Slitter Winder KL-1000-



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# 1 TECHNICAL INFORMATION

| | |
|---|---|
| Model | KL 1000 |
| Paper grades | coated paper and board, 60–300 g/m² |
| Handedness | drive on the left side in relation to web running direction |
| Winding method | shaftless |
| Trimmed width | |
| - max | 2750 mm |
| - min | 2050 mm |
| Speed (max) | 28.3 m/s (1700 m/min) |
| Balancing speed | 28.3 m/s |
| Braking of source reel | with brake generator |
| Blade table | rotating |
| Reel lowering device | tipping device |
| Machine reel dimensions (max) | Ø2550 mm × 2800 mm |
| Finished reel dimensions | |
| - max | Ø1500 mm × 2750 mm |
| - min | width 230 mm |
| Slitting blades | |
| - amount | 6 pairs |
| - dimensions | upper Ø190 mm<br>lower Ø250 mm |
| - drive | on separate motors |
| - width setting | automatic |
| King rolls | |
| - dimensions | Ø600 mm × 2950 mm |
| - surface finish | front roll: ungrooved with rough surface<br>back roll: spiral grooves |
| Driver roll | Ø345 mm × 3000 mm |

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| | |
|---|---|
| Blade table rolls | |
| - type | short roll |
| - diameter | 150 mm |
| - surface finish | roughened |
| Spreader roll | Ø 6 1/4 in. |
| Reel press roll | Ø350 mm × 2950 mm |
| Reeling core guides | |
| - amount | 3 pairs |
| - diameter | 70 mm, 3 in. and 6 in. |
| Width of trimmings (max) | 100 mm |
| Web tension | |
| - rated value | 200 kp/m |
| - measuring | electronic |
| Reel press roll relief system | hydraulic |
| Winding control quantities | |
| - Reel press roll relief | programmed |
| - King roll torque differential | programmed |
| - web tension | automatic |
| Acceleration/deceleration time | 75 s |

# 2 STRUCTURAL SPECIFICATIONS

## 2.1 UNWINDING AND BRAKING SECTION

### 2.1.1 Unwinding stands

For source reel, the unwinding stands have lockable holding positions where the source reel is lowered.

Transversal motion is achieved with a hydraulic motor. The braking unit is connected to the reel with hydraulic cylinders.

### 2.1.2 Support arms

The stands are equipped with support arms on which the empty spool can be rolled with hydraulically operated levers.

## 2.2 SLITTING AND WINDING SECTION

### 2.2.1 Frames

The frames are of steel beams and connected with two transversal supports. To reduce vibration, the frontmost upright beams are filled with hard-core filling.

To the frames are attached hydraulic cylinders that allow relief of reel press roll to achieve a desired winding tension. Motion of the pistons is synchronized with a cross-over shaft.

### 2.2.2 Blades

Motors that spin the lower blades are positioned on top of the lower blade beam and can be moved to a desired position.

Upper blades with roller bearings are attached to the upper blade beam. The upper blades, with the exception of the edge blades, are remote-controlled.

Controls for blade repositioning are in the operator's console. The switches needed for manual control are positioned on the machine frame.

### 2.2.3 Blade table rolls

On both sides of the blade devices, there are the rolls drawn by the paper web, assembled from approximately 1 m long parts.

### 2.2.3 Driver roll

On a separate stand between the source reel section and the slitting section is attached the roll driving the web. The machine roll can be unwound from both the upper and the lower side, thus ending up with the wire side either on top or bottom of the finished reels.

### 2.2.4 Spreader roll

The fixed-curvature spreader roll is positioned before the king rolls.

### 2.2.5 Web feeding belts

Below the backmost king roll, there is a 1m wide web feeding mat made up of narrow gummed belts. It is driven by the king rolls.

### 2.2.6 King rolls

The king rolls are of steel pipe. They are mounted on roller bearings and dynamically balanced on maximum speed.

### 2.2.7 Reel press roll

The reel press roll is attached to end pieces moving along the rails on the frame. The roll is mounted on antifriction bearings.

### 2.2.8 Reeling core holders

For axial locking of the cores, the slitter-winder has locking devices moving along the rails on the frame.

The axial locking of the holders is hydraulic and raising the holders is pneumatic with switch control.

### 2.2.9 Push-out device

Attached to the frame, there is a push-out device that pushes the finished reels off of the drawing rolls and onto the tipping device.

## 2.3 REEL LOWERING DEVICE

For lowering the finished reels, there is a tipping device in front of the slitter-winder. During reeling, the lowering device is in upper position and acts as a maw guard, preventing any possible loose rolls from escaping.

## 2.4 CONTROL AND ADJUSTMENT DEVICES

The control and adjustment devices of the machine are positioned in the operator's console.

## 2.5 SAFETY GUARDS

Both ends of the unwinding section and the drive shafts of the rolls are equipped with safety guards.

## 2.6 DRIVE

Each king roll has its own motor and gear. The frontmost motor can take a higher load in order to allow for controlling of the quality of the reel. Deceleration is done with motors and final stop with mechanical brakes. The couplings have brake flanges.

The brake generator is attached to the reeling roll through a coupling and is also equipped with a mechanic brake.

Control of electric functions is centered at the operator's console.

## 2.7 CONFIGURATION OM761547

# 3 OPERATING INSTRUCTIONS

## 3.1 PREPARING FOR THE WINDING

- Start the hydraulic pump motor (2).
- Turn on the voltage to the drive and controls 30 minutes before operation of the machine begins (33.1).

## 3.2 ACTIONS BEFORE WINDING AND AFTER CHANGE OF GRADE

- Make sure that the coupling and locks of the new source reel open. In the field, there is an indicator light showing when the coupling is open.
- Select the unwinding direction.
- Carefully lower the source reel, using a crane, in correct orientation, to the forks and remove the empty spool from the rails. Do **not** enter the space between the removal arms of unwinding.
- Turn the coupling heads to a correct position.
- Close the unwinder locks (4) and the source reel coupling. The switch for closing the coupling is positioned next to the coupling.
- Make sure that the coupling has closed. The drive will not start unless the coupling is closed.
- Raise the upper blades (11).
- Reposition the blades according to instructions. Clean away the dust from the rails with regular intervals, at least once a year. Beware of the sharp edges of the blades.
- Set the trimmings nozzles.
- Place cores onto the king rolls and lock them (55).
- Set the load for the drawing rolls motors and target tension on their empirically determined values (26).
- Reset the *m*-amount removal[1] counter (47).

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[1] "removal" = a set of finished reels removed from the slitter-winder – is there a preferred term?

## 3.3 WEB FEEDING

- Start the hydraulic pump motor (2).
- Tear the source reel tail into the shape of a wedge.
- Raise the web feeding belts (9); maw blower starts.
- Star the trimmings blowers (12, 13), thus automatically starting the pulper air exhaust.
- Make sure that the drive is ready to run (36).
- Start the slitter-winder on crawl speed.
- Manually lead the paper onto the web feeding belts.
- Stop crawl when web reaches the king rolls in full width.
- Glue the tail onto the cores.
- Release the safeties of the reel press roll (52).
- Bring down the reel press roll (53).
- Lower the upper blades (11).
- Web feeding belts automatically come down as the machine switches to run mode.
- Center the source reel (5).

## 3.4 WINDING

- Make sure that the reel press roll relief is on automatic. On 'manual', the relief can be set to a desired value.
- Select the automatic relief program.
- Switch on the blade drive.
- Switch the slitter-winder on crawl.
- If necessary, raise or lower the front end of the guide roll to achieve an even tension.
- Raise the tipping device to upper position (57).
- Check the orientation of the trimmings nozzles.

- Accelerate to run speed.
- Monitor tension and adjust the set value if necessary.
- Monitor the current differential of the drawing roll motors and adjust the set value if necessary.
- Make sure that the relief pressure on the reel press roll changes according to the program.
- Reserve a new batch of cores in the vicinity of the machine.
- Monitor the diameter of the reels or the *m*-amount, decelerate and stop if necessary.
- If possible, place new cores between the king rolls already during the deceleration phase.

## 3.5 ALARMS

### 3.5.1 High oil temperature

Stop the slitter-winder and call for maintenance personnel.

### 3.5.1 Low oil level

Stop the slitter-winder and call for maintenance personnel. The pump stops automatically.

### 3.5.1 Oil filter clogged

Stop the hydraulic pump and start the back-up pump. An indicator light turns on. Acknowledge the alarm. Call for maintenance personnel.

### 3.5.1 Blade motor stopped

Stop the slitter-winder, reset the safety switch and call for maintenance personnel.

## 3.6 ACTIONS AFTER WINDING

- Raise the reel press roll. (mechanical control up to the upper limit)
- Stop the blade drive.
- Copy the *m*-amount count in the removal counter to report and reset the counter.
- Release reel locks and lower the locking devices.
- Push the reels onto the tipping device. Action is not possible unless the core locking devices are not down and both the tipping device and the reel press roll beam are not up.
- Lower the reels onto the floor.
- Lock new cores.
- Glue the paper tail onto the cores.
- Bring down the reel press roll.
- Continue as in "3.4".

## 3.7 ACTIONS WHEN SOURCE REEL RUNS OUT OF PAPER

- Decelerate the slitter-winder to crawl.
- Stop the slitter-winder and the blade drive when the source reel runs out of paper.
- Open source reel coupling and remove the spool. The spool remover will not function unless both the locks and coupling of the unwinder are open. The spool remover is **not** to be used for lifting a spool with more than 5 cm of paper on it. In such a case, a crane is to be used after opening the locks.
- Continue as in "3.2".
- Start the circumference blowing when the paper web reaches the drawing rolls.
- Splice the paper onto the reel.

## 3.8 WEB BREAK

- Stop the slitter-winder.
- Remove any loose paper.
- Continue as in "3.3".

## 3.9 FAULT MARKINGS ON MACHINE REELS

- Decelerate the slitter-winder to crawl before reaching the marking.
- Pay attention to paper.
- Stop the slitter-winder before reaching the marking.
- Remove faulty section of paper from source reel and splice the tail onto the source reel.
- Continue winding.

## 3.10 ACTIONS BEFORE EXTENDED STOPPAGE

- Stop the hydraulic pump motor.
- Stop the trimmings blowers.
- Turn off control voltage.
- Turn off drive voltage.

## 3.11 AUTOMATIC BLADE REPOSITIONING

### 3.11.1 Controls

The control switches, adjustment switches and indicator lights of the blade repositioning machinery are positioned in the operator's console. The switches needed for manual control are positioned on the interior side of the blade table.

### 3.11.2 Setting reel width

Setting reel width is done width thumb wheels on the operator's console. Setting is started from the left end and the width of each reel is set from left to right, one thumb wheel for each reel. On the first thumb wheel is set the desired move range of the edge blades. If the number of reels is less than the number of thumb wheels, the first extraneous thumb wheel is set on '0'.

The width of reels can be set on the thumb wheels even while the machine is running. While the automatics are set on automatic or manual drive, the reel width can be tested by pressing the "BLADE REPOSITIONING TEST" ("TERÄASETUS-TESTI") button. There is nothing to prevent from setting the width of the reels automatically unless the "REEL TOO LONG" ("LIIAN PITKÄ RULLA") or the the "REEL TOO SHORT" ("LIIAN LYHYT RULLA") indicator light turns on. Otherwise the order of the reels must be changed or the situation somehow rectified or the setting must be done manually (see "Reel too long" and "Reel too short").

### 3.11.3 Setting the "0" positions

In order for the automatics to correctly set the format, the intervals between the blades must be input to the automatics while then blades are in "0" positions, that is the blade sleds are against the mechanical stopper. Guiding the blades to "0" positions is done by inputting an impossible set of reel widths to the automatics and pressing the "BLADE REPOSITIONING TEST" and "BLADE REPOSITIONING MOVE" ("TERÄASETUS-SIIRTO") buttons. The blades will then move to "0" positions but format setting will not start. Also, all the blade sleds will attach to the fixed rail. The set of reel widths is impossible when, for example, a reel too narrow (e.g. 100 mm) is set on one of the thumb wheels, not an edge blade.

When the blade sleds are in "0" position and attached to the rail, the intervals of the cutting edges of the lower blades are measured. The intervals are set on the specific thumb wheels. The cutting edge of a blade is the edge that can be utilized when switching to the next set of reel widths.

For the blade pairs and their sleds that have been removed entirely, an interval of '0' is set on thumb wheels. Defective and partially removed blade pairs must be taken into account when setting the blade intervals. While the blades are in "0" position, the blade pressure is also set (see "Setting the blade pressure").

### 3.11.4 Reel too short

If the width of some reel has been set narrower than the machinery allows or there is no blade pair in use at the point of cutting, the "REEL TOO SHORT" indicator light will turn on. After the "BLADE REPOSITIONING MOVE" button has been pressed, the blade sleds will move to the "0" positions. The reel widths must then be re-inputted.

### 3.11.5 Reel too long

If the last point of cutting is outside the trimmed width of the web, the "REEL TOO LONG" indicator light will turn on. The same thing happens if the trimming on the rest position side has been set at 0 mm. After the "BLADE REPOSITIONING MOVE" button has been pressed, the blade sleds will move to the "0" positions. The reel widths must then be re-inputted.

### 3.11.6 Blade pairs removed from the machine or faulty

If a blade pair becomes damaged or is removed from the slitter-winder, it must also be disconnected from the automatics. Disconnecting is done from a switch separate for each blade pair on the operator's console.

### 3.11.7 Starting blade repositioning

Blade repositioning can start when:

- The slitter-winder has been stopped.
- The automatics are taking care.
- The automatics supply connection unit is on. The switch is on the operator's console.
- Blade repositioning motor voltage is on. The switch is on the contactor case.
- The control system selector is on 'AUTO'.
- The "READY FOR REPOSITIONING" indicator light on the operator's console is on.

Blade repositioning is started by pressing the "BLADE REPOSITIONING MOVE" button on the operator's console. Start takes place only after the reel widths have been set on thumb wheels and it has been checked that the aforementioned requirements exist.

### 3.11.8 Blade repositioning

Blade repositioning starts immediately after the "BLADE REPOSITIONING MOVE" button has been pressed. In the first phase, all blade pairs will detach from the fixed rails and attach to the move rails. The repositioning motor starts and the move rails transport the blade pairs to their "0" positions. In "0" positions, the blade pairs bump into mechanical stoppers. The stoppers on the lower blade side have limit switches that, when the blade pair has arrived, guide the pair off of the move rails and onto fixed rails. The move towards "0" position continues until every blade pair is in "0" position and the move rail is in one of its extreme positions.

After this, all blade pairs re-attach to the move rail. The repositioning motor starts and the move rail transports the blade pairs to the cutting positions according to the reel widths set. As the blade pairs approach target, the repositioning motor switches to crawl and stops when a blade pair is at target. The blade pair attaches to fixed rails. The repositioning motor restarts and the repositioning continues until all blade pairs are at target. Finally the move rail is in its opposite extreme position. The blade pairs that are not taking part in cutting move to a position where they do not hinder the adjacent blade sled.

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## 3.12 OPERATOR'S CONSOLE

# 4 SAFETY

## 4.1 EMERGENCY STOP

## 4.2 (SECTION MISSING)

# 5 SPECIFIC INSTRUCTIONS

## 5.1 FAULTS IN REELS AND REMOVAL ACTIONS

## 5.2 SHARPENING THE BLADES

## 5.3 UPPER BLADE 3M180822

## 5.4 LOWER BLADE 3M732867

## 5.5 ADJUSTMENT OF SPREADER ROLL

# 6 MAINTENANCE

## 6.1 LUBRICANT TABLE

## 6.2 MAINTENANCE TABLES

## 6.3 SPECIFIC EQUIPMENT

### 6.3.1 Pneumatic brakes, Twiflex

### 6.3.2 Cylinders

### 6.3.3 Cylinder, Atlas Copco

### 6.3.4 Coupling, Söderkvist

### 6.3.5 Gear assembly, Kumpulainen

### 6.3.6 Motor, Georgii Kobold

### 6.3.7 Blade motor, Strömberg

### 6.3.8 Spreader roll, Mount Hope

### 6.3.9 Screw jack, Pfaff

### 6.3.10 Articulated shaft, Gelenkwellen

### 6.3.11 Hydraulic motor, TRW

### 6.3.12 Gears, Santasalo

### 6.3.13 Couplings, Santasalo

# 7 LISTS

## 7.1 BEARINGS

## 7.2 SEALS

## 7.3 BELTS

## 7.4 CYLINDERS

## 7.5 SPARE PARTS

## 7.6 RECOMMENDED SPARE PARTS