

Designation: D 6779 – 07a

# Standard Classification System for Polyamide Molding and Extrusion Materials (PA)<sup>1</sup>

This standard is issued under the fixed designation D 6779; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope\*

1.1 This classification system covers polyamide materials suitable for molding and extrusion. Some of these compositions are also suitable for application from solution.

1.2 This classification system allows for the use of recycled polyamide materials provided that the requirements as stated in this classification system are met. The proportions of recycled material used, as well as the nature and amount of any contaminant, however, cannot be covered practically in this specification.

1.3 The properties included in this classification system 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 by using the suffixes as given in Section 5.

1.4 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 system.

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 The following precautionary caveat pertains only to the test methods portion, Section 11, of this classification system. 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 requirements prior to use.

NOTE 1—This classification system is similar to ISO 1874-1/-2, although the technical content is significantly different.

### 2. Referenced Documents

- 2.1 ASTM Standards: <sup>2</sup>
- D 257 Test Methods for DC Resistance or Conductance of Insulating Materials
- D 789 Test Methods for Determination of Solution Viscosities of Polyamide (PA)
- D 792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- D 883 Terminology Relating to Plastics
- D 1600 Terminology for Abbreviated Terms Relating to Plastics
- D 3892 Practice for Packaging/Packing of Plastics

D 4000 Classification System for Specifying Plastic Materials

- D 6260 Test Method for Gravimetric Determination of Carbon Black in Nylon Materials (PA)<sup>3</sup>
- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- 2.2 IEC/ISO Standards:<sup>4</sup>
- IEC 60243-1 Electrical Strength of Insulating Materials— Test Methods—Part 1: Tests at Power Frequencies
- IEC 60250 Recommended Methods for the Determination
- of the Permittivity and Dielectric Dissipation Factor of Electrical Insulating Materials at Power, Audio and Radio Frequencies Including Metre Wavelengths
- ISO 75-1 Plastics—Determination of Temperature of Deflection Under Load—Part 1: General Test Methods
- ISO 75-2 Plastics—Determination of Temperature of Deflection Under Load—Part 2: Plastic and Ebonite
- ISO 179-1 Plastics—Determination of Charpy Impact Strength—Part 1: Non-instrumented Impact Test
- ISO 294-1 Plastics—Injection Moulding of Test Specimens of Thermoplastic Materials—Part 1: General Principles, Multipurpose-Test Specimens and Bars
- ISO 307 Determination of Viscosity Number of Polyamides In Dilute Solutions

<sup>&</sup>lt;sup>1</sup> This classification system is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.15 on Thermoplastic Materials.

Current edition approved Sept. 15, 2007. Published November 2007. Originally approved in 2002. Last previous edition approved in 2007 as D 6779 - 07.

<sup>&</sup>lt;sup>2</sup> For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Withdrawn.

<sup>&</sup>lt;sup>4</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

- ISO 527-1 Plastics—Determination of Tensile Properties— Part 1: General Principles
- ISO 527-2 Plastics—Determination of Tensile Properties— Part 2: Testing Conditions
- ISO 1183 Plastics—Methods for Determining the Density and Relative Density of Non-Cellular Plastics
- ISO 1874-1 Plastics—Polyamide (PA) Homopolymers and Copolymers for Moulding and Extrusion-Part 1: Designation
- ISO 1874-2.2 Plastics—Polyamide (PA) Homopolymers and Copolymers for Moulding and Extrusion-Part 2: Preparation of Test Specimens and Determination of Properties
- **ISO 3167** Plastics, Multipurpose Test Specimens
- ISO 3451-4 Plastics—Determination of Ash—Part 4: Polyamides
- ISO 11357-1 Plastics-Differential Scanning Calorimetry—Part 1: General Principles
- ISO 11357-3 Plastics—Differential Scanning Calorimetry-Part 3: Determination of Temperature and Enthalpy of Melting and Crystallization

ISO 15512 Plastics—Determination of Water Content

### 3. Terminology

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

### 4. Classification

4.1 Polyamide materials are classified into groups in accordance with their composition. These groups are subdivided into classes and grades as shown in the Basic Property Table (Table PA).

Note 2-An example of this classification system for unreinforced polyamide is given as follows: The designation PA0123 indicates the following:

PA	=	polyamide as found in Terminology D 1600,
01 (group)	=	polyamide 66,
2 (class)	=	heat stabilized, and
3 (grade)	=	with a minimum viscosity number of 210 and
		the requirements given in Table PA.

4.1.1 Grades of reinforced or filled versions, or both, of the basic materials are identified by a single letter that indicates the reinforcement or filler used and two digits, in multiples of 5, that indicate the nominal quantity in percent by weight. Thus, a letter designation G for glass reinforced and 35 for percent or reinforcement, G35, specifies a material with a nominal glass level of 35 %. The reinforcement letter designations and associated tolerance levels are shown as follows:

Symbol	Material	Tolerance (Based on the Total Mass)
С	carbon- and graphite-fiber-reinforced	±2 %
G	glass-reinforced	±2 %
L	lubricants (such as PTFE, graphite,	Depends upon material and
	silicone, and molybdenum disulfide)	process-to be specified.
Μ	mineral-reinforced	±2 %
R	combinations of reinforcements or	±3 %
	fillers, or both	

Note 3-An example of this classification system for reinforced polyamide is given as follows: The designation PA012G35 indicates the following:

PA	=	polyamide as found in Terminology D 1600,
01 (group)	=	polyamide 66,
2 (class)	=	heat stabilized, and
G35 (grade)	=	nominal 35 % glass with the requirements
		given in Table PA.

NOTE 4-This part of the classification system uses percent of reinforcements or additives, or both, in the callout 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 control of these reinforcements and additives can be accomplished by use of the suffix part of the system (see Section 5).

NOTE 5-Materials containing reinforcements or fillers, or both, at nominal levels not in multiples of 5 are included in the nearest PA grade designation. For example, a material with a nominal glass fiber level of 33 % is included with Grade G35 as shown in Note 4.

NOTE 6-Ash content of filled or reinforced materials may be determined using Test Method ISO 3451-4.

4.2 Variations of polyamide materials that are not in Table PA are classified in accordance with Tables PA and A or B. Table PA is used to specify the group of polyamide and Table A or B is used to specify property requirements.

4.2.1 Specific requirements for variations of polyamide materials shall be shown by a six-character designator. The designation will consist of the letter "A" or "B" and the five digits comprising the cell numbers for the property requirements in the order as they appear in Tables A and B.

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

4.2.2 When the grade of the basic material is not known, is not important or does not meet the Table PA requirements, the use of "0" grade classification shall be used for reinforced materials in this classification system.

NOTE 7-An example of this classification system for a reinforced polyamide material is given as follows. The designation PA0110G30A42270 would indicate the following material requirements:

PA0110	=	Polyamide 66, from Table PA,
G30	=	Glass reinforced at 30 % nominal.

