

**Flow Control Division**

*Anchor/Darling Valves
BW/IP Valves
Edward Valves
Valtek Control Products
Worcester Valves*

20-Feb-2019

US Nuclear Regulatory Commission
Document Control Desk
11545 Rockville Pike
Rockville, MD 20852-2746

Subject: Spring Deflection Causing Potential Hang-Up of the Flapper (Disc), Worcester Series 44 Swing Check Valve

This is to notify the US Nuclear Regulatory Commission that, in accordance with the provisions of 10CFR Part 21, we have identified a potential issue and are submitting our evaluation of the event.

Attachments:

Picture of Adverse Condition
General Assembly Views

Description: GE BWXT, acting on behalf of Ontario Power sent five valves back to the Flowserve facility for evaluation of the spring which could spread apart when the flapper rotates open and wedge between the valve body and flapper, creating the potential for the valve flapper to stick open.

Evaluation: Shop inspections of the returned valves confirmed the potential for the spring legs to rotate outwards and potentially wedge between the flapper and seat retainer. Of the five valves evaluated, two of the valves had the spring legs rotate outward and after repeated cycles got caught between the flapper and disc; on one of the instances the spring legs prevented full closure of the flapper.

If the valves have a safety-related function to isolate flow and must transfer closed, then the springs could prevent the valve from performing its safety related function.

The evaluation determined the cause is an inadequate spring design which allows the spring to deflect and permit the legs to move outward.

Extent of Condition: In discussion with the customer, it is believed the problem did not exist with valves originally supplied from the Worcester, Scarborough Canada facility; although this cannot be confirmed by Flowserve. It is believed the extent of condition resides with valves and replacement springs supplied from the Flowserve Raleigh, NC facility when the product line was transferred and the spring vendors changed; even though it has been confirmed that the

springs supplied out of the Raleigh, NC facility comply with the product drawing requirements. The springs were first sold in valve assemblies or as replacement parts from the Raleigh facility starting in 2008.

Valve Scope:

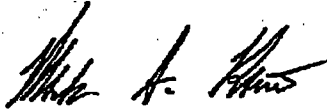
The scope of impacted valves is the Worcester series 44 swing check valves. (Please note Worcester also has a series 44 three piece ball valve, which is not in the scope.) The Raleigh facility has supplied parts or valves for four Worcester series 44 swing check valves assemblies which use these springs. The drawings numbers for these valve assemblies are listed below.

| <u>Drawing</u> | <u>Valve Size</u> | <u>Customer</u> |
|----------------|-------------------|--------------------------------------|
| KN44-0590 | 1.5 x 1 x 1.5 | Bruce Power, GE BWXT & Ontario Power |
| KN44-0630 | 2 | Comanche Peak |
| 14-107362-001 | 1.5 x 1 x 1.5 | GE BWXT |
| 16-118733-001 | 1.5 x 1 x 1.5 | GE BWXT |

Corrective Actions:

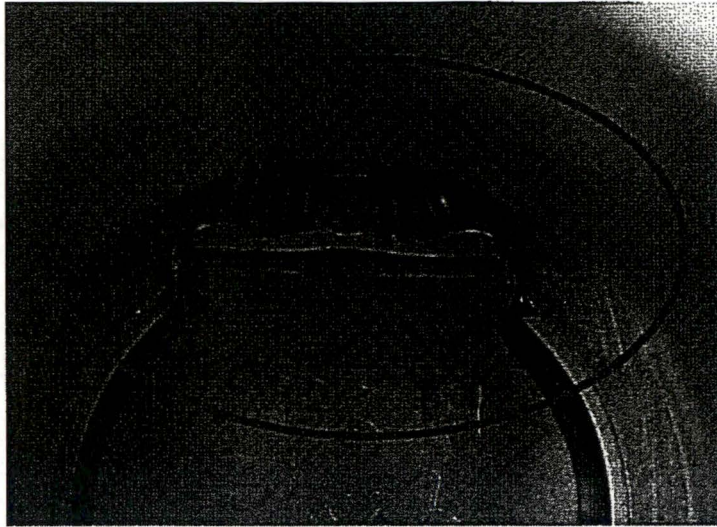
- Owner's may remove the springs. The valves will check-off and seal under low pressure conditions without the assistance of the spring; this was demonstrated in shop tests using tap water pressure (approximately 60 psig) and will initiate closure when full open without the assistance of the spring.
- Flowserve is evaluating alternate spring designs along with the possibility of adding guides to prevent the undesired spring movement. Any new design will be proof tested.

Respectfully submitted,

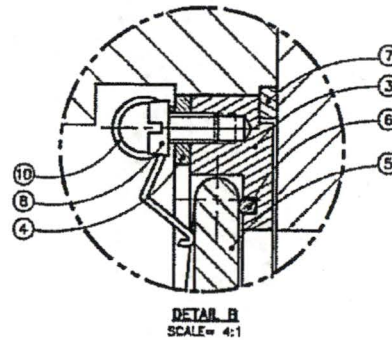
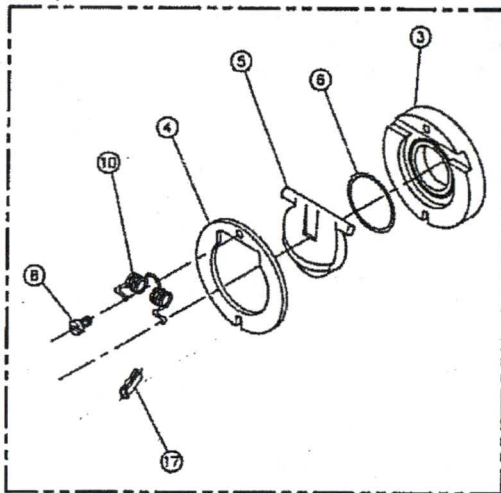


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Picture of Adverse Condition



General Assembly Views



ISOMETRIC VIEW ←
OF SPRING AND SEAT HOUSING SUBASSEMBLY.

