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

Part 1:

Designation system and basis for specifications

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*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.

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 14663-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

ISO 14663 consists of the following parts, under the general title *Plastics — Ethylene/vinyl alcohol (EVOH) copolymer moulding and extrusion materials*:

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

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

Part 1: Designation system and basis for specifications

1 Scope

1.1 This part of ISO 14663 establishes a system of designation for ethylene/vinyl alcohol (EVOH) copolymer thermoplastic materials, which may be used as the basis for specifications.

1.2 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.

1.3 This part of ISO 14663 is applicable to copolymers of ethylene and vinyl alcohol containing from 15 % (*m/m*) to 60 % (*m/m*) 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.

1.4 It is not intended to imply that materials having the same designation give necessarily the same performance. This part of ISO 14663 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 described in part 2 of this International Standard, 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 clause 3, introductory paragraph).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 14663. 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 14663 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 1043-1:1997, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*.

ISO 1133:1997, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*.

ISO 14663-2:1999, *Plastics — Ethylene/vinyl alcohol (EVOH) copolymer moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties*.

3 Designation system

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 polymerization process or composition of the polymer (see 3.1).
- Data block 2: Position 1: Intended application or method of processing (see 3.2).
Positions 2 to 8: 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 their nominal content (see 3.4).
- 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 part of ISO 14663.

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 (,,).

3.1 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 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 % (m/m)
18	> 15 but ≤ 20
23	> 20 but ≤ 25
28	> 25 but ≤ 30
33	> 30 but ≤ 35
38	> 35 but ≤ 40
43	> 40 but ≤ 45
48	> 45 but ≤ 50
53	> 50 but ≤ 55
58	> 55 but ≤ 60

The ethylene content shall be determined by the method specified in ISO 14663-2, annex B.

3.2 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 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.

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Table 2 — Code-letters used in data block 2
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Code-letter	Position 1	Code-letter	Positions 2 to 8
A	Adhesives	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
		G1	Pellets
H	Coating	H	Heat-ageing stabilized
		L	Light or weather stabilized
M	Moulding		
		N	Natural (no colour added)
		P	Impact modified
		R	Mould release agent
		S	Lubricated
		T	Transparent
V	Thermoforming	V	Heat shrinkable
X	No indication	X	Crosslinkable
Y	Textile yarns, spinning	Y	Increased electrical conductivity

3.3 Data block 3

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, using set of conditions X¹⁾ (see table 3). Set of conditions D is intended for comparisons with PE, E/VAC 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.

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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
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

¹⁾ This set of conditions is proposed for inclusion in the next edition of ISO 1133.

3.4 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 5. Subsequently (without a space), the filler/reinforcing material content by mass may be given by a two-figure number in positions 3 and 4.

Table 5 — Code-letters used for fillers and reinforcing materials in data block 4

Code-letter	Material	Code-letter	Form
B	Boron compound	B	Beads, spheres, balls
C	Carbon ¹⁾	C	Chips, cuttings
		D	Powder
E	Clay		
		F	Fibre
G	Glass	G	Ground
		H	Whiskers
K	Calcium carbonate	K	Knitted fabric
L	Cellulose ¹⁾	L	Layer
M	Mineral ^{1) 2)} , metal ¹⁾	M	Mat (thick)
		N	Non-woven fabric (thin)
P	Mica ¹⁾	P	Paper
Q	Silicon compound		
R	Aramid	R	Mould release agent
S	Synthetic organic ¹⁾	S	Scale, flake
T	Talc	T	Cord
		V	Veneer
W	Wood ¹⁾	W	Woven fabric
X	Not specified	X	Not specified
		Y	Yarn
Z	Others ¹⁾	Z	Others ¹⁾

1) 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.

2) Mixtures of materials and/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 fibre (GF) and 10 % mineral powder (MD) would be indicated by (GF25+MD10).

4 Examples of designations

An ethylene/vinyl alcohol copolymer (EVOH) with an ethylene content of 36 % (*m/m*) (38), intended for extrusion (E), without special additives and having a melt mass-flow rate (measured at 210 °C using a 2,16 kg load) of 14,7 g/10 min (X200), would be designated:

Description block (optional)	International Standard number block	Individual-item block			
		1	2	3	
Thermoplastics	ISO 14663	-	EVOH 38,	E N,	X 200
ISO Standard					
Data block 1:	Symbol				
	Ethylene content				
Data block 2:	Position 1: extrusion				
	Position 2: no colour added				
Data block 3:	Position 1: MFR conditions (210/2,16)				
	Position 2: MFR range				

Designation: Thermoplastics ISO 14663-EVOH38,EN,X200

An ethylene/vinyl alcohol copolymer (EVOH) with an ethylene content of 21 % (m/m) (23), intended for moulding (M), coloured (C), in the form of pellets (G1), having a melt mass-flow rate (measured at 210 °C using a 2,16 kg load) of 0,90 g/10 min (X012) and reinforced with 55 % of glass fibre (GF55), would be designated:

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Description block (optional)	International Standard number block	Individual-item block				
		1	2	3	4	
Thermoplastics	ISO 14663	-	EVOH 23,	M C G1,	X 012,	GF 55
ISO Standard						
Data block 1:	Symbol					
	Ethylene content					
Data block 2:	Position 1: moulding					
	Position 2: coloured					
	Position 3: pellets					
Data block 3:	Position 1: MFR conditions (210/2,16)					
	Position 2: MFR range					
Data block 4:	Glass fibre					
	Nominal content					

Designation: Thermoplastics ISO 14663-EVOH23,MCG1,X012,GF55

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