- А = Table A property requirements,
- 4 = Tensile strength, 140 MPa, min,

2

- = Tensile modulus, 4500 MPa, min,
- 2 = Charpy impact,  $5.0 \text{ kJ/m}^2$ , min,
- 7 = Deflection temperature at 1.8 MPa, 200°C, min, and

0 = Unspecified.

If no properties are specified, the designation would be PA0110G30A00000.

NOTE 8-When a grade of polyamide is not fully identified by a standard callout, it is possible to specify all table properties by the use of an addition of Classification D 4000 suffixes. Suffix values will override the PA table values. An example of an unreinforced polyamide material is given as follows: PA0212KN023. This example is a general purpose, low

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viscosity PA6 material where K denotes tensile properties, N denotes tensile modulus with ISO 527 as the test method, and 023 denotes a value of 2300 MPa. This value for tensile modulus overrides the normal table value. This example can be applied to replace all table values, that is, tensile stress, notched Charpy impact, and heat deflection temperature.

4.3 To facilitate the specification of special materials where the basic property table does not reflect the properties required, Table B has been incorporated into this classification system. This table will be used in a manner similar to Table A.

NOTE 9—Pigmented or colored polyamides can differ significantly from the natural polymers in mechanical properties depending on the choice of colorants and concentrations. The main property affected is ductility, as illustrated by a reduction in Charpy impact and elongation values. In a typical white pigmented polyamide, elongation losses of up to 50 % and Charpy impact losses of up to 30 % are common. If specific properties of pigmented materials are necessary, Table B may be employed to specify property requirements.

NOTE 10—An example of a special material using this classification system is as follows: The designation PA0220B54220 would indicate the following material requirements from Table B:

PA0220 = Pol	yamide 6, 1	heat stabilized,	from '	Table PA,
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- B = Table B property requirements,
- 5 = Tensile strength, 70 MPa, min,
- 4 = Tensile modulus, 2400 MPa, min,
- 2 = Charpy impact,  $4.0 \text{ kJ/m}^2$ , min,
- 2 = Deflection temperature at 1.8 MPa,  $55^{\circ}$ C, min, and
- 0 =unspecified.

#### TABLE PA Requirements for Polyamides Dry-as-Molded<sup>A,B</sup>

Group	Description	Class	Description	Grade	Description <sup>C</sup>	Viscosity Number, ISO 307, min, mL/g	Density, <sup>D</sup> I <mark>SO 1183</mark> g/cm <sup>3</sup>	Tensile Strength, ISO 527-1 and ISO 527-2, MPa, min	Tensile Modulus, <sup><i>E</i></sup> ISO 527-1 and ISO 527-2, MPa, min	Charpy Impact Resistance, ISO 179/ 1eA, kJ/m <sup>2</sup> , min	Deflection Temperature, <sup>F</sup> ISO 75-1 and ISO 75-2, at 1.8 MPa, °C, min
01	PA66	1	General-	1		135	1.13 to 1.15	70	2300	3.3	60
			purpose	2		165	1.13 to 1.15	70	2300	3.3	60
				3		210	1.13 to 1.15	70	2300	3.3	60
				4		270	1.13 to 1.15	70	2300	3.3	60
				5	recycled	115	1.13 to 1.15	70	2300	3.3	60
				6	recycled	135	1.13 to 1.15	70	2300	3.3	60
				G15	15 % glass	a	1.20 to 1.26	100	4000	3.0	215
				G20	20 % glass		1.25 to 1.33	115	5000	4.0	220
				G25	25 % glass	0.11.4	1.29 to 1.37	140	6000	5.0	225
				G35	35 % glass		1.35 to 1.45	170	8000	7.0	235
				G40	40 % glass		1.42 to 1.52	175	9000	8.0	235
				G45	45 % glass		1.45 to 1.55	180	10 000	9.0	240
				M40	40 % mineral		1.45 to 1.55	80	5000	2.0	100
		0	Heat-	0 1	other AS	125	$\frac{9-07a}{112 to 115}$	70	_2300	2.0	60
		rds.itel	stabilized	g/stand		496 <mark>135</mark> 1-2	1.13 to 1.15 1.13 to 1.15	$-946^{70}_{70}60$	6372300 0b	a0/a 3.0	779-60 a
			Stabilizeu	3		210	1.13 to 1.15	70	2300	3.0	60
				4		270	1.13 to 1.15	70	2300	3.0	60
				5	recycled	115	1.13 to 1.15	70	2300	3.0	60
				6	recycled	135	1.13 to 1.15	70	2300	3.0	60
				G15	15 % glass		1.20 to 1.26	100	4000	3.0	220
				G25	25 % glass		1.29 to 1.37	140	6000	5.0	225
				G30	30 % glass		1.32 to 1.42	160	7000	6.0	230
				G35	35 % glass		1.35 to 1.45	170	8000	7.0	235
				G40	40 % glass		1.43 to 1.53	175	9000	8.0	235
				G45	45 % glass		1.45 to 1.55	180	10 000	9.0	240
				M40	40 % mineral		1.45 to 1.55	80	5000	2.0	100
				R20	20 % filler		1.23 to 1.31	70	3200	1.5	
				R40 0	40 % filler other		1.43 to 1.53	100	5500	2.5	200
		3	Nucleated	1		135	1.13 to 1.15	80	2500	2.8	60
				2		165	1.13 to 1.15	80	2500	2.8	60
				3		210	1.13 to 1.15	80	2500	2.8	60
				4		270	1.13 to 1.15	80	2500	2.8	60
				5	recycled	115	1.13 to 1.15	80	2500	2.8	60
				6	recycled	135	1.13 to 1.15	80	2500	2.8	60
				0	other						
		4	Nucleated,	1		Requirement	s the same as c	orresponding g	rades under G	iroup 01, Class	3
			heat-	2							
			stabilized	3							
				4							
				5	- 41						
		F	Impact	0	other		1 06 to 1 10	FO	1700	0.0	FO
		5	Impact-	1 2	requeled		1.06 to 1.12	52	1700	9.0	50
			modified		recycled		1.06 to 1.12 1.15 to 1.23	50 85	1600 3000	8.0	50 210
				G15 G35	15 % glass		1.10 10 1.23	85 110	3000 5500	6.0 6.0	210

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TABLE PA Requirements for Polyamides Dry-as-Molded<sup>A,B</sup>

