INTERNATIONAL STANDARD

ISO 7391-1

Second edition
1996-11-15

Plastics — Polycarbonate (PC) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

Plastiques — Polycarbonate (PC) pour moulage et extrusion —

Partie 1: Système de désignation et base de spécification

INTERNATIONAL ISO

Reference number
ISO 7391-1:1996(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 7391-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This second edition cancels and replaces the first edition (ISO 7391-1:1987) and includes the following changes:

— the text has been brought into accordance with the standard SC 9 frame text;

— the notched Charpy impact strength and the Izod impact strength have been deleted as designatory properties.

ISO 7391 consists of the following parts, under the general title *Plastics — Polycarbonate (PC) 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 — Polycarbonate (PC) moulding and extrusion materials —

Part 1:
Designation system and basis for specifications

1 Scope

1.1 This part of ISO 7391 establishes a system of designation for polycarbonate thermoplastic material, which may be used as the basis for specifications.

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

a) viscosity number

b) melt flow rate

c) Charpy impact strength

and on information about the intended application and/or method of processing, important properties, additives, colorants, fillers and reinforcing materials.

1.3 This part of ISO 7391 is applicable to thermoplastic polyesters of carbonic acid and aromatic dihydroxy compounds. The polyester may be a homopolymer, a copolymer or a mixture of the two.

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 7391 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 7391. 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 7391 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:—[1], *Plastics — Symbols — Part 1: Basic polymers and their special characteristics.*

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

ISO 7391-2:1996, *Plastics — Polycarbonate (PC) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties.*

3 Designation system

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

<table>
<tr><th colspan="7">Designation</th></tr>
<tr><td rowspan="3">Description block
(optional)</td><th colspan="6">Identity block</th></tr>
<tr><td rowspan="2">International Standard number block</td><th colspan="5">Individual-item block</th></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 designation, the individual-item block is subdivided into 5 data blocks comprising the following information:

— Data block 1: Identification of the plastic by its symbol PC in accordance with ISO 1043-1 (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, polycarbonate plastics are identified by the symbol "PC", in accordance with ISO 1043-1.

1) To be published. (Revision of ISO 1043-1:1987)

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 1.

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 1 — 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	Coloured
D	Disc manufacture		
E	Extrusion	E	Expandable
F	Extrusion of films	F	Special burning characteristics
G	General use	G	Granules
H	Coating	H	Heat ageing stabilized
L	Monofilament extrusion	L	Light or weather stabilized
M	Moulding		
		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
V	Thermoforming		
		W	Stabilized against hydrolysis
X	No indication	X	Crosslinkable
		Y	Increased electrical conductivity
		Z	Antistatic

3.3 Data block 3

In this data block, the range of the viscosity number is represented by a 2-figure code-number (see 3.3.1), the range of the melt mass-flow rate by a 2-figure code-number (see 3.3.2) and the range of the Charpy impact strength by a 1-figure code-number (see 3.3.3). 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 combinations of the values of the designatory properties have to be provided for currently available polymers.

3.3.1 Viscosity number

The viscosity number shall be determined in accordance with ISO 7391-2.

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

Table 2 — Ranges of viscosity number in data block 3

Code-number	Range of viscosity number ml/g
46	≤ 46
49	> 46 but ≤ 52
55	> 52 but ≤ 58
61	> 58 but ≤ 64
67	> 64 but ≤ 70
70	> 70

3.3.2 Melt flow rate

The melt mass-flow rate (MFR) shall be determined in accordance with ISO 7391-2.

The possible values of melt mass-flow rate are divided into 5 ranges, each represented by a 2-figure code-number as specified in table 3.

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

Code-number	Range of melt mass-flow rate (MFR) g/10 min
03	≤ 3
05	> 3 but ≤ 6
09	> 6 but ≤ 12
18	> 12 but ≤ 24
24	> 24

NOTE — Melt mass-flow rate (MFR) will be replaced by melt volume-flow rate (MVR) at the next five-year revision of this part of ISO 7391.

3.3.3 Charpy impact strength

The Charpy impact strength (unnotched) shall be determined in accordance with ISO 7391-2.

The possible values of Charpy impact strength are divided into 6 ranges, each represented by a 1-figure code-number as specified in table 4.

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

Code-number	Range of Charpy impact strength kJ/m²
0	≤ 10
1	> 10 but ≤ 30
3	> 30 but ≤ 50
5	> 50 but ≤ 70
7	> 70 but ≤ 90
9	> 90

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

Table 5 — 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		
M	Mineral [1] [2], metal [1]		
S	Synthetic, organic [1]	**S**	Scales, flakes
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 shall 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).

