



Test Properties Definitions

1 Introduction

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. To provide a standardized set of definitions of test properties for noise and vibration testing, analysis, benchmarking, and development.

1.2 Applicability. This test procedure is appropriate for the evaluation of all subsystems, components, and vehicles.

1.3 Remarks. Providing standard definitions of vehicle properties and included hardware used in testing can improve communication and commonization efforts.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

2.3 Additional References. None.

3 Resources

3.1 Facilities. Not applicable.

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.

4.2.1 Environmental Conditions.

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. Not applicable.

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5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Not applicable.

5.3 Test Documentation. Include photographs of all attachment locations in the condition in which they were measured. Show hardware, instrumentation and fixtures used in the test.

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.

7 Notes

7.1 Glossary.

7.1.1 Vehicle Construction Types.

- A. **Body-Frame Integral (BFI):** The primary structure for a BFI vehicle is provided by the body. In some cases, this primary structure is complemented by chassis structure at one or both ends of the vehicle (i.e., cradles or cross-members which may be rigidly attached to the body or attached using isolators). The front and rear chassis systems are typically structurally coupled via the body, except in certain cases of driveline configuration such as the drive shaft assembly in a torque tube system (e.g., Corvette platform).
- B. **Body-On-Frame (BOF):** The structure for a BOF vehicle is provided by both the body and frame. The body or cab is attached to the frame at discreet locations using body mounts (isolators). The suspension, powertrain and driveline are typically attached to the frame. If the product is a conventional pickup, the pickup box is generally rigidly attached to the frame structure only. If the product is an Ultimate Utility Vehicle (UUV), the pickup box is typically integral to the body and also attached to the frame using body mounts (isolators). The Front End Sheet Metal (FESM) can be integral to the body (generally welded) or non-integral (bolted to the body), isolators or body mounts also connect the FESM to the frame.

7.1.2 Body Configurations.

- A. **Body-In-White (BIW):** The configuration that leaves the paint booth or the basic structural shell of the vehicle including: floor pan, front of dash, door side ring, front radiator support, doors, FESM and deck lid/hatch prior to topcoat paint and trim.
- B. **Body Structure:**
 - 1. **BIW** with non-structural closures removed.
Note: A Body Structure typically does not include the hood, doors, deck lid/hatch or bolt-on fender outers unless these are assumed to be structural items. The use of closures as structural elements should be defined in the requirements for the vehicle program, and taken into consideration during development and validation testing.
 - 2. **Paint**, inclusive of Electro-deposition Primer (ELPO); E-Coat, and other properly cured sealers and adhesive(s).
 - 3. **Properly Bonded Fixed Glass**, such as windshield, backlight or fixed quarter windows, with any trim needed for glass installation and retention.
 - 4. **All Non-Isolated Structural Bolt-On Parts.** The specific parts included will vary depending on the vehicle design. Examples include: hard-mounted cradles (with braces if appropriate), non-integral FESM, Instrument Panel (IP) beam, pedal support bracket(s), bolt-on radiator supports, rear cross-members, diagonal braces, bumper beam(s) and tunnel straps.
 - 5. **Sunroof Module(s).** Generally included if anticipated to contribute to the structural stiffness.

7.1.3 Chassis Configurations.

- A. **Chassis Structure (BFI):** A cradle or cross-member that is attached to the body structure directly (i.e., non-isolated or hard-mounted) or by using isolators or mounts.

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- B. **Chassis Structure (BOF):** Frame with non-isolated bolt-on parts. The specific parts included will vary depending on the vehicle design. Examples include: transmission cross-member, spare tire support structure, Original Equipment Manufacturer (OEM) trailer hitch and bumpers.
- C. **Chassis Structure (BOF) Plus Pickup Box:** The Chassis Structure (BOF) Plus Pickup Box is defined as including the Chassis Structure (BOF) together with the pickup box structure.

7.1.4 Trimmed Body Configurations. Refer to Appendix A, Figures A1 thru A6 to aid in visualization of the following definitions.

- A. **Trimmed Body (BFI):** A full vehicle without chassis, powertrain, exhaust or suspension. The Trimmed Body includes swing metal, reservoirs, body-mounted fuel tank, batteries, glass, seats, doors, interior trim, IP and console, rear window trim panel, acoustic treatments and other items that add mass to the body structure. The fuel tank should be full and all other fluids should be filled to the manufacturer recommended specification.
Note: A trimmed body does not include isolated cradles, but does include cradle bolt stabilizer brackets.
- B. **Trimmed Body (BOF):** The Trimmed Body (BOF) is defined as the collection of sub-assemblies supported by the Body Structure when separated from the frame/chassis at the body mounts. Both integral and non-integral (bolt-on) FESM should be included, together with a Condenser, Radiator, Fan Module (CRFM) if all mounts are to the body or FESM. The fuel tank should be full and all other fluids should be filled to the manufacturer recommended specification.
- C. **Trimmed Body (BOF) Without FESM:** The Trimmed Body without FESM configuration applies only to products with non-integral (bolt-on) FESM. The configuration is achieved by removing the FESM from the Trimmed Body.

