



Engine Oil Pan and Transmission Bottom Pan Gaskets

1 Scope

Note: This commodity standard describes the requirements for engine oil pan and transmission bottom pan gaskets and the drain plug seal (see Table 1, Note 3). The constructional and component features covered by this standard are described in this section. Do not use this document for applications outside the scope and 1.3 applicability descriptions of this standard.

1.1 Material Description. Table 1 describes the Classes for use in Engine (E) and/or Transmission (T) elastomers meeting the designated temperature range and application. If no small capital letter is beside a Class, it applies to both engine and transmission. A hardness range for compounds is assigned by type using a numeric or alpha numeric designation (see Table 4a) Part Performance Requirements are in 3.19 and Table 10.

Elastomers for high pressure applications are included in Table 1.

Table 1: Material and Application Criteria Designation

Class	Type	Temperature Range °C Note 1	Application		Elastomer Note 2	Table References
AE			Engine	Silicone elastomer is no longer permitted for use in engine oil systems per directive by the Assembly, Sealing and Fastening PMT and the Lubrication PMT. Part(s) sourced under the 2006 and earlier versions of GMW3083 are instructed to use ACM or AEM. See Appendix A, Table A1.	VMQ	Appendix A
AT		-25 to 150	Transmission	Standard Use. See Table 3, Transmission Requirements.	AEM/ACM	3, 4b, 6
BT	1	-20 to 165	Transmission	Standard use. No fuel dilution resistance required. See Table 4a and Table 9, Requirements.	ACM	4a, 4b, 9
BT	2	-25 to 165			AEM	5, 6, 9
CT	1	-15 to 175	Transmission	Standard use polymer. No fuel dilution resistance required.	FKM/FPM	7, 8, 9
	2	-29 to 165		Improved low temperature. No fuel dilution resistance required.	FKM/FPM	7, 8, 9
DE	1	-15 to 175	Engine	Fuel dilution 5% to 10% by volume. Under constant immersion or high exposure.	FKM/FPM	7, 8, 9
	2	-29 to 165		Improved low temperature. Fuel dilution 5% to 10% by volume. Under constant immersion or high exposure	FKM/FPM	7, 8, 9
	3	-29 to 175		High pressure applications. Hardness 70 to 80 range. No metal oxides in compound.	FKM/FPM	7, 8, 9

Class	Type	Temperature Range °C Note 1	Application		Elastomer Note 2	Table References
	4	-28 to 150		Oil pan drain plug seal ^{Note 3} . Not for high pressure applications.	FKM/FPM	7, 8, 9
F _E	1	-20 to 165	Engine	Fuel dilution 5% to 10% by volume. Under constant immersion or high exposure.	ACM	4a, 4b, 9
	2	-25 to 165		Fuel dilution 5% to 10% by volume. Under constant immersion or high exposure.	AEM	5, 6, 9
	3	-25 to 165		High pressure applications. Hardness 70 to 80 range.	AEM	5, 6, 9
SE		-40 to 150	Formed-in-place or cured-in-place, low odor, low volatile	No longer in use. See appropriate 998 standards.	VMQ	

Note 1: As defined by ASTM D1329 Low Temperature Retraction at ten percent (10%) (TR₁₀) with 38 mm die and SAE J2236 respectively.

Note 2: Nomenclature symbol as defined by ASTM D1418 or ISO 1629. Others will be added as needed.

Note 3: For non-O-ring cross sections only (e.g., flat washer with rubber edge bonded, tear drop, etc.) All O-rings shall use GMW17376.

Note: ACM = Polyacrylate, AEM = Ethylene Acrylic, FKM = Fluorocarbon Rubber, FPM = Fluorocarbon Rubber (by International Organization for standardization), VMQ = Silicone with Vinyl and Methyl Substituent Groups.

1.1.1 Part Constructions. Construction usage code letters that apply to this standard are in Table 2.

Table 2: Construction Usage Code Letters

Construction Feature	Code Letters ^{Note 1}
Elastomer with Carrier. Plastic carriers are designated with a lower case letter p after this letter.	Cp
Elastomer with Carrier. Metal carriers use a lower case "m" after this letter.	Cm
Elastomer Only. Press-in-place designs for a machined or as cast groove.	E

Note 1: Code letters designate specific tests that apply only to that construction and/or material for detail drawing specifications. See Section 8 for proper use protocol.

