



Driveline Interface Fastener Integrity

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. Ensure that fastener-based interfaces between driveline components are able to transmit torque over a specified customer usage.

1.2 Applicability. This test is intended to address three (3) primary designs found in GM vehicles:

1.2.1 Bolted Flange Interfaces. These interfaces are commonly found between:

- Propshaft and rear axle.
- Propshaft and front axle.
- Propshaft and transmission.
- Axle and halfshaft.

1.2.2 Half-Round Flange Yoke to Universal Joint with Straps. These interfaces are commonly found between:

- Propshaft and rear axle.
- Propshaft and front axle.
- Propshaft and transmission.

1.2.3 Halfshaft Nut to Wheel Bearing Interface. These interfaces are commonly found between:

- Halfshaft and rear wheel hub.
- Halfshaft and front wheel hub.

1.3 Remarks. This test procedure can be performed by any facility meeting the criteria detailed in section 3, including General Motors and/or Suppliers of the driveline components.

This fastener interface test procedure can be conducted in harmony with the individual component fatigue or abuse test, provided a review of 4.1.1 is conducted such that, of the three (3) methods available, the method chosen is compatible between the component test and the interface test.

Note: When considering combining the Component level fatigue testing (i.e., propshaft, halfshaft, etc.) as part of the Interface fatigue testing, a failure of the test may complicate the analysis of the failure (system or component) and the strategy to continue the testing.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW15601

GMW16518

GMW17337

GMW17732

GMW16330

GMW17104

GMW17707

2.3 Additional References.

CG583

3 Resources

3.1 Facilities. The test facility shall have a bedplate large enough for securing the test rig and capable of withstanding dynamic loading of the rig/specimen. The longest propshaft, plus actuator plus fixed-end angle stands would require a bedplate 2 m wide by 4 m long. The load magnitude and frequency is unlikely to require an isolated bedplate. See Appendix A, Figure A1 for typical test set-up.

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. See Appendix A, Figure A1 for typical test set-up.

3.2.1 Rotary actuator which can apply a maximum load of 8000 N m through a range of ± 140 degrees of rotation at 1 Hz.

3.2.2 Angle stands to hold fixed end lockout plate and rotating end rotary actuator.

3.2.3 Lockout plate to react load of fixed end of test sample to angle stands.

3.2.4 Adapter between rotary actuator and input end of test sample.

3.3 Test Vehicle/Test Piece.

3.3.1 Halfshaft or propshaft. Six (6) samples for each design to be tested is recommended.

3.3.2 Mating component, which may include axle side gear, axle output flange, axle input flange, wheel hub assembly, transmission output shaft, transmission side gear, transfer case output shaft, intermediate driveshaft, Power Transfer Unit (PTU) Intermediate Driveshaft (IDS), or Power Transfer unit (PTU) output shaft. Sufficient quantities of mating components should be considered.

Note: When considering combining the Component level fatigue testing (i.e., propshaft, halfshaft, etc.) as part of the Interface fatigue testing, a failure of the test may complicate the analysis of the failure (system or component) the strategy to continue the testing.

Note: New parts should be used for each sample of the test. That includes the mating components in the interface test.

3.4 Test Time.

Calendar time: 14 d

Test time: 48 h

Coordination time: 20 h

3.5 Test Required Information. See 4.1.1

3.6 Personnel/Skills. Test Technician should be proficient in operation of the facilities listed in 3.1, as well as in proper selection and operation of the equipment listed in 3.2 and familiar with the general operation of halfshaft and propshaft assemblies.

4 Procedure

4.1 Preparation.

4.1.1 Determine Loads and Cycle Count. The loads and cycle count shall be determined by one of the following three (3) methods.

Note: The method will be called out in the Technical Specification. Alternately, the test engineer can obtain agreement from the design release engineer regarding the most appropriate loads determination method.

4.1.1.1 Method A - Loads Equivalent to Life. This method determines that the fasteners shall not loosen when exposed to the maximum fatigue loads and cycle count of the mating components. The advantage of this method is that it does not require vehicle loads to be determined. The disadvantage is that the mating component may fracture before the target cycles. The load chosen shall be a torque selected from the Stress-Life (S-N) curve at