
**Plastics — Poly(phenylene sulfide) (PPS)
moulding and extrusion materials —**

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

Plastiques — Matériaux pour moulage et extrusion en poly(phénylène sulfide) (PPS) —

Partie 1: Système de désignation et base de spécification



Reference number
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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 28078-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

ISO 28078 consists of the following parts, under the general title *Plastics — Poly(phenylene sulfide) (PPS) moulding and extrusion materials*:

- *Part 1: Designation system and basis for specifications*
- *Part 2: Preparation of test specimens and determination of properties*

Plastics — Poly(phenylene sulfide) (PPS) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

1 Scope

1.1 This part of ISO 28078 establishes a system of designation for PPS thermoplastic materials, which may be used as the basis for specifications.

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

- a) melt mass-flow rate or melt viscosity
- b) density
- c) tensile modulus

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

1.3 This part of ISO 28078 is applicable to all PPS 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 28078 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 28078-2, 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 11469, *Plastics — Generic identification and marking of plastics products*

ISO 28078-2, *Plastics — Poly(phenylene sulfide) (PPS) 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 PPS in accordance with ISO 1043-1 (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 (see 3.6).

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 sulfide) materials are identified by the symbol PPS, in accordance with ISO 1043-1.

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 1.

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 1 — 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		
C	Calendering	C	Coloured
		D	Powder
E	Extrusion	E	Expandable
F	Extrusion of films		
G	General use	G	Granules
		G1	Pellets
		G3	Beads
H	Coating	H	Heat-ageing stabilized
L	Monofilament extrusion	L	Light and weather stabilized
M	Injection moulding		
		N	Natural (no colour added)
		P	Impact modified
Q	Compression moulding	Q	Plating
R	Rotational moulding	R	Mould release agent
S	Sintering	S	Lubricated
V	Thermoforming		
X	No indication	X	Crosslinkable
Y	Textile yarns, spinning	Y	Increased electrical conductivity
		Z	Antistatic

3.4 Data block 3

3.4.1 General

In this data block, the range of melt mass-flow rate or melt viscosity is represented by a composite designation comprising a code-letter/code-number pair indicating the test conditions followed by a “+” sign and a two-figure code-number indicating the range itself (see 3.4.2), the whole being placed between parentheses. This designation is followed by a two-figure code-number representing the density (see 3.4.3) and a two-figure code-number representing the tensile modulus (see 3.4.4). The composite designation representing the melt mass-flow rate or melt viscosity, the code-number representing the density and the code-number representing the tensile modulus are separated from each other by hyphens.

EXAMPLE The ranges of values of the designatory properties of PPS having a melt mass-flow rate, measured under the conditions 315 °C/5,00 kg (A5), of 8 g/10 min (09), a density of 1 600 kg/m³ (16) and a tensile modulus of 14 000 MPa (14) would be indicated by (A5+09)-16-14.

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 Melt mass-flow rate (MFR) or melt viscosity (MV)

The melt mass-flow rate shall be determined by the method specified in ISO 28078-2, using one of the three sets of test conditions specified in column A of Table 2, and the melt viscosity shall be determined by the method specified in ISO 28078-2, using one of the six sets of test conditions specified in columns B and C of Table 2.

For MFR, set of conditions A5 is the normal set of conditions.

Set of conditions A2 shall be used only for materials having an MFR exceeding 25 g/10 min when measured using set of conditions A5.

Set of conditions A1 shall be used only for materials having an MFR exceeding 25 g/10 min when measured using set of conditions A2.

Table 2 — Code-letter/code-number pairs used for test conditions for measurement of melt mass-flow rate and melt viscosity in data block 3

Code-number	A (temperature/load)	B (temperature/shear rate)	C (temperature/shear rate)
5	MFR 315 °C/5,00 kg	MV 310 °C/400 s ⁻¹	MV 316 °C/400 s ⁻¹
2	MFR 315 °C/2,16 kg	MV 310 °C/1 000 s ⁻¹	MV 316 °C/1 000 s ⁻¹
1	MFR 315 °C/1,2 kg	MV 310 °C/1 200 s ⁻¹	MV 316 °C/1 200 s ⁻¹

The possible values of MFR and MV are divided into five ranges, each represented by a two-figure code-number as specified in Table 3.

Table 3 — Code-numbers used for melt mass-flow rate and melt viscosity in data block 3

Code-number	Range of MFR g/10 min	Range of MV Pa·s
03	MFR ≤ 3	MV > 700
05	3 < MFR ≤ 6	300 < MV ≤ 700
09	6 < MFR ≤ 12	100 < MV ≤ 300
15	12 < MFR ≤ 18	40 < MV ≤ 100
18	MFR > 18	MV ≤ 40

3.4.3 Density

The density shall be determined by the method specified in ISO 28078-2.