1.2 Symbols.

1.2.1 Plastic and rubber parts shall be marked with a symbol to designate the type of material from which the part was fabricated for the purpose of collection and handling of parts for recycling.

1.2.2 Elastomer Marking Symbol. Mark rubber parts per GMW3116.

1.2.3 Plastic Marking Symbol. Mark plastic parts per GMW3116.

1.3 Applicability. Gaskets or seals for lower engine (below engine block) and transmission bottom pan joints. O-rings and rubber coated metal gaskets for these applications are covered in GMW17376 and GMW17294 respectively.

1.4 Remarks.

1.4.1 Approved compound properties for each type of elastomer are listed in Table 3, Table 4a, Table 4b, Table 9, Table 10. Table values by type are a compilation of data from multiple approved compounds. Properties from molded parts are found in Table 4b, Table 6 and Table 8.

1.4.2 Global Bill of Material Policy on Silicone Use. Existence of any silicone heat cured elastomer gasket compounds for oil systems must be converted to ACM, AEM or FKM (see Table 1) due to engine related oxygen sensor fouling and/or oil foaming concerns. A conversion to non-silicone elastomers is required and includes,

but is not limited to any known silicone use on purchased or assembly components. The design life end use of the part (short or long) has no bearing on the decision as low molecular weight volatiles extraction occurs early in the exposure to heat and oil.

1.4.3 Satisfactory GMW3155 test results are **compound and design** dependent.

1.4.4 Select the class and type intended for the end use needs. Table 1 temperatures represent the continuous operating range for all approved compounds in that class as measured in air at atmospheric pressure.

1.4.5 Compounds Represented in Tables. The majority of elastomer compounds represented in the current property tables are for sealing metal to metal joints where micro-hardness ranges from 55 International Rubber Hardness Degrees (IRHD) to 84 IRHD. Plastic pans must use lower hardness gaskets where part micro-hardness ranges from 50 IRHD to 60 IRHD to avoid plastic stress fractures.

1.4.6 Fluorocarbon Behavior in Fuel Diluted Oil. For methanol and ethanol diluted oil conditions, the percent fluorine level (higher is desired) is most important. In biodiesel diluted conditions with oil, the cure type (peroxide) and no metal oxides, take precedence over percent fluorine. The metal oxides have no significant impact on fluorocarbon (FKM) Type II, Type III, Type IV or Type V peroxide cure systems. There is no impact on color choice for carbon black filled and mineral filled systems. There are variations in naming conventions for metal oxides. For example, ceramic type mineral systems are metal oxides and are being used successfully in mobility systems where zinc, calcium or magnesium oxides would not be successful in that application.

1.4.7 Compression Deflection. Load deflection (15% and 35%) in compression set and compression stress relaxation tests were changed to more closely represent GMW3155 component validation test conditions.

1.4.8 Terminology. Use of **Shall** and **Will** as it applies to this document:

1.4.8.1 Shall denotes a binding provision to be met by the product or process.

Examples:

- The gross vehicle weight shall be a maximum of xxxx kilograms.
- The speedometer **shall** provide an indication of speed in kilometers per hour (km/h) for European Union applications.

Note: Give applicable conditions as a statement of fact, plus a list, without using **shall**.

Example:

The sealing performance requirements apply under the following conditions:

- GMW3155 test procedure
- High Pressure Conditions listed in GMW3155
- Report all individual values

1.4.8.2 Will denotes requirements associated with the development of the product, rather than for the product itself.

Examples:

- Sixty (60) days prior to conducting GMW3155 component qualification tests, the supplier will deliver production intent component units to GM test laboratory.
- After the component test is completed, the Pontiac test laboratory **will** provide the results in a written report.

