INTERNATIONAL STANDARD

ISO 1268-11

First edition
2005-02-01

Fibre-reinforced plastics — Methods of producing test plates —

Part 11: Injection moulding of BMC and other long-fibre moulding compounds — Small plates

Plastiques renforcés de fibres — Méthodes de fabrication de plaques d'essai —

Partie 11: Moulage par injection de BMC et d'autres mélanges à mouler à longues fibres — Plaques de petites dimensions

Reference number
ISO 1268-11:2005(E)

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Published in Switzerland

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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 1268-11 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 13, *Composites and reinforcement fibres*.

Together with the other parts (see below), this part of ISO 1268 cancels and replaces ISO 1268:1974, which has been technically revised.

ISO 1268 consists of the following parts, under the general title *Fibre-reinforced plastics — Methods of producing test plates*:

— *Part 1: General conditions*

— *Part 2: Contact and spray-up moulding*

— *Part 3: Wet compression moulding*

— *Part 4: Moulding of prepregs*

— *Part 5: Filament winding*

— *Part 6: Pultrusion moulding*

— *Part 7: Resin transfer moulding*

— *Part 8: Compression moulding of SMC and BMC*

— *Part 9: Moulding of GMT/STC*

— *Part 10: Injection moulding of BMC and other long-fibre moulding compounds — General principles and moulding of multipurpose test specimens*

— *Part 11: Injection moulding of BMC and other long-fibre moulding compounds — Small plates*

Introduction

Many factors in the injection-moulding process can influence the properties of moulded test specimens and hence the measured values obtained when the specimens are used in a test method. The thermal and mechanical properties of such specimens are in fact strongly dependent on the conditions of the moulding process used to prepare the specimens. Exact definition of each of the main parameters of the moulding process is a basic requirement for reproducible and comparable operating conditions.

It is important in defining moulding conditions to consider any influence the conditions may have on the properties to be determined. Thermosets may show differences in orientation and length of anisotropic fillers such as long fibres and in curing. Residual ("frozen-in") stresses in the moulded test specimens may also influence properties. Due to the crosslinking of thermosets, molecular orientation is of less influence on mechanical properties than it is for thermoplastics. Each of these phenomena must be controlled to avoid fluctuation of the numerical values of the measured properties.

The principles described in this part of ISO 1268 are the same as those in ISO 10724-2. Only a few details of the moulds have changed, as has specimen thickness, because of the use of long-fibre reinforcements. It is therefore possible to compare the properties of long-fibre moulding compounds with those of thermosetting powder moulding compounds (PMCs) and thermoplastics.

Fibre-reinforced plastics — Methods of producing test plates —

Part 11:
Injection moulding of BMC and other long-fibre moulding compounds — Small plates

1 Scope

This part of ISO 1268 specifies two two-cavity moulds, designated the type D1 and type D2 ISO moulds, for the injection moulding of small plates measuring 60 mm × 60 mm with preferred thicknesses of 2 mm (type D1) or 4 mm (type D2) which can be used for a variety of tests (see Annex A). The moulds may additionally be fitted with inserts for studying the effects of weld lines on the mechanical properties (see Annex B).

This part of ISO 1268 is intended to be read in conjunction with ISO 1268-1.

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 472, *Plastics — Vocabulary*

ISO 1268-1, *Fibre-reinforced plastics — Methods of producing test plates — Part 1: General conditions*

ISO 1268-10:2005, *Fibre-reinforced plastics — Methods of producing test plates — Part 10: Injection moulding of BMC and other long-fibre moulding compounds — General principles and moulding of multipurpose test specimens*

ISO 2577, *Plastics — Thermosetting moulding materials — Determination of shrinkage*

