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January 31, 1980

Mr. Thomas A. Ippolito, Chief
Operating Reactors - Branch 3
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2
Seismic Qualification of
Electromatic Relief Valves
NRC Docket Nos. 50-237/249
and 50-254/265

Dear Mr. Ippolito:

Attached is a report summarizing the analytical methods and results obtained in response to your inquiries regarding seismic qualifications of the Electromatic Relief Valves at Dresden and Quad Cities Stations. The contents of this response have been previously discussed with members of the NRC Staff on January 31, 1980.

If you have any additional questions concerning this matter, please contact this office.

Very truly yours,

Robert F. Janecek

Robert F. Janecek
Nuclear Licensing Administrator
Boiling Water Reactors

Attachment
1639A

A005
1/1

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An overview of the analysis performed for the electromatic valves is given here in the following:

(A) Determine the valve nozzle loads and the valve C.G. accelerations from the piping analysis.

(B) Using the loads of part (A), consider the following elements and find the stresses:

(1) Calculate the valve body stress for internal steam pressure plus $[SSE+SRV]_{ABS}$ valve nozzle loads from part (A).

(2) Using $[SSE + SRV]_{ABS}$ "g" values, find the stresses in the turnbuckle and the pilot valve tube for these "g" values applied to the extended structure C.G. in 3 directions simultaneously.

Assume a continuous solid circular cross-section of 1-1/32" O.D. for the turnbuckle. This simplifies the analysis for the loads and moments supported by the turnbuckle and pilot valve tube.

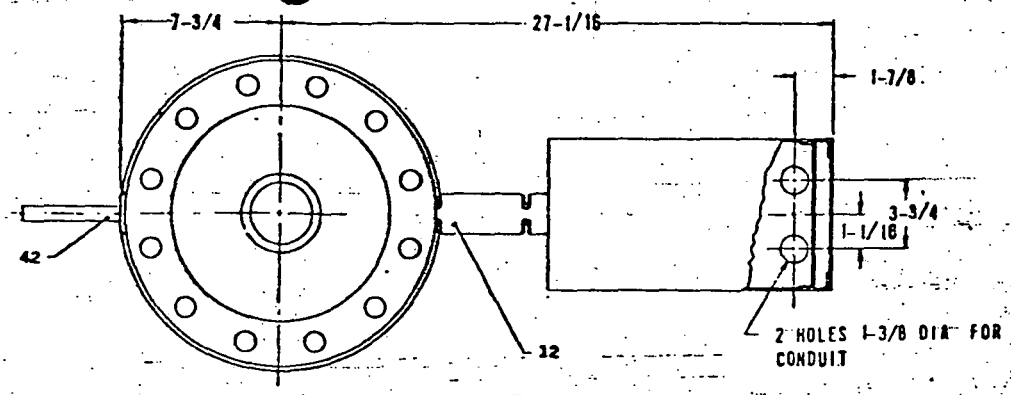
Include the internal steam pressure for the pilot valve tube.

(3) The stresses of the solenoid assembly mounting bracket hold-down bolts are calculated for the $[SSE + SRV]_{ABS}$ acceleration of the solenoid switch assembly C.G. in 3 directions simultaneously.

