Transmission

The automotive transmission segment requires material solutions which offer both stiffness and fatigue resistance to answer the needs of applications such as :

- Pedal and pedal assemblies
- Gear lever housing and cables
- Clutch master cylinder...

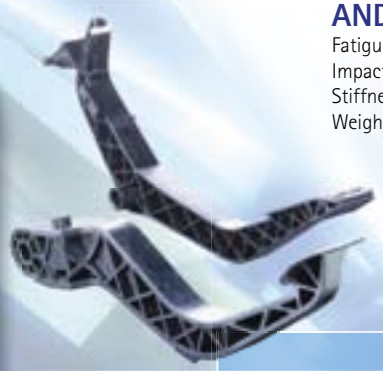
High mechanical properties and stability

Specific TECHNYL® PA 6.6 and PA 6 glass fibre reinforced grades have proved to be an excellent material selection for pedals. More recently, new concepts for applications such as electric throttle controlled pedals and adjustable pedal boxes have demonstrated further innovation, taking advantage of Rhodia Engineering Plastics competencies and skills in the areas of both design and material technology.

Rhodia Engineering plastics is a recognised supplier in developing clutch master cylinder solutions, providing material solutions which are characterised by tight dimensional tolerances, combined with creep and fatigue resistance.

Processing advantages

Further innovation has been achieved for applications like gear lever housings, thanks to TECHNYL STAR™ polyamide's superior flowability, and its performance and processing advantages.



PEDALS AND PEDAL BOX

Fatigue behaviour
Impact behaviour
Stiffness
Weight saving

PROPERTIES		STANDARDS	UNIT	UNREINFORCED TECHNYL® A 217 Natural
Density		ISO 1183-A	g/cm³	1.14
Water absorption (24h at 23°C)		ISO 62	%	1.3
Melting point (DSC)		ISO 11357	°C	263
Coefficient of linear thermal expansion parallel (23°C to 85°C)		ISO 11359	E-5/°C	7
Heat deflection temperature under load 1,8 MPa		ISO 75/Af	°C	75
Mould shrinkage	Direction //	RHODIA-EP	%	1.9
	Direction T	RHODIA-EP	%	1.9
TENSILE	Strength at break	ISO 527 type 1 A	MPa	55 / 70
	Strain at break	ISO 527 type 1 A	%	35 / 300
	Tensile Modulus	ISO 527 type 1 A	MPa	3000 / 1500
FLEXURAL	Strength at break	ISO 178	MPa	120 / 50
	Flexural Modulus	ISO 178	MPa	2900 / 1450
IMPACT	Izod notched	ISO 180/1A	kJ/m²	4 / 12
	Charpy notched	ISO 179/1eA	kJ/m²	4.5 / 14
	Charpy unnotched	ISO 179/1eU	kJ/m²	NB / NB

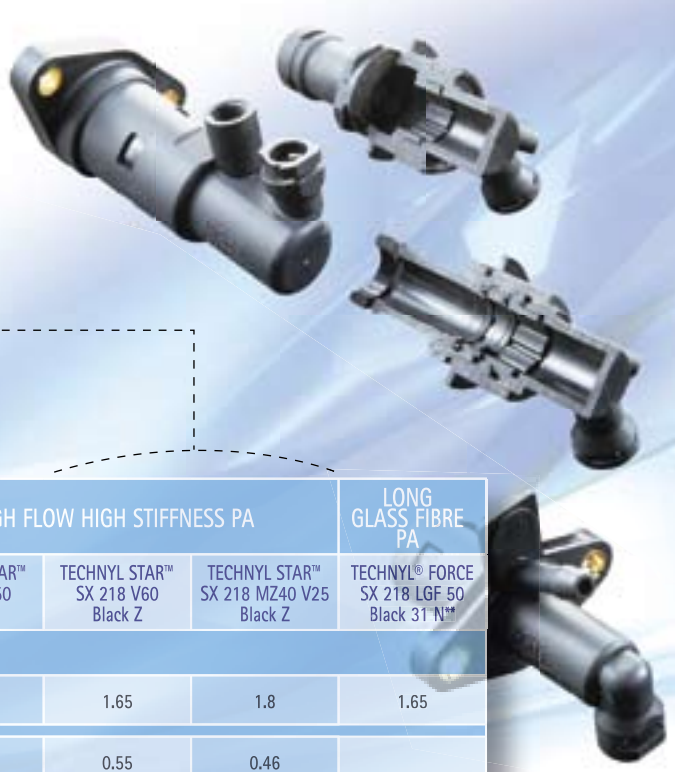
*d.a.m = dry as moulded / cond. = conditioned according ISO 1110

BRAKE FLUID RESERVOIR

Stiffness
Thermal resistance
Chemical resistance
Weldability

CLUTCH MASTER CYLINDER

Stiffness
Strength
Dimensional stability
Low creep
Excellent surface finish (low friction)
Temperature and chemical resistance (hydraulic liquids)
Fatigue resistance
Weldability



GLASS FIBRE REINFORCED PA66			GLASS FIBRE REINFORCED PA6	HIGH FLOW PA	HIGH FLOW HIGH STIFFNESS PA			LONG GLASS FIBRE PA
TECHNYL® A 218 V30 Black 21NS	TECHNYL® A 218 V35 Black 21N	TECHNYL® A 218 V50 Black 21N	TECHNYL® C 216 V40 Black Z	TECHNYL STAR™ S 218 V35 Black 31 N	TECHNYL STAR™ SX 218 V50 Black Z	TECHNYL STAR™ SX 218 V60 Black Z	TECHNYL STAR™ SX 218 MZ40 V25 Black Z	TECHNYL® FORCE SX 218 LGF 50 Black 31 N**
PHYSICAL								
1.37	1.41	1.57	1.45	1.41	1.55	1.65	1.8	1.65
	0.75	0.6	0.9	0.9	0.72	0.55	0.46	
263	263	263	222	222	222	222	222	222
2.5	2.2	1.5	2.6					
255	255	255	214	210	210	215	200	215
0,5	0.45	0.3		0.3			0.3	0.29
0,8	0.75	0.5		0.6			0.7	0.35
MECHANICAL								
190 / 135	210 / 150	240 / 175	215 / 140	195 / 115	230 / 165	240 / 165	180 / 110	250 / 170
3 / 4	3 / 4	2 / 2.5	2.3 / 3.5	3 / 4.5	2.6 / 4	2.5 / 4	2 / 2	2
10000 / 7500	11400 / 8700	16200 / 12500	13100 / 7300	11700 / 7400	17000 / 11600	21000 / 15500	20000 / 13000	18000 / 12200
260 / 175	286 / 195	345 / 250	350 / 210	295 / 195	320 / 255	385 / 260	250 / 160	
8400 / 5900	9500 / 6800	13500 / 10000	13000 / 7200	10000 / 6200	15500 / 10000	19000 / 13200	15600 / 8800	15500 / 10900
11 / 16	13 / 18	15 / 18	16 / 29	13 / 16	15 / 22	15 / 22	5.7 / 10	
12 / 16	13.5 / 18.5	16 / 18	18 / 34	13 / 19	15 / 20	15 / 20		38 / 38
80 / 95	95 / 100	95 / 100	107 / 115	72 / 80	85 / 95	85 / 95		

**exists also in 30, 40, 60 %, Long Glass Fibre reinforced

HANDBRAKE LEVER

High stiffness
Creep resistance
Weight saving

GEAR LEVER HOUSING

Thermal resistance
Stiffness
Creep resistance
Acoustic properties

Exterior

Excellent weatherability, good paintability and excellent surface finish are key requirements for exterior applications.

Breakthrough for on-line painted body panel

The new high performance TECHNYL® A 238C M20 for fenders or A 238C M25 for fuel filler flap represent the latest breakthrough for this segment. Conductivity and high heat resistance combined with excellent surface quality and impact resistance allows the production of on-line painted body parts, at E-coat temperatures up to 210°C.

Stiffness and high surface finish

TECHNYL STAR™ polyamide is particularly well-suited for door handle and lock applications, thanks to its excellent surface finish and easy paintability, even in very highly reinforced grades. Moreover, TECHNYL STAR™ polyamide is so versatile to be processed using injection moulding, or gas or water injection technologies.

Outdoor mirror frames and supports require high stiffness combined with good surface. TECHNYL® polyamide grades as B 218L V30 Black 44N, providing outstanding weathering resistance and adapted rheological behaviour for achieving good aspect, fit well the need of the application.

WHEEL COVER

Impact resistance
Thermal resistance
Dimensional stability
Paintability

DOOR HANDLE

UV resistance
Surface finish
Stiffness
Strength
Paintability
Electro-platability

PROPERTIES		STANDARDS	UNIT	UNREINFORCED PA 6.6 TECHNYL® A 217 Black 1N
Density		ISO 1183-A	g/cm³	1.14
Water absorption (24h at 23°C)		ISO 62	%	1.3
Melting temperature		ISO 11357	°C	263
Coefficient of linear thermal expansion parallel (23°C to 85°) C		ISO 11359	E-5/°C	7
Heat deflection temperature under load 1,8 MPa		ISO 75/Af	°C	75
Mould shrinkage	Direction //	RHODIA-EP	%	1.9
	Direction T	RHODIA-EP	%	1.9
TENSILE	Strength at break	ISO 527 type 1 A	MPa	55 / 70
	Strain at break	ISO 527 type 1 A	%	35 / 300
	Tensile Modulus	ISO 527 type 1 A	MPa	3000 / 1500
FLEXURAL	Strength at break	ISO 178	MPa	120 / 50
	Flexural Modulus	ISO 180	MPa	2900 / 1450
IMPACT	Izod notched	ISO 180/1A	kJ/m²	4 / 12
	Charpy notched	ISO 179/1eA	kJ/m²	4.5 / 14
	Charpy unnotched	ISO 179/1eU	kJ/m²	NB / NB

*d.a.m = dry as moulded / cond. = conditioned according ISO 1110

HEADLIGHT BEZEL

Surface aspect
Thermal stability
Dimensional stability
Metallization adhesion
Low fogging

FENDER

High heat and impact resistance
Conductivity
Dimensional stability
High surface finish
Weight saving
Design freedom
Resistance to small dents
On-line paintability

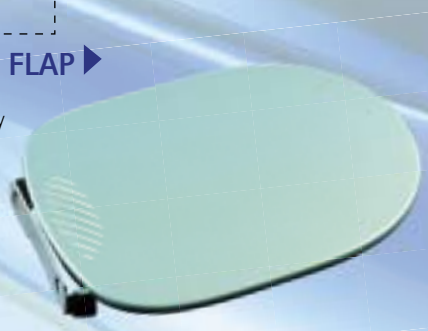
GLASS FIBRE REINFORCED PA 6/6.6	GLASS FIBRE REINFORCED PA 6	HIGH FLOW PA				HIGH FLOW HIGH STIFFNESS PA	ON-LINE PAINTABLE PA 6.6		
TECHNYL® B 218L V30 Black 44N	TECHNYL® C 218 V30 Black 21N	TECHNYL STAR™ S 218 V30 Black 31N	TECHNYL STAR™ S 218 V35 Black 31N	TECHNYL STAR™ S 218L1 V30 Black 1N	TECHNYL STAR™ S 218 MT40 Black 23N	TECHNYL STAR™ SX 218L1 V50 Black 1N	TECHNYL® A 218C M25 Black 5N	TECHNYL® A 238C M20 Black	TECHNYL® A 238C M25 Black 5N
PHYSICAL									
1.37	1.35	1.34	1.41	1.34	1.45	1.55	1.38	1.21	1.23
0.95	0.95	0.95	0.9	0.95	0.72	0.72		0.61	0.59
242	222	222	222	222	222	222	260	260	260
2.6	3.2	3.2							
230	205	205	210	205	90	210		185	207
0.5	0.35	0.35	0.3	0.3	1		0.64	1.70	
0.7	0.65	0.65	0.6	0.6	1.1		0.65	1.80	
MECHANICAL									
185 / 115	190 / 110	180 / 110	195 / 115	180 / 110	86 / 50	230 / 162	71 / -	55 / -	60 / 50
3 / 8	4 / 5	3 / 5	3 / 4.5	3.2 / 5	7 / 25	2. 6 / 4	2 / -	16 / -	12 / 30
		10500 / 6200	11700 / 7400	10500 / 6200		17000 / 11600	6800 / -	2800 / -	3300 / 2400
		260 / 170	295 / 195	260 / 170	150 / 65	320 / 255			
8300 / 4700	8400 / 4900	9500 / 5200	10000 / 6200	9500 / 5200	5500 / 1850	15500 / 10000		2720 / -	3200 / 2350
11 / 19	14 / 24	12 / 14	13 / 16	10 / 12	5 / 7	15 / 22			
11 / 16	15 / 31.5	11 / 13	13 / 19	10 / 12	5 / 6.5	15 / 20	3.5 / -	14 / -	11 / 16
80 / 92	100 / 108	55 / 72	72 / 80	50 / 65	45 / 220	85 / 95	38 / -	170 / -	80 / -

EXTERNAL MIRROR HOUSING

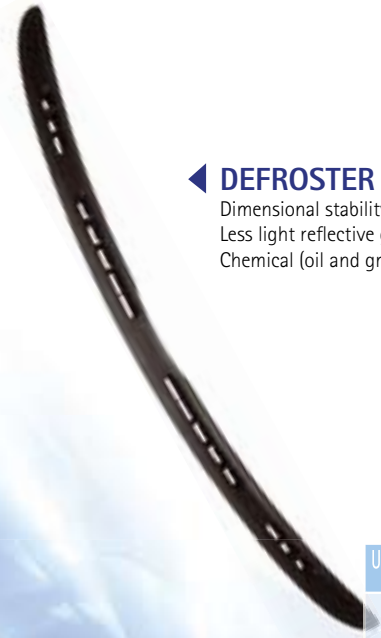
UV resistance
Stiffness
Vibration damping
Fatigue resistance

FUEL FILLER FLAP

Stiffness
Dimensional stability
High surface finish
Paintability



Interior



DEFROSTER GRILL

Dimensional stability
Less light reflective gloss
Chemical (oil and greases) resistance

Aesthetics, mechanical performances and UV resistance are the main requirements for auto interiors. TECHNYL®, TECHNYL STAR™ and new TECHNYL® ALLOY fit many applications in this segment:

- Door and seat components
- Dashboard and equipment (centre fascias, air vent grilles)
- Ashtrays
- Switches

Sensorial comfort and perceived quality

Available in several colours, TECHNYL® polyamide grades dedicated to interior applications have been designed to support both existing specifications and new, emerging requirements in the area of comfort (e.g. odour, scratch resistance, UV resistance, squeak noise reduction)

Rhodia has introduced a new, innovative family of materials, TECHNYL® ALLOY, a PA/ABS alloy specifically designed to mould large components like instrumental panels or central fascias, delivering significant values, in areas such as:

- Weight saving
- Direct moulded-in colour
- Wide processability window
- Stress cracking resistance
- High heat resistance up to 200° C

PROPERTIES		STANDARDS	UNIT	UNREINFORCED PA 6.6 TECHNYL® A 221 Black 51N	REINFORCED PA 6.6 TECHNYL® A 218 V30 Black 21 NS	COLOURE TECHNYL® B 216 Col. or Black
Density		ISO 1183-A	g/cm³	1.14	1.37	1.14
Water absorption (24h at 23°C)		ISO 62	%	1.1		1.6
Melting Temperature		ISO 11357	°C	263	263	242
Coefficient of linear thermal expansion parallel (23°C to 85°C)		ISO 11359	E-5/°C	6.5	2.5	7
Heat deflection temperature under load 1,8 MPa		ISO 75/Af	°C	80	255	67
Mould shrinkage	Direction //	RHODIA-EP	%	1.2	0.50	1.4
	Direction T	RHODIA-EP	%	1.2	0.80	1.4
TENSILE	Strength at break	ISO 527 type 1 A	MPa	75 / 50	190 / 135	75 / 60
	Strain at break	ISO 527 type 1 A	%	20 / 170	3 / 4	30 / 300
	Tensile Modulus	ISO 527 type 1 A	MPa	3200 / 2000	10000 / 7500	3000 / 1100
FLEXURAL	Strength at break	ISO 178	MPa	125 / 55	260 / 175	125 / 50
	Flexural Modulus	ISO 179	MPa	3100 / 1400	8400	3000 / 1200
IMPACT	Izod notched	ISO 180/1A	kJ/m²	4 / 12	11 / 16	5 / 16
	Charpy notched	ISO 179/1eA	kJ/m²	4 / 12	12 / 16	5 / 16
	Charpy unnotched	ISO 179/1eU	kJ/m²	NB / NB	80 / 95	NB / NB

*d.a.m = dry as moulded / cond. = conditioned according ISO 1110

AIR VENT GRILLE

Dimensional stability
Strength and Stiffness
Surface quality
Fluidity (to fill little details)

DOOR HANDLE

UV resistance
Surface finish
Stiffness
Strength
Paintability
Electro-platability
Colourability

D PA 6.6/6	HIGH FLOW COLOURED UV PROTECTED PA	HIGH FLOW PA		HIGH FLOW HIGH STIFFNESS PA		UNREINFORCED PA ABS ALLOY	IMPACT MODIFIED PA / ABS ALLOY		REINFORCED PA / ABS ALLOY		
TECHNYL® B 216 V30 Col. or Black	TECHNYL STAR™ S 216L1 V30 Col. or black	TECHNYL STAR™ S 218 V30 Black 31 N	TECHNYL STAR™ S 218 MT 40 Black 23 N	TECHNYL STAR™ SX 218 V50 Black Z	TECHNYL STAR™ SX 218 V60 Black Z	TECHNYL® ALLOY KC 226 Col. or black	TECHNYL® ALLOY KC 246 Col. or black	TECHNYL® ALLOY KC 256 Col. or black	TECHNYL® ALLOY KC 216 V10 Col. or black	TECHNYL® ALLOY KC 216 V12 Col. or black	TECHNYL® ALLOY KC 216 V15 Col. or black
PHYSICAL											
1.37	1.34	1.34	1.45	1.55	1.65	1.12	1.08	1.07	1.17	1.18	1.22
0.95	0.95	0.95	0.72	0.72	0.55	0.9	0.9	0.9	1	1	0.9
242	222	222	222	222	222	220	220	220	220	220	220
3		3.2				6	6		3		
230	205	205	90	210	215	75	70	70	140	145	170
0.5	0.30	0.35	1.0			0.8	0.7	0.7	0.5		0.4
0.7	0.60	0.65	1.1			0.8	0.7	0.7	0.7		0.7
MECHANICAL											
185 / 115	180 / 110	180 / 110	86 / 50	230 / 162	240 / 165	65 / 42	43 / 39	40 / 35	95 / 50	96 / 55	110 / 65
3 / 8	3.2 / 5	3.2 / 5	7 / 5	2.6 / 4	2.5 / 4	20 / 200	60 / 200	80 / 250	4 / 11	3.3 / 8	4 / 8
9800 / 6500	10500 / 6200	10500 / 6200	6000 / 2400	17000 / 11600	21000 / 15500	3000 / 1400	2250 / 1200	2100 / 1100	4700 / 2700	4800 / 2800	5700 / 4000
235 / 140	260 / 170	260 / 170	150 / 65	320 / 255	385 / 260	100 / 55	80 / 45	75 / 40	155 / 75	160 / 80	170 / 100
8300 / 4700	9500 / 5200	9500 / 5200	5500 / 1850	15500 / 10000	19000 / 13200	2900 / 1350	2150 / 1100	2050 / 1000	4000 / 2500	4300 / 2700	5000 / 3200
11 / 19	10 / 12	12 / 14	5 / 7	18 / 22	15 / 22	6 / 20	55 / 90	65 / 110	9 / 18	8 / 16	10 / 18
11 / 16	10 / 12	11 / 13	5 / 6.5	15 / 20	15 / 20	6 / 16	60 / 105	70 / 120	8 / 16	7 / 15	9.5 / 16
80 / 92	50 / 65	55 / 72	45 / 220	85 / 95	85 / 95	NB / NB	NB / NB	NB / NB	52 / 92	50 / 90	55 / 82

CENTRE FASCIA

Impact resistance
Dimensional stability
Good surface aspect
Paintability
Chemical resistance

Fuel Systems

Today's regulations mandate materials that provide reduced fuel emission vehicles. These rules strongly affect both new and proposed fuel system solutions as well as material selection criteria.

Barrier properties

Thanks to polyamide's good "barrier effect" properties to different fuels, polyamide can offer innovative solutions for applications such as:

- Fuel filler ducts
- Fuel lines
- Fuel rails

Innovation

For fuel and vapour line applications, a patented TECHNYL® polyamide-based solution was developed by Rhodia Engineering Plastics to provide superior resistance to stress cracking when in contact with road salt solutions, outstanding mechanical properties at low temperature, combined with improved barrier properties to fuels.

Blow moulding solutions

Specific TECHNYL® grades are available for manufacturing the fuel filler duct using blow moulding technology, exhibiting reduced permeability and superior impact even at low temperature.

PROPERTIES		STANDARDS	UNIT
Density		ISO 1183-A	g/cm³
Water absorption (24h to 23°C)		ISO 62	%
Melting Temperature		ISO 11357	°C
Coefficient of linear thermal expansion parallel (23°C to 85°C)		ISO 11359	E-5/°C
Heat deflection temperature under load 1,8 MPa		ISO 75/Af	°C
Mould shrinkage	Direction //	RHODIA-EP	%
	Direction T	RHODIA-EP	%
TENSILE	Strength at break	ISO 527 type 1 A	MPa
	Strain at break	ISO 527 type 1 A	%
	Tensile Modulus	ISO 527 type 1 A	MPa
FLEXURAL	Strength at break	ISO 178	MPa
	Flexural Modulus	ISO 178	MPa
IMPACT	Izod notched	ISO 180/1A	kJ/m²
	Charpy notched	ISO 179/1eA	kJ/m²
	Charpy unnotched	ISO 179/1eU	kJ/m²

*d.a.m = dry as moulded / cond. = conditioned according ISO 1110

FUEL RAIL ▶
Stiffness
Thermal resistance
Dimensional stability
Chemical resistance (fuel)
Surface aspect

DIESEL FILTER

Stiffness
Thermal and chemical resistance
Dimensional stability
Weldability

GLASS FIBRE REINFORCED PA66			GLASS FIBRE REINFORCED LASER MARKABLE PA 6.6	UNREINFORCED TRANSLUCENT PA 6	PA 6 FOR EXTRUSION			PA6 FOR BLOW MOULDING
TECHNYL® A 218 V30 Black 21NS	TECHNYL® A 218 V35 Black 21N	TECHNYL® A 248 V33 Black 21N	TECHNYL® A 216T V33	TECHNYL® C 216A Natural	TECHNYL® C 442 Black	TECHNYL® C 502 XT	TECHNYL® C 507 XT	TECHNYL® C 548B Black
PHYSICAL								
1.37	1.41	1.39	1.4	1.13	1.07	1.13	1.13	1.05
	0.75	1.25		1.3	1.15	1.37		1.2
263	263	263	263	222	222	222	222	222
2.5	2.2	2.5	2.3	7	7			7
255	255	248	255	70	50		55	55
0.5	0.45	0.5	0.45	0.6				1.2
0.8	0.75	0.7	0.75	0.8				1.25
MECHANICAL								
190 / 135	210 / 150	130 / 100	200 / 145	80 / 40	35 / 30		50	55 / 45
3 / 4	3 / 4	4 / 8	3 / 4	120 / 280	220 / 270	160 / 300	30	150 / 220
10000 / 7500	11400 / 8700	8500 / 6000	11000 / 8300	2700 / 1000	900 / 400	2800 / 900	2780	1850 / 1000
260 / 175	286 / 195	235 / 130	280 / 190	110 / 40	40 / 20			70 / 45
8400 / 5900	9500 / 6800	7800 / 5500	9200 /6400	2600 / 900	850 / 380			1750 / 850
11 / 16	13 / 18	15 / 18	12 / 17	4.8 / 85	85 / NB	7 / NB		90 / NB
12 / 16	13.5 / 18.5	14 / 22	13 / 17	4.2 / 70	NB / NB		5.8	92 / NB
80 / 95	95 / 100	80 / 90	90 / 98	NB / NB	NB / NB	NB / NB	NB	NB / NB

FUEL FILLER TUBE

Low fuel permeability
High impact resistance
Dimensional stability
Chemical resistance (fuel)
Weldability

Electrical and El

CONNECTIVITY SYSTEMS

Pin retention strength
Connection and pull-force
Impact resistance
Low viscosity for part miniaturization
Very high mechanical properties
Dimensional stability
Colourability
Heat resistance
Flowability and cycle time

A large number of automotive electrical components are used in cars in application areas such as :

- Peripheral devices
- Switches
- Sensors
- Activators on board computers

TECHNYL® polyamide grades are widely used in manufacturing components such as coils, connectors, relays, steering switches, ignition system, and electronic central unit.

Best balance between mechanical properties and flammability performance

Polyamide is particularly well suited to this broad spectrum of applications, as it supports complex formulations bringing the desired strength, colour and moulding behaviour to a particular application.

Laser marking

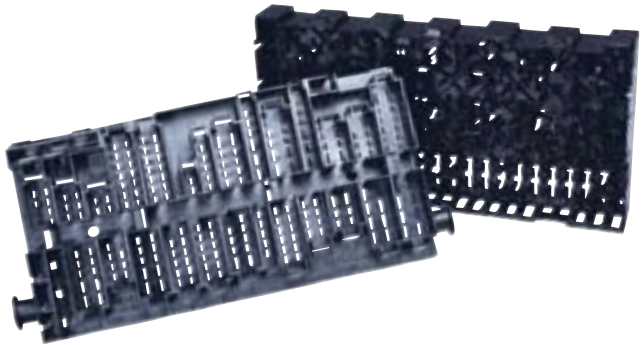
Specific grades such as TECHNYL® A 216T V33 are available for parts requesting laser marking as in example the engine injectors.

Overmoulding

Thanks to their high flowability, TECHNYL® grades are suitable for overmoulding bobbins without damaging the coil wiring.

PROPERTIES		STANDARDS	UNIT	UNREINFORCED PA	
				TECHNYL® A 205F	TECHNYL® A 217
Density		ISO 1183-A	g/cm³	1.14	1.14
Water absorption (24h at 23°C)		ISO 62	%	1.2	1.3
Melting Temperature		ISO 11357	°C	263	263
Coefficient of linear thermal expansion parallel (23°C to 85°C)		ISO 11359	E-5/°C	7	7
Heat deflection temperature under load 1,8 MPa		ISO 75/Af	°C	75	75
Mould shrinkage	Direction //	RHODIA-EP	%	1.9	1.9
	Direction T	RHODIA-EP	%	1.9	1.9
TENSILE	Strength at break	ISO 527 type 1 A	MPa	60 / 40	55 / 70
	Strain at break	ISO 527 type 1 A	%	25 / 200	35 / 300
	Tensile Modulus	ISO 527 type 1 A	MPa	3200 / 1600	3000 / 1500
FLEXURAL	Strength at break	ISO 178	MPa	120 / 50	120 / 50
	Flexural Modulus	ISO 178	MPa	2900 / 1300	2900 / 1450
IMPACT	Izod notched	ISO 180 /1A	kJ/m²	4.5 / 6	4 / 12
	Charpy notched	ISO 179/1eA	kJ/m²	4.5 / 8	4.5 / 14
	Charpy unnotched	ISO 179/1uA	kJ/m²	NB / NB	NB / NB

*d.a.m = dry as moulded / cond. = conditioned according ISO 1110



ectronics

CLIPS

Fast moulding
Mechanical properties
Suitable for requested fastening operation even at low temperature
Thermal resistance
Chemical resistance

6.6	IMPACT MODIFIED	GLASS FIBRE REINFORCED PA 6.6	GLASS FIBRE REINFORCED LASER MARKABLE PA 6.6	FLAME RETARDANT PA				HIGH FLOW HIGH STIFFNESS PA	UNREINFORCED PA ABS ALLOY	IMPACT MODIFIED PA / ABS ALLOY
TECHNYL® A 225F	TECHNYL® A 246M	TECHNYL® A 218 V30	TECHNYL® A 216T V33	TECHNYL® B 50H1	TECHNYL® A 30H1 V25	TECHNYL® A 20H1 V25	TECHNYL STAR™ S 60G1 V30	TECHNYL STAR™ SX 218L1 V50	TECHNYL® ALLOY KC 226 Col. or black	TECHNYL® ALLOY KC 246 Col. or black
1.14	1.08	1.37	1.4	1.16	1.54	1.38	1.43	1.55	1.12	1.08
1.1	1.05			1.1		1	0.9	0.72	0.9	0.9
263	263	263	263	242	263	263	222	222	220	220
6.5	6.5	2.5	2.3	6.5					6	6
80	65	255	255	85	220	250	205	210	75	70
1.5	1.9	0.5	0.45	1.1		0.9	0.4		0.8	0.7
1.8	1.9	0.8	0.75	1		0.55	0.7		0.8	0.7
MECHANICAL										
70 / 50	44 / 35	190 / 135	200 / 145	80 / 45	95 / -	135 / 100	147 / 97	230 / 162	65 / 42	43 / 39
20 / 100	65 / 210	3 / 4	3 / 4	10 / -	2.5 / -	2 / 3.5	- / -	2.6 / 4	20 / 200	60 / 200
3200 / 2000	1900 / 600	10000 / 7500	11000 / 8300	3600 / 2200	8800 / -	9000 / 6000	11700 / 7000	17000 / 11600	3000 / 1400	2250 / 1200
125 / 55	70 / 27	260 / 175	280 / 190	105 / 70			240 / 170	320 / 255	100 / 55	80 / 45
3150 / 1400	1800 / 700	8400 / 5900	9200 /6400	3200 / 2000		8000 / 5000	10700 / 6900	15500 / 10000	2900 / 1350	2150 / 1100
5 / 12	60 / 80	11 / 16	12 / 17	3 / 10	10 / -	6 / 8	9 / 12	15 / 22	6 / 20	55 / 90
4 / 4 ,5	55 / 100	12 / 16	13 / 17	4.5 / 12		6 / 8	10 / 13	15 / 20	6 / 16	60 / 105
NB / NB	NB / NB	80 / 95	90 / 98	90 / NB	45 / 47	40 / 45	67 / -	85 / 95	NB / NB	NB / NB

CONTROL SWITCH GEAR

Surface aspect
Low squeak noise
Colourability
Stiffness

Technical and De

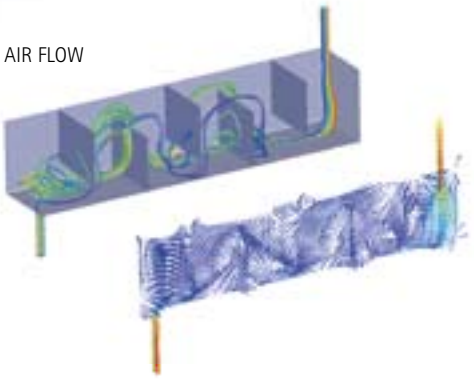
Our concept of partnership is based on delivering leading technical service/support process to our customers. We provide expertise in both materials and technologies to bring solutions that respond to our customers' demands for innovation and cost effectiveness.

Throughout the world Rhodia technical centres are equipped to provide complete service solutions, as opposed to just products. The engineers in our labs and technical centres are available to support customers at each stage of the application development cycle.

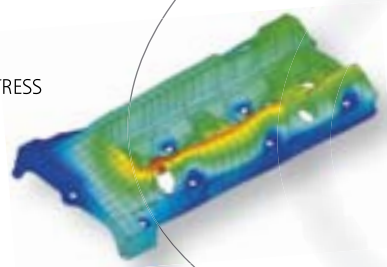
Our Technical Service Engineers are available to assist our customers in finding technical solutions that meet their requirements. Specific support is offered on:

- Materials selection
- Materials testing
- Parts design advice, training for design engineers
- Processing through different technologies
- Assembling and post-processing technologies

AIR FLOW



STRESS

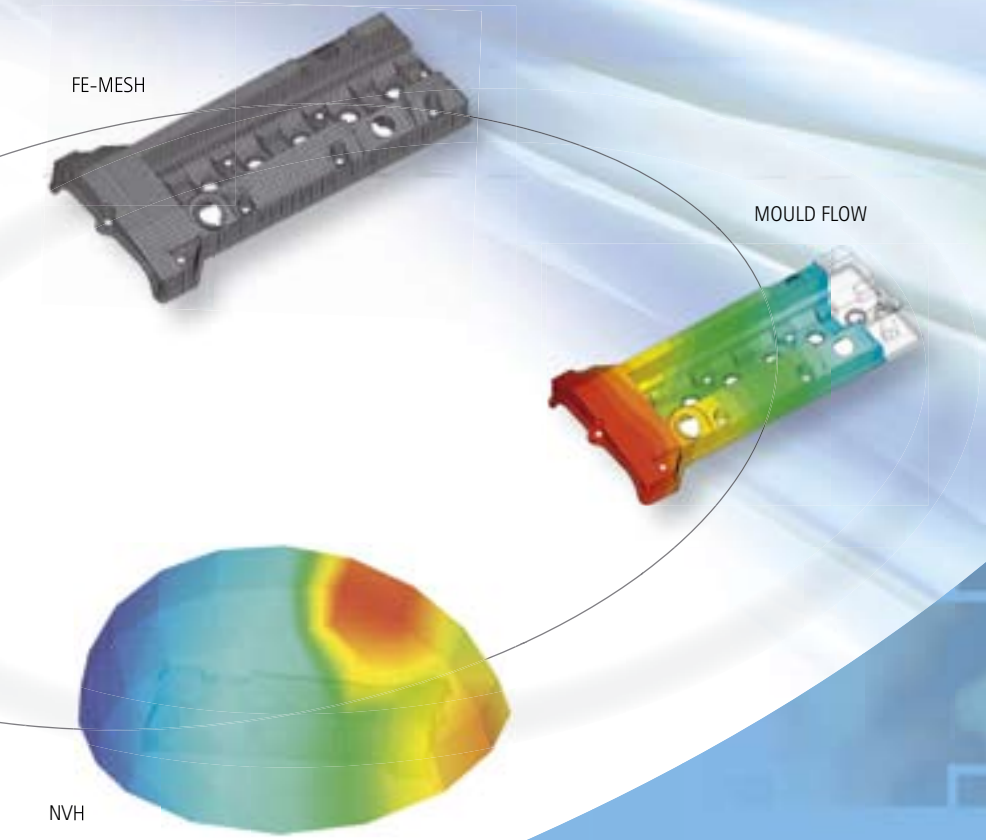


sign Support

Rhodia Technical Centres worldwide supply series of Advanced Technical Support services and are available to support our customers on their key development projects:

- Specific material behaviour data for CAE studies
- Improved mechanical performance prediction, mainly for glass fibre reinforced products, thanks to a "multi-scale" material description. This simulation allows to improve the prediction of the mechanical behaviour of parts taking into consideration the fibre orientation.
- Part mechanical performance optimization
- Static and dynamic cases
- Impact simulation
- Optimized design for injection tools (mould lay-out)
- Acoustics prediction, noise emission optimization
- Parts testing: according to the main automotive standards for different components (burst pressure static/dynamic/pulsating, vibration testing, acoustic tests, noise measurements, ageing and endurance tests, etc.)
- New design concepts elaboration and testing

Our Technological Centres are also equipped with moulding machines, extrusion lines, and blow moulding machines to assist in process optimisation for our customers.



Rhodia bringing through technol

Rhodia Polyamide working in partnership with Tier1 and OEMs is continuously developing innovative solutions with a strong focus on new technologies to open and to support new market opportunities.
The strategy of this innovation path is to design materials optimised for new technologies, ensuring customers have optimum competitive solutions.

Rhoda Polyamide's latest innovation development is the Technyl® XCell product range. These grades are designed for micro-cellular injection moulding "MuCell® process" providing a market first, offering part weight saving without compromise in surface aesthetics. An achievement thanks to the partnership with the company Trexel (the Mucell® technology owner).
The particular differentiating strengths of Rhodia Polyamide are:

- In-depth customers process knowledge
- Upstream integration in Polyamide, allowing innovation from monomers to final compounds
- Complete service to customers ranging from part design to tool development and process support.

Rhodia Polyamide offers products and solutions for main customer's technologies:

- Injection moulding
- Blow-moulding
- Extrusion
- Water-assisted injection technology
- Gas-assisted injection technology
- MuCell® microcellular moulding
- Assembling, including laser welding

Injection moulding

Specialist in Polyamide, Rhodia provides the largest range of grades for injection moulding. This includes standard materials, grades designed for high or specific performances, such as high flow products designed to offer a high level of process productivity.

TECHNYL® PA 66 range
TECHNYL® PA 6 range
TECHNYL® STAR™, high flow PA 6 range
TECHNYL® ALLOY, PA/ABS range
TECHNYL® FORCE, Long Glass Fibre range
TECHNYL® XCELL
TECHNYL® SI, unequalled impact/stiffness balance range.

Blow-moulding

Rhodia Polyamide assumes a strong know-how in the blow-moulding field

- Process expertise, including the 3D technologies
- Long experience in PA6 for turbo air duct and fuel filler pipe applications

TECHNYL® C 548B, C 548B V15
TECHNYL® A 548B V15, A 548B V20

Extrusion

Rhodia Polyamide offers a wide range of products for extrusion, providing excellent processability with flexibility. These grades are ideal for the convoluted pipe "fuel system applications" and for transmission cable gasketing.

TECHNYL® C442 blk
TECHNYL® XT C 507

innovations

Water Injection Technology (WIT)

Rhodia Polyamide has developed a specific range of grades for WIT process. The primary benefits of these grades are to offer high quality inner surface with a constant wall thickness and process productivity. In this technology, Rhodia Polyamide has acquired a unique know-how and can provide an efficient support to customers through:

- Portable WIT device and mould
- Injector design
- Computer simulation

TECHNYL® A 338 Wit 1 V30
TECHNYL® A 338 Wit 2 V30

Gas Injection Technology (GIT)

Rhodia Polyamide Technyl PA6 and PA66 specific grades offer the best processability and surface aspect for hollow parts such as door handles and cooling pipes. Rhodia has built a strong known-how through:

- Partnership with main GIT pipe suppliers
- In house testing on customers moulds
- Part design and process optimization

TECHNYL® C216V30 blk Z
TECHNYL® A218ZV30 blk 34N

MuCell® Micro-cellular Technology

Rhodia Polyamide proposes Technyl® XCell, the first PA66 and PA6 product range especially designed for the MuCell® process. These grades in combination with the MuCell® technology offers:

- Parts weight reduction thanks to microcellular foaming,
- Outstanding mechanical properties,
- No compromise in surface finish,
- Warpage improvement,
- Cycle time reduction.

This innovative range opens new solutions in applications such as under-the-hood components .

TECHNYL® XCELL range

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Rhodia
Polyamide

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