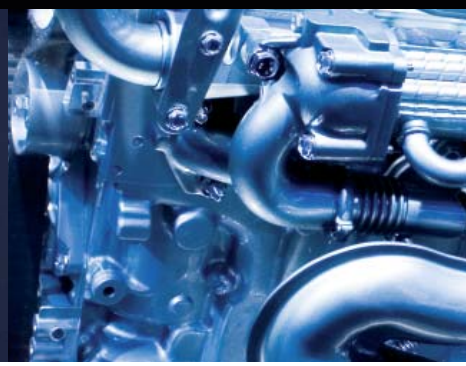
Grivory HT3

The durable high-performance polyamide

GRIVORY®

EMS

Introduction



The next generation of polyphthalamide

Grivory HT3 is a new product line in the polyphthalamide (PPA) product range of EMS-GRIVORY. Its special polymer structure allows a completely new performance spectrum, unique in this material group, to be achieved.

Grivory HT3 stands out due to its very low moisture uptake, which allows components with very high dimensional stability to be manufactured. In addition, this new polymer is extremely resistant to hydrolysis and can be used for applications involving direct contact with water.

The unique property profile of Grivory HT3 opens up unimagined possibilities for highly technical applications in the fields of automotive construction, electro and electronics as well as industry and consumer goods.

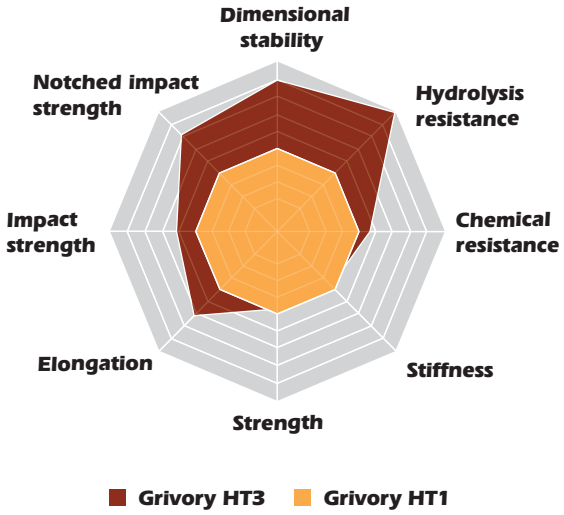
Based on renewable raw materials

Our environmental protection starts right with the granules. Grivory HT3 is based to large extent on renewable raw materials, allowing us to protect our fossil resources. Grivory HT3 stands for responsibility towards our environment.

GreenLine

Strengths where they are required

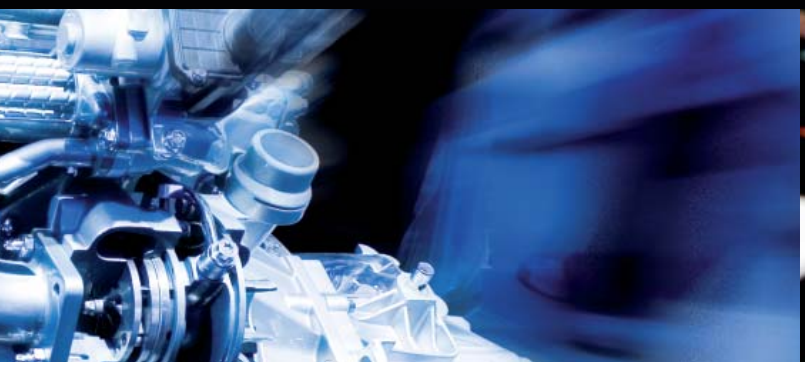
Grivory HT3 has a balanced profile! Compared to Grivory HT1, important properties have been improved.

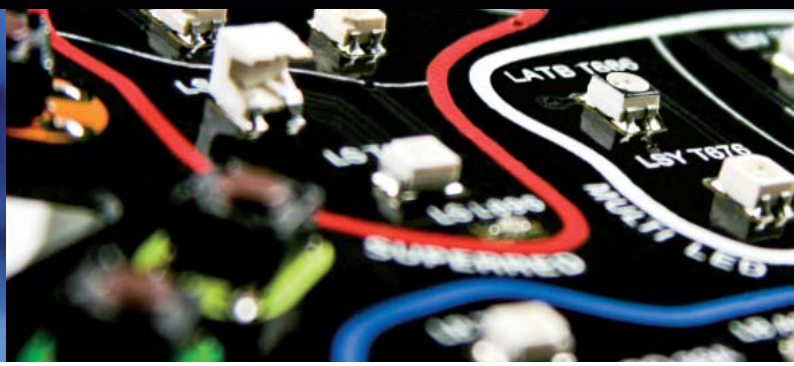


- Low water absorption and high dimensional stability
- Very good resistance to hydrolysis
- Good toughness
- Excellent resistance to chemicals

Extrudable!

With Grivory HT3 we have developed an extrudable PPA. Application fields are varied and range to high-temperature resistant cables, even in contact with liquid media.





Automotive

The Grivory product range sets standards in the field of metal replacement for applications in automotive construction. Even highly stressed components can be light-weight and economically manufactured. Lower weight means lower fuel consumption. The property profile of Grivory HT3 is particularly well suited to applications in automotive construction. Grivory HT3 starts off where other plastic materials reach their limits.

The low water absorption and good dimensional stability allow manufacture of high-precision components - even for high working temperatures. Components made of Grivory HT3 are impact resistant and can be used in direct contact with automotive media.

Suitability of Grivory HT3 for applications in contact with automotive media

	Test temp. [°C]	Grivory HT3	Grivory HT1
Petrol E85	80/120	■■	■■
FAM B	80/120	■■	■■
Diesel	125/140	■■■	■■
RME (Bio Diesel)	125	■■■	■■■
Hydraulic oil	150	■■■	■■
SAE 10W40	140	■■■	■■

■■ good ■■■ very good

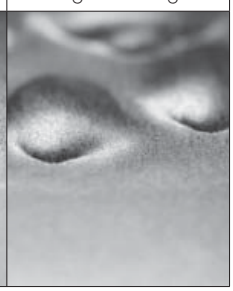
Grivory HT3 provides excellent hydrolysis resistance for applications involving direct contact with cooling water. Thanks to its excellent permeation properties and strength, Grivory HT3 also enables the manufacture of construction components in under-bonnet applications or connectors and connection elements for use in contact with fuel.

Electro and electronics

Miniaturisation of components for use in the fields of electro and electronics is continually entering new dimensions. At the same time, specifications for the components are increasing. Under these conditions, the property profile offered by Grivory HT3 has maximum effect. In addition, specially modified Grivory HT3 grades provide optimal flame protection (UL 94 V-0) without addition of halogens or red phosphorus (WEEE and RoHS compatibility).

The low water absorption and dimensional stability of Grivory HT3 also play an important role in electro and electronics and it is approved for lead-free reflow soldering as per JEDEC Class 1. This means that no protection against ambient moisture is needed and production of precision components with narrow manufacturing tolerances is possible. Due to its mechanical properties such as high elongation at break and excellent impact strength, Grivory HT3 is predestined for the manufacture of components for different electronic applications. Specifically developed grades with maximum reflection make Grivory HT3 suitable for production of LED's (Light Emitting Diodes).

Grivory HT3 passes JEDEC Class 1 without blistering

Material	Grivory HT3-GF30 V0	Standard PPA
Conditioning	JEDEC 1 85°C 85% r.h. 168h	JEDEC 1 85°C 85% r.h. 168h
Result reflow soldering (260°C)	Passed, no blistering	Failed, high blistering
		

Industry and consumer goods

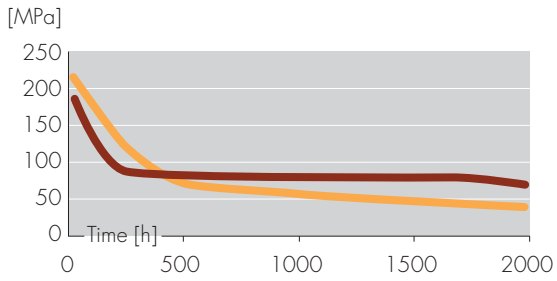
The spectrum for polyamide applications in industrial and consumer goods markets is extremely wide. For some time now, special polyamides have provided optimum solutions in these fields. Grivory HT3 is an ideal supplement to the Grivory product range and opens up previously unimagined opportunities.

Grivory HT3 enables the manufacture of extremely resilient components in the fields of sanitary fittings, heating and climate control or household appliances. Due to its good resistance to hydrolysis, Grivory HT3 performs extremely well where high temperatures and direct contact with water are involved. Product approvals for direct contact with foodstuffs (EU, FDA, NSF 51) and drinking water (KTW, W270, ACS, WRAS, NSF 61) are absolutely necessary for this kind of application.

Replacement of die-cast alloys or even thermoset materials with Grivory HT3 is extremely interesting, particularly construction, furniture and tool-making as well as in mechanical engineering or sport and leisure-time activities. The high-precision components often require high dimensional stability without loss of performance with regard to design and colour. Due to its optimal processability, use of Grivory HT3 also allows additional integration of function and resulting savings on part costs.

In the field of medicine, possible applications for Grivory HT3 are strong and stiff operating instruments which can be sterilised, as well as data communication and diagnosis machines with high chemical resistance. Metal replacement for artificial limbs, walking aides or design components for hospital beds and fittings is an important benefit allowing cost reductions in medicinal applications to be achieved.

Tensile stress at break after storage in water at 140°C



Compared to Grivory HT1, the mechanical properties of Grivory HT3 remain more constant even after a long period under stress and in contact with hot water. The two graphs show a change already after a few hours, Grivory HT3 remains at a stable level.

Shear modulus

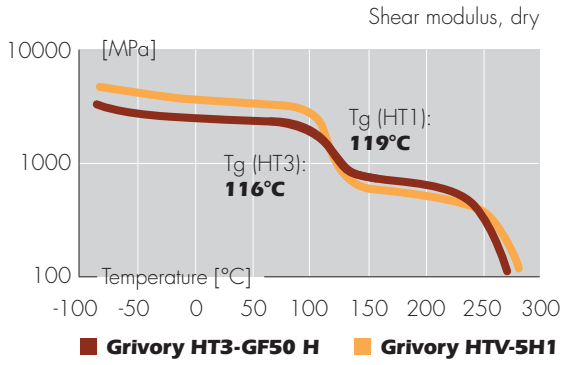
Shear modulus is an important design parameter and describes the working temperature range of plastic materials. The structure of the plastic remains stiff and solid until the glass transition temperature (Tg) is reached. At temperatures above the glass transition temperature the material becomes softer and less resilient.

Processing

Grivory HT3 is characterised by problem-free processing using conventional injection moulding equipment.

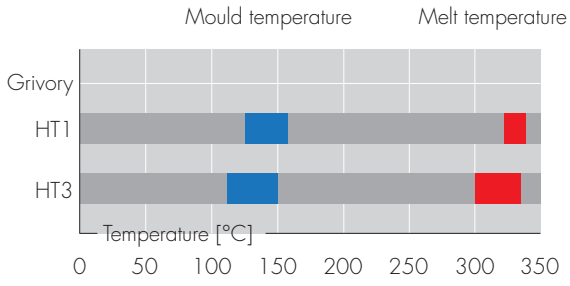
Thermal properties of Grivory HT3-GF50 H

determined in torsion pendulum tests



Despite its melting point which is 30°C lower than Grivory HT1, in comparison, Grivory HT3 exhibits an only slightly lower glass transition temperature range. Despite its lower melting point, Grivory HT3 can be exposed to practically the same working temperatures.

Process parameters for Grivory HT3 (injection moulding)



The low melting point of Grivory HT3 which lies at 295°C, creates a wide working window for this material with melt temperatures ranging from 300 to 340°C. Optimum mould temperatures have been defined as between 120 - 150°C. This signifies that temperature control of injection moulds can be carried out with conventional pressurised-water heating equipment.

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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