Grivory GVX

Metal replacement at the highest level

GRIVORY®
EMS

Introduction

Our metal is called Grivory

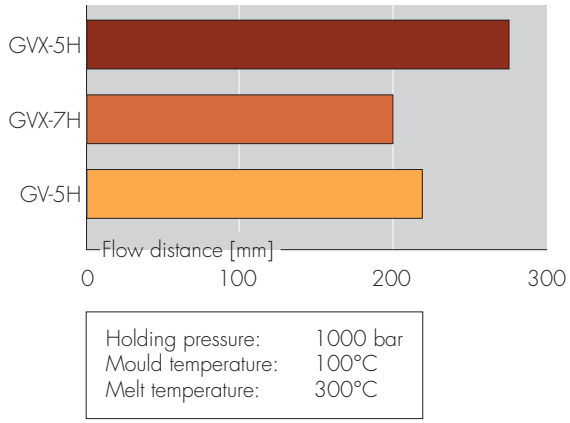
With the high-performance polymer Grivory GV, EMS-GRIVORY has been market leader in the field of metal replacement for many years now. The new material Grivory GVX now takes us a step further. With clearly improved mechanical properties, the range of metal replacement applications has been significantly widened. The exceptional performance provided by Grivory GVX is convincing in every detail!

Grivory GVX is characterised in particular by:

- highest stiffness and strength values
- very low warpage
- simple processing

Excellent processability

Can this performance be increased by using glass fibres? Yes, but not at the cost of reduced processability! Despite up to 70% glass-fibre content, Grivory GVX products are characterised by excellent flow properties and are surprisingly simple to process.



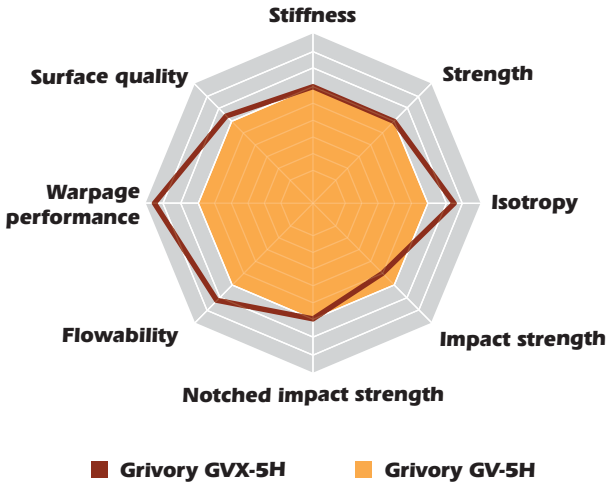
Holding pressure:	1000 bar
Mould temperature:	100°C
Melt temperature:	300°C

Surface quality of Grivory GVX also shines

The new Grivory GVX is also visibly convincing. Thanks to its good flow properties it has exceptionally good surface gloss, even with a high degree of reinforcement.

Added performance

With its exceptional property specification profile, Grivory GVX opens up a completely new chapter in the field of metal replacement.



If all property values of Grivory GV-5H are compared with those of the new material Grivory GVX-5H, the consistent increase in performance is clearly apparent. The further development of Grivory GVX is particularly visible in its low warpage values, more isotropic material properties and flowability.

