

Grinova S

Brilliant Surface Quality

EMS-GRIVORY



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GRINOVA S

EMS-GRIVORY has been market leader for many years in the field of “metal replacement” with its high-performance polymer Grivory GV. In contrast to glass fiber-reinforced PA6 or PA66, Grivory GV retains its original stiffness and strength even in a warm and humid environment.
With Grinova S, EMS-GRIVORY is writing the next chapter in a success story. This high-performance polymer impresses with a smoother, glossier surface with enhanced UV and weathering stability. Time-consuming post-treatment such as priming and painting is now a thing of the past.

EXCELLENT SURFACES:

- High gloss: The requirements of ISO 2813 for high-gloss surfaces are achieved, even with high filler content.
- Scratch resistant: Up to 75% harder and more scratch resistant than conventional high-gloss polyamide materials.
- Smooth: Grinova S, with its medium surface roughness (Ra) of less than 1 µm, minimizes friction noise and abrasion.
- Precise components: Highly precise components can be manufactured due to low shrinkage of the material.

EFFICIENT PROCESSING:

- Energy savings: Lower melt and mold temperatures save energy and therefore costs compared to Grivory GV, PA MXD6 and PPA (polyphthalamide).
- Good flowability: Easily flowing and therefore also suitable for thin-walled components.

VERSATILE RANGE OF APPLICATIONS:

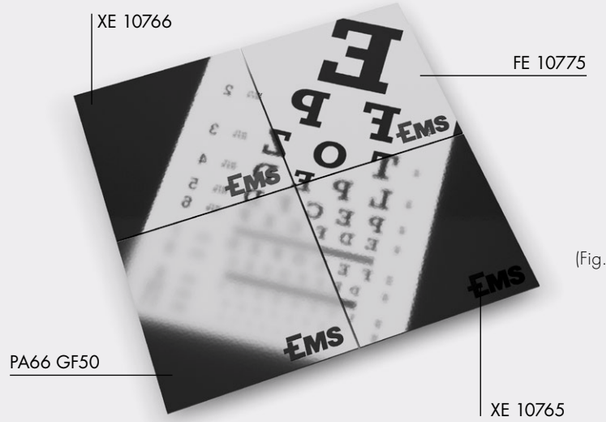
- Automotive industry: Grinova S is ideally suited for unpainted interior and exterior applications.
- Mechanical engineering: Grinova S is ideal for complex and thin-walled visible parts.
- Medical industry: Smoother surfaces for easier cleaning and disinfection.



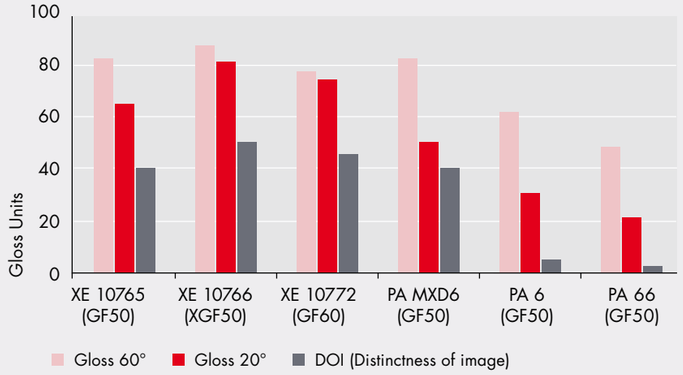


SURFACE

Injection-molded parts made of conventional glass-fiber reinforced polymers often have rough surfaces varying in color, especially at the end of the flow path. Grinova S provides a glossy surface with no painting, even with a glass-fiber content of 60%. This fulfils ISO 2813 requirements for high gloss with over 70 GU at a measuring angle of 60°. Differences in fiber content only become visible at a measuring angle of 20°, with the DOI value indicating the clarity of the surface reflections (Fig. 1). Grinova S loses none of its gloss even after absorption of moisture or water.



