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**Paper, board and corrugated  
fibreboard — Description and  
calibration of fixed platen  
compression-testing equipment**

*Papier, carton et carton ondule — Description et étalonnage du  
matériel pour essai de compression à plateau fixe*

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Published in Switzerland

# Contents

	Page
Foreword.....	iv
Introduction.....	v
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references.....</b>	<b>1</b>
<b>3 Terms and definitions.....</b>	<b>1</b>
<b>4 Principle.....</b>	<b>1</b>
<b>5 Apparatus.....</b>	<b>1</b>
<b>6 Verification and calibration.....</b>	<b>2</b>
6.1 General.....	2
6.2 Upper and lower platen conditions.....	2
6.3 Operation speed.....	2
6.4 Load cell measurement system.....	2
<b>7 Calibration report.....</b>	<b>2</b>
<b>Bibliography.....</b>	<b>4</b>

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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 documents 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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://www.iso.org/iso/foreword.html).

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 13820:2014), which has been technically revised:

The main changes are as follows:

- the title of this document has been changed;
- “fixed platen” has been added to the scope;
- former 4.2, 5.2 and Annex A have been removed;
- [Clause 6](#) has been restructured with additional sub-clauses added for clarity;
- the bibliography has been updated.

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](http://www.iso.org/members.html).

## Introduction

This document describes the fixed-platen compression tester used for carrying out compression tests on paper, board, and corrugated fibreboard. This equipment develops compressive forces at a constant rate of strain. This is the primary equipment used in modern test labs, preferred because of its reliability, its ability to test over the range of test levels likely to be found, and because the characteristics of existing instruments have been well defined and universally accepted.

Another instrument, known as the beam-deflection compression tester, develops compressive forces between one platen driven at constant speed and another platen resting on a deformable beam. With this type neither rate of stress nor rate of strain is constant. The two instrument types produce different results<sup>[1][2][3][2]</sup>. The extent of the difference depends on the test being conducted and on the characteristics, particularly the elastic characteristics, of the material being tested. The beam-deflection tester has been inadequately defined in past International Standards for compression tests; among existing instruments there have been different loading rates, different beam stiffnesses, and therefore different rates of strain. It is no longer described in this document.

The testing equipment referred to in this document is used for tests described in ISO 3035<sup>[1]</sup>, ISO 3037<sup>[2]</sup>, ISO 7263<sup>[3]</sup>, ISO 12192<sup>[4]</sup>, ISO 13821<sup>[5]</sup>, and ISO 16945<sup>[6]</sup>, among others.

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# Paper, board and corrugated fibreboard — Description and calibration of fixed platen compression-testing equipment

## 1 Scope

This document specifies the essential characteristics and the principles of calibration of fixed platen compression testing equipment used in the testing of paper, board, and corrugated fibreboard.

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

## 3 Terms and definitions

No terms and definitions are listed in this document.

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://standards.iteh.ai/catalog/standards/sist/9a04dd7c-7bc9-4356-bfba-6c06255645/iso-13820-2021> or <https://www.electropedia.org/>

## 4 Principle

The characteristics and calibration of the compression testing machine are described.

## 5 Apparatus

**5.1 Fixed-platen compression testing machine**, operating on the constant rate of deformation (strain) principle and incorporating the following features.

**5.2 An upper and a lower platen**, each large enough to completely accommodate the test piece and sufficiently rigid to resist significant deformation by the compressive forces.

The platens shall be mounted so as to have not more than 0,05 mm relative movement in the horizontal plane and their surfaces shall be parallel to each other, within 0,05 mm per 100 mm of platen surface. The surface of the platens shall be flat to the extent that the lowest and highest points are within 0,05 mm of the average surface.

Some tests require the surface finish of the platen to be such as to prevent slippage of the test piece during the test. Emery cloth, grade 00 or its equivalent (type 240 in Europe, crocus cloth in Canada), secured to the surface of the platens with contact adhesive or with low-compressibility double-sided pressure-sensitive tape (see last paragraph in this subclause), or matte finish of the platen surfaces, or any equivalent means, can be used to achieve this, provided the requirements for parallelism are met.

The emery cloth shall be replaced as soon as any damage is observed. A knife or other sharp instrument shall not be used to remove the emery cloth or other material adhering to the platens.

While conformity with ISO 7263 permits emery cloth to be used on the platen surfaces, other test methods do not. With ISO 3037, it is safer to avoid the use of emery cloth. However, it is common practice to use the same tester for tests which do and do not require emery cloth. The possibility of erroneous test results is sufficiently low to allow the use of emery cloth in all ISO test methods in which the use of this compression testing machine is now required, provided that a grade not coarser than 00 is used.

**5.3 Means of moving one platen** towards the other at a constant, controlled speed.

**5.4 Means of measuring peak force** to the nearest 1 N or 1 %, whichever is greater, applied to an object placed between the platens.

NOTE Pen recorders can give low results because inertia in the pen movement can prevent detection of the peak force. This fault will not be evident during static calibration.

## 6 Verification and calibration

### 6.1 General

Before calibration and checking, condition the tester for a minimum of 4 h in the standard atmosphere specified in ISO 187.

### 6.2 Upper and lower platen conditions

Check that the platen surfaces conform to the requirements of 5.2. Check the condition of any emery cloth facings and renew if necessary.

### 6.3 Operation speed

Check that in operation, one platen approaches the other at a constant, controlled speed that is within  $\pm 0,25$  mm/min of the nominal speed. The nominal speed used shall be reported with the test values.

### 6.4 Load cell measurement system

Check that the load reading is zero when the platens are not in contact.

If the load cell is verified in situ, it shall be verified with all peripheral equipment (such as computers and printers) operating as they would be when testing is being carried out. Immediately before calibration, load and unload the tester to its maximum capacity three times.

Calibrate the machine by placing weights of known mass on the lower platen or by operating the instrument with a precalibrated load cell or a precalibrated proving ring between the platens. The weights, load cell, or proving ring shall have been calibrated with a maximum error of 0,1 %.

Carry out the calibration at a minimum of five approximately evenly spaced points covering the working range of the instrument. Calibrate at progressively higher test levels, allowing at least 30 s between each measurement, and repeat three times. The average calibration at each point shall be known to within 1 N or 1 %, whichever is greater, with all peripheral equipment (such as computers and printers) operating as they would be while testing is being carried out.

## 7 Calibration report

The calibration report shall include at least the following information:

- a) a reference to this document, i.e. ISO 13820:2021;
- b) date and place of calibration;

- c) conditioning atmosphere used;
- d) the test speed at which one platen approaches the other (6.3);
- e) the mean of, and maximum deviation of, the instrument readings for each point calibrated;
- f) any deviation from the specified procedure, or any other information which would help in interpretation of the results;
- g) traceability information for the reference materials (e.g. precalibrated load cell or proving ring).

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- [4] ISO 12192, *Paper and board — Determination of compressive strength — Ring crush method*
- [5] ISO 13821, *Corrugated fibreboard — Determination of edgewise crush resistance — Waxed edge method*
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