



Specification

KRONES film specifications
Shrink film

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1 General information

1.1 Basic information

This specification contains a broad range of packaging options. These possible combinations of material and material characteristics require a release by KRONES in all cases.

With standard equipment, in terms of packaging, customer materials that are already available can be checked and released for commissioning by KRONES. If no packaging materials are provided yet by the customer, KRONES provides recommendations (pack-specific proposals), which must be confirmed by the customer. The drawings prepared by KRONES apply.

Following successful customer acceptance under production conditions on site (refer to the specifications for acceptance conditions), the packaging material used is logged, countersigned by both parties and approved for processing on this machine.

In the event of subsequent changes to the material and packaging, it is the customer's responsibility to inform KRONES about the matter and to obtain a release. KRONES reserves the right to perform tests under conditions closely simulating production if changes are made to material or packaging by the customer. The test materials required for this purpose must be provided by the customer.

The scopes used for this test are agreed in advance with KRONES and could comprise the following, for example:

- One shift (one day of approx. 8 hours) + corresponding sufficient packaging material

Test results are recorded and given to the customer. Manual samples and/or finished packs are provided for examination. If the results reveal no defects for the customer, they are recorded in writing, signed by the customer and by KRONES and approved again for processing on the related machine. If the tests show that the defects which are the subject of the customer's complaint are caused not by the design of the machine, but rather by the material, which is outside of KRONES specifications, KRONES reserves the right to bill the customer for costs incurred at standard market rates.

1.2 Planning for shrink film applications

The performance and quality of each film-wrapped pack depends on a range of different factors, many of which are in direct relation to the film used.

Important factors are:

- The physical properties of the film (dimensions, film thickness, shrink properties, etc.) must be suitable for the shape and size of the products to be packed, and for the packers and shrinking tunnel used.
- KRONES offers recommendations and assistance for your film applications based on our wide product range and our many years of experience in the field of packaging technology. Any changes made to individual film properties usually also lead to changes to the machine settings if an optimum result is to be guaranteed. KRONES should therefore be consulted about any planned changes before any such changes are made.
- Graphics on printed film: when shrinking multipacks or films used for wrapping, the geometry of the respective pack will cause the film to compress in some areas and stretch in others. Due to the fact that the print sometimes covers the entire surface of the pack, the areas defined for positioning critical graphics - such as brand logos, etc. - must be discussed with KRONES.

The ideal positioning of the graphics can be checked using films with a grid line pattern.

- ▶ Only use films which comply with the prescribed specifications.
- ▶ Compare printed films with a raster pattern (square distance of 10 mm or similar).
- ▶ Produce at least six test packs.
- ▶ Check the areas with a minimum graphic distortion.

1.3 Storage and transport of shrink films

Characteristics	Requirements
General storage environment	<ul style="list-style-type: none"> ■ Ambient temperature of approx. 20°C ■ Protection against direct sunlight (UV) ■ Protection against dust, mechanical damage and moisture ■ Storage in original packaging
Storage at the machine	Min. 24 hours (optimal: at least 48 hours) before processing (acclimatisation)
Relative humidity	40 - 70 %
Storage duration	Min. 7 days to max. ½ year
Transport	On pallets with cartons, pallet cards and pallet straps (see illustration below)

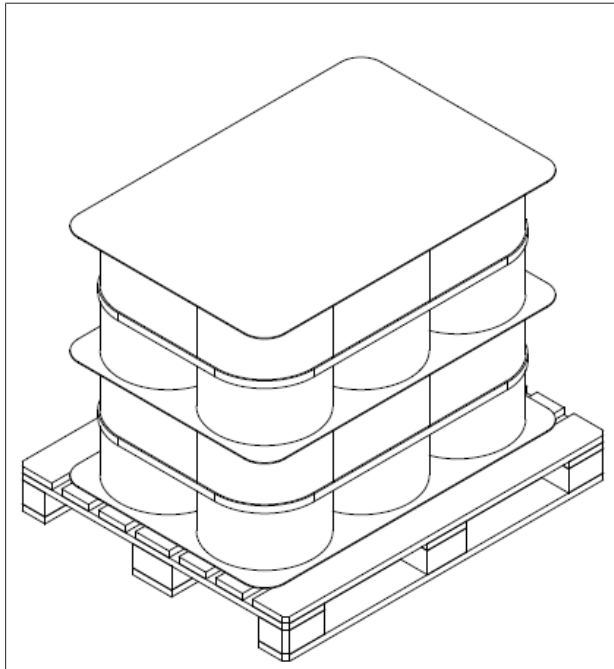


Fig. 1: Possible arrangement for transportation on a pallet

NOTICE

Processing a film which is too "fresh" can lead to excessive fluctuations in shrinking quality! Ideal and consistent storage conditions increase the useful life of the films and guarantee a consistent and high processing quality!



2 Films

2.1 Info

If you do not yet have any information or film you may be looking to process, an additional film specification will be drawn up for you depending on the container in question. Otherwise we ask that you send the film to KRONES for checking and approval.

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Dimensions, design and material for test run are confirmed:

Customer / Date _____

Ueberlappung - overlap

Cut

(A)

(S/SS)

0 -	in mm	0 -	in mm
A		D	
B		E	
C		F	

suggested film thickness 50-60 µm

Pattern repeat

Important! Film specifications must be confirmed following a test run!
Final specifications can only be made after start-up! For additional information, see the general film specifications!

Film width

Vordruck Shrinkpack einbehäng

Direction of operation

Viewed side of im print

In case of printed film, side printed

ø 74-77.5
max. 500

Fig. 2: Printed forms are provided in the Appendix

2.2 Dimensional properties of film reels or of shrink films

Dimension properties		Values ²⁾	Standard	Batch tolerance ³⁾	Comments
Film thickness ¹⁾		25 - < 40 μm ²⁾	DIN 53370	+/- 5 % of average value	Consultation with the technical department KRONES AG is required. ■ Ink layer thicknesses from 2 - 7 μm
		40 - 60 μm ²⁾			■ Ink layer thicknesses from 2 - 7 μm
		> 60 - 100 μm ²⁾			Consultation with the technical department KRONES AG is required. ■ Ink layer thicknesses from 2 - 7 μm
Reel outer diameter		≤ 500 mm*			
Film weight		≤ 120 kg			
Sleeve inner diameter		74.0 - 77.5 mm*			
Sleeve width		≤ 900 mm*		+/- 3 mm*	Sleeve and film must be flush (see edge profile).
Standard film width	1 lane	≤ 720 mm*		+/- 3 mm*	With multi-lane processing, the specified values must be complied with through pack-specific film specifications.
	2 lane	≤ 700 mm*			
	3 lane	≤ 660 mm*			
Extended film width	1 lane	≤ 900 mm*		+/- 3 mm*	With multi-lane processing, the specified values must be complied with through pack-specific film specifications.
	2 lane	≤ 860 mm*			
	3 lane	≤ 800 mm*			
Winding tolerance				+/- 3 mm*	Max. permissible lateral misalignment of film web during winding-up
Edge profile (max. deviation)		± 3 mm*		+/- 3 mm*	The edge profile includes the tolerances of sleeve width, film width and winding tolerance
Max. repeat length		350-1.300 mm ²⁾			
Bend routing (offset)		≤ 20 mm*		≤ 20 mm*	Fold an approx. 10 m long piece of film in half widthways and align the ends lying on top of each other. Keep the piece of film tight and measure the greatest deviation of the edges of the film.

1) Changing the film thickness for a particular type will require you to also change the machine's basic setting.

2) When complying with the material parameters (see section 2.3 Material parameters for PET container and can packs [▶ 8]) this information can be taken as a guideline.

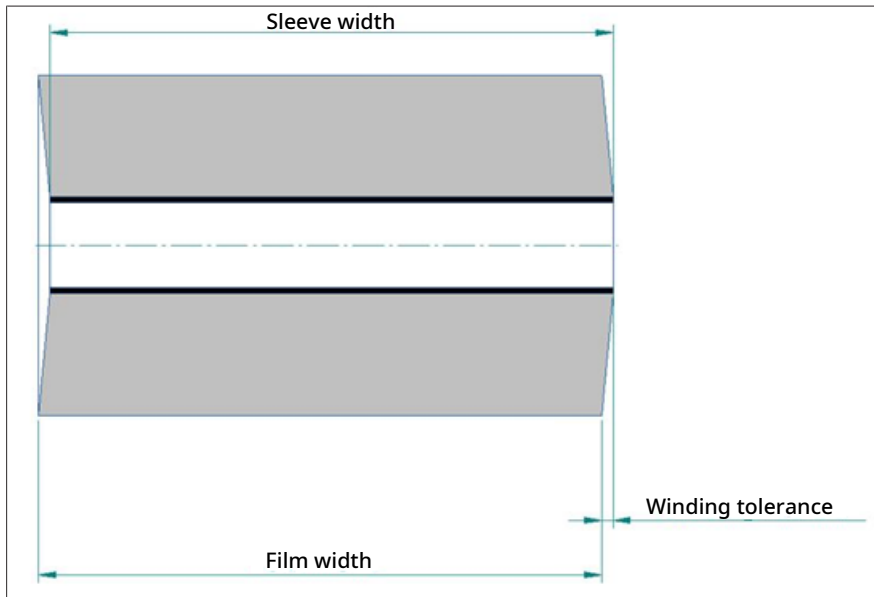
3) Stability of the parameters of a released film type across all deliveries and production batches, at the time of processing in the machine.

* Dimension specifications must be met by the operating company to ensure optimum functioning of the Variopac.



Remark:

The artwork and the printing ink of the film has an influence on the shrink result. Different artworks may require different machine settings.



The tolerance of the edge profile (i.e. the sum of the tolerances from film width, sleeve width and winding tolerance) may not exceed ± 3 mm.

Fig. 3: Tolerance of the edge profile

2.3 Material parameters for PET container and can packs

Modern shrink films are mono or coextrusion films and consist of a mixture of LDPE (70 % ± 10 %) and LLDPE (20 % ± 10 %). In addition, additives (antiblock, antistatics and slip agents) may be used in the production of shrink films. The addition of polypropylenes may be max. < 20 % and filler max. < 5 % of the total weight of the film. The addition of paraffins and EVA materials is permitted as long as this does not increase the tackiness during processing. Ceramic additives to increase stiffness can lead to increased cutter wear.

Dimension properties	Values	Standard	Type tolerance ³⁾	Influence/ Remarks (+)
Shrinkage rate in machine direction of operation (150°/10 sec.)	65 % – 75 %*	DIN 55543-3	± 3 %	<ul style="list-style-type: none"> ■ Visual appearance of pack ■ Pack stability ■ Shrunken bull's eye
Shrinkage rate across the machine direction of operation (150°/10 sec.)	23 % – 40 %*	DIN 55543-3	± 3 %	<ul style="list-style-type: none"> ■ Visual appearance of pack ■ Pack stability ■ Shrunken bull's eye
Shrinkage force in machine direction of operation (150°/10 sec.)	0.10 N – 0.15 N	DIN EN ISO 14616	± 0.02 N	<ul style="list-style-type: none"> ■ Visual appearance of pack ■ Pack stability
Shrinkage force across the machine direction of operation (150°/10 sec.)	0.01 N – 0.05 N*	DIN EN ISO 14616	± 0.01 N	<ul style="list-style-type: none"> ■ Visual appearance of pack ■ Pack stability
Contraction force in machine direction of operation (150°/10 sec.)	1.50 N – 2.55 N*	DIN EN ISO 14616	± 0.1 N	<ul style="list-style-type: none"> ■ Visual appearance of pack ■ Pack stability ■ Shrunken bull's eye
Contraction force transverse to machine direction of operation (150°/10 sec.)	0.50 N – 1.00 N*	DIN EN ISO 14616	± 0.1 N	<ul style="list-style-type: none"> ■ Visual appearance of pack ■ Pack stability ■ Shrunken bull's eye
Tensile strength in machine direction of operation (100 mm/min.)	> 22 N/mm ² *	DIN EN ISO 527-3	± 2 N/mm ²	<ul style="list-style-type: none"> ■ Film unwinding ■ Pack stability
Tensile strength across machine direction of operation (100 mm/min.)	> 19 N/mm ² *	DIN EN ISO 527-3	± 2 N/mm ²	<ul style="list-style-type: none"> ■ Film unwinding ■ Pack stability
Breaking elongation in machine direction of operation (100 mm/min.)	400 % – 500 %*	DIN EN ISO 527-3	± 20 %	<ul style="list-style-type: none"> ■ Production output ■ Pack stability
Breaking elongation across machine direction of operation (100 mm/min.)	> 600 %*	DIN EN ISO 527-3	± 20 %	<ul style="list-style-type: none"> ■ Cutter wear ■ Production output ■ Pack stability
E-module in machine direction of operation (100 mm/min.)	> 480 N/mm ² *	DIN EN ISO 527-3	± 20 N/mm ²	<ul style="list-style-type: none"> ■ Cutter wear ■ Wrinkling ■ Production output ■ Pack stability
E-module across machine direction of operation (100 mm/min.)	> 530 N/mm ² *	DIN EN ISO 527-3	± 20 N/mm ²	<ul style="list-style-type: none"> ■ Cutter wear ■ Wrinkling ■ Production output ■ Pack stability
Haze	< 15 %	ASTM D 1003	-	<ul style="list-style-type: none"> ■ Printed film ■ Visual appearance of pack

Dimension properties	Values	Standard	Type tolerance ³⁾	Influence/ Remarks (+)
Surface tension – front of film	32 mN/m*	DIN ISO 8296	± 2 mN/m	<ul style="list-style-type: none"> ■ Electrostatic charging ■ Printing ink adhesion
Surface tension – reverse of film	40 mN/m*	DIN ISO 8296	± 4 mN/m	<ul style="list-style-type: none"> ■ Electrostatic charging ■ Printing ink adhesion
Surface tension – print area	32 mN/m*	DIN ISO 8296	± 2 mN/m	<ul style="list-style-type: none"> ■ Electrostatic charging ■ Printing ink adhesion
Static friction coefficient – front of film	0.2 – 0.3*	DIN ISO 8295	± 0.02	<ul style="list-style-type: none"> ■ Stackability of the packs
Static friction coefficient – reverse of film	0.25 – 0.35*	DIN ISO 8295	± 0.02	<ul style="list-style-type: none"> ■ Stackability of the packs
Dynamic friction coefficient – front of film	0.15 – 0.25*	DIN ISO 8295	± 0.02	<ul style="list-style-type: none"> ■ Electrostatic charging
Dynamic friction coefficient – reverse of film	0.2 – 0.3*	DIN ISO 8295	± 0.02	<ul style="list-style-type: none"> ■ Electrostatic charging
Hot tackiness (150 mm/min.)	≥ 2 N/15 mm*	ASTM F1921/F1921M	-	<ul style="list-style-type: none"> + Outside against outside + Outside against inside + Inside against inside + Special regulations for multi-pack processing ■ Welding ■ Pack bottom ■ Reel replacement
Electrostatic charge of the film web	≤ 10 kV*	...	-	<ul style="list-style-type: none"> + Measurement at the film reel: Unwind 4-5 layers and measure on the inside ■ Pack stability

3) Stability of the parameters of a released film type across all deliveries and production batches, at the time of processing in the machine.

*) Dimension specifications must be met by the operating company to ensure optimum operation of the Variopac.

The film thickness is primarily dependent on the pack weight. Container volume and number of containers play a subordinate role.

Pack weight	Film thickness
< 3 kg	Film with 25-40 µm
3-10 kg	Film with 35-50 µm
10-15 kg	Film with 50-70 µm
15-20 kg	Film with 60-80 µm
> 20 kg	Film with 70-100 µm

The specified values are to be viewed as being general standard values. The load-bearing capacity of the film is very much determined by the material used. The pack geometry has a major influence on the pack stability and strength.

2.4 Film dimensions

- The final specification of the film dimensions and the print area depends, among other things, on the shape of the product and the properties of the film. The dimensions and the print area should always be specified exactly, after a trial run has been performed with original products and sample films on the customer's machine.
- It is ensured by the film supplier that the additives or surface treatments (e.g. printing) required for producing the film do not cause any scuffing whatsoever on the rubber-coated rollers used for the film transport.

2.5 Determination of the film dimensions (film width and repeat length)

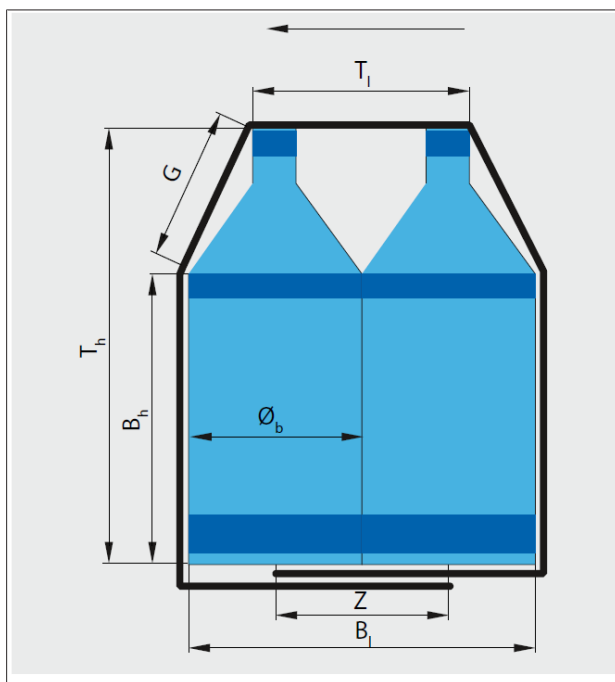


Fig. 4:

- Film width $A = B_b + 2 \times F$
- Repeat length $S = Z + B_l + 2 B_h + T_l + 2 G$
- Container diameter: \varnothing_b
- Cap diameter: \varnothing_v
- Number of containers in direction of operation: s
- Base width: B_b
- Base length: B_l
- Base height: B_h
- Inclination $G = \sqrt{(T_h - B_h)^2 + ((B_l - T_l)/2)^2}$
- Top length $T_l = (n-1) \times \varnothing_b + \varnothing_v$
- Top height T_h
(e.g.: Shrink tray = container height + cap + carton thickness)

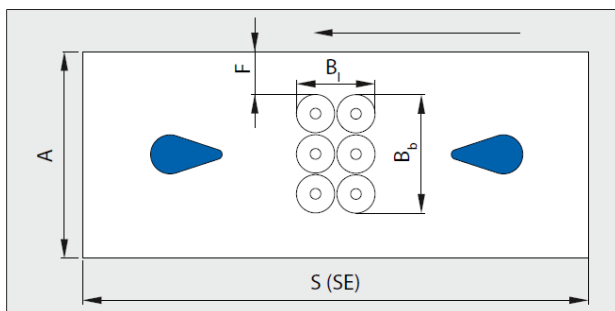


Fig. 5:

- Overlap = Z
Reference values:
 $n > 1 \rightarrow \varnothing_b$ (min. 50 mm);
 $n = 1 \rightarrow \varnothing_b / 2$ (min. 35 mm)
- Film overhang = F
see table 2.6 Specification for lateral film overhang [► 11]

Deviations can considerably influence the stability and visual appearance (e.g. separation of a container from a shrunk pack - separation of the base welding due to insufficient overlap - visual film eye). For this reason, confirmation by KRONES is required.

"SE", the effective or real rapport length for a printed film is determined based on the availability of the print cylinder. It should not vary by more than ± 15 mm from the theoretically calculated length "S".

2.6 Specification for lateral film overhang

Number of containers in direction of operation one after the other	Container diameter [mm]	Film overhang [mm] for shrink pack/shrink pad	Film overhang [mm] for shrink tray
1	50 to 69	40	not relevant/as cannot be processed
1	70 to 89	50	not relevant/as cannot be processed
1	90 to 110 (or more)	55	not relevant/as cannot be processed
2	50 to 69	40	40
2	70 to 89	55	50
2	90 to 110 (or more)	60	60
3	50 to 69	50	40
3	70 to 89	65	50
3	90 to 110 (or more)	70	60
> 4	50 to 69	60	40
> 4	70 to 89	70	50
> 4	90 to 110 (or more)	75	60

Number of cans in direction of operation one after the other	Can diameter [mm]	Film overhang [mm] for shrink pack/shrink pad	Film overhang [mm] for shrink tray
2	50 to 59	35	35
2	60 to 70 (or more)	40	40
3	50 to 59	50	40
3	60 to 70 (or more)	65	50
> 4	50 to 59	60	40
> 4	60 to 70 (or more)	70	50



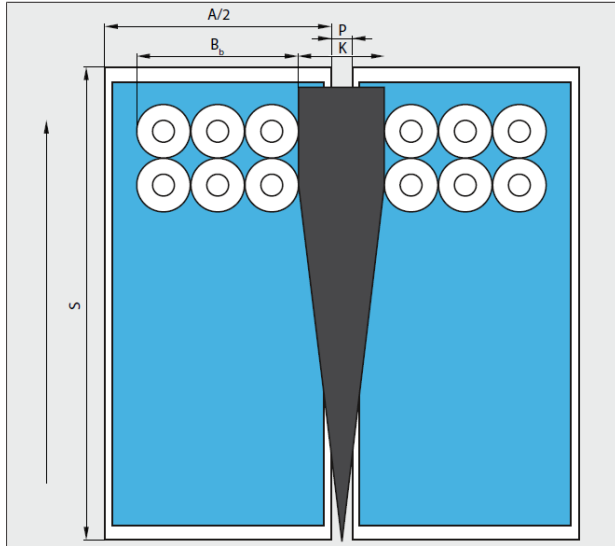
Remark:

The lateral film overhangs can only be used for a stable pack (reference to shrink pack specification TD10025114). If the pack has optical requirements for the film eye, the lateral film overhang may deviate!



2.7 Multi-lane film processing

For multi-lane film processing, the film is cut lengthwise in the machine. Therefore, the exact film width "A" is required for designing the handling part and its dimensions "K". For film already provided, KRONES must be notified of the film widths. For recommendations from KRONES, the specification of the film width "A" must be complied with.



$$K = A/2 - B_b + P$$

- Base width = B_b
- Film width = A
- Film spreading = P
- Wedge width = K

Fig. 6:

2.8 Multipack processing

Multi-pack processing or shrink-to-shrink packs refer to the combination of several smaller packs to create a larger one.

When doing so, it is imperative that the primary film is not welded to the secondary film.

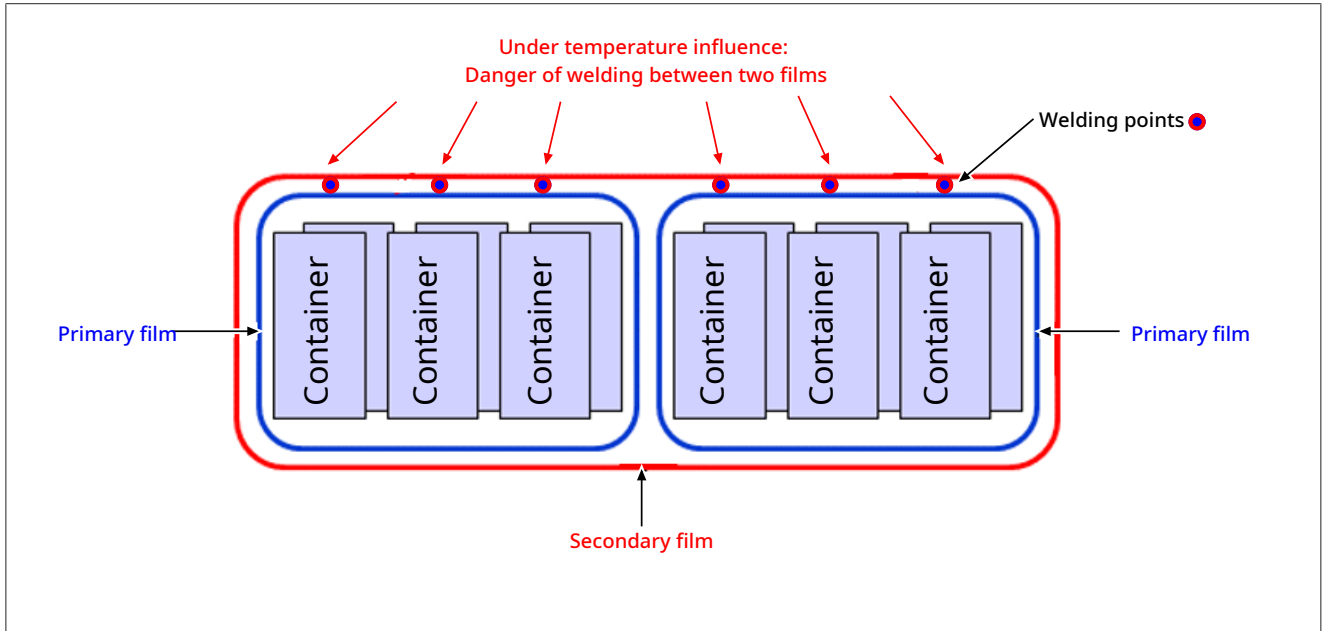


Fig. 7: Under temperature influences: Danger of welding between two films

The secondary film must have one of the following conditions for this:

- Secondary film with a different melting point to the primary film (note: Risk due to lower process stability due to high dependence on ambient temperature, humidity and product temperature)
- Sealing capacity for hot tackiness according to ASTM F1921/F1921M: < 1.2 N/15mm between the outside of the primary film and inside of the secondary film:

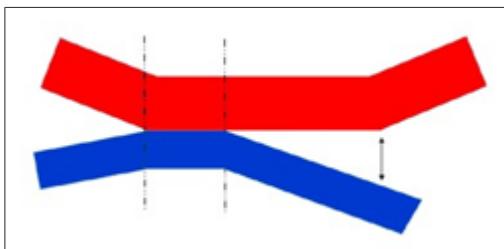


Fig. 8:

With this value it is normally possible to cleanly separate both layers of film.

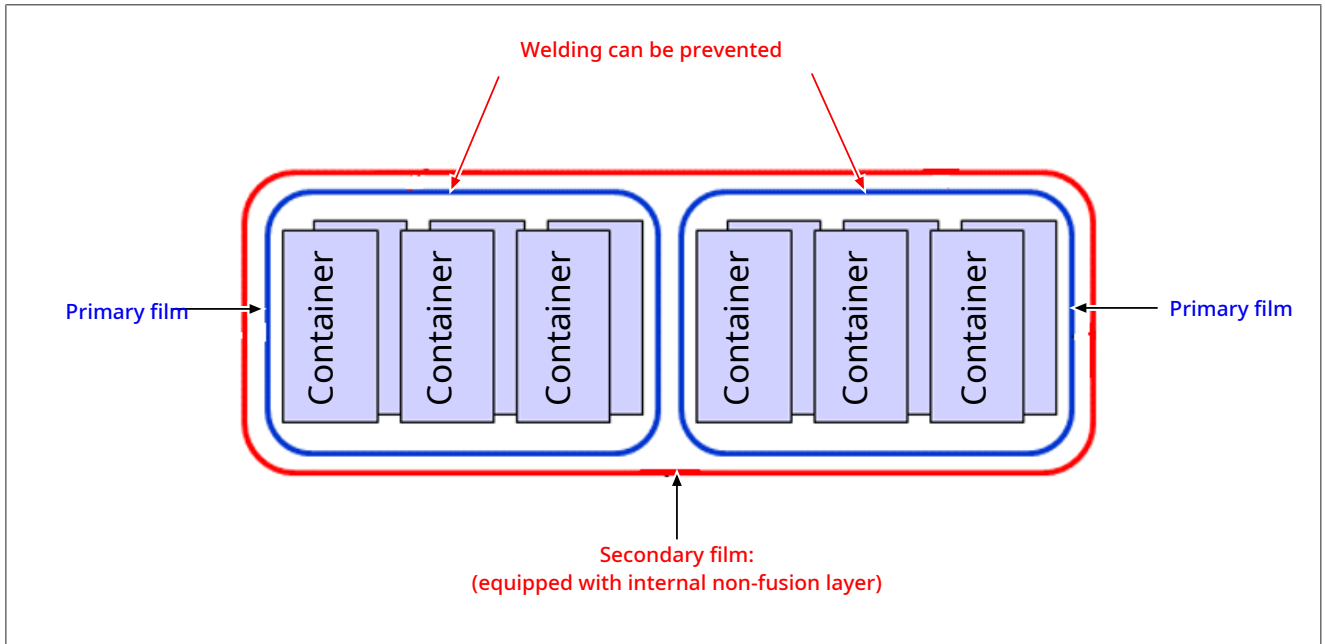


Fig. 9: Welding can be prevented



Remark:

For example, a varnish for the printed image or a film mixture of polypropylene can be used.

NOTICE

Compliance with the material parameters and special features of the sealing properties

The material parameters of section 2.3 Material parameters for PET container and can packs [▶ 8] must also be complied with for the respective film in multi-pack processing.

With regard to the sealing properties of the two films in relation to each other, the above-mentioned special features must be taken into account.

In particular the ability of the secondary film to be welded together with itself must always be guaranteed. If this is not the case, its ability to be processed and shrinking quality will be greatly impaired!

2.9 Graphics/register mark variants

Variant 1: Printed film with regular register mark

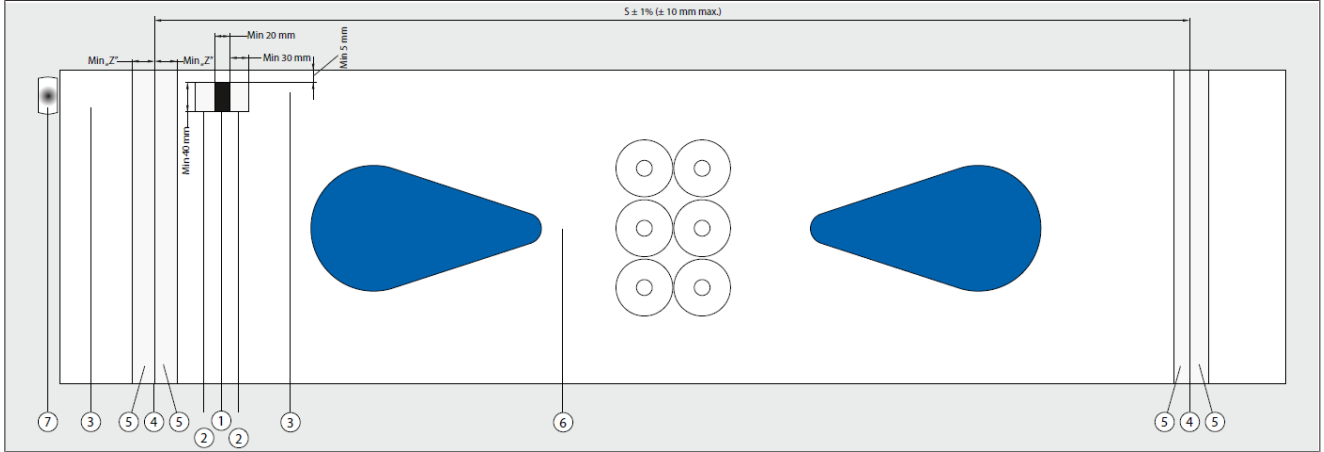


Fig. 10: Printed film with regular register mark

1. Register mark
2. Area before and after the register mark
3. Scanning area of the sensor before/after area (1) and (2)
4. Cutting line
5. Area around cutting line
6. Area adjacent to register mark
7. Sensor

NOTICE
 The position of the sensor can be selected freely via the film width while taking the characteristics listed in the point 2.9 Graphics/register mark variants [▶ 15] into account.

Variant 2: Printed film, printed image serves as register mark

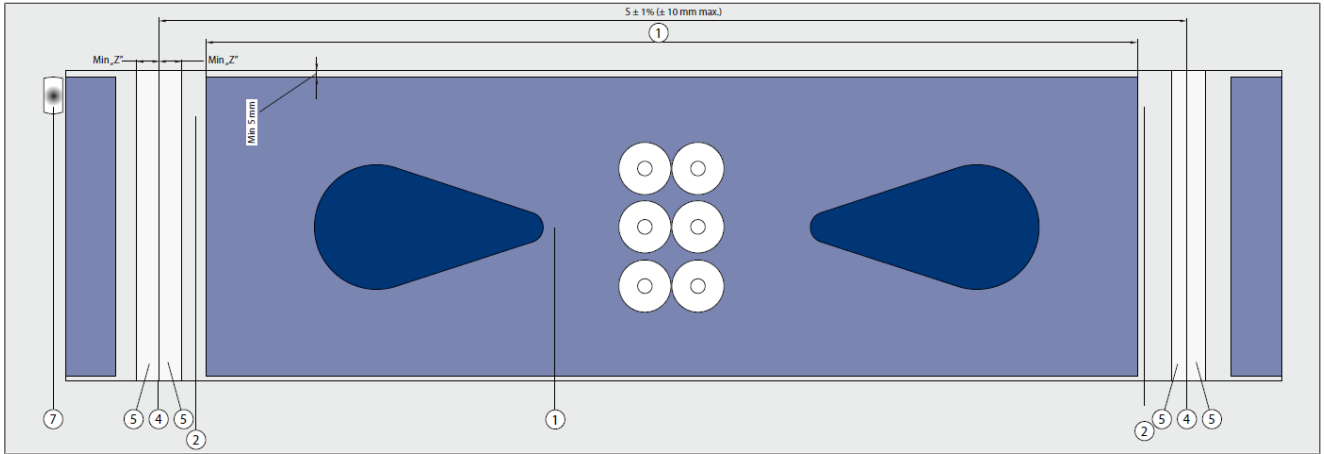


Fig. 11: Printed film, printed image serves as register mark

1. Register mark
2. Area before and after the register mark
3. Scanning area of the sensor before/after area (1) and (2)

4. Cutting line
5. Area around cutting line
6. Area adjacent to register mark
7. Sensor

NOTICE

The position of the sensor can be selected freely via the film width while taking the characteristics listed in the point 2.9 Graphics/register mark variants [▶ 15] into account.

Variant 3: Printed film, transparent area used as register mark

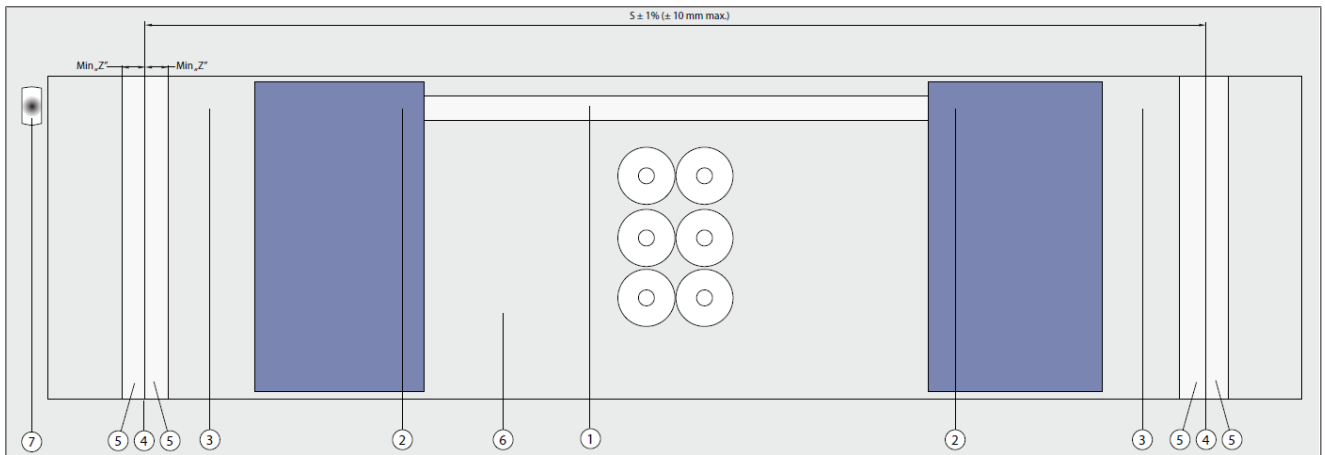


Fig. 12: Printed film, transparent area used as register mark

1. Register mark
2. Area before and after the register mark
3. Scanning area of the sensor before/after area (1) and (2)
4. Cutting line
5. Area around cutting line
6. Area adjacent to register mark
7. Sensor

NOTICE

The position of the sensor can be selected freely via the film width while taking the characteristics listed in the point 2.9 Graphics/register mark variants [▶ 15] into account.

Variant 4: Printed film, transparent area between two film lengths used as register mark

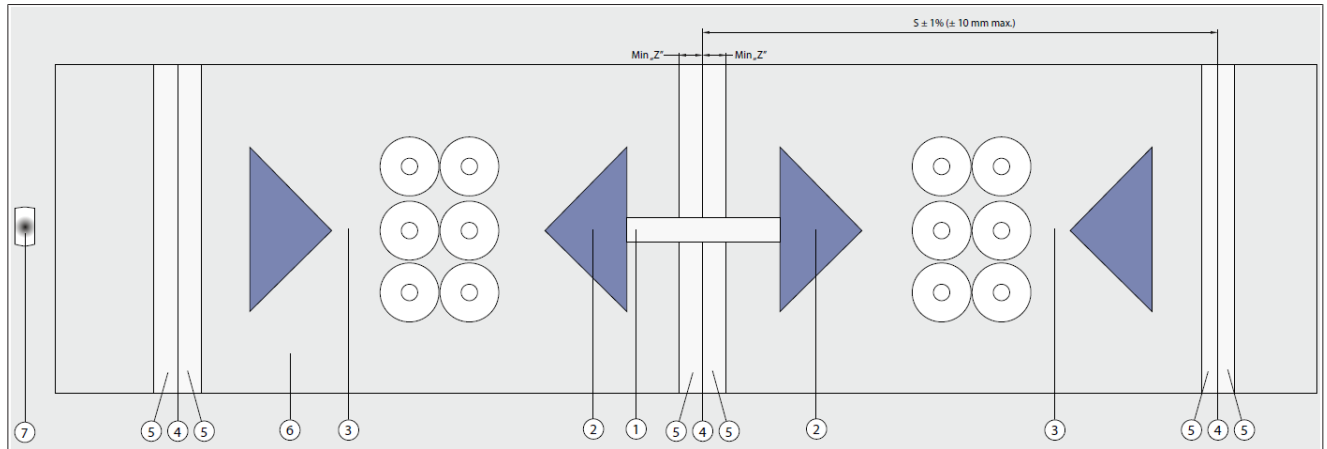


Fig. 13: Printed film, transparent area between two film lengths used as register mark

1. Register mark
2. Area before and after the register mark
3. Scanning area of the sensor before/after area (1) and (2)
4. Cutting line
5. Area around cutting line
6. Area adjacent to register mark
7. Sensor

NOTICE

The position of the sensor can be selected freely via the film width while taking the characteristics listed in the point 2.9 Graphics/register mark variants [▶ 15] into account.

A printed area is used as a register mark – conditions:

(1) Register mark

- Completely printed
- Min. length 20 mm
- Min. width 40 mm
- Rectangular limitation in the direction of operation in the detection area of the sensor

(2) Areas ahead of and after the register mark

- Completely transparent
- Length = at least 30 mm
- Width = sensor detection area = at least 40 mm

(3) Scanning area of the sensor ahead of/after 1 + 2

- Width = sensor detection area = 40 mm
- The register mark must not be repeated in this area. This means no further printed area with the length of the register mark (\pm tolerance length of register mark) may be present in the direction of operation.
- Determination of tolerance of the register mark length: Register mark \pm (4 % length of the register mark, min. 20 mm)

■ Example:

Register mark length = 100 mm Tolerance = 4 % of 100 mm = 4 mm

As 4 mm < 20 mm => tolerance = 20 mm

No further printed area with a length of 80 to 120 mm may be present in the scanning area of the register mark.

(4) Area around the cutting line

■ Z + 20 mm must be a transparent area that is not pre-treated for printing, as this is the only way to ensure optimum welding of the pack film overlaps.

■ This is also the area to which the end of the new film reel is welded.

(5) Area adjacent to register mark

■ This area can be designed as desired.

A transparent area is used as a register mark – basic conditions:

(1) Register mark

■ Completely transparent

■ Min. length 20 mm

■ Min. width 40 mm

■ Rectangular limitation in the direction of operation in the detection area of the sensor (width = 40 mm)

(2) Areas ahead of and after the register mark

■ Completely printed

■ Length = at least 30 mm

■ Width = sensor detection area = at least 40 mm

(3) Scanning area of the sensor ahead of/after 1 + 2

■ Width = sensor detection area = 40 mm

■ The register mark must not be repeated in this area. This means no further printed area with the length of the register mark (\pm tolerance length of register mark) may be present in the direction of operation.

■ Determination of tolerance of the register mark length: Register mark \pm (4 % length of the register mark, min. 20 mm)

■ Example:

Register mark length = 100 mm Tolerance = 4 % of 100 mm = 4 mm

As 4 mm < 20 mm => tolerance = 20 mm

No further printed area with a length of 80 to 120 mm may be present in the scanning area of the register mark.

(4) Area around the cutting line

■ Z + 20 mm must be a transparent area that is not pre-treated for printing, as this is the only way to ensure optimum welding of the pack film overlaps.

■ This is also the area to which the end of the new film reel is welded.

(5) Area adjacent to register mark

■ This area can be designed as desired.



2.10 Recommended Printing Area

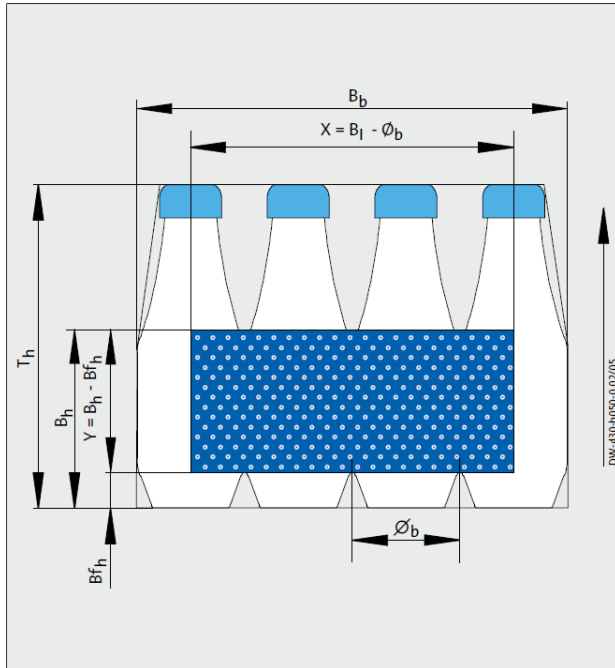


Fig. 14: Printing area

Labels, barcodes, etc. should only be located within the area "X x Y".

This area should span a virtually flat area, .e.g it should not extend into the side contour area of the pack.

Printing which extends beyond this will be distorted due to the shrinking process or will be illegible due to creasing (see Fig. Printing area [▶ 19]).

B_{f_h} = Base shape height

2.11 Printed side for contour printing (standard)/positioning of lettering

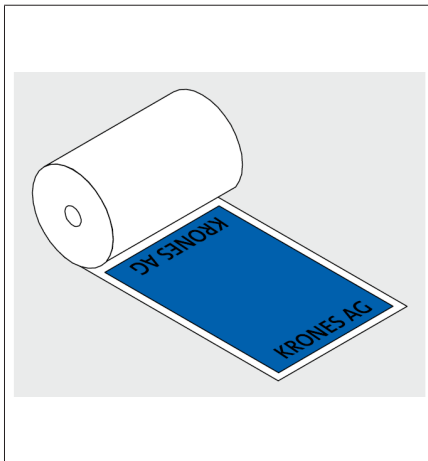


Fig. 15: Reverse printing

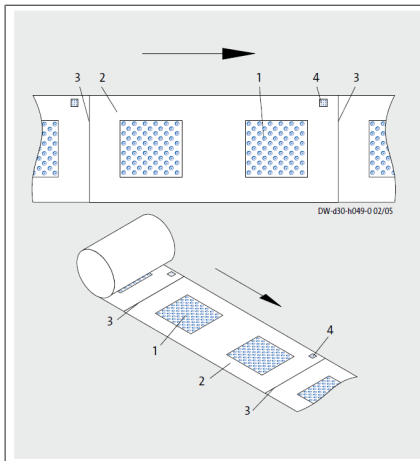


Fig. 16: Print design - use of a separate register mark

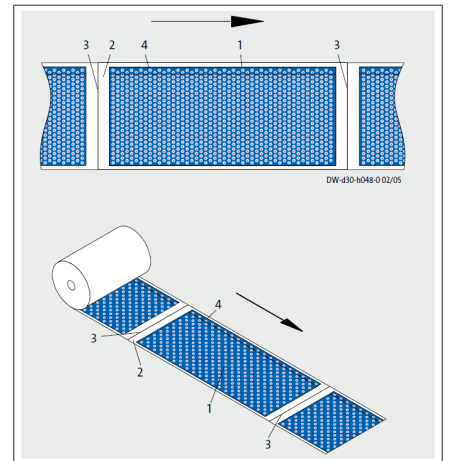


Fig. 17: Print design - use of the print design as a register mark

1. Print design and coding
2. Transparent (without printing)
3. Cut
4. Print design area that is also used as register mark or a separate register mark

2.12 Processing films with full-surface printing – Notes on processability

If films with full-surface printing are to be processed, KRONES is to be informed so that their processability can be clarified and confirmed.

The following basic conditions must be observed with regard to the print layout and the design of the register mark:

- The print must not impair the welding of the film, in particular in the area of the overlap.
- The area before and after the register mark (3) must be printed in a single colour for a length of at least 30 mm.
- The area of the film edges (1) must also be printed in a single colour for at least the width of the register mark (2) (incl. the distance from the register mark to the film edge).
- The colour of the register mark and the colour of the single-colour area must be clearly different with regard to the grey-scale value/contrast (ideal: black/white).
- The colour design of both areas must also be identical for the entire product range run on the respective packer.



Fig. 18: Processing of films with full-surface printing

2.13 Examples of printed films – Checking for processability



Fig. 19: Raster printing/fine spraying

Register mark length sufficient in running direction (≥ 20 mm) Register mark width perpendicular to running direction is insufficient (< 40 mm).

A statement regarding processing can only be provided after testing because of the raster imprint/fine spraying.

→ Statement only possible following a test



Fig. 20: Print design used as register mark

No register mark.

The transparent area between the two bars printed in red can be used on this film as the register mark. This transparent area is present only once within a register (length of area).

→ The film can be processed. (Control via Variant 3, see Chap. 2.9 Graphics/register mark variants [▶ 15])

3 Process-dependent requirements

The following factors must be complied with if the shrink film is to be optimally processed:

3.1 Film reels in as-received condition

1. Film wrapping:

The wrapping of the film sheet around the coil must be free of overlaps, fraying or unevenness. The inner edge of the sleeve must not be frayed.

Recognisable edges:

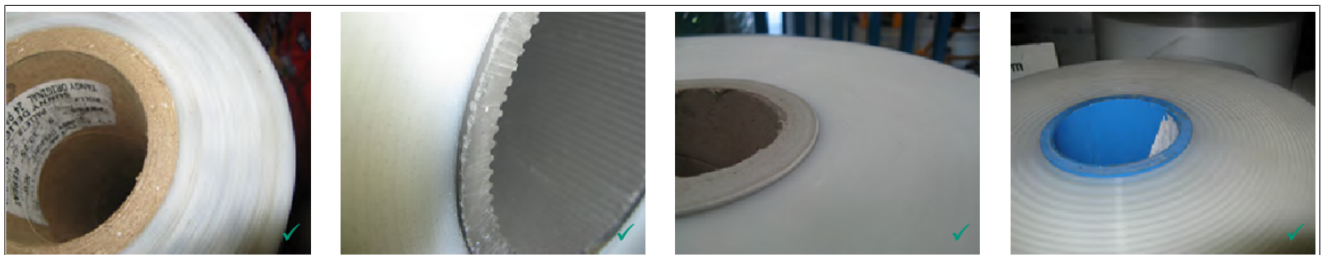


Fig. 21:

Unrecognisable edges (edge not clear):



Fig. 22:

Dirty circular areas of film reel:

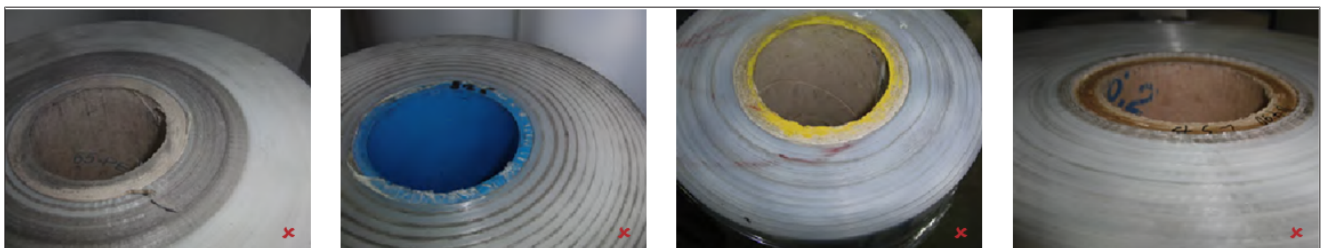


Fig. 23:

2. Sleeve material:

The shape of the sleeve must not be distorted and it must rotate smoothly.

Note:

Sustainable plastic sleeves are recommend!

Suitable sleeve shapes:

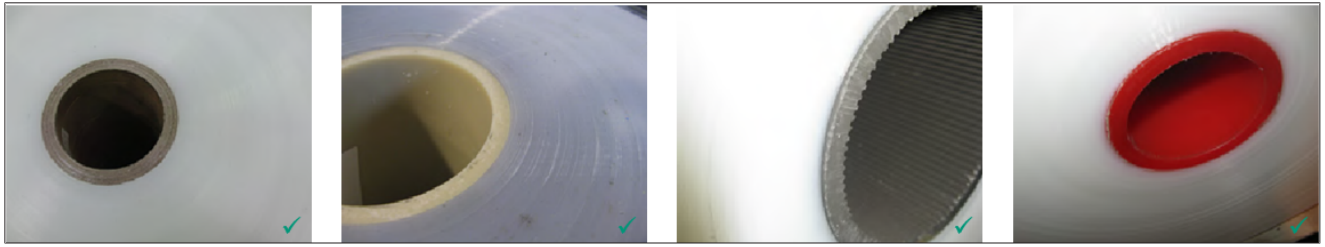


Fig. 24:

Unsuitable sleeve shapes:

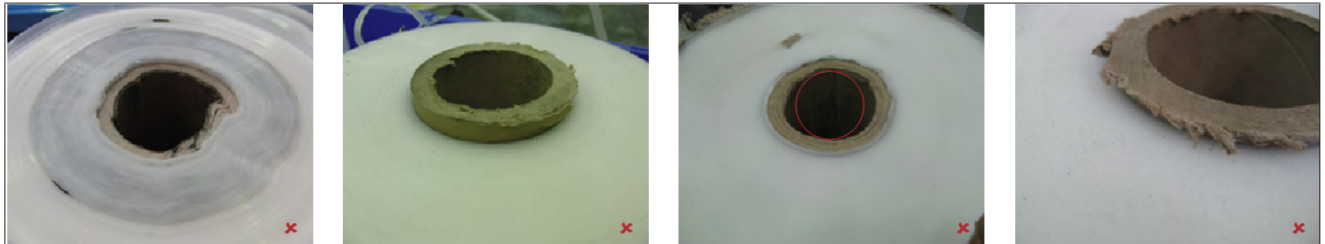


Fig. 25:

3.2 Checking for further film defects before processing

The following list is not intended to be exhaustive!

	Location	Faults	Comment
1.	Roller	Jammed film	Film cannot be unwound freely from the reel
2.	Film	Gels, fish eyes (> 3 mm)	<ul style="list-style-type: none"> ■ Non-melted or partially melted material ■ Not to be prevented with recycled films
3.	Film	Scratches, scuff marks	Causes film tears or visual defects
4.	Film	Holes, blisters, burn marks	Causes film tears or visual defects
5.	Film	Thickness fluctuations	Causes waves and wrinkles or film tears
6.	Film	Black spots	<ul style="list-style-type: none"> ■ Visual faults ■ Not to be prevented with recycled film
7.	Coloured film	Incorrect print layout	Graphics or position of print differs from agreed standard
8.	Coloured film	Bar code	Legible and correct bar code
9.	Coloured film	Poor ink adhesion	Printing separates from film - faulty corona pre-treatment
10.	Coloured film	Printing ink	Colour out of the agreed colour tolerance range
11.	Coloured film	Inconsistent colour coverage	Pale or "watery" print sections
12.	Coloured film	Print register	Faulty orientation outside the tolerance limit
13.	Coloured film	Smearred, scuffed printing	Smearred or "strained" colour

3.3 Properties of containers in shrinking tunnel

The containers to be processed must be designed so that they are not damaged or deformed by the heat created during the shrinking process. The properties of the shrink film and the containers to be processed may need to be adjusted to suit one another in some cases. For example, a combination of a container with a very thin wall and a shrink film requiring a great deal of energy for the shrinking process may in some cases lead to the deformation of the bottle neck. If the film and container material display a similar thermal behaviour, this can also have a negative impact on the pack quality.



Fig. 26:

3.4 Ambient conditions on shrinking tunnel

The ambient temperature for KRONES shrinking tunnels is between 8 °C and 50 °C. Seasonal or daily fluctuations of the ambient temperature will influence the shrinking result via the film temperature and the container temperature. Condensation moisture leads to wet containers and a reduction in the shrinking quality.

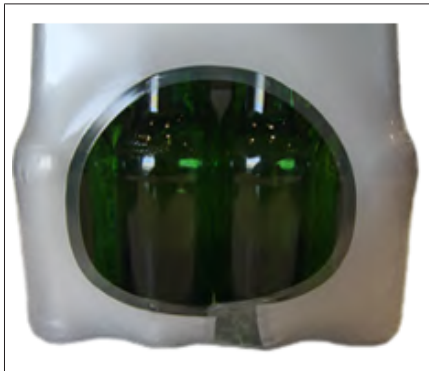


Fig. 27: Dry containers



Fig. 28: Wet containers

3.5 Properties of shrink film printing



Fig. 29:

The printing must allow the film shrinking process to be performed without causing any optical defects (e.g. tears, print layout deformation, colour change) and must not have a significant negative impact on the shrink properties of the film.

Depending on the pigments used, the behaviour regarding the absorption of infrared radiation may differ. For example, prints with white and metallic effects can lead to major differences in shrinking quality and require the creation of a separate processing formula.

The print is normally applied using the reverse-printing procedure. Printing the film on the pack exterior side may in some cases have an effect on the shrinking result.

4 Printed forms for filling out film widths and repeat lengths

4.1 Shrink pack for 1-lane processing

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Dimensions, design and material for test run are confirmed:

Customer / Date _____

0 -	in mm	0 -	in mm
A		D	
B		E	
C		F	

Ueberlappung – overlap

suggested film thickness 50–60 µm

In case of printed film, side printed

Pattern repeat

Important! Film specifications must be confirmed following a test run!
Final specifications can only be made after start-up! For additional information, see the general film specifications!

Film width

Vordruck Shrinkpack einbahning

Fig. 30:

4.2 Shrink pack for 2-lane processing

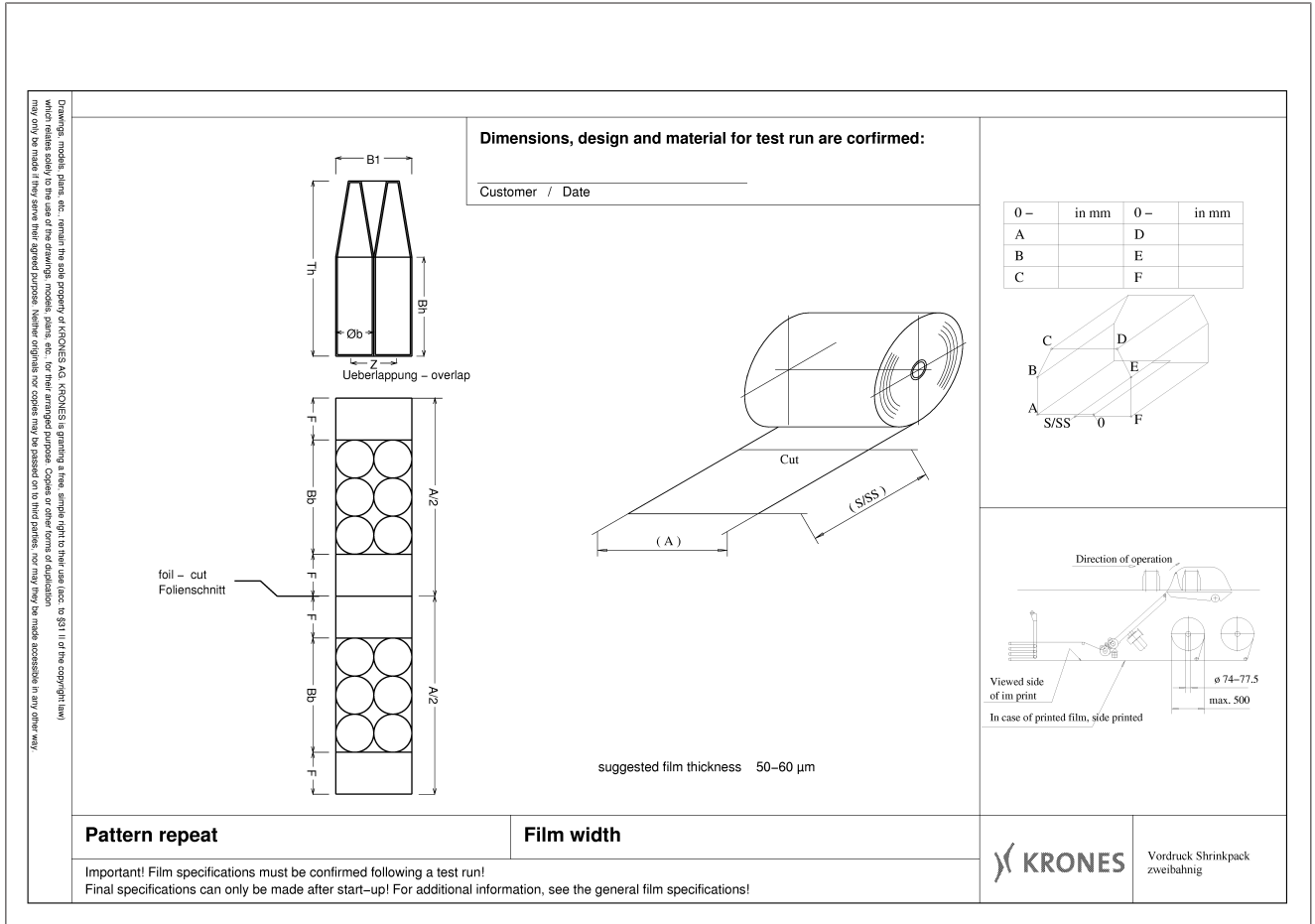


Fig. 31:

4.3 Shrink pack for 3-lane processing

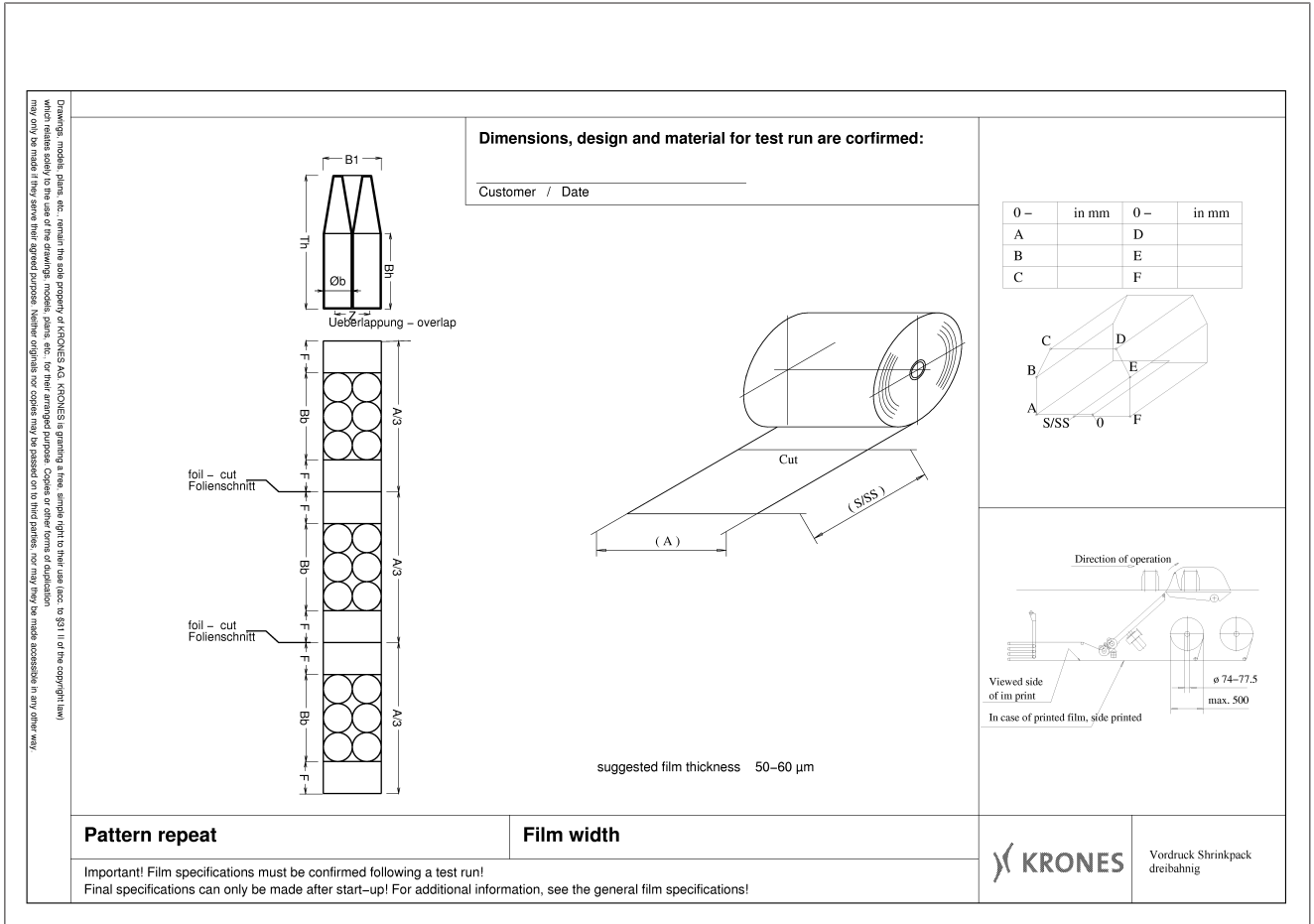


Fig. 32:

4.4 Shrink pad for 1-lane processing

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Dimensions, design and material for test run are confirmed:

Customer / Date _____

Ueberlappung – overlap

Cut

(A)

(S/SS)

suggested film thickness 50–60 µm

0 –	in mm	0 –	in mm
A		D	
B		E	
C		F	

Pattern repeat

Film width

Important! Film specifications must be confirmed following a test run!
Final specifications can only be made after start-up! For additional information, see the general film specifications!

Direction of operation

Viewed side of im print

In case of printed film, side printed

ø 74–77.5
max. 500

KRONES

Vordruck Shrinkpad einbahrig

Fig. 33:

4.5 Shrink tray for 1-lane processing

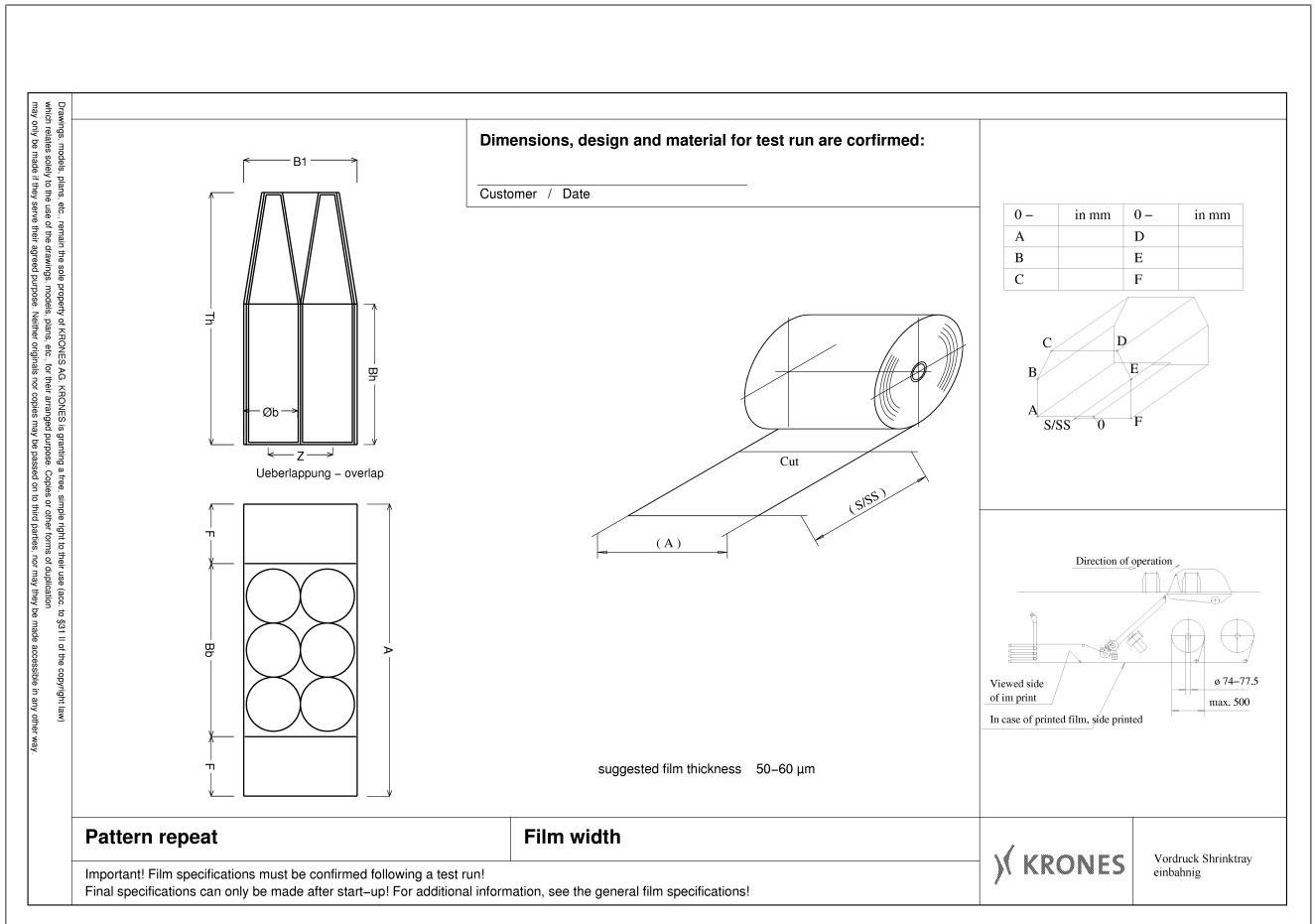


Fig. 34: