

Highlights AKRO-PLASTIC



AKRO-PLASTIC 
Think Polyamide

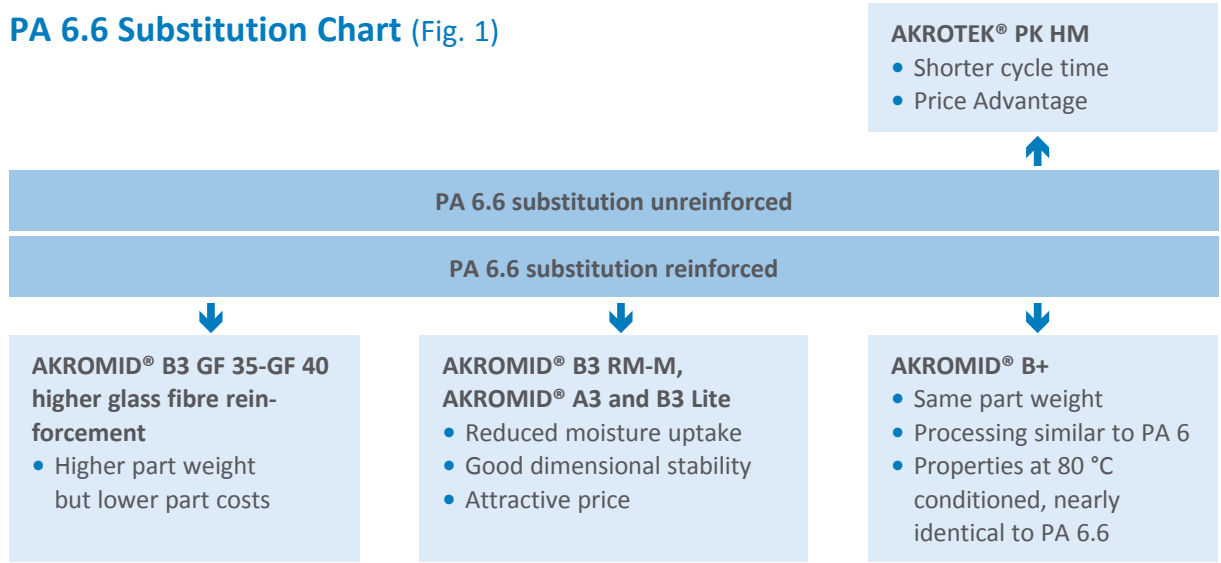
AKRO-PLASTIC GmbH
Member of the Feddersen Group



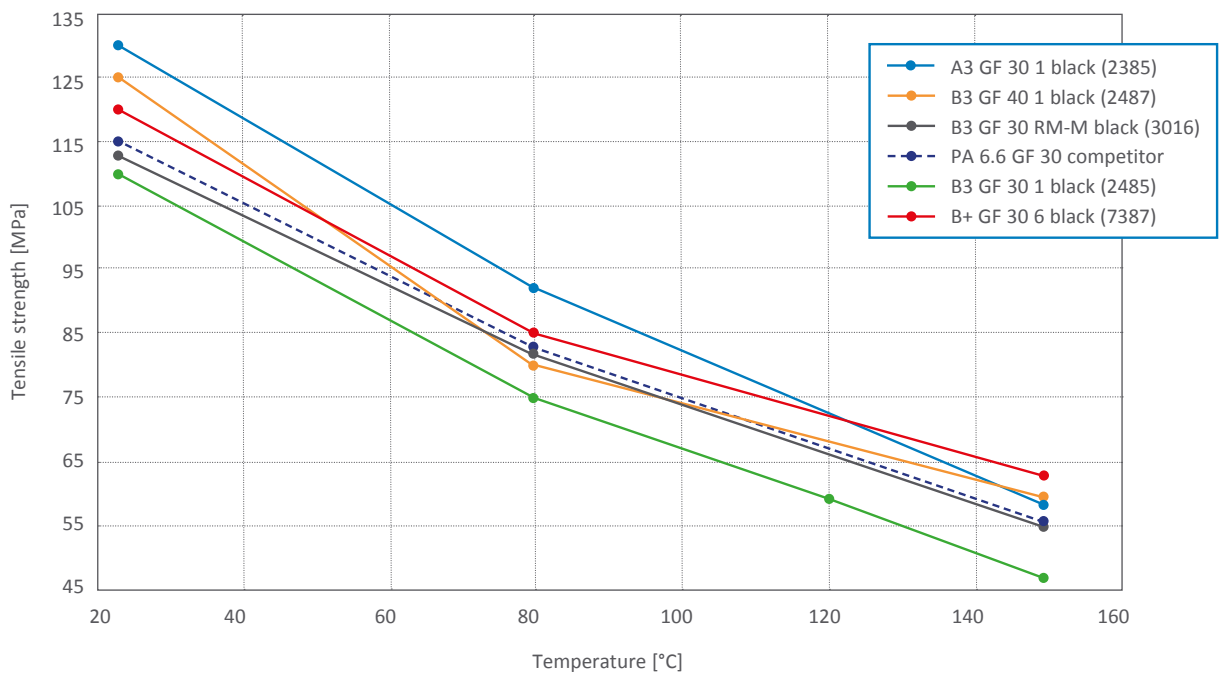
Substitution of PA 6.6

- Critical PA 6.6 raw material availability and increasing material costs push for new material solutions. The following technical information should provide ideas, how PA 6.6 glass fibre compounds can be replaced by PA 6 glass fibre compounds.

PA 6.6 Substitution Chart (Fig. 1)



Tensile Strength over Temperature – Conditioned State (acc. to ISO 1110) (Fig. 2)



The picture illustrates tensile strength in conditioned state at multiple temperatures of different glass fibre reinforced polyamid compounds.



Competence Center

Extended Application Development at AKRO-PLASTIC

- Precise quality assurance of the produced materials
- Development of innovative materials based on extensive material testing and inhouse trials to define influences and parameters for following serial processes:
- Special injection moulding processes (chemical foaming, FIT, PST Plasma SealTight®)
- Injection moulding machines with 80–300 tons clamping force and twin shot
- PME WIT PowerModul
- Plasma SealTight® PTU1212 and KUKA robot KR 10 R1100 sixx



PST Plasma SealTight® – Joining Metals and Plastics (A Joint Project of AKRO-PLASTIC and PLASMATREAT)

In-Line production line for coating and overmoulding

Application fields:

- Lightweight in automotive and aerospace industry achieved via making hybrid structures
- Sealing systems in the electronics industry, production of media-tight connectors via injection moulding process

Material development for the PST Plasma SealTight® process:
adhesion-optimised plastic compounds

- Tensile shear strength of a standard PA 6 GF 30 with stainless steel is 38 MPa and the optimised version with AKROMID® B3 GF 30 7 PST (7178) reaches 47 MPa
- Tensile shear strength of a standard PA 6.6 GF 30 with stainless steel is 31 MPa and the optimised version with AKROMID® A3 GF 30 7 PST (7318) reaches 37 MPa



Fluid Injection Moulding (FIT)

- Material development for fluid injection moulding
- Compounds for a bigger process window (GIT and WIT)
- Better surface qualities and lower residual wall thickness (WIT)
- Projectile injection technology for uniform wall thickness
- Two component cooling pipes
- Several compounds available: A3 GM 20/10 4 WIT black (4529) for cooling pipes, B28 GF 30 RM-D GIT black (5197) for door handle, B3 GM 20/10 4 WIT grey (5719) for handle

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AKROMID® HI

Skid Protection B3 GF 30 S1 Natural (2091)

- New high flow grade: C3 1 S3 black (4297) and C3 5 S3 black (4605) if higher heat resistance is required
- New medium toughened grade A3 1 S3 black (21002) and cost advantage
- High performance product A3 1 S3 black (1139) for heat aging applications at 120 °C/1,000 h
- A3 S1 black (1071) product with highest notched impact strength (>80 kJ/m²) for applications like valve guard and cable gland
- Very good batch to batch consistency for mechanical properties and narrow tolerances for mechanical properties
- Suitable for 2K moulding, adhesion to TPE is possible
- Applications: fasteners and clamps, cable ties and channels, window frames, protection covers



AKROLOY® PA

High-Strength Material for Metal Replacement

- Blend of semi-crystalline PA 6.6 and partially aromatic, amorphous copolyamide
- Alternative to aluminium and zinc die-cast alloys
- Advantage: constant properties, due to lower moisture absorption
- Excellent stiffness up to 80 °C
- High strength and stiffness, easy processing, aesthetic surface
- Applications: mechanical engineering, automotive, industrial
- New grades with particularly light inherent color and better weld line strength: PA GF 30 (6415), GF 40 (6416), GF 50 (6507), GF 60 (6418)
- New grades with flat glass fibre, easy flowing and high transverse force: PA GF 50 (6546) and PA GF 60 (6765)



AKROLOY® PARA

High-End Aromatic Compounds

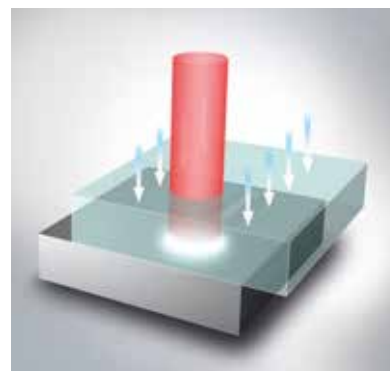
- The Dr. Schneider Company Group developed a lightweight design concept for air vents which are made out of PARA ICF 40 (6128)
- Based on polyarylamide with higher strength compared to AKROLOY® PA
- PARA GF 50 strength over 300 MPa d.a.m. and 280 MPa conditioned
- PARA GF 60 is the product with highest strength (320 MPa) of all glass fibre reinforced AKRO-PLASTIC compounds
- PARA GF 50 has 40 % lower moisture absorption compared to AKROLOY® PA GF 50
- PARA ICF 40 is our product with highest stiffness (39,000 MPa tensile modulus)
- Excellent surface aspect, good chemical resistance, low creep tendency, constant properties and better flow properties than AKROLOY® PA
- Application: automotive, mobile electronics, mechanical engineering



Laser Transparent

Materials for Laser Welding

- Laser welding requires laser transparent and laser absorbing material
- Laser transparent products based on PA 6.6 and PA 6.12 reinforced (up to 60 % glass fibre) and unreinforced, black or colored and even impact modified
- For example: A3 6 LT black (5651), D3 GF 30 1 LT black (5391), B28 LGF 40 2 LT blue and C28 LGF 40 6 XTC LT black (7176)
- Quality control measurement of the laser transparency with a wavelength of 980 nm during production
- AKRO-PLASTIC provides laser transparency value on each certificate of accomplishment for laser transparent compounds
- Advantage of laser welding: precise work with precise energy input, complicated weld geometry possible, high weld line strength
- Applications: mechanical engineering, automotive, industry



AKROTEK® PEEK

Best Performance in Plastic

- PEEK exhibits several outstanding properties: high continuous operating temperature (> 340 °C); very good chemical resistance, inherent flame retardancy; good radiation resistance, very good tribological properties, minimal creep
- Applications: pump components, sealing rings, plug-in connectors, fasteners, bearing segments in wind turbines, impeller
- Wide product range: glass fibre reinforced, carbon fibre reinforced, tribologically modified
- Less delamination and mould deposit on PTFE modified compounds
- CF compounds with very low coefficient of friction and reduced wear



PRECITE® PBT

Precision for Demanding Applications

- Glass fibre reinforced PBT, PBT/ASA and PBT/ABS upto 50 % glass fibre. Our ICX® Technology enables a new benchmark for PBT. Up to 180 MP strength and almost 2 % elongation at break are possible with our P3 GF 50 (6944).
- PRECITE® (PBT/PET) GF 30 and GF 50 offer new potential in strength and surface quality with improved flow
- Impact modified grades as well as hydrolysis resistant versions
- ICF® grades with affordable carbon fibre reinforcement which releases its full potential in PBT, as the sizing is ideal for PBT. So P3 ICF 30 (6948) does have 290 MPa flex strength and 2,1 % elongation at break, at 1.41 g/cm³ density.
- Applications: precision parts with high demand to dimensional stability like connectors and housings or fuseboxes in the E&E or automotive industry





Lightweight Design

New Ways in Lightweight Engineering

- Different possibilities:

- 1) Use of a polymer with lower weight: AKROMID® Lite products
- 2) Use of reinforced material with lower weight: carbon fibre
- 3) Use of chemical procedures: foaming, MuCell®, WIT, PIT

AKROMID® Lite compounds:

- Approx. 8 % lower weight and adhesion to TPE, ZnCl₂ resistant
- Better dimensional stability due to lower moisture absorption and flow
- AKROMID® B3 GF 30 9 L (7227) material with improved aesthetics

MuCell® compounds:

- AKROMID® A28 GF 30 9 EN MCL black (5966) is suitable for MuCell®, picture aside shows engine cover developed by GK Concept & YIZUMI
- MuCell® parts are characterised by high bending strength and outstanding surface quality



ICF Compounds

Carbon Fibre Reinforced Compounds

- Very competitive price compared to glass fibre compounds with similar performance and extremely high price advantage compared to common carbon fibres
- Density advantage over glass fibres and shorter cycle times
- Reduction in wall thickness due to higher stiffness
- ICF carbon fibre content from 15–40 %
- Available with all AKRO-PLASTIC products
- New grades for fuel filter applications: A3 CGM 10/20 4 black (5870) and B3 CGM 15/20 1 black (5489)
- T1 CGM 15/10 S1 black (6431) quick connector housing for fuel supply chain, temperature resistance -30 to 130 °C



EN Products

Electrical Neutral Compounds in Series Application

- Verifiable content of bromine and iodine <1 ppm
- For all EN product lines, AKRO-PLASTIC provides an inspection certificate that specifies the bromine and iodine content to be <1 ppm. We currently offer the best resolution analysis in the daily standard use
- Only supplier with production accompanying trace analysis
- Solves the problem of galvanic corrosion
- Custom-built machinery
- Available worldwide (production in China and Germany is possible)
- Application: electrical components in automotive, E&E, industry
- New grades: A28 GF 30 9 EN MCL black (5966) and T1 GF 30 S1 EN black (6817)



LGF Compounds

Safe under Extreme Loads

- Advantages to short glass fibre reinforced compounds
- Better mechanical properties at high and low temperatures
- Lower creep
- Higher absorption of impact stress
- Suitable for replacement of some metals and other expensive thermoplastics
- Broad product portfolio: A28 LGF 50 1 natural (5997), B28 LGF 40 1 L black (6155), C3 LGF 50 5 XTC natural (5574), PA LGF 40 natural (6535), PA LGF 50 natural (5504)
- Offered with XTC stabilisation (polymer matrix protected against oxidative degradation at temperatures up to 230 °C)



AKROTEK® PK

The Polyketone with Universal Qualifications

- Application: spring for turn switch made of AKROTEK® PK-HM natural (4773)
- High resilience and minor creep, high elongation at break
- Good chemical resistance compared to other engineering thermoplastics
- Good flow behaviour and fast crystallisation → short cycle times
- Low moisture absorption 0.4 % at 23 °C, 50 % rel. humidity
- Excellent tribological properties
- Outstanding reproducibility of dimension and tolerances
- PK-VM CF 10 TM black (6135) high elongation at break and perfect tribological behaviour
- Applications: tribological applications, sliding parts, parts with high chemical resistance, wheels
- New grades: PK-VM GF 30 LT black (6934) for laser welding



AKROMID® RM-M

For Mechanically Highly Loaded Parts

- Outstanding surface finish even with 60 % glass fibre
- More constant properties in humid climate than standard PA
- Low moisture absorption (under 1 %) with mechanical properties hardly affected
- Low warpage
- Closes the gap between PA 6.6 compounds and partially aromatic compounds due to the lower moisture absorption
- Applications: lamella, sunroof frames, mirror components
- Standard products: B3 GF 50 4 RM-M black (3221) and B3 GF 60 4 RM-M black (5238)





Water Management

Compounds for Drinking Water Contact

- AKRO-PLASTIC offers two new product ranges of engineering plastics that are suitable for the water management and food industry.
- AKROMID® T5 GF XX 8 is a family listed PPA unreinforced or with 10 % to 50 % GF with KTW approval up to 85 °C and W270 approval
- These products are also in compliance with EU10/2011 and FDA
- PPA compounds show high stiffness and strength at elevated temperatures and absorb very low moisture
- AKROTEK® PK-VM GF XX 8 is a family listed PK unreinforced or with 5 % to 50 % GF with KTW approval up to 85 °C and W270 approval
- These products are characterised by good chemical resistance and good hydrolysis resistance
- Application: pumps, valves, water filter, water meter housing, gears, sealings



Highly Reinforced

For Highest Requirements

- Broad portfolio of materials (PA 6, PA 6.6, PA 6/PA 6.6, PA 6.6 + PA 6I/6T, PPA, PK, PEEK)
- For selected AKRO-PLASTIC compounds reinforcement up to 70 % GF
- PA GF 70 is the product with the highest reinforcement content → E-Modulus (25 GPa)
- Better control in production as compounding equipment made by sister company FEDDEM GmbH & Co. KG (gentle compounding which means longer glass fibres and lower polymer degradation)
- Very good surface finish
- Tight specification limit for glass fibre content
- Suitable for metal substitution (e.g. die-cast aluminum)
- Very low warpage in case of glass beads filled compounds



XTC Quick Connector

AKROMID® Compounds for Higher Heat Stabilisation

- Quick connector for break-pressure line made of C3 GF 30 5 XTC black (4686)
- Stabilisation with shielding technology
- Compound with long term use temperature up to 230 °C
- Electrically neutral formulation
- High strength and elongation at break after heat aging
- Suitable for metal replacement
- Application: charge air ducts, resonators, connectors, parts in engine compartments
- New grades for example: C3 LGF 50 5 XTC natural (5574), C3 ICF 10 5 XTC black (6168) and C3 ICF 15 5 XTC black (6169)
- C28 GFM 10/20 5 XTC (7367) can be used for engine covers with very high requirements in terms of heat resistance





FR Compounds

Flame Retardant Compounds for E&E Applications

- AKROMID® A3 GF XX HU is a family listed PA 6.6 with 25 % to 60 % GF with UL Yellow Card with RTI 130 °C suitable for industrial applications
- All FR compounds with halogen free-FR agents and CTI 600 (free of iodine and bromine)
- AKROMID® C3 1 FR passes test according to UL 94-V0 at 0.4 mm, good GWFI and GWIT, with a strain at break above 10 %, suitable for living hinges, UL Yellow Card all colors available
- AKROMID® C3 GF 25 1 FR and C3 GF 30 1 FR passes test according to UL 94-V0 at 0.4 mm, good GWFI and GWIT and with very good flow properties, UL Yellow Card all colors available
- AKROLOY® PA K 17 FR is a PA 6.6 blend with 35 % glass fibre reinforcement, high strength and stiffness, UL 94-V0 at 0.4 mm with very good flow properties
- AKROMID® A3 GF 30 FR-EN is a UL 94-V0 grade, that is free of iodine and bromine (<1 ppm) and hence “FR-EN” (lowest possible ion-content for low corrosion of electronic components)
- AKROMID® B3 1 FR orange and B3 GF 30 FR orange in warning orange as required in electric cars, passes test according to UL 94-V0



FR Compounds for Public Transportation

- AKROMID® B28 GF 15 (6940), B28 GF 25 (6430) and B28 GF 30 (6941) fulfill the bus standard ECE R118 Annex 6, 7 and 8.
- AKROMID® C3 1 FR (4163) and B3 1 FR (6437) meet the European train standard EN 45545-2 R22, R23 and R24. These materials offer a Yellow Card with V0 at 0.4 mm and are therefore suitable for R26, too.
- For European train applications which need a higher stiffness AKRO-PLASTIC offers B3 GF 25 FRT (6910) and B3 GF 30 FRT (6665). Applications: arm rests or small to mid-sized non-listed components.
- AKROMID® C28 GF 25 FRT (7332) fulfills the requirements of EN45545-2 R6 including cone-calorimeter (MARHE < 90 kW/m²) with 50 kW/m² radiation intensity. Therefore this material is suitable for seats and cable channels
- AKROLOY® PA K17 FR black (5762) meets the Federal Aviation Regulation FAR 25.863 for interior parts. It offers a low smoke density, toxicity and flammability.



Hydrolysis Resistant

Compounds for Cooling Water Application

- New DPPD free compounds for different automotive standards. DPPD was formerly used for hydrolysis stabilisation and it is expected to be re-classified
- A3 GF 30 4 L black (4678) is approved according to TL 52682 (G13, 135 °C 1000 h) and GM 2055 (G48, 130 °C, 1000 h) and suitable for WIT process
- B3 GF 30 4 L (7481) is approved according to TL 52682 (135 °C, 1000 h)
- PK-VM GF 30 natural (4706) passes the Audi hydrolysis test (110 °C, 1500 h) and can be used for electric vehicles.
- A3 GF 30 4 6 black (13690) is approved according to TL 52682 (G13, 135 °C, 1000 h) and GM 2055 (G48, 130 °C, 1000 h)
- A3 GF 35 5 black (3571) is approved according to BMW (G48, 120 °C, 1000 h)
- A3 GM 20/10 4 WIT black (4529) is approved according to TL 52682 (G12EVO, 135 °C, 1000 h). Suitable for WIT process





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