INTERNATIONAL STANDARD

ISO 1873-1

Fourth edition
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Plastics — Polypropylene (PP) moulding and extrusion materials —

Part 1:
Designation system and basis for specifications

Plastiques — Polypropylène (PP) pour moulage et extrusion —
Partie 1: Système de désignation et base de spécification

Reference number
ISO 1873-1:1995(E)

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 1873-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This fourth edition cancels and replaces the third edition (ISO 1873-1:1991) and includes the following changes:

The designatory property "isotactic index" has been replaced by the designatory properties "tensile modulus of elasticity" and "impact strength".

ISO 1873 consists of the following parts, under the general title *Plastics — Polypropylene (PP) 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 — Polypropylene (PP) moulding and extrusion materials —

Part 1:
Designation system and basis for specifications

1 Scope

1.1 This part of ISO 1873 establishes a system of designation for polypropylene (PP) thermoplastic material, which may be used as the basis for specifications.

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

a) tensile modulus of elasticity

b) impact strength

c) melt mass-flow rate (MFR)

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 1873 is applicable to all propylene homopolymers and to copolymers of propylene with a content of other 1-olefins of less than 50 % (*m/m*), as well as blends of polymers containing at least 50 % (*m/m*) of aforementioned polymers.

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.

This part of ISO 1873 does not apply to propylene-based rubber.

1.4 It is not intended to imply that materials having the same designation give necessarily the same performance. This part of ISO 1873 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 part 2 of this International Standard, 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 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 1873. 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 1873 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 1043-1:1987, *Plastics — Symbols — Part 1: Basic polymers and their special characteristics.*

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

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

ISO 1873-2:—[1], *Plastics — Polypropylene (PP) 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:

<table>
<tr><th colspan="6">Designation</th></tr>
<tr><td rowspan="3">Description block
(optional)</td><td colspan="5">Identity block</td></tr>
<tr><td rowspan="2">International Standard Number block</td><td colspan="4">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>

1) To be published. (Revision of ISO 1873-2:1989)

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 PP 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, polypropylene plastics are identified by the symbol "PP", 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	Propylene homopolymer
B [1]	Thermoplastic propylene impact polymer consisting of two or more phases of either a propylene plastic H or a propylene plastic R and rubber phases composed of propylene and another olefinic monomer (or monomers) having no functional group other than the olefinic group, added *in situ* or physically blended with the propylene plastic matrix
R	Thermoplastic propylene random copolymer containing another olefinic monomer (or monomers) having no functional group other than the olefinic group, copolymerized with propylene
1) This group of polymers were termed "block" copolymers in the past.	

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.

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	Textile yarns, spinning	**Y**	Increase electrical conductivity
		Z	Antistatic

3.3 Data block 3

In this data block, the range of the tensile modulus of elasticity is represented by a 2-figure code-number (see 3.3.1), the range of impact strength by a 2-figure code-number (see 3.3.2) and the range of melt flow rate by a 3-figure code-number (see 3.3.3). The code-numbers are separated from each other by hyphens.

If a property values 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 cell 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 Tensile modulus of elasticity

The tensile modulus of elasticity shall be determined in accordance with ISO 1873-2.

The possible values of tensile modulus of elasticity are divided into 6 ranges, each represented by a 2-figure code-number as specified in table 3.

Table 3 — Ranges of tensile modulus of elasticity in data block 3

Code-number	Range of tensile modulus (MPa)
02	⩽ 400
06	> 400 but ⩽ 800
10	> 800 but ⩽ 1 200
16	> 1 200 but ⩽ 2 000
28	> 2 000 but ⩽ 3 500
40	> 3 500

3.3.2 Charpy impact strength

The notched Charpy impact strength shall be determined in accordance with ISO 1873-2.

The possible values of notched Charpy impact strength are divided into 6 ranges, each represented by a 2-figure code-number as specified in table 4.

Table 4 — Ranges of notched Charpy impact strength in data block 3

Code-number	Range of notched Charpy impact strength (kJ/m^2)
02	⩽ 3
05	> 3 but ⩽ 6
09	> 6 but ⩽ 12
16	> 12 but ⩽ 20
25	> 20 but ⩽ 30
35	> 30

3.3.3 Melt mass-flow rate

The melt mass-flow rate shall be determined in accordance with ISO 1133 at a temperature of 230 °C with a load of 2,16 kg.