2 References

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

2.1 External Standards/Specifications.

AIAG D-22	ASTM D1505	ISO 34-1	ISO 11357
ASTM D297	ASTM D2240	ISO 37	ISO 13226
ASTM D395	ASTM D3182	ISO 48	ISO/IEC 17025
ASTM D412	ASTM D3418	ISO 815	SAE J300
ASTM D471	ASTM D3677	ISO 1629	SAE J1351
ASTM D624	ASTM D4485	ISO 1817	SAE J2236

ASTM D892	ASTM E1131	ISO 2781	SAE J2643
ASTM D1329	ASTM SF105	ISO 2921	SAE 5W30
ASTM D1415	IATF 16949	ISO 3384	
ASTM D1418	IEEE/ASTM SI 10	ISO 4650	

2.2 GM Standards/Specifications.

9986153	GMW14872	GMW16955	GMW17332
GMW3059	GMW14914	GMW17113	GMW17376
GMW3083	GMW15117	GMW17205	GMW17821
GMW3116	GMW16137	GMW17224	
GMW3155	GMW16177	GMW17281 (ID)	
GMW14270	GMW16678	GMW17294	

(ID) = This standard is limited to internal distribution within General Motors and shall not be distributed outside this company. Contact the GM Lead Engineer for further instructions.

2.3 Additional References.

- Association of Rubber Product Manufacturers (ARPM) Incorporated. Web site: www.arpminc.com
- ASTM Test Monitoring Center, 6555 Penn Avenue, Pittsburgh, PA 15206-4407
- Automotive Industry Action Group (AIAG) AIAG D-22, Best Practice Unified Procedure for Approval of Rubber and Plastic Formulation Ingredient Changes, 26200 Lahser Road, Suite 200, Southfield, MI 48033-7100
- Component Technical Specification (CTS)
- Information Handling Systems Inc., www.ihs.com
- Statement of Requirements (SOR) Appendix D, Elastomer Finite Element Data Request Form (CG5335)
- Vehicle Technical Specification (VTS) (ID)

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3 Requirements

3.1 Requirements on Test Specimens.

3.1.1 Compound Characterization for Finite Element Modeling. All elastomeric compounds qualifying to this standard must also be entered into the hyperelastic GM Material Property Database for finite element modeling unless otherwise specified by the Component Statement of Requirements (SOR) or Component Technical Specification (CTS). Axel Products, Incorporated is GM's sole global contract test facility as the equipment and test methods used are unique and confidential. A finite element development form is submitted with each elastomeric compound. The form is available from Axel Products or Statement of Requirements (SOR) Appendix D. Follow the form instructions.

3.2 Test Preparation and Evaluation.

3.2.1 Resources.

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

3.3 Elastomer Test Specimens Preparation. Specimens used to develop all table properties are die cut specimens from ASTM D3182 sheet stock molded to the same conditions as for actual products, with post cure if applicable. Precondition slabs at 50% Relative Humidity (RH) and 23 °C for at least 16 h before testing. As an option, specimens from non-post cure compounds may be used from production molds. Report the cure time and temperature conditions for all molded specimens.

3.3.1 Elastomer Test Specimens Parts. Specimens can be die cut from production molds to a coupon size. When preparing tensile test specimens from finished parts, in some cases, not all dimensions of the (ISO 37 type 4) dumbbell can be obtained as specified, e.g., the width of the ends. These test specimens can still be used, if the narrow portion has the correct specified values and a widening of the ends of the dumbbell exists. The test specimen should have the following properties:

- The ends of the dumbbell where it is clamped should be at least twice the width of the narrow portion of the dumbbell. This increase in width should be symmetrical about the narrow portion of the test specimen.
- The length of the tab ends must be sufficient to insure secure clamping.

Note: Length is based on clamp type. See GMW17821.

3.3.2 Metal and plastic specimens are prepared to the appropriate GMW standard referenced in this document or production drawing. If no GM standard is available, use the appropriate industry standard referenced in this document or appropriate detail drawing.

