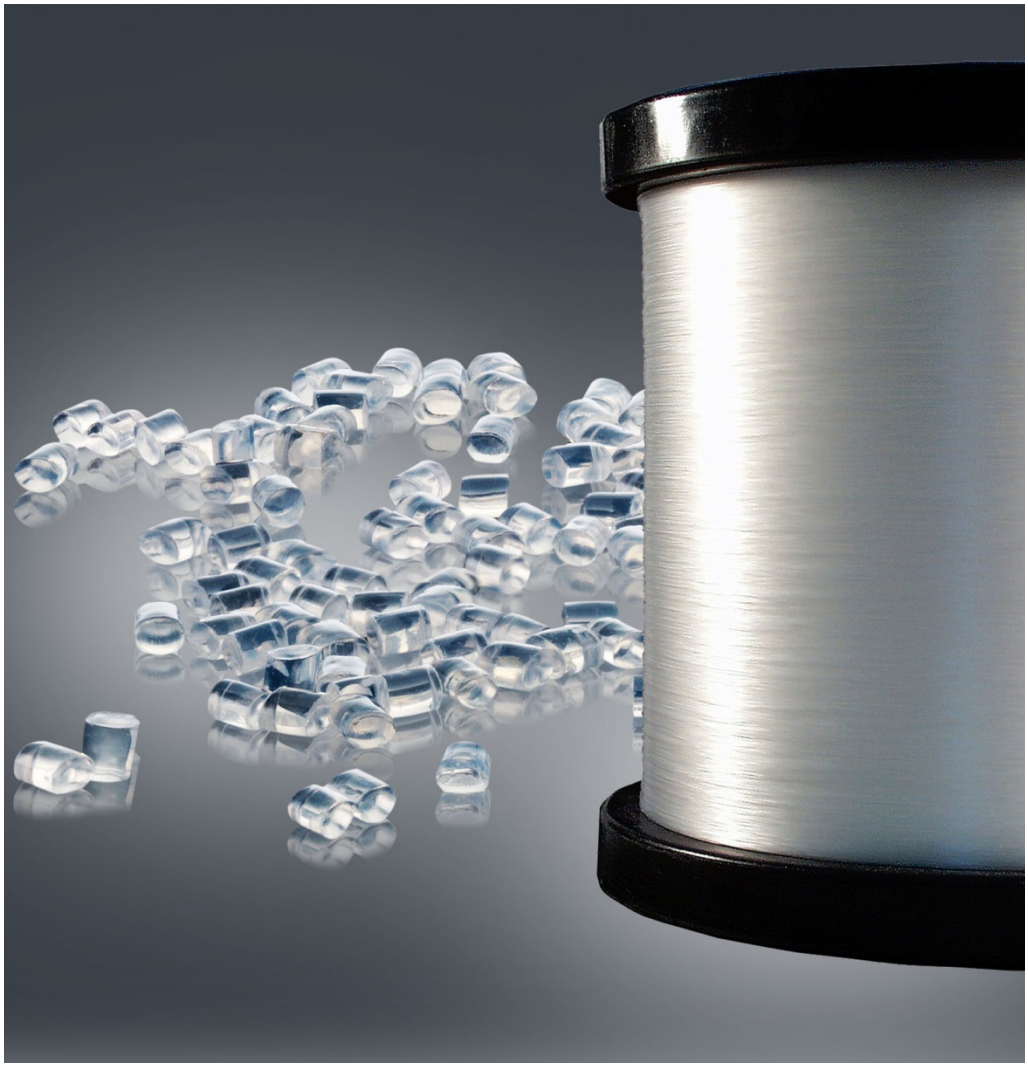
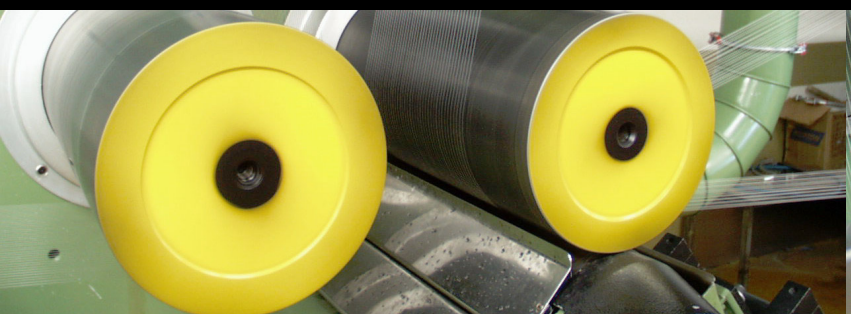
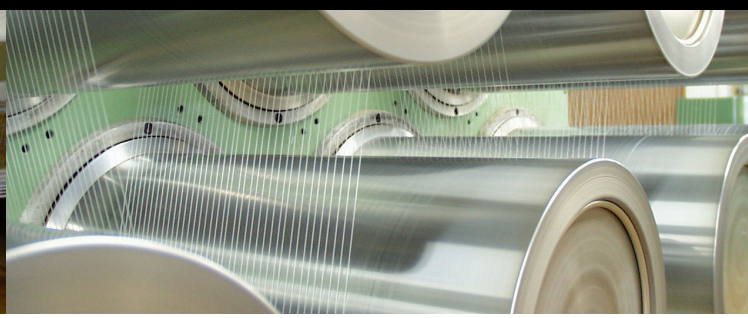