9     Impact modified, heat. stabilized     2     recycled (35)     1.08 to 112 (35)     52     1700 (35)     9.0 (35)     50 (35)       7     Toughend (35)     35 % (giss (35)     36 % (giss (35) <th>Group</th> <th>Description</th> <th>Class</th> <th>Description</th> <th>Grade</th> <th>Description<sup>C</sup></th> <th>Viscosity Number, ISO 307, min, mL/g</th> <th>Density,<sup>D</sup> ISO 1183 g/cm<sup>3</sup></th> <th>Tensile Strength, ISO 527-1 and ISO 527-2, MPa, min</th> <th>Tensile Modulus,<sup><i>E</i></sup> ISO 527-1 and ISO 527-2, MPa, min</th> <th>Charpy Impact Resistance, ISO 179/ 1eA, kJ/m<sup>2</sup>, min</th> <th>Deflection Temperature, ISO 75-1 and ISO 75-2, at 1.8 MPa, °C, min</th>	Group	Description	Class	Description	Grade	Description <sup>C</sup>	Viscosity Number, ISO 307, min, mL/g	Density, <sup>D</sup> ISO 1183 g/cm <sup>3</sup>	Tensile Strength, ISO 527-1 and ISO 527-2, MPa, min	Tensile Modulus, <sup><i>E</i></sup> ISO 527-1 and ISO 527-2, MPa, min	Charpy Impact Resistance, ISO 179/ 1eA, kJ/m <sup>2</sup> , min	Deflection Temperature, ISO 75-1 and ISO 75-2, at 1.8 MPa, °C, min
02     PA6     1     10     10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10     11.10					0	other						
PAG     615     515 % glass      1.15 io 1.23     655     3000     6.0     210       R30     355 % glass      1.31 b 1.14     100     5500     4.0        R30     355 % line      1.43 b 0.155     75     4500     4.0        R30     355 % line      1.43 b 0.156     75     4500     4.0        R40      1.65 b 1.10     42     1500     40     45       615     155 % glass      1.26 b 1.10     42     1500     40     45       635     75 % glass      1.26 b 1.11     40     1300     1.0     40     45       635     75 % glass      1.35 b 1.17     80     2400     1.0     2.2     60      1.35 b 1.17     80     2.0      60      1.35 b 1.17     80       1.35 b 1.17     80			6	Impact-				1.08 to 1.12		1700	9.0	
12     PAS     153 bitlined     0.35 bitlined     0.13 bitlined     1.31 bitlined     1.00 bitlined     0.00 bitlined <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>												
PAS     No     0     0     0     1.45     0.1.55     75     450     4.0        7     Toughend     1     0     0     1.35     1.38     1.03     1.35     1.38     1.0     1.35     1.35     1.35     1.35     1.35     1.35     1.35     1.35     1.13     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1												
12     P46     135     35 % filler      1.38 to 1.48     80     500     0.0     900       1				stabilized								
0     orbit												
2     PA6     1     recycled     1      1.06 to 1.10     4.2     1.00     4.0     4.0     4.0     4.0     1.00     3.5     4.5     6.35     6.35     6.35     6.35     6.35     7.0     2.00     8.0     8.0     8.0     8.0     8.0     8.0     8.0     8.0     8.0     8.0     8.0     8.0     8.0     8.0     8.0     8.0     8.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0     1.0								1.30 10 1.40	80	5500	3.0	200
02     PA5     1     1     105     10     1.05     1.1     4.00     3.05     9.00     1.80       03     3.5     9.9     3.55     9.9     1.28     1.30     4.20     1.00     1.00     1.1     2.200     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00     1.00 <t< td=""><td></td><td></td><td>7</td><td>Toughened</td><td></td><td>other</td><td></td><td>1 06 to 1 10</td><td>42</td><td>1500</td><td>40</td><td>45</td></t<>			7	Toughened		other		1 06 to 1 10	42	1500	40	45
02     PA6     1     5     glass			•	roughonou		recycled						
02     P46     1     G35     35, glass      1.28 to 1.38     110     5500     11     220       9     Torigh- heat- bat     1     recycled      1.06 to 1.10     42     5500     9.0     180       110     5500     15     15 h glass      1.58 to 1.23     70     2800     9.0     180       110     5500     10     550     11     5500     11     220     70     2800     9.0     180     1.20     1.37 to 1.47     70     3800     10     220     6.0      70     70     800     6.0      70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70     70												
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $					G35			1.28 to 1.38	110	5500	11	220
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						other						
heat- stabilized     G15     15     % glass      1.15     1.28     10     5500     11     2200       92     PA5     1     645     45% glass      1.39     1.49     130     8000     10     230       0     other     135     1.13 to 1.17     80     2400     2.5     600       0     Other     15     1.13 to 1.17     80     2400     2.0     600       0     Other     15     1.13 to 1.17     80     2400     2.0     600       0     Other     0     other     100     1.12 to 1.14     70     2200     3.0     600       1.12 to 1.14     70     2200     3.0     1.20     1.12     1.12     1.12     1.12     1.12     1.12     1.13     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12			8									
12     13     10     500     11     220       02     PA6     0     45%     9%     9%     Weather-     1     135     1.13     1.17     70     3800     6.0        9     Weather-     1     135     1.13     1.17     80     2400     2.5     600       10     Other     0     other      1.13     1.13     1.17     80     2400     2.5     600       0     Other     0     other      1.12     1.13     1.12     1.13     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0     1.12     0												
02     PA6     0     Weather- stabil- 2     130     1.30     1.47     70     280     6.0        9     Weather- stabil- 2     1     1.37     1.13     1.17     80     2400     2.5     600       0     Other     0     other     1.13     1.17     80     2400     2.0     600       0     Other     0     other     1.12     1.13     1.17     80     2400     2.0     600       0     Other     0     other     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.12     1.1						•						
M35     65 % meral other      1.37 to 1.47     70     800     6.0        9     Weather     1     135     1.13 to 1.17     80     2400     2.5     60       02     PA6     0     Other     135     1.13 to 1.17     80     2400     4.0     50       02     Other     0     other     150     1.12 to 1.14     70     2200     3.0     50       12     0     1.12 to 1.14     70     2200     3.0     50       13     5     % spass     1.12 to 1.15     70     2200     3.0     50       14     0     5     % spass     1.28 to 1.40     155     700     8.0     170       130     30 % glass     1.12 to 1.14     70     2200     3.0     180       14     10     1.28 to 1.40     155     7000     7.5     180       030     9 glass     1.12 to 1.14     70     2200     3.0     180       135 <td></td> <td></td> <td></td> <td>SIGUIIZEU</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>				SIGUIIZEU								
9     Nother     10     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0     0/0 <td></td>												
9     Weather. ized <sup>6</sup> 1     135     1.13 to 1.17     80     2400     2.5     60       02     PA6     1     General- purpose     1     100     1.12 to 1.14     5     75     2400     4.0     50       02     Other     1     100     1.12 to 1.14     5     75     2400     4.0     50       112     1.12 to 1.15     70     2200     3.0     50       112     1.12 to 1.15     70     2200     3.0     50       112     1.12 to 1.15     70     2200     3.0     50       112     1.12 to 1.14     5     700     200     7.5     180       G33     30 % glass     138 to 1.40     155     700     8.0     180       M30     30 % mineral     1.32 to 1.40     1.55     700     3.0     180       M30     30 % mineral     1.34 to 1.57     70     200     3.0     180       M30     30 % glass     1.12 to 1.14     70 <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>5.0</td><td></td></th<>											5.0	
