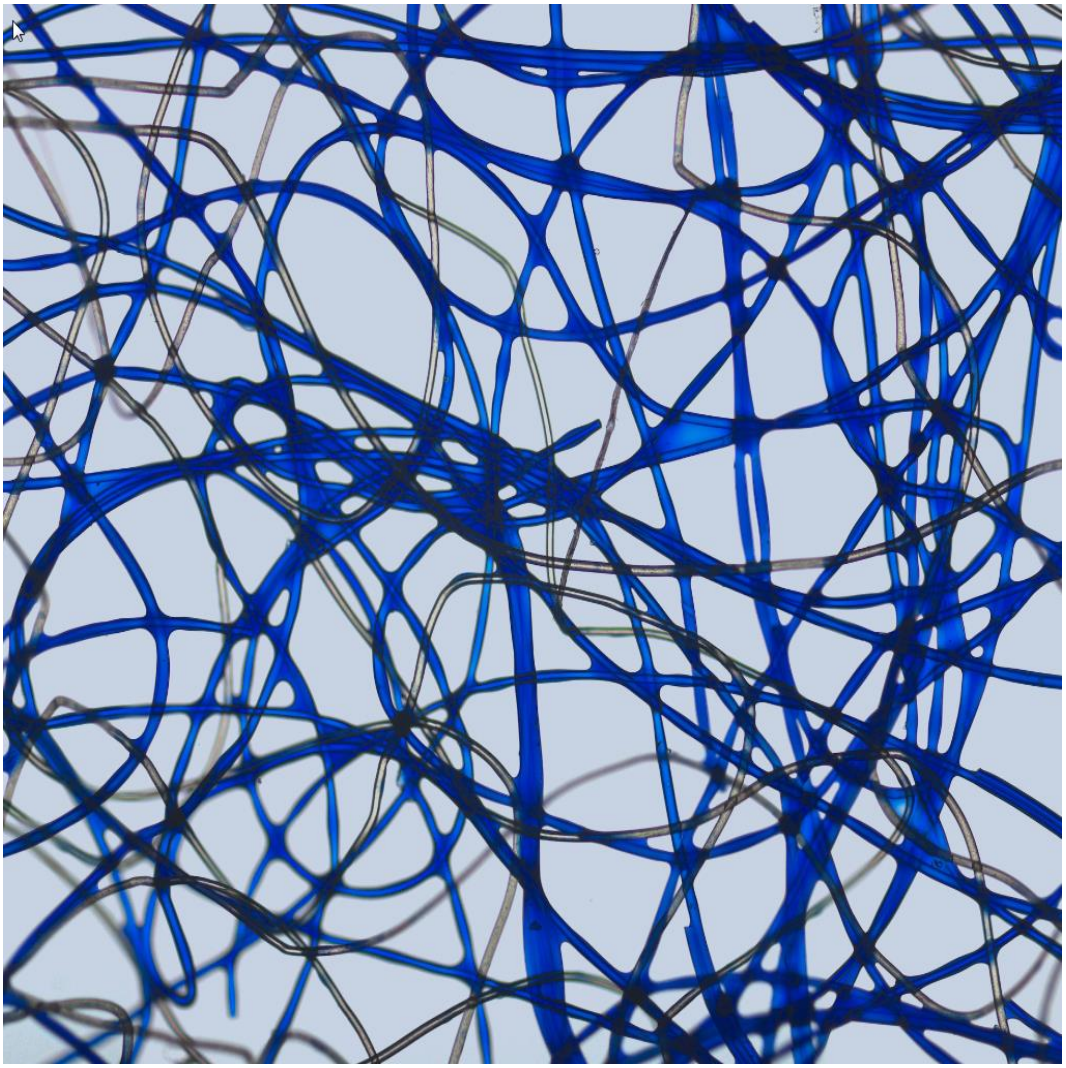


Melt Bonding Fibers

GRILON®

EMS





Melt Bonding Fibers

Bonding fibers melt at much lower temperatures than the base or matrix material. The temperature difference must be great enough to avoid damaging the matrix. Bicomponent bonding fibers are fibers that consist of two polymers with different melting points. They can be constructed as side-by-side or as core/sheath cross sections. Compared to solid profile (or monocomponent) melt bonding fibers the bicomponent fibers retain their fiber structure due to the higher melting core; only the lower melting sheath functions as an adhesive.

