INTERNATIONAL COMMITTEE OF
ICDLI
DECORATIVE LAMINATES INDUSTRY

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TECHNICAL INFORMATION

Environmental declaration for high pressure laminate HPL and its elements

LIFE CYCLE ASSESSMENT FOR A EUROPEAN HPL

April 1999

Edited by

Internationales Komitee der Hersteller Dekorativer Schichtstoffplatten
Internationaal Comité voor Decoratieve Kunststofplaten Industrie

Comité International de l'Industrie du Stratifié Decoratif
Comitato Internazionale dell'Industria dei Laminati Plastici

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1. WHAT IS LCA ?

LCA (Life Cycle Assessment) is a systematic way to evaluate the environmental impact of products or activities by following a so-called "cradle-to-grave" approach.
This approach implies the identification and quantification of emissions and material and energy consumption which affect the environment at all stages of the entire product life cycle.
It means that LCA consists of all the processes related to the functioning of a product, from the extraction of raw material through the production, use and reuse and disposal of all final waste.

Normative reference:
"Environmental management. Life cycle assessment", ISO 14040 – 14043, 1996 -1997 (see Annex 2).

2. WHEN TO USE LCA ?

- When a single company or an association want to compare the environmental impacts of different products with the same function (final application)
- To identify the most dominant and critical stage in a product life cycle
- To indicate strategically the direction of a product development

3. WHO DID LCA ?

European producers of HPL represented by ICDLI (International Committee of Decorative Laminates Industry) have undertaken an accurate and large study for the first time on a common scientific basis in order to establish the influence of HPL on the environment. Producers from 9 European countries, representing up to 70 % of the total European market, have contributed to this study. The work was conducted by INTRON BV (The Netherlands), a well-known independent institute for the quality assessment for the building industry.

4. GOAL DEFINITION AND SCOPE

- PURPOSE:
  ICDLI has identified the most typical application of HPL in a worktop in its entire life
- SUBJECT:
  The subject of an LCA is always defined in a so-called "functional unit".
  What is a functional unit?
  It is the unit for which data are collected and the environmental profile is calculated.
  ICDLI identified the following basic functional units covering its entire life cycle (cradle to grave):

  - *1 m^2 of high pressure decorative elements consisting of high pressure decorative laminate of 1.0 mm thickness HGS grade according to EN 438-1 and 38 mm chipboard backed with kraft paper, functioning in a long life indoor use application*

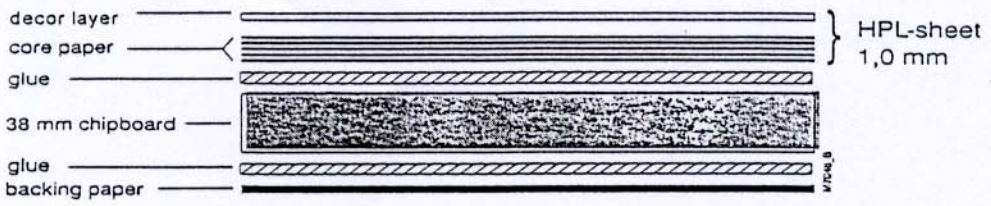

fig. 1

and:

  - *1 m^2 of high pressure decorative laminates of 1.0 mm thickness HGS grade according to EN 438-1*
  - *the production of 1 m^2 of an HPL element consisting of high pressure laminate of 1.0 mm thickness HGS grade and 38 mm chipboard backed with kraft paper*

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The study started with the gathering of data concerning the constituents necessary for the production of HPL, such as paper, pigments, chemical products and resins. Similarly for the chipboard (wood and glue). Additionally, transport to the producers of HPL, the production itself of HPL and HPL elements, packaging and final delivery to the customer have also been considered. The LCA ends with the disposal of waste materials and incineration with energy recovery (see fig. 2).

