# Corrugated fibreboard - Determination of edgewise crush resistance (non-waxed edge method) (ISO 3037:2022)

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD



| | |
|---|---|
| See Eesti standard EVS-EN ISO 3037:2022 sisaldab Euroopa standardi EN ISO 3037:2022 ingliskeelset teksti. | This Estonian standard EVS-EN ISO 3037:2022 consists of the English text of the European standard EN ISO 3037:2022. |
| Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas. | This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation. |
| Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 07.12.2022. | Date of Availability of the European standard is 07.12.2022. |
| Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest. | The standard is available from the Estonian Centre for Standardisation and Accreditation. |

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 85.080.30

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN ISO 3037

December 2022

ICS 85.080.30

Supersedes EN ISO 3037:2013

English Version

# Corrugated fibreboard - Determination of edgewise crush resistance (non-waxed edge method) (ISO 3037:2022)

Carton ondulé - Détermination de la résistance à la compression sur chant (méthode sans enduction de cire) (ISO 3037:2022)

Wellpappe - Bestimmung des Kantenstauchwiderstandes (Verfahren für ungewachste Kanten) (ISO 3037:2022)

This European Standard was approved by CEN on 25 November 2022.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**



Ref. No. EN ISO 3037:2022 E

## European foreword

This document (EN ISO 3037:2022) has been prepared by Technical Committee ISO/TC 6 "Paper, board and pulps" in collaboration with Technical Committee CEN/TC 172 “Pulp, paper and board” the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 3037:2013.

Any feedback and questions on this document should be directed to the users’ national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

## Endorsement notice

The text of ISO 3037:2022 has been approved by CEN as EN ISO 3037:2022 without any modification.

# Contents

Page

# 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,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 172, *Pulp, paper and board,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This sixth edition cancels and replaces the fifth edition (ISO 3037:2013), which has been technically revised.

The main changes are as follows:

— the title has been changed from "Corrugated fibreboard - Determination of edgewise crush resistance (unwaxed edge method)" to "Corrugated fibreboard - Determination of edgewise crush resistance (non-waxed edge method)";

— the introduction has been updated to highlight the impact of edge effects and the incomparability of different test methods;

— information about the corrugated fibreboard grades has been added to the scope;

— Clause 3 has been updated;

— Clause 6 has been revised;

— Clause 9 has been updated and a constant feed rate has been added;

— Clause 11 has been added to refer to precision data in Annex B;

— Clause 12 has been updated;

— Annex A has been revised;

— 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.

# Introduction

A variety of methods for the determination of edgewise crush resistance are in use in different parts of the world. These can be classified into four groups as follows:

a) Those in which a carefully cut rectangular test piece is tested without any special treatment or modification (e.g. this document).

b) Those in which the edges of the test piece to which the force is applied are waxed, to prevent the test result being influenced by edge effects (e.g. ISO 13821).

c) Those in which the test piece edges are not waxed but the shape of the test piece is such that the length is substantially reduced at a point midway between the loaded edges, in order to induce the failure to occur away from those edges (e.g. JIS Z 0403-2).

d) Those in which carefully cut rectangular test pieces are tested with edges clamped to prevent the result from being influenced by edges effects (e.g. TAPPI T 839).

The dimensions of the test piece vary from one group to the other and, in group c), the methods vary in the shape and method of reducing the length, and in whether or not the test piece is held in a clamp during crushing.

The methods might not give the same numerical results and experience has shown that results for the four groups of test methods will not correlate. It can be shown that most of them can be used (at varying levels of accuracy) to predict the top-to-bottom compression strength that will be achieved when the board is properly converted into a transport package, provided that the formula to predict BCT values from ECT results is based on data from the ECT method being used.

This document describes a method for group a). It is intended as a method for quality measurement and quality specification purposes and is selected because it correlates with the top-to-bottom compression strength of the final transport package and because it is the simplest and most operationally convenient method, an important factor when large numbers of tests need to be conducted. However, it does not measure the actual intrinsic compressive strength of the corrugated fibreboard, giving lower results than most of the methods in groups b), c) and d). This systematic difference is due to edge effects.

Other methods can be used for other purposes, particularly when the object of the test is to study fundamental structural characteristics of the package.

There are methods available for calculating the edgewise crush resistance from the compression strength of the component papers.

# Corrugated fibreboard — Determination of edgewise crush resistance (non-waxed edge method)



## 1 Scope

This document specifies a non-waxed edge method for the determination of the edgewise crush resistance of corrugated fibreboard. The force is applied in the direction of the flute axis.

This method is applicable to single-wall (double-faced), double-wall, and triple-wall corrugated fibreboard.

It is applicable to all corrugated fibreboard flute types if no buckling and/or tipping occurs during measurement. This method is also applicable to test samples taken from corrugated cases and other converted products.

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

## 3 Terms, definitions and abbreviated terms

### 3.1 Terms and definitions

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

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://www.electropedia.org/

**3.1.1**
**edgewise crush resistance**
maximum force per unit length that a test piece of corrugated fibreboard can support until the onset of failure when a compressive force is applied in the direction of the flute axis

**3.1.2**
**buckling**
failure mode distinct from pure compression, where the mid-part of the sample moves substantially out of the vertical plane creating a “c” or similar shape

Note 1 to entry: This can occur when the bending resistance of the sample is lower than the compression resistance of the sample for the given geometry of the test piece, or when sample edge imperfections add an angular or rotational component to the force from the loading platens.