

User Manual

COATED CARTONBOARD

August 2021



KWIDZYN



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1. INTRODUCTION

We are pleased to present to you our Coated Cartonboard User Manual.



The objective of this Manual is to help you, the printers and converters, to achieve the best results when using our high quality cartonboards.

This manual focuses on our coated cartonboard products Arktika and Alaska Plus produced at our Kwidzyn mill in Poland.

It gives our recommendations, guidelines and suggestions on how to best treat our material in the printing and converting process (in some cases these must be treated only as recommendations).

Arktika and Alaska Plus are multi-ply folding boxboards:

- ➊ **Arktika** is a GC1 grade, with double coating on the top side and one layer of coating on the backside.
- ➋ **Alaska Plus** is a lightweight GC2 board. It is produced with a double coating on the top side and an uncoated backside.

Our coated cartonboards offer all the creative possibilities you are looking for your packaging. High brightness and great printability together with stiffness give both a creative platform as well as physical strength.

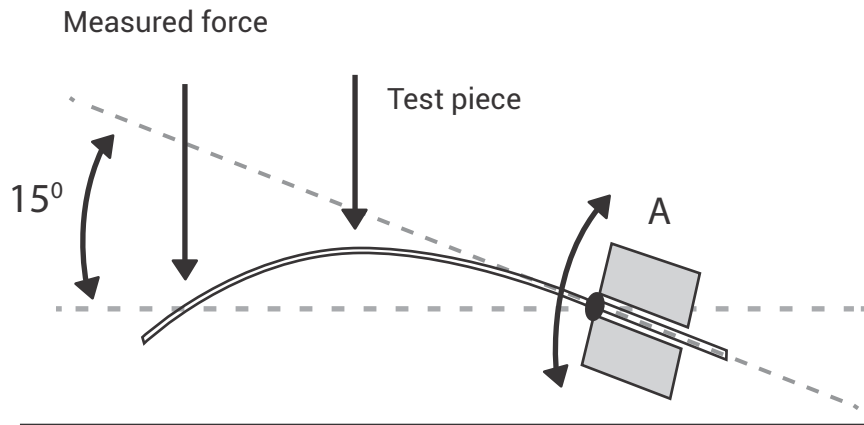
Our boards support the most sophisticated design concepts and finishing techniques. High smoothness enables a superior print quality on offset, rotogravure and flexo high-speed multicolour printing presses.

The complete product range is produced from fresh fibre to ensure purity and high quality of the material. All of the fibre used in the production originates from sustainably managed forests.

Arktika and Alaska Plus are fully recyclable and comply with EN 13430:2004. Packaging - Requirements for packaging recoverable by material recycling. Our folding boxboards should be also considered as fully biodegradable products, they decompose in both natural aerobic biodegradation process and in industrial composting process performed at increased temperature.

2. DEFINITIONS

- ▶ **Basis weight (g/m²):** Weight of 1m² of cartonboard expressed in grams.
- ▶ **Thickness (µm):** Distance between the cartonboard's two surfaces.
- ▶ **Stiffness (mNm):** The ability of the cartonboard to withstand bending forces perpendicular to its surface.



- ▶ **MD (machine direction):** Flow or movement of material through the paper machine. Cellulose paper fibres are oriented somewhat parallel to the direction of flow through the paper machine.
- ▶ **CD (cross direction):** Direction or dimension at right angle to the flow through the paper machine.
- ▶ **Brightness (%):** The reflectance value of cartonboard relative to a 100% brightness value standard. Brightness does not always correspond with the subjectively perceived whiteness shade.

- ▶ **Smoothness:** A smoother surface allows for a better printing quality. Cartonboard smoothness is measured by Bendtsen roughness number (ml/min) or Parker Print Surf (µm).
- ▶ **Gloss (%):** Gloss is the measure of light directly reflected from the cartonboard's surface (measuring gloss 75° standard).
- ▶ **Plybond (Scott Bond – J/m²):** The ability of layers of cartonboard to adhere together. This characteristic is important for mechanical strength during converting operations.
- ▶ **Delamination:** Internal bond or ply bond failure resulting in elongated raised “bubbles” on the cartonboard surface. Delamination is usually caused by excessive flexing of the cartonboard during converting operations including high tack inks whose splitting force exceeds the board's internal fiber bond adhesion.
- ▶ **Runnability:** Cartonboard's capability of being transported trouble-free from the roll stand or feeder of a printing press through the printing machine to the delivery, allowing full yield of the machine and an acceptable printing quality.
- ▶ **Texture:** The visual topographical surface appearance of a solid print. Texture is a combination of 3-dimensional surface profile (roughness) and 2-dimensional distribution of the surface elements (hills and valleys, their orientation, aspect ratio and feature size).
- ▶ **Dot gain:** increasing of the raster point size after printing on the surface in relation to the current point on the film, causing a change in the tonality of raster reproduction, especially visible in medium tones. The reproduced image appears darker or has discoloration.
- ▶ **Trapping:** Trap on a press is the ability of a printed ink to accept the next printed ink compared to how well paper accepts that ink.
- ▶ **Slur:** Abnormal dot gain caused by slippage or movement in the printing process. The image usually is elongated in the press direction.

