INTERNATIONAL STANDARD

ISO 3672-1

Second edition
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Plastics — Unsaturated-polyester resins (UP-R) —

Part 1: Designation system

Plastiques — Résines de polyesters non saturés (UP-R) —

Partie 1: Système de désignation

Reference number
ISO 3672-1:2000(E)

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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 3.

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 part of ISO 3672 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 3672-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 12, *Thermosetting materials*.

This second edition cancels and replaces the first edition (ISO 3672:1979), which has been technically revised.

ISO 3672 consists of the following parts, under the general title *Plastics — Unsaturated-polyester resins (UP-R)*:

— *Part 1: Designation system*

— *Part 2: Preparation of test specimens and determination of properties*

Plastics — Unsaturated-polyester resins (UP-R) —

Part 1: Designation system

1 Scope

1.1 This part of ISO 3672 establishes a data block system for the designation of unsaturated-polyester resins (UP-R).

1.2 The various types of UP-R are differentiated from each other by a classification system based on information about the basic polymer parameters, the possible fillers/reinforcements (type and content), the intended method of processing, any specified properties and those of the specified properties used specifically for designation purposes (designatory properties).

1.3 This part of ISO 3672 is applicable to all types of unsaturated-polyester resin for normal use in a liquid state and in a solid state.

1.4 It is not intended to imply that materials having the same designation necessarily give the same performance. This part of ISO 3672 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 To ensure that code-letters and code-numbers remain unambiguous and to avoid conflicts within the system, any new code-letters or code-numbers for use in data block 1, 2 or 3 shall be approved before use by the secretariats of ISO/TC 61/SC 1, SC 12 and SC 13.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 3672. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 3672 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 472:1999, *Plastics — Vocabulary*.

ISO 1043-1:1997, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics*.

ISO 1043-2:2000, *Plastics — Symbols and abbreviated terms — Part 2: Fillers and reinforcing materials.*

ISO 2535:—[1)], *Plastics — Unsaturated-polyester resins — Measurement of gel time at ambient temperature.*

1) To be published. (Revision of ISO 2535:1997)

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*.

ISO 3672-2:2000, *Plastics — Unsaturated-polyester resins (UP-R) — Part 2: Preparation of test specimens and determination of properties*.

ISO 14848:1998, *Plastics — Unsaturated-polyester resins — Determination of reactivity at 130 °C*.

3 Terms and definitions

For the purposes of this part of ISO 3672, the terms and definitions given in ISO 472 and ISO 3672-2 apply, plus the following:

3.1
UP-R
the abbreviation for unsaturated-polyester resins

4 Designation system

4.1 General

The designation system defined in this part of ISO 3672 is based on the following standardized pattern:

<table>
<tr><th colspan="7">Designation</th></tr>
<tr><th rowspan="3">Description block</th><th colspan="6">Identity block</th></tr>
<tr><th rowspan="2">ISO Standard</th><th colspan="5">Individual-item block</th></tr>
<tr><th>Data block 1</th><th>Data block 2</th><th>Data block 3</th><th>Data block 4</th><th>Data block 5</th></tr>
</table>

The designation consists of an optional description block, reading “R” (resin), 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: Marking block

Item 1: Identification of the basic polymer by its symbol, in accordance with ISO 1043-1;

Item 2: Nature of the designatory reinforcement materials or fillers, in accordance with ISO 1043-2;

Item 3: Form of the designatory reinforcement materials or fillers, in accordance with ISO 1043-2;

Item 4: Nominal content of the designatory reinforcement materials or fillers, in accordance with Table 1.

Data block 2: Method of processing

Method of processing for which the unsaturated-polyester resin is intended, designated in accordance with Table 2.

Data block 3: Properties

Item 1: Specified properties, in accordance with Table 3;

Item 2: Designatory property No. 1 — viscosity at 23 °C determined in accordance with ISO 3219;

Item 3: Designatory property No. 2 — gel time at ambient temperature determined in accordance with ISO 2535 or reactivity at 130 °C determined in accordance with ISO 14848.

