PAPCEL®

PAPER MACHINES
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High-pressure (closed) headbox runs with an air cushion and with deflocculation rolls. It is used particularly on paper machines intended for a speed up to 600 m/min. with diverse substances, i.e. with different flow rates and consistencies. The headbox provides uniform distribution of paper stock on a PM longitudinal wire.

Design
The headbox is made of stainless steel. It comes in a shape of a box. Its inside surfaces, coming in contact with the stock, are electrochemically polished. The turbulent stock flow is enabled by a diffuser board and deflocculating rolls with adjustable speed. There is a rotary antifoam and rinsing shower pipe installed inside the headbox. The headbox stock supply is provided through an inlet body or diffuser plate.

Top lip regulation
The headbox precise design and machining of the top lip enable its adjustability in two directions, i.e. upwards and downwards. The bottom output edge can be slipped out. The lip provides certain vertical flexibility which allows fine profile adjustment. The top parts of the top lip spindles are equipped with worm gears with micrometric indicators that can be preset with individual accuracy of 0.01 mm or with stepping motors connected to the control system of the machine.

Main parts
- inlet body (manifold) (1)
- the headbox (2) [front, rear, bottom part and side plates]
- deflocculation rolls with drive (3)
- front part control (4)
- top lip regulation (5) [mechanical, automatic]
- position indicators
- level and pressure sensor
- antifoam shower pipe (6)

Material
- headbox is made of stainless steel
- stands are made of structural steel and galvanized outwardly; also possible stainless steel

Accessories
- basement rails are made of cast-iron
- inside surfaces coming in contact with the stock are polished

Scope of delivery
- complete machine according to main parts description
- accessories optionally

Advantages
- faster and more precise control
- possibility of corrections in a close profile range through slice profiles changes
- possible regulation of output lip slipping during operation
- provided protection against lip bending
- automatic blocking of an upper lip movement
- simple operation and easy maintenance
- minimum spare parts

Machine design and work safety are in compliance with EU standards.
High-pressure headbox scheme

- SIC
- LIC
- PIC
- KM
- PT
- STU-200
- MIXING PUMP
- PRESSURE AIR SOURCE

High-pressure headbox with diffuser

- Headbox cover
- Front part control
- Deflocculation rolls
- Back part
- Diffuser
- Manifold
- Front part
- Worm gearboxes
- PM Wire
- Breast roll
Hydraulic headbox operates without air cushion and is fully filled with paper stock. It has some elements as classical high pressurized closed headbox. Main difference lays in built-in block with stage diffuser and an installation of pulsation damper in front of the headbox. This headbox is proper for paper machines operating with lower consistency and speed above 300 m/min.

Main parts

Pulsation damper (1) is installed before headbox itself, including inlet section, perforated plate with stage openings and top part with side outlet to the distributor. Air cushion occurs above the stock level in the damper. Stock inlet is either vertical or horizontal. Optimal stream through the headbox is done by inlet geometry, perforated plate and keeping the proper stock level. Major task of this system is dampening of pulsation in main stock stream caused by cleaners in approach flow system. The equipment could be designed as round distributor as well because all benefits of the system remain but stock inlet to the headbox is done through distribution hoses having identical diameter and length. Last case utilizes favorably consistency control with diluting water.

Inlet body (2). Its role is guide the stock to paper machine run direction and distribute it homogeneously across whole paper web width. Inlet bodies are suited with recirculation. Recirculation setting is very important due to certain paper properties. When the round distributor and headbox is connected through the distribution hoses an inlet body with constant cross profile without recirculation is used.

Stage diffuser block (3) distributes the stock regularly across whole width of the headbox and produces controlled turbulences to de-flocculate the fibres and let to each stock stream from diffuser outlet even flow profile. The block is produced from plastic or stainless steel with plastic inserts. The third alternative enables optimizing in case when real throughput doesn’t correspond with dimensioned throughput or when the intensity of turbulence should be changed.

The same could be done in case of throughput break for instance headbox lip damage. Identical inserts don’t have to be installed across the whole diffuser but inserts with smaller or bigger profile can be used in the edge parts. Concerning this aspect the stage diffuser has big potential for operation optimizing.

Inlet chamber with outlet nozzle (4) brings the paper stock to the wire and rectifies its outlet. It is of stainless steel and parts of headbox coming in touch with the stock are of stainless steel and electric chemically polished. Use of quality material provides headbox with great stability and long life.

Adjusting equipment (5) serves for adjusting of headbox slice slip and stock outlet onto the wire.

Possibilities of cross profile control

- manual control of top lip shifting mechanisms, eventually valves of dilution water (without automatics)
- fully automatic control of cross profile through QCS of PM control system – step motors of shifting mechanisms, eventually electronic controlled valves for diluting water

Material

- headbox is made of stainless steel
- stands are from common steel, zinc coated outside, respectively of stainless steel
- base rails are from cast iron
- parts coming in touch with stock are made from stainless steel and polished

Accessories

- headbox stands
- front foot bridge or front and back footbridge incl. ladders
- source of pressurized air
- inlet pipes
- base rails
- slide valve of the knotter
- format guides
- source of dilution water + pump + distribution
Scope of delivery
- complete machine according to main parts description
- accessories according to customer’s inquiry

Use of hydraulic headboxes
- for closer flow scope which is important namely in cases when narrow assortment of paper is required
- with round distributor is suitable for speeds above 700 m/min

Advantages
- higher operating speed
- favorable value of cross substance weight variations
- more even dispersing of fibres and fillers in stock
- absence of air in the headbox prevents foam creating
- better fibre formation

Machine design and work safety are in compliance with EU standards.
The wire part of the PM serves for stock dewatering and consequently it transforms the stock into the “paper sheet”. The stock goes out of the headbox on a longitudinal endless wire where the paper stock is dewatered so that the fibres settles down on the wire surface.

The endless wire is embraced at the headbox side by a breast roll and on the other side by a suction roll (couch roll) and driving roll. The suction and driving roll combination is recommended for each wire part version both from the drive perspective (better driving force distribution and more cautious influence on the wire itself) and from the perspective of the subsequent paper web removal and its transfer into the press part.

In the upper part between the rolls, dewatering elements are located, which have plastic or ceramic foils attached to them. The longitudinal endless wire with the stock is moving on their surface and in case of the contact the stock is dewatered.

Dewatering elements are located on the wire table in a following order:
- forming board,
- dewatering foils,
- hydrofoils boxes,
- vacuum water boxes,
- suction boxes.

The correct placement of the dewatering elements is essential for a quality dewatering to reach the required percentage of the dryness behind the wire part. A steam box is used to increase a temperature of the paper before it enter the press part to get more of the dryness during pressing.

The wire part length depends on the PM performance and on types of paper produced there. The wire length is also determined by the number of dewatering elements.

The paper width is secured by format showers which separate the paper web edges. These edges appearing during dewatering are rough and their passage through the PM might prevent a non-problematic production due to the appearance of breaks. We offer a cantilever construction version of the wire part which facilitates an easy and quick wire replacing. The structure is anti-corrosive and with an adequate height to allow an easy and accessible maintenance.

All other complementing features such as wire run pneumatic guide, low-pressure and high-pressure shower systems, doctors, edge threading and breakage nozzles, are seen as standard for all wire parts supplied.
DEWATERING ELEMENTS

Dewatering elements
The wire part purpose is to dewater the stock distributed from the headbox on the wire and ensure the creation of the “paper sheet”. That is why dewatering elements are installed on the upper wire part.
The order of dewatering elements is in paper run direction on the lower part of the wire as follows: forming board, dewatering foils, hydrofoils boxes, depression foil boxes and suction boxes. All these elements are made of stainless steel and fitted with foils, covered with polyethylene or ceramics. Dandy rolls and formers are used on the upper part of the wire in paper run direction.
Machine design and work safety are in compliance with EU standards.

Forming board is a weldment made of stainless steel. It is fixed to carriers on stands which enable its height adjustment against the breast roll in a range of 0 - 80 mm.
It is fitted with a wide foil with foils of 65 mm width. These foils can be made of polyethylene or ceramics. With respect to a possible wearing the forming board is height-adjustable. All the foils are fixed on the table by T-shaped groovings.

Advantages
- height and longitudinal adjustability
- simple foils replacement

Dewatering foil is as a weldment made of stainless steel. It is fixed to the beams with stands which enable its height adjustment. The foil design can be stationary or turnable for possible changes of its scraping angle (0° - 2.5°).
In case of the turnable design when changing the angle, is always necessary to adapt also the height adjustment accordingly. The dewatering foil body is provided with a foil wide of 65 mm. This foil can be made of polyethylene or ceramics and fixed by a T-shaped groovings.
Hydrofoils box is a weldment made of stainless steel. It is fixed to the beams with using stands which enable its height adjustment with respect to possible the foils wearing off. It is fitted with 5 - 7 foils with width of 65 mm. The foils can be made of polyethylene or ceramics. All the foils are fixed to the box by T-shaped groovings.

Depression water box is a weldment made of stainless steel. It is fixed to the beams with stands which enable its height adjustment with respect to possible wearing of the foils. It is fitted with 5 - 7 foils with a width of 65 mm. These foils can be made of polyethylene or ceramics. All the foils are fixed to the box by T-shaped groovings.

The depression in the box is created by a fan. The depression value can be regulated by a suction valve. The suction zone width profile can be regulated by sliding gates.

