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Plastics — Polyoxymethylene (POM) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

Plastiques — Matériaux à base de polyoxyméthylène (POM) 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This second edition cancels and replaces the first edition (ISO 29988-1:2018), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— 4.5.2 and 5.3 have been revised.

A list of all parts in the ISO 29988 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Plastics — Polyoxymethylene (POM) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

1 Scope

This document establishes a system of designation for polyoxymethylene (POM) thermoplastic material, which can be used as the basis for specifications.

NOTE Polyoxymethylene materials are thermoplastic materials composed principally of long-chain synthetic homopolymers and copolymers of formaldehyde. The repeating unit in the molecular chain is $-CH_2O-$ as an integral part of the main polymer chain resulting from polymerization of formaldehyde.

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

a) melt mass-flow rate or melt volume-flow rate;

b) tensile modulus, and on information about basic polymer parameters, intended application, method of processing, important properties, additives, colorants, fillers and reinforcing materials.

This document is applicable to all polyoxymethylene homopolymers and to copolymers of polyoxymethylene and blends of polymers containing polyoxymethylene. It applies to materials ready for normal use in the form of powder, granules or pellets and to materials unmodified and modified by colorants, additives, fillers, etc. It is not intended to imply that materials having the same designation necessarily give the same performance.

This document does not provide engineering data, performance data or data on processing conditions which can be required to specify materials for particular end-use applications. If such additional properties are required, they are to be determined in accordance with the test methods specified by the relevant International Standard.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

ISO 29988-2, *Plastics — Polyoxymethylene (POM) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Designation and specification system

4.1 General

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

Designation						
Designation block	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 designation, the individual-item block is subdivided into five data blocks comprising the following information.

Data block 1: Identification of the plastic by its symbol POM in accordance with ISO 1043-1 and information about the polymerization process or composition of the polymer (see 4.2).

Data block 2: Fillers or reinforcing materials and their nominal content (see 4.3).

Data block 3: Position 1: Intended application or method of processing (see 4.4).

Positions 2 to 8: Important properties, additives, and supplementary information (see 4.4).

Data block 4: Designatory properties (see 4.5).

Data block 5: For the purpose of specifications, a fifth data block can be added containing additional information (see 4.6).

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 (,,).

NOTE Data blocks 1 and 2 together form the part marking symbol.

4.2 Data block 1

In this data block, after the hyphen, polyoxymethylene plastics are identified by the symbol "POM", in accordance with ISO 1043-1, followed by a hyphen and the code-letter H for homopolymers or K for copolymers.

Blends can be made from materials mentioned in both tables and/or other polymers (see ISO 1043-1). For polymer blends or alloys, use the abbreviated terms for the basic polymers, with the main component in first place followed by the other components in descending order according to their mass fractions, separated by a plus sign and no space before or after the plus sign.

EXAMPLE A blend of polyoxymethylene homopolymer and polyethylene is designated: POM-H+PE.

4.3 Data block 2

In this data block, the type of filler and/or reinforcing material is represented by a 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 1. Subsequently (without a space), the mass content can be given by a 2-figure number in positions 3 and 4.

Table 1 — Code letters for fillers and reinforcing materials in data block 2

Code-letter	Material[a]	Code-letter	Form
A	Aramid[c]		
B	Boron	**B**	Balls, beads, spheres
C	Carbon	**D**	Powder
		F	Fibre
G	Glass	**G**	Ground
		H	Whiskers
K	Calcium carbonate		
L	Cellulose[a]		
M	Mineral		
ME	Metal[b]		
R	Aramid[c]		
S	Synthetic organic[d]	**S**	Scales, flakes
T	Talc		
W	Wood		
X	Not specified	**X**	Not specified
Z	Others[a]	**Z**	Others[a]

[a] The materials may be further defined, for example by their chemical symbols or by additional symbols defined in the relevant International Standard.

[b] In the case of metals (ME), the type(s) of metal shall be indicated by means of the relevant chemical symbol(s).

[c] Aramid was previously defined by the symbol "R", but "A" is in common use.

[d] A specific material may be further defined.

Mixtures of materials 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 fibres (GF) and 8 % mineral powder (MD) would be indicated by (GF25+MD08).

4.4 Data block 3

In this data block, information about the 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 3

Code-letter	Position 1	Code-letter	Position 2 to 8
		A	Processing stabilized
B	Blow moulding		
		C	Coloured
		D	Powder
E	Extrusion		
F	Extrusion of films		
G	General use	**G**	Pellets, granules
H	Coating	**H**	Heat-ageing stabilized
L	Monofilament extrusion	**L**	Light or weather stabilized
M	Injection moulding		
		N	Natural (no colour added)
		P	Impact modified
R	Rotational moulding	**R**	Mould release agent
S	Sintering	**S2**[a]	Improved wear and/or frictional properties
X	No indication	**W**	Stabilized against hydrolysis
Y	Textile yarns, spinning	**Y**	Increased electrical conductivity
		Z	Antistatic

[a] In this document, Code-letter S2, "improved" wear and/or frictional properties, means reduced wear and lowered coefficient of friction in applications requiring the acetal plastic to slide against a similar or different material, such as a plastic bearing sliding against a rotating steel shaft.

4.5 Data block 4

4.5.1 General

In this data block, the melt mass-flow rate or melt volume-flow rate is represented by a one-figure code-number (see 4.5.2) and the tensile modulus by a one-figure code-number (see 4.5.3). The two code-numbers are separated from each other by hyphen.

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 either side of, the range limit because of manufacturing tolerances, the designation is not affected.

NOTE Not all combinations of the values of the designatory properties are provided by currently available materials.

4.5.2 Melt flow rate

The melt mass-flow rate (MFR) or melt volume-flow rate (MVR) shall be determined in accordance with ISO 1133-1 at a temperature of 190 °C with a load of 2,16 kg.

The possible values of melt mass-flow rate are divided into 7 ranges, each represented by a one-figure code number as specified in Table 3.

Table 3 — Code-numbers used for melt flow rate in data block 4

Code number	MFR range g/10 min	MVR range cm^3/10 min
1	≤4	≤3,4
2	>4 but ≤7	>3,4 but ≤6,0
3	>7 but ≤11	>6,0 but ≤9,4
4	>11 but ≤16	>9,4 but ≤13,7
5	>16 but ≤35	>13,7 but ≤30,0
6	>35 but ≤60	>30,0 but ≤51,5
7	>60	>51,5

4.5.3 Tensile modulus

The tensile modulus of elasticity shall be determined in accordance with ISO 29988-2.

The possible values of tensile modulus of elasticity are divided into three ranges, each represented by a one-figure code number as specified in Table 4.

Table 4 — Code-numbers used for tensile modulus in data block 4

Code number	Tensile modulus range MPa
1	≤2 250
2	>2 250 but ≤4 000
3	>4 000

4.6 Data block 5

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

5 Examples of designations

5.1 Designation only

a) An unfilled polyoxymethylene homopolymer (POM-H) with 30 % mass of POM recyclate intended for injection moulding (M), with a mould release agent (R), natural (not coloured) (N) and having a melt flow rate of 2,1 g/10 min (1) and a tensile modulus of2 010 MPa (1), would be designated:

DESIGNATION										
Description block (optional)	Identity block									
	ISO Standard	Individual-item block								
		Data block 1		Data block 2			Data block 3		Data block 4	Data block 5
		Polymer		Performance and origin related information			Application and processing		Properties	Additional information
		Type	Modification	Filler	Flame retardant	Recyclate	Processing	Characteristics		
Thermoplastics	29988	POM-H				(R30)	M	RN	1–1	
> Part marking <										
No	No	Yes		Yes			No		No	No

b) **Designation**: ISO 29988-POM-H,(R30),MRN,1-1

c) **Part marking:** > POM(R30) <

For symbol of recyclate, “REC” can be used if appropriate.

5.2 Designation transformed into a specification

a) A polyoxymethylene copolymer (POM-K) intended for extrusion (E), weather stabilized (L), natural (not coloured) (N), with a melt flow rate of 5 g/10 min (2) and a tensile modulus of 2 350 MPa (2), containing no fillers or reinforcing materials and meeting the requirements of specification ASTM D 6778 POM0222, would be designated:

DESIGNATION										
Description block	Identity block									
	ISO Standard	Individual-item block								
		Data block 1		Data block 2			Data block 3		Data block 4	Data block 5
		Polymer		Performance and origin related information			Application and processing		Properties	Additional information
		Type	Modification	Filler	Flame retardant	Recyclate	Processing	Characteristics		
Thermoplastics	29988	POM-K					E	LN	2–2	ASTM D6778 POM0222
> Part marking <										
No	No	Yes		Yes			No		No	No

b) **Designation:** ISO 29988-POM-K,,ELN,2-2,ASTM D 6778 POM0222

c) **Part marking:** > POM <

5.3 Designation transformed into a specification for polymer mixture case

a) Mixture of polyoxymethylene copolymer (POM-K) and polyethylene, containing 10 % mass of powder of calcium carbonate intended for injection (M), "improved" wear and/or frictional properties (S2) with a melt flow rate of 45 g/10 min (6) and a tensile modulus of 1 900 MPa (1).

DESIGNATION										
Description block (optional)	Identity block									
	ISO Standard	Individual-item block								
		Data block 1		Data block 2			Data block 3		Data block 4	Data block 5
		Polymer		Performance and origin related information			Application and processing		Properties	Additional information
		Type	Modification	Filler	Flame retardant	Recyclate	Processing	Characteristics		
Thermoplastics	29988	POM-K	PE	KD			M	S2	6–1	
> Part marking <										
No	No	Yes		Yes			Yes		No	No

b) **Designation:** ISO 29988-POM-K+PE,KD10,MS2,6-1

c) **Part marking:** > POM+PE-KD10 <