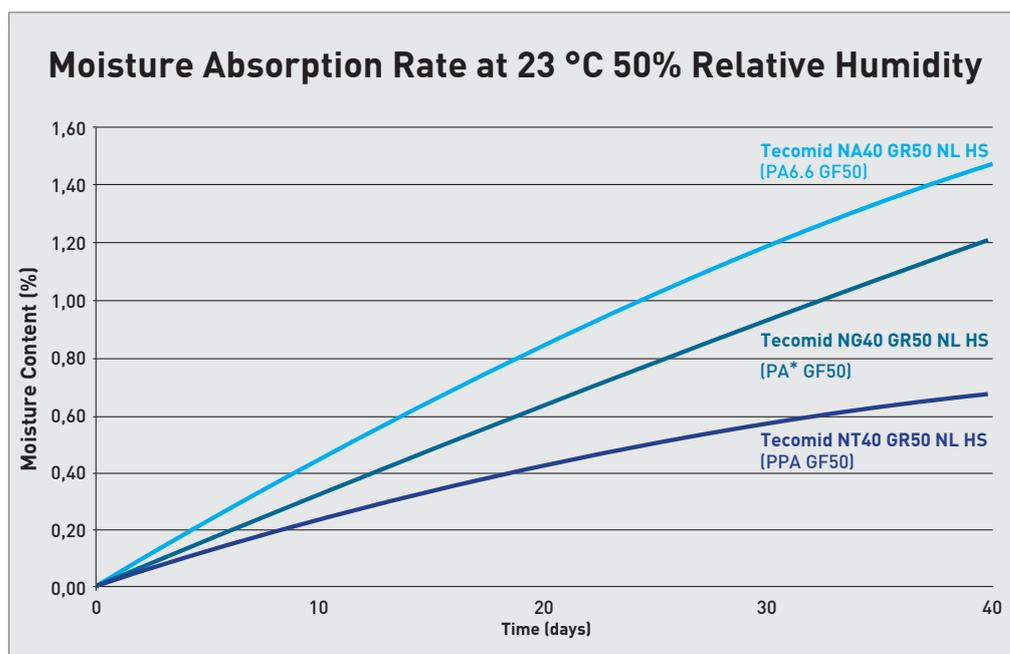


New Dimensions for Metal Replacement Materials

PA6.6 & PA6 are known for their excellent mechanical properties and thermal stability under elevated temperatures. Moreover these advantages can be greatly enhanced with various reinforcements, and stabilizers. On the other hand, due to their hygroscopic nature, when they pick up moisture from the environment, not only their strength & stiffness are lowered but also their dimensions change. PPA (**Tecomid**[®] NT) are bringing a solution for this issue with their very slow moisture absorption rate and little influence of moisture on strength and stiffness of the material. But if the continuous working temperature is not higher than 125°C, this solution becomes over-engineered.

To address this issue eurotec[®] developed **Tecomid**[®] NG40 GR50 NL HS (High performance PA, 50% glass fiber reinforced, heat stabilized, natural). The high performance polyamide grade combines exceptional mechanical properties with low moisture absorption rate. Additionally the grade retains its mechanical properties even after moisture pick up.

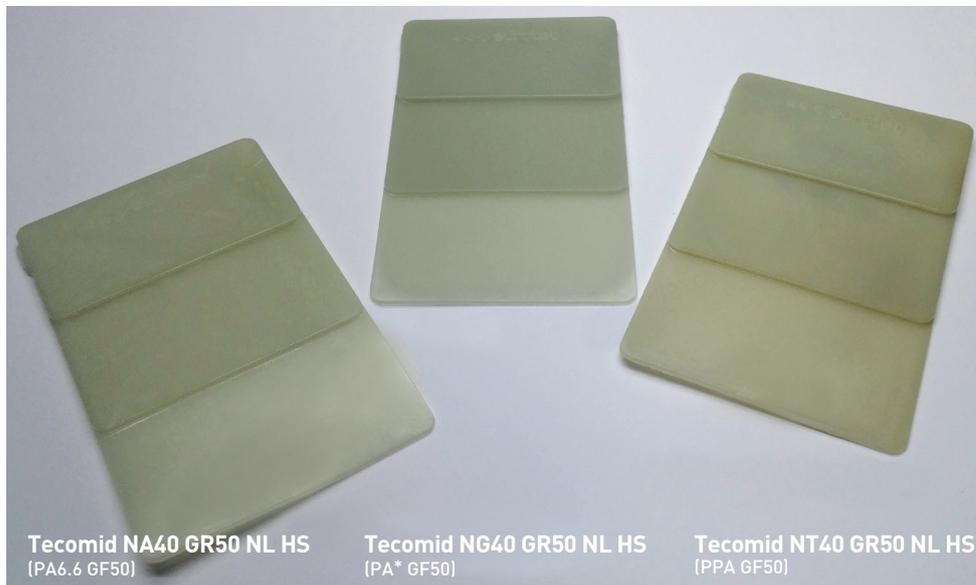


*Test conducted at 4mm thickness



PROPERTY	Condition	Unit	Standard	Tecomid NG40 GR50 NL HS		Tecomid NA40 GR50 NL HS	
				(d.a.m.)	(cond.)	(d.a.m.)	(cond.)
Density	-	g/cm ³	ISO 1183	1,59	-	1,57	-
Moisture Absorption	50% RH, 23 °	%	ISO 62	1,2	-	1,3	-
Stress at Break	5 mm/sn	Mpa	ISO 527	240	210	240	180
Stress at Break	5 mm/sn	%	ISO 527	2,5	2,5	2,5	3,0
Tensile Modus	5 mm/sn	Mpa	ISO 527	16500	16500	16500	12750
Izod Impact, notched	+ 23 °C	kl/m ²	180/1A	15	15	18	20
	- 30 °C			13	13	15	-
HDT	0,45 Mpa	°C	ISO 75-1/2	260	-	260	-
	1,80 Mpa			255	-	255	-

Tecomid® NG40 GR50 NL HS excels with its excellent surface aspect, slow rate of moisture absorption, low warpage and enables dimensionally precise, functional parts that can replace metal die cast alloys.



Counter Type Examples

- Zytel HTN53G50HSLR
- Grivory GV-5H
- Leona 90G50



Metal Replacement

Stopper for Automotive Online Body Painting

Stopper elements that are used for automotive online body painting process has to function under the harsh conditions of cataphoresis, solvent based primer application and numerous solvent & water based paint applications. Material which is used in this process not only has to show resistance to chemicals involved these applications but also must show resistance to numerous thermal stresses in prolonged time. Due to these vigorous treatments formerly metal stoppers were used in order to hold, support and provide a snap-fit point for automotive body shells. eurotec® provide a solution to well-known OEM with **Tecomid® NA40 NL MI** (PA6.6, unfilled, heat stabilized, impact modified, natural). The grade enabled metal



replacement with its excellent chemical resistance, exceptional hinge capability and outstanding thermal resistance. Thanks to its 2000 MPa tensile modulus and unique stabilization package, parts made with this grade show excellent snap-fit point while resisting various thermal and chemical resistances.



Fluorescent Lamp Ballast

Tecomid® NB40 GR122 FA50 (PA6, unfilled, flame retardant – halogen free, grey) has been approved by a global OEM in lighting sector in producing fluorescent lamp ballast. While the grade enables stable and fast production in an eight cavity tool with hot runners, also provides very good surface finish and flame retardancy with its V0 (acc. to UL94) fire rating.



Adjustable Plier for Tile Leveling System

Installing tiles could be a big challenge. Installer has to properly set flexible, large format, heavy or thin tiles on a floor foundation which is uneven and/or contains imperfections. To make matters worse, tiles that seemed uniformly leveled at first can show differences as the tile adhesive sets, compromising the overall aesthetics. Tile leveling systems have been developed to address this issue. These are two part systems that consist of an element to fixate tiles and an adjustable plier for leveling and tightening the tiles. **Tecodur®** PB70 GR50 BK009 MX 01 (PBT/PET, 50% glass fiber reinforced, heat and UV stabilized, improved impact, black) has been successfully used to produce adjustable pliers for tile leveling systems. Strength and stiffness need of a hand tool, coupled with resistance to fatigue and impacts has been met with the grades 17000 MPa modulus and 145 MPa strength.





Arc Welding Electrode Holder

Arc welding is the type of welding that melts metal base and an electrode with an electric arc between them. During the welding process, welding electrode holders are subjected to high voltages, high electric currents and elevated thermal stresses. Therefore materials used to make this apparatus have not only to be stiff and strong due to high mechanical loadings, but also have to resist high thermal stresses coupled with good insulation property.

eurotec® utilizing its knowledge, find solutions to one of the leading welding machine producer to develop an arc welding electrode holder made mostly from thermoplastics. Handle is made with **Tecomid® NA30 KP25 BL031 MD 0B** (PA6.6, 25% glass fiber reinforced, impact modified, heat stabilized, blue). Thanks to grades excellent fatigue resistance, improved stiffness with 4000 MPa tensile modulus, very good shock resistance with 15kJ/m² izod notched impact value, and easy processing; handles have excellent surface aspect with exceptional resistance to continuous mechanical loadings.

Main body is made with **Tecomid® NB40 GR30 BL031** (PA6, 30% glass fiber reinforced, blue). The grade offered outstanding combination of strength and stiffness coupled with complete thermal resistance, to make the body strong and durable over its life span.

Jaw cover is made with **Tecomid® NA40 GR40 BK008 XA43** (PA6.6, 40% glass fiber reinforced, flame retardant – red phosphorus, heat stabilized, black). Close to arc and fire of the welding, the grade with its excellent fire and thermal resistance provides excellent insulation point without any puncture and dimensional distortion.





WRAS Approval from eurotec® with Tecotek® OP20 GR30 BG018 01 0A

The Water Regulations Advisory Scheme (WRAS) is the UK Water Industry's approval scheme. Products approved by the scheme have been shown to comply with the requirements of the Water Supply (Water Fittings) Regulations 1999 and amendments.

Tecotek® OP20 GR30 BG018 01 0A (PPE/PS, 30% glass fiber reinforced, beige) successfully satisfied the criteria set out in BS 6920: Part 1: 2000 "Suitability of non-metallic products for use in contact with water intended for human consumption with regards to their effect on the quality of the water" and thus approved by WRAS. The grade is suitable to be used in direct contact with potable water up to 85°C.

ISO 9000 – ISO 14000 – OHSAS 18000 Integrated Management System

ISO 9000 is the series of quality management systems standards which is designed to help organizations to meet needs of the customers and other stakeholders while meeting also the regulatory requirements related to a product.

ISO 14000 series has various aspects of environmental management. It provides practical tools for companies and organizations looking to identify and control their environmental impact and constantly improve their environmental performance.

OHSAS 18001 is an Occupation Health and Safety Assessment Series for health and safety management systems. It is intended to help organizations to control occupational health and safety risks.

eurotec® naturally, pays importance to protect environment & world as a way of living life. On the other hand, it prevents occupational diseases hazards which may result from its activities or work-related accidents. By complying with all requirements which are associated with product quality, environmental aspects, energy use and safety risks; **eurotec®** qualified to have ISO 14001 and ISO 18001 certificates additionally to ISO 9001.

All in all, integrated management system is established and it is legalized also with the new certificates.

NB40 HF85 MT112 EC 0B



Light of metals and easy processing of thermoplastics are combined with Tecomid® NB40 HF85 MT112 EC 0B (PA6, 85% Metal Filled, Electric & Thermal Conductive) in a unique way. Tecomid® NB40 HF85 MT112 EC 0B has the density of 4.5 g/cm³ which will give the part vibration and sound dampening properties along with static dissipative feature due to grade's surface resistance value of 10⁷-10⁸Ω. This grade is capable of replacing metal applications where metal is used for its weight. Unlike the parts made from metals, parts made from Tecomid® NB40 HF85 MT112 EC 0B will not require any kind of secondary operations. Moreover they will be inherently corrosion free. This high density grade can be used for less lethal or training bullets, sport equipment balancing weights, sport equipment weights, inertia disks, golf club heads, fishing weights, acoustic isolation panels, headphone body, and vibration damping panels.

Lock for Fire Extinguisher System's Control Panel

Tecodur PB70 GR17 BK002 FA20 (PBT, 17% Glass Fiber Reinforced, Flame Retardant-halogen (RoSH compliant), Black) has replaced Rynite FR515 NC010 with grades superior flexibility and processability. As one of the most crucial safety equipment, control panel of a fire extinguisher system must be functional during a fire. The grade has V0 (acc. to UL94) flame rating at 0.75 mm and GWFI value 960°C at 1 mm (acc. to IEC 60695) which will make the part resistant to flame and ignition. In addition to the excellent flame ratings, the grade's heat deformation temperature (HDT) is 210 at 0.45 MPa (acc. to ISO 75) which enables lock to be used in high temperatures.



Innovative Ultra-light Prams

An innovative automotive industry company has replaced metals with IXEF 1022 for making prams. **Tecomid** NBX0 GR60 BK012 E (PA6, 60% Glass Fiber Reinforced, Black) has replaced IXEF 1022 in this application by the grades similar mechanical properties and surface finish. **Tecomid** NBX0 GR60 BK012 E has the density of 1.70 g/cm³ which is much lower than any metal, makes the prams both super light and strong. **Tecomid** NBX0 GR60 BK012 E has the modulus of 20000 MPa and tensile strength 220 MPa, making these prams easy to carry, maneuver and safe.



Launches PPO/PS Compounds

Combining PPO resin's high temperature resistance, hydrolytic stability and outstanding insulative properties with excellent processability and low density of polystyrene (PS).

Polyphenylene Ether resin (PPE), commercially known as Polyphenylene Oxide (PPO), is an amorphous high temperature thermoplastic that offers;

- Glass transition temperature higher than 210°C
- Low mold shrinkage
- Excellent dimensional stability
- Very low coefficient of thermal expansion
- Very low water absorption
- Hydrolytic stability
- High dielectric strength
- Inherent resistance to flammability

Although there are many advantages in using PPO resins as a material, polymer itself is nearly impossible to process. One way to utilize advantages of PPO resin is using PPO/PS miscible blends. Blending PPO with high impact polystyrene gives impact resistance and processability while thermal properties of the blend depend on the PPO/PS ratio. eurotec® make use of her vast knowledge in compounding, expands her product portfolio with PPO/PS grades under the trade name of Tecotek®. For future reference, some exemplary grades and its Noryl counter grades can be seen from table below.



Tecotek Grade	Explanation	Noryl Competitor
OP20 NL 01 0A	PPO	Noryl 731S
OP20 NL FB81 0B	PPO, Flame Retardant V1 at 1.6mm, High Heat	Noryl SE1
OP20 NL FA81 0C	PPO, Flame Retardant V0 at 0.75mm, High Heat	Noryl N 1250
OP20 GR10 NL 01 0A	PPO GF10	Noryl GFN1
OP20 GR20 NL 01 0A	PPO GF20	Noryl GFN2
OP20 GR20 NL 01 0C	PPO GF20, High Heat	Noryl GFN 1720
OP20 GR20 NL FB81 0B	PPO GF20, Flame Retardant V1 at 1.6mm, High Heat	Noryl SE1GFN2
OP20 GR30 NL 01 0A	PPO GF30	Noryl GFN3

As there are numerous applications which utilizes PPO/PS blends advantages, some application examples are;

Automotive	Electric / Electronic	Others
Trims	Solar Energy Housings and Covers	Pump Housings and Impellers
Fenders	Lightening housings and covers	Water Meters
Tank Flaps	Connectors	Business Machine Chassis
Grills	Circuit Breakers	
Mirror Housing	PCB	
Fuse Boxes	Power Distributor Boxes	
Instrument Panels		



Manhole Adjusting System Spacer

Constructing a manhole is a demanding process. Materials that used in this application must show resistance to various chemicals, water and unsanitary conditions of sewer systems. Furthermore in today's traffic environment, manholes must also withstand high lateral and vertical loads. Traditional materials such as bricks and tiles used to support and adjust ironwork cannot cope with these loads and stresses which makes manhole adjustment systems a need. Tecotek® OP20 GR20 BK014 01 0A (PPE/PS, 20% Glass Fiber Reinforced, Black) is currently being used for manhole adjusting system spacer application due to its dimension stability under moist environment. Moreover the grade delivers very good impact resistance with izod impact (notched) value 10kJ/m^2 coupled with the grade delivers excellent chemical resistance and hydrolytic stability enable parts to withstand harsh conditions of the sewer systems.



Water Pump Inlet Cover

Water pump inlet covers must withstand high water pressures and, must not degrade with water contact or change dimensions to prevent leakage and serve perfectly in its life span. Tecotek® OP20 GR30 BK014 01 0A (PPE/PS, 30% Glass Fiber Reinforced, Black) is currently being used in this application for its good mechanical properties with a tensile modulus of 9000 MPa, izod impact (notched) value 11kJ/m² and, excellent hydrolytic and dimensional stability. Excellent water resistance in varying temperatures makes this grade the perfect choice where both good mechanical strength and water contact is needed.

Metal Replacement: Replacing Carbon Steel

Weaving Machinery Rapier Gripper

Fast paced weaving machineries used in textile sector need great precision in every step to maintain its speed without a failure. Precision needs sensitive sensors and sensitive sensors need machine parts that can block electromagnetic interference (EMI). Tecomid® NA40 CN20 BK012 HS (PA6.6, 20% Carbon Fiber Reinforced, Heat Stabilized, Black) is chosen in rapier gripper application for both its good mechanical properties and EMI shielding capability for replacing carbon steel. The grade has volume resistivity of 10⁴ Ω.cm which enables the parts made from this grade to block all electromagnetic waves as well as tensile modulus of 12000 MPa prevents the part from bending and skipping a knot. Tecomid® NA40 CN20 BK012 HS can be used in applications where both EMI/RF shielding and good mechanical properties needed.



Solar Panel Control Housing

Direct exposure to sunlight, operation under harsh environmental conditions, controlling high electric currents make the solar panel control housings a very demanding application.

Tecotek® OP20 BK014 PU81 0C (PPO/PS, unfilled, flame retardant – halogen free, UV stabilized, high heat grade, black) provides every need of this application with its excellent fire resistance thanks to its V0 (acc. to UL94) flame rating along with excellent UV resistance. Parts made from this grade have excellent weatherability and outstanding dielectric strength. Also grade's perfect dimensional stability will provide excellent sealing quality required for water proofing.



Submersible Pump Impeller & Gasket Housing

Continuous water contact, high torque and high rpm working conditions of submersible pump impellers require water resistant, dimensionally stable and strong material.

Tecotek® OP20 GR30 BK014 01 0A (PPO/PS, 30% glass fiber reinforced, black) with its very low water absorption, hydrolytic stability and good mechanical properties with its 120 MPa tensile strength and 9000 MPa tensile modulus provided an excellent solution for this application and made a perfect replacement of Noryl GFN3. Moreover gasket housings produced from the same grade have excellent sealing property under water pressure thanks to the grade's dimensional stability and high modulus.



Metal Replacement: Baggage Hook for Automotive

An important OEM in Automotive industry has successfully replaced its metal baggage hooks to plastic by using our **Tecomid® NA40 GR50 BK037 HS** (PA6.6, 50% glass fiber reinforced, heat stabilized, black). Thanks to grade's remarkable mechanical properties with 16000 MPa tensile modulus and 210 MPa tensile strength proved itself brilliantly after vigorous testing by working between -40°C to 80 °C temperature range while supporting 10kg load without distorting no more than 2mm from its original shape. Moreover outstanding thermal stability, excellent mechanical properties, deep black color and easy processing of this grade provided aesthetic, strong and safe parts that made the switch between metal to plastic easy.