3.4 Test Units. Report data in the appropriate International System of Units (SI) using IEEE/ASTM SI 10.

3.5 Test Conditions. If not otherwise stated, mechanical properties in delivery state and after heat or fluid immersion are to be tested at 23 °C and with the same test methods. Unless otherwise specified, conduct testing at 50% RH and 23 °C. If temperature and humidity are known not to significantly affect test results, use a relative humidity range of 30% to 55% and temperature range of 20 °C to 32 °C. All test conditions must be within ± 2 h, ± 2 °C and $\pm 5\%$ RH of the specified numbers unless otherwise indicated.

3.6 Elastomer Compound Table Data. Each approved elastomer compound shall meet its table, and section item requirements. Individual compound property tests represent characteristics that are significant to the intended usage (see Table 1) per agreement between the compound supplier and GM Engine and Transmission Engineering personnel. Type data can represent the collective property profile of more than one (1) compound (e.g., Type 1 in all Table 3 thru Table 10). Therefore, it is inappropriate to use this data for quality control of a single compound.

3.6.1 Global or Cross Regional Compounds. Compound formulations produced in more than one (1) mix facility but sharing a common compound identification shall be subject to review. The level of testing and approval may be by polymer source and/or mix site depending on the variation permitted in ingredient selection and process conditions. Approvers are responsible for tracking production compound history and managing local variation as part of the formal approval process.

3.6.1.1 Contingency. As part of the approval process, each compound supplier shall have a designated alternative mix operation. Compound from that location(s) shall be evaluated to 3.7 Table Data Requirements, tentative approval conditions.

3.6.1.2 Data Requirements for Multiple Supplier Mixing Locations. When mixing sites evaluated under 3.6.1 and 3.6.1.1 (contracted mix site) have different batch sizes, mixing equipment, etc. that significantly influence the test result, data must be submitted to 3.7 requirements for each mixing site. GM Materials Approved Source List approvals are by mix site. Combination data of mix sites to make up the required six (6) production lots is not permitted.

3.7 Table Data Requirements. Approved elastomer compound specification values (with noted exceptions) are statistically based on a six-sigma limit spread in (normal distribution) data from minimum of six (6) production lots (five (5) data points/lot) with noted exceptions on the finite element development form (SOR, Appendix D). Tentative approval, signified by the letter **T**, will be given based on data from one (1) production and three (3) lab lots or three (3) production lots. Tier 1 sources will be responsible for continuing to submit data until the total number of samples is met for full qualifications as stated in the first line of this paragraph. Appropriate industry statistical standards, methods or practices should be used when generating data.

3.8 Test Frequency. For statistical reporting of data, use the latest version of the finite element development form (SOR, Appendix D). The finite element development form (SOR, Appendix D) lists the test frequency and data required. Upon completion of the data requirements for table development, the approved compound source is only required to satisfy International Automotive Task Force (IATF) IATF 16949 requirements (Production Part Approval Process, Appendix D) and their internal test frequency. See 3.12.1, 3.13 and 3.19 regarding change management as the document content changes over time.

3.8.1 Number of Test Specimens. As defined by the finite element development form (SOR, Appendix D) with each specimen meeting the stated requirements. Each spread sheet cell represents an individual test result.

3.9 Plastic Constructions (Cp). Part properties have to be defined on part drawing. References to plastic material should contain the appropriate GMW or regional standards for the approved materials. Approved material sources are found in GM Materials Approved Source List.

3.10 Regrind. Regrind is defined in GMW3116. A production part molder/supplier must identify for development and production test parts, the intended level, and to test to that maximum level. It is the responsibility of the

molder-fabricator and material source to establish what level can be used, number of reuses, blend ratios, etc., and provide data that the values stated on the detail drawing can be met (at that regrind level). Only dedicated, reprocessed approved material can be used with virgin stock. Reprocessed feed streams must be separated by percent base polymer (e.g., percent fluorine in fluorocarbon rubber, cure system, and color if integral, and used only in like compounds). Parts must be tested for specification limits and validated at the maximum production intent regrind level. A 10% maximum plastic regrind is recommended. Prints without a regrind reference or code are to use 100% virgin material.

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

3.12 Documentation. Samples of components or material released to this specification shall be tested for conformity with the requirements of this specification and approved by the responsible GM department before the start of delivery of production level components or materials.

