

Washing



BRUGMAN
HOLLAND

Founded in 1954 Brugman has become one of the world's leading manufacturers of wet-pre-treatment machines for woven fabrics. Since 2002 Brugman belongs to the Vanwyk Group of companies. With a head office and production facilities in the Netherlands, and a sales and service centre in China, we deliver machinery to textile manufacturers all over the world. Through the years Brugman introduced various innovative developments to the market. The combination steamer, light weight fabric guiding rollers, the Brubo-matic bearing and sealing construction, UNIPAD squeezing rollers and the bleach-o-matic are examples of such innovations. Research and development is carried out in close co-operation with research institutes, customers and chemical suppliers and is always aimed at practical solutions. Brugman machines are well known for their reliability, robust construction, low maintenance requirements, ease of operation and value for money.



Washing by Brugman

The demands of the market are frequently changing. Brugman has always responded to this with various innovations. A good example is the development of the revolutionary Brubo-Matic open width washing machine. This machine gives excellent washing results across the broad spectrum of woven fabrics. It is also beneficial for plant economies: the Brubo-Matic is efficient, reduces costs and is user friendly. Even under the highest production pressure the machine runs extremely smooth and is always available. The Brubo-Matic is suitable for all washing applications. For applications requiring relaxation the Brubo-Dwell has been developed.

The Brugman Brubo-Matic washing range has the following characteristics:

- excellent washing efficiency
- extremely sturdy construction
- quiet running
- low energy consumption
- ease of operation
- maximum contribution to environmental issues
- fully automated
- low maintenance requirements
- quick and simple installation



Excellent washing efficiency

Together with the Dutch Textile Research Institute TNO, Brugman has studied washing performance to determine the best philosophy for the Brubo-Matic design. Washing performance is a result of fabric type, water quality, water flow, production speed, liquor exchange rate and temperature.



With this in mind, the following machine concepts were considered in the research carried out by TNO:

- washing with single versus double fabric threading
- washing with variably loaded jockey rollers
- washing with high or low liquor levels
- washing with spray-pipes, with or without liquor in the tanks
- use of fabric diversion rollers



Features of the Brubo-Matic

Based on the results achieved after extensive trials on the TNO washing simulator, Brugman arrived at the following design:

- Single fabric threading, as double fabric threading does not give any proven advantage in respect of washing efficiency. Moreover single fabric threading has the advantage of preventing fabric tension build-up as well as easier operation and maintenance.
- Light weight fabric guiding rollers
- Meander counter current partitions for each bottom fabric guiding roller to attain optimum use of washing liquor
- Effective 40 kN squeezer between the washing units to give maximum liquor separation from bath to bath
- Unique 50 N/mm "UNIPAD" high extraction heavy squeezing units.
- 15 meter compartment for washing, and 25 meter compartments for soaping for optimal balance between time and squeezing power.



Smooth fabric transport

The Brugman machines are characterised by a smooth fabric run. This is made possible by the Brugman guided fabric rollers, the in-house designed state of the art Brugman bearing and seal construction and the excellent drive system, based on an AC inverter drive. By eliminating variations in fabric tension crease free running is guaranteed.



Brugman guiding rollers

For crease free fabric transport the Brugman light weight fabric guiding rollers fulfil the following requirements:

- low weight
- high grinding degree
- accurate concentricity
- rigidity

The minimal weight of the Brugman guiding rollers is due to the combination of construction out of 100% stainless steel and special shaft attachment. The shafts on each side connect to the rollers via a double-disc construction. This results in a low weight roller with high strength and minimum fabric tension. Precision grinding guarantee, a smooth surface and accurate concentricity.

Single fabric threading

Experience proves that single fabric threading with a maximum intermediate roller distance of 1000 mm guarantees crease free fabric transport.

