A Program of ASTM International

Test Monitoring Center

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EOEC Information Letter No. 26-1
Sequence No. 16
May 22, 2026

ASTM consensus has not yet been obtained on this information letter. An appropriate ASTM ballot will be issued in order to achieve such consensus.

TO: EOEC Mailing List

SUBJECT: Changes and Additions to ASTM D7216-25 Test Procedure

The Engine Oil Elastomer Compatibility (EOEC) surveillance panel met on April 14, 2026, and voted to accept the following changes and additions to the ASTM D7216-25 test procedure. The primary change to the procedure includes the replacement of reference oil TMC 1006 with TMC SL107. Additions to the procedure include adding six new elastomer types. The new elastomer types that were added are listed below:

Engine Oil Elastomer Compatibility (EOEC)
1) Hydrogenated Nitrile Butyl Rubber (HNBR)
2) Fluoroelastomer (FKM2)

Light Duty Engine Oil Compatibility (LDEOC)
1) Fluoroelastomer (FKM3)
2) Ethylene Acrylate (AEM2)
3) Ethylene Acrylate (AEM3)
4) Polyacrylate (ACM2)

There are multiple places within the procedure where a change or addition has been made. A summary of changes and additions (additions noted in blue text), listed in the order in which they are found within the document, are shown below.

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EOEC Surveillance Panel Chair
Southwest Research Institute

Jeffrey A. Clark
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Attachments

c: https://www.astmtmc.org/ftp/docs/bench/eoec/procedure_and_ils/il26-1_EOEC.pdf

Distribution: Email

{Revises Test Method D 7216-25}

However, the ASTM Test Monitoring Center (TMC)[1,2] provides a reference oil (TMC ~~1006~~ SL107) and an assessment of the test results obtained with this oil and the reference elastomers.

1.1 This test method covers quantitative procedures for the evaluation of the compatibility of automotive engine oils with several reference elastomers typical of those used in the sealing materials in contact with these oils. Compatibility is evaluated by determining the changes in volume, Durometer A hardness, elongation, and tensile properties when the elastomer specimens are immersed in the oil for a specified time and temperature.

1.6 This test method is arranged as follows:

Adding 3.1.1 and 3.2 to Section 3 and re-numbering all Section 3 items accordingly:
3.1.1 For definitions of terms used in this test method, refer to Terminology D4175.
3.2 Definitions specific to this test method.

4.1 Measurements of initial volume, hardness (Durometer A), elongation, and tensile properties are made on specimens of specified dimensions cut from sheets of reference elastomers.

[1] Until the next revision of this test method, the ASTM Test Monitoring Center updates changes in the test method by means of information letters. Information letters can be obtained from the ASTM Test Monitoring Center, 203 Armstrong Drive, Freeport, PA 16229. (www.astmtmc.org) Attention: Director. This edition incorporates revisions in all information letters through No. 23-1.

4.1.1 Table 1 shows the types of elastomers involved, typical of those used in heavy-duty diesel engines.

TABLE 1 Immersion Temperatures and Times for the Reference Elastomers[A]

Elastomer	Immersion Test Temperature, °C	Immersion Test Time, h
Nitrile (NBR)	100 ± 1	336.0 ± 0.5
Polyacrylate (ACM)	150 ± 1	336.0 ± 0.5
Fluoroelastomer (FKM)	150 ± 1	336.0 ± 0.5
Silicone (VMQ-1)	150 ± 1	336.0 ± 0.5
VAMAC (MAC)	150 ± 1	336.0 ± 0.5
Hydrogenated Nitrile (HNBR)	100 ± 1	336.0 ± 0.5
Fluoroelastomer (FKM-2)	150 ± 1	336.0 ± 0.5

7.4 *Reference Seal Elastomers*—Obtain cured prepared sheets of the reference seal elastomers from the Parts Distributor (PD).[26] The sheets are at least 152 mm by 152 mm and have a uniform thickness of 2 mm ± 0.1 mm. The specific reference elastomers described in this test method are a fluoroelastomer (FKM), a polyacrylate material (ACM), a silicone rubber (VMQ-1), a nitrile rubber (NBR), an ethylene acrylate "VAMAC" material (MAC), a hydrogenated nitrile rubber (HNBR), and a fluoroelastomer (FKM-2).