Granules for Monofilaments

GRILON®

EMS





Polymers for Monofilaments

Grilon High-Tech Polyamides are preferred raw materials for the manufacture of monofilaments.

EMS-GRILTECH is known worldwide as the specialist for customized polyamides. Our own polymerization plants, long standing know-how and innovative research have created technical monofilament granules of the highest standing. Polyamides are designed and developed for each application. This provides unrestricted flexibility, independence and a very high quality standard.

Type	Melting Point [°C]	Density [kg / m³]	Water Absorption at 50% RH [%]	Water Absorption in Water [%]
PA 6	222	1.14	3.0	9.5
PA 66	260	1.15	2.8	8.5
PA 610	220	1.07	1.4	3.3
PA 612	215	1.06	1.3	2.8
PA 1010	200	1.05	1.0	2.1
PA 12	178	1.01	0.7	1.5

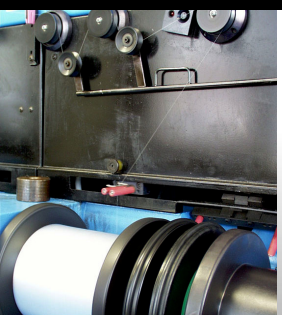
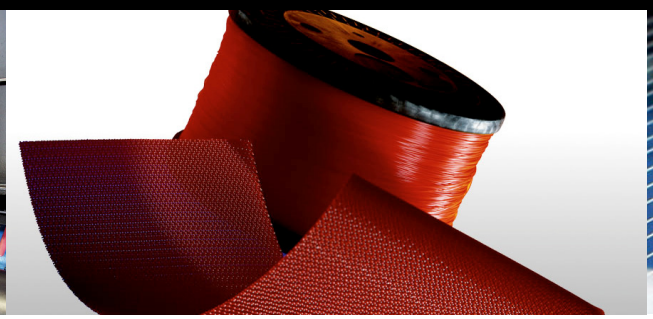
Polycondensation of Homopolyamides

[1] n NH_2-$(CH_2)_a$-COOH → H[NH-$(CH_2)_a$-CO]$_n$-OH

[2] n NH_2-$(CH_2)_b$-COOH → H[NH-$(CH_2)_b$-CO]$_n$-OH

[3] n NH_2-$(CH_2)_a$-NH_2 + n HOOC-$(CH_2)_b$-COOH → H[-NH-$(CH_2)_a$-HN-CO-$(CH_2)_b$-CO-]$_n$ OH

PA Type		Chain Length	Raw Material	Feedstock
PA 6	[1]	a = 5	Caprolactam	Crude oil
		-	-	-
PA 12	[2]	-	-	-
		b = 11	Laurolactam	Crude oil
PA 610	[3]	a = 6	Hexamethylenediamine	Crude oil
		b = 8	Sebacic acid	Bio-base
PA 612	[3]	a = 6	Hexamethylenediamine	Crude oil
		b = 10	Dodecanedioic acid	Crude oil
PA 1010	[3]	a = 10	Decanediamine	Bio-base
		b = 8	Sebacic acid	Bio-base


Product Information

Advantages

- Proven spinning quality
- Tailor-made
- Wide product range
- Polymer know-how
- Wide viscosity range
- High clarity and whiteness

Applications

- Filtration
- Paper Machine Clothing (PMC)
- Paint brushes
- Toothbrushes
- Ropes
- Fishing lines
- Tennis & badminton rackets

Processing Information

Storage

Sealed, undamaged bags can be kept over a long period of time in storage facilities that are dry, protected from the influence of weather and where the bags can be protected from damage.

Handling and safety

Detailed information can be obtained from the Material Safety Data Sheet (MSDS), which can be requested with every material order.