02     PA6     1     Stabil- ized <sup>3</sup> 2 other     recycled other     115     1.13 to 1.17     65     2200     2.0     60       02     PA6     1     General- purpose     0     Other     0     112 to 1.14     5     75     2400     4.0     50       120     1.12 to 1.14     5     70     2200     3.0     50       120     1.12 to 1.14     5     70     2200     3.0     50       120     1.12 to 1.15     70     2200     3.0     50       025     25 % glass     1.28 to 1.26     155     7500     8.0     180       030     30 % mineral     1.30 to 1.40     170     2200     3.0     180       030     30 % glass     1.12 to 1.14     170     2200     3.0     180       040     40 % glass     1.12 to 1.14     170     2200     3.0     50       110     410%     12 to 1.14     70     2200     3.0     50       1111			9	Weather-			135	1.13 to 1.17	80	2400	2.5	60
02     PA6     1     Other general- purpose     0     other 12 to 114     75     2400     4.0     50       12     112     112     112     114     76     220     3.0     50       14     12     112     113     70     220     3.0     50       14     12     112     113     70     220     3.0     50       15     % glass     128     112     114     155     5000     6.5     180       035     glass     1.28     1.38     1.35     5000     6.5     180       035     glass     1.28     1.44     155     750     8.0     1.80     1.44     155     750     8.0     1.80     1.44     155     750     8.0     1.80     1.44     155     750     8.0     1.80     1.42     1.44     75     6.03     2.40     1.0     1.42     1.44     75     6.03     2.00     1.20     1.44     75 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>												
02     PA6     1     General: purpose     1     1     1     1     1     1     1     1     1     7     2     400     4.0     50       3     150     11210114     70     2200     3.0     50       120     11210115     70     2200     3.0     50       120     1210115     70     2200     3.0     50       120     128     135     5000     6.5     180       030     glass     1.28     1.40     155     750     8.0     180       030     glass     1.38     1.40     1.52     75     4500     4.0     76       M40     40%     glass     1.42     1.5     70     2200     3.0     50       112     1.12     1.14     70     2200     3.0     50       112     1.5     1.6     1.41     70     2200     3.0     50       112     1.12     1.5     <						other						
purpose     2     112 to     112 to     113     70     2200     3.0     50       4     15% glass     200     112 to     115     70     2200     3.0     50       615     15% glass     120 to     128 to     135     5000     6.5     180       G33     30% glass     1.32 to     1.40 to     1.55     7000     7.5     180       G33     30% glass     1.32 to     1.40 to     70     3200     2.4     50       M30     30 % mineral     1.44 to     1.52     75     4500     4.0     70       M40     40 % glass     1.12 to     1.14     70     2200     3.0     50       mineral     M40 to     1.25 to     1.42 to     1.50     100     6000     3.0     50       stabilized     2     1.15 to     1.12 to     1.14     70     2200     3.0     50       G5     5 % glass     1.12 to     1.14     70     2000     3.0						other						
3     150     1.12 to 1.15     70     2200     3.0     50       G15     15% glass     200     1.12 to 1.15     70     2200     3.0     50       G30     30 % glass     128 to 1.36     135     500     6.5     180       G33     30 % glass     1.28 to 1.40     150     7000     7.5     180       G33     35% glass     1.28 to 1.40     155     7500     8.0     100       M30     30 % mineral     1.38 to 1.40     75     2300     2.4     50       M40     40 % mineral     1.44 to 1.52     75     4500     4.0     70       M40     40 % mineral     1.44 to 1.50     100     6007     200     3.0     50       M40     40 % mineral     1.44 to 1.52     75     4500     4.0     70     70       M40     40     155     112 to 1.14     70     2200     3.0     50       Stabilized     2     112 to 1.15     70     2200     3.0 <t< td=""><td>02</td><td>PA6</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	02	PA6	1									
Heat     12 to 1:12     12 to 1:12     12 to 1:25     10     2200     3.0     50       G15     5's glass     1.28 to 1:26     100     22     0.0     15     15     100     15     15     100     15     100     15     100     15     100     15     100     15     100     15     100     15     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100     100 <td></td> <td></td> <td></td> <td>purpose</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>				purpose								
Gif 5     15 % glass     1.20 to 1.28     110     4200     4.0     170       G25     25 % glass     1.32 to 1.40     150     7000     7.5     180       G30     30 % glass     1.32 to 1.40     150     7000     7.5     180       G35     % glass     1.32 to 1.40     70     3200     2.4     50       M40     40 % mineral     1.44 to 1.52     75     4500     4.0     70       M40     40 % glass     1.12 to 1.14     70     3200     2.4     50       M40     40 % glass     1.12 to 1.14     70     3200     2.4     50       M40     2     150     1.12 to 1.14     70     2200     3.0     50       stabilized     2     155     1.12 to 1.14     70     2200     3.0     50       G65     5 % glass     1.12 to 1.14     70     2000     3.0     50       G65     5 % glass     1.28 to 1.40     155     7000     65     190												
G25     25 % glass     1.28 to 1.40     135     5000     6.5     180       G30     35 % glass     1.38 to 1.44     155     7500     8.0     180       M30     30 % mineral     1.30 to 1.40     70     2000     2.4     50       M40     40 % mineral     1.44 to 1.52     75     4500     4.0     70       R40     40 % mineral     1.44 to 1.52     75     4500     4.0     70       R40     40 % glass     The D6775-014     75     6603     200 back at 0.0     6000     3.0     180       stabilized     2     135     1.12 to 1.14     70     2200     3.0     50       3     150     1.12 to 1.15     70     2200     3.0     50       4     200     1.21 to 1.14     70     2000     3.0     50       5     5% glass     1.12 to 1.14     70     2000     3.0     50       625     5% glass     1.22 to 1.46     1.35     5000     2.5     100 <td></td> <td></td> <td></td> <td></td> <td></td> <td>15 % glass</td> <td>200</td> <td></td> <td></td> <td></td> <td></td> <td></td>						15 % glass	200					
G30     30 % glass     1.32 to 1.40     150     7000     7.5     180       M30     30 % mineral     1.38 to 1.44     155     7500     8.0     180       M40     40 % glass     1.44 to 1.52     75     4500     4.0     70       M40     40 % glass     1.44 to 1.52     75     4500     4.0     70       mineral     1.44 to 1.52     75     4500     4.0     70       mineral     1.42 to 1.50     76     603 7 2400     6000     3.0     50       stabilized     2     135     1.12 to 1.15     70     2200     3.0     50       3     150     1.12 to 1.15     70     2200     3.0     50       4     200     1.22 to 1.15     70     2200     3.0     50       5     recycled     135     1.12 to 1.14     70     2200     3.0     50       635     5 % glass     1.28 to 1.28     110     4200     4.0     180       635     5 % gl												
G35     J35 % glass     L     1.38 to 1.44     155     7500     8.0     180       M30     30 % mineral     1.30 to 1.40     70     3200     2.4     50       M40     40 % mineral     1.44 to 1.52     75     4500     4.0     70       R40     40 % mineral     1.42 to 1.50     100     6000     3.0     180       mineral     1.42 to 1.14     70     2200     3.0     50       stabilized     2     135     1.12 to 1.14     70     2200     3.0     50       3     150     1.12 to 1.14     70     2200     3.0     50       5     recycled     135     1.12 to 1.14     70     2200     3.0     50       615     5 % glass     1.12 to 1.14     70     2000     3.0     50       625     25 % glass     1.28 to 1.36     135     5000     6.5     190       G35     5 % glass     1.38 to 1.40     150     7000     7.5     190       <												
