INTERNATIONAL STANDARD

ISO 6402-1

Second edition
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Plastics — Impact-resistant acrylonitrile/styrene (ASA, AES, ACS) moulding and extrusion materials, excluding butadiene-modified materials —

Part 1:
Designation system and basis for specifications

Plastiques — Acrylonitrile/styrène sans butadiène résistant au choc (ASA, AES, ACS) pour moulage et extrusion —

Partie 1: Système de désignation et base de spécification

Reference number
ISO 6402-1:1997(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 6402-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This second edition cancels and replaces the first edition (ISO 6402-1:1990), the text of which has been brought into accordance with the standard SC 9 frame text.

ISO 6402 consists of the following parts, under the general title *Plastics — Impact-resistant acrylonitrile/styrene (ASA, AES, ACS) moulding and extrusion materials, excluding butadiene-modified materials*:

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

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

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Plastics — Impact-resistant acrylonitrile/styrene (ASA, AES, ACS) moulding and extrusion materials, excluding butadiene-modified materials —

Part 1:
Designation system and basis for specifications

1 Scope

1.1 This part of ISO 6402 establishes a system of designation for impact-resistant acrylonitrile/styrene (or substituted styrene) thermoplastic material, excluding butadiene-modified materials, which may be used as the basis for specifications.

1.2 The types of impact-resistant acrylonitrile/styrene plastic are differentiated from each other by a classification system based on appropriate levels of the designatory properties

a) Vicat softening temperature

b) melt flow rate

c) Izod impact strength

d) flexural modulus

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

1.3 This part of ISO 6402 is applicable to all impact-resistant acrylonitrile/styrene thermoplastic materials, excluding butadiene-modified materials, having as impact modifier a dispersed elastomeric phase, free of double bonds of the butadiene type, based on

— acrylic ester (ASA materials);

— ethylene-propylene-diene (EPDM) (AES materials);

— chlorinated polyethylene (ACS materials).

It applies to materials ready for normal use and to materials unmodified or modified by colourants, additives, fillers, etc.

This part of ISO 6402 does not apply to materials

a) containing less than 10 % (*m/m*) acrylonitrile in the continuous phase;

b) with an Izod impact strength of less than 3 kJ/m^2;

c) containing more than 5 % (*m/m*) of another comonomer or polymer in the continuous phase.

1.4 It is not intended to imply that materials having the same designation give necessarily the same performance. This part of ISO 6402 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 6402. 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 6402 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 1043-1:1997, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics.*

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

ISO 1656:1996, *Rubber, raw natural, and rubber latex, natural — Determination of nitrogen content.*

ISO 6402-2:1994, *Plastics — Impact-resistant acrylonitrile/styrene (ASA, AES, ACS) moulding and extrusion materials, excluding butadiene-modified 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:

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 5 data blocks comprising the following information:

— Data block 1: Identification of the plastic by its symbol ASA, AES or ACS in accordance with ISO 1043-1 and information about the polymerization process or composition of the polymer (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, impact-resistant acrylonitrile/styrene plastics are identified by the symbol ASA, AES or ACS, in accordance with ISO 1043-1, and, after a space, the acrylonitrile content of the continuous phase is designated by a single-figure code-number as specified in table 1.

Table 1 — Ranges of acrylonitrile content in data block 1

Code number	Range of AN content % (*m/m*)
1	> 10 but ⩽ 30
2	> 30

For the purposes of this part of ISO 6402, the AN content of the continuous phase shall be determined by the Kjeldahl method, as specified in ISO 1656, or alternatively by a pyrolysis/thermal-conductivity method.

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 2.

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 2 — Code-letters used in data block 2

Code-letter	Position 1	Code-letter	Positions 2 to 8
		A	Processing stabilized
		B	Antiblocking
		C	Coloured
		D	Powder
E	Extrusion		
F	Extrusion of films	F	Special burning characteristics
G	General use	G	Granules
		H	Heat-ageing stabilized
		L	Light or weather stabilized
M	Moulding		
		N	Natural (no colour added)
		R	Mould release agent
		S	Lubricated
X	No indication		
		Z	Antistatic

3.3 Data block 3

In this data block, the range of the Vicat softening temperature is represented by a 3-figure code-number (see 3.3.1), the range of the melt flow rate by a 2-figure code-number (see 3.3.2), the range of the Izod impact strength by a 2-figure code-number (see 3.3.3) and the range of the flexural modulus by a 2-figure code-number (see 3.3.4). 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 combinations of the values of the designatory properties have to be provided for currently available polymers.

3.3.1 Vicat softening temperature

The Vicat softening temperature shall be determined in accordance with ISO 6402-2.

