INTERNATIONAL STANDARD

ISO 25137-1

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Plastics — Sulfone polymer moulding and extrusion materials —

Part 1: Designation system and basis for specifications

Plastiques — Matériaux pour moulage et extrusion à base de polymères sulfone —

Partie 1: Système de désignation et base de spécifications

Reference number
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 25137-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

ISO 25137 consists of the following parts, under the general title *Plastics — Sulfone polymer moulding and extrusion materials*:

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

— *Part 2: Preparation of test specimens and determination of properties*

Plastics — Sulfone polymer moulding and extrusion materials —

Part 1: Designation system and basis for specifications

1 Scope

1.1 This part of ISO 25137 establishes a system of designation for sulfone polymer moulding and extrusion materials, including polysulfone (PSU), polyethersulfone (PESU) and polyphenylsulfone (PPSU), which may be used as the basis for specifications.

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

a) temperature of deflection under load,

b) melt mass-flow rate,

c) Charpy notched impact strength,

d) tensile modulus and

e) yield stress,

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

1.3 This part of ISO 25137 is applicable to all sulfone polymers that contain ether oxygen, which is a necessary component of the polymers as in the diphenyl sulfone moiety.

It applies to sulfone polymer materials ready for normal use in the form of powder, granules or pellets, unmodified or modified by colorants, additives, fillers, etc.

1.4 It is not intended to imply that materials having the same designation necessarily give the same performance. This part of ISO 25137 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 3.1).

2 Normative references

The following referenced documents are indispensable for the application 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 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*

ISO 25137-2, *Plastics — Sulfone polymer moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

3 Designation system

3.1 General

The designation system for thermoplastics is based on the following standard 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 PSU, PESU or PPSU, in accordance with ISO 1043-1, thus giving information about the composition of the polymer (see 1.3 and 3.2).

— Data block 2: Position 1: Intended application and/or method of processing (see 3.3).

Positions 2 to 8: Important properties, additives and supplementary information (see 3.3).

— Data block 3: Designatory properties (see 3.4).

— Data block 4: Fillers or reinforcing materials and their nominal content (see 3.5).

— Data block 5: For the purpose of specifications, a fifth data block may 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 a comma.

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, the polymer is identified by its abbreviated term PSU, PESU or PPSU, in accordance with ISO 1043-1, giving information on the composition as indicated in Table 1.

Table 1 — Abbreviated terms used for information on the major component (⩾ 75 % by mass) in the composition of the polymer in data block 1

Abbreviated term	Chemical structure of the repeating unit
PSU (polysulfone)	oxy-1,4-phenylenesulfonyl-1,4-phenyleneoxy-1,4-phenylene(dimethylmethylene)-1,4-phenylene
PESU (polyethersulfone)	oxy-1,4-phenylenesulfonyl-1,4-phenylene
PPSU (polyphenylsulfone)	oxybiphenyl-4,4′-diyloxy-1,4-phenylenesulfonyl-1,4-phenylene

3.3 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	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	Heat stabilized
K	Cable and wire coating	**K**	Metal deactivated
L	Monofilament extrusion	**L**	Light 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	Increased electrical conductivity
		Z	Antistatic

3.4 Data block 3

3.4.1 General

In this data block, the set of conditions used to anneal specimens before determination of the temperature of deflection under load is represented by a code-letter and the range of the temperature of deflection under load by a three-figure code-number (see 3.4.2), the melt mass-flow rate test conditions by a code-letter and the range by a two-figure code-number (see 3.4.3), the range of the Charpy notched impact strength by the letter N followed by a two-figure code-number (see 3.4.4), the range of the tensile modulus by a three-figure code-number (see 3.4.5) and the range of the yield stress by a two-figure code-number (see 3.4.6). 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 may be possible for currently available materials.

