
Corrugating medium — Determination of the edge crush resistance after laboratory fluting

*Papier cannelure pour carton ondulé — Détermination de la
résistance à la compression sur chant après cannelage en laboratoire*

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods and quality specifications for paper and board*.

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Introduction

This International Standard evaluates the ability of corrugating medium to contribute to the compression strength of a corrugated box. It is a procedure for measuring the edgewise compression strength of a laboratory-fluted strip of corrugating medium. The corrugated medium is fluted by passing it between heated rollers. Two different test procedures are then widely used.

- a) The fluted corrugating medium is compressed immediately after fluting (i.e. 20 s to 25 s after fluting).
- b) The fluted corrugating medium is conditioned for 30 min to 35 min after fluting under standard laboratory test conditions before being compressed.

Procedure a) generally gives considerably higher results than those obtained with procedure b). The differences in results are claimed to be caused by the lower moisture content (and thus higher stiffness) of the unconditioned fluted corrugating medium.

Since considerable advantages are claimed for both procedures and both are widely used, this International Standard describes both procedures.

Test values and failure modes in this approach are expected to be different than those for ring crush method and short span compression test (SCT).

NOTE This test is sometimes referred to as CCT (corrugated crush test) or CFC (corrugated fluted crush test).

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Corrugating medium — Determination of the edge crush resistance after laboratory fluting

1 Scope

This International Standard specifies two methods for the determination of the edge crush resistance of a corrugating medium after laboratory fluting. The procedures are applicable to any corrugating medium to be used after fluting in the manufacture of corrugated fibreboard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 13820, *Paper, board and corrugated fibreboard — Description and calibration of compression-testing equipment*

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3 Terms and definitions

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

3.1

edge crush resistance

CCT

maximum edgewise compression force per unit length that a laboratory fluted test piece will withstand before onset of break under the test conditions specified in this International Standard

Note 1 to entry: Edge crush resistance is expressed in kilonewtons per metre (kN/m).

3.2

edge crush resistance index

edge crush resistance divided by the grammage

Note 1 to entry: The result is expressed in newton metres per gram (Nm/g).

4 Principle

The principle is as follows:

- a) fluting of the paper by passing it between heated rollers and mounting in a holder with the flutes placed vertically;
- b) application of a compressive force and determination of the maximum force per unit length.

5 Apparatus

5.1 **Cutting device**, for cutting the test pieces to the required specifications, see [Clause 8](#).

5.2 **Flutter**, consisting of a pair of matched steel corrugating rolls. The rolls shall be capable of being maintained at a temperature of $175\text{ °C} \pm 8\text{ °C}$. The temperature is controlled by any suitable method. Check the temperature when the rolls are in motion.

One roll is motor-driven at $4,5\text{ r/min} \pm 1,0\text{ r/min}$ and the rolls are held in mesh by a force of $(100 \pm 10)\text{ N}$ exerted between the rolls and distributed evenly across the teeth, under test conditions. In some instruments, the force between the rolls is applied by a spring acting in a slide. In such instruments, friction in this device can result in the force which acts upon the test piece being considerably less than the force required to displace the rolls initially. When verifying that an instrument conforms to the requirements given in this subclause, it is therefore necessary to measure the force required to prevent the undriven roll from moving towards the driven roll, from a position about $200\text{ }\mu\text{m}$ away.

The essential characteristics of each roll are the following (see also [Figure 1](#)):

- roll diameter: $228,5\text{ mm} \pm 0,5\text{ mm}$;
- roll thickness: $16\text{ mm} \pm 1\text{ mm}$;
- number of teeth: 84 (see Note 3 below);
- radius of teeth at peak: $1,5\text{ mm} \pm 0,1\text{ mm}$;
- radius of teeth at base: $2,0\text{ mm} \pm 0,1\text{ mm}$;
- depth of teeth: $4,75\text{ mm} \pm 0,05\text{ mm}$;
- distance between teeth (peak to peak around the arc): $8,55\text{ mm} \pm 0,05\text{ mm}$.

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In order to optimize the matching of pairs of rolls, pairs of rolls should be selected in which the differences in dimensions between the two are substantially less than the tolerances shown. Prior to first use, the rolls should be run at the operating temperature for about 6 h with a mild abrasive on the teeth. The two rolls should then be marked in some way so that, after removal for cleaning or maintenance, they can be reassembled with exactly the same teeth in mesh.

NOTE 1 It is recommended to have a guiding device to help feed the test piece perpendicular to the corrugating nip.

NOTE 2 The flutter is identical to that used for ISO 7263[2].