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.

Table 5 — Range of melt mass-flow rate in data block 3

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

NOTE 2 Melt mass-flow rate (MFR) may be replaced by melt volume-flow rate (MVR) after 1998.

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.

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		
W	Wood		
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 fibre (GF) and 10 % mineral powder (MD) would be indicated by (GF25+MD10).

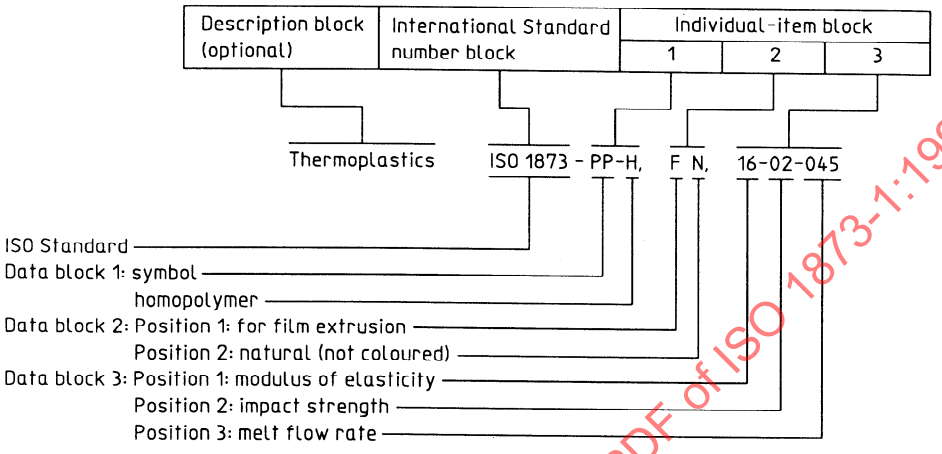
3.5 Data block 5

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

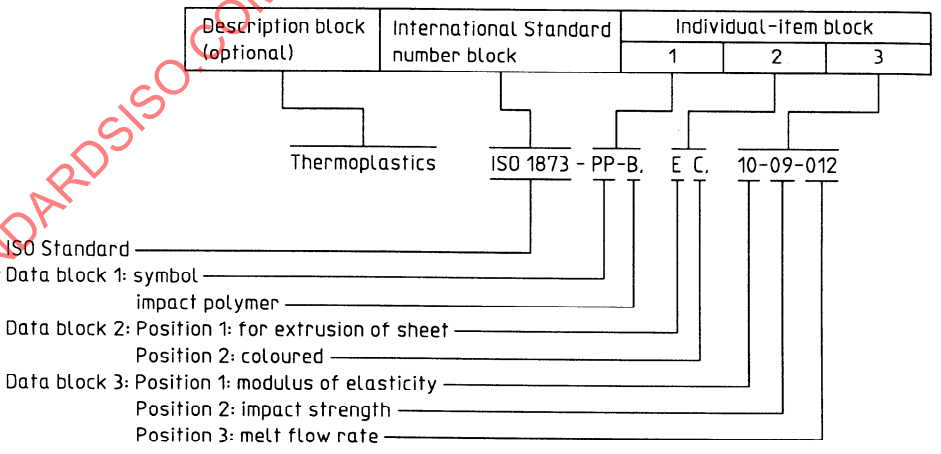
4.1 Designation only

4.1.1 A polypropylene homopolymer (PP-H) intended for film extrusion (F), natural (not coloured) (N), having a modulus of elasticity of 1 400 MPa (16), an impact strength of 3 kJ/m^2 (02) and a melt flow rate of 3,4 g/10 min (045), would be designated:



Designation: ISO 1873-PP-H,FN,16-02-045

4.1.2 A thermoplastic propylene impact polymer (PP-B) for extrusion of sheets (E), having a modulus of elasticity of 1 100 MPa (10), an impact strength of 7 kJ/m^2 (09) and a melt flow rate of 0,9 g/10 min (012), without special modification but coloured (C), would be designated:



Designation: ISO 1873-PP-B,EC,10-09-012