# 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.

DIGITAL METAL IMPACT MONITORING SYSTEM
CABINET AND ASSOCIATED ELECTRONICS

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# SECTION 1 - SPECIFICATIONS

## 1.0 PERFORMANCE SPECIFICATIONS

### 1.1 Electrical Requirements for Interfaces

| | | |
|---|---|---|
| 1.1.1 | Voltage: | 115 ± 10 Vac |
| 1.1.2 | Frequency: | 60 ± 5 hz |
| 1.1.3 | Load: | 500 watts |
| 1.1.4 | Electromagnetic Interference: | None |
| 1.1.5 | Other: | None |

1.2 Installation Requirements: Section 3 of Technical Manual

1.3 Auxiliary Devices: Field Sensors

1.4 Preventative Maintenance Schedule: Section 6 of Technical Manual

1.5 Design Life: 40 years

1.6 Operating Cycles: Continous

1.7 Performance Requirements for[b]:

| | | | DBE Conditions(a) | | | | | Post DBE Conditions(a) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Parameter | Normal Conditions | Abnormal Conditions | Test Conditions | FLB/SLB | LOCA | Seismic | FLB/SLB | LOCA | Seismic |
| 1.7.1 | Time requirement | Continous | Included Under Normal | Note b | N/A | N/A | Note b | N/A | N/A | Note C |
| 1.7.2 | Performance requirement | Note a | Included Under Normal | Note b | N/A | N/A | Note b | N/A | N/A | Note C |

1.8 Environmental Conditions - Location[b]

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.8.1 | Temperature(°F) | Ambient | As normal | | N/A | N/A | Ambient | N/A | N/A | Ambient |
| 1.8.2 | Pressure (psig) | Ambient | As normal | | N/A | N/A | Ambient | N/A | N/A | Ambient |
| 1.8.3 | Humidity (% RH) | Ambient | As normal | | N/A | N/A | Ambient | N/A | N/A | Ambient |
| 1.8.4 | Radiation (R) | N/A | As normal | | N/A | N/A | N/A | N/A | N/A | N/A |
| 1.8.5 | Chemicals | None | As normal | | N/A | N/A | None | N/A | N/A | None |
| 1.8.6 | Vibration | None | As normal | | N/A | N/A | None | N/A | N/A | None |
| 1.8.7 | Acceleration (g) | None | None | Figure 1&2 | N/A | N/A | Note b | N/A | N/A | None |

Notes: a: The equipment must be capable of providing an alarm output when impacts are detected
b: The equipment must be capable of providing an alarm output when impacts are detected after an OBE and must maintain structural integrity during an SSE.
c: The equipment must be able to operate continously after the OBE to provide the alarm function when impacts are detected

1.9 Qualified Life: N/A

1.10 Remarks: None

## SECTION 2 - QUALIFICATION BY TEST

2.0 TEST PLAN

2.1 Equipment Description: Digital Metal Impact Monitoring System Configuration 1606E43 with added weights

2.2 Number Tested: 1 unit

2.3 Mounting: Base mounted with bolts

2.4 Connections: Input via impact simulator

2.5 Aging Simulation Procedure: N/A

2.6 Service Conditions to be Simulated by Test[1]

| | | Normal | Abnormal | Containment Test | Seismic | HELB | Post-HELB |
|---|---|---|---|---|---|---|---|
| 2.6.1 | Temp. (°F) | Ambient | Same as Normal | N/A | Ambient | N/A | N/A |
| 2.6.2 | Pressure (psig) | 0 | Same as Normal | N/A | 0 | | |
| 2.6.3 | Humidity (% RH) | Ambient | Same as Normal | N/A | Ambient | | |
| 2.6.4 | Radiation (R) | Ambient | Same as Normal | N/A | None | | |
| 2.6.5 | Chemicals | None | Same as Normal | N/A | None | | |
| 2.6.6 | Vibration | None | Same as Normal | N/A | None | | |
| 2.6.7 | Acceleration (g) | None | Same as Normal | N/A | TRS > RRS Figure 1 (note a) TRS > RRS Figure 2 (note b) | | |