M40     40 % mineral     1.44 to 1.52     75     4500     4.0     70       https://standard.s_to.mineral <td></td> <td></td> <td></td> <td></td> <td>G35</td> <td></td> <td></td> <td>1.38 to 1.44</td> <td></td> <td>7500</td> <td>8.0</td> <td>180</td>					G35			1.38 to 1.44		7500	8.0	180
How mineral     40 % glass/ mineral     1.42 to 1.50 MO     100     6000     3.0     180       https://standard.gite.hteat.blogs.fi     other     1.00     0.00     2.114     75     606 7 0 00     3.0     50       stabilized     2     135     1.12 to 1.14     70     2200     3.0     50       3     150     1.12 to 1.15     70     2200     3.0     50       4     200     1.12 to 1.14     70     2200     3.0     50       5     recycled     135     1.12 to 1.14     70     2200     3.0     50       65     5 % glass     1.16 to 1.22     85     2500     2.5     110       G15     15 % glass     1.20 to 1.26     110     420     4.0     180       G25     25 % glass     1.38 to 1.44     155     7500     8.0     190       G45     45 % glass     1.70 to 1.78     175     10 000     10     190       G45     65 % glass     1.70 to 1.78     175     <												
https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite.https://standard.gite												
High     Heat     Heat <th< td=""><td></td><td></td><td></td><td></td><td></td><td>mineral AS</td><td></td><td><u>9-07a</u></td><td>100</td><td>0000</td><td>5.0</td><td>100</td></th<>						mineral AS		<u>9-07a</u>	100	0000	5.0	100
Indext     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P     P<			rdsite	h ai catalo		other ards/sist/c14	496961-2	2012 4 5 18	-9464-60	6375100b	a0/astm-de	5779- <b>Q</b> 7a
3   150   1.12 to 1.15   70   2200   3.0   50     4   200   1.12 to 1.15   70   2200   3.0   50     5   recycled   135   1.12 to 1.14   70   2200   3.0   50     G5   5 % glass   1.16 to 1.22   85   2500   2.5   110     G15   15 % glass   1.20 to 1.28   110   4200   4.0   180     G30   30 % glass   1.28 to 1.36   135   5000   6.5   190     G35   35 % glass   1.32 to 1.40   150   7000   7.5   190     G45   45 % glass   1.46 to 1.54   175   10 000   10   190     G45   45 % glass   1.52 to 1.60   175   10 000   10   190     G45   45 % glass   1.52 to 1.60   175   10 000   10   190     G45   50 % glass   1.52 to 1.60   175   10 000   10   190     M30   30 % mineral   1.42 to 1.77   70   3200   2.5   120			2	Hour								
4   200   1.12 to 1.15   70   2200   3.0   50     5   recycled   135   1.12 to 1.14   70   2000   3.0   50     G5   5% glass   1.16 to 1.22   85   2500   2.5   110     G15   15% glass   1.20 to 1.28   110   4200   4.0   180     G25   25% glass   1.23 to 1.36   135   5000   6.5   190     G30   30% glass   1.32 to 1.40   150   7500   8.0   190     G45   45% glass   1.36 to 1.44   155   7500   8.0   190     G45   45% glass   1.46 to 1.54   175   10 000   10   190     G65   65% glass   1.70 to 1.78   175   13 000   10   200     M30   30% mineral   1.30 to 1.40   70   3500   3.0   60     M40   40% mineral   1.44 to 1.52   75   4500   4.0   70     R40   40% glass/   1.25 to 1.33   80   2.5   50   50   50				Stabilized								
G5   5 % glass   1.16 to 1.22   85   2500   2.5   110     G15   15 % glass   1.20 to 1.28   110   4200   4.0   180     G25   25 % glass   1.28 to 1.36   135   5000   6.5   190     G30   30 % glass   1.32 to 1.40   150   7000   7.5   190     G34   45 % glass   1.38 to 1.44   155   7500   8.0   190     G45   45 % glass   1.38 to 1.44   155   7500   8.0   190     G45   50 % glass   1.52 to 1.60   175   10 000   10   190     G45   64 % glass   1.70 to 1.78   175   13 000   10   200     M30   30 % mineral   1.39 to 1.47   70   3500   3.0   60     M40   40 % mineral   1.44 to 1.52   75   4500   4.0   70     R20   20 % glass/   1.25 to 1.33   80   3200   2.5   50     mineral   1.42 to 1.50   100   6000   3.0   180   50   50												
G15   15 % glass   1.20 to 1.28   110   4200   4.0   180     G25   25 % glass   1.28 to 1.36   135   5000   6.5   190     G30   30 % glass   1.32 to 1.40   150   7000   7.5   190     G45   45 % glass   1.38 to 1.44   155   7500   8.0   190     G45   45 % glass   1.64 to 1.54   175   10 000   10   190     G50   50 % glass   1.52 to 1.60   175   10 000   10   190     G65   65 % glass   1.70 to 1.78   175   13 000   10   200     M30   30 % mineral   1.39 to 1.47   70   3200   2.4   50     M35   35 % mineral   1.39 to 1.47   70   3500   3.0   60     M40   40 % mineral   1.42 to 1.50   100   6000   3.0   180     mineral   1.90   1.12 to 1.14   70   2300   2.5   50     Mad   1   100   1.12 to 1.14   70   2300   2.5   50 <td></td> <td></td> <td></td> <td></td> <td>5</td> <td>recycled</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>					5	recycled						
G25   25 % glass   1.28 to 1.36   135   5000   6.5   190     G30   30 % glass   1.32 to 1.40   150   7000   7.5   190     G45   45 % glass   1.38 to 1.44   155   7500   8.0   190     G45   45 % glass   1.46 to 1.54   175   10 000   10   190     G50   50 % glass   1.70 to 1.78   175   13 000   10   200     G65   65 % glass   1.70 to 1.78   175   13 000   10   200     M30   30 % mineral   1.30 to 1.40   70   3200   2.4   50     M35   35 % mineral   1.39 to 1.47   70   3500   3.0   60     M40   40 % mineral   1.44 to 1.52   75   4500   4.0   70     R20   20 % glass/   1.25 to 1.33   80   200   2.5   50     mineral   100   1.12 to 1.14   70   2300   2.5   50     and   2   135   1.12 to 1.14   70   2300   2.5   50						5 % glass		1.16 to 1.22				110
G30   30 % glass   1.32 to 1.40   150   7000   7.5   190     G35   35 % glass   1.38 to 1.44   155   7500   8.0   190     G45   45 % glass   1.46 to 1.54   175   10 000   10   190     G65   650 % glass   1.52 to 1.60   175   10 000   10   190     G65   65 % glass   1.70 to 1.78   175   13 000   10   200     M30   30 % mineral   1.30 to 1.47   70   3500   3.0   660     M40   40 % mineral   1.44 to 1.52   75   4500   4.0   70     R20   20 % glass/   1.25 to 1.33   80   3200   2.5   120     mineral   1.42 to 1.50   100   6000   3.0   180     mineral   1.42 to 1.50   100   6000   3.0   180     mineral   1.42 to 1.50   100   6000   2.5   50     and   2   135   1.12 to 1.14   70   2300   2.5   50     4   200   1.12						15 % glass						
G35   35 % glass   1.38 to 1.44   155   7500   8.0   190     G45   45 % glass   1.46 to 1.54   175   10 000   10   190     G50   50 % glass   1.52 to 1.60   175   10 000   10   190     G66   65 % glass   1.70 to 1.78   175   10 000   10   200     M30   30 % mineral   1.30 to 1.40   70   3200   2.4   50     M35   35 % mineral   1.39 to 1.47   70   3500   3.0   60     M40   40 % mineral   1.44 to 1.52   75   4500   4.0   70     R20   20 % glass/   1.25 to 1.33   80   3200   2.5   120     mineral   0   0 ther   100   1.12 to 1.14   70   2300   2.5   50     and   2   135   1.12 to 1.14   70   2300   2.5   50     lubricated   1   100   1.12 to 1.14   70   2300   2.5   50     0   other   112 to 1.15   75   2300						25 % glass						
G45   45 % glass   1.46 to 1.54   175   10 000   10   190     G50   50 % glass   1.52 to 1.60   175   10 000   10   190     G65   65 % glass   1.70 to 1.78   175   13 000   10   200     M30   30 % mineral   1.30 to 1.40   70   3200   2.4   50     M35   35 % mineral   1.39 to 1.47   70   3500   3.0   60     M40   40 % mineral   1.44 to 1.52   75   4500   4.0   70     R20   20 % glass/   1.25 to 1.33   80   3200   2.5   120     mineral   1.42 to 1.50   100   6000   3.0   180     mineral   100   1.12 to 1.14   70   2300   2.5   50     and   2   135   1.12 to 1.14   70   2300   2.5   50     lubricated   1   100   1.12 to 1.15   75   2300   2.5   50     and heat   2   135   1.12 to 1.14   70   2300   2.5   50												
