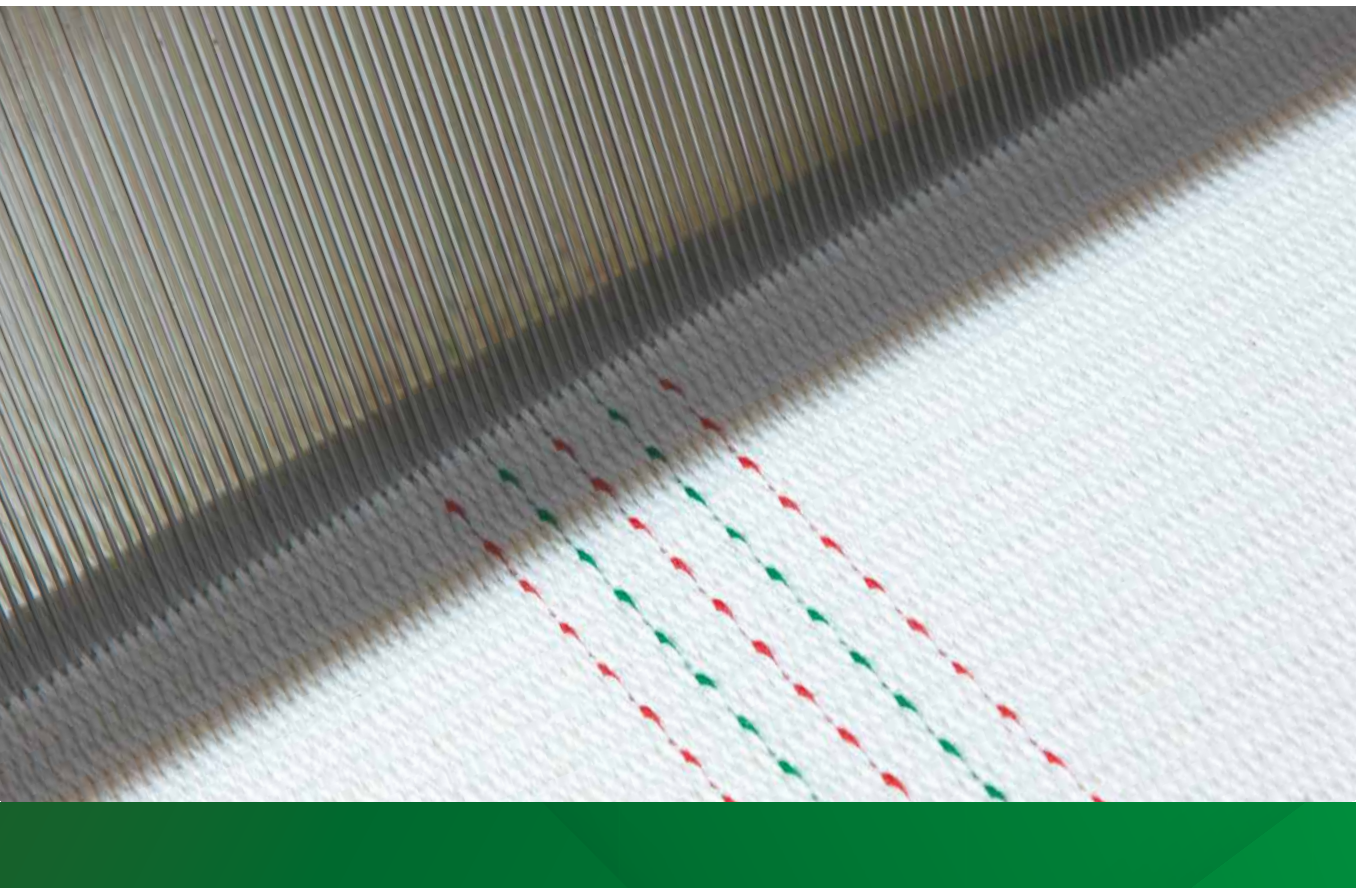


CUSTOMER SOLUTIONS

# CORRUGATOR BELTS

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Custom solutions for smooth operation  
of your production processes





QUICK OVERVIEW

## SECTORS AND AREAS OF APPLICATION

Muhlen Sohn corrugator belts are specially developed for use in the heating and tracking section of corrugators. Their four tasks are smooth transport, straight running characteristics, pressure and contact with the heating plates and best possible drying of the corrugated board.

The belts are exposed to considerable stress in the form of temperature, ballast system pressure, friction, tension and moisture. Muhlen Sohn corrugator belts consist of high-tensile, heat and abrasion-resistant fibers that give the belts excellent pulling and transport characteristics. This guarantees safety and reliability during your production process.

