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**Plastics — Post-consumer poly(ethylene terephthalate) (PET) bottle recyclates —**  
**Part 1:**  
**Designation system and basis for specifications**

*Plastiques — Recyclats de bouteilles en poly(téréphtalate d'éthylène) (PET) post-consommation —*  
*Partie 1: Système de désignation et base de spécification*

ISO 12418-1:2012

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# Contents

Page

Foreword .....	iv
1 Scope .....	1
2 Normative references .....	1
3 Designation system .....	2
3.1 General .....	2
3.2 Data block 1 .....	2
3.3 Data block 2 .....	3
3.4 Data block 3 .....	3
3.5 Data block 4 .....	4
3.6 Data block 5 .....	5
4 Example of a designation .....	5
Bibliography .....	7

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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

ISO 12418-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 9, *Thermoplastic materials*.

ISO 12418 consists of the following parts, under the general title *Plastics — Post-consumer poly(ethylene terephthalate) (PET) bottle recyclates*:

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

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# Plastics — Post-consumer poly(ethylene terephthalate) (PET) bottle recyclates —

## Part 1: Designation system and basis for specifications

### 1 Scope

**1.1** This part of ISO 12418 establishes a designation system for post-consumer poly(ethylene terephthalate) (PET) bottle recyclates, which may be used as the basis for specifications.

**1.2** The types of PET bottle recyclate are differentiated from each other by a classification system based on appropriate levels of the following designatory properties:

- a) intrinsic viscosity (IV);
- b) levels of contamination due to the label and other visible contaminants, PVC and polyolefins (and including adhesive);
- c) water content;
- d) bulk density.

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Information regarding the intended application or method of processing will also assist in classification.

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**1.3** This part of ISO 12418 is applicable to all PET bottle recyclates.

It applies to materials ready for normal use in the form of powder, flakes or pellets.

**1.4** It is not intended to imply that materials having the same designation will give the same performance. This part of ISO 12418 does not provide engineering data or data on processing conditions which might be required to specify a material for a particular application and/or method of processing.

If such additional details 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 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 referenced documents are indispensable for the application 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 12418-2:2012, *Plastics — Post-consumer poly(ethylene terephthalate) (PET) bottle recyclates — Part 2: Preparation of test specimens and determination of properties*

ISO 15270, *Plastics — Guidelines for the recovery and recycling of plastics waste*

### 3 Designation system

#### 3.1 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: Position 1: Identification of the plastic by its abbreviated term (PET), in accordance with ISO 1043-1 (see 3.2.1).  
Position 2: The recycling process used (see 3.2.2).  
Position 3: The form of the product (see 3.2.3).  
Position 4: For products in flake or pellet form, the size of the flakes or pellets (see 3.2.4).  
Position 5: The filter opening used in the case of pellet extrusion (see 3.2.5).
- Data block 2: Filler or reinforcing material, its form and its content in the recyclate (see 3.3).
- Data block 3: Position 1: Intended application and/or method of processing (see 3.4).  
Position 2: Information on food packaging (see 3.4).  
Position 3: Whether coloured or natural (see 3.4).
- Data block 4: Designatory properties (see 3.5).
- Data block 5: For the purpose of specifications, a fifth data block containing additional information may be added (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

##### 3.2.1 General

In this data block, after the hyphen, poly(ethylene terephthalate) plastics are identified in position 1 by the symbol “PET”. Then, in positions 2 to 5 (see 3.2.2 to 3.2.5), information about the recycling process and the form of the product is given. The code-letters and code-numbers used are specified in Table 1.

##### 3.2.2 Recycling process

In position 2 of this data block, the recycling process is represented by code-letters in parentheses, as follows:

- (MRG) for general mechanical recycling, the meaning of mechanical recycling being as defined in ISO 15270;

- (MRA) for mechanical recycling plus treatment with alkali;
- (MRP) for mechanical recycling plus treatment other than treatment with alkali, such as solid-phase polymerization or vacuum evaporation.

### 3.2.3 Product form

In position 3 of this data block, the form of the product is represented by a code-letter, F, P or W.

### 3.2.4 Size of flakes or pellets in product

In position 4 of this data block, the size of the flakes or pellets making up the product is represented by a code-letter, S, M or L.

### 3.2.5 Filter opening

In position 5 of this data block, the filter opening in the case of pellet extrusion is represented by a two-figure code-number.

**Table 1 — Code-letters and code-numbers used in data block 1**

Position 2		Position 3		Position 4			Position 5 (in the case of pellets)	
Code-letters	Recycling process	Code-letter	Product form	Code-letter	Flake size <sup>a</sup> mm	Pellet size <sup>b</sup> mm	Code-number	Filter opening µm
(MRG)	General mechanical recycling	F	Flakes	S	≤ 5	≤ 2	35	≤ 35
(MRA)	Mechanical recycling + treatment with alkali	P	Pellets	M	> 5 but ≤ 10	> 2 but ≤ 5	99	> 35
(MRP)	Mechanical recycling + other treatment <sup>c</sup>	W	Powder	L	≥ 10	≥ 5		

NOTE Solid-phase polymerization or vacuum evaporation treatment is a suitable additional process for MRP.

