

# INTERNATIONAL STANDARD

# ISO 6402-1

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1990-10-15

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

**Part 1:**  
**Designation**  
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*ISO 6402-1:1990*  
*Plastiques — Thermoplastiques à base d'acrylonitrile/styrène sans butadiène (ASA, AES, ACS), résistants au choc, pour moulage et extrusion —*

*Partie 1: Désignation*



Reference number  
ISO 6402-1:1990(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*.

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

- *Part 1: Designation*
- *Part 2: Preparation of test specimens and determination of properties*

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

## Part 1: Designation

### 1 Scope

1.1 This part of ISO 6402 establishes a system of designation for impact-resistant acrylonitrile/styrene (or substituted styrene) thermoplastic materials, excluding butadiene-modified materials (for example ABS), 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) impact strength and
- d) flexural modulus,

and on information about intended application, method of processing, important properties, additives, colour and fillers.

1.3 This designation system 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 in the form of powder, granules or pellets, unmodified and modified by colorants, 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 less than 3 kJ/m<sup>2</sup>;
- 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 or method of processing.

If such additional properties are required, they shall, until an International Standard is available, be determined by test methods agreed on by the parties concerned.

NOTE 1 Test methods of this kind will be specified in ISO 6402-2, which is in preparation.

1.5 In order to specify a thermoplastic material for a particular application, additional requirements may be specified in Data Block 5 (see clause 3).

**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 178:1975, *Plastics — Determination of flexural properties of rigid plastics.*

ISO 180:1982, *Plastics — Determination of Izod impact strength of rigid materials.*

ISO 293:1986, *Plastics — Compression moulding test specimens of thermoplastic materials.*

ISO 306:1987, *Plastics — Thermoplastic materials — Determination of Vicat softening temperature.*

ISO 1043-1:1987, *Plastics — Symbols — Part 1: Basic polymers and their special characteristics.*

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

ISO 1133:1981, *Plastics — Determination of the melt flow rate of thermoplastics.*

ISO 1656:1988, *Rubber, raw natural, and rubber latex, natural — Determination of nitrogen content.*

ISO 2557-1:1989, *Plastics — Amorphous thermoplastics — Preparation of test specimens with a specified maximum reversion — Part 1: Bars.*

ISO 4607:1978, *Plastics — Methods of exposure to natural weathering.*

ISO 8328:1989, *Plastics — Amorphous thermoplastic moulding materials — Determination of maximum reversion.*

**3 Designation system**

The designation system for thermoplastics is based on the standardized pattern given in figure 1.

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 4 data blocks comprising the following information:

Data Block 1: Identification of the plastic by its symbol (ASA, AES, ACS) and information about the composition of the copolymer (see 3.1).

Data Block 2: Position 1: Intended application or method of processing (see 3.2).

Positions 2 to 4: Important properties, additives and supplementary information (see 3.2).

Data Block 3: Designatory properties (see 3.3).

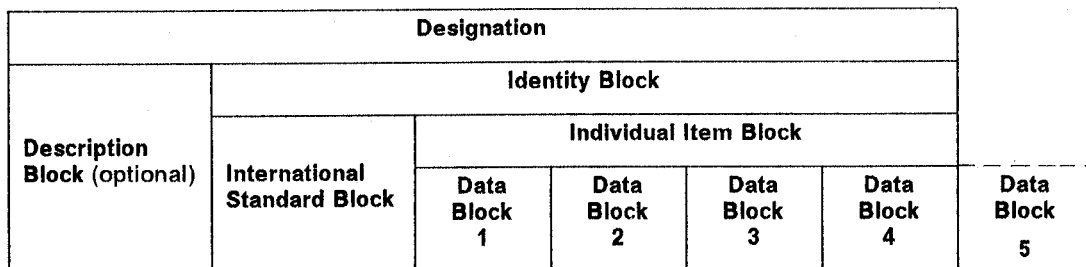
Data Block 4: Fillers or reinforcing materials and the nominal content thereof (see 3.4).

For the purpose of specifications, a fifth data block may be added containing additional information. The kind of information and the code-letters used are not the subject of this part of ISO 6402.

The first character of the Individual Item Block shall be a hyphen.

The four 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 (,,).



**Figure 1 — Data block designation system**

### 3.1 Data Block 1

In this data block, after the hyphen, the plastic is identified by its symbol (ASA, AES, ACS) (see 1.3) 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 — Codes used for acrylonitrile content in Data Block 1**

Code	Range of AN content % (m/m)
1	> 10 to ≤ 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 the intended application or method of processing is given in position 1 and information about important properties, additives and colour in positions 2 to 4. The code-letters used are specified in table 2.

If information is presented in positions 2 to 4 and no specific information is given in position 1, the letter X shall be inserted in position 1.

### 3.3 Data Block 3

In this data block, the Vicat softening temperature is represented by a three-figure code-number (see 3.3.1), the melt flow rate by a two-figure code-number (see 3.3.2), the impact strength by a two-figure code-number (see 3.3.3) and the flexural modulus by a two-figure code-number (see 3.3.4). The four codes 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 either side of, the range limit because of manufacturing tolerances, the designation is not affected.

NOTE 2 Not all combinations of the values of the designatory properties are provided by currently available materials.

**Table 2 — Code-letters used in Data Block 2**

Code-letter	Position 1	Positions 2 to 4
A		Processing stabilized
B		Antiblocking
C		Coloured
D		Powder; dry blend
E	Extrusion of pipes, profiles and sheet	
F	Extrusion of film	Special burning characteristics
G	General use	Pellets; granules
H		Heat-ageing stabilized
L		Light and/or weather stabilized
M	Injection moulding	
N		Natural (not coloured)
R		Moulding release agent
S		Lubricated
X	No indication	
Z		Antistatic

### 3.3.1 Vicat softening temperature

The Vicat softening temperature (VST) shall be determined in accordance with ISO 306, method B, with test specimens moulded from dry material, using a test load of  $50 \text{ N} \pm 1 \text{ N}$  and a heating rate of  $50 \text{ °C/h} \pm 5 \text{ °C/h}$ . The possible values of the VST are divided into four ranges, each represented by a three-figure code-number, as specified in table 3.

**Table 3 — Codes used for Vicat softening temperature in Data Block 3**

Code	VST range °C
085	≤ 90
095	> 90 to ≤ 100
105	> 100 to ≤ 110
115	> 110

### 3.3.2 Melt flow rate

The melt flow rate (MFR) shall be determined in accordance with ISO 1133, using set of test conditions No. 19 (temperature 220 °C, load 10 kg). The material for the determination of the melt flow rate shall be conditioned for 4 h at 80 °C, or in accordance with the manufacturer's recommendations, and then stored in a desiccator at  $23 \text{ °C} \pm 2 \text{ °C}$  until tested.

The possible values of the MFR are divided into four ranges, each represented by a two-figure code-number, as specified in table 4.

**Table 4 — Codes used for melt flow rate in Data Block 3**

Code	MFR range g/10 min
04	≤ 5
08	> 5 to ≤ 10
15	> 10 to ≤ 20
25	> 20

**3.3.3 Izod impact strength**

The Izod impact strength shall be determined with test specimens in the basic state (see ISO 2557-1), having a maximum reversion  $S_m$ , measured in accordance with ISO 8328, of < 5 %. The test specimens shall be prepared either by compression moulding, in accordance with ISO 293, or, alternatively, by thermal relaxation of injection-moulded test specimens, as specified in ISO 2557-1.

The impact strength shall be determined by method 4A of ISO 180.

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

**Table 5 — Codes used for Izod impact strength in Data Block 3**

Izod impact strength	
Code	Range kJ/m <sup>2</sup>
05	> 3 to ≤ 6
09	> 6 to ≤ 12
16	> 12 to ≤ 20
25	> 20 to ≤ 30
35	> 30

**3.3.4 Flexural modulus**

The flexural modulus shall be determined in accordance with ISO 178 with 80 mm × 10 mm × 4 mm test specimens in the basic state, prepared as specified in 3.3.3. The possible values of the flexural modulus are divided into four ranges, each represented by a two-figure code-number, as specified in table 6.