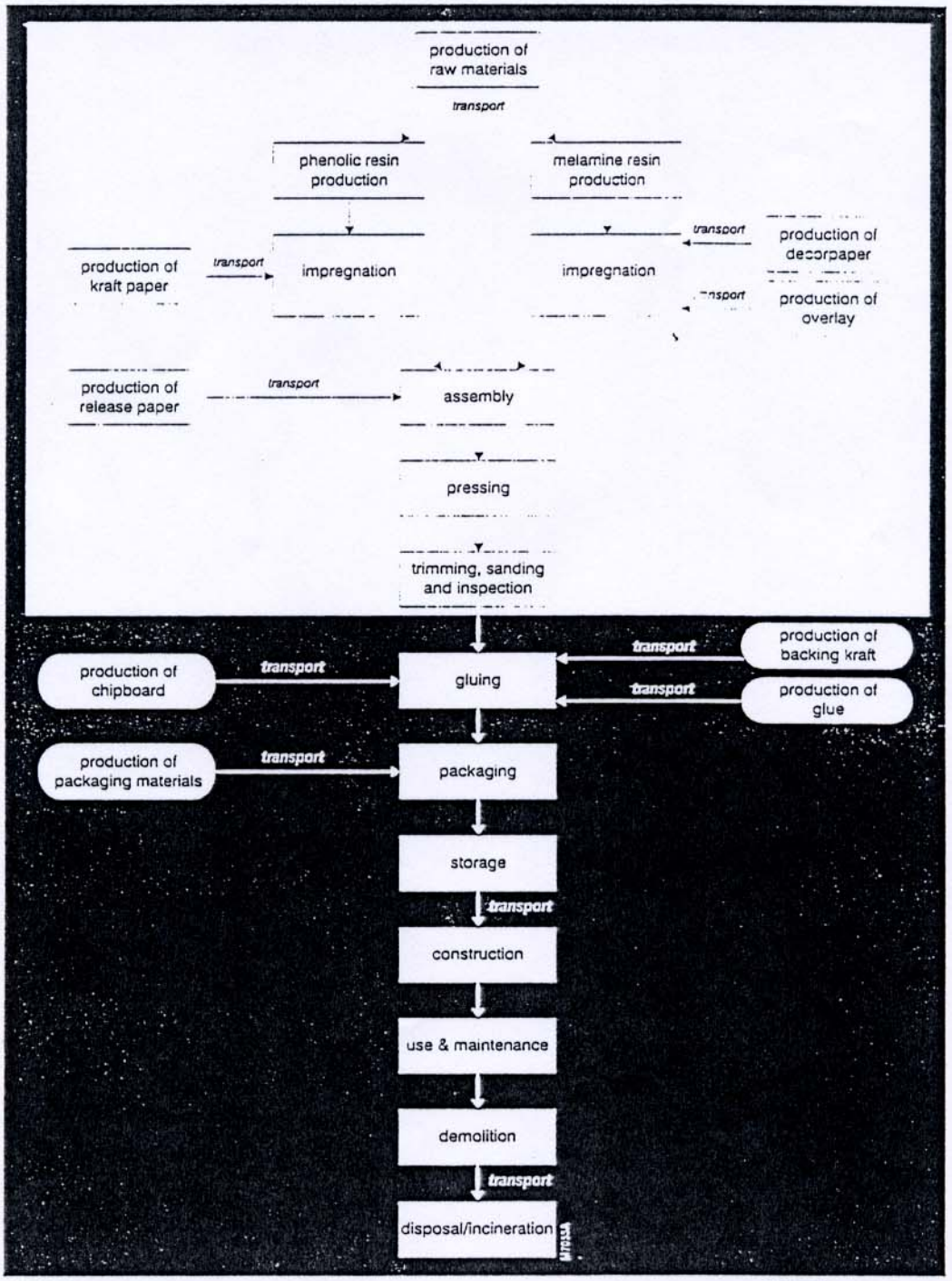

fig. 2

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5. IMPACT ASSESSMENT: CLASSIFICATION

The environmental profiles consist of several impact classes as below:

ENVIRONMENTAL IMPACT CLASS		High Pressure Decorative Laminate, 1m² A		Chipboard 1m² B	HPL Element 1m² C			Total life cycle A+B+C
		Raw Materials	Production	Raw materials and Production	Gluing and packaging	Service Life	Waste treatment	
Abiotic depletion	*10^{-15}*	*12*	*3*	*41*	*2.9*	*3.1*	*-42*	*20*
Biotic depletion	*yr*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Greenhouse effect	*kg*	*4.5*	*1.4*	*19*	*2.0*	*1.2*	*5.0*	*33*
Depletion of the ozone layer	*10^{-7}kg*	*0.77*	*0.52*	*15*	*0.68*	*0*	*-21*	*-4.2*
Energy	*MJ*	*63*	*20*	*271*	*34*	*17*	*-385*	*24*
Waste	*Kg*	*0.066*	*0.074*	*0.446*	*0.062*	*0.001*	*-0.381*	*0.267*

Source: Intron BV ("Eco-profiles of high pressure decorative laminate (HPL) according to EN 438.1 and its elements. Final Technical Report R97402", 29 April, 1998)

6. HOW MAY FIGURES BE INTERPRETED ?

Abiotic depletion

Responsible treatment of HPL elements after their long life (by thermal recovery) reduces the impact of abiotic resources by 68%.

