
**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



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.

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.

International Standard ISO 9988-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This second edition cancels and replaces the first edition (ISO 9988-1:1991) which has been revised to bring it into line with the standard SC 9 frame text and with ISO 1043-1.

ISO 9988 consists of the following parts under the general title *Plastics — Polyoxymethylene (POM) moulding and extrusion materials*:

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

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Plastics — Polyoxymethylene (POM) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

1 Scope

1.1 This part of ISO 9988 establishes a system of designation for polyoxymethylene (POM) thermoplastic materials, which may be used as the basis for specifications.

Polyoxymethylene materials are thermoplastic materials composed principally of long-chain synthetic homopolymers and copolymers of formaldehyde. The repeating unit in the molecular chain is $-\text{CH}_2\text{O}-$ as an integral part of the main polymer chain resulting from polymerization of formaldehyde.

1.2 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.

1.3 This part of ISO 9988 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.

1.4 It is not intended to imply that materials having the same designation necessarily give the same performance. This part of ISO 9988 does not provide engineering data, performance data or data on processing conditions which may be required to specify materials for particular end-use applications.

If such additional properties are required, they shall be determined in accordance with the test methods specified in part 2 of this International Standard.

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 clause 3).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9988. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9988 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1043-1:1997, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*.

ISO 1043-2:1988, *Plastics — Symbols — Part 2: Fillers and reinforcing materials*.

ISO 1133:1997, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*.

ISO 9988-2:—¹⁾, *Plastics — Polyoxymethylene (POM) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*.

3 Designation and specification system

The designation and specification 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

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 5 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 3.1).
- Data block 2: Position 1: Intended application or method of processing (see 3.2).
Positions 2 to 8: Important properties, additives and supplementary information (see 3.2).
- Data block 3: Designatory properties (see 3.3).
- Data block 4: Fillers or reinforcing materials and their nominal content (see 3.4).
- Data block 5: For the purpose of specifications, a fifth data block may be added containing additional information (see 3.5).

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 (,,).

1) To be published. (Revision of ISO 9988-2:1991)

3.1 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.

3.2 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	Processing stabilized
B	Blow moulding		
		C	Coloured
		D	Powder
E	Extrusion		
F	Extrusion of films		
G	General use	G	Granules
H	Coating	H	Heat-ageing stabilized
L	Monofilament extrusion	L	Light or weather stabilized
M	Moulding		
		N	Natural (no colour added)
		P	Impact modified
R	Rotational moulding	R	Mould release agent
S	Sintering	S2	Improved wear and/or frictional properties
X	No indication	W	Stabilized against hydrolysis
Y	Textile yarns, spinning	Y	Increased electrical conductivity
		Z	Antistatic

NOTE Code-letter S2, for this document "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.

3.3 Data block 3

In this data block, the melt mass-flow rate or melt volume-flow rate is represented by a one-figure code-number (see 3.3.1) and the tensile modulus by a one-figure code-number (see 3.3.2). The two code-numbers are separated from each other by a 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.

3.3.1 Melt flow rate

The melt mass-flow rate (MFR) or melt volume-flow rate (MVR) shall be determined in accordance with ISO 9988-2.

The possible values of the MFR or MVR are divided into seven ranges, each represented by a one-figure code-number, as specified in table 2.

Table 2 — Code-numbers used for melt flow rate in data block 3

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

NOTE Melt mass-flow rate (MFR) may be replaced by melt volume-flow rate (MVR) at the next 5-year review.

3.3.2 Tensile modulus

The tensile modulus shall be determined in accordance with ISO 9988-2.

The possible values of the tensile modulus are divided into three ranges, each represented by a one-figure code-number, as specified in table 3.

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

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

3.4 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 4. Subsequently (without a space), the mass content may be given by a two-figure number in positions 3 and 4. 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).

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

Code-letter	Material	Code-letter	Form
		B	Beads, spheres, balls
C	Carbon ¹⁾		
		D	Powder
		F	Fibre
G	Glass	G	Ground
		H	Whiskers
K	Calcium carbonate		
M	Mineral ¹⁾ , metal ^{1) 2)}		
R	Aramide		
S	Synthetic, organic ¹⁾		
X	Not specified	X	Not specified
Z	Others ¹⁾	Z	Others ¹⁾

1) These materials may be further defined by their chemical symbol, for example, or additional symbols defined in the relevant International Standard or by additional codes to be agreed upon.
 2) Metal fillers shall be identified by placing the chemical symbol for the metal after the mass content.