**Table 6 — Codes used for flexural modulus in Data Block 3**

Code	Flexural modulus range MPa
15	≤ 1 800
20	> 1 800 to ≤ 2 300
25	> 2 300 to ≤ 2 800
30	> 2 800

**3.4 Data Block 4**

In this data block, the type of filler or reinforcing material is represented by one code-letter in position 1 and its physical form by a second letter in position 2 (see table 7 and ISO 1043-2), if requested. Subsequently (without a space), the mass content may be represented by a two-figure code-number in positions 3 and 4, as specified in table 8.

Mixtures of materials or forms may be indicated in parentheses by combining the relevant codes using the sign "+"; for example a mixture of 25 % (m/m) glass fibres (GF) and 10 % (m/m) mineral powder (MD) would be indicated by (G+M) in position 1, (F+D) in position 2 and (25+10) in positions 3 and 4.

**Table 7 — Symbols for fillers and reinforcing materials in Data Block 4**

Code-letter	Material (Position 1)	Form (Position 2)
B	Boron	Balls; beads; spheres
C	Carbon <sup>1)</sup>	
D		Powder; dry blend
F		Fibre
G	Glass	Granules; ground
H		Whiskers
K	Chalk (CaCO <sub>3</sub> )	
M	Mineral <sup>1)</sup> ; metal <sup>2)</sup>	
S		Scale, flake
T	Talcum	
X	Not specified	Not specified
Z	Others <sup>1)</sup>	Others

1) These materials may be defined by two letters after position 4 of the data block, for example by chemical symbol, additional codes or codes to be agreed upon.

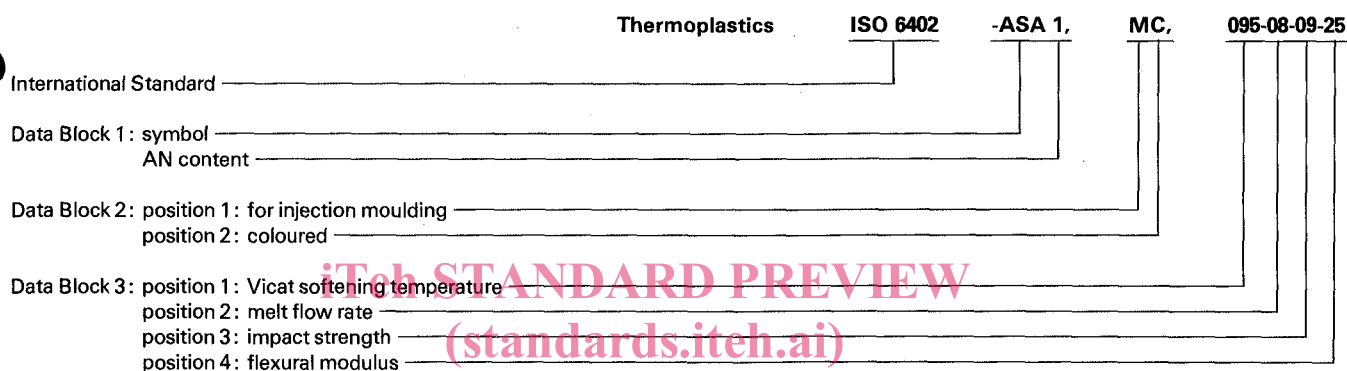
2) Metal filler shall be identified by the chemical symbol (in capital letters) after the mass content. For example steel whiskers may be designated "MH05FE".

**Table 8 — Coding system for the mass content in Data Block 4**

Code	Mass content % (m/m) (Positions 3 and 4)
05	≤ 7,5
10	> 7,5 to ≤ 12,5
15	> 12,5 to ≤ 17,5
20	> 17,5 to ≤ 22,5
25	> 22,5 to ≤ 27,5
30	> 27,5 to ≤ 32,5
35	> 32,5 to ≤ 37,5
40	> 37,5 to ≤ 42,5

**4 Example of designation**

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



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**Descriptors:** plastics, acrylonitriles, styrene, moulding materials, extrusions, designation.

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