(Fig. 1)

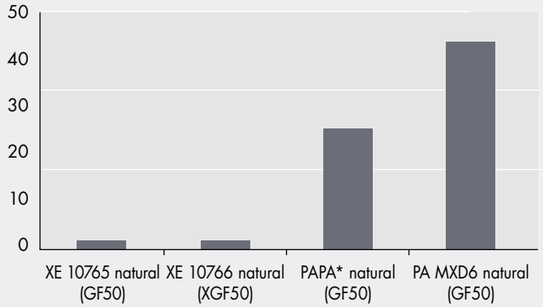




WEATHERING STABILITY

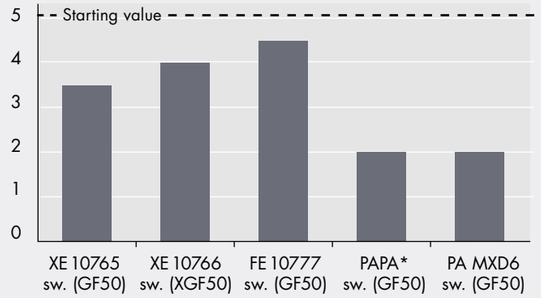
Sun and rain
Grinova S provides excellent resistance to weathering, so that injection-molded parts look "like new" even after prolonged weathering, often without the need for additional UV protective coatings. It outperforms competing materials under changing humidity conditions and is also available in special weather-resistant colors, eliminating the need for extended testing.

Yellow Index after 1,600 h artificial weathering: "Florida Climate"



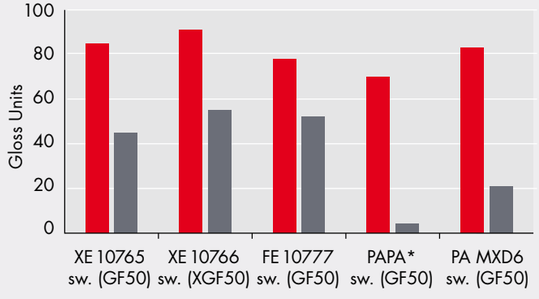
*PAPA = Partially Aromatic Polyamide

Grey Scale after 1,600 h artificial weathering: "Florida Climate"



*PAPA = Partially Aromatic Polyamide

Gloss Index after 1,600 h artificial weathering: "Florida Climate"



*PAPA = Partially Aromatic Polyamide



SAVINGS AND SUSTAINABILITY

Energy

Grinova S is characterized by its high flowability and low melting point, providing 20% energy savings during processing. Painting is superfluous in many applications, with cost reductions of up to 40% due to fewer work steps and less waste.

Grinova S for visible parts with intrinsic weathering stability. Our latest engineering polymer requires lower mold temperatures than PA MXD6 and, thanks to its high tracking resistance, is better suited for high-voltage applications in modern electric cars. It provides energy and cost savings compared to conventional PAPA* compounds.

(*PAPA = Partially Aromatic Polyamide)

Avoidance of emissions

"No paint" also means progress regarding sustainability in the use of polymer materials.

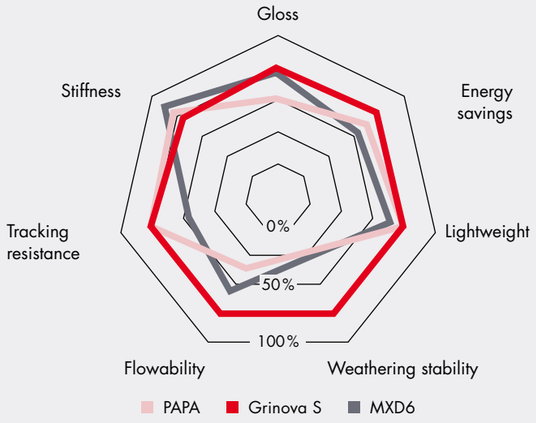
CO_2 footprint

EMS is leading in sustainability of its manufacturing processes. Since 2021 we have been CO_2-neutral worldwide for Scope 1 (direct emissions) and Scope 2 (indirect emissions from energy suppliers). CO_2 emissions of raw materials used for Grinova S were also given a critical review. This leads to an overall CO_2 saving of 23%, which is passed on to customers. Grinova S is another milestone on our mutual path to "Net Zero" by 2050.

