

**BRITISH STANDARD**

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**BS EN ISO  
1872-1:1999**

*Incorporating  
Amendment No. 1 to  
BS ISO 1872-1:1993  
(renumbers the BS as  
BS EN ISO  
1872-1:1999)*

**Plastics —**

**Polyethylene (PE) moulding  
and extrusion materials**

**Part 1. Designation system and basis for  
specifications**

The European Standard EN ISO 1872-1:1999 has the status of a  
British Standard

ICS 83.080.20

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## Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee PRI/32, Olefin plastics, upon which the following bodies were represented:

British Cable Makers' Confederation  
 British Plastics Federation  
 Ministry of Defence  
 Packaging and Industrial Films Association  
 Telecommunications Cables Group of Bcmc

This British Standard, having been prepared under the direction of the Sector Board for Materials and Chemicals, was published under the authority of the Standards Board and comes into effect on 15 August 1995

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The following BSI references relate to the work on this standard:  
 Committee reference PRI/32  
 Draft for comment 92/45175 DC

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## National foreword

This British Standard is the English language version of EN ISO 1872-1:1999.

This British Standard is published under the direction of the Sector Board for Materials and Chemicals whose Technical Committee PRI/32 has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN ISO title page, the EN ISO foreword page, the ISO title page, ISO page ii, pages 1 to 8, an inside back cover and a back cover.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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EN ISO 1872-1

May 1999

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English version

Plastics — Polyethylene (PE) moulding and extrusion  
materials — Part 1: Designation system and basis for  
specifications

(ISO 1872-1:1993)

Plastiques — Polyéthylène (PE) pour moulage et  
extrusion — Partie 1: Système de désignation et  
base de spécification  
(ISO 1872-1:1993)

Kunststoffe — Polyethylen (PE) Formmassen —  
Teil 1: Bezeichnungssystem und Basis für  
Spezifikationen  
(ISO 1872-1:1993)

This European Standard was approved by CEN on 16 April 1999.

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Ref. No. EN ISO 1872-1:1999 E

**EN ISO 1872-1:1999****Foreword**

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This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 1999, and conflicting national standards shall be withdrawn at the latest by November 1999.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

**Endorsement notice**

The text of the International Standard ISO 1872-1:1993 has been approved by CEN as a European Standard without any modification.

NOTE Normative references to International Standards are listed in annex ZA (normative).

INTERNATIONAL  
STANDARD

**ISO**  
**1872-1**

Second edition  
1993-12-15

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**Plastics — Polyethylene (PE) moulding and  
extrusion materials —**

**Part 1:**

Designation system and basis for  
specifications

*Plastiques — Polyéthylène (PE) pour moulage et extrusion —  
Partie 1: Système de désignation et base de spécification*



Reference number  
ISO 1872-1:1993(E)

## ISO 1872-1:1993(E)

## 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 1872-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Sub-Committee SC 9, *Thermoplastic materials*.

This second edition cancels and replaces the first edition (ISO 1872-1:1986), which has been brought into accordance with the revised frame text for designation standards.

ISO 1872 consists of the following parts, under the general title *Plastics — Polyethylene (PE) 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 — Polyethylene (PE) moulding and extrusion materials —

## Part 1:

### Designation system and basis for specifications

#### 1 Scope

**1.1** This part of ISO 1872 establishes a system of designation for polyethylene thermoplastic material, which may be used as the basis for specifications.

**1.2** The types of polyethylene plastic are differentiated from each other by a classification system based on appropriate levels of the designatory properties

a) density

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 part of ISO 1872 is applicable to all polyethylene homopolymers and to copolymers of ethylene having a content of other 1-olefinic monomers of less than 50 % (*m/m*) and a content of non-olefinic monomers with functional groups up to a maximum of 3 % (*m/m*).

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

This part of ISO 1872 does not apply to masterbatches or to EPM rubber.

**1.4** It is not intended to imply that materials having the same designation give necessarily the same performance. This part of ISO 1872 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 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 clause 3, introductory paragraph).



**ISO 1872-1:1993(E)**

**2 Normative references**

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 1872. 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 1872 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 1043-1:1987, *Plastics — Symbols — Part 1: Basic polymers and their special characteristics.*

ISO 1133:1991, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics.*

ISO 1183:1987, *Plastics — Methods for determining the density and relative density of non-cellular plastics.*

ISO 1872-2:1989, *Plastics — Polyethylene (PE) and ethylene copolymer thermoplastics — Part 2: Preparation of test specimens and determination of properties.*

**3 Designation and specification system**

The designation and specification system for thermoplastics is based on the following standardized pattern:

| Designation                     |                                     |                       |              |              |              |              |
|---------------------------------|-------------------------------------|-----------------------|--------------|--------------|--------------|--------------|
| Description block<br>(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 PE in accordance with ISO 1043-1 (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.

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 (,,).

**3.1 Data block 1**

In this data block, after the hyphen, polyethylene plastics are identified by the symbol "PE", in accordance with ISO 1043-1.

**3.2 Data block 2**

In this data block, information about the 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 1.

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 1 — Code-letters used in data block 2**

| Code-letter | Position 1                              | Code-letter | Positions 2 to 8                  |
|-------------|---|-------------|-----------------------------------|
| <b>B</b>    | Blow moulding                           | <b>A</b>    | Processing stabilized             |
| <b>C</b>    | Calendering                             | <b>B</b>    | Antiblocking                      |
| <b>E</b>    | Extrusion of pipes, profiles and sheets | <b>C</b>    | Coloured                          |
| <b>F</b>    | Extrusion of films                      | <b>D</b>    | Powder                            |
| <b>G</b>    | General use                             | <b>E</b>    | Expandable                        |
| <b>H</b>    | Coating                                 | <b>F</b>    | Special burning characteristics   |
| <b>K</b>    | Cable and wire coating                  | <b>G</b>    | Pellets, granules                 |
| <b>L</b>    | Monofilament extrusion                  | <b>H</b>    | Heat ageing stabilized            |
| <b>M</b>    | Injection moulding                      | <b>K</b>    | Metal deactivated                 |
| <b>Q</b>    | Compression moulding                    | <b>L</b>    | Light and weather stabilized      |
| <b>R</b>    | Rotational moulding                     | <b>M</b>    | Nucleated                         |
| <b>S</b>    | Sintering                               | <b>N</b>    | Natural (no colour added)         |
| <b>T</b>    | Tape manufacture                        | <b>P</b>    | Impact modified                   |
| <b>X</b>    | No indication                           | <b>R</b>    | Mould release agent               |
|             |   | <b>S</b>    | Lubricated                        |
|             |   | <b>T</b>    | Improved transparency             |
|             |   | <b>X</b>    | Crosslinkable                     |
|             |   | <b>Y</b>    | Increased electrical conductivity |
|             |   | <b>Z</b>    | Antistatic                        |

**3.3 Data block 3**

In this data block, density is represented by a 2-figure code-number (see 3.3.1) and melt mass-flow rate by a code-letter and a 3-figure code-number (see 3.3.2). The two 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 range limit because of manufacturing tolerances, the designation is not affected.

NOTE 1 Not all the combinations of the values of the designatory properties are provided by currently available polymers.

**ISO 1872-1:1993(E)**

**3.3.1 Density**

The density shall be determined on a piece of melt-indexer extrudate.

The sample, uncoloured and unfilled, is extruded from a standard melt indexer at 190 °C in accordance with the method described in ISO 1133 under suitable conditions in order to obtain a strand of suitable length, free of voids, with a smooth surface. After being cut off, the strand is allowed to fall on a cool metal plate. It is subsequently annealed by immersing it in 200 ml of boiling water in a beaker, boiled for 30 min, and allowed to cool for 1 h by keeping the beaker and contents in the laboratory atmosphere. The density of the specimen is then determined within 24 h in accordance with ISO 1183.

The possible values of density are divided into 10 ranges, each represented by a 2-figure code-number as specified in table 2.

**Table 2 — Code-numbers used for density in data block 3**

| Code-number | Range of density at 23 °C ± 2 °C<br>kg/m <sup>3</sup> |
|-------------|---|
| 00          | < 901   |
| 03          | > 901 but < 906                                       |
| 08          | > 906 but < 911                                       |
| 13          | > 911 but < 916                                       |
| 18          | > 916 but < 921                                       |
| 23          | > 921 but < 925                                       |
| 27          | > 925 but < 930                                       |
| 33          | > 930 but < 936                                       |
| 40          | > 936 but < 942                                       |
| 45          | > 942 but < 948                                       |
| 50          | > 948 but < 954                                       |
| 57          | > 954 but < 960                                       |
| 62          | > 960   |

**3.3.2 Melt mass-flow rate**

The melt mass-flow rate shall be determined in accordance with ISO 1133 under the test conditions specified in table 3.

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

| Code-letter | Temperature<br>°C | Nominal load<br>kg |
|-------------|-------------------|--------------------|
| E           | 190               | 0,325              |
| D           | 190               | 2,16               |
| T           | 190               | 5,00               |
| G           | 190               | 21,6               |

Set of conditions T is used only for materials having an MFR less than 0,1 g/10 min when tested under set of conditions D. Set of conditions G is used only for materials having an MFR < 0,1 g/10 min when tested under set of conditions T. Set of conditions E is used only for materials having an MFR > 100 g/10 min when tested under set of conditions D.

The possible values of melt mass-flow rate are divided into 11 ranges, each represented by a 3-figure code-number as specified in table 4. The test conditions used shall be indicated by a single code-letter, as specified in table 3, immediately preceding the code-number indicating the range.

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

| Code-number | Range of MFR<br>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                     |

NOTE 2 Melt mass-flow rate (MFR) will be replaced by melt volume-flow rate (MVR) at the next five-year revision of this part of ISO 1872.

### 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 mass content may be given by a 2-figure number in positions 3 and 4.

ISO 1872-1:1993(E)

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

| Code-letter | Material                                      | Code-letter | Form                        |
|-------------|---|-------------|-----------------------------|
| <b>B</b>    | Boron   | <b>B</b>    | Balls, beads, spheres       |
| <b>C</b>    | Carbon <sup>1)</sup>                          | <b>D</b>    | Powder                      |
| <b>G</b>    | Glass   | <b>F</b>    | Fibre                       |
| <b>K</b>    | Calcium carbonate                             | <b>G</b>    | Ground (ground fibres also) |
| <b>L</b>    | Cellulose <sup>1)</sup>                       | <b>H</b>    | Whiskers                    |
| <b>M</b>    | Mineral <sup>1)2)</sup> , metal <sup>1)</sup> | <b>S</b>    | Scales, flakes              |
| <b>S</b>    | Synthetic organic <sup>1)</sup>               | <b>X</b>    | Not specified               |
| <b>T</b>    | Talc  | <b>Z</b>    | Others <sup>1)</sup>        |
| <b>W</b>    | Wood  |             |                             |
| <b>X</b>    | Not specified                                 |             |                             |
| <b>Z</b>    | Others <sup>1)</sup>                          |             |                             |

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) Mineral fillers should be designated more precisely if a symbol is available, e.g. "E", "P".

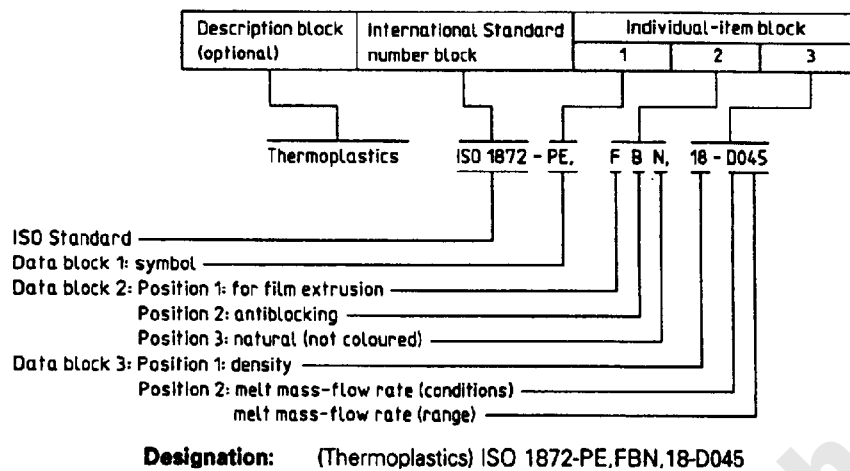
Mixtures of materials and/or forms may be indicated by combining the relevant codes using the sign "+" and placing the whole between parentheses. For example, a mixture of 25 % glass fibres (GF) and 10 % mineral powder (MD) would be indicated by (GF25+MD10).

**3.5 Data block 5**

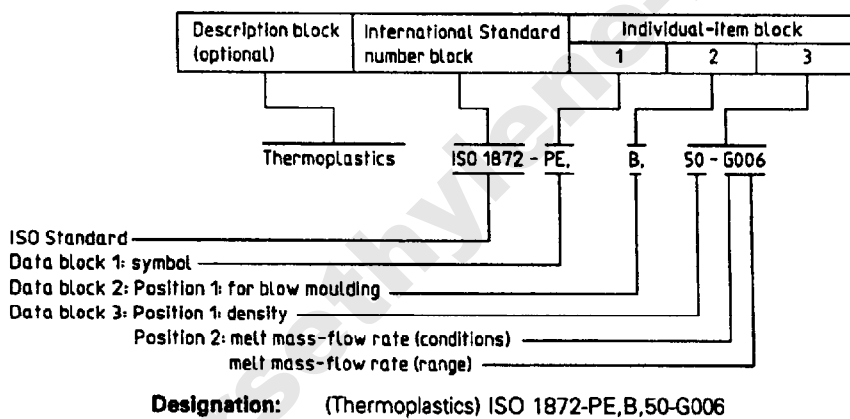
Indication of additional requirements in this optional data block is a way of transforming the designation of a material into a specification for a particular application. This shall be done for example by reference to a suitable national standard or to a standard-like, generally established specification.

**4 Examples of designations**

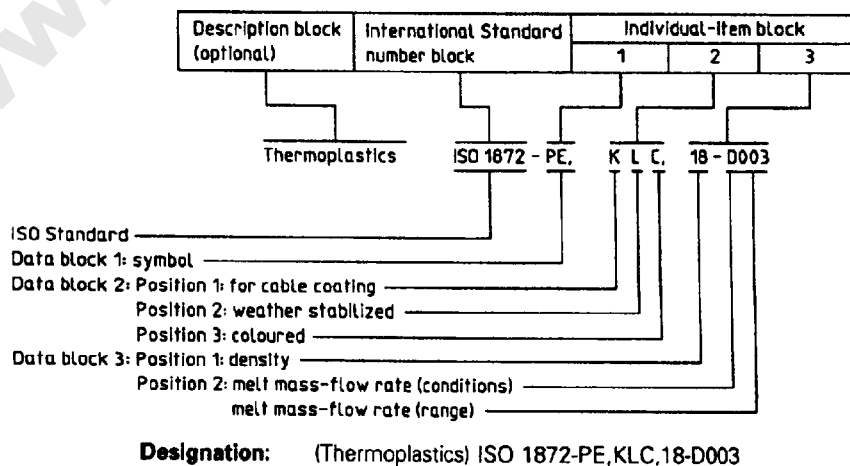
**4.1** A polyethylene thermoplastic material (PE), intended for extrusion of film (F) with antiblocking (B) and natural (not coloured) (N), having a density of 918 kg/m<sup>3</sup> (18) and a melt mass-flow rate (MFR 190/2,16) (D) of 3,5 g/10 min (045), would be designated:



4.2 A polyethylene thermoplastic material (PE) for blow moulding (B) without special additives and having a density of 952 kg/m<sup>3</sup> (50) and a melt mass-flow rate (MFR 190/21,6) (G) of 0,5 g/10 min (006), would be designated:



4.3 A polyethylene thermoplastic material (PE), intended for cable coating (K), weather stabilized (L), coloured (C), having a density (base polymer) of 920 kg/m<sup>3</sup> (18) and a melt mass-flow rate (MFR 190/2,16) (D) of 0,22 g/10 min (003), would be designated:



## EN ISO 1872-1:1999

**Annex ZA (normative)****Normative references to international publications with their relevant European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

| Publication | Year | Title  | EN            | Year |
|-------------|------|--|---------------|------|
| ISO 1043-1  | 1997 | <i>Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics</i>                                   | EN ISO 1043-1 | 1999 |
| ISO 1872-2  | 1997 | <i>Plastics — Polyethylene (PE) moulding and extrusion materials — Part 2: Preparation of test specimens and determination of properties</i> | EN ISO 1872-2 | 1997 |
| ISO 1133    | 1997 | <i>Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics</i>                       | EN ISO 1133   | 1999 |

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