3.4.2 Temperature of deflection under load

The temperature of deflection under load shall be determined in accordance with ISO 25137-2 at a stress level of 1,8 MPa, using test specimens moulded from dry material, annealed under one of the sets of conditions given in Table 3 and then conditioned, before the determination, at (23 ± 2) °C and (50 ± 10) % relative humidity for a minimum of 24 h.

Table 3 — Specimen-annealing conditions

Code-letter	Temperature °C	Time h
A	140	4
B	170	1
C	200	1

The possible values of the temperature of deflection under load are divided into twelve ranges, each represented by a three-figure code-number as specified in Table 4.

Table 4 — Code-numbers for temperature of deflection under load in data block 3

Code-number	Range of temperature of deflection under load, T_{fe} °C
145	⩽ 150
155	> 150 but ⩽ 160
165	> 160 but ⩽ 170
175	> 170 but ⩽ 180
185	> 180 but ⩽ 190
195	> 190 but ⩽ 200
205	> 200 but ⩽ 210
215	> 210 but ⩽ 220
225	> 220 but ⩽ 230
235	> 230 but ⩽ 240
245	> 240 but ⩽ 250
255	> 250

3.4.3 Melt mass-flow rate

The melt mass-flow rate (MFR) shall be determined in accordance with ISO 25137-2 under the conditions specified in Table 5. The material for the determination of the MFR shall be dry.

Table 5 — Test conditions used for the determination of melt mass-flow rate

Code-letter	Test temperature °C	Nominal load kg
A	343	2,16
B	360	10,00
C	365	5,00
D	380	2,16

The possible values of the MFR are divided into seven ranges, each represented by a two-figure code-number as specified in Table 6.

Table 6 — Code-numbers for melt mass-flow rate in data block 3

Code-number	Range of melt mass-flow rate g/10 min
02	$\geqslant 2$ but $\leqslant 5$
05	> 5 but $\leqslant 10$
10	> 10 but $\leqslant 15$
15	> 15 but $\leqslant 20$
20	> 20 but $\leqslant 30$
30	> 30 but $\leqslant 40$
40	> 40

3.4.4 Charpy notched impact strength

The Charpy notched impact strength shall be determined in accordance with ISO 25137-2.

The possible values of the Charpy notched impact strength are divided into ten ranges, each represented by the letter N and a two-figure code-number as specified in Table 7.

Table 7 — Code-numbers for Charpy notched impact strength in data block 3

Code-number	Range of Charpy notched impact strength kJ/m²
N03	⩽ 4,0
N05	> 4,0 but ⩽ 6,0
N07	> 6,0 but ⩽ 8,0
N09	> 8,0 but ⩽ 10
N15	> 10 but ⩽ 20
N25	> 20 but ⩽ 30
N35	> 30 but ⩽ 40
N45	> 40 but ⩽ 50
N55	> 50 but ⩽ 60
N65	> 60

3.4.5 Tensile modulus

The tensile modulus shall be determined in accordance with ISO 25137-2.

The possible values of the tensile modulus are divided into nine ranges, each represented by a three-figure code-number as specified in Table 8.

Table 8 — Code-numbers for tensile modulus in data block 3

Code-number	Range of tensile modulus MPa
015	⩽ 2 000
020	> 2 000 but ⩽ 4 000
040	> 4 000 but ⩽ 6 000
060	> 6 000 but ⩽ 8 000
080	> 8 000 but ⩽ 10 000
100	> 10 000 but ⩽ 12 000
120	>12 000 but ⩽ 14 000
140	> 14 000 but ⩽ 16 000
160	> 16 000

3.4.6 Yield stress

The yield stress shall be determined in accordance with ISO 25137-2.

The possible values of the yield stress are divided into seven ranges, each represented by a two-figure code-number as specified in Table 9.

Table 9 — Code-numbers for yield stress in data block 3

Code-number	Range of yield stress MPa
60	⩽ 65
65	> 65 but ⩽ 85
70	> 85 but ⩽ 105
75	> 105 but ⩽ 125
80	> 125 but ⩽ 145
85	> 145 but ⩽ 165
90	> 165

3.5 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 10. Subsequently (without a space), the actual content, expressed as a percentage by mass, may be given by a two-figure number in position 3.

Table 10 — Code-letters for fillers and reinforcing materials in data block 4

Code-letter	Material	Code-letter	Form
B	Boron	**B**	Balls, beads, spheres
C	Carbon [a]		
		D	Powder, dry blend
		F	Fibre
G	Glass	**G**	Granules, ground
		H	Whiskers
K	Chalk		
L	Cellulose		
M	Mineral [a,b], metal [a]		
S	Synthetic, organic [a]	**S**	Scales, flakes
T	Talc		
X	Not specified	**X**	Not specified
Z	Others [b]	**Z**	Others

[a] These materials may be further defined by their chemical symbol, for example, or by 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 shall be designated more precisely if a symbol is available.

Mixtures of materials 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 8 % mineral powder (MD) would be indicated by (GF25+MD08).

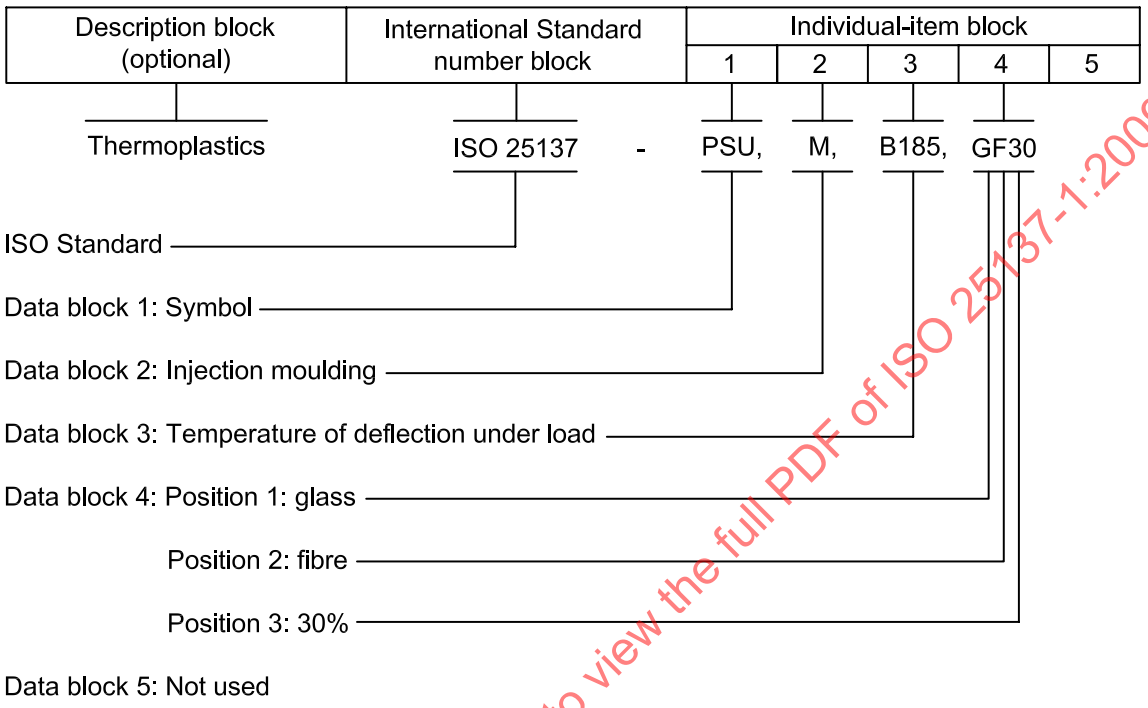
3.6 Data block 5

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 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 polysulfone (PSU) moulding and extrusion material intended for injection moulding (M), having a temperature of deflection under load, determined after annealing the specimens at 170 °C for 1 h, of 181 °C (B185) and containing 30 % glass fibre (GF30), would be designated:



Designation: ISO 25137-PSU,M,B185,GF30