Designation: D 4550 – 98

Standard Classification for Thermoplastic Elastomer-Ether-Ester (TEEE) [1]

This standard is issued under the fixed designation D 4550; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

INTRODUCTION

This classification is intended to be a means of calling out materials used in the fabrication of end items or parts. It is not intended for the selection of materials. Material selection should be made by those having expertise in the plastics field after careful consideration of the design and the performance required of the part, the environment to which it will be exposed, the fabrication process to be employed, the inherent properties of the material other than those covered by this specification, and the economics.

1. Scope

1.1 This classification covers segmented block copolyether-ester elastomers suitable for molding and extrusion. This classification allows for the use of segmented block copolyether-ester elastomers that are recycled, reconstituted, recycled-regrind, recovered, or reprocessed, or a combination thereof, provided that the requirements as stated in this classification are met. It is the responsibility of the supplier and the buyer of recycled, reconstituted, recycled-regrind, recovered, or reprocessed, or a combination thereof, copolyether-ester elastomers to ensure compliance (see Guide D 5033).

1.2 The properties included in this classification are those required to identify the compositions covered. There may be other requirements necessary to identify particular characteristics important to specialized applications. These may be specified using the suffixes as given in Section 5.

1.3 This classification system and subsequent line callout (specification) are intended to provide a means of calling out plastic materials used in the fabrication of end items or parts. It is not intended for the selection of materials. Material selection should be made by those having expertise in the plastic field after careful consideration of the design and the performance required of the part, the environment to which it will be exposed, the fabrication process to be employed, the costs involved, and the inherent properties of the material other than those covered by this classification.

1.4 The following precautionary caveat pertains only to the test methods portion, Section 11 of this classification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—This classification system is similar to ISO FDIS 14910-1/-2 1997, although the technical content is significantly different.

NOTE 2—This classification system is being revised to add international specimens and test procedures as the standard for compliance. The previous test specimens and Tables TEEE and A are included in Appendix X1 as a reference for those wishing to use them. It is recommended that the material manufacturer be consulted on all callouts against this classification system.

2. Referenced Documents

2.1 *ASTM Standards:*

D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing[2]

D 638M Test Method for Tensile Properties of Plastics [Metric][2]

D 790 Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials[2]

D 883 Terminology Relating to Plastics[2]

D 1238 Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer[2]

D 1600 Terminology for Abbreviated Terms Relating to Plastics[2]

[1] This specification is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.15 on Thermoplastic Materials.

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[2] *Annual Book of ASTM Standards,* Vol 08.01.

D 2240 Test Method for Rubber Property—Durometer Hardness[3]

D 3418 Test Method for Transition Temperatures of Polymers by Thermal Analysis[4]

D 3641 Practice for Injection Molding Test Specimens of Thermoplastic Molding and Extrusion Materials[4]

D 3892 Practice for Packaging/Packing of Plastics[4]

D 4000 Classification System for Specifying Plastic Materials[4]

D 5033 Guide for the Development of Standards Relating to the Proper Use of Recycled Plastics[5]

D 5630 Test Method for Ash Content in Thermoplastics[5]

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specification[6]

2.2 *ISO Standards:*[7]

ISO 178 1993 Plastics—Determination of Flexural Properties

ISO 294-1 1996 Plastics—Injection Moulding of Test Specimens of Thermoplastic Materials-Part 1: General Principles, Multipurpose-Test Specimens (ISO Mount Type A) and Bars (ISO Mould Type B)

ISO 527-1 1993 Plastics—Determination of Tensile Properties-Part 1: General Principles

ISO 527-2 1993 Plastics—Determination of Tensile Properties-Part 2: Test Conditions for Moulding and Extrusion Materials

ISO 868 1985 Plastics and Ebonite-Determination of Indentation Hardness by Means of a Durometer

ISO 1133 1997 Plastics—Determination of the Melt Mass-Flow Rate (MFR) and the Melt Volume Flow Rate (MVR) of Thermoplastics

ISO 3146 1985 Plastics—Determination of Melting Behaviour (Melting Temperature or Melting Range) of Semi-Crystalline Polymers

[3] *Annual Book of ASTM Standards,* Vol 09.01.
[4] *Annual Book of ASTM Standards,* Vol 08.02.
[5] *Annual Book of ASTM Standards,* Vol 08.03.
[6] *Annual Book of ASTM Standards,* Vol 14.02.
[7] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

