

# TECHNICAL LEAFLET

## COMPARISON BETWEEN CPL AND HPL



Although the terms CPL and HPL are in widespread use and the products have been applied for many years, questions are still frequently asked concerning the differences in quality and the product possibilities offered by the two alternatives. But in the context of laminates, there are also other frequently used terms and/or material descriptions, which are listed below.

### 1. The Terms CPL and HPL

CPL is the abbreviation for Continuous Pressure Laminates

HPL is the abbreviation for High Pressure Laminates

### 2. Raw Materials / Terms

#### 2.1 DECOR PAPER

The decorative side of a laminate either consists of decor paper, printed with woodgrain décors or fantasy designs, or of uni colours or white décors. The decor papers range in weight from 50 - 160 g/m<sup>2</sup>.

#### 2.2 SODIUM KRAFT PAPER

Sodium kraft papers (also referred to as core layers) form an integral part of a laminate. Sodium Kraft papers range in weight from 70 – 300 g/m<sup>2</sup>, the heavier papers being predominantly used for compact laminates.

#### 2.3 OVERLAY

Overlay is bleached, transparent paper, capable of absorbing a large quantity of resin. It is used to protect the print impression on printed decor papers and to improve the abrasion resistance.

#### 2.4 UNDERLAY

Underlay, or barrier paper, is a layer of paper between decor paper and sodium Kraft paper, intended to prevent a chemical reaction from taking place between the resins. It can also be used to achieve optical effects.

#### 2.5 RESINS

Melamine-formaldehyde resins produce transparent and hard coatings and are therefore ideally suited for the surface layers of decorative laminate sheets. Brown, relatively elastic phenol formaldehyde resins are used in the impregnation of core layers.

### 3. Laminate Description

Decorative sheet laminate consists of layers of cellulose fibrous material (paper), impregnated with thermosetting resins. These are bonded together using the manufacturing methods described below. The surface layer generally consists of a melamine resin impregnated overlay, décor paper and a barrier paper, if applicable. The core of a laminate consists of phenol resin impregnated sodium Kraft papers. The application of heat and pressure provides flowing and subsequent curing of the resins. Through cross-linked bonding of the resins, reinforced by the cellulose fibres of the papers, a very homogenous material with a non-porous surface is produced.

### 4. Laminate Composition

The laminate composition provides information on the number of paper layers and their construction, i.e. the laminate thickness as well as the quality requirements are determined. Apart from the décor paper, the number and weights of the core papers and the use of overlay and underlay are also defined.

### 5. Manufacturing Process

#### 5.1 CPL-PROCESS

The term CPL already provides a hint with regard to the manufacturing process; CPL is produced in continuously operating double-belt presses with a press pressure of between 25 and 50 bar and temperatures ranging from 150 °C to 170 °C. Depending on the laminate thickness and the length of the pressing zone, the feed rate varies from 8 to 30 m/min.

#### 5.2 HPL-PROCESS

HPL is produced in discontinuously operating multi daylight presses with press pressures of between 70 and 80 bar and temperatures in excess of 120 °C. In the context of the laminate production process, the pressure unit is very often also expressed in megapascal [MPa]. For example, 50 bar is equivalent to 5 megapascal. Daylight presses can have up to 45 daylight, and each level can accommodate up to 24 laminate sheets (ranging in thickness from approx. 0.50 to 1.90 mm). Depending on the press feed and the maximum temperature, the entire press cycle, including re-cooling, lasts approximately 100 minutes.

#### 5.3 FORMATTING / SANDING

In the case of HPL sheets, formatting of length and width as well as reverse side sanding involve separate processes. In contrast, CPL production allows all of the following processes to take place on-line, immediately following the press: formatting of length and/or width, reverse side sanding and/or rolling-up into coils.

### 6. Quality Testing / Comparison

Both qualities, CPL and HPL, are classified and tested in accordance with EN 438:2005. The laminate composition and resins used are comparable for both types of laminate. Effectively therefore, identical specifications in terms of laminate thickness, décor and surface, achieve the same test results.

The laminate characteristics are defined in EN 438:2005 and three important requirements in terms of laminate properties are achieved by the following main criteria:

- Abrasion resistance is influenced by the selection of a suitable overlay.
- Impact resistance is influenced by the laminate thickness.
- Scratch resistance is influenced by surface structure

The table below provides an excerpt of essential laminate properties. The values listed for abrasion resistance, impact resistance and scratch resistance correspond to the values required by the Standard for kitchen worktops.

Property	Test method EN 438-2	Unit	Target value EN 438-1	CPL	HPL
Min. thickness	-	mm	-	0,15	0,50
Max. thickness	-	mm	-	1,50	40,0
Max. depth of structure	-	µm	-	150	500
High gloss	-	-	-	Limited	yes
Compact laminate *	-	-	-	no	yes
Abrasion resistance	10	Revolutions IP Revol. wear value	≥ 150 ≥ 350	≥ 150 ≥ 350	≥ 150 ≥ 350
Impact resistance	20	N (min.)	≥ 20	≥ 20	≥ 20
Scratch resistance	25	Rating	3	3	3
Light fastness	27	Grey scale rating	4 to 5	4 to 5	4 to 5
Reaction to dry heat	16	Rating	≥ 4	≥ 4	≥ 4
Resistance to cigarette burns	30	Rating	≥ 3	≥ 3	≥ 3
Resistance to water vapour	14	Rating	≥ 3	3 to 5	3 to 5
Resistance to staining	26	Rating Group 1 + 2 Group 3	≥ 5 ≥ 3	≥ 5 ≥ 3	≥ 5 ≥ 3

\*] Compact laminate = laminate thickness of ≥ 2 mm

## 7. Advantages and Disadvantages CPL and HPL

### 7.1 CPL - PROCESS

The continuous production process of CPL dispenses with waste being incurred on length cuts and facilitates online finishing. It allows flexibility for order specific length requirements, which can be produced efficiently. In addition, thin laminates of < 0.5 mm can be manufactured and, within the confines of a certain thickness spectrum, these can be supplied in rolled-up format.

### 7.2 HPL - PROCESS

This manufacturing process allows the production of compact laminates (laminate thickness ≥ 2 mm) and high-gloss surface finishes. Theoretically, it would be possible to produce just one single sheet of laminate in conjunction with multi daylight presses; however, doing so would be to the detriment of any economic efficiency.

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