The possible values of the density are divided into seven ranges, each represented by a two-figure code-number as specified in Table 4.

Table 4 — Code-numbers used for density in data block 3

Code-number	Range of density, ρ kg/m ³
11	$\rho \leq 1\,100$
12	$1\,100 < \rho \leq 1\,300$
14	$1\,300 < \rho \leq 1\,500$
16	$1\,500 < \rho \leq 1\,700$
18	$1\,700 < \rho \leq 1\,900$
20	$1\,900 < \rho \leq 2\,100$
21	$\rho > 2\,100$

3.4.4 Tensile modulus

The tensile modulus shall be determined by the method specified in ISO 28078-2.

The possible values of the tensile modulus are divided into six ranges, each represented by a two-figure-code number as specified in Table 5.

Table 5 — Code-numbers used for tensile modulus in data block 3

Code-number	Range of tensile modulus, E_t MPa
08	$E_t \leq 8\,000$
10	$8\,000 < E_t \leq 12\,000$
14	$12\,000 < E_t \leq 16\,000$
18	$16\,000 < E_t \leq 20\,000$
22	$20\,000 < E_t \leq 24\,000$
24	$E_t < 4\,000$

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 6. Subsequently (without a space), the mass content may be given by a two-figure number in position 3.

Mixtures of materials and/or forms may be indicated by combining the relevant codes using the sign “+” and placing the whole between parentheses.

EXAMPLE A mixture of 25 % glass fibre (GF) and 10 % mineral powder (MD) would be indicated by (GF25+MD10) or (GF+MD)35.

Table 6 — 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		
L	Cellulose	L	Layer
M	Mineral ^{a b} , metal ^a		
P	Mica ^a		
Q	Silicon		
R	Aramid	R	Rovings
S	Synthetic, organic ^a	S	Scales, flakes
T	Talc		
X	Not specified	X	Not specified
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 chemical symbol is available.

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.

4 Examples of designations

4.1 Designation only

A poly(phenylene sulfide) moulding and extrusion material (PPS), intended for injection moulding (M), having a melt mass-flow rate, measured under the conditions 315 °C/5,00 kg (A5), of 8 g/10 min (09), a density of 1 600 kg/m³ (16) and a tensile modulus of 14 000 MPa (14), and reinforced with 40 % of glass fibre (GF40), would be designated:

Description block (optional)	International Standard number block	Individual-item block			
		1	2	3	4
Thermoplastics	ISO 28078	PPS,	M,	(A5+09)-16-14,	G F 40
ISO Standard					
Data block 1: Symbol					
Data block 2: Position 1: injection moulding					
Data block 3: Position 1: melt mass-flow rate					
Position 2: density					
Position 3: tensile modulus					
Data block 4: Position 1: glass					
Position 2: fibre					
Position 3: content 40 %					

Designation: ISO 28078-PPS,M,(A5+09)-16-14,GF40
or
Thermoplastics ISO 28078-PPS,M,(A5+09)-16-14,GF40

4.2 Designation transformed into a specification

A poly(phenylene sulfide) moulding and extrusion material (PPS), intended for injection moulding (M), having a melt viscosity, measured under the conditions 316 °C/400 s⁻¹ (C5), of 200 Pa·s (09), a density of 1 980 kg/m³ (20) and a tensile modulus of 18 000 MPa (18), and reinforced with 60 % of glass fibre and mineral powder, would be designated:

Description block (optional)	International Standard number block	Individual-item block				
		1	2	3	4	5
Thermoplastics	ISO 28078	PPS,	M,	(C5+09)-20-18,	(G F+M D) 60,	ASTM D6358 PPS011R60A24146
ISO Standard						
Data block 1: Symbol						
Data block 2: Position 1: injection moulding						
Data block 3: Position 1: melt viscosity						
Position 2: density						
Position 3: tensile modulus						
Data block 4: Position 1: glass						
Position 2: fibre						
Position 3: mineral						
Position 4: powder						
Position 5: content 60 %						
Data block 5: Specification standard and specification						

Designation: ISO 28078-PPS,M,(C5+09)-20-18,(GF+MD)60,ASTM D6358 PPS011R60A24146
or
Thermoplastics ISO 28078-PPS,M,(C5+09)-20-18,(GF+MD)60,ASTM D6358 PPS011R60A24146

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