Polymers

Melt bonding fibers generally consist of synthetic, thermoplastic polymers such as copolyamide, copolyester and polyolefin. The melting point depends on the polymer and raw material components. This polymer design leads to tailor made products with very low crystallinity, low melt viscosity, good flow ability and finally to a very high bonding strength in the finished product.

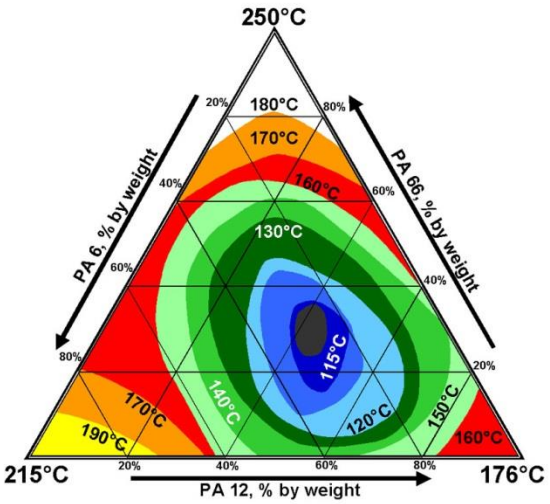


Fig 1 Melting point of copolyamide as a function of the monomer mix.

Applications

- Spun yarns
- Nonwovens
- Paper
- Hygiene
- Composites
- Wood insulation

Benefits

- Low energy demand
- High production speeds
- Low capital expenditure
- Outstanding bonding properties
- Increased product value

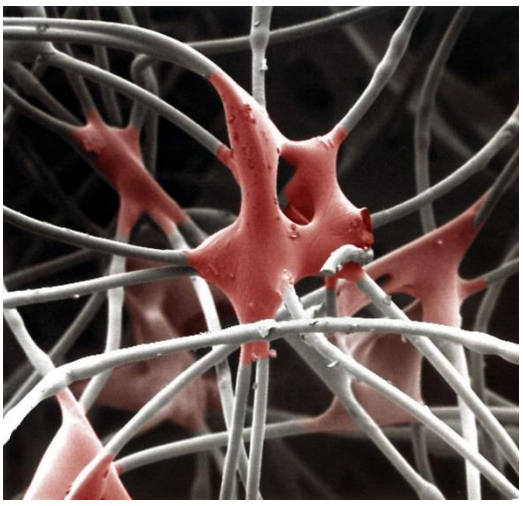


Fig. 2 Fused melt bonding fiber in the fiber matrix



Material Selection

Polyester based materials are preferably bonded with copolyester melt bonding fibers and polyamide fibers bond well with copolyamides. The temperature difference of the matrix fiber and the bonding fiber must be great enough to avoid damage to the base material.

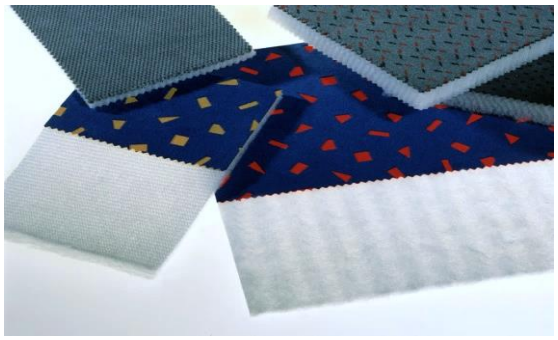


Fig. 3 Voluminous nonwovens

Grilon CoPolyamide (CoPA)

- Hydrophilic amide group (-HN-CO-)
- Formation of hydrogen bonds (very good bonding to cellulose)
- High bonding strength
- Low bonding temperature
- Steam activated bonding
- Stable against hydrolysis