The possible values of the Vicat softening temperature are divided into 4 ranges, each represented by a 3-figure code-number as specified in table 3.

Table 3 — Ranges of Vicat softening temperature in data block 3

Code-number	Range of Vicat softening temperature (°C)
085	$\leqslant$ 90
095	$>$ 90 but $\leqslant$ 100
105	$>$ 100 but $\leqslant$ 110
115	$>$ 110

3.3.2 Melt flow rate

The melt mass-flow rate (MFR) shall be determined in accordance with ISO 6402-2

The possible values of the melt mass-flow rate are divided into 4 ranges, each represented by a 2-figure code-number as specified in table 4.

Table 4 — Ranges of melt mass-flow rate in data block 3

Code-number	Range of melt mass-flow rate (MFR) g/10 min
04	≤ 5
08	> 5 but ≤ 10
15	> 10 but ≤ 20
25	> 20

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 6402.

3.3.3 Izod impact strength

The Izod impact strength shall be determined in accordance with ISO 6402-2.

The possible values of the Izod impact strength are divided into 5 ranges, each represented by a 2-figure code-number as specified in table 5

Table 5 — Ranges of Izod impact strength in data block 3

Code-number	Range of Izod impact strength kJ/m²
05	> 3 but ≤ 6
09	> 6 but ≤ 12
16	> 12 but ≤ 20
25	> 20 but ≤ 30
35	> 30

NOTE — After 1998, only Charpy impact strength will be used for designation, and consequently Izod impact strength will be cancelled.

3.3.4 Flexural modulus

The flexural modulus shall be determined in accordance with ISO 6402-2.

The possible values of the flexural modulus are divided into 4 ranges, each represented by a 2-figure code-number as specified in table 6.

Table 6 — Ranges of flexural modulus in data block 3

Code-number	Range of flexural modulus MPa
15	⩽ 1 800
20	> 1 800 but ⩽ 2 300
25	> 2 300 but ⩽ 2 800
30	> 2 800

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 7. Subsequently (without a space), the filler/reinforcing-material content by mass may be given by a 2-figure number in positions 3 and 4, as specified in table 8.

Table 7 — 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)]		
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).

Table 8 — Ranges of filler/reinforcing-material content in data block 4

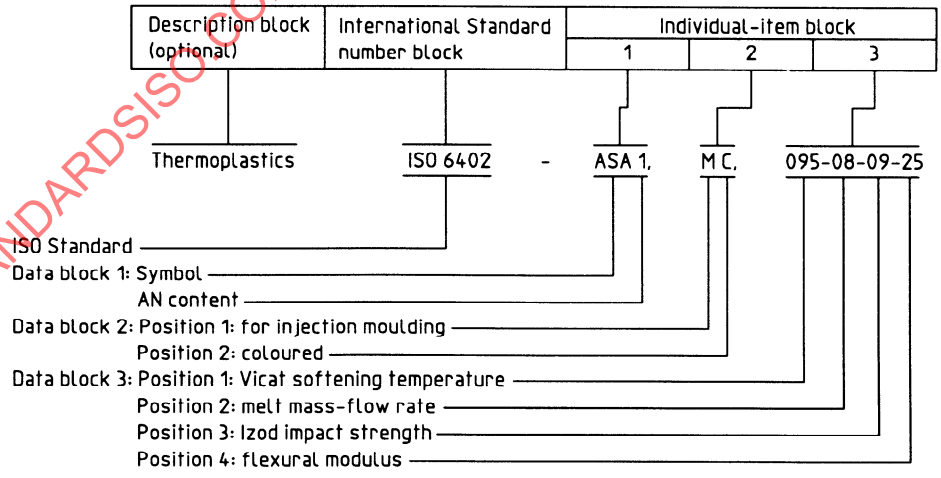
Code-number	Range of filler/reinforcing-material content % (*m/m*)
05	⩽ 7,5
10	> 7,5 but ⩽ 12,5
15	> 12,5 but ⩽ 17,5
20	> 17,5 but ⩽ 22,5
25	> 22,5 but ⩽ 27,5
30	> 27,5 but ⩽ 32,5
35	> 32,5 but ⩽ 37,5
40	> 37,5 but ⩽ 42,5

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 Example of a designation

An impact-resistant acrylonitrile/styrene thermoplastic material with an acrylic ester impact modifier (ASA), having an AN content of 23 % (*m/m*) (1), intended for injection moulding (M), coloured (C) and having a Vicat softening temperature VST/B50 of 97 °C (095), a melt mass-flow rate of 7 g/10 min (08), an Izod impact strength of 11 kJ/m^2 (09) and a flexural modulus of 2 600 MPa (25), would be designated:



Designation: Thermoplastics ISO 6402-ASA 1,MC,095-08-09-25