



**SLOVENSKI STANDARD**  
**oSIST prEN 438-2:2014**  
**01-november-2014**

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**Dekoratívni visokotlačni laminati (HPL) - Plošče na osnovi duromernih smol - 2.  
del: Ugotavljanje lastnosti**

High-pressure decorative laminates (HPL) - Sheets based on thermosetting resins  
(Usually called Laminates) - Part 2: Determination of properties

Dekorative Hochdruck-Schichtpressstoffplatten (HPL) - Platten auf Basis härtbarer Harze  
(Schichtpressstoffe) - Teil 2: Bestimmung der Eigenschaften

Stratifiés décoratifs haute pression (HPL) - Plaques à base de résines  
thermodurcissables (communément appelées stratifiés) - Partie 2: Détermination des  
propriétés

**Ta slovenski standard je istoveten z: prEN 438-2**

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**ICS:**

83.140.20      Laminatne plošče      Laminated sheets

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English Version

## High-pressure decorative laminates (HPL) - Sheets based on thermosetting resins (Usually called Laminates) - Part 2: Determination of properties

Stratifiés décoratifs haute pression (HPL) - Plaques à base  
de résines thermodurcissables (communément appelées  
stratifiés) - Partie 2: Détermination des propriétés

Dekorative Hochdruck-Schichtpressstoffplatten (HPL) -  
Platten auf Basis härtbarer Harze (Schichtpressstoffe) - Teil  
2: Bestimmung der Eigenschaften

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 249.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## Contents

	Page
Foreword	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 Assessment of appearance	6
5 Determination of thickness	7
6 Determination of length and width	8
7 Determination of edge straightness	9
8 Determination of edge squareness	10
9 Determination of flatness	12
10 Resistance to surface wear	13
11 Resistance to abrasion (flooring grade laminates)	17
12 Resistance to immersion in boiling water	17
13 Substrate protection against water vapour	20
14 Resistance to water vapour	22
15 Resistance to wet conditions (Exterior grade laminates)	24
16 Resistance to dry heat	26
17 Dimensional stability at elevated temperature	29
18 Resistance to wet heat	30
19 Resistance to climatic shock (exterior grade laminates)	33
20 Resistance to impact by small-diameter ball	36
21 Resistance to impact by large diameter ball	41
22 Resistance to impact by large diameter ball (flooring grade laminates)	45
23 Resistance to cracking under stress (laminates $\leq 2$ mm thick)	46
24 Resistance to crazing (Compact laminates)	50
25 Resistance to scratching	52
26 Resistance to staining	58
27 Light fastness (Xenon arc)	62
28 Resistance to UV light (Exterior grade laminates)	65
29 Resistance to artificial weathering (Exterior grade laminates)	66
30 Testing Method deleted	68
31 Formability (Method A)	68
32 Formability (Method B)	71
33 Resistance to blistering (Method A)	75
34 Resistance to blistering (Method B)	76
35 Determination of the microscratch resistance	77

<b>Annex A</b> (Informative) <b>Surface finish and colour influence on surface evaluations</b>	<b>85</b>
<b>Annex B</b> (Informative) <b>Calibration and maintenance of abrasion equipment</b>	<b>86</b>
<b>Annex C</b> (Normative) <b>Measurement of shore A hardness</b>	<b>90</b>

## iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 438-2:2016

<https://standards.iteh.ai/catalog/standards/sist/1d3114b1-97e0-4021-8462-b80cee781f12/sist-en-438-2-2016>

## Foreword

This document (prEN 438-2:2014) has been prepared by Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by NBN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 438-2:2005.