Comparison Steam Activation

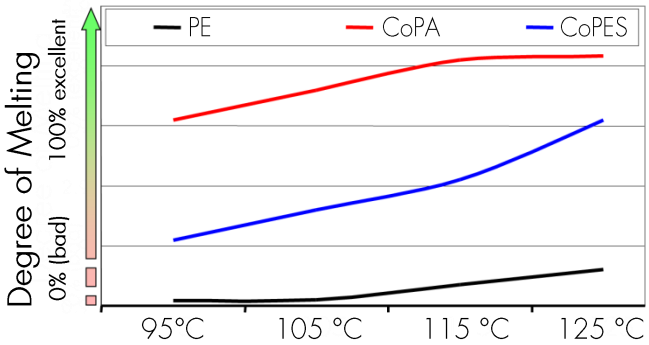


Fig. 4

Grilon CoPolyester (CoPES)

- Hydrophilic ester group (-CO_2C-)
- Best bonding fiber for polyester matrix
- Very low melt viscosity, good wetting
- Flexible soft bonding
- Less expensive
- Weather resistant
- Low fogging

Comparison Bonding Strength

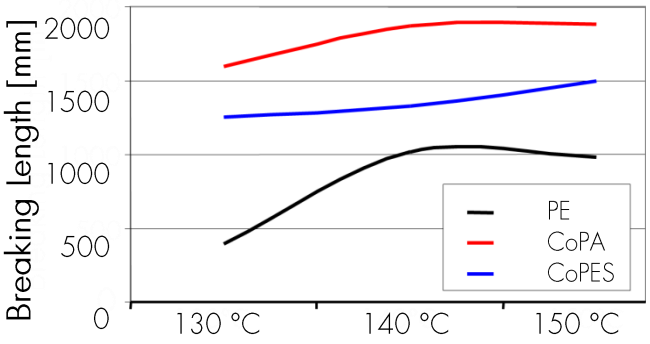
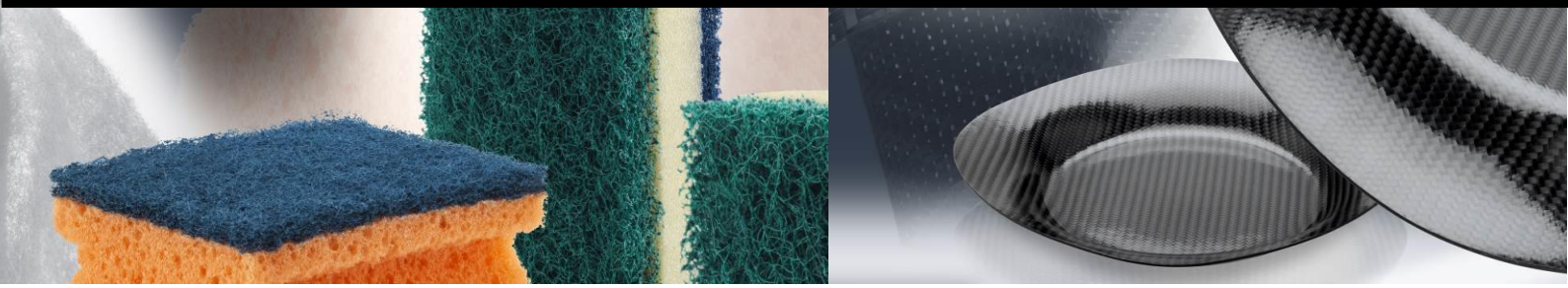
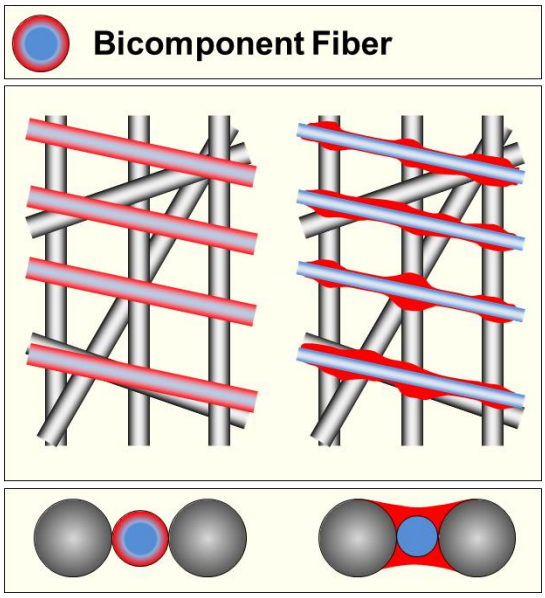


