
International Standard



1873/1

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**Plastics — Polypropylene (PP) and propylene copolymer
thermoplastics —
Part 1: Designation**

Plastiques — Thermoplastiques à base de polypropylène (PP) et de copolymères de propylène — Partie 1: Désignation

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1873/1 was prepared by Technical Committee ISO/TC 61, *Plastics*.

This second edition cancels and replaces the first edition (ISO 1873/1-1980), of which it constitutes a minor revision. The annex to the first edition, concerning the determination of the isotactic index, is now published separately as ISO 9113.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Plastics — Polypropylene and propylene-copolymer thermoplastics — Part 1: Designation

1 Scope and field of application

1.1 This part of ISO 1873 establishes a system of designation for propylene (PP) thermoplastic materials 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) isotactic index,
- b) melt flow rate,

and information about basic polymer parameters, intended application, method of processing, important properties, additives, colour and fillers.

1.3 This designation system is applicable to all propylene homopolymers and to copolymers of propylene and blends containing at least 50 % (*m/m*) of the aforementioned polymers.

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.

This International Standard does not apply to propylene-based rubber or to mixtures of polypropylene with EPDM; for the designation of such mixtures, see ISO 1043/1, clause A.5

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 processing conditions which may be required to specify a material for particular application or method of processing.

If such additional properties are required, they shall be determined in accordance with the test methods specified in ISO 1873/2, if suitable.

1.5 In order to specify a thermoplastic material for a particular application or reproducible processing, additional requirements may be coded in Data Block 5 (see clause 3).

2 References

ISO 1043, *Plastics — Symbols and codes*

- *Part 1: Symbols for basic polymers and their special characteristics.*¹⁾
- *Part 2: Codes for designations of polymers by a data-block system.*¹⁾

ISO 1133, *Plastics — Determination of the melt flow rate of thermoplastics.*

ISO 1873/2, *Plastics — Polypropylene (PP) and propylene-copolymer thermoplastics — Part 2: Preparation of test specimens and determination of properties.*²⁾

ISO 9113, *Plastics — Polypropylene (PP) and propylene-copolymer thermoplastics — Determination of isotactic index.*²⁾

1) At present at the stage of draft. (Revision, in part, of ISO 1043-1978.)

2) At present at the stage of draft. (Revision, in part, of ISO 1873/1-1980.)

3 Designation system

The designation system of thermoplastics is based on the following standardized pattern¹⁾:

Designation						
Description Block (optional)	Identity Block					
	International Standard Number Block	Individual Item Block				Data Block 5
		Data Block 1	Data Block 2	Data Block 3	Data Block 4	

It 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 in 4 data blocks comprising the following information:

- No. 1: Identification of the plastic by its symbol PP, according to ISO 1043/1, and coded information about the polymerization process and composition of the polymer (see 3.1).
- No. 2: Position 1: Intended application or method of processing (see 3.2).
Positions 2 to 4: Important properties, additives and supplementary information (see 3.2).
- No. 3: Designatory properties (see 3.3).
- No. 4: Fillers or reinforcing materials and their nominal content (see 3.4).

For the purpose of specifications, a fifth data block may be added containing additional information. The kind of information and its codes are not subject of this part of ISO 1873.

The first character of the Individual Item Block shall be a hyphen. The four data blocks shall be separated from each other by a comma.

NOTE - 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, polypropylene plastics are identified by the symbol (PP), according to ISO 1043/1, followed by a hyphen and one letter, coding additional information about the polymer as specified in table 1.

Table 1 - Codes for the information on polymer composition in Data Block 1

Code	Definition
H	Propylene homopolymer
B	Thermoplastic propylene "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 propylene
R	Thermoplastic propylene 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 propylene
Q	Blends of polymers with at least 50 % (m/m) of propylene plastic H (homopolymer), B ("block" copolymer) and/or R (random copolymer)

1) See ISO 1043/2.

3.2 Data Block 2

In this data block, information about intended application or method of processing is given in Position 1 and information about important properties, additives and colour in Positions 2 to 4. The codes are specified in table 2.

Table 2 – Codes used in Data Block 2

Code	Position 1	Code	Positions 2 to 4
B	Blow moulding	A	Processing stabilized
C	Calendering	B	Antiblocking
E	Extrusion of pipes, profiles and sheet	C	Coloured
F	Extrusion of film and thin sheeting	D	Powder; dry blend
G	General use	E	Expandable
H	Coating	F	Special burning characteristics
K	Cable and wire coating	G	Pellets; granules
L	Monofilament extrusion	H	Heat-ageing stabilized
M	Injection moulding	K	Metal deactivated
		L	Light and/or weather stabilized
		N	Natural (not coloured)
Q	Compression moulding	O	No indication
R	Rotational moulding	P	Impact modified
S	Powder coating or sintering	R	Moulding release agent
T	Tape manufacture	S	Lubricated
X	No indication	T	Improved transparency
Y	Textile yarns	Y	Increased electrical conductivity
		Z	Antistatic

If information is presented in Positions 2 to 4 and no specific information is given in Position 1, the letter X shall be inserted in Position 1.

3.3 Data Block 3

For the purpose of this designation, in Data Block 3 the range of the isotactic index is indicated by two figures (see 3.3.1) and the range of the melt flow rate by one letter and three figures (see 3.3.2). The two codes are differentiated from each other by a hyphen.

If a property value falls on or near a cell limit, the manufacturer shall state which cell will designate the material. If subsequent individual test values lie on, or either side of, the cell limit, because of manufacturing tolerances, the designation is not affected.

NOTE – Not all the combinations of the values of the designatory properties may be provided by currently available polymers.

3.3.1 Isotactic index

Isotactic index is defined as the percentage by mass of H, B or R propylene plastics that is not soluble in boiling *n*-heptane, as determined under the conditions specified in ISO 9113.

The isotactic index is classified by six cells and indicated by two figures, as specified in table 3. It shall always refer to the base polymer.

For type Q propylene plastics (see 3.1), the code 00 shall be used.

Table 3 – Isotactic index cell codes and cell ranges

Code	Range
95	> 90
85	> 80 to 90
75	> 70 to 80
65	> 60 to 70
55	> 50 to 60
45	< 50

3.3.2 Melt flow rate

The melt flow rate (MFR) shall be determined according to ISO 1133 under the test conditions specified in table 4.

Table 4 – Test conditions for determination of melt flow rate

Code	Temperature °C	Nominal "load" kg
M	230	2,16
T	190	5,00

The resulting MFR is classified by 11 cells, and designated by three figures as specified in table 5. The test condition used shall be coded by one letter according to table 4 in front of the cell designation.

Table 5 – Cell codes and cell ranges for melt flow rate in Data Block 3

Code	Range of melt flow rate g/10 min
000	< 0,10
001	> 0,10 to 0,20
003	> 0,20 to 0,40
006	> 0,40 to 0,80
012	> 0,80 to 1,5
022	> 1,5 to 3,0
045	> 3,0 to 6,0
090	> 6,0 to 12
200	> 12 to 25
400	> 25 to 50
700	> 50

3.4 Data Block 4

In this data block, the type of filler or reinforcing material is coded by one letter in Position 1 and its physical form by a second letter in Position 2 (see table 6), if requested. Subsequently (without space), the mass content may be given by two figures in Positions 3 and 4, as specified in table 7.

Mixtures of materials or forms may be indicated in parentheses by combining the relevant codes by the sign "+"; for example a mixture of 25 % (m/m) glass fibre (GF) and 10 % (m/m) mineral powder (MD) can be indicated by (G + M) in Position 1, (F + D) in Position 2 and (25 + 10) in Positions 3 and 4.