Real Time Test Development Correlation Criteria

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. The purpose of this standard is to establish correlation guidelines for reviewing real-time test development results.

1.2 Foreword. Not applicable.

1.3 Applicability. This standard applies to all real-time test development projects that require correlation between unfiltered laboratory remote parameter responses and unfiltered road remote parameter responses.

Note: Band pass filtered road and lab responses are used when performing energy correlation. The filter band must be the same for each response and the time histories must have data content in the chosen band, see GMW15244.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW15242 GMW15269
GMW15244

3 Resources

3.1 Facilities.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment. Not applicable.

3.3 Test Vehicle/Test Piece. Not applicable.

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation. Not applicable.

4.2 Conditions. Not applicable.

4.2.1 Environmental Conditions. Not applicable.

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4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions. Correlation criteria fall into three categories:

4.3.1 Statistical. Statistics can be determined for any time history response collected during the test development process. Statistics typically evaluated may include Maximum, Minimum, Range, Root Mean Square (RMS), and Energy. Energy per unit mass (specific energy) is calculated from acceleration data, see GMW15244.

4.3.2 Derived. Pseudo-fatigue damage is a calculated value derived from the time history data, material properties, and part geometry using a calculation method specified by the user. Damage calculations are usually reserved for stress, strain and load data, see GMW15269.

4.3.3 Observed. Observed correlation is the process of viewing responses with respect to one another. Laboratory responses are usually compared to road responses. Amplitude, phase, and general data character should be considered.

5 Data

5.1 Calculations. When comparing statistical or derived parameters, the same parameter is determined for both the road and lab response. Dividing the lab value by the road value forms a ratio. A ratio equal to 1.0 indicates good correlation for that particular parameter and the responses being compared. Correlation should be determined for each channel of data, both individually and across all responses included in the data set.

5.2 Interpretation of Results. The range of acceptable correlation criteria for different parameters is shown in Table 1. Refer to the corresponding document in 5.4 for guidelines on calculating the values of different parameters. It is strongly recommended that the correlation results be reviewed through a peer review process prior to obtaining customer approval.

Table 1: Acceptable Correlation Criteria

Measured or Calculated Parameter	Lab/Road Ratio (Acceptable Range)
Maximum/Minimum/Range	0.9 to 1.1
RMS (Lab/Edit) Note 1	0.9 to 1.1
Energy (acceleration data only) Note 2	0.8 to 1.2
Damage (stress, strain, and load data only)	0.5 to 2.0

Note 1: RMS requires the time base and offset for each channel to be the same, i.e., laboratory response vs. edited road response.
Note 2: Energy correlation requires the same band-pass filter be applied to the road and lab response data (see note in 1.3).

5.3 Test Documentation. All data is to be archived per local process in RPCIII file format.

5.4 Related Documents as Example Methods.

- GMW15269 Pseudo-Fatigue Analysis.
- GMW15244 Energy Editing Method.

6 Safety

This standard may involve hazardous materials, operations, and equipment. This standard does not propose to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

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