EN 438 consists of the following parts:

- EN 438-1 *Plastics — High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (Usually called Laminates) - Part 1: Introduction and general information*
- EN 438-2 *Plastics — High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (Usually called Laminates) - Part 2: Determination of properties*
- EN 438-3 *Plastics — High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (Usually called Laminates) - Part 3: Classification and specifications for laminates less than 2 mm thick intended for bonding to supporting substrates*
- EN 438-4 *Plastics — High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (Usually called Laminates) - Part 4: Classification and specifications for Compact laminates of thickness 2 mm and greater*
- EN 438-5 *Plastics — High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (Usually called Laminates) - Part 5: Classification and specifications for flooring grade laminates less than 2 mm thick intended for bonding to supporting substrates*
- EN 438-6 *Plastics — High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (Usually called Laminates) - Part 6: Classification and specifications for Exterior-grade Compact laminates of thickness 2 mm and greater*
- EN 438-7 *Plastics — High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (Usually called Laminates) - Part 7: Compact laminate and HPL composite panels for internal and external wall and ceiling finishes*
- EN 438-8 *Plastics — High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (Usually called Laminates) - Part 8: Classification and specifications for design laminates*
- EN 438-9 *Plastics — High-pressure decorative laminates (HPL) — Sheets based on thermosetting resins (Usually called Laminates) - Part 9: Classification and specifications for alternative core laminates*

## 1 Scope

This part of EN 438 specifies the methods of test for determination of the properties of high-pressure decorative laminates as defined in Clause 3. These methods are primarily intended for testing the sheets specified in EN 438-3, EN 438-4, EN 438-5, EN 438-6, EN 438-8, and EN 438-9.

## 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.

EN 31, *Particleboards — Specifications*

EN 316, *Wood fibreboards — Definition, classification and symbols*

EN ISO 62, *Plastics — Determination of water absorption (ISO 62)*

EN ISO 178, *Plastics — Determination of flexural properties (ISO 178)*

EN ISO 291:2008, *Plastics — Standard atmospheres for conditioning and testing (ISO 291:2008)*

EN ISO 2813, *Paints and varnishes — Determination of specular gloss of non-metallic paint films at 20°, 60° and 85°*

EN ISO 4287:1998/A1:2009, *Geometrical Product Specifications (GPS) - Surface texture: Profile method - Terms, definitions and surface texture parameters - Amendment 1: Peak count number (ISO 4287:1997/Amd 1:2009)*

EN ISO 4288:1997, *Geometrical product specifications (GPS) - Surface texture: Profile method - Rules and procedures for the assessment of surface texture (ISO 4288:1996)*

EN ISO 4892-1:2013, *Plastics — Methods of exposure to laboratory light sources - Part 1: General guidance (ISO 4892-1)*

EN ISO 4892-2:2013, *Plastics — Methods of exposure to laboratory light sources - Part 2: Xenon-arc sources (ISO 4892-2)*

EN ISO 4892-3:2013, *Plastics — Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps (ISO 4892-3)*

EN ISO 6506-1, *Metallic materials — Brinell hardness test - Part 1: Test method (ISO 6506-1)*

EN ISO 12945-2, *Textiles — Determination of fabric propensity to surface fuzzing and to pilling — Part 2: Modified Martindale method*

EN ISO 12947-1, *Textiles — Determination of the abrasion resistance of fabrics — Part 1: Martindale abrasion testing apparatus*

ISO 48:2010, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ISO 105-A02, *Textiles — Tests for colour fastness — Grey scale for assessing change in colour*

ISO 209:2007, *Aluminium and aluminium alloys — Chemical composition*

ISO 1770:1981/Amd 1:1983, *Solid-stem general purpose thermometers*

**prEN 438-2:2014 (E)**

ISO 7267-2:2008, *Rubber-covered rollers — Determination of apparent hardness — Part 2:Shore-type durometer method*

ISO 9370, *Plastics — Instrumental determination of radiant exposure in weathering tests — General guidance and basic test method*

**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 438-1 apply.

**4 Assessment of appearance****4.1 Principle**

Laminates shall be inspected for surface appearance under standardised conditions of lighting and viewing.

**4.2 Apparatus**

**4.2.1** Horizontal inspection table, of height approximately 700 mm and large enough to accommodate the largest sheets to be inspected.