TABLE TEEE Requirements for Polyether-Ester Elastomers

Group	Class	Grade	Description[A]	Flexural Modulus[B] ISO 178 MPa	Flow Rate[C] ISO 1133 g/10 min.	Flow Rate Condition	Tensile Strength[D] ISO 527-1, -2 MPa, min	Elongation[D] at Break ISO 527-1, -2 % min
01	1	1		25 to 75	3 to 12	190 /2.16	15	375
		2	Medium Tensile	25 to 75	3 to 12	190 /2.16	10	150
		3		25 to 75	3 to 12	190 /2.16	5	150
		0	Other	25 to 75	3 to 12	. . .	. . .	. . .
	2	1		25 to 75	5 to 24	220 /2.16	15	375
		2		25 to 75	13 to 20	220 /2.16	. . .	. . .
		0	Other	25 to 75	5 to 24	. . .	. . .	. . .
	0	0	Other	25 to 75	. . .	. . .	. . .	. . .
02	1	1	Blow Molding	76 to 150	0.5 to 5	230 /2.16	25	400
		0	Other	76 to 150	0.5 to 5	. . .	. . .	. . .
	2	1		75 to 150	3 to 12	190 /2.16	30	300
		2		76 to 150	3 to 12	220 /2.16	10	200
		0	Other	76 to 150	3 to 12	. . .	. . .	. . .
	3	1		76 to 150	5 to 24	220 /2.16	20	375
		2	Medium Tensile	76 to 150	5 to 24	230 /2.16	15	200
		3		76 to 150	5 to 24	220 /2.16	15	100
		0	Other	76 to 150	5 to 24	. . .	. . .	. . .
	0	0	Other	76 to 150	. . .	. . .	. . .	. . .
03	1	1	Blow Molding	151 to 250	0.5 to 5	230 /2.16	30	250
		0	Other	151 to 250	0.5 to 5	. . .	. . .	. . .
	2	1		151 to 250	3 to 12	220 /2.16	25	300
		2	Heat Stabilized	151 to 250	3 to 12	220 /2.16	25	300
		3		151 to 250	3 to 12	190 /2.16	25	300
		0	Other	151 to 250	3 to 12	. . .	. . .	. . .
	3	1		151 to 250	5 to 24	220 /2.16	25	400
		2	Medium Tensile	151 to 250	5 to 24	230 /2.16	20	200
		3		151 to 250	5 to 24	190 /2.16	25	300
		4		151 to 250	5 to 24	220 /2.16	10	50
		0	Other	151 to 250	5 to 24	. . .	. . .	. . .
	0	0	Other	151 to 250	. . .	. . .	. . .	. . .
04	1	1		251 to 450	3 to 12	230 /2.16	30	400
		2		251 to 450	3 to 12	190 /2.16	35	300
		0	Other	251 to 450	3 to 12	. . .	. . .	. . .
	2	1		251 to 450	5 to 24	240 /2.16	50	100
		0	Other	251 to 450	5 to 24	. . .	. . .	. . .
	3	1		251 to 450	<55	240 /2.16	15	100
		0	Other	251 to 450	<55	. . .	. . .	. . .
	0	0	Other	251 to 450	. . .	. . .	. . .	. . .
05	1	1	Blow Molding	451 to 1000	0.5 to 5	240 /2.16	35	250
		0	Other	451 to 1000	0.5 to 5	. . .	. . .	. . .