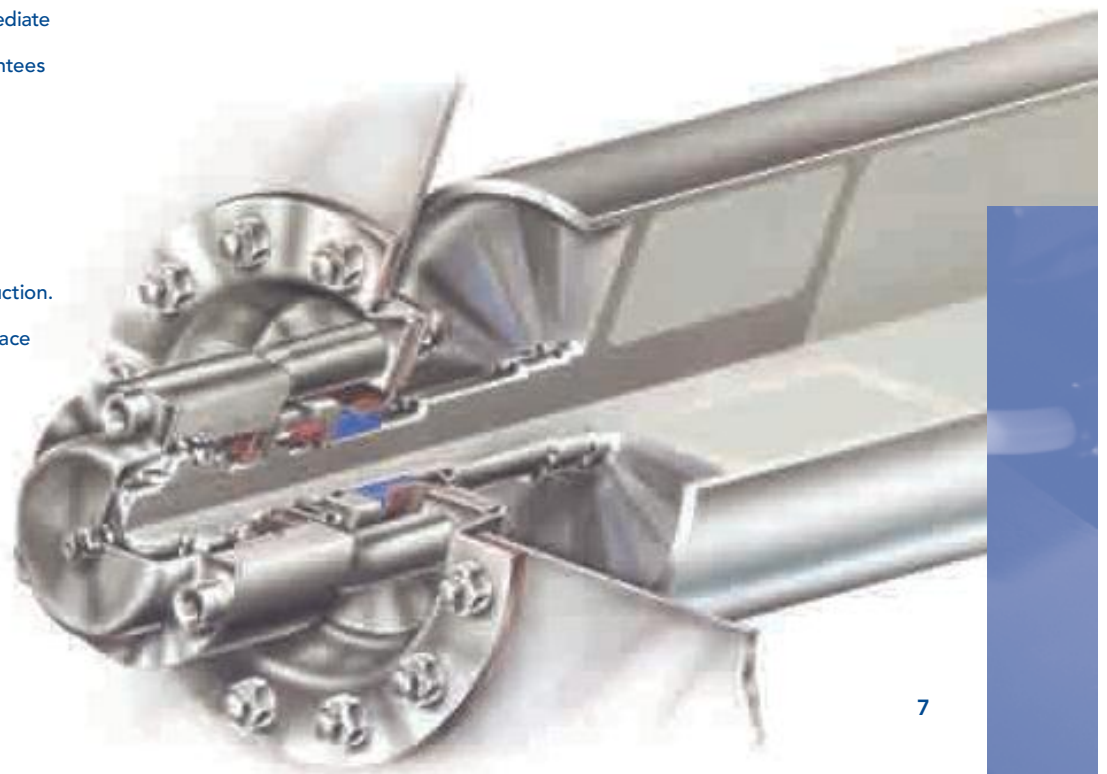
Low friction roller bearings

Each fabric guiding roller has a separate seal and bearing construction. This construction allows ample space between wall and bearing.



A flexible mounted seal ring manufactured out of high polymer composite and a spring loaded stainless steel counter ring, lapped and with special surface treatments, give extremely low friction.

The seal construction together with the double row self adjusting ball bearing results in very low running friction. All metal parts of the bearing construction are made out of stainless steel.



Squeezing units

Bath separation between washers and de-watering are important aspects of washing. All Brugman squeezing units ensure even squeezing effects due to the coupled membrane construction and direct force transfer.



40 kN intermediate squeezing units

All washers are equipped as standard with 40 kN squeezing units.

Depending on their execution they can be fully enclosed or open.

50 N/mm 'Unipad' high extraction squeezing units

Before impregnating and at the end of the line a maximum squeezing effect is required; Brugman's solution is the 50 N/mm 'Unipad' high extraction squeezer.

