Grivory HT

Enhanced Performance at High Temperatures

EMS-GRIVORY

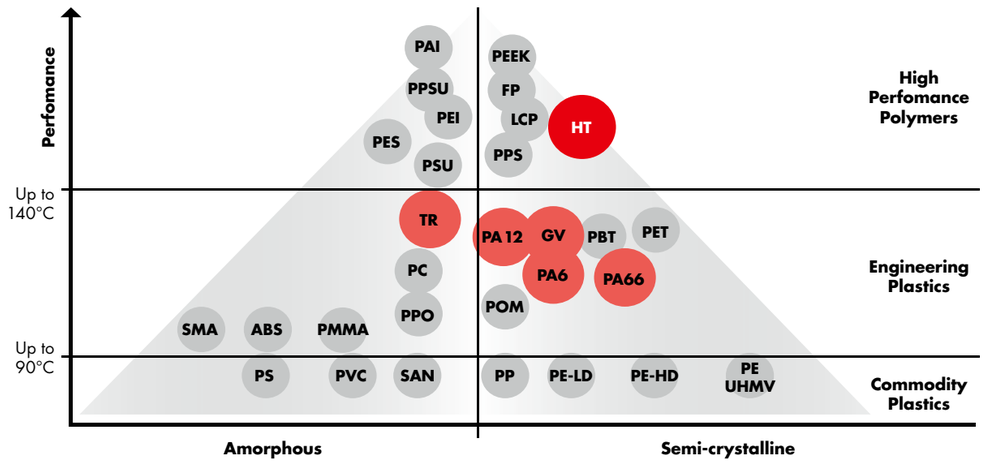
Grivory HT

Contents

Introduction

Grivory is the trade name for EMS-GRIVORY's family of semi-crystalline, partially aromatic polyamides. Grivory HT comprises of aromatic, semi-crystalline, high-performance products based on polyphthalamide (PPA) structure. Properties include:

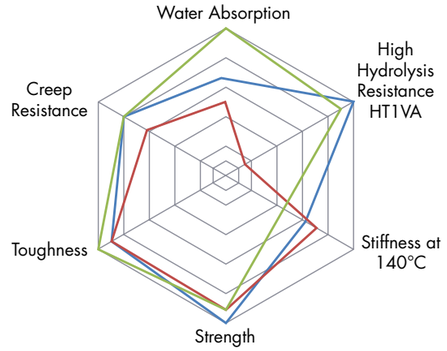
- Excellent stiffness and strength at high operating temperatures
- Good resistance to chemicals and hot water
- Low absoption of moisture or water
- Low moisture effects on mechanical-physical properties
- Good dimensional stability and low warpage
- Good surface quality
- Economical manufacturing



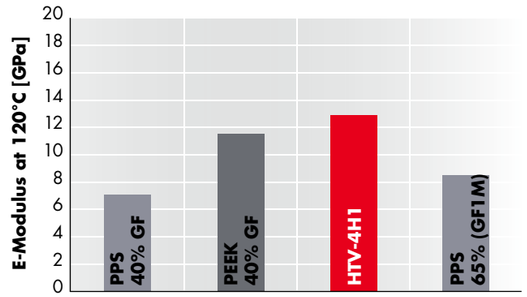
Grivor HT includes several families groups with different base polymers:

Grivory HT1: PA6T/6I
Grivory HT2: PA6T/66
Grivory HT3: PA10T/X

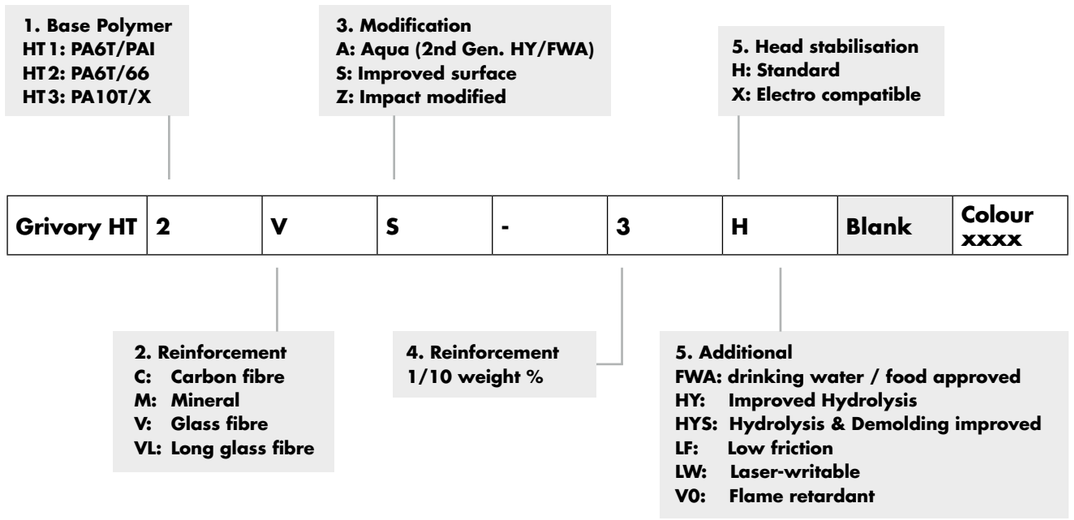
HT Property comparison
[Scale of 1 to 10, where 10 is the highest]



EMS-GRIVORY has designed the Grivory HT families with a high performance profile. The main distinguishing feature of Grivory HT compared to other polyamides is its good performance at high temperatures. This makes it possible to produce injection moulded parts economically with excellent mechanical properties, heat resistance and chemical resistance.
Grivory HT is an ideal construction material as a metal replacement and offers excellent opportunities for cost, and weight reduction and energy savings.