7.1.5 Trimmed Chassis Configuration.

- A. **Trimmed Chassis Structure (BFI):** The Trimmed Chassis Structure (BFI) is defined as including the Chassis Structure together with all isolated or non-isolated components mounted to the structure, excluding the Body Structure, powertrain, driveline components, CRFM or suspension. Where practical, the portion of the powertrain mounts rigidly attached to the chassis structure should be included.
- B. **Trimmed Chassis (BOF):** The Trimmed Chassis (BOF) is defined as the components remaining when the Trimmed Body is separated and removed at the body mounts, and the pickup box if present, is separated and removed at the frame-to-pickup box attachments.
- C. **Trimmed Chassis Structure (BOF):** The Trimmed Chassis Structure (BOF) is defined as the Trimmed Chassis with the powertrain, driveline components and suspension removed. Where practical, the portion of the powertrain mounts rigidly attached to the frame structure should be included, i.e., frame side brackets.

7.1.6 Trimmed Structure Configurations. Refer to Appendix A for figures to aid in visualization of the following definitions.

- A. **Trimmed Structure (BFI):** The Trimmed Structure (BFI) is defined as the trimmed body attached to one or more Trimmed Chassis Structure assemblies (powertrain, driveline, exhaust and suspension are excluded). Both isolated and non-isolated cradles and cross-members should be included. The CRFM (with fluid) should be included for all cases including where the CRFM is mounted to both the Body Structure and the Chassis Structure, and thus was not part of either the Trimmed Body or Trimmed Chassis Structure.
- B. **Trimmed Structure (BOF):** The Trimmed Structure (BOF) is defined as the Trimmed Body attached to one or more Trimmed Chassis Structure assemblies (powertrain, driveline, exhaust and suspension are excluded). Bumper beams, OEM trailer hitches and pickup boxes are to be included.

7.1.7 Full Vehicle Configurations.

- A. **Full Vehicle (BFI/BOF):** Complete vehicle with a full fuel tank and all other fluids filled to the manufacturer recommended specification.

7.1.8 Isolators, Mounts and Bushings.

- A. **Elastic Center of an Isolator:** A point or points described as being the effective center of the rubber isolator (or hydraulic fluid). If the actual rubber or fluid were to be replaced by a theoretical spring or springs, the "elastic center" is the location where that spring would act. There may be a separate "elastic center" for each degree of freedom, and it should be noted that the elastic center can, in some cases,

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be outside of the actual part geometry. Consultation with the mount or bushing engineer may be required to accurately identify the elastic center point or points.

- B. **Isolator Attachment Fixtures:** Any part which is fabricated to simulate the isolator bracket hardware can be considered a fixture. An isolator attachment fixture should duplicate the geometry and dynamics of the isolator bracket with due care given to replicate the contact area or “footprint” of the actual isolator bracket as closely as possible.
- C. **Isolator Bracket Hardware:** All parts used to connect the isolators, mounts or bushings to the Body Structure or cradle/frame structure.
- D. **Interface Hardware vs. Fixtures:** In cases where the interface is a critical component of what is being tested, careful consideration must be given to what parts are included and what fixtures are used. For example, if quantifying the Pressure/Force (P/F) with the force being applied at an engine mount, in some cases it may be desirable to include the “body side” of the engine mount casing in the test property. In other cases, a fixture may be used to represent this part. See Appendix B, Figures B1 and B2 for additional examples.

7.2 Acronyms, Abbreviations, and Symbols.

BFI	Body-Frame Integral
BOF	Body-On-Frame
BIW	Body-in-White
CRFM	Condenser, Radiator, Fan Module
ELPO	Electro-deposition Primer
FESM	Front End Sheet Metal
IP	Instrument Panel
N&V	Noise and Vibration
OEM	Original Equipment Manufacturer
P/F	Pressure/Force
UUV	Ultimate Utility Vehicle

8 Coding System

This standard shall be referenced in other documents, drawings, etc., as follows:

Test to GMW8702

9 Release and Revisions

This standard was originated in May 2004. It was first approved by Noise and Vibration in October 2005. It was first published in October 2005.

Issue	Publication Date	Description (Organization)
1	OCT 2005	Initial publication.
2	FEB 2008	Reformatted (N&V Structure-borne Harmonization Team)
3	OCT 2014	Revised to current template. (Global Road Induced Structure-borne Noise and Vibration Team)

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