
**Plastics — Polypropylene (PP)
moulding and extrusion materials —**

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

*Plastiques — Matériaux polypropylène (PP) pour moulage et
extrusion —*

Partie 1: Système de désignation et base de spécification



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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This first edition of ISO 19069-1 cancels and replaces ISO 1873-1:1995, which has been technically revised to introduce a new designation system.

ISO 19069 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*

Plastics — Polypropylene (PP) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

1 Scope

This part of ISO 19069 establishes a system of designation for polypropylene (PP) thermoplastic material, which can be used as the basis for specifications.

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, and
- 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.

This part of ISO 19069 is applicable to all polypropylene homopolymers and to copolymers of propylene with a content of other 1-olefinic 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 19069 does not apply to propylene-based rubber.

It is not intended to imply that materials having the same designation give necessarily the same performance. This part of ISO 19069 does not provide engineering data, performance data, or data on processing conditions which can 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 ISO 19069-2¹⁾, if suitable.

In order to specify a thermoplastic material for a particular application or to ensure reproducible processing, additional requirements can be given in data block 5 (see [3.1](#)).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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*

1) To be published.

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

ISO 1873-2²⁾, *Plastics — Polypropylene (PP) 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 | | | | | | |
|---------------------------------|-------------------------------------|-----------------------|--------------|--------------|--------------|--------------|
| Designation 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 designation, the individual-item block is subdivided into five 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 3.2).
- Data block 2: Fillers or reinforcing materials and their nominal content (see 3.3).
- Data block 3: Position 1: Intended application or method of processing (see 3.4).
Positions 2 to 8: Important properties, additives, and supplementary information (see 3.4).
- Data block 4: Designatory properties (see 3.5).
- Data block 5: For the purpose of specifications, a fifth data block can be added containing additional information (see 3.6).

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, 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.

2) Will be revised with a new number ISO 19069-2.

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

| Code letter | Definition |
|---|--|
| H | Propylene homopolymer |
| Ba | 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 <i>in situ</i> 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 |
| ^a This group of polymers were termed “block” copolymers in the past. | |

3.3 Data block 2

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

Table 2 — Code letters for fillers and reinforcing materials in data block 2

| Code letter | Material | Code letter | Form |
|-------------|---|-------------|-----------------------|
| B | Boron | B | Balls, beads, spheres |
| C | Carbon ^a | D | Powder |
| G | Glass | F | Fibre |
| K | Calcium carbonate | G | Ground |
| L | Cellulose ^a | H | Whiskers |
| M | Mineral ^{a,b} , metal ^a | S | Scales, flakes |
| S | Synthetic organic ^a | X | Not specified |
| T | Talc | Z | Others ^a |
| W | Wood | | |
| X | Not specified | | |
| Z | Others ^a | | |

NOTE Mixtures of materials and/or forms can 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).

^a These materials can 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.

^b Mineral fillers should be designated more precisely if a symbol is available.

3.4 Data block 3

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 3](#).

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 3 — Code letters used in data block 3

| Code letter | Position 1 | Code letter | Position 2 to 8 |
|-------------|---|-------------|-----------------------------------|
| B | Blow moulding | A | Processing stabilized |
| C | Calendering | B | Antiblocking |
| E | Extrusion of pipes, profiles and sheets | C | Coloured |
| F | Extrusion of films | D | Powder |
| G | General use | E | Expandable |
| H | Coating | F | Special burning characteristics |
| J | Cable and wire insulating | G | Pellets, granules |
| K | Cable and wire sheathing | H | Heat-ageing stabilized |
| L | Monofilament extrusion | K | Metal deactivated |
| M | Injection moulding | L | Light or weather stabilized |
| Q | Compression moulding | M | Nucleated |
| R | Rotational moulding | N | Natural (no colour added) |
| S | Sintering | P | Impact modified |
| T | Tape manufacture | R | Mould release agent |
| X | No indication | S | Lubricated |
| Y | Textile yarns, spinning | T | Improved transparency |
| | | Y | Increased electrical conductivity |
| | | Z | Antistatic |

3.5 Data block 4

3.5.1 General

In this data block, the range of the tensile modulus of elasticity is represented by a 2-figure code number (see [3.5.2](#)), the range of impact strength by a 2-figure code number (see [3.5.3](#)) and the range of melt flow rate by a 3-figure code number (see [3.5.4](#)). 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 cell limit because of manufacturing tolerances, the designation is not affected.