Fig. 5



Comparison Solid Profile and Bico Fiber



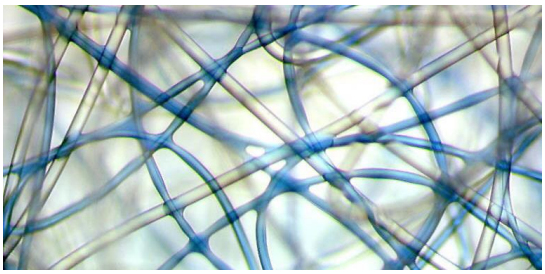
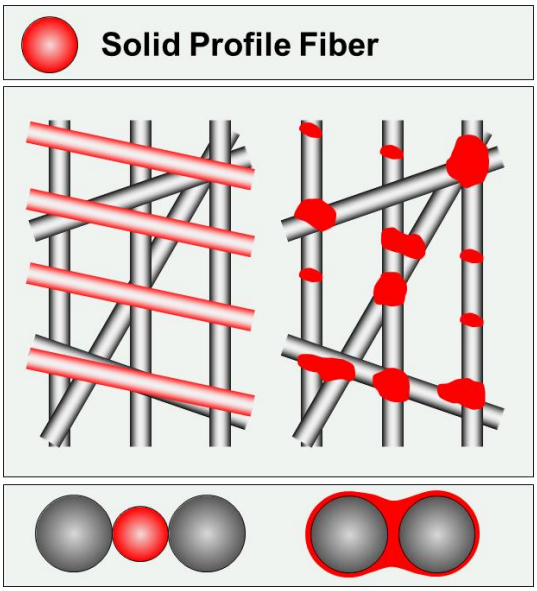


Fig. 6 20 % Bico fiber in the matrix



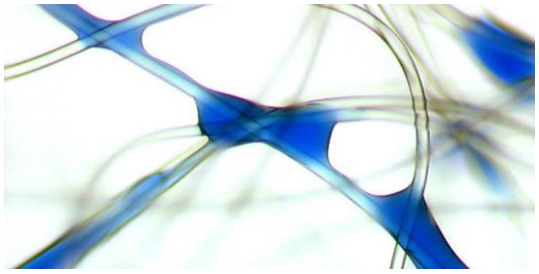


Fig. 7 20% Solid profile fiber in the matrix

Bicomponent melt bonding fibers in contrast to solid profile fiber retain their appearance under melt conditions. Almost no measurable shrinkage can be observed in the nonwoven during thermo fusion. The adhesion points with the matrix fiber are smaller but more frequent; the structure of the matrix is thereby well stabilized.

Solid profile (monocomponent) melt bonding fibers have very strong fusion points. The adhesive fiber melts to form large wetting sails at the cross points of the matrix fibers with high adhesive strength. Low melt viscosity and high crystallinity of the polymer are key characteristics of melt bonding fibers.