G50   50 % glass   1.52 to 1.60   175   10 000   10   190     G65   65 % glass   1.70 to 1.78   175   13 000   10   200     M30   30 % mineral   1.30 to 1.40   70   3200   2.4   50     M35   35 % mineral   1.39 to 1.47   70   3500   3.0   60     M40   40 % mineral   1.44 to 1.52   75   4500   4.0   70     R20   20 % glass/   1.25 to 1.33   80   3200   2.5   120     mineral   1.42 to 1.50   100   6000   3.0   180     mineral   100   1.12 to 1.14   70   2300   2.5   50     and   2   135   1.12 to 1.14   70   2300   2.5   50     lubricated   1   100   1.12 to 1.14   70   2300   2.5   50     0   other   12 to 1.15   75   2300   2.5   50     10bricated   3   150   1.12 to 1.14   70   2300   2.5   50												
G65   65 % glass   1.70 to 1.78   175   13 000   10   200     M30   30 % mineral   1.30 to 1.40   70   3200   2.4   50     M35   35 % mineral   1.39 to 1.47   70   3500   3.0   60     M40   40 % mineral   1.44 to 1.52   75   4500   4.0   70     R20   20 % glass/   1.25 to 1.33   80   3200   2.5   120     mineral   R40   40 % glass/   1.42 to 1.50   100   6000   3.0   180     mineral   0   other   112 to 1.14   70   2300   2.5   50     and   2   135   1.12 to 1.14   70   2300   2.5   50     lubricated   3   150   1.12 to 1.14   70   2300   2.5   50     0   other   150   1.12 to 1.14   70   2300   2.5   50     100   1.12 to 1.15   75   2300   2.5   50   50     4   200   1.12 to 1.14   70   2300												
M30   30 % mineral   1.30 to 1.40   70   3200   2.4   50     M35   35 % mineral   1.39 to 1.47   70   3500   3.0   60     M40   40 % mineral   1.44 to 1.52   75   4500   4.0   70     R20   20 % glass/   1.25 to 1.33   80   3200   2.5   120     mineral   R40   40 % glass/   1.42 to 1.50   100   6000   3.0   180     mineral   0   other   1   1.42 to 1.50   100   6000   2.5   50     3   Nucleated   1   100   1.12 to 1.14   70   2300   2.5   50     and   2   135   1.12 to 1.14   70   2300   2.5   50     4   200   1.12 to 1.15   75   2300   2.5   50     0   other												
M35   35 % mineral   1.39 to 1.47   70   3500   3.0   60     M40   40 % mineral   1.44 to 1.52   75   4500   4.0   70     R20   20 % glass/   1.25 to 1.33   80   3200   2.5   120     mineral   R40   40 % glass/   1.42 to 1.50   100   6000   3.0   180     mineral   nineral   1.42 to 1.50   100   6000   3.0   180     mineral   100   1.12 to 1.14   70   2300   2.5   50     and   2   135   1.12 to 1.14   70   2300   2.5   50     4   200   1.12 to 1.15   75   2300   2.5   50     0   other   150   1.12 to 1.15   75   2300   2.5   50     0   other   100   1.12 to 1.14   70   2300   2.5   50     4   Nucleated   1   100   1.12 to 1.14   70   2300   2.5   50     0   other   135   1.12 to 1.14   70<						0						
R20   20 % glass/ mineral   1.25 to 1.33   80   3200   2.5   120     R40   40 % glass/ mineral   1.42 to 1.50   100   6000   3.0   180     mineral   0   other   0   0   50   50     3   Nucleated   1   100   1.12 to 1.14   70   2300   2.5   50     and   2   135   1.12 to 1.14   70   2300   2.5   50     lubricated   3   150   1.12 to 1.15   75   2300   2.5   50     4   200   1.12 to 1.15   80   2300   2.5   50     4   100   1.12 to 1.14   70   2300   2.5   50     6   0   other   0   0   0   2.5   50     4   100   1.12 to 1.14   70   2300   2.5   50     5   135   1.12 to 1.14   70   2300   2.5   50     5   135   1.12 to 1.14   70   2300   2.5   50     <												
mineral R40     mineral 40 % glass/ mineral     1.42 to 1.50     100     6000     3.0     180       3     Nucleated     1     100     1.12 to 1.14     70     2300     2.5     50       and     2     135     1.12 to 1.14     70     2300     2.5     50       lubricated     3     150     1.12 to 1.15     75     2300     2.5     50       4     200     1.12 to 1.15     80     2300     2.5     50       0     other     100     1.12 to 1.14     70     2300     2.5     50       4     200     1.12 to 1.15     80     2300     2.5     50       0     other     1100     1.12 to 1.14     70     2300     2.5     50       4     135     1.12 to 1.14     70     2300     2.5     50       53     135     1.12 to 1.14     70     2300     2.5     50       4     135     1.12 to 1.15     75     2300     2.5												
R40   40 % glass/ mineral other   1.42 to 1.50   100   6000   3.0   180     3   Nucleated   1   0   1.12 to 1.14   70   2300   2.5   50     and   2   135   1.12 to 1.14   70   2300   2.5   50     lubricated   3   150   1.12 to 1.15   75   2300   2.5   50     0   other   200   1.12 to 1.15   80   2300   2.5   50     4   200   1.12 to 1.14   70   2300   2.5   50     0   other   0   0   1.12 to 1.14   70   2300   2.5   50     100   1.12 to 1.14   70   2300   2.5   50     112   1.12 to 1.14   70   2300   2.5   50     135   1.12 to 1.14   70   2300   2.5   50     135   1.12 to 1.14   70   2300   2.5   50     135   1.12 to 1.15   75   2300   2.5   50     14   200 <td< td=""><td></td><td></td><td></td><td></td><td>R20</td><td></td><td></td><td>1.25 to 1.33</td><td>80</td><td>3200</td><td>2.5</td><td>120</td></td<>					R20			1.25 to 1.33	80	3200	2.5	120
3   Nucleated   1   100   1.12 to 1.14   70   2300   2.5   50     and   2   135   1.12 to 1.14   70   2300   2.5   50     lubricated   3   150   1.12 to 1.15   75   2300   2.5   50     4   200   1.12 to 1.15   80   2300   2.5   50     6   0   other   0   0   0   2.5   50     4   Nucleated   1   100   1.12 to 1.14   70   2300   2.5   50     4   Nucleated   1   100   1.12 to 1.14   70   2300   2.5   50     and heat-   2   135   1.12 to 1.14   70   2300   2.5   50     stabilized   3   150   1.12 to 1.15   75   2300   2.5   50     4   200   1.12 to 1.15   80   2300   2.5   50						40 % glass/ mineral		1.42 to 1.50	100	6000	3.0	180
and   2   135   1.12 to 1.14   70   2300   2.5   50     lubricated   3   150   1.12 to 1.15   75   2300   2.5   50     4   200   1.12 to 1.15   80   2300   2.5   50     0   other   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0			0	Nucleated		other	100	1 10 40 1 1 1	70	0000	0.5	50
lubricated   3   150   1.12 to 1.15   75   2300   2.5   50     4   200   1.12 to 1.15   80   2300   2.5   50     0   other   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0 </td <td></td> <td></td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			3									
4   200   1.12 to 1.15   80   2300   2.5   50     0   other   1   100   1.12 to 1.14   70   2300   2.5   50     4   Nucleated   1   100   1.12 to 1.14   70   2300   2.5   50     and heat- stabilized   2   135   1.12 to 1.14   70   2300   2.5   50     4   200   1.12 to 1.15   75   2300   2.5   50												
0   other     4   Nucleated   1   100   1.12 to 1.14   70   2300   2.5   50     and heat-   2   135   1.12 to 1.14   70   2300   2.5   50     stabilized   3   150   1.12 to 1.15   75   2300   2.5   50     4   200   1.12 to 1.15   80   2300   2.5   50				ubnoateu								
4     Nucleated and heat- stabilized     1     100     1.12 to 1.14     70     2300     2.5     50       3     135     1.12 to 1.14     70     2300     2.5     50       4     20     135     1.12 to 1.14     70     2300     2.5     50       4     200     1.12 to 1.15     75     2300     2.5     50						other					-	
stabilized     3     150     1.12 to 1.15     75     2300     2.5     50       4     200     1.12 to 1.15     80     2300     2.5     50			4	Nucleated			100	1.12 to 1.14	70	2300	2.5	50
4 200 1.12 to 1.15 80 2300 2.5 50											2.5	
				stabilized								
5 recycled 135 1.12 to 1.14 70 2100 2.5 50												