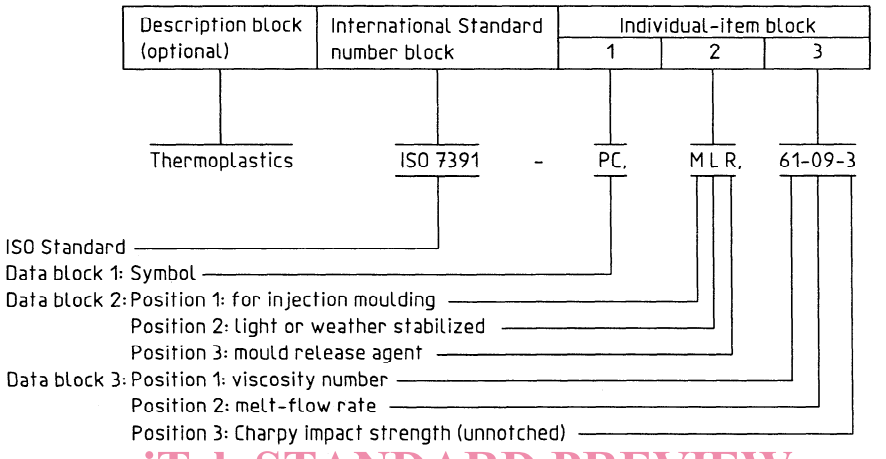
3.5 Data block 5

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

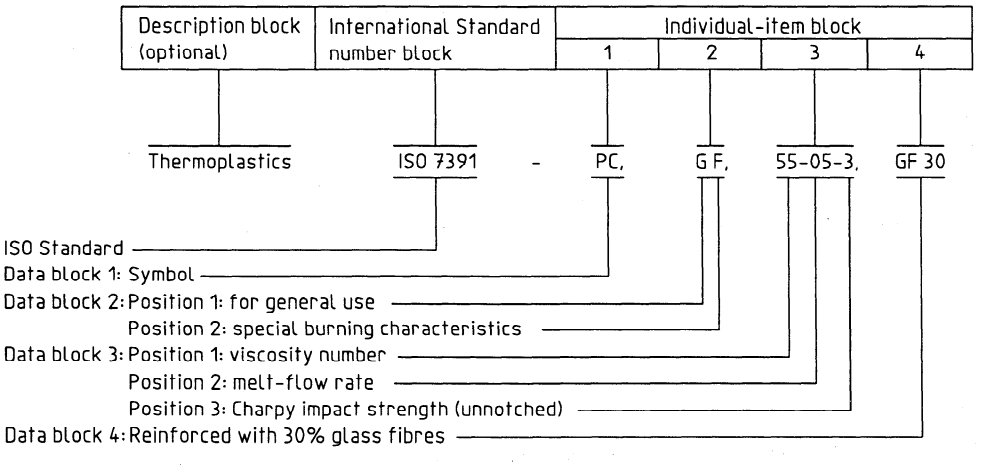
4.1 Designation only

A polycarbonate thermoplastic material (PC) intended for injection moulding (M), light or weather stabilized (L) and with a mould release agent (R), with a viscosity number of 59 ml/g (61), a melt mass-flow rate (MFR 300/1,2) of 9,5 g/10 min (09) and a Charpy impact strength (unnotched) of 35 kJ/m^2 (3), would be designated:



Designation: ISO 7391-PC,MLR,61-09-3

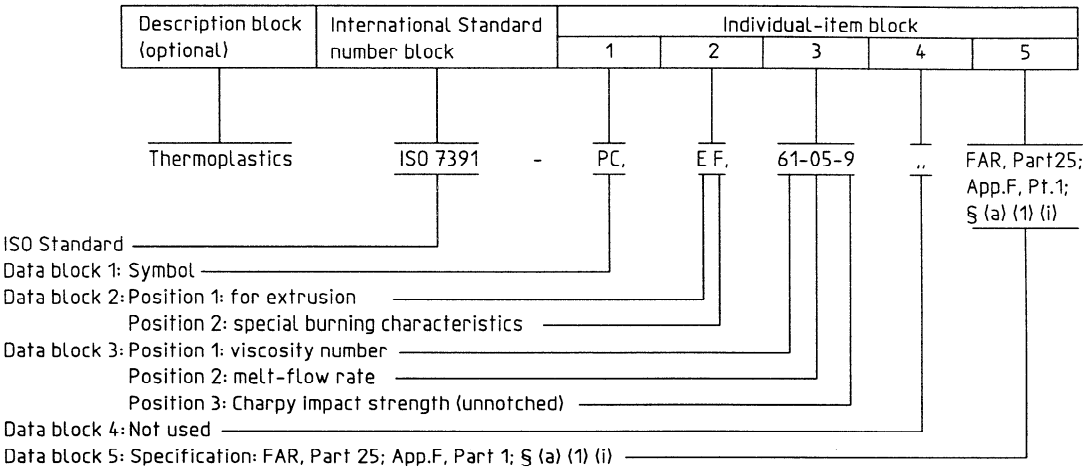
A polycarbonate thermoplastic material (PC) for general use (G), with special burning characteristics (F) and with a viscosity number of 56 ml/g (55), a melt mass-flow rate (MFR 300/1,2) of 5,5 g/10 min (05), a Charpy impact strength (unnotched) of 35 kJ/m^2 (3) and a glass (G) fibre (F) content of 30 % (30), would be designated:



Designation: ISO 7391-PC,GF,55-05-3,GF30

4.2 Designation transformed into a specification

A polycarbonate thermoplastic material (PC) intended for extrusion (E), with special burning characteristics (F) and with a viscosity number of 63 ml/g (61), a melt mass-flow rate (MFR 300/1,2) of 4,5 g/10 min (05) and a Charpy impact strength (unnotched) of 95 kJ/m^2 (9), as well as the additional requirement to meet the FAR, Part 25, Amdt. 25-72; Appendix F, Part 1; Paragraph (a) (1) (i) test, would be specified:



Specification: ISO 7391-PC,EF,61-05-9,,FAR, Part 25; App.F, Pt.1; §(a)(1)(i)