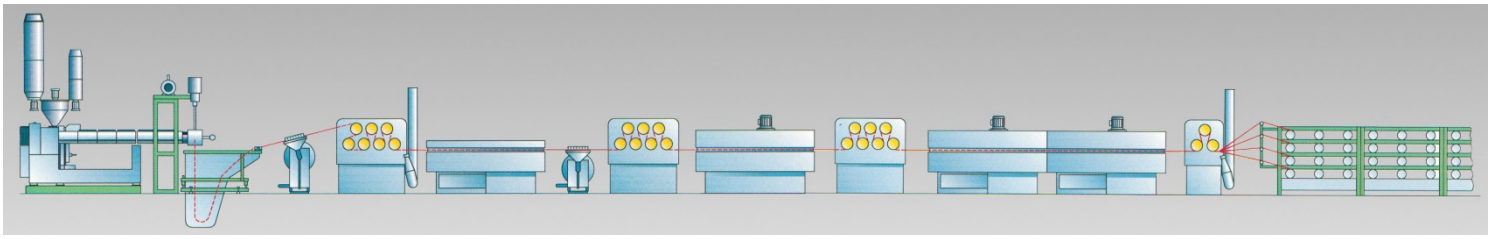
Drying

Grilon is pre-dried and packed with low moisture content. Should the packaging become damaged or be left open too long, then the material must be dried. Too high moisture content is evidenced by a foaming melt, excessive nozzle drool and silver streaks on the moulded part. We recommend to dry polyamides before extrusion.

Packaging

Bag	18 kg / 20 kg / 25 kg
Octabin	800 kg

Other packaging sizes on request



Melting Raw Monofilaments Drawing Post-treatment Relaxation Winding Equipment





PA 6

Type	Viscosity	MVR 275°C / 5kg [ml / 10min]	rel. Visc. 1,0% H_2SO_4 [-]
F 34	medium	35	3.43
F 40	high	25	3.68
F 50	very high	10	5.20

Grilon F series is based on PA6 with various levels of melt viscosity. All are suitable for monofilaments and exhibit good mechanical properties.

PA 12

Type	Viscosity	MVR 275°C / 5kg [ml / 10min]	rel. Visc. 0,5% m-Cresol [-]
L 16	low	200	1.66
L 20	medium	110	1.90
L 25	high	20	2.25

Polyamide 12 (PA12) is formed by the polymerization of laurolactam, a ring-shaped, long-chain monomer obtained in a complex, multi-step process from the basic raw material butadiene.

Special Features:

- Very low water absorption and excellent dimensional stability
- Very good resistance to chemicals / weathering
- Excellent hydrolysis resistance
- Lowest density among all polyamides
- High impact strength down to –40°C
- Wide processing window
- Problem-free processing

CoPA

Type	Viscosity	Melting Point [°C]	Density [kg / dm³]	MVR 275°C / 5kg [ml / 10min]
CA 6E	copolyamide with low melting point	130	1.06	250
G 21	high viscosity amorphous copolyamide	125*	1.18	20

* Glass transition temperature DSC

Grilon CA 6 E is a copolyamide with low melting point.

Special Features:

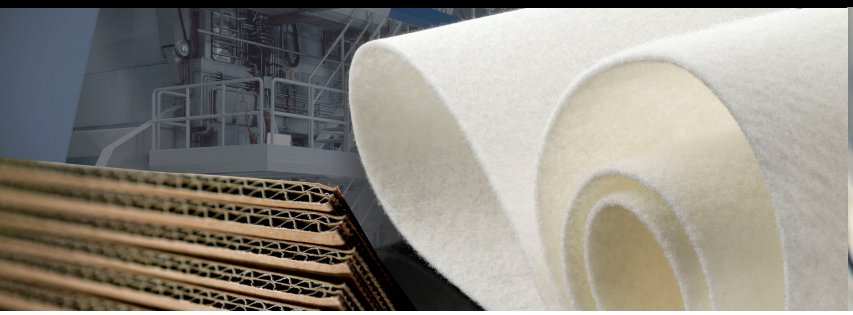
- Very high flexibility and toughness
- Very good thermoforming and orientation properties
- High shrink
- Very good transparency

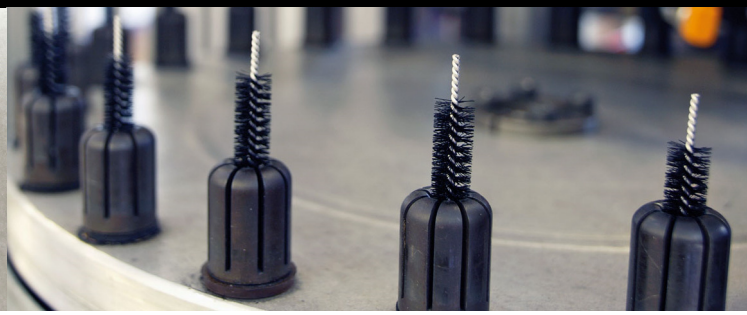
Grivory G21 is a high viscosity amorphous copolyamide. It is suitable for injection moulding, the manufacture of monofilaments and coextrusion of tubes. It is also used as an additive for polyamide 6 and different copolyamides to improve film properties.