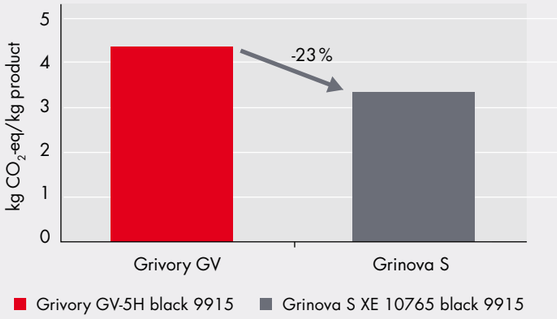
ISCC PLUS

On request, we already offer customers material certified according to ISCC PLUS (mass balance method) based on bio-based or recycled raw materials.

Grinova S vs PA MXD6 and PAPA* (all GF50)



Thanks to innovative raw materials and production processes, Grinova S reduces the global warming potential along the supply chain to the customer by 23% in accordance with ISO 14064





APPLICATIONS

Automotive
Grinova S is ideal for structural components in car interiors such as fan blades, indicator levers and gearshifts as well as door handles. Compared to glass fiber-reinforced PA6 and PA66, it remains stiff and strong even after exposure to moisture. Thanks to good flowability, it is particularly suitable for the manufacture of complex, thin-walled parts. The surface of Grinova S can easily be chrome-plated using both traditional methods and the new chromium(III) technology. With integrated UV protection, Grinova S is ideal for demanding exterior applications such as active grill shutters, roof racks or mirror housings. Injection molded parts made from Grinova S create weight and energy savings by providing the same levels of stiffness, strength and impact resistance at half the wall thickness as ABS parts. Due to its low friction, Grinova S is particularly recommended for moving mechanical parts where other plastics wear out quickly or are too noisy.

Industrie
Thanks to its resistance to weathering and high flowability, Grinova S is ideally suited for the manufacture of thin-walled housings for exterior use. In contrast to the conventional sheet molding compound (SMC) process, in which pressed glass-fiber reinforced (GFR) parts have to be primed and painted in several layers, Grinova S housings weighing up to 6 kg leave the injection mold already finished and ready for use. This allows integration of additional functions into the component, reducing the number of parts and saving assembly costs. Often, only one layer of protective coating is required, depending on the application.

Consumer and medical sector
Grinova S parts have not only an impressive and attractive appearance, but also a high-quality haptic and metal-like sound. In contrast to polyolefins, polyamides do not become electrostatically charged, allowing the surface to repel dust and dirt.

The scratch-resistant surface prevents pollution and cross-contamination. Injection-molded parts made of Grinova S can be sterilized and reused many times.

Electronics
All glass-fiber reinforced Grinova S grades have very high tracking resistance and dielectric strength.

SERVICE AND SUPPORT

EMS-GRIVORY - Your development partner for innovative solutions
EMS-GRIVORY is global leader in the development and production of high-performance polymers. As a development partner, EMS provides support throughout the entire development process, from the initial idea to series production.

EMS-GRIVORY
The Best Solution!
Innovative. Fast. Successful.

Ideas and solutions
Providing solutions and generating ideas, EMS develops innovative, cost-effective and sustainable applications together with the customer.

Individual material adaptations
EMS adapts materials precisely for specific applications and legal requirements, including customer-specific colors and test samples.