NOTE Not all the combinations of the values of designatory properties have to be provided for currently available polymers.

If the type of polypropylene is used for spinning by the melt blown process in which the melt mass-flow rate is greater than 200 g/10 min, the designatory properties should only be melt mass-flow rate, and the double X shall be inserted in the 2-figure code number position of tensile modulus of elasticity and impact strength separately.

3.5.2 Tensile modulus of elasticity

The tensile modulus of elasticity shall be determined in accordance with ISO 1873-2³⁾.

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 4.

Table 4 — Ranges of tensile modulus of elasticity in data block 4

| 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 |
| XX | Not specified |

3.5.3 Charpy impact strength

The notched Charpy impact strength shall be determined in accordance with ISO 1873-2³⁾.

The possible values of notched Charpy impact strength are divided into 12 ranges, each represented by a 2-figure code number as specified in Table 5.

Table 5 — Ranges of notched Charpy impact strength in data block 4

| 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 but ≤40 |
| 45 | >40 but ≤50 |
| 55 | >50 but ≤60 |
| 65 | >60 but ≤70 |
| 75 | >70 but ≤80 |
| 85 | >80 but ≤90 |
| 90 | >90 |
| XX | Not specified |

3) Will be revised with a new number ISO 19069-2.

3.5.4 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 20 ranges, each represented by a 3-figure code number as specified in [Table 6](#).

Table 6 — Ranges of melt mass-flow rate in data block 4

| Code number | Range of melt mass-flow rate(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 |
| 200 | >12 but ≤25 |
| 400 | >25 but ≤50 |
| 600 | >50 but ≤75 |
| 800 | >75 but ≤100 |
| 900 | >100 but ≤130 |
| 910 | >130 but ≤160 |
| 920 | >160 but ≤200 |
| 930 | >200 but ≤400 |
| 940 | >400 but ≤800 |
| 950 | >800 but ≤1 200 |
| 960 | >1 200 but ≤1 600 |
| 970 | >1 600 but ≤2 000 |

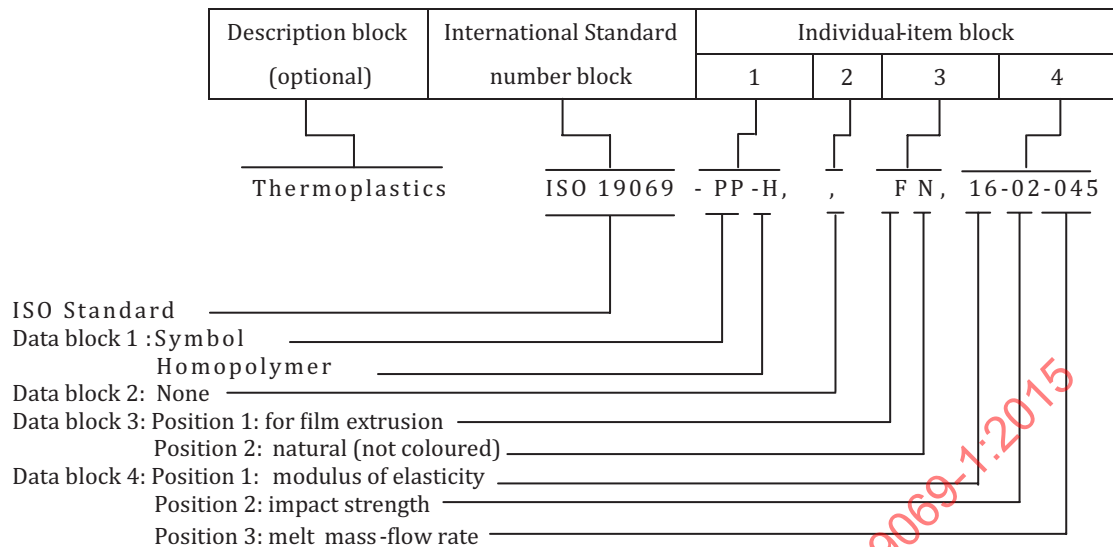
3.6 Data block 5

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.