10.3.1 Transmit reference oil test data to the TMC by electronic means ~~or by telephone facsimile~~ immediately upon completion of the test analysis. Include all of the reporting forms in the transmission.

11.2.2.7 The letter code for reporting Hydrogenated Nitrile (HNBR) results is HNBR.
11.2.2.8 The letter code for reporting Fluoroelastomer (FKM-2) results is FKM-2.

TABLE 2 FLUOROELASTOMER (FKM) Reference Oil Precision Data

NOTE 1—These statistics are based on 612 results obtained on Test Monitoring Center reference oil SL107 between April 7, 2020 and April 16, 2025.

Variable	$s_{i.p}$	i.p.	s_R	R
Volume Change, %	0.19	0.50	0.18	0.51
Hardness Change, Points	3.12	1.77	4.90	5.74
Tensile Strength Change, %	3.29	9.12	3.65	10.12
Elongation Change, %	5.52	15.29	6.19	17.16

[2] Contact the TMC for the current company. In 2004, the company functioning in this capacity was: OH Technologies Inc., Attention Jason Bowden, PO Box 5039, 9300 Progress Parkway, Mentor OH 44060, USA.

TABLE 3 NITRILE (NBR) Reference Oil Precision Data

NOTE 1—These statistics are based on 693 results obtained on Test Monitoring Center reference oil SL107 between April 11, 2020 and April 17, 2025.

Variable	$s_{i.p}$	i.p.	s_R	R
Volume Change, %	0.49	1.36	0.50	1.39
Hardness Change, Points	1.23	3.42	1.24	3.44
Tensile Strength Change, %	5.88	16.31	5.88	16.31
Elongation Change, %	6.33	17.56	6.33	17.56

TABLE 4 POLYACRYLATE (ACM) Reference Oil Precision Data

NOTE 1—These statistics are based on 630 results obtained on Test Monitoring Center reference oil SL107 between April 9, 2020 and April 17, 2025.

Variable	$s_{i.p}$	i.p.	s_R	R
Volume Change, %	0.47	1.29	0.47	1.30
Hardness Change, Points	1.62	4.48	1.62	4.49
Tensile Strength Change, %	6.81	18.87	6.82	18.90
Elongation Change, %	9.91	27.48	9.91	27.48

TABLE 5 SILICONE (VMQ) Reference Oil Precision Data

NOTE 1—These statistics are based on 572 results obtained on Test Monitoring Center reference oil SL107 between April 15, 2020 and April 16, 2025.

Variable	$s_{i.p}$	i.p.	s_R	R
Volume Change, %	2.98	8.25	3.17	8.79
Hardness Change, Points	2.08	5.76	2.08	5.76
Tensile Strength Change, %	4.98	13.80	5.05	14.00
Elongation Change, %	7.10	19.68	7.36	20.41

TABLE 6 VAMAC (MAC) Reference Oil Precision Data

NOTE 1—These statistics are based on 587 results obtained on Test Monitoring Center reference oil SL107 between April 15, 2020 and April 15, 2025.

Variable	$s_{i.p}$	i.p.	s_R	R
Volume Change, %	1.35	3.73	1.48	4.09
Hardness Change, Points	1.36	3.77	1.36	3.77
Tensile Strength Change, %	5.45	15.12	5.45	15.12
Elongation Change, %	7.36	20.39	7.45	20.65

TABLE 7 HYDROGENATED NITRILE (HNBR) Reference Oil Precision Data

NOTE 1—These statistics are to be determined when sufficient data is available on Test Monitoring Center reference oil SL107

Variable	$s_{i.p}$	i.p.	s_R	R
Volume Change, %				
Hardness Change, Points				
Tensile Strength Change, %				
Elongation Change, %				

TABLE 8 FLUOROELASTOMER (FKM-2) Reference Oil Precision Data

NOTE 1—These statistics are to be determined when sufficient data is available on Test Monitoring Center reference oil SL107

Variable	$s_{i.p}$	i.p.	s_R	R
Volume Change, %				
Hardness Change, Points				
Tensile Strength Change, %				
Elongation Change, %				

12.1.1 Tables 2-8 summarize reference oil intermediate precision and reproducibility of the test. The tabulated values are current as of August 2007. The Surveillance Panel updates these values as necessary.

