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INTERNATIONAL STANDARD

ISO 8986-1

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Plastics — Polybutene (PB) moulding and extrusion materials —

Part 1:
Designation system and basis for specifications

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

Partie 1: Système de désignation et base de spécification

Reference number
ISO 8986-1:1993(E)

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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.

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

ISO 8986 consists of the following parts, under the general title *Plastics — Polybutene (PB) 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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INTERNATIONAL STANDARD ISO 8986-1:1993(E)

Plastics — Polybutene (PB) 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 thermoplastic material which may be used as the basis for specifications.

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

a) density

b) melt 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 butylene homopolymers and to copolymers of butylene with a maximum content of other 1-olefinic monomers of less than 50 % (*m/m*) and with a content of non-olefinic monomers with functional groups up to a maximum of 1 % (*m/m*).

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.

A part 2 to this International Standard covering the preparation of test specimens and determination of properties is being prepared for use if such data are required.

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, introductory paragraph).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8986. 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 8986 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.

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ISO 1043-1:1987, *Plastics — Symbols — Part 1: Basic polymers and their special characteristics.*

ISO 1133:1991, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics.*

ISO 1183:1987, *Plastics — Methods for determining the density and relative density of non-cellular plastics.*

3 Designation and specification system

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

<table>
<tr><td colspan="7">Designation</td></tr>
<tr><td rowspan="3">Description block (optional)</td><td colspan="6">Identity block</td></tr>
<tr><td rowspan="2">International Standard Number block</td><td colspan="5">Individual-item block</td></tr>
<tr><td>Data block 1</td><td>Data block 2</td><td>Data block 3</td><td>Data block 4</td><td>Data block 5</td></tr>
</table>

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 5 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 3.1).

— 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.

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 (,,).

3.1 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.

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 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.

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3.3 Data block 3

In this data block, the range of the density is represented by a 2-figure code-number (see 3.3.1) and the melt flow rate by a 3-figure code-number (see 3.3.2). 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 1 Not all the combinations of the values of the designatory properties have to be provided for currently available polymers.

3.3.1 Density

The density shall be determined in accordance with ISO 1183, method D, on a piece of melt-indexer extrudate.

The sample, uncoloured and unfilled, is extruded from a standard melt indexer at 190 °C in accordance with the method described in ISO 1133, under suitable conditions in order to obtain a strand of suitable length free of voids with a smooth surface. After being cut off, the strand is allowed to fall on a cool metal plate. It is then kept at a temperature of 23 °C ± 2 °C and (50 ± 5) % relative humidity for 10 days prior to performance of the test.

The possible values of density are divided into 7 ranges, each represented by a 2-figure code-number as specified in table 3.

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

Code-letter	Definition
H	Butylene homopolymer
B	Thermoplastic butylene "block" copolymer having not more than 50 % (*m/m*) of another olefinic monomer (or monomers) having no functional group other than the olefinic group, copolymerized with butylene.
R	Thermoplastic butylene random copolymer having not more than 50 % (*m/m*) of another olefinic monomer (or monomers) having no functional group other than the olefinic group, copolymerized with butylene.
Q	Blends of polymers with at least 50 % (*m/m*) of butylene plastic H (homopolymer), B ("block" copolymer) and/or R (random copolymer).

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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	Extrusion of films	**F**	Special burning characteristics
G	General use	**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

Table 3 — Ranges of density in data block 3

Code-number	Range of density kg/ m^3
00	$\leqslant$ 900
03	> 900 but $\leqslant$ 905
08	> 905 but $\leqslant$ 910
13	> 910 but $\leqslant$ 915
18	> 915 but $\leqslant$ 920
23	> 920 but $\leqslant$ 925
28	> 925

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3.3.2 Melt flow rate

The melt mass-flow rate shall be determined in accordance with ISO 1133 under the test conditions specified in table 4.

Table 4 — Test conditions used for the determination of melt flow rate

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

Set of conditions F is used only for materials having an MFR less than 0,1 g/10 min when tested under set of conditions D.

The possible values of melt mass-flow rate are divided into 11 ranges, each represented by a 3-figure code-number as specified in table 5. The test conditions used shall be indicated by a single letter, selected from table 4, immediately preceding the code-number.

