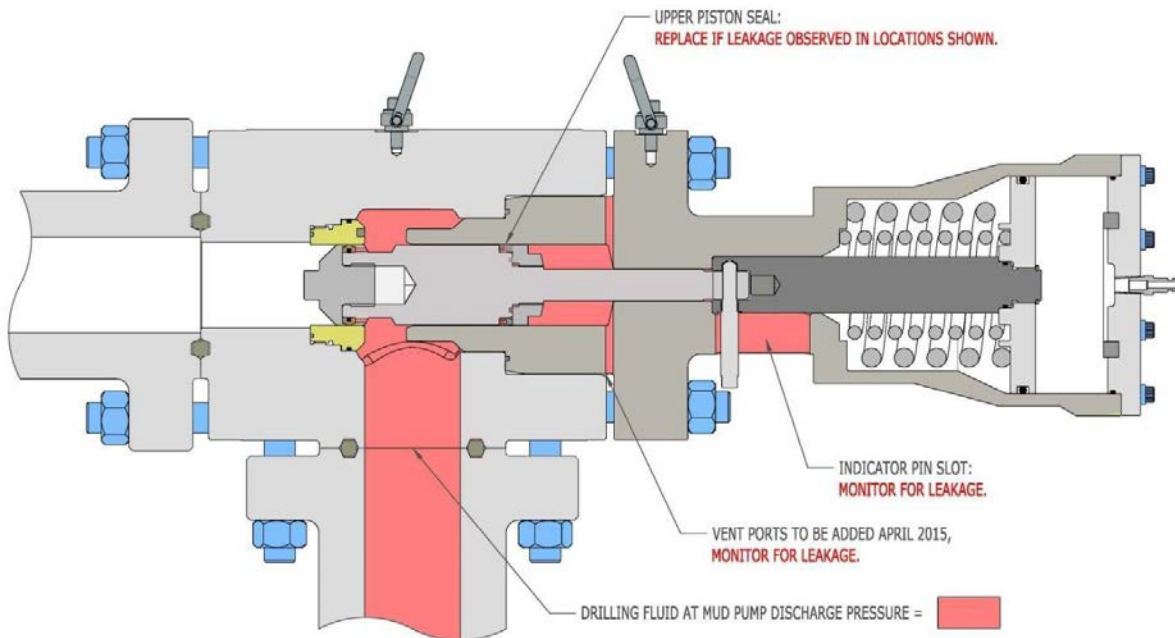


Figure 2: BX Valve Potential Leakage and Inspection Locations:



2. Preventive maintenance

NOV recommends that owners/operators of Titan BX relief valve systems follow a documented preventive maintenance program to ensure proper functioning of the valve.

*In the event that a valve cannot be brought in for the 12 month maintenance NOV recommends using a safety clamp on the actuator (NOV P/N: 51027708) until the valve can be taken out of service to drill the vent holes.
(See figure 4 for clamp installation)*

Table 1: Recommended Preventive Maintenance

Maintenance activity	Time interval	Performed by
Visual inspection for leakage of valve piston upper seal. (see Issue 1)	7 days of service	Owner/operator
Six Month Titan BX Functionality test <ul style="list-style-type: none"> Per NOV Functionality Procedure 51031286-SPC 	6 months maximum	Owner/operator or NOV Field Service Tech
<ul style="list-style-type: none"> Complete valve assembly and disassembly per Titan BX Installation and Operations Manual 100% visual inspection of all parts Add leak vent/observation ports to housing if not already implemented. (See Figure 3 for Drill Locations) Note: Safety Clamp (NOV P/N:51027708) Is required if vent ports have not been added. (See Figure 4 for clamp installation) Replace all seals, Inspect, replace or rework other parts as required (See INSPECTION REPORT to document) <ol style="list-style-type: none"> No pitting allowed on any seal surface No Visual Cracks allowed on any surface All ring gasket grooves must be surface NDE inspected. Die Penetrant is acceptable Perform Titan BX Functionality Test per NOV Functionality Procedure (See INSPECTION REPORT to document) Pneumatic pressure test actuator as required (See INSPECTION REPORT to document) Maintain INSPECTION REPORT for five years minimum 	12 months	One of the following: <ul style="list-style-type: none"> NOV Repair Facility Qualified NOV Service Personnel Onsite Qualified Rig Personnel Onsite

Failure to follow the recommendations and/or guidance in NOV Manuals and Product Bulletins may result in death, bodily injury or property damage.

Operators should also refer to previous NOV Product Information Bulletins and Safety Alerts at <http://www.nov.com/drilling> for additional information related to this issue and information regarding safe operation, maintenance, and inspection criteria.

Please contact your local National Oilwell Varco (NOV) Service Center if you have any questions regarding this safety alert.

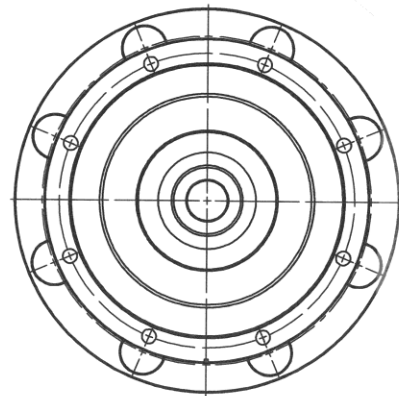
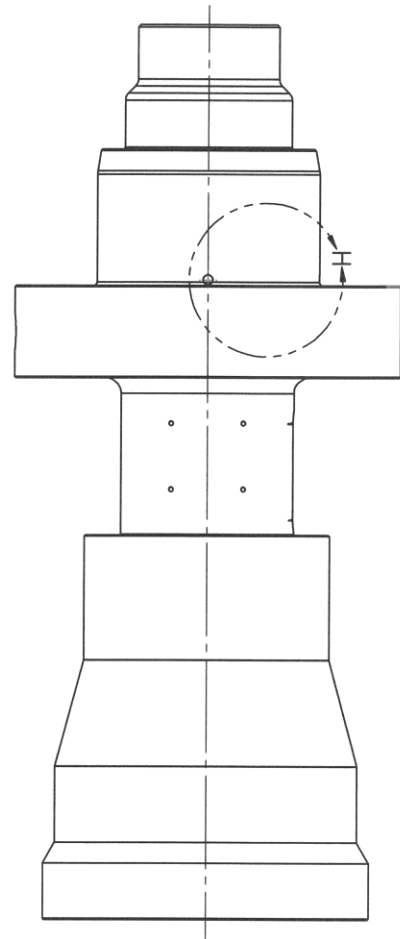
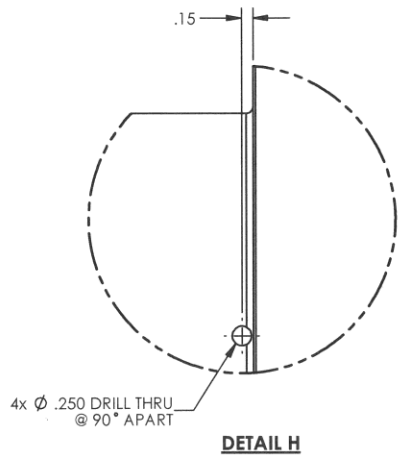


Figure 3: Vent Hole Drill Locations

INSPECTION REPORT

BALLOON	PART DESCRIPTION	PASS REPAIR REPLACE	VISUAL OBSERVATIONS, NOTES AND COMMENTS	SIGNATURE
1				
2	RING GASKETS QTY2			
3	MALE FLANGE			
4	RING SEALS QTY 2			
5	FEMALE UNION			
6	1502 NUT QTY 2			
7	RETAINER SEGMENTS			
8	RETAINER RING			
9	FEMALE FLANGE			
10	MALE UNION			
11	STUDS QTY 16			
12	NUTS QTY 24			
13	BODY			
14	INSERT			
15	PISTON			
16	PISTON CAP			
17	ACTUATOR HOUSING			