3.12.1 Managing Change. Any change to the component or material, e.g., cost, design, function, properties, manufacturing process and/or location of manufacture requires a new release of the product. It is the sole responsibility of the supplier to provide the customer, unsolicited, with documentation of any change or modification to the product/process, and to apply for a new release.

If not otherwise agreed to, the entire verification test shall be repeated and documented by the supplier before start of delivery of the modified or changed product. In some cases, a shorter test can be agreed to between the responsible GM department and the supplier.

3.12.1.1 GM North America (GMNA) Only. Elastomer polymer or ingredient changes to the approved production compounds are made by submitting the AIAG D-22 template assigning a number(s) to the appropriate listed changes, and a Supplier Production Change Request (SPCR). GM report forms are available from GM Engine and Transmission Materials Engineering. Submit a completed form to GM Engine and Transmission Materials Engineering before submitting a SPCR.

3.13 Deviations from Test Procedure. Deviations (improvements or corrections) from the requirements of the test procedure(s), not specification limits, shall have been agreed upon between tester and requester. Use of procedure deviations are considered temporary (up to 6 months) until a consensus is reached and revisions made to this document. Such deviation requirements shall be specified on component drawings, test certificates, reports, etc. Once consensus is reached, all earlier print deviations must be corrected by an Engineering Work Order (EWO). See 8.1.6.

3.14 Requirements on Delivery.

3.14.1 Identify parts to 1.1 and Table 1 designations.

3.14.2 Specify part micro-hardness International Rubber Hardness Degree (IRHD) to ASTM D1415 or ISO 48 Method M on the part print. See GMW17821.

3.14.3 Parts must meet 3.18 Performance Requirements.

3.14.4 Chemical Requirements Characterization Tests (Optional). To verify a finished part or slab specimen matches the original validated compound, compare the slab specimen to the original validated compound using one or a combination of the following tests:

3.14.4.1 Infrared Spectroscopy. ISO 4650 or ASTM D3677 verifies the material type and will be kept on file by the compound supplier.

3.14.4.2 Thermogravimetric Analysis, Temperature Scanning Method. ASTM E1131, first derivative to determine composition.

3.14.4.3 Density or Specific Gravity. ASTM D297, hydrostatic method or ASTM D1505, density gradient. Values shall be included on the part print with a ± 0.02 range for mass calculation.

3.14.5 Compression Testing. Compression set testing will be run at the upper limit temperatures for each type and class in Table 1 at the percent compression indicated in Table 3 through Table 8.

3.14.5.1 The decision to run Compression Stress Relaxation (CSR) per GMW17113 at 150 °C in air based on correlation studies with GMW3155 in oil. The compression requirements for CSR are indicate in all tables. CSR

is run with manual fixtures or continuous units depending on the equipment available. Suppliers are not required to run manual and continuous results for compound approval.

3.14.5.2 Reporting Manual CSR Results. In addition to the percent retained sealing force, the stiffness ratio (see Appendix A) is also reported along with all test sample plots to verify the of stability of the mounted test fixture and quality of the data produced.

3.15 Elastomer Property Requirements. Follow American Society for Testing and Materials (ASTM) International or International Organization of Standardization (ISO) method requirements for test specimen selection, if the compound is anisotropic or mill/flow direction is known. Report results in the direction indicated by the ASTM or ISO method. If no direction is indicated, test and report in the lowest result direction.

Table 3: Transmission Requirements Note 1, Note 2, Note 3, Note 4, Note 5, Note 6