TABLE
Continued

Group	Class	Grade	Description[A]	Flexural Modulus[B] ISO 178 MPa	Flow Rate[C] ISO 1133 g/10 min.	Flow Rate Condition	Tensile Strength[D] ISO 527-1, -2 MPa, min	Elongation[D] at Break ISO 527-1, -2 % min
	2	1		451 to 1000	5 to 24	240 /2.16	35	150
		2		451 to 1000	5 to 24	220 /2.16	35	100
		0	Other	451 to 1000	5 to 24	. . .	. . .	. . .
	3	1		451 to 1000	<55	220 /2.16	25	300
		2		451 to 1000	55	240 /2.16	20	. . .
		0	Other	451 to 1000	55	. . .	. . .	. . .
	0	0	Other	451 to 1000	. . .	. . .	. . .	. . .
06	1	1		1001 to 2000	5 to 24	240 /2.16	35	150
		2		1001 to 2000	5 to 24	240 /2.16	25	15
		0	Other	1001 to 2000	5 to 24	. . .	. . .	. . .
	0	0	Other	1001 to 2000	. . .	. . .	. . .	. . .
07	1	1		10 to 50	3 to 15	190 /2.16	15	400
	1	0	Other	10 to 50	3 to 15	. . .	. . .	. . .
	0	0	Other	10 to 50	. . .	. . .	. . .	. . .
08	1	1		50 to 200	3 to 15	190 /2.16	10	250
		2		50 to 200	3 to 15	220 /2.16	10	150
		3		50 to 200	3 to 15	190 /2.16	5	200
		0	Other	50 to 200	3 to 15	. . .	. . .	. . .
	2	1		50 to 200	5 to 24	220 /2.16	10	150
		2		50 to 200	5 to 24	220 /2.16	15	100
		0	Other	50 to 200	5 to 24	. . .	. . .	. . .
	3	1		50 to 200	<55	220 /2.16	15	60
		2		50 to 200	<55	220 /2.16	10	75
		3		50 to 200	<55	220 /2.16	10	45
		0	Other	50 to 200	<55	. . .	. . .	. . .
	0	0	Other	50 to 200	. . .	. . .	. . .	. . .
09	1	1		100 to 400	3 to 15	190 /2.16	35	300
		2		100 to 400	3 to 15	190 /2.16	15	250
		3		100 to 400	3 to 15	220 /2.16	10	100
		0	Other	100 to 400	3 to 15	. . .	. . .	. . .
	2	1		100 to 400	5 to 24	220 /2.16	10	50
		0	Other	100 to 400	5 to 24	. . .	. . .	. . .
	3	1		100 to 400	<55	240 /2.16	15	100
		0	Other	100 to 400	<55	. . .	. . .	. . .
	0	0	Other	100 to 400	. . .	. . .	. . .	. . .
00	0	0	Other	. . .	. . .	. . .	. . .	. . .

[A] No descriptions unless needed to describe a special grade under the class. All other grades are listed by requirement.
[B] Test specimen—80 × 10 × 4 mm. Test speed—2-mm/min.
[C] Dry samples 3h at 100°C in dehumidifying oven prior to running test.
[D] ISO 527-2 Type 1BA specimen. Test speed—50-mm/min.

TABLE A Detail Requirements Polyether-Ester Elastomers

Designation Order No.	Property	Cell Limits									
		0	1	2	3	4	5	6	7	8	9
1	Flexural modulus, ISO 178, MPa min.[A]	unspecified	10	25	75	150	250	450	1000	2000	specify value
2	Flexural modulus, ISO 178, MPa max[A]	unspecified	25	75	150	250	450	1000	2000	4000	specify value
3	Tensile strength, ISO 527-1, -2, MPa, min[B]	unspecified	10	20	30	40	50	60	70	80	specify value
4	Elongation at break, ISO 527-1, -2, %, min.[B]	unspecified	5	10	20	100	200	300	400	500	specify value
5	To be determined	unspecified	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .

[A] Test specimen—80 × 10 × 4 mm. Test speed—2-mm/min.
[B] ISO 5271-2, Type 1BA specimen.

3. Terminology

3.1 Definitions—The terminology used in this classification system is in accordance with Terminologies D 883 and D 1600.

4. Classification

4.1 Polyether-ester elastomers are classified into groups according to flexural modulus. These groups are subdivided into classes by viscosity range and are further subdivided into grades by tensile properties, as shown in the basic property table (Table TEEE).

NOTE 3—An example of this classification system is as follows: The designation TEEE0332 would indicate:

TEEE	=	polyether-ester elastomer,
03 (group)	=	flexural modulus from 151 to 250 MPa,
3 (class)	=	flow rate from 5 to 24 g/10 min, and
2 (grade)	=	property requirements as given in Table TEEE.

4.1.1 To facilitate the incorporation of future or special materials, the other category for group (00), class (0), and grade (0) is shown in Table TEEE.

4.2 Reinforced and lubricated versions of the polyether-ester materials that are not in Table TEEE are classified in accordance with Tables TEEE and A. Table TEEE is used to specify the group of polyester materials and Table A is used to specify the property requirements after the addition of reinforcements or lubricants at the nominal level indicated (see 4.2.1).

