

Felting

Nonwovens for the automotive industry



Market requirements

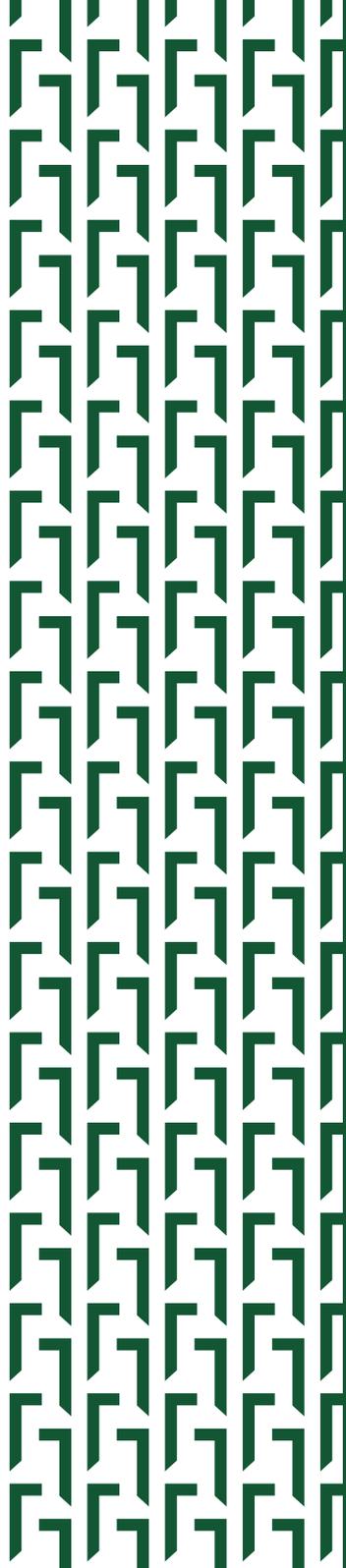
Technical textiles are a rapid growth segment. The automotive industry has become one of the biggest consumers of these materials. The automotive world and the cars we drive have changed at a headlong pace, and the coming years will see a far greater number of innovations than were introduced over the past century. With these changes will come whole new and challenging demands made on the automotive industry: It will face ever dwindling resources, rising raw material prices, enormous pricing and competitive pressure, and growing vehicle production. In addition, consumers will expect the automakers to come up not only with appealing designs but a growing level of comfort, functionality and safety, alongside reduced weight.



These developments must be met by the development of lightweight materials such as nonwovens. These expectations are giving rise to a whole new set of challenges for automakers as they seek to reduce costs, weight and fuel consumption. A part of the solution is the use of technical textiles, and in some cases the substitution of heavy materials. Alongside the economical production and use of textiles, consumer wishes and expectations also have to be addressed. Textiles – and increasingly nonwovens as a sub-category – are taking on a whole number of important functions in the automotive world, both in the inside and outside visible and invisible area. Around 40 applications and more than 35 sq.meters of textile surfaces on average in every car testify to the growing importance of nonwovens in the automotive sector.

The central requirements

- Aesthetic design
- Functionality (insulation, damping, linings and substrates)
- Sparing use of resources
- Reduced fuel consumption and carbon emissions
- Recyclable materials



Contents

Market requirements	2
Nonwovens: Their uses in modern cars	4
Visible automotive applications	5
System configuration and needle recommendations	7
Requirements imposed on the end product and the needle	9
Non-visible automotive applications	10
System configuration and needle recommendations	12
Requirements imposed on the end product and the needle	13
Groz-Beckert Academy and App myGrozBeckert	14

Nonwovens: Their uses in modern cars

Over recent years, the use of technical textiles in the automotive sector has increased exponentially, with an ever growing number of applications for nonwovens in particular. The main reasons for this are its low weight, favorable cost-to-performance ratio and outstanding scope for design in terms of thickness, density, functionality and formability. It offers almost unlimited possibilities for application and design. In addition, the speed of nonwoven fabric production is comparatively high.

