Cepi ContainerBoard

DE ES FR EN IT

European list of corrugated base papers

Definition
Identification
Terms of guarantee for technical specifications
Technical trends & developments

Document available in English, French, German, Italian and Spanish

Foreword

This document represents the outcome of a review of the list of containerboard grades, their specification and classification. These paper grades are produced and sold by the members of the European containerboard industry, and are used in the manufacture of corrugated board.

The list was first issued in 1992, and has regularly been updated in order to integrate the improvements of the knowledge and the understanding of how the properties of papers influence properties of the box and the performance of the corrugator. This document is the fifth update and it represents the conclusions of the review made by the Cepi ContainerBoard[1] Technical Committee, group of technical experts commissioned to review this list and to update it using current knowledge of the papers, their properties, and performance.

The first ambition of the list is to cover most of the paper and board qualities used by the corrugated industry in Europe and to give a brief technical description of them, and not to describe the process they are made from. It has to be recognized that not all of the relevant properties can be described by the existing measuring methods ; as a consequence the group foresees the need to modify some of the parameters in the coming years. Especially the long-term box strength properties under load (and eventually) climate changes and difficulties measuring the correct properties at low and high substances need to be investigated. An example of the first is creep and of the later are CMT measurements.

The second ambition of the experts has also been to maintain most of the existing code structure in the document, and it cannot be strongly enough pointed out that the increased trade between companies and usage of EDI message means an increased demand for all papermakers to mark their products according to the standard described in this document.
However, the Technical Committee recognized that the usage of two digits does not cover all the needs, which can be foreseen for the coming years. It makes it necessary to introduce, in the future, either two extra digits to describe all product variations supplied to the corrugated board industry or a complementary system of identification (e.g. a two dimensional code).

As in the preceding issue, the document is subdivided into groups of products used for production of corrugated board. The main changes to the previous document are:

- The recycled light weight liner (LWL) category has been removed as well as the substance threshold, separating the light weight liners and the brown testliners
- The testliner 3 property requirements according the substance classes, have been modified as a consequence of the removal of the light weight liners grades
- Property requirements of the testliner 4 have been introduced (burst index and SCT-CD index) in order to take into account the evolutions of the market.
- The Cobb references for the testliners 1, 2 and 3 have been modified with the introduction of two types of sizing : “sized” and “special sized” (knowing that the “special sized” liners are typically used to fulfil the United Nations regulation concerning corrugated board). The barcode system has also been modified for the testliners 1, 2 and 3 and it now foresees these three variants (unsized, sized and special sized)
- A brown kraft top liner grade has been defined, with property requirements (burst index and SCT-CD index)
- Two sub-categories of recycled fluting high performance have been introduced and the property requirements adapted accordingly
- Due to the limitations seen at measuring CMT of high substances, and the rising trend to light weight fluting (used at low flute heights), the Technical Committee is currently developing an alternative method to replace the CMT measurement (A flute). Consequently, the CMT 30 values of the Light Weight Medium are now mentioned in the list only as indicative.

Furthermore, several previous principles were confirmed and completed:

- Grade numbers that are not allocated in the list shall not be used. However, in order to meet the recurrent request for the identification of specialty papers that can be produced by some plants, some specific numbers were allocated for each of the main grade families (brown and white top kraftliner, semi chemical fluting, brown and white top recycled liners, recycled fluting). Their fair use remains subject to the compliance with the corresponding Material Definition of the corresponding grade “family” (especially the primary pulp content)
- Producers may either refer to the ISO 2758 or ISO 2759 for the bursting strength of their liners. However, whatever is the standard used, the liners must fulfil the minimum required level of performance of the category claimed, as indicated in the document
- All the indicated values in the tables or graphs are either minimum or maximum values, which can be guaranteed, and in no case nominal values (except explicitly mentioned).

Finally, the reference document is the English version and its updated issue can be found on the Cepi ContainerBoard website: http://cepi-containerboard.org.

[1] Cepi ContainerBoard (CCB) is the European industry association of corrugated case materials producers, also called containerboard.

Cepi ContainerBoard list of grades

Summary

Definition of the grades

Liners

Brown kraftliner

MATERIAL DEFINITION

A brown kraftliner is a paper predominantly made from primary kraft pulp.

PROPERTY REQUIREMENTS

Burst and SCT-CD are considered as two of the most important strength properties of kraftliner, while they are a good indicator of strength performance of a box, flexibility during converting and usage of the corrugated board. Bursting strength, together with compression strength SCT and tensile stiffness in CD and MD, are in many cases used for calculating box performance.

Concerning COBB, a brown kraftliner should be sized. The sized grade will be measured by the 1 minute COBB test with values typically in the range 25 g/m^2 to 45 g/m^2.

