DRAFT INTERNATIONAL STANDARD

ISO/DIS 16260

ISO/TC **6**/SC **2**	Secretariat: **SIS**
Voting begins on: **2014-01-15**	Voting terminates on: **2014-04-15**

Paper and board - Determination of internal bond strength

Papier et carton — Détermination de la force intérieure de collage

ICS: 85.060

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 16260 was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*, Subcommittee SC 2, *Test methods and quality specifications for paper and board*.

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Introduction

Paper and board sheets may, during printing, conversion or specific product applications, be subjected to impulses, impacts or shock loads of sufficient magnitude to cause structural failure of the sheet. Commonly observed structural failures include surface picking, blistering and interior delamination.

This International Standard describes one method for determining the internal bond strength of a sheet of paper or board. There are other published methods [4] for determining "Z" or thickness direction tensile strength but in this method the delaminating force is applied at a rate very much higher than in other methods. This method may therefore be preferred for predicting sheet performance under printing or converting conditions.

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Paper and board — Determination of internal bond strength

1 Scope

This draft International Standard describes a method to measure the energy required to rapidly delaminate a test piece of paper or board. Rupture of the test piece in the "Z" or thickness direction is initiated by a pendulum having a defined mass, moving at a defined velocity.

The procedure is suitable for both single and multi-ply papers and boards, including coated sheets and those that are laminated with synthetic polymer films. It is particularly suitable for papers and boards that may be subjected to rapid impacts, impulses or shock loads during printing or conversion.

The test procedure entails the adherence of double sided adhesive tape to both sides of the test piece under pressure. For this reason the method may be unsuitable for materials that might be structurally damaged by compression or are porous enough to permit migration of the tape adhesive into or through the test piece.

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 and board — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

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3 Terms and definitions

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

3.1
internal bond strength
average energy, expressed as Joules per square metre of surface, required to delaminate a test piece under the conditions of the test

3.2
test assembly
test piece, mounted ready for the test. The test assembly consists of the test piece, laminated between two pieces of double sided adhesive tape, with the bottom side of the lower tape layer adhered to a rigid metal anvil and the upper side of the upper tape layer adhered to an "L"-shaped aluminium platen

4 Principle

A square test piece is adhered to a flat metal anvil by means of double sided adhesive tape. An "L" shaped aluminium platen with the same surface area as the test piece is then adhered to the upper surface of the test piece, again using double sided adhesive tape. The assembly is shown in Figure 1. The assembly is secured in position and a pendulum allowed to impact the upper inside surface of the platen, causing it to rotate about its outside corner, splitting the test piece in the "Z" or thickness direction (Figure 2) The energy absorbed in rupturing the test piece is calculated from measurements of the peak excess swing of the pendulum and the known masses and dimensions of the system components.

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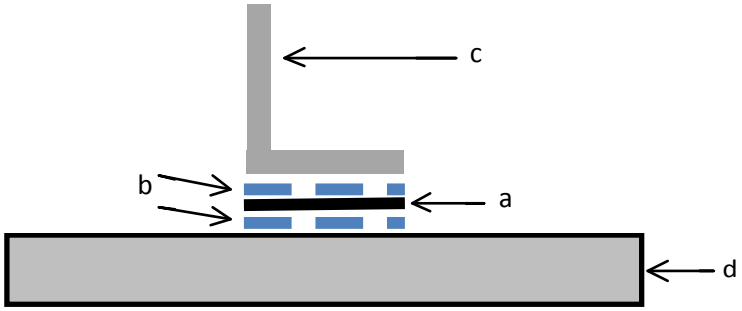


