International Standard

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Fibre-reinforced plastics — Determination of the plain-pin bearing strength

Plastiques renforcés de fibres — Détermination de la résistance au matage au moyen d'une goupille ordinaire

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Principle ... **2**
5 Apparatus ... **2**
6 Test specimens ... **4**
6.1 Shape and dimensions ... 4
6.1.1 Preferred specimen size ... 4
6.1.2 Alternative specimen size ... 4
6.2 Preparation of specimens ... 4
6.2.1 General ... 4
6.2.2 End tab material (if required) ... 4
6.2.3 Application of end tabs ... 4
6.2.4 Machining the test specimens ... 4
6.3 Checking the test specimens ... 5
7 Number of test specimens ... **5**
8 Conditioning ... **5**
9 Procedure ... **5**
9.1 Test conditions ... 5
9.2 Specimen and pin dimensions ... 5
9.3 Testing speed ... 5
9.4 Data collection ... 5
9.5 Failure load ... 5
9.6 Failure mode ... 6
10 Calculation and expression of results ... **7**
11 Precision ... **7**
12 Test report ... **8**
Annex A (informative) **Interlaboratory validation exercise for plain-pin-bearing test method** ... **10**
Bibliography ... **12**

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 12815:2013), which has been technically revised.

The main changes are as follows:

— the measurement of the roundness of the hole has been added;

— the range of testing speed has been expanded;

— the roundness of the hole in the test reports has been added.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

In preparing this harmonized version to other similar methods, such as prEN 6037 and ASTM D 5961, harmonization with open-hole tests has been achieved where relevant (e.g. specimen and hole size). The method is applicable to all current and future fibre-reinforced plastic composites meeting the requirements of this document.

The method described in this document uses the maximum load to define the plain-pin laminate bearing strength. This point is well-defined and has been shown to be at a similar level to the less easily defined, initial failure in the similar “torqued bolt” test(s). In the torqued bolt test, the load can increase after the bearing failure (up to × 2), as the failed material is jammed against the bolt, washers and loading jigs. The property determined applies only to the laminate lay-up tested.

The strength properties of “bolted” joints are dependent on the actual conditions involved for the joint being assessed. This includes initial bolt torque (including any load lost in bolt threads), effect of relaxation due to visco-elastic effects, effect of hot/wet conditioning, washer size/over-size, bolt material/rivet details and chamfer depth/plate thickness. It is recommended that additional tests to the plain-pin test be conducted for the actual joint conditions of interest in the applications, as no standardized configuration can represent all these variations. ASTM D 5961 can be used as guidance on bolted joint tests.

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Fibre-reinforced plastics — Determination of the plain-pin bearing strength

1 Scope

This document specifies a procedure for determining the plain-pin bearing strength of fibre-reinforced plastic composites.

The method described in this document is applicable to fibre-reinforced plastic composites with either thermoset or thermoplastic matrices.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 472, *Plastics — Vocabulary*

ISO 527-4:2023, *Plastics — Determination of tensile properties — Part 4: Test conditions for isotropic and orthotropic fibre-reinforced plastic composites*

ISO 1268 (all parts), *Fibre-reinforced plastics — Methods of producing test plates*

ISO 2602, *Statistical interpretation of test results — Estimation of the mean — Confidence interval*

ISO 5893, *Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Specification*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
plain-pin bearing strength
σ_p
stress obtained by dividing the maximum load by the projected cross-sectional area of the pin contact area with the specimen (i.e. d x t)

Note 1 to entry: The result is expressed in megapascals, MPa.

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