BALLOON	PART DESCRIPTION	PASS REPAIR REPLACE	VISUAL OBSERVATIONS, NOTES AND COMMENTS	SIGNATURE
18	UPPER PISTON NUT			
19	SWIVEL			
20	INDICATOR PIN			
21	ACTUATOR HOUSING STEM			
22	INNER SPRING ACTUATOR			
23	OUTER SPRING ACTUATOR			
24	PNEUMATIC PISTON			
25	SNAP RETAINING RING			
26	CUSHION			
27	ACTUATOR CAP			
28	ACTUATOR CAPSCREWS (QTY 8)			
29	ACTUATOR HOUSING O-RING			
30	PNEUMATIC PISTON O-RING			
31	BODY INSERT FACE SEAL			
32	OUTER BODY INSERT SEAL			
33	PISTON CAP SEAL			
34	UPPER PISTON SEAL			

BALLOON	PART DESCRIPTION	PASS REPAIR REPLACE	VISUAL OBSERVATIONS, NOTES AND COMMENTS	SIGNATURE
35	UPPER PISTON O-RING			
36	ACTUATOR HOUSING FACE SEAL			
37	STEM O-RING			
38	STUDS QTY8			
39	QUICK CONNECT			

OPERATION

MANAGER IN CHARGE SIGNATURE

100% VALVE DISASSEMBLY

RING GASKET NDE PERFORMED INLET

RING GASKET NDE PERFORMED OUTLET

VALVE FUNCTIONALITY PRESSURE TEST PERFORMED

ACTUATOR PNEUMATIC PRESSURE TEST PERFORMED

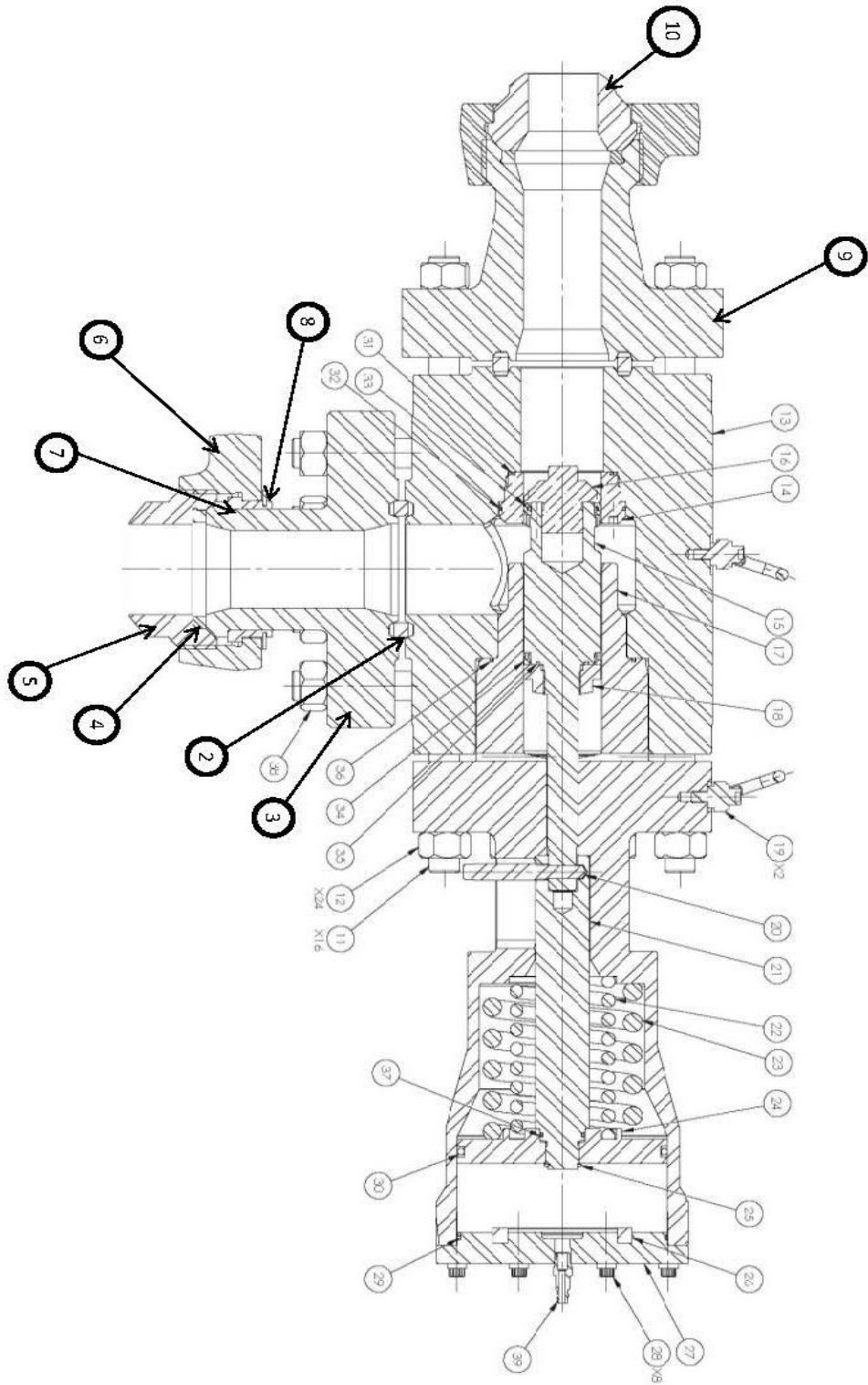
VALVE REASSEMBLY

NOTE:

All recorded pressure data for the VALVE FUNCTIONALITY TEST and the

ACTUATOR PNEUMATIC PRESSURE TEST must be maintained with this inspection report

ASSEMBLY DRAWING



Safety Clamp Installed

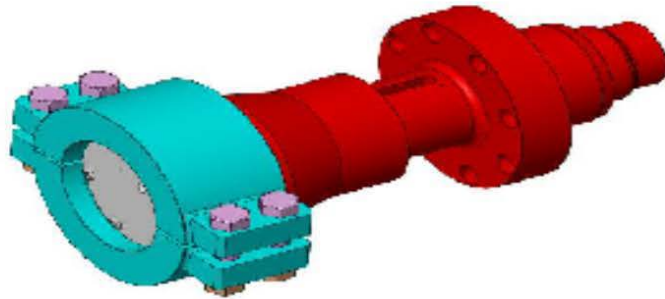
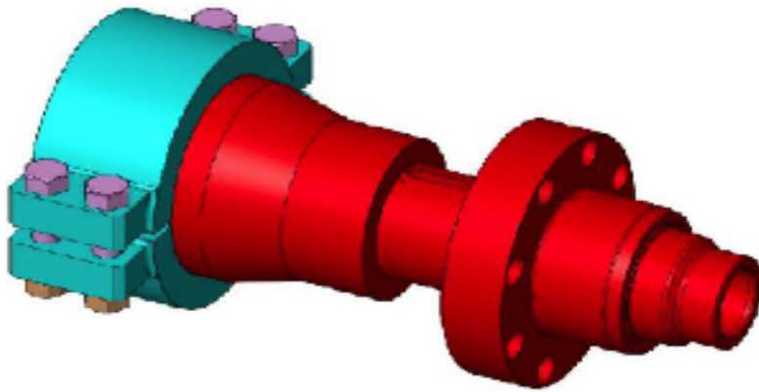


FIGURE 4

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Note: Safety Clamps are to be installed per the NOV Titan BX Safety Clamp Installation Procedure 51029090-SPC.

