

WCAP 8587

"Equipment Qualification Data Packages"

Supplement 1

EQDP-ESE-2

Pressure Transmitters: Qualification Group B

Revision 5

Instruction Sheet

The following instructional information and checklist is being furnished to help insert the following into WCAP-8587 Supplement 1 EQDP-ESE-2 Class 3 (Non-Proprietary). Discard the old sheet and insert the new sheets as listed below. Revised information is indicated by a bar and number 5 on the outside margin of the page.

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EQUIPMENT QUALIFICATION DATA PACKAGE

This document contains information, relative to the qualification of the equipment identified below in accordance with the methodology of WCAP-8587. The Specification section (Section 1) defines the assumed limits for the equipment qualification and constitute interface requirements to the user.

Pressure Transmitters: Qualification Group B

APPROVED:

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SECTION 1 - SPECIFICATIONS

1.0 PERFORMANCE SPECIFICATIONS

1.1 Electrical Requirements

- 1.1.1 Voltage: 40 VDC \pm 1V
- 1.1.2 Frequency: N/A
- 1.1.3 Load: 4 - 20 ma
- 1.1.4 Electromagnetic Interference: None.
- 1.1.5 Other: None

1.2 Installation Requirements: Mounted as per References 1 and 3. (See Westinghouse drawing 8765 D65 Revision 3 (Barton) and 8765 D66 Revision 4 (Veritrak))

1.3 Auxiliary Devices: None

1.4 Preventative Maintenance Schedule: As a result of the completion of the Westinghouse Aging Evaluation Program (Phase 1, Short Term Aging described in WCAP-8587 and discussed in WCAP-8687-Supplement 2, Appendix A1 (Component Aging) Reference 4 and Appendix A2 (Materials Aging) Reference 5 Proprietary, no preventive maintenance is required to support the equipment qualified life. This does not preclude development of a preventive maintenance program designed to enhance equipment performance and identify unanticipated equipment degradation as long as this program does not compromise the qualification status of the equipment. Surveillance activities may also be considered to support the basis for/and a possible extension of the qualified life.

1.5 Design Life: 40 years

1.6 Operating Cycles (Expected number of cycles during design life, including test): continuous duty.

1.7 Performance Requirements for^(b): Turbine Inpulse Chamber Pressure

Parameter	Normal Conditions	Abnormal Conditions	Containment Test Conditions	DBE Conditions ^(a)				Post DBE Conditions ^(a)	
				FLB/SLB	LOCA	Seismic	FLB/SLB	LOCA	Seismic
1.7.1 Time requirement	Continuous	Included under normal	N/A	N/A	N/A	Event duration	N/A	N/A	Continuous
1.7.2 Performance ^(c) requirement	$\pm 1.0\%$ 0.4 sec					$\pm 11\%$ ^(d) 0.4 secs			$\pm 1.0\%$ 0.4 secs

1.8 Environmental conditions for Same Function^(b)

1.8.1 Temperature ($^{\circ}\text{F}$)	50 - 120	Included under normal	Ambient						ambient
1.8.2 Pressure (psig)	0					0			0
1.8.3 Humidity (% RH)	0 - 95					ambient			ambient
1.8.4 Radiation (R)	< 400					None			None
1.8.5 Chemicals	None					None			None
1.8.6 Vibration	None					None			None
1.8.7 Acceleration (g)	None					None			None
						Fig. 1			

NOTES: (a) DBE is the Design Basis Event

(b) Margins are not included in the parameters specified in this section

(c) Reference accuracy (maximum normal temperature) and time response specified.

(d) Reference accuracy $\pm 10\%$ deviation during event

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1.9 Qualified Life: The Westinghouse Aging Evaluation program has demonstrated a qualified life of (5) five years. The qualified life due to radiation service is dependent on the location of the transmitter (example: 10^4 R/year yields a 10 year qualified life). Also see Table 1.

1.10 Remarks: None

SECTION 2 - QUALIFICATION BY TEST

2.0 TEST PLAN

4 | Seismic testing was performed in the testing laboratory at Westinghouse Advanced Energy Systems Division (AESD) in Large, Pa.

