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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

ICS 85.060

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Foreword

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ISO 16945 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods and quality specifications for paper and board*.

Introduction

This test 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 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).

Corrugating medium — Determination of 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 referenced documents are indispensable for the application 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 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 term and definition 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 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 The result is expressed in newton metres per gram (Nm/g)

4 Principle

Fluting of the paper by passing it between heated rollers and mounting in a holder with the flutes placed vertically. Application of a compressive force and determination of the maximum force per unit length.

5 Apparatus

5.1 Cutting device

A cutting device for cutting the test pieces to the required specifications, see Clause 8.

5.2 Fluter

A fluter consisting of a pair of matched steel corrugating rolls. The rolls shall be capable of being maintained at a temperature of 175 °C ± 8 °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 r/min ± 1,0 r/min and the rolls are held in mesh by a force of 100 ± 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 given in this subclause, it is therefore necessary to measure the force required to just prevent the undriven roll from moving towards the driven roll, from a position about 200 µm away.

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

Roll diameter	228,5 mm ± 0,5 mm
Roll thickness	16 mm ± 1 mm
Number of teeth	84 (see Note below)
Radius of teeth at peak	1,5 mm ± 0,1 mm
Radius of teeth at base	2,0 mm ± 0,1 mm
Depth of teeth	4,75 mm ± 0,05 mm
Distance between teeth (peak to peak around the arc)	8,55 mm ± 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 better is recommended.

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

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

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

Dimensions in millimetres

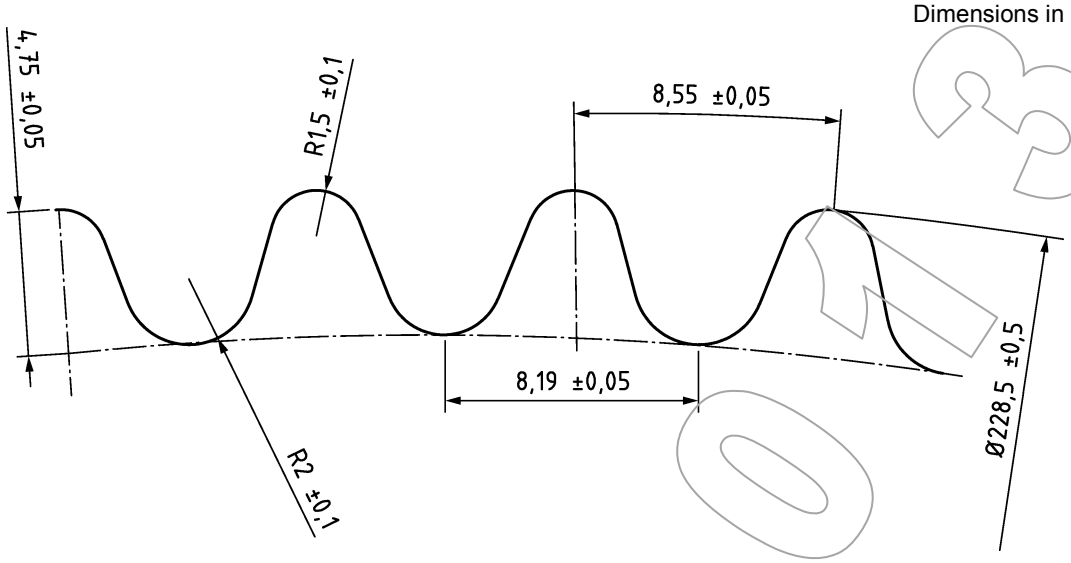


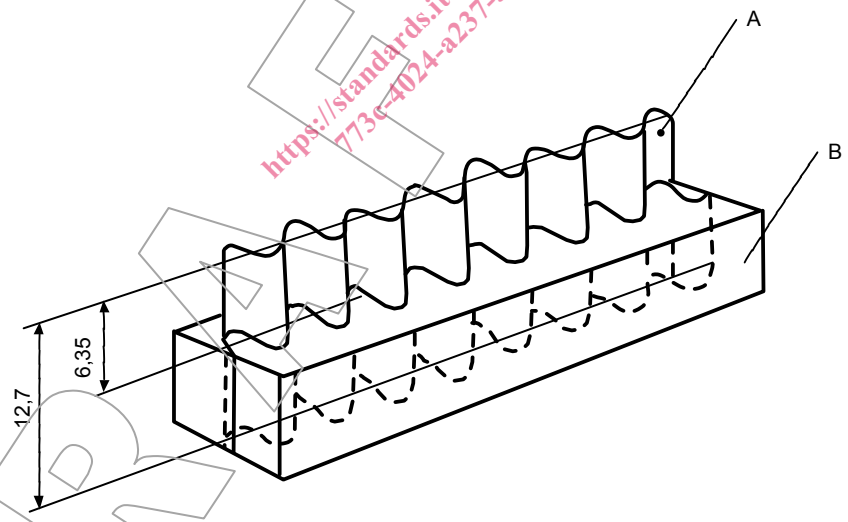
Figure 1 – Profile of corrugating rolls

5.3 Holder

A 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).

Dimensions in millimetres



Key

A test piece

B test piece holder

Figure 2 – Test piece holder