
**Plastics — Polyketone (PK) moulding
and extrusion materials —**

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

*Plastiques — Polycétone (PK) 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).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This second edition cancels and replaces the first edition (ISO 21970-1:2018), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— the description of Data block 1 has been corrected.

A list of all parts in the ISO 21970 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Plastics — Polyketone (PK) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

1 Scope

This document establishes a system of designation for polyketone (PK) moulding and extrusion materials which may be used as the basis for specifications. Polyketone polymer chains are built up from regularly alternating olefinic units and keto groups. The olefinic units shall be randomly distributed ethylene and propylene.

The types of polyketone plastics are differentiated from each other by a classification system based on appropriate levels of the designatory properties, melting temperature, melt mass-flow rate, temperature of deflection under load and on information about the intended application and/or method of processing, important properties, additives, colour, fillers and reinforcing materials.

The designation system is applicable to all polyketone terpolymers and blends. It applies to materials ready for normal use in the form of powder, granules or pellets, unmodified or modified by colourants, fillers or other additives.

It is not intended to imply that materials having the same designation give necessarily the same performance. This document does not provide engineering data, performance data or data on processing conditions which may be required to specify a material. If such additional properties are required, they are intended to be determined in accordance with the test methods specified in ISO 21970-2, if suitable.

In order to designate a polyketone to meet particular specifications, the requirements are to be given in data block 5 (see [4.1](#)).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 75-1, *Plastics — Determination of temperature of deflection under load — Part 1: General test method*

ISO 75-2, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

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

ISO 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

ISO 11357-3, *Plastics — Differential scanning calorimetry (DSC) — Part 3: Determination of temperature and enthalpy of melting and crystallization*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Designation system

4.1 General

The designation 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 designation, the individual-item block is subdivided into five data blocks comprising the following information:

- Data block 1: Identification of the plastic by its abbreviated term PK in accordance with ISO 1043-1 and information about the composition of the polymer (see 4.2).
- Data block 2: Position 1: Intended application and/or method of processing (see 4.3).

Positions 2 to 8: Important properties, additives and supplementary information (see 4.3).

- Data block 3: Designatory properties (see 4.4).
- Data block 4: Fillers or reinforcing materials and their nominal content (see 4.5).
- Data block 5: For the purpose of specifications, a fifth data block contains appropriate information (see 4.6).

The first character of the individual item block shall be a hyphen. The data blocks shall be separated from each other by a comma. If a data block is not used, this shall be indicated by doubling the separation sign, i.e. by two commas (,,). Terminal commas may be omitted.

4.2 Data block 1

In this data block, the plastic is identified by its abbreviated term PK in accordance with ISO 1043-1 and, after a hyphen, a symbol indicating the composition as specified in Table 1.

Table 1 — Symbol indicating the chemical structure of polyketone materials in data block 1

Symbol	Chemical identification
PK-EP	Terpolymer of carbon monoxide, ethylene, propylene $-(CH_2-CH_2-C=O)_n-(CH_2-CH(CH_3)-C=O)_m-$

For polymer blends or alloys use the abbreviated terms for the basic polymers, with the main component in first place followed by the other components in descending order according to their mass fractions, separated by a plus sign and no space before or after the plus sign.

EXAMPLE A blend of polyketone and polyamide 6 is designated: PK-EP+PA6.

4.3 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 (no indication) shall be inserted in position 1.

Table 2 — Code-letters used in data block 2

Code-letter	Position 1	Code-letter	Position 2 to 8
A	Adhesive	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	G1	Granules
		G2	Pellets
		G3	Beads
H	Coating	H	Heat-ageing stabilized
K	Cable and wire coating	K	Metal deactivated
L	Monofilament extrusion	L	Light and weather stabilized
M	Moulding		
		N	Natural (no colour added)
		P	Impact modified
Q	Compression moulding	Q1	Platable
R	Rotational moulding	R	Mould release agent
S	Sintering	S	Lubricated
T	Tape manufacture	T	Transparent
V	Thermoforming		
X	No indication	X	Crosslinkable
Y	Textile yarns, spinning	Y	Increased electrical conductivity
		Z	Antistatic

4.4 Data block 3

4.4.1 General

In this data block, the range of the melting temperature is represented by a 3-figure code-number (see [4.4.2](#)), melt mass-flow rate by a code-letter followed by a 3-figure code-number (see [4.4.3](#)) and the heat deflection temperature by a 3-figure code-number (see [4.4.4](#)). 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 limit because of manufacturing tolerances, the designation is not affected.

NOTE Not all the combinations of the values of the designatory properties can be possible for currently available materials.

4.4.2 Melting temperature

The melting temperature shall be determined in accordance with ISO 11357-3.

The possible values of the melting temperature are divided into 7 ranges, each represented by a 3-figure code-number as specified in [Table 3](#).

