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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 plastique acrylonitrile-styrène-acrylate (ASA), plastique acrylonitrile-(éthylène-propylène-diène)-styrène (AEPDS) et plastique acrylonitrile-(polyéthylène chloré)-styrène (ACS) pour moulage et extrusion —

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastics materials*.

This first edition of ISO 19065-1 cancels and replaces ISO 6402-1:2002, which has been technically revised to introduce a new designation system.

The revised designation system is published under a new ISO number, as many existing documents refer to ISO 6402-1. If the existing ISO 6402-1 would be replaced by the new designation system, these documents would refer to the incorrect designation system.

In order to give users time to switch from ISO 6402-1 to ISO 19065-1, ISO 6402-1 needs to be phased out in 5 to 10 years. During this period, ISO 6402-2 will effectively be Part 2 of this International Standard.

ISO 19065 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*

Introduction

ISO 6402-1:2002 is complex and does not fit with daily practice anymore. In practice ISO 1043 and ISO 11469 are, in combination, 'improperly' being used as a designation system for e.g. marking. The aim of this International Standard is to simplify the data block system and to connect more to ISO 1043 and ISO 11469, where the first two blocks are used for generic identification and marking of products.

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 19065 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 19065 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.

This part of ISO 19065 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 kJ/m^2;

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 19065 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 are to be determined in accordance with the test methods specified in ISO 6402-2, 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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 1043-2, *Plastics — Symbols and abbreviated terms — Part 2: Fillers and reinforcing materials*

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: Fillers or reinforcing materials and their nominal content (see 3.3).

Data block 3: First letter: Intended application and/or method of processing (see 3.4).

Letters 2 to 8: Important properties, additives and supplementary information (see 3.4).

Data block 4: Designatory properties (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 the hyphen, 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	*N*-phenylmaleimide and other maleimides
X	Other/unspecified

3.3 Data block 2

In this data block, the type of filler and/or reinforcing material is represented by a one 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 3 (in accordance with ISO 1043-2). Subsequently (without a space), the mass content may be given by a two-figure number.

Mixtures of filler materials or forms may be indicated by combining the relevant codes using the sign "+" within parentheses followed by the total filler content outside the parenthesis. For example, a mixture of 25 % glass fibres (GF) and 10 % mineral powder (MD) would be indicated by (GF+MD)35 or

(GF25+MD10). If the mass content of filler and/or reinforcing material is less than 10 %, the first figure number is the figure is presented by 0 and the second figure of the mass content.

Table 3 — Code-letters for fillers and reinforcing materials in Data block 2

Code-letter	**Material** (Position 1)	**Form** (Position 2)
B	boron	beads, spheres, balls
C	carbon [a]	
D		fines, powder
F		fibre
G	glass	ground
H		whiskers
K	calcium carbonate	
M	mineral [a]	
ME	metal [b]	
S	synthetic organic [a]	flakes
T	talcum	
X	not specified	not specified
Z	others [a]	others

[a] These materials may be identified after the code-letter, e.g. by chemical symbol or additional codes to be agreed upon.

[b] The type of metal shall be identified by means of the relevant chemical symbol(s) after the mass content . For example, steel whiskers may be designated “MEH05Fe”.

3.4 Data block 3

In this data block, information about the method of processing is represented by a code letter, followed by cord letters about additives, supplementary information, and other characteristics. The code-letters used are specified in Table 4.

If no specific information is given on the method of processing the letter X shall be used as the first code-letter.

Table 4 — Code-letters used in data block 3

Code-letter	Method of processing (First letter)	Supplementary information (Letters 2 to 8)
A		processing stabilized
B		antiblocking
C		coloured
D		powder, dry-blend
E	extrusion of pipes, profiles and sheets	
F	extrusion of films and thin sheeting	special burning characteristics
G		granules
H		heat stabilized
L		light stabilized
M	injection moulding	
N		natural (no colour added)
R		mould release agent
S		lubricated
X	no indication	
Z		antistatic

3.5 Data block 4

3.5.1 General

In this data block, the range of Vicat softening temperature is represented by a three-figure code-number (see 3.5.2), the range of melt volume-flow rate by a two-figure code-number (see 3.5.3), the range of Charpy notched impact strength by a two-figure code-number (see 3.5.4) and the range of tensile modulus by a two-figure code-number (see 3.5.5). 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.

3.5.2 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 °C ± 2 °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 5.

Table 5 — Code-numbers for Vicat softening temperature in data block 4

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

3.5.3 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 °C ± 2 °C and then stored in a desiccator at 23 °C ± 2 °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 6.