Nomenclature Grivory HT



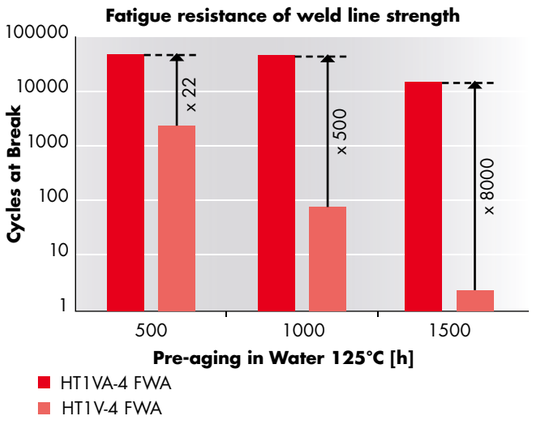
Product overview

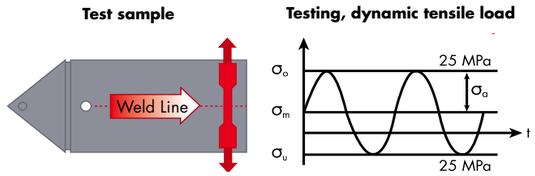
Property	Grade	HT1	HT2	HT3
High Hydrolysis resistance	HT1A-HY	X		
High Hydrolysis resistance/suitable for contact with food and drinking water	HT1A-FWA	X		
Electro compatible stabilization	X	X	X	X
Flame retardant, halogen free (UL 94, V0)	V0		X	X
Long glass fiber reinforced	VL	X		
Carbon-fiber reinforced	C		X	X
Low friction	LF		X	
Renewable raw materials				X

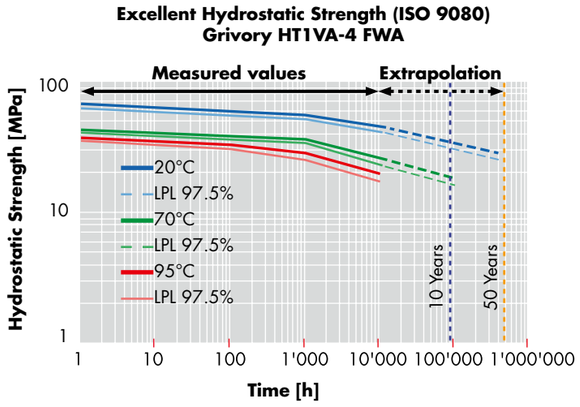
Highlights

Grivory HT1VA High Hydrolysis Resistance

Grivory HT1VA is the new generation of optimized high hydrolysis resistant products. Products offer outstanding fatigue resistance of weld line strength, exceptional long term behavior and excellent hydrostatic strength. Improved demolding increases design freedom by opening the possibility for complex geometries. Processing is similar to Grivory HT1 where the melting temperature is 320°C to 340°C and tool temperature starts at 130°C. The product assortment comprises grades with electro-compatible stabilization and approvals for use in direct contact with food / drinking water.







Grivory HT1VA Core products

Property	Standard	Unit	HT1VA-35 HYS	HT1VA-4 HY	HT1VA-4 FWA	HT XE 10814[1]	HT1VA-5 HY	HT1VA-5 FWA
Degree of reinforcement	ISO 3451	%	35	40	40	40	50	50
E-Modulus	ISO 527	GPa	13.5/13.5	14.5/14.5	14.5/14.5	14.5/14.5	18.0/18.0	18.0/18.0
Tensile Strength at Break	ISO 527	MPa	230/220	250/230	250/230	250/230	275/260	275/260
Charpy Impact +23°C	ISO 179	kJ/m²	50/50	70/70	70/70	70/70	70/70	70/70
Charpy Notched Impact +23°C	ISO 179	kJ/m²	11/11	11/11	11/11	11/11	12/12	12/12
Melting Point	ISO 11357	°C	310/-	325/-	325/-	325/-	325/-	325/-
Heat Deflection HDT/C 8.0 MPa	ISO 75	°C	155/-	200/-	200/-	200/-	200/-	200/-
Density	ISO 1183	g/cm³	1.47/-	1.53/-	1.53/-	1.53/-	1.64/-	1.64/-
Water Absorption, 23°C	ISO 62	%	3.5/-	3.5/-	3.5/-	3.5/-	3.0/-	3.0/-
Moisture Absorption, 23°C/50%	ISO 62	%	2.0	1.5	1.5	1.5	1.3	1.3
Shrinkage Long./Trans.	ISO 294	%	0.2/0.9	0.10/0.55	0.10/0.55	0.10/0.55	0.05/0.45	0.05/0.45
Melt Temperatures	–	%	320 to 330	330 to 340	330 to 340	330 to 340	330 to 340	330 to 340
Tool Temperature	–	°C	≥ 130	≥ 140	≥ 140	≥ 140	≥ 140	≥ 140

[1]GF40, Laser transparent

Grivory HT1VA-35 HYS
Active Cooling Valve

Key properties: High hydrolysis resistance
Excellent demolding perfomance

Basic Product Assortment

HT1

Grades	Reinforcement	Characteristics
HTV-3H1 HTV-4H1 HTV-5H1 HTV-6H1	30% glass fiber 40% glass fiber 50% glass fiber 60% glass fiber	Exhibiting well-balanced mechanical, chemical, and thermal performance. Usage for functional parts in contact with chemicals at high applications temperatures.
HTV-4X1 HTV-5X1 HTV-6X1	40% glass fiber 50% glass fiber 60% glass fiber	Electro-compatible stabilisation. For application requiring resistance to high electrical voltage, in humid and hot environments.
HT XE 12301 HT XE 12303 HT XE 12304	40% glass fiber 50% glass fiber 60% glass fiber	For higher CTI values, electro-compatible stabilization.

HT2

Grades	Reinforcement	Characteristics
HT2V-3H HT2V-4H HT2V-5H HT2V-6H	30% glass fiber 40% glass fiber 50% glass fiber 60% glass fiber	General purpose, with well-balanced mechanical and thermal properties. Suitable for water-cooled moulds.
HT2V-3X V0 HT2V-4X V0 HT2V-5X V0	30% glass fiber 40% glass fiber 50% glass fiber	Flame retardant, halogen-free, UL 94 V0.
HT2V-3H LF	30% glass fiber	Low friction, exhibiting improved tribological properties.
HT2C-3X	30% carbon fiber	Electrically conductive, unbeatable strength/ density ratio.
HT2C-3X LF	30% glass fiber	Electrically conductive, unbeatable strength/ density ratio, low friction, exhibiting improved tribological properties.
HT XE 16125	50% Long glass fibre	High stiffness, high creep resistance.

HT3: PPA partially based on renewable raw material

Grades	Reinforcement	Characteristics
HT3Z HT3Z LF BLACK 9564	0	Low friction, exhibiting improved tribological properties.
XE 4063 BLACK 9238	GF30	General purpose, high dimensional stability.
XE 4095	GF50	High flow
XE 4101 BLACK 9225	GF40	Drinking water and food approved. [1]
XE 4027	GF30	Flame retardant UL 94 V0

[1] NSF 61 82°C; ACS 23°C; KTW 23°C; W270/ DIN EN 16421 Food contact: EU 10/2011; USA FDA Food Contact Notification 1170; JP Notification No. 196 / 2020

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.

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.

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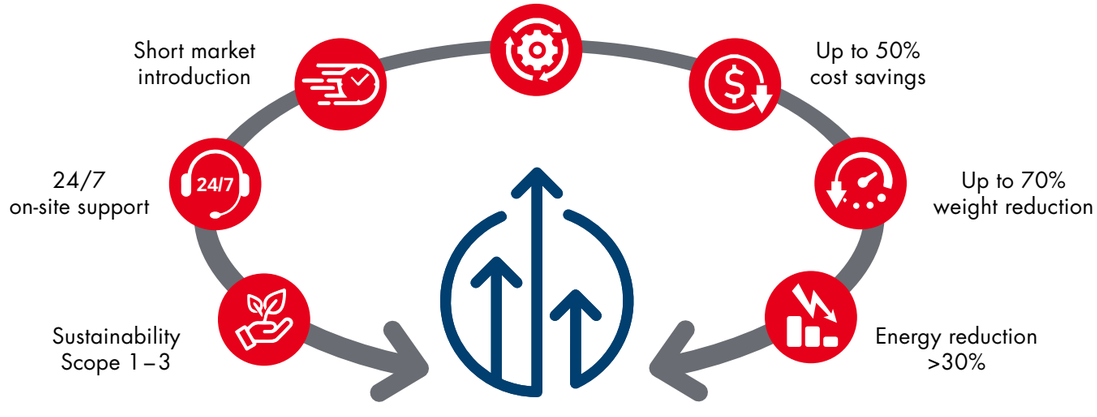
EMS as development partner



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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
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.
Vélizy Espace, Immeuble Le Blériot
13 avenue Morane Saulnier
78140 Vélizy-Villacoublay
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
Forest Lodge
Dunston Business Village
Dunston
Stafford ST18 9AB
Great Britain
Phone +44 1785 283 734
Fax +44 1785 283 722
welcome@uk.emsgrivory.com

Italy
EMS-CHEMIE (Italia) S.r.l.
Via Carloni 56
22100 Como (CO)
Italy
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, 14059
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 91 73
Fax +1 803 481 61 21
welcome@us.emsgrivory.com

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a business unit of the EMS Group

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