



Flow Control Division

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

May 2, 2014

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

Subject: Missing Jam Nuts on Size 4, Pressure Class 600 Normally Open, In-Line Check Valve per Flowserve Drawing No. 07-45546-01

Attachment: Flowserve Drawing No.07-45546-01

Ladies/Gentlemen:

This is to notify the US Nuclear Regulatory Commission that, in accordance with the provisions of 10CFR Part 21, on this date I was notified that Flowserve has identified a potential defect and are henceforth submitting our evaluation of the event.

Nature of the Defect: In March of 2014, PG&E Diablo Canyon visual inspection discovered the outer jam nut was missing from the valve stem and was found downstream. This jam nut locks the inner jam nut which retains the spring and spring retainer. There were signs of one stake on the stem threads. These check valves include a conical spring which maintains the disc open in its normal position. Flow in the normal direction maintains the valve open and a minimum reverse flow is required to close the valve. The valve is used in saturated steam service and must close with a reverse flow of less than 7000 lbs/hr steam at 95 and 1085 psig. The PG&E supplied data sheet does not identify a specific safety related function. However, the valve operating parts are identified as safety related on the drawing.

The valve will not maintain an open position with limited reverse flow without the spring in place and the spring will not be available to assist holding the disc open and stable during forward flow.

A second, identical valve at the site was also inspected and no defects were found.

Background: In February 2013, PG&E Diablo Canyon visual inspection discovered that both jam nuts, the spring retainer and the spring were missing from an identical valve. There were signs of one stake on the stem threads as required by the drawing however the staked thread had broken and the stake depth was minor. Flowserve evaluated the failure as required by 10 CFR 21 and the consensus of the evaluation committee was that based on history with this product and our experience with the staking of threads in general the failure was an isolated incident.

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A recommendation was provided to PG&E to torque the jam nuts prior to staking and to stake the stem thread in two locations when reassembling the valve. In addition, Flowserve factory personnel were trained on enhanced staking techniques.

Evaluation: Flowserve has completed an evaluation of the most recent failure and concluded that the root cause of the outer jam nut loosening and unscrewing from the stem, most likely is from inadequate nut tightening and staking. The original assembly drawings for the valves did not specify the required torque value and specified only one stake requirement. Based on the fact that this is the second failure of this type Flowserve no longer considers it to be an isolated incident and that it is reportable under the requirements of 10 CFR 21.

Extent of Condition: Flowserve records indicate that in addition to the PG&E Diablo Canyon site, a quantity of 5 similar valves per drawing W9925475 (Anchor Darling SO E023T-1) were supplied to the TVA Sequoyah plant from Flowserve's Williamsport, PA plant in 2000.

Corrective actions taken:

- As noted above after the initial failure, on March 7, 2013, PG&E Diablo Canyon was notified by letter to torque the jam nuts to 44 ftlbs and to stake the threads in two places when reassembling the valve.
- For future reference Assembly Drawings 07-45546-01 and W9925475 which cover the designs of the Diablo Canyon valves and a similar design used for the TVA Sequoyah Plant were revised to add jam nut torque and more detailed thread staking notes.
- In addition to the instructions given on the assembly drawing, in the future Flowserve's internal assembly instructions will include more detail regarding the torquing and staking operations.

Based on the second valve failure, Flowserve recommends that PG&E Diablo Canyon and TVA Sequoyah inspect all in service valves for proper torque and provide dual thread staking per the revised drawings.

