



**International
Standard**

ISO 3689

**Paper and board — Determination
of bursting strength after
immersion in water**

*Papier et carton — Détermination de la résistance à l'éclatement
après immersion dans l'eau*

**Third edition
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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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This document was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods and quality specifications for paper and board*.

This third edition cancels and replaces the second edition (ISO 3689:1983), which has been technically revised.

The main changes are as follows:

- [Clause 2](#) has been updated;
- Terms for burst index ([3.3](#)), felt side ([3.4](#)), and wire side ([3.5](#)) have been added in [Clause 3](#);
- [Clause 5](#) has been revised;
- [7.2](#) “conditioning” has been updated;
- [Clause 8](#) “Procedure” is revised, especially immersion time ([8.1.2](#)) and excess water removal ([8.1.3](#)) has been added;
- Former [8.3](#) “determination” in particular the limits of the bursting strength are revised;
- Former 8.4 “number of tests” is revised;
- Former [Clause 9](#) “Expression of results” is technically revised;
- [Clause 10](#) “Precision” has been updated;
- [Clause 11](#) “Test report” is revised;
- [Annex A](#) with examples of possible support systems has been added;
- editorially revised.

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.

Paper and board — Determination of bursting strength after immersion in water

1 Scope

This document specifies a method for the determination of the wet strength of paper and board by measuring its bursting strength after it has been immersed in water for a specified period.

The method is applicable to most kinds of paper and board, provided that an appropriate immersion time is agreed between the interested parties.

Different results can be found if the sample is re-tested after a period of time.

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 186, *Paper and board — Sampling to determine average quality*

ISO 187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

ISO 536, *Paper and board — Determination of grammage*

ISO 2758, *Paper — Determination of bursting strength*

ISO 2759, *Board — Determination of bursting strength*

ISO 14487, *Pulps — Standard water for physical testing*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological 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

bursting strength after immersion

limited resistance offered by a single sheet of paper or board, after immersion in water to a uniformly distributed pressure applied at right angles to its surface up to the point at which it breaks, under the specified conditions of test

3.2

bursting strength retention after immersion

percentage ratio of the bursting strength of a single sheet of paper or board after immersion in water to that of the same paper or board in the dry state measured under the specified conditions of test

3.3

burst index

bursting strength of paper, in kilopascals, divided by the grammage of the paper

Note 1 to entry: Grammage of the paper is determined in accordance with ISO 536.

[SOURCE: ISO 2758:2014, 3.2, modified — text from the definition moved to Note 1 to entry.]

3.4

felt side

Right side

Top side

side of a sheet of machine-made paper that was not in contact with the wire of the papermaking machine during manufacture

3.5

wire side

side of a sheet or web of paper that was formed in contact with the papermaking machine's forming wire, as opposed to that formed on the top side of the paper

4 Principle

Immersion in water for the specific period (see [8.1.2](#)) of a test piece of the paper or board to be tested and determination of the bursting strength.

5 Apparatus, reagents and materials

5.1 Burst testing apparatus in accordance with ISO 2758 or ISO 2759

5.1.1 Burst tester, configured in accordance with ISO 2758, for papers having expected wet bursting strengths within the range of 70 kPa to 1 400 kPa.

5.1.2 Burst tester, configured in accordance with ISO 2759, for all types of board (including corrugated and solid fibreboard) having bursting strengths within the range 350 kPa to 5 500 kPa and for papers or boards having bursting strengths as low as 250 kPa if the paper or board is to be used to prepare a material of higher bursting strength, such as corrugated board.

5.2 Blotting paper, with a grammage of $250 \text{ g/m}^2 \pm 25 \text{ g/m}^2$. The blotting paper shall have dimensions larger than the test piece and smaller than the width of the metal roller ([5.3](#)).

5.3 Metal roller with a smooth face, 200 mm wide ± 10 mm, a diameter of 90 mm ± 10 mm, and a mass of $10 \text{ kg} \pm 0,5 \text{ kg}$.

5.4 Tank of water, maintained under a standard atmosphere according to ISO 187, large enough to hold the test pieces in a vertical position, cleaned with reagent water ([5.6](#)) to ensure that it is free from surfactants. The temperature shall be measured with a thermometer before immersion ([5.7](#)) to ensure that the water temperature is maintained in accordance with ISO 187.

If the tank ([5.4](#)) is maintained in a non-conditioned atmosphere, the tank shall include thermostatic control in accordance with ISO 187. If evaporation could expose samples to the air, a lid shall be added and the water level shall be monitored. Tanks should be cleaned periodically using tap water, cloths, and brushes with a following tap water rinse to eliminate any paper fibre film on the tank side walls and bottoms.

The used temperature shall be stated in the test report (see [Clause 11](#)).

5.5 Support system, either in the vertical or horizontal attitude, to facilitate immersion ([8.1](#)) in water and to prevent a test piece from folding over on itself or coming in contact with other test pieces (examples