4.2.1 Reinforced versions of the basic materials are identified by a single letter that indicates the reinforcement used and two that indicate the nominal quantity in percent by weight. Thus, a letter designation *G* for glass-reinforced and 33 for % of reinforcement, *G* 33, specifies a filled material with a nominal glass level of 33 %. The reinforcement letter designations and associated tolerance levels are shown in the following table:

Symbol	Material	Tolerance
C	carbon and graphite fiber	±2 %
G	glass	±2 %
L	lubricants (for example, PTFE, graphite, silicone, and molybdenum disulfide)	depends upon material and process—to be specified
M	mineral	±2 %
R	combination of reinforcements or fillers, or both	±3 %

NOTE 4—This part of the classification system uses the percent of reinforcements or additives, or both, in the control of the modified basic material. The types and percentages of reinforcements and additives should be shown on the supplier's technical data sheet unless they are proprietary in nature. If necessary, additional callout of these reinforcements and additives can be accomplished by the use of the suffix part of the system (Section 2.1).

4.2.2 Specific requirements for reinforced, filled, or lubricated polyether-ester materials shall be shown by a six-character designation. The designation will consist of the letter "*A*" and the five digits comprising the cell numbers for the property requirements in the order as they appear in Table A.

4.2.2.1 Although the values listed are necessary to include the range of properties available in existing materials, users should not infer that every possible combination of the properties exists or can be obtained.

4.2.3 When the grade of the basic material is not known or is not important, the use of "0" grade classification will be used for reinforced materials in this system.

NOTE 5—An example of a reinforced polyether-ester elastomer of this classification system is as follows. The designation TEEE0332G-20A46230 would indicate the following material requirements from Table A:

TEEE0332	=	polyether-ester elastomer from Table TEEE,
G20	=	glass reinforced at 20 % nominal (see 4.2.1),
A	=	Table A property requirements,
4	=	flexural modulus of 150 MPa, min,
6	=	flexural modulus of 450 MPa, max,
2	=	tensile strength of 20 MPa,
3	=	elongation at break of 11 to 20 %, and
0	=	unspecified.

If no properties are specified, the designation would be TEEE0332G20A00000.

5. Suffix Requirements

5.1 When additional requirements are needed that are not covered by the basic requirements or cell-table requirements, they shall be indicated through the use of suffixes.

5.2 A list of suffixes can be found in Classification System D 4000 (Table 3) and may be used for additional requirements as appropriate. Additional suffixes will be added to that standard as test methods and requirements are developed and requested.

6. Basic Requirements

6.1 Basic requirements from the property or cell tables, are always in effect unless superseded by specific suffix requirements, which always take precedence.

6.2 The plastics composition shall be uniform and shall conform to the requirements specified herein.

7. Detail Requirements

7.1 The materials shall conform to the requirements in Tables TEEE and A, and suffix requirements as they apply.

7.2 For the purpose of determining conformance, all specified limits in this standard are absolute limits, as defined in Practice E 29.

7.3 With the absolute method, an observed value or a calculated value is not rounded off, but is to be compared directly to the specified limiting value. Conformance or nonconformance is based on this comparison.

8. Sampling

8.1 Sampling shall be statistically adequate to satisfy the requirements of 12.4.

8.2 A batch or lot shall be constituted as a unit of manufacture as prepared for shipment and may consist of a blend of two or more "production runs."

9. Specimen Preparation

9.1 The test specimens shall be molded in accordance with ISO 294 and Practice D 3641. Recommended processing conditions are shown in Table 1.

TABLE 1 Conditions for Injection Molding of Test Specimens

Melting Temperature, °C	D Durometer[A] Hardness	Specimen Thickness, mm	Mould Temperature, °C	Melt Temperature, °C	Average Injection Velocity, mm/s
≤160	. . .	2	20	[B]	200 ± 100
>160	≤50	2	40	[B]	200 ± 100
>160	>50	2	50	[B]	200 ± 100
. . .	. . .	4	20	[B]	200 ± 100

[A] Hardness determined by ISO 868 or Test Method D 2240.
[B] 30°C above melting temperature as determined by ISO 3146 or Test Method D 3418.

10. Conditioning

10.1 Test specimens shall be conditioned in the standard laboratory atmosphere in accordance with Procedure A of Practice D 618 before performing the required tests.

10.2 Conduct tests in the standard laboratory atmosphere of 23 ± 2°C and 50 ± 5 % relative humidity.

11. Test Methods

11.1 Determine the properties enumerated in this classification system by means of the test methods referenced in Section 1.1.

11.1.1 The number of tests shall be consistent with the requirements of Section 8 and 12.4.

12. Inspection and Certification

12.1 Inspection and certification of the material supplied with reference to a specification based on this classification system shall be for conformance to the requirements specified herein.