**4.2.2** The light source shall provide a diffused illumination of  $(1200 \pm 400)$  lx over the whole area of the largest sheets to be inspected. This may be either diffused daylight or diffused artificial daylight. The daylight shall be unaffected by surrounding trees, etc. When artificial daylight is used, it shall have a correlated colour temperature of (5000 to 6500) K. Both of them shall be in accordance with EN ISO 3668.

A convenient distance of the lights from the inspection table is approximately 1,5 m.

**4.3 Test specimen**

The specimen shall be the laminate under test, as supplied by the manufacturer.

**4.4 Procedure**

Place the laminate, decorative face uppermost, on the inspection table. Wipe it free of any loose contamination with a soft cloth, using a suitable cleaning agent if necessary. Inspect it from the distance required by the relevant part of EN 438 for defects such as smudges, smears, fingerprints, scratches, foreign particles, damage or any other form of blemish evident within the decorative surface. In case of cut to size panels of high-pressure decorative alternative core laminate(s), the inspection shall be performed on the edges too. The evaluation of the total area of spot-type defects in square millimetres and of the total length of hair-like defects in millimetres may be carried out with the help of the Tappi Size Estimation Chart or with an equivalent system. In case of dispute the inspection shall be carried out at a distance between 750 mm to 900 mm using the Tappi Chart or an equivalent system.

The inspector shall use normal vision, corrected if necessary. In cases of doubt or dispute, three observers shall be required for the visual assessment. All observers shall have good colour vision. In case of three observers, the reported rating for the test surface shall be the average to the nearest nominal value.

NOTE: Dirt size estimation chart (transparency) to evaluate the surface defects size. The chart product 0109DIRTT is recommended by both ISO/TC 219 and CEN/TC 134, and is available from TAPPI, Technology Park, P.O. Box 105113, Atlanta, GA 30348-5113, USA, [www.tappi.org](http://www.tappi.org).



#### 4.5 Test report

The test report shall include the following information:

- a) reference to this part of EN 438;
- b) name, type and nominal thickness of the product;
- c) size of the laminate under test;
- d) viewing distance;
- e) total area of spot-type defects in square millimetres;
- f) total length of hair-like defects in millimetres;
- g) any deviation from the specified test method;
- h) date of the test.

#### 4.6 Measurements uncertainty

The precision of the this test method is not known because inter-laboratory data are not yet available. When inter-laboratory data will be obtained, precision statements will be added to the test method at the following revision. As all the other test methods have an end point determination based on subjective judgement, it is not meaningful to make a statement of precision in this cases.

### 5 Determination of thickness

#### 5.1 Principle

The thickness of a laminate is measured using a micrometer or a dial gauge indicator.

#### 5.2 Apparatus

Thickness gauge, (ratchet-type micrometer or dial gauge indicator), having two flat parallel measuring surfaces of diameter 6 mm and capable of being read to 0,01 mm. When the thickness of a decorative laminate is being measured, the two surfaces shall exert a pressure of 10 kPa to 100 kPa upon each other.

#### 5.3 Test specimen

The specimen shall be the laminate under test, as supplied by the manufacturer.

#### 5.4 Procedure

Check the gauge for accuracy and then determine the thickness of the laminate to the nearest 0,01 mm. The thickness shall be measured at the centre of each edge, at a distance of at least 20 mm from the edge of the sheet.

#### 5.5 Test report

The test report shall include the following information:

- a) reference to this part of EN 438;

**prEN 438-2:2014 (E)**

- b) name, type and nominal thickness of the product;
- c) all values measured;
- d) any deviation from the specified test method;
- e) date of the test.

**5.6 Measurements uncertainty**

The precision of the this test method is not known because inter-laboratory data are not yet available. When inter-laboratory data will be obtained, precision statements will be added to the test method at the following revision. As all the other test methods have an end point determination based on subjective judgement, it is not meaningful to make a statement of precision in this cases.

**6 Determination of length and width****6.1 Principle**

Measuring the length and width of the laminate using a metal tape or rule.

**6.2 Apparatus**

Steel tape or rule, of sufficient length to measure the greatest dimension of the laminate, and graduated to allow a reading accuracy of 1 mm.