3. PRODUCT INFORMATION

3.1. Structure and characteristics

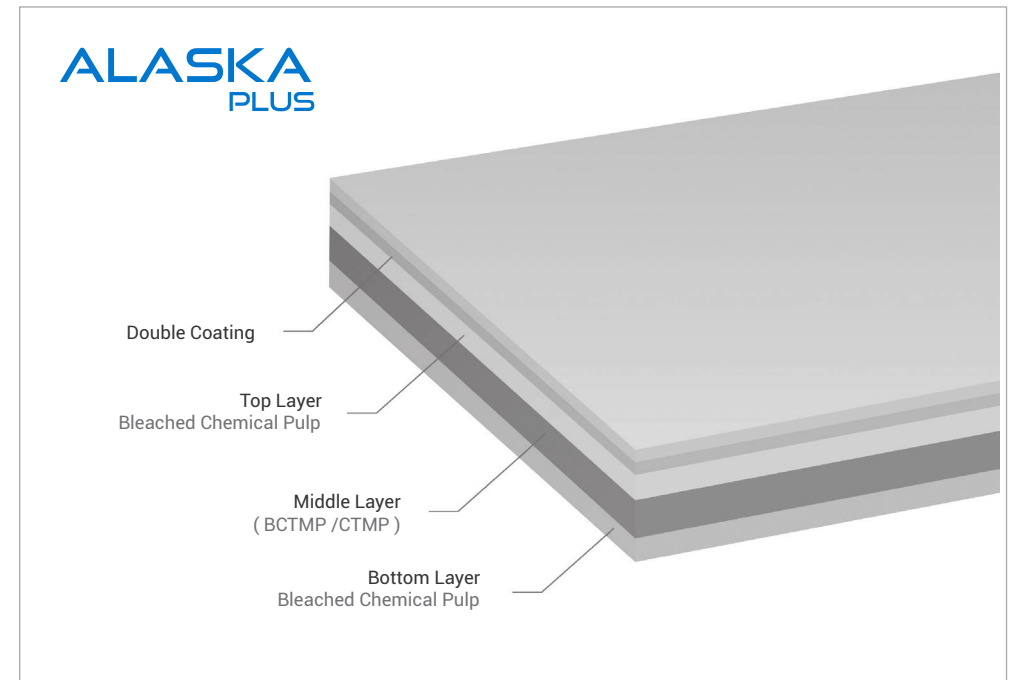
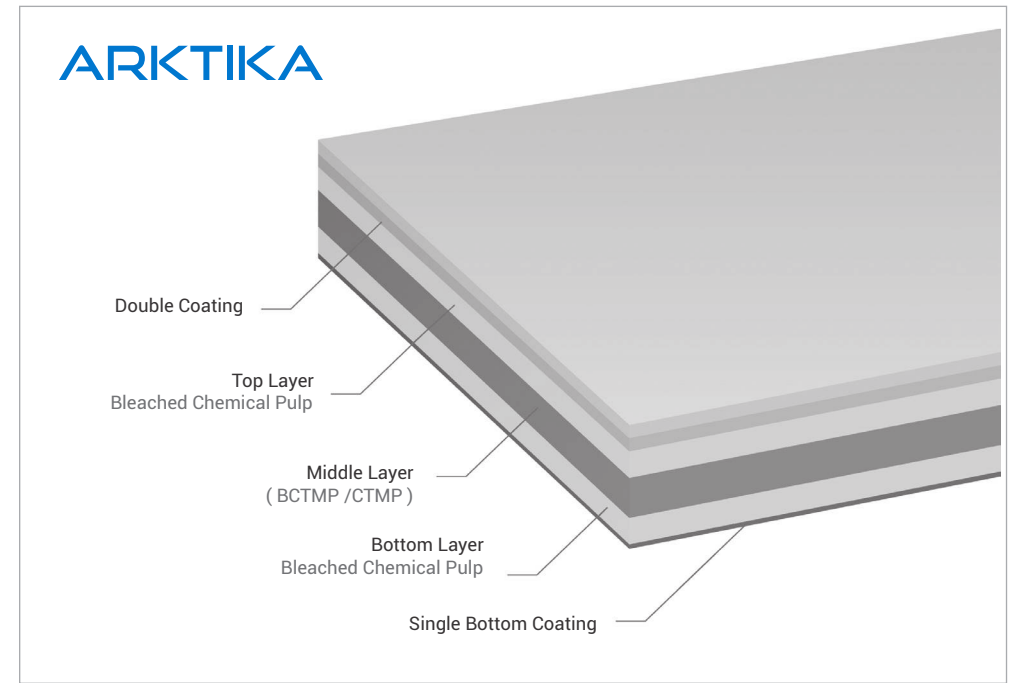
Arktika and Alaska Plus have a multi-ply structure. Arktika is a GC1 grade with a double coating on the topside and one layer of coating on the backside, and is thus printable on both sides.

Alaska Plus is a lightweight GC2 board with a double coating on the top side and an uncoated manila backside. It is recommended to only print text and solid spot colours on the backside.

Both boards are produced on our board machine #4 in Kwidzyn mill in Poland.

The board machine is a three-wire machine and each layer is formed on a separate wire, which ensures a good paper web formation and an even basis weight distribution. The plies are bonded while still wet, before entering the press section of the paper machine. Starch is additionally sprayed between the plies to ensure ply bond. The sizing strength (resistance to water penetration) is monitored during the production process.

After drying and "calendaring" the surface of the board, two layers of a pigment-latex formulation are applied. Both coating mixtures have a pH of approximately 9. The main coating component is a specially produced precipitated calcium carbonate. To improve gloss and other printing properties, high quality clay is also added. State-of-the-art coating, drying and hot-calendaring equipment, as well as the usage of top-quality materials ensure high brightness, smoothness and gloss for the cartonboard product's surface. All these properties guarantee a high quality in offset, rotogravure and flexo printing.



3.2. Basis weight range and technical parameters

Basis weight range:

	g/m ²									
ARKTIKA	200	215	230	250	-	275	-	300	325	350
ALASKA PLUS	190	205	220	235	245	255	270	280	305	330

Key technical parameters:

ARKTIKA	200	215	230	250	275	300	325	350
Thickness µm	282	308	336	378	428	474	520	568
Stiffness L&W 15° MD mN	136	180	220	300	410	530	670	880
Stiffness L&W 15° CD mN	68	90	110	145	200	250	315	400
Stiffness Taber (15°) MD (mNm)	6,6	8,7	10,6	14,5	19,8	25,6	32,4	42,5
Stiffness Taber (15°) CD (mNm)	3,3	4,3	5,3	7,0	9,7	12,1	15,2	19,3
Brightness Top %	92							
Brightness Bottom %	91							

ALASKA PLUS	190	205	220	235	245	255	270	280	305	330
Thickness µm	320	350	385	425	440	470	500	520	570	620
Stiffness L&W 15° MD mN	160	210	260	330	370	425	505	560	725	930
Stiffness L&W 15° CD mN	80	105	130	160	175	210	240	270	335	410
Stiffness Taber (15°) MD (mNm)	7,7	10,1	12,6	15,9	17,9	20,5	24,4	27,0	35,0	44,9
Stiffness Taber (15°) CD (mNm)	3,9	5,1	6,3	7,7	8,5	10,1	11,6	13,0	16,2	19,8
Brightness Top %	91									
Brightness Bottom %	> 70									

Up-to-date technical specifications are available on our arktika-alaska.com website.

3.3. End-use applications

ALASKA PLUS

- Pharmaceutical & healthcare packaging
- Cosmetics & beauty care packaging
- Hair coloration packaging
- Chocolate & confectionery packaging
- High quality food packaging

ARKTIKA

- Cosmetics & perfume packaging
- Pharmaceutical & healthcare packaging
- Chocolate & confectionery packaging
- Media packaging
- Book covers
- Greeting cards

3.4. Certifications

The following certificates are available for Arktika and Alaska Plus:

- + **FSC®/PEFC certificate** (on request and subject to availability)
- + **ISEGA certificate** (for EU countries) allowing for dry and fat food applications
- + **Robinson test certificates** on request
- + **PZH** (Polish National Institute for Hygiene) certificate allowing for dry and fat food applications

Other certificates:

- + **ISO 9001** Quality Management System
- + **ISO 14001** Environmental Management System
- + **ISO 45001** Health & Safety Management System
- + **ISO 17025** General requirements relating to the competence of research and standardisation laboratories
- + **ISO 50001:2018** Energy Management System

All certificates are available on our arktika-alaska.com website.

4. STORAGE CONDITIONS

Coated multi-ply board is sensitive to changes in ambient conditions, such as temperature and relative humidity. In particular, rapid temperature and/or humidity changes may cause a distortion of the board, leading to problems when converting or finishing.

The shipping unit (pallet or reel) **should be kept sealed** until the board has had sufficient time to acclimatise to the atmospheric conditions where the printing and finishing operations are located. The recommended relative humidity of press and converting rooms is 50 to 55% and the temperature 20 to 23°C.

We recommend taking into account the following board equalization guidelines:

STORAGE TIME NECESSARY FOR THE ACCLIMATISATION OF CARTONBOARD							
Difference in temperature (°C)	5	7,5	10	15	20	25	30
Volume of the pallet or reel (m³)	[h]	[h]	[h]	[h]	[h]	[h]	[h]
0,2	4	8	10	16	20	30	40
0,4	8	12	16	24	36	40	60
0,6	10	15	20	30	40	55	72
1,0	12	18	24	36	48	60	84
2,0	15	20	28	40	65	72	96

If storage is necessary between printing and finishing operations, it is also strongly recommended that you protect the board from variations in temperature and humidity between each. This is best done by covering the board with a plastic bag or other protective material.

Acclimatisation is also needed if excessive differences exist between the relative humidity of the board and that of the ambient air. The following table can help determine a proper procedure.

Provided that the cartonboard is stored and converted correctly, characteristics are guaranteed to meet the technical specifications for 12 months after the date of production.

REQUIREMENTS AND PRINTING CONDITIONS	Humidity difference Δ RH in %	Hints
One pass, normal registration accuracy	Δ RH < 8	Suitable for printing
	Δ RH > 10	Conditioning necessary
	$8 < \Delta$ RH < 10	Find out experimentally
Two or more passes, normal registration accuracy	Δ RH < 6	Suitable for printing
	Δ RH > 8	Conditioning necessary
	$6 < \Delta$ RH < 8	Find out experimentally
One pass, normal registration accuracy	Δ RH < 6	Suitable for printing
	Δ RH > 9	Conditioning necessary
	$6 < \Delta$ RH < 9	Find out experimentally
Two or more passes, high registration accuracy	Δ RH < 4	Suitable for printing
	Δ RH > 7	Conditioning necessary
	$4 < \Delta$ RH < 7	Find out experimentally

5. PRINTING AND CONVERTING

5.1. The influence of board characteristics on the print quality

**GLOSS
SMOOTHNESS**

- Gloss
- Dot gain
- Contrast
- Grey balance
- Sharpness
- Colour range

**LEVEL OF ABSORBENCY
REGULARITY OF
ABSORBENCY**

- Homogenous print quality
- Dot gain
- Contrast
- Trapping
- Halftone range
- Sharpness

**WHITENESS
SHADE**

- Contrast
- Grey balance
- Colour range

**FLATNESS DIMENSIONAL
STABILITY**

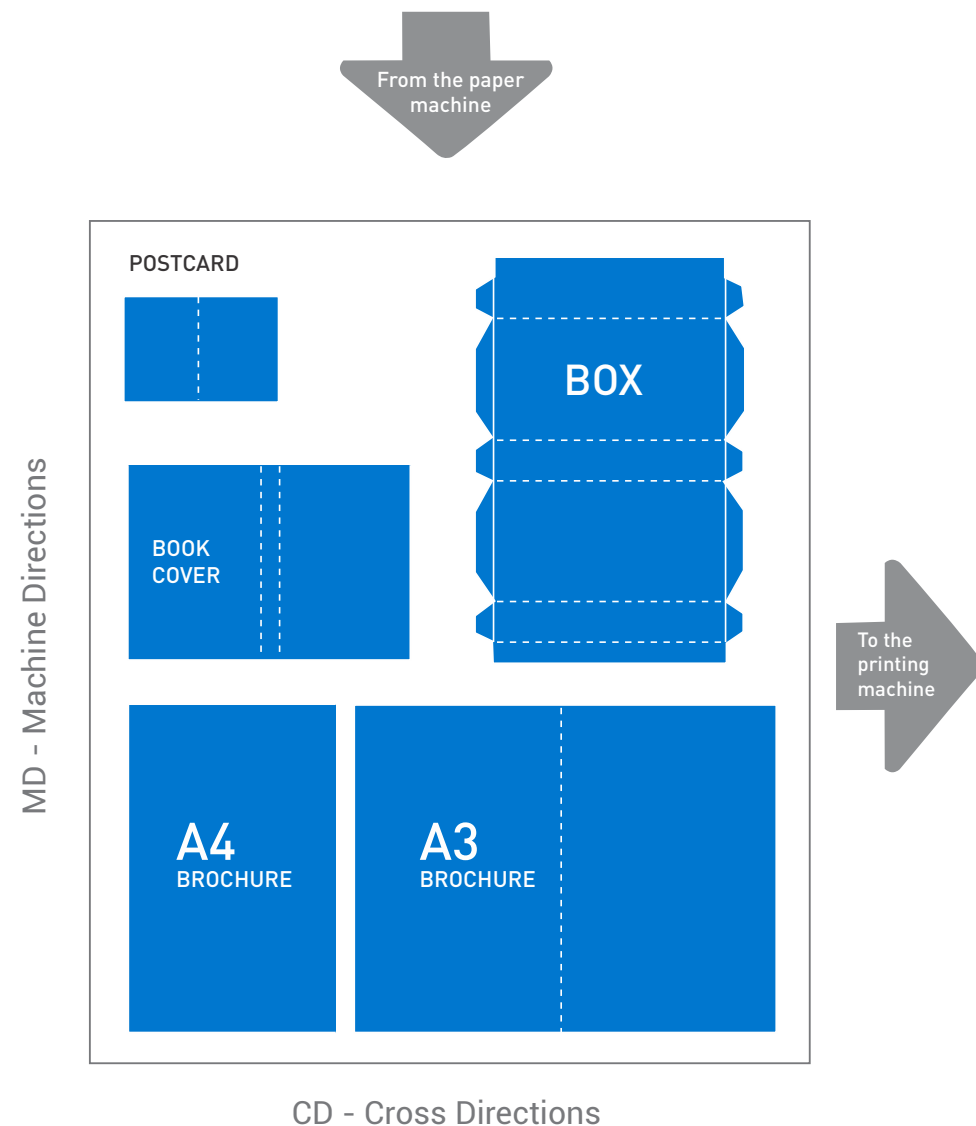
- Dot gain
- Register
- Slur
- Sharpness

5.2. Recommended printing direction

During the cartonboard production process, individual fibres tend to align in the same direction which the web travels (also called machine direction or MD).

The cartonboard's MD stiffness is almost twice as high as the cross direction (or CD) stiffness. Fibre elongation, caused when the moisture content is raised, is also different. With a ~ 10% change in relative humidity, the change in CD elongation is ~ 1 mm, and the MD elongation is ~ 0,3 mm for a 1m long edge.

Due to the inherent differences in cartonboard properties between the cross and machine directions (see diagram), we recommend the following order for any print form design:



5.3. Printing parameters

Arktika and Alaska Plus cartonboards are intended for offset, rotogravure and flexo printing. Concerning Digital Printing technologies we recommend to first trial our board.

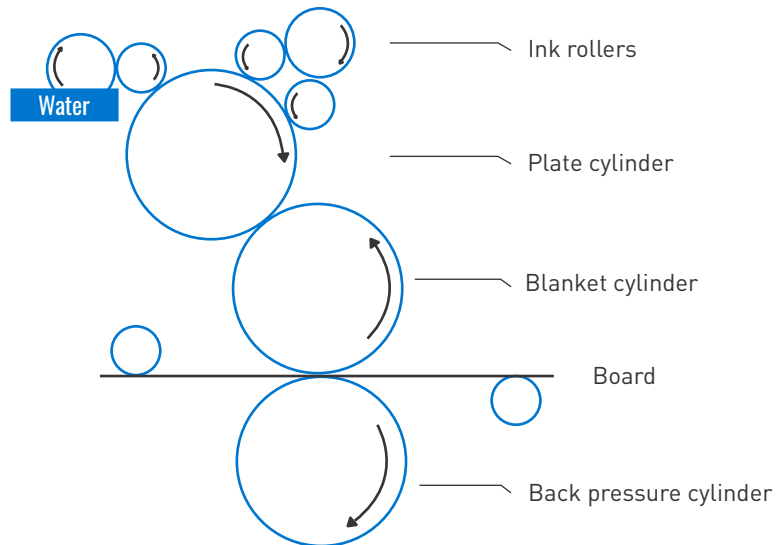
The following recommendations should be followed in offset printing, due to the calcium carbonate content in the coating:

- ▶ Use only water for the dampening solution of 5-10°n
- ▶ Use buffered fountain solutions with a pH level between 5,0 and 5,5
- ▶ Fountain solutions may not contain citric acid

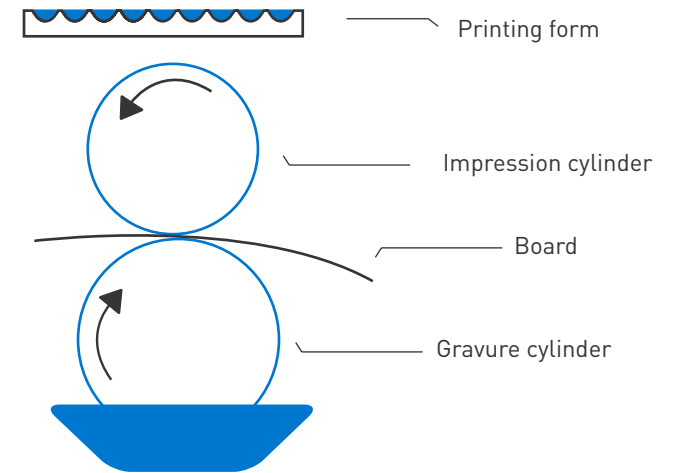
For optimum colour and quality of printing, we recommend to only use inks that are suitable for package printing, and that dry by oxidation or UV. Inks with high rub resistance are preferable. For special requirements such as food packaging, low migration inks are advised.

Arktika and Alaska Plus boards are also an excellent backdrop for fluorescent inks that are visible only under UV waves.

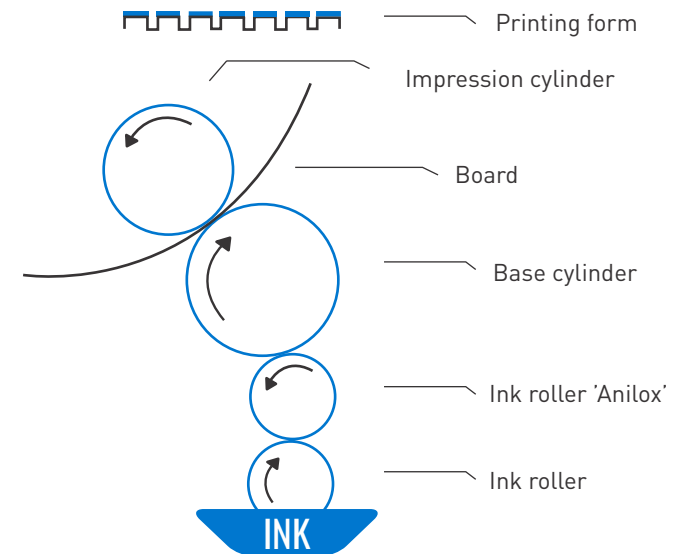
OFFSET



ROTOGRAVURE



FLEXO



6. CONVERTING

6.1. Varnishing

Arktika and Alaska Plus cartonboards can be varnished (including dispersion varnish, oil varnish, UV varnish as well as Iridin® pearlescent pigments), in order to improve the print or scratch resistance of the finished surface and support the design of the final packaging. We recommend to always test the varnish for the specific application to ensure the outcome is as desired. Soft touch and flock products can be used as well.

6.2. Die-cutting and creasing

Our creasing guidelines are summarized in the table below; however, this should be treated only as a guideline.

Gramage g/m ²	Thickness µm	Rule width mm/Pt.	Rule height mm	Crease depth mm	Groove width	
					MD	CD
190	320	0,7	23,45	0,35	1,20	1,30
205	350	0,7	23,45	0,35	1,25	1,35
220	385	0,7	23,40	0,40	1,30	1,40
235	425	0,7	23,35	0,45	1,35	1,45
245	440	0,7	23,35	0,45	1,40	1,50
255	470	0,7	23,30	0,50	1,40	1,50
270	500	0,7	23,30	0,50	1,45	1,55
280	520	0,7	23,25	0,55	1,50	1,60
305	570	0,7	23,20	0,60	1,60	1,70
330	620	1,05	23,15	0,65	1,95	2,05

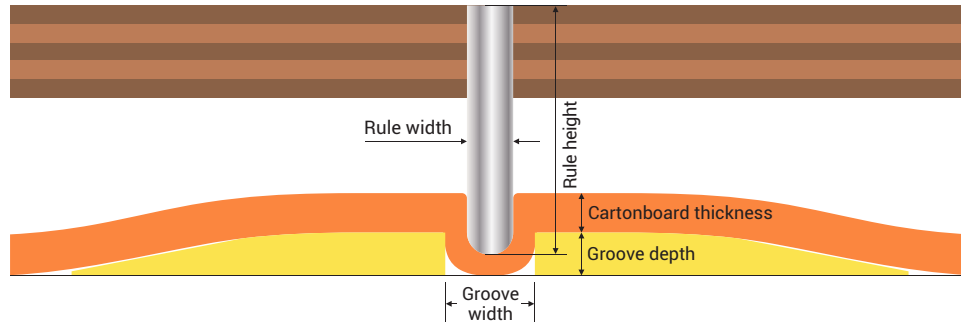
Die-cutting rule height = 23,8 mm.
For Pertinax counter plates the creasing rule height needs to be reduced by 0,1mm.
We recommend to use 3 point cutting rule above 600 µm thickness.

ARKTIKA

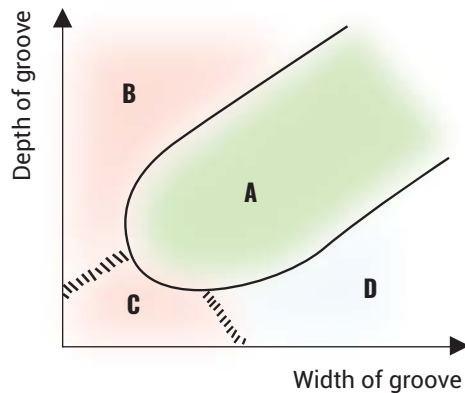
Gramage g/m ²	Thickness µm	Rule width mm/Pt.	Rule height mm	Crease depth mm	Groove width	
					MD	CD
200	282	0,7	23,50	0,30	1,15	1,25
215	308	0,7	23,45	0,35	1,20	1,30
230	336	0,7	23,45	0,35	1,20	1,30
250	378	0,7	23,40	0,40	1,30	1,40
275	428	0,7	23,35	0,45	1,35	1,45
300	474	0,7	23,30	0,50	1,40	1,50
325	520	0,7	23,25	0,55	1,50	1,60
350	568	0,7	23,20	0,60	1,55	1,65

Die-cutting rule height = 23,8 mm.
For Pertinax counter plates the creasing rule height needs to be reduced by 0,1mm.
We recommend to use 3 point cutting rule above 600 µm thickness.

Creasibility – scoring principle



Good & Bad creasing



- Ⓐ Good crease
- Ⓑ Sharp creasing
→ cracking
- Ⓒ Unsuufficient creasing
→ cracking
- Ⓓ Inaccurate crease

6.3. Embossing, stamping, laminating

Arktika and Alaska Plus cartonboards are generally suitable for cold/hot stamping and laminating. During hot processes the board temperature should not exceed 200°C. The boards produce excellent results in Braille text on high speed machines. Arktika and Alaska Plus provide a good background also for holographic film (Cast&Cure).

6.4. Glue application

Due to the high smoothness, limited absorption of the coating layer and stiffness of our folding boxboards the below recomendataions need to be taken into account to ensure a good quality of the gluing path:

- Use glues whose viscosity matches the gluing speed
- Leave the area to be glued unvarnished and unprinted
- For larger cartons, use additional score lines to help good glue penetration
- Prevent excessive drying of the board surface during the preceding operations, e.g. UV ink curing
- Due to the high stiffness of our board, special attention has to be paid to the selection of the correct creasing settings. Before gluing, the creased edges of the box should be folded correctly, to avoid excessive springing back of the flaps

7. SIZES & PACKAGING

7.1. Sheets and Reels Sizes

Assortment	Parameter	Data		
SHEETS	1. Height of pallets (pallet included)	Min. 100 cm	Max. 150 cm	Standard 145 cm Exception Max. 110 cm for loads into containers
	2. Size Tolerance +2 mm	Min. 380 x 400 mm LG 401 x 400 mm SG	Max. 1240 x 1490 mm LG 1490 x 1240 mm SG	Standard Standard stock sizes are listed in the Appendix I
	3. Squareness	1 mm per 1000mm		
	4. Number of sheets on pallet	According to the number indicated on the pallet label plus max 10 sheet		
	5. Packing	Shrink wrap	Sheets bulk packed (flagged as an option)	
	6 Palletising	If one length of the sheet is less than 60 cm, twin pallets are used or two bulk stacks are placed on one larger pallet.		
	7. Weight (gross) depends on size & height of pallet	Max. 1200 kg	Average 300 - 500 kg	
	8. Minimum quantities	Minimum order quantity per item: 4 tons For standard stock sizes: 1 pallet For Kwidzyn X-Press: 1 ton		

Assortment	Parameter	Data		
ROLLS	1. Width of roll Tolerance \pm 1 mm	Standard: 500 mm – 2300 mm		Exception 500-600 mm for joined rolls
	2. Outer diameter	Min. 1200 mm	Max. 1750 mm*	Recommendation 1200, 1250, 1300, 1350, 1400, 1450, 1500, 1600 mm
	3. Core Tolerance \pm 1 mm	Standard: 150, 300, 305 mm		
	4. Packing	Roll is packed in stretch foil to protect it from moisture, but it doesn't protect against water		
	5. Weight (gross) depends on width & diameter		Max. 2700 kg	Average 800 – 1300 kg
	6. Minimum quantities	Minimum order quantity per item: 4 tons		

* To be discussed with Planning Department before placing the order; full trim only.

NOTE: Rolls delivered for further conversion to sheets are wound as follows:

- Alaska Plus 280 g/m² and above – coating on the inside;
- Arktika 300 g/m² and above – coating on the inside.

7.2. Pallets

On a standard basis we deliver the cartonboard on wood pallets, which are 10 mm larger than the sheet sizes of the cartonboard. The board is protected from ambient conditions by a heat-shrink film. We can also deliver rolls on pallets.

In case of any specific pallet requirement, we have an extensive selection of available pallets and our Customer Service professionals can assist in case of any special requirements.

7.3. Pallet label details

Both pallets and rolls are marked with standard labels containing the following information:

- Manufacturer name or Customer name
- Board product name
- Basis weight
- Size
- Gross weight
- Net weight
- Pallet identification number
- Production date
- Contract number / order number
- Product barcode for automated scanning of details

Additionally for rolls:

- Roll identification number
- Core diameter
- Roll diameter
- Length of the roll
- Unwinding direction

8. VOLUME TOLERANCES

Arktika and Alaska Plus are always delivered and invoiced according to the exact sheet count. We do not apply any volume tolerances in our production, and each time make sure that our customers get delivered at least the amount of sheets ordered. For deliveries in sheets the weight is calculated from the number of sheets, the sheet size and the nominal basis weight.

We deliver sheets on full pallets only, and the number of sheets is rounded up in the last pallet to achieve the full pallet height. In Kwidzyn X-Press orders the pallet height is adjusted to meet the original order size as closely as possible. Sheet quantities are only rounded down with a prior agreement with our customer and we do not have under makes nor deliver half pallets. The confirmed number of sheets is thus guaranteed in each delivery. In order to protect the sheets we add max. 10 sheets on top of each pallet.

9. HANDLING OF COMPLAINTS

Should you experience any nonconformance of our product please do refer to our technical team in terms of any quality related problem and to our customer service team in case of any problem with delivery/ordering or the like.

We will work on solving the issue at hand as quickly as possible with the aim of giving a response no later than 30 days from receiving all required information. Please remember that we do require specific data and samples for our investigations, with basic information in case of quality issues being: order number, pallet/roll number, 5 sheets printed and unprinted sheets each as well as a description of the problem.

Our technical team can help you to determine which additional samples and information is required to guarantee a thorough investigation in the mill.

DISCLAIMER

- The information in different paragraphs is provided in good faith and without any liability to the customer. It does not release the user from the responsibility to check the suitability of the board for specific end uses.
- When Arktika and Alaska Plus are being used for the first time, the customer needs to carry out their own tests to check the compatibility of converting compounds like inks, glue, foil and processing parameters like printing, creasing and cutting, gluing etc.

APPENDIX

STANDARD STOCK ITEMS

Number of sheets on pallet depends on basis weight

ARKTIKA

Basis weight g/m ²	61x86	86x61	70x100	100x70	72x102	102x72
200	4500	4500	4500		4500	
215		4100	4100	4000		
230	3800	3800	3800	3800		
250	3400	3400	3400	3400	3400	
275	3000		3000	3000		
300	2700	2700	2700	2700	2700	2700
325			2400			
350	2200	2200	2200	2200	2200	2200

ARKTIKA
ALASKA
PLUS

Number of sheets on pallet depends on basis weight

ALASKA PLUS

Basis weight g/m ²	61x86	86x61	70x100	100x70	72x102
190	4000	4000	4000	4000	
205		3650	3650		
220	3300	3300	3300	3300	
235	3000	3000	3000	3000	3000
245					
255	2700	2700	2700	2700	2700
270			2550		
280	2450	2450	2450	2450	2450
305	2250		2250	2250	
330	2100	2100	2100	2100	2100

CONTACT INFORMATION

Customer Technical Service & Customer Service

Email: paperboard@mm.group

Visit us as: arktika-alaska.com

Above data is subject to change. Please visit www.coatedboard-kwidzyn.com