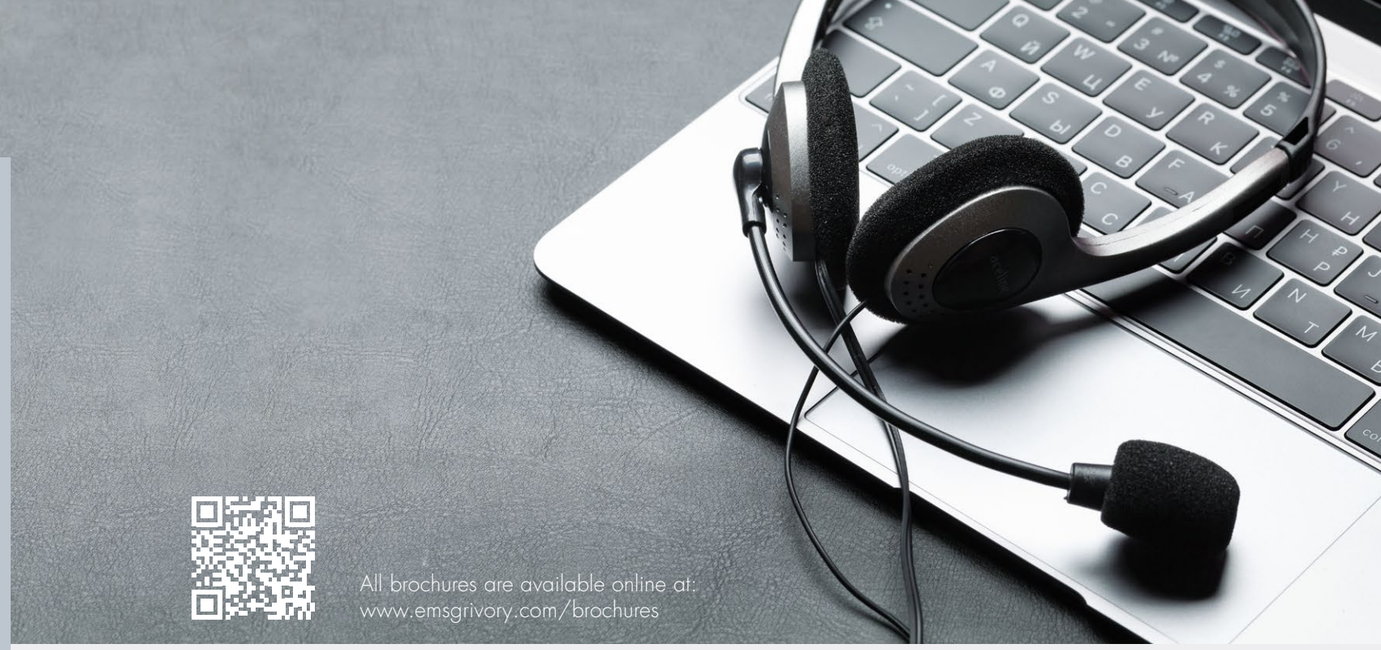
Simulation and optimization
Simulations are used to optimize component designs and injection molding processes, thus reducing costs and saving development time.

Environmentally-friendly solutions and sustainability
EMS attaches great importance to environmentally-friendly and sustainable production and provides a wide range of bio-based materials and recyclate. All production sites worldwide are CO_2-neutral.

Product characterization and approvals
Modern and extensively equipped test laboratories provide fast, targeted support for customer-specific applications and developments. Materials are approved worldwide for use in contact with food and drinking water, sanitary components and electrical appliances.

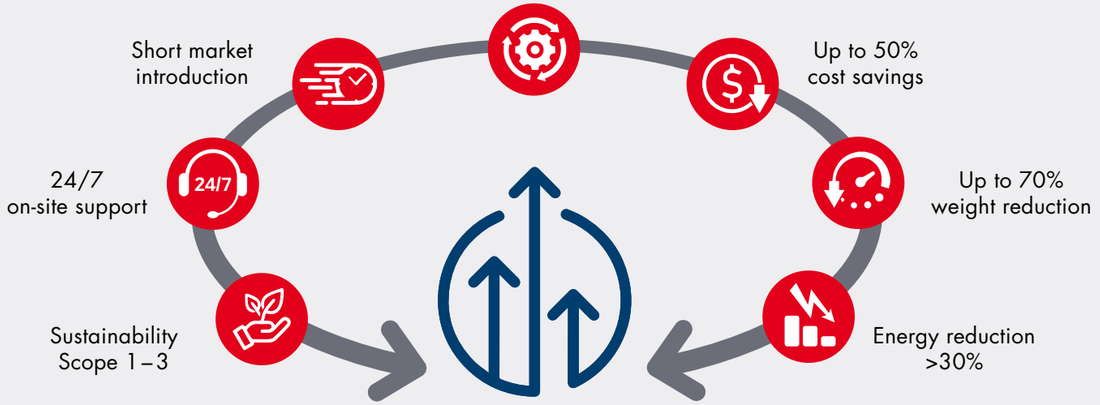
Series start-up and on-site support
EMS supports series start-up 24/7 on site for efficient production.

Global partner
With global production sites, on-site technical support and global application development centers, EMS provides uniformly high standards and service quality worldwide.