<sup>a</sup> Flake size is given by the sieve mesh opening of the grinder.

<sup>b</sup> Pellet size is given by the die opening in the pelletizer and measured using a ruler or callipers.

<sup>c</sup> In addition to the usual mechanical recycling process, one or more physical and/or chemical processes, other than treatment with alkali, are used to improve the purity.

## 3.3 Data block 2

In this data block, the type of filler and/or reinforcing material is normally represented by a single code-letter in position 1 and its physical form by a second code-letter in position 2. Subsequently (without a space), the mass content may be given by a two-figure code-number. In the case of general PET bottle recyclates, however, it is not permitted to add filler and/or reinforcing material intentionally. The recyclate content may be given by the code-letter R followed, without a space, by the mass content, the whole being placed between parentheses. For example, the fact that the PET contains no filler but 100% of recycled material would be indicated by (R100).

## 3.4 Data block 3

In this data block, information about the intended application and/or method of processing is given in position 1. Information on food packaging is given in position 2 and whether the product is coloured or natural is indicated in position 3. The code-letters used are specified in Table 2. If no specific information is indicated, the letter X or the letters XX, depending on the position, shall be inserted (see Table 2).

Table 2 — Code-letters used in data block 3

Position 1		Position 2		Position 3	
Code-letter	Intended method of processing	Code-letters	Intended application	Code-letter	Colour
B	Blow moulding or injection moulding	FD	Direct food contact <sup>a</sup>	C	Coloured
E	Extrusion of films or sheets	FI	Indirect food contact	N	Natural (no colour added)
F	Fibre	NF	Non-food application		
X	No indication	XX	No indication	X	No indication
NOTE Examples of national and regional legislation on food contact are given in the Bibliography.					
<sup>a</sup> Food packaging shall meet the legal requirements for direct food contact of the country or region where it is to be used.					

### 3.5 Data block 4

#### 3.5.1 General

In this data block, the range of intrinsic viscosity (IV) is represented by a code-letter/number combination in position 1, the level of contamination due to the label and other visible contaminants by a code-letter/number combination in position 2, the level of contamination due to PVC by a code-letter/number combination in position 3, the level of contamination due to polyolefins (and including adhesive) by a code-letter/number combination in position 4, the water content by a code-letter/number combination in position 5 and the bulk density by a code-letter/number combination in position 6. The code-letter/number combinations used are specified in Table 3.

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 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 are provided by currently available polymers.

Table 3 — Code-letters/numbers used in data block 4

Position 1		Position 2		Position 3		Position 4		Position 5		Position 6	
Code	Intrinsic viscosity  dl/g	Contamination level (only for flakes) mg/kg						Code	Water content  %	Code	Bulk density  kg/m³
		Code	Label and similar	Code	PVC	Code	Poly-olefins				
IV10	≥ 1,0	L02	≤ 20	V02	≤ 20	O02	≤ 20	W1	≤ 1,0	D1	≥ 400
IV08	≥ 0,8 but < 1,0	L10	> 20 but ≤ 100	V10	> 20 but ≤ 100	O10	> 20 but ≤ 100	W2	> 1,0 but < 1,5	D2	> 300 but < 400
IV07	≥ 0,7 but < 0,8	L30	> 100 but ≤ 300	V30	> 100 but ≤ 300	O30	> 100 but ≤ 300	W9	≥ 1,5	D9	≤ 300
IV06	≥ 0,6 but < 0,7	L99	> 300	V99	> 300	O99	> 300				
IV00	< 0,6										

#### 3.5.2 Intrinsic viscosity

The intrinsic viscosity (IV) shall be determined either in accordance with the method given in Table 1 of ISO 12418-2:2012 or from the melt volume-flow rate (MVR) determined in accordance with Annex C of ISO 12418-2:2012, using the conversion equation given in that annex.



The possible values of the intrinsic viscosity are divided into five ranges, each represented by a code-letter/number combination as specified in Table 3.

### 3.5.3 Contamination due to the label and other visible contaminants, PVC and polyolefins

The level of contamination due to the label and other visible contaminants, PVC and polyolefins (including adhesive) shall be determined in accordance with ISO 12418-2.

The possible contamination levels are divided into four ranges, each represented by a code-letter/number combination as specified in Table 3.

### 3.5.4 Water content

The water content shall be determined in accordance with ISO 12418-2.

### 3.5.5 Bulk density

The bulk density shall be determined in accordance with ISO 12418-2.

## 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.

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## 4 Example of a designation

A PET bottle recycle (recycle rate 100%) recycled by mechanical recycling plus treatment other than treatment with alkali [(MRP)], in the form of flakes (F) of size 7 mm (M), without filler [(R100)], intended for blow moulding (B) and indirect food contact applications (FI), natural (N), intrinsic viscosity 0,85 dl/g (IV08), contamination due to the label and other visible contaminants 15 mg/kg (L02), contamination due to PVC 30 mg/kg (V10), contamination due to polyolefins 10 mg/kg (O02), water content 0,5 % (W1) and bulk density 350 kg/m<sup>3</sup> (D2).