



Grivory XL

Xtra Light

Even lighter, even stiffer!

GRIVORY[®]
EMS

Focus on light-weight construction



Grivory XL (Xtra Light) – the new generation of high-performance polyamides for light-weight construction – are characterised by extraordinary stiffness combined with low density.

Lightweight design is a focus topic in several market segments. Replacement of metal using high-performance polymers is one way of achieving this goal. The most important reasons for metal replacement are:

- reduction of component weight
- avoidance / reduction of post treatment
- less mould abrasion and lower costs
- corrosion protection is no longer required
- integration of function
- cost savings

The specialist with a new lightweight design product group

EMS-GRIVORY, with its high-performance polyamide materials, is the specialist for metal replacement. Partially aromatic Grivory GV polyamides show nearly unchanged stiffness and strength values even in a conditioned state. Unreinforced Grivory HT high-temperature polyamides maintain property values at very high levels, even at temperatures around 120°C.

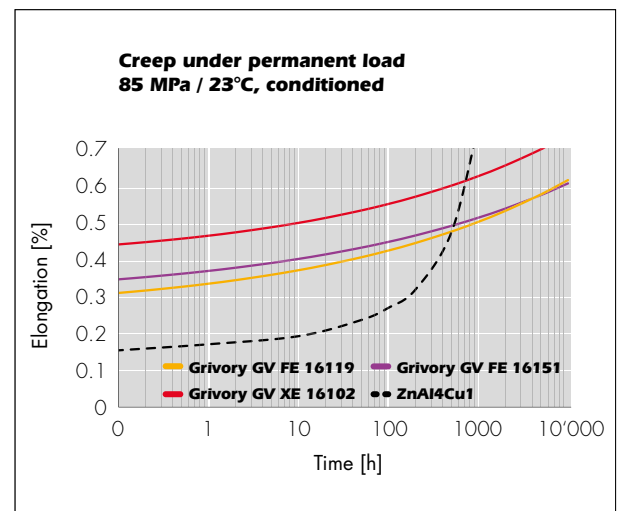
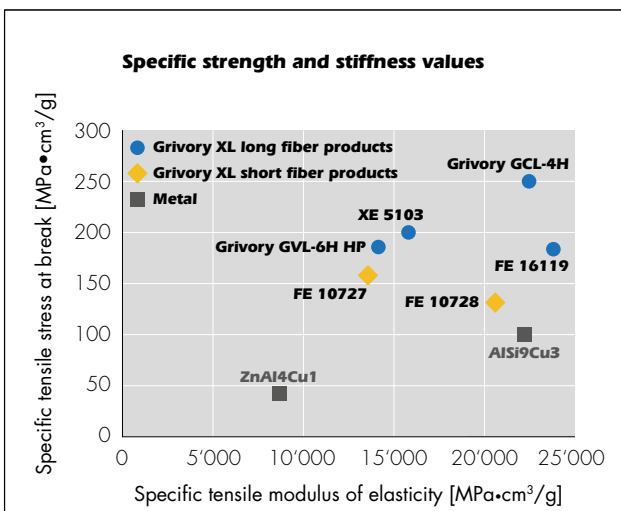
With the new XL products, EMS-GRIVORY goes a step

further and creates new solution approaches for light-weight construction. The Grivory XL products (XL = Xtra Light) are based on the well-known partially aromatic polyamide PA66 + PA6I/X. While classic thermoplastic design materials show stiffness values of up to 20,000 MPa, the new Grivory XL products have values up to 38,000 MPa.

More performance with lower weight

Special hybrid reinforcement with carbon and glass fibres was developed for this new generation of materials, allowing the required properties to be achieved in a target-focussed way. Some Grivory XL products are very easy-flowing and allow designs with long flow paths with little pressure required. These products make it possible to achieve efficient manufacture of very complex components with very little warpage. Some grades of the very successful LFT polyamide product family, reinforced with long glass fibres, were developed using this kind of reinforcement system. They are characterised by extremely low creep, high notched impact strength and extraordinary resilient behaviour.

All these properties are provided by materials which





have a very low density, improved stiffness and which allow component dimensions to be extremely accurate. In addition, the values for specific strength and stiffness are much higher than those for metals such as die-cast zinc, making these materials extremely attractive for lightweight construction.

Superior mechanical properties

Grivory XL products are used in applications where components cannot be constructed with sufficient thickness or without the necessary number of strengthening webs so that deformation occurs under load. The greater stiffness of the Grivory XL products allows thinner-walled components to be realised with correspondingly short cycle times. Due to the high modulus of elasticity, long fibre reinforced products in particular show further reduced creep deformation even under high loads. The

new EMS high-performance polymers show substantially lower creep deformation than zinc die-cast metals.

Tailor-made materials

Grivory XL products incorporate a wide range of systematically adjustable properties which can be optimised correspondingly depending on the requirement catalogue. The following tables show some of the variety of these products although this is only a small section of possible grades.

In addition: Through specific strengthening with endless-fiber tapes, the excellent property profile of the Grivory XL products can be improved even further. In combination with oriented endless-fibres in EMS Tape Technology (ETT), the new materials exhibit linearly elastic behaviour similar to a spring without plastic deformation at loads up to and above 200 MPa.

Mechanical Properties GRIVORY XL long fibre reinforced products

		Standard	Units	Cond.	Grivory GVL-6H HP	Grivory GV FE 16119	Grivory GCL-4H
Density		ISO 1138	g/cm ³	dry	1.69	1.61	1.34
Tensile modulus of elasticity	1 mm/min	ISO 527	MPa	dry	23'500	38'000	30'500
Tensile strength at break	5 mm/min	ISO 527	MPa	dry	315	280	335
Elongation at break	5 mm/min	ISO 527	%	dry	2.1	1.1	1.5
Impact strength	Charpy, 23°C	ISO 179/1eU	kJ/m ²	dry	125	60	65
Notched impact strength	Charpy, 23°C	ISO 179/1eA	kJ/m ²	dry	45	17	18
Melt temperature	DSC	ISO 11357	°C	dry	260	260	260
Heat distortion temp. HDT/C	8.00 MPa	ISO 75	°C	dry	230	230	210

Mechanical Properties GRIVORY XL short fibre reinforced products

		Standard	Units	Cond.	Grivory GVX-7H	Grivory GV FE 10727	Grivory GV FE 10728	Grivory GV FE 8902	Grivory GV FE 10740
Density		ISO 1138	g/cm ³	dry	1.85	1.55	1.73	1.73	1.69
Tensile modulus of elasticity	1 mm/min	ISO 527	MPa	dry	28'000	21'000	35'500	35'000	35'000
Tensile strength at break	5 mm/min	ISO 527	MPa	dry	290	245	220	270	160
Elongation at break	5 mm/min	ISO 527	%	dry	1.5	2	0.8	1.3	0.5
Impact strength	Charpy, 23°C	ISO 179/1eU	kJ/m ²	dry	60	65	50	50	45
Notched impact strength	Charpy, 23°C	ISO 179/1eA	kJ/m ²	dry	15	11	10	11	11
Melt temperature	DSC	ISO 11357	°C	dry	260	260	260	260	260
Heat distortion temp. HDT/C	8.00 MPa	ISO 75	°C	dry	220	160	200	200	170



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.

EMS-GRIVORY Europe

Switzerland

EMS-CHEMIE AG
Business Unit EMS-GRIVORY Europe
Via Innovativa 1
7013 Domat/Ems
Switzerland
Phone +41 81 632 78 88
Fax +41 81 632 76 65
welcome@emsgrivory.com

Germany

EMS-CHEMIE (Deutschland) Vertriebs GmbH
Warthweg 14
64823 Gross-Umstadt
Germany
Phone +49 6078 783 0
Fax +49 6078 783 416
welcome@de.emsgrivory.com

France

EMS-CHEMIE (France) S.A.
855 Avenue Roger Salengro
Boîte postale 16
92370 Chaville
France
Phone +33 1 41 10 06 10
Fax +33 1 48 25 56 07
welcome@fr.emsgrivory.com

Great Britain

EMS-CHEMIE (UK) Ltd.
Darfin House, Priestly Court
Staffordshire Technology Park
Stafford ST18 0LQ
Great Britain
Phone +44 1785 283 739
Fax +44 1785 283 722
welcome@uk.emsgrivory.com

EMS-GRIVORY,
a business unit of the EMS Group

Italy

EMS-CHEMIE (Italia) S.r.l.
Via Carloni 56
22100 Como (CO)
Italia
Phone +39 011 0604522
Fax +39 011 0604522
welcome@it.emsgrivory.com

EMS-GRIVORY Asia

China

EMS-CHEMIE (China) Ltd.
227 Songbei Road
Suzhou Industrial Park
Suzhou City 215126
Jiangsu Province
P.R. China
Phone +86 512 8666 8180
Fax +86 512 8666 8210
welcome@cn.emsgrivory.com

EMS-CHEMIE (Suzhou) Ltd.

227 Songbei Road
Suzhou Industrial Park
Suzhou City 215126
Jiangsu Province
P.R. China
Phone +86 512 8666 8181
Fax +86 512 8666 8183
welcome@cn.emsgrivory.com

Taiwan

EMS-CHEMIE (Taiwan) Ltd.
36, Kwang Fu South Road
Hsin Chu Industrial Park
Fu Kou Hsiang
Hsin Chu Hsien 30351
Taiwan, R.O.C.
Phone +886 3 598 5335
Fax +886 3 598 5345
welcome@tw.emsgrivory.com

Korea

EMS-CHEMIE (Korea) Ltd.
#817 Doosan Venturedigm,
415 Heungan Daero,
Dongan-gu, Anyang-si,
Gyeonggi-do, 431-755
Republic of Korea
Phone +82 31 478 3159
Fax +82 31 478 3157
welcome@kr.emsgrivory.com

Japan

EMS-CHEMIE (Japan) Ltd.
EMS Building
2-11-20 Higashi-koujiya
Ota-ku, Tokyo 144-0033
Japan
Phone +81 3 5735 0611
Fax +81 3 5735 0614
welcome@jp.emsgrivory.com

EMS-GRIVORY America

United States of America

EMS-CHEMIE (North America) Inc.
2060 Corporate Way
P.O. Box 1717
Sumter, SC 29151
USA
Phone +1 803 481 61 71
Fax +1 803 481 61 21
welcome@us.emsgrivory.com

EMS
EMS-GRIVORY