INTERNATIONAL STANDARD

ISO 21301-1

First edition
2019-02

Plastics — Ethylene-vinyl acetate (EVAC) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

Plastiques — Matériaux à base de copolymères éthylène/acétate de vinyle (EVAC) pour moulage et extrusion —

Partie 1: Système de désignation et base de spécification

Reference number
ISO 21301-1:2019(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **2**
4 Designation system **2**
4.1 General 2
4.2 Data block 1 2
4.3 Data block 2 3
4.4 Data block 3 3
4.5 Data block 4 4
4.5.1 General 4
4.5.2 Melt mass-flow rate 4
4.6 Data block 5 5
5 Examples of designations **6**

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61 *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

This first edition of ISO 21301-1 cancels and replaces the second edition of ISO 4613-1:1993, which has been technically revised. The main changes compared to the previous edition are as follows:

— a new designation system has been introduced;

— the range of MFR has been added.

The revised designation system is published under a new ISO number, as many existing documents refer to ISO 4613-1. If the existing ISO 4613-1 would be replaced by the new designation system, these documents would refer to the incorrect designation system.

The new designation system according to ISO 21301-1 is intended to replace gradually any designation system according to ISO 4613-1.

A list of all parts in the ISO 21301 series can be found on the ISO website.

Introduction

ISO 4613-1 (revised as ISO 21301-1) is complex and does not fit with daily practice anymore. In practice, ISO 1043 (all parts) and ISO 11469 are, in combination, "improperly" being used as a designation system for, for example, marking. The aim of this revision is to simplify the data block system and to connect more to ISO 1043 (all parts) and ISO 11469, where the first two blocks are used for generic identification and marking of products.

Plastics — Ethylene-vinyl acetate (EVAC) moulding and extrusion materials —

Part 1: Designation system and basis for specifications

1 Scope

1.1 This document establishes a system of designation for ethylene-vinyl acetate thermoplastic material, which can be used as the basis for specifications.

1.2 The types of ethylene-vinyl acetate (EVAC) plastic are differentiated from each other by a classification system based on appropriate levels of the following designatory properties:

a) vinyl acetate content;

b) melt mass-flow rate;

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

1.3 This document is applicable to all ethylene vinyl acetate copolymers containing from a mass fraction from 3 % to 50 % (approximately 25 % molar) of vinyl acetate.

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

1.4 It is not intended to imply that materials having the same designation give necessarily the same performance. This document does not provide engineering data, performance data or data on processing conditions which can be required to specify a material for a particular application and/or method of processing.

If such additional properties are required, they are determined in accordance with the test methods specified in ISO 21301-2, if suitable.

1.5 In order to specify a thermoplastic material for a particular application or to ensure reproducible processing, additional requirements can be given in data block 5 (see 4.1).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1043-2, *Plastics — Symbols and abbreviated terms — Part 2: Fillers and reinforcing materials*

ISO 8985, *Plastics — Ethylene/vinyl acetate copolymer (EVAC) thermoplastics — Determination of vinyl acetate content*

ISO 21301-2, *Plastics — Ethylene-vinyl acetate (EVAC) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Designation system

4.1 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 symbol EVAC in accordance with ISO 1043-1 and information about the polymerization process or composition of the polymer (see 4.2);

— Data block 2: Fillers or reinforcing materials and their nominal content (see 4.3);

— Data block 3: Position 1: Intended application or method of processing (see 4.4);

Positions 2 to 8: Important properties, additives and supplementary information (see 4.4);

— Data block 4: Designatory properties (see 4.5);

— Data block 5: For the purpose of specifications, a fifth data block may be added containing additional information (see 4.6).

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 (,,).

4.2 Data block 1

In this data block, after the hyphen, ethylene-vinyl acetate plastics are identified by the symbol "EVAC", in accordance with ISO 1043-1 and, after a space, the vinyl acetate content is indicated.

The vinyl acetate content, expressed as a percentage by mass, shall be determined in accordance with ISO 8985. The possible values of vinyl acetate content are divided into 8 ranges, each represented by a 2-figure code-number as specified in Table 1.

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

Code-number	VAC content (mass fraction in %)
03	>3 but ≤5
08	>5 but ≤10
13	>10 but ≤15
18	>15 but ≤20
23	>20 but ≤25
28	>25 but ≤30
35	>30 but ≤40
45	>40 but ≤50

4.3 Data block 2

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 2 (in accordance with ISO 1043-2). Subsequently (without a space), the mass content may be given by a two-figure number in positions 3 and 4. The first figure number is presented by 0 and the second figure number is the figure of the mass content if the mass content of filler and/or reinforcing material is less than 10 %.

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).

Table 2 — 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	
L	Cellulose	
M	Mineral[a], metal[a,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] Metal fillers shall be identified by their chemical symbol (in capital letters) after the mass content. For example, 5 % steel whiskers may be designated "MH05FE".

4.4 Data block 3

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 shall be inserted in position 1.

Table 3 — Code-letters used in data block 3

Code-letter	First letter	Letters 2 to 8
A	Adhesives	Processing stabilized
B	Blow moulding	Antiblocking
C	Calendering	Coloured
D		Powder
E	Extrusion	Expandable
F	Extrusion of films	Special burning characteristics
G	General use	Granules
H		Heat stabilized
K	Cable and wire	Metal deactivated
L	Monofilament extrusion	Light stabilized
M	Moulding	Nucleated
N		Natural (no colour added)
P		Impact modified
Q	Compression moulding	
R	Rotational moulding	Mould release agent
S	Sintering	Lubricated
T	Tape manufacture	Transparent
X	No indication	Crosslinkable
Y		Increased electrical conductivity
Z		Antistatic

4.5 Data block 4

4.5.1 General

In this data block, the range of the melt mass-flow rate is represented by a letter and a 3-figure code-number (see 4.5.2).

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.

4.5.2 Melt mass-flow rate

The melt mass-flow rate shall be determined in accordance with ISO 21301-2 under the test conditions specified in Table 4.

Set of conditions B is used only for materials having an MFR greater than 100 when tested under set of conditions D.

Set of conditions Z is used only for materials having an MFR greater than 100 when tested under set of conditions B.

The possible values of melt mass-flow rate are divided into 16 ranges, each represented by a 3-figure code-number as specified in Table 5. The test conditions used shall be indicated by a single letter, selected from Table 4, immediately preceding the code-number.

Table 4 — Test conditions used for the determination of melt mass-flow rate

Code-letter	Temperature °C	Nominal load kg
D	190	2,16
B	150	2,16
Z	125	0,325

Table 5 — Ranges of melt mass-flow rate in data block 4

Code-number	Range of melt flow rate g/10 min
000	≤0,10
001	>0,10 but ≤0,20
003	>0,20 but ≤0,40
006	>0,40 but ≤0,80
012	>0,80 but ≤1,5
022	>1,5 but ≤3,0
045	>3,0 but ≤6,0
090	>6,0 but ≤12
200	>12 but ≤25
400	>25 but ≤50
700	>50 but ≤100
715	>100 but ≤200
725	>200 but ≤300
740	>300 but ≤450
750	>450 but ≤600
770	>600 but ≤800

4.6 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.