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Plastics — Poly(phenylene ether) (PPE) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

Plastiques — Matériaux à base de poly(phénylène éther) (PPE) pour moulage et extrusion —

Partie 1: Système de désignation et base de spécification

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 28941-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

ISO 28941 consists of the following parts, under the general title *Plastics — Poly(phenylene ether) (PPE) moulding and extrusion materials*:

— *Part 1: Designation system and basis for specifications*

ISO 28941-1 is a revision of ISO 15103-1, the revision concerning principally the inclusion of melt volume-flow rate as a designatory property and the inclusion of additional ranges of values of the other designatory properties. In order to give users time to switch from ISO 15103-1 to ISO 28941-1, ISO 15103-1 will remain in force for a number of years after publication of ISO 28941-1. During this period, ISO 15103-2 will effectively be Part 2 of this International Standard.

Plastics — Poly(phenylene ether) (PPE) moulding and extrusion materials —

Part 1:
Designation system and basis for specifications

1 Scope

1.1 This part of ISO 28941 establishes a system of designation for PPE thermoplastic materials, which may be used as the basis for specifications.

1.2 The types of PPE plastic are differentiated from each other by a classification system based on appropriate levels of the designatory properties

a) temperature of deflection under load

b) melt volume-flow rate

c) Charpy notched impact strength

d) flammability

and on information about basic polymer parameters, intended application and/or method of processing, important properties, additives, colorants, fillers and reinforcing materials.

1.3 This part of ISO 28941 is applicable to all PPE materials, including those modified with polystyrene or polyamide or other materials.

It applies to materials ready for normal use in the form of powder, granules or pellets and to materials unmodified or modified by colorants, additives, fillers, etc.

1.4 It is not intended to imply that materials having the same designation necessarily have the same performance. This part of ISO 28941 does not provide engineering data, performance data or data on processing conditions which may be required to specify a material for a particular application and/or method of processing.

If such additional properties are required, they shall be determined in accordance with the test methods specified in ISO 15103-2, if suitable.

1.5 In order to specify a thermoplastic material for a particular application or to ensure reproducible processing, additional requirements may be given in data block 5 (see 3.1).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*

ISO 15103-2, *Plastics — Poly(phenylene ether) (PPE) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

3 Designation system

3.1 General

The designation system for thermoplastics is based on the following standardized pattern:

Designation						
Description block (optional)	**Identity block**					
	International Standard number block	**Individual-item block**				
		Data block 1	**Data block 2**	**Data block 3**	**Data block 4**	**Data block 5**

The designation consists of an optional description block, reading “Thermoplastics”, and an identity block comprising the International Standard number and an individual-item block. For unambiguous coding, the individual-item block is subdivided into five data blocks comprising the following information:

— Data block 1: Identification of the plastic by its symbol PPE in accordance with ISO 1043-1 and information about the composition of the polymer (see 3.2).

— Data block 2: Position 1: intended application or method of processing (see 3.3).

Positions 2 to 8: important properties, additives and supplementary information (see 3.3).

— Data block 3: Designatory properties (see 3.4).

— Data block 4: Fillers or reinforcing materials and their nominal content (see 3.5).

— Data block 5: For the purposes of specifications, a fifth data block may be added containing additional information.

The first character of the individual-item block shall be a hyphen. The data blocks shall be separated from each other by commas.

If a data block is not used, this shall be indicated by doubling the separation sign, i.e. by two commas (,,).

3.2 Data block 1

In this data block, after the hyphen, poly(phenylene ether) materials are identified by the symbol PPE, in accordance with ISO 1043-1, followed by a hyphen and a code-number giving additional information on the polymer, as specified in Table 1.

Table 1 — Code-numbers used for additional information in data block 1

Code-number	Material
1	PPE
2	PPE+PS
3	PPE+PA
4	PPE+another polymer not already given in this table
5	PPE+PS+another polymer not already given in this table
6	PPE+PP
7	PPE+PPS

3.3 Data block 2

In this data block, information about intended application and/or method of processing is given in position 1 and information about important properties, additives and colour in positions 2 to 8. The code-letters used are specified in Table 2.

If information is presented in positions 2 to 8 and no specific information is given in position 1 the letter X shall be inserted in position 1.

Table 2 — Code-letters used in data block 2

Code-letter	Position 1	Code-letter	Positions 2 to 8
A	Adhesives	**A**	Processing stabilized
B	Blow moulding	**B**	Antiblocking
C	Calendering	**C**	Coloured
		D	Powder
E	Extrusion	**E**	Expandable
F	Extrusion of films	**F**	Special burning characteristics
G	General use	**G**	Granules
		G1	Pellets
		G3	Beads
H	Coating	**H**	Heat-ageing stabilized
K	Cable and wire coating	**K**	Metal deactivated
L	Monofilament extrusion	**L**	Light and weather stabilized
M	Moulding		
		N	Natural (no colour added)
		P	Impact modified
Q	Compression moulding	**Q1**	Plateable
R	Rotational moulding	**R**	Mould release agent
S	Sintering	**S**	Lubricated
T	Tape manufacture	**T**	Transparent
V	Thermoforming		
X	No indication	**X**	Cross-linkable
Y	Textile yarns, spinning	**Y**	Increased electrical conductivity
		Z	Antistatic

3.4 Data block 3

3.4.1 General

In this data block, the temperature of deflection under load is represented by the letter A or B followed by a three-figure code-number (see 3.4.2), the melt volume-flow rate by a two-figure code-number (see 3.4.3), the impact strength by a two-figure code-number (see 3.4.4) and the flammability by a combination of code-letters and code-numbers indicating the flammability category (see 3.4.5). The code-numbers are separated from each other by hyphens.

