INTERNATIONAL STANDARD

ISO 7263-2

First edition
2018-12

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

Part 2: B-flute

Papier cannelure — Détermination de la résistance à la compression à plat après cannelage en laboratoire —
Partie 2: Cannelure B

Reference number
ISO 7263-2:2018(E)

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Published in Switzerland

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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).

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).

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.

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 document cancels and replaces ISO 7263:2011, which has been technically revised.

This document adds a version of the test method covering the use of a B-flute fluter, expanding the flexibility of the technical approach using the same general methodology. Prior to this revision of the method, ISO 7263 allowed only for the use of A-flute equipment. That method is maintained as ISO 7263-1.

The main changes compared with ISO 7263:2011 are as follows:

— ISO 7263 has been divided into two parts due to technical developments to allow both A-flute (Part 1) and B-flute (Part 2) performance to be tested;

— Clause 1: the scope has been modified;

— Clause 2: normative references have been changed;

— 5.2: measurements for B-flute have been added;

— 5.3: description of rack and comb has been modified;

— 5.3: Figure 3 has been added;

— 5.5: description of flat crush tester has been modified;

— Clause 7 has been modified;

— Clause 7: this document requires conditioning of samples where testing will be carried out immediately after fluting, not only where test pieces will be reconditioned before testing;

— Clause 8 has been modified;

— 9.2: for testing immediately after fluting the time between fluted test piece discharge and initial application of force has been increased to a more realistic level;

— Clause 11: precision with more detailed description of precision data according to ISO/TR 24498 and TAPPI T 1200 has been moved to informative Annex B;

— Test report is now Clause 11 and has been updated;

— Annex B: precision data according to ISO/TR 24498 and TAPPI T 1200 has been added.

A list of all parts in the ISO 7263 series can be found on the ISO website.

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.

Introduction

The flat crush resistance of laboratory-fluted corrugating medium is regarded as a property indicating the potential flat crush resistance of corrugated fibreboard made from that medium. The corrugated medium is fluted by passing it between heated rollers. Two different test procedures are used:

a) the fluted corrugating medium is compressed immediately after fluting (i.e. 15 s to 25 s after fluting);

b) the fluted corrugating medium is conditioned for 30 min to 35 min under standard laboratory test conditions before being compressed.

Since considerable advantages are claimed for both procedures and both are widely used, the ISO 7263 series describes both procedures. 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, and/or the change in flute profile which occurs during the conditioning period.

ISO 7263-1[6] describes the testing method for the A-flute geometry.

This document describes the testing method for the B-flute geometry.

The option of using an A- or B-flute geometry is to be determined by the producer and/or the end-use customer; it is not required for any particular flute structure.

A method for determining the flat crush resistance of manufactured corrugated fibreboard is given in ISO 3035[3].

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

Part 2:
B-flute

1 Scope

This document describes a method for the determination of the flat crush resistance of a corrugating medium after laboratory fluting using a B-flute geometry.

The procedure is applicable to any corrugating medium intended to be used, after fluting, in the manufacture of corrugated board.

NOTE ISO 7263-1 describes a method to determine the flat crush resistance using an A-flute geometry.

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*

ISO 13820, *Paper, board and corrugated fibreboard — Description and calibration of compression-testing equipment*

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 http://www.electropedia.org/

3.1
flat crush resistance
maximum force that a corrugated test piece will withstand before the flutes collapse under an increasing force applied perpendicular to its surface

Note 1 to entry: The flat crush resistance is expressed in newtons (N).

3.2
flat crush resistance index
flat crush resistance (3.1) divided by the grammage of the paper

Note 1 to entry: The result is expressed in newton square metres per gram (Nm^2/g).

4 Principle

Fluting of the corrugating medium by passing it between heated rollers, and its formation into single-faced corrugated board using pressure-sensitive adhesive tape as the facing. Application of a crushing force, in the direction perpendicular to the plane of the flutes, and determination of the flat crush resistance.

For details regarding the test method precision, see Annex B.

5 Apparatus

5.1 Cutting device, for cutting the test pieces to the dimensions required.

5.2 Fluter, consisting of a pair of matched rotating steel corrugating rolls, a means of heating the rolls and a chute for feeding test pieces squarely between the rolls.

The roll temperature shall be maintained at 175 °C ± 8 °C. The temperature can be controlled by any suitable method. Check the temperature when the rolls are in motion.

One roll is motor-driven at 4,5 r/min ± 1,0 r/min and the rolls are held in mesh by a force of 100 N ± 10 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, it is therefore necessary to measure the force required to just prevent the stationary roll from moving towards the driven roll, from a position about 200 µm away.

