GM	WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW17362

Driveline Cold Impact Test of Rotating Shaft Seals

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. The purpose of this standard is to check sealing during simulated cold weather starting. This condition includes maximum and minimum shaft-to-seal interference, Shaft to Bore Misalignment (STBM), and Dynamic Run Out (DRO). Seal is inspected for loose fit in bore from thermal expansion.

1.2 Applicability. This standard applies to shaft seals included in driveline components or assemblies. This is not intended to apply to seals for powertrain, engines, or transmissions applications. This is not for cassette or slip-yoke seals. This is not for seals without a spring on the main seal lip (i.e., Poly Tetra Fluoro Ethylene (PTFE) and wiper seals).

1.3 Remarks.

1.3.1 Expectation is that each seal completes at least 124 h of testing, without leakage. If seal cannot pass 124 h of testing without leakage, investigate and report the reason for the variation.

1.3.2 Refer to 5.2 for additional expectations.

1.3.3 Test lab shall provide the Design Release Engineer (DRE) with test results written in Data Sheet CG4360.

Note: Deviations from the specifications in this standard are permissible when authorized by the DRE.

Note: Test at maximum and minimum of STBM and DRO, calculated from design tolerance stack-ups that include bending deflection and shaft-to-bore coaxiality. Request this information from the assembly designer or Tier 1 Supplier.

Note: Test at speeds (S) and temperatures (T) specified in the Vehicle Technical Specification (VTS). Request these from the DRE. Run tests using Table 2, Default Test Values, when approved by the DRE.

2 References

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

2.1 External Standards/Specifications.

ISO 6194-1 RMA OS-1-1

2.2 GM Standards/Specifications.

None

2.3 Additional References.

- CG4360
- Freudenberg Sealing Technologies, Weinheim, Germany, www.fst.de
- German Institute of Standardization (DIN), Berlin, Germany, www.din.de
- Rubber Manufacturers Association (RMA), Washington, DC, www.rma.org
- Statement of Requirements (SOR)
- Vehicle Technical Specifications (VTS)

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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.

3.1.3 Testing area shall be orderly and clean. Food, drink, spills and trash shall not be visible. Test altering contamination, both metallic and non-metallic, shall be kept separate from testing samples and equipment.

3.2 Equipment.

3.2.1 A seal test machine is required per Rubber Manufacturers Association (RMA) or German Institute of Standardization (DIN) equipped with programmable speed and temperature control.

3.2.2 A radial lip force measurement machine is required, per DIN (e.g., Freudenberg Sealing Technologies).

3.2.3 A sight glass tube with measurement scale is required to set the shaft oil level and monitor changes.

3.2.4 Measurement gauges or devices shall have a label showing the most recent date of calibration check.

3.3 Test Vehicle/Test Piece.

3.3.1 Test a minimum of four (4) seals (reference 4.1.1, Seal Preparation).

3.3.2 After operation and radial load measurement, the lip loading must exceed a measurement result of 0.1 N/mm of circumference upon a shaft with Least Material Condition (LMC) dimensions.

3.3.3 Refer to 5.2 for additional expectations.

3.4 Test Time.

Calendar time:	26 days
Test time:	592 hours
Coordination time:	32 hours

Note:

Project Schedule Long: 26 days (measurement time + one (1) test station running four (4) times until suspend time).

Project Schedule Short: 11 days (measurement time + four (4) test stations running until expected time).

Measurement Time: 2 days (four (4) seals + all shafts + all bores + all installations, i.e., STBM and DRO).

3.4.1 Stop test machine after D2 (see Table 2) of operation, or if leakage is detected. Leakage is oil that contacts the bore.

3.4.2 Target D1 (see Table 2) of operation without leakage. Results that deviate from target require DRE approval. Plan to test four (4) seals. Four (4) tests may require 26 days or more depending on number of testers used. Factor in one (1) 24 h break-in conditioning per seal.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills.

3.6.1 Test operator shall have reading skills suitable for understanding this specification. Operator shall be able to perform simple calculations on an electronic calculator and identify measurements exceeding the tolerance. Operator shall be able to make accurate measurements with calipers, scales and gages.

3.6.2 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 seals.

4 Procedure

4.1 Preparation.

4.1.1 Seal Preparation.

4.1.1.1 Mark seals Number 1 through Number 4.

4.1.1.2 Measure diameters and widths before inserting seal into seal test machine.

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