12.1.2.1 *Intermediate Precision Limit (*i.p.*)*—The difference between two results obtained under intermediate precision conditions that in the long run, in the normal and correct conduct of the test method, exceed the values shown in Tables 2-8 in only one case in twenty. When only a single test result is available, the Intermediate Precision Limit can be used to calculate a range (test result ± Intermediate Precision Limit) outside of which a second test result would be expected to fall about one time in twenty.

12.1.3.1 *Reproducibility Limit (*R*)*—The difference between two results obtained under reproducibility conditions that would, in the long run, in the normal and correct conduct of the test method, exceed the values in Tables 2-8 in only one case in twenty. When only a single test result is available, the Reproducibility Limit can be used to calculate a range (test result ± Reproducibility Limit) outside of which a second test result would be expected to fall about one time in twenty.

- 12.1.5 A correction factor is to be added to test results as specified in Table 9.

TABLE 9 Correction Factor – Heavy Duty Polyacrylate Elastomer (ACM)

Elastomer Batch	Volume Change Industry Correction Factor
Batches prior to ACM-28	0.00
ACM-28 and higher	+0.19

A1.1 Table A1.1 lists the formulation data and typical physical properties for cured elastomer sheets provided by the PD (see 7.4). It is the responsibility of the PD to ensure that the elastomer sheets conform to all requirements, including curing, formulation, and properties.

TABLE A1.1 Formulation Data and Typical Physical Properties for Four of the Reference Elastomer Materials in 7.4[A]

Elastomer	Ingredients	Parts, by Mass	Durometer A Hardness,[B] Points	Tensile Strength,[C] MPa	Ultimate Elongation,[B] %	Specific Gravity[D] mg/m^3
Fluoroelastomer	Rubber[E]	100.00	71	≥13	270	1.84
(FKM)	Maglite D	3.00				
	N-990 Carbon Black	30.00				
	Calcium Hydroxide – Reagent Grade	6.00				

	Press Cure: 10 min @ 177 °C					
	Post Cure: 16 h @ 232 °C					
Polyacrylate	Rubber[F]	100.00	66	11.9	175	1.31
(ACM)	N-550 Carbon Black	65.00				
	Stearic Acid	1.00				
	Substituted diphenylamine[G]	2.00				
	Processing aid[H]	2.00				
	Sodium Stearate	4.00				
	Quaternary ammonium compound[I]	2.00				

	Press cure: 12 min @ 170 °C					
	Post cure: None					
Silicone	*Refer to SAE J2643 for formulation data*		63	8.9	407	1.187
(VMQ-1)						
Nitrile	Rubber[J]	100.00	68	19.6	290	1.25
(NBR)	Zinc Oxide	5.00				
	Stearic Acid	2.00				
	Antidegradent[K]	2.00				
	N-774 Carbon Black	70.00				
	Polysulfide[L]	5.00				
	Dicumyl peroxide[M]	3.00				

	Press cure: 12 min @ 170 °C					
	Post cure: None					
Zeptol HNBR	Zeptol 2000L	100.00	73	19.6	250	1.22
(HNBR)	N762	10.00				
	N990	60.00				
	TAIC	3.00				
	Maglite D	3.00				
	Hydrotalcite FG	3.00				
	Vanox CDPA	1.25				
	Vul-Cup 40KE	7.50				

	Press cure: 10 min @ 177 °C					
	Post cure: None					
VAMAC G	Vamac®G	100.00	70	15.2	313	1.22
(MAC)	Naugard 445	2.00				
	Stearic Acid	1.50				
	Vanfre Vam	1.00				

