INTERNATIONAL STANDARD

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Plastics — Thermoset moulding compounds — Determination of the degree of fibre wetting in SMC

Plastiques — Compositions de moulages à base de thermodurcissables — Détermination du taux de mouillage des fibres dans les SMC

Reference number
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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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 17771 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 13, *Composites and reinforcement fibres*. It is technically identical to EN 12575:1998.

Introduction

This method provides a common basis for reinforcement manufacturers, compounders and moulders to compare data and monitor the consistency of wetting of the fibre. As wetting of fibre often improves during the first 24 h, samples of the same age are used for comparison purposes.

In a production situation, the process and formulation parameters are assumed to be constant and sufficient to produce a standard visual level of wetting. Any drifts in paste viscosity, reinforcement fibre content, mass per unit area, degree of compaction, etc., which adversely affect wetting can thus be identified.

In a development situation, the compounding process conditions need to be such that they give an acceptable level of wetting of the reinforcement. New formulations or new reinforcements can be screened using a control under identical process conditions. This screening is carried out after compounding, allowing the products under evaluation to be judged superior or inferior to the control.

Plastics — Thermoset moulding compounds — Determination of the degree of fibre wetting in SMC

1 Scope

This International Standard specifies a method for determining the degree of wetting of the reinforcement in a sheet moulding compound (SMC).

It is applicable to quality control by the user of the SMC, as well as to process control during SMC production.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard 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, *Plastics — Vocabulary*

ISO 8604, *Plastics — Prepregs — Definitions of terms and symbols for designations*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 472 and ISO 8604 and the following apply.

3.1
fibre bundle
discrete collection of many parallel fibre filaments, chopped or unchopped

3.2
wetting
state in which all the reinforcing bundles in an SMC sheet, not necessarily each individual filament, are wetted by the paste

4 Sampling

From each item to be checked (a single roll or sheet of SMC), take a laboratory sample consisting of a strip at least 40 cm wide extending cross the entire width of the SMC sheet.

5 Apparatus

5.1 **Ruler** (solvent-resistant).

5.2 **Sampling table** (measuring approximately 100 cm × 180 cm).

5.3 **Solvent-resistant opaque plate**, with a 10 cm × 10 cm inspection window (viewing field) at its centre.

5.4 Solvent-resistant gloves.

5.5 Magnifying glass (magnification × 10).

5.6 Disposable spatula (such as a tongue depressor) or **disposable blade**.

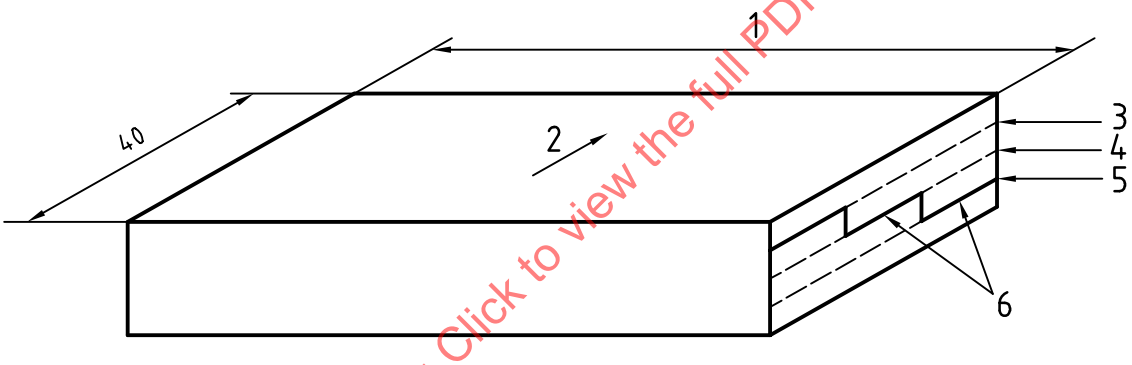
6 Procedure

6.1 The test is normally carried out immediately after manufacture of the SMC, although it can be used as a quality control test at any specified time after manufacture.

6.2 Remove the upper protective film from the sample. With sheets 10 mm thick or more, use the spatula or disposable blade to split the sheet across its entire width at three different levels (see Figure 1). This exposes a cross-section of the sheet in which the fibres at the top, middle and bottom of the sheet can be observed at the same time. With SMC sheets less than 10 mm thick, tear the sample across its entire width. It will always tear at an angle. Because of this angle, a cross-section appears across the sheet, enabling the degree of fibre wetting to be assessed visually.

If the degree of wetting is 100 %, it is not necessary to continue the assessment using the inspection window.

Dimensions in centimetres



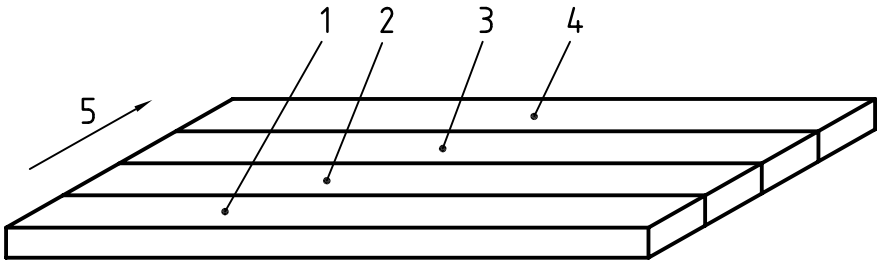
Key

1	Width of roll or sheet
2	Machine direction
3	Top
4	Middle
5	Bottom
6	Line along which sheet is split

Figure 1 — Splitting an SMC sheet

6.3 If there are dry spots, take a new sample and split it across its entire width at the level containing the most dry areas.

Divide the sample into four identical strips of length 10 cm perpendicular to the machine direction (see Figure 2) and choose the strip which contains the largest dry spots.



Key

1 to 4	Strips
5	Machine direction

Figure 2 — Sheet divided into four strips

6.4 Inspect the strip by moving the inspection window from left to right in 10 cm steps.

In each 10 cm square (viewing field), use the ruler to measure the dimensions of the dry spots, determine their surface area in square centimetres and record the results. Add these areas to give the dry-spot area Z_i for each viewing field.

NOTE 1 The use of a magnifying glass is recommended when necessary, especially in the case of light colours, high filler contents and low-solubility sizing in the reinforcement fibres.

NOTE 2 Pressing down on the SMC with any object (hands, spatula, knife, elbow, etc.) is likely to displace paste off the fibres and cause a defect.

NOTE 3 Should any particular area parallel to the machine direction exhibit a repeating defect, the determination of the cause of the defect (e.g. wrinkles in the film or partial blockage of the doctor blade) will enable it to be corrected.

7 Expression of results

Calculate the degree of wetting of the fibre from the equation:

$$D_{\mathrm{W}} = 100 - \frac{\sum_{i=1}^{n} Z_i}{n \times A} \times 100$$

where

D_{W} is the degree of wetting, in per cent;

Z_i is the total dry-spot area in a particular viewing field, in square centimetres;

n is the number of viewing fields;

A is the area of the viewing field (inspection window), in square centimetres.

8 Precision

The precision of this method is not known because interlaboratory data are not available. When interlaboratory data are obtained, a precision statement will be added at the following revision.