All brochures are available online at:
www.emsgrivory.com/brochures

EMS as development partner



The best solution with EMS

TECHNICAL DATA

					XE 10767	XE 10765	XE 10766	XE 10772	FE 10775	FE 10778	FE 10776
Mechanical properties											
Filler					GF35	GF50	GF50	GF60	M40	Glass Flakes 40	CF 15
E-Modulus	1 mm/min	ISO 527	MPa	dry	11500	17000	17000	21500	6500	12850	13300
				cond.	10500	15500	15500	20000	5000		11200
Tensile stress at break	5 mm/min	ISO 527	MPa	dry	200	250	250	275	95	165	205
				cond.	170	195	210	235	70		150
Elongation at break	5 mm/min	ISO 527	%	dry	2.3	2.5	2	2	2.5	2.2	2.5
				cond.	2.3	2.5	2	2	4.0		4.0
Impact strength	Charpy, 23°C	ISO 179/1eU	kJ/m²	dry	55	75	70	60	45	35	35
				cond.	55	75	70	60	70		40
Impact strength	Charpy, -30°C	ISO 179/1eU	kJ/m²	dry	45	60	55	40			30
				cond.	45	60	55	40			25
Notched impact strength	Charpy, 23°C	ISO 179/1eA	kJ/m²	dry	12	13	14	14	2.8	3.5	5.0
				cond.	12	13	14	14	3.2		5.5
Notched impact strength	Charpy, -30°C	ISO 179/1eA	kJ/m²	dry	12	13	13	13			4.0
				cond.	12	13	13	13			3.5
Ball indentation hardness		ISO 2039-1	MPa	dry	265	285	300	335			
				cond.	245	250	270	320			
Thermal properties											
Melt temperature	DSC	ISO11357	°C	dry	220	220	220	220	220	220	220
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	195	195	200	200	100	185	190
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	140	150	170	170	80	105	110
Thermal expansion longitudinal	23-55°C	ISO 11359	10^{-4}/K	dry	20	15	15	15			
Thermal expansion transverse	23-55°C	ISO 11359	10^{-4}/K	dry	60	55	50	40			
Max. working temperature	permanent	ISO 2578	°C	dry	100-120	100-120	100-120	100-120	80	100-120	100-120
Max. working temperature	short-term	ISO 2578	°C	dry	195	195	195	200	120	185	190
Electrical properties											
Dielectric strength		IEC 60243-1	kV / mm	dry	40	35	40	40			
				cond.	40	35	40	40			
Comparative tracking index	CTI	IEC 60112	-	cond.	600	600	600	600			
Specific volume resistance		IEC 600933	Ω · m	dry	10^{13}	10^{13}	10^{13}	10^{13}			
				cond.	10^{13}	10^{13}	10^{13}	10^{13}			
Specific surface resistance		IEC 600933	Ω	cond.	10^{14}	10^{14}	10^{14}	10^{14}			
General properties											
Density		ISO 1183	g/cm³	dry	1.40	1.56	1.56	1.69	1.45	1.45	1.19
Flammability (UL-94)	0.8 mm	IEC 60695-11-10	rating		HB	HB	HB	HB	HB	HB	HB
Water absorption	23°C/saturated	ISO 62	%		6.0	4.5	4.5	4	5.0	4.5	5.5
Moisture absorption	23°C/50% r.F.	ISO 62	%		1.7	1.6	1.6	1.4	1.6	1.3	2.1
Linear mold shrinkage	longitudinal	ISO 294	%	dry	0.1	0.10	0.05	0.03	0.70	0.03	0.10
Linear mold shrinkage	transverse	ISO 294	%	dry	0.30	0.70	0.35	0.28	0.74	0.14	0.60
Product designation as per ISO 16396 – PA66/8X					MH, C14-110, GF35	MH, C14-190, GF50	MH, C14-190, GF50	MH, C14-220, GF60	MH, C14-060, M40	MH, C14-120	MH, C14-140, CF15

EMS-GRIVORY worldwide

www.emsgrivory.com

EMS-GRIVORY – The leading manufacturer of high-performance polyamides

EMS-GRIVORY is the leading manufacturer of high-performance polyamides and the supplier with the widest range of polyamide materials. Our products are well-known throughout the world under the trademarks Grilamid, Grivory and Grilon.

We offer our customers a comprehensive package of high-capacity and high-quality products along with segment-specific advisory competence in distribution and application development. We maintain our market leadership through continual product and application development in all segments.



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