GROZ-BECKERT

Felting

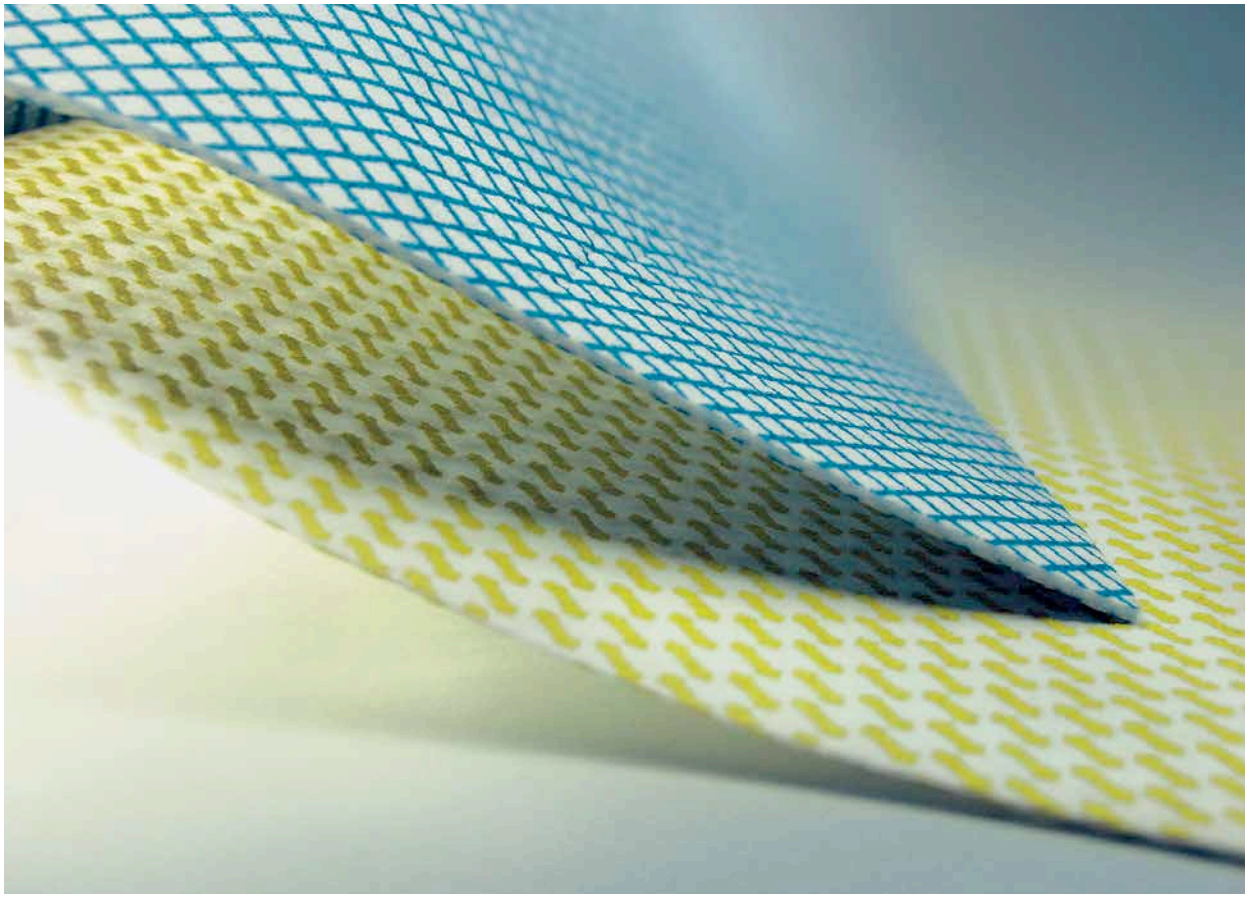
Jet strips for hydroentanglement

Hydroentanglement technology

One method used for the mechanical bonding of nonwoven fabrics is hydroentanglement, also known as the spunlace method. This technology forces water through very precisely manufactured jets at pressure levels ranging from 30 to over 400 bar.

The individual water jets emerge at speeds of up to 280 m/s and form a continuous jet curtain. The impulse power of these water jets results in a mechanical bond being formed as the fibers become looped and entangled around each other in the web. In some applications, the fibers are also split during this process in order to bring about certain product characteristics. This type of nonwoven fabric bonding is used for products in fields such as hygiene and medicine, as here particularly high safety requirements are imposed on the end products, for instance no residues are permitted to remain in the product. In addition, when using this technology high production speeds of 50 to 400 m/min can be achieved. Another benefit is the possibility to manufacture lower surface weights of 10 to 600 g/m^2.

The tools used in hydroentanglement systems are called jet strips. At Groz-Beckert, these tools for hydroentanglement are marketed under the name HyTec®.



Cleaning cloths

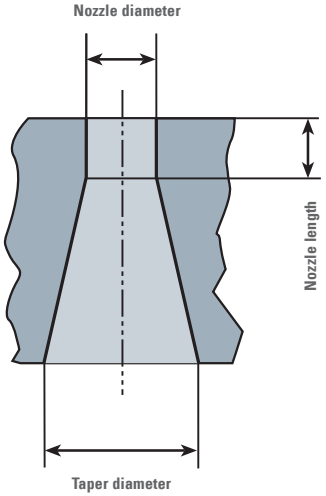
Contents

Jet strips in different versions

The Groz-Beckert Felting division offers jet strips for hydroentanglement systems in a variety of materials. Even the standard materials used are characterized by excellent corrosion resistance. The new HyTec® P jet strips are significantly harder, thereby facilitating longer operating times. The Groz-Beckert range also includes jet strips with a special GEBEDUR® treatment.

The production process used guarantees an absolutely sharp, burr-free nozzle edge with form-fit nozzle geometries which are both precise and totally uniform. These benefits ensure a long service life, perfect jet formation and minimal accumulation of dirt at the jet strip.

The designation system used for jet strips

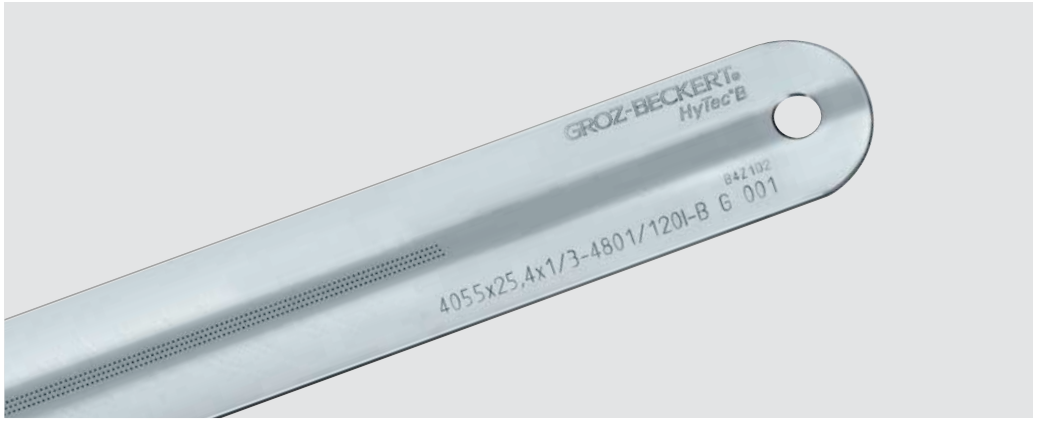


Specifications	
3500x25.4x1.0/3-5000/140I-P G001	
3,500 mm	Overall length
25.4 mm	Width
1.0 mm	Thickness
3	(1) one-row, (2) two-row, (3) three-row
5,000	Number of nozzles per row
0.14 mm	Nozzle diameter (cylindrical, small)
I	Factor (nozzle length relative to nozzle dia.)
P	Material
G	Groz-Beckert
001	Consecutive number

HyTec® A standard version

HyTec® A

- Absolutely even jet formation, coupled with high, consistent impulse power
- Very good corrosion resistance
- Outstanding surface quality to prevent the accumulation of dirt at the jet strip
- Homogeneous product characteristics over a long period



HyTec® B GEBEDUR® version

HyTec® B

- Improved resistance to scratching and damage during strip changing processes due to GEBEDUR® treatment in the nozzle area
- Absolutely even jet formation, coupled with high, consistent impulse power
- Very good corrosion resistance
- Homogeneous product characteristics over a long period

HyTec® P

HyTec® P

- Pronounced spring characteristics
- Significantly better handling properties due to the very good rigidity against deformation (stiffness)
- Good resistance to corrosion
- High lifetime due to improved resistance to wear on surfaces and nozzle edges

Fields of application for jet strips

The spectrum of applications which use the spunlace method ranges from products used in medicine and hygiene through decorative nonwoven fabrics to linings for car interiors. Technical products such as filter felts or geotextiles are also manufactured using hydroentanglement, as are many types of protective clothing, sports and multipurpose clothing or synthetic leather.

Wipes

Wound dressings

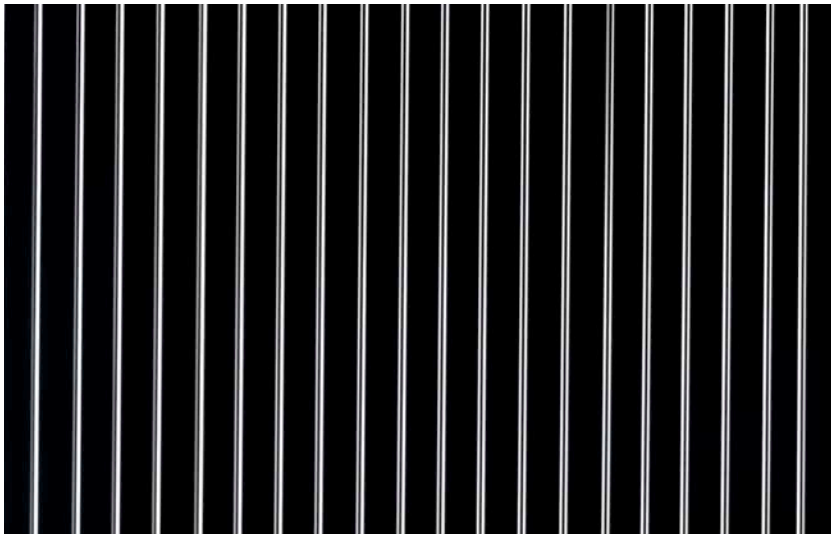
Synthetic leather

Diapers

Jet strips from Groz-Beckert – the product range

Groz-Beckert jet strips for hydroentanglement systems come in all customary dimensions, specifications and nozzle geometries. The range encompasses jet strips with a total length of up to appr. 6,200 mm and all customary widths and thicknesses. The jet strips generally come with 1, 2 or 3 rows of holes, and the maximum number of nozzles can be up to 20,000 per strip. The nozzle diameters are generally between 0.08 and 0.22 mm, although other dimensions are possible on request. The Groz-Beckert production method guarantees absolutely sharp, homogeneous nozzle edges and nozzle geometries.

It also ensures that all the nozzles of a jet strip have precisely the same diameter. The focus is on achieving a local service life, absolutely even jet formation with high impulse power and excellent bonding, in order to provide our customers with an optimized product. This will ensure they achieve their targets – for optimum productivity, quality and efficiency.



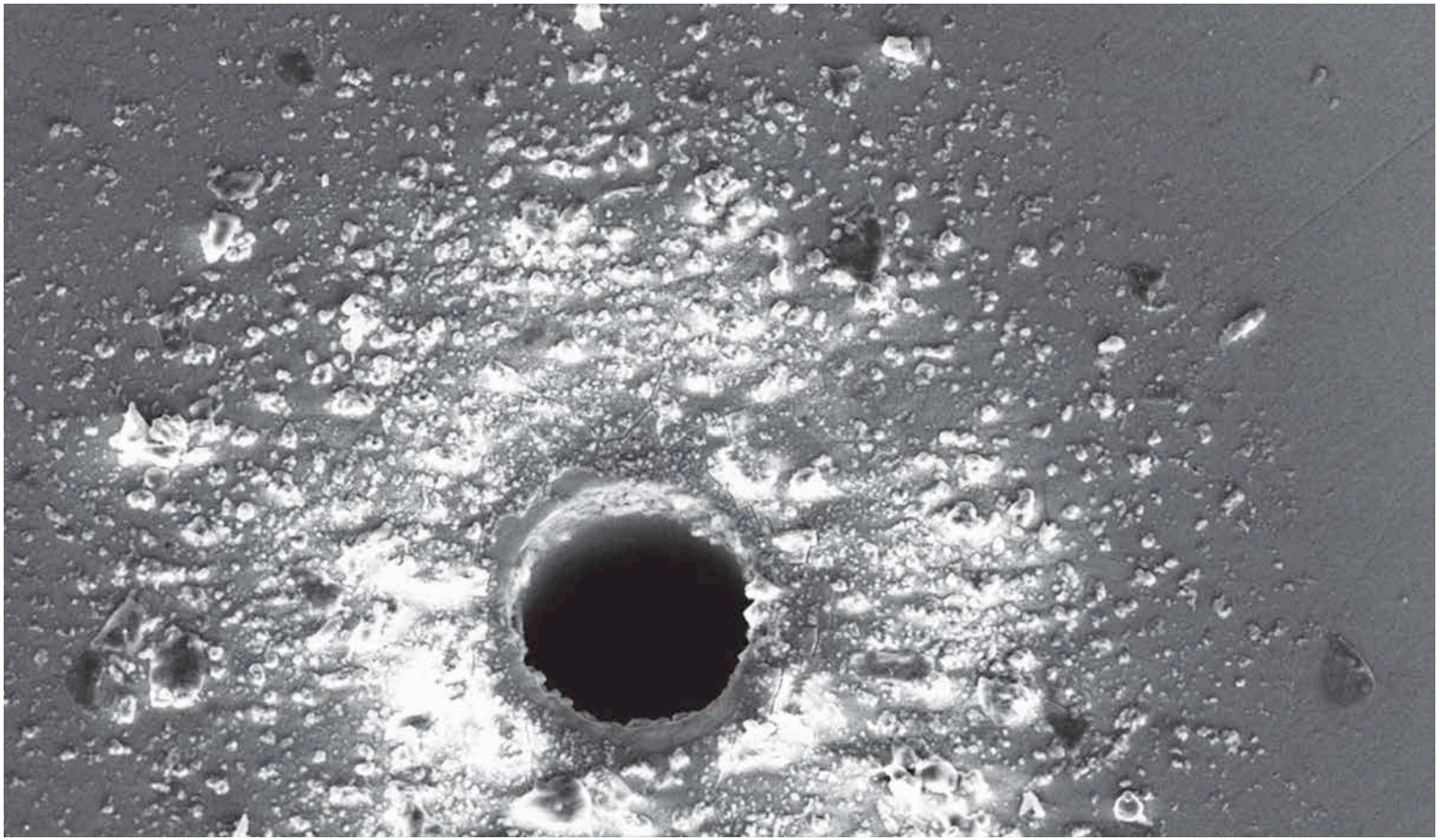
A perfect water curtain

Cleaning – beating dirt formation one step at a time

Services for jet strips

In the manufacture of spunlace products, not only the tools used but also the accompanying processes used to maintain the function and value of the jet strips and also the spunlace system itself play a key role. To maintain the properties of the jet strips and extend their service life, Groz-Beckert recommends professional cleaning and offers a process water analysis service.

When producing spunlace products, water is forced at high pressure through the nozzles of the jet strip. This entails large quantities of process water flowing through the individual nozzles. Contamination in the process water can leave its mark in the nozzle area. These pollutants can be fiber or sand residues, finishing agents, metal or rust particles, limescale deposits and any chemicals added to the process water. The deposits clog up the inside of the nozzle, impeding the jet formation process. This has a negative impact on the fabric appearance and/or can be detrimental to its physical characteristics. To prevent clogging, the jet strip needs to be professionally cleaned at regular intervals by removing deposits from the nozzles. At the same time, however, optimum care must be taken of the structure of the jet strip, and aspects such as occupational safety and environmental protection also play a key role.



Furring in the nozzle's area

Cleaning processes using an ultrasound bath

The most efficient cleaning process takes place using an ultrasound bath. Alternatively, the jet strips can also be immersed in a bath. Groz-Beckert recommends the use of a clearly defined cleaning process as described below. Here, a distinction is made between two fundamentally different cleaning processes which are effective against different types of jet strip contamination. The efficiency of the cleaning effect increases with the temperature of the cleaning medium. We recommend a value of around 50 °C. If both cleaning processes are used, always start with the acid cleaning process.

Acid cleaning to remove limescale deposits

Step 1: Cleaning in diluted phosphoric acid
To prepare the cleaning solution, dissolve 3.5 liters of 85 % strength standard technical phosphoric acid in 100 liters of water. Fully or partially deionized water or tap water can be used.

The cleaning process, which takes around 15 minutes, is carried out in the ultrasound bath.

Note: When stirring the solution, the acid must be added to the prepared water, never the other way around.

Step 2: Intermediate rinsing
Following on from the ultrasound bath cleaning, the jet strips are then rinsed in the fully or partially deionized water or tap water.

Step 3: Jet strip cleaning plant
Using hot, fully deionized water, the nozzles of the jet strips are rinsed through from both sides under a pressure of appr. 200 bar.

Step 4: Drying
If the jet strips are not used immediately after cleaning, we recommend drying them with compressed air (de-oiled).

Note: The use of acid cleaning additives in particular calls for expert knowledge, as using unsuitable cleaning additives can result in corrosion of the jet strips.

Alkaline cleaning to counteract normal soiling such as grease, fiber residues and finishing agents

Step 1: Cleaning in diluted sodium hydroxide (alternative: suitable cleaning additives)
Dissolve 3 kilograms of sodium hydroxide pellets in 100 liters of water. Here too, the fully or partially deionized water or tap water must be prepared first, never the other way around. Attention: During the dissolving process, the fluid will heat up.

Cleaning in the ultrasound bath should take place for least 15 minutes.

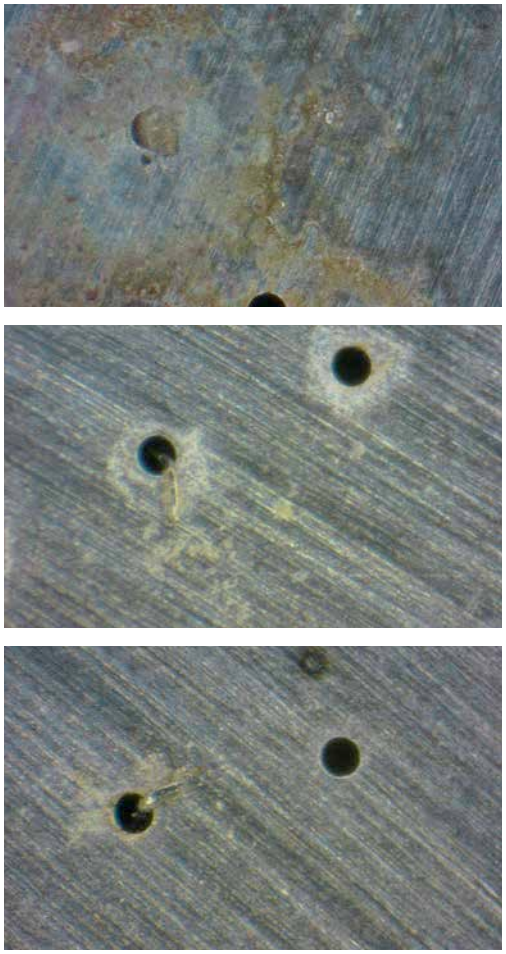
Step 2: Intermediate rinsing
The jet strip is rinsed in fully or partially deionized water or tap water after the ultrasound bath cleaning process.

Step 3: Jet strip cleaning plant
With hot, fully deionized water, the nozzles of the jet strips are rinsed through from both sides under a pressure of appr. 200 bar.

Step 4: Drying
If the jet strips are not used immediately after cleaning, we recommend drying them with compressed air (de-oiled).

Important safety remark

When using chemicals and their dilutions (such as phosphoric acid and sodium hydroxide), and also when using ready prepared cleaning additives, always read the valid safety instructions and the instructions from relevant safety data sheets without fail, for instance in respect to eye protection, hand protection and vapor extraction measures. Cleaning must be carried out by suitably trained personnel. The disposal of chemicals must comply with statutory and local authority regulations.



Dirt deposits at the nozzle

Process water analysis – clear analysis, individual advice

When manufacturing spunlace products, the quality of the process water has a decisive role to play. The parameters of the process water affect the service life of various machine parts in the spunlace machine and of the jet strips. The process water also has a significant impact on the quality of the end product in fields such as the production of hygiene articles. Consequently particular attention must be paid to ensuring hygienically pure water.

Notes on working with jet strips

A jet strip is a highly sensitive precision tool. Damage to the nozzles in the micron range are not visible to the naked eye, but can impair the jet formation and consequently its function. This kind of damage can be caused by incorrect handling of the jet strips, but for example also by leaving the jet strips to clean for too long in the ultrasound bath. Taking special care when handling jet strips is consequently vital. As a rule, the process water is circulated in a closed circuit. The process water requires thorough cleaning with the aid of a special filter medium. The methods used include sand and pocket filters (bag or cartridge filters). In addition, germs in the process water should be neutralized using ultraviolet radiation. We recommend using process water which has a pH value in the neutral range.

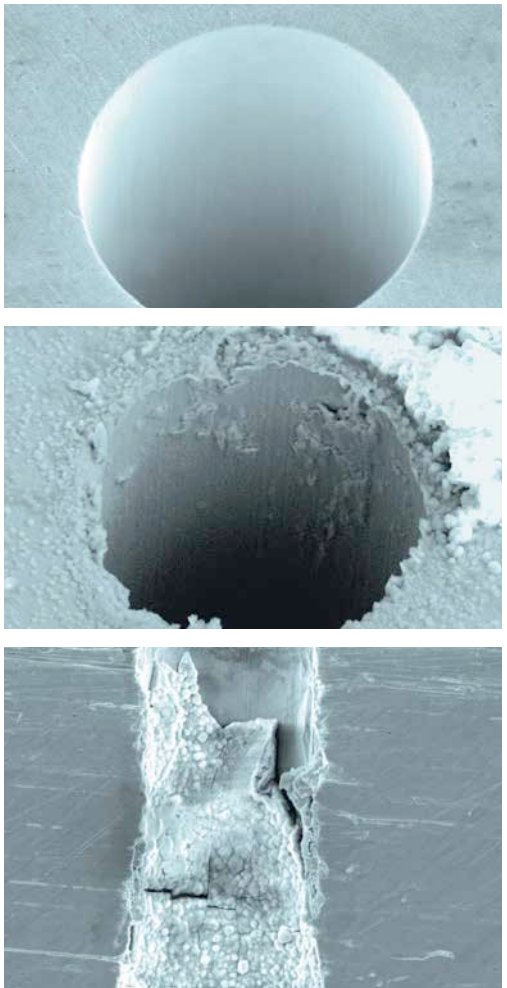
Water can occur in acidic or alkaline form, and be fully or partially deionized. However, it can also contain microorganisms, metal particles and other inorganic substances in different concentrations. Alongside the pH value, water hardness and chloride content, there are a wide range of other characteristic variables to determine the water quality.
Groz-Beckert will help you to obtain precise information about the process water you are using. As part of a specific laboratory analysis carried out at Groz-Beckert, we analyze your process water for important chemical parameters. This allows you to gain a precise overview of your process water quality.

As a leading manufacturer of jet strips, Groz-Beckert offers you individual advice in conjunction with a process water analysis.

The significance of these characteristic variables:

- pH value: The lower the value in the acid range, the higher the risk of corrosion. Recommended pH value: 6.5 to 7.5
- Water hardness: Soft water supports the metal dissolution process. Conversely, water that is too hard causes the nozzles to become clogged with limescale. Recommended water hardness: 4° to 6° dH
- Chloride content: The higher the chloride content, the greater the risk of corrosion. Recommended chloride content: lower than 100 mg/l

Comparison between a new nozzle and a soiled nozzle.



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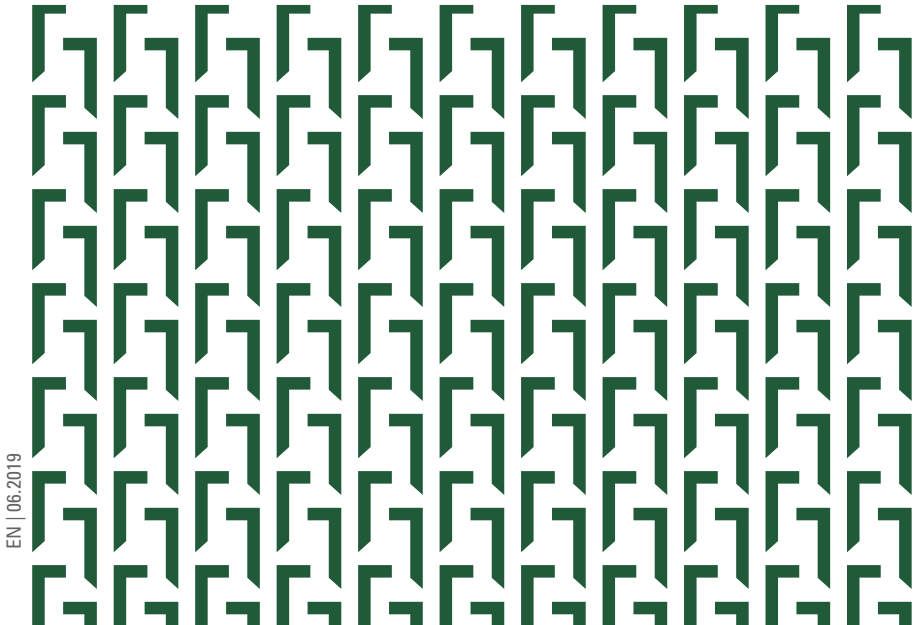

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