4 Examples of designations

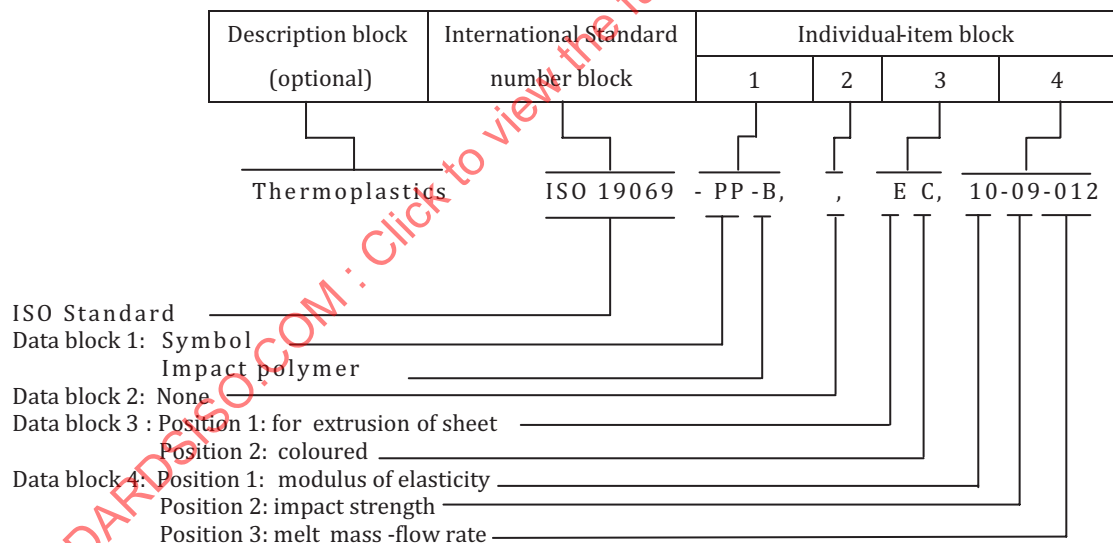
4.1 Designation only

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/m² (02) and a melt mass-flow rate of 3,4 g/10 min (045), would be designated:



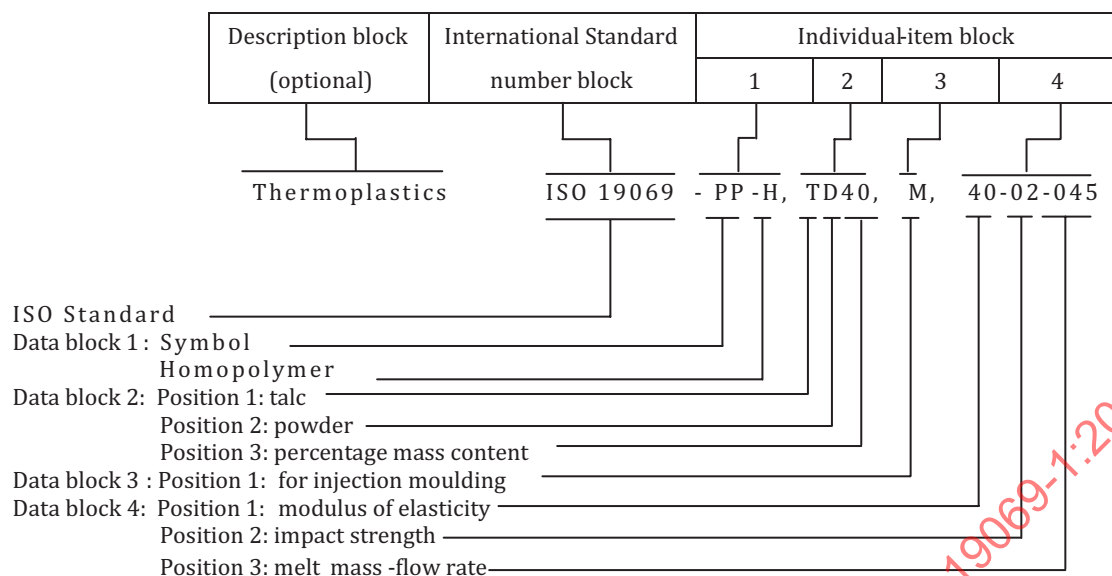
Designation: (Thermoplastics) ISO 19069 - PP-H,,FN, 16-02-045