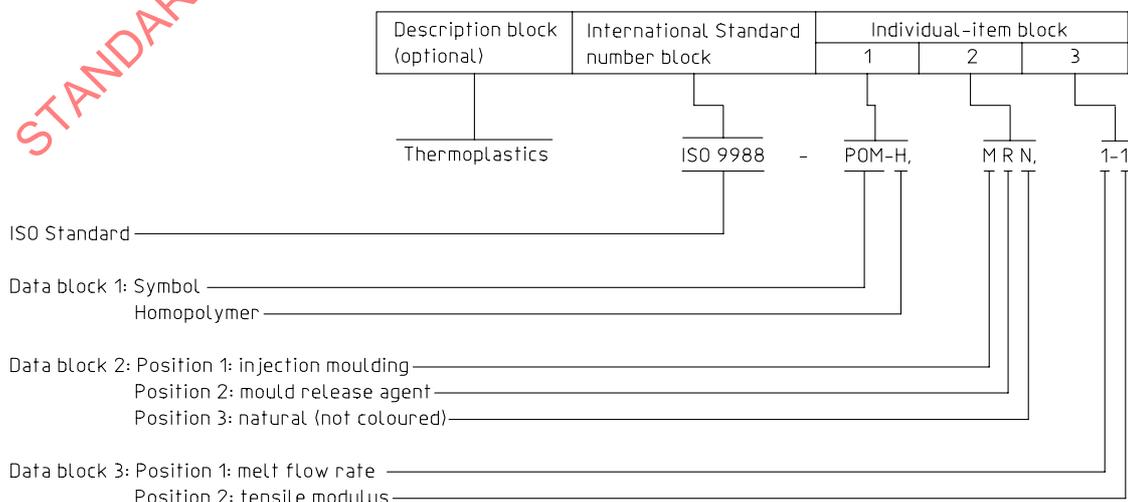
3.5 Data block 5

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 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

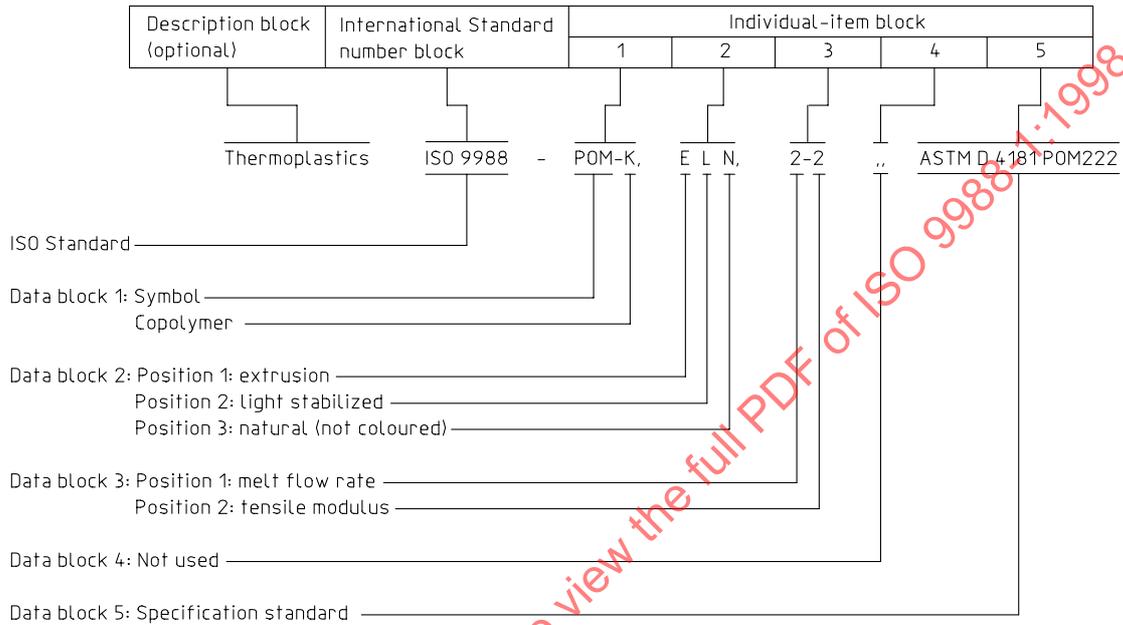
A polyoxymethylene homopolymer (POM-H) intended for injection moulding (M), with a mould release agent (R), natural (not coloured) (N) and having a melt flow rate of 2,1 g/10 min (1) and a tensile modulus of 2 010 MPa (1), would be designated:



Designation: ISO 9988-POM-H,MRN,1-1

4.2 Designation transformed into a specification

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 4181 POM222, would be specified:



Specification: ISO 9988-POM-K,ELN,2-2,,ASTM D 4181 POM222