Table 5 — Ranges of melt flow rate in data block 3

Code-number	Range of melt flow rate (MFR) g/10 min
000	$\leqslant$ 0,10
001	> 0,10 but $\leqslant$ 0,20
003	> 0,20 but $\leqslant$ 0,40
006	> 0,40 but $\leqslant$ 0,80
012	> 0,80 but $\leqslant$ 1,5
022	> 1,5 but $\leqslant$ 3,0
045	> 3,0 but $\leqslant$ 6,0
090	> 6,0 but $\leqslant$ 12,0
200	> 12,0 but $\leqslant$ 25,0
400	> 25,0 but $\leqslant$ 50,0
700	> 50,0

NOTE 2 Melt mass-flow rate (MFR) will be replaced by melt volume-flow rate (MVR) at the next five-year revision of this standard.

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 6. Subsequently (without a space), the mass content may be given by a 2-figure number in positions 3 and 4.

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 shall be done for example by reference to a suitable national standard or to a standard-like, generally established specification.

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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[1)]		
		D	powder
		F	fibre
G	glass	**G**	ground
		H	whiskers
K	calcium carbonate		
L	cellulose[1)]		
M	mineral[1)2)], metal[1)]		
S	synthetic, organic[1)]		
T	talc		
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. In the case of metals (M), it is essential to indicate the type of metal by means of its chemical symbol.

2) 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 (MD) would be indicated by (GF25+MD10).

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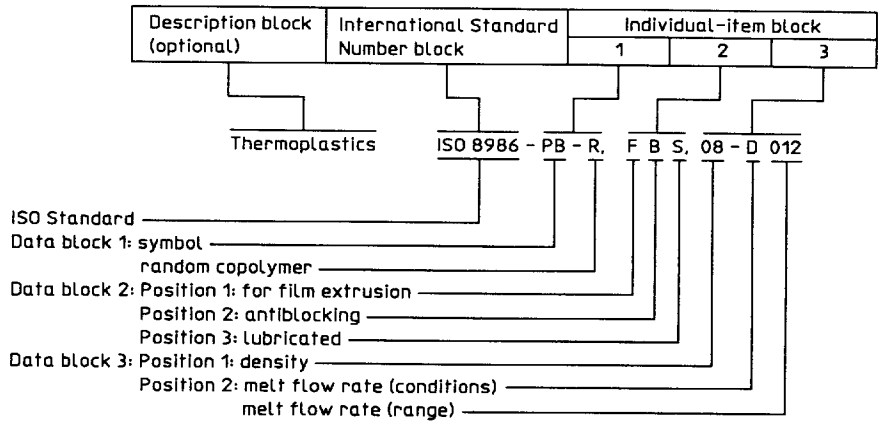
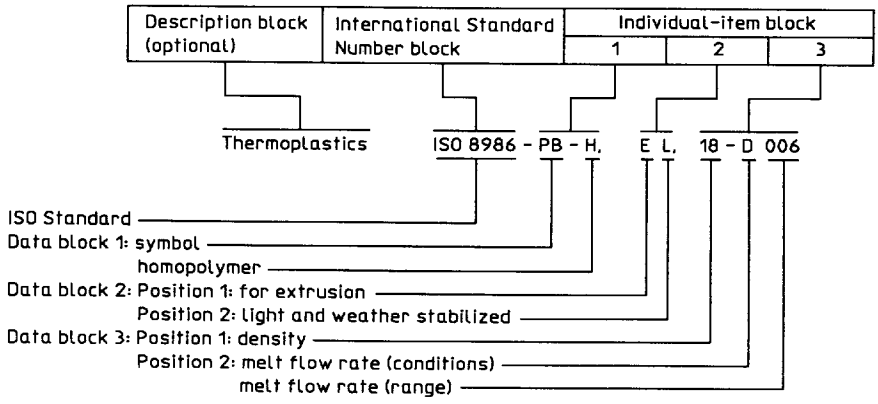
4 Examples of designations

4.1 A polybutene random-copolymer thermoplastic material (PB-R), intended for extrusion of film (F) with anti-blocking (B) and lubricant (S), having a density of 907 kg/m^3 (08) and a melt flow rate (MFR 190/2,16) (D) of 1,0 g/10 min (012), would be designated:



Designation: ISO 8986-PB-R,FBS,08-D012

4.2 A polybutene-homopolymer thermoplastic material (PB-H) for extrusion of pipes (E) with light stabilizer (L), a density of 919 kg/m^3 (18) and a melt flow rate (MFR 190/2,16) (D) of 0,5 g/10 min (006) would be designated:



Designation: ISO 8986-PB-H,EL,18-D006

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