Table 3 — Code-numbers for melting temperature in data block 3

Code-number	Range of melting temperature °C
200	≤205
210	>205 but ≤215
220	>215 but ≤225
230	>225 but ≤235
240	>235 but ≤245
250	>245 but ≤255
260	>255

4.4.3 Melt mass-flow rate

The melt mass-flow rate shall be determined in accordance with ISO 1133-1, under the test conditions specified in [Table 4](#).

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

Code-letter	Test temperature °C	Nominal load kg
A	240	2,16
B	250	2,16
C	260	2,16
D	270	2,16
E	240	5
F	250	5
G	260	5
H	270	5

The possible values of the melt mass-flow rate are divided into 9 ranges, each represented by a 3-figure code-number as specified in [Table 5](#). The test conditions used shall be indicated by a single code letter, as specified in [Table 4](#), immediately preceding the code number indicating the range.

Table 5 — Code-numbers for melt mass-flow rate in data block 3

Code-number	Range of MFR g/10 min
000	≤0,10
001	>0,10 but ≤2,0
003	>2,0 but ≤4,0
006	>4,0 but ≤8,0
024	>8,0 but ≤40
060	>40 but ≤80

Table 5 (continued)

Code-number	Range of MFR g/10 min
130	>80 but ≤180
215	>180 but ≤250
999	>250

4.4.4 Heat deflection temperature

The heat deflection temperature shall be determined in accordance with ISO 75-1 and ISO 75-2.

The possible values of the deflection temperature at 1,8 MPa are divided into 21 ranges, each represented by a 3-figure code-number as specified in Table 6.

Table 6 — Code-numbers for heat deflection temperature at 1,8 MPa in data block 3

Code-number	Range of temperature °C
060	≤60
070	>60 but ≤70
080	>70 but ≤80
090	>80 but ≤90
100	>90 but ≤100
110	>100 but ≤110
120	>110 but ≤120
130	>120 but ≤130
140	>130 but ≤140
150	>140 but ≤150
160	>150 but ≤160
170	>160 but ≤170
180	>170 but ≤180
190	>180 but ≤190
200	>190 but ≤200
210	>200 but ≤210
220	>210 but ≤220
230	>220 but ≤230
240	>230 but ≤240
250	>240 but ≤250
260	>250

4.5 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 7. Subsequently (without a space), the actual content by mass percent shall be given by a two-figure number in position 3.

Table 7 — Code-letters used for fillers and reinforcing materials in data block 4

Code-letter	Material (Position 1)	Code-letter	Form (Position 2)
B	Boron	B	Beads, spheres, balls
C	Carbon ^a	C	Chips, cuttings
		D	Powder
E	Clay		
		F	Fibre
G	Glass	G	Ground
		H	Whiskers
K	Calcium carbonate	K	Knitted fabric
L	Cellulose ^a	L	Layer
M1	Mineral ^b	M	Mat (thick)
M2	Metal ^a	N	Non-woven fabric (thin)
P	Mica ^a	P	Paper
Q	Silicon		
R	Aramid	R	Roving
S	Synthetic, organic ^a	S	Scales, flakes
T	Talc	T	Cord
		V	Veneer
W	Wood	W	Woven fabric
X	Not specified	X	Not specified
		Y	Yarn
Z	Others ^a	Z	Others ^a

^a These materials may be further defined, for example, by their chemical symbol codes or additional symbols defined in the relevant International Standards. In the case of the metal (M2), it indicates the type of metal by means of its chemical symbol.

^b Mineral fillers shall be designated more accurately if a symbol is available. Mixtures of various materials and/or different shape (or forms) may be represented by associated relating code, using the sign "+" and placing in brackets the full. For example, a mixture of 25 % glass fibre (GF) and 10 % mineral powder (M1D) is represented by (GF25+M1D10).

4.6 Data block 5

Indication of additional requirements in this data block transforms the designation of a material into a specification for a particular material. This may be done, for example, by reference to a suitable national standard or to a standard like, generally established specification.

5 Example of designation

A polyketone moulding and extrusion material (PK), built up from keto, ethylene and propylene groups (EP), reinforced with 30 % glass fibre (GF30), intended for injection moulding (M), being heat stabilized (H), light stabilized (L) and natural (N), having a melting temperature of 220 °C (220), a melt mass-flow rate of 60 g/10 min at a temperature of 240 °C and a load of 2,16 kg (A060) and a deflection temperature of 210 °C (210), would be designated as follows.

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
		Polymer	Processing and application		Properties	Performance related information	Additional information
		Symbol	Process- ing	Charac- teristics		Fillers	
Thermo plastics	ISO 21970	PK-EP	M	HLN	220-A060- 210	GF30	Not Applicable

Designation: Thermoplastics ISO 21970-PK-EP, MHLN, 220-A060-210, GF30