

INTERNATIONAL STANDARD

ISO
3673-1

Second edition
1996-12-15

Plastics — Epoxy resins —

Part 1: Designation

Plastiques — Résines époxydes —

Partie 1: Désignation



Reference number
ISO 3673-1:1996(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 3673-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee 12, *Thermosetting materials*.

This second edition cancels and replaces the first edition (ISO 3673-1:1980), of which it constitutes a minor (editorial) revision.

ISO 3673 consists of the following parts, under the general title *Plastics — Epoxy resins*:

- *Part 1: Designation*
- *Part 2: Preparation of test specimens and determination of properties*

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Printed in Switzerland

Plastics – Epoxy resins – Part 1: Designation

1 Scope

This part of ISO 3673 specifies a method of designation for epoxy resins.

The objective of this designation method is to allocate to each commercial product a group of digits, called the "designation", giving in a coded form certain information on the product: chemical base, approximate values of main properties and the nature of modifiers, solvents or additives.

Thus, all products having similar characteristics and therefore likely to have the same uses will have the same designation, so aiding users in their choice, provided that manufacturers quote the designation in their data sheets.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 3673. 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 3673 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 1183: 1987, *Plastics — Method for determining the density and relative density of non-cellular plastics*.

ISO 1675: 1985, *Plastics — Liquid resins — Determination of density by the pycnometer method*.

ISO 3001:—¹⁾, *Plastics — Epoxy compounds — Determination of epoxy equivalent*.

ISO 3219: 1993, *Plastics — Polymers/resins in the liquid state or as emulsions or dispersions — Determination of viscosity using a rotational viscometer with defined shear rate*.

3 Designation system

Epoxy resins shall be designated by the symbol "EP" for epoxide, followed by a group of five digits (corresponding to principal properties), followed by a space, followed by three digits (corresponding to secondary properties) as follows:

- each digit, except the first two digits which shall be taken together, shall correspond to one of the properties given in table 1,
- the position (I and II, III, IV, etc.) of each digit in the group shall indicate the property to which it refers,
- each digit for a property shall indicate the class (1, 2, 3 etc.) corresponding to a certain range of values of the property, as given in table 1.

NOTE 1 Not every combination of property classification will be achievable in practice. Note also that the designation of a material will not correspond, except by chance, with a horizontal row.

NOTE 2 The value of each property in positions III, IV and VI to be taken into consideration in defining the class to which a product belongs is the mean value found in manufacture and normally given in data sheets.

1) To be published. (Revision of ISO 3001:1978)

Because of inevitable variations in manufacturing conditions, a product supposedly belonging to a given class for one property incidentally may fall, in some cases:

- in the adjacent lower class if the mean value of this property is near the lower limit of the designation class;
- in the adjacent upper class if the mean value is near the upper limit.

4 Designation of an epoxy resin

In accordance with the designation system described in clause 3, an epoxy resin shall be designated by a group of five digits followed by a group of three digits, the two groups being separated by a space.

The first group of five digits refers to the principal properties and the final three digits to the secondary properties.

If one of the properties, usually designated by a digit indicating the class, is not specified, a small "x" shall be inserted at the appropriate place in the designation.

EXAMPLE An epoxy resin designated by EP 03361 3xx is a resin based on an aliphatic glycidyl ether (or ester), viscosity between 1 Pa·s and 5 Pa·s, epoxy equivalent between 291 g/mol et 525 g/mol, without any modifiers, density between 1,15 g/cm³ and 1,19 g/cm³, without any indication for additives and without any special indications.

NOTE 3 The designation does not exempt the manufacturer from giving in his literature the actual values of the designated properties, together with manufacturing and measurement tolerances.

5 Special properties

These properties shall not be included in the designation but shall be given, if necessary, in actual values only, and reference made to the relevant International Standards for the test methods.

Examples of such properties are electrical properties and optical properties, both of which will be the subjects of future International Standards.

Table 1 — Characteristics of epoxy resins

Designation order number	I and II	III	IV	V	VI	VII	VIII
Characteristic	Principal properties				Secondary properties		
	Chemical base ¹⁾	Viscosity at 23 °C and shear rate of 1 s ⁻¹	Epoxy equivalent	Organic modifiers or solvents	Density at 23 °C	Additives ²⁾	Special indications ²⁾
Units	—	Pa·s (= 10 P)	g/mol	—	g/cm ³	—	—
Method Class	—	ISO 3219	ISO 3001	—	ISO 1675 ISO 1183	—	—
x	Not designated (ND)	ND	ND	ND	ND	ND	ND
1	Bisphenol A/ glycidyl ethers	≤0,25	≤115	None	<1,10	None	Material with specified burning characteristics ³⁾
2	Aromatic glycidyl ethers (or esters)	>0,25 to 1	116 to 150	Reactive agent	1,10 to 1,14	Fillers	Content of hydrolysable chlorine below 0,2 %
3	Aliphatic glycidyl ethers (or esters)	>1 to 5	151 to 175	Non-reactive agent	1,15 to 1,19	Colorants (organic or inorganic)	Low tendency to crystallize
4	Cycloaliphatic glycidyl ethers (or esters)	>5 but fluid	176 to 210	Organic solvent	1,20 to 1,29	Fillers and colorants	Water- soluble
5	Epoxy- cycloolefins	Semi-solid	211 to 290	Reactive agent and organic solvent	1,30 to 1,39	Emulsifying agents	Heat- resistant
6	Epoxy- novolac	Solid	291 to 525	Non-reactive agent and organic solvent	1,40 to 1,59	—	—
7	Halogenated epoxides	Thixotropic	526 to 1 025	—	1,60 to 1,80	—	—
8	Other glycidic nitrogenous compounds	—	1 026 to 2 050	—	>1,80	—	—
9	Heterocyclic compounds	—	>2 050	—	—	—	—
10	Epoxy-olefins	—	—	—	—	—	—
11	Bisphenol glycidyl ethers other than class 1	—	—	—	—	—	—

1) The chemical basis shall be indicated by two digits:

- class x is written xx
- class 1 is written 01
- class 2 is written 02 etc.
- class 11 is written 11

For a mixture with equal proportions of two resins of different chemical base, the symbol "xx" (not designated) may be used.

2) The most important one shall be indicated, if there are several additives or special indications.

3) For a complete assessment of the fire performance of a material, information is required on at least the following properties:

- ignitability
- combustibility
- flammability
- heat release
- smoke release
- noxious-gas release

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