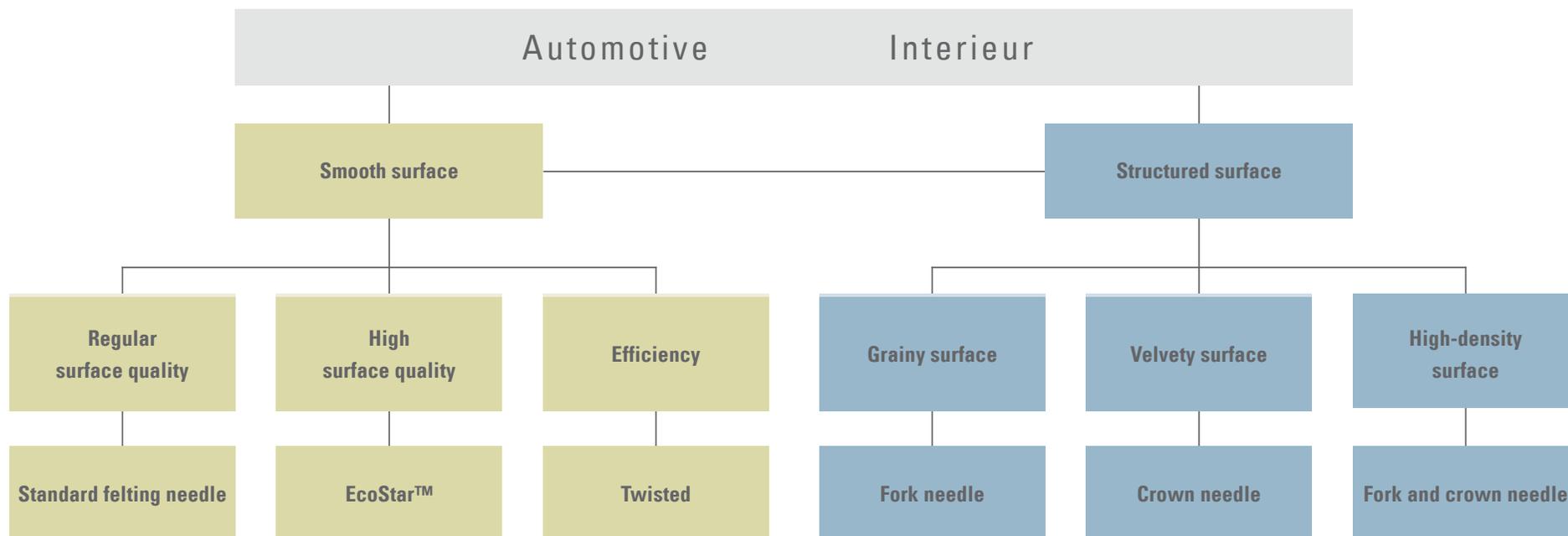
Due to the use of innovative materials and production processes, nonwoven fabrics offer a number of benefits in terms of weight, function and design. This applies to vehicle interiors and exteriors, for visible and non-visible applications. These fabrics are suitable as decor materials, but are also used below surfaces either as substrates for decorative materials or also act as insulators or damping fabrics. Aesthetic applications include for instance linings for doors and underfloor areas. Technical functions include not only air filtration for ventilation systems but primarily also soundproofing. In indoor areas, environmentally friendly recyclable materials are primarily used which also contribute towards weight reduction wherever possible.

Quality, efficiency, process stability and performance

With its selection of needles specifically for nonwovens for use in automotive applications, Groz-Beckert is rising to the challenge of guaranteeing not only optimum quality, process reliability and stability, but also a reduction of manufacturing costs. Groz-Beckert sees its role as that of a partner to address.



Visible automotive applications



Application-specific solutions for different surfaces

Nonwovens form a substantial component of every car – as clearly testified by well in excess of 40 different fields of application. The visible area accounts for around 10 % or 3.5 sq.m. of the nonwovens used. Surface quality plays a key role, particularly for visible nonwovens used in auto interiors. Examples include door and side paneling, parcel shelves and headliners. Groz-Beckert provides a range of special needle solu-

tions specifically to address this field of application. Nonwovens needled using these are subdivided into structured and flat needled products. Depending on the requirements of customers from the automotive sector, and taking into consideration the application field of the finished product, different needle types are suitable for their production.



