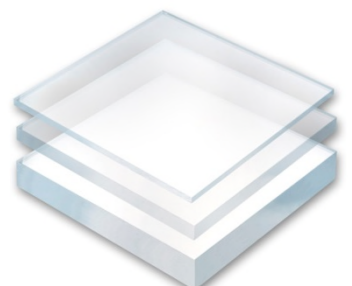
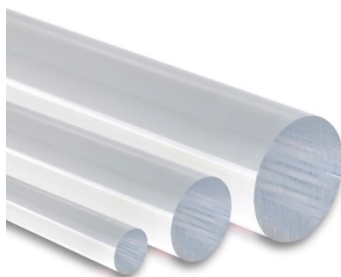
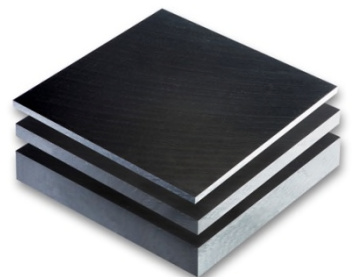
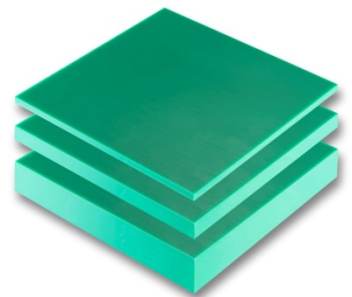


## Semi-finished plastic products





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## Material data sheet

### PA 6 ivory

Chemical Designation: Polyamide 6  
DIN-abbreviation: PA 6  
Colour / Fillers: ivory opaque  
Density: 1,14 g/cm<sup>3</sup>

Data generated directly after machining  
(standard climate Germany).

#### Main features

- high toughness
- electrically insulating
- high strength
- good machinability
- resistant to many oils, greases and fuels
- good wear properties
- good weldable and bondable
- good slide and wear properties

#### Target Industries

- mechanical engineering
- aircraft and aerospace technology
- electronics
- food technology
- automotive industry

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                              |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 3300     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen. n. b. = not broken<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 79       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Tensile strength at yield             | 50 mm / min                      | 78       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Elongation at yield                   | 50 mm / min                      | 4        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Elongation at break                   | 50 mm / min                      | 130      | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Flexural strength                     | 2 mm / min, 10 N                 | 100      | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                                      |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 2900     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                                      |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 24/41/86 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                                      |
| Compression modulus                   | 5 mm / min, 10 N                 | 2700     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                                      |
| Impact strength (Charpy)              | max. 7,5 J                       | n. b.    | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                                      |
| Notched impact strength (Charpy)      | max. 7,5 J                       | 7        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eA    |                                                                                                                                                                                                                                                                                                                      |
| Ball indentation hardness             |                                  | 155      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                                      |





## Material data sheet

### PA 6 ivory

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | 45    | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 221   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 160   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 100   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 12    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 13    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.6   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.37  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties        | parameter                                    | value            | unit  | norm             | comment                                                         |
|------------------------------|----------------------------------------------|------------------|-------|------------------|-----------------------------------------------------------------|
| surface resistivity          | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω     | DIN IEC 60093 1) | 1) Specimen in 20 mm thickness<br>2) Specimen in 1 mm thickness |
| volume resistivity           | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω*cm  | DIN IEC 60093    |                                                                 |
| Dielectric strength          | 23 °C, 50% r.h.                              | 31               | kV/mm | ISO 60243-1 2)   |                                                                 |
| Resistance to tracking (CTI) | Platin electrode, 23 °C, 50% r.h., solvent A | 600              | V     | DIN EN 60112     |                                                                 |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                                          |
|-------------------------------|---------------------|-----------|------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.3 / 0.6 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) – poor resistance<br>4) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | (+)       |      | - 2)                   |                                                                                                                                                                                                                                                                                  |
| Resistance to weathering      |                     | -         |      | - 3)                   |                                                                                                                                                                                                                                                                                  |
| Flammability (UL94)           | corresponding to    | HB        |      | DIN IEC 60695-11-10 4) |                                                                                                                                                                                                                                                                                  |

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Date: 2018/02/20


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## Material data sheet

### PA 6 black

Chemical Designation: Polyamide 6  
DIN-abbreviation: PA 6  
Colour / Fillers: black opaque / molybdenum disulfide  
Density: 1,14 g/cm<sup>3</sup>

Data generated directly after machining  
(standard climate Germany).

#### Main features

- high toughness
- good wear properties
- high strength
- improved surface hardness
- resistant to many oils, greases and fuels
- good slide and wear properties

#### Target Industries

- mechanical engineering
- automotive industry

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                              |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 3300     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen. n. b. = not broken<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 84       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Tensile strength at yield             | 50 mm / min                      | 82       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Elongation at yield                   | 50 mm / min                      | 5        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Elongation at break                   | 50 mm / min                      | 37       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Flexural strength                     | 2 mm / min, 10 N                 | 110      | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                                      |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 3100     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                                      |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 17/32/79 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                                      |
| Compression modulus                   | 5 mm / min, 10 N                 | 2900     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                                      |
| Impact strength (Charpy)              | max. 7,5 J                       | n. b.    | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                                      |
| Notched impact strength (Charpy)      | max. 7,5 J                       | 5        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eA    |                                                                                                                                                                                                                                                                                                                      |
| Ball indentation hardness             |                                  | 160      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                                      |





## Material data sheet

### PA 6 black

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | 51    | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 220   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 160   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 100   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 8     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 8     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.6   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.37  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties        | parameter                                    | value            | unit  | norm             | comment                                                                                                                                                                                                                                               |
|------------------------------|----------------------------------------------|------------------|-------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| surface resistivity          | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω     | DIN IEC 60093 1) | 1) Specimen in 20 mm thickness<br>2) Due to the black colourant and moisture uptake of the material the electrical insulation properties cannot be 100% guaranteed, despite single measurements suggesting otherwise<br>3) Specimen in 1 mm thickness |
| volume resistivity           | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω*cm  | DIN IEC 60093 2) |                                                                                                                                                                                                                                                       |
| Dielectric strength          | 23 °C, 50% r.h.                              | 30               | kV/mm | ISO 60243-1 3)   |                                                                                                                                                                                                                                                       |
| Resistance to tracking (CTI) | Platin electrode, 23 °C, 50% r.h., solvent A | 600              | V     | DIN EN 60112     |                                                                                                                                                                                                                                                       |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                  |
|-------------------------------|---------------------|-----------|------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.3 / 0.6 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | (+)       |      | - 2)                   |                                                                                                                                                                                                                                                          |
| Resistance to weathering      |                     | (+)       |      |                        |                                                                                                                                                                                                                                                          |
| Flammability (UL94)           | corresponding to    | HB        |      | DIN IEC 60695-11-10 3) |                                                                                                                                                                                                                                                          |

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## Material data sheet

### PA 6 C ivory

Chemical Designation: Cast polyamide 6  
DIN-abbreviation: PA 6 C  
Colour / Fillers: ivory opaque  
Density: 1,15 g/cm<sup>3</sup>

Data generated directly after machining  
(standard climate Germany).

#### Main features

- high toughness
- electrically insulating
- high strength
- good dumping
- resistant to many oils, greases and fuels
- good wear properties
- good slide and wear properties

#### Target Industries

- mechanical engineering
- heavy duty industry
- oil and gas industry
- food technology
- automotive industry

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 3500     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen. n. b. = not broken<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 83       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Tensile strength at yield             | 50 mm / min                      | 80       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at yield                   | 50 mm / min                      | 4        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at break                   | 50 mm / min                      | 40       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Flexural strength                     | 2 mm / min, 10 N                 | 109      | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                                              |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 3200     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                                              |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 19/36/83 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                                              |
| Compression modulus                   | 5 mm / min, 10 N                 | 2900     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                                              |
| Impact strength (Charpy)              | max. 7,5 J                       | n. b.    | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                                              |
| Notched impact strength (Charpy)      | max. 7,5 J                       | 4        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eA    |                                                                                                                                                                                                                                                                                                                              |
| Ball indentation hardness             |                                  | 170      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                                              |





## Material data sheet

### PA 6 C ivory

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | 40    | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 215   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 170   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 100   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 12    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 12    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.7   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.38  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties | parameter | value            | unit | norm          | comment |
|-----------------------|-----------|------------------|------|---------------|---------|
| surface resistivity   |           | 10 <sup>14</sup> | Ω    | DIN IEC 60093 |         |
| volume resistivity    |           | 10 <sup>14</sup> | Ω*cm | DIN IEC 60093 |         |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                                          |
|-------------------------------|---------------------|-----------|------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.2 / 0.4 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) – poor resistance<br>4) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | (+)       |      | - 2)                   |                                                                                                                                                                                                                                                                                  |
| Resistance to weathering      |                     | -         |      | - 3)                   |                                                                                                                                                                                                                                                                                  |
| Flammability (UL94)           | corresponding to    | HB        |      | DIN IEC 60695-11-10 4) |                                                                                                                                                                                                                                                                                  |

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## Material data sheet

### PA 6 C black

Chemical Designation: Cast polyamide 6  
 DIN-abbreviation: PA 6 C  
 Colour / Fillers: black opaque / molybdenum disulfide  
 Density: 1,15 g/cm<sup>3</sup>

Data generated directly after machining  
(standard climate Germany).

#### Main features

- high toughness
- good wear properties
- high strength
- good damping
- resistant to many oils, greases and fuels
- good slide and wear properties

#### Target Industries

- mechanical engineering
- automotive industry
- heavy duty industry

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 3200     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen. n. b. = not broken<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 82       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Tensile strength at yield             | 50 mm / min                      | 80       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at yield                   | 50 mm / min                      | 4        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at break                   | 50 mm / min                      | 55       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Flexural strength                     | 2 mm / min, 10 N                 | 102      | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                                              |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 3000     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                                              |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 22/38/85 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                                              |
| Compression modulus                   | 5 mm / min, 10 N                 | 2800     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                                              |
| Impact strength (Charpy)              | max. 7,5 J                       | n. b.    | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                                              |
| Notched impact strength (Charpy)      | max. 7,5 J                       | 4        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eA    |                                                                                                                                                                                                                                                                                                                              |
| Ball indentation hardness             |                                  | 170      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                                              |



## Material data sheet

### PA 6 C black

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | 43    | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 217   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 170   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 100   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 11    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 11    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.6   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.33  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties | parameter                         | value            | unit | norm             | comment                                                                                                                                                                             |
|-----------------------|-----------------------------------|------------------|------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| surface resistivity   | Silver electrode, 23 °C, 12% r.h. | 10 <sup>14</sup> | Ω    | DIN IEC 60093    | 1) Due to the black colourant and moisture uptake of the material the electrical insulation properties cannot be 100% guaranteed, despite single measurements suggesting otherwise. |
| volume resistivity    | Silver electrode, 23 °C, 12% r.h. | 10 <sup>14</sup> | Ω*cm | DIN IEC 60093 1) |                                                                                                                                                                                     |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                  |
|-------------------------------|---------------------|-----------|------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.2 / 0.5 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | (+)       |      | - 2)                   |                                                                                                                                                                                                                                                          |
| Resistance to weathering      |                     | (+)       |      |                        |                                                                                                                                                                                                                                                          |
| Flammability (UL94)           | corresponding to    | HB        |      | DIN IEC 60695-11-10 3) |                                                                                                                                                                                                                                                          |

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Date: 2017/03/30

## Material data sheet

### PA 6 GF30 black

Chemical Designation: Polyamide 6  
DIN-abbreviation: PA 6  
Colour / Fillers: black opaque / glass fibres  
Density: 1,36 g/cm<sup>3</sup>

Data generated directly after machining  
(standard climate Germany).

#### Main features

- very high strength
- good wear properties
- high dimensional stability
- good machinability
- resistant to many oils, greases and fuels
- good weldable and bondable
- good heat deflection temperature

#### Target Industries

- mechanical engineering
- automotive industry
- electronics

#### Characteristics

| mechanical properties                 | parameter                        | value     | unit              | norm                  | comment                                                                                                                                                                                                                                                                                           |
|---------------------------------------|----------------------------------|-----------|-------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 5700      | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen.<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 98        | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                   |
| Tensile strength at yield             | 50 mm / min                      | 98        | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                   |
| Elongation at yield                   | 50 mm / min                      | 4         | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                   |
| Elongation at break                   | 50 mm / min                      | 5         | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                   |
| Flexural strength                     | 2 mm / min, 10 N                 | 140       | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                   |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 5200      | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                   |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 21/42/107 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                   |
| Compression modulus                   | 5 mm / min, 10 N                 | 4200      | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                   |
| Impact strength (Charpy)              | max. 7,5 J                       | 60        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                   |
| Ball indentation hardness             |                                  | 232       | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                   |



## Material data sheet

### PA 6 GF30 black

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | 49    | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 218   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 180   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 100   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 6     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 6     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.3   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.41  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties        | parameter                                    | value            | unit  | norm             | comment                                                                                                                                                                                                                                               |
|------------------------------|----------------------------------------------|------------------|-------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| surface resistivity          | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω     | DIN IEC 60093 1) | 1) Specimen in 20 mm thickness<br>2) Due to the black colourant and moisture uptake of the material the electrical insulation properties cannot be 100% guaranteed, despite single measurements suggesting otherwise<br>3) Specimen in 1 mm thickness |
| volume resistivity           | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω*cm  | DIN IEC 60093 2) |                                                                                                                                                                                                                                                       |
| Dielectric strength          | 23 °C, 50% r.h.                              | 32               | kV/mm | ISO 60243-1 3)   |                                                                                                                                                                                                                                                       |
| Resistance to tracking (CTI) | Platin electrode, 23 °C, 50% r.h., solvent A | 550/475          | V     | DIN EN 60112     |                                                                                                                                                                                                                                                       |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                  |
|-------------------------------|---------------------|-----------|------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.2 / 0.3 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | (+)       |      | - 2)                   |                                                                                                                                                                                                                                                          |
| Resistance to weathering      |                     | (+)       |      |                        |                                                                                                                                                                                                                                                          |
| Flammability (UL94)           | corresponding to    | HB        |      | DIN IEC 60695-11-10 3) |                                                                                                                                                                                                                                                          |

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Date: 2018/02/20


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## Material data sheet

### PA 66 ivory

Chemical Designation: Polyamide 66  
DIN-abbreviation: PA 66  
Colour / Fillers: ivory opaque  
Density: 1,15 g/cm<sup>3</sup>

Data generated directly after machining  
(standard climate Germany).

#### Main features

- high toughness
- electrically insulating
- high strength
- good weldable and bondable
- resistant to many oils, greases and fuels
- good wear properties
- good slide and wear properties

#### Target Industries

- mechanical engineering
- aircraft and aerospace technology
- electronics
- food technology
- automotive industry

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 3500     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen. n. b. = not broken<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 85       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Tensile strength at yield             | 50 mm / min                      | 84       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at yield                   | 50 mm / min                      | 7        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at break                   | 50 mm / min                      | 70       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Flexural strength                     | 2 mm / min, 10 N                 | 110      | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                                              |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 3100     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                                              |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 20/35/81 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                                              |
| Compression modulus                   | 5 mm / min, 10 N                 | 2700     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                                              |
| Impact strength (Charpy)              | max. 7,5 J                       | n. b.    | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                                              |
| Notched impact strength (Charpy)      | max. 7,5 J                       | 5        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eA    |                                                                                                                                                                                                                                                                                                                              |
| Ball indentation hardness             |                                  | 175      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                                              |





## Material data sheet

### PA 66 ivory

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | 47    | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 258   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 170   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 100   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 11    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 12    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.5   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.36  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties | parameter | value            | unit | norm          | comment |
|-----------------------|-----------|------------------|------|---------------|---------|
| surface resistivity   |           | 10 <sup>14</sup> | Ω    | DIN IEC 60093 |         |
| volume resistivity    |           | 10 <sup>14</sup> | Ω*cm | DIN IEC 60093 |         |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                                          |
|-------------------------------|---------------------|-----------|------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.2 / 0.4 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) – poor resistance<br>4) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | (+)       |      | - 2)                   |                                                                                                                                                                                                                                                                                  |
| Resistance to weathering      |                     | -         |      | - 3)                   |                                                                                                                                                                                                                                                                                  |
| Flammability (UL94)           | corresponding to    | HB        |      | DIN IEC 60695-11-10 4) |                                                                                                                                                                                                                                                                                  |

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## Material data sheet

### PA 66 black

Chemical Designation: Polyamide 66  
 DIN-abbreviation: PA 66  
 Colour / Fillers: black opaque / molybdenum disulfide  
 Density: 1,15 g/cm<sup>3</sup>

Data generated directly after machining  
(standard climate Germany).

#### Main features

- high toughness
- good wear properties
- high strength
- high stiffness
- resistant to many oils, greases and fuels
- good slide and wear properties
- good weldable and bondable

#### Target Industries

- mechanical engineering
- automotive industry
- aircraft an aerospace technology
- electronics

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 3200     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen. n. b. = not broken<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 84       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Tensile strength at yield             | 50 mm / min                      | 83       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at yield                   | 50 mm / min                      | 10       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at break                   | 50 mm / min                      | 40       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Flexural strength                     | 2 mm / min, 10 N                 | 114      | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                                              |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 3100     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                                              |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 20/38/86 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                                              |
| Compression modulus                   | 5 mm / min, 10 N                 | 2700     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                                              |
| Impact strength (Charpy)              | max. 7,5 J                       | n. b.    | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                                              |
| Notched impact strength (Charpy)      | max. 7,5 J                       | 5        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eA    |                                                                                                                                                                                                                                                                                                                              |
| Ball indentation hardness             |                                  | 168      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                                              |



## Material data sheet

### PA 66 black

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | 52    | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 253   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 170   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 100   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 10    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 10    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.5   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.36  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties        | parameter                                    | value            | unit  | norm             | comment                                                                                                                                                                                                                                               |
|------------------------------|----------------------------------------------|------------------|-------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| surface resistivity          | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω     | DIN IEC 60093 1) | 1) Specimen in 20 mm thickness<br>2) Due to the black colourant and moisture uptake of the material the electrical insulation properties cannot be 100% guaranteed, despite single measurements suggesting otherwise<br>3) Specimen in 1 mm thickness |
| volume resistivity           | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω*cm  | DIN IEC 60093 2) |                                                                                                                                                                                                                                                       |
| Dielectric strength          | 23 °C, 50% r.h.                              | 35               | kV/mm | ISO 60243-1 3)   |                                                                                                                                                                                                                                                       |
| Resistance to tracking (CTI) | Platin electrode, 23 °C, 50% r.h., solvent A | 600              | V     | DIN EN 60112     |                                                                                                                                                                                                                                                       |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                  |
|-------------------------------|---------------------|-----------|------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.2 / 0.4 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | (+)       |      | - 2)                   |                                                                                                                                                                                                                                                          |
| Resistance to weathering      |                     | (+)       |      |                        |                                                                                                                                                                                                                                                          |
| Flammability (UL94)           | corresponding to    | HB        |      | DIN IEC 60695-11-10 3) |                                                                                                                                                                                                                                                          |