Properties of Grivory GVX grades

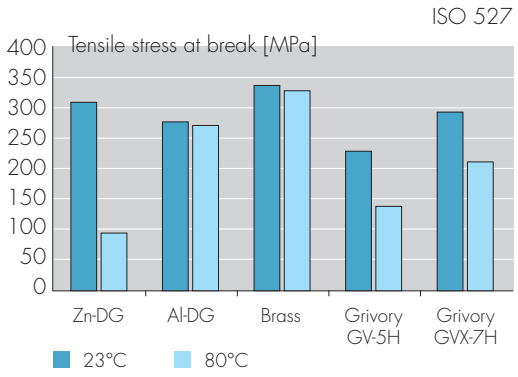
Mechanical properties					
					Grivory GVX-5H
Tensile modulus of elasticity	1 mm/min	ISO 527	MPa	dry	18000
				cond.	17000
Tensile stress at break	5 mm/min	ISO 527	MPa	dry	250
				cond.	220
Elongation at break	5 mm/min	ISO 527	%	dry	2.5
				cond.	2.5
Impact strength	Charpy, 23°C	ISO 179/1eU	kJ/m²	dry	80
				cond.	75
Impact strength	Charpy, -30°C	ISO 179/1eU	kJ/m²	dry	65
				cond.	60
Notched impact strength	Charpy, 23°C	ISO 179/1eA	kJ/m²	dry	15
				cond.	15
Notched impact strength	Charpy, -30°C	ISO 179/1eA	kJ/m²	dry	15
				cond.	15
Ball indentation hardness		ISO 2039-1	MPa	dry	290
				cond.	265
Thermal properties					
Melt temperature	DSC	ISO11357	°C	dry	260
Heat deflection temperature HDT/A	1.80 MPa	ISO 75	°C	dry	245
Heat deflection temperature HDT/C	8.00 MPa	ISO 75	°C	dry	175
Thermal expansion longitudinal	23-55°C	ISO 11359	10^{-4}/K	dry	0.20
Thermal expansion transverse	23-55°C	ISO 11359	10^{-4}/K	dry	0.50
Max. working temperature	Permanent	ISO 2578	°C	dry	100 - 120
Max. working temperature	Short-term	ISO 2578	°C	dry	220
Electrical properties					
Dielectric strength		IEC 60243-1	kV / mm	dry	33
				cond.	33
Comparative tracking index	CTI	IEC 60112	-	cond.	600
Specific volume resistance		IEC 600933	Ω · m	dry	10^{10}
				cond.	10^{10}
Specific surface resistance		IEC 600933	Ω	cond.	10^{12}
General properties					
Density		ISO 1183	g/cm³	dry	1.56
Flammability (UL-94)	0.8 mm	ISO 1210	rating	-	HB
Water absorption	23°C/saturated	ISO 62	%	-	4.0
Moisture absorption	23°C/50 % r.h.	ISO 62	%	-	1.4
Lineal mould shrinkage	longitudinal	ISO 294	%	dry	0.05
Lineal mould shrinkage	transverse	ISO 294	%	dry	0.30
Product designation as per ISO 1874				PA66+PA6I/X	MH, 14-190, GF50

	Grivory GVX-6H	Grivory GVX-65H	Grivory GVX-7H
	22500	25500	28000
	22000	25000	27500
	290	300	290
	260	280	260
	2.0	1.9	1.5
	2.0	1.9	1.5
	75	75	60
	70	70	60
	70	70	60
	70	70	60
	15	15	15
	15	15	15
	15	15	15
	15	15	15
	320	345	370
	305	330	360
	260	260	260
	250	250	250
	205	215	220
	0.15	0.15	0.10
	0.50	0.50	0.30
	100 - 120	100 - 120	100 - 120
	220	220	220
	33	33	33
	33	33	33
	600	600	600
	10^{10}	10^{10}	10^{10}
	10^{10}	10^{10}	10^{10}
	10^{12}	10^{12}	10^{12}
	1.69	1.77	1.85
	HB	HB	HB
	3.5	3.2	2.9
	1.2	1.1	1.0
	0.05	0.05	0.05
	0.25	0.25	0.20
	MH, 14-220, GF60	MH, 14-250, GF65	MH, 14-250, GF70

Die-cast metals under pressure

The advantages of Grivory GVX compared to die-cast metals are, above all, their lower density, simple processability and efficient production with up to 40% lower manufacturing costs.

With a tensile stress at break of up to 300 MPa, Grivory GVX is leader among thermoplastic materials and does not need to avoid direct comparison with property profiles of metals. At high temperatures for example, it exhibits much better performance than die-cast zinc. When combined with a component design suited for plastic materials, structural rigidity values, comparable to those of metal components, can be achieved.



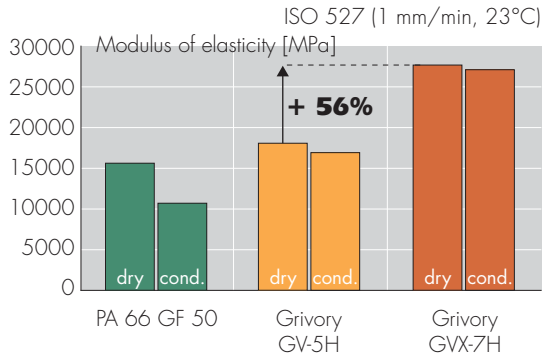
The future for metal replacement

Due to its exceptional mechanical properties and simple processing, Grivory GVX expands the limits of metal replacement. The well-known advantages of weight reduction, freedom of design, functional integration and, above all cost savings, make polyamide materials much in demand as an alternative to more expensive metals.

Grivory GVX - metal replacement at the highest level!

Stiff and strong

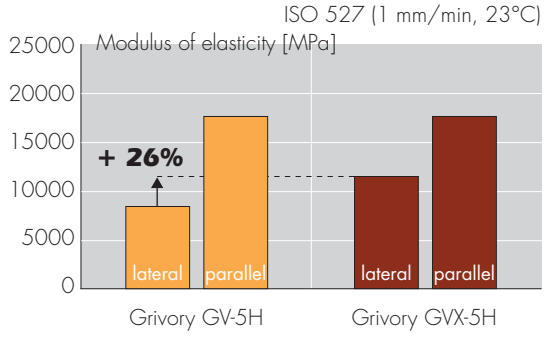
A significant increase in stiffness values - a new dimension for thermoplastic materials with glass-fibre reinforcement.



Grivory GVX achieves modulus of elasticity values of nearly 30'000 MPa. Compared to values for Grivory GV, this is an increase of more than 50%! These values also remain at the highest level for test bars in a conditioned state where conventional polyamides show a decrease of up to 35%.

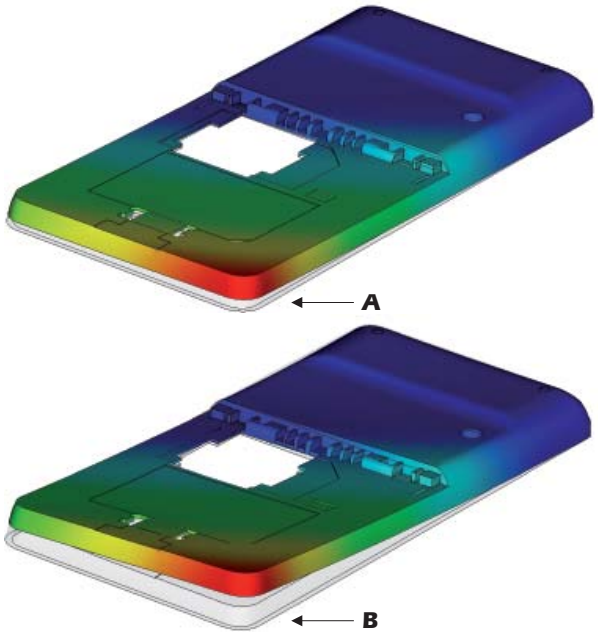
Significantly higher lateral stiffness

Compared to Grivory GV, Grivory GVX shows an increase of 26% in lateral stiffness for the same glass-fibre content. This factor is particularly important in the manufacture of components exposed to internal pressure. The striking improvement is a great advantage for parts exposed to stress applied laterally to the direction of the fibres.



Warpage

All semi-crystalline plastic materials are subject to the problem of warpage. With Grivory GVX, this warpage has been reduced by up to 50%. Due to an optimised interaction between the matrix and reinforcing glass-fibres, 25% lower lateral shrinkage to the direction of alignment of the fibres has been achieved. This low transverse shrinkage results in the manufacture of components with greatly reduced warpage.



The Moldflow analysis clearly shows the difference in warpage between Grivory GVX (A) and conventional products with the same amount of glass-fibre reinforcement (B). This reduced warpage is not only Moldflow-Theory. Both test bars and daily applications confirm this lower warpage in an impressive manner.

EMS-GRIVORY worldwide
www.emsgrivory.com

We introduce ourselves
EMS-GRIVORY is a unit of the business area Performance Polymers of the EMS Group and employs around 760 employees throughout the world.

The largest development and production site is located in Domat/Ems, Switzerland. We also have technology, production and sales facilities in most of the important markets in Europe, Asia and the USA.

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