SUBSTANCE (g/m^2)	BURST INDEX		or	SCT-CD INDEX
	ISO 2758	ISO 2759		
< 250	≥ 3.5	≥ 3.6		≥ 18.0
≥ 250	≥ 3.0	≥ 3.0		≥ 17.5

White top kraftliner

MATERIAL DEFINITION

A white top kraftliner is a paper predominantly made from primary kraft pulp.

BRIGHTNESS MEASUREMENT

Brightness is measured according to conditions defined by the standard ISO 2470-1 meaning with a filter corresponding to CIE standard C / standard observer 2 degrees (with a progressive adjustment of the filter with fluorescence reference linked to ISO IR3 fluorescent standard).

PROPERTY REQUIREMENTS

Burst and SCT-CD are considered as two of the most important strength properties of kraftliner, while they are a good indicator of strength performance of a box, flexibility during converting and usage of the corrugated board. Bursting strength, together with compression strength SCT and tensile stiffness in CD and MD, are in many cases used for calculating box performance. Optical properties are essential for a white top kraftliner. As a consequence a white top kraftliner shall reach certain criteria in terms of brightness, roughness and sizing.

Concerning COBB, a white top kraftliner should be sized. The sized grade will be measured by the 1 minute COBB test with values typically in the range 25 g/m^2 to 45 g/m^2.

	BURST INDEX		or	SCT-CD INDEX	and	BRIGHTNESS ISO 2470-1	and	BENDTSEN ROUGHNESS
	ISO 2758	ISO 2759						
Fully white	≥ 3.7	≥ 3.8		≥ 18.5		≥ 78%		≤ 600
White top	≥ 3.7	≥ 3.8		≥ 18.5		≥ 70%		≤ 600
White mottled	≥ 3.7	≥ 3.8		≥ 18.5		≥ 50%		≤ 1000

Definition of the grades

Liners

White coated kraftliner

MATERIAL DEFINITION

A white coated kraftliner is a paper predominantly made from primary kraft pulp.
A coated kraftliner is a white kraftliner coated with a coating colour containing pigments.

PROPERTY REQUIREMENTS

Burst and SCT-CD are considered as two of the most important strength properties of kraftliner, while they are a good indicator of strength performance of a box, flexibility during converting and usage of the corrugated board. Bursting strength, together with compression strength SCT and tensile stiffness in CD and MD, are in many cases used for calculating box performance. Optical properties are essential for a white coated kraftliner. As a consequence a white coated kraftliner shall reach certain criteria in terms of brightness, roughness and sizing.

Concerning COBB, a white coated kraftliner should be sized. The sized grade will be measured by the 1 minute COBB test with values typically in the range 25 g/m^2 to 45 g/m^2.

	BURST INDEX ISO 2758	BURST INDEX ISO 2759	or SCT-CD INDEX	and BRIGHTNESS ISO 2470-1	and GLOSS	and BENDTSEN ROUGHNESS	and PPS ROUGHNESS
Fully white	≥ 3.5	≥ 3.6	≥ 18.5	≥ 80%	≥ 20	≤ 300	≤ 5.0
White top	≥ 3.5	≥ 3.6	≥ 18.5	≥ 76%	≥ 20	≤ 300	≤ 5.0

Definition of the grades

Liners

Brown testliner

MATERIAL DEFINITION

A testliner is a predominantly recycled fibre based paper.

PROPERTY REQUIREMENTS

Burst and SCT-CD are considered as important strength properties, while they are a good indicator of strength performance of a box, flexibility during converting and usage of the corrugated board. Bursting strength, together with compression strength SCT and tensile stiffness in CD and MD, are in many cases used for calculating box performance.

The minimum value of Burst Index of a specified grade is the maximum value of the Burst Index for the next lower paper grade. The minimum value of SCT-CD Index of a specified grade is the maximum value of the SCT-CD Index for the next lower paper grade. If one of the limits either Burst or SCT-CD is exceeded by a testliner, this paper is automatically classified in the next superior testliner grade.

Any containerboard, which does not reach either Burst Index or SCT-CD Index required to define testliner is a special grade which may result from specific negotiations between the producer and the client, and which may be the subject of particular commercial conditions. In no case may these grades be called “testliner”.

GRADE	SUBSTANCE	BURST INDEX		or	SCT-CD INDEX
	g/m^2	ISO 2758	ISO 2759		
Testliner 1	< 200	≥ 2.8	≥ 3.0		≥ 17.5
	≥ 200	≥ 2.8	≥ 2.9		
Testliner 2	< 200	≥ 2.2	≥ 2.5		≥ 15.5
	≥ 200	≥ 2.2	≥ 2.4		
Testliner 3	< 95	≥ 1.6	≥ 1.9		≥ 13.5
	≥ 95	≥ 1.7	≥ 2.0		
	≥ 120	≥ 1.8	≥ 2.0		
	≥ 200	≥ 1.8	≥ 1.8		
Testliner 4	≥ 90	≥ 1.3	-		≥ 11.5

Definition of the grades

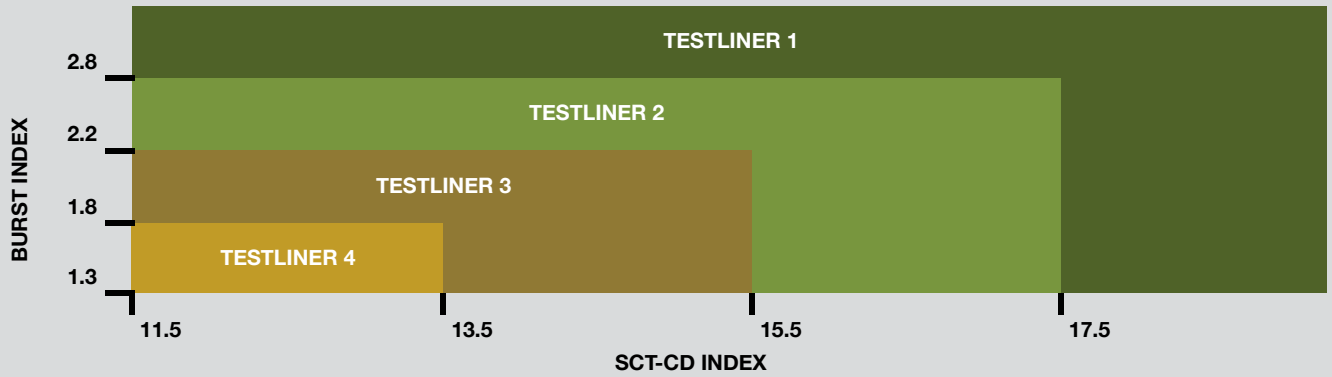
Liners

Brown testliner

PROPERTY REQUIREMENTS *(continued)*

Concerning the COBB, the testliner 4 is “unsized”. Testliners 1, 2 & 3 can be “unsized”, “sized” or “special sized”. The sized grade is measured by the 1 minute COBB test with values typically in the range of 25 g/m² to 45 g/m² (Nb.: the “special sized” is typically used to fulfil the United Nations regulation concerning corrugated board).

SCT-CD OR BURST COMBINATION FOR TESTLINER (example for 150 g/m² - ISO 2758)



Brown kraft top liner

MATERIAL DEFINITION

A Kraft top liner is a recycled fibre based paper with a top layer predominantly made from virgin fibre.

PROPERTY REQUIREMENTS

	BURST INDEX		or	SCT-CD INDEX
	ISO 2758	ISO 2759		
Brown kraft top liner	≥ 2.8	≥ 2.9		≥ 14.5

Definition of the grades

Liners

White top testliner, uncoated

MATERIAL DEFINITION

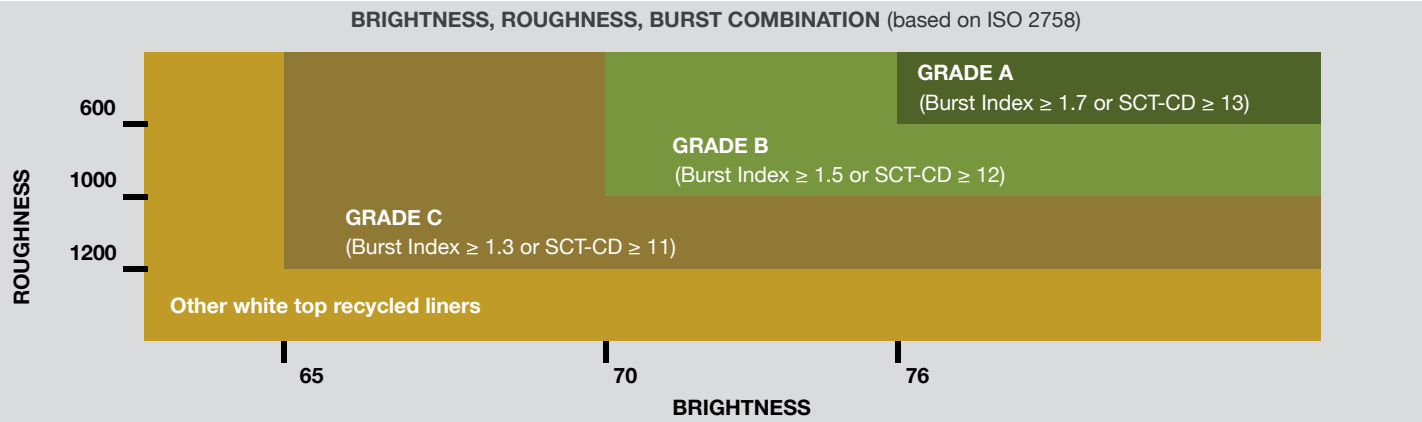
An uncoated white top testliner is a predominantly recycled fibre based paper, of which the top side is in general characterized by coverage of white fibres on a recycled base layer.

BRIGHTNESS MEASUREMENT

Brightness is measured according to conditions defined by the standard ISO 2470-1 meaning with a filter corresponding to CIE standard C / standard observer 2 degrees (with a progressive adjustment of the filter with fluorescence reference linked to ISO IR3 fluorescent standard).

PROPERTY REQUIREMENTS

Burst and SCT-CD are considered as important strength properties, while they are a good indicator of strength performance of a box, flexibility during converting and usage of the corrugated board. Bursting strength, together with compression strength SCT and tensile stiffness in CD and MD, are in many cases used for calculating box performance.
If an uncoated white top testliner does not fulfil the criteria retained to define one of the grades A, B or C (brightness, roughness and burst or SCT-CD), this paper is a special grade that cannot be called 'White Top Testliner' and that can only be classified as 'other white top recycled liners' without guaranteed standardized properties.
Concerning COBB, Uncoated White Recycled Liners classified in categories A and B should be sized. The sized grade will be measured by the 1 minute COBB test with values typically in the range 25 g/m^2 to 45 g/m^2.



	BURST INDEX ISO 2758	BURST INDEX ISO 2759	or SCT-CD INDEX	and BRIGHTNESS ISO 2470-1	and BENDTSEN ROUGHNESS
Grade A	≥ 1.7	≥ 1.9	≥ 13	≥ 76%	≤ 600
Grade B	≥ 1.5	≥ 1.7	≥ 12	≥ 70%	≤ 1000
Grade C	≥ 1.3	≥ 1.5	≥ 11	≥ 65%	≤ 1200

Definition of the grades

Liners

Mottled testliner

MATERIAL DEFINITION

A mottled testliner is a predominantly recycled fibre based paper, of which the top side is characterized by an uneven coverage of white fibres on a recycled base.

PROPERTY REQUIREMENTS

Burst and SCT-CD are considered as important strength properties, while they are a good indicator of strength performance of a box, flexibility during converting and usage of the corrugated board. Bursting strength, together with compression strength SCT and tensile stiffness in CD and MD, are in many cases used for calculating box performance.

	BURST INDEX		or	SCT-CD INDEX
	ISO 2758	ISO 2759		
Mottled testliner	≥ 1.5	≥ 1.7		≥ 12

White top testliner, coated

MATERIAL DEFINITION

A white top testliner coated is a white testliner coated with a coating colour containing pigments.

PROPERTY REQUIREMENTS

Burst and SCT-CD are considered as important strength properties, while they are a good indicator of strength performance of a box, flexibility during converting and usage of the corrugated board. Bursting strength, together with compression strength SCT and tensile stiffness in CD and MD, are in many cases used for calculating box performance.

Optical properties are essential for a white top testliner coated. As a consequence a white top testliner coated shall reach certain criteria in term of brightness, roughness and sizing conditions.

	BURST INDEX		or	SCT-CD INDEX	and	BRIGHTNESS ISO 2470-1	and	GLOSS	and	BENDTSEN ROUGHNESS	and	PPS ROUGHNESS
	ISO 2758	ISO 2759										
Coated white top testliner	≥ 1.3	≥ 1.5		≥ 11		≥ 76%		≥ 20		≤ 600		≤ 5.0

Definition of the grades

Flutings – Medium

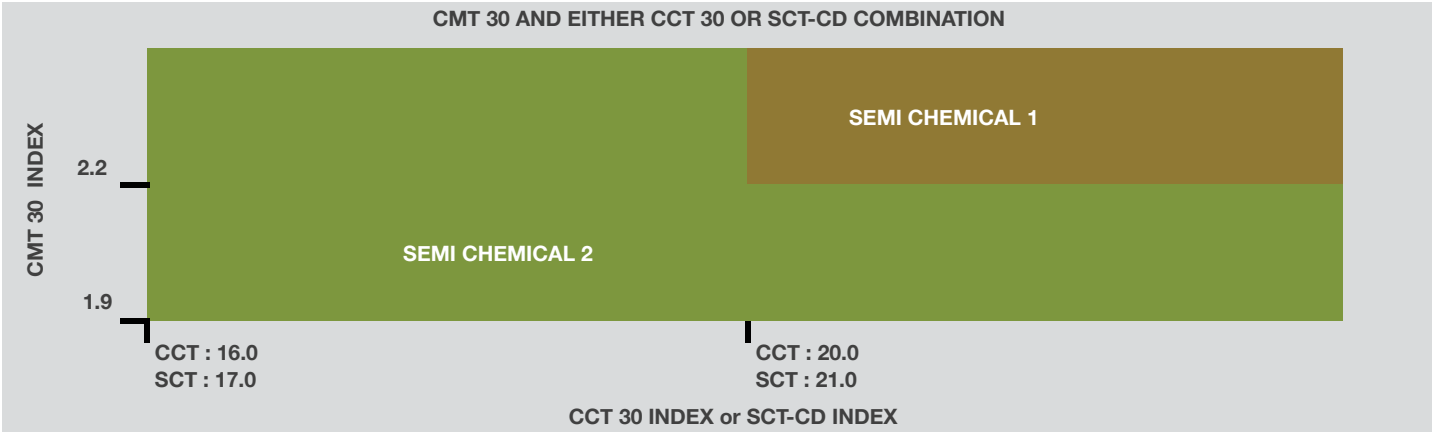
Semi chemical fluting

MATERIAL DEFINITION

A semi chemical fluting is a paper predominantly made from semi chemical primary fibres pulp.
Semi Chemical 1 has generally a content of more than 80% semi chemical primary fibres.

PROPERTY REQUIREMENTS

CMT and either CCT or SCT CD, shall be used to express the compression stiffness.
The correlation between CCT and SCT CD is different for Semi Chemical fibres, compared to other type of fibres.



	CMT 30 INDEX	and either	CCT 30 INDEX	or	SCT-CD INDEX
Semi Chemical 1	≥ 2.2		≥ 20.0		≥ 21.0
Semi Chemical 2	> 1.9		> 16.0		> 17.0

Flutings – Medium

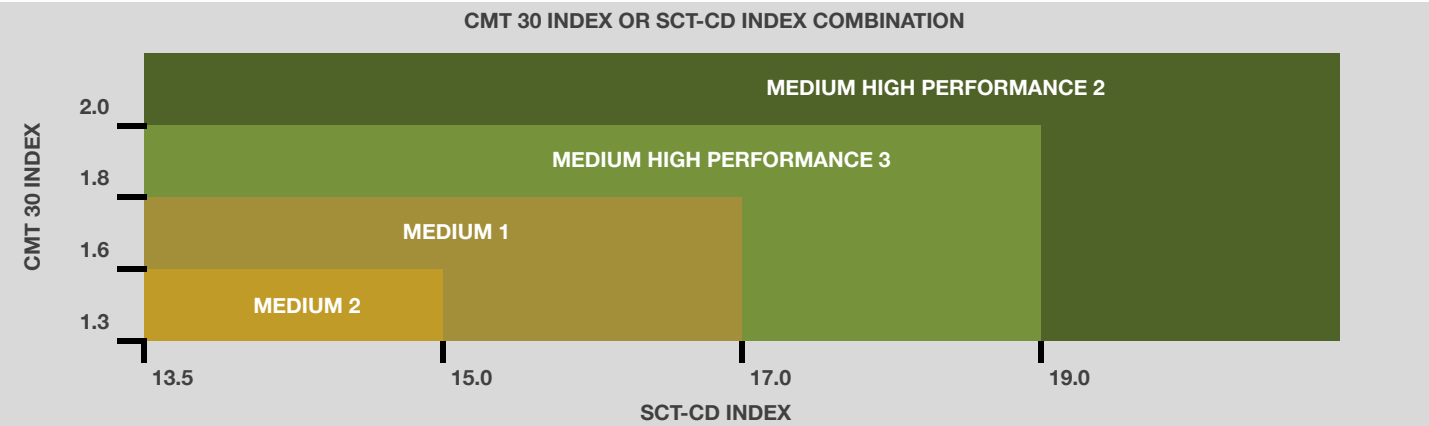
Recycled fluting – medium (other than light weight recycled medium)

MATERIAL DEFINITION

A recycled fluting is a predominantly recycled fibre based paper.
The substance of recycled fluting is equal or over 100 g/m2.

PROPERTY REQUIREMENTS

If one of the limits either CMT 30 or SCT-CD is exceeded by a medium, this paper is automatically classified in the next superior medium grade.



	SCT-CD INDEX	or	CMT 30 INDEX
Medium high performance 2	≥ 19.0		≥ 2.0
Medium high performance 3	≥ 17.0		≥ 1.8
Medium 1	≥ 15.0		≥ 1.6
Medium 2	≥ 13.5		≥ 1.3

Flutings – Medium

Light weight recycled medium – LWM (other than recycled fluting - medium)

MATERIAL DEFINITION

A Light Weight Medium is a predominantly recycled fibre based paper.
The substance of this paper is strictly below 100 g/m2.
The abbreviation of this name is LWM (Light Weight Medium).

PROPERTY REQUIREMENTS

	SUBSTANCE (g/m^2)	SCT-CD in kN/m	*CMT 30 in N ** *(Indicative values)*
Light weight medium (LWM)	95	≥ 1.45	≥ *135*
	90	≥ 1.35	≥ *125*
	85	≥ 1.30	≥ *110*
	80	≥ 1.15	≥ *95*
	75	≥ 1.00	≥ *90*

** Due to the limitations seen at measuring CMT of high substances, and the rising trend to light weight fluting (used at low flute heights), the Technical Committee is currently developing an alternative method to replace the CMT measurement (A flute). Consequently, the CMT 30 values of the Light Weight Medium are now mentioned in the list only as indicative.*

Other papers used in the corrugated industry

Cartonboard

MATERIAL DEFINITION

Carton board is a multi-ply material made from a combination of primary and/or recovered fibres, mainly used in the production of packaging. It can be coated on one or both sides with pigments.
Also known as solid board, folding box board or white lined chip board.

Printing & writing papers

MATERIAL DEFINITION

Paper suitable for printing or other graphic method, which can be coated on one or both sides with pigments.

Kraft papers

MATERIAL DEFINITION

A brown Kraft paper is normally made from unbleached softwood primary Kraft pulp.
A white Kraft paper is normally made from bleached primary Kraft pulp.
MF and MG papers have often an addition of hardwood Kraft pulp.

SUB CATEGORIES

SACK-PAPERS
A Sack paper is a porous paper made from any combination of primary fibres, with high elasticity and high tear resistance, designed for packaging of products with high demands for durability.

MF-PAPERS (Machine Finished)
An MF-paper is a paper from any combination of primary fibres that has been finished by calandering on the papermaking machine. It is designed for good printability in combination with good durability.

MG-PAPERS (Machine Glazed)
An MG-paper is a paper made from any combination of primary fibres, which has been glazed on a drying cylinder in the papermaking machine. It is designed for high printing demand or further converting with demand of a smooth surface.

Indentification of the grades

Grade numbers

Liners

PRIMARY FIBRE BASED LINERS

00	Brown kraftliner
01	number not allocated *
02	Fully white kraftliner
03	Coated fully white kraftliner
04	White top kraftliner
05	Coated white top kraftliner
06	White mottled kraftliner
07	number not allocated *
08	Coloured kraftliner
09	Wet strength kraftliner
92	Brown liners with barrier or special treatment
93	White liners with barrier or special treatment
94	Pre-printed primary fibre based liner
97	*Other brown kraftliners* **
98	*Other white top kraftliners* **
99	number not allocated *

RECOVERED FIBRE BASED LINERS

10	Brown testliner 1 “sized”
11	Brown testliner 1 “unsized”
12	Brown testliner 1 “special sized”
13 to 19	numbers not allocated *

Flutings

PRIMARY FIBRE BASED FLUTINGS

40	Semi chemical 1
46	Semi chemical 2
47	*Other semi chemical fluting* **
48 & 49	numbers not allocated *

RECOVERED FIBRE BASED FLUTINGS

41	Medium 1
42	number not allocated *
43	Medium 2
44	Medium High Performance 3
45	Medium High Performance 2
60	Light Weight Medium
61	*Other recycled fluting* **
62 to 69	numbers not allocated *

RECOVERED FIBRE BASED LINERS *(continued)*

20	Brown testliner 2 “sized”
21	Brown testliner 2 “unsized”
22	Brown testliner 2 “special sized”
23 to 29	numbers not allocated *
30	Brown testliner 3 “sized
31	Brown testliner 3 “unsized”
32	Brown testliner 3 “special sized”
33 to 37	numbers not allocated *
38	Brown testliner 4
39	number not allocated *
50	*Other brown recycled liners* **
54	number not allocated *
55	Brown testliner with barrier or special treatment
56	Coloured testliner
57 to 59	numbers not allocated *
70	White top testliner, uncoated – Grade A
71	White top testliner, uncoated – Grade B
72	White top testliner, uncoated – Grade C
73	*Other white top recycled liners* **
74	Mottled testliner
75	Pre-printed recycled liners
76	White top testliner with barrier or special treatment
77	White top testliner, coated
78 to 79	numbers not allocated *

Other liners & mixed use papers

51	Dual purpose paper (Liner or Fluting) with barrier or special treatment
52	Dual purpose paper (Liner or Fluting)
53	Schrenz
90	Brown kraft top liner
91	White kraft top liner

Other papers used in the corrugated industry

80	Primary fibre based cartonboard
81	Recovered fibre based cartonboard
82	Writing papers
83 to 89	numbers not allocated *
95	Brown kraft papers
96	White kraft papers

(*) Number not allocated shall not be used, only Cepi ContainerBoard decides on the grade number.
(**) These numbers can be used to identify “speciality” grades not mentioned in the list, but fulfilling the corresponding “Material Definition” of the grade family (especially the primary pulp content)

Terms of guarantee for technical specifications

Generally speaking, the containerboard producer guarantees the following technical specifications of their products under the conditions defined below, and for all the grades mentioned in the preceding pages. On particular agreement, other properties can be recommended (in writing) to be guaranteed.

A/ List of properties that can be guaranteed by the paper producer

	The usual specifications guaranteed by the containerboard producers, are the following for the different grades of containerboard :
KRAFTLINERS	Substance, moisture content, burst, compression resistance, water absorption and, for white grades, brightness and roughness.
RECYCLED LINERS	Substance, moisture content, burst, compression resistance, water absorption and, for white grades, brightness and roughness.
FLUTINGS – MEDIUM	Substance, moisture content, compression resistances.

B/ Terms and conditions of the guarantee

SAMPLING METHOD	In case of a dispute between the customer and supplier, the only authentic measures are those made with both parties present, under the conditions laid down by the standard ISO 186 for sampling methods and ISO 187 for the climate conditions. These measures are made by the customer's and supplier's laboratories, and a third party laboratory may be called upon which is accepted by both parties.
CHARACTERISTICS VALUE VARIATIONS	Characteristics are respected if 97.5% of the characteristics values are not less than a guaranteed value.
TYPICAL VALUE	Typical value is defined as a long term (at least six months) average outcome value of paper production.
GUARANTEED VALUE	Guaranteed value is the lowest customer reel mean value of the supplied paper.
SUBSTANCE GUARANTEE CONDITIONS	The containerboard producers will guarantee the substance of their papers in standardised measuring conditions. The check of this item will only be considered as valid by the producer, if it has been made according the standard ISO 536, with a sampling procedure complying with the standard ISO 186.
BASIS WEIGHT VARIATIONS	The mean value of the basis weight of the supplied paper has to be within ± 3% of the agreed basis weight for a paper with a substance ≤ 200 g/m2, and ± 4% of the agreed basis weight for paper with a substance > 200 g/m2. The check of this item will only be considered as valid by the producer, if it has been made with a sampling procedure complying with the standard ISO 186.

Terms of guarantee for technical specifications

PAPER MOISTURE

The containerboard producers will guarantee the moisture of their papers in standardised measuring conditions. The check of this item will only be considered as valid by the producer, if it has been made according the standard ISO 287, with a sampling procedure complying with the standard ISO 186. Paper moisture and variation in paper moisture are defined as absolute units.

CONTAINERBOARD REQUIREMENTS FOR MOISTURE CONTENT AND VARIATION

	Kraftliner	Testliner & other recycled liners	Semi chemical fluting	Recycled fluting medium
Average moisture content of a customer reel in %	6.5 - 9.5	6.0 - 9.0	7.5 - 11	6.5 - 9.5
Without reference, in %	8.0	7.5	9.0	8.0
Maximum CD moisture peak to peak difference over the width of customer reel with measuring a box * of 15 cm (6 inches) width around the average content in %-unites	± 1.5	± 1.5	± 2	± 2
Maximum CD moisture peak to peak difference between two adjacent measuring boxes * of 15 cm (6 inches) width in a customer reel in % -unites	2.8	2.8	2.8	2.8

** For the future the target of the paper production should be above guidelines with a measuring box of 7.5 cm.*

KRAFTLINER

The agreed moisture content of the supplied paper should be specified to be between 6.5 and 9.5% moisture content. If there is no reference to the moisture of the supplied paper, the moisture content is understood to be 8.0%. The individual moisture content values over the width of the customer reel may not differ by more than ± 1.5% (calculated on a sampling width/measuring box of 15 cm) around the customer reel moisture content mean value. Between two adjacent measuring boxes of 15 cm the maximum peak to peak difference is 2.8%.

TESTLINER AND OTHER RECYCLED LINERS

The agreed moisture content of the supplied paper should be specified to be between 6 and 9% moisture content. If there is no reference to the moisture of the supplied paper, the moisture content is understood to be 7.5%. The individual moisture content values over the width of the customer reel may not differ by more than ± 1.5% (calculated on a sampling width/measuring box of 15 cm) around the customer reel moisture content mean value. Between two adjacent measuring boxes of 15 cm the maximum peak to peak difference is 2.8%.

SEMI CHEMICAL FLUTING

The agreed moisture content of the supplied paper is proposed to be between 7.5 and 11% moisture content. If there is no reference to the moisture of the supply, the moisture content will be understood to be 9.0%. The individual moisture content values over the width of the customer reel may not differ by more than ± 2% (calculated on a sampling width/measuring box of 15 cm) around the customer reel moisture content mean value. Between two adjacent measuring boxes of 15 cm the maximum peak to peak difference is 2.8%.

PAPER MOISTURE
(Continued)

RECYCLED FLUTING - MEDIUM

The agreed moisture of the supplied paper should be specified to be between 6.5 and 9.5% moisture content. If there is no reference to the moisture of the supplied paper, the moisture content is understood to be 8%. The individual moisture content values over the width of the customer reel may not differ by more than ± 2% (calculated on a sampling width/measuring box of 15 cm) around the customer reel moisture content mean value. Between two adjacent measuring boxes of 15 cm the maximum peak to peak difference is 2.8%

TEST METHODS AND UNITS OF MEASUREMENT

		STANDARDS	UNITS
Sampling method		ISO 186	-
Climate		ISO 187	°C and RH in %
Paper moisture		ISO 287	%
Substance		ISO 536	g/m^2
Burst	> 350 kPa	ISO 2758 + ISO 2759	kPa
	< 350 kPa	ISO 2758	kPa
CMT 30		ISO 7263	N
SCT		ISO 9895	kN/m
CCT 30		SCAN P42	kN/m
Tensile Stiffness		ISO 1924	kN/m
Cobb		ISO 535	g/m^2
Brightness		ISO 2470 - 1	%
Roughness - Bendtsen		ISO 8791 - 2	ml/mn
Roughness – PPS s10		ISO 8791 - 4	µ/m
Gloss 75 degrees		ISO 8254 - 1	%

STATISTICAL REPORT

If the mill producing the containerboard does not have certified quality system and the customer is requesting a statistical report on the properties of the delivered papers, the containerboard producer would normally send a report on a monthly basis.

C/ reel identification and finishing

Concerning the identification and the finishing of the delivered reels, the reference document is the “Guidelines” published in common by FEFCO and Cepi ContainerBoard (this document is available on the Cepi ContainerBoard website: http://cepi-containerboard.org).

For traceability reasons it is recommended to save the reel label until the reel is completely converted.

Technical trends & developments

Box performance and creep

The strength of a corrugated box can be measured by the Box Compression test (BCT test). This value gives the compression strength during a time interval of some seconds. Experience shows however, that a box subjected to considerably lower loads than the BCT value can collapse after much longer time intervals (days, weeks, months). This is due to the so called creep behaviour of the material in the box. This behaviour must be taken into consideration when a box is designed. The time to collapse cannot easily be predicted since it is a function of the paper raw material used to build the box, the climate that the box is subjected to, and especially climate variations. Normally the risk of creep collapse is taken into account by using safety factors to reduce the BCT value. These safety factors are influenced by the predicted use of the box as well as the paper material used.

Box performance and tensile stiffness

It is well known that the bending stiffness of the corrugated board is an important factor for the deflection and buckling of the corrugated package.
For a given flute height and board substance the tensile stiffness of the liners is the determining factor for the bending stiffness.
The tensile stiffness of the liner and medium is today often used for computer modelling/calculations of the corrugated box performance – to reach a theoretical BCT value.
Consequently it is recommended to the paper producers to present typical test values for tensile stiffness, for both liner and medium. The recommended test method is ISO 1924-3.

Optical properties and visual appearance

The ISO Brightness (ISO 2470-1) has so far, been the official classification for white paper grades. However, the ISO 2470-1 method measure only in the blue area of visible light, and is not equal to the perceived brightness of the human eye.
Technically ISO 5631-1 is the most appropriate standard to define the perceived whiteness colour (L*, a*, and b*) of white and white top paper grades.

Thus it is recommended to use the ISO 5631-1 method in addition to ISO 2470-1 to build up confidence and understanding of the new parameters.

Fibre angle and tensile stiffness orientation (TSO)

Warp – poor flatness of corrugated board sheets is not an unusual problem within the corrugated industry. Twist warp – when the four corners of a corrugated sheet have different distance to the average horizontal plane of the board, may occur for different reasons.

The fibre orientation or TSO-angle of a paper can be measured with different methods. Variations of the fibre orientation in the used liners may be a reason for twist-warp.
As a guideline the deviation of the fibre/TSO-angle shall be within or close to ± 5° to avoid paper related twist warp.

Cepi ContainerBoard
Avenue Louise 250
B – 1050 Brussels

Tel. +32 (02) 647 41 57
Email : ccb@ecbo.be
www.cepi-containerboard.org
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