Non-deflecting 'Unipad' bowls

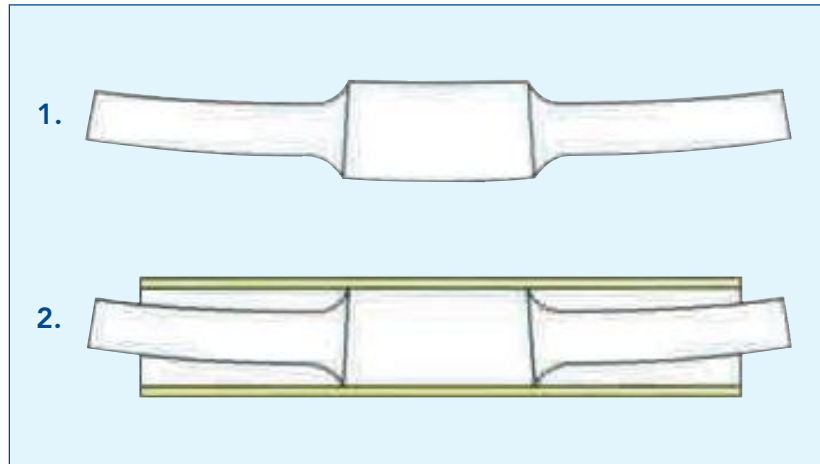
All high extraction squeezing units are equipped with 'Unipad' bowls. These bowls virtually do not deflect under pressure and therefore guarantee an absolute uniform squeezing effect. The 'Unipad' construction consists of two parts:

1. Inner core

The inner core is subject to deflection similar to conventional bowls (see illustration).

2. Outer casing

The outer casing is only in contact with the inner core at the centre. The defined width of the contact area in the centre compensates for both deflections.



Loading the squeezing units

As the stainless steel bottom bowl is the pressurised bowl, the squeezing unit is automatically opened when the air pressure is released.

In order to guarantee an equal pressure on both sides, all squeezing units are equipped with a control panel which feeds a buffer pipe. This in turn supplies the air pressure to the membranes on both sides.

As the force is directly transferred to the bottom bowl without the use of movable links such as pistons, the bowl pressure is equal on both sides.



Rubber coverings

The upper bowl is covered with the best available rubber quality. Hardness is ranging from 75° Shore for intermediate up to 95° Shore for high extraction bowls. This rubber is highly resistant to all chemicals commonly present in washing processes.

Vacuum extraction

For specific applications the squeezing unit can be replaced by a vacuum extractor. This equipment is available as a modular extension to the Brugman washing line.

Brubo-Dwell

For longer dwell times or relaxation of fabric, special washing units are required: Brugman's solution is the Brubo-Dwell.

This conveyor based unit is available for the following processes:

- soaping in washers after printing
- relaxation treatment
- alkali treatment
- all dwell processes

Operation

On entry the fabric is guided between double spray pipes and plaited onto the first conveyor belt which is situated above the liquor. The fabric on this conveyor belt is thoroughly saturated by spraying.