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TABLE PA Requirements for Polyamides Dry-as-Molded<sup>A,B</sup>

Group	Description	Class	Description	Grade	Description <sup>C</sup>	Viscosity Number, ISO 307, min, mL/g	Density, <sup>D</sup> ISO 1183 g/cm <sup>3</sup>	Tensile Strength, ISO 527-1 and ISO 527-2, MPa, min	Tensile Modulus, <sup><i>E</i></sup> ISO 527-1 and ISO 527-2, MPa, min	Charpy Impact Resistance, ISO 179/ 1eA, kJ/m <sup>2</sup> , min	Deflection Temperature, ISO 75-1 and ISO 75-2, at 1.8 MPa, °C, min
				0	other						
		5	Impact-	1			1.05 to 1.12	45	1700	30	45
			modified	2			1.05 to 1.18	55	2000	6.0	45
				3 G15	15 % glass		1.05 to 1.18 1.15 to 1.24	40 75	1000 3300	6.0 9.0	35 130
				G30	30 % glass		1.30 to 1.40	135	6500	15	180
				G35	35 % glass		1.32 to 1.42	135	6800	15	190
				G40	40 % glass		1.39 to 1.47	135	8000	10	200
		6	Impost	0	other		1 OF to 1 10	45	1700	20	45
		6	Impact- modified,	1 2			1.05 to 1.12 1.05 to 1.18	45 55	1700 2000	30 6.0	45 45
			heat-	3			1.05 to 1.18	40	1000	6.0	35
			stabilized	4			1.05 to 1.18	25	1000	30	30
				G15	15 % glass		1.15 to 1.24	75	3300	9.0	130
				G30	30 % glass		1.30 to 1.40	135	6500	15	180
				G35	35 % glass		1.32 to 1.42	135	6800	10	190
				G40 M35	40 % glass 35 % mineral		1.39 to 1.47 1.35 to 1.45	135 65	8000 3200	10 3.0	200 50
				M40	40 % mineral		1.39 to 1.47	65	3200	3.0	50
				0	other						
		7	Flexural- modified,	1	injection molding		1.05 to 1.16	55	2375 max	10	45
			heat-	2	extrusion		1.05 to 1.16	30	2000 max	7.0	25
			stabilized	3	blends		1.05 to 1.10	35	1700 max	4.5	35
				0	other						
aa <sup>H</sup>	DAIA	0	Other	0	other	445.1		05		4.0	
03 <sup><i>H</i></sup>	PA11	1	General purpose	1		115 to	1.01 to 1.06	35	900	4.0	36
			pulpose	2		160 to	1.01 to 1.06	1e <sub>35</sub>	900	6.0	36
				0	other	190					
		2	Heat-	1	ourier	115 to	1.01 to 1.06	35	900	4.0	36
			stabilized			140					
				2		160 to	1.01 to 1.06	35	900	6.0	36
				3	black AST	190 160 to 7	91.01 to 1.06	35	900	4.0	36
						190	21.1.4510		C279.101	4.0	220.02
				g/stand		210 to 255	1.01 to 1.06	-946 <sub>35</sub> -60	63/ <sub>900</sub> 00	a0/as <sub>6.0</sub> -d0	79-1 <sub>36</sub> /a
				0	other	200					
		3	Plasticized	1		170 to	1.01 to 1.06	30	370	25	36
						200					
		4	Plaati	0 1	other	190 to	1 01 to 1 06	25	500	25	36
		4	Plasti- cized,	1		180 to 240	1.01 to 1.06	35	500	25	30
			Heat Sta-	2		170 to	1.01 to 1.06	35	400	25	36
			bilized			200					
				3		115 to	1.01 to 1.06	30	350	25	36
				4	black	140 175 to	1.01 to 1.06	35	400	25	36
				4	DIACK	240	1.01 10 1.00	35	400	25	30
				5		170 to	1.01 to 1.06	30	370	25	36
						190					
				6		200 to	1.01 to 1.06	35	370	25	36
				7	black	230 160 to	1.01 to 1.06	35	340	25	36
						240					
		-	0.1	0	other						
	DA10	0	Other	0	other	100 +-	1 00 to 1 00	20	000	0 5	05
04	04 PA12	1	General purpose	1		100 to 210	1.00 to 1.06	30	800	2.5	35
04	17(12		Paipose	2		100 to	1.00 to 1.06	35	1000	2.5	35
04	17112			~							
04						210					
04				3		211 to	1.00 to 1.06	35	1000	2.5	35
04				3		211 to 270					
04						211 to	1.00 to 1.06	35 35	1000 1000	2.5 2.5	35 35