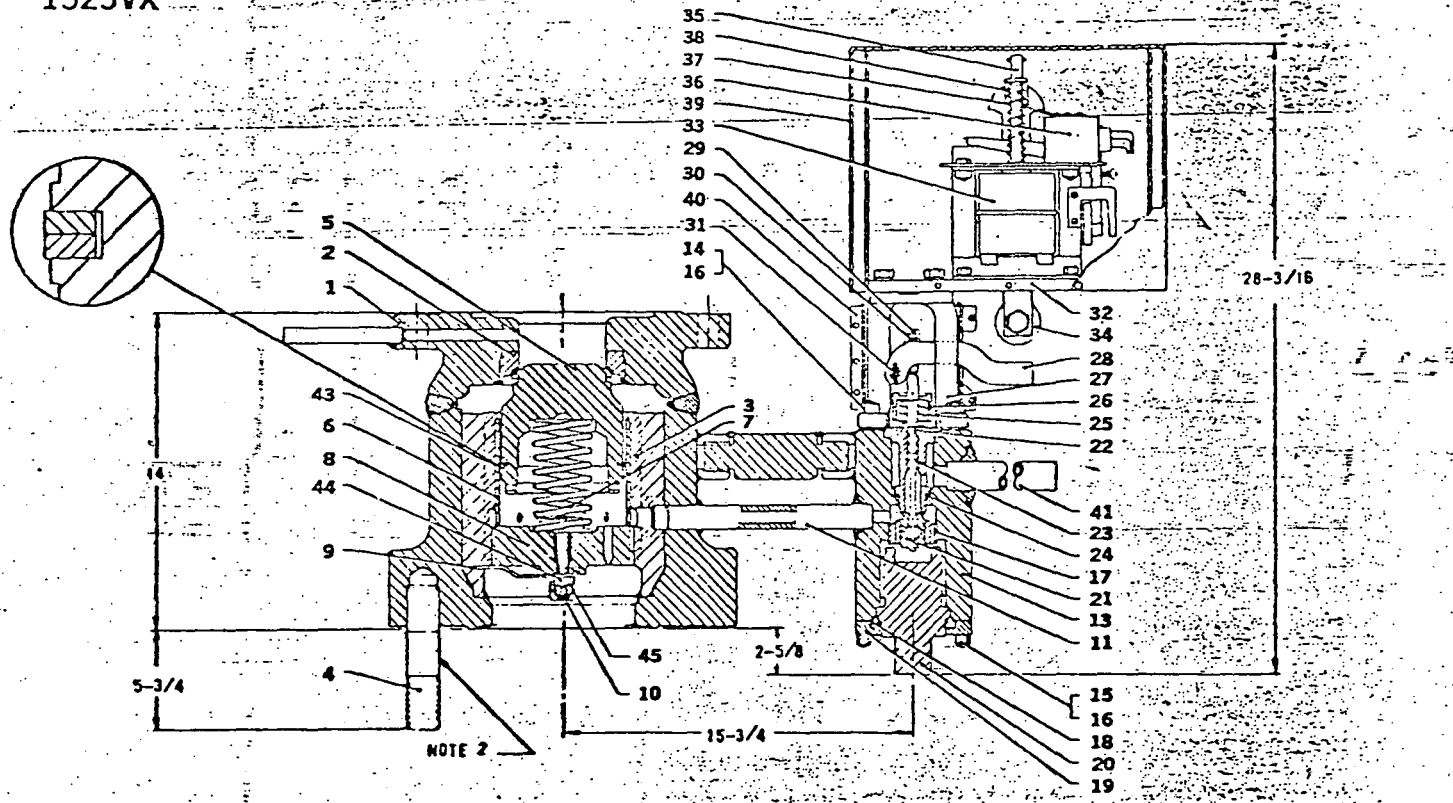
(4) The solenoid assembly mounting bolts (located at the top of the mounting bracket) are analyzed for the $[SSE + SRV]_{ABS}$ acceleration of the solenoid switch C.G. in 3 directions simultaneously.

SUMMARY OF STRESSES

Relief Valve Element	Allowable Stress at Design Temperature	Maximum Stress
1. Valve Body	$1.1S_h = 19{,}250$ psi $1.65S = 28{,}875$ psi	$\sigma_m = 1{,}533$ psi $\sigma_m + \sigma_b = 12{,}057$ psi
2. Turnbuckle	$1.0S_{yield} = 28{,}100$ psi	$\sigma = 15{,}332$ psi
3. Pilot Valve Tube	$1.0S_{yield} = 23{,}580$ psi	$\sigma = 22{,}115$ psi
4. Solenoid Assembly Mounting Bracket Hold-down Bolts	$1.0S_{yield} = 105{,}000$ psi	$\sigma = 3{,}036$ psi
5. Solenoid Assembly Mounting Bolts	$1.0S_{yield} = 105{,}000$ psi	$\sigma = 3{,}584$ psi



1525VX



MATERIALS 1525VX

PART NO.	MATERIALS
1 Base	ASTM A105 Grade II (.30 Max. C.) Carbon Steel
2 Seat Ring	ASTM A105 Grade II (.30 Max. C.) Carbon Steel — (Note 1)
3 Cage	ASTM A216 Grade WCB Carbon Steel
4 Stud	ASTM A193 Grade B-7 Alloy Steel
5 Disc	ASTM A565 Grade 616 Stainless Steel
6 Disc Guide	AMS-5387
7 Disc Spring	Inconel X-750
8 Disc Retainer	ASTM A278 Grade 414 Stainless Steel to Eng. Inst. MA-7
9 Lock Arm	ASTM A479 Type 430 Stainless Steel
10 Cap Screw	ASTM A193 Grade B7 Alloy Steel
11 Pilot Valve Tube	ASTM A106 Grade A Carbon Steel
12 Turnbuckle	ASTM A105 Grade II (.30 Max. C.) Carbon Steel
13 Pilot Base	ASTM A105 Grade II (.30 Max. C.) Carbon Steel
14 Top Stud	ASTM A193 Grade B-7 Alloy Steel
15 Bottom Stud	ASTM A193 Grade B-7 Alloy Steel
16 Stud Nuts	ASTM A194 Grade 2H Alloy Steel
17 Pilot Disc Guide	AMS-5387
18 Seal Ring	ASTM A351 Grade CF8M Stainless Steel
19 Seal Ring Retainer	ASTM A105 Grade II (.30 Max. C.) Carbon Steel
20 Pilot Plug	ASTM A182 F22 Alloy Steel
21 Pilot Disc	ASTM A565 Grade 616 Stainless Steel
22 Pilot Disc Stem	ASTM A565 Grade 616 Stainless Steel
23 Pilot Seat Bushing	Monel Alloy K-500 (Note 1)
24 Seat Bushing Gasket	AISI 304 Stainless Steel — Asbestos Filled

PART NO.	MATERIALS
25 Pilot Spring	AISI 302 Stainless Steel
26 Spring Cover	AISI 303 Stainless Steel
27 Solenoid Bracket	ASTM A216 Grade WCB Carbon Steel — Zinc Plated
28 Operating Lever	ASTM A27 Grade N-1 Carbon Steel — Zinc Plated
29 Adjusting Screw	AISI 416 Stainless Steel
30 Lock Nut	Carbon Steel — Zinc Plated
31 Lever Pin	Carbon Steel — Zinc Plated
32 Solenoid Plate	AISI C1019 Carbon Steel — Zinc Plated
33 Solenoid	
34 Solenoid Plunger Head	AISI C1018 Carbon Steel
35 Plunger Assembly	
Guide Plate	ASTM A109 Carbon Steel
Spring Guide	ASTM A135 Alloy No. 4 Brass
36 Unimax Switch	
37 Plunger Spring	Carbon Steel
38 Spring Bracket	ASTM A109 Carbon Steel
39 Solenoid Cover	Carbon Steel
40 Bracket Cover	Carbon Steel
41 Pilot Valve Vent	ASTM A106 Grade A Carbon Steel
42 Drain Extension	ASTM A105 Grade A Carbon Steel
43 Piston Rings	AISI 420 Stainless Steel (30 R/C Max.)
44 Castle Nut	ASTM A194 Grade 2H Alloy Steel
45 Cotter Pin	ASTM A479 Type 316 Stainless Steel

NOTES: 1. AWS-A5.13-RcoCr-A Seating Surface.
2. Studs are equally spaced to straddle center line and not on center line as shown.

Capacity Tables Shown on Page 25.
Outlet Reaction Chart Shown on Page 8