Respectfully submitted,



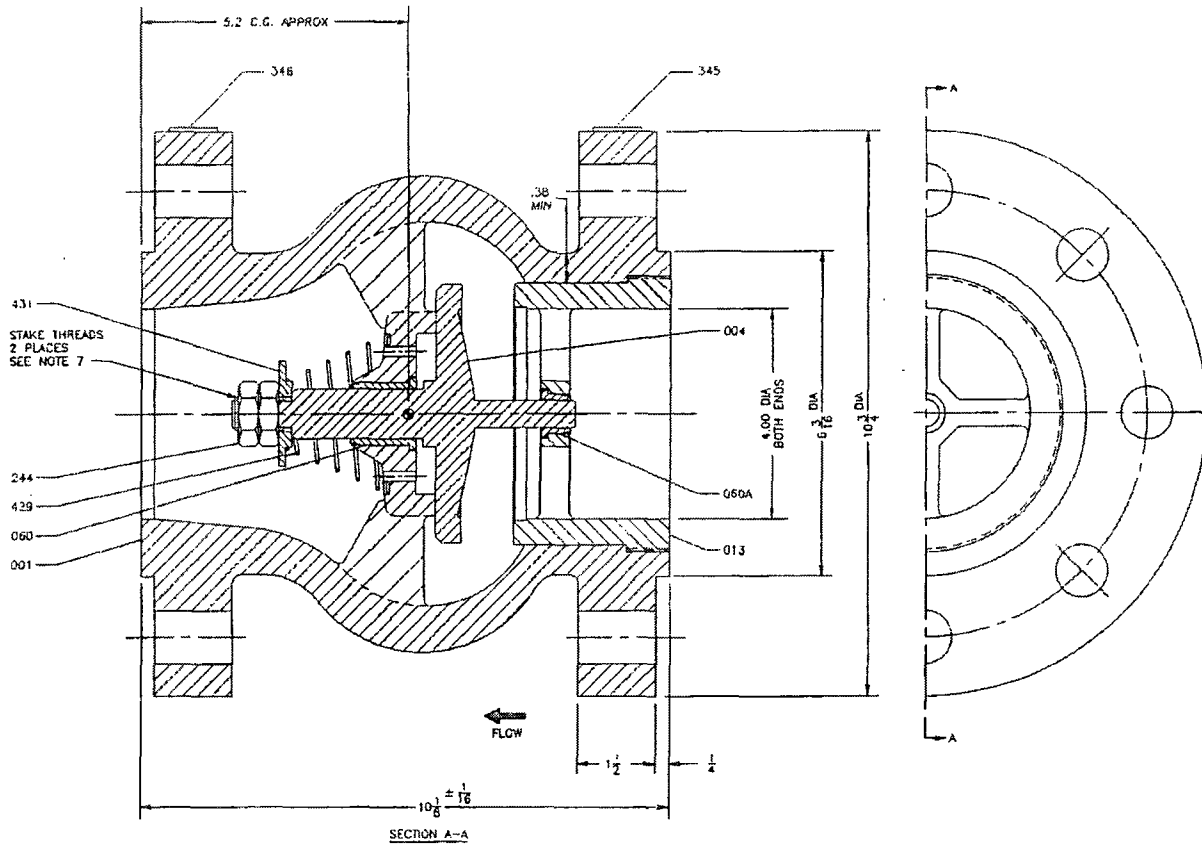
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Flow Control Division
1900 S. Saunders St.
Raleigh, NC 27603

07-45546-01

PART NO	QTY	DESCRIPTION	MATERIAL	NAT'L NOTE
001	1	BODY	SA216-WCB	5A
004	1	DISC/STEM	SA479-316L	5A
013	1	SEAT RING	SA351-CF8M	4A,6A
060	1	BUSHING (BODY)	A564-630-900	6B
060A	1	BUSHING (SEAT RING)	A564-630-900	6B
244	2	JAM NUTS	A194-2H	6B,7
345	1	NAMEPLATE	AISI 304	
346	1	IDENTIFICATION PLATE	AISI 304	
429	1	SPRING (CONICAL)	INCONEL X-750	6B
431	1	SPRING RETAINER	A479-316	6B

NOTES

- APPROX VALVE WEIGHT = 115 LBS.
- APPROX VALVE Cy = 210.
- VALVES ARE NORMALLY OPEN AND DESIGNED TO CLOSE AT < 7000 LBM/HR REVERSE SATURATED STEAM FLOW AT 85 AND 1085 PSIG.
- ALTERNATE MATERIALS:
A. SA479-316L
5. \odot DENOTES CENTER OF GRAVITY.
- SAFETY CATEGORY:
A. PRESSURE BOUNDARY.
B. SAFETY RELATED.
- TORQUE NUTS TO 44 FT-LBS. STAKE NUT THREADS IN TWO PLACES 90 TO 120 DEGREES APART TO SECURE NUT.



VALVE DESIGN SPECIFICATION: 8179 REV. 2N

PACIFIC GAS & ELECTRIC COMPANY
DIABLO CANYON POWER PLANT

VALVE IS ASME SECTION III, CLASS 3
1989 EDITION, NO ADDENDA; WITH N-STAMP

VALVE DESIGN PRESSURE IS 1085 PSIG \odot 600°F
COLD WORKING PRESSURE IS 1480 PSIG

FLOWSERVE Anchor/Deering, BWIP, Durco and Valfak Valves
Flow Control Division
RALEIGH, NC

IN-LINE CHECK VALVE
CARBON STEEL, FLANGED ENDS
NORMALLY OPEN
SIZE: 4 CLASS: 600

REV	ADDN NO.	QAP REV	BYM DATE	DVM DATE	CHKD DATE	APPR DATE	DATE	NTS	SIZE	CLASS	PART NO
B	3930-1	7	7/17/07	DKR 8/01/13	CMS 8/6/13	PRX 7/1/13					
A	3930.	1	7/17/07	DKR 9/20/07	MDC 9/21/07	MDC 9/21/07					
0	---	0	7/17/07	DKR 7/17/07	MAN 7/27/07	CHM 8/01/07					

W9925475
C 07-45546-01

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B	3930-1	7	7/17/07	DKR 8/01/13	CMS 8/6/13	PRX 7/1/13
A	3930.	1	7/17/07	DKR 9/20/07	MDC 9/21/07	MDC 9/21/07
0	---	0	7/17/07	DKR 7/17/07	MAN 7/27/07	CHM 8/01/07