NOTE 3 In some flutters, a full roll is not used.

Dimensions in millimetres

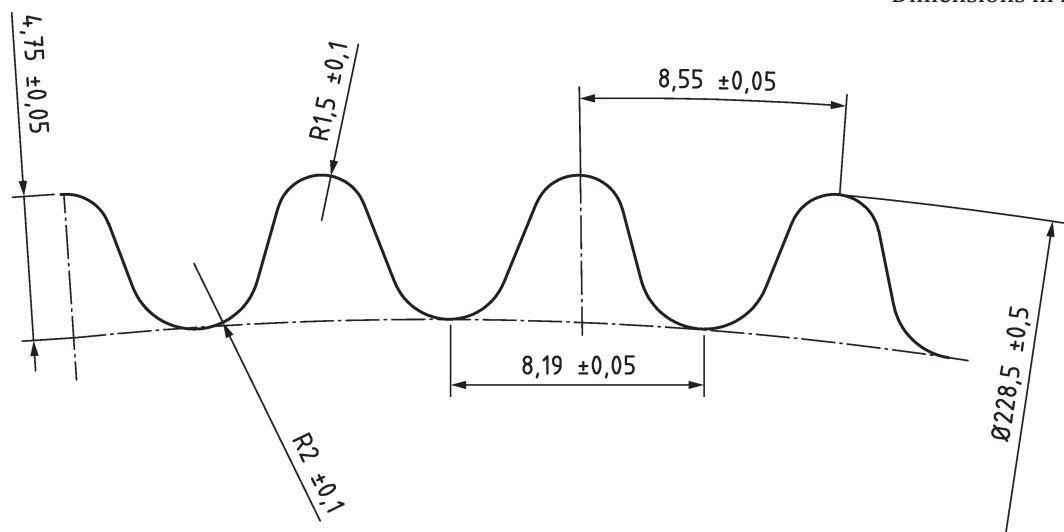
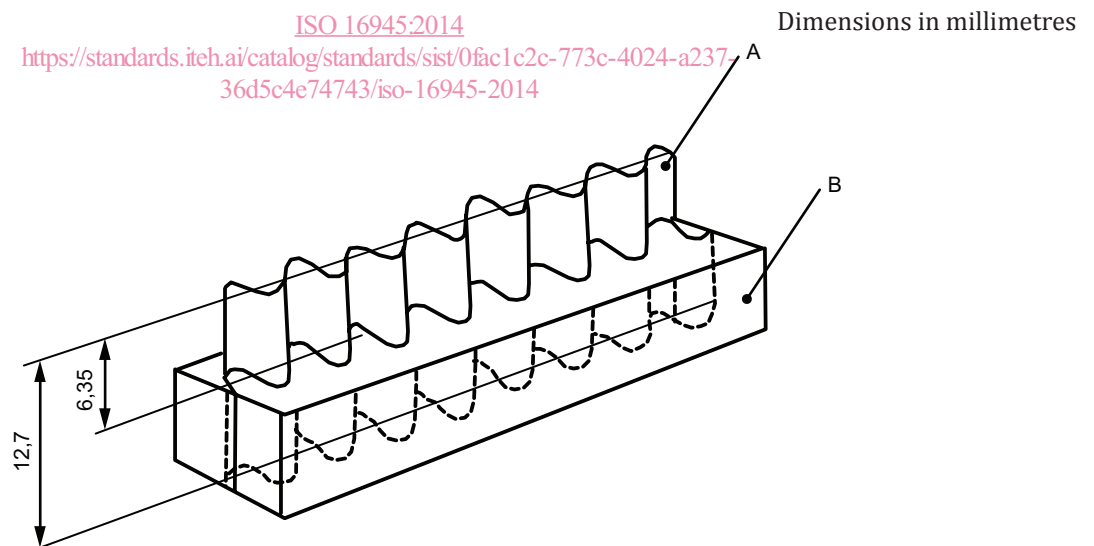


Figure 1 — Profile of corrugating rolls

5.3 Holder, with a profile matching the profile of the corrugated medium, able to hold the test piece so that the flutes are vertical. The holder can be opened for mounting of test pieces. A suitable stopping surface exists so that 6,35 mm width of the specimen is grasped by the holder (see Figure 2).

The fluted crush test piece holder should conform to the same parallelism requirements as the crush tester (see 5.4).

**Key**

- A test piece
- B test piece holder

Figure 2 — Test piece holder

5.4 Compression tester, a motor-driven, fixed-platen type compression tester in accordance with ISO 13820.