Data block 4 and data block 5 (optional): Additional requirements

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 an “X” (not applicable), but only if another block follows.

For labelling purposes, and provided no other blocks follow, the comma between blocks 1 and 2 can be omitted.

There is no need to fill in data blocks if they are not required.

4.2 Data block 1

Item 1: After the hyphen, unsaturated-polyester resins shall be identified by the symbol UP, in accordance with ISO 1043-1.

Mixtures and modifications shall be designated in accordance with ISO 1043-1:1997, subclauses 4 and 5.

The following information shall be restricted to designatory fillers/reinforcements used in the unsaturated-polyester resin in question:

Item 2: Nature of filler/reinforcement, in accordance with Table 1;

Item 3: Form of filler/reinforcement, in accordance with Table 1;

Item 4: Nominal content (mass %) of filler/reinforcement, in accordance with Table 1.

Note, in particular, the following:

— the same code-letters have different meanings when used for item 2 and item 3;

— whenever information needs to be indicated only for item 3, an “X” (not applicable) is required for item 2.

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

Item 2 Nature of filler/reinforcement (in accordance with ISO 1043-2)		Item 3 Form of reinforcement/filler (in accordance with ISO 1043-2)		Item 4 Percentage content by mass w % (m/m)	
				05	$w < 7{,}5$
		B	Balls, beads, spheres	**10**	$7{,}5 \leqslant w < 12{,}5$
C	Carbon	**C**	Chips, cuttings	**15**	$12{,}5 \leqslant w < 17{,}5$
D	Aluminium oxide trihydrate	**D**	Dust, powder	**20**	$17{,}5 \leqslant w < 22{,}5$
E	Clay			**25**	$22{,}5 \leqslant w < 27{,}5$
		F	Fibre	**30**	$27{,}5 \leqslant w < 32{,}5$
G	Glass	**G**	Ground	**35**	$32{,}5 \leqslant w < 37{,}5$
K	Calcium carbonate			**40**	$37{,}5 \leqslant w < 42{,}5$
L1	Cellulose			**45**	$42{,}5 \leqslant w < 47{,}5$
L2	Cotton			**50**	$47{,}5 \leqslant w < 52{,}5$
M	Mineral			**55**	$52{,}5 \leqslant w < 57{,}5$
P	Mica			**60**	$57{,}5 \leqslant w < 62{,}5$
Q	Silica			**65**	$62{,}5 \leqslant w < 67{,}5$
R	Recycled material			**70**	$67{,}5 \leqslant w < 72{,}5$
S	Synthetic, organic	**S**	Scale, flakes	**75**	$72{,}5 \leqslant w < 77{,}5$
T	Talc			**80**	$77{,}5 \leqslant w < 82{,}5$
W	Wood			**85**	$82{,}5 \leqslant w < 87{,}5$
X	No indication	**X**	No indication	**90**	$87{,}5 \leqslant w < 92{,}5$
Z	Others	**Z**	Others	**95**	$92{,}5 \leqslant w < 97{,}5$

NOTE 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 20 % glass fibre (GF) and 20 % mineral dust (MD) would be indicated by (GF20+MD20) or (GF+MD)20.

4.3 Data block 2

In this data block, information about the method of processing is given using the code-letters and code-numbers specified in Table 2.

The code-letters and code-numbers used to indicate the intended method of processing in data block 2 shall be selected carefully. Certain brands of material can be processed in more than one way, e.g. either by compression moulding (Q) or by injection moulding (M). Such brands shall be designated “general purpose” (G). The designation of special methods of processing shall be reserved for specially modified resins.

Table 2 — Code-letters and code-numbers used in data block 2

A	**Adhesive processing**	**N**	**No-pressure processing**
A1	Glues	**N1**	Casting
A2	Mastics	**N2**	Continuous impregnation
A3	Aggregates (fibres, sand, abrasion particles)	**N3**	Hand lay-up
A4	PVC-PMMA reinforcement winding	**N4**	Inclusion
A5	Resin cement	**N5**	Lamination
C	**Coating**	**N6**	Spray-up
C1	Powder coating	**N7**	Filament winding
C2	Gel coating	**P**	**Pultrusion**
C3	Paper treatment	**Q**	**Compression moulding**
F	**Foaming**	**T**	**Transfer moulding**
G	**General purpose**	**W**	**Wet process**
L	**Melt impregnation**	**X**	**No indication**
M	**Injection moulding**	**Z**	**Others**
M1	Injection compression		

4.4 Data block 3

4.4.1 General

In this data block, the specified properties (see 4.4.2) are represented either by a code-letter or a code-letter and code-number as item 1, and the designatory properties (see 4.4.3 and 4.4.4) as items 2 and 3. Items 2 and 3 each start with an oblique stroke.

If the value of a designatory property 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.

Whenever information needs to be indicated only for item 2 and/or 3, an “X” (not applicable) is required for item 1 and/or 2.

4.4.2 Item 1: Specified properties

Any properties to be specified are indicated using either a code-letter or a code-letter and code-number, in accordance with Table 3.

Table 3 — Code-letters and code-numbers used in data block 3 for item 1 (specified properties)

C	**Chemical properties**	**P**	**Processing properties**
C1	Chemical resistance	**P1**	Thixotropic
C2	Hydrolysis resistance	**P2**	Low volatile emission
C3	Low-temperature crosslinking	**P3**	Containing release agent
C4	Low-pressure crosslinking	**R**	**Containing recycled material**
C5	Pre-accelerated	**S**	**Surface properties**
E	**Electrical properties**	**S1**	General purpose
F	**Flame resistance** (improved burning behaviour)	**S2**	Low shrink
F1	Self-extinguishing	**S3**	Low profile
F2	Flame retardant	**S4**	Zero shrink
L	**Light and weather stabilized**	**S5**	Abrasion resistance
M	**Mechanical properties**	**S6**	Self-lubricating
M1	Impact modified	**T**	**Thermal properties** (Temperature resistance)
M2	Flexural strength	**W**	**Water absorption**
N	**Food contact**	**X**	**No indication**
O	**Optical properties**	**Z**	**Others**
O1	Translucent		
O2	Opaque		
O3	Low colour		

4.4.3 Item 2: Designatory property No. 1 — Viscosity

This designatory property is indicated using a code-letter and a code-number in accordance with Table 4. It is not applicable to unsaturated-polyester resins in the solid state.

The viscosity shall be determined in accordance with ISO 3219.

4.4.4 Item 3: Designatory property No. 2 — Reactivity at 130 °C or gel time at ambient temperature

This designatory property is indicated using a code-letter and a code-number in accordance with Table 4. It is not applicable to unsaturated-polyester resins in the solid state.

The reactivity is used for resins processed at high temperature. It shall be determined in accordance with ISO 14848.

The gel time is used for resins processed at ambient temperature. It shall be determined in accordance with ISO 2535.

Table 4 — Code-letters and code-numbers used in data block 3 for item 2 (viscosity) and item 3 (reactivity or gel time)

Property	Code-letter	Range and code-number						
Viscosity ν (Pa·s)	**V**	$\nu < 0{,}3$ **1**	$0{,}3 \leqslant \nu < 0{,}5$ **2**	$0{,}5 \leqslant \nu < 0{,}85$ **3**	$0{,}85 \leqslant \nu < 1{,}5$ **4**	$1{,}5 \leqslant \nu < 2{,}5$ **5**	$\nu \geqslant 2{,}5$ **6**	Thixotropic **7**
Gel time t (minutes) Reactivity t from start temp. (80 °C) to maximum temp. (minutes)	**R**	$t < 1$ **1**	$1 \leqslant t < 2$ **2**	$2 \leqslant t < 3$ **3**	$3 \leqslant t < 6$ **4**	$6 \leqslant t < 9$ **5**	$9 \leqslant t < 20$ **6**	$t \geqslant 20$ **7**