Note a: to maintain alarm capability
Note b: to maintain structural integrity

2.7 Measured Variables

This section identifies the parameters required to be measured during the test sequence(s).

| | | Required | Not Required |
|---|---|---|---|
| 2.7.1 | Category I - Environment | | |
| 2.7.1.1 | Temperature | | A |
| 2.7.1.2 | Pressure | | A |
| 2.7.1.3 | Moisture | | A |
| 2.7.1.4 | Composition | | A |
| 2.7.1.5 | Seismic Acceleration | A | |
| 2.7.1.6 | Time | | A |
| 2.7.2 | Category II - Input Electrical Characteristics | | |
| 2.7.2.1 | Voltage | | A |
| 2.7.2.2 | Current | | A |
| 2.7.2.3 | Frequency | | A |
| 2.7.2.4 | Power | | A |
| 2.7.2.5 | Other (impact signal) | A | |
| 2.7.3 | Category III - Fluid Characteristics | | |
| 2.7.3.1 | Chemical Composition | | A |
| 2.7.3.2 | Flow Rate | | A |
| 2.7.3.3 | Spray | | A |
| 2.7.3.4 | Temperature | | A |
| 2.7.4 | Category IV - Radiological Features | | |
| 2.7.4.1 | Energy Type | | A |
| 2.7.4.2 | Energy Level | | A |
| 2.7.4.3 | Dose Rate | | A |
| 2.7.4.4 | Integrated Dose | | A |

A: seismic test

| | | Required | Not Required |
|---|---|---|---|
| 2.7.5 | Category V - Electrical Characteristics | | |
| 2.7.5.1 | Insulation Resistance | | A |
| 2.7.5.2 | Output Voltage (Alarm Relay) | A | |
| 2.7.5.3 | Output Current | | A |
| 2.7.5.4 | Output Power | | A |
| 2.7.5.5 | Response Time | | A |
| 2.7.5.6 | Frequency Characteristics | | A |
| 2.7.5.7 | Simulated Load | | A |
| 2.7.6 | Category VI - Mechanical Characteristics | | |
| 2.7.6.1 | Thrust | | A |
| 2.7.6.2 | Torque | | A |
| 2.7.6.3 | Time | | A |
| 2.7.6.4 | Load Profile | | A |
| 2.7.7 | Category VII - Auxiliary Equipment | | |
| | None | | |

A: Seismic test

2.8 Test Sequence Preferred

This section identifies the preferred test sequences

2.8.1 Inspection of Test Item
2.8.2 Operation (Normal Condition)
2.8.3 Seismic

2.9 Test Sequence Actual

This section identifies the actual test sequence(s) which, in total, constitutes the overall test program for this equipment.

| Step | | Notes |
|---|---|---|
| 2.9.1 | Inspection of Test Item | |
| 2.9.2 | Operation (E Normal Condition) | Complete Functional Check |
| 2.9.3 | Seismic Test Sequence | |
| | OBE Testing | (8 OBEs) |
| | SSE Testing | (4 SSEs) |
| 2.9.4 | Operation (Normal Condition) | Complete Functional Check |

2.10 Type Test Data

2.10.1 Objective

The objective of this test program is to demonstrate that the Westinghouse Digital Metal Impact Monitoring System cabinet and associated electronics will meet the seismic requirements given in Revision 1 of Regulatory Guide 1.133 and maintain its structural integrity when seismically tested in accordance with the requirements of IEEE 344-1975.

2.10.2 Seismic Tests

The single design basis event capable of producing an adverse environment at the equipment location is a seismic event. The seismic testing is reported in Reference 1. The generic required response spectrum (Figures 1 & 2) contains significant margin with respect to any single plant application referencing this program[1].

2.10.3 Conclusion

The tests demonstrated that the D-MIMS cabinet and associated electronics meet the requirements given in Reg. Guide 1.133 for

maintaining capability of providing an alarm signal following on OBE.

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. WCAP-8687 Supp. 2-E54A, R. Jabs, J. Drexler, "Seismic Test Report for the Digital Metal Impact Monitoring System Cabinet".