The essential characteristics of each roll are shown in Table 1.

Table 1 — Measurements for B-flute

Description	B-profile
Roll diameter	(226 ± 0,5) mm
Roll face width	≥ 15 mm
Number of teeth for full roll	112
Radius of teeth at peak	(1,2 ± 0,1) mm
Radius of teeth at base	(1,6 ± 0,1) mm
Depth of teeth	(2,5 ± 0,05) mm
Distance between teeth (peak to peak around the arc)	(6,45 ± 0,05) mm

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. A difference of 0,1 mm or less for the pair of rolls is recommended. 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 In some fluters, a full roll is not used.

Partial roll fluters may be used, if they meet the geometry described in Table 1.

For maintenance of fluting rolls (horizontal type) see Annex A.

Dimensions in millimetres

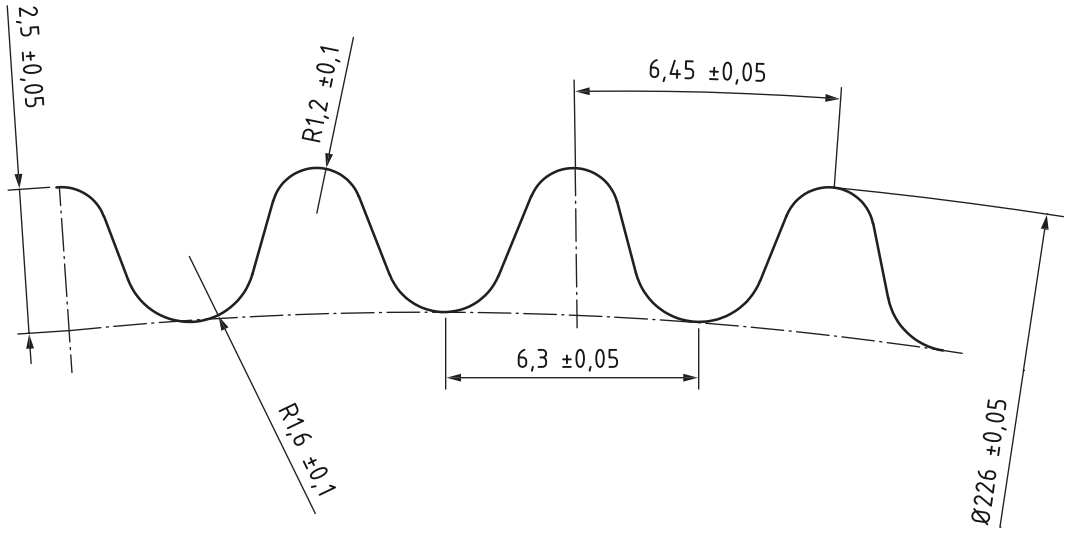


Figure 1 — B-profile of corrugating rolls

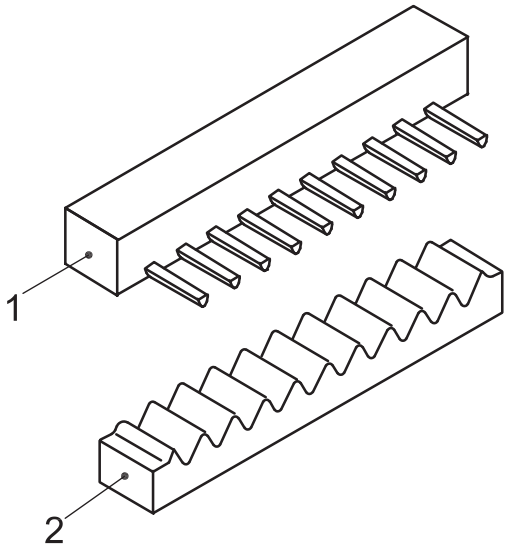
5.3 Rack and comb.

5.3.1 **Rack**, at least 19 mm wide with a profile corresponding to the teeth of the corrugating rolls.

It has nine full teeth and one incomplete tooth at each end so as to form 10 valleys. The tooth spacing and the height of the teeth correspond to the data in Table 1, Figure 1 and Figure 3.

5.3.2 **Comb**, at least 19 mm wide with 10 prongs (see Figure 2 and Figure 3).

The rack (5.3.1) and comb may be replaced with an automatic device, provided it can be demonstrated that this device will produce the same results. For the comb a trapezoidal profile is recommended.



Key

1 comb
2 rack

Figure 2 — Profile of comb and rack