2.1 Equipment Description: Barton and Veritrak Pressure Transmitters
(See Section 2.10.2)

2.2 Number Tested: Three (3) Barton Units
Six (6) Veritrak Units

2.3 Mounting: As described in References 1 and 3.

2.4 Connections: a) Electrical Connections, Two Wires,
b) Process Connections, Capillary Tube

2.5 Aging Simulation Procedure

4 | By a separate component test program as described by Subprogram C of Appendix B to WCAP-8587 and reported in Reference 4.

Aging Evaluation Program described in Appendix B to WCAP 8587. and reported in References 4 and 5.

4

2.10.3 Test Summary

2.10.3.1 Normal Environment Testing

Westinghouse requires that the Qualification Group B Pressure Transmitters be located such that they does not experience a consequent adverse environment when required to operate following a high energy line break either inside or outside containment. Therefore the only testing required is to demonstrate equipment capability under normal and abnormal service conditions (temperature, humidity, and A.C. Power Voltage and frequency).

4

Reference 2 summarizes the results of available radiation testing of organic and inorganic materials and justifies that, for radiation doses less than 10^4 rads, no deterioration in material structural properties is detectable. For equipment not containing teflon, 10^5 is an acceptable table threshold. As a consequence, a radiation simulation is not required on this equipment, since estimated in-service radiation doses will not prejudice the cability of the equipment to perform under design basis event (i.e., seismic event) conditions.

5

Westinghouse requires a calibration at 80°F and 130°F on every production unit. Peak to peak noise, time response and ability to meet performance requirements at 95% RH have been verified by type test.

2.10.3.2 Seismic Tests

5 | The single design basis event capable of producing an adverse environment at the equipment location is a seismic event. The seismic testing reported in References 1 and 3 was completed on new equipment employing multi-axis multi-frequency inputs in accordance with Reg. Guide 1.100 (IEEE-344-1975). The generic required response spectra (Figures 1a thru 1c) contains significant margin with respect to any single plant application referencing this program⁽¹⁾.

2.10.3.3 Aging Evaluation

The Westinghouse Aging Evaluation Program (Appendix B, WCAP 8587) and References 4 and 5 has incorporated a representative sample of components from the Qualification Group B Pressure Transmitters. The objective of the program is to demonstrate that during the qualified life there are no in-service aging mechanisms capable of reducing the capability of the Qualification Group B Pressure Transmitters to perform during or after a seismic event. As a consequence, the seismic testing on the un-aged transmitters described above, is not prejudiced by any in-service aging mechanism.

2.10.4 Conclusion

The currently demonstrated qualified life of the Qualification Group B Pressure Transmitters is 5 years. Westinghouse is planning an extension of the Westinghouse Aging Evaluation Program to increase the demonstrated qualified life. The results of the aging

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program, together with the seismic and environmental testing described herein, demonstrate the qualification of the Group B Pressure Transmitters employing the practices recommended by Reg. Guide 1.89 and 1.100.

2.11 Section 2 Notes

- (1) The generic tests completed by Westinghouse employ parameters designed to envelope a number of plant applications. Margin is a plant specific parameter and will be established by the applicant.

2.12 References

1. McElhaney, D. L., R. B. Miller "Equipment Qualification Test Report Pressure Transmitters - Qualification Group B (Seismic Design Verification Testing)" WCAP-8687 Supp 2-E02A (Proprietary), May 1980.
2. WCAP-8587 (Non-Proprietary), January 1981, Appendix C, "Effects of Gamma Radiation Doses Below 10^4 Rads on the Mechanical Properties of Materials,".
3. Skeers, D. M., "Equipment Qualification Test Report Pressure Transmitters - Qualification Group B (Seismic Design Verification Testing) WCAP-8687 Supp. 2-E02B (Proprietary), March 1981.
4. Jabs, R., Parello, J., Huang, J., Yalich, M., "Equipment Qualification Test Report Short Term Component Aging Test Program," WCAP-8687, Supplement 2, Appendix A1 (Proprietary), March 1981.
5. "Equipment Qualification Test Report Materials Aging Analysis", WCAP-8687, Supplement 2, Appendix A2 (Proprietary), March 1981.

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SECTION 3 QUALIFICATION BY EXPERIENCE

5

Westinghouse does not employ operating experience in support of the qualification program for the Pressure Transmitters - Qualification Group B.

SECTION 4 QUALIFICATION BY ANALYSIS

5

A review of materials utilized in the Barton model 753 and Veritrak model 76PG1 pressure transmitters has been performed. Since teflon is not used in these transmitters a radiation life of 10^5 R is applicable based on the radiation analysis documented in Reference 2.

TABLE 1

ACTUAL QUALIFICATION TEST CONDITIONS

EQUIPMENT (1) SYSTEM/CATEGORY	LOCATION STRUCTURE/AREA	MANUFACTURER TYPE/MODEL	ABNORMAL/ACCIDENT ENVIRONMENTAL EXTREMES			OPERABILITY		ACCURACY(%)		QUAL	QUAL	QUAL	QUAL
			PARAMETER	SPECIFIED (2)	QUALIFIED	REQ	DEM	REQ	DEM	LIFE	METHOD	REF	STATUS
Turbine pres- sure trans- mitter/ RPS/ Category d	Turbine building	Barton	Temperature		130 ⁰ F	Con-	Con-	+1	+1	5	Seq.	ESE-	Completed
		753:	Pressure		Atmos.	tinu-	tinu-			yrs.	Test	2	
		and	Rel. humidity		95%	ous	ous			(3)			
		Veritrak	Radiation		>10 ⁵ R(γ)								
		76PG1	Chemistry		None								
Steamline Pressure transmitter RPS/PAMS/ Category d	Auxiliary Bldg.	Barton	Temperature		130 ⁰ F	Con-	Con-	+1	+	5	Seq.	ESE-	Completed
		753	Pressure		Atmos.	tinu-	tinu-			yrs.	Test	2	
		and	Rel. humidity		95%	ous	ous			(3)			
		Veritrak	Radiation		>10 ⁵ R(γ)								
		76PG1	Chemistry		None								

NOTES:

- For definition of the category letters, refer to NUREG 0588 "Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," Appendix E, Section 2.
- Plant specific environmental parameters are to be inserted by the applicant.
- Phase I of the Westinghouse Aging Evaluation Program as described in WCAP-8587 Appendix B will establish a qualified life of at least 5 years for this equipment, Phase II of this program will extend the qualification life to a maximum of 20 years or as far as is achievable.

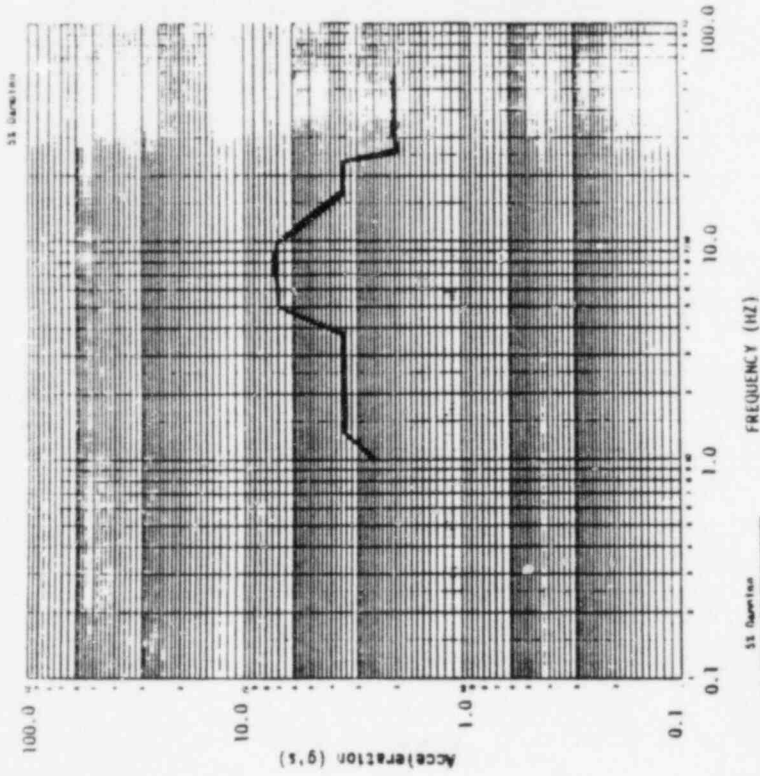


FIGURE 1A REQUIRED RESPONSE SPECTRUM
FOR SAFE SHUTDOWN EARTHQUAKE (INPUT A)