Properties Note 1	Standard	Unit		ACM			AEM				
Class				AT			AT				
Type				6	6-1	7	6	6-1	7	7-1	8
Hardness, Shore A	ASTM D 2240 or ISO 7619-1	points		60 ± 5	65 ± 5	70 ± 5	60 ± 5	65 ± 5	70 ± 5	75 ± 5	80 ± 5
Tensile Strength	ASTM D 412, Die C or ISO 37, type 2 or 4 specimen Note 2 ISO 37, 200 mm/minute	MPa	Minimum	7	7	8	10	9	10		
Tensile Stress at 100% Elongation		MPa	Minimum	2	2	2	3	3	5	6	5
Elongation at Break		%	Minimum	200	160	180	250	200	175	175	150
Tear Strength Note 3	ASTM D624, Die C or ISO 34-1, Method A	kN/m N/m	Minimum	15 3	15	15 3	20 3	20	20	30	20
Hardness, micro	ASTM D1415 or ISO 48 Method M	IRHD		As specified on part drawing							
Heat Aging, 1008 h at 150 °C Tensile strength, Elongation	SAE J2236	% %	Minimum	50 50							
Low Temperature Retraction, TR ₁₀ . (Optional): Glass Transition, T _g	ASTM D1329 ASTM D3418, or ISO 11357, part 2	°C	At or colder	-20 -25	-25 -30	-20 -25	-25 -30				
(Optional) Compression Stress Relaxation (CSR) Note 4 1008 h at 150 °C	GMW17113 AC/AM2AD0	% RSF	Minimum	10	30	15	10				
Compression Set, 22 h at 150 °C	ASTM D395 Method B Note 5 or ISO 815 test piece Type B	%	Maximum	25	25	N/A	20	25	25	35	25
Compression Set, 22 h at 175 °C	ASTM D395 Method B Note 5 or ISO 815 test piece Type B	%	Maximum	N/A	N/A	25	25	30	30	45	30

CSR, 1008 h at 150 °C using Dexron VI ^{Note 6}	GMW17113 AC/AM201D0	% RSF		15	30	20	15
Fluid Aging, 1008 h at 150 °C in Dexron VI ^{Note 6} Change Tensile, Change Elongation, Volume Swell	ISO 1817 or ASTM D471	% % %	Maximum	±30 -50 0 to 20	±30 -30 0 to 20	±30 -50 0 to 20	-30 -60 0 to 25

Note 1: Table property values are based on ASTM D3182, sheet data from ASTM D412, Die C specimens in the specified hardness range. Die C consistently produces lower property values than ISO dies at rate.

Note 2: Data from part test specimens using ISO 37, type 2 or four (4) dies must meet table requirements.

Note 3: Tear specimens are unnicked.

Note 4: Table property values are from GM designated test fixtures and test specimens.

Note 5: For GMNA testing the load will remain on specimen during fixture cooling and only released just before measurement.

Note 6: Table property values are from test fixtures using designated test specimens. Follow GMW17113, no oil change during the entire test. Use Dexron VI per 9986153 (default). However, suppliers or test labs shall use the automatic transmission fluid (ATF) that is defined in the latest GM Statement of Requirements (SOR) or blue print if there is discrepancy between the latest GM SOR/blue print and this document.

Table 4a: Properties for ACM ^{Note 1}

Property	Test Procedure	Unit	Value
Micro Hardness			
Class BT and FE, Type 1	ASTM D1415 or ISO 48, Method M	IRHD	See part drawing ± 4 point range
Hardness			
Class BT and Class FE, Type 1	ASTM D2240	Shore A	To be reported
Density			
Class BT and Class FE, Type 1	ASTM D297, ASM D1505 or ISO 2781	Grams/cubic centimeter	To be reported
Elongation at Break			
Class BT and Class FE, Type 1	ASTM D412, Die C or ISO 37, Type 2 dumbbell, 200 mm ± 20 mm/minute	Percent	160 Minimum
Stress at 100% Elongation			
Class BT, Type 1	ASTM D412, Die C or ISO 37, Type 2 dumbbell, 200 mm ± 20 mm/minute	Megapascals	2 Minimum
Class FE, Type 1	ASTM D412, Die C or ISO 37, Type 2 dumbbell, 200 mm ± 20 mm/minute	Megapascals	1.8 Minimum
Tensile Strength			
Class BT, Type 1	ASTM D412, Die C or ISO 37, Type 2 dumbbell, 200 mm ± 20 mm/minute	Megapascals	7.0 Minimum
Class FE, Type 1	ASTM D412, Die C or ISO 37, Type 2 dumbbell, 200 mm ± 20 mm/minute	Megapascals	7.5 Minimum
Tear Strength			
Class BT, Type 1	ASTM D624, Die C, specimen are un-nicked or ISO 34-1, Method A	Kilonewtons/meter Newtons/millimeter	15 Minimum 2 Minimum
Class FE, Type 1	ASTM D624, Die C, specimen are un-nicked or ISO 34-1, Method A	Kilonewtons/meter Newtons/millimeter	15 Minimum 3 Minimum
Property	Test Procedure	Unit	Value

Property	Test Procedure	Unit	Value
Age Resistance			
Class BT and Class FE, Type 1	SAE J2236 1008 h at + 165 °C Change in Elongation at break Change in Tensile strength	Percent Percent	-50 Maximum -50 Maximum
Low Temperature Retraction, TR₁₀			
Class BT and Class FE, Type 1	ASTM D1329 or ISO 2921	Degrees Celsius or colder	-20
Compressive Stress Relaxation in Air ^{Note 2} (for those with manual test fixtures).			
Class BT, Type 1	GMW17113 Method AM1AD0, 15% deflection, 1008 h at +150 °C	Percent Retained Sealing Force	10 Minimum
Class BT, Type 1	GMW17113 Method AM1AD0, 35% deflection, 1008 h at +150 °C	Percent Retained Sealing Force	10 Minimum
Class FE, Type 1	GMW17113 Method AM1AD0, 15% deflection, 1512 h at +150 °C	Percent Retained Sealing Force	10 Minimum
Class FE, Type 1	GMW17113 Method AM1AD0, 35% deflection, 1512 h at +150 °C	Percent Retained Sealing Force	10 Minimum
Continuous Compressive Stress Relaxation in Air ^{Note 3} (for those with continuous test fixtures).			
Class FE, Type 1	GMW17113 Method BC1AD0, 15% deflection, 1512 h at +150 °C	Percent Retained Sealing Force	20 Minimum
Class FE, Type 1	GMW17113 Method BC1AD0, 35% deflection, 1512 h at +150 °C	Percent Retained Sealing Force	20 Minimum
Compressive Stress Relaxation in ASTM SF105 Oil ^{Note 4}			
Class FE, Type 1	GMW17113 AM2O1D0, 15% deflection, 1512 h at +150 °C	Percent Retained Sealing Force	15 Minimum
Compressive Stress Relaxation in Dexron® VI ^{Note 5}			
Class BT, Type 1	GMW17113 Method AM1AD0, 15% deflection, 1008 h at +150 °C	Percent Retained Sealing Force	15 Minimum
Class BT, Type 1	GMW17113 Method AM1AD0, 35% deflection, 1008 h at +150 °C	Percent Retained Sealing Force	15 Minimum
Compression Set ^{Note 6}			
Class BT and Class FE, Type 1	15% deflection per ASTM D395, Method B, or ISO 815 Test piece Type B modified ^{Note 7} 168 h at +165 °C. See 3.14.5.	Percent Maximum	40

Note 1: Table property values are based on ASTM D3182 sheet data from ASTM D412, Die C specimens in the specified hardness range. Die C consistently produces lower property values than ISO dies at rate.

Note 2: Values are from GMW17113 designated test fixtures and test specimens. Do not use ASTM D6147 or ISO 3384 test fixtures.

Note 3: Continuous testing may be run in place of manual fixtures. Both are not required.

Note 4: At this time a replacement formulation for ASTM SF105 is in pilot production. Although the replacement has no ASTM designation, it is expected to have no impact on table limits.

Note 5: Table property values are from test fixtures using designated test specimens. Follow GMW17113, no oil change during the entire test. Use Dexron® VI per 9986153 (default). However, suppliers or test labs shall use the Automatic Transmission Fluid (ATF) that is defined in the latest GM Statement of Requirements (SOR) or blue print if there is discrepancy between the latest GM SOR/blue print and this document.

Note 6: Values to be determined to compare with test results from finished part.

Note 7: GM Engine and Transmission Engineering requires load be maintained during cooling and measurement made in 10 minutes or less after load removed.