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Plastics — Ethylene/vinyl alcohol (EVOH) copolymer moulding and extrusion materials —

Part 1: Designation system and basis for specifications

Plastiques — Matériaux à base de copolymères éthylène/alcool vinylique (EVOH) pour moulage et extrusion —

Partie 1: Système de désignation et base de spécification

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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).

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 ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

This first edition of ISO 21309-1 cancels and replaces ISO 14663-1:1999, which has been technically revised to introduce a new designation system. The main changes are as follows:

— a new designation system has been introduced;

— the number of the standard has been changed;

— the code numbers used for melt mass-flow rate have been revised.

A list of all parts in the ISO 21309 series can be found on the ISO website.

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.

Plastics — Ethylene/vinyl alcohol (EVOH) copolymer moulding and extrusion materials —

Part 1: Designation system and basis for specifications

1 Scope

This document establishes a system of designation for ethylene/vinyl alcohol (EVOH) copolymer thermoplastic materials, which may be used as the basis for specifications.

The types of ethylene/vinyl alcohol (EVOH) copolymer plastic are differentiated from each other by a classification system based on appropriate levels of the designatory property:

— melt mass-flow rate;

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

This document is applicable to copolymers of ethylene and vinyl alcohol containing from 15 mol % to 60 mol % of ethylene. It applies to materials ready for normal use in the form of powder, granules or pellets, unmodified or modified by colorants, additives, fillers, etc.

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 intended to be determined in accordance with the test methods described ISO 21309-2, if suitable.

In order to specify a thermoplastic material for a particular application or to ensure reproducible processing, additional requirements can be given in data block 4 and 5 (see Clause 4, introductory paragraph).

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 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

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 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 five data blocks comprising the following information:

— Data block 1: Identification of the plastic by its symbol EVOH in accordance with ISO 1043-1 and information about the composition of the polymer (see 4.2).

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

— Data block 3: First letter: Intended application or method of processing (see 4.4). Letters 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. This kind of information is not relevant to this document.

The first character of the individual-item block shall be a hyphen. The five 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 alcohol copolymers are identified by the symbol EVOH, in accordance with ISO 1043-1, and, after a space, a two-figure code-number giving the ethylene content (mol %) of the copolymer as specified in Table 1.

Table 1 — Code numbers used for ethylene content in data block 1

Code-number	Range of ethylene content mol %
15	>13 but ≤17
18	>17 but ≤20
23	>20 but ≤25
27	>25 but ≤28
29	>28 but ≤31
32	>30 but ≤34
35	>34 but ≤37
38	>37 but ≤40

Table 1 *(continued)*

Code-number	Range of ethylene content mol %
44	>40 but ≤46
48	>46 but ≤50
53	>50 but ≤55
58	>55 but ≤60

The ethylene content can be determined by the method specified in ISO 21309-2:2019, Annex B.

4.3 Data block 2

This data block is foreseen for fillers or reinforcing materials and their normal content; this is not relevant for EVOH.

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 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	Blow moulding	**B**	Antiblocking
		C	Coloured
		D	Powder
E	Extrusion		
F	Extrusion of films	**F**	Special burning characteristics
G	General use	**G**	Granules / Pellets
H	Coating	**H**	Heat-ageing stabilized
		L	Light or weather stabilized
M	Moulding		
		N	Natural (no colour added)
P	Extrusion of pipe	**P**	Impact modified
		R	Mould release agent
		S	Lubricated
T	Thermoforming	**T**	Transparent
		V	Heat shrinkable
X	No indication	**X**	Crosslinkable
Y	Textile yarns, spinning	**Y**	Increased electrical conductivity
		Z	Antistatic

4.5 Data block 4

In this data block, the melt mass-flow rate is represented by a single code-letter (indicating the conditions of measurement) immediately followed by a three-figure code-number (indicating the range in which the value falls).

If a 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.

The melt mass-flow rate shall be determined in accordance with ISO 1133-1, using set of conditions X (see Table 3). Set of conditions D is intended for comparisons with PE, EVAC or other polymers, provided the melting point of the ethylene/vinyl alcohol copolymer is below 190 °C.

Table 3 — Test conditions for determination of melt mass-flow rate

Code-letter	Test temperature °C	Nominal load kg
D	190	2,16
X	210	2,16

The possible values of the melt mass-flow rate are divided into 11 ranges, each represented by a three-figure code-number as specified in Table 4.

Table 4 — Code numbers used for melt mass-flow rate in data block 3

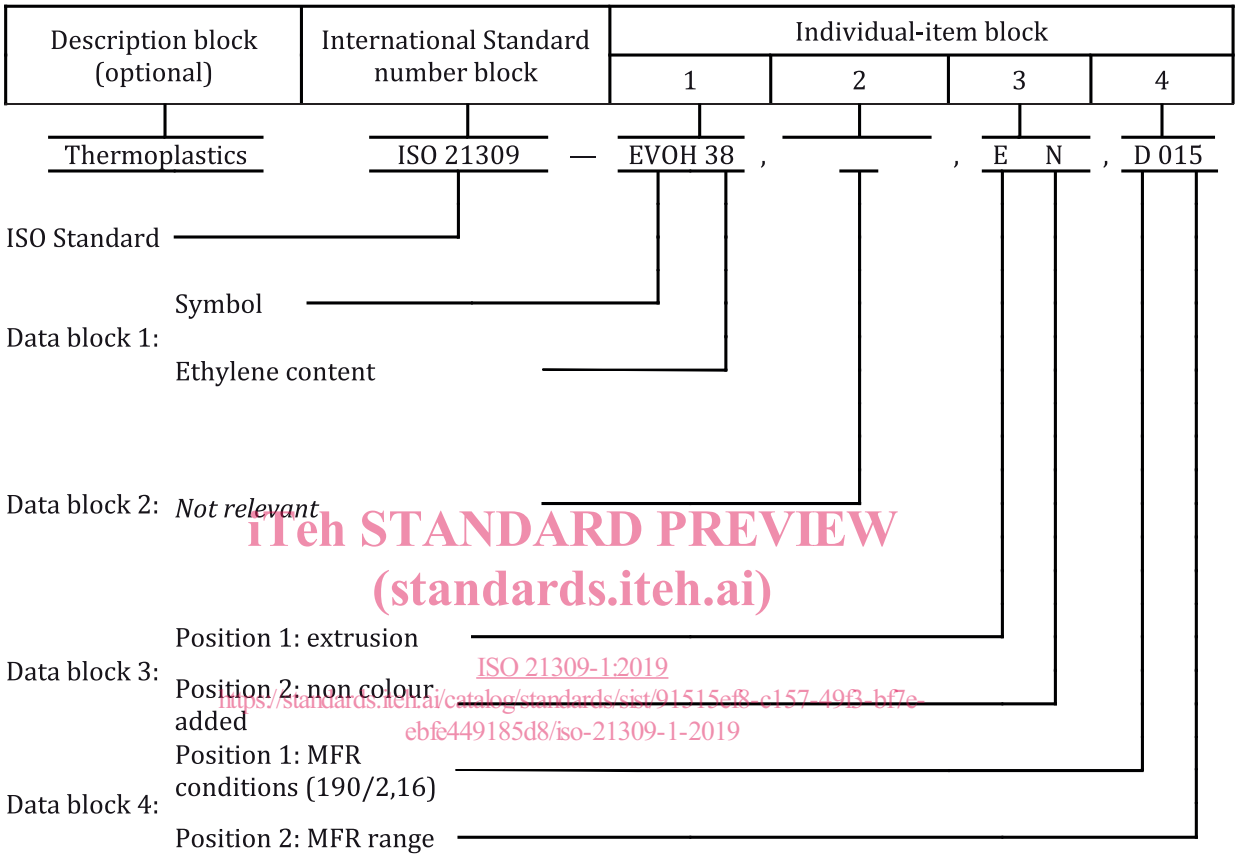
Code-number	Range of melt mass-flow rate g/10 min
000	≤0,10
002	>0,10 but ≤0,30
004	>0,30 but ≤0,50
007	>0,50 but ≤1,00
015	>1,00 but ≤2,00
025	>2,00 but ≤3,0
040	>3,0 but ≤5,0
060	>5,0 but ≤8,0
090	>8,0 but ≤12
200	>12 but ≤25
400	>25 but ≤50
700	>50

4.6 Data block 5

Indication of additional requirements in this data block transforms the designation of a material into a specification for a particular material. This may be done, for example, by reference to a suitable national standard or to a standard-like, generally established specification.

5 Examples of designations

An ethylene/vinyl alcohol copolymer (EVOH) with an ethylene content of 38 mol % (38), intended for extrusion (E), without special additives and having a melt mass-flow rate (measured at 190 °C using a 2,16 kg load) of 1,6 g/10 min (D015), would be designated:



Designation: Thermoplastics ISO 21309–EVOH38,,EN,D015