Key

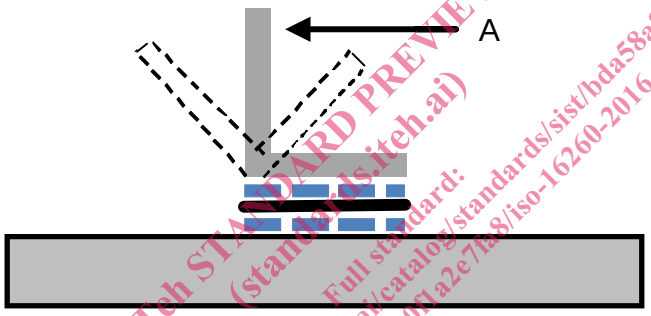
a test piece

b double sided adhesive tape

c aluminium platen

d metal anvil

Figure 1 — Components of a test assembly



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Key

A pendulum strike point and direction

Figure 2 — Pendulum to anvil strike point

5 Apparatus

5.1 A means of preparing test pieces of dimensions 25,4 mm x 25,4 mm for testing by pressing the components of the test assembly together at a controlled pressure for a controlled time. Any device employed to apply pressure should be capable of doing so in the range of 345 kPa to 1034 kPa and for a period of at least 3 s. During the pressure cycle the aluminium platen (see 5.4) should be securely clamped in position to prevent flexing.

NOTE Most commercially available preparation stations are capable of simultaneously preparing five test assemblies.

5.2 Ensure that the test instrument is levelled in the front–back and left–right directions and the pendulum is horizontal when in the latched position.

5.3 A pendulum, mounted on a pedestal by means of a horizontal spindle supported on low-friction bearings, whose centre of mass lies on the centreline of the pendulum shaft at a point 127 mm ± 0,6 mm from the centreline of the spindle. The pendulum shall be free to rotate from a horizontal position through at least 180 degrees. At its free end the pendulum carries a metal striker ball which contacts the inside face of the aluminium angle on the test assembly when the pendulum reaches the vertical position. To minimise energy losses due to vibration the centre of percussion of the pendulum should be at the point of impact of the striker ball with the aluminium angle, there should be no looseness in the construction of multi-part pendulums.

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5.4 A means for securing the pendulum in a horizontal position with provision for a rapid, vibration-free release.

5.5 A stationary anvil (base) and a separable aluminium angle (platen) that is a right angle in cross section. These components, together with the test piece and adhesive tape, form the test assembly. See Figure 1.

Anvils intended for use in multiple test piece preparation stations should be indelibly marked to ensure that they are always placed in the same position in the preparation station. The test assembly is securely held in position so that the pendulum strikes the centre of percussion of the aluminium platen when the axis of rotation is at the outside corner of the right angle of the platen. See Figure 2.

5.6 A means of registering the peak angular swing of the pendulum after release from the horizontal position.

5.7 A means to convert the peak angular swing of the pendulum to an internal bond strength value. Commonly employed methods include optical encoder/digital computers and mechanical scale/friction pointer. The minimum range of the instrument shall be 0 – 525 Joules/m^2.

5.8 An optional means to extend the range of the instrument. This may be achieved by fitting pendulums of different sizes, adding augmenting weights to the pendulum or reducing the surface area of the test piece by an amount not exceeding 50 %. The user of this standard should consult the manufacturer of the test instrument regarding the installation and verification of such options. Any such modifications to the instrument must be included in the test report.

5.9 A device suitable for cutting strips of the test material 25,4 mm ± 0,1 mm wide and of sufficient length to mount in the test assembly preparation device.

5.10 A knife or multi-blade cutting device for separating test assemblies prepared in multi-station test assembly preparation devices.

5.11 Double sided adhesive paper tape 25,4 mm ± 0,08 mm wide with a creped release liner. The tape should have a nominal thickness of 0,15 mm and should exhibit a minimum adhesion to steel of 56 N/100 mm when measured in accordance with ASTM D3330/D3330M-04(2010) *Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape* [3].

NOTE A suitable tape is 3M™ Double Coated Paper Tape 410M[1)].

5.12 A supply of solvent suitable for removing adhesive residue from the anvils and platens.

6 Sampling

If tests are being made to evaluate a lot, the sample shall be selected in accordance with ISO 186. If the tests are made on another type of sample, make sure that the specimens taken are representative of the sample received.

7 Conditioning

Conditioning shall be carried out in accordance with ISO 187.

1) 3M™ Double Coated Paper Tape 410M is an example of a suitable product available commercially. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.

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