

3 Machine description

3.1 Limitations of use

3.1.1 Authorized use

The PEWO-fold 1 Compact is a wrapping machine which fully wraps a product or product group in film in a series of folding and hot-sealing processes and seals the film at the side.

The machine is designed exclusively for the secondary packaging of products.

The data specifying the limits of the machine apply exclusively with regard to dimensioning and quality.

The machine is supplied with electrical and pneumatic energy and designed for connection to industrial supply networks.

Use The machine is an item of work equipment and designed exclusively for use in commercial and industrial area within a permanent structures with a stationary location.

Use by the following personnel groups

The PEWO-fold 1 Compact is designed for use by semi-skilled personnel who have, as a minimum requirement, received instruction on the use of the machine and specialist technical personnel who have received instruction on the use of the machine.

The machine is designed for use by persons over the age of 14.

3.1.2 Undesignated use

Any use not explicitly described under authorized use and the conditions for authorized use is impermissible.

3.2 Technical data

3.2.1 Products and packaging

Only the products and packaging materials specified in the format overview and the order confirmation may be processed.

Characteristics of the film:
(See 3.4 Film processing on page 3-15).

3.2.2 Machine capacity

The machine capacity is shown and specified in the product format overview.

The format overview for the products can be found in the Documentation folder (see Section 2 **Changeover list**) and on the data medium Documentation (see **Changeover list/Formats**).

Depending on the machine type, the following parameters can be read off:

- Capacity infeed film machine (products per minute)
- Capacity outfeed film machine
Capacity infeed casepacker (collations per minute)
- Capacity outfeed casepacker
Capacity infeed palletizer (cases per minute)

Example format overview

Summary of products		Quota/Order number :	Project name:	Revised by :	
<input type="checkbox"/> quote <input type="checkbox"/> order		Customer:		Last changed :	
		Machine type(s):		Revision:	
Product no.	Product name	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>Film machine <input type="checkbox"/> <small>no other type</small></p> <p>Single dimension case (height)</p> <p>Case dimension</p> <p>Product description</p> <p>Collation dimension (height) in mm</p> <p>Film width in mm</p> <p>Film thickness in µm</p> <p>Production speed in cases per minute</p> <p>Collation printing bar</p> <p>Change of package of film machine (printing part of infeed or case packer (collation or case) or case per minute)</p> </div> <div style="width: 45%;"> <p>Case packer <input type="checkbox"/> <small>no other case</small></p> <p>Configuration in case label</p> <p>Case type</p> <p>Case label dimension (LxW) in mm</p> <p>Case outside dimension (LxW) in mm</p> <p>Weight per case in kg</p> <p>Output of discharge (cases per minute)</p> <p>Product label printing bar</p> </div> </div>			
		Pallet dimension	Incoming board	Case dimension	
		Label pattern	Label sheet	Printed label in mm	

3.2.3 Performance Level

The required Performance Level for the machine was defined for all assembly groups by means of a risk assessment in accordance with EN ISO 13849-1. The required Performance Level (PLr) is "d."

This Performance Level is achieved due to the dimensioning of the protective devices.

3.2.4 Airborne sound emission

The airborne sound emission is measured in accordance with 2006/42/EC Appendix I Paragraph. 1.7. 4.2.u without the application of harmonized standards.

The A-weighted sound pressure level is **< 75 dB (A)**.

The A-weighted sound pressure level at the operating location may deviate from this as a result of different working conditions.

3.2.5 Type of protection

The housings for the electrical equipment of the machine are designed to comply with type of protection **IP54**.