If a property value falls on or near a range limit, the manufacturer shall state which range will designate the material. If subsequent individual test values lie on, or on either side of, the limit because of manufacturing tolerances, the designation is not affected.

NOTE Not all combinations of the values of the designatory properties may be possible for currently available polymers.

3.4.2 Temperature of deflection under load

The temperature of deflection under load shall be determined in accordance with ISO 15103-2.

The possible values of the temperature of deflection under load at 1,8 MPa and 0,45 MPa are divided into 17 ranges, each represented by a letter followed by a three-figure code-number as specified in Table 3 and Table 4, respectively.

Table 3 — Ranges of temperature of deflection under load at 1,8 MPa in data block 3

Code-number	Range of temperature of deflection under load at 1,8 MPa °C
A050	⩾ 50
A060	⩾ 60
A070	⩾ 70
A080	⩾ 80
A090	⩾ 90
A100	⩾ 100
A110	⩾ 110
A120	⩾ 120
A130	⩾ 130
A140	⩾ 140
A150	⩾ 150
A160	⩾ 160
A170	⩾ 170
A180	⩾ 180
A190	⩾ 190
A200	⩾ 200
A210	⩾ 210

Table 4 — Ranges of temperature of deflection under load at 0,45 MPa in data block 3

Code-number	Range of temperature of deflection under load at 0,45 MPa °C
B050	⩾ 50
B060	⩾ 60
B070	⩾ 70
B080	⩾ 80
B090	⩾ 90
B100	⩾ 100
B110	⩾ 110
B120	⩾ 120
B130	⩾ 130
B140	⩾ 140
B150	⩾ 150
B160	⩾ 160
B170	⩾ 170
B180	⩾ 180
B190	⩾ 190
B200	⩾ 200
B210	⩾ 210

3.4.3 Melt volume-flow rate

The melt volume-flow rate shall be determined in accordance with ISO 15103-2. The measured value shall be rounded off to the nearest whole number and this whole number taken as the code-number. It will usually be a two-figure number. In cases when it is a single-figure number, the code-number shall be zero followed by the single-figure number.

EXAMPLE If the measured melt volume-flow rate is 5,1 cm^3/10 min, the code-number will be 05.

3.4.4 Charpy notched impact strength

The Charpy notched impact strength shall be determined in accordance with ISO 15103-2.

The possible values of the Charpy notched impact strength are divided into eight ranges, each represented by a two-figure code-number as specified in Table 5.

Table 5 — Ranges of Charpy notched impact strength in data block 3

Code-number	Range of Charpy notched impact strength kJ/m^2
00	< 5
05	⩾ 5
10	⩾ 10
20	⩾ 20
30	⩾ 30
40	⩾ 40
50	⩾ 50
60	⩾ 60

3.4.5 Flammability

The flammability shall be determined in accordance with ISO 15103-2 at a thickness of 1,6 mm.

The possible flammability categories are represented by the code-letter/number combinations specified in Table 6.

Table 6 — Code-letter/number combinations used for flammability in data block 3

Code-letter/number combination	Flammability category
HB40	HB40
HB75	HB75
V2	V-2
V1	V-1
V0	V-0

3.5 Data block 4

In this data block, the type of filler and/or reinforcing material is represented by a single code-letter in position 1 and its physical form by a second code-letter in position 2, the code-letters being as specified in Table 7. Subsequently (without a space), the mass content may be given by a two-figure number in positions 3 and 4.

Table 7 — Code-letters for fillers and reinforcing materials in data block 4

Code-letter	Material	Code-letter	Form
B	Boron	**B**	Beads, spheres, balls
C	Carbon	**C**	Chips, cuttings
		D	Powder
E	Clay		
		F	Fibre
G	Glass	**G**	Ground
		H	Whiskers
K	Calcium carbonate	**K**	Knitted fabric
L	ex. cellulose[a]	**L**	Layer
M	Mineral[a, b], metal[a]	**M**	Mat (thick)
		N	Non-woven fabric (thin)
P	Mica[a]	**P**	Paper
Q	Silicon		
R	Aramid	**R**	Rovings
S	Synthetic, organic[a]	**S**	Scales, flakes
T	Talc	**T**	Cord
		V	Veneer
W	Wood	**W**	Woven fabric
X	Not specified	**X**	Not specified
		Y	Yarn
Z	Others	**Z**	Others

[a] These materials may be further defined by their chemical symbol, for example, or additional symbols defined in the relevant International Standard. In the case of metals (M), it is essential to indicate the type of metal by means of its chemical symbol.

[b] Mineral fillers should be designated more precisely if a symbol is available. Mixtures of materials and/or forms may be indicated by combining the relevant codes using the sign "+" and placing the whole between parentheses. For example, a mixture of 25 % glass fibre (GF) and 10 % mineral power (MD) would be indicated by (GF25+MD10).

3.6 Data block 5

Indication of additional requirements in this data block is a way of transforming the designation of a material into a specification for a particular application. This may be done for example by reference to a suitable national standard or to a standard-like, generally established specification.