**6.3 Test specimen**

The specimen shall be the laminate under test, as supplied by the manufacturer.

**6.4 Procedure**

Apply the steel tape or rule (see 6.2) to each edge of the laminate in turn, on a line approximately 25 mm from and parallel to the edge. Measure the length on each edge to the nearest 1 mm.

**6.5 Expression of results**

The arithmetical means of the pairs of length and width measurements shall be calculated and expressed to the nearest 1 mm as the length and width of the laminate.

**6.6 Test report**

The test report shall include the following information:

- a) reference to this part of EN 438;
- b) name, type and nominal thickness of the product;
- c) length and width values;
- d) any deviation from the specified test method;
- e) date of the test.

## 6.7 Measurements uncertainty

The precision of the this test method is not known because inter-laboratory data are not yet available. When inter-laboratory data will be obtained, precision statements will be added to the test method at the following revision. As all the other test methods have an end point determination based on subjective judgement, it is not meaningful to make a statement of precision in this cases.

## 7 Determination of edge straightness

### 7.1 Principle

Applying a metal straightedge to the edge of the laminate and measuring the deviation of the sheet edge from the metal straightedge using a steel rule.

### 7.2 Apparatus

7.2.1 **Metal straightedge**, of 1000 mm length.

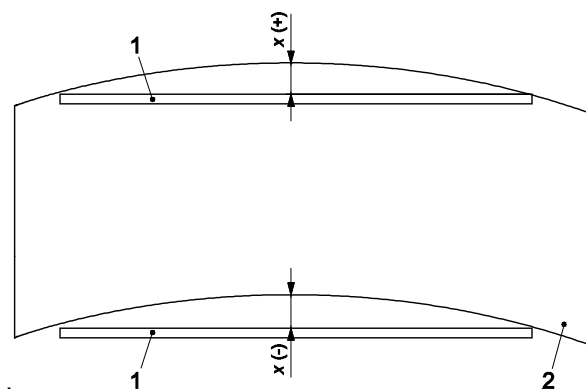
7.2.2 **Steel rule**, graduated in 0,5 mm divisions.

### 7.3 Test specimen

The specimen shall be the laminate under test, as supplied by the manufacturer.

### 7.4 Procedure

Apply the metal straightedge (see 7.2.1) to each edge of the laminate in turn, and use the steel rule (see 7.2.2) to measure the maximum deviation of the edge of the laminate from the metal straightedge ( $x$  in Figure 1) to the nearest 0,5 mm



### Key

- 1 Metal straightedge
- 2 Laminate

Figure 1 — Edge straightness measurement

**prEN 438-2:2014 (E)****7.5 Expression of results**

The maximum deviation from the metal straightedge shall be recorded for each of the four edges. Results shall be designated (+) if the edge is convex, and (-) if the edge is concave.

**7.6 Test report**

The test report shall include the following information:

- a) reference to this part of EN 438;
- b) name, type and nominal thickness of the product;
- c) test result for each of the four edges;
- d) any deviation from the specified test method;
- e) date of the test.

**7.7 Measurements uncertainty**

The precision of the this test method is not known because inter-laboratory data are not yet available. When inter-laboratory data will be obtained, precision statements will be added to the test method at the following revision. As all the other test methods have an end point determination based on subjective judgement, it is not meaningful to make a statement of precision in this cases.

**8 Determination of edge squareness****8.1 Principle**

Applying a right-angled square to the corner of the laminate and measuring the deviation of the edge from the square using a steel rule.

**8.2 Apparatus**

**8.2.1 Right-angled square**, with one arm of at least 1000 mm long (see Figure 2).

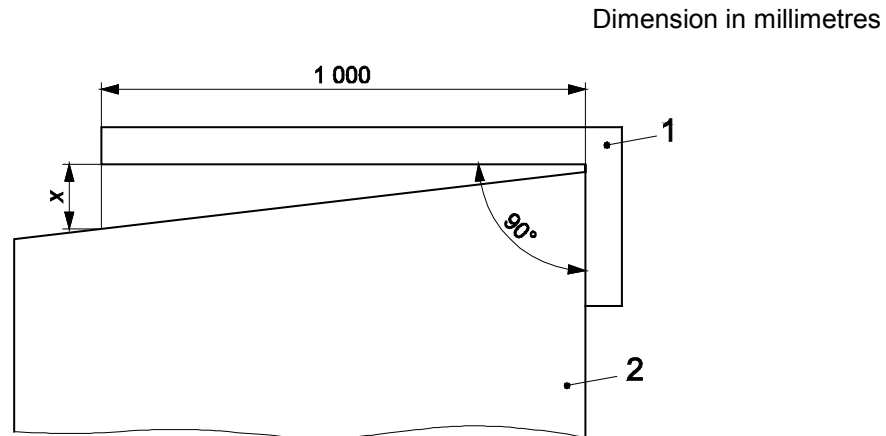
**8.2.2 Steel rule**, graduated in 0,5 mm divisions.

**8.3 Test specimen**

The specimen shall be the laminate under test as supplied by the manufacturer.

**8.4 Procedure**

Apply the right-angled square (see 8.2.1) to one corner of the laminate and measure the deviation of the edge of the laminate from the arm of the square at a distance of 1 metre from the corner. Record the results to the nearest 0,5 mm. Repeat the procedure with the square applied to the diagonally opposite corner of the laminate.

**Key**

- 1 Right-angled square
- 2 Laminate

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 Figure 2 — Edge squareness measurement

**8.5 Expression of results**

The maximum deviation from the square shall be recorded for the two diagonally opposite corners (x in Figure 2).

**8.6 Test report**

The test report shall include the following information:

- a) reference to this part of EN 438;
- b) name, type and nominal thickness of the product;
- c) test result;
- d) any deviation from the specified test method;
- e) date of the test.

**8.7 Measurements uncertainty**

The precision of the this test method is not known because inter-laboratory data are not yet available. When inter-laboratory data will be obtained, precision statements will be added to the test method at the following revision. As all the other test methods have an end point determination based on subjective judgement, it is not meaningful to make a statement of precision in this cases.

## prEN 438-2:2014 (E)

## 9 Determination of flatness

### 9.1 Principle

Measuring the bow (flatness deviation) of the laminate using a bow gauge placed at the position of greatest deformation.

### 9.2 Apparatus

**Bow gauge**, of length 1 000 mm graduated to permit a reading accuracy of 0,1 mm (see Figure 3).

Dimension in millimetres

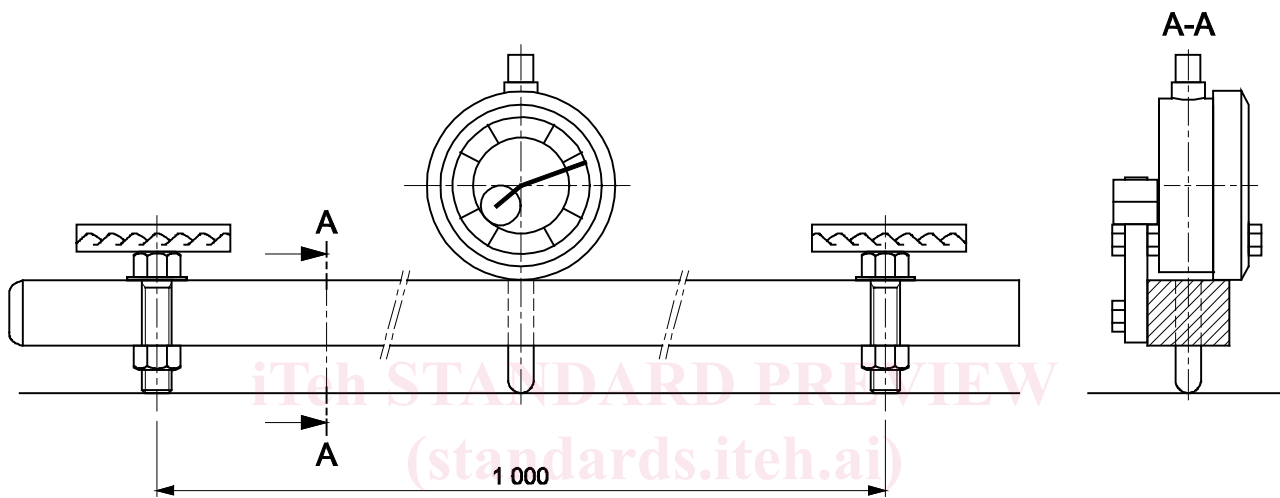


Figure 3 — Bow gauge for measuring flatness

### 9.3 Test specimens

The specimen shall be the laminate as supplied by the manufacturer. In cases of dispute the laminate must be pre-conditioned in accordance with the manufacturer's recommendations until equilibrium is reached.

### 9.4 Procedure

Place the laminate concave side up without restraint on a flat horizontal surface.

Place the bow gauge (see 9.2) so that the three feet (two fixed and one movable) are lightly touching the surface of the laminate in the area of greatest deformation, and measure the flatness deviation (shown on the dial gauge) to the nearest 0,1 mm.

### 9.5 Expression of results

The maximum flatness deviation measured using the bow gauge shall be recorded.

### 9.6 Test report

The test report shall include the following information:

- reference to this part of EN 438;
- name, type and nominal thickness of the product;

- c) maximum flatness deviation;
- d) any deviation from the specified test method;
- e) date of the test.

## 9.7 Measurements uncertainty

The precision of the this test method is not known because inter-laboratory data are not yet available. When inter-laboratory data will be obtained, precision statements will be added to the test method at the following revision. As all the other test methods have an end point determination based on subjective judgement, it is not meaningful to make a statement of precision in this cases.

## 10 Resistance to surface wear

### 10.1 Principle

The test measures the ability of the decorative surface of the laminate under test to resist abrasive wear through to the sub-layer. Abrasion is achieved by rotating a specimen in contact with a pair of loaded cylindrical wheels covered with abrasive paper. The wheels are positioned so that their cylindrical faces are equidistant from the specimen's axis of rotation but not tangential to it. As they are turned by the rotating specimen they abrade an annular track on the specimen's surface. The numbers of revolutions of the specimen required to cause defined degrees of abrasion are used as measures of resistance to surface wear. This test is not applicable to flooring grade laminates.

### 10.2 Materials

Calibration plates of rolled zinc sheet, (Taber S-34 or equivalent), having a thickness of  $(0,8 \pm 0,1)$  mm and a Brinell hardness of  $(48 \pm 2)$  when tested in accordance with EN ISO 6506-1, except that the ball diameter shall be 5 mm and the load 360 N.

The zinc plate shall not be used for more than 10 calibrations per side.

**10.2.1 Abrasive paper strips**, (Taber S-42 or equivalent), of width 12,7 mm and length about 160 mm, having the following composition:

- a) paper of grammage 70 g/m<sup>2</sup> to 100 g/m<sup>2</sup>;
- b) open coated 180 grit powdered aluminium oxide (Al<sub>2</sub>O<sub>3</sub>) having a particle size such that it will pass through a sieve of aperture 100 µm and remain on a sieve having an aperture of 63 µm;
- c) adhesive backing (optional).

**10.2.2 Double-sided adhesive tape**, required only if the abrasive paper has no adhesive backing.

**10.2.3 Dirt size estimation chart (transparency)**, evaluate the wear through size. The chart, product code 0109DIRTT, is recommended by both ISO/TC 219 and CEN/TC 134 and is available from TAPPI, Technology Park, P.O. Box 105113, Atlanta, GA 30348-5113, USA, www.tappi.org.

### 10.3 Apparatus

#### 10.3.1 Abrasion resistance testing machine

The test machine consists of the following items, see Figure 4:

- a) test specimen holder in the form of a disc (key 7) which rotates in a horizontal plane at a frequency of (58 to 62) rpm and to which the test specimen (key 6) can be clamped with a clamping screw (key 5);