SLOVENSKI STANDARD
SIST EN 438-1:2000

01-maj-2000

Dekorativni visokotlaļ ni laminati (HPL) - Ploģļ e na osnovi duromernih smol - 1. del: Specifikacije (ISO 4586-1:1987, spremenjen)

Decorative high-pressure laminates (HPL) - Sheets based on thermosetting resins - Part 1: Specifications (ISO 4586-1:1987, modified)

Dekorative Hochdruck-Schichtpreßstoffplatten (HPL) - Platten auf Basis härtbarer Harze - Teil 1: Spezifikation (ISO 4586-1:1987, modifiziert)

Stratifiés décoratifs haute pression (HPL) - Plaques a base de résines thermodurcissables - Partie 1: Spécifications (ISO 4586-1:1987, modifiée)

Ta slovenski standard je istoveten z: **EN 438-1:1991**

ICS:

83.140.20	Laminatne ploģļ e	Laminated sheets

SIST EN 438-1:2000 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 438-1 : 1991

May 1991

UDC 674.1.03:674.812.2-41

Descriptors: Plastics, laminated plastics, decorative coatings, thermosetting resins, plates, classifications, specifications

English version

Decorative high-pressure laminates (HPL) — Sheets based on thermosetting resins — Part 1: Specifications

(ISO 4586-1 : 1987 modified)

Stratifiés décoratifs haute pression (HPL) — Plaques à base de résins thermodurcissables — Partie 1: Spécifications (ISO 4586-1 : 1987 modifiée)

Dekorative Hochdruck — Schichtpreßstoffplatten (HPL) — Platten auf Basis härtbarer Harze — Teil 1: Spezifikation (ISO 4586-1 : 1987 modifiziert)

This European Standard was approved by CEN on 24 October 1990. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

This European Standard has been drawn up by a CEN ad hoc group for decorative laminates. It has been prepared as a result of the primary questionnaire procedure (PQ) based on ISO 4586-1 : 1987.

The principal modifications compared with the International Standard are the definition for sheets of decorative high pressure laminates (HPL) and the introduction of a correlation table between the two systems of alphabetical and numerical classification of decorative high pressure laminates.

The Secretariat of the ad hoc group on decorative laminates is held by AFNOR.

According to the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

0 Introduction

The first part of this standard includes requirements for the types of materials that are classified in clause 4.

The requirements for several properties may be satisfied by alternative test methods. These have been included where the requirements by either method are approximately equivalent, and either where expensive equipment of different types is in satisfactory use, or where experience is limited to one of the alternatives in certain countries.

1 Scope and field of application

This standard classifies decorative laminated sheets (HPL) according to their performance and main recommended fields of application, and provides also for materials of special characteristics, for example postformability or defined reaction to fire.

Requirements are specified for those types of materials that are most generally used, but additional types may be added as required. The limit values specified apply to the most commonly used types of materials, but within each classification, it may be possible to obtain variants having much higher performance figures.

These materials are characterized by their decorative surfaces, which are relatively hard and resistant to wear, scratching, impact, boiling water, domestic stains and moderate heat. They are intended for interior applications as follows:

- Thin single-faced laminates usually less than 2 mm thick, for bonding to a substrate.
- Compact laminates, single or double-faced, approximately 2 mm to 5 mm thick, which need to be rigidly supported without necessarily being bonded to a substrate.
- Compact laminates, self-supporting, double-faced, usually thicker than 5 mm, the thickness of which will be selected according to application and panel dimensions.

The back surface of sheets having only one decorative face is made suitable for adhesive bonding to a substrate.

This standard applies only to decorative laminated sheets as defined in clause 3. The second part of the standard specifies the methods of test.

2 Reference

EN 438-2 Decorative high-pressure laminates (HPL) - Sheets based on thermosetting resins
Part 2 : Determination of properties

3 Definition

For the purposes of this standard the following definition applies.

decorative high-pressure laminated sheet (HPL)

A sheet consisting of layers of fibrous sheet material (for example, paper) impregnated with thermosetting resins and bonded together by means of heat and a pressure of not less than 7 MPa[1)], the outer layer or layers on one or both sides having decorative colours or designs.

Decorative high-pressure laminated sheet (HPL) as defined in this standard is made from core layers impregnated with phenolic and/or aminoplastic resins and a surface layer or layers impregnated with aminoplastic resins (mainly melamine resins).

4 Classification

A classification system consists of a material type describing the general characteristics of the laminate together with three index numbers describing levels of performance. This system has been developed to cover the many HPL product variants now available. An alphabetical classification system can be used as an alternative (see **4.5**), and table 1 compares the two systems and shows how they relate to some typical applications.

4.1 Index numbers for specifying HPL properties

Index 1 = Resistance to surface wear (table 2).

Index 2 = Resistance to impact by small diameter ball (table 3).

Index 3 = Resistance to scratching (table 4).

4.2 Material type – Special characteristics

The classes of material listed in table 1 are all available as standard type decorative laminated sheet (type S) having the basic characteristics described in clause 1.

For some classes of material, additional types (type P and type F) are also available, possessing the special properties described below.

[1)] 1 MPa = 1 MN/m^2

Table 1 . Classification system and typical applications

Performance category	Type	Index Number			Equivalent alphabetical classification	Examples of typical applications
		1 Wear	2 Impact	3 Scratch		
Thick materials of high performance for special use in horizontal and vertical applications requiring particularly high impact and moisture resistance	Compact S or Compact F	3	*)	3	CGS (Compact general purpose standard) CGF (Compact general purpose flame retardant)	Doors, partitions, walls, various self-supporting components in construction and transportation
Very high resistance to surface wear High impact resistance Very high resistance to scratching	S or F	4	3	4	HDS (Horizontal heavy duty standard) HDF (Horizontal heavy duty flame retardant)	Countertops, flooring on special substrates
High resistance to surface wear High resistance to impact High resistance to scratching	S, F or P	3	3	3	HGS (Horizontal general purpose standard) HGF (Horizontal general purpose flame retardant) HGP (Horizontal general purpose postforming)	Kitchen working surfaces, restaurant and hotel tables, heavy duty doors and wall coverings, interior walls of public transport vehicles
High resistance to surface wear Moderate resistance to impact High resistance to scratching	S, F or P	3	2	3	–	Horizontal applications for office (computer tables) and bathroom furniture
Moderate resistance to surface wear High resistance to impact Moderate resistance to scratching	S or F	2	3	2	VGS (Vertical general purpose standard) VGF (Vertical general purpose flame retardant)	
Postforming material with moderate resistance to impact	P	2	2	2	VGP (Vertical general purpose postforming)	Front panels for kitchen, office and bathroom furniture, wall coverings, shelves
Low resistance to surface wear Moderate resistance to impact and scratching	S, F or P	1	2	2	–	Special decorative surface effects for vertical use in kitchens, showrooms etc.
Low resistance to surface wear and scratching Moderate resistance to impact	S	1	2	1	VLS (Vertical light duty standard)	Exposed side components of cupboards

*) The test method EN 438-2 no. 11 is not applicable to compact CGS and CGF grades, however in practical applications the impact resistance of compact laminates is superior to that of other decorative laminate types.

4.2.1 Type P – *Postformable decorative laminated sheet*

Type P sheet is similar to type S, but it can also be formed in accordance with the manufacturer's recommendations.

4.2.2 Type F – *Decorative laminated sheet having defined reaction to fire*

Type F sheet is similar to type S, but it also meets special requirements of specified fire tests, which may vary according to the application of the material and the country of use.

4.3 Application characteristics

Materials are available in the classes shown in table 1. The list of typical applications given for each category is for guidance only and is not intended to be comprehensive.

Other combinations of properties are possible and can be classified by the numerical index system.

4.4 Index numbers

Index numbers are used to specify three important HPL properties.

4.4.1 *Resistance to surface wear (First index number)*

Table 2. Index for resistance to surface wear

Index number	Number of revolutions	
	IP	$\frac{IP + FP}{2}$
1	0	≥ 50
2	≥ 50	≥ 150
3	≥ 150	≥ 350
4	≥ 350	≥ 1000

4.4.2 *Resistance to impact by small diameter ball* [1] *(Second index number)*

Table 3. Index for resistance to impact

Index number	Spring force (N)
1	≥ 12
2	≥ 15
3	≥ 20
4	≥ 25

4.4.3 *Resistance to scratching*[2] *(Third index number)*

Table 4. Index for resistance to scratching

Index number	Load (N)
1	≥ 1.5
2	≥ 1.75
3	≥ 2.0
4	≥ 3.0

4.5 Nomenclature

In addition to the prefix HPL and the number of this standard, materials can be specified either by the type and index number system, or by the alphabetical classification system.

For example, horizontal general purpose postforming laminate can be specified as HPL–EN 438 – P333 or HPL–EN 438 – HGP.

5 Requirements

5.1 Compliance

In order to comply with the requirements of this standard, materials of each type shall meet the requirements of every property for which a value or requirement is specified in clause **6**.

Two methods of test are given for the measurement of dimensional stability, impact resistance, resistance to colour change in artificial light, formability and resistance to cigarette burns. When there is a choice of method, material satisfying the requirements of either method shall be deemed to comply with the specification for that property; however, the choice of method may be agreed between the interested parties. The method selected shall be stated in the test report.

5.2 Notes on requirements for reaction to fire

The requirements for reaction to fire are determined by the fire regulations of the country in which the material is to be used.

Actually, it is not possible with a single test, to predict compliance with all the different national requirements. No test is therefore included in this specification and reference must be made to the various requirements when appropriate.

The selection of a suitable test or tests for inclusion in this standard will be considered when International Standards specifying fire tests for building materials and structures have been agreed.

[1] Applies only to materials less than 2 mm thick.
[2] See annex B.

6 Properties

6.1 Colour and pattern

When inspected in daylight or D 65 Standard illuminant and again under a tungsten illuminant, there shall be no significant difference between a standard agreed by the supplier and the specimen under test.

6.2 Surface finish

6.2.1 *Finish matching*

When inspected at different viewing angles, there shall be no significant difference between a standard agreed by the supplier and the specimen under test.

6.2.2 *Reverse side*

The reverse side of sheets having only one decorative surface shall be suitable for adhesive bonding if so required.

6.3 Thickness

No requirements for nominal thickness are specified for individual types of material listed in table 7; however, variations from the nominal thickness supplied shall at no point exceed the limits shown in table 5 when thickness is measured in accordance with clause 4 of EN 438-2 : 1991.

Table 5. Permitted variations of thickness

Values in millimetres

Nominal thickness t	Maximum variation
$0.5 \leq t \leq 1.0$	± 0.10
$1.0 < t \leq 2.0$	± 0.15
$2.0 < t \leq 2.5$	± 0.18
$2.5 < t \leq 3.0$	± 0.20
$3.0 < t \leq 4.0$	± 0.25
$4.0 < t \leq 5.0$	± 0.30
$5.0 < t$	as agreed

6.4 Appearance

The following inspection requirements are intended as a general guide, indicating the minimum acceptable quality for laminates supplied as full size sheets. Cut-to-size panels and certain applications involving full size sheets may call for special quality requirements which can be negotiated between supplier and purchaser; in such cases the following requirements may be used as a basis for discussion. It should be noted that only a small percentage of sheets in a batch should be of the minimum acceptable quality.

6.4.1 *Surface defects*

When inspected according to clause **5** of EN 438-2 : 1991, at a distance of 1,5 m, the following surface defects are permissible.

6.4.1.1 *Spots, dirt and similar surface defects*

The admissible size of defects is based on a maximum contamination area equivalent to 1,0 mm^2/m^2 laminate and is proportional to the sheet size under inspection.

The total admissible area of contamination may be concentrated in one spot or dispersed over an unlimited amount of smaller defects.

6.4.1.2 *Fibres, hairs, scratches*

The admissible length of defects is based on a maximum contamination length of 10 mm/m^2 laminate and is proportional to the sheet size under inspection.

The total admissible length of contamination may be concentrated in one defect or dispersed over an unlimited amount of smaller defects.

6.4.1.3 *Combinations of surface defects*

When defect types described in **6.4.1.1** and **6.4.1.2** occur in the same sheet, then the maximum level for each of the two types of defect shall not exceed half of the levels prescribed in **6.4.1.1** and **6.4.1.2**.

6.4.2 *Edge defects*

Visual defects (e.g. moisture marks, lack of gloss, etc.) can be present on all four edges of the laminate providing the defect-free length and width are not more than 20 mm shorter than the nominal length and width.

6.4.3 *Broken corners*

One broken corner of ≤ 3 cm or two broken corners of ≤ 1,5 cm are allowed.

These values refer to the distance between the original corner and the fracture line (see figure 1).

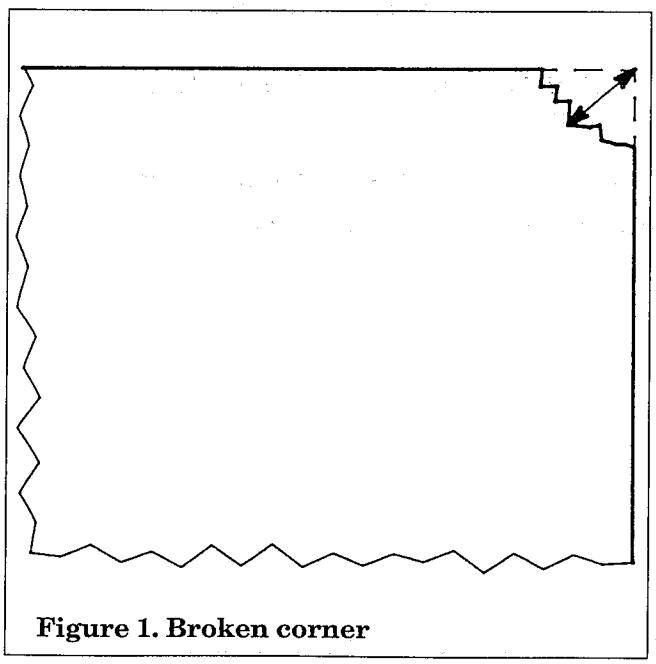

Figure 1. Broken corner

6.4.4 *Sanding defects*

Slight chatter marks are allowed.

6.4.5 *Flatness*

The flatness of laminates is dependent on atmospheric conditions within the storage area. Provided that the laminates are stored in the conditions recommended by the manufacturer, they shall not show a departure of the surface from a straightedge of 1 m length in any position, of more than the limits listed in table 6 when the laminate is laid concave side up on a flat surface.

Table 6. Permitted departure from flatness

Values in millimetres

Composition	Thickness t	Maximum warp
Single-faced laminate	$t < 2.0$	120
	$2.0 \leq t < 5.0$	50
Double-faced laminate	$2.0 \leq t < 5.0$	10
	$5.0 \leq t$	5

6.4.6 *Length and width of a full-size laminate*

The laminate shall be the nominal size with a tolerance of $^{+10}_{-0}$ mm.

6.4.7 *Straightness of edges*

The edges shall be straight within a tolerance of 1,5 mm per metre length of the edge (value a in figure 2). The edge being measured shall be at least as long as the 1 m straightedge.

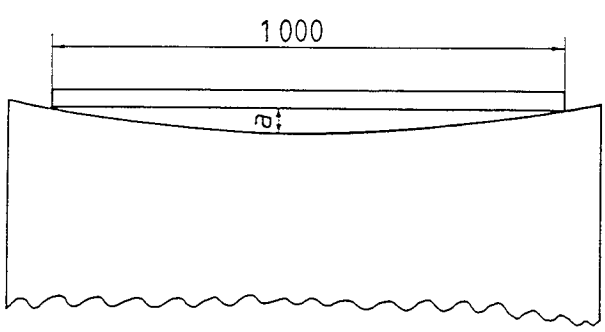

Figure 2. Measurement of straightness

6.4.8 *Squareness of the laminate*

The panel shall be rectangular within a tolerance of 1,5 mm per metre length of the edge (value b in figure 3). The edge being measured shall be at least as long as the 1 m straightedge.

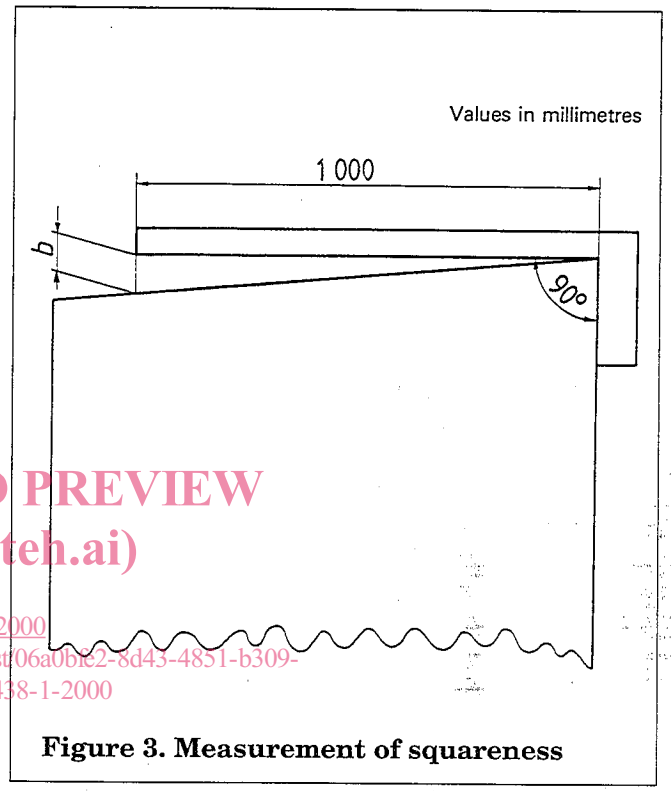

Figure 3. Measurement of squareness

6.5 Other properties

When tested by the appropriate methods, the properties for each type of material shall satisfy the requirements listed in tables 1 and 7.