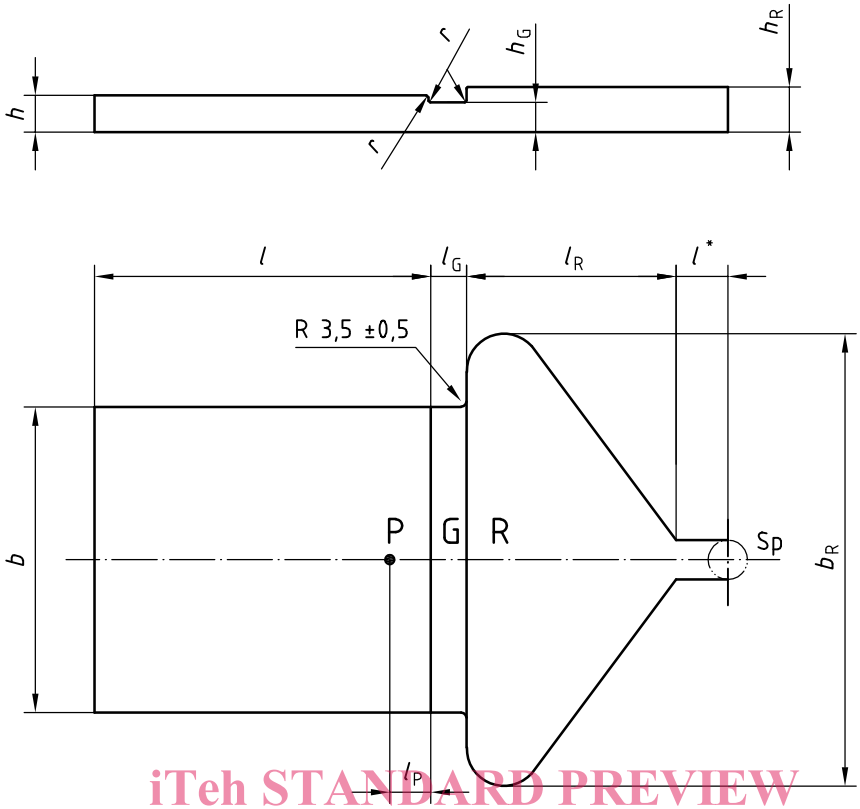
3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472 and ISO 1268-10 apply.

4 Apparatus

4.1 Type D1 and D2 ISO moulds

Type D1 and D2 moulds are two-cavity moulds (see Figure 2) intended for the preparation of plates measuring 60 mm × 60 mm. The plates produced using these moulds shall have the dimensions given in Figure 1.



