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Plastics — Symbols —

Part 1:
Basic polymers and their special characteristics

Plastiques — Symboles —

Partie 1: Polymères de base et leurs caractéristiques spéciales

Reference number
ISO 1043-1 : 1987 (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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1043-1 was prepared by Technical Committee ISO/TC 61, *Plastics*.

Together with ISO 1043-2 and ISO 1043-3, it cancels and replaces ISO 1043 : 1978, of which it constitutes an extension and a partial revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Plastics — Symbols —

Part 1 :
Basic polymers and their special characteristics

1 Scope and field of application

This part of ISO 1043 provides uniform symbols for terms relating to plastics. It includes only those symbols that have come into established use, and its aim is both to prevent the occurrence of more than one symbol for a given plastics term, and to prevent the interpretation of more than one meaning for a given symbol.

NOTE — For symbols for fillers and reinforcing materials, see ISO 1043-2, and for symbols for plasticizers, see ISO 1043-3. Symbols for rubber and latices are given in ISO 1629.

2 References

ISO 1043, *Plastics — Symbols*

— *Part 2: Fillers and reinforcing materials.* [1)]

— *Part 3: Plasticizers.* [1)]

ISO 1629, *Rubbers and latices — Nomenclature.*

3 Use of the symbols

3.1 Symbols for homopolymeric and natural polymeric materials are given in clause 4, those for copolymeric materials in clause 5, and symbols for special characteristics in clause 6. Examples of the use of symbols are given in clause 7, and guidance for the preparation of new symbols in annex A. Reference lists of the symbols used are given in annex B.

3.2 To distinguish the essential molecular characteristics within a given generic type of plastics material, additional symbols, with rules for their use, are provided. The use of symbols for describing properties that can only be ascertained subjectively should be avoided since this can lead to confusion.

3.3 The symbols are primarily intended to be a convenient shorthand for chemical names in publications and other written matter, and are not intended for the selection of materials. They should also be used for indicating simply the type of basic polymer in materials and products, e.g. ABS moulding material, PA film, PE sheeting, PVC pipe.

3.4 Only capital letters shall be used.

3.5 The first appearance of the symbols in texts shall be enclosed in parentheses and shall be preceded by the term written in full.

3.6 The rules of the International Union of Pure and Applied Chemistry (IUPAC) for source-based names of polymers specify that, when "poly" is followed by more than one word, enclosing marks are used. This practice is followed in this part of ISO 1043, but in common usage the enclosing marks are often omitted.

3.7 No attempt is made formally to systematize a shorthand terminology of polymers. Terminology and formulae designations for scientific literature in the field of natural and synthetic polymers are elaborated by the Macromolecular Nomenclature Commission of IUPAC. The symbols published by this Commission are the same as in this part of ISO 1043, as far as frequently used polymers are concerned.

1) At present at the stage of draft.

4 Symbols for homopolymeric and natural polymeric materials

Symbol	Material
CA	Cellulose acetate
CAB	Cellulose acetate butyrate
CAP	Cellulose acetate propionate
CF	Cresol-formaldehyde
CMC	Carboxymethyl cellulose
CN	Cellulose nitrate
CP	Cellulose propionate
CTA	Cellulose triacetate
EC	Ethyl cellulose
EP	Epoxide; Epoxy
FF	Furane-formaldehyde
MC	Methyl cellulose
MF	Melamine-formaldehyde
PA	Polyamide
PAI	Polyamide/imide
PAN	Polyacrylonitrile
PAUR	Poly(ester urethane)
PB	Polybutene-1
PBA	Poly(butyl acrylate)
PBT	Poly(butylene terephthalate)
PC	Polycarbonate
PCTFE	Polychlorotrifluoroethylene
PDAP	Poly(diallyl phthalate)
PE	Polyethylene
PEEK	Polyetheretherketone
PEI	Poly(ether imide)
PEOX	Poly(ethylene oxide)
PES	Poly(ether sulfone)
PET	Poly(ethylene terephthalate)
PEUR	Poly(ether urethane)
PF	Phenol-formaldehyde
PFA	Perfluoro alkoxyl alkane
PI	Polyimide
PIB	Polyisobutene; Polyisobutylene
PIR	Polyisocyanurate
PMI	Polymethacrylimide
PMMA	Poly(methyl methacrylate)
PMP	Poly-4-methylpentene-1
PMS	Poly-α-methylstyrene
POM	Polyoxymethylene (polyacetal); Polyformaldehyde
PP	Polypropylene
PPE	Poly(phenylene ether)
PPOX	Poly(propylene oxide)
PPS	Poly(phenylene sulfide)
PPSU	Poly(phenylene sulfone)
PS	Polystyrene
PSU	Polysulfone
PTFE	Polytetrafluoroethylene
PUR	Polyurethane
PVAC	Poly(vinyl acetate)
PVAL	Poly(vinyl alcohol)
PVB	Poly(vinyl butyral)
PVC	Poly(vinyl chloride)
PVDC	Poly(vinylidene chloride)
PVDF	Poly(vinylidene fluoride)
PVF	Poly(vinyl fluoride)
PVFM	Poly(vinyl formal)
PVK	Polyvinylcarbazole
PVP	Polyvinylpyrrolidone
SI	Silicone
SP	Saturated polyester
UF	Urea-formaldehyde
UP	Unsaturated polyester

5 Symbols for copolymeric materials

(see also annex A, clause A.4)

Symbol	Material
A/B/A	Acrylonitrile/butadiene/acrylate
ABS	Acrylonitrile/butadiene/styrene
A/CPE/S	Acrylonitrile/chlorinated polyethylene/styrene
A/EPDM/S [1]	Acrylonitrile/ethylene-propylene-diene/styrene
A/MMA	Acrylonitrile/methyl methacrylate
ASA	Acrylonitrile/styrene/acrylate
E/EA	Ethylene/ethyl acrylate
E/MA	Ethylene/methacrylic acid
E/P	Ethylene/propylene
EPDM [1]	Ethylene/propylene/diene
E/TFE	Ethylene/tetrafluoroethylene
E/VAC	Ethylene/vinyl acetate
E/VAL	Ethylene/vinyl alcohol
FEP	Perfluoro(ethylene/propylene); Tetrafluoroethylene/hexafluoropropylene
MBS	Methacrylate/butadiene/styrene
MPF	Melamine/phenol-formaldehyde
PEBA	Polyether block amide
SAN [2]	Styrene/acrylonitrile
S/B	Styrene/butadiene
SMA	Styrene/maleic anhydride
S/MS	Styrene/α-methylstyrene
VC/E	Vinyl chloride/ethylene
VC/E/MA	Vinyl chloride/ethylene/methyl acrylate
VC/E/VAC	Vinyl chloride/ethylene/vinyl acetate
VC/MA	Vinyl chloride/methyl acrylate
VC/MMA	Vinyl chloride/methyl methacrylate
VC/OA	Vinyl chloride/octyl acrylate
VC/VAC	Vinyl chloride/vinyl acetate
VC/VDC	Vinyl chloride/vinylidene chloride

NOTE — For symbols for mixtures of polymers, see annex A, clause A.5.

1) EPDM is a rubber symbol; for definition see ISO 1629.

2) In Japan and the USA the symbol "SAN" is a registered trademark; therefore in Japan and the USA "AS" is used for styrene/acrylonitrile.

6 Symbols for indication of special characteristics

The symbols of the basic polymers may be supplemented by up to four symbols (see the table) to differentiate between modifications of a basic polymer, if required. The supplementary symbols shall be placed after the symbol of the basic polymer, separated by a hyphen. No symbols shall be placed in front of the symbol of the basic polymer.

Table — Examples of symbols indicating special characteristics

Symbol	Significance
C	chlorinated
D	density
E	expandable *or* expanded
F	flexible *or* fluid (liquid state)
H	high
I	impact
L	linear *or* low
M	medium *or* molecular
N	normal *or* novolak
P	plasticized
R	resol
T	thermoplastic
U	ultra *or* unplasticized
V	very
W	weight
X	crosslinked *or* crosslinkable

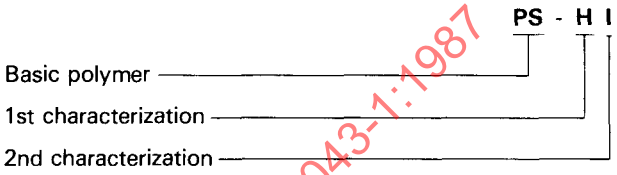
7 Examples of use of symbols

Example 1

Symbol for basic polymer **PVC** plus Symbol for "plasticized" **P** = **PVC-P**

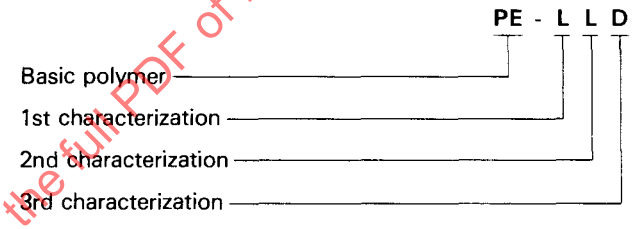
Example 2

"High-impact" modified polystyrene = **PS-HI**



Example 3

"Linear low density" polyethylene = **PE-LLD**



Annex A

Guide for preparing new symbols for basic polymers, mixtures of polymers, and related terms

(This annex forms an integral part of the Standard.)

A.1 Use the letter P for "poly" to designate a homopolymer.

NOTE — The letter P may be used to designate a copolymer when its omission would be confusing.

A.2 Use only capital letters; for example:

Poly(vinyl chloride)	**PVC**

A.3 Where duplication otherwise occurs or where confusion may otherwise result, use two capital letters for a given component, not necessarily in the order in which they occur in the component being designated; for example:

Poly(vinyl acetate)	**PVAC**
Poly(vinyl alcohol)	**PVAL**
Poly(vinyl formal)	**PVFM**

A.4 For copolymers, use symbols for monomeric components in the order in which they occur in the term being designated, separated by an oblique stroke; the symbols generally appear from left to right in the order of decreasing mole ratio (mol %) or mass ratio (mass %) of the monomeric components in the copolymer.

Bipolymers

A/MMA	*Acrylonitrile/methyl methacrylate*
E/P	Ethylene/propylene

Terpolymers

VC/E/MA	Vinyl chloride/ethylene/methyl acrylate

NOTE — The oblique strokes may be omitted when common usage has established the symbol without the oblique stroke; for example ABS and FEP.

A.5 For mixtures of polymers, use the symbols for the basic polymers separated by a plus sign, in parentheses; for example:

(PMMA + ABS) for a mixture of poly(methyl methacrylate) and acrylonitrile/butadiene/styrene.

A.6 Use figures after the symbols for the components (but before the symbols indicating special characteristics) to designate polymers prepared from various condensation units in a homologous series; for example:

1)	Polymer of ε-caprolactam	**PA 6**
2)	Polymer of hexamethylenediamine and adipic acid	**PA 66**
3)	Polymer of hexamethylenediamine and sebacic acid	**PA 610**
4)	Polymer of 11-aminoundecanoic acid	**PA 11**
5)	Polymer of ω-dodecanolactam	**PA 12**
6)	Copolymer of hexamethylenediamine, adipic acid and sebacic acid	**PA 66/610**
7)	Copolymer of ε-caprolactam and ω-dodecanolactam	**PA 6/12**

where PA indicates a polyamide and, when two monomers are involved, the first figure refers to the number of carbon atoms in the amine and the second figure refers to the number of carbon atoms in the acid. An oblique stroke is used to separate the polyamide components of copolyamides.

A.7 The symbols for terms for different materials used in the plastics industry should never be identical. On the other hand, it is not feasible to avoid using in the plastics industry symbols that in another industry designate another product. Adherence to the provision in clause 3 for identification of the term for which the symbol is used at its first occurrence in the text will avoid possible confusion.

A.8 New symbols for terms relating to plastics will be incorporated in future editions of this part of ISO 1043 when they are needed for purposes of international communication and commerce. Interested parties should keep their national ISO member bodies informed of the need for such new international symbols for industrially important materials.