12.2 Lot-acceptance inspection shall be the basis on which acceptance or rejection of the "lot" is made. The lot-acceptance inspection shall consist of the tests listed as they apply:

12.2.1 Flow rate.

12.2.2 Reinforcement content.

12.3 Periodic-check inspection with reference to a specification based upon this classification system shall consist of the tests specified for all requirements of the material under the specification. Inspection frequency shall be adequate to assure the material is certifiable in accordance with 12.4.

12.4 Certification shall be that the material was manufactured, sampled, tested and inspected in accordance with this classification system and that the average values for the lot meet the requirements of the specification line callout.

12.5 Reports of the test results shall be furnished when requested. The report shall consist of results of the lot-acceptance inspection for the shipment and results of the most recent periodic-check inspection.

13. Packaging, Packing, and Marking

13.1 The provisions of Practice D 3892 apply to packaging, packing, and marking of containers for plastic materials.

14. Keywords

14.1 elastomers; line callout; polyether-ester; recycle

APPENDIX

(Nonmandatory Information)

X1. REFERENCE TO PREVIOUS EDITION (SPECIFICATION D 4550 – 92$^{\epsilon 1}$)

TABLE X1.1 Requirements for Polyether-Ester Elastomers (Table TEEE, Specification D 4550 – 92$^{\epsilon 1}$)

Group	Class	Grade	Description[A]	Flexural Modulus[B] ASTM D 790 MPa	Flow Rate[C] g/10 min.	Flow Rate ASTM D 1238 Condition	Tensile Strength[D] ASTM D 638 MPa, min	Elongation[D] at Break ASTM D 638 % min
01	1	1		25 to 75	3 to 12	190 /2.16	15	375
		2	Medium Tensile	25 to 75	3 to 12	190 /2.16	10	150
		3		25 to 75	3 to 12	190 /2.16	5	150
		0	Other	25 to 75	3 to 12	. . .	. . .	. . .
	2	1		25 to 75	5 to 24	220 /2.16	15	375
		2		25 to 75	13 to 20	220 /2.16	. . .	. . .
		0	Other	25 to 75	5 to 24	. . .	. . .	. . .
	0	0	Other	25 to 75	. . .	. . .	. . .	. . .
02	1	1	Blow Molding	76 to 150	0.5 to 5	230 /2.16	25	400
		0	Other	76 to 150	0.5 to 5	. . .	. . .	. . .
	2	1		75 to 150	3 to 12	190 /2.16	30	300
		2		76 to 150	3 to 12	220 /2.16	10	200
		0	Other	76 to 150	3 to 12	. . .	. . .	. . .

TABLE *Continued*

Group	Class	Grade	Description[A]	Flexural Modulus[B] ASTM D 790 MPa	Flow Rate[C] g/10 min.	Flow Rate ASTM D 1238 Condition	Tensile Strength[D] ASTM D 638 MPa, min	Elongation[D] at Break ASTM D 638 % min
	3	1		76 to 150	5 to 24	220 /2.16	20	375
		2	Medium Tensile	76 to 150	5 to 24	230 /2.16	15	200
		3		76 to 150	5 to 24	220 /2.16	15	100
		0	Other	76 to 150	5 to 24	. . .	. . .	. . .
	0	0	Other	76 to 150	. . .	. . .	. . .	. . .
03	1	1	Blow Molding	151 to 250	0.5 to 5	230 /2.16	30	250
		0	Other	151 to 250	0.5 to 5	. . .	. . .	. . .
	2	1		151 to 250	3 to 12	220 /2.16	25	300
		2	Heat Stabilized	151 to 250	3 to 12	220 /2.16	25	300
		3		151 to 250	3 to 12	190 /2.16	25	300
		0	Other	151 to 250	3 to 12	. . .	. . .	. . .
	3	1		151 to 250	5 to 24	220 /2.16	25	400
		2	Medium Tensile	151 to 250	5 to 24	230 /2.16	20	200
		3		151 to 250	5 to 24	190 /2.16	25	300
		4		151 to 250	5 to 24	220 /2.16	10	50
		0	Other	151 to 250	5 to 24	. . .	. . .	. . .
	0	0	Other	151 to 250	. . .	. . .	. . .	. . .
04	1	1		251 to 450	3 to 12	230 /2.16	30	400
		2		251 to 450	3 to 12	190 /2.16	35	300
		0	Other	251 to 450	3 to 12	. . .	. . .	. . .
	2	1		251 to 450	5 to 24	240 /2.16	50	100
		0	Other	251 to 450	5 to 24	. . .	. . .	. . .
	3	1		251 to 450	<55	240 /2.16	15	100
		0	Other	251 to 450	<55	. . .	. . .	. . .
	0	0	Other	251 to 450	. . .	. . .	. . .	. . .
05	1	1	Blow Molding	451 to 1000	0.5 to 5	240 /2.16	35	250
		0	Other	451 to 1000	0.5 to 5	. . .	. . .	. . .
	2	1		451 to 1000	5 to 24	240 /2.16	35	150
		2		451 to 1000	5 to 24	220 /2.16	35	100
		0	Other	451 to 1000	5 to 24	. . .	. . .	. . .
	3	1		451 to 1000	<55	220 /2.16	25	300
		2		451 to 1000	<55	240 /2.16	20	. . .
		0	Other	451 to 1000	<55	. . .	. . .	. . .
	0	0	Other	451 to 1000	. . .	. . .	. . .	. . .
06	1	1		1001 to 2000	5 to 24	240 /2.16	35	150
		2		1001 to 2000	5 to 24	240 /2.16	25	15
		0	Other	1001 to 2000	5 to 24	. . .	. . .	. . .
	0	0	Other	1001 to 2000	. . .	. . .	. . .	. . .
07	1	1		10 to 50	3 to 15	190 /2.16	15	400
	1	0	Other	10 to 50	3 to 15	. . .	. . .	. . .
	0	0	Other	10 to 50	. . .	. . .	. . .	. . .
08	1	1		50 to 200	3 to 15	190 /2.16	10	250
		2		50 to 200	3 to 15	220 /2.16	10	150
		3		50 to 200	3 to 15	190 /2.16	5	200
		0	Other	50 to 200	3 to 15	. . .	. . .	. . .
	2	1		50 to 200	5 to 24	220 /2.16	10	150
		2		50 to 200	5 to 24	220 /2.16	15	100
		0	Other	50 to 200	5 to 24	. . .	. . .	. . .
	3	1		50 to 200	<55	220 /2.16	15	60
		2		50 to 200	<55	220 /2.16	10	75
		3		50 to 200	<55	220 /2.16	10	45
		0	Other	50 to 200	<55	. . .	. . .	. . .
	0	0	Other	50 to 200	. . .	. . .	. . .	. . .
09	1	1		100 to 400	3 to 15	190 /2.16	35	300
		2		100 to 400	3 to 15	190 /2.16	15	250
		3		100 to 400	3 to 15	220 /2.16	10	100
		0	Other	100 to 400	3 to 15	. . .	. . .	. . .
	2	1		100 to 400	5 to 24	220 /2.16	10	50
		0	Other	100 to 400	5 to 24	. . .	. . .	. . .
	3	1		100 to 400	<55	240 /2.16	15	100
		0	Other	100 to 400	<55	. . .	. . .	. . .
	0	0	Other	100 to 400	. . .	. . .	. . .	. . .
00	0	0	Other	. . .	. . .	. . .	. . .	. . .

[A] No descriptions unless needed to describe a special grade under the class. All other grades are listed by requirement.
[B] Tangent modulus, Method 1, Procedure B.
[C] Procedure B. Dry samples 3h at 100°C in dehumidifying oven prior to running test:
[D] Type IV specimens, injection molded or die cut from injection molded slabs.
Group 1 and 7 materials—Headspeed 500 mm/min.
Group 2–6 and 8–9 materials—Headspeed 50 mm/min.

TABLE X1.2 Detail Requirements Polyether-Ester Elastomers (Table A, Specification D 4550 – 92$^{\epsilon 1}$)

Designation Order No.	Property	Cell Limits									
		0	1	2	3	4	5	6	7	8	9
1	Flexural modulus, ASTM D 790, MPa min.[A]	unspecified	10	25	75	150	250	450	1000	2000	specify value
2	Flexural modulus, ASTM D 790, MPa max[A]	unspecified	25	75	150	250	450	1000	2000	4000	specify value
3	Tensile strength, ASTM D 638, MPa, min[B]	unspecified	10	20	30	40	50	60	70	80	specify value
4	Elongation at break, ASTM D 638, %, min.[B]	unspecified	5	10	20	100	200	300	400	500	specify value
5	To be determined	unspecified	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .

[A] Tangent modulus, Method 1, Procedure B.
[B] Type IV specimens, injection molded or die cut from injection molded slabs. Speed of testing shall be 50 mm/min, unless otherwise agreed.