Special Features:

- High transparency and surface gloss
- Very good chemical resistance
- Very good abrasion resistance
- Excellent resistance to heat distortion
- Low transmission of UV radiation

Masterbatches based on our raw materials are available on special request.





PA 610

Type	Viscosity	MVR 275°C / 5kg [ml / 10min]	rel. Visc. 0,5% m-Cresol [-]
XE 1306	Low	75	1.95
XE 3919	Medium	55	2.07
XE 3884 OB		55	2.07
XE 1261	High	20	2.30

Polyamide 610 (PA610) is created through poly-condensation of hexamethylenediamine and sebacic acid.

Hexamethylenediamine is obtained from crude oil, while sebacic acid is obtained following a multi-step chemical process from the renewable bio -raw material castor oil.

Special Features:

- Low water absorption and good dimensional stability compared to PA6 or PA66
- Good resistance to chemicals and weathering
- Very good resistance to hydrolysis
- High melting point of 220°C
- Problem-free processing

PA 612

Type	Viscosity	MVR 275°C / 5kg [ml / 10min]	rel. Visc. 0,5% m-Cresol [-]
XE 4279	Low	225	1.71
XE 3938		135	1.81
XE 1291		135	1.81
XE 3908	Medium	35	2.15
XE 4049	High	25	2.30

Polyamide 612 (PA612) is created through poly-condensation of hexamethylenediamine and dodecanedioic acid.

Special Features:

- Low water absorption and good dimensional stability compared to PA6 or PA66
- Good resistance to chemicals and weathering
- Very good resistance to hydrolysis
- High melting point of 220°C
- Problem-free processing

Masterbatches

Grilon masterbatches are based on polyamide 6 or copolyamides and are compatible with most other polyamides. Masterbatches help to add different additives and pigments homogeneously in an extruded product. Enhanced properties and functionalities of the final product can be achieved.



GreenLine Polyamide 610

Polyamide 610 (PA610) is created through poly-condensation of hexamethylenediamine and sebacic acid.

Hexamethylenediamine is obtained from crude oil, while sebacic acid is obtained following a multi-step chemical process from the renewable bio-raw material castor oil. As a result polyamide 610 polymer is made to 62 per cent of renewable raw materials. Bio-based Polyamide 610 products are sold by EMS-CHEMIE under the name GreenLine.

Special Features:

- Use of 62% renewable basic raw materials (in relation to the polymer)
- Low water absorption and good dimensional stability compared to PA6 or PA66
- Good resistance to chemicals and weathering
- High melting point of 220°C
- Problem-free processing



GreenLine Polyamide 1010

Polyamide 1010 (PA1010) is created through poly-condensation of decanediamine and sebacic acid.

Both monomers are obtained from a multi-step chemical process from the renewable bio-raw material castor oil. Polyamide 1010 is nearly 100% based on renewable raw materials. Bio-based products are sold by EMS-CHEMIE under the name GreenLine.

Special Features:

- ≈100% use of renewable basic raw materials (in relation to the polymer)
- Very low water absorption and excellent dimensional stability
- Good resistance to chemicals and weathering
- Low density
- Wide processing window
- Problem-free processing
- A direct bio-alternative to PA12

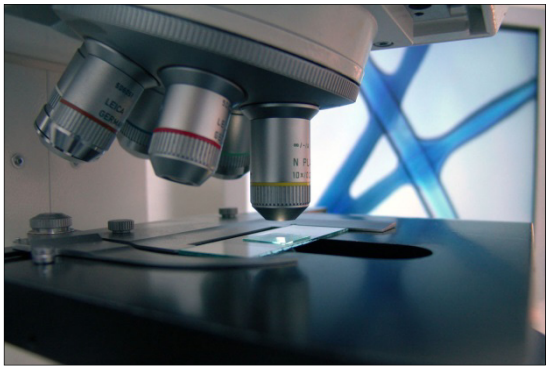






Technical Service in the Laboratory

Customers benefit from our large infrastructure and profound know-how that comes with a global operating company. Laboratories are equipped with essential tools for textile testing, physical and chemical analysis as well as modern picture analyzing equipment.



Research and Development Partner

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



Technical Application Support

EMS-GRILTECH is a specialist in polyamide synthesis and the processing of these materials. Our customer services are not only concerned with the manufacturing and supply of engineering thermoplastics but also provide full technical support.





EMS-GRILTECH worldwide

www.emsgriltech.com

EMS-GRILTECH is a Business Unit of EMS-CHEMIE AG, which belongs to EMS-CHEMIE HOLDING AG (www.ems-group.com).

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

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