Elastomer	Ingredients	Parts, by Mass	Durometer A Hardness,[B] Points	Tensile Strength,[C] MPa	Ultimate Elongation,[B] %	Specific Gravity[D] mg/m^3
	Armeen 18D	0.50				
	Carbon Black FEF N-550	60.00				
	TP-759	10.00				
	Diak #1	1.50				
	DOTG	4.00				
	TOTAL PHR	180.50				

	Press cure: 5 min @ 177 °C					
	Post cure: 4 hours @ 175°C					
FKM-2 (FKM2)	*Refer to SAE J2643 for formulation data*		79	15.3	190	1.86

[A] Manufacturer shall mark each elastomer sheet to designate the direction of the grain of the material.
[B] Test Method D2240.
[C] Test Methods D412.
[D] Test Methods D297.
[E] Viton A-275C or Fluorel FC-2123 has been found satisfactory for this purpose. (Viton is a trademark of Dupont Dow Elastomers; Fluorel is the trademark of 3M.)
[F] HyTemp 4051 EP has been found satisfactory for this purpose. (HyTemp is a trademark of Zeon Chemicals.)
[G] Naugard 445 has been found satisfactory for this purpose. (Naugard is a trademark of Uniroyal Chemical.)
[H] Struktol WB 222 has been found satisfactory for this purpose. (Struktol is a registered trademark.)
[I] HyTemp NPC-50 has been found satisfactory for this purpose.
[J] Nipol DN3350 has been found to be satisfactory for this purpose. (Nipol is a trademark of Zeon Chemicals.)
[K] Stangard has been found satisfactory for this purpose. (Stangard is a trademark of Harwick Chemical.)
[L] Thiokol TP-95 has been found satisfactory for this purpose. (Thiokol is a trademark of Morton International.)
[M] Varox DCP40KE has been found satisfactory for this purpose. (Varox is a trademark of R.T. Vanderbilt.)

A2.1.1 The test procedure described in this annex uses nine elastomer seals typical of those used in passenger-car, spark-ignition engines. Table A2.1 shows the types of elastomers involved. They differ from those described in Table 1 and 7.4 that are more commonly used in heavy-duty diesel engines. The apparatus and the TMC SL107 reference oil testing are identical to those described in Sections 6 and 10, respectively. The procedure described in this annex differs, however, from that in Section 8 in that the tensile stress change at 50 % elongation is also determined. In all other respects, the procedure is identical to that described in Section 8.

TABLE A2.1 Immersion Temperatures and Times for the Reference Elastomers[A]

Elastomer	Immersion Test Temperature, °C	Immersion Test Time, h
Hydrogenated Nitrile (HNBR-1)	100 ± 1	336.0 ± 0.5
Polyacrylate (ACM-1)	150 ± 1	336.0 ± 0.5
Fluoroelastomer (FKM-1)	150 ± 1	336.0 ± 0.5
Silicone (VMQ-1)	150 ± 1	336.0 ± 0.5
Ethylene acrylate (AEM-1)	150 ± 1	336.0 ± 0.5
Fluoroelastomer (FKM-3)	150 ± 1	336.0 ± 0.5
Ethylene acrylate (AEM-2)	150 ± 1	336.0 ± 0.5
Ethylene acrylate (AEM-3)	150 ± 1	336.0 ± 0.5
Polyacrylate (ACM-2)	150 ± 1	336.0 ± 0.5

A2.2.2 *Reference Seal Elastomers*—The specific reference elastomers described in this annex are a hydrogenated nitrile rubber (HNBR-1), a polyacrylate rubber (ACM-1), a fluoroelastomer rubber (FKM-1), a silicone rubber (VMQ-1), an ethylene acrylate rubber (AEM-1), a fluoroelastomer rubber (FKM-3), a polyacrylate rubber (ACM-2), an ethylene acrylate rubber (AEM-2), and an ethylene acrylate rubber (AEM-3).

A2.2.2.1 Information on the formulations for the reference elastomers listed in A2.2.2 is given in SAE J2643 (Appendix B for ACM-1 and ACM-2, Appendix C for AEM-1, AEM-2 and AEM-3, Appendix D for HNBR-1, Appendix E for VMQ-1, Appendix G for FKM-1 and FKM-3).

TABLE A2.2 Industry Correction Factor—Light Duty Polyacrylate Elastomer (ACM1)

Elastomer Batch	Volume Change Industry Correction Factor
Batches prior to 19	0.00
ACM1-19	–2.65
ACM1-20	–3.14
ACM1-21	–2.53
ACM1-22	–1.65
ACM1-23	–2.72
ACM1-24	–2.43
ACM1-25	–2.55
ACM1-26	–3.40
ACM1-27	–3.50

A2.5.2.6 The letter code for reporting Ethylene Acrylate (AEM-2) results is AEM2.
A2.5.2.7 The letter code for reporting Ethylene Acrylate (AEM-3) results is AEM3.
A2.5.2.8 The letter code for reporting Polyacrylate (ACM-2) results is ACM2.
A2.5.2.9 The letter code for reporting Fluoroelastomer (FKM-3) results is FKM3.

A2.6.2 Tables A2.3-11 summarize reference oil intermediate precision and reproducibility of the test. The tabulated values are current as of February 2020. The Surveillance Panel updates these values as necessary.

TABLE A2.3 Hydrogenated Nitrile (HNBR-1) Reference Oil Precision Data

NOTE 1—These statistics are based on 760 results obtained on Test Monitoring Center reference oil SL107 between February 25, 2020 and April 14, 2025.

Variable	$s_{i.p.}$	i.p.	s_R	R.
Volume Change, %	0.48	1.34	0.48	1.34
Hardness Change, Points	0.82	2.26	0.82	2.26
Tensile Strength Change, %	5.48	15.18	5.48	15.19

Legend:
$s_{i.p.}$ = intermediate precision standard deviation
i.p. = intermediate precision
s_R = reproducibility standard deviation
R = reproducibility

TABLE A2.4 Polyacrylate (ACM-1) Reference Oil Precision Data

NOTE 1—These statistics are based on 754 results obtained on Test Monitoring Center reference oil SL107 between February 25, 2020 and April 15, 2025.

Variable	$s_{i.p.}$	i.p.	s_R	R
Volume Change, %	0.64	1.77	0.64	1.78
Hardness Change, Points	1.63	4.53	1.63	4.53
Tensile Strength Change, %	5.28	14.62	5.28	14.62

Legend:
$s_{i.p.}$ = intermediate precision standard deviation
i.p. = intermediate precision
s_R = reproducibility standard deviation
R = reproducibility

TABLE A2.5 Fluoroelastomer (FKM-1) Reference Oil Precision Data

NOTE 1—These statistics are based on 696 results obtained on Test Monitoring Center reference oil SL107 between March 02, 2020 and April 16, 2025.

Variable	$s_{i.p.}$	i.p.	s_R	R
Volume Change, %	0.20	0.55	0.20	0.56
Hardness Change, Points	1.15	3.20	1.20	3.32
Tensile Strength Change, %	3.85	10.67	4.13	11.46

Legend:
$s_{i.p.}$ = intermediate precision standard deviation
i.p. = intermediate precision
s_R = reproducibility standard deviation
R = reproducibility

TABLE A2.6 Silicone (VMQ-1) Reference Oil Precision Data

NOTE 1—These statistics are based on 802 results obtained on Test Monitoring Center reference oil SL107 between February 26, 2020 and March 16, 2025.

Variable	$s_{i.p.}$	i.p.	s_R	R
Volume Change, %	2.04	5.65	2.79	7.72
Hardness Change, Points	1.81	5.01	1.81	5.01
Tensile Strength Change, %	5.06	14.04	5.12	14.20

Legend:
$s_{i.p.}$ = intermediate precision standard deviation
i.p. = intermediate precision
s_R = reproducibility standard deviation
R = reproducibility

TABLE A2.7 Ethylene Acrylate (AEM-1) Reference Oil Precision Data

NOTE 1—These statistics are based on 715 results obtained on Test Monitoring Center reference oil SL107 between March 2, 2020 and March 11, 2025.

Variable	$s_{i.p.}$	i.p.	s_R	R
Volume Change, %	0.87	2.41	0.99	2.75
Hardness Change, Points	1.27	3.52	1.27	3.52
Tensile Strength Change, %	4.82	13.36	4.82	13.36

Legend:
$s_{i.p.}$ = intermediate precision standard deviation
i.p. = intermediate precision
s_R = reproducibility standard deviation
R = reproducibility

TABLE A2.8 Ethylene Acrylate (AEM-2) Reference Oil Precision Data

NOTE 1—These statistics are based on 97 results obtained on Test Monitoring Center reference oil SL107 between May 10, 2024 and April 14, 2025.

Variable	$s_{i.p.}$	i.p.	s_R	R
Volume Change, %	0.88	2.43	0.88	2.44
Hardness Change, Points	1.38	3.84	1.38	3.84
Tensile Strength Change, %	4.90	13.58	4.90	13.59

Legend:
$s_{i.p.}$ = intermediate precision standard deviation
i.p. = intermediate precision
s_R = reproducibility standard deviation
R = reproducibility

TABLE A2.9 Ethylene Acrylate (AEM-3) Reference Oil Precision Data

NOTE 1—These statistics are based on 99 results obtained on Test Monitoring Center reference oil SL107 between May 15, 2024 and April 16, 2025.

Variable	$s_{i.p.}$	i.p.	s_R	R
Volume Change, %	0.76	2.10	0.76	2.11
Hardness Change, Points	1.51	4.17	1.51	4.17
Tensile Strength Change, %	5.37	14.90	5.37	14.90

Legend:
$s_{i.p.}$ = intermediate precision standard deviation
i.p. = intermediate precision
s_R = reproducibility standard deviation
R = reproducibility

TABLE A2.10 Polyacrylate (ACM-2) Reference Oil Precision Data

NOTE 1—These statistics are based on 100 results obtained on Test Monitoring Center reference oil SL107 between May 10, 2024 and April 17, 2025.

Variable	$s_{i.p.}$	i.p.	s_R	R
Volume Change, %	0.53	1.47	0.53	1.47
Hardness Change, Points	1.34	3.72	1.35	3.74
Tensile Strength Change, %	5.12	14.19	5.12	14.19

Legend:
$s_{i.p.}$ = intermediate precision standard deviation
i.p. = intermediate precision
s_R = reproducibility standard deviation
R = reproducibility

TABLE A2.11 Fluoroelastomer (FKM-3) Reference Oil Precision Data

NOTE 1—These statistics are based on 90 results obtained on Test Monitoring Center reference oil SL107 between May 15, 2024 and April 16, 2025.

Variable	$s_{i.p.}$	i.p.	s_R	R
Volume Change, %	0.19	0.52	0.19	0.52
Hardness Change, Points	1.03	2.85	1.03	2.85
Tensile Strength Change, %	3.57	9.89	3.62	10.04

Legend:
$s_{i.p.}$ = intermediate precision standard deviation
i.p. = intermediate precision
s_R = reproducibility standard deviation
R = reproducibility

A2.6.4 *Intermediate Precision Limit (*i.p.*)*—The difference between two results obtained under intermediate precision conditions that in the long run, in the normal and correct conduct of the test method, exceed the values shown in Tables A2.3-A2.11 in only one case in twenty. When only a single test result is available, the Intermediate Precision Limit can be used to calculate a range (test result ± Intermediate Precision Limit) outside of which a second test result would be expected to fall about one time in twenty.

A2.6.6 *Reproducibility Limit (*R*)*—The difference between two results obtained under reproducibility conditions that would, in the long run, in the normal and correct conduct of the test method, exceed the values in Tables A2.3-A2.11 in only one case in twenty. When only a single test result is available, the Reproducibility Limit can be used to calculate a range (test result ± Reproducibility Limit) outside of which a second test result would be expected to fall about one time in twenty.