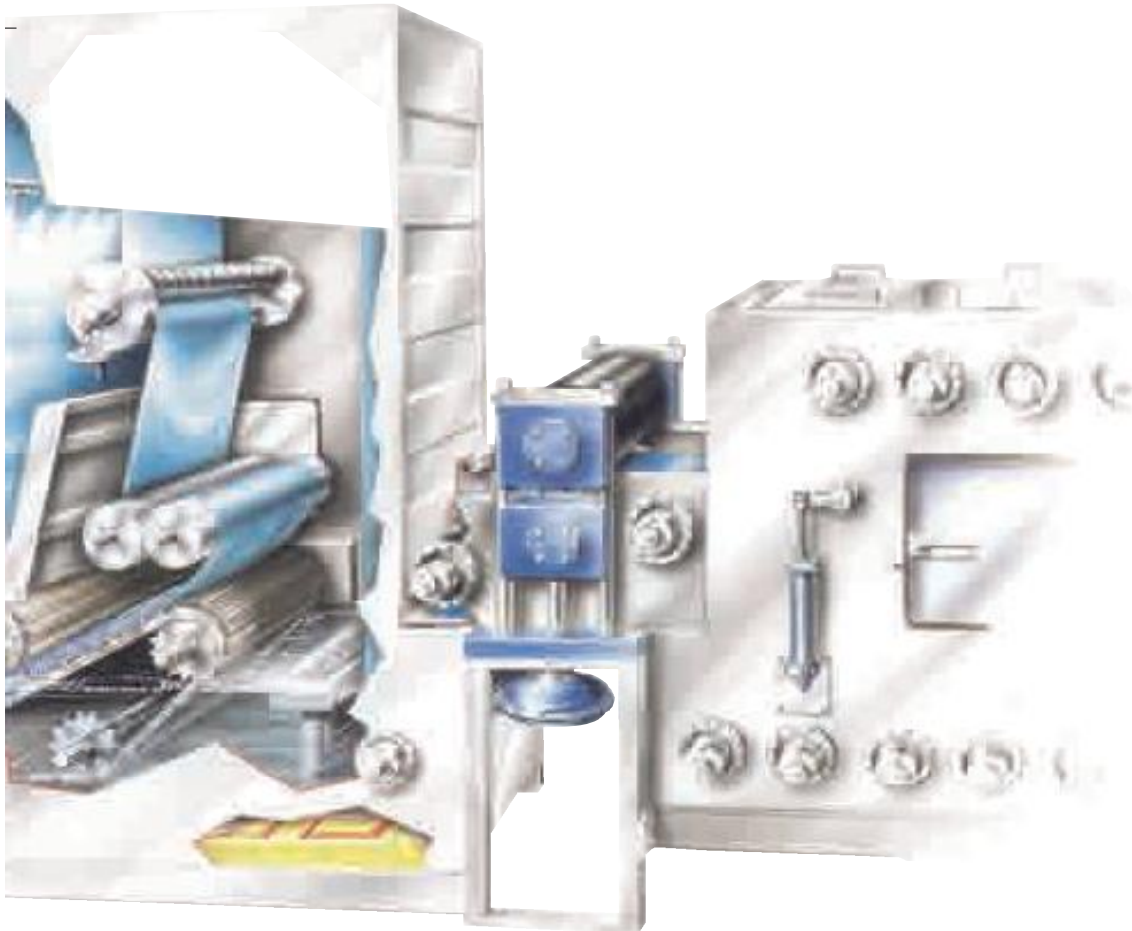
At the end of the first conveyor the fabric is directed onto the lower conveyor which transports the fabric under the liquor. The fabric leaves the Brubo-Dwell via a water lock, selvedge guiders and a 40 kN squeezing unit.

The Brubo-Dwell is executed with indirect heating in order to accommodate various processes up to 95° C. In addition direct heating is included to reduce the start up time.





End of the first conveyor



Drying



Cylinders and drive system

For maximum drying capacity with minimum fabric tension, cylinder drums with a diameter of 800 mm and individual AC-drive motor are Brugman's standard execution. The cylinders have a finely polished surface and their sides are provided with inspection holes and vacuum valves. The journals run in special heat resistant bearings. Admissible working steam pressure is 3.5 bar, test pressure is 5.25 bar.

Steam supply and condensate return

The operation side of a stack has a vertical steam distribution pipe with a T-piece at the upper end.

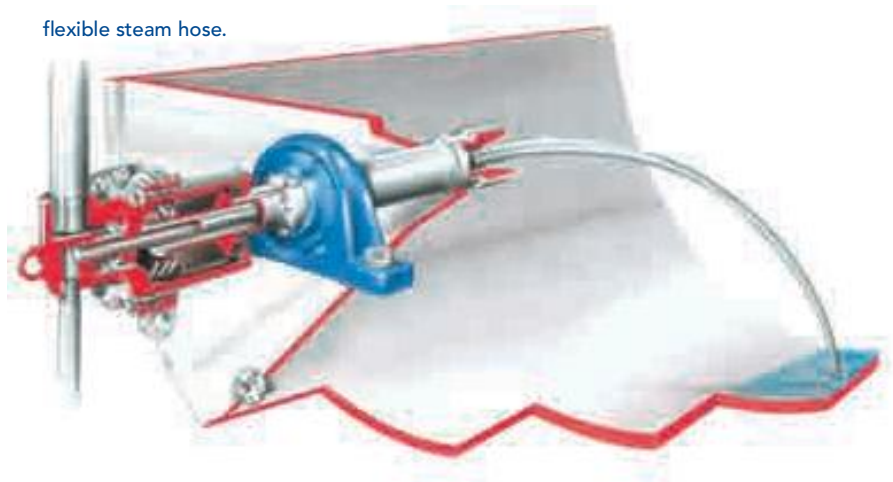
This piece is connected to the steam supply and a safety valve.

The distribution pipe has a steam trap at the bottom end.

Each individual cylinder is supplied through a long life, stainless steel flexible steam hose.

Each cylinder is fed through a 'Johnson' rotary joint. These joints guarantee steam supply and condensate return without any leakage.

When a machine consists of more than one stack the steam distribution and condensate return pipes are inter-connected.



Adjusting capacity

Over-drying must be avoided at all times. The required capacity is determined by initial moisture, fabric weight, machine speed and residual moisture.

Actual drying capacity is influenced by machine speed, number of active drying cylinders and steam supply. The number of active drying cylinders can be controlled by shutting off pairs of drying cylinders, based on recipe. The amount of steam supply can be controlled by either measurement of fabric temperature and moisture content or the temperature of the condensate.

Cooling cylinders

To prevent batching or plaiting of fabrics at high temperature, the Brugman cylinder dryer is normally equipped with two cooling cylinders. Cooling water is fed and retrieved through 'Johnson' rotary joints.

Robust Frame

The frame of each stack consists of I-beams with interconnections. All parts are shot-blasted, primed and sprayed with two component paint in the desired colour. If a machine consists of more than one stack, these are interconnected by means of profiled beams which also carry the compensators.





Temperature control



Water supply control



Liquor level control

Ease of operation

Ease of operation is realized by one large color screen from which all drive systems and process control parameters can be managed. This user-friendly and centralized function gives the operator maximum time to keep a good overview of the general production situation.

The Brugman vision 2000 series of integrated control system is designed to manage any parameter for all type of continuous finishing.

Process control systems manage the process conditions through a continuous comparison of the actual value against the pre-defined value in the selected recipe. Brugman uses proportional valves for water and steam control as a standard to ensure accurate and adequate supply.

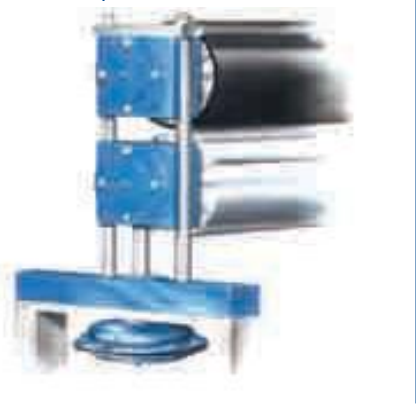
One of the most important conditions for an installation to run perfectly is a fully controlled synchronised drive system that gives constant fabric tension from entry to exit of the machine.



Add-on control



Squeeze unit control



pH-control / acid diluting system





Counter current flow control



Cylinder dosing system



Chemical flow control

Complete control system

Examples of common process control equipment are displayed on these pages. The sophistication of the control system can be enhanced, if required, by inclusion of more machine or process specific controls such as the add-on setting of an applicator, an air-free tester for a steamer or a fabric moisture measurement system at the exit of a cylinder dryer.

A basic concept

Control of water and chemical flows, pH and water and steam temperatures are usually part of a control system.

Depending on the types of process or application, chemicals are fed by:

- dosing cylinders; for instance for auxiliaries into a washing section,
- dosing pumps; for a Brubo-sat bleaching applicator or dye padder,
- proportional control valves; usually when chemicals are prepared in a remote mixing station.

Easy servicing

Facilities such as internet can be implemented for integration with a factory network or intelligent devices. For trouble shooting the system offers facilities such as an error logbook with a standard read-out of the last errors and online servicing. Nothing escapes the system as next to all regular data, also any manual operator action is recorded.



Steamer pressure control



Density control

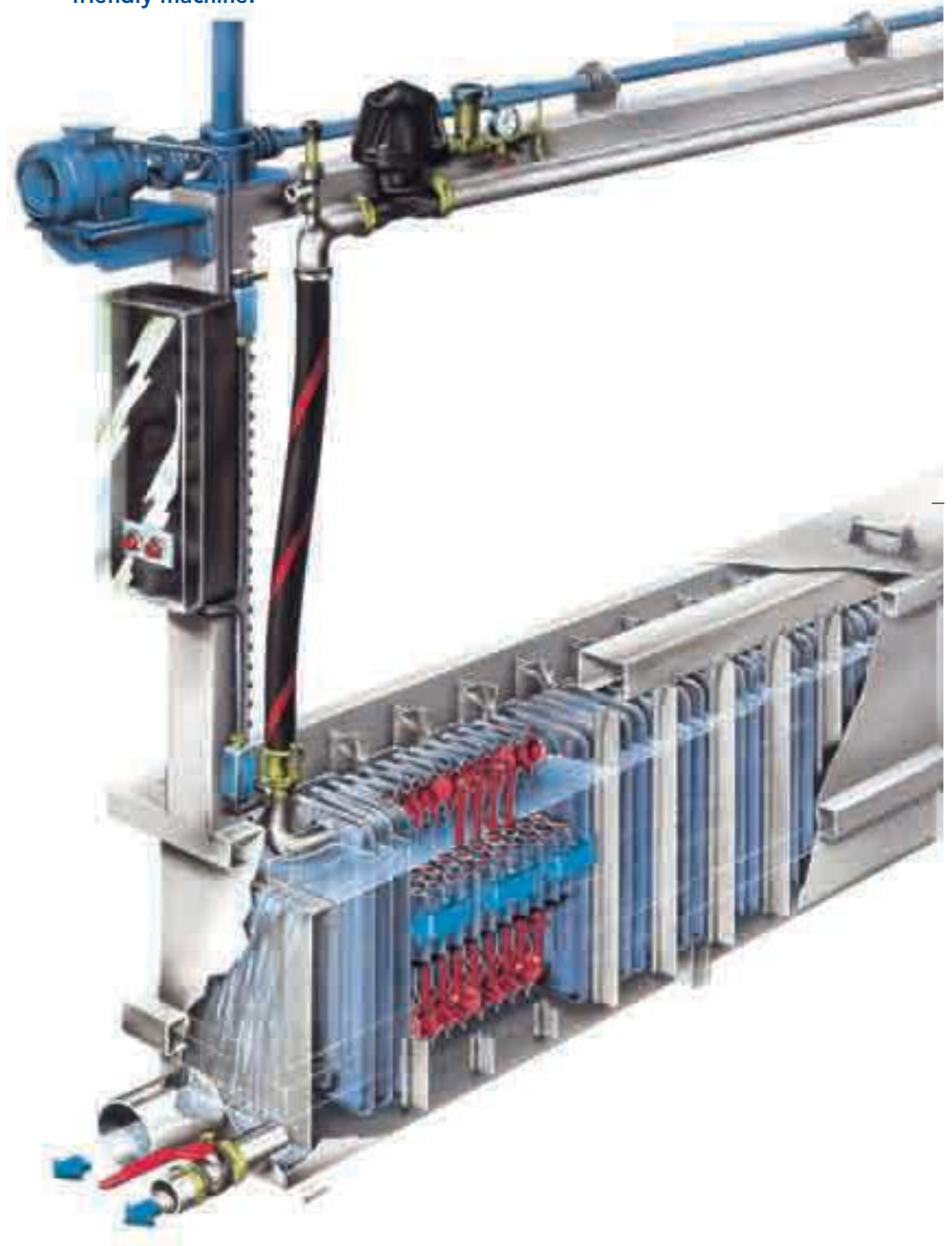


Steam supply control (cylinder dryer)



Lowest consumption

During the development of the Brubo-Matic much attention has been given to washing efficiency, energy consumption and water management. As a result the Brubo-Matic range is an economic and environmentally friendly machine.



Brugman strives to maintain quality whilst reducing processing costs. In this respect the biggest gain can be obtained by utilising the energy of hot waste water.



Environmentally friendly

The smooth running of the Brubo-Matic and the AC inverter controlled drive system result in an extremely quiet operation.

Thanks to its unique design and the high degree of automation the consumption figures are low. Purification plants therefore receive lower volume but higher concentrations of waste water thus reducing recovery costs and environmental taxes.

Efficient washing

The typical Brubo-Matic exhibits such features as;

- the light weight high precision guiding rollers
- the meander counter current concept
- the 40 kN intermediate squeezing units
- the 50 N/mm 'UNIPAD' high extraction squeezing units

The possibility of combining washing compartments with 15 or 25 meters fabric contents ensures an optimum machine lay-out for any customer's requirement. In addition electronic flow sensors in combination with proportional valves allow accurate fresh water flow control in relation to actual fabric production. All this results in the lowest possible consumption of water.

Minimal steam required

The high washing performance of the 'Brubo-Matic' product line results in low water- and therefore also in low steam consumption. Loss of heat is limited by a closed design of the unit with an entry- and exit-water lock, optionally covered intermediate squeezing units and insulation techniques. In combination with the Brugman high efficient Heat recovery system, steam consumption is minimised.

Efficient exchange of heat

With the Brugman high efficiency heat recovery unit energy saving up to 50% can be achieved. The temperature of the supply water can be raised by 40°C. This is achieved by the transfer of heat

from hot waste water to the cold supply water.

The hot waste water flows by gravity from the washing section to the heat recovery unit. A difference of only 50 mm in the liquor levels is sufficient. Therefore no pump is required.



There are no moving parts in the Brugman heat recovery unit.

As the waste water merely comes into contact with the outside surface of the element, cleaning is required only once a week. The element is equipped with a motorised lifting device. This means that cleaning with a water hose is just a matter of minutes.

Low power consumption

Low weight fabric guiding rollers and low friction seal and bearing construction are fundamental elements for a smooth running machine. The capacity of the AC motors is carefully selected based on the maximum useful width and machine speed, but is always ideally proportioned in order to run within an optimum speed range.

Day to day convenience



Maintenance

Maintenance is virtually limited to greasing and cleaning because the Brubo-Matic washing unit has:

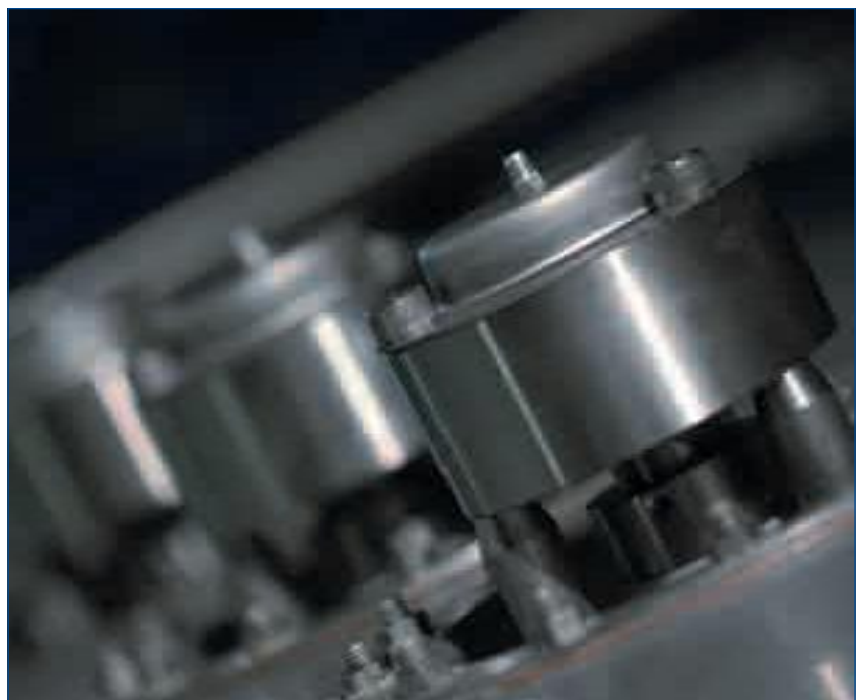
- few moving parts
- mainly stainless steel components
- robust construction
- high quality materials
- unique window seal design