3.2.6 Data and connection values name plate

Specifications	Values
Type	PEWO-fold 1 Compact
Year of manufacture	2016
Machine - No.	21169-10000
Voltage	3 x 400 V + N + PE / 50 Hz
Power consumption	8.7 kW
Fuse protection (short-circuit design of the equipment)	20 A
Current consumption (full-load current)	12.6 A
Operating pressure	4 bar

3.2.7 Data and connection values name plate UPS feed

Specifications	Values
Type	PEWO-fold 1 Compact
Year of manufacture	2016
Machine - No.	21169-10000
Voltage	3 x 400 V + N + PE / 50 Hz
Power consumption	1.5 kW
Fuse protection (short-circuit design of the equipment)	10 A

Specifications	Values
Current consumption (full-load current)	2.2 A
Operating pressure	4 bar

3.2.8 Further data and connection values

Specifications	Values
Supply line	5 x 4 mm ²
Pneumatic connection	½"
Input pressure	min. 4 bar to max. 10 bar
Air consumption	approx. 15 standard liters / cycle
Compressed air quality class	[5: 3 : 4]

3.2.9 Intended operating location

Operating location requirements:

- ≤ 2000 m above sea level
- Relative humidity during operation from 30% to 70%
- Operation in dry environment
- Operation inside buildings
- Vibration-free location
- Ambient temperature during operation +10 °C to +35 °C.

3.2.10 Weight

The machine weighs approximately 2000 kg.

3.2.11 Dimensions

The installation plan with dimensions can be found in section 6 **Installation plan**.

3.2.12 Lubricant

Drive chains and runner block

Recommended lubricant for drive chains and runner block:

- Long-term grease Klübersynth UH1 14-151 (see section 5 **Certificates**)

This long-term grease meets the requirements of the FDA (Food and Drug Administration) 178.3570 and the NSF-H1 (International nonfood compounds registration program).

3.3 Description of function sequence

3.3.1 Functional description of the machine

The line is equipped with a Track & Trace system for optional operation in serialization/aggregation mode.

On this machine, product groups are completely wrapped in film and the film sealed at the sides.

Starting the machine

After the machine is started, the assembly groups which are powered by a servo motor are referenced and all pneumatically controlled assembly groups move to working position.

Function group Infeed

Infeed conveyor and side belt

The infeed conveyor starts up as soon as the start sensor on the infeed conveyor detects a product. If no more products are fed in, the infeed conveyor switches off when the follow-up time expires.

The products arrive on the infeed conveyor lying flat. The infeed conveyor transports the products into the side belt and from there into the stacker chamber.

Film splicer

(See 3.3.3 Functional description Film splicer on page 3-13)

Function group Collating

Stacker

The first product to enter the stacker chamber activates a switch. The following products are accumulated to a specified minimum number, defined by a time. Once the time has elapsed, the minimum back-up has been reached and the layer is ready for stacking.

The stacker lift moves out and pushes the layer up and through between the two spring-loaded rails.

The spring-loaded rails are spring-mounted and are pressed apart by the products during the lift movement. When the layer passes by the spring-loaded rails, the spring-loaded rails spring together again and hold the layer. The stacker lift moves down and products are again fed to the stacker.

The stacking process repeats until the number of strokes indicated in the software is reached.

Once the number has been achieved, the collating is complete and the main infeed pusher receives the signal to push.

Camera system 1

Camera system 1 for reading the 2D data of each individual product is positioned on the stacker. The data are aggregated.

Function group Processing

<i>Film transport system</i>	<p>The air cushion and the film transport system, to transport the film, switch on.</p> <p>When enough film is uncoiled, the air cushion switches off and the vacuum to hold the film switches on.</p> <p>The cutter cuts the film.</p>
<i>Tear strip</i>	<p>A tear strip is affixed to the film via a roller with supply monitoring. There is a notch in the film on the right and left in the leading area of the tear strip.</p>
<i>Main infeed pusher</i>	<p>The main infeed pusher pushes the product group against and through the film cut beneath the front hold-down unit to a position beneath the rear hold-down unit. The product group is wrapped in film.</p>
<i>Hold-down unit</i>	<p>The package clamp on the rear hold-down unit is activated when the main infeed pusher reaches the front position. The hold-down unit moves down and holds the product group, which is wrapped in film, in position. The main infeed pusher moves back.</p>
<i>Upper folder</i>	<p>When the package has been clamped, the upper folder moves down and lays the top section of the film against the product group.</p>
<i>Sealing bar</i>	<p>When the upper folder reaches the bottom position, the sealing bar moves out and up and presses the lower section of the film over the upper section of the film and against the product group. The ends of the film are sealed.</p> <p>After expiry of the sealing time, the sealing bar and the upper folder return to their original positions. The package clamp on the rear hold-down unit is released.</p>
<i>Outfeed transport</i>	<p>When front sealing has been performed, the outfeed transports the product group into the side folding rails.</p>
<i>Prefolder</i>	<p>The prefolders move out and fold the vertical excess film lengths in. Then, the excess lengths of film at the top and bottom are pressed flat against the product group by the side folding rails. The product group is completely wrapped in film.</p> <p>The outfeed transports the fully wrapped product group into the side sealing unit.</p>
<i>Sealing jaws</i>	<p>The sealing jaws move out and seal the film. The product group becomes a collation.</p> <p>The outfeed transports the collation out of the side sealing unit and feeds it to the outfeed conveyor.</p>

Function group Outfeed

<i>Outfeed conveyor</i>	The outfeed conveyor transports the collation out of the machine.
<i>Labeler</i>	There is a labeler positioned above the outfeed conveyor. It prints a label and attaches it to the collation.
<i>Camera system 2 and 3</i>	Camera systems 2 and 3 are mounted after the labeler. Camera system 2 evaluates the data captured by camera system 1. A faulty collation is detected by camera system 2 and discharged. Camera system 3 checks the label on the collation. Collations with a faulty label or without a label are discharged.
<i>Rejection unit</i>	A rejection unit is positioned at the end of the outfeed conveyor. A rejection unit discharges collations that are incomplete or not correctly labeled into a reject bin next to the outfeed conveyor. The verification control sensor on the reject bin registers the collation. If the collation is not detected, a sensor reports - Product not discharged. The machine stops. The collation must be removed.

Back-up controls

The machine is equipped with the following back-up controls:

- Infeed
- Outfeed

<i>Infeed</i>	In the event of a product backup on the infeed conveyor, the back-up sensor signals to the upstream machine that there is a back-up, in order to stop the further feed of products.
<i>Outfeed</i>	In the event of a product backup on the outfeed conveyor, the main infeed pusher is stopped.

EMERGENCY STOP

<i>EMERGENCY STOP</i>	The machine is partially depressurized via the safety valve. Products located in the side sealing unit must be removed.
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Machine stop

In a controlled machine stop, the product groups located in the side sealing unit are transported out of the machine by the outfeed transport. The machine then stops.

Shortage of packaging material monitors

The machine is equipped with the following shortage of packaging material monitors:

Low film warning

The machine has two low film warnings on every film reel. These indicate that the film is running low. A sensor triggers a message on the HMI. A visual and an acoustic signal are issued.

The sealing operation is started at the splicer when the low film warning is triggered. At the same time, the system automatically switches from the active reel to the spare reel (see functional description, splicer).

End of film, tear in film

In the event of an end of film or a film tear, the dance rollers drop down. A sensor triggers a message on the HMI. The machine stops.

End of tear strip, torn tear strip

At the end of the tear strip or in the event of a torn tear strip, a sensor triggers a message on the HMI. The machine stops.

End of material reel, labeler

When the end of the material reel on the labeler is reached, a sensor triggers a message on the HMI. The machine stops.

Film presence monitoring in the cutter area

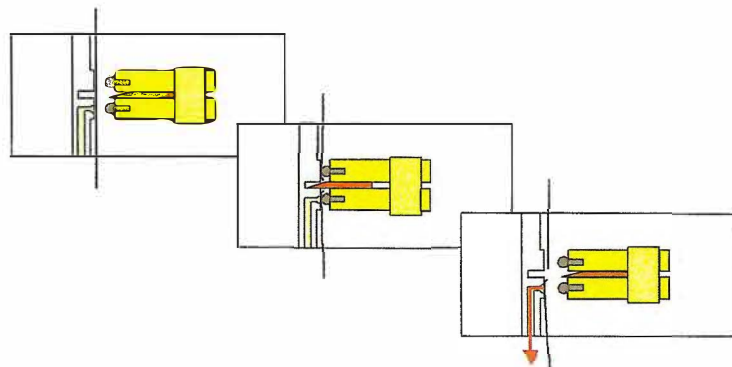
A sensor in the cutter area checks whether film is present. If the sensor is not covered during production as a result of missing film, the machine stops. An error message on the HMI, a visual and an acoustic signal are issued.

If film is present after a restart - sensor is covered - no film is advanced with the first cycle of the production process.

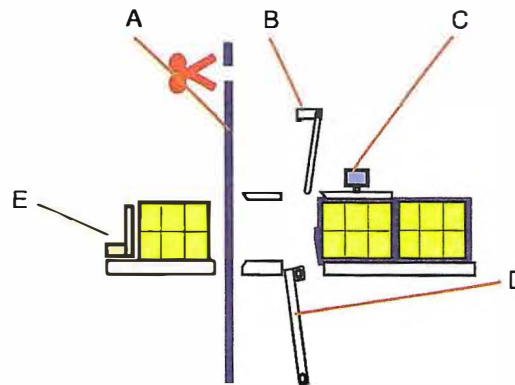
3.3.2 Functional description, sealing operation

The product group is wrapped in film in 10 steps, the sealed seam welded and the side sealing carried out.

Step 1

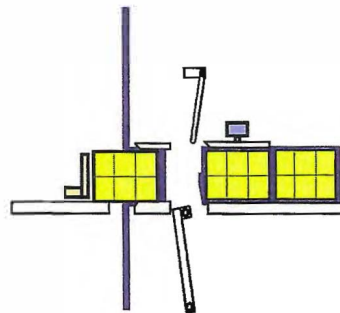


The cutter cuts the film. The vacuum is activated and holds the film cut.

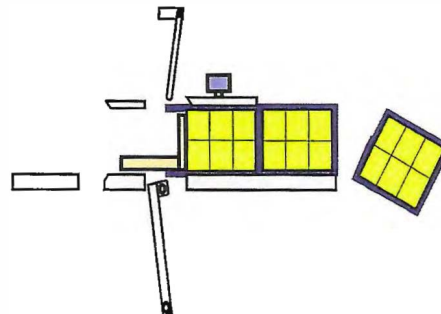
Step 2

- A Film cut
- B Upper folder
- C Rear hold-down unit
- D Sealing bar
- E Main infeed pusher

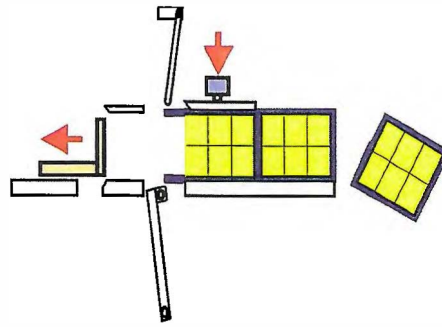
The main infeed pusher pushes the stacked product group in front of the film cut.

Step 3

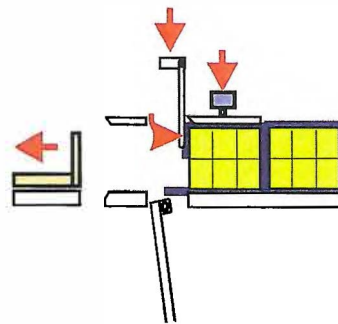
The main infeed pusher pushes the product group through the film cut and under the front hold-down unit.

Step 4

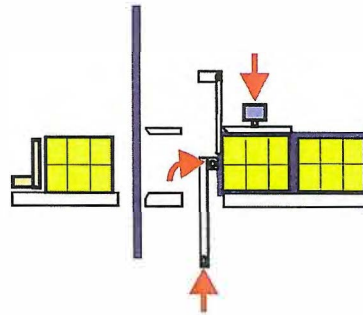
The main infeed pusher pushes the product group under the rear hold-down unit.

Step 5

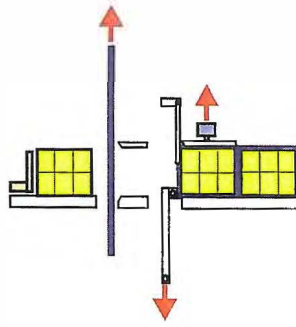
The package clamp on the rear hold-down unit is activated. The product group is thus held in position. The main infeed pusher moves back.

Step 6

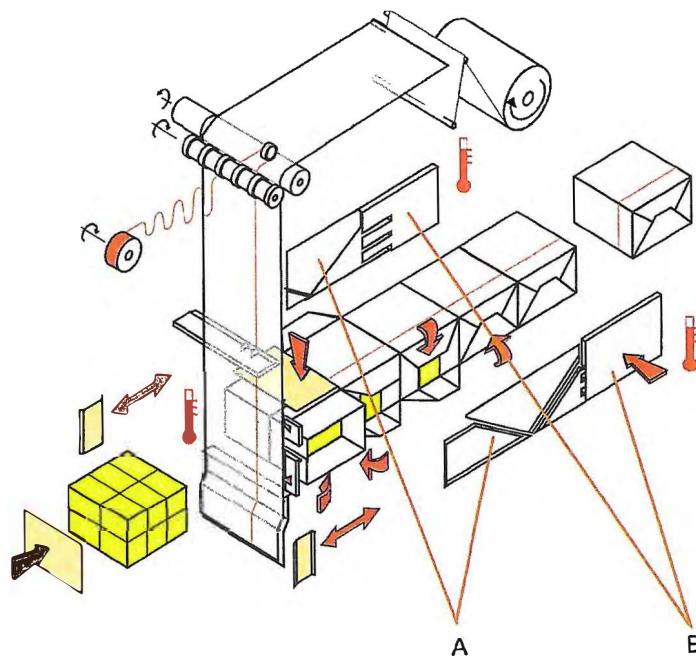
The upper folder moves down and presses the upper part of the film against the product group.

Step 7

The sealing bar moves out and up and presses the lower section of the film over the upper section of the film and against the product group. The ends of the film are sealed.

Step 8

The package clamp on the rear hold-down unit is released. The upper folder and the sealing bar return to their original positions.

Step 9

- A Side folding rails
- B Sealing jaws

The product group is forwarded further to the side folding rails. The prefolder first wraps the vertical sides with film and afterwards, the upper and lower excess film lengths are attached to the product group through the side folding rails.

Step 10

The product group is transported further in the side sealing station. The sealing jaws seal the film which has been folded in at the side and pressed against the product group.

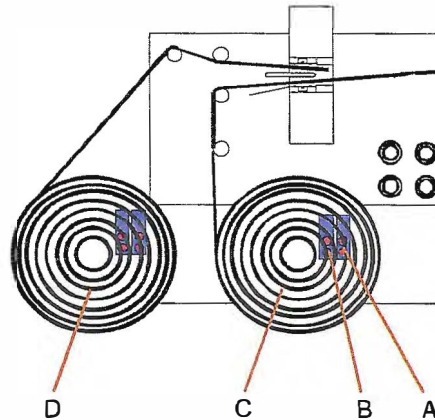
A collation is formed out of the product group.

3.3.3 Functional description Film splicer

The film splicer automatically changes from the active reel to the spare reel without a machine stop.

The sealing operation at the splicer is triggered by low film warnings 1 and 2. After the sealing operation, production is carried out with the spare reel.

Overview of splicer



- A Sensor low film warning 1
- B Sensor low film warning 2
- C Active reel
- D Spare reel

Low film warning

The active reel **C** and the spare reel **D** are each monitored by two sensors.

When the sensor of low film warning 1 (**A**) is no longer covered, a signal is issued that the film is running out. As soon as low film warning 1 has been activated, the heater of the film splicer is activated.

When the sensor low film warning 2 (**B**) is no longer covered, a signal is issued that the end of the film has been reached. The machine processes the remaining number of cycles saved in the software. This means that the remaining film can be almost completely used up. Then the cutting wire is heated up. The sealing operation at the splicer then starts.

Sealing operation at the splicer

Preconditions

- Film of the spare reel is inserted and clamped into the film splicer (see Fig. 1).
- The heater of the film splicer is activated.
- The cutting wire is heated up.

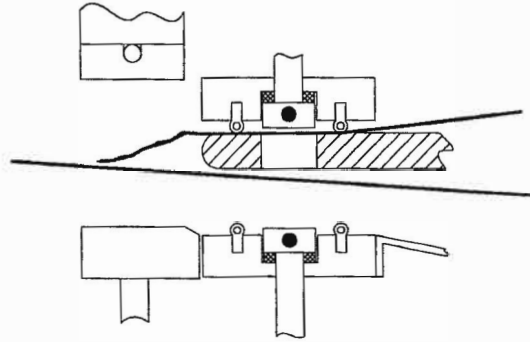
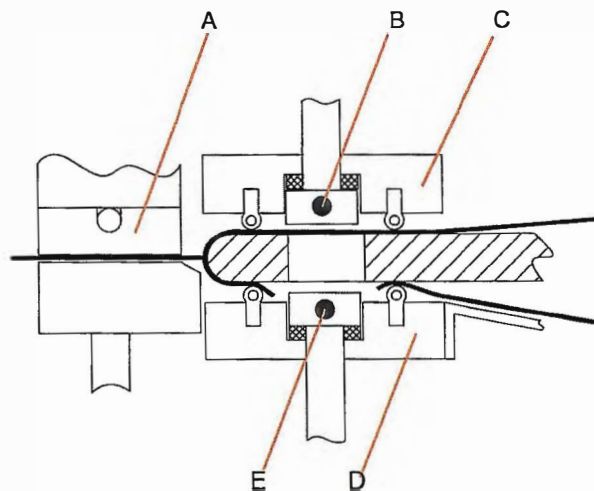


Fig. 1: The film on the spare reel is clamped



- A Sealing unit
- B Top cutting wire
- C A clamping plate clamps the film on the spare reel
- D A clamping plate clamps the film on the active reel
- E Bottom cutting wire

Fig. 2: Overview of sealing operation

Clamping plate **D** clamps the film from the active reel which is to be separated.

The sealing unit **A** closes and fuses the ends of the film.

Then the bottom cutting wire **E** moves upward and separates the clamped film on the active reel (see Fig. 3).

The sealing unit **A** opens again and the clamp is released (see Fig. 4).

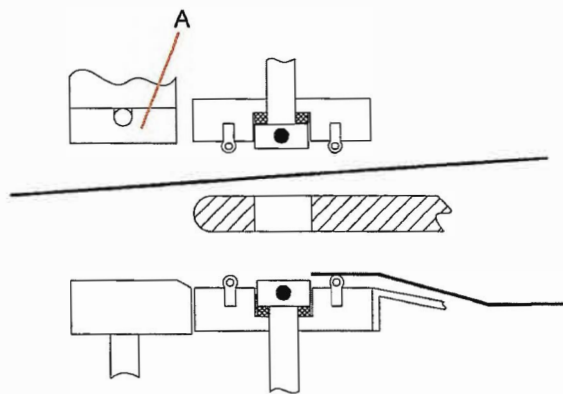


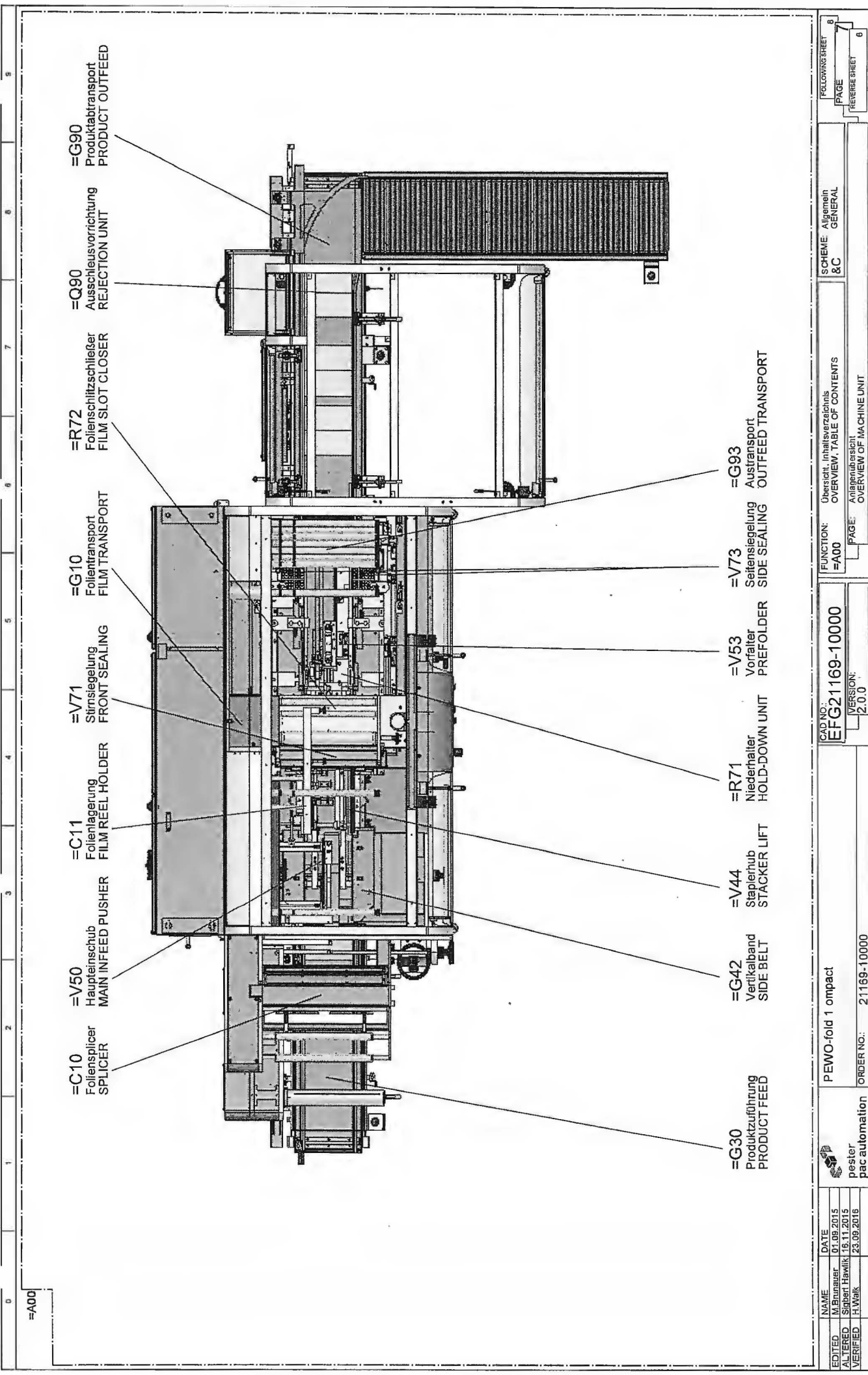
Fig. 3: The clamp is released

The products are wrapped in film from the spare reel. The spare reel has now become the active reel.

3.4 Film processing

Films with the following characteristics can be used:

Material	OPP
Film width	min. 90 mm - max. 430 mm
Film thickness	min. 15 μm - max. 50 μm
Reel diameter	max. 400 mm



=C10 Follensplicer
SPLICER

=V50 Hauptanschub
MAIN INFEEED PUSHER

=C11 Follenslagerung
FILM REEL HOLDER

=V71 Stirnsiegelung
FRONT SEALING

=G10 Follentransport
FILM TRANSPORT

=R72 Follenschlitzschließer
FILM SLOT CLOSER

=Q90 Ausschleusvorrichtung
REJECTION UNIT

=G90 Produkttransport
PRODUCT OUTFEED

=V44 Staplerhub
STACKER LIFT

=R71 Niederhalter
HOLD-DOWN UNIT

=V53 Vorfalter
PREFOLDER

=V73 Seitenregelung
SIDE SEALING

=G93 Austransport
OUTFEED TRANSPORT

=G30 Produktzuführung
PRODUCT FEED

=G42 Vertikalband
SIDE BELT

NAME		DATE		P E W O - f o l d 1 o m p a c t		CAD NO.:		FUNCTION:		SCHEME: Allgemein		FOLLOWING SHEET	
M. Brunauer		01.09.2015		21169-10000		EFG21169-10000		=A00		GENERAL		8	
ALTERED		16.11.2015		ORDER NO.:		VERSION:		Übersicht, Inhaltsverzeichnis		& C		PAGE	
H. Waik		23.09.2016		21169-10000		2.0.0		AGBERRÜBERSICHT				REVERSE SHEET	
VERIFIED								OVERVIEW OF MACHINE UNIT				6	

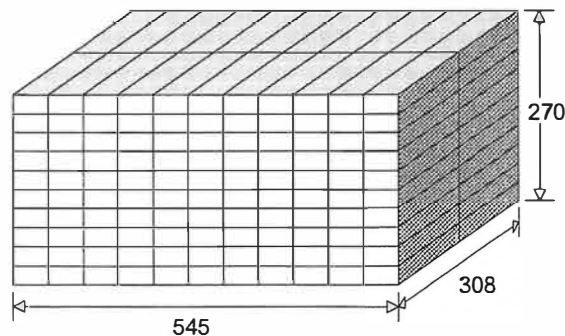
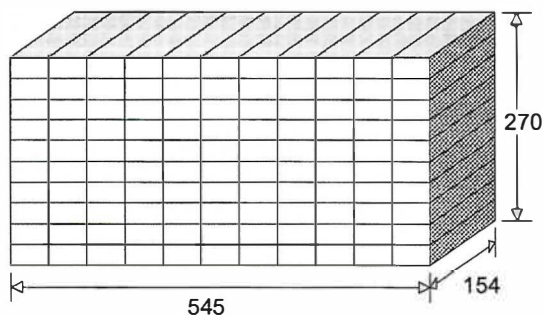
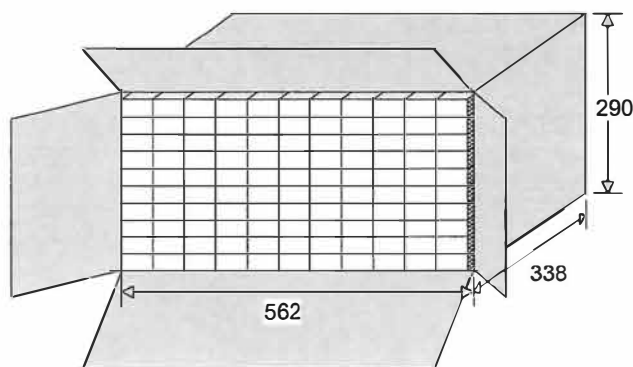
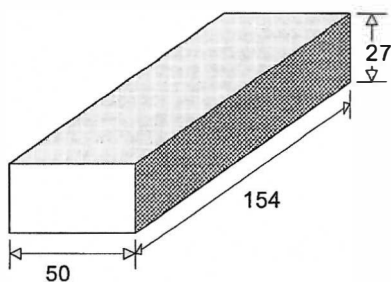
=A00

Gebindeschema Collation drawing

pester pac automation · Hauptstr. 50 · 87787 Wolfertschwenden, Germany



pester
pac automation



Einzelpackung: 49,5 x 27,0 x 154,0 mm

Verkaufseinheit: 562,0 x 290,0 x 338,0 mm = Karton Aussenmaß

(554,0 x 282,0 x 322,0 mm) = Karton Innenmaß

220 Einzelpackungen je Verkaufseinheit

(11 x 10 x 2)

Infeed speed bundler: 100 cartons/min
Infeed speed casepacker: 100 cartons/min
Output: 0,45 cases/min

Datum: 11.09.2015

Name: APeter

ZchnngNr.: 30913c