GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW16189

Sealings in Turbo Charger Applications

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/Material Description. This specification covers the materials of elastomeric sealings in turbocharger applications.

Materials covered by this standard are divided into the following types:

1.1.1 Type A. Ethylene Acrylate Elastomer (AEM) gasket for use in quick-connects for 160 °C permanent and 185 °C peak temperatures.

1.1.2 Type B. Fluoroelastomer (FKM) gasket for use in quick-connects for 200 °C permanent and 225 °C peak temperatures.

1.1.3 Type C. FKM sealings for static applications for 200 °C permanent and 225 °C peak temperatures.

1.1.4 Type D. Silicone Elastomer (VMQ) sealings for static applications for 200 °C permanent and 225 °C peak temperatures.

1.1.5 Type E. Drawing defined (e.g., using SAE J200 or ASTM D2000 line callout). If no type of material is indicated, material of Type A is sufficient.

1.1.6 Type F. Ethylene Acrylate Elastomer (AEM) gasket for use in quick-connects for 135 °C permanent and 150 °C peak temperatures.

1.1.7 Type G. Fluoroelastomer (FKM) gasket for use in quick-connects for 150 °C permanent and 175 °C peak temperatures.

1.2 Symbols. Not applicable.

1.3 Applicability. What is this standard used for? Be specific. Describe component, subsystem, system, vehicle or program. Do not indicate “Not applicable”.

1.4 Remarks. None.

2 References

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

2.1 External Standards/Specifications.

ASTM D2000	ISO 48	ISO 815	ISO 23529
ISO 34-1	ISO 188	ISO 1817	SAE J200
ISO 37			

2.2 GM Standards/Specifications.

GMW3059	GMW14270	GMW15803	GMW17245

2.3 Additional References. Not applicable.

3 Requirements

3.1 Resources.

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3.1.1 Test Samples. Unless otherwise specified, the shape and size of test pieces shall be in accordance with the relevant test procedure. Minimum six (6) test samples (gaskets) are required for initial sample testing. Minimum three (3) test samples are required for inspection testing.

3.1.1.1 Samples are finished parts or to be taken from finished parts. Where the dimensions on the finished parts do not allow preparing of test pieces, tests are to be performed on sheet material of the same production batch. The same state of cure between slabs or buttons and finished parts must be assured by appropriate tests, which must be described in the test report. When presenting a new quality, sheet material of the same batch is recommended.

3.1.1.2 If not otherwise stated, mechanical properties in delivery state and after heat or fluid immersion are to be tested at 23 °C ± 5 °C and with the same test methods. Unless otherwise stated, ambient temperature test conditions shall be held to 23 °C ± 5 °C. Unless otherwise stated, all other temperatures except 23 °C ± 5 °C shall be held to ± 3 °C.

3.1.2 Conditioning. Conditioning shall be as specified in the relevant test procedure.

3.1.3 Equipment. Conforming to the relevant test procedures.

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

3.1.5 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 its physical definition.

3.1.6 Facilities. Conforming to the relevant test procedures.

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

3.2 Material and Performance Requirements.

3.2.1 Design Validation (DV) or Product Validation (PV) Testing. Material and Performance Properties are summarized in Table 1. For full approval of a sealing, compliance to the requirements of Table 1 is needed. Six (6) samples of material shall be tested to each of the requirements for DV or PV Testing.

3.2.2 Audit/Inspection Testing. If not defined otherwise, the following testing should be done for production audit testing. Three (3) samples of material shall be tested to each of the requirements for Audit/Inspection Testing.

- All tests per Table 1, except Long Term Aging Resistance.

Table 1: Material and Performance Properties

Property	Test Procedure	Unit	Value
Hardness			
Type A, F	ISO 48, Method M	IRHD	65 - 5 + 10
Type B, C, G	ISO 48, Method M	IRHD	60 ± 5
Type D	ISO 48, Method M	IRHD	65 ± 5
Type E	As specified on drawing/math data file		As specified on drawing
Elongation at Break			
Type A ,B, C, D	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	%	200 minimum
Type E	As specified on drawing/math data file	%	As specified on drawing
Type F, G	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	%	150 minimum
Tensile Strength			

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Property	Test Procedure	Unit	Value
Type A, F	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	MPa	8.5 minimum
Type B, C, G	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	MPa	9 minimum
Type D	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	MPa	4 minimum
Type E	As specified on drawing/math data file	MPa	As specified on drawing
Tear Strength Note 1			
Type A, F	Tear strength to ISO 34-1, Method A (trouser test piece)	N/mm	4 minimum
Type B, C, G	Tear strength to ISO 34-1, Method A (trouser test piece)	N/mm	3 minimum
Type D	Tear strength to ISO 34-1, Method A (trouser test piece)	N/mm	2.5 minimum
Type E	As specified on drawing/math data file		As specified on drawing
Age Resistance (Heat Aging)			
Type A	ISO 188, Method B, 168 h - 2 h at 185 °C ± 3 °C Change in Hardness Change in Elongation at Break Elongation at Break Change in Tensile Strength Tensile Strength Tear Strength	 IRHD % % % MPa N/mm	 +15 maximum -50 maximum 125 minimum -20 maximum 8.5 minimum 2.5 minimum
Type A	ISO 188, Method B, 1008 h - 2 h at 160 °C ± 3 °C Change in Hardness Change in Elongation at Break Elongation at Break Change in Tensile Strength Tensile Strength Tear Strength	 IRHD % % % MPa N/mm	 +15 maximum -60 maximum 125 minimum -20 maximum 8.5 minimum 2.5 minimum
Type B, C	ISO 188, Method B, 168 h - 2 h at 225 °C ± 3 °C Change in Hardness Change in Elongation at Break Elongation at Break Change in Tensile Strength Tensile Strength Tear Strength	 IRHD % % % MPa N/mm	 ±5 maximum -20 maximum 180 minimum -20 maximum 9 minimum 3 minimum
Type B, C	ISO 188, Method B, 1008 h - 2 h at 200 °C ± 3 °C Change in Hardness Change in Elongation at Break Elongation at Break Change in Tensile Strength Tensile Strength Tear Strength	 IRHD % % % MPa N/mm	 ±5 maximum -40 maximum 180 minimum -20 maximum 9 minimum 3 minimum
Type D	ISO 188, Method B, 168 h - 2 h at 225 °C ± 3 °C Change in Hardness	 IRHD	 ±5 maximum
Type D	ISO 188, Method B, 1008 h - 2 h at 200 °C ± 3 °C Change in Hardness	 IRHD	 ±5 maximum

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