Cleaning

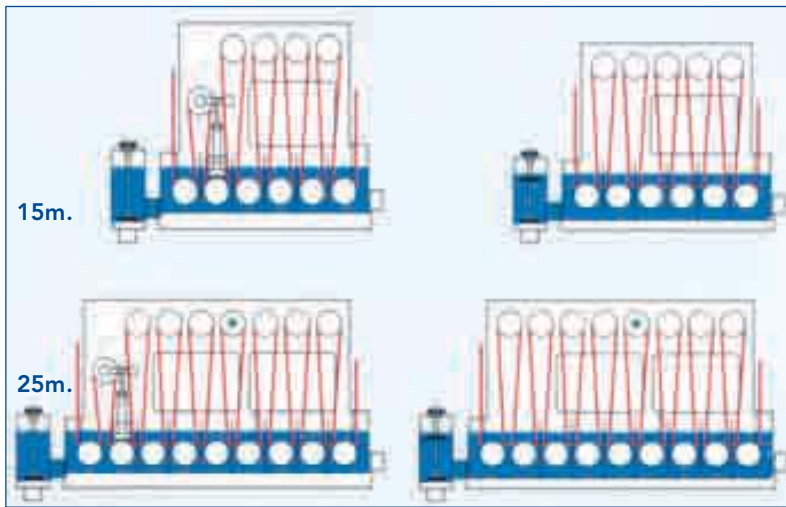
Good accessibility makes cleaning of the interior of the machine quick and easy.

The smooth surface of the exterior prevents accumulation of dirt and can easily be hosed down. Contaminated seals can easily be rinsed by pulling and releasing the seal ring.

Maintenance of the drive system is simple. The machine is equipped with AC motors in accordance with industrial standards. The switch boards are air-conditioned and equipped with PLC's and components from the world's most reliable suppliers. Built in fault indicators help to quickly locate defective parts. Remote service via VPN through the internet is standard.



Brubo-Matic Executions



Ease of operation is guaranteed by:

- single fabric threading
- good visibility and accessibility through large glass doors on both washing and squeezing units
- central operating console
- integrated drive and process control system
- comprehensive operation manual in accordance with CE regulations

Brubo-Matic	Roller width (mm)	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400
Washing compartment with 15m content fabric	Liquor content	680	750	825	900	970	1045	1120	1190	1265	1335
Washing compartment with 25m content fabric	Liquor content	995	1100	1205	1315	1420	1530	1635	1740	1850	1955
Brubo-Dwell	Roller width (mm)	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400
25 kg/m fabric capacity	Liquor content	3400	3775	4160	4540	4925	5310	5690	6075	6460	6840
50 kg/m fabric capacity	Liquor content	4415	4915	5410	5910	6410	6910	7405	7905	8405	8900
75 kg/m fabric capacity	Liquor content	5530	6155	6780	7400	8030	8650	9280	9900	10530	11150

Diameter of rollers, bowls and journals (in mm)

Rollers	Journal	Roller
Fabric guiding rollers	35	180-200
Expander	50	112
Squeezing bowls	Journal	Roller
40 kN Rubber covered top roller	60	265
Stainl. St. covered bottom roller	60	250
50 N/mm Rubber covered top roller	90 (100)*	300 (376)*
Stainl. St. covered bottom roller	90 (100)*	300 (369)*

* note: for a roller width of 2800 mm or more

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