Key

Sp sprue
G gate
R runner
P pressure sensor

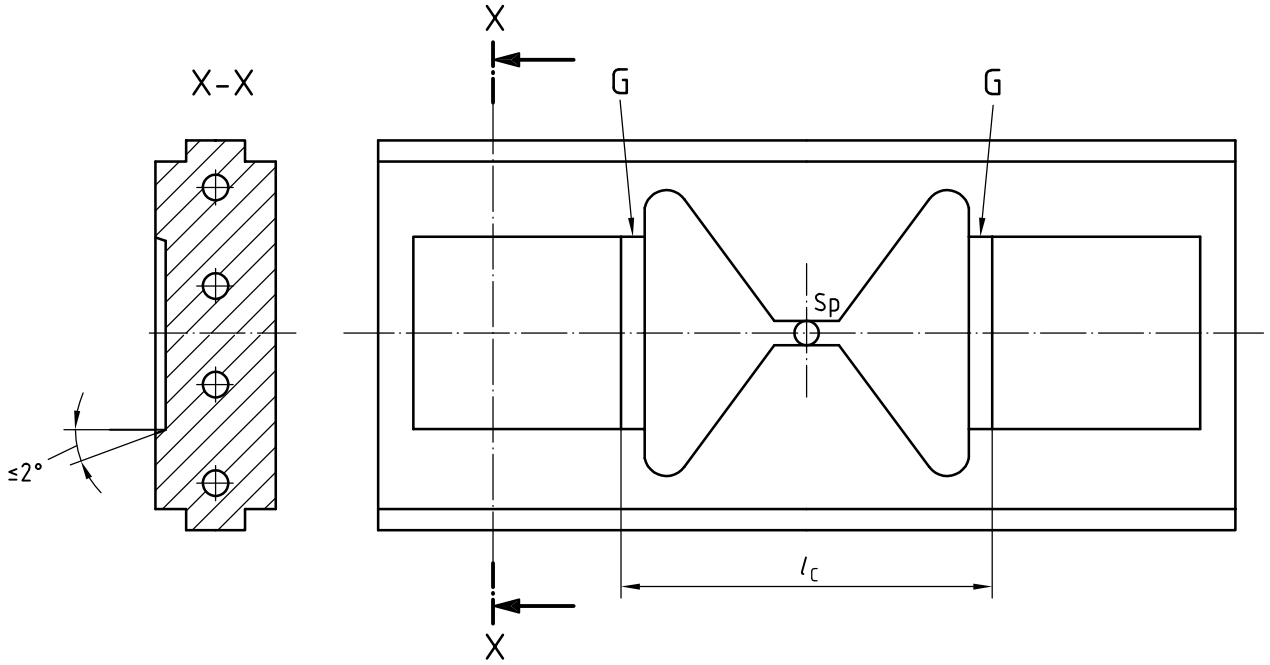
		Dimensions in mm			Dimensions in mm
l	length of plate	60 ± 2 [a]	h_G	height of gate	(0,75 ± 0,05) × h [b,c]
b	width of plate	60 ± 2 [a]	l_R	length of runner	25 to 30 [d]
h	thickness of plate:		b_R	width of runner at gate	⩾ (b + 6)
	type D1 mould	2,0 ± 0,1	h_R	depth of runner at gate	= h
	type D2 mould	4,0 ± 0,1 [a]	l^*	unspecified distance	—
l_G	length of gate	4,0 ± 0,1 [b]	l_p	distance of pressure sensor from gate	5 ± 2 [e]

[a] These dimensions are for the preferred test specimen used in ISO 6603.
[b] See Note 1 to Subclause 4.1.
[c] See Note 2 to Subclause 4.1.
[d] See Note 3 to Subclause 4.1.
[e] The position of the pressure sensor shall be further limited by the following conditions:

$l_p + r_p \leqslant 10$
$l_p - r_p \geqslant 0$

where r_p is the radius of the sensor.

Figure 1 — Details of type D1 and D2 ISO moulds



Key

Sp sprue

G gate

l_C is the distance between the lines along which the test specimens are cut from the runners (see Note 4 to Subclause 4.1)

moulding volume $V_M \approx 30\,000$ mm^3 (at 2 mm thickness)

projected area $A_p \approx 11\,000$ mm^2

Figure 2 — Cavity plate for type D1 and D2 ISO moulds

The main constructional details of type D1 and D2 ISO moulds shall be as shown in Figures 1 and 2 and shall meet the following requirements:

a) The sprue diameter on the nozzle side shall be at least (4,5 ± 0,5) mm.

b) The cavities shall be one-end gated as shown in Figure 2.

c) The draft angle of the runners shall be (13 ± 3)°. The cavity shall have a draft angle not greater than 2°.

d) The dimensions of the cavities shall be such that the dimensions of the test specimens produced conform to the requirements given in the relevant test standard. To allow for different degrees of mould shrinkage, the dimensions of the cavities shall be chosen so that they are between the nominal value and the upper limit of the dimensions specified for the specimen concerned.

   The main dimensions, in millimetres, of the cavities shall be as follows (see also Figure 1):

   — length: 60 to 62;

   — width: 60 to 62;

   — depth: type D1 mould 2,0 to 2,1;

   type D2 mould 4,0 to 4,1.

e) Ejector pins shall be located outside the test area of the specimen, i.e. in the area of the runner.