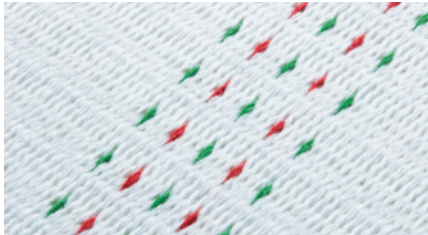


## CORRUGATOR BELTS

*Custom solutions for smooth operation of your production processes*

### PRODUCT RANGE

#### ALLROUNDER BELTS



Paper Side



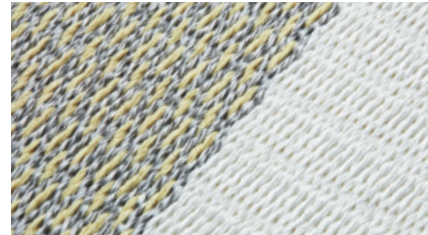
Pressure Side

#### 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



Paper Side



Pressure Side

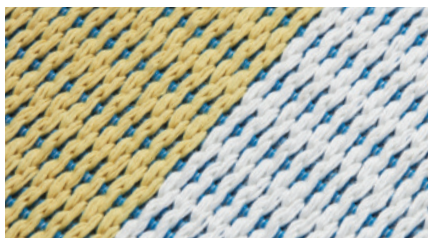
#### AQUA PULL AE

- 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



Paper Side



Pressure Side

#### 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



Paper Side



Pressure Side

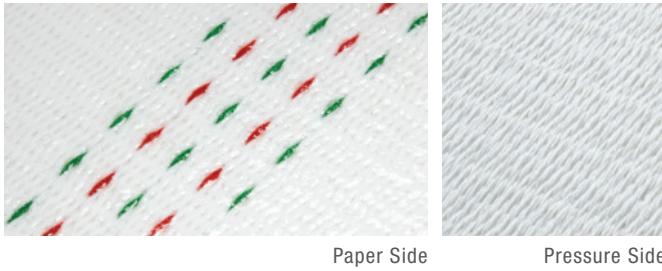
#### AQUA RUN AE

- 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

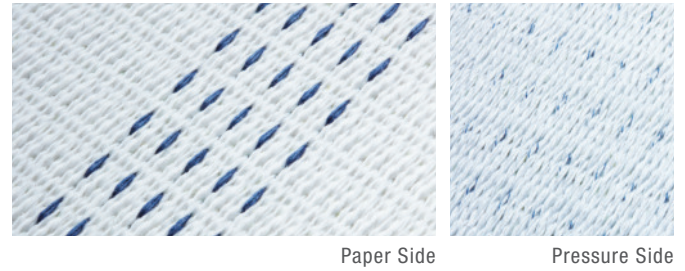


### MAX PULL S

- 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



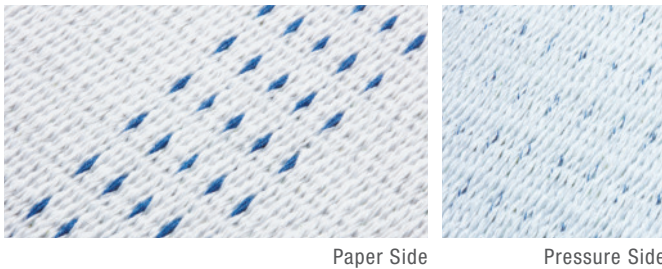
### MAX PULL Antistatic\*

- 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 production due to silicone coating
- Reduced waste – no adhesion of the board

## BELTS FOR DISCHARGING ELECTROSTATIC CHARGES

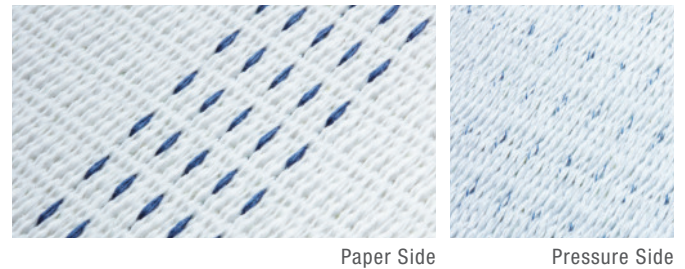


### AQUA PULL Antistatic

- Bottom belt
- Generally suitable for all pressure systems (including pressure systems with weight rollers)
- 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
- Reduced waste – no adhesion of the board
- Reduced use of resources – no need for additional components



### 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 production due to silicone coating
- Reduced waste – no adhesion of the board
- Reduced use of resources – no need for additional components

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

## TEST RESULTS – ABRASION TEST

The abrasion test is a measure of the abrasion resistance and thus for the service life of materials. Mühlen Sohn corrugator belts possess a verifiably higher life time under identical production conditions.

### 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

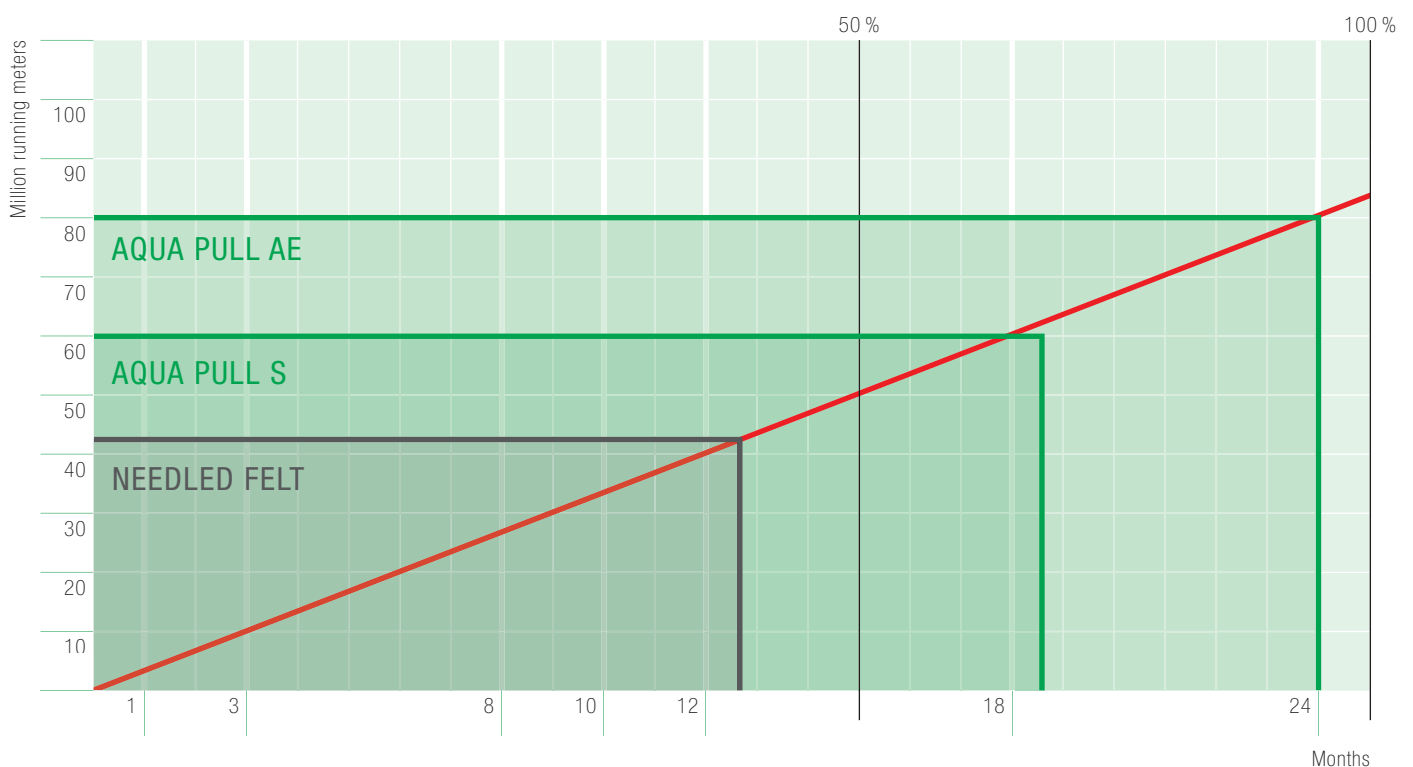
**4.7 %** AQUA PULL AE with inwoven edge protection

**6.7 %** AQUA PULL S

**17.0 %** NEEDLED FELT

The AQUA PULL S has triple the abrasion resistance of needed felt materials.

## LIFE EXPECTANCY OF THE CORRUGATOR BELTS



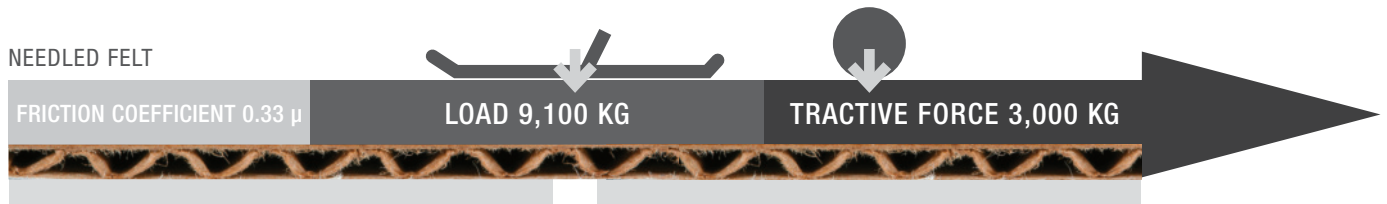
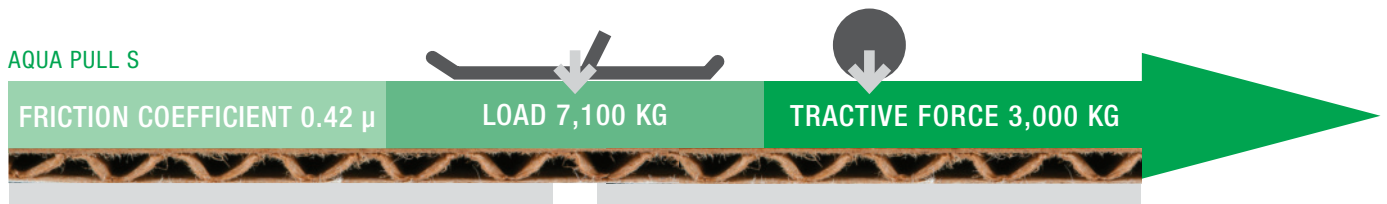
∅ life expectancy identified in practice.

# 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 needed 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.



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

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

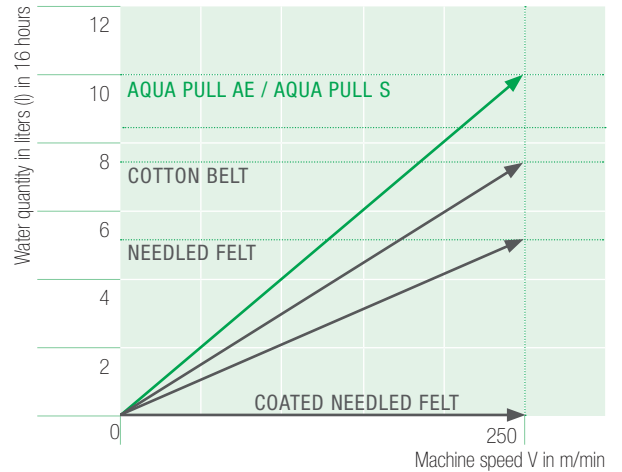
- Insufficient heat/temperature transfer and therefore poorer bonding
- Poorer quality – can result in squeezed corrugated board
- Only low speeds possible
- Originally developed only for paper machines
- Heavily worn heating plates



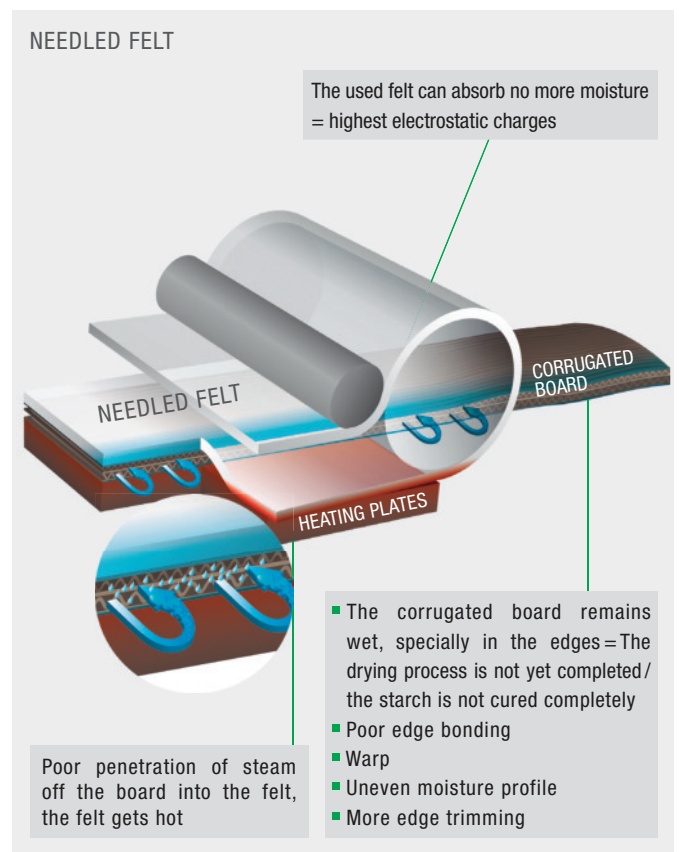
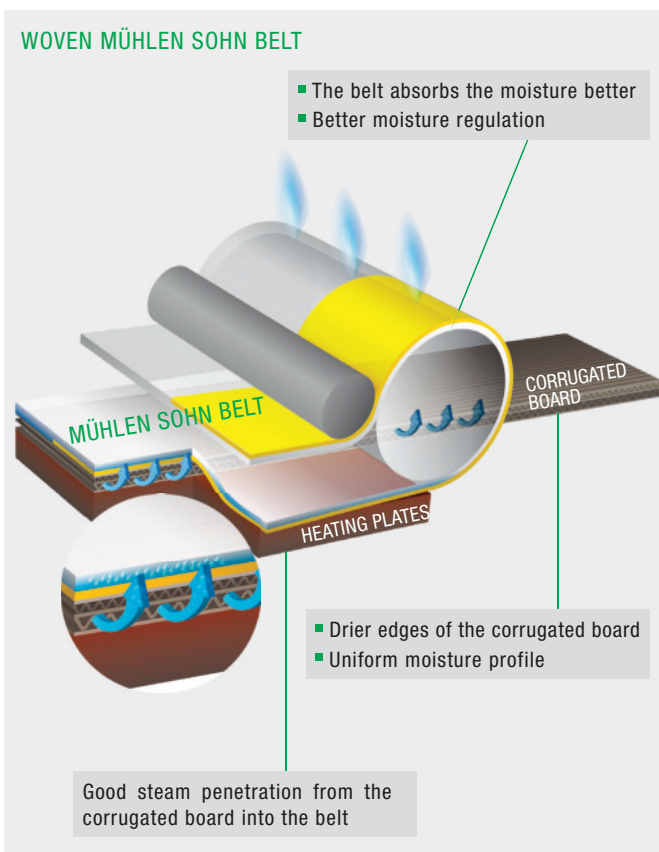
# TEST RESULTS – MOISTURE/VAPOR ABSORPTION AND RELEASE

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>
∅ 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.



## MOISTURE/VAPOR ABSORPTION & RELEASE



## 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 %.

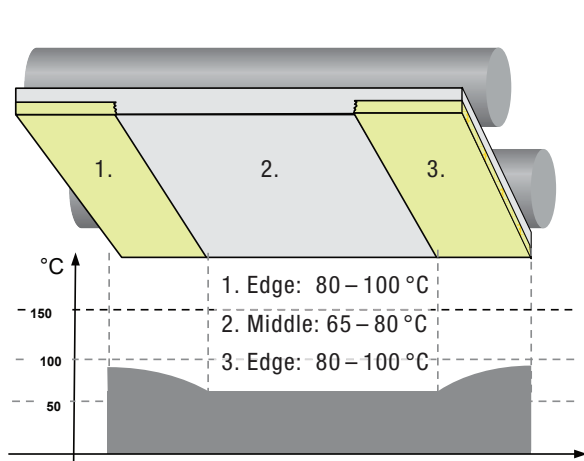
EDGE TRIM WITH AQUA PULL AE EDGE TRIM



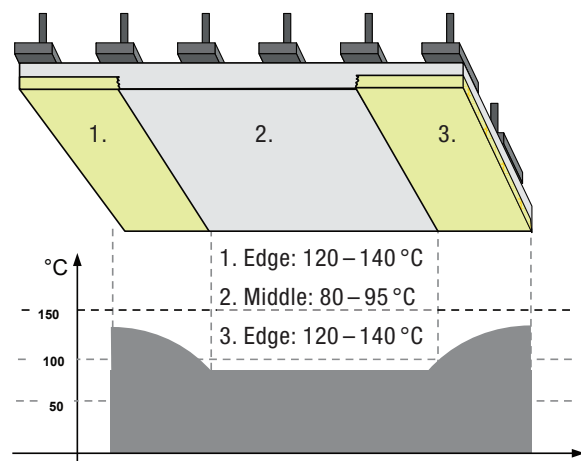
EDGE TRIM WITH OTHER BELTS



## TEMPERATURE PROFILE IN CORRUGATOR BELTS



BALLAST ROLLS



SURFACE PRESSURE LOADING SYSTEM

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 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.