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Containerboard paper types and their properties

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Containerboard paper is produced in Hungary in the paper mill operated by Hamburger Hungaria Ltd. On the two paper machines located there, about 670.000 tonnes of paper are produced a year, exclusively utilising waste paper, accounting for 85% of the total paper production in Hungary.
The portfolio matches the recommendations by CEPI Containerboard.
Without proper professional experience, choosing from the containerboard grades available on the European market can be quite a headache for anyone wanting to use them for making corrugated products.
Contrary to several other industrial products, there are no official standards for paper grades in the paper industry; whereas, in case of a connector element, for example, an international standard regulates the minimum requirements concerning the element in question.

Paper type	Commercial name	Grammage range
Testliner	Austroliner 2	120 – 150 g/m^2
	Austroliner 3	120 – 175 g/m^2
Brown light weight recycled liner	Austroliner 2 Light	100 – 115 g/m^2
	Austroliner 3 Light	80 – 115 g/m^2
Other brown recycled liner	Austroliner 4	100 – 150 g/m^2
	Austroschrenz	100 – 140 g/m^2
	Austroschrenz Light	70 – 95 g/m^2
Recycled medium	Austrofluting-R	112 – 175 g/m^2
	Austrowelle	100 – 150 g/m^2
	Austrowelle 2	110 – 175 g/m^2
Light weight recycled medium	Austrowelle Light	70 – 95 g/m^2

Purchasing such an element would also give us exact information regarding what load it can withstand; however, in the paper industry, there may be significant differences between the same products made by different paper-makers.

The predecessor of CEPI Containerboard (the containerboard branch of the Confederation of European Paper Industries), Groupement Ondulé, compiled a list of European corrugated base paper types back in 1992.

Due to a lack of normative regulation, the year 2005 version of this list is currently used to give some basic assistance in categorising the containerboard grades.

It is important to mention that the list, although it was put together by paper-makers, was made not for paper-makers, but for manufacturers of corrugated products in order to make orientation easier; and although it cannot be regarded as a standard, most European paper-makers still structured and specified their product range accordingly.

The change in market demand, the endeavour on the side of corrugated product-makers to achieve cost-efficiency and efforts to minimise packaging encourage paper-makers to develop their products, resulting in several products in the market that are worth mentioning in the individual categories, beyond what is defined and listed by CEPI. These developments may result in a change in the containerboard papers list; therefore, the list is currently revised in order to implement the changes that have occurred since 2005.

CEPI Containerboard examines and classifies containerboard papers primarily according to their strength properties.

The requirements concerning strength are typically expressed as indices, that is, as specific values, which makes it possible to classify paper grades independently of grammage.

The requirements for individual paper grades determined by CEPI are minimum values, referring to the average value of the lowest reel in a minimum 20-tonne, homogenous shipment.

The parameters defined are measured in accordance with the relevant standards, while sampling is carried out according to standard ISO186; the climate conditions of measurements are defined by standard ISO187.

The CEPI regulations differentiate between the following containerboard paper types according to their strength properties:

CEPI categorises containerboard paper types according to their function, into liner and corrugating medium paper types. Liners are containerboard papers that are used to make the outer and inner, non-corrugated parts of the corrugated board; while corrugating medium (also called medium or fluting) is containerboard paper that gets corrugated during board production.

1. Liners

They can be classified in two groups, basically: kraftliners, which are liners produced mainly of primary fibre; and testliners, which are primarily made of recovered fibre.

Within these categories, a further distinction is made between brown and white, as well as coated and uncoated (in case of white) liners. The most important strength indices of top liners – based on which CEPI classifies them – are burst, or cross-direction SCT (short-span compression test), in case of white liners, this is complemented by certain surface characteristics, such as brightness and roughness.

1.1. Brown kraftliner

Paper made out of primary, or virgin fibre, whose most important characteristic is burst.

	Burst index [ISO 2759; kP*m²/g]	
	<250 g/m²	≥ 250 g/m²
Long fibre, brown	> 3.5	> 3.0
Short fibre, brown		
Wet strength		

1.2. White kraftliner

Also made mainly out of primary fibre, its most important characteristic is burst, coupled with brightness as a classification criterion.

	Burst index [ISO 2759; kP*m²/g]	Whiteness [ISO 2470-1; %]
Fully white	> 3.5	> 80
White top		> 70
White mottled		–
Coloured		–
Fully white, coated	> 3.5	> 85
White top, coated		> 75

1.3. Testliner

Basically made out of recovered fibre, non-white, non-low grammage paper, the most important strength characteristic of which is burst or cross-

direction SCT. Based on these parameters, there are three grade categories.

	Burst index [ISO 2759; kP*m²/g]	SCT-KI [ISO 9895; N*m/g]
Testliner 1 125 – 200 g/m²	> 3.0	> 17.5
Testliner 1 ≥ 200 g/m²	> 2.9	
Testliner 2 125 – 200 g/m²	> 2.5	> 15.5
Testliner 2 ≥ 200 g/m²	> 2.4	
Testliner 3 125 – 200 g/m²	> 2.0	> 13.5
Testliner 3 ≥ 200 g/m²	> 1.8	

1.4. Brown light weight recycled liner

Paper made basically out of recovered fibre, with a grammage strictly below 125 g/m².

Burst or cross-direction SCT is its main characteristic. In this particular case, SCT is defined as an absolute minimum value, not as a specific one.

	Burst index [ISO 2759; kP*m²/g]	SCT-KI [ISO 9895; N*m/g]
120 g/m²	> 2.0	1.60
115 g/m²		1.50
110 g/m²		1.40
100 g/m²		1.30
95 g/m²		1.25

1.5. Other brown recycled liners

These paper types are also made out of recovered fibre, whose strength properties must meet certain burst requirements, or – in case of Schrenz paper types –, there are no defined requirements concerning strength.

	Burst index [ISO 2759; kP*m²/g]
Brown bicolor / Brown duplex	> 1.6
Schrenz	without guarantees

1.6. White recycled liner, uncoated

Paper made basically out of recovered fibre, with guaranteed brightness, roughness and burst values.

	Brightness [ISO 2470-1; %]	Roughness [ISO 8791-2; ml/min]	Burst index [ISO 2759; kP*m²/g]
Grade A	≥ 76	≤ 600	≥ 1.9
Grade B	≥ 70	≤ 1000	≥ 1.7
Grade C	< 70	> 1000	< 1.7

In terms of surface water-absorbing capacity, grades A and B are sized, their typical Cobb60 [ISO 535] values are 25 - 45 g/m².

1.7. Mottled recycled liner

	Burst index [ISO 2759; kP*m/g]
Mottled 1	≥ 2.2
Mottled 2	< 2.2

1.8. White recycled liner, coated.

There are no strength criteria specified by CEPI in case of coated, white top liners.

2. Corrugating mediums

Taking into consideration the function of flutings, there are only strength criteria for them, which are: CMT30 (Concora Medium Test) or cross-direction SCT (short-span compression test).

2.1. SC Fluting

Paper made primarily out of semi chemical primary fibre, whose classification criteria are CMT30 and cross-direction SCT.

	CMT_{30} index [ISO 7263; N*m²/g]	SCT-KI [ISO 9895; N*m/g]
SC fluting	≥ 1.9	≥ 17.0

2.2. Recycled fluting/medium

Paper made basically out of recovered fibre, with CMT_{30} or cross-direction SCT regulation, grammage over 100 g/m².

	CMT_{30} index [ISO 7263; N*m²/g]	SCT-KI [ISO 9895; N/m]
High-performance medium	≥ 1.8	≥ 18.0
Medium	≥ 1.6	≥ 16.0
Medium 2	≥ 1.3	≥ 13.5

Paper made basically out of recovered fibre, with a grammage strictly below 100 g/m². Either CMT30 or cross-direction SCT is important, with both parameters expressed in absolute minimum value, not specific value, in this particular case.

	CMT_{30} [ISO 7263; N]	SCT-KI [ISO 9895; N/m]
100 g/m²	145	1.50
95 g/m²	135	1.40
90 g/m²	125	1.30
80 g/m²	95	1.10

2.4. Other flutings

Fluting made out of straw-pulp with CMT30 regulation, or Schrenz paper without strength guarantee.

	CMT_{30} index [ISO 7263; N*m²/g]
Straw fluting	> 1.4
Schrenz	without guarantees

As a final word, let me comment that as we can see in some cases, the now 7-year-old classification system is rather sketchy here and there, not to mention the fact that practical requirements concerning containerboard papers have also changed in the meantime. Therefore, CEPI Containerboard is working on revising the list, which is expected to yield more accurate data, and in some cases, the introduction of further classification parameters or inspection standards.

Rejtő Sándor Faculty of Light Indrustry and Environmental Engineering

The Faculty offers three BSc programs: Light Industry Engineering, Industrial Design Engineering, Environmental Engineering, and a MSc program in Light Industry Engineering.

The bachelor's program in Light Industry Engineering prepares students for the control and supervision of manufacturing processes related to their specialisation. After completing the fundamental courses in engineering, with basic technical and engineering skills they can choose from the following specialisations: Creative products and technologies, Quality Control System Developer, Printing and Media, Packaging and Paper Technologies.

Engineers, with a BSc degree in Industrial Design Engineering will be able to initiate, compile and implement projects, to carry out analyses using relevant design methods and to professionally justify the implemented work procedures. They will have competence in comprehensive product design, taking into consideration aesthetic, usability, market, safety, and implementation aspects, as well as historic, cultural, social, economic, industrial and natural environmental factors related to industrial design and product development. Specialisations: Product Design and Product Management.

BSc Environmental Engineers will possess the necessary up-to-date vocational and technological skills needed to reduce and prevent environmental damage and pollution. They are trained to be capable of making environmental studies. We offer the Light Industry specialisation.
Those who earned the BSc degree can continue their studies on the Light Industry Engineering MSc program. The training is organised in cooperation with the Faculty of Wood Sciences of University of West Hungary. Graduates of the BSc program may also continue their studies in the Engineering Teacher Master program in cooperation with Trefort Ágoston Centre for Engineering Education.

Our special Light Industry Engineering Assistant program offers a more practice-oriented training, the knowledge acquired can be converted to vocational expertise easily. In case of an appropriate performance the graduates of this program may continue their studies on BSc level, where most of their earned credits are taken into account.

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