
**Plastics — Polybutene-1 (PB-1) moulding
and extrusion materials —**

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

*Plastiques — Matériaux à base de polybutène-1 (PB-1) pour moulage
et extrusion —*

Partie 1: Système de désignation et base de spécification



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Published in Switzerland

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 8986-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This second edition cancels and replaces the first edition (ISO 8986-1:1993), which has been technically revised. The main changes are as follows:

- it has been made clear that the standard concerns polybutene-1 as opposed to its isomer polyisobutene;
- density has been deleted as a designatory property;
- the only other designatory property, melt mass-flow rate (MFR), has been replaced by melt volume-flow rate (MVR);
- 190 °C/5,0 kg has been added to the sets of conditions which can be used for the measurement of MVR.

ISO 8986 consists of the following parts, under the general title *Plastics — Polybutene-1 (PB-1) 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 — Polybutene-1 (PB-1) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

1 Scope

1.1 This part of ISO 8986 establishes a system of designation for polybutene-1 (PB-1) thermoplastic materials which may be used as the basis for specifications. For the sake of simplicity, the designation polybutene and the abbreviation PB are used in both parts of ISO 8986.

1.2 The types of polybutene plastics are differentiated from each other by a classification system based on appropriate levels of the designatory property melt volume-flow rate 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 8986 is applicable to all butene homopolymers and to copolymers of butene with a maximum content of other 1-olefinic monomers of less than 50 % by mass and with a content of non-olefinic monomers with functional groups up to a maximum of 1 % by mass.

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 give necessarily the same performance. This part of ISO 8986 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.

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 8986-2, *Plastics — Polybutene-1 (PB-1) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

3 Designation and specification system

3.1 General

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	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 PB in accordance with ISO 1043-1 and information about the polymerization process or 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 purpose 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, polybutene plastics are identified by the symbol PB, in accordance with ISO 1043-1, followed by a hyphen and a single code-letter giving additional information on the polymer as specified in Table 1.

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

Code-letter	Definition
H	Butene homopolymer.
B	Thermoplastic butene “block” copolymer having not more than 50 % by mass of another olefinic monomer (or monomers) having no functional group other than the olefinic group, copolymerized with butene.
R	Thermoplastic butene random copolymer having not more than 50 % by mass of another olefinic monomer (or monomers) having no functional group other than the olefinic group, copolymerized with butene.
Q	Blends of polymers with at least 50 % by mass of butene plastic H (homopolymer), B (“block” copolymer) and/or R (random copolymer).

3.3 Data block 2

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 2

Code-letter	Position 1	Code-letter	Positions 2 to 8
		A	Processing stabilized
B	Blow moulding	B	Antiblocking
C	Calendering	C	Coloured
		D	Powder
E	Extrusion	E	Expandable
F	Film extrusion	F	Special burning characteristics
G	General purpose	G	Granules
H	Coating	H	Heat ageing stabilized
K	Cable and wire coating	K	Metal deactivated
L	Monofilament extrusion	L	Light or weather stabilized
M	Moulding	M	Nucleated
		N	Natural (no colour added)
		P	Impact modified
Q	Compression moulding		
R	Rotational moulding	R	Mould release agent
S	Sintering	S	Lubricated
T	Tape manufacture	T	Transparent
X	No indication		
		Y	Increased electrical conductivity
		Z	Antistatic

3.4 Data block 3

3.4.1 General

In this data block, the range of the melt volume-flow rate (MVR) is represented by a three-figure code-number (see 3.4.2).

NOTE 1 In this edition of ISO 8986-1, melt mass-flow rate (MFR) has been replaced by melt volume-flow rate (MVR).

If the MVR 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 2 Not all values of MVR are necessarily provided by currently available polymers.

3.4.2 Melt volume-flow rate

The melt volume-flow rate shall be determined as specified in ISO 8986-2 under the test conditions specified in Table 3.

Table 3 — Test conditions used for the determination of melt volume-flow rate

Code-letter	Temperature °C	Nominal load kg
D	190	2,16
T	190	5,0
F	190	10,0

Set of conditions F shall be used only for materials having an MVR less than $0,1 \text{ cm}^3/10 \text{ min}$ when tested under set of conditions D.

The possible values of melt volume-flow rate are divided into 11 ranges, each represented by a three-figure code-number as specified in Table 4. The test conditions used shall be indicated by a single code-letter, selected from Table 3, immediately preceding the code-number.

Table 4 — Ranges of melt volume-flow rate in data block 3

Code-number	Range of melt volume-flow rate $\text{cm}^3/10 \text{ min}$
000	$\leq 0,10$
001	$> 0,10 \text{ but } \leq 0,20$
003	$> 0,20 \text{ but } \leq 0,40$
006	$> 0,40 \text{ but } \leq 0,80$
012	$> 0,80 \text{ but } \leq 1,5$
022	$> 1,5 \text{ but } \leq 3,0$
045	$> 3,0 \text{ but } \leq 6,0$
090	$> 6,0 \text{ but } \leq 12,0$
200	$> 12,0 \text{ but } \leq 25,0$
400	$> 25,0 \text{ but } \leq 50,0$
700	$> 50,0$

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

Table 5 — 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 ^a		
		D	powder
		F	fibre
G	glass	G	ground
		H	whiskers
I	(inorganic) mineral ^{a,b}		
K	calcium carbonate		
L	cellulose ^a		
M	metal ^a		
S	synthetic, organic ^a		
T	talc		
X	not specified	X	not specified
Z	others ^a	Z	others ^a
^a These materials may be further defined by their chemical symbol, for example, or additional symbols defined in the relevant International Standards. 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 fibres (GF) and 10 % mineral powder (ID) would be indicated by (GF25+ID10).			

3.6 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.