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## Material data sheet

### PA 66 GF30 black

Chemical Designation: Polyamide 66  
DIN-abbreviation: PA 66  
Colour / Fillers: black opaque / glass fibres  
Density: 1,34 g/cm<sup>3</sup>

Data generated directly after machining  
(standard climate Germany).

#### Main features

- very high strength
- good wear properties
- high dimensional stability
- very high stiffness
- resistant to many oils, greases and fuels
- good weldable and bondable
- good heat deflection temperature

#### Target Industries

- mechanical engineering
- automotive industry
- aircraft and aerospace technology

#### Characteristics

| mechanical properties                 | parameter                        | value     | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                   |
|---------------------------------------|----------------------------------|-----------|-------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 5500      | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen.<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 91        | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Tensile strength at yield             | 50 mm / min                      | 91        | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Elongation at yield                   | 50 mm / min                      | 8         | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Elongation at break                   | 50 mm / min                      | 14        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Flexural strength                     | 2 mm / min, 10 N                 | 135       | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                           |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 4700      | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                           |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 25/46/104 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                           |
| Compression modulus                   | 5 mm / min, 10 N                 | 4100      | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                           |
| Impact strength (Charpy)              | max. 7,5 J                       | 97        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                           |
| Ball indentation hardness             |                                  | 216       | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                           |





## Material data sheet

### PA 66 GF30 black

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | 48    | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 254   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 180   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 110   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 5     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 5     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.2   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.39  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties        | parameter                                    | value            | unit  | norm             | comment                                                                                                                                                                                                                                               |
|------------------------------|----------------------------------------------|------------------|-------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| surface resistivity          | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω     | DIN IEC 60093 1) | 1) Specimen in 20 mm thickness<br>2) Due to the black colourant and moisture uptake of the material the electrical insulation properties cannot be 100% guaranteed, despite single measurements suggesting otherwise<br>3) Specimen in 1 mm thickness |
| volume resistivity           | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω*cm  | DIN IEC 60093 2) |                                                                                                                                                                                                                                                       |
| Dielectric strength          | 23 °C, 50% r.h.                              | 35               | kV/mm | ISO 60243-1 3)   |                                                                                                                                                                                                                                                       |
| Resistance to tracking (CTI) | Platin electrode, 23 °C, 50% r.h., solvent A | 550/475          | V     | DIN EN 60112     |                                                                                                                                                                                                                                                       |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                  |
|-------------------------------|---------------------|-----------|------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.1 / 0.2 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | (+)       |      | - 2)                   |                                                                                                                                                                                                                                                          |
| Resistance to weathering      |                     | (+)       |      |                        |                                                                                                                                                                                                                                                          |
| Flammability (UL94)           | corresponding to    | HB        |      | DIN IEC 60695-11-10 3) |                                                                                                                                                                                                                                                          |

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Date: 2018/02/20


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## Material data sheet

### PC transparent

Chemical Designation: Polycarbonate  
DIN-abbreviation: PC  
Colour / Fillers: white transparent  
Density: 1,19 g/cm<sup>3</sup>

#### Main features

- high toughness
- electrically insulating
- good machinability
- easy to polish
- good heat deflection temperature
- sensitive to stress cracking
- good weldable and bondable

#### Target Industries

- mechanical engineering
- electronics
- food technology
- automotive industry

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 2200     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen. n. b. = not broken<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 69       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Tensile strength at yield             | 50 mm / min                      | 69       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at yield                   | 50 mm / min                      | 6        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at break                   | 50 mm / min                      | 90       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Flexural strength                     | 2 mm / