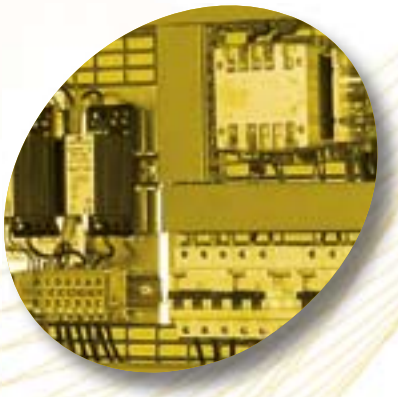
TECHNYL®



Electric and Electronics

TECHNYL® polyamide range

Rhodia

Polyamide

Contents

Rhodia Po

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Polyamide is one of the most valuable engineering plastics, particularly for applications requiring high mechanical properties, along with chemical and temperature resistance, plus an excellent finish. Polyamide is often the perfect answer for designers seeking weight savings, function integration and design freedom.

Rhodia Polyamide is focused on providing polyamide 6.6 and 6 based compounds to its customers in every market and on every continent. Rhodia's employee's talents, along with its technological and scientific expertise have allowed it to attain its strong position in polyamide through a robust program of new technology introduction and new process development.

Global Customer Support

Rhodia Polyamide offers global coverage for its customers for product development, supply and complete commercial services through direct sales with a dedicated key account manager structure as well as a representation in more than 60 countries, supported by an operational E-business channel (SSOL) and a strong commercial distribution network.

To provide its customers with the quality and product consistency they require, all Rhodia's Engineering Plastics' sites are accredited to the ISO/TS 16949 technical standard.

Rhodia's Engineering Plastics activity continually extends its market reach through an aggressive program of global investments. With its seven engineering plastics state-of-the art production facilities along with ten R&D and technical centres, Rhodia Polyamide covers all major areas for polyamide consumption, with the capability to develop products and technologies locally.

- WORLDWIDE HEADQUARTERS
- REGIONAL HEADQUARTERS
- APPLICATION & TECHNOLOGY DEVELOPMENT CENTERS
- MANUFACTURING PLANTS
- R&D CENTERS

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Customer-driven & Focused on Innovation

Rhodia offers the industry's largest polyamide brand, TECHNYL®, serving markets as varied as Automotive, Electric & Electronics, and Consumer and Industrial Goods. The company continuously strives for innovative solutions developed in close partnership with its customers, from design through production.

The company's innovative approach comes from the understanding of its customers' evolving needs, focusing on functionalities such as weight and size reduction, function integration, safety and comfort, as opposed to focusing on a single product or application.

As far as polymers and grades are concerned, new polyamide materials are regularly developed, resulting in the continuous expansion of the TECHNYL® family through breakthroughs as TECHNYL STAR™, TECHNYL® FORCE, TECHNYL® SI, TECHNYL® XT, TECHNYL® ALLOY and TECHNYL® XCELL. These materials are reaching into an ever wider range of new applications.

Most applications are developed in close collaboration with designers, mould producers and processors. Our technical support teams participate in part design and tool development, contributing with their plastics expertise and their in-depth application knowledge.

Rhodia's Engineering Plastics also drive innovation in other technologies, including the acoustic performance of materials, as well as advanced processing techniques, such as gas or water-assisted injection technology, or Mucell® technology. This enables higher levels of performances and productivity.

Sustainable Development

Last but not least, Rhodia's Engineering Plastics are committed to their role in the value chain of recycling in order to limit the use of natural resources in partnership with their customers. For example, the company offers a range of polymers based on recycled production waste.
Rhodia sustainable development policy is global and is being implemented through clear commitments and action plans. It encompasses three interlinked, equally important spheres: the Health/Safety/Environment sphere; the People sphere, which covers social, societal and ethical issues, and the Economic sphere, where the key objectives are innovation, partnerships, best practices and value creation.

Polyamide in the Electrical and Electronic industries

The use of polyamide in electrical and electronic equipment has been growing consistently over the past 20 years, benefiting from strong end market growth and the metal, thermoset or other materials replacement. Polyamide can now be found nearly in every household, in applications such as mixers or washing machines, or in industrial devices such as transformers, switch gears or others.

Polyamide, like most thermoplastic polymers, has a low density, is easy to mould, is colourable and can be combined with various additives providing additional features such as higher stiffness, reduced shrinkage, better flammability or UV resistance. Thanks to its semi-crystalline morphology and relatively high melt temperature, polyamide brings excellent mechanical and ageing properties. It is particularly adapted to make parts requiring both impact stiffness and wear resistance. Polyamide based products are durable even if used in very demanding environments.

Polyamide's intrinsic flammability properties reaching the UL94 V-2 rating make it the ideal material for electrical and electronic equipment. When combined with flame retardant additives, polyamide reaches the most demanding levels of fire and electric resistance, meeting UL94 V-0 and Glow Wire Ignition Temperature 775°C, thus responding to ever growing safety standards. Excellent thermal resistance is a further advantage in applications often involving high working temperatures and currents or arc breaking phenomenon.

PA6.6 is well-known for its excellent flowability and very fast crystallisation, leading to better cycle times versus other thermoplastics. In order to also improve PA6 productivity for designers and moulders, Rhodia Engineering Plastics has developed high flow TECHNYL STAR™ Polyamide which features a low viscosity even at low temperature. This is a clear advantage for compounds used in E&E market as it supports both the trend for miniaturization and the need for highly competitive production cost.

Rhodia Engineering Plastics compounds are designed to fulfil the most demanding needs of the electrical and electronic markets in all application segments:

- Power distribution
- Industrial control
- Appliances
- Connectors
- Insulation systems

Power distributi

MORE RELIABLE POWER...

The power distribution market refers to electrical devices conveying low to medium voltage power and can be separated into two distinct application categories:

Active components such as:
- Mini circuit breakers
- Residual current devices (RCD)
- Timers
- Domotic systems

Passive components such as:
- Switches
- Sockets
- Industrial plugs

Safety first
Rhodia's focus on innovation, combined with the intrinsic properties of polyamide resins, has led to TECHNYL® products which provide answers to the very strict regulations driving the power distribution market.

Other proposed TECHNYL® grades have been designed to pass Glow Wire Flammability Index 960°C according to the IEC 695-2-12 standard. These grades retain their insulation properties after many circuit cuts due to their high resistance to repeated electrical arc impact.

Design, miniaturisation and function integration
TECHNYL® grades combine excellent mechanical properties with dimensional stability, which allows manufacturers to create smaller and more complex parts, supporting the market trend toward miniaturisation. Furthermore, the availability of various colours permits more creative part design and differentiation.

Cost and productivity
Polyamide is increasingly used for power distribution applications, displacing other material such as Thermosets. To continue this trend and to further generalise the use of polyamide in circuit breakers worldwide, specially designed TECHNYL® C 52G3 MZ25 offers first class performance under strict economic constraints, providing a reliable and cost-effective solution.

SOLUTIONS FOR A BETTER ENVIRONMENT

The latest generation of TECHNYL® grades specifically designed for miniature circuit breakers has been developed using halogen free flame retardant additives while ensuring total security of devices in operation.

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Glow Wire Flammability Test according to IEC 60695-2-12

A selection of the Rhodia Engineering Plastics product range:

REFERENCE	GWFI	DESCRIPTION	STRENGTHS	APPLICATION
Unreinforced products				
TECHNYL® A 205F	850°C at 0,8 mm	Unreinforced PA6.6.	Cycle time Mouldability	Sockets, colour accessories
TECHNYL® C 52G1	960°C at 3 mm	Unreinforced PA6	Surface aspect Impact resistance Improved GW resistance	Wall plates
Reinforced products				
TECHNYL® C 52G2 MV25	960°C at 1,6 mm	25% Mineral and glass reinforced PA6 Halogen & red Phosphorous free	Dimensional stability Stiffness	MCB, differentials, control unit housings
TECHNYL® C 52G3 MZ25	960°C at 0,8 mm	25% Mineral reinforced PA6 Halogen & red Phosphorous free	Moulding Design freedom Glow wire performance	
TECHNYL® A 52G1 MZ20	960°C at 0,8 mm	20% Mineral reinforced PA6.6 Halogen & red Phosphorous free	Dimensional stability Thermal stress resistance	
TECHNYL® A 30H1 V25*	960°C at 0,8 mm	25% glass fibre reinforced PA6.6 Halogenated flame retardant*	Stiffness Thermal stress resistance UL94 V0	
TECHNYL STAR™ S 60G1 V30	960°C at 0,8 mm	30% glass fibre reinforced high flow PA6 Halogen & red Phosphorous free	Design freedom Electrical arc impact UL94 V0	
TECHNYL® A 60G1 V30	960°C at 0,8 mm	30% glass fibre reinforced PA6.6 Halogen & red Phosphorous free	Thermal stress resistance UL94 V0	
TECHNYL® A 60G1 V25	960°C at 0,8 mm	25% glass fibre reinforced PA6.6 Halogen & red Phosphorous free	Thermal stress resistance UL94 V0	

*All halogenated TECHNYL® grades are PBB and PBDE free.

All Technical Datasheets are available at www.rhodia-ep.com.

All the above mentioned references are available in light electrical grey colour according to the RAL 7035 standard.
Specific colour alternatives are available upon request.

A RESPONSE FOR SAFETY AND REGULATIONS

A major concern of Rhodia development teams working for the electrical and electronic market is to create products complying with both current, as well as upcoming standards and regulations driving the power distribution market.

Rhodia Engineering Plastics has built specific know-how and capability for the compounding of flame retardant polyamides.

The thorough selection of additives and a specific focus on reliability and reproducibility of performances ensures the constant high quality of the TECHNYL® product range.

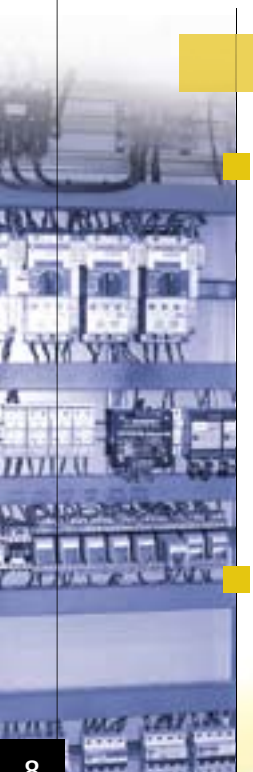
COST-EFFECTIVE SOLUTION & CONSISTENT PRODUCT QUALITY

Polyamide is taking a clear leadership versus thermoset solutions in the power distribution field thanks to:

- *Significant productivity gains both in moulding and assembly (e.g. mini circuit breakers)*
- *Freedom of design and function integration*
- *Better impact resistance*
- *Lower density*

Rhodia's global quality focus allows the full availability and consistency of the TECHNYL® product range worldwide.

Industrial contr



HIGH PERFORMANCE AND ACCURACY...

The Industrial Control market refers to electrical devices used in the industry for driving machines and controlling automation equipment (e.g. contactors, switch gear, push buttons, rotating switches).

These devices often operate under very tough conditions combining high temperatures, vibrations and extended periods of continuous operation. They must require low levels of maintenance and guarantee full reliability over many years.

Rhodia Engineering Plastics offers a comprehensive range of TECHNYL® polyamide compounds responding to the most demanding needs of industrial control applications.

High mechanical resistance
Glass fibre reinforced TECHNYL® compounds provide excellent mechanical properties and low creep strain at high temperatures.

Flammability performance
Final products are often required to fulfil both IEC 60947 and UL508 standards. TECHNYL® grades pass the Glow Wire Flammability Index 960°C and Vertical Flammability UL94 V-0 tests.

Insulation performance
The design of a contactor is directly impacted by the insulation performance of the moulded plastic, measured through the Comparative Tracking Index (CTI). The latest generation halogen and red Phosphorous free products, TECHNYL® A 50H1, TECHNYL® A 60G1 V30 and TECHNYL STAR™ S 60G1 V30 provide a CTI of 600 volts allowing very compact and cost-effective part design.

Electrical arc resistance Technyl® A 60G1 V30
TECHNYL® grades can be used to mould arc chambers of industrial contactors thanks to their excellent resistance to repeated electrical arc.

Contact corrosion and chemical stability
A constant challenge for polyamide grades is to eliminate the migration of flame retardant additives likely to contribute to contact corrosion inside industrial control devices. Rhodia's latest red Phosphorous generation product, TECHNYL® A 21T3 V25, shows extremely low migration values. Halogen & Red Phosphorous free TECHNYL® A 60G1 V30 and A 60G1 V25 as well as TECHNYL STAR™ S 60G1 V30 demonstrate low contact corrosion.

Laser printability
Most TECHNYL® grades are compatible with common laser printing technologies, allowing durable working of finished products resistant to heat, acid oils and solvents.

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Vertical Flammability Test

A selection of the Rhodia Engineering Plastics product range:

REFERENCE	UL94	CTI	DESCRIPTION	APPLICATION
Unreinforced products				
TECHNYL® A 50H1	V-0 at 0,4 mm	600 V	Unreinforced PA6.6 halogen and Phosphorous free	Housings and covers
TECHNYL® B 50H1	V-0 at 0,4 mm	600 V	Unreinforced PA6.6/6 halogen and Phosphorous free	Housings and covers
TECHNYL® A 205F	V-2 at 0,4 mm	600 V	Unreinforced PA6.6 fast cycle	Plugs, identification accessories
Reinforced products				
TECHNYL® C 52G2 MV25	V-2 at 0,8 mm	500 V	25% Mineral and glass filled PA6 Halogen & Phosphorous free	Fuses, MCB, RCD housings
TECHNYL STAR™ S 60G1 V30	V-0 at 0,8 mm	600 V	30% Glass fibre reinforced High Flow PA6 Halogen & red Phosphorous free	Contactors, MCCB, switches and relays
TECHNYL® A 60G1 V30	V-0 at 0,8 mm	600 V	30% Glass fibre reinforced PA6.6 Halogen & red Phosphorous free	
TECHNYL® A 60G1 V25	V-0 at 0,8 mm	550 V	25% Glass fibre reinforced PA6.6 Halogen & red Phosphorous free	
TECHNYL® A 21T3 V25	V-0 at 1,6 mm	600 V	25% glass fibre reinforced PA6.6 Red Phosphorous flame retardant Low migration	
TECHNYL® A 20 V25	V-0 at 0,8 mm	450 V	25% glass fibre reinforced PA6.6 Red Phosphorous flame retardant	
TECHNYL® A 21T3 V35	V-0 at 1,6 mm	550 V	35% glass fibre reinforced PA6.6 Red Phosphorous flame retardant Low migration	
TECHNYL® A 30H1 V30*	V-0 at 0,8 mm	450 V	30% glass fibre reinforced PA6.6 halogenated flame retardant*	

*All halogenated TECHNYL® references are PBB and PBDE free.

All Technical Datasheets are available at www.rhodia-ep.com.

TECHNYL STAR™ S 60G1 V30, *halogen and red Phosphorous free based on high flow PA, procures major advantages that where not achievable with previously existing solutions:*

- Halogen free.
- High mechanical properties and impact resistance.
- CTI: 600 Volts.
- V-0, Glow Wire Flammability Index 960°C.
- Light colour.
- Low contact corrosion.
- Improved smoke toxicity (no HBr, HCl).
- Laser printable.
- Wide moulding window and cycle time advantage.

FOR RAIL VEHICLES APPLICATIONS

Ignitability, smoke opacity and toxicity are major concerns. Whilst waiting for the new European standard to come into being, the French standard NF F 16-101 is today's reference.

A large part of the TECHNYL® flame retardant product range has been tested by independant and official laboratories within the frame of European cooperation of Accreditation program (DAR (D), COFRAC (F), DANAK (DK), SINAL (I), ...).

The list is available at www.rhodia-ep.com.

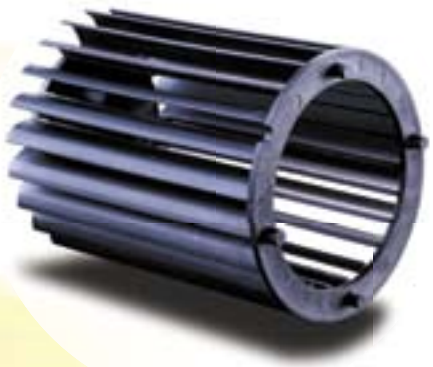
	RTI				
Product	Elec	WI	Wol	HWI	HAI
TECHNYL® A 50H1	130	85	65	2	3
TECHNYL® B 50H1	120	90	95	4	0
TECHNYL® A 205F	115	75	85	3	0
TECHNYL STAR™ S 60G1 V30	130	115	130	0	0
TECHNYL® A 60G1 V25	130	115	130	0	0
TECHNYL® A 60G1 V30	130	115	130	0	0
TECHNYL® A 21T3 V25	125	105	125	2	0
TECHNYL® A 20 V25	115	105	115	1	1
TECHNYL® A 30H1 V30	130	100	120	0	0

Values at 1,5 mm

Appliances

MORE USER AND ENVIRONMENT FRIENDLY HOUSEHOLD DEVICES...

The appliance market is an increasingly important consumer of polyamide, both for large goods (e.g. washers, dryers, dishwashers) and smaller ones (e.g. mixers, toasters, hair dryers)



TECHNYL® flame retardant polyamides comply with standards and improve day-to-day safety.

- All grades are UL registered.
- Many grades also comply with IEC 60335 and specifically GWIT 775°C. (see focus next page).

Excellent mechanical properties.

Many moulded parts for appliance applications require high mechanical performance, during their service life, but also flexibility for assembly (e.g. door locks, pressor cages, switches). TECHNYL® polyamide offers an excellent balance of properties between stiffness, impact resistance and elongation at break. Very high tensile modulus can be achieved through high-flow TECHNYL STAR™ grades filled up to 60% with glass fibre (see graph next page).
Furthermore, TECHNYL® polyamide offers the best flammability performance combined with high stiffness over a wide range of flame retardant grades.

Light colours, together with the most demanding flammability requirements are also possible – both through brominated additives as well as the last innovative halogen free solutions.

Environmental protection

Consumers around the world are increasingly aware of the need to protect the environment, making this element an important criterion in their purchasing decision. Appliance manufacturers are responding to this trend with more "green" products.

Furthermore, in Europe, two directives are bringing new environmental waste management issues to the appliance market:

- Restriction on the use of certain Hazardous Substances (RoHS) 2002/95/CE
- Waste management of Electrical and Electronic Equipments (WEEE) 2002/96/CE

Along with an increasing demand for safety, these regulations are creating new constraints for design engineers.

TECHNYL STAR™ S 60G1 V30, TECHNYL® A 60G1 V30 (30% Glass fibre) and TECHNYL® A 60G1 V25 (25% Glass fibre) are specifically developed to meet GWIT 775°C performance.

TECHNYL® A 30H1 V30 and TECHNYL® C 30H1 V30 have very robust Glow Wire performance and should also be considered.

Glow Wire Ignitability Test according to IEC 60695-2-13

REFERENCE	UL94	DESCRIPTION	SPECIFIC
Unfilled products			
TECHNYL® A 205F	V-2 at 0,4 mm	Unreinforced PA6.6	50% regrind UL approved. Excellent colourability in combination with Concentrate MB
TECHNYL® A 225F	V-2 at 0,8 mm	Unreinforced nucleated PA6.6	Excellent dimensional stability. Low cycle time
TECHNYL® A 50H1	V-0 at 0,4 mm	Unreinforced halogen & red Phosphorous free PA6.6	Pin retention and toughness Thermal resistance
TECHNYL® B 50H1		Unreinforced halogen & red Phosphorous free PA6.6/6	50% regrind UL approved. Excellent mechanical properties balance and flowability
Reinforced products			
TECHNYL® A 218W V30	HB	PA6.6 30% Glass Fibre reinforced	Hydrolysis resistant/water contact
TECHNYL® A 218 V30		PA6.6 30% Glass Fibre reinforced	Heat stabilized and high productivity
TECHNYL STAR™ S 218 V35		High flow PA6 35% Glass Fibre reinforced	
TECHNYL STAR™ S 218 V50 or V60		High flow PA6, Glass Fibre reinforced	Very high mechanical properties and dimensional stability
TECHNYL® A 60G1 V30 or V25	V-0 at 0,8 mm	PA6.6 Glass Fibre reinforced, halogen & Phosphorous free	GWIT 775°C, light colour. Tracking resistance, low migration
TECHNYL STAR™ S 60G1 V30		High flow PA6 30% Glass Fibre reinforced, Halogen free	GWIT 775°C, light colour. Tracking resistance, low migration
TECHNYL® A 30H1 V30* or V25*		PA6.6 Glass Fibre reinforced, halogenated	GWIT 775°C, light colour

*All halogenated TECHNYL® grades are PBB and PBDE free.

All Technical Datasheets are available at www.rhodia-ep.com.

HYDROLYSIS RESISTANT PRODUCTS FOR WATER CONTACT.

TECHNYL® A 218W V30 is in compliance with all the major regulations (ACS, WRAS, NSF, KTW) for the use in applications where there is contact with drinkable water.

This grade shows an excellent resistance to hydrolysis, for heating systems, electro-valve bodies and other similar applications.

RESTRICTION ON THE USE OF CERTAIN HAZARDOUS SUBSTANCES.

According to the European Directive 2002/95/CE effective in January 2006, the following substances are not allowed in electrical and electronic equipments.

- *Lead*
- *Chromium (VI)*
- *Cadmium*
- *Mercury*
- *Flame Retardant PBDE & PBB*

No TECHNYL® polyamide compound contains these substances. Official certificates are available on request.

IEC 60335 AND GLOW WIRE IGNITION TEMPERATURE (GWIT)

According to the IEC 60335 safety standard, parts carrying an electrical current higher than 0,2 A in unattended household appliances, must pass more stringent flammability tests, such as GWIT≥ 775°C.

The following TECHNYL® grades meet this demand:

TECHNYL® A 30H2 V25
TECHNYL® A 30H1 V30
TECHNYL® C 30H1 V30
TECHNYL® C 32H2 MX30

Halogen and Red-Phosphorous free:
TECHNYL STAR™ S 60G1 V30
TECHNYL® A 60G1 V30

WASTE OF ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

Europe is implementing a breakthrough waste management policy for both professional and consumer electrical and electronic equipments.

Milestones:

The directive 2002/96/CE describing operational aspect is in force since publication on January 27th 2003.

By August 2004:
Adoption into national laws.

By August 2005:
National measures developed for separate collection and treatment, including removal of fluids and selective treatment.

"Plastics containing brominated flame retardant must be removed from any separated collected WEEE".

By Dec. 2006:
1) Member States shall ensure a minimum rate of 4 kg/inhabitant of separate collection.
2) Specific rate of recovery, re-use and recycling have been defined for each category and will be revised by Dec 2008.

Concerning large and small appliances, components, material and substance re-use and recycling shall be increased to a minimum of 75% by weight.

Financing of this waste management is based on the "Polluter should pay" principle.

Connectors

SMALL AND SOPHISTICATED

Electrical connectors are found in a wide range of applications for the automotive, telecom/datacom, computer and electronic equipment industries.

Polyamide is particularly well suited to this broad spectrum of applications, as it supports complex formulations which bring the desired strength, colour or moulding behaviour to a particular application. Polyamide offers the best balance between mechanical properties and flammability performance.

Mechanical properties.
TECHNYL® polyamide meets the most severe application requirements for pin retention strength, connection and pull-force, as well as impact resistance. This is due to a flexural modulus ranging from 1.900 MPa to 19 GPa, combined with high tensile strain at break.

UL registered.
Many TECHNYL® grades are UL registered. Some unfilled grades are "50% regrind" registered and available on a worldwide basis.

Heat resistance.
Most TECHNYL® grades are available as standard or heat stabilised grades.

Dimensional stability.
TECHNYL® reinforced grades are stable enough to meet most stringent customer expectations.

Flowability & cycle time.
Polyamide's semi-cristalline structure allows for fast solidification in the tool. Its natural low viscosity enables part miniaturization as well as proper filling of extremely thin multiple-cavity moulds.
TECHNYL® grades also respond to most manufacturers' increasing cost reduction pressure by providing specific fast-cycle solutions.

Comparative Tracking Index (CTI) according to IEC 112

Flexural Stress at Break evaluation

A selection of the Rhodia Engineering Plastics product range:

REFERENCE	UL94	DESCRIPTION	SPECIFIC
Unreinforced products			
TECHNYL® A 205F	V-2 at 0,4 mm	Unreinforced PA6.6	50% regrind UL approved Excellent colorability in combination with concentrate MB
TECHNYL® A 225F	V-2 at 0,8 mm	Unreinforced nucleated PA6.6	Excellent dimensional stability Low cycle time
TECHNYL® A 50H1	V-0 at 0,4 mm	Unreinforced halogen & red Phosphorous free PA6.6	Pin retention and toughness Thermal resistance
TECHNYL® B 50H1	V-0 at 0,4 mm	Unreinforced halogen & red Phosphorous free PA6.6/6	50% regrind UL approved Excellent mechanical properties balance and flowability
TECHNYL® A 218	HB	Heat Stabilized PA6.6	Balanced mechanical properties Excellent elongation
Reinforced products			
TECHNYL® A 218 MT15 V25	HB	40% Mineral and Glass Fibre reinforced PA6.6	Low shrinkage, dimensional stability
TECHNYL® A 218 V20		20% Glass Fibre reinforced PA6.6	Heat stabilised and high productivity
TECHNYL® A 218 V30		30% Glass Fibre reinforced PA6.6	
TECHNYL STAR™ S 218 V35		35% Glass Fibre High flow reinforced PA6	
TECHNYL STAR™ S 218 V50		50% Glass Fibre High flow reinforced PA6	Very high mechanical properties and dimensional stability
TECHNYL STAR™ S 218 V60		60% Glass Fibre High flow reinforced PA6	
TECHNYL STAR™ S 60G1 V30	V-0 at 0,8mm	30% Glass Fibre high flow reinforced PA6 Halogen & red Phosphorous free	GWIT 775°C, light colour Tracking resistance, no migration
TECHNYL® A 60G1 V30		30% Glass Fibre reinforced PA6.6 Halogen & red Phosphorous free	GWIT 775°C, light colour Tracking resistance, no migration
TECHNYL® A 60G1 V25		25% Glass Fibre reinforced PA6.6 Halogen & Red Phosphorous Free	GWIT 775°C, light colour Tracking resistance, no migration
TECHNYL® A 30H1 V25*		25% Glass Fibre reinforced PA6.6 Halogenated flame retardant*	GWIT 775°C, light colour

*All halogenated TECHNYL® grades are PBB and PBDE free.

All Technical Datasheets are available at www.rhodia-ep.com.

Polyamide and PBT are the main engineering plastics used for connectors.

Compared to PBT, PA shows significant advantages:

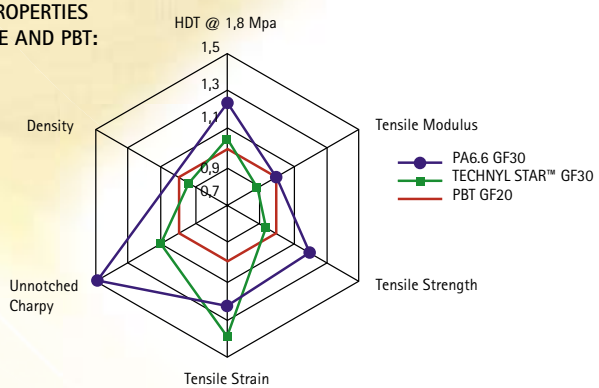
- Easy moulding and productivity.

- *The presence of humidity is far less critical, especially for regrind use.*
- *Better flowability and improved cycle time.*

- Lower density.

- Higher HDT and melt temperature for PA6.6.

COMPARED PROPERTIES OF POLYAMIDE AND PBT:



Insulation systems

STANDARDS AND REGULATIONS COMPLIANCE IS A PREREQUISITE

Insulation systems serve a large number of applications in the automotive, appliance, telecom, computer and aerospace industries. They can be found in motors, converters, relays, capacitors and other applications.

Polyamide is the material of choice for the manufacturing of coils, due to its good balance of properties:

- Flammability rating V-2 to V-0 UL94.
- Excellent dielectric long-term ageing performance, directly linked to bobbins temperature class.
- Good stiffness.
- Reduced moulding cycle-time and wide processing window.

Rhodia develops generic pre-approved systems combining TECHNYL® grades with various other materials (wire, insulation tape, varnish...). This approach is intended to simplify manufacturers compliance to UL1446 and provide them with cost effective solutions. Details of all Rhodia approved systems can be found at www.rhodia-ep.com.

In some cases, specific part design require small modification of pre-approved TECHNYL® based systems. Such minor changes of existing pre-approved systems are possible by conducting a "sealed tube test" with Rhodia's support.

Pre-approved systems

REFERENCE	UL 1446 TEMPERATURE CLASS	SYSTEM DESIGNATION	DESCRIPTION
TECHNYL® A 218 V30	B	B-3	30% Glass Fibre heat stabilised PA6.6
TECHNYL® A 218 V50	B	B-3	50% Glass Fibre heat stabilised PA6.6

Specific grades for insulation systems

REFERENCE	RTI ELEC	UL94	DESCRIPTION
TECHNYL® A 208K	130	V-2	Unreinforced PA6.6
TECHNYL® A 208F	130	V-2	Unreinforced PA6.6, heat stabilized
TECHNYL® A 50 H1	130	V-0 at 0,4 mm	Unreinforced PA 6.6, fast cycle. Halogen & red Phosphorous free
TECHNYL® A 30H1 V25*	130	V-0	25% Glass Fibre reinforced PA6.6
TECHNYL® A 60G1 V30	130	V-0	30% Glass Fibre reinforced PA6.6 Halogen & red Phosphorous free
TECHNYL STAR™ S 60G1 V30	130	V-0	30% Glass Fibre high flow PA6 Halogen & red Phosphorous free

*All halogenated TECHNYL® grades are PBB and PBDE free.
All Technical Datasheets are available at www.rhodia-ep.com.

Services

TECHNICAL SUPPORT

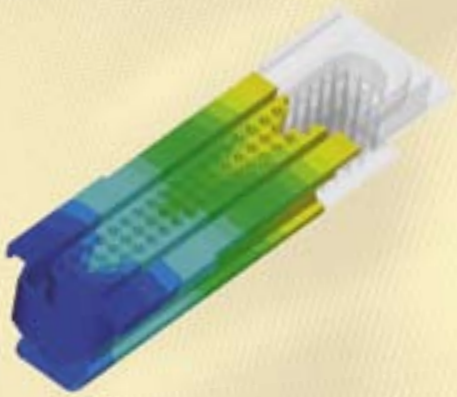
Rhodia Engineering Plastics brings significant resources to provide complete service solutions, as opposed to just products.
The engineers in our labs and technical centers are available to support customers at each stage of a part's development:

BASIC TECHNICAL SUPPORT

- Materials selection
- Materials testing (to standards or to specific protocol)
- Parts design advice, training for design engineers
- Assembly technology expertise (e.g. welding, marking)
- Moulding expertise and support

ADVANCED TECHNICAL SUPPORT

- Parts structure optimisation through Computer Aided Design
- Optimisation of acoustic and noise emission behaviour
- 3D mould flow analysis and warpage both for thick and thin wall parts, mould design support
- Process optimisation using the customer's moulds in Rhodia development centers
- Finished part testing
  - Resistance to heat, fire and tracking
  - Endurance tests: humidity, heat, cold, acceleration, vibration
  - Ageing in hot or conditioned air
  - Multi-axial impact
  - Noise emission measurement
- New compounds development according to specific needs



More information about Rhodia Enginneering Plastics' products, services and worldwide contacts can be found on our web site: www.rhodia-ep.com.

Coding

SIMPLIFIED CODING SYSTEM
Standard Grades

Polymer Type:
A = PA6.6 **B** = PA6.6/6 **C** = PA6 **S and SX** = TECHNYL STAR™

TECHNYL A 218 V30 BLUE 59 CF

Viscosity Level:
2 = Standard (injection)
3 to 4 = High (injection and extrusion)
5 = Very high (blow molding)

Nucleation/Impact Modifier
0 = Un-nucleated
1 = Standard nucleation
2 = Fine nucleation
3 to 5 = Impact modified

Protection Type
0,5,6 = Light or no specification
7 = Thermal protected (medium)
8 = Thermal protected (high)
9 = Thermal, oil and grease protected

Filler nature:
V = glass fibre
S = glass beads
MT, MX or MZ = mineral

Filler content:
30 = 30% in weight

Colour Name

Colour Number

Cadmium Free
(same meaning as N)

CODING SYSTEM
Flame Retardant Grades

Polymer Type:
A = PA6.6 **B** = PA6.6/6 **C** = PA6 **S and SX** = TECHNYL STAR™

TECHNYL STAR S 60G1 V30 BLACK 15 N

Flame retardant System:
2 = Phosphorous
3 = Halogenated
5 = Halogen & Phosphorous free
6 = Halogen and Red Phosphorous free

UL 94 Rating
0 = UL94 V-0
1 = UL94 V-1
2 = UL94 V-2

H = Heat Stabilised
T = Tough
G = Glow Wire Resistant
X = Low Fire & Fumes Toxicity

V = Glass Fibre
MV = Glass Fibre + Mineral
MT, MX or MZ = Mineral

Pourcentage of Filler

Colour + Reference #
N, CF = Cadmium Free

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