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/m² (09) and a melt mass-flow rate of 0,9 g/10 min (012), without special modification but coloured (C), would be designated:



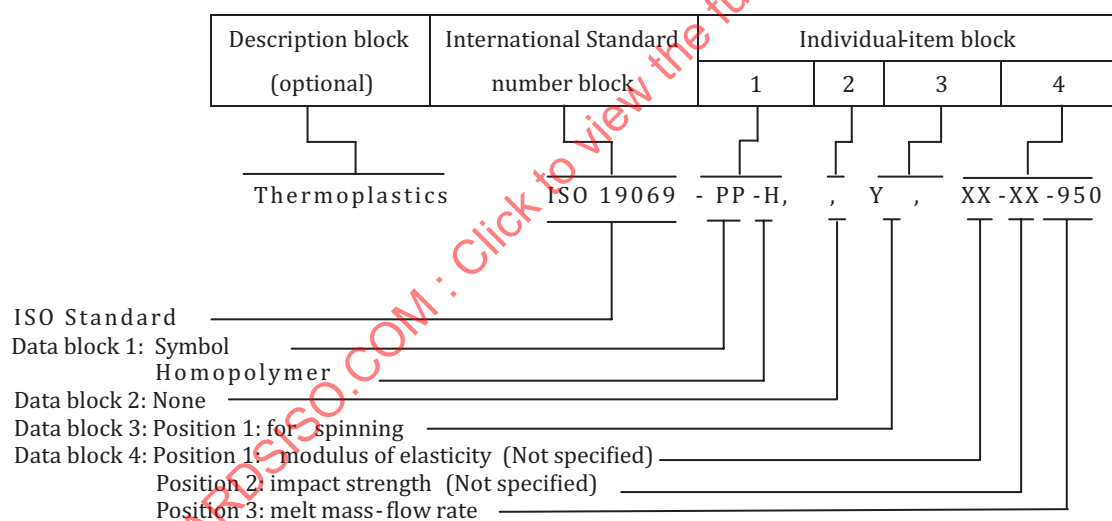
Designation: (Thermoplastics) ISO 19069 - PP-B,, EC, 10-09-012

4.1.3 A polypropylene homopolymer (PP-H) intended for injection moulding (M), having a modulus of elasticity of 4 500 MPa (40), an impact strength of 2 KJ/m² (02) and a melt mass-flow rate of 3,5 g/10 min (045), reinforced with 40% talc powder (TD40), would be designated:



Designation: (Thermoplastics) ISO 19069 - PP-H, TD40, M, 40-02-045

4.1.4 A polypropylene homopolymer (PP-H) intended for spinning (Y), having a melt mass-flow rate of 1 000 g/10 min (950), would be designated:



Designation: (Thermoplastics) ISO 19069 - PP-H,,Y, XX-XX-950

4.2 Designation transformed into a specification

A thermoplastic propylene random copolymer (PP-R) for extrusion of pipes for hot and cold water installations (E), light stabilized (L), having a modulus of elasticity of 900 MPa (10), an impact strength of 42 KJ/m² (45) and a melt mass-flow rate of 0,22 g/10 min (003), would be specified: