Packaging Guidelines

Content

This new Packaging Guidelines replaces the following existing standards (KN's)

KN 053.024	Development units- and accessories packaging
KN 050.003	Palletisation of packed units
KN 050.007	Pallets, wooden substructures as well as wooden material for packaging applications
KN 050.006	Pallet blocks of pressboard
KN 050.058	Specification edge protectors
KN 050.008	Quality Standard for Packaging made from corrugated cardboard only
KN 050.056	Strech Wrap of charge carriers

1 Other applicable standards/references

- KN 050.034 Environmentally Sound Products – Packaging
- KN 053.016 Development Order
- KN 053.024 Equipment and Accessory Packaging Development
- KN 050.016 Weight Information on Product Type Plates and Packaging
- Development order form (doc. no. 23 04 04)

2 Purpose

These packaging guidelines describe the use of packaging and its core elements in development. These guidelines are designed to show the individual/position performing the work how goods should be securely and ideally packaged.

They also:

- Assist purchasers in showing suppliers (e.g., in emerging markets) how to use the correct packaging for deliveries to Kärcher
- Help train employees.

They should serve as a clear, easily understood, and practical guide for packaging development, and inform suppliers of existing guidelines and instructions in the area of packaging and delivery.

The following instructions are intended, through:

- Optimal packaging design
- Standardised dimensions for containers, cardboard boxes, and load carriers
- Specific quantities for each packaging material, and
- Correct and complete labelling of packaging

To promote the smooth flow of materials between suppliers and Kärcher, and avoid unnecessary repackaging.

This standard is binding for all supplier deliveries ordered by Purchasing after receipt of this standard (unless otherwise agreed upon with the supplier).

Kärcher shall then consider any non-performance of the requirements and specifications of this standard in regard to these deliveries as material defects in the delivered products.

3 Packaging quality requirements

All packaging is exposed during transport to stresses such as shocks, vibrations, and pressure, as well as environmental factors such as moisture, dust, and dirt.

This is why packaging of good quality that adequately protects the product must be used.

Packaging must generally be designed to withstand transport and/or stress.

Appropriate packaging must be selected for deliveries to and from countries with special import/export requirements for packaging (e.g., wood packaging) and any shipping documents necessary for import or certificates required by applicable law must be kept on hand.

The factory/supplier is generally responsible for the direct packaging of the goods.

The best outer packaging is useless if there is no inner packaging suitable for the product. The inner packaging cushions and immobilises the product, and keeps it away
from the outer packaging. If several products are included in one package, the inner packaging also keeps the individual products separated.

If the packaged product is sensitive to dust or if subsequent product function is jeopardised by contamination during transport, the inner packaging must also protect against dust and dirt, or even electrostatic discharge.

Packaging made of wood (box) or wooden components (brackets) may be used for very heavy products or products whose design is not suitable for cardboard packaging.

When using wood packaging, make sure any import regulations or requirements in the country of delivery (e.g., China, Australia) are met.

The more sensitive to pressure and shocks, the heavier, and the larger the product is, the more stable the outer and inner packaging must be.

Used outer packaging generally may not be used. The stability of used packaging may already be considerably reduced due to tearing, buckling, denting, or perforation.

4 Specifying packaging

The packaging managers at the Development Packaging Module Centre, as well as the employees at each production and/or development site tasked directly with packaging, are responsible for specifying packaging for our products.

Each part number is assigned a type of packaging.

For purchased parts, the supplier provides design-specific information and drawings, as needed. These are provided no later than before Quality Gate 2 (prototype release). Prior to delivery to Kärcher, the supplier shall check for a corresponding list of packaging materials, including packaging instructions.

The specified packaging shall be used for every delivery and compliance will be reviewed during receiving. Failure to do so will result in rejection. Any resulting steps made necessary by such failure may be billed to the supplier.

In exceptional instances, deviations from the delivery packaging may be coordinated and established in writing with the proper packaging manager prior to delivery.

The supplier is expected to provide support for routine packaging optimisation and alterations. The supplier will receive written notification of any decision regarding or alteration to packaging. Should the supplier fail to respond to a notification of a packaging alteration within 10 business days, the new delivery packaging shall be deemed accepted by the date specified in the notification.

Should the supplier have reason to alter the packaging, the supplier shall notify the proper Kärcher purchaser.

5 Cardboard and corrugated fibreboard packaging and packaging components

5.1 Cardboard quality

Unless otherwise stipulated on the third-party parts order forms, the information described below shall apply.

5.1.1 Corrugated fibreboard primary packaging

The required corrugated fibreboard quality is based on the calculated technical load levels (BCT/ECT) included in all technical drawings.

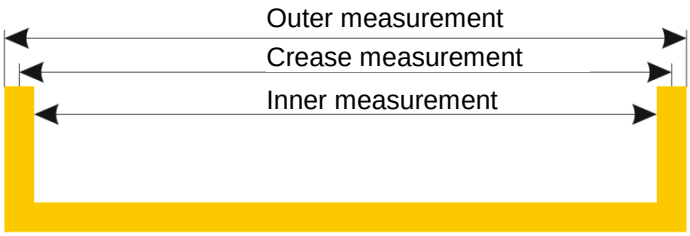
If necessary, the calculation tool developed by Kärcher will be provided to the supplier.

The following table provides a rough guide:

Product weight	Box	Lap	Inner fixtures
< 5 kg	E or B flute	Glued	Depending on the type of transport and/or the sensitivity of the packed products The necessity of punching inserts / or something similar must be validated by means of the release tests
< 12 kg	E/B flute	Glued	
< 20 kg	B/C flute	Glued	
< 30 kg	B/C flute	Glued or stapled	
> 30 kg	B/C flute	Glued or stapled; common is stapled	

5.1.2 Folding box dimensions/size

To check the dimensions/size, a single folding box is taken from the middle of the stack and the dimensions are compared with the corresponding third-party order form (FTB 6.59X-XXX) and the punch outline (0.098-XXX).



Outer measurement

The outer measurement is taken when the box is erected. All measurements for review are located in the corresponding palletisation plan. These contain the exact dimensions of the cardboard box. The outer measurement is the measurement between two creases plus or minus the corresponding packaging material thickness (DIN 55468-1).

Crease measurement

The crease measurement is the distance between two parallel creases or a crease and a parallel edge. The measurement is taken from the centre of the one crease to the centre of the other crease, or from the edge to the centre of the crease when the box blank is flat.

Inner measurement (Kärcher specification)

The inner measurement of a folding box is on the third-party order form and can be calculated based on the outer measurement as follows:

With outer measurement:	Length and width:	- 2 x material thickness
	Height E/B flute:	- 4 x material thickness (- 20%*)
	B/C flute:	- 4 x material thickness (- 18%*)

* Specification due to packaging development

Box dimensions	Length (mm)	Width (mm)	Height (mm)
Outer dimensions	400	200	500
Calculation	400-14	200-14	500-28-(28*0.18)
Inner dimensions	386	186	466

Sample calculation: (outer box dimensions in mm: 400 x 200 x 500: B/C flute: 7 mm)

Flute type	A	C	B	E	F
Packaging material thickness (±0.5 mm)	4.5	4	3	1.5	1

Flute type and corresponding material thickness (packaging material thickness) for calculating the inner measurement.

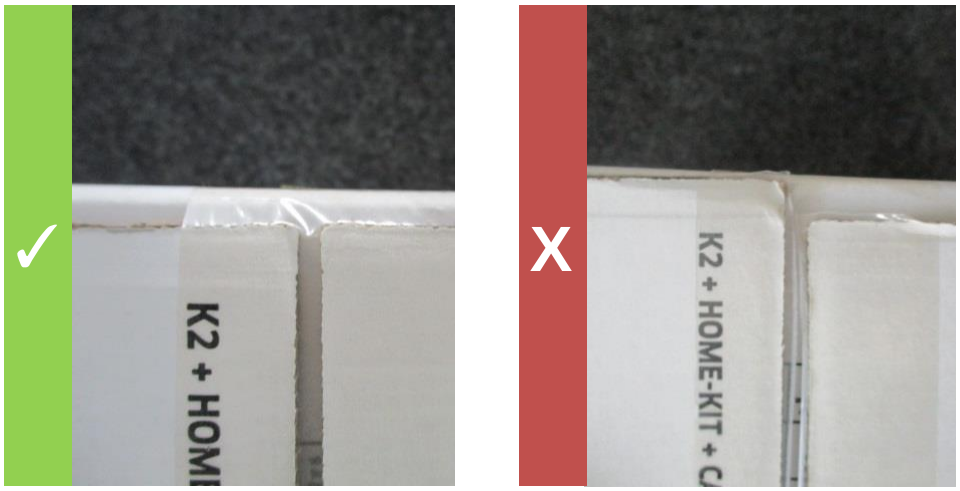
Top/bottom tabs

To avoid overlap in the top or bottom tabs, they should not be longer than W/2 - 1/2 of the material thickness (= 1/2 width - 1/2 material thickness) per side. This means there should be a gap that is as wide as the thickness of the material.

On the other hand on top and bottom the tabs shouldn't create a big gap. Maximum the gap on top of the folding box can be 2mm. At the bottom of the box the gap can be 4mm.

Correct top and bottom of a closed folding box with gaps less than 2mm (on the top) and less than 4mm (on the bottom).

Through closing the folding box with adhesive tape the tabs may shift. The defined maximum for this shift has to be 5mm.



Correct closed tabs without more than 5mm shift and an incorrect closed part.

5.1.3 Tolerances (crease measurement)

Most packages are erected by machine. This is why the following table has tolerances that are less than those in DIN 55429 part 2.

Packaging material	Crease measurement tolerances [1]
Box	±0.3% per measurement. These tolerances increase per measurement: a) by ±0.005 mm per 100 g/m² of grammage due to material b) by ±0.4 mm due to production
Solid fibreboard	Punched: ±0.3% per measurement. These tolerances increase per measurement: a) by ±0.005 mm per 100 g/m² of grammage due to material b) by ±0.4 mm due to production Overall at least ±1 mm
	Other production methods ±0.3% per measurement. These tolerances increase per measurement: a) by ±0.005 mm per 100 g/m² of grammage due to material b) by ±0.6 mm due to production Overall at least ±1.5 mm
Corrugated fibreboard	Punched: per measurement up to 200 mm: ±1.0 mm over 200 mm to 700 mm: ±1.5 mm over 700 mm: ±2.0 mm
	Other production methods up to 300 mm: ±2.0 mm over 300 mm to 700 mm: ±3 mm over 700 mm to 1,200 mm: ±0.5%
[1]) Special dimensions may be necessary for automated processing.	

5.1.4 Glue/staple lap

When checking the glue lap, make sure the two sides are joined properly. The easiest way to check this is to make sure a printed image, label or illustration is lined up on both sides.

The two sides should be joined together cleanly so the printed image clearly forms a single image (see below).

If the folding box has no image on it, then the crease measurements on each side are compared with the other.

The gap width tolerances are as follows:

- Punched box: max. ±1.5 mm
- Slotted box: max. ±3 mm

Right: A folding box with adhesive seam. Both halves of the box are joined with a printed image (label). Due to the offset, the two flaps do not line up. The tolerance has been exceeded. Right: A folding box with staple lap. The two halves of the box have a label printed on them. The stapled laps are ideally joined and do not deviate. An observer sees a single image. The specified tolerances have not been exceeded.

Glue/staple lap position: Make sure that the lap on the long side (print side) is always on the right, otherwise the folding box cannot be automatically labelled.

The correct pressing must also be ensured. The offset on the inside and outside of the box should be half of the material thickness. The image should transition smoothly.

5.1.4.1 Gluing/stapling

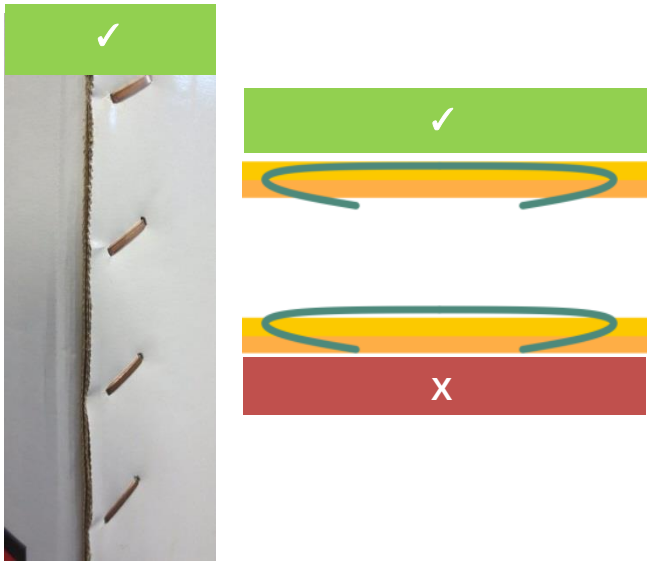
Boxes with a total package weight (product plus packaging) < 25 kg are generally stapled.

The exact method of lap joining is specified in each third-party order form.

Box on left with glue lap and box on right with staple lap.

5.1.4.3 Staples

For a folding box held together with staples, the position of the top and bottom staples is critical. These two staples must be at least 5–10 mm below the edge of the box to avoid tearing. Enough staples must also be used to ensure that the sides of the box are held together securely. The distance between the staples should be consistent and be 30–100 mm apart depending on the height of the folding box. The staples are under the surface of the packaging, i.e., counter-sunk.



Ideal stapled lap with counter-sunk staples. Examples of correctly and incorrectly counter-sunk staples.

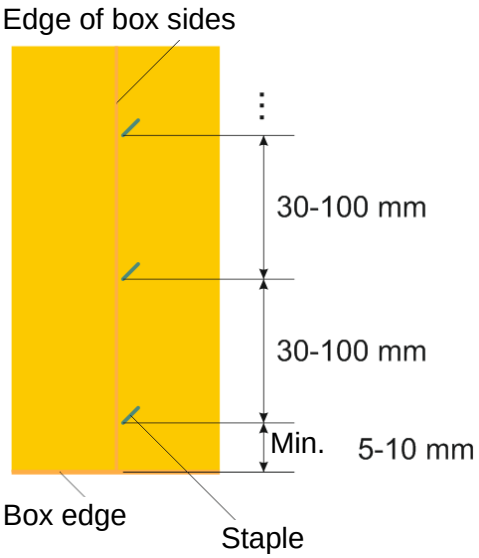
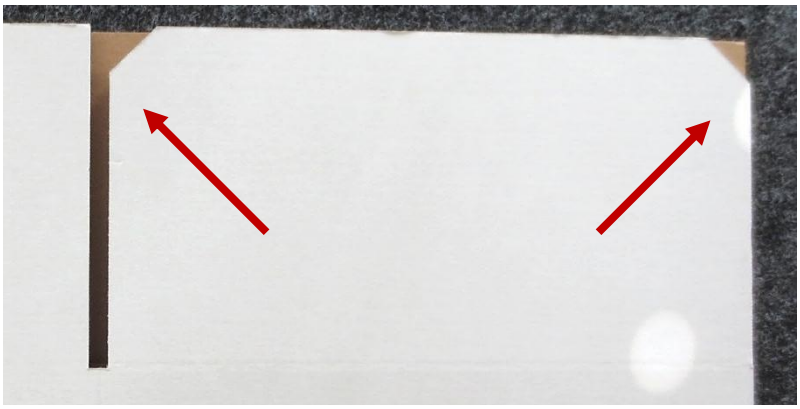
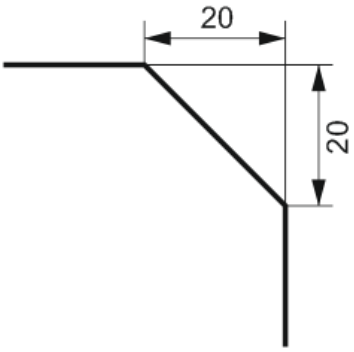


Illustration of applying staples. Distance between staples is consistently 30–100 mm depending on folding box height.

5.1.5 Tapered corners (automated erecting)

By using automatically erecting the corners of the inner flaps (short top and bottom laps) should be tapered to 20 x 20 mm to ensure the box enters the erectors smoothly.





Tapered corners on the short top/bottom laps of a box.

5.1.6 Box design (automated erecting)

Following box pattern above should be used when automated erecting is used. This is intended to ensure that the automated erecting and labelling functions reliably.

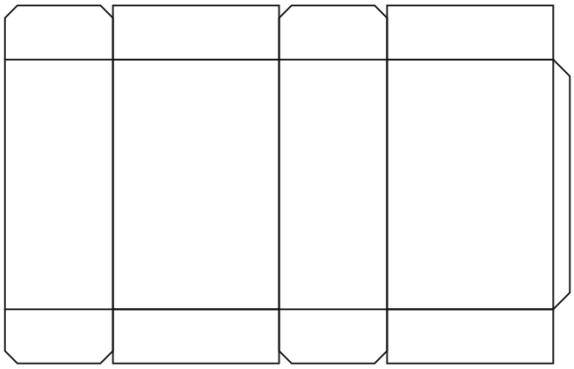


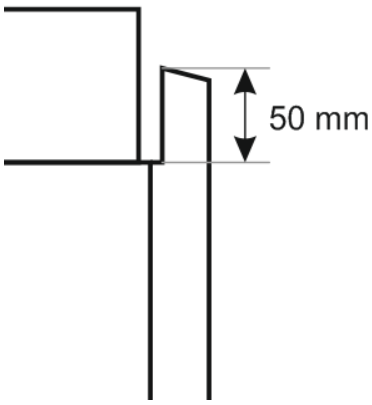
Illustration of a correct box blank (short, long, short, long, glue lap).

5.1.7 Extended glue lap

An extended glue lap is used to prevent the glue lap from coming undone under low stress. This kind of lap can also dampen shock-like stress when, e.g., tubes are located here.

The extended glue lap makes this part of the inside of the box shorter, which must be considered when arranging products in the box.

The extended glue lap is 50 mm longer than the crease line of the top and bottom laps. The slant on the longest side of the lap is 50 mm longer as shown in the following figure:



Dimensions of the extended glue lap unless otherwise noted on the drawing.

Should only be done if required to pass testing or if it's fixed within the specifications in the BOM.

5.1.8 Humidity and environmental factors

Boxes should not be damaged by environmental factors, e.g., rain.

For further processing, boxes should be neither too dry nor too damp. Stack moisture should fall between 45–65% (measured from the centre with an insertable hygrometer).

5.1.9 Delivery of flat boxes

The delivery of flat boxes from the supplier to the plants is defined by each factory's material requirements planner.

5.2 Punch-out handles

5.2.1 Use

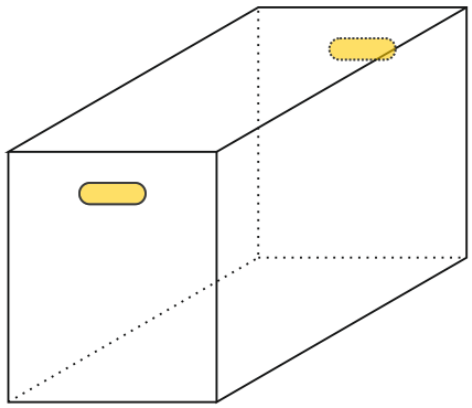
Product management shall determine the requirement of punch-out handles on the box.

In general, no punch-outs are used for H&G/Retal products, since these cause issues in brick-and-mortar retail (theft/tampering). The inclusion of punch-out handles should thus always be coordinated with the proper product manager.

Punch-out handles maybe used in all other business sectors, but depend on the product and size of the packaging.

5.2.2 Dimensions and placement

Any openings for handles should be included on the third-party order form along with any necessary measurements.



Folding box with marked punch-out handles.

5.3 Corrugated fibreboard secondary packaging

5.3.1 Outer box

Outer boxes are secondary packaging made of corrugated fibreboard. These outer boxes are for grouping several primary packages into a single packaging unit.

Outer boxes are stacked on a load carrier on, e.g., slip sheets or wooden pallets, according to the palletisation plan.

The outer box or outer box label must be produced and delivered in the design, size, and quality stated on the current third-party order form.

5.3.2 Pallet box

A pallet box is secondary packaging made of stable, dual-flute corrugated fibreboard with side flaps on a pallet, as shown in the photo below.

These pallet boxes are for grouping several primary packages into a single packaging unit.

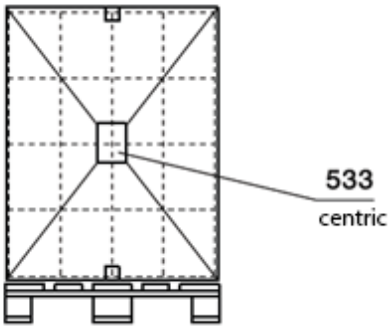
The pallet box must be secured to the load carrier with at least eight staples.

Only one pallet box is stacked on a load carrier.

5.3.3 Secondary package labelling

A pallet label must be applied to the front (short side) of the outer box or pallet box. This label must contain the following:

- Kärcher logo
- Item number
- Item description in German, English, and French (unless otherwise specified in the EWA)
- Number of primary packages in the secondary package



Sample drawing of a labelled outer box.

Sample pallet label layout.

A layout template is included in printable PDF format under the label number in SAP and can be requested from Purchasing.

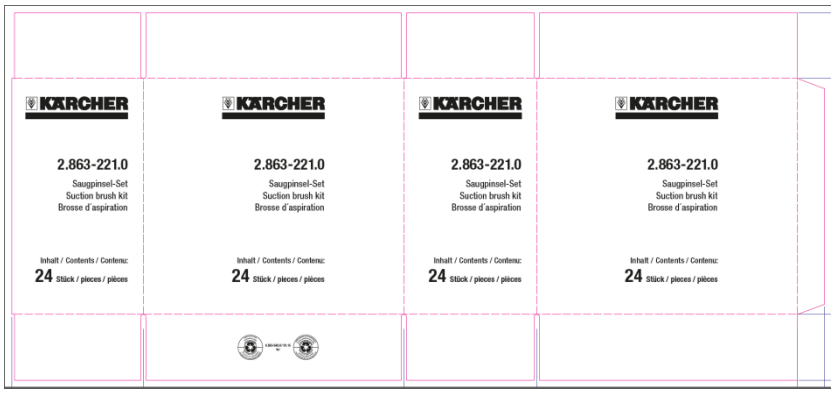
5.3.3.1 Label design

- Dimensions: Width: ≥ 100 mm, height: ≥ 150 mm
- Quality: 80 g/m² plain paper secured with tape or
  80 g/m² self-adhesive paper

5.3.3.2 Outer box labelling with direct printing

Outer boxes may be labelled on all four sides with direct flexo printing.

A layout template is included in printable PDF format under the outer box part number in SAP and can be requested from Purchasing.



Sample layout of a labelled outer box.

5.3.3.3 Outer box labelling with labels

Alternatively, the outer box may be labelled on the corners specified in the drawings using labels.

A layout template is included in printable PDF format under the outer box part number in SAP and can be requested from Purchasing.

Corners of outer box where labels may be placed.

7 Plastic packaging or packaging components

7.1 Blister packaging

https://en.wikipedia.org/wiki/Blister_pack

Blister packaging is a type of transparent packaging. They are divided into the following groups based on production:

- Fused packages
- Pressed packages
- Stapled packages

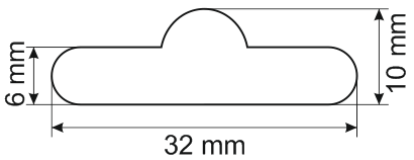
7.1.1 Requirements

In general, the following features must be inspected and present when using and producing blister packaging:

- Euroslot (see specification in Euroslot or the appropriate technical drawings)
- Size and shape (see specification in the appropriate technical drawings)
- Material thickness/wall thickness (see technical drawings)
- Materials (see appropriate technical drawings)
- Visual quality
- Reduced susceptibility to scratches
- High rupture strength
- Paperboard release characteristics (see Adhesion assessment)

7.1.2 Euroslot

A Euroslot is described in more detail in the technical documents, however a minimum size should be met in all instances. The width of a display hook is approx. 30 mm, therefore a minimum width of 32 mm should be met as shown below.



7.1.3 Adhesion assessment

The release behaviour of the thermoformed part from the paperboard is subject to similar rules as those that apply when inspecting the glue lap as described under “Manual opening” in Section 0, “

Glue lap assessment”.

Consequently, paperboard peeling is the desired behaviour when opening the blister packaging, since the adhesive strength of the glue is the strongest bond.

Correct: blister is difficult to remove and results in the paperboard peeling.

Incorrect: blister is easily removed, adhesive bond fails.

7.2 Bubble wrap

Bubble wrap is a flexible plastic sheeting containing numerous small air pockets, used in cushioning items during shipment. Standard average bubble diameter is 6.0 - 25.4 mm and height about 4 mm.

Bubble wrap is lightweight, water resistant, reusable non-scratching.

7.2.1 Requirements:

To wrap mid-weight products, such as accessories use 3/16” bubble.

To wrap heavy products or fill gaps use ½” bubble.

When sharp heavy products needs to be wrap super duty bubble with 3rd we bubble can be used.

7.3 Bottles

High Density Polyethylene HDPE) is the most widely used resin for plastic bottles. This material is economical, impact resistant, and provides a good moisture barrier. HDPE is compatible with a wide range of products including acids and caustics but is not compatible with solvents. HDPE is naturally translucent and flexible. The addition of color will make HDPE opaque, but not glossy. HDPE lends itself to silk screen decoration. While HDPE provides good protection at below freezing temperatures, it cannot be used with products filled above 160 °F (71 °C) or products requiring a hermetic (vacuum) seal

7.3.1 Requirements:

Detergent and oil should use HDPE bottles

7.4 Safety guidelines to reduce risk of asphyxiation in children by using flexible plastic packaging

This section is based on **DIN CEN/TR 16353**.

“Packaging safety guidelines to reduce risk of asphyxiation in children by using flexible plastic packaging”

These safety guidelines serve as instructions for reducing the risk of asphyxiation in children by using flexible plastic packaging.

Parents/guardians play a critical role when handling sheets and bags from packaging. However, this is not a reliable or complete solution. This is why it is necessary to consider and take any action that can increase product safety without sacrificing function.

This rule applies to plastic packaging that serves the following purposes:

- Facilitates carrying
- Prevents the ingress of moisture
- Protects against physical damage, or
- Groups together several units for transport

7.4.1 Area of application and terms

This section applies when flexible plastic packaging is likely to be accessible to children in the household and may pose an asphyxiation hazard.

Disposable packaging:

Packaging that is not reusable because it is destroyed in order to access the product (e.g., shrink-film or skin packaging).

Figure 1: Examples of disposable plastic packaging according to definition. [1] [2] [3]

Reusable packaging: Packaging that is designed and able to be reused.

Figure 2: Examples of reusable plastic packaging according to definition [4] [5] [6]

7.4.2 Risk assessment

An assessment of choking/asphyxiation risk includes the following:

- Is flexible plastic packaging required for the product?
- Packaging for very small products may not pose a risk
- Will the packaging be destroyed during opening (e.g., shrink-film packaging)?
- Is packaging designed or able to be disposable or reusable?
- Use of designs, colours, or other features that make packaging more appealing to small children.

7.4.3 Safety strategies

Warnings and safety statements should follow local and national laws, and regulatory guidelines (CPSA, UL, ETL, etc).

Ideally, risks should be eliminated by foregoing packaging that may cause choking.

- If this is not possible, the risk should be minimised, e.g., by adding air holes.
- If this type of solution is not possible, clear consumer warnings must be included.
- If the opening of a bag is < 380 mm, it is not an asphyxiation hazard since the bag will not fit over the heads of most small children.
- If the opening of a bag is > 380 mm and has a minimum thickness of 0.038 mm (this only applies to polyethylene and may differ with other materials due to stiffness), it is not an asphyxiation hazard since it too stiff to take on the form of a child, thereby covering the nose and mouth.
- Film that is thinner than 0.038 mm (for polyethylene) and has an opening > 380 mm or has an overall size greater than 100 x 100 mm must have air holes. These should have a minimum diameter of 6 mm. Approximately 1% of a 30 x 30 mm area should be removed by the holes.

Cords and drawstrings should not be used to close the bag to further minimise the risk.

If none of this is possible, warning labels can help identify the potential risk of asphyxiation. These labels should contain the following in the consumer's national language:

KEEP AWAY FROM CHILDREN TO PREVENT RISK OF ASPHYXIATION

7.4.4 Tester and testing

A thickness tester (1 µm margin of error) is required for testing.

Only one sheet of film is tested at a time. Bags are cut on the sides to make two sheets of film. This should be done without deforming the film.

The thickness of each sheet of film must be tested at 10 points. These points should be evenly distributed over a 100 x 100 mm diagonal line on each surface. These points are then used to calculate the mean.

8 Wooden packaging or packaging components

This standard describes the requirements for wooden materials, pallets, and wooden skids that are commonly used for packaging at Kärcher.

This standard describes the minimum requirements. Any other requirements on third-party order forms or in order descriptions are not invalidated by this standard.

Definition of wooden materials

Wooden materials are objects (boards, beams, blocks, squared timber, etc.) made of wood that are:

a) Used to package Kärcher equipment, systems, and parts, or

b) Used to produce pallets and wooden skids.

Purpose

In the following instances, this standard describes requirements for wooden materials, pallets, and wooden skids, and is binding for the suppliers of these products:

a) When this standard is referenced in the order description, order documents, or the third-party order form for such products, or

b) When the order description, one of the order documents, or the third-party order form for such products contains the phrase, “[...] according to DIN 15147 or UIC 435-2 [...]”.

Purpose of use

Under this standard, wooden materials, pallets, and wooden skids are used to package and/or transport Kärcher equipment, systems, and parts.

Contact at Kärcher

The Packaging Development Module Centre is responsible for answering questions relating to wood and wooden packaging (packaging@de.kaercher.com).

8.1 Wood and wooden packaging quality requirements

Any kind of wood that meets the following minimum specifications may be used:

Bulk density (kg/m³)	Shrinkage coefficient		Strengths			
	Radial	Tang.	Tensile (axial)	Compression (axial)	Flexural (transverse)	Shear (axial)
470	0.15	0.32	80	40	68	7.5

Specifications for wood types.

Bark and knotholes

Wooden materials may not contain bark (except for plywood) or bark pockets.

Wooden materials also may not contain knotholes. Knots (inclusions) may not exceed ¼ of the width of the piece of wood.

Wanes

- Wanes are not permitted in stringers/cross-boards, centre flooring boards, and on the outer edges of outer cover and flooring boards.
- Otherwise, wanes are permitted on two edges of a piece, provided that:
  a) They contain no bark
  b) They face upward
  c) They do not exceed a diagonal measurement of 15 mm

Rot, foreign material, freezing

Fungal decay and rot (e.g., mildew, fungus, dry rot), foreign materials (e.g., leftover film, straps), and frost are not permitted.

Moisture content

Unless specified in the third-party order form, wood moisture on delivery **may not exceed 22%** of the weight of the dry wood.

The following specifications apply to testing:

- Moisture content of the cover boards must be measured at two diagonally opposite ends of the pallet, not exceeding 100 mm from the outer edges of the pallet.

- Moisture content of the flooring boards (skid boards) must be measured at two diagonally opposite ends of the pallet, not exceeding 100 mm from the outer edges of the pallet.

a) A Gann Hydromette 85 with drive-in electrode is the preferred tester. The electrode should be driven perpendicular into the surface of the board as described in the user manual for the tester.
b) The highest of the four measured values is the final value.

In cases of dispute, the measuring points and individual values should be documented.

8.2 Wood and wooden packaging in international trade (IPPC treatment)

In many primarily non-European countries, wooden materials must be treated to protect against the propagation of vermin. This pertains to all wooden packaging components. Only parts previously treated with heat or pressure, such as compressed wood blocks, are exempted. IPSM No. 15 serves as the primary basis for this requirement. As such, only the most important aspects will be referenced below.

Heat treatment (HT marking)

The wood must be exposed to a temperature of 56 °C for at least 30 minutes.

Methyl bromide treatment (MB marking)

The wood must be exposed to this gas for at least 24 hour according to a schedule.

8.2.1 Wooden material labelling

Each piece of loose wood that is not firmly attached to another piece of wood must be marked appropriately on two sides. The markings on squared timber must be easily visible and placed on two opposing sides.

The size is generally not specified, but must be easily visible.

- The IPPC symbol
- The code for country and state (e.g., for Baden-Württemberg: DE-BW)
- The two-digit country code (e.g., for Germany: 49)
- The four-digit authorised producer code
- The treatment code, e.g., HT or MB, with the suffix DB for bark-free wood

8.3 Pallet and wooden skid construction

8.3.1.1 Wooden materials to use

Only wooden materials meeting the requirements of this standard may be used to produce ballets and wooden skids.

The blocks used for the pallet may not be split or omitted.

Particle board pallet blocks

When particle board is used for pallet blocks to produce pallets and wooden skids, the requirements described in Section 8.4 must be met.

Number of fasteners

For each spacer block, at least two screw nails must be driven through both the cover board and stringer (top and bottom of the pallet).

Position of fasteners

- All fasteners must be driven in perpendicular to the surface of the pallet at a minimum of 20 mm from the edges of the boards. They must also be as far apart from one another as possible.
- Fasteners must be driven into the wood such that they do not protrude from the surface of the board nor are they recessed more than 3 mm.
- Fasteners that penetrate the top or bottom of wooden material must be clinched.
-

Fastener penetration in spacer blocks

When nailing into spacer blocks, all fasteners must penetrate at least 40 mm into the blocks.

Allowances

All functional dimensions are specifically indicated in the technical drawings with allowances.

Any dimensions in the third-party order form with no specified allowances have a maximum allowance of **±2 mm**. Board thickness may no longer be less than 1 mm.

However, 8.1, 8.2.1, and 8.2.2 of this standard apply to the outer dimensions of Euro pallets and exchangeable pallets.

Minimum load-bearing capacity

Unless otherwise stipulated or required, each pallet must withstand a load of at least 1,000 kg distributed anywhere on the surface of the pallet when stored on a shelf or when on a forklift.

8.4 Particle board pallet blocks

This standard describes the design of particle board pallet blocks that are common at Kärcher.

Given that the requirements under Section 8.4.1 have been met, particle board pallet blocks can be used **instead of** solid wood blocks. This ensures more economic production, compliance with recycling laws, and environmental protection.

Particle board pallet blocks under this standard are used at Kärcher for disposable pallets.

8.4.1 Particle board block design

Conditioned **recycled wood, urea resin**, and small quantities of **hardener** and **paraffin** are used. **These must meet the following requirements:**

- Chlorine-free in accordance with DIN 51 400
- CFC-free
- Formaldehyde emission in accordance with Emission Class E1 for particle board pallets
- Non-poisonous and groundwater-neutral
- Oil-, grease-, and dye-free
- Free of iron parts, e.g., no staples, nails, screws, or bolts, and other foreign objects, e.g. plastic, etc.

The glue used in the blocks must make them watertight and be heat-resistant as per DIN EN 312 and DIN EN 13 986:

- **Underwater swelling** at a temperature of 20 °C may not exceed an average (10 samples) of 6–7% over 24 hours.
- The **specific weight** must be at least 650 kg/m high 3, +/- 3%.
- **Nail extraction resistance** must be at least 5.5 kN when joining block to cross-board to cover board and when joining block to flooring board.

8.4.1.1 Sizes/cuts

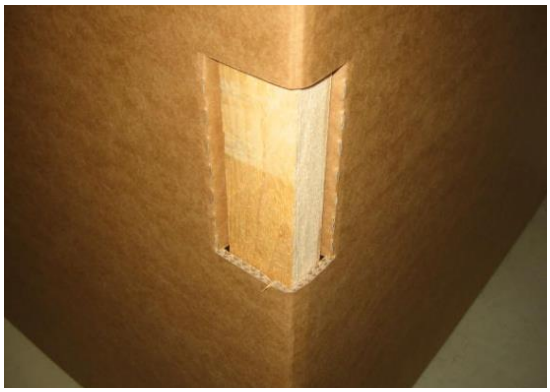
The number of sizes should be kept as low as possible. Two sizes have been established:

80 mm	x	80 mm	x	80 mm
100 mm	x	100 mm	x	80 mm

8.4.2 Stapling wood/wood with pallet boxes

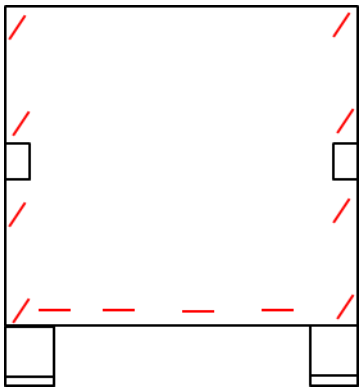
When adding a box to a pallet, make sure the box is touching the wood in all places. Only in this way the box can be joined with the pallet wood later.

If flaps are included on the corners for timber, they must be pressed inward so a piece of squared timber can be attached.



When stapling the box to the pallet, make sure the staples are placed horizontally in a manner that will keep the box on the pallet. The total number of staples (horizontal and vertical) is specified in the technical drawings.

Because of the direction of the flute the staples should be placed horizontally or inclined not totally vertical because they get between the flutes and totally perforate the box and not hold the box to the timber.



For the squared timber, place the staples vertically, with the bottom one down far enough to join the timber with the pallet.

9 Labelling

9.1 Label blanks

Label blanks are glued onto the printed folding boxes either by machine or by hand.

The label format is saved with the label blank.

Label blanks must be produced in the design, size, and quality stated on the current third-party order form for the label format.

9.2 Adhesive label

Printed adhesive labels consisting of a face and a liner.

Adhesive labels must be produced in the design, size, and quality stated on the current third-party order form.

9.3 Bar codes

The “Global Trade Item Number” (GTIN) is an identification number for uniquely identifying products and packages worldwide. In practice, the GTIN is often equated with the bar code in which the number is encoded. The GTIN is usually encoded in an EAN/UPC (ISO/IEC 15420), Code 128 (ISO/IEC 15417), or Interleaved 2 of 5 (ISO/IEC 16390) bar code.

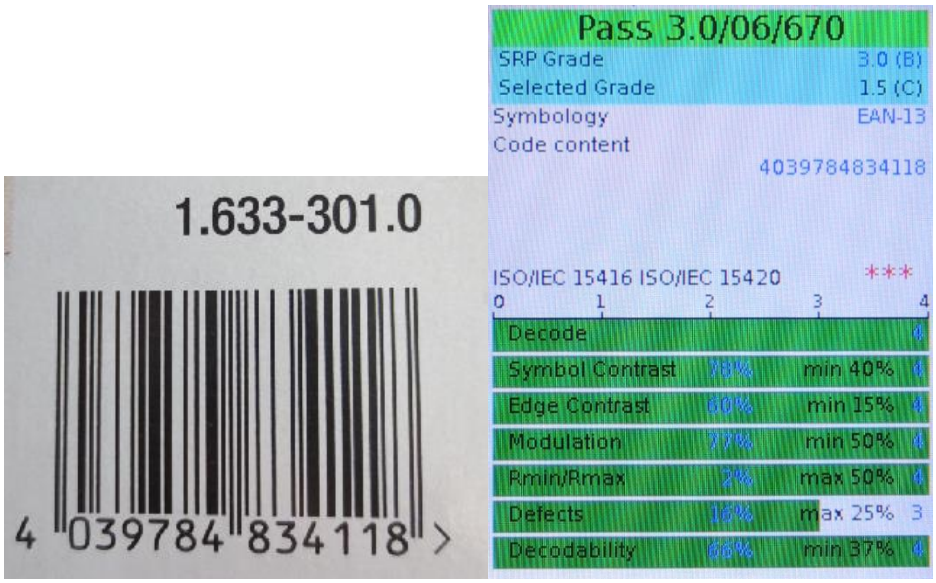
For more detailed information on these bar codes, see the GS1 specifications: http://www.gs1.org/

The bar codes used at Kärcher are inspected and approved in accordance with ISO/IEC 15416 and must meet Level 2 or B at minimum:

A (4) / 3.5 – 4.0	Very good (scans correctly on first pass)
B (3) / 2.5 – 3.49	Good (scans correctly on first pass, most commonly required)
C (2) / 1.5 – 2.49	Satisfactory (may require multiple scans)
D (1) / 0.5 – 1.49	Adequate (requires manual input when scanning fails)

Some brief explanations of the parameters of the standards:

PCS value:	Background colour minus bar colour divided by background colour.
Symbol contrast:	Brightest point of the background minus the darkest point of the bars.
Edge contrast:	How straight are the bars printed?
Modulation:	The ratio of symbol contrast to edge contrast (evenness of the code).
Defects:	Flaws in the space between bars or colour gaps in the bars.
Decoding:	General problems, such as a bright field that is too narrow, incorrect check digit, symbol that is too small, or other errors.
Decodability:	The degree of printing accuracy (metric deviations).



Example of a GTIN-13 with analysis.

10 Packaging tests

10.1 Drop test

Drop tests are performed according to the following guidelines based on the defined requirement for the shipping type, as well as the weight of the product plus packaging.

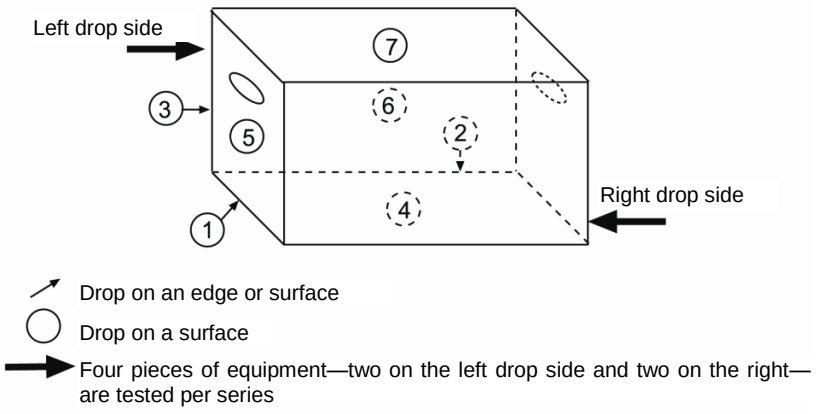
Product weight	(Formerly KN 053.024)	
	pallet dispatch	**single dispatch**
< 10kg	7 droppings from 40 cm height	7 droppings 80 cm height
< 20kg	7 droppings from 30 cm height	7 droppings from 60 cm height
< 30kg	7 droppings from 20 cm height	7 droppings from 50 cm height
> 30kg	6 bounces on a vertical level (inclined plane) at room temperature	6 bounces on a vertical level (inclined plane) at room temperature
80 - 200kg	Ring dispatch min. 2 loaded pallets depending on distance e.g. OSO - CEM	
> 200kg	Ring dispatch min. 2 loaded pallets depending on distance e.g. OSO - CEM	

See FEFCO Testing Method No. 51 for how to perform and log the test, whereby the number of surfaces and the names of each surface under this standard deviate from the FEFCO specifications.

http://www.fefco.org/technical-documents/fefco-testing-methods-recommendations

Names/order

1. Lower front horizontal edge
2. Lower side horizontal edge
3. Vertical side edge
4. Bottom
5. Front
6. Side
7. Top



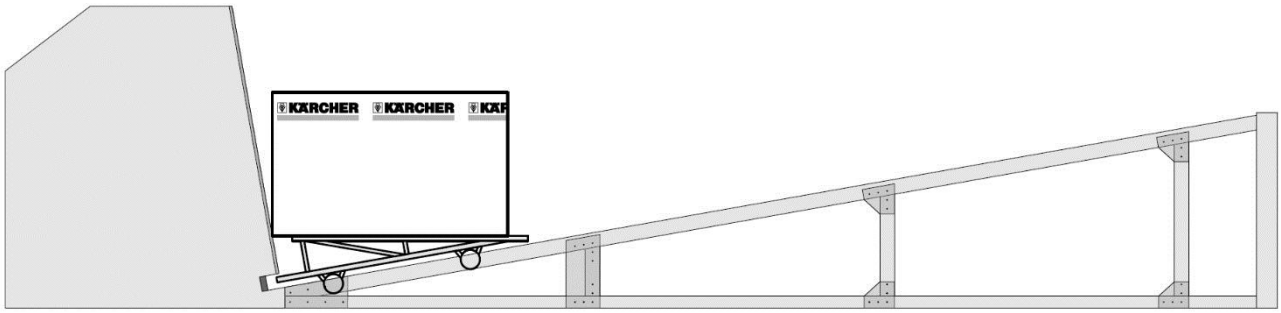
Drop side markings per Kärcher standard.

10.2 Incline:

See FEFCO Testing Method No. 53

http://www.fefco.org/technical-documents/fefco-testing-methods-recommendations

Equipment, including packaging and accessories, weighing over 30 kg is subjected to testing on an incline.



Test layout for an incline.

Weight (kg)	30	40	50	60	70	80	90	100	110	120	130	140	150
Distance (m)	4.0	3.7	3.4	3	2.7	2.4	2.1	1.8	1.5	1.2	0.9	0.6	0.3

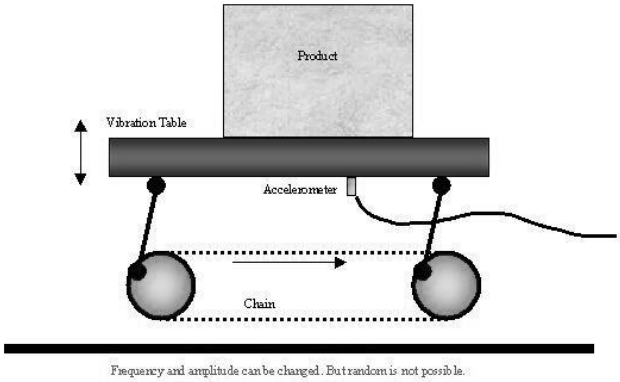
Defined distances for testing on an incline by weight.

10.3 Vibration test

This method describes the testing apparatus and method used to determine the ability of a single or a stack of filled, corrugated fibreboard boxes, with or without weight placed on them, to withstand vibrations within the specified range.

See FEFCO Testing Method No. 52

http://www.fefco.org/technical-documents/fefco-testing-methods-recommendations



10.4 Determination of grammage of corrugated fibreboard paper components

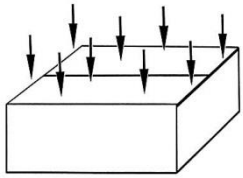
See FEFCO Testing Method No. 10

http://www.fefco.org/technical-documents/fefco-testing-methods-recommendations

Other applicable documents

- FEFCO Testing Method No. 1: Sampling.
- EN 20187: Paper, board and pulps: standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples.
- EN ISO 536: Paper and board – determination of grammage.
- FEFCO Testing Method No. 6: Determination of flat crush resistance of corrugated fibreboard.

10.5 Box compression test (BCT)



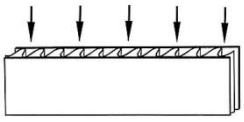
See FEFCO Testing Method No. 50

http://www.fefco.org/technical-documents/fefco-testing-methods-recommendations

Other applicable documents

- FEFCO Testing Method No. 1: Sampling
- EN 20 187: Paper, board and pulps: standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples
- EN 22 206: Packaging; complete, filled transport packages; identification of parts when testing
- EN 22 233: Packaging; complete, filled transport packages

10.6 Edge crush test (ECT)



See FEFCO Testing Method No. 8

http://www.fefco.org/technical-documents/fefco-testing-methods-recommendations

Other applicable documents

- FEFCO Testing Method No. 1: Sampling.
- EN 20187: Paper, board and pulps: standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples.

10.7 Determination of water absorption of corrugated fibreboard (Cobb test)

See FEFCO Testing Method No. 7

http://www.fefco.org/technical-documents/fefco-testing-methods-recommendations

Other applicable documents

- FEFCO Testing Method No. 1: Sampling.
- EN 20187: Paper, board and pulps: standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples.
- EN 20 535: Paper and board – water absorption – Cobb method

There are various Cobb tests whose test times vary:

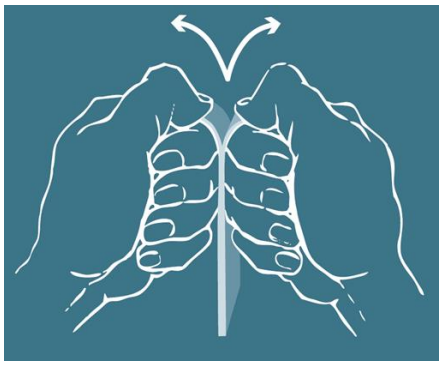
Recommended test time in sec	Symbol	Dwell time in sec (in container)	Blotting after sec (total time)
30	$Cobb_{30}$	20 ± 1	30 ± 1
60	$Cobb_{60}$	45 ± 1	60 ± 2
120	$Cobb_{120}$	105 ± 1	120 ± 2
300	$Cobb_{300}$	285 ± 1	300 ± 2
1,800	$Cobb_{1800}$	1,755–1,815	15 ± 2 after dwell time

10.8 Glue lap assessment

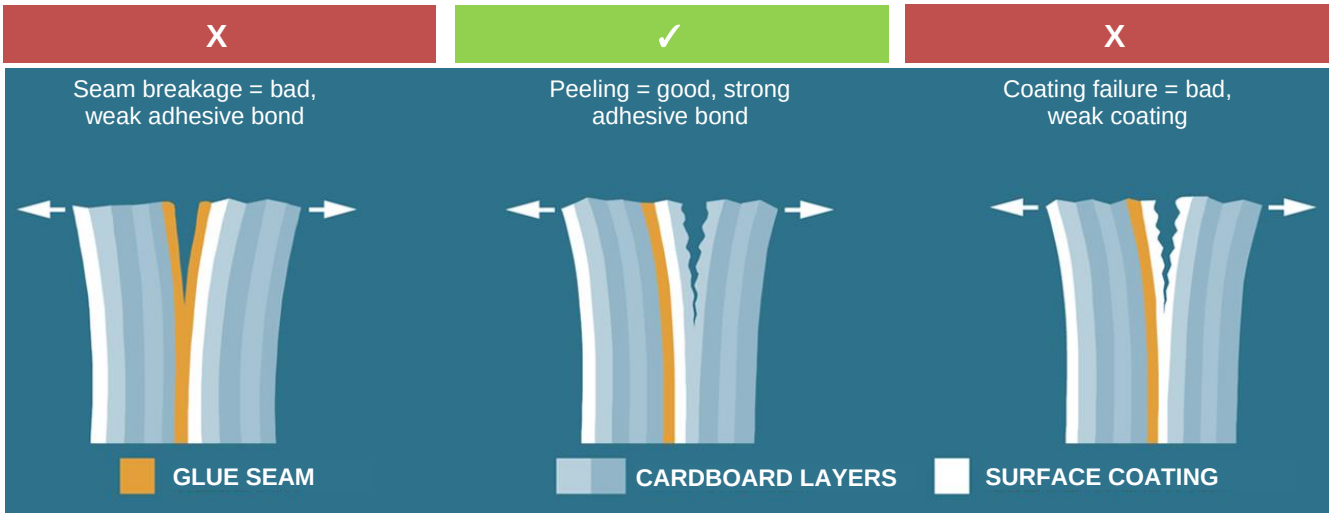
To quickly assess the glue lap, tearing the box open manually but in a specific manner is a common method.

Test strips 20 mm wide are placed perpendicular to the glue seam.

The ends of the strips are held between the thumb and index finger, and the glue seam is pulled apart very slowly.



The result can then be assessed using the following diagram:



Glue lap test assessment

Even if the cardboard is not damaged, the glue seam can fail during transport or at below-freezing temperatures.

If there is peeling, it is assumed that the glue seam met its requirements. There is a favourable balance between the strength of the glue seam and the inner strength of the cardboard. The strongest part of the adhesive bond is the adhesive itself and its bond to the cardboard.

Left – good glue seam, peeling occurs. Right – bad glue seam, no peeling occurs.

Critical factors for a good glue seam:

- Cardboard properties: High elongation at break levels of outer layers, surface absorbency
- Amount of adhesive
- Adhesive properties
- Open time, pressure and press-down time
- Pressure and temperature

Problems and causes:

Problem	Cause
Brittle glue seam	• Insufficient adhesive • Insufficient press-down time
Glue seam fails (adhesive only on one mating surface)	• Insufficient pressure • Insufficient adhesive • Application temperature too low (hot glue) • Excessive open time
Glue seam fails (adhesive on both mating surfaces)	• Excessive adhesive • Insufficient press-down time • Application temperature too high (hot glue) • Insufficient open time
Boxes stick together after edge seams glued	• Excessive adhesive (extrudes out of edge seam) • Warped glue seam • Glue line too close to edge of box

Tape assessment

Monta practical cardboard testing:

This test should also provide practical results regarding durable box closure in addition to the “theoretical” standard tests.

Under specified conditions, tape is placed on boxes (plot templates and folding boxes for sale) that are subjected to tension. To build tension, cardboard tubes 2–3 mm taller than the boxes are placed in the corners, and then the boxes are closed. This back-pressure supports the restoring force of the box flaps. The box is then closed with tape. According to the test specifications, the side lengths on the front are 5 cm.

The date, time, and type of tape should be labelled on the box.

The closed box should sit in the climate-controlled room for 48 hours at 40 °C with 60% relative humidity.

The test is successful if the box is still closed after 48 hours and the tape has not come off.

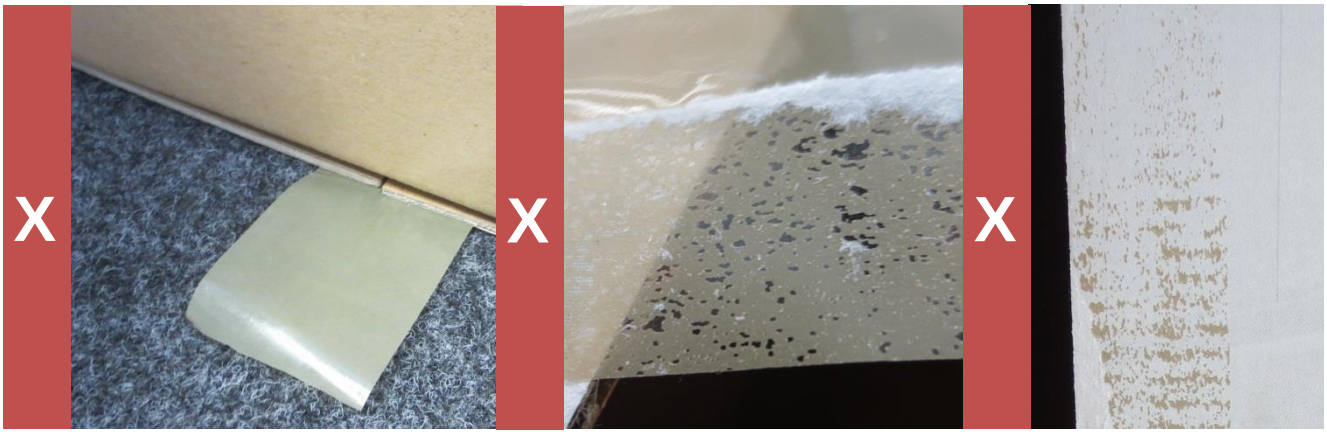
It is the combination of heat and moisture that challenges tape. The moisture diffuses into the box, working from both the outside and the inside.

The temperature and the overfilling place great strain on a secure and durable box closure.

Protruding cardboard tube in packaging undergoing testing.

Closed box, tension caused by cardboard tubes.

Examples of good tape peeling results (tape takes some of the fibre material with it)



Examples of poor tape characteristics (left: insufficient adhesion, tape comes off without peeling fibre; centre and right: adhesive residue on the box after removing the tape)

Adhesive strength on standard test plates (Afera Testing Method 4001):

Determines adhesive strength, the force necessary to remove a piece of tape from a standard test plate in a specific direction at a defined angle, a defined speed, and with defined pressure.

Testing and implementation:

Cut the tape specimens to 400 mm in length and 25 mm in width. Apply the specimens to a 200 mm long, 50 mm wide, stainless steel plate (2 mm thick) with a 2 kg metal roller.

Pull approximately 25 mm of tape from the prepared steel plate. Secure the steel plate in the tester clamp, then secure the loose end of the tape in the other clamp.

Now remove the tape at a defined speed or 300 ± 30 mm/min.

The test produces a result using the adhesive strength in N and the specimen width of 25 mm: N/25 mm.

The following is required for the test:

- The stainless steel plate must be clean
- The stainless steel plate must be cleaned with a solvent before and after each use
- The room must have a specific climate
- Three turns worth of tape must be removed from the roll before specimens are taken.

10.9 Primary packaging exterior assessment

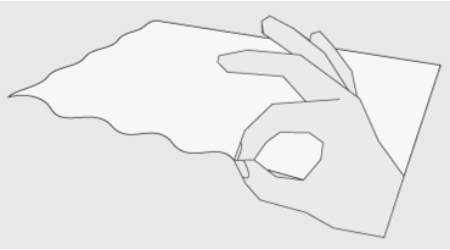
10.9.1 Grain

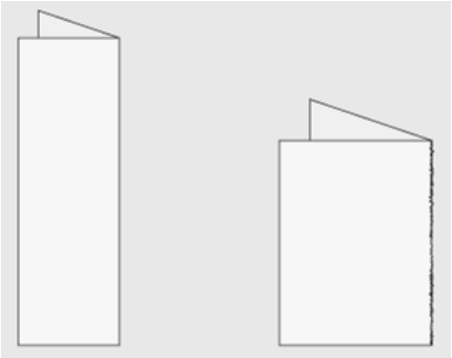
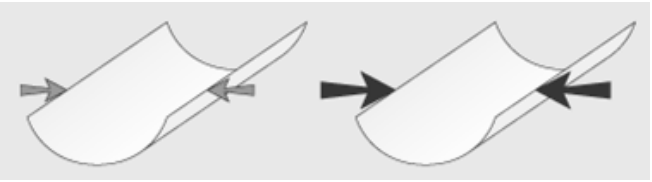
These tests are necessary when the exterior appears uneven and wavy

Causes may be:

- Base material is too thin, or
- Fibre is not perpendicular to the flute (crossed).

Available tests:

Tear test Tear the paper on the short and long sides. -> Smooth tearing with the paper grain, frayed, uneven tearing across the grain.	
Moisture test Dampen both edges of a sheet of paper. -> The grain is the direction in which the paper is less wavy.	
Fingernail test Scrape both edges of the sheet of paper with fingernails. -> Paper curls differently, the grain is parallel to the less wavy side.	

Fold test Fold a sheet of paper lengthwise and crosswise. A smooth fold (with the grain) and rough fold (across the grain)	
Strip test Cut two identical strips, one from the long side, one from the short side of the sheet. Label the strips and hold them next to each other horizontally. -> The strip with the grain parallel to the long side bends less. This test is not suitable for thick fibre (cardboard, paperboard) and very thin paper.	
Bend test Very suitable for cardboard and paperboard. Cut the sheet into a square. Now bend in both directions. -> Bending with the grain gives less resistance. Bending across the grain gives noticeably more resistance.	

10.9.2 Whiteness

ISO 11475:2004 specifies the procedure to be used for determining the whiteness of papers and boards. The values obtained correspond to the visual appearance of white papers and boards with or without fluorescent whitening agents when they are viewed under the CIE D65 daylight illuminant. It is based on reflectance data obtained over the full visible spectral range (VIS) in contrast to the measurement of ISO brightness which is limited to the blue region of VIS.

In addition, it specifies a method for adjustment of the UV-content to correspond to the D65 daylight illuminant , insofar as results obtained when fluorescent whitening agents are present are dependent upon the UV-content of the radiation falling upon the sample. It is specific for the measurement of fluorescence in the blue region of the spectrum.

The papers used for printed packaging's should have at least a CIE whiteness of 100.

White surface that is not too cloudy or too grey.

X

Cloudy depiction of the print motif. This is caused by insufficient pressure between the rubber blanket and the print sheet during offset.

✓

X

11 Primary packaging print quality

The print quality of bar codes is described in Section 8.4

The defined print quality for each SKU packaging could be found in the specification.

The printed quality is checked by visual inspection. This inspection includes all printed sides of the folding box. The first part of the inspection is determining whether or not the print as a whole matches the print template. Then the actual quality of the print is inspected against reference specimens. These include:

- Squeezed edges
- Offset image
- Smearing or blurry areas
- Incomplete areas
- Colour variations

For multi-colour boxes, the colours are inspected for noticeable variations from the reference specimen or colour chart.

During pre-print, the first approved print is the authoritative reference specimen.

Figure 3: Example on left is good, example of right exhibits major colour variation (magenta).

11.1.1.1 Direct flexo printing

No washboard effect in the grid, no blank spots on full-surface prints, no overly squeezed edges of lettering or lines

Figure 4: Washboard effect in post-printing and smearing. Right [7] Smearing or chalking after ink is dry due to inadequate smudge resistance. May result in blurry print results.

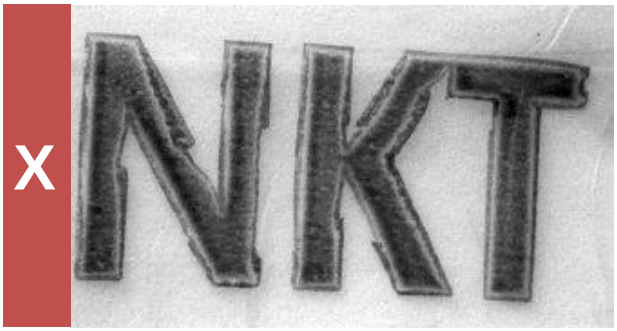
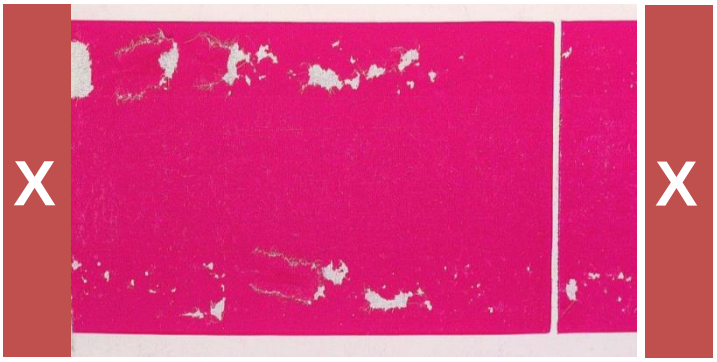


Figure 5: Overly squeezed edges caused by flexo printing. [8]

Figure 6: Inaccurate registration, here during offset (yellow exhibits large variation). [9] May result in blurry print results when all colours vary slightly.

Figure 7: Bubbling due to a sheet that is too damp. [10]



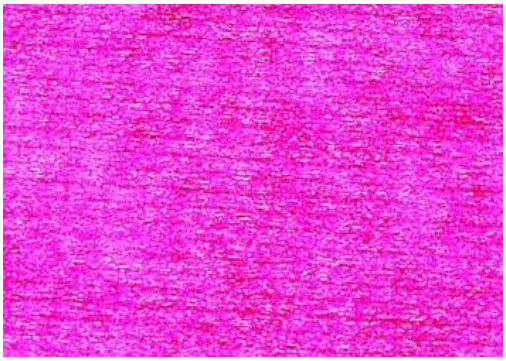


Figure 8: Incomplete print (picking on left [11], cloudy on right [12] due to, e.g., paper texture, lack of tension on the printing blanket, worn printing blanket, etc.)

11.1.2 Grid count

Measuring the grid size of a printed image helps determine print quality. It is measured with a grid counter. The higher the number on the grid counter, the more dots the printed image has per centimetre, and the higher the print quality.

The grid (lines/cm) should fall between the following points for the following printing types:

Flexo printing:	48 – 54 lines/cm
Offset printing:	60 – 70 lines/cm
Direct flexo printing:	24 – 48 lines/cm

A stencil can be used to inspect the grid. The stencil should be placed over a suitable location with a lot of printed content. Ideally, this would be a four-colour image on a grey background.

The stencil is then slowly rotated until a secondary pattern (moiré pattern) emerges.

The example below shows a moiré pattern with approximately 50 lines/cm.

11.2 Lacquer quality

The quality of the lacquer is also subjected primarily to a visual inspection.

This inspection includes the completeness of the gloss. The lacquer must be applied to the printed image evenly and completely, with no unevenness. The lacquer also may not visually distort the colour rendering of the printed image.

Examples of cracking (UV lacquer) near a crushed crease:

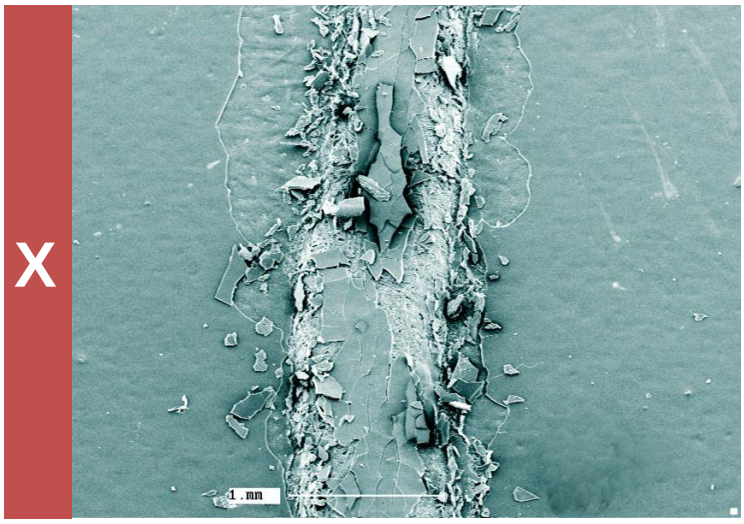


Figure 9: Coat cracking and UV lacquer peeling (SEM micrograph). [13]

A lacquer that is too yellow or milky will impact the print result (see figure at right):

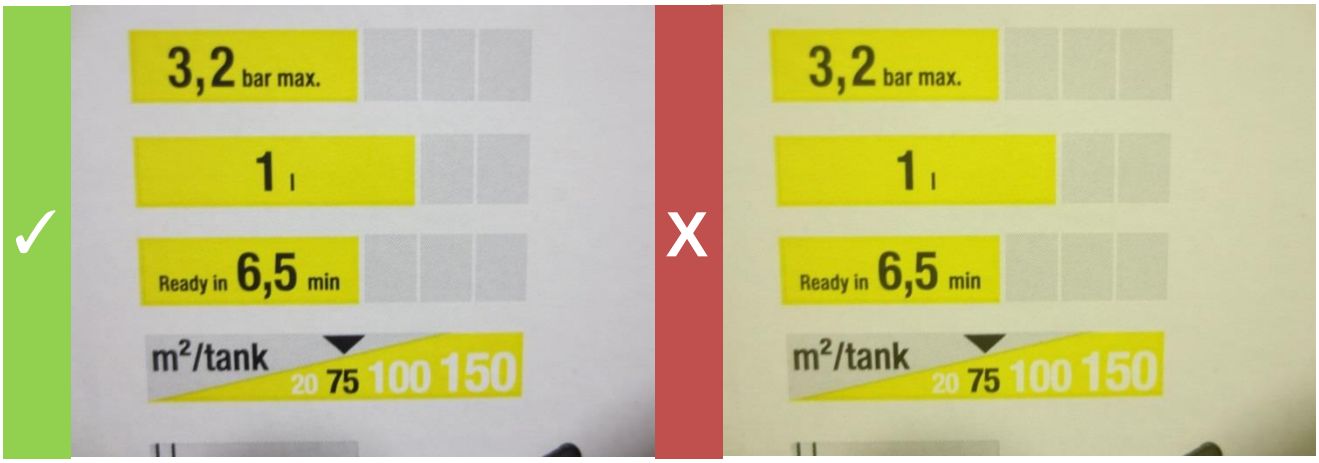


Figure 10: Lacquer that is too yellow at right.

The adhesion of the lacquer is then tested by rubbing a specimen of the same material over an appropriate area (of the printed image). The printed image should not smear or peel:

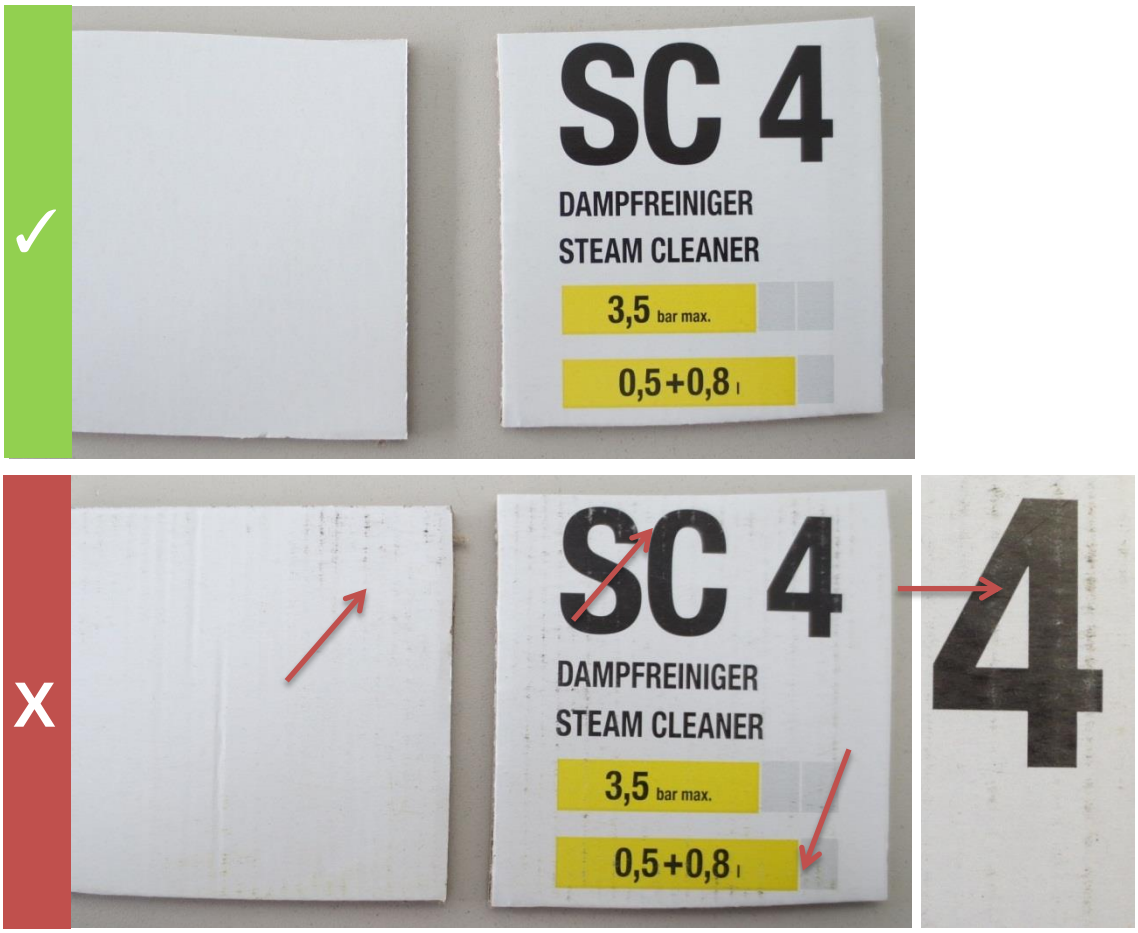


Figure 11: Top: good example of a passed rub test. Bottom: failed rub test, parts of the printed image have rubbed off, and smearing and dark spots have occurred.

A pull-off test can also be performed with tape

A pull-off test checks the anchoring of the ink or lacquer on the substrate.

This test can be performed using, e.g., a piece of tape (called a tape test).

A piece of tape is placed on the printed substrate with a specific pressure, then pulled off using constant force.

A visual inspection of the residue on the adhesive side of the tape indicates the adhesive strength of the ink layer.

The adhesive strength of the tape is critical for this test and its informative value. This is why the pull-off force must be monitored during testing.

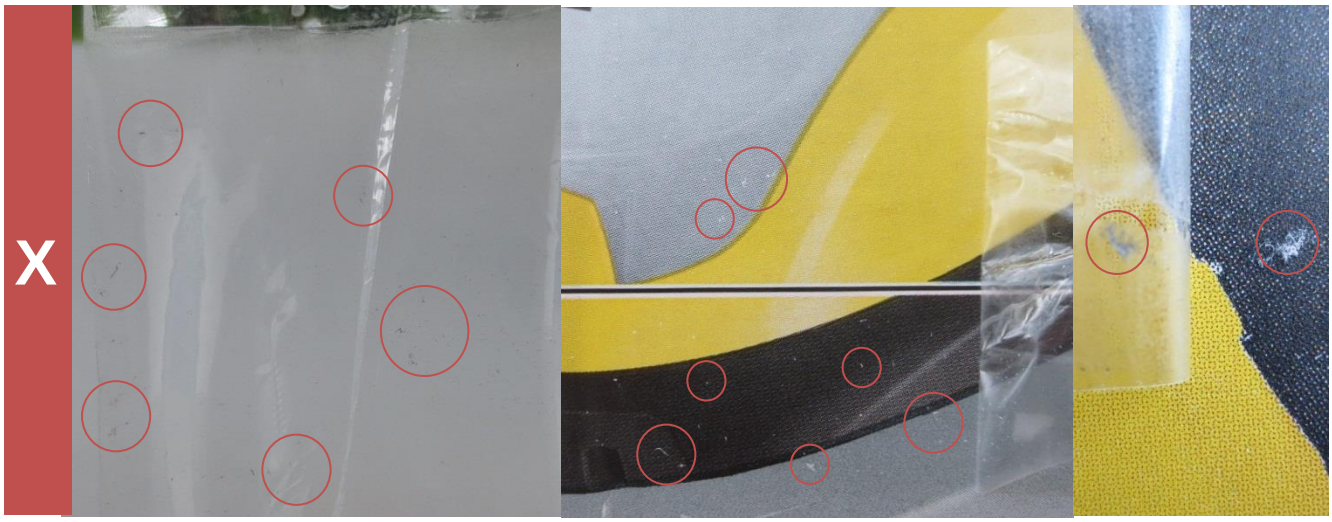


Figure 12: Left: tape with slight ink transfer; centre: printed object with ink removed in spots -> slight streaks are visible; right: slight fibre separation, also slight streaks.

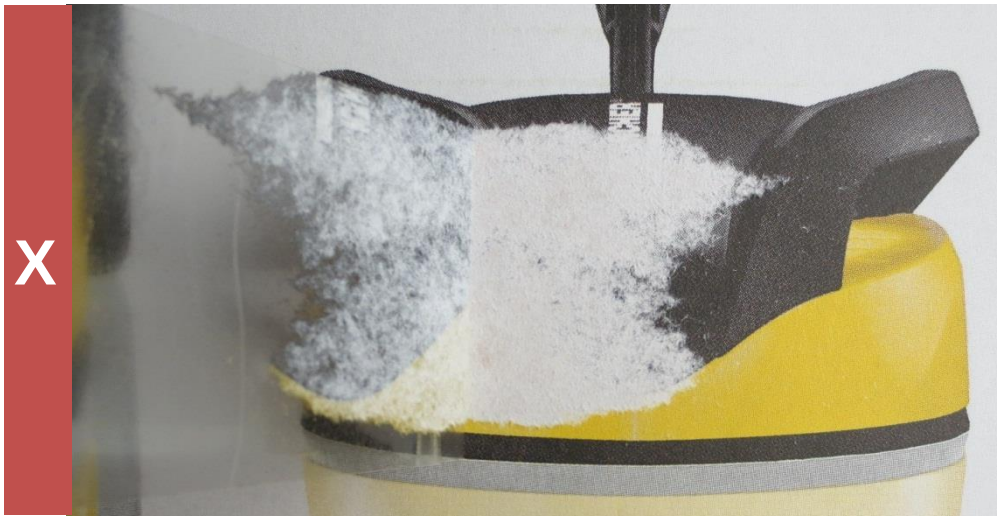


Figure 13: Individual fibres or an entire area can separate if the adhesive strength of the tape is greater than the strength between the fibres. The printed image has separated due to the fibre surface detaching.

13 Pallets

Other applicable documents

- DIN 15147
- UIC 435-2
- UIC 435-4
- Kärcher standard KN 050.006
- Exchange criteria in the European pallet pool
- CHEP specifications (Standard B1208A/B1210A), technical guidelines, statement of conformity)
- ISPM No. 1

13.1 Euro pallets

The quality of the Euro pallet must meet EPAL standards (www.epal-pallets.org), including standard UIC 435-2. Only Class A and B pallets under UIC 435-2 will be accepted.

Repaired Euro pallets must be repaired professionally and meet EPAL standards and quality standard UIC 435-4.

13.2 Special pallets

All plywood pallets are permitted when they meet the design and construction of a Euro pallet and/or a CHEP pallet with the appropriate flooring and cover boards.

The following technical specifications must also be met:

- Load capacity
- Durability
- Water absorption
- Transport accessibility

Figure 14: Plywood pallet and sample pallets.

Please see the corresponding technical documents for each product for binding geometric specifications.

Cardboard pallets are also permitted when they are approved by the Packaging Development Module Centre (packaging@de.kaercher.com) in terms of load-bearing capacity, even when wet.

Pallets made solely of compressed wood, known as MDF pallets (e.g., INKA pallets), or similar pallets without flooring boards are not permitted.

X

Special pallets that are not permitted

13.3 Slip sheets

For loading containers without pallets for overseas transport to USA, Brazil, etc.

Material and quality

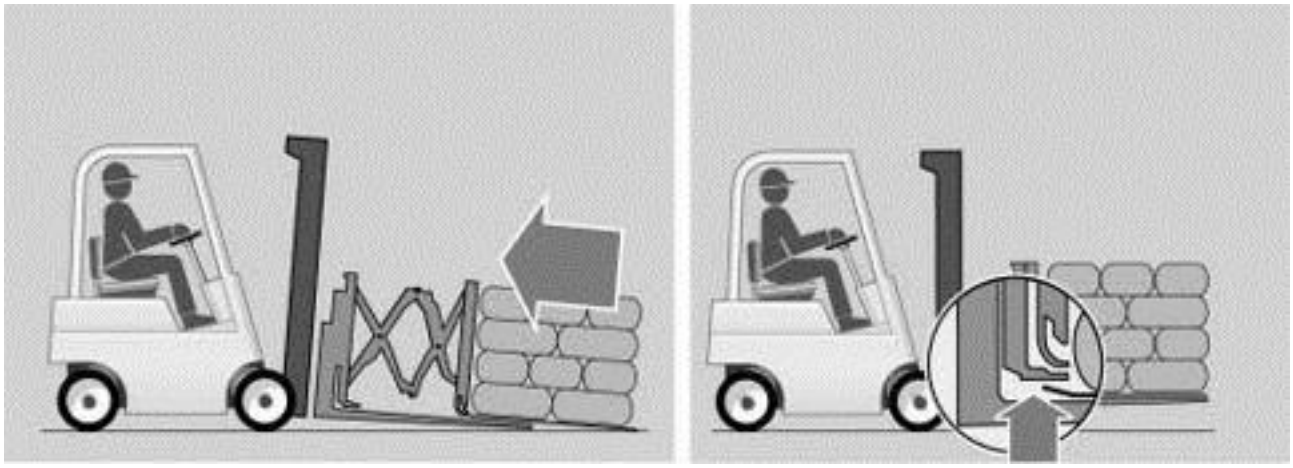
Plastic (0.8 mm HDPE) or solid cardboard (e.g., kraftliner), rarely also corrugated fibreboard.

Dimensions

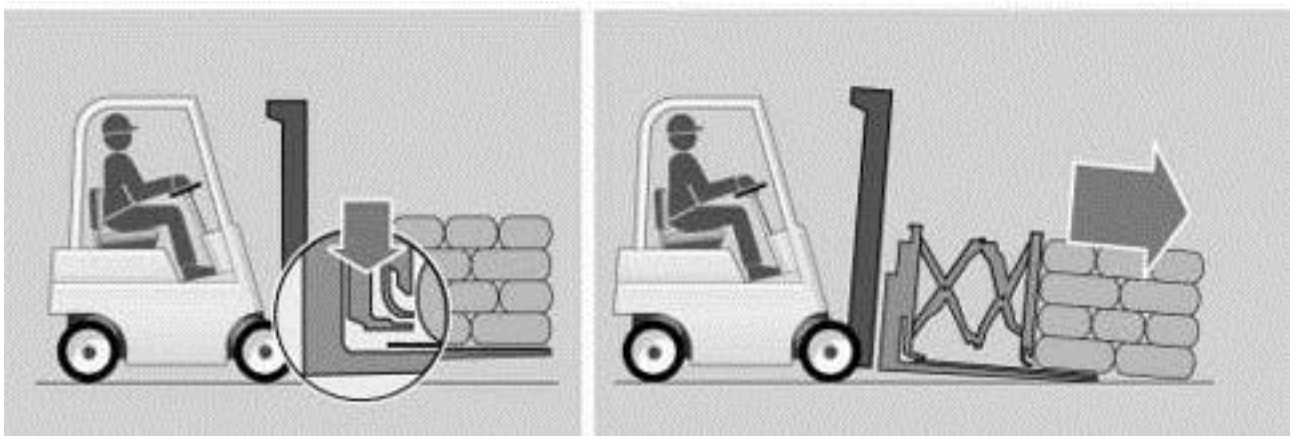
- 1,200 x 1,000
- 1,200 x 800
- 1,200 x 770

Procedure

Loading a slip-sheet on a forklift:



Unloading a slip-sheet off a forklift:



14 Shipping unit

Unless otherwise specified, delivery must be on Euro pallets.

These Euro pallets must be at least Class A or B under Euro pallet qualification. Pallet height including pallet may not exceed 1,180 mm for accessories and spare parts.

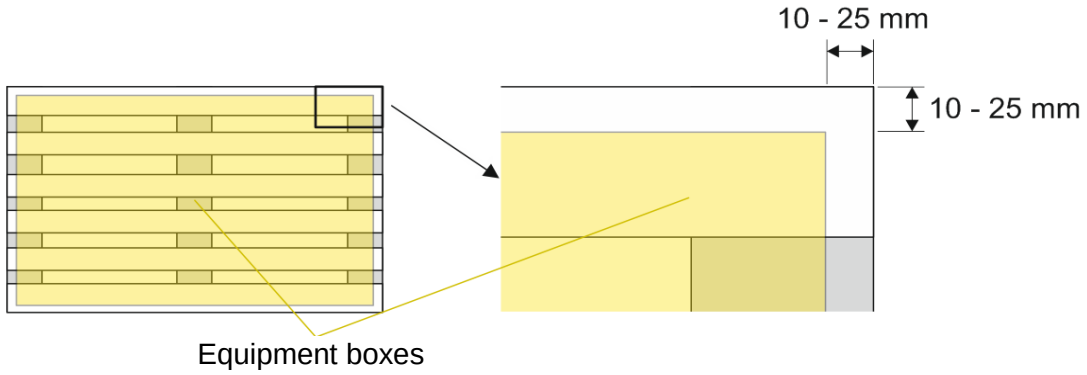
For equipment, the pallet height for delivery must be from 1,300 mm or from 2,600 mm. Unless otherwise specified, the pallets must be stackable to this lorry height at minimum.

The following stacking factors are specified for delivery:

Pallet height	Lorry stack	Storage
< 1,300 mm	2 x stack	4 x stack
> 1,300 and < 1,800 mm	1 x stack	4 x stack
> 1,800 mm	1 x stack	2 x stack

14.1 Package distance from pallet edge

Equipment boxes must remain 10–25 mm from the edges of the pallet.



14.2 Palletisation plan

Vertical stacking is the ideal pallet loading approach since the individual packages offer the highest load-bearing capacity in this configuration.

If more efficient due to the specific dimensions of the box, interlocked stacking should be used. However, note that the load-bearing capacity of each box must be increased.

On the other hand, layers may be rotated to prevent the stack from falling over, which may be lopsided due to packages whose contents are too light or have an offset centre of gravity. Since this effect can even be multiplied when wrapping the pallet, layers must be rotated where possible, or an intermediate layer even added between products to keep the stack stable.

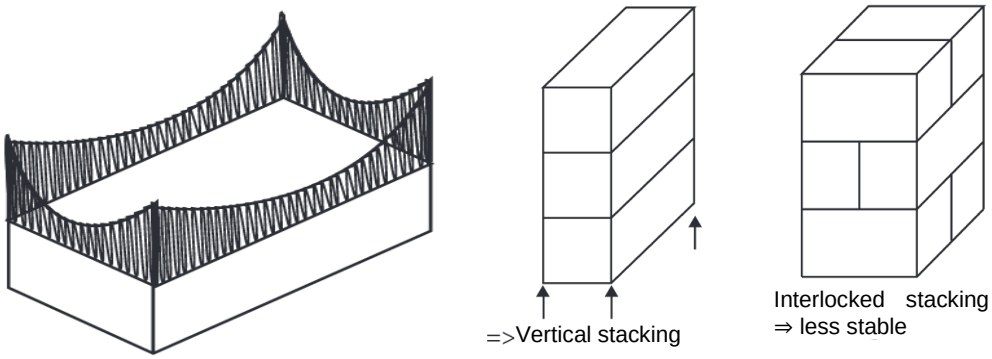


Illustration of the moments of inertia of a folding box and the stacking patterns "vertical stacking" and "interlocked stacking".

14.2.1.1 Pallet dunnage

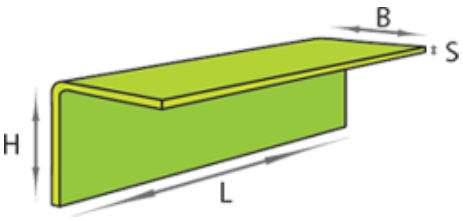
Pallet dunnage is needed when there are gaps between packages on the pallet or if the distance of the packages from the edges of the pallet is too great, i.e., the measurement in **Fehler! Verweisquelle konnte nicht gefunden werden.** (max. 25 mm) cannot be maintained and the distance is greater.

The height of the pallet dunnage should be 30–50 mm below the top edge of the stack. The design and material used for pallet dunnage are specified in the technical drawings and bills of materials in SAP.

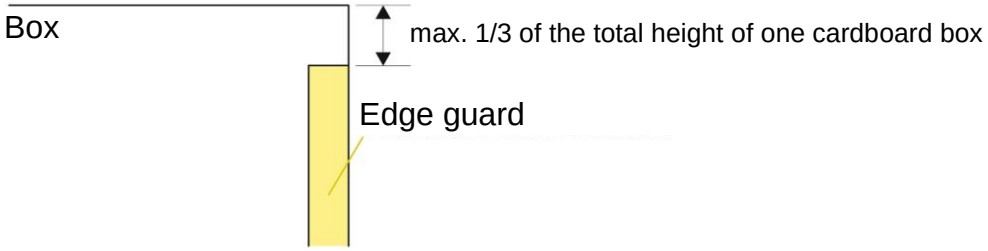
Palletisation should always strive to eliminate the need for pallet dunnage.

14.2.2 Edge protection

An edge guard should keep the stacked boxes flush with each other at the corners to ensure the greatest load-bearing capacity of the boxes. It also acts as a stabiliser during wrapping.



Edge guards should always be 20–30 mm shorter than the stack. This should reliably prevent the edge guards from protruding above the stack.



Edge guards should meet the following minimum requirements:

Description	Unit	Target	Tolerance
Side width (W & H)	mm	58.0	±3
Side thickness (D)	mm	2.75	±0.2
Angle (∠ HW)	degrees	88	±6
Pressure	N		approx. 1,400
Compression	N		approx. 2,900
Cut length	> 500 mm		±5 mm
	> 500 mm / > 2,500 mm		±10 mm
	> 2,500 mm		±20 mm

Desired condition of edge guards on delivery

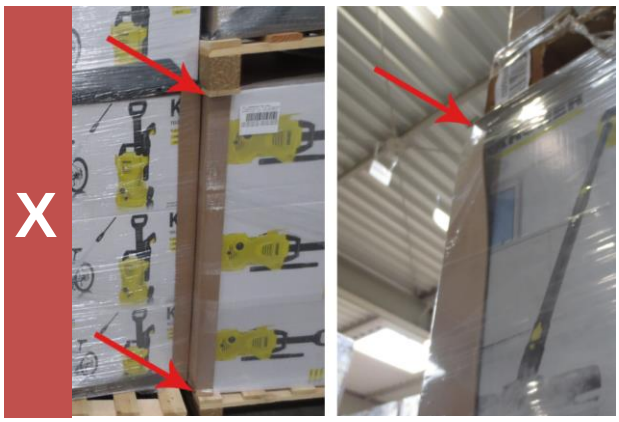
Edge guards OK. Desired condition of edge guards.

The following deviations will not be accepted:

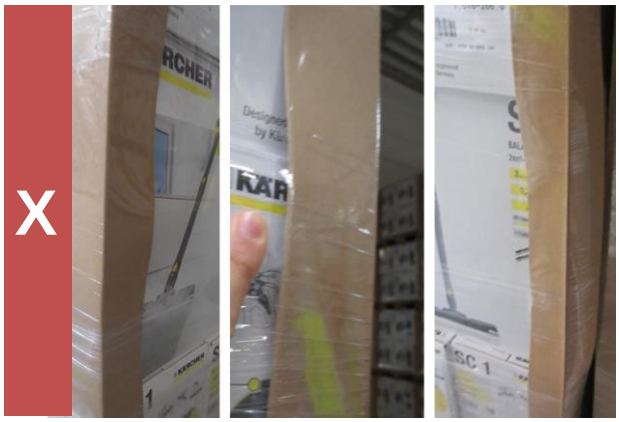
- Corrugated fibreboard used for edge guards
- Edge guards bearing load → compressed
- Deviation in quality/deviation in stability or durability
- Edge guards doubled
- Edge guards out of position

Examples of deviations on delivery that are not accepted

No corrugated fibreboard used for edge guards.



Edge guard bearing load. Result: compressed.



Edge guard taped to package. Reason: interlocked stacking.

Edge guards doubled.

Edge guards out of position.

14.2.3 Corrugated fibreboard blanks

Corrugated fibreboard blanks are used to keep dirt and moisture from the pallet off of the equipment boxes.

The size and material (e.g., chipboard, plastic-covered corrugated fibreboard) are specified in the technical drawings and in SAP, and can be found there.

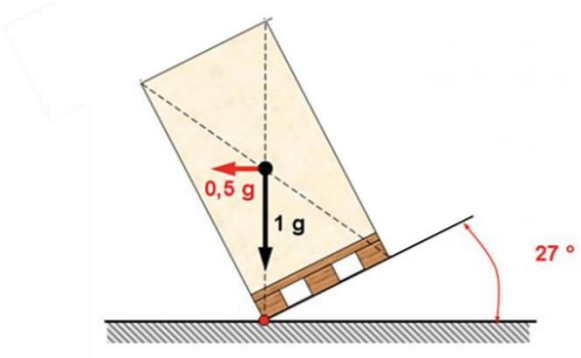
DE15 and DE01 no longer have pallet-sized blanks. The following table shows the blank and its dimensions for each pallet size:

Pallet	Blank	Dimensions
1,200 x 800 mm	6.590-775.0	1,160 x 760 mm
1,200 x 1,000 mm	6.590-238.0	1,140 x 965 mm

14.3 Wrapping

In general, the specifications under the DEKRA tipping test apply for the approval and inspection of the wrapping and the resulting loading unit. Once wrapped, the loading unit must be tilted to an angle of 27° and may not shift for 30 seconds. Only then is the wrapping approved.

When stretch film is used, it must be applied in transparent manner so the labels underneath can still be scanned by machine.



14.3.1 General

Wrapping should keep the product stable on the pallet during transport and storage.

The tipping test described above is authoritative for the approval and correctness of the wrapping.

Due to the various films and the wide range of wrapping machines in use, the following figures describe elements of wrapping that:

1. Are mandatory, or
2. Are only recommendations

Other applicable documents: **VDI 3968-5**

14.3.2 Stretchin of the wrapping film

In order to achieve the maximum strength of the film, the stretch film has to be set under pretension when attaching to the packaged items. This means for us that by machine load securing the bias parameters must be set correctly therefore see the manufacturer's instructions. Is the load manually secured the film has to be under tension from the beginning.

In the stretch machine following parameters to adjust:

> Turntable speed

> Winding style

> Film tension

14.3.3 Mandatory elements

For manual and semi-automatic wrapping, the start of the film must be placed between the load carrier and the first layer, and **never** tied to the pallet.

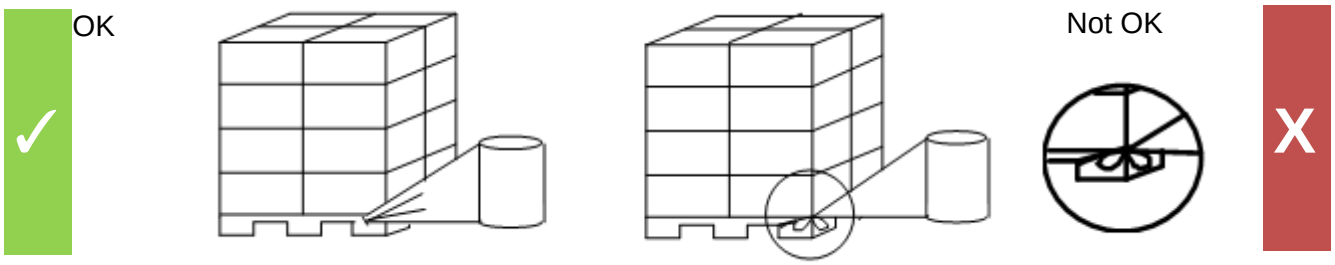
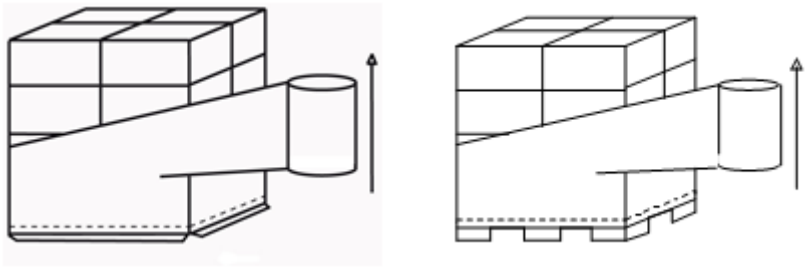


Figure 15: Attaching the start of the film.

At least 33% of the height of the load carrier (pallet) must also be wrapped.

The film is wrapped around the pallet from bottom to top, overlapping the previous pass by 30%.



The load must be wrapped with at least 3 top layers. The top layers should protrude by approximately ⅓ of the width of the film, as shown in Figure 16.

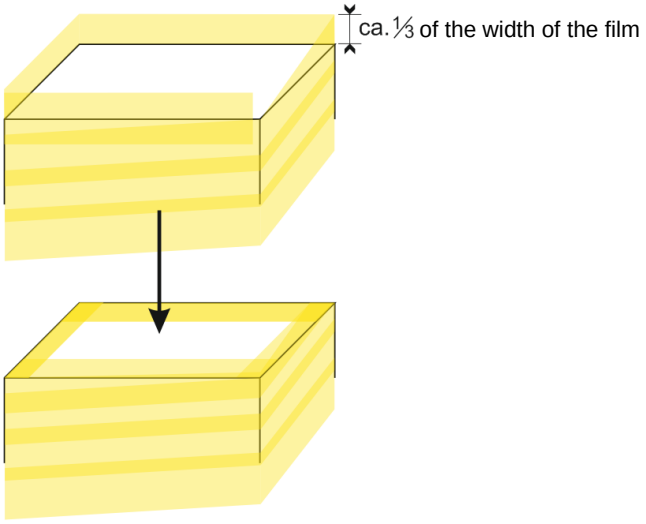


Figure 16: Film overlap of top layers.

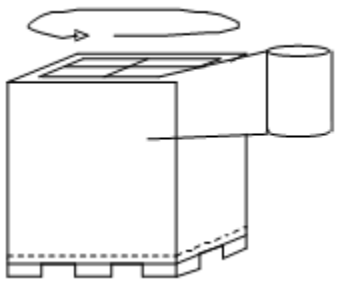
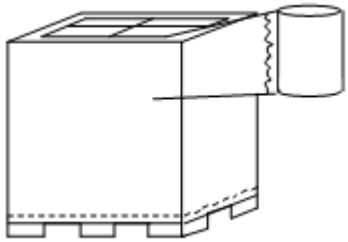
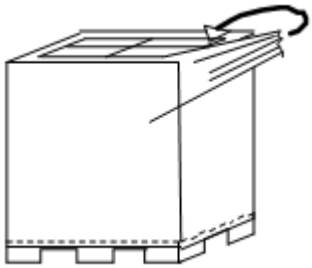


Figure 17: Top layers.

Tear off the film at the top of the pallet.

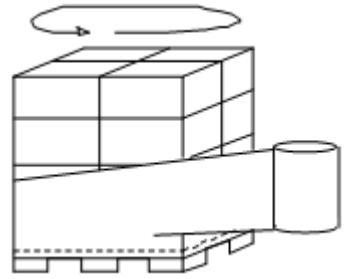


Gather the end of the stretch film, tuck it under the edge of the film at the top of the pallet, and press it down, securing with tape as needed.



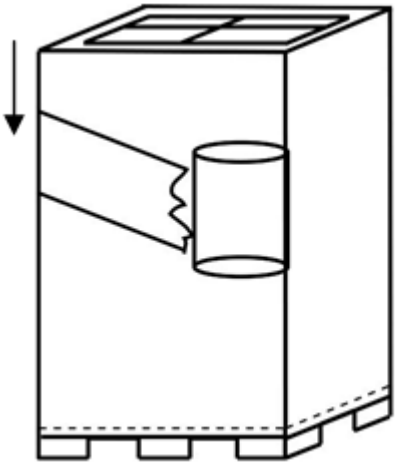
14.3.1 Recommended elements

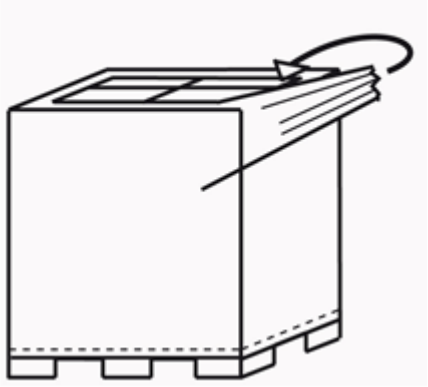
Wrap the loading unit halfway up with 7 base layers.



Either:

- Take the film back down, tearing it off and spreading the end smoothly against the side of the load. The end of the film should then be stretched downward once more and torn off at approximately ½ of the width of the film below the top of the pallet (Figure 96). For tall pallets (> 1.8 m), the film can be stretched downward enough to where it can simply be spread on by hand.
- Or gather the end of the stretch film, tuck it under the edge of the film at the top of the pallet, and press it down, securing with tape as needed.





15 Other applicable standards and specifications

15.1 General specifications

Kärcher's General Terms of Purchase and the packaging specifications set forth here shall apply. Special specifications for our German logistics warehouses are also noted (in italics).

In many cases, other specifications arise due to packaging specifications for individual parts. In the event of any discrepancies with these delivery specifications, the individual packaging specification shall take precedence. This may also deviate from the following in individual aspects.

Compliance with specifications is checked for every delivery. Failure to comply will result in a bill sent to you for any reworking costs or in the product(s) being returned to you at your expense.

Adequate packaging that is appropriate for the product(s) and safe for transport must be chosen for all modes of shipment. The sender shall ship the goods in a manner that protects them from total or partial loss, and from damage, and in a manner that prevents injury, or damage to property or other goods.

Failure on the part of the sender to provide secure packaging may result in refusal of the delivery by the recipient or a request from the recipient for the sender to acknowledge the lack of or deficiency in packaging on the bill of lading. If the sender frequently consigns unpackaged identical items requiring packaging or with the same packaging deficiencies in the same despatch, he may acknowledge such in a general statement.

The sender shall be liable for all consequences of the lack of or deficiency in the packaging, and all shipping damage that the insurer cannot cover due to insufficient packaging shall be borne by the sender. Hazardous materials specifications shall also be observed.

Environmentally friendly and recyclable packaging is preferred.

Deliveries not meeting the stipulated configuration (overfill, defects, or incomplete packaging, etc.) shall be refused and, if necessary, returned at the sender's expense.

The sender is responsible for the administration of the packaging (cleanliness, availability).

15.2 Other applicable standards and documents

KN 017.020	Material Master Record
KN 017.030	Document Info Record – Creating, Editing, Displaying, Searching
KN 017.040	Bill of Materials – Creating, Editing, Displaying, Searching
KN 053.012	Initial Sample Inspections
KN 053.037	Product Development, Requirements Specification, Functional Specification to Launch Inspection Manuals
KN 012.002	Implementation Rules for Technical Drawings
KN 012.050	Multilingual Documents
KN 017.032	SAP Definitions for Saving Multilingual Documents
KN 034.010	Designing Drawings with Welding/Quality Requirements under DIN EN ISO 3834
KN 034.011	Welding Suppliers/Welding Technology from External Suppliers
KN 050.004	Packaging of electronic components

15.3 Purchased equipment packaging developed by Kärcher

The packaging components specified by Kärcher must be used. For final packaging approval, at least two pieces of purchased equipment must be sent to the Packaging Development Module Centre by QG 3.

15.4 Purchased equipment packaging developed by supplier

If the packaging is developed by the supplier, this KN must be observed in addition to the appropriate KNs under 15.1.

The Kärcher Packaging Development Module Centre (packaging@de.kaercher.com) shall approve the packaging for all products sold by AKW.

In order to test the packaging developed by the supplier, the corresponding packaging documentation and samples must be sent to the Packaging Development Module Centre.

This is usually done via Central Purchasing or, in exceptional instances, such as for KNA products, via the appropriate development department at Kärcher.

The packaging development process should generally be observed.

The supplier shall also provide the following information:

- Weight of unpackaged equipment without accessories
- Dimensions and weight of unpackaged equipment with ready-to-use accessories
- Dimensions and weight of packaged equipment
- Weight of packaging separated by pallet and other packaging material
- For multiple pieces of equipment on one pallet, the equipment per layer and the number of layers must also be included.
- Adequate packaging documentation that makes traceable the materials used in particular.