



**Attachments to Appendix 3D**

**3D Attach A Sample Equipment Qualification Data Package (EQDP)**

EQ FILE \_\_\_\_\_

REVISION \_\_\_\_\_

Manufacturer  
Product  
Model Number

Prepared	_____	Date	_____
Reviewed	_____	Date	_____
Approved	_____	Date	_____

Revision Control Summary

PAGE(S) INVOLVED

BASIS FOR CHANGE

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TABLE OF CONTENTS

<u>DESCRIPTION</u>	<u>TAB</u>
Qualification Summary	A
References (optional)	B
Equipment Identification	C
Checklist for Environmental Qualification Data Package (EQDP)	D
Supplements (Component Unique Checklists)	D
Engineering Justification and Analysis (optional)	E
Figures (optional)	F
EQ Installation/Interface, Maintenance and Condition Monitoring Requirements and Recommendations	G
Qualification Documents (optional)	H
Miscellaneous Documents and Correspondence (optional)	I
Evaluation of NRC Generic Letters and Bulletins (optional)	J

TAB A

QUALIFICATION SUMMARY



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QUALIFICATION SUMMARY

1 QUALIFICATION SUMMARY

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2 PRINCIPAL QUALIFICATION DOCUMENTATION

Title/Number/Revision \_\_\_\_\_  
DATE \_\_\_\_\_

Title/Number/Revision \_\_\_\_\_  
DATE \_\_\_\_\_

Title/Number/Revision \_\_\_\_\_  
DATE \_\_\_\_\_

3 QUALIFICATION CRITERIA:

Criteria used to demonstrate qualification is in accordance with the following (indicate documents that are applicable):

10CFR50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants".

IEEE Std 323 (1974) - "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations."

Other. Specify



TAB B

REFERENCES (OPTIONAL)

TAB C

EQUIPMENT IDENTIFICATION





TAB D

CHECKLIST FOR

ENVIRONMENTAL QUALIFICATION

DATA PACKAGE (EQDP)

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CHECKLIST FOR ENVIRONMENTAL QUALIFICATION DATA PACKAGE (EQDP)

1 QUALIFICATION METHODOLOGY

1.1 Description of Methodology: \_\_\_\_\_

1.2 Does the qualification report state that the qualification method conforms to IEEE Std 323 (1974) or an IEEE "daughter" standard? \_\_\_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

1.3 If analysis was performed in lieu of testing:

1.3.1 Was justification provided? \_\_\_ Reference: \_\_\_\_\_

Identify analysis performed: \_\_\_\_\_

1.3.2 Was partial type test data provided to support the analytical assumptions and conclusions? \_\_\_ Reference: \_\_\_\_\_

1.3.3 Were equipment performance requirements identified? \_\_\_ Reference: \_\_\_\_\_

1.3.4 Were specific features and failure modes and effects analyzed? \_\_\_  
Reference: \_\_\_\_\_

1.3.5 Were assumptions and mathematical models used together with appropriate justification for their use? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

1.4 When test data or operating experience data have been extrapolated, has the basis been appropriately identified and justified? \_\_\_ Reference: \_\_\_\_\_

Identify extrapolated data: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

**2 COMPARISON OF INSTALLED EQUIPMENT TO QUALIFIED EQUIPMENT**

Is the equipment identified in the qualification program identical to the plant equipment that requires qualification? \_\_\_\_

		PLANT DEVICE	QUALIFIED DEVICE	QUALIFICATION REFERENCE
2.1	Equipment Type			
2.2	Manufacturer			
2.3	Model Number(s)			
2.4	Serial Number(s)			

2.5 Identify Component-Unique check sheet attached (See Supplements 1–4):

COMMENTS: \_\_\_\_\_

**3 MATERIALS ANALYSIS**

Identify the materials susceptible to significant thermal and/or radiation degradation and aging (Use Tab E of Binder for Detailed Materials Analysis)

MATERIAL	PROPERTY	FUNCTION	RADIATION THRESHOLD	REFERENCE	ACTIVATION ENERGY	REFERENCE

COMMENTS: \_\_\_\_\_

4 TEST SEQUENCE

4.1 Test Sequence: Was the test sequence established to simulate the accident environment in accordance with IEEE Std 323 (1974), paragraph 6.3.1.7? \_\_\_ (note below)

	RELATIVE ORDER/ NO/NA	REFERENCE
4.1.1 Test sample inspected for damage:		
4.1.2 Baseline functional tests performed under normal conditions		
4.1.3 Test sample operated at extremes of all performance, operating, surge voltages and electrical characteristics given in equipment specifications, excluding DBE and post DBE events.		
4.1.4 Equipment aged:		
Thermal:		
Radiation:		
Wear:		
4.1.5 Test sample subjected to specified nonseismic mechanical vibration		
4.1.6 Test sample subjected to simulated OBE and safe shutdown earthquake (SSE) seismic vibration in accordance with IEEE Std 344 (2004)		
4.1.7 Test sample performs required safety function(s) while exposed to simulated Design Basis Event (DBE) exposure:		
4.1.8 Test sample performs required safety function(s) while exposed to simulated Post-DBE exposure:		
4.1.9 Post test final inspection and disassembly of test sample		

COMMENTS: \_\_\_\_\_

4.2 Was the same piece of equipment used throughout the test sequence described in question 4.1 above? \_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

4.3 Have the test equipment, test equipment accuracies and calibration data been appropriately documented? \_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

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5 NORMAL SERVICE CONDITIONS QUALIFICATION

5.1 Qualified Life Basis:

Limiting Parameter Reference

COMMENTS: \_\_\_\_\_

5.2 Were all known synergistic effects that are believed to have a significant effect on equipment performance considered in the aging program? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

5.3 Thermal Aging:

5.3.1 Was thermal aging considered in the qualification program? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

5.3.2 Was the basis for thermal aging identified in the qualification program? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

5.3.3 Was the aging acceleration rate justified and were the parameters of time and temperature identified in the qualification program? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

5.3.4 Identify the methodology used for thermal aging analyses.

COMMENTS: \_\_\_\_\_

5.3.5 Was the equipment operated during the thermal aging? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

5.3.6 Were process interface environments considered during the thermal aging? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

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5.4 Radiation Aging Exposure:

5.4.1 Was radiation aging exposure considered in the qualification program? \_\_\_  
Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

5.4.2 Was the basis for radiation aging exposure identified in the qualification program?  
\_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

5.4.3 Is the radiation test exposure dose and dose rate acceptable? \_\_\_ Reference:  
\_\_\_\_\_

COMMENTS: \_\_\_\_\_

5.5 Special environmental calculations (e.g., temperature, radiation)

Type                      Reference

5.6 Vibration (non-seismic) Aging:

5.6.1 Were the effects of nonseismic vibrations induced during normal and abnormal  
operation addressed in the qualification program? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

5.6.2 Was the basis for vibration aging identified and justified in the qualification  
program? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

5.7 Operational Stress Aging:

5.7.1 Were the effects of electrical, mechanical, and process operational stresses  
induced during normal and abnormal operation addressed in the qualification  
program? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

5.7.2 Was the basis for stresses induced during operational aging identified and  
justified in the qualification program? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_



6 ACCIDENT SERVICES CONDITIONS QUALIFICATION

6.1 Do the test values of the qualification program envelop the plant specific requirements?  
 \_\_\_\_\_

6.1.1 Function Time

Required Function Time (duration vs. test)	Plant Application and Service Conditions	Qualification Documentation	Report Section
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COMMENTS: \_\_\_\_\_

6.1.2 Accident Profile

	Plant Application and Service Conditions	Qualification Documentation	Report Section
Rate of temperature/ pressure increase			
Peak: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			
Decrease To: °F/Psig/RH/Time			

COMMENTS: \_\_\_\_\_



6.1.3 Radiation

	Plant Application and Service Conditions	Qualification Documentation	Report Section
Radiation qualification method	NA		
Equipment susceptible to beta radiation			
Radiation type			
Accident radiation dose rate (rad/hr)			
Accident radiation dose (rad)			
COMMENTS: _____			

6.1.4 Spray and Submergence

	Plant Application and Service Conditions	Qualification Documentation	Report Section
Spray qualification method (test/analysis)			
Pressure at time of spray Introduction			
In-leakage considered			
Corrosion considered			
Spray composition (in ppm and % solution by weight)			
Submergence duration			
Time to submergence			

COMMENTS: \_\_\_\_\_

6.2 Special environmental calculations (temperature, radiation, etc.)

<u>Type</u>	<u>Reference</u>
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6.3 Was margin applied to the test parameters or otherwise addressed in the test program to assure that normal variation and uncertainties are accounted for? \_\_\_\_

Suggested Margin According to IEEE Std 323 (1974)	Margin Applied	Reference
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Temperature: +15°F

Pressure: +10% of gauge

Radiation: +10% of accident dose

Operating Time: +10% of the period of time the equipment is required to operate following the start of the design basis event or 2 hours.

Voltage: ±10% of rated value, but not to exceed equipment design limits

Frequency: ±5% of rated value, but not to exceed equipment design limits

Vibration: +10% added to acceleration requirements at the mounting point of the equipment.

COMMENTS:\_\_\_\_\_

6.4 For equipment that is required to perform its safety function within a short time following an accident, was the equipment qualified for at least 2 hours? \_\_\_\_ Reference: \_\_\_\_  
COMMENTS:\_\_\_\_\_

6.4.1 If equipment is to operate in the short term, does the test discuss the long-term equipment failure modes? \_\_\_\_ Reference: \_\_\_\_\_

6.5 Is the equipment subject to moisture or liquid intrusion that can affect the performance of the equipment under design basis event conditions? \_\_\_\_ Reference: \_\_\_\_  
COMMENTS:\_\_\_\_\_

6.6 Was process/component induced temperature rise considered during DBE testing? \_\_\_\_  
Reference: \_\_\_\_\_  
COMMENTS:\_\_\_\_\_



7 PERFORMANCE AND OPERABILITY EVALUATION

- 7.1 Identify the safety function(s) of the equipment: \_\_\_\_\_
- 7.2 Acceptance Criteria: Does the report/analysis identify the limiting values of performance characteristics, which would constitute failure if not met? \_\_\_ Reference: \_\_\_\_\_  
Identify Acceptance Criteria: \_\_\_\_\_  
COMMENTS: \_\_\_\_\_
- 7.3 Performance Characteristics: Does the report/analysis provide the performance characteristics for the equipment, which should be verified before, after, and periodically during the test to judge equipment performance? \_\_\_ Reference: \_\_\_\_\_  
Identify baseline and functional testing: \_\_\_\_\_  
COMMENTS: \_\_\_\_\_
- 7.4 Does the qualification report/analysis describe loads (or load combinations) applied during DBE test? \_\_\_ Reference: \_\_\_\_\_  
COMMENTS: \_\_\_\_\_
- 7.5 Do the applied loads during baseline testing reflect normal operating conditions? \_\_\_  
Reference: \_\_\_\_\_  
COMMENTS: \_\_\_\_\_
- 7.6 Identify electrical characteristics necessary for the equipment performance specifications to be satisfied.

Parameter	Specific Accident Conditions	Reference	Demonstrated Conditions	Reference
Voltage				
Load				
Frequency				
Accuracy				
Other(s)				
COMMENTS:	_____			

- 7.7 Did the equipment perform its intended function during and after the simulated design basis event exposure? \_\_\_ Reference: \_\_\_\_\_  
COMMENTS: \_\_\_\_\_
- 7.8 Did the test demonstrate the operability requirements for the required time interval for that the equipment is required to operate? \_\_\_ Reference: \_\_\_\_\_  
COMMENTS: \_\_\_\_\_

8 ANOMALIES

Abnormal Conditions: Were abnormal conditions or anomalies properly addressed and resolved? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

9 INSTALLATION/INTERFACES REQUIREMENTS AND RECOMMENDATIONS

List all interfaces pertinent to EQ identified in the test report or evaluation and reference the source.

9.1 REQUIREMENTS

Interface	Vendor Requirement	Basis Reference	Plant Requirement	Reference
Mounting Bolts External Process Connections Electrical Connections Mechanical Connections Conduit Seals Connector Seals Orientation Physical Configuration Other				

COMMENTS: \_\_\_\_\_

9.2 RECOMMENDATIONS

Interface	Vendor Recommendation	Basis Reference	Plant Recommendation	Reference
Mounting Bolts External Process Connections Electrical Connections Mechanical Connections Conduit Seals Connector Seals Orientation Physical Configuration Other				

COMMENTS: \_\_\_\_\_

10 MAINTENANCE AND CONDITION MONITORING REQUIREMENTS AND RECOMMENDATIONS

10.1 REQUIREMENTS

Maintenance	Vendor Requirement	Basis Reference	Plant Requirement	Reference
	1			
	2			
	3			
	4			
Condition Monitoring				
	1			
	2			
	3			
	4			