Advantages
- height and longitudinal adjustability
- easy foils replacement

Accessories
- M+C elements
- A+R elements
- separators - mechanical or automatical
Suction box is a weldment made of stainless steel. It is fixed to the beams with stands which enable a height adjustment of the box with respect to a possible wearing of the lining. The cover can be made of polyethylene or ceramics and its height ranges from 30 to 40 mm. The suction zone comprises slots or round holes. The free cover area ranges from 40 to 50% of the total lining surface. The suction zone width in the cover is adjustable by sliding gates. The box vacuum is created by a vacuum pump. Connection to PM vacuum system is through a water separator. The vacuum regulation runs automatically using a control valve or can be done manually.

Multi-chamber suction box is a weldment made of stainless steel. It is fixed on stands which enable a height adjustment of the box with respect to a possible wearing of the foils. The foils are fixed to the box by T-shaped groovings. Each chamber is provided with a different number of foils installed with a different spacing. The vacuum value in each chamber differs from each other in order to reach optimal stock dewatering rates in the PM wire part. Each chamber is separately connected with the PM vacuum system through a water separator. The box underpressure is created by a vacuum pump. The vacuum regulation runs automatically by means of a control valve or manually. The suction zone width is adjustable by means of sliding gates.

Each chamber is separately connected with the PM vacuum system through a water separator. The box vacuum is created by a vacuum pump. The vacuum regulation runs automatically by means of a control valve or manually. The suction zone width is adjustable by means of sliding gates.

Advantage

+ compactness
Crescent former serves as wire part for production of tissue papers with substance weight from 12 g/m² on the wire (i.e. 14 g/m² on the reel) at design speed up to 1500 m/min. The de-watering proceeds through centrifugal force on forming roll.

**Design**

Bearing structure is cantilevered, made of stainless steel resistant against corrosion and adapted for easy and speedy wire and other elements exchange. Set of special troughs and covers for water discharging from the former is part of its structure. There is a wire deflector in frontal part designed as slip out to ease cleaning and maintenance of the equipment. Main part represents forming roll with special cover enabling an intensive dewatering between forming wire and felt which contributes to very good fibres formation. Other parts are elements for stretching, guiding and conditioning the wire.

**Main parts**
- bearing structure (1)
- forming roll with cover and bearing (2)
- guide rolls with cover and bearing (3)
- pneumatic wire guide (4)
- wire stretching (5)
- oscillating doctor of wire forming roll (6)
- oscillating doctors of guide rolls (7)
- showering system of wire part, incl. low-pressure showers (8)
- high-pressure oscillating shower
- chemicals wire showering (9)
- troughs for water collecting and discharging from forming part (10)
- wire deflector (11)
- walkways and ladders
- pneumatic circuit

**Accessories**
- equipment for roll exchange and wire wearing
- wire
- drive
- control
- high pressure water distribution piping, incl. pump

**Scope of delivery**
- complete machine according to description of main parts
- accessories according to the customer's inquiry

**Advantages**
- production of tissue paper with low substance weight
- high operation speed
- very good formation of the fibres
- low operating costs
- compact design

Construction design and machine safety are in compliance with EU standards.
TECHNICAL PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design speed</td>
<td>m/min</td>
<td>1.500</td>
</tr>
<tr>
<td>Operating speed</td>
<td>m/min</td>
<td>1.350</td>
</tr>
<tr>
<td>Operating width</td>
<td>mm</td>
<td>2.750</td>
</tr>
<tr>
<td>Minimum substance weight on the wire</td>
<td>g/m²</td>
<td>12</td>
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</table>

Wire conditioning in crescent former

Crescent former placement in tissue machine
Top former

Two-wire formers are used for more intensive stock dewatering and improving of paper parameters. Top former with endless wire is used to be installed above the bottom wire board with the endless wire. Top former is installed on new and reconstructed paper machines as well. It is located roughly in second third of wire board between dewatering foils and suction boxes.

Design

Most important part of Top former is suction box created by three suction chambers with different vacuum capacity and progressively increasing vacuum.

Under second chamber of Top former is under bottom wire installed forming box to improve paper formation. It is provided with adjustable foils which are pneumatically pressed to the wires. Suction box is put behind the forming box and fixes the paper web on bottom wire on place of split the top and bottom wire.

Main parts

- bearing structure in cantilever design (1)
- guide rolls (2)
- wire stretching (3)
- wire guide (4)
- suction box – Top former (5)
- forming box – bottom wire (6)
- showering system (7)
- suction box for wire cleaning (8)
- doctors (9)
- suction box – bottom wire (10)
- wire tension sensing
- collecting troughs (11)
- guards and service bridges

Accessories

- vacuum system
- drive
- control system with control console
- dewatering wire
- mist removing
- equipment for rolls and wires exchange

Advantages

- high dewatering efficiency
- place saving
- improving of paper two-sidedness

Design and work safety are in compliance with EU standards.

### TECHNICAL PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximal wire width</td>
<td>mm</td>
<td>5.100</td>
</tr>
<tr>
<td>Maximal design speed</td>
<td>m/min</td>
<td>1.000</td>
</tr>
</tbody>
</table>
**SHAKER**

**Shaker** is used for better felting of paper and for reaching of higher paper strength. Fibres coming on the wire from headbox are formed in longitudinal machine axis direction. This fact could cause very low cross strength of the paper. But through shaking the wire by the shaker the fibres are formed uneven and an uniform cross and longitudinal strength is then reached.

Favorable results of wire shaking depend on a lot of factors:
- stroke length and shaking frequency
- machine speed
- kind of operated paper stock
- ratio stock outlet speed and wire speed

**Design**
Shaker is used up to maximal speed 350 m/min of the paper machine. Shaker effect is reduced at higher speeds eventually disappears at all. Shaker itself consist of welded box where an eccentric is beard on rolling bearings. The eccentricity values are adjustable.

Size of eccentricity and so stroke size are adjusted by movement of con-rod on main shaft. The value of the stroke is reading able on a scale. The shaker is connected with wire board through a shaker bar. Shaker drive is solved through a variator or electric motor with frequency converter. During shaker operation the stroke size and oscillation frequency should respect diagram put on shaker box.

**Main parts**
- shaker with stand and foundation frame (1)
- V-belt drive: pulley (2), variator or electric motor with frequency converter, safety cover
- hand wheel for revolutions control (3)
- main shaft with lubrication disks (4)
- con-rod - connecting shaker with wire board (5)

**Material**
- shaker box and a stand - weldments of common steel
- con-rod and con-rod head are made from stainless steel

**Advantages**
- high operation reliability
- easy service

Design and work safety are in compliance with EU standards.

**TECHNICAL PARAMETERS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximal power on shaker con-rod</td>
<td>kN</td>
</tr>
<tr>
<td>Stroke length</td>
<td>mm</td>
</tr>
<tr>
<td>Number of double strokes</td>
<td>min⁻¹</td>
</tr>
<tr>
<td>Total machine weight</td>
<td>kg</td>
</tr>
<tr>
<td>Power of electric motor with variator</td>
<td>kW</td>
</tr>
<tr>
<td>Power of electric motor with frequency converter</td>
<td>kW</td>
</tr>
</tbody>
</table>
Pneumatic guides PR are designed for paper machines wires and felts run regulation or for a contingent regulation of other endless belts. The regulation itself consists of a pneumatically controlled sensor with a vane and of a pneumatic circuit. According to the disposition and operating position in a paper machine, the guides are produced in a standard design as is introduced in a chart on the following page. For all guides types, we recommend a pneumatic sensor PR-02-PVW.

**Design**

**Horizontal guide PR-xxxyH** consists of a bearing housing into which a guide roll is bedded. The bearing housing can turn on a bearing pin by means of two pneumatic bellows.

**Vertical guide PR-xxxyV** is almost of the same design as the horizontal one with the only difference consisting in the fact that its lower pneumatic bellow is bigger due to elimination of weight of the roll that is guided.

**Special guide PR-xxxyS** is designed for a wire run regulation in PM wire parts for a guide roll with a doctor.

**Sensor with vane PR-02-PVW**
The pneumatic guide is an actuator which sets a guide roll into a needed position according to the evaluation of sensor impulses. Generally, the sensing element works like a distributor valve forcing the pressure air to enter particular pneumatic bellows. The valve dislocation is due to a vane swinging to the right or to the left from the central position of the longitudinal machine axis. The sensor tip is to be set in its central balanced position during installation by pushing it on the relevant edge of an endless belt.

**Main parts**
- bearing housing (1); pneumatic bellows (2)
- base plate (3)
- pneumatic sensor (4); guide pneumatic circuit (5)

**Material**
- pneumatic bellows (rubber)
- regulator: wet part (stainless steel); dry part (common steel)
- pneumatic sensor (stainless steel)

**Accessories**
- air treatment unit

**Scope of delivery**
- complete machine according to main parts description
- accessories optionally

**Advantages**
- fully automatic operation
- low operating costs
- functionality and reliability in service

Machine design and work safety are in compliance with EU standards.
## TECHNICAL PARAMETERS

<table>
<thead>
<tr>
<th>Environment</th>
<th>Working station</th>
<th>Working wire (felt) width up to 3 m</th>
<th>Working wire (felt) width up to 5 m</th>
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</thead>
<tbody>
<tr>
<td>Wet</td>
<td>Horizontal PR-301WH</td>
<td>PR-301WH</td>
<td>PR-301WH</td>
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<tr>
<td></td>
<td>Vertical PR-301WV</td>
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<tr>
<td></td>
<td>Special PR-301WS</td>
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</tr>
<tr>
<td>Dry</td>
<td>Horizontal PR-301DH</td>
<td>PR-301DH</td>
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</tr>
<tr>
<td></td>
<td>Vertical PR-301DV</td>
<td>PR-301DV</td>
<td>PR-301DV</td>
</tr>
</tbody>
</table>

- **Working stroke guide** mm ± 45
- **Ball diameter in bedding** mm
  - *pr-301wh* mm standard 140 mm 200 mm 220 mm
- **Input air pressure** bar 3 - 5
- **Embracement angle** ° 25 - 35

* *) other type based on customer’s requirements

H = horizontal
V = vertical
S = special

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Horizontal guide PR-301WH

Vertical guide PR-301WV

Special guide PR-301WS

Sensor PR-02PVW
**Wire Stretching in the PM Wire Part**

**Manual Wire Stretching**
An optimal wire tension is one of basic prerequisites for an efficient PM wire part operation. An insufficiently stretched wire may bring a driving roll slippage followed by an abnormal wearing both of the wire and of the driving roll and possibly of the suction couch roll. For an optimal wire performance, that is extended during its operation, it is necessary to compensate the extension. For such purposes, we deliver the wire stretching equipment in two modifications.

**Design**
Wire stretching devices are produced and offered in top and bottom modifications. The equipment itself consists of four consoles mounted on beams or basement rails. Two consoles are provided with hinged levers for fixing of a guide roll, doctor and shower pipe. On two other consoles, there are worm gearboxes hinged and coupled with the levers by motion screws. The gearboxes are linked to each other through a driving shaft. On the gearbox drive side, there is a pneumatic motor installed.

**Control Machines**
The basic stretching is without scanning the tension in the wire (felt). The device can be equipped with a scanner and automatic tension control. This is done subsequently through tensometric scanning sleeves installation under one of the guide rolls of the stretched wire (felt) and a relevant control system.

**Stretching Control**
- Manual - by pneumatic distributor
- Automatic - control board, control system

**Main Parts**
- Consoles (1)
- Worm gearboxes with pneumatic motor (2)
- Levers (3)
- Connecting shaft (4)

**Material**
- Wire stretching equipment is made of stainless steel in two standard sizes:
  - for bearing pitch up to 3,100 mm
  - for bearing pitch up to 5,250 mm

**Accessories**
- Pneumatic distributor / electric push buttons

**Scope of Delivery**
- Complete machine according to main parts description
- Accessories optionally

**Advantages**
- Simple operation
- Reliable and safe operation

Design and work safety are in compliance with EU standards.
Bottom wire stretching system with a wire tension sensor is of a high importance especially during the first days of a new wire operation when the stretching and gradual settling takes place. A sensor controls the optimal tension recommended by a wire supplier during this period.

**Design**
Wire stretching consists of two welded consoles mounted on basement rails. Both consoles are provided with hinged levers for fixing of a guide roll, doctor and shower pipe. Pins connecting consoles with the levers are linked to each other by a connecting pipe intended for a motion coordination of both levers. The motion of levers is induced by pneumatic bellows of different sizes.

**Main parts**
- consoles (1)
- levers (2)
- connecting pipe
- pneumatic bellows (3)

**Material**
Wire stretching is made of stainless steel in two standard sizes:
- for bearing pitch up to 3.100 mm with one pneumatic bellow
- for bearing pitch up to 5.250 mm with two pneumatic bellows

**Accessories**
- control box / automatic unit
- air distribution with proportional valve for connection to automatic unit
- tension sensor

**Scope of delivery**
- complete machine according to main parts description
- accessories optionally

**Advantages**
- longer service life of wire

**Possibilities of stretching control**
- by a manual adjustment of an air pressure supply into pneumatic bellows by a regulating valve and chart located on the control box and according to values shown by a pointer on a scale for lever positions
- by a lever position sensor, tension sensor and programmable automatic unit. The automatic unit controls the air supply into pneumatic bellows by a proportional valve in accordance with the given parameters and a level position linked to the tension sensing
- standard way - fixed part regulation

Design and work safety are in compliance with EU standards.
**Low-pressure shower** NOT is used for wires and felts cleaning and conditioning. They influence considerably the felt and screen life time, PM productivity, the quality of paper produced and the energy consumption.

The showers are divided into following groups according to their function:
- moisturizing
- cleaning
- lubricating
- intensive
- condensing
- flooding
- trimms showering

**Design**

Low-pressure showers are made of stainless steel in three standard versions:
- shower with Ø 57 mm – mounting pitch up to 3.500 mm
- shower with Ø 76 mm – mounting pitch up to 5.500 mm
- shower with Ø 108 mm – mounting pitch up to 7.700 mm

The showers dispose of attached nozzles with a flat jet in sizes 1 to 3 with a distance from the wire or felt of 100 mm. There is a cleaning brush inside of the shower that can be used for cleaning of nozzles and the inner surface of the shower from impurities. There is a head with a manual wheel on the operator side with the standard version that serves for a cleaning brush manipulation and valve opening of the waste water outlet. There is a connection for a water supply on the other side. The pipes have nozzles fixed on them which are pressed or mounted into the pipe.

**Main parts**
- shower with nozzles (1)
- cleaning brush (2)
- water supply (3)
- cleaning brush wheel (4)
- waste piping for sediments outlet (5)
- stands for shower pipe fitting (6)

**Material**
- all parts are made of stainless steel

**Accessories**
- inlet and outlet water hose
- sealing fittings
- stainless piping for water supply

**Scope of delivery**
- complete equipment in accordance with the main parts description
- accessories optionally

**Advantages**
- high cleaning efficiency that ensures right screen and felt function

Machine construction and work safety are in compliance with EU standards.
Clean water requirements
- cleaned = max. water contamination 50 mg per litre
- industrial = max. water contamination 9 – 12 mg SS per litre
- max. SS size 20 µm

SS = suspended solids (insoluble in water)

Shower connection
PAPCEL provides complete shower connection individually or in groups to the machine water distribution system; assembly, startup and operator training included.

Low-pressure shower in the wire part of PM
High-pressure oscillating showers VOT with an electromechanical oscillation are used for high-pressure cleaning of wires and felts in paper machines with clear water under a pressure of 1.0 to 5.0 MPa. This cleaning procedure brings a positive influence on the felt and wire service life (keeping original properties of wires and felts for optimal PM operation), quality of produced paper and energy consumption.

**Design**
The high-pressure shower pipe is made of stainless steel in two standard modifications:
- shower pipe Ø 57 mm (mounting pitch up to 3.500 mm)
- shower pipe Ø 76 mm (mounting pitch up to 5.500 mm)

High-pressure shower pipes are provided with nozzles with a needle jet of 0.84 to 1.75 mm diameter. To provide optimal form of cleaning, their max. distance from the wire or the felt should not exceed 100 mm. Max. pitch of nozzles in connection with the oscillator stroke should not exceed 125 mm. The standard modification is equipped on its control side with a blind flange to enable required cleaning of the inside space and nozzles. A connection for a high-pressure hose is installed on the drive side. Optionally, the shower pipes can be equipped also with a cleaning brush for cleaning of the inside space and nozzles.

**Oscillation control**
A special control mechanism allows any desired adjustment of the shower pipe stroke within the range of the oscillator stroke (max. 250 mm). Adjustment of the feed speed can be done manually (through PM speed values that are entered through keyboard on PM control board) or automatically (the feed rate is directly derived from the PM drive).

The control mechanism enables connections of more oscillating shower pipes to one control panel. This control panel can control also a pump operation, filters in a pump suction and delivery lines and water supply to particular oscillating shower pipes.

It is also comprised of a blocking system and links to particular system groups together with a blockage of PM drive.

**Main parts**
- electromechanical oscillator with a drive (1)
- oscillator holder and shower pipe guiding (2)
- pulleys (3)
- shower pipe with nozzles (4)
- shower pipe conduit holder (5)
- inlet hose with cube (6)

**Material**
- oscillator outer parts, shower pipe and nozzles are made of stainless steel

**Accessories**
- oscillation control
- high-pressure pump
- liquid filter before pump
- high-pressure filter
- shutting and control fittings (electromagnetic or pneumatic)
- high-pressure hoses
- stainless steel piping for high-pressure water

**Scope of delivery**
- complete equipment according to the main parts description
- accessories optionally

**Advantages**
- high washing efficiency without leaving uncleansed spots
- fully automatic operation

Machine design and work safety are in compliance with EU standards.
### TECHNICAL PARAMETERS

<table>
<thead>
<tr>
<th>Nozzle with needle jet (φ v mm)</th>
<th>Water consumption - pressure (litres per min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 MPa</td>
</tr>
<tr>
<td>0.8</td>
<td>1,19</td>
</tr>
<tr>
<td>1,0</td>
<td>1,70</td>
</tr>
<tr>
<td>1,4</td>
<td>2,96</td>
</tr>
<tr>
<td>1,75</td>
<td>4,96</td>
</tr>
</tbody>
</table>

**Requirement for water cleanness**
- max. content of impurities 20 mg NL/l water
- NL = insoluble substances

It is necessary to install a corresponding filter in the HP pump suction line.

**Electromechanical oscillation principle in a relation to the machine speed**

The shower pipe oscillation runs discontinuously as required. The shower pipe motion (oscillation) is carried out by an electromechanical oscillator.

The basic part of the electromechanical oscillator is a motion screw transmitting a rotary motion into a linear one. In the end positions, the motion reverses, which brings linear motion of the oscillator piston rod backwards.

Speed of this shifting can be calculated as follows:

\[
V_{osc} = (V_{machine} \times \phi_{nozzle}) / \phi_{wire (felt)}
\]

This brings shifting (stroke) by a nozzle diameter per a wire (felt) rotation which causes very intensive washing without leaving any uncleansed spots. The oscillator introduces a compact encased device preventing water penetration into the working space. Its outer parts are made of stainless steel. The retractable piston rod of the oscillator is protected against coarse impurities by a collar. On both sides the shower pipe is resting on rollers bedded in self-lubricating bushing of stands. One of these stands serves also as an oscillator holder. Fitting dimensions of both stands are identical allowing installation of the oscillator both on the drive side and on the control side. The oscillator is connected with the shower pipe by a sleeve.

**Technical data of oscillation**
- oscillator stroke 250 mm
- shifting speed according to PM speed and wire or felt length
- drive 250 W, 380 V, 50 Hz

**Pneumatic oscillation principle in relation to the machine speed**

The basic part of the oscillation system is a pneumatic cylinder which enables lifting of the rod from 1 to 250 mm.

To make cleaning more efficient a control valve is used to control the speed of the pneumatic cylinder.

**Shower tube connection**

PAPCEL offers complete installations of individual shower pipes, or of their groups with connections to PM clear water distribution system incl. assembly, commissioning and training of operators.
Threading and trimming water jets is designed for trimming of paper web edges in the PM wire part and for making a tail for its threading in a PM press and drying parts. It is also used for fast paper web cutting in case of a web break. A standard design consists of one threading water jet (in case of the web break) and two trimming water jets.

Threading water jet (in case of the web break) is controlled by an electric motor and an electro-magnetic clutch with a possibility of a manual control by a hand wheel. It allows to thread the paper web from the PM wire part to the press part and to cut the paper web in case of its break. The threading tail width of the paper web can be set by means of inductive sensors as required.

Trimming water jets are intended for a paper web trimming to a required size. They can be adjusted manually within a certain range.

Design
Basic part of threading and trimming water jet is formed by linear rails with a carriage. Threading and trimming water jet is attached to the carriage that can move on rails. It is driven by a toothed belt gearing and a worm-gear electric motor, coupled through an electromagnetic clutch intended for its uncoupling, if necessary. Threading and trimming water jet can be then controlled manually by a hand wheel. The feed rate can be regulated by a frequency converter depending on the PM operating speed. The movement is monitored by four inductive sensors. Two of them are pre-set to the given threading tail width and the other two are used for protection in end positions. An electric control unit of the threading and trimming water jet is located according to customer's requirements.

Threaded and trimming water jets are provided with removable nozzles with needle-shaped jet. The nozzles distance from the wire is to be set according to the given paper stock.

Pressure water supply hose for the threading jet is placed inside of an energy chain. The whole equipment is mounted on stands on the main beams of the PM wire part.

Main parts
- linear guides - beam with V-belt pulleys and toothed belt (1)
- worm gearbox (2); electromagnetic clutch
- trimming water jets (3)
- threading water jet with a moveable carriage (4)
- water distribution to threading and trimming water jet
- manual drive (5), inductive sensors, guards (6)
- stands with coupling to wire part (7)

Material
- bearing structure and guards are made of stainless steel
- linear rails - aluminium alloy and common steel

Accessories
- automatics intended for el. motor connecting of threading water jet
- possibility of automatic paper format setting

Scope of delivery
- complete equipment according to main parts description
- accessories optionally

Advantages
- easy operation
- simple installation

Machine design and work safety are in compliance with EU standards.
### TECHNICAL PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper web width</td>
<td>up to 5.000 mm</td>
</tr>
<tr>
<td>Feed speed of threading water jet</td>
<td>adjustable by means of frequency converter upon customer's request</td>
</tr>
<tr>
<td>Electric motor</td>
<td>kW / W / rpm 0,37 / 380 / 89 (resistant against wet conditions)</td>
</tr>
<tr>
<td>Electromagnetic clutch</td>
<td>V / A 24 / 1,24 (air gap between discs 0,3)</td>
</tr>
<tr>
<td>Adjustment of threading paper tail</td>
<td>mm min. 80 / max. 500</td>
</tr>
<tr>
<td>Adjustment of trimming water jet</td>
<td>mm min. 0 / max. 270</td>
</tr>
<tr>
<td>Supply: clear industrial water - 2x pressure and consumption according to the produced material</td>
<td></td>
</tr>
</tbody>
</table>
Coach agitators CA are designed for continuous mixing, pulping of paper broke and trimms from paper machine. Coach agitator is usually located under coach roll and on the beginning of the press part. Operation output of coach agitator depends mainly on paper width, output and kind of operated paper stock on paper machine.

**Design**

The agitating equipment itself with flange can be beard in stainless steel welded or concrete tank which is covered by welded stainless steel sheets. Particular sizes of the agitators differ by number of tearing paddles and their size, shaft design, sealing unit and tank size.

Sealing unit is sealed on both sides by sealing rope or double mechanic sealing. In case of bad access to the agitator is back part of the bearing replaced by sliding bearing. There’s put a screen on bottom discharging part of the tank. Screen is perforated with holes or slots.

**Main parts**

- tank (1)
- basic bearing body (2) with sealing or bead bearing
- bearing body drive (3) with sealing
- double mechanic sealing or rope sealing (4)
- electric gearbox (5)
- flange for level sensor (6)
- discharge with screen (7) (slots, holes)
- shaft with tearing and doctoring paddles (8)

**Material**

All parts coming in touch with stock are of stainless steel.

**Accessories**

Main accessories:

- control valve for sealing water inlet
- chute with shower pipe
- part of inlet pipe for diluting water

Auxiliaries:

- level sensor
- consistency measurement
- control and closing armatures
- pipe line
- pump
- frequency converter
- break sensor

**Advantages**

- efficiency of operating organs
- simple service and machine operation

Design and work safety are in compliance with EU standards.
## TECHNICAL PARAMETERS

<table>
<thead>
<tr>
<th>Machine type</th>
<th>PM width (mm)</th>
<th>PM capacity (t/h)</th>
<th>Tank volume (m³)</th>
<th>Ø D (mm)</th>
<th>Electric motor (kW)</th>
<th>Weight incl. drive (kg) *)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA 3</td>
<td>2.500 - 3.500</td>
<td>3 - 12</td>
<td>6 - 12</td>
<td>800</td>
<td>30 - 45</td>
<td>4.000</td>
</tr>
<tr>
<td>CA 4</td>
<td>3.500 - 4.500</td>
<td>6 - 15</td>
<td>8 - 15</td>
<td>900</td>
<td>37 - 55</td>
<td>5.000</td>
</tr>
<tr>
<td>CA 5</td>
<td>4.500 - 5.500</td>
<td>10 - 25</td>
<td>15 - 25</td>
<td>900 (1.000)</td>
<td>45 - 75</td>
<td>6.000</td>
</tr>
<tr>
<td>CA 6</td>
<td>5.500 - 6.500</td>
<td>15 - 30</td>
<td>20 - 35</td>
<td>1.000</td>
<td>75 - 110</td>
<td>7.000</td>
</tr>
</tbody>
</table>

*) informative weight of coach broke agitator with a steel tank

Coach agitator in PM scheme

Coach agitator in a concrete tank
Horizontal broke pulpers HB are designed for pulping of wet and dry broke from paper and cardboard machines. It is comprised of tank and horizontally arranged pulping elements with a bedding and driving unit.

**Design**

The HB pulpers are designed and delivered according to the given paper sort, paper web width and PM performance. The new rounded shape of the tank increases the pulping process efficiency. A deflector, installed above the pulper rotor, prevents a stock splashing. The pulper stator can be cleaned by a washing water led directly into the functional elements. The output branch of the pulped stock from the output body and the stock discharge branch of the chest are chosen according to actual operating conditions. Unnecessary branches can be closed by blind flanges. The pulper tank is provided with a manhole for an easy access to functional elements.

According to actual conditions the pulper can be completed with a chute and a sliding shower pipe for keeping the broke in a required direction.

Performances shown in the chart apply to a dry broke under the reel and wet broke under presses.

**Main parts**

- welded stainless chest with manhole (1)
- functional elements: rotor (2), vaned rim (3), stator screen (4)
- output body (5)
- V-belt drive with guard (6)
- electric motor on slide rails (7)

**Material**

All parts coming in contact with the stock are made of stainless steel. Output body and functional elements are made of special wear-resistant stainless cast steel.

**Accessories**

- M + C instrumentation
- pumps of pulped stock
- chutes

**Scope of delivery**

- complete machine according to main parts description with drive (standard delivery without electric motor)
- accessories optionally

**Advantages**

- high efficiency of pulping
- low energy consumption
- simple operation
- possible automation of pulping process
- dimensions adapting to actual conditions of on-site installation
### TECHNICAL PARAMETERS

<table>
<thead>
<tr>
<th>Type</th>
<th>Volume (m³)</th>
<th>D1</th>
<th>D2</th>
<th>X (mm)</th>
<th>Y (mm)</th>
<th>Z (mm)</th>
<th>Dry broke capacity (t/h)</th>
<th>Wet broke capacity (t/h)</th>
<th>Electric motor (kW)</th>
<th>Total weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HB-14</td>
<td>14</td>
<td>DN 250</td>
<td>DN 100</td>
<td>3.650</td>
<td>2.860</td>
<td>5.200</td>
<td>6.5 - 9.0</td>
<td>16.5 - 21.5</td>
<td>132</td>
<td>7.160</td>
</tr>
<tr>
<td>HB-20</td>
<td>20</td>
<td>DN 300</td>
<td>DN 100</td>
<td>4.700</td>
<td>2.900</td>
<td>5.130</td>
<td>11.5 - 16.0</td>
<td>29.0 - 39.5</td>
<td>200</td>
<td>9.430</td>
</tr>
</tbody>
</table>

Example of installation (pulping of a dry broke)
Rolls

we produce rolls both for the paper industry and for the other industries with following parameters:

- max. roll diameter 1,800 mm
- max. overall length 8,000 mm
- max. linear pressure 350 kN/m

The rolls are standardly dynamically balanced for the required designed speed. For long slim rolls, we use a method of dynamic roll balancing in more levels. Rolls, operating as pressure vessels (with internal overpressure), are designed and tested in compliance with EU standards. If required, the rolls are delivered with corresponding certificates.

List of the rolls produced for the paper industry

- guide rolls for wire, press and drying parts (made of steel, grinded, with a rubber cover, copper-plated, chrome-plated, plasma-sprayed)
- deflocculation rolls for headboxes
- segment rolls for rewinders (made of aluminium alloy)
- breast rolls
- driving rolls with a rubber cover for wire parts
- forming rolls for a Crescent former
- press rolls (incl. rolls for JUMBO presses) with blankets and internal cooling system
- drying cylinders
  - made of cast iron or welded
  - chrome plating included
  - fix or free rope pulleys included (possibly with rope grooving)
- size press rolls - incl. covers in accordance with the sizing agent and pressure
- carrying rolls of a rewinder, plasma spraying included
- carrying rolls of a reel - made of cast iron or welded (carbon or stainless steel)
- reel spools - incl. covers (polyurethane, rubber)

Rolls types

- with hot-pressed cast ends and with pressed-on steel pins
- with hot-pressed steel pins or pins fixed through freezing
- with bolted ends

Design

The company produces rolls, cylinders and cylindrical bodies in all known design modifications, such as:

- massive rolls
- rolls made of weldless thin-walled and thick-walled tubes
- rolls made of grey cast iron
- roll-bended
- cylindrically grinded or crowned

Material

- depending on customer’s request
- according to the load

Machine design and work safety are in compliance with EU standards.
Rolls can be delivered with following coatings and covers:
- rubber or polyurethane cover, teflon cover, copper plating, ceramic cover, hard chrome plating or high-grade steel coating (stainless steel, type 13 % Cr, chrome-nickel steel, chrome-nickel-molybdenum steel, tungsten-carbide etc.) according to special requirements
- we provide rolls with particular coating and covers as blind-bored, grooved or with combined surfaces

Special roll surfaces can be provided also through subdeliveries by reputable and specialized roll manufacturers within the scope of delivery and based upon previous agreement with the customer.

Servicing
For all mentioned rolls (made or by PAPCEL or other manufacturers), we provide repairs, overhauls and replacements of roll pins and also coating of necks, grinding of roll surfaces and also new covers. The service is offered completely, i.e. from dismantling of the roll through its repair. For all rolls, we produce and deliver also the bedding for oil and grease lubrication.
The paper pressing is the last process to extract mechanically the water in the PM line. There is a wide range of presses (having one or more pressing zones) used for such a purpose which when optimally combined create an adequate press part.

The adequate press part must respect the machine performance, speed (the way of paper threading), given product and the way of felts and rolls removal.

Standard technical parameters of the press part:
- operational speed up to 1,000 m/min (tissue 1,500 m/min)
- operational width up to 6,000 mm
- felt tension up to 5 kN/m

Material design:
- common steel
- common steel wrapped by an anti-corrosive metal plate
- stainless steel

Offered range of presses:

Standard presses
(NIP width 20 – 30 mm, pressure up to 150 kN/m)
- single-felt
- double-felt
- double-felt with a suction roll

Press part with continuous presses

Press with two pressing zone:
Combi press
(pressure up to 110 kN/m)
- with a smooth central roll
- with a suction central roll

Press part with Combi press and continuous press
Press with extended pressing zone "JUMBO"
(NIP width 60 – 75 mm, pressure up to 350 kN/m)
- single-felt
- double-felt

Shoe press with extended pressing zone
(NIP width 200 – 250 mm, pressure up to 1,000 kN/m)
- Single shoe press
- Double shoe press
- Triple-NIP
**Press with extended pressing zone “JUMBO”** is constructed as a double-roll press with a hydraulic loading of the upper press roll. Usually it is used as the last press before the web enters the PM drying part.

**Design**
The load bearing structure is designed with regards to a high static and dynamic stress and it is adapted for an easy felt exchange and press rolls removal.

The press rolls with a modern construction design are embedded in double-row spherical-roller bearings in bearing housings which enable a grease or central oil lubrication depending on the speed and load. A necessary part of the roll equipment is an inner cooling system for the roll cover temperature stabilization. The roll cover is made of highly elastic rubber with high mechanical and heat resistance. Due to these characteristics, the pressing zone of the “Jumbo” press is extended. The cover is crowned in accordance with the roll flattening and operating linear load calculation. There are blind bored holes to drainage water during pressing.

Both rolls are suited by press felts, each of them designed individually according to the speed, linear load and the assortment produced. An essential part of the press is the regulation and felt stretching and conditioning system.

There is a double-motor drive, i.e. each press roll has its own drive unit. An electric part of the drive, control and manipulation system (control panel included), loading hydraulic system of the upper press roll and paper threading form a part of the machine.

**Main parts**
- bearing structure (1)
- press rolls and embedding (2)
- press rolls cooling device (3)
- hydraulic drive (4); machine control (5)

**Material**
- the bearing structure and guide rolls are made of common steel
- the press rolls embedding is made of cast iron
- press rolls coating – Kraft Master II

**Accessories**
- roll removal equipment
- “Jumbo” press drive (mechanical and electric part, control included)

**Scope of delivery**
- complete machine in accordance with the main parts description
- accessories optionally

**Advantages**
- extended pressing zone
- increase of the dryness after the press part

Design and work safety are in compliance with EU standards.
Example of a calculation using the Finite Element Method (press roll load)

"JUMBO" press installation in PM
Shoe press is located in the PM press part. It belongs to the group of presses with an extended pressing zone. The load is controlled from 0 kN/m to the maximum load.

**Design**
The press roll has a bending compensation through a hydraulic system or a classic press roll with crowning. The shoe press is equipped with a stationary beam on which a set of hydraulic cylinders is attached. These cylinders press down the “shoe” to the rotating flexible blanket. The shoe profile is influenced by the shape of the upper loading roll. A rotating elastic blanket of the lower roll slides over a thin oil layer. Because of the hydraulic cylinders set and hydraulic unit design, it is possible to control the cross profile of the paper. It is used as a final press that is able to reach 35 – 40 % dryness when the dryness at the entrance is about 45 – 52 %.

**Main parts**
- bearing structure (1)
- press roll (2)
- shoe press roll (3)
- hydraulic system for the upper press roll
- hydraulic system for the lower press roll
- safety guards

**TeCHNICAL PARAMETERS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum roll length (mm)</td>
<td>5,100</td>
</tr>
<tr>
<td>Maximum bearing distance (mm)</td>
<td>6,350</td>
</tr>
<tr>
<td>Maximum linear pressure (N/mm)</td>
<td>1,000</td>
</tr>
<tr>
<td>Maximum design speed (m/min)</td>
<td>1,000</td>
</tr>
</tbody>
</table>

**Accessories**
- drive
- control system and control panel
- assembly tools and tools for the regular exchange of the elastic blanket
- central lubrication and hydraulic aggregate

**Advantages**
- high dewatering efficiency
- saving of operating costs – energy saving in the drying part

Machine design and work safety are in compliance with EU standards.
Suction tubes

Suction tubes are used for a mechanical or chemical cleaning of PM wires and felts. By means of an underpressure, it sucks out the given cleaning medium (water, chemicals) that is consequently led through suction piping outside the paper machine. This way of cleaning brings an increased quality of produced papers and at the same time a reduction of energy consumption and, last but not least, longer service life of wires and felts.

Design

Suction tubes can be produced in two modifications:
- single or double grooved - for felt cleaning,
- technological suction tubes - used for air extraction from the space between a paper web and the felt which brings an improved adhesion of the paper web on the felt.

Felt suction tube

Felt suction tubes are made of stainless steel, its lining can be made of plastics or ceramics. Suction tube is provided with an adjustable suction slot and adjustable suction width by means of sliding gates. On the control side, there is a blind flange with a vacuum meter, on the drive side, there is a flange for coupling of a pipeline to a vacuum pump. The own body is bedded in split collars and attached to the bearing structure. It is height-adjustable in order to set its optimal position against the felt. Suction tubes for cleaning are installed on felts or wires from the paper web side in places where there is no contact with the paper web. In case of permeable felts (1st press), there is a single, double or multi-grooved suction tube installed, for heavier felts (2nd and 3rd press), we recommend to use two suction tubes installed in series where a spacing between them should not exceed 0,5 m.

Technological suction tube

Technological suction tube is used especially in the press part in front of a nip of the actual press. When touching the felt, the paper web can close up a certain part of the air which, after going through the nip, causes paper web breaks or a paper web fold. These defects are prevented by the technological suction tube that sucks the unwanted air through the felt. The structural design of the tube depends on its position. When placed very close to the nip, the suction tube with a “nose” shape is used. In case of a longer distance from the nip, the shape of the suction tube can match the suction tube used for a felt conditioning.

Main parts

- suction tube body (1)
- suction tube lining (2)
- sliding gates (3)
- blind flange with vacuum meter (4)
- rotary flange on drive side (5)
- bolts for attachment to bearing structure (6)

Material

- suction tube body, incl. flange is made of stainless steel
- suction tube lining - polyethylene, ceramics
- sliding gates - polyethylene

Scope of delivery

- complete device according to main parts description
- we deliver a flange joint including a counter flange and edging ring

Accessories

- separator
- hoses

Advantages

- increased quality of produced paper
- reduced energy consumption
- longer service life of wires and felts

Cross-section areas

- cross-section area of single-grooved suction tube: 80 - 100 % of open slot area
- cross-section area of double-grooved suction tube: 100 - 150 % of open slot area
- cross-section area of suction piping: 70 % of open slot area

Machine design and work safety are in compliance with EU standards.

### Technical parameters

<table>
<thead>
<tr>
<th>Suction slot width</th>
<th>Felt / Technological suction tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>mm</td>
</tr>
<tr>
<td>Underpressure</td>
<td>bar</td>
</tr>
<tr>
<td></td>
<td>0,2 - 0,4</td>
</tr>
</tbody>
</table>
Stretching devices EDS, PDS, HDS are intended for stretching of felts in the press part and drying fabric in the PM drying part. According to the way of exerting force of stretching, the stretching can be pneumatic or electric.

Design

Electric stretching equipment EDS
This equipment consists of a motion screw with sidewalls, beddings and gearbox on the drive side and with the same parts on the service side. Both sides are connected by a shaft between the gearboxes. On the gearbox of the service side, there is a hand wheel installed. By using the wheel and a special wrench, it is possible to align the axis of beddings so that it is perpendicular to the PM axis. On the gearbox of the drive side, there is an overhung geared electric motor which sets both motion screws in motion at a time. By shifting the guide roll, installed in the stretcher bedding, it is possible to stretch or to relieve the felt (or the drying fabric). The protection of end positions is carried out by contactless inductive sensors which stop the engine when reaching one of the end positions.

Control devices
The basic modification of the stretching equipment is without fabric (felt) tension sensing. It can be supplemented with a tension sensing system and automatic regulation of tension forces and accordingly completed with tensometric sensors under one of guide rolls of the fabric (felt) stretched and with a relevant regulation system.

Pneumatic stretching equipment PDS and hydraulic stretching equipment HDS
This equipment consists of two beams (on the service and drive side) with guides and a rack bar. An installed carriage with bearing housing travels on the guides. To provide parallel shifting both on the service and drive side, these carriages are coupled with a connecting shaft and linked to pinions that are engaged in rack bars on the beams. Both carriages can be set in motion by means of two pneumatic cylinders. By shifting the guide roll installed in the stretcher bedding, it is possible to stretch or to relieve the felt. The required stretching value is directly proportional to the air pressure value in the pneumatic cylinders, i.e. it is not necessary to use tensometric sensors, or additional control elements either. The air pressure value can be regulated by a reducing valve in the pneumatic circuit of the stretching equipment.

Main parts

Type EDS
- stretcher body (1)
- connecting shaft (2)
- stretcher drive (electric gearbox) (3)
- bearing housings (4)

Type PDS, HDS
- beam with support (5)
- pneumatic and hydraulic cylinder (6), pneumatic circuit
- bearing housings (7)

Material
- stretching system for the press and drying part is made of common steel, press part stretching can be made according to customer’s request also of stainless steel

Accessories
- tensometric sensors with amplifier of output signal
- hydraulic power unit and control system

Scope of delivery
- complete machine according to main parts description
- accessories optionally

Advantages
- simplicity
- reliability in service

Machine design and work safety are in compliance with EU standards.
**TECHNICAL PARAMETERS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabric or felt tension</td>
<td>kN/m</td>
<td>0 - 5</td>
</tr>
<tr>
<td>Recommended tension force - fabric</td>
<td>kN/m</td>
<td>3 - 5</td>
</tr>
<tr>
<td>Recommended tension force - felt</td>
<td>kN/m</td>
<td>4</td>
</tr>
<tr>
<td>Max. width of belt stretched</td>
<td>mm</td>
<td>4,600, max. stroke 1,500</td>
</tr>
</tbody>
</table>

Electric stretching equipment EDS

Pneumatic stretching equipment PDS, HDS
Doctors are used for cleaning of rolls and cylinders in paper machines. Each doctor is specially constructed to fit an actual application in a PM so that it meets all given requirements – mainly the roll cleaning. Therefore it is not possible to relocate it to other positions, since its function would be violated which may lead even to a roll damage.

Doctor types:
- cleaning
- creping
- breaking

Design
Doctors are usually delivered with blades and blade holders from well-known producers or according to customer’s request. The main emphasis is put on overall functionality and also on a final price.

The doctors are delivered with a blade loading:
- by their own weight and manual control
- using pneumatic cylinders
- using hose blade holders

To improve the scraping effect, the doctors are equipped with an oscillation device. The movement is usually created by an eccentric pin which is located in the electric motor with a gearing device. The device can be delivered with a lubrication tube as well.

Main parts
- doctor beam (1)
- blade holder (2)
- blade (3)
- pins + bedding (4)
- PM fixing consoles (5)

Material
- fully stainless steel version (the wet part of the machine)
- stainless steel parts + covered carrier
- common steel, including anticorrosive paint (the dry part of the machine).

The material quality depends on customer’s request or is made in a standard way of stainless steel and common steel. An oscillating electric motor can be delivered with a protection up to IP 68, pneumatic control cylinders are made of standard aluminum or non-corroding steel.

Accessories
- frequency converter

Scope of delivery
- construction design + devices according to main parts description
- parts for overall control elements connection for the PM control
- independent control panel

Advantages
- efficient and economic scraping function
- elimination of damage roll surface
- longer intervals for regrinding of roll surface

Machine design and work safety are in compliance with EU standards.
Control of doctors

Doctors are supplied with a blade loading by their own weight and manual control or with a loading and shifting by pneumatic cylinders.

In case of doctors with hose holders, their loading and shifting are induced by means of air distribution hoses along the whole blade length. These hoses are an integral part of every doctor construction.

Doctors with down pressure and shifting by means of pneumatic cylinders or doctors with hose holders, are coupled with a control box or a control panel of the paper machine. The control is done manually by pneumatic distributor and the setting of required pressure control by a reduction valve in accordance with data chart on the control box.
Drying part is the longest part of the PM. Its main purpose is to ensure the necessary drying capacity to reach the set PM performance.

The drying parts types (the drying fabrics arrangement criteria):

**Classical (conventional) design**
- drying cylinders (Ø 1250, Ø 1500, Ø 1800) in two parallel rows with an upper and lower fabrics guiding.

**Slalom fabric design**
- drying cylinders (Ø 1250, Ø 1500, Ø 1800) in two parallel rows with one fabric guiding only or a single-row where the lower row is formed by guide rolls (non-heated, with grooves or bores) with complementary stabilization boxes. The main goal of such a setting is a permanent contact between the paper and the drying fabric to prevent breaks. The vacuum cylinders can be connected to the vacuum directly through a shaft on the drive side or form the part of the vacuum together with the stabilization box mounted tightly above this cylinder.

**Yankee cylinder design**
- the drying cylinder itself (Ø 4000) with or without fabric

**Zero cylinder design**
- one drying cylinder of a smaller diameter (Ø 1000) is installed in the beginning of the drying part with a complementary stabilization box.
Recuperation units use the waste heat from the warm and damp air leaving the drying part hood to heat a fresh air destined for the hood ventilation. The recuperation units are an integral part of modern drying parts either delivered or reconstructed and they are supplied by subcontractors.

Drying part hood
The task of hood is to lower the thermal radiation from the drying cylinders into the air, to prevent a damp and warm air leak from the drying part into the hall and to lower the amount of air necessary for the vaporized water from the paper outlet by increasing its total moisture content.

Cleaning of drying fabrics
It prevents the fabric contamination which would cause a wrong dewatering and at the same time through a contact between the guide rolls to a web bundling on their surface which would consequently cause a partial or total damage of the fabrics. The cleaning is performed by subcontractors.

Slitter
It enables a guiding tail slitting into the POPE reel in case of a paper breakage. The device is located at the end of the drying part in front of the cooling cylinder. The slitter is supplied by subcontractors.

Variations of silent drying cylinders’ drives
- a half-silent drive where the driving force from the drive unit of the adequate section is transferred on the last upper and lower cylinder only by a common plugging gearbox. Other cylinders in the lower and upper row are carried away by individual drying fabrics.
- silent drive where the drying part is driven through the guide rolls of the drying fabrics.
- other drying cylinder: motor of the drive is located right on the shaft of the guide roll from the service side.

Paper rope threading
The most common version is a double-rope over the whole drying part. We use an automatic threading ropes stretching, i.e. when the paper is threaded, the ropes are stretched only as necessary so that the machine would run continually. For more details, see a separate leaflet.
Rope threading system is used for automatic paper web threading through the threading ropes from press part via drying section onto the reel of the paper machine.

Design
It consists of set of pulleys, rope stretchers and if necessary rope drive. As next equipment can be used auxiliary chutes and air pipes with nozzles to be placed in transfer points. Two-rope system is applied normally, but for heavier paper kinds three-rope system can be used.

Rope pulleys
Pulleys dimensions (diameter, width, groove depth) depend on machine speed and paper substance weight.

Main parts
- pneumatic rope stretching
- set of pulleys with holders

Material
- standard design is common steel, eventually stainless steel according to customer's inquiry

Accessories
- threading rope drive

Scope of delivery
- complete machine according to the main parts description
- accessories optionally

Advantages
- reliability in service
- easy operation and maintenance

Machine design and work safety are in compliance with EU standards.

Ropes drive is used when the threading ropes do not pass through the drying cylinders or when the web contact is not enough for the rope dragging which might cause slips. The speed of the electric motor is controlled by a frequency converter and is deduced from the speed of a closest suitable roll. The drive is provided with a safety cover.

Leading pulleys
They serve for creating of a threading rope vee guiding (lower depth of a groove) in points of the transfer.

Guiding pulleys
They are designed for threading rope guiding in the machine (higher depth of a groove). They can be produced in a single or double modification.
Rope stretching system
This system is designed for stretching of the threading ropes individually. Its size depends on an overall rope length of a threading circle.

Vertical mechanical rope stretching device
Is done by a system of weights. The system allows rope stretching by a doubled stroke \((L = 2 \times \text{STROKE})\).

<table>
<thead>
<tr>
<th>TECHNICAL PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke (m)</td>
</tr>
<tr>
<td>0.60</td>
</tr>
<tr>
<td>0.75</td>
</tr>
<tr>
<td>0.95</td>
</tr>
<tr>
<td>1.10</td>
</tr>
<tr>
<td>1.25</td>
</tr>
</tbody>
</table>

Vertical pneumatic stretching
Vertical pneumatic stretching is done by pneumatic cylinders controlled by a pneumatic control board. The system allows rope stretching by a quadruple stroke of pneumatic cylinders \((L = 4 \times \text{STROKE})\). Maximum rope stretching stroke (pulleys in end positions) is signalled by magnetic position sensors.

<table>
<thead>
<tr>
<th>TECHNICAL PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke (m)</td>
</tr>
<tr>
<td>0.50</td>
</tr>
<tr>
<td>0.75</td>
</tr>
<tr>
<td>0.90</td>
</tr>
</tbody>
</table>

Horizontal pneumatic stretching
Is done by pneumatic cylinders controlled by a pneumatic control board. The system allows rope stretching by a quadruple stroke of pneumatic cylinders \((L = 4 \times \text{STROKE})\). Maximum rope stretching stroke (pulleys in end positions) is signalled by magnetic position sensors.

Advantages of the pneumatic rope stretching
Continuous and easy setting of the necessary force of the threading ropes and a possibility of a force release when the paper is threaded in a fully automatic device.
Size press is made as two-roll press with hydraulic or pneumatic loading. Press rolls are settled horizontally and its movable roll (first roll in paper run direction) is arranged under the stationary roll.

Design
The rolls are dynamically balanced on demanded speed and can be covered with different coats (rubber, ceramics) depending on produced kind of paper and type of sizing agent. The sizing agent proceeds through distribution pipes between the rolls and retained by outside dams. Volume of sizing slurry can be controlled through set of valves, which are regulated either manually or electric-pneumatically. Paper web proceeds through the bath to be sized. Sizing agent surplus is led through system of waste troughs and pipes back to the working station. Roll surface coming not in contact with paper web and front parts of the rolls are cleaned by set of side and front doctors.

Paper can be sized according to demand on both or one side only in the sizing press. Paper web run through the size press is modified by use of shifting unit of inlet guide roll. After sizing the paper is led through guide roll under pressing part onto spreader roll, which spreads the paper web across its width before inlet to the after-drying part (usually on a pair of drying cylinders with chrome-plated surface).

System of threading ropes is part of the size press and its design enables save feeding of the paper web from previous to the following drying section of the paper machine.

Main parts
- bearing structure consisting of particular stands fixed by bolts and locks together (1)
- stationary press roll with bearing (2)
- movable press roll with bearing (3)
- shifting equipment
- paper guide rolls (4)
- side and front doctors (5)
- spreader roll with drive (6)
- size agent inlet (7)
- size agent outlet (8)
- hydraulic circuit; control console; pneumatic circuit
- safety covers and foot bridges (9)

Material
Bearing structure and the rolls are made of common carbon steel. Size agent inlet and outlet parts are of stainless steel.

Accessories
- rope threading
- size press drive (mechanic and electric part including control)
- system of sizing agent preparation

Scope of delivery
- complete machine according to description of main parts
- accessories according to customer’s inquiry

Advantages
- high sizing efficiency
- high operational reliability
- small space demands

Design and work safety are in compliance with EU standards.
Paper surface treatment

- Surface sizing - to get an effective quality improvement of produced paper and reduce sizing agent consumption due to their better retention (compared to sizing in substance)
- Surface treatment by special agents - to reach hydrophobic, greaseproof properties etc.
- Surface dyeing - costs saving compared to dyeing in substance, reaching of special color effects and reducing of waste water pollution
- Thin layer of special coats - thermoplastics, pigments, clays etc.

We offer complete overhauling and rebuilding of size presses and their parts besides production of new ones.
Film press (application press) is put directly in paper machine after pre-drying section. It is made as two roll press with inclined presses axis. The load is deduced through lever mechanism with hydraulic or pneumatic pressure. The pressure is controlled according to technological demands from 0 kN/m to maximal load.

Coated medium (for instance mixture of starch, sizing agent, AKD, pigment etc.) is transported to dosing chamber and proceeds to the calibrating space. Amount of applied starch on paper surface is here calibrated by use of profiled bars.

**Design**

Press rolls are designed on maximal load and dynamically balanced on demanded speed and covered with special coats depending on produced paper kind. Bearing structure is made of common or stainless steel according to customer's inquiry. Profiled bars have diameter 10 - 38 mm and are made from stainless steel with chrome plated cover.

**Main parts**
- bearing structure (1)
- stationary press roll (2)
- movable press roll (3)
- coating head with profiled bar (4)
- paper guide roll
- sizing agent supply (5)
- sizing agent outlet
- hydraulic and pneumatic system (6)
- safety guards and machine foot bridges (7)

**Accessories**
- press rolls and profiled bars drive
- control system incl. control console
- paper rope threading
- system of sizing agent preparation consisting of:
  - working station
  - starch kitchen
- cross knife before film press
- air blowing (spooner) after film press
- infra - drying
- retaining tank under film press

**Paper surface treatment**
- surface sizing - to get an effective quality improvement of produced paper and reduce sizing agents consumption due to their better retention (compared to sizing in substance)
- surface treatment by use of special agents - to reach hydrophobic, greaseproof properties etc.
- surface dyeing - costs saving compared to dyeing in substance, reaching of special color effects and reducing of waste water pollution
- thin layer of special coats

**Advantages**
- bigger thickness of coated layer compared to standard size press
- savings of operating costs - energy saving in after-drying section due to sizing at higher concentrations
- high operating reliability
- replacing of size press for speeds higher than 650 m/min.

We offer complete overhauling and rebuilding of film presses and their parts besides productions of new ones.

Design and work safety are in compliance with EU standards.
## TECHNICAL PARAMETERS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axis height of stationary press roll</td>
<td>1.800 mm</td>
</tr>
<tr>
<td>Diameter of stationary press roll</td>
<td>1.010 mm</td>
</tr>
<tr>
<td>Diameter of movable press roll</td>
<td>1.005 mm</td>
</tr>
<tr>
<td>Maximal roll width</td>
<td>5 m</td>
</tr>
<tr>
<td>Maximal design speed</td>
<td>1.000 m/min</td>
</tr>
<tr>
<td>Maximal linear load</td>
<td>40 kN/m</td>
</tr>
<tr>
<td>Sizing</td>
<td>up to 4 g at dryness 10 - 15%</td>
</tr>
</tbody>
</table>

*) valid for rolls up to 3 m width

Profiled bars in bracket

Press roll with application head
Soft calendar is a machine usually installed at the PM line end before the reel. It is designed for one-sided or both-sided glazing of paper webs for production of fancy and graphic papers. There is a steam box installed before the calender which provides improved smoothness of the paper surface.

**Design**

The soft calender is standardly produced as a four-roll two-NIP press or as a double-NIP with three rolls. Each NIP provides combination of an oil-heated thermo roll and a swimming S-roll with a continuously adjustable bending according to the actually induced load.

At one-sided web glazing, both rolls are placed either up or down according to the side being glazed. At double-sided web glazing, the thermo roll is placed up in the first NIP and down in the second NIP.

Each roll is equipped with a swinging doctor. Swimming roll edges are monitored by thermo-cameras that provide signals for cooling of surfaces in question to keep their temperatures constant and to reduce the temperature of the roll cover in order to assure its longer service life. Before each pressing zone, there is a spreader roll providing optimal transverse tension of the paper web. The paper web, leaving the PM drying part, goes through a steam box to the first spreader roll providing the cross web stretching before its entry in the first NIP. Afterwards, the paper web goes over its web guiding roll to the second spreader roll where it is stretched before its entry into the second NIP.

**Main parts**

- supporting structure (1)
- thermo-roll (2), S-roll (swimming roll) (3)
- swinging doctors (4); roll edge cooling system (5)
- temperature measuring elements (6); enter elements for dissipation of static electricity
- spreader roll (7), web guiding roll with bedding (8)
- web tension sensing system; hydrostatic drive
- pneumatic distribution line; machine covers

**Accessories**

- air distribution elements with fan for roll edge cooling
- heating station of thermo rolls
- soft calender drive and steam box

**Scope of delivery**

- machine in accordance with main parts description
- accessories optionally

**Advantages**

- easy installation and assembly
- simple routine maintenance

Machine design and work safety are in compliance with EU standards.

**Supporting structure**

Through its design this supporting structure, comprising particular stands made of structural steel, minimises operating vibrations. Individual stands are mounted to each other by strengthened bolt connections and adapted to provide safety handling during on-site installation by a crane or other lifting devices. This supporting structure is designed to provide maximum machine rigidity both at standstill and running.

**Thermo-rolls**

The soft calender is equipped with two thermo-rolls that can be heated up to 180°C. The roll surface is protected with a special cover to provide an optimal paper web smoothness. Both thermo-rolls are put in bearing bodies with a spherical roller bearing on the drive side and with a roller bearing, type CARB, on the operating side. All bearings of the thermo-rolls are lubricated through a central lubrication system.
**Technical Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating speed</td>
<td>m/min</td>
<td>1,000</td>
</tr>
<tr>
<td>Linear pressure</td>
<td>kN/m</td>
<td>300</td>
</tr>
<tr>
<td>Max. web width</td>
<td>mm</td>
<td>3,000</td>
</tr>
<tr>
<td>Thermo-rolls diameter</td>
<td>mm</td>
<td>710</td>
</tr>
<tr>
<td>S-rolls diameter</td>
<td>mm</td>
<td>555</td>
</tr>
<tr>
<td>Thermo-roll temperature</td>
<td>°C</td>
<td>180 (220)</td>
</tr>
</tbody>
</table>

This equipment can be supplied also according to the customer’s request with different parameters.

**Roll edge cooling system**

This system is designed for S-roll edge cooling in order to avoid different temperatures on the roll cover due to contacts between the paper web and the thermo-roll. This roll edge cooling system comprises two fans that can be switched independently or concurrently as necessary. Behind the fans there are a water cooler and distribution piping of individual beams. There are blowers (air nozzles) on these beams installed with pneumatic cylinders used for opening or closing of the air supply line according to the actual S-roll surface temperature.

**Temperature measuring elements**

Due to different temperatures on the S-roll cover resulting from the contact between the paper web and the thermo-roll, it is necessary to monitor the zone in question. Therefore, the cross beam is provided with thermo-cameras.

**Elements for dissipation of static electricity**

A discharge electrode is used for active discharging of electrostatic faults during production and they work with voltage of 8 kV AC. Because of various profiles of surface charges, the electrodes are designed for charges of both polarities. The discharge electrode is connected to a high-voltage power-supply unit.

**Spreader roll**

This spreader roll is intended for paper web stretching in its cross direction before its entering the soft calender pressing zone. An actual roll deflection can be adjusted by means of a worm gear.

**Web guiding roll with bedding**

The paper web guiding roll is attached to the calender’s supporting structure. It is designed for paper web guiding from the first NIP toward the spreader roll. The roll surface is chrome-plated and the chrome layer thickness is up to 80 µm.

**Web tension sensing system**

The system comprises tensometric sensors installed under the web guiding roll beddings, located in front of and behind the soft calender. The sensors are used for a web tension evaluation and adjustment.

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**S-roll (swimming roll)**

The soft calender is equipped with two S-rolls with coating. Each S-roll is powered by toothed belts being stretched by a bolt. Its pinion is bedded in a bearing body equipped with two spherical roller bearings.

**Oscillating doctors**

Oscillating doctors are designed for surface cleaning of thermo-rolls and floating rolls. Their oscillating motion is based on shearing actions of the doctor blade across the roll surface. The total travel (stroke) is 19 mm at frequency of 12 cycles/min. Any regular motion of a doctor brings improved doctoring and removal of particles settled between the blade and the roll. Concurrently, it eliminates possible roll surface damage. This swinging motion is induced by an electric front gearbox.
Hydraulic reels HN with a supporting drum, type POPE, are intended for paper web reeling. The paper web is reeled up at constant speed on a roll - the reel spool. The reel spool revolutions depend on down pressure induced by the carrying cylinder which is driven either by a geared electric motor or PM transmission.

**Design**
The supporting drum can be made of cast iron or completely welded of structural carbon or stainless steel. Between stands there is a doctor with electromechanical oscillation installed for surface cleaning. On the PM control side, there is a fixed or free rope pulley according to the paper threading system into the reel. The supporting drum is equipped with an internal cooling system used for the paper web cooling coming from the PM drying part.

Tilting arms are operated hydraulically and they are mechanically coupled to keep their mutual positions and providing a uniform run. The loading levers are designed in the same way which as an addition can regulate the reel spool loading on the supporting drum for each lever separately. In the end position, the reel spool is stopped by hydraulic dampers and braked by disc brakes. A great emphasis is put on work safety during the reel operation. The reel is designed so that an access to dangerous spots and to squeezing points (between the reel spool and supporting drum) is prevented. Control of all reel functions can be done through the control board either in manual or fully automatic modes.

**Main parts**
- bearing structure (1): two steel-welded boxes, two stands with beams and prismatic guides for reel spool rolling
- supporting drum with rope pulley (2) (stationary or floating)
- supporting drum bedding (3)
- supporting drum cooling system (4)
- tilting arms (5) for attachment of empty reel spools
- loading levers (6) attached to basement rails of the reel
- doctor with oscillation (7)
- damper of wound paper reel with a brake (8)
- reel spool starter (9)
- reel spool magazine (10)

**Material**
The main material is common steel, supporting drum coat can be done according to customer's request (cast iron, structural steel, stainless steel).

**Accessories**
- machine control
- machine guards (11)
- service bridges, hydrostatic drive, pneumatic circuit

**Scope of delivery**
- complete machine according to the main parts description
- accessories optionally

**Advantages**
- simple operation
- possibility of fully automatic operation
- adjustable hardness of paper web winding

Machine design and work safety are in compliance with EU standards.
**TECHNICAL PARAMETERS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. winding diameter</td>
<td>mm</td>
<td>3,200</td>
</tr>
<tr>
<td>Supporting drum diameter</td>
<td>mm</td>
<td>900 - 1,100</td>
</tr>
<tr>
<td>Max. reel speed</td>
<td>m/min</td>
<td>1,000</td>
</tr>
<tr>
<td>Max. paper web width</td>
<td>mm</td>
<td>4,600</td>
</tr>
</tbody>
</table>

Equipment with different parameters optionally, depending on the customer.
Rewinder is used for rewinding and longitudinal slitting of the paper web from the paper machine reel spool into paper rolls of required sizes.

Design

The winding part of the machine consists of two rolls, each of these carrying rolls has its separate drive. A hydraulically controlled ejector of the reeled up rolls and hydraulically controlled cross cutter, which separates the paper web from the wound up roll, are installed in the first carrying roll bedding in the paper web run direction. The carrying roll guard bedding is done in the same way on the second roll, it is controlled pneumatically and serves for a safer roll manipulation in the area between the tilting table and the smooth carrier roll. Both rolls are dynamically balanced according to the required winding speed. Surfaces of both rolls are plasma-sprayed. Both carrying rolls are driven by AC variable-speed motors. The paper roll is laterally guided by mandrels that are pneumatically lifted or dropped down. They are retractable hydraulically or pneumatically. Every paper roll, while being reeled up, is pressed down from the top by a rider roll, its loading is controlled according to diameters of the paper roll while being reeled up. In the top position, the rider roll is locked.

The slitting section of the machine is arranged according to required width of strips to be cut, max. operating speed and type and width of the paper web. It is controlled pneumatically or electro-pneumatically on principles of so-called shears slitting with a tangential slit or a slit with embracement on the slitting roll. The machine is equipped in front of and also behind the slitting section with spreader rolls used for correct paper web guiding and cross stretching in the input part just before cutting and when coming to carrying rolls. These spreader rolls are installed on feeders for an optimal adjustment of the paper web run. The slitting section comprises also a device for direct measuring of the paper web tension located on the guide roll with its constant embracement by means of which the required tension of the reel can be controlled. In the slitting section, there is also an equipment for a dust exhaustion which significantly reduces the amount of impurities on the paper surface.

The paper web threading system serves for a transfer of the paper web from an unwinding stand through transfer, spreader and guide rolls, the slitting section and its spreader roll up to the space between carrying rolls of the rewinder. It comprises V-belt conveyers, chutes, air nozzles, clamping roll device and underpressure system with a sucking of the paper web onto the first carrying roll of the rewinder.

The unwinding stand is arranged as a twin frame with two stands on which reel spool beddings with locking levers and an ejector of empty reels spool, combined with hydraulic dampers on ends of unloading arms, are installed. The brake for unwinding is manufactured either with an AC generator motor, a pneumatic disc brake with air or water cooling, or a drum brake. A clutch installed between the brake and the reel spool is equipped with a grooved shaft on which the coupling part is pneumatically displaced in dependence on the reel spool carrier. The entire unwinding stand is equipped with a cross and longitudinal feed for correct adjustment of the paper web run when entering the machine.

The machine can be also delivered with a complete electric installation, including the control system, automatic paper web threading system, equipment for dust exhaustion from the paper web surface, equipment for suction of trimmings in the slitting section, and reel spools. Besides production of new machines, the company offers also complete overhauls and reconstructions of rewinders and their parts.

Machine design and work safety are in compliance with EU standards.
Main parts
- bearing structure - individual stands made of profile steel, attached to each other by fixing bolts and locks (1)
- supporting rolls (2)
- pressure roll (3)
- core clamping mandrels (4)
- paper rolls ejector (5)
- tilting table (6)
- spreader rolls (7)
- slitting section (8)
- paper web threading (9)
- unwinding stand (10)
- machine hydrostatic drive
- machine pneumatic circuit
- machine electric part (switchboard boxes, cabling, control board)
- control system incl. software
- machine guards
- machine drive (11)

Accessories
- equipment for suction of trimmings
- automatics for paper web threading
- equipment for dust exhaustion
- reel spools with rubber or polyurethane cover
- automatic roll core threading
- cross knife
- vacuum on a grooved carrying roll
- barrier increasing safety of reel spools handling on unwinding stand
- central lubrication system

Scope of delivery
- machine according to main parts description
- accessories optionally

Material
- bearing structure - common steel
- roll coats - common steel with a surface treatment

Advantages
- good price - productivity ratio
- high quality of rewound paper rolls
- high quality slitting
- reliability in service

TECHNICAL PARAMETERS
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basis weight of paper web to be rewound</td>
<td>g/m²</td>
</tr>
<tr>
<td>Max. working speed</td>
<td>m/min</td>
</tr>
<tr>
<td>Max. unwinding diameter</td>
<td>mm</td>
</tr>
<tr>
<td>Max. winding diameter</td>
<td>mm</td>
</tr>
<tr>
<td>Max. paper web width</td>
<td>mm</td>
</tr>
<tr>
<td>Min. slitting width</td>
<td>mm</td>
</tr>
</tbody>
</table>

An equipment with different parameters can be delivered optionally.