
Plastics — Acrylonitrile-styrene-acrylate (ASA), acrylonitrile-(ethylene-propylene-diene)-styrene (AEPDS) and acrylonitrile-(chlorinated polyethylene)-styrene (ACS) moulding and extrusion materials —

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

Plastiques — Matériaux pour moulage et extrusion à base d'acrylonitrile-styrène-acrylate (ASA), d'acrylonitrile-(éthylène-propylène-diène)-styrène (AEPDS) et d'acrylonitrile-(polyéthylène chloré)-styrène (ACS) —

Partie 1: Système de désignation et base de spécifications



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

STANDARDSISO.COM : Click to view the full PDF of ISO 6402-1:2002

© ISO 2002

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

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 3.

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 part of ISO 6402 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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

This fourth edition cancels and replaces the third edition (ISO 6402-1:2001), which has been technically revised.

ISO 6402 consists of the following parts, under the general title *Plastics — Acrylonitrile-styrene-acrylate (ASA), acrylonitrile-(ethylene-propylene-diene)-styrene (AEPDS) and acrylonitrile-(chlorinated polyethylene)-styrene (ACS) moulding and extrusion materials*:

- *Part 1: Designation system and basis for specifications*
- *Part 2: Preparation of test specimens and determination of properties*

Plastics — Acrylonitrile-styrene-acrylate (ASA), acrylonitrile-(ethylene-propylene-diene)-styrene (AEPDS) and acrylonitrile-(chlorinated polyethylene)-styrene (ACS) moulding and extrusion materials —

Part 1:

Designation system and basis for specifications

1 Scope

1.1 This part of ISO 6402 establishes a system of designation for acrylonitrile-styrene-acrylate (ASA), acrylonitrile-(ethylene-propylene-diene)-styrene (AEPDS) and acrylonitrile-(chlorinated polyethylene)-styrene (ACS) moulding and extrusion materials, which may be used as the basis for specifications.

1.2 The types of ASA, AEPDS and ACS plastic are differentiated from each other by a classification system based on appropriate levels of the designatory properties

- a) Vicat softening temperature
- b) melt volume-flow rate
- c) Charpy notched impact strength
- d) tensile modulus

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 6402 is applicable to all ASA, AEPDS and ACS materials consisting of a continuous phase based mainly on styrene-acrylonitrile (SAN) copolymer (in which the styrene component may be styrene itself and/or alkyl-substituted styrene) and a dispersed elastomeric phase based mainly on

acrylate (ASA materials),

ethylene-propylene-diene (EPDM) (AEPDS materials),

chlorinated polyethylene (ACS materials),

with or without other components, in such quantities as specified in data block 1.

It applies to ASA, AEPDS and ACS materials ready for normal use in the form of powder, granules, pellets or chips, unmodified or modified by colorants, additives, fillers, etc.

ISO 6402-1:2002(E)

ISO 6402-1:2002 does not apply to materials

- a) containing less than 10 % by mass of acrylonitrile in the continuous phase;
- b) with a Charpy notched impact strength of less than 3 kilojoules per square metre;
- c) containing less than 50 % by mass of acrylate in the elastomeric phase in the case of ASA;
- d) containing less than 50 % by mass of ethylene-propylene-diene in the elastomeric phase in the case of AEPDS;
- e) containing less than 50 % by mass of chlorinated polyethylene in the elastomeric phase in the case of ACS.

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 particular application or to ensure reproducible processing, additional requirements may be given in data block 5 (see 3.1).

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 6402. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 6402 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

ISO 6402-2, *Plastics — Acrylonitrile-styrene-acrylate (ASA), acrylonitrile-(ethylene-propylene-diene)-styrene (AEPDS) and acrylonitrile-(chlorinated polyethylene)-styrene (ACS) 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 (ASA, AEPDS, ACS) in accordance with ISO 1043-1 and information about the composition of the polymer (see 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 plastic is identified by its abbreviated term (ASA, AEPDS, ACS) in accordance with ISO 1043-1 and, after a space, a single-figure code-number indicating the composition, as specified in Table 1, and a code-letter indicating the nature of any additional monomer, as specified in Table 2.