Table 6 — Code-numbers for melt volume-flow rate in data block 4(measured at 220 °C/10 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

3.5.4 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 7.

Table 7 — Code-numbers for Charpy notched impact strength in data block 4

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

3.5.5 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 8.

Table 8 — Code-numbers for tensile modulus in data block 4

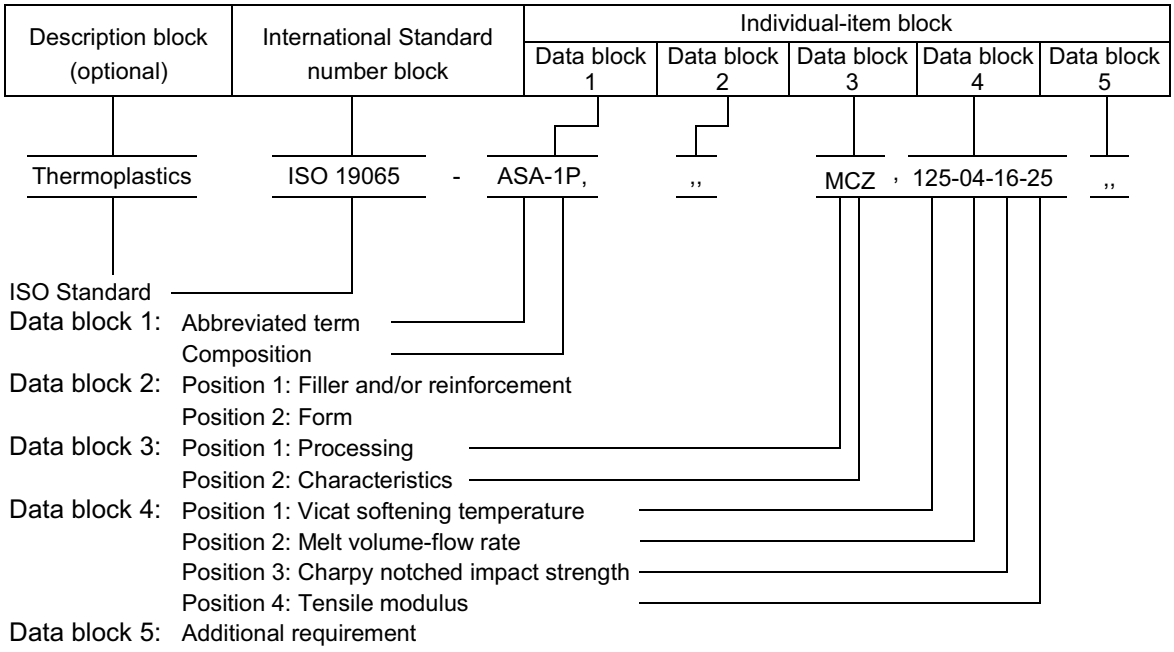
Code-number	Range of tensile modulus MPa
15	≤ 1 800
20	> 1 800 but ≤ 2 300
25	> 2 300 but ≤ 2 800
30	> 2 800

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 Example of a designation

An ASA moulding material, incorporating 8 % by mass of *N*-phenylmaleimide (1P), intended for injection moulding (M), coloured (C), antistatic (Z), and with a VST of 121 °C (125), an MVR of 5 cm^3/10 min (04), a Charpy notched impact strength of 16 kJ/m^2 (16) and a tensile modulus of 2 600 MPa (25), would be designated:



Designation: Thermoplastics ISO 19065-ASA-1P,,MCZ,125–04–25,, or

ISO 19065-ASA-1P,,MCZ,125–04–16–25,, or

ISO 19065-ASA-1P,,MCZ,125–04–16–25

Part marking: > ASA-1P <

DESIGNATION									
Description block (optional) Thermoplastics	Identity block								
	ISO Standard	Individual item block							
		Data block 1		Data block 2		Data block 3		Data block 4	Data block 5
		Polymer		Performance		Processing and application		Properties	Additional information
		Type	Composition	Filler	Reinforcing material	Processing	Characteristics		
	19065–1	-ASA	–1P			M	CZ	125–04–16–25	
> Part marking <									
No	No	Yes		Yes		No		No	No

Designation: Thermoplastics ISO 19065-ASA-1P,,MCZ,125–04–16–25,, or

ISO 19065-ASA-1P,,MCZ,125–04–16–25,, or

ISO 19065-ASA-1P,,MCZ,125–04–16–25

Part marking: > ASA-1P <

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