Fiber Profile / Cross Section



concentric



side by side



solid profile

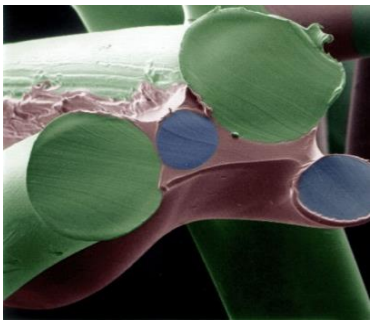
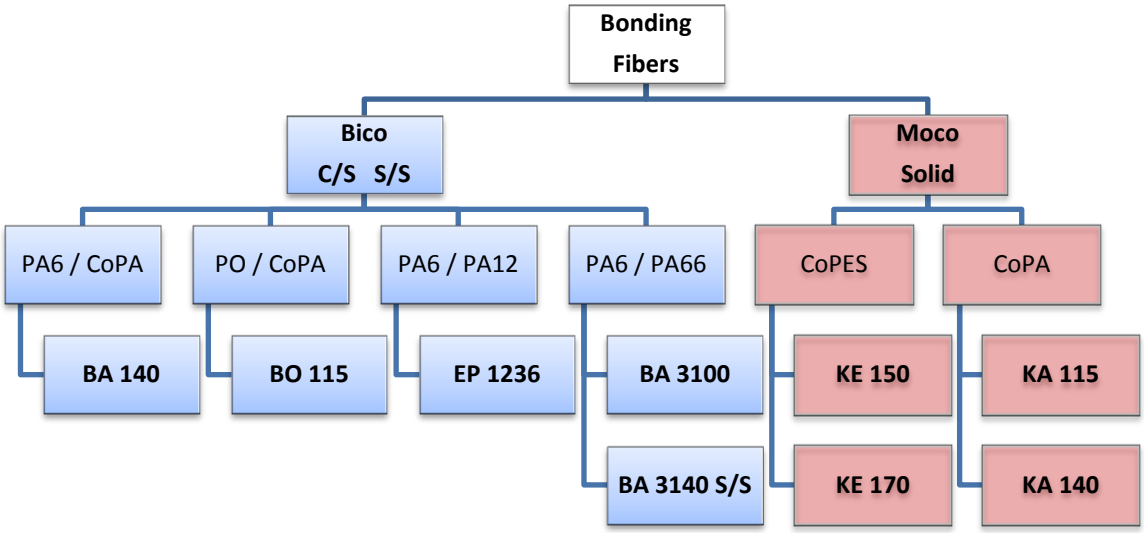


Fig. 8 REM detail of fused fibers

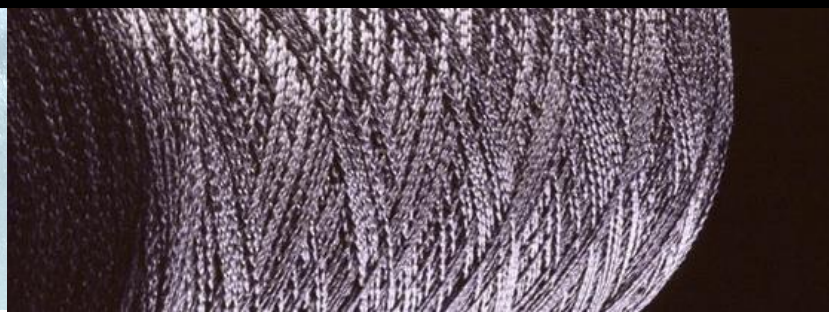
Product Range



Binder Fiber	Profile	Polymer	Melting Point [°C]	Count [dtex]	Cut [mm]
KE 150	Moco	CoPES	150	5.5	60
KE 170	Moco	CoPES	170	5.5	60
KA 115	Moco	CoPA	115	4.2/11	51/80/100
KA 140	Moco	CoPA	135	4.2/11	51/80
BA 140	Bico, C/S	PA6/CoPA	220/135	3.3/8/17/30/67	Vario 2/60/80/ Vario 4
EP 1236	Bico, C/S	PA6/PA12	220/176	3.3/8/17	60/80
BO 115	Bico, C/S	PO/CoPA	160/115	4.2	6
BA 3100	Bico, C/S	PA6/PA66	220/260	2.2/3.3	43/51
BA 3140 S/S	Bico, S/S	PA6/PA66	220/260	6.7	62

Moco = monocomponent, Bico = bicomponent, C/S = Core/Sheath, S/S = Side by Side





Melt Bonding Fibers

Benefits

- Outstanding bonding strength
- Prevents fiber loss in yarns and nonwovens
- Small percentage of bonding fibers significantly improves mechanical resistance
- No "Push up" during weaving and tufting
- Resistant against wet and dry cleaning
- Blendable with natural and manmade fibers
- Excellent dyeing capability

Application Technique

- The finer the count of a melt bonding fiber the higher the tenacity of the nonwoven in machine (MD) and cross direction (CD). Fine count melt bonding fibers give small bonding points but are much more frequent in number than with a coarser fiber..
- Separation force is mainly concentrated at a single point of a bulky nonwoven and can be increased by using melt bonding fibers. Coarse count binder fibers especially give strong bonding points.
- Low melt bonding fibers prevent natural fibers from damage and yellowing during thermofusion (e.g. KA 115).
- Bicomponent melt bonding fibers are preferably used with light and fine nonwovens (e.g. BA 140) due to more frequent bonding points.
- Solid profile melt bonding fibers are typically used with heavy and voluminous nonwovens (e.g. KA 140, KE 150, KE 170). The larger the difference between melting points of binder and matrix fibers the better the flexibility of the nonwoven.
- It is generally recommended to use 5-15% of melt bonding fibers for yarns and 15-25% for nonwovens.

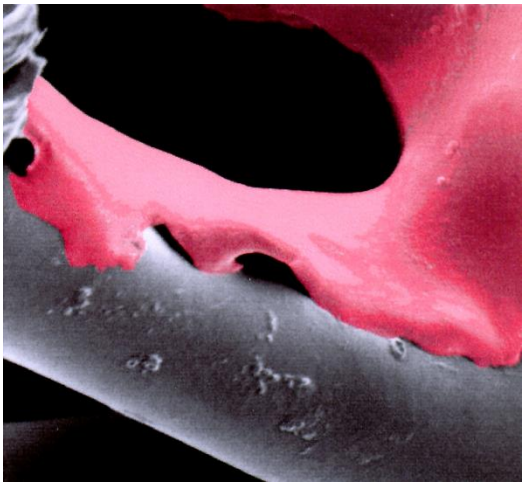


Fig. 9 Detail of a fused melt bonding fiber (red) on a matrix fiber (gray).

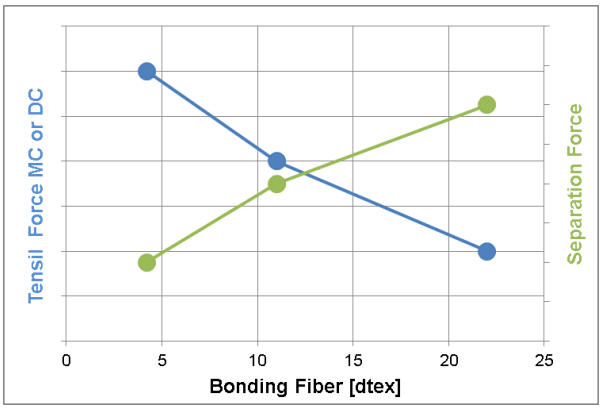


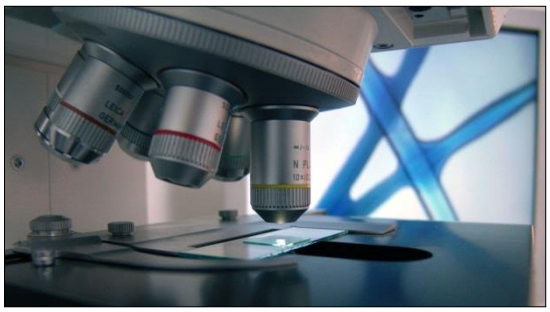
Fig. 10 Influence on tensile force (MC and DC) and separation force in function of the bonding fiber count.





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Our customers benefit from a large infrastructure and profound know-how of our worldwide operating company. In the various laboratories all important equipment for textile testing, extensive physical and chemical analysis and modern picture analyzing tools are on hand.



Research and Development Partner

Our Research and Development is working constantly to meet the newest and ever challenging demands of the market. With the most modern pilot plants for polymerizing and spinning, new innovations can be realized and in time produced on our flexible production plants.



Technical Application Support

In the technical fiber center state of the art equipment for fiber processing can be used by our customers. Under practical conditions, trials to process fibers into nonwovens, felts or yarns can be performed. Our application engineers support customers worldwide at their location.



Environmental Efforts

The results of the inspection made according to Oeko-Tex® Standard 100, product class I for baby articles, have shown that Grilon fibers and yarns, raw or black, meet the human-ecological requirements of the standard presently established.

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We manufacture and sell Grilon yarns and fibers, Nexylon and Nexylene fibers, Griltex hotmelt adhesives, Grilbond bonding agents, Primid cross linkers for powder coatings and Grilonit reactive diluents. We have developed these materials and additives into outstanding specialty products for technically demanding applications. In this way we create added value for our customers as they can also enjoy success in their own markets only through continuous improvement.

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