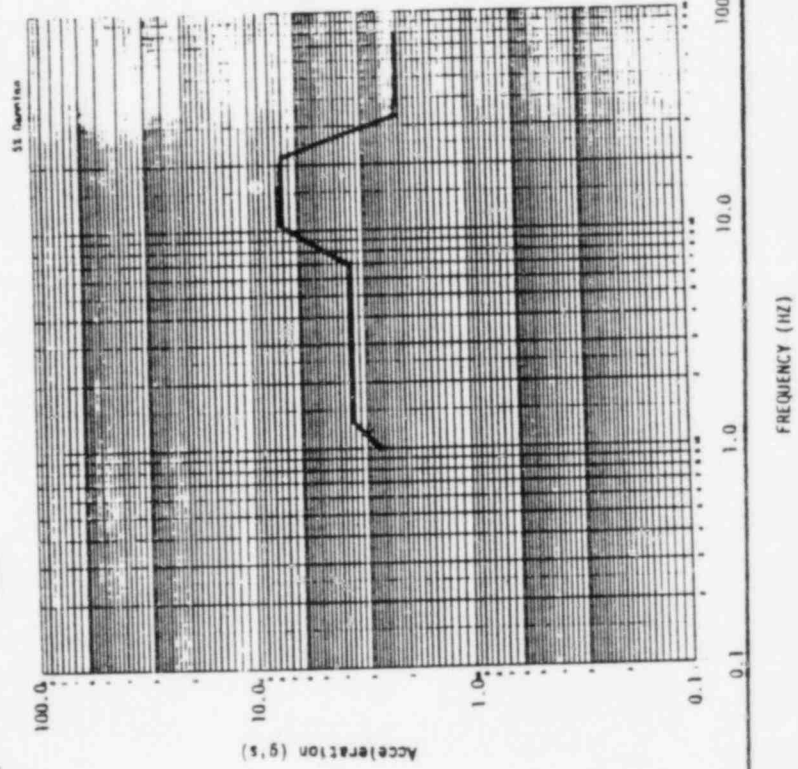


FIGURE 1B PROVIDED RESPONSE SPECTRUM
FOR SAFE SHUTDOWN EARTHQUAKE (INPUT B)

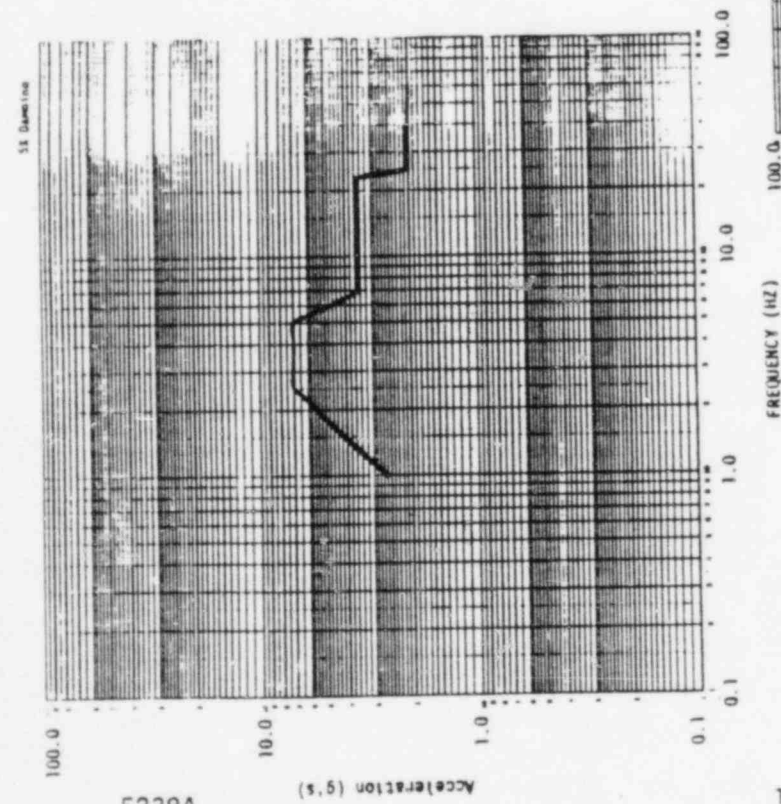


FIGURE 1C REQUIRED RESPONSE SPECTRUM
FOR SAFE SHUTDOWN EARTHQUAKE (INPUT C)