Table 1 — Code-numbers used to indicate the composition in data block 1

Code-number	Composition
0	Monomers and/or polymers other than those of acrylonitrile, styrene (and/or alkyl-substituted styrene) and acrylate in the case of ASA, EPDM in the case of AEPDS and chlorinated polyethylene in the case of ACS are not incorporated in such quantity as to exceed 5 % by mass of the plastic.
1	Monomers and/or polymers other than those of acrylonitrile, styrene (and/or alkyl-substituted styrene) and acrylate in the case of ASA, EPDM in the case of AEPDS and chlorinated polyethylene in the case of ACS are incorporated in such quantity as to exceed 5 % by mass but not to exceed 15 % by mass of the plastic.
2	Monomers and/or polymers other than those of acrylonitrile, styrene (and/or alkyl-substituted styrene) and acrylate in the case of ASA, EPDM in the case of AEPDS and chlorinated polyethylene in the case of ACS are incorporated in such quantity as to exceed 15 % by mass but not to exceed 30 % by mass of the plastic.

Table 2 — Code-letters used for additional monomers in data block 1

Code-letter	Monomer
A	Acrylate
B	Butadiene
M	Maleic anhydride and other anhydrides
P	<i>N</i> -phenylmaleimide and other maleimides
X	Other/unspecified

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 3.

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 3 — 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 stabilized
		L	Light stabilized
M	Moulding		
		N	Natural (no colour added)
		R	Mould release agent
		S	Lubricated
X	No indication		
		Z	Antistatic

3.4 Data block 3

3.4.1 General

In this data block, the range of Vicat softening temperature is represented by a three-figure code-number (see 3.4.2), the range of melt volume-flow rate by a two-figure code-number (see 3.4.3), the range of Charpy notched impact strength by a two-figure code-number (see 3.4.4) and the range of tensile modulus by a two-figure code-number (see 3.4.5). The four 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 Vicat softening temperature

The Vicat softening temperature (VST) shall be determined in accordance with ISO 6402-2, using test specimens moulded from dry material and stored in a desiccator at $23\text{ °C} \pm 2\text{ °C}$ until tested.

The possible values of the VST are divided into six ranges, each represented by a three-figure code-number as specified in Table 4.

Table 4 — Code-numbers for Vicat softening temperature in data block 3

Code-number	Range of Vicat softening temperature °C
085	≤ 90
095	> 90 but ≤ 100
105	> 100 but ≤ 110
115	> 110 but ≤ 120
125	> 120 but ≤ 130
135	> 130

3.4.3 Melt volume-flow rate

The melt volume-flow rate (MVR) shall be determined in accordance with ISO 6402-2. The material for the determination of the MVR shall be conditioned for 4 h at $80\text{ °C} \pm 2\text{ °C}$ and then stored in a dessicator at $23\text{ °C} \pm 2\text{ °C}$ until tested.

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

Table 5 — Code-numbers for melt volume-flow rate in data block 3
(measured at $220\text{ °C}/10\text{ kg}$)

Code-number	Range of melt volume-flow rate cm ³ /10 min
04	≤ 5
08	> 5 but ≤ 10
15	> 10 but ≤ 20
30	> 20 but ≤ 40
50	> 40

3.4.4 Charpy notched impact strength

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

The possible values of the Charpy notched impact strength are divided into five ranges, each represented by a two-figure code-number as specified in Table 6.

Table 6 — Code-numbers for Charpy notched impact strength in data block 3

Code-number	Range of Charpy notched impact strength kJ/m ²
05	> 3 but ≤ 7
09	> 7 but ≤ 14
16	> 14 but ≤ 23
25	> 23 but ≤ 35
35	> 35

3.4.5 Tensile modulus

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

The possible values of the tensile modulus are divided into four ranges, each represented by a two-figure code-number as specified in Table 7.

Table 7 — Code-numbers for tensile 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

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

Table 8 — 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		
M	Mineral ^{a, b} , metal ^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 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).