Muhlen Sohn corrugator belts are universally applicable – on all machine types known to us worldwide! They are used particularly successfully on modern high-performance corrugators. Moreover, our corrugator belts were developed specially for machines with ballast rolls, air hoods or surface pressure loading systems. No matter what your production requires – Muhlen Sohn offers the suitable product for every application.

## YOUR ADVANTAGES DURING THE CORRUGATED BOARD PRODUCTION PROCESS

- Insensitivity to external influences
- Enhanced moisture regulation thanks to high moisture absorption and moisture evaporation capability due to the use of hygroscopic fibers
- High coefficient of friction = excellent board pull
- Better and evenly spread bonding of the corrugated board
- Good straight running characteristics
- Good running smoothness – less noise
- Universal application options
- Repairable in case of damage
- Less edge trimming
- Higher speeds
- For every product mix
- Up to 50% less waste

**DURABILITY**  
**WORLDWIDE EXPORT**  
**TECHNOLOGY**  
**QUALITY**  
**MADE IN GERMANY**  
**TEAR STRENGTH**

**ABRASION RESISTANCE**  
**MULTI FILAMENT YARNS**  
**FLEXIBILITY**  
**EXPERIENCE**  
**KNOW-HOW**  
**RELIABILITY**  
**CUT-TO-MEASURE**

CONTINUOUSLY IMPROVING

# TRADITION, INNOVATION AND QUALITY

**Our customers can always rely on Muhlen Sohn's quality management. We own a comprehensive quality management system in all company divisions and were certified according to the internationally recognized DIN EN ISO 9001:2015 quality standard since 1995. Muhlen Sohn - this is quality with a seal of approval.**

We use exclusively high-grade materials in accordance with the DIN 60910 standard, which we import from all renowned quality manufacturers worldwide in addition to the domestic market. The raw materials always undergo an incoming inspection, directly followed by a quality inspection. All tests are performed using the latest measuring equipment.

Muhlen Sohn was founded in 1880, and our benefit is many years of experience. Our machinery is among the most modern in the world, and it is operated exclusively by qualified staff with long professional experience. Process reliability in our production is one of our objectives. Our unique weaving process, continuous monitoring and documentation of our production and periodic quality checks assure the high quality of our products.

Many further developments and patented inventions from our company contributed to make us the market leader. Ongoing innovations secure this position. Accompany Muhlen Sohn into a successful future.



## MUHLEN SOHN – SINCE 1880

Founded in 1880, Muhlen Sohn has been making technical advances in product development for well over a century. Today we develop, produce and sell high-quality heavy-duty fabrics for technically demanding applications. We see ourselves primarily as a manufacturer but also as a skilled and innovative development and service (OEM) partner in mechanical and plant engineering.

Our combination of tradition and innovation is the key to our success. We have been bringing new momentum to our sector ever since the company was first established. In today's highly competitive mechanical and plant engineering market this makes us not only a constant presence but synonymous with quality and technology leadership.



**SUSTAINABLE  
GROWTH  
SINCE 1880**

YOUR BENEFIT, IS OUR GOAL

# CUSTOMER-FOCUSED PRODUCTION AND EXCELLENT SERVICE

As the technological market leader for corrugator belts and fluidizing fabrics, Muhlen Sohn stands not only for innovative products of the highest quality. Our flexibility in development and production allows us to expand the existing product range by special products according to customer requirements.

In addition to ongoing further development and enhancement of our product range in our in-house research and development department, tailored solutions to suit your needs are the focus of our work. We believe in constant dialog, and close cooperation. Our customers' requirements are also always incorporated into the development of our products. Furthermore, we are the technological partner of all important machine manufacturers.

Our representatives in more than 100 countries worldwide – and our branches in the USA and China – ensure direct contact with you.

Customer-focused performance is incidentally one of our most important corporate principles – from the very beginning. From the initial contact to comprehensive after-sales service. A short response time, 24-hour service and multilingual employees at the branches are a matter of course for Muhlen Sohn.

Our many years of activity in the corrugated board sector also allow us to support our customers with advice. For example, we can provide valuable assistance in case of quality problems in production and use our expertise to support customers in the ideal equipment of the heat and traction section.



## CORRUGATOR BELTS – TO YOUR ADVANTAGE

- Maximum quality
- High durability
- Optimal moisture regulation
- Maximum flexibility
- Customer-specific solutions
- Worldwide availability
- Accessories
- Expert consultation



### WORLDWIDE SERVICE – FAST AND PROFESSIONAL

24 hours a day, 365 days a year – you can always reach us, and a fast reaction time is guaranteed.

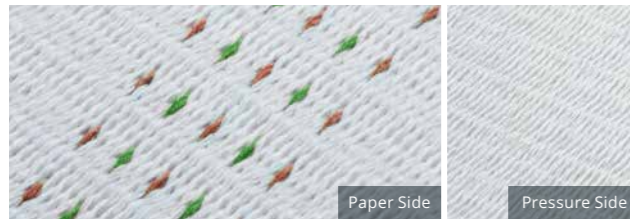
Localized organization of service engineers ensures that we react to customer queries and send engineers within the shortest time.

**EMERGENCY SERVICE NUMBER  
FOR CORRUGATOR BELTS:  
+49 7304-801333**

STRONG AND SOLID

# PRODUCT RANGE

## BELTS FOR UNIVERSAL USAGE

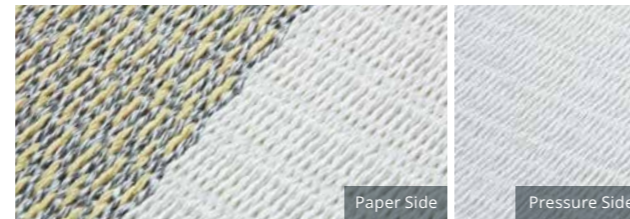


### AQUA PULL S

- Bottom belt
- Universal usage
- Suitable for all pressure systems
- Especially developed for double backers

#### ADVANTAGES

- Excellent moisture management
- Optimal board transport
- Long lifetime



### AQUA PULL AE

- Top belt
- Universal usage
- Special hybrid aramid edges - combination of moisture management and heat as well as abrasion resistance at the edges

#### ADVANTAGES

- Excellent moisture management and evenly bonding over the entire belt width, also at the edges
- Extreme long lifetime due to special hybrid aramid edges

## BELTS FOR HIGH SPEED CORRUGATORS

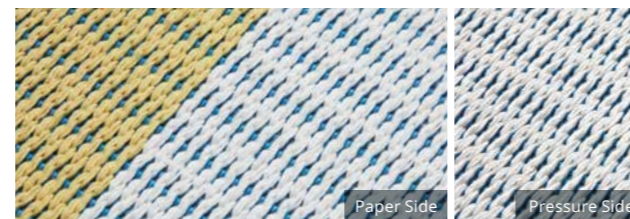


### AQUA ULTRA AE

- Top belt
- Particularly for high speed corrugating machines (maximum speed possible)
- Especially recommended for fine and micro flutes
- Open weaving structure for steam evaporation
- In-woven armoured edges for more robustness

#### ADVANTAGES

- Used to increase productivity (higher speed)
- Excellent moisture management also with high speeds
- Higher temperature and abrasion resistance at the edges
- Extreme long lifetime due to aramid edges



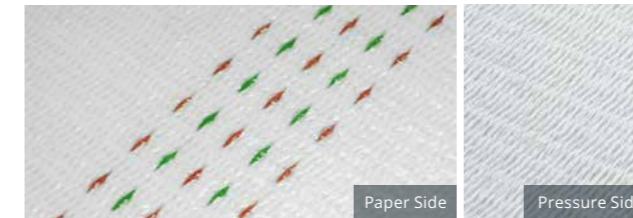
### AQUA RUN AE

- Top belt
- For highest production speeds
- Especially recommended for heavy boards, double and triple wall, but also suitable for fine and micro flutes
- Open weaving structure for steam evaporation
- In-woven armoured edges for more robustness

#### ADVANTAGES

- Used to increase productivity (higher speed)
- Excellent moisture management also with high speeds
- Higher temperature and abrasion resistance at the edges
- Extreme long lifetime due to aramid edges

## COATED BELTS FOR HIGH PAPER TRACTION



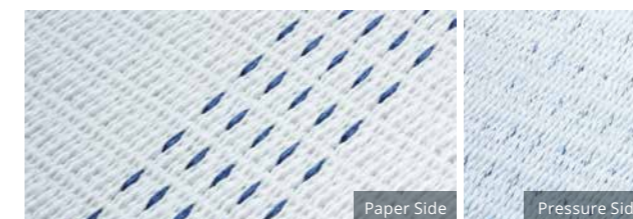
### MAX PULL S

- Bottom belt
- Also for the use in semibeltless systems as bottom and top belt
- With a high-grip traction layer of silicone on the paper side
- Particularly for heavy or smooth boards and rough paper surfaces

#### ADVANTAGES

- Safe and slip-free transport due to silicone coating (high coefficient of friction of the belt surface)
- Uniform and evenly spread bonding of the corrugated board over the complete belt width

## COATED ANTISTATIC BELT FOR HIGH PAPER TRACTION WHILE SIMULTANEOUSLY DISCHARGING ELECTROSTATIC CHARGES



### MAX PULL ANTISTATIC\*

- Bottom belt
- Also for the use in semibeltless systems as bottom and top belt
- With a high-grip traction layer of silicone on the paper side
- Safe discharge of electrostatic charges over the entire lifetime of the belt
- Especially developed combination of antistatic yarns

#### ADVANTAGES

- Increased work safety – no flying sparks
- Safe and slip-free transport due to silicone coating
- Reduced waste – no adhesion of the board

\* MAX PULL Antistatic is a coated belt as well as an antistatic belt.

TECHNICAL SPECS

# PRODUCT OVERVIEW AND TECHNICAL FEATURES

Product name	Material	Thickness <sup>1</sup> (approx.)	Temperature resistance <sup>2</sup> a), b), c)	Width <sup>3</sup>	
				min. <sup>4</sup>	max.
<b>BELTS FOR UNIVERSAL USAGE</b>					
<b>AQUA PULL S</b>	100 % synthetic	8 mm 9 mm 10 mm	a) up to 150 °C b) 200 °C c) 254 °C	1,600 mm	3,600 mm
<b>AQUA PULL AE</b>	100 % synthetic, aramid	8 mm 9 mm 10 mm	a) up to 150 °C (250 °C <sup>5</sup> ) b) 200 °C (350 °C <sup>5</sup> ) c) 254 °C (450 °C <sup>5</sup> )	1,600 mm	3,600 mm
<b>BELTS FOR HIGH SPEED CORRUGATORS</b>					
<b>AQUA ULTRA AE</b>	100 % synthetic, aramid	7 mm	a) up to 150 °C (250 °C <sup>5</sup> ) b) 200 °C (350 °C <sup>5</sup> ) c) 254 °C (450 °C <sup>5</sup> )	1,600 mm	3,600 mm
<b>AQUA RUN AE</b>	100 % synthetic, aramid	8 mm	a) up to 150 °C (250 °C <sup>5</sup> ) b) 200 °C (350 °C <sup>5</sup> ) c) 254 °C (450 °C <sup>5</sup> )	1,600 mm	3,600 mm
<b>COATED BELTS FOR HIGH PAPER TRACTION</b>					
<b>MAX PULL S</b>	100 % synthetic, silicone	9,3 mm Coating Thickness: 0.9 mm	a) up to 150 °C b) 200 °C c) 254 °C	1,600 mm	3,500 mm
<b>BELTS FOR DISCHARGING ELECTROSTATIC CHARGES</b>					
<b>MAX PULL ANTISTATIC <sup>6</sup></b>	100 % synthetic, silicone, antistatic yarns	8 mm Coating Thickness: 0.6 mm	a) up to 150 °C b) 200 °C c) 254 °C	1,600 mm	3,500 mm
<b>DRUM LAGGING</b>					
<b>SUPER WRAP LAG</b>	100 % synthetic, silicone, self-adhesive layer	7.3 mm	up to 260 °C	-	-
<b>SUPER GRIP</b>	100 % synthetic, silicone, rubber	8.4 mm	up to 260 °C	-	-

<sup>1</sup> Based on DIN EN ISO 5084. For tolerances and more technical data, please see data sheet.  
<sup>2</sup> In dry heat conditions.  
<sup>3</sup> Up to max. 1% shrinkage - from experience 0.5%.

<sup>4</sup> Less than 1,600 mm on request.  
<sup>5</sup> Edge reinforcement of aramid.  
<sup>6</sup> MAX PULL Antistatic is a coated belt as well as an antistatic belt.

a) Continuous load  
 b) Brief load  
 c) Melting point / decomposition point

STRONG AND SOLID

# DRUM LAGGING, ARAMID REINFORCEMENT AND BELT LACING



### SUPER WRAP LAG DRUM LAGGING

- Drum lagging for all kind of corrugators
- Self adhesive layer - no extra glue
- High temperature resistance, good chemical resistance as well as high coefficient of friction

#### ADVANTAGES

- High-strength adhesion
- No dangerous substances
- Coefficient of friction remains constant throughout the entire lifetime
- Quick and easy installation ⇒ 50% time saving during installation compared to a conventional installation

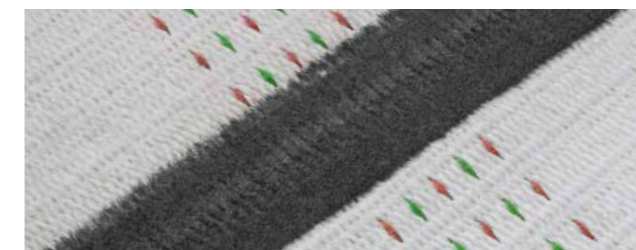


### SUPER GRIP DRUM LAGGING

- Drum lagging for all kind of corrugators
- Mounting with glue
- High temperature resistance, good chemical resistance as well as high coefficient of friction

#### ADVANTAGES

- High-strength adhesion
- No dirt on the backside of the belt due to rubber abrasion
- Coefficient of friction remains constant throughout the entire lifetime
- Emergency running properties until planned change



### HOT JAW LACING WITH FLOCKING

Patented lacing method with flocking for marking-free production.

- No contact of the hooks with the corrugated board, heating plates or pressure loading system thanks to special press-in technique
- Flocking protects the corrugated board from marks or blistering
- No weakening of the fabric, because no cutting is required
- Long lasting thanks to being applied below the belt wear limit and manufactured with high-quality components
- Ideal rolling characteristics and less noise emission
- Adequate breathability
- Repairable



### IN-WOVEN ARMoured EDGES

- In-woven armoured edges for more robustness and a longer lifetime
- Higher temperature and abrasion resistance at the edges
- For production with:
  - frequently changing paper widths
  - many order changes
  - high temperature of heating plates

PROVEN STUDIES

# ABRASION RESISTANCE

The abrasion test is a measure of the abrasion resistance and thus for the service life of materials. Muhlen Sohn corrugator belts possess a verifiably higher life time under identical production conditions. The AQUA PULL S has triple the abrasion resistance of needed felt materials.

**Implementation conditions:**  
Textile abrasion testing in accordance with DIN 53863 using the "FRANK" abrasion tester type 666.

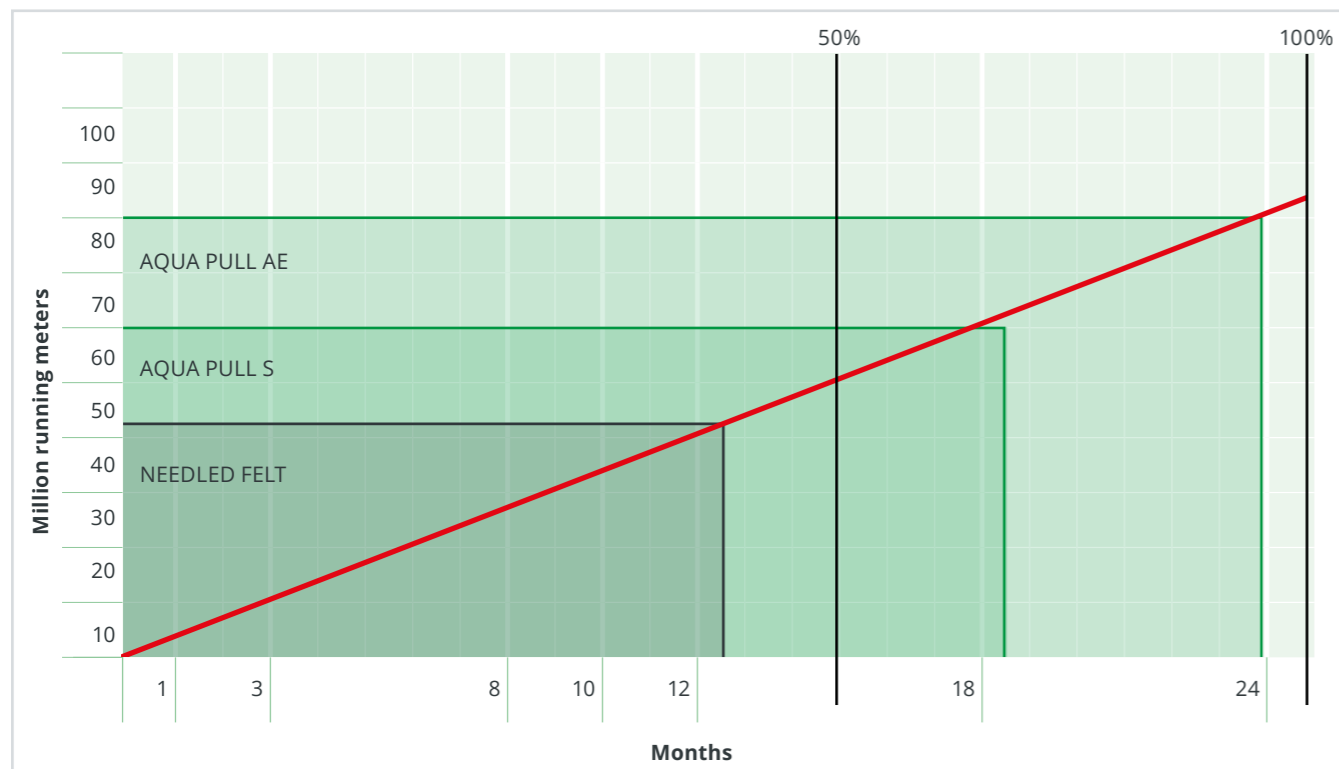
Load	1.0 kp
Abrasion agent	"FRANK" abrasion paper, grain size 280
Number of rubs	10,000

**4.7 %** AQUA PULL AE with in-woven edge protection

**6.7 %** AQUA PULL S

**17.0 %** NEEDED FELT

## LIFE EXPECTANCY OF THE CORRUGATOR BELTS



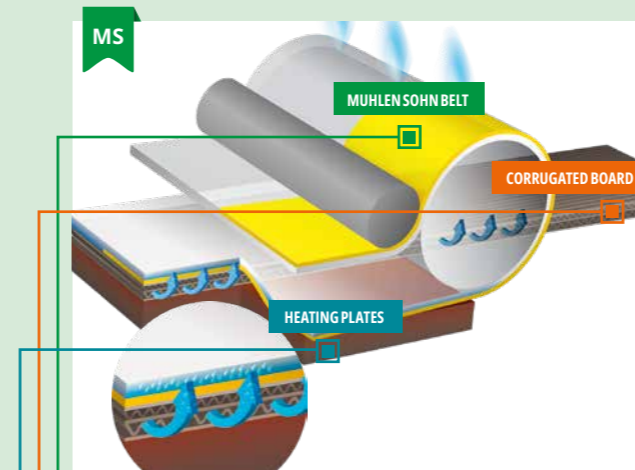
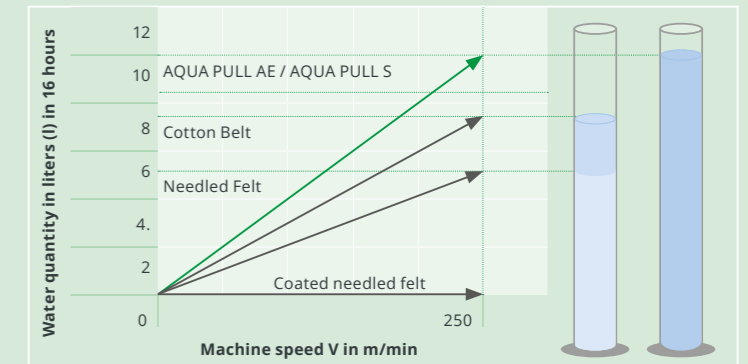
Ø life expectancy identified in practice.

PROVEN STUDIES

# MOISTURE/VAPOR ABSORPTION AND RELEASE

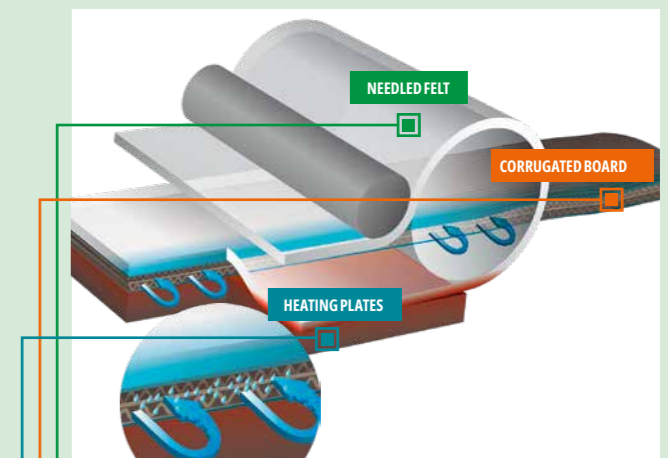
Evaluation of the moisture absorption and release capacity of various belt media under the following assumed production conditions:

TOP-BELT LENGTH	39.00 m
TOP-BELT WIDTH	2,500 mm
BELT SURFACE	97.5 m <sup>2</sup>
Ø PRODUCTION SPEED	~ 250 m/min.
SHIFTS/PRODUCTION TIME	2 shifts = 16 hours
FORWARD FEED (BELT CONTACTS BOARD)	4 sec.
RETURN (VAPOR RELEASE)	6 sec.
TOTAL CYCLE	10 sec.



### WOVEN MUHLEN SOHN BELT

- The belt absorbs the moisture better
- Better moisture regulation
- Drier edges of the corrugated board
- Uniform moisture profile
- Good steam penetration from the corrugated board into the belt



### NEEDED FELT

- The used felt can absorb no more moisture = highest electrostatic charges
- The corrugated board remains wet, specially in the edges = The drying process is not yet completed / the starch is not cured completely
- Poor edge bonding
- Warp
- Uneven moisture profile
- More edge trimming
- Poor penetration of steam off the board into the felt, the felt gets hot

BELT PROTECTION

# IN-WOVEN ARMoured EDGE

Most corrugators produce in different paper widths. The temperature increases significantly at the edges of the belt. Extreme temperature and friction load as well as higher abrasion at the edges leads to a significant reduction of the belt life. The in-woven, not coated, edge protection of Muhlen Sohn made of aramid fibers resist the high load and extends the belt life.

When using surface pressure loading systems the temperature in the belt is up to 40 - 60 °C higher, especially at the belt edges. When producing small boards, the belt has directly contact to the heating plates and causes intense wear. The specially developed Muhlen Sohn in-woven aramid edge protection extends the life time of the belt.

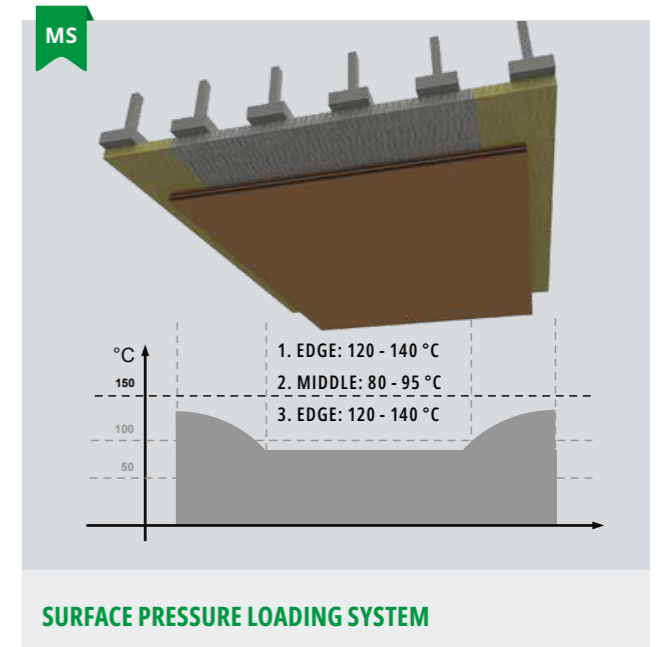
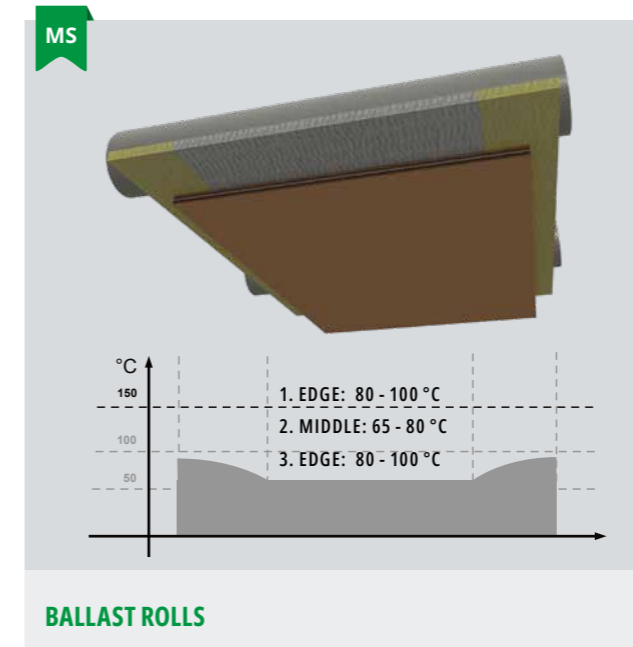
## IN-WOVEN ARMoured EDGES

In-woven armoured edges for more robustness and a higher lifetime of the corrugator belt

- Variable width of the in-woven armoured edge protection for customer specific use
- Due to the aramid edges, the moisture level remains even in the center as well as at the belt edges
- Less wear especially at the belt edges thanks to the high temperature and abrasion resistant aramid fibres
- Extends the life time of the belt up to approx. 25 - 50 % more linear meters running performance compared to competitor products

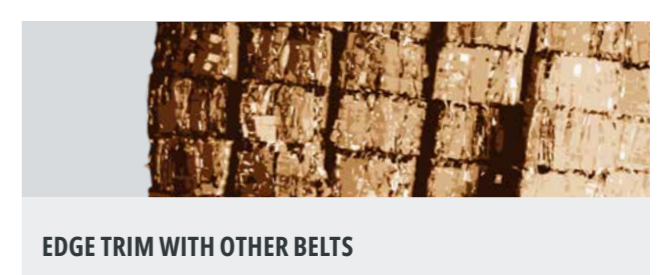
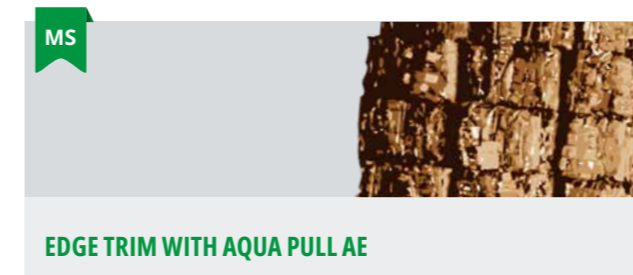
## TEMPERATURE PROFILE IN CORRUGATOR BELTS

Corrugators are usually operated with different paper widths. With small paper widths, the temperature rises significantly at the belt edges. This leads to an extreme temperature and friction load and to higher abrasion at the edges of PES and cotton belts and thereby also to a significantly shorter service life. The in-woven edge reinforcement of aramid fibers used e.g. in the AQUA PULL AE withstands the high loads and guarantees a production output of 60 to 80 million running meters or more.



## ECONOMY – LESS EDGE TRIMMING

Lack of adhesion – as is frequently seen with needled felt materials – is the most common cause of waste. Less edge trimming with the AQUA PULL AE thanks to reliable bonding in the edge area by the patented edge protection, which ensures uniform thickness reduction of the corrugator belt across the whole width of the belt and over the entire life and thereby reduces waste by up to 50%.



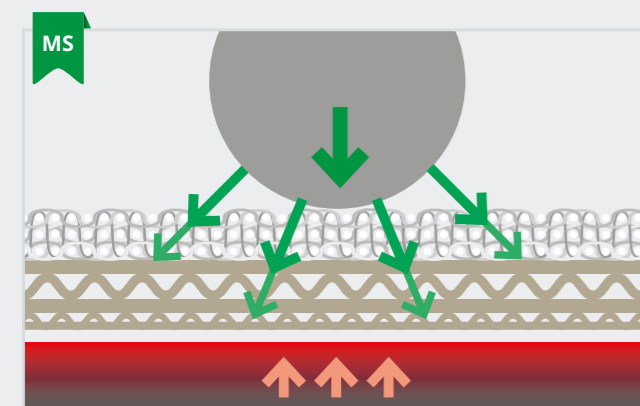
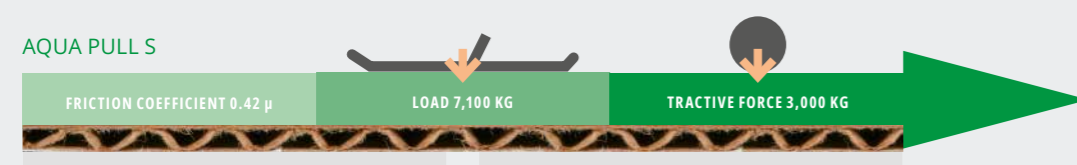
COEFFICIENT OF FRICTION

# TRANSPORT CHARACTERISTICS

To transport the corrugated board through the heating and tracking unit of a corrugator, the necessary tractive force must be transferred from the belt to the corrugated board. This is regulated by the loading system via the belt. The type of loading system (roller or pressure loading system) does not play a role here. The loading system ensures reliable transport at low belt coefficient of friction to avoid slipping.

**Example:**

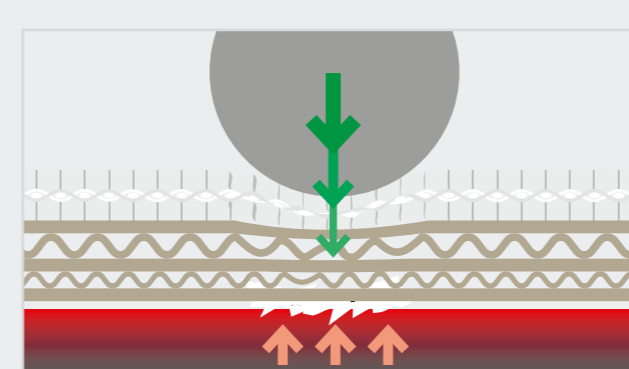
A tractive force of 3,000 kg is to be generated by the friction force between the belt and the corrugated board. The AQUA PULL S corrugator belt has a coefficient of friction of 0.42  $\mu$  and consequently must be loaded with approx. 7,100 kg. The coefficient of friction of needled felt materials is 0.33  $\mu$ , requiring a load of approx. 9,100 kg. The higher the load, the higher the friction between the belt and the press system. This results in higher energy consumption, with this effect occurring particularly in the case of surface pressure systems.



**MUHLEN SOHN CORRUGATOR BELT**

Strong belt material distributes the roller contact pressure over a large area.

- Smoother adhesion/higher quality
- Stiffer and drier board
- Less warp
- Less wear of the heating plates
- Higher temperature transfer
- Higher speed



**NEEDED FELT**

Soft felt material leads to highly localized pressure due to load rollers on the felt via the corrugated board on the heating plates

- Insufficient heat/temperature transfer and therefore poorer bonding
- Poorer quality – can result in squeezed corrugated board
- Only low speeds possible
- Originally developed only for paper machines
- Heavily worn heating plates

## MÜHLEN SOHN GMBH & CO. KG

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