Biotic depletion

HPL and HPL elements do not deplete biotic resources like wood.
Their lifetime is longer than cultivated forests need to grow.

Greenhouse effect and energy

- One may produce more than 6 sqm of HPL for the same greenhouse impact as by production of only 1 sqm of aluminium sheet in the same thickness (see the table below)
- One may produce more than 8 sqm of HPL for the energy consumption as by production of only 1 sqm of aluminium sheet in the same thickness (see the table below)

ENVIRONMENTAL IMPACT CLASS	HPL (1,0 mm) ① 1 m²	STEEL (1,0 mm) ② 1 m²	ALUMINIUM (1,0 mm) ③ 1 m²
	raw materials + production	raw materials + production	raw materials + production
Greenhouse effect (Kg)	6,0	23	37
Energy (MJ)	83	350	670

① Density: 1,4 gr/cm³
② Density: 7,8 gr/cm³
③ Density: 2,8 gr/cm³

Source: Intron B.V.

Depletion of the ozone layer

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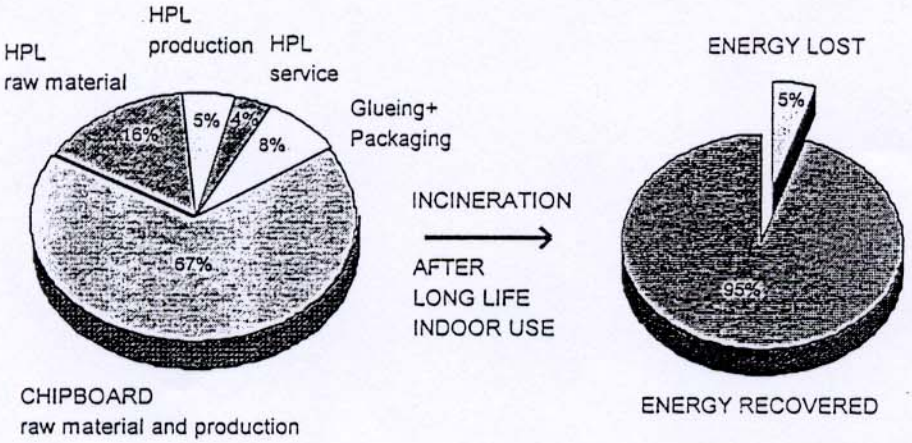
HPL elements have no impact on the ozone layer over their whole life.

Energy consumption
On account of their high calorific value (17 - 20 MJ/kg) HPL and HPL elements are ideal for thermal recycling.



Only 5 % of energy needed for HPL elements is used for the production of HPL

95 % of energy is recovered by incineration

Waste
The amount of waste is 2.7 % in weight of which 1.6 % is used for energy recovery (by incineration) and 1.1% is household-like waste.

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ANNEX A

DEFINITIONS

Abiotic depletion
The use of non-renewable resources, such as oil, natural gas, coal, metals, etc..
The figure has been indicated with no unit of measure, since the use of resources necessary for the product is related to the (estimate) amount of recoverable reserves:

$$\textit{abiotic depletion} = \frac{\text{use (Kg)}}{\text{stock (Kg)}}$$

Biotic depletion
The use of renewable resources.
By this figure the use of renewable resources necessary for the product is related to the total recoverable reserves per year:

$$\textit{biotic depletion (yr)} = \text{BDF} \left[\frac{\text{stock}}{\text{production}} \right] \times \text{use}$$

Note: all the paper used for HPL is obtained from sustainable forests.

Greenhouse effect
Global heating of the atmosphere due to the absorption of IR rays which cannot pass through the atmosphere due to the presence of polluting gases.
It is expressed in form of CO_2 equivalents (Kg).

Depletion of the ozone layer
Reduction of the ozone layer due to the emission of ozone depleting gases in the Stratosphere.
Ozone depletion potential is taken as a reference related to the ozone depleting emissions caused by the resources necessary for the product.
It is expressed in form of CFK 11 equivalents (Kg).

Energy
The figure originates from the total energy consumption expressed in MJ, including the transport of energy carriers, the generation efficiency and transport to the user.

Waste
Solid waste fractions produced.

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ANNEX B

LITERATURE

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Technical information are based on the best knowledge of the technical experts of all ICDLI member companies.

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