## SECTIONS 3 & 4 QUALIFICATION BY EXPERIENCE AND/OR ANALYSIS

Westinghouse does not employ operating experience or analysis in support of the qualification program for the Digital Metal Impact Monitoring System.

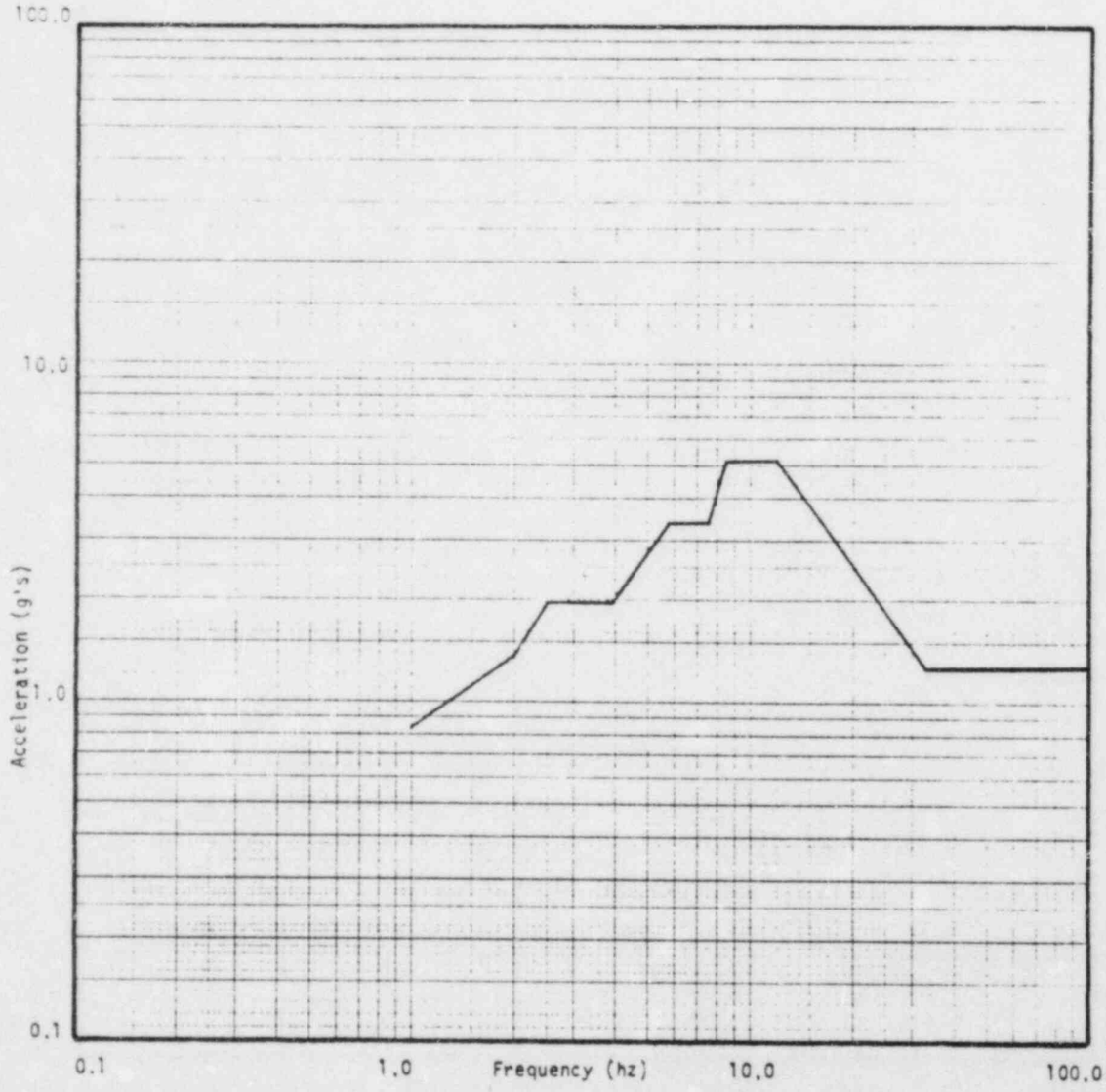


Figure 1 D-MIMS Generic OBE RRS (5% Damping)
In Principle Didection

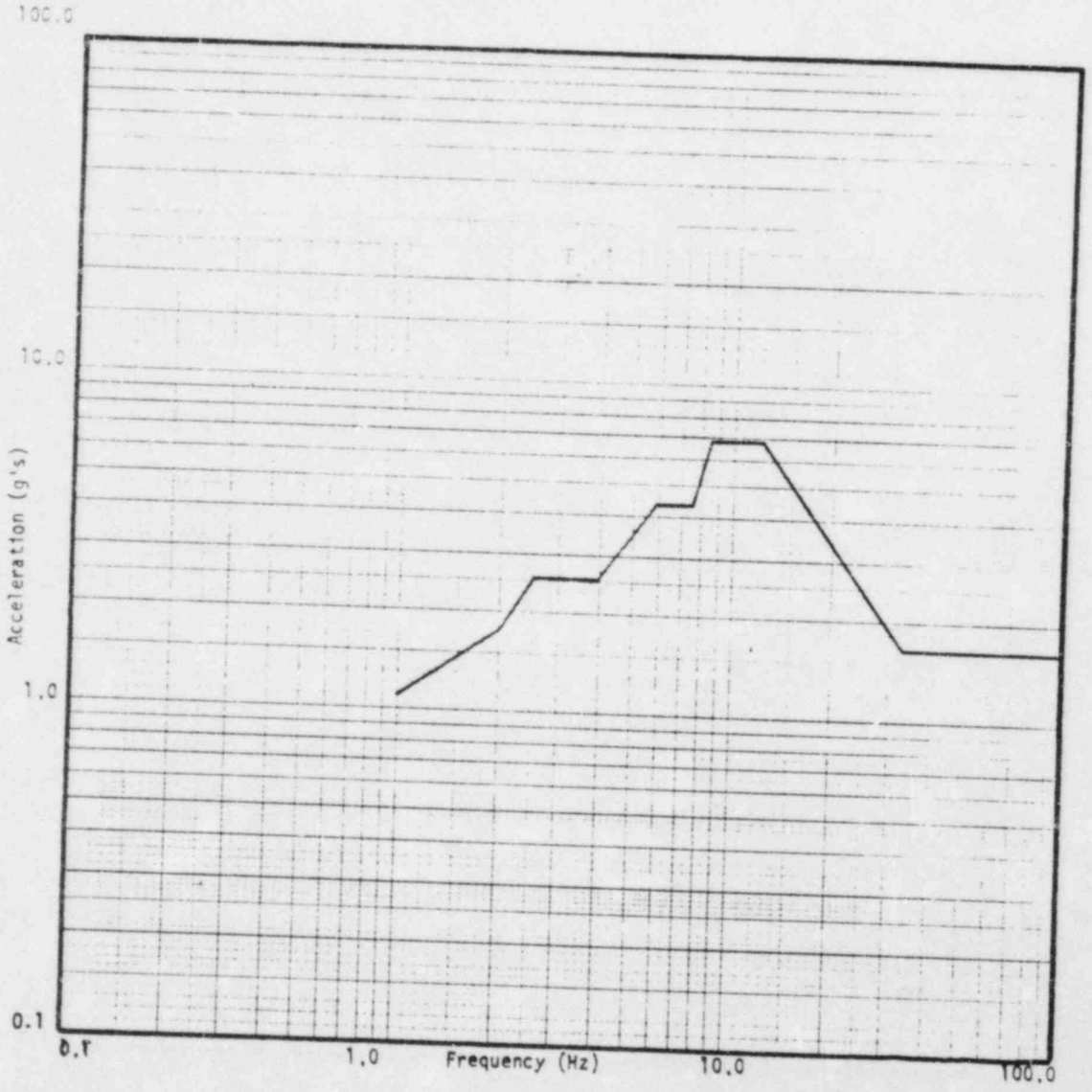


Figure 2 D-MIMS Generic SSE RRS (5% Damping)
In Principle Direction