COMMENTS: \_\_\_\_\_



10.2 RECOMMENDATIONS

Maintenance	Vendor Recommendation	Basis Reference	Plant Recommendation	Reference
	1			
	2			
	3			
	4			
Condition Monitoring				
	1			
	2			
	3			
	4			

COMMENTS: \_\_\_\_\_

SUPPLEMENT 1

COMPONENT-UNIQUE CHECKLIST

MOTORS

A. EQUIPMENT IDENTIFICATION

- (1) Is the motor identified in the qualification report identical to the plant motors that require qualification? \_\_\_\_\_

Item	Plant	Report	Acceptable	Report Section
(a) Insulation system materials				
(b) Coil construction (form or random wound, cast)				
(c) Insulation class (B, F, H)				
(d) Lubricant: Manufacturer				
Type				
(e) Bearing: Manufacturer				
Type				
(f) Seals: Manufacturer				
Type				
Material				
(g) Motor lead insulation				
(h) Plant Motor Operating Characteristics:				
RPM				
Load HP				
Configuration				
Duty				

COMMENTS: \_\_\_\_\_

- (2) Was a motorette or formette used in the qualification program? \_\_\_\_\_

If so, explain any differences between the motorette or formette system and the plant motor.

COMMENTS: \_\_\_\_\_

SUPPLEMENT 2

COMPONENT-UNIQUE CHECKLIST

CABLES/SPLICES

A. EQUIPMENT IDENTIFICATION

- (1) Are the cables (splices) identified in the qualification program identical to the plant cables (splices) that require qualification?

Item	Plant	Report	Acceptable	Report Section
(a) Conductor				
Insulation:				
Material				
Size				
Stranding				
Coating				
Insulation Thickness				
Number of conductors				
Arrangement of conductors				
(b) Shielding				
(c) Insulation jacket:				
Material				
Thickness				
Construction Method				
(d) Outer jacket:				
Material				
Thickness				
(e) Rated voltage				
(f) Rated current				

SUPPLEMENT 2

COMPONENT-UNIQUE CHECKLIST

CABLES/SPLICES

A. EQUIPMENT IDENTIFICATION (Continued)

Item	Plant	Report	Acceptable	Report Section
(g) Operating temperature rating: Normal				
Emergency				
Short circuit				
(h) Insulation resistance				
(i) Splice: Material				
Thickness				
Identification				

COMMENTS: \_\_\_\_\_

- (2) Does the qualification program adequately address temperature and moisture resistance? \_\_\_ Reference: \_\_\_\_\_

COMMENTS: \_\_\_\_\_

- (3) Was the cable subjected to a mandrel bend or voltage withstand test? \_\_\_  
Reference: \_\_\_\_\_

SUPPLEMENT 2

COMPONENT-UNIQUE CHECKLIST

CABLES/SPLICES

B. CABLE PERFORMANCE

- (1) For cables subjected to LOCA/HELB simulation testing provide the following cable performance characteristics:

Reference

Cable Specimen Number

Test Cable Length

Applicable Plant Cable Codes

Applicable Plant Applications

- (2) Test Data:

Parameter	Test Data (units)*	Reference	Normalized Test Data (ohms-1000FT)	Normalized Data Corrected for Wall Thickness (ohms-1000FT)	R <sub>CS</sub> (ohms-1000FT)	R <sub>CC</sub> (ohms-1000FT)
Baseline						
Post Thermal Aging						
Pre-LOCA						
LOCA (0-1 h)						
LOCA (1-6 h)						
LOCA (8 h - 24 h)						
LOCA (24 h - end)						
Post-LOCA						

\* Record the lowest IR value or the highest leakage current.

R<sub>CS</sub> = Resistance for Conductor to Shield.

R<sub>CC</sub> = Resistance for Conductor to Conductor

COMMENTS: \_\_\_\_\_

SUPPLEMENT 2

COMPONENT-UNIQUE CHECKLIST

CABLES/SPLICES

(3) Test Loading:

	Value	Reference
Cable test loads: Voltage		
Current		
Period energized		
Voltage withstand test: Voltage		
Leakage current		

COMMENTS: \_\_\_\_\_

C. INSTRUMENT CABLE IDENTIFICATION

Component	Scheme Number	Location

SUPPLEMENT 3

COMPONENT-UNIQUE CHECKLIST

ELECTRICAL PENETRATIONS

A. EQUIPMENT IDENTIFICATION

- (1) Are the penetrations identified in the qualification program identical to the plant penetrations that require qualification? \_\_\_\_

Item	Plant	Report	Acceptable	Report Section
(a) Penetration type				
(b) Mounting				
(c) External connections COMMENTS:_____				

- (2) Does the qualification report identify the following performance characteristics?