Visible automotive applications

The expectations placed on the quality of structured and smooth surfaces differ, as do the needles required for their manufacture.

In the case of flat needled products, felting needles with RF barbs are available for regular surface qualities and optimum process stability – with easily manageable costs. The best possible surface quality is achieved using EcoStar™ felting needles. In comparison to standard felting needles this universal felting needle not only enables improved surface quality but also has a lower penetration force during fiber transport – while achieving the same level of efficiency. A typical field of application here is the parcel shelf.

If efficiency takes priority in the manufacture of smooth surfaces, the use of Twisted felting needles is the right choice. The twisted working part ensures greater barb definition in application. The result: more efficient needling and consequently capacity for higher production speeds. If a grainy or velvety surface feel is preferred, structuring needles are a more suitable option.

- Crown needles (for a velvety surface)
- Fork needles (for a grainy surface)
- or a combination of crown and fork needles (for very dense and stable surfaces) can be used.

The fields of application for products structured in this way in cars range from the floor and trunk area to the headliner.

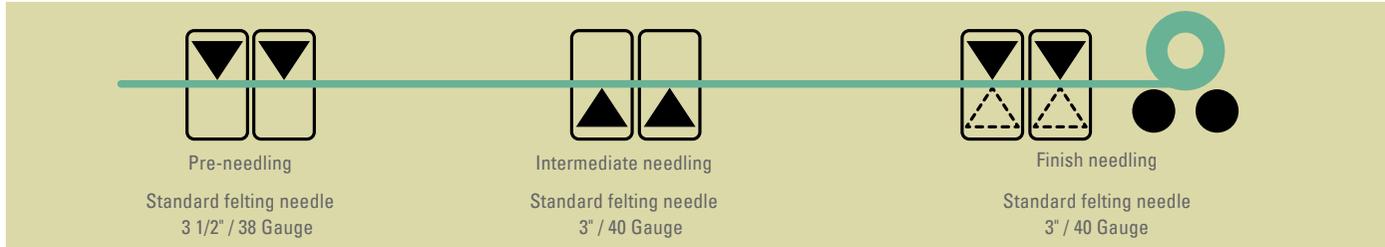


Door interior made of Alcantara

Depending on the product specification

System configuration and needle recommendations

Standard felting needle – regular surface quality



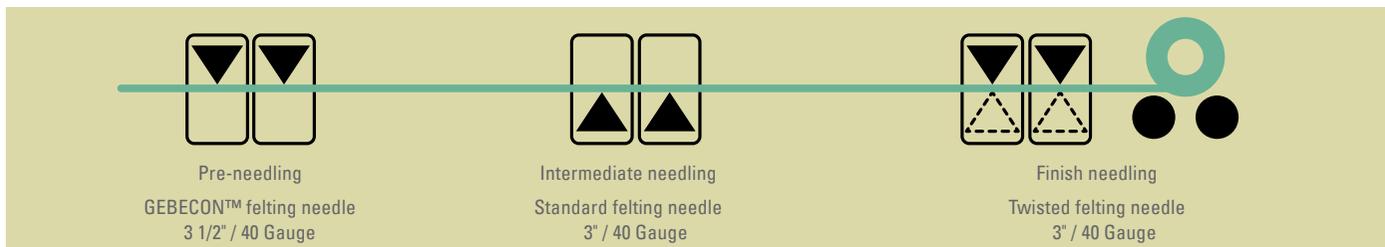
In addition to the surface quality, the use of RF barbs ensures a high level of process stability without escalating costs.

GEBECON™/EcoStar™ – high surface quality



The use of EcoStar™ felting needles for finish needling results in optimum surface quality in flat needled products.

GEBECON™/Twisted – efficiency



The twisted working part of a Twisted felting needle ensures greater barb definition in application. The result: more efficient needling and consequently capacity for higher production speeds. For intermediate needling, also a Twisted felting needle can be used.



Products

Headliner, parcel shelf, trunk lining, car seat, door paneling, floor covering, floor mats, glove compartment, storage compartment in center console, cockpit

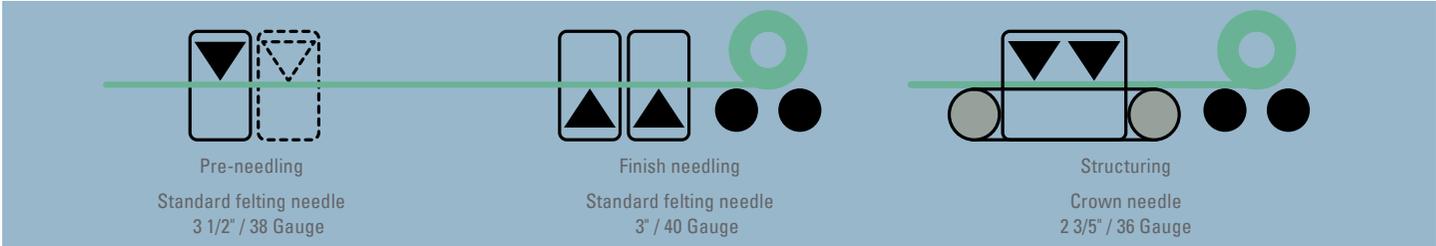
System configuration and needle recommendations

Fork needle – grainy surface



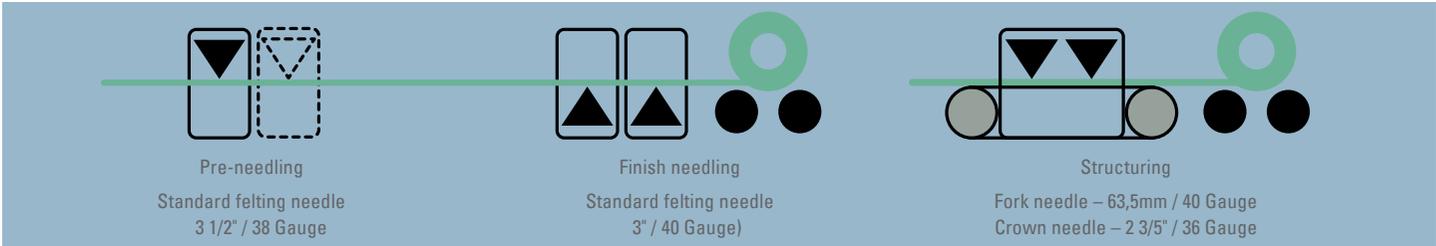
The exclusive use of fork needles in the structuring machine produces a surface with a grainy character.

Crown needle – velvety surface



The exclusive use of crown needles in the structuring machine produces a surface with a velvety appearance.

Fork and crown needles – high-density surface



A combination of fork and crown needles in the structuring machine ensures a dense, stable surface structure.

Requirements imposed on the end product and the needle

Application	Fiber fineness range [dtex]	Product weight [g/m ²]	Material/processing	Requirements imposed on materials/processing	Requirements imposed on Groz-Beckert products	Groz-Beckert products
Car seat	1.7–3.3 / 4 0.8–3.3	150–200 200–1,000	Synthetic leather (Alcantara) for car seats and backrests	<ul style="list-style-type: none"> • High level of strength • Optimum compaction • High abrasion resistance • Absolutely even surface • Light fastness 	<ul style="list-style-type: none"> • Gentle fiber transport • No visible penetration holes 	<ul style="list-style-type: none"> • Fine gauge needles (38–42 gg) • GEBECON™ • EcoStar™
Door paneling	1.3–300 3.3–17	100–3,000	Synthetic leather (Alcantara) for door interiors	<ul style="list-style-type: none"> • High level of strength • Optimum compaction • High abrasion resistance • Absolutely even surface • Light fastness 	<ul style="list-style-type: none"> • Gentle fiber transport • No visible penetration holes 	<ul style="list-style-type: none"> • Fine gauge needles (38–42 gg) • GEBECON™ • EcoStar™
Headliner	1.3–300 3.3–17	100–1,400	PP, PA PAN PET	<ul style="list-style-type: none"> • Weight savings • Dirt repellent • Damping properties • Abrasion resistance • Stability • Low emissions 	<ul style="list-style-type: none"> • No visible penetration holes • Homogeneous surface 	<ul style="list-style-type: none"> • EcoStar™ • Standard felting needles with RF barbs
Parcel shelf	1.3–300 3.3–17	100–1,400	PP/ PES	<ul style="list-style-type: none"> • Rigidity/dimensional stability • Abrasion resistance • Dirt repellent • Thermal stability • Weight reduction • Lamination of wide-ranging decor surfaces 	<ul style="list-style-type: none"> • No visible penetration holes • Homogeneous surface 	<ul style="list-style-type: none"> • EcoStar™
Trunk lining	1.3–300 3.3–17	100–1,400	PES	<ul style="list-style-type: none"> • Flexible material concepts • Dirt repellent • Abrasion resistance • Stability • High-quality surface design • Damping properties • Flame retardancy 	<ul style="list-style-type: none"> • Abrasion resistance 	<ul style="list-style-type: none"> • EcoStar™
Floor covering	3.3–135	100–800	PA Chemical fibers such as PP/PES	<ul style="list-style-type: none"> • Noise attenuation • Functionality • Design 	<ul style="list-style-type: none"> • Surface design • Strength levels 	<ul style="list-style-type: none"> • Crown or fork needles • or combination of both
Floor mats/carpets Ribbed fabric/random velour	1.3–300 3.3–17	100–1,400	Chemical fibers such as PP/PES	<ul style="list-style-type: none"> • Lamination of decor surfaces • Velvety surface • High covering power 	<ul style="list-style-type: none"> • Surface design • Strength levels 	<ul style="list-style-type: none"> • Crown or fork needles • or combination of both
Underfloor lining	1.3–300 3.3–17	100–1,400	Nonwoven fabric made of PP	<ul style="list-style-type: none"> • Improved aerodynamics • Weight savings • Corrosion protection • Improved acoustic properties • Waste-free production • Long service life due to higher abrasion and impact resistance 	<ul style="list-style-type: none"> • High needle stability • Optimum bending resistance properties • High needle wear resistance • Even fiber transport 	<ul style="list-style-type: none"> • Conical felting needle • GEBECON™ • GEBEDUR™ • Vario barb needle

Non-visible automotive applications

Only around 10% of nonwovens used in cars are visible, the remaining 90% do their job unseen. Fields of application include brake disks, filters, exhaust systems or batteries, but they also contribute towards the design appeal of instrument panels or headliners.

The wheel arch liner was one of the first external automotive components to be made from nonwoven fabric, while today a many other areas such as the underbody assembly are also conceivable uses. Noise reduction is one of the most important roles of non-woven components used in non-visible applications. For this, insulating and absorbing material concepts are used in order to improve vehicle acoustics. Today, efficient products are often PVC or GMT (thermoplastic fiberglass) based, but components made of nonwoven fabrics are playing an increasingly important role.



Floor assembly



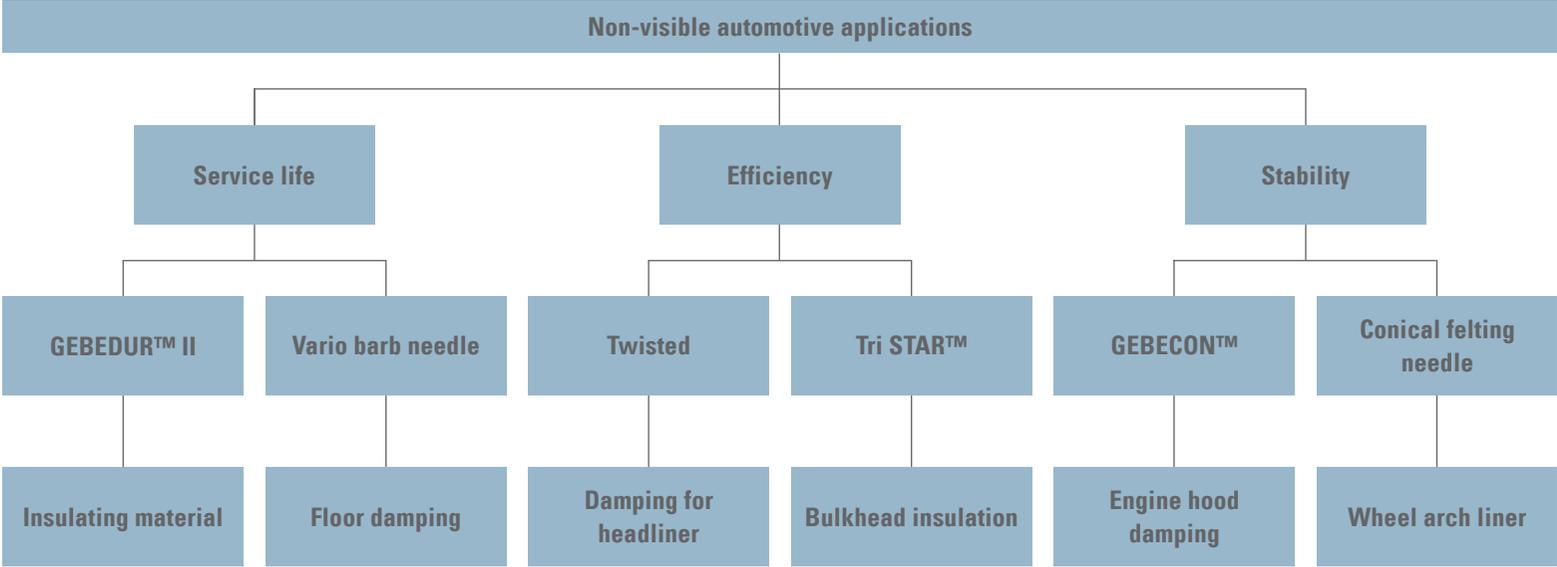
Insulating material



Hood absorber



Wheel arch liner



The functions

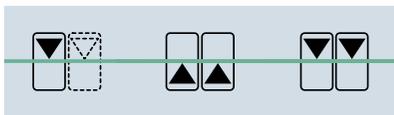
As a technical component, nonwovens provide an insulating, damping, sealing, filtration and protective function. They can serve both as linings or substrates for laminated decor materials, ensure acoustic efficiency or compensate for temperature differences.

Products

Underbody protection, wheel arch lining, seat padding, internal door paneling, damping/insulating material (glass and ceramic fiber), carpet backing, hood absorber, carbon brake.

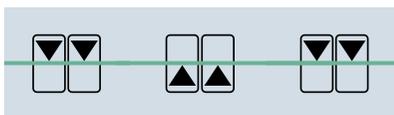
System configuration and needle recommendations

Damping for headliner: Twisted



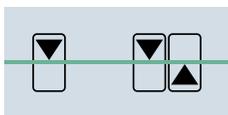
Pre-needling: Standard felting needle – 3 1/2" / 36 Gauge
 Intermediate/finish needling: Twisted felting needle – 3" / 38 Gauge

Bulkhead insulation: Tri STAR™



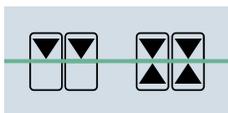
Pre-needling: Standard felting needle – 3 1/2" / 32 Gauge
 Intermediate/finish needling: Tri STAR™ felting needle – 3" / 36 Gauge

Engine hood damping: GEBECON™



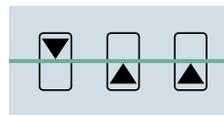
Pre-needling: GEBECON™ felting needle – 3 1/2" / 25 Gauge
 Finish needling: Standard felting needle – 3 1/2" / 32 Gauge

Wheel arch liner: Conical felting needle



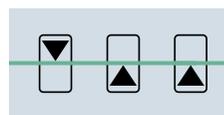
Pre-needling: Conical felting needle – 3 1/2" / 32 Gauge
 Finish needling: Conical felting needle – 3" / 32 Gauge

Floor damping: Vario barb needle



Pre-needling: Vario barb needle – 3 1/2" / 25 Gauge
 Finish needling: Vario barb needle – 3" / 25 Gauge

Insulating material: GEBEDUR™ II



Pre-needling: Conical felting needle – 3 1/2" / 36 Gauge with GEBEDUR™ II treatment
 Finish needling: Conical felting needle – 3" / 36 Gauge with GEBEDUR™ II treatment

For higher wear resistance

Groz-Beckert offers a range of different coatings and treatments for the improved wear resistance of felting needles. In order to improve the service life of needles, the surface of the working part is given a special coating, such as GEBEDUR™ I, or metal-lurgically treated (GEBEDUR™ II). Groz-Beckert® dur combines longer service life with increased corrosion resistance, thanks to a new base material coupled with a patented manufacturing process.

Requirements imposed on the end product and the needle

Application	Fiber fineness range [dtex]	Product weight [g/m ²]	Material/processing	Requirements imposed on materials/processing	Requirements imposed on Groz-Beckert products	Groz-Beckert products
Floor damping	3.3–300 PP 6.7–17	100–2,500	Natural fibers such as cotton, flax, jute etc. Bonding fibers (PP/PES)	<ul style="list-style-type: none"> • Weight reduction • Sparing use of resources • Damping 	<ul style="list-style-type: none"> • High needle stability • Service life 	<ul style="list-style-type: none"> • Conical felting needle with GEBEDUR™ II • Vario barb needle
Insulating material	Mix	500–2,000 1,000	Waste/shredded fibers Natural fibers (hemp, jute, flax etc.) Blends with chemical fibers	<ul style="list-style-type: none"> • Sound insulation • Cold and heat insulation 	<ul style="list-style-type: none"> • High needle stability • Optimum bending resistance properties 	<ul style="list-style-type: none"> • Conical felting needle • GEBECON™ • Vario barb needle • GEBEDUR™ II
Engine hood damping	3.3–300	500–2,000 1,500	Hood absorber (insulating material made from recycled and natural fibers)	<ul style="list-style-type: none"> • Noise insulation/absorption • Heat resistance • Deep drawing capability • Oil and water resistant • Low component weight 	<ul style="list-style-type: none"> • High needle stability • Optimum bending resistance properties 	<ul style="list-style-type: none"> • Conical felting needle • Vario barb needle
Wheel arch linings	PP 6.7–17	500–1,500	Recycled fibers Nonwoven fabric with bonding fibers (polypropylene, polyester)	<ul style="list-style-type: none"> • Deep drawing capability • Dimensional stability • Resistant to water and road salt • Reduction of passenger compartment and tire/road noise • Weight reduction 	<ul style="list-style-type: none"> • Compact needling • High needle stability • Homogeneous needling 	<ul style="list-style-type: none"> • Conical felting needle • Vario barb needle
Carbon brake	1–1.7 1.3	2,000–4,500	Short fibers/Nonwoven Panox	<ul style="list-style-type: none"> • Dimensional stability • Wettability • Even thickness and porosity structure • Optimum fiber alignment (straightened and unstraightened) 	<ul style="list-style-type: none"> • Maximum fiber protection • Targeted fiber deflection • Needle stability (no needle breakage) • Targeted bonding of layered plies 	<ul style="list-style-type: none"> • Standard triangular felting needle with KV or RF barbs, also Tri STAR™ possible • Twisted
Engine-side bulkhead insulation	3.3–11	500–1,000	Nonwoven (natural/glass and mineral fibers)/heat shield made of aluminum	<ul style="list-style-type: none"> • Airborne sound absorption • Thermal stability • Low component weight • Flame retardancy • Service life 	<ul style="list-style-type: none"> • High needle stability • Compact needling 	<ul style="list-style-type: none"> • Standard felting needles with RF barbs • Tri STAR™
Damping material for headliners	3.3–11 PP 6.7	100–800	Nonwoven made of natural and chemical fibers with bonding fibers (polypropylene, polyester)	<ul style="list-style-type: none"> • Intrinsic rigidity • Soundproofing • Temperature resistance 	<ul style="list-style-type: none"> • Fiber protection • Compaction • Homogeneous surface • Tear resistance 	<ul style="list-style-type: none"> • Standard felting needles with RF barbs • Twisted

Groz-Beckert Academy and myGrozBeckert App



Academy – Your textile training program

The Groz-Beckert Academy has made it its mission to pass on knowledge, to share experiences and to make know-how and expertise accessible.

The range of courses includes basic, continuing and specialized training, all of which are held in the Technology and Development Center (TEZ) in Albstadt. The Groz-Beckert Academy also offers individual training on-site at the customer.

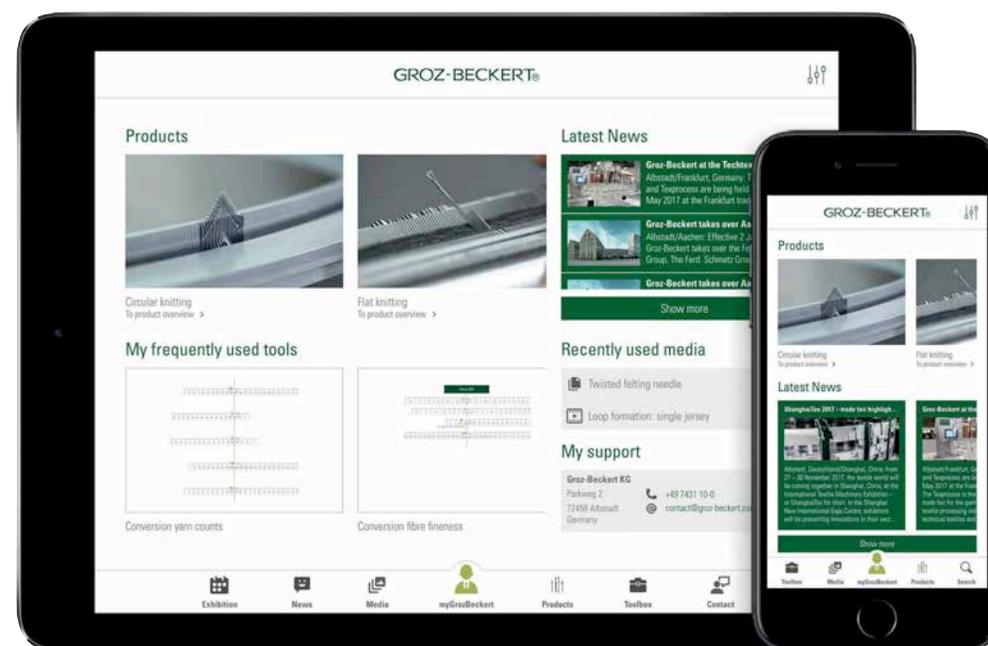
All courses are offered in both German and English. Selected courses are also available in other languages, such as Chinese and Spanish.

App – Your personal work tool

myGrozBeckert has brought the textile world together in one app since 2011. Providing information on Groz-Beckert products as well as the company itself. The highlight of the app is the Toolbox, which provides the user with useful conversion and calculation tools. The app also informs you of any news and events relating to Groz-Beckert.

The newest version of the app was released to app stores in 2017 with fully customizable navigation. This enables users to define favourites and preferred topics themselves and to change them at any time as required.

myGrozBeckert works with all iOS and Android smartphones and tablets, and is available in German, English, and Chinese. You can download the free app through the Google Play Store, the Apple App Store or through various Chinese app stores.



More information on the Groz-Beckert Academy is available on the website and in the training program

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