



International Committee of the Decorative Laminates Industry

Technical Leaflet

Technical characteristics and physical properties of HPL

December 2015



Preface

High-pressure laminate (HPL) in accordance with EN 438 has been used in the construction and furniture sector for decades. The European standard EN 438 defines the material, requirements and properties of HPL.

HPL is a resin and paper-based thermosetting composite material and features a unique, extremely robust, resistant, modern and very decorative surface. HPL is omnipresent in our day-to-day lives and is self-supporting or used in conjunction with substrates. The application and usage areas of HPL are extremely diverse and are constantly evolving. This requires knowledge management which provides regularly updated information and assistance with regard to different applications and processing, in the form of technical bulletins.

This technical bulletin "Technical characteristics and physical properties of HPL" provides an overview of additional, selected characteristics of HPL.

This document makes no claim of completion regarding listing the full details of any standards referred to in the text.

All information is based on the current state of technical knowledge, but it does not constitute any form of liability. It is the personal responsibility of the user of the products described in this information leaflet to comply with the appropriate laws and regulations.

For more than 50 years the ICDLI has been the international representative of the interests of European laminate manufacturers. Further information about the ICDLI and the data sheets published up to now can be found at www.icdli.com.

This application was compiled by the International Committee of the Decorative Laminates Industry. It considers the conditions of application technology in the European countries. If you have further questions, please contact us:

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Physical and chemical properties

Physical state	Solid
Bulk density	$\geq 1.35 \text{ g/cm}^3$
Solubility	Insoluble in water, oil, methanol, diethyl ether, n-octanol, acetone
Boiling point	None
Fogging effect	None
Melting point	None
Calorific value	Approx. 18 – 20 MJ/kg
Heavy metals	HPL contains no toxic compounds based on antimony, barium, cadmium, chromium ^{III} , chromium ^{VI} , lead, mercury or selenium.
Climatic behaviour	Dimension stability of HPL depends on climatic conditions (temperature / relative humidity)

Stability and reactivity data

Stability	HPL is stable and resistant; they are not considered to be reactive or corrosive.
Hazardous reactions	None
Incompatibility	Strong acids or alkaline solutions will damage the surface.

Fire and explosion prevention data

Ignition temperature	Approx. 400 °C
Flash point	None
Thermal decomposition	Possible above 250 °C
Smoke and toxicity	HPL is classified as F2 in accordance with NF F 16101.
Flammability	HPL is classified as non-flammable and will only burn in the presence of open flames.
Extinguishing media	HPL is categorised as Class A. Carbon dioxide, water spray, dry chemical foam can be used to extinguish flames. Water suppresses and prevents flames being reignited.
Explosion hazard	The processing of HPL through sawing, sanding and milling produces Class ST-1 dust. Standard safety precautions and adequate ventilation must be provided.
Explosion limit	The dust concentration should be below 60 g/m ³ .
Protection against explosion and fire	HPL must be treated as wood-based material.
Fire classification as per EN 13 501	HPL-Type HGS, HGP and CGS D-s2, d0 or better HPL-Type HGF and CGF either B-s2, d0 or C-s2, d0 or better (See below for terminology definitions)



Electrostatic behaviour

HPL minimises the generation of electrostatic charge by contact change or friction with other materials and does not need to be earthed. The surface resistance is $10^9 - 10^{12}$ Ohm and the charge capacity according to EN 61340-4-1 is ≤ 2 kV. HPL is therefore antistatic. You can also find detailed information in the bulletin "Electrostatic discharge properties of HPL".

Transport

HPL is not classified as a hazardous substance for transportation, therefore no safety data sheets are required.

Disposal

Refer to the local regulations. Burning should be carried out in officially approved industrial incinerators.

REACH

REACH does not apply to HPL since this is an article and not a chemical substance. Nevertheless it is important to ensure that information is exchanged with the raw material suppliers about REACH-relevant material properties.

Health information

HPL is classified as non-hazardous to humans or animals. There is no evidence of toxic or ecotoxic effects emanating from HPL. HPL surfaces are physiologically safe and approved for use in contact with foodstuffs according to the Regulation (EC) 1935/2004.

Working areas	The usual safety precautions for dedusting are to be applied.
Formaldehyde emission	< 0.4 mg/h m ² according to EN 717-2 < 0.05 ppm according to EN 717-1 (Chamber Methode)
Pentachlorophenol / Lindane	HPL contains no PCP (pentachlorophenol) or Lindane.
Miscellaneous	HPL is not a hazardous substance in terms of the Ordinance on Hazardous Substances.

More values and information about HPL are provide in EN 438 .



Property	Test standard	Unit	HPL type	
			HGS HGP HGF	CGS CGF
Flexural strength, lengthwise	ISO 178	N/mm ²	≥ 80	≥ 140*
Flexural strength, crosswise	ISO 178	N/mm ²	≥ 80	≥ 100*
Flexural modulus, lengthwise	ISO 178	N/mm ²	≥ 9000	≥ 14000*
Flexural modulus, crosswise	ISO 178	N/mm ²	≥ 9000	≥ 10000*
Tensile strength, lengthwise	EN ISO 527-1	N/mm ²	≥ 60	≥ 115*
Tensile strength, crosswise	EN ISO 527-1	N/mm ²	≥ 60	≥ 75*
Impact strength, lengthwise	ISO 179-1	kJ/m ²	n.a.	≥ 11*
Impact strength, crosswise	ISO 179-1	kJ/m ²	n.a.	≥ 8*
Compressive strength parallel to the layers	DIN 52 185	N/mm ²	n.a.	≥ 165*
Delamination load	DIN 53 463	N	n.a.	≥ 2500*
Brinell hardness	EN 1534	N/mm ²	n.a.	≥ 185*
Thermal conductivity	EN 12 664	W/(m * K)	0.3	CGS 0,3* CGF 0,5*
Coefficient of linear thermal expansion	DIN 53 752	1/K	n.a.	n.a.
- lengthwise			0.9 * 10 ⁻⁵	0.9 * 10 ⁻⁵
- crosswise			1.6 * 10 ⁻⁵	1.6 * 10 ⁻⁵
Sound reduction index	EN ISO 10 140	dB(A)	Depends on material and construction	

*: The values were determined in a round robin test on 10 mm compact laminates at IHD Dresden in October 2014.



EN 438 parts 3 to 6 and parts 8 and 9 include product classification systems. While each of these systems is different, they contain some common elements as follows:

Main classifications:

H = Horizontal grade

V = Vertical grade

C = Compact laminate

E = Exterior grade

AC = Abrasion Class for flooring grade (AC 1 to AC 6)

A = Pearlescent laminate

M = Metal laminate

W = Wood veneer laminate

B = Coloured core laminate

R = Metal reinforced core laminate

T = Thin laminate < 2mm

Sub-classifications:

D = Heavy duty or severe use

G = General purpose or moderate use

S = Standard grade

F = Flame-retardant grade

P = Postforming grade

Out of these letters HPL can be classified as e.g.:

HGS = Horizontal General Standard

HGP = Horizontal General Postforming

VGFR = Vertical General Fire Retardant

etc.