Performance Characteristics	Acceptable	Report Section
(a) Temperature rating		
(b) Voltage rating		
(c) Continuous current rating		
(d) Short-time overload current rating & duration		
(e) Rated short circuit current & duration		
(f) Pressure rating		
(g) Maximum gas leakage rate COMMENTS:_____		

SUPPLEMENT 3

COMPONENT-UNIQUE CHECKLIST

ELECTRICAL PENETRATIONS

A. EQUIPMENT IDENTIFICATION (Continued)

(3) Does the qualification program address the following tests?

Item	Acceptable	Report Section
(a) Continuous current rating		
(b) Short-time overload current rating and duration		
(c) Short circuit current rating and duration		
(d) Rated maximum duration of rated short circuit current		
(e) Pneumatic pressure rating		
(f) Maximum gas leakage rate		
(g) Conductor continuity		
(h) Dielectric strength		
(i) Impulse		
(j) Insulation resistance		
(k) Flame		

COMMENTS: \_\_\_\_\_



## SUPPLEMENT 4

## COMPONENT-UNIQUE CHECKLIST

## TRANSMITTERS

A. TRANSMITTER PERFORMANCE

Provide the following transmitter accuracy data:

Transmitter Model \_\_\_\_\_

Parameter	Accuracy	Reference
Baseline		
Post-Thermal Aging		
Radiation Aging		
Post-Radiation Aging		
Seismic		
Pre-LOCA		
LOCA (0-24 hrs)		
LOCA (24 hrs to end)		
Post-LOCA		
COMMENTS: _____		

TAB E

ENGINEERING JUSTIFICATION AND ANALYSIS (OPTIONAL)

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(Suggested Headings)

1. Documentation
2. Qualification Summary
3. Qualification Criteria
4. Qualification Methodology
5. Comparison of Installed Equipment to Qualified Equipment
6. Required Operating Environment
7. Materials Analysis
8. Test Sequence
9. Normal Service Conditions Qualification
  - 9.1 Thermal Aging
  - 9.2 Radiation Aging
  - 9.3 Vibration (Non-Seismic) Aging
  - 9.4 Operational Stress Aging
10. Accident Service Conditions Qualification
  - 10.1 Function Time
  - 10.2 Accident Profile
  - 10.3 Radiation
  - 10.4 Spray and Submergence
11. Performance Requirements, Acceptance Criteria, and Operability Evaluation
12. Anomalies
13. Installation Evaluation
14. Maintenance and Surveillance
15. Deviation Justification

TAB F

FIGURES (OPTIONAL)



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FIGURES

## TAB G

EQ QUALIFICATION INSTALLATION, INTERFACE, MAINTENANCE,  
AND CONDITION MONITORING REQUIREMENTS AND RECOMMENDATIONS

	Requirements (Yes/No)	Recommendations (Yes/No)
EQ Installation		
EQ Interface		
EQ Maintenance		
EQ Condition Monitoring		

	Requirements				
Description	Basis Requirements	Exceptions	Basis Reference	Implementation	Basis Reference
<u>Installation/Interfaces</u>					
<u>Maintenance</u>					
<u>Condition Monitoring</u>					

	Recommendations				
Description	Basis Recommendation	Exceptions	Basis Reference	Implementation	Basis Reference
<u>Installation/Interfaces</u>					
<u>Maintenance</u>					
<u>Condition Monitoring</u>					

TAB H

QUALIFICATION DOCUMENTS (OPTIONAL)



TAB I

MISCELLANEOUS DOCUMENTS AND CORRESPONDENCE (OPTIONAL)

TAB J

EVALUATION OF NRC GENERIC LETTERS  
AND BULLETINS (OPTIONAL)

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## EVALUATION OF NRC GENERIC LETTERS AND BULLETINS

Pursuant, to 10 CFR 52, this tab addresses any NRC Generic Letters and Bulletins issued after March 2007 (i.e., the date of the most recent revision of the applicable Standard Review Plan) to determine if any written responses or other action was (or had been) required for the components identified in Tab C. The responses provided to the NRC are summarized in this section.