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TABLE PA Requirements for Polyamides Dry-as-Molded<sup>A,B</sup>

Group	Description	Class	Description	Grade	Description <sup>C</sup>	Viscosity Number, ISO 307, min, mL/g	Density, <sup>D</sup> ISO 1183 g/cm <sup>3</sup>	Tensile Strength, ISO 527-1 and ISO 527-2, MPa, min	Tensile Modulus, <sup><i>E</i></sup> ISO 527-1 and ISO 527-2, MPa, min	Charpy Impact Resistance, ISO 179/ 1eA, kJ/m <sup>2</sup> , min	Deflection Temperature, <sup>4</sup> ISO 75-1 and ISO 75-2, at 1.8 MPa, °C, min
		2	Heat-	1		100 to	1.00 to 1.06	35	800	2.5	35
			stabilized	2		150 151 to	1.00 to 1.06	35	800	2.5	35
				3		210 211 to	1.00 to 1.06	35	1000	2.5	35
						280					
				G15	15 % glass		1.10 to 1.20	75	3000	10	160
				G25 G30	25 % glass 30 % glass		1.10 to 1.25 1.15 to 1.30	90 95	3000 4000	15 15	160 160
				G40	40 % glass		1.30 to 1.45	100	4500	15	160
				R30	30 % filler		1.18 to 1.32	55	3500	5.0	100
				0	other		1.10 10 1.02	55	3300	5.0	100
		3	Nucleated	1	other	100 to	1.00 to 1.06	35	800	1.0	35
				2		180 181 to	1.00 to 1.06	35	800	1.0	35
				0	other	250					
		4	Plasticized	1		100 to 280	1.00 to 1.06	30	300 to 550	15	
				2		100 to	1.00 to 1.06	30	450 to 750	10	
				0	- 41	280					
		5	Plasti-	0 1	other	100 to	1.00 to 1.06	20	200 to 350	20	
			cized, heat-	2		280 100 to 280	1.00 to 1.06	S 30	300 to 550	15	
			stabilized	3		100 to	1.00 to 1.06	30	450 to 750	10	
				4		280 100 to 280	1.00 to 1.06	te <sub>35</sub> .8	550 to 950	5.0	
			0.1	0	other						
05	PA612	0 1	Other General	0	other	100 to	1.05 to 1.07	50	1800	2.0	45
			purpose	2		139 140 to	1.05 to 1.07	50	1800	2.5	45
				0		1990//	<u>9-07a</u>	50	1000		45
				3	and solicit/c1	496200	1.05 to 1.07	-94650	1800	3.0	779-45
				G45	35 % glass 45 % glass		-1.28 to 1.38 1.38 to 1.48	-94 140 00 150	00 /7000 00 8500	11 asg.0- do	175 a 180
				0	other						
		2	Heat-	1	00.0/	140	1.05 to 1.07	50	1800	2.0	45
			stabilized	G20	20 % glass		1.17 to 1.25	105	4500	5.0	170
				G30	30 % glass		1.25 to 1.33	120	5500 7000	5.0	170
				G35 0	35 % glass		1.28 to 1.38	140	7000	9.0	175
		3	Weather- stabi-	1	other	140	1.05 to 1.07	50	1800	1.5	45
			lized <sup>G</sup>	0	other						
06	PA46	1	General	0 1	other	170	1.16 to 1.20	85	2300	6.0	
00	r"A40	I	General- purpose	2		170 195	1.16 to 1.20 1.16 to 1.20	85 85	2300 2300	6.0 6.0	140
		~	11-11	0	other	105	4.40	05	0000		
		2	Heat-	1		165	1.16 to 1.20	85	2300	6.0	140
			stabilized	2	15.0/	195	1.16 to 1.20	85	2300	6.0	140
				G15	15 % glass		1.25 to 1.31	125	5000	3.6	240
				G30 G40	30 % glass		1.38 to 1.42	175 195	8000	7.5	280
				G40 G50	40 % glass		1.48 to 1.53 1.58 to 1.63	195 210	10 000 12 000	10.0	280 280
				R50	50 % glass 50 % filler		1.60 to 1.67	140	9000	12.0 4.0	280
		3	Flame-	0 1	other		1.32 to 1.36	45	2250	4.0	140
		-	retar-	G15	15 % glass		1.55 to 1.59	115	6000	4.5	270
			dant <sup>/</sup> ,		-						
		heat-	G30 G40	30 % glass 40 % glass		1.63 to 1.69 1.76 to 1.80	155 145	10 000 11 000	7.5 8.0	280 280	
								14:)		0.0	600
			stabilized	G40 G45	40 % glass 45 % glass		1.75 to 1.79	165	12 000	8.0	280