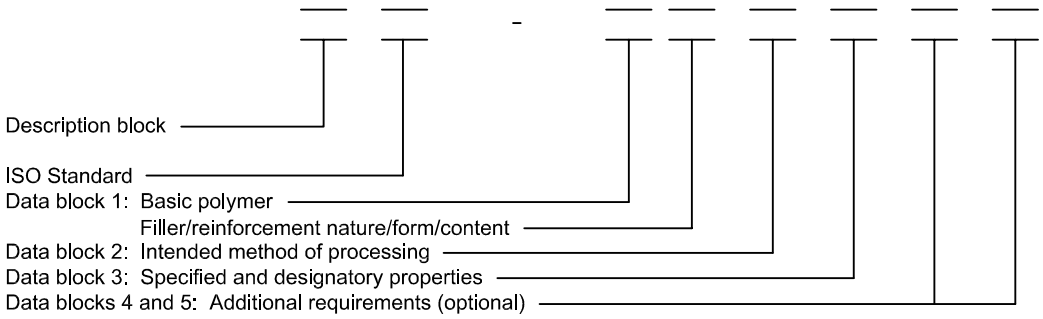
4.5 Data block 4 and data block 5

The inclusion of additional requirements in these data blocks enables special agreements between a particular supplier and a particular purchaser to be taken into account.

5 Examples of designations

5.1 General

The designation system specified in clause 4 will give a designation of the following general form:



5.2 Examples

EXAMPLE 1

R ISO 3672-UP,C2,C2/V1/R6

Description block: Resin		**R**
ISO Standard		**ISO 3672**
Data block 1:	Unsaturated polyester	**UP**
	No reinforcement/filler	**...**
Data block 2:	For gel coating	**C2**
Data block 3:	Improved hydrolysis resistance	**C2**
	Viscosity: 0,2 Pa·s	**V1**
	Gel time: 12 min	**R6**
Data blocks 4 and 5: Not used		**...**

EXAMPLE 2

R ISO 3672-UP,Q,M1/V3/R5

Description block: Resin		**R**
ISO Standard		**ISO 3672**
Data block 1:	Unsaturated polyester	**UP**
	No reinforcement/filler	**...**
Data block 2:	For compression moulding	**Q**
Data block 3:	Impact modified	**M1**
	Viscosity: 0,6 Pa·s	**V3**
	Reactivity: 7 min	**R5**
Data blocks 4 and 5: Not used		**...**

EXAMPLE 3

R ISO 3672-UP(MD40),N3,P2/V7/R6

Description block: Resin		**R**
ISO Standard		**ISO 3672**
Data block 1:	Unsaturated polyester	**UP**
	With 40 % filler (mineral dust)	**MD40**
Data block 2:	For no-pressure processing (hand lay-up)	**N3**
Data block 3:	Low volatile emission	**P2**
	Viscosity: thixotropic	**V7**
	Reactivity: 15 min	**R6**
Data blocks 4 and 5: Not used		**...**

EXAMPLE 4

R ISO 3672-UP(QB05),N,C5/V7/R7

Description block: Resin		**R**
ISO Standard		**ISO 3672**
Data block 1:	Unsaturated polyester	**UP**
	With $< 7{,}5$ % filler (silica)	**QB05**
Data block 2:	No-pressure processing	**N**
Data block 3:	Pre-accelerated	**C5**
	Viscosity: thixotropic	**V7**
	Reactivity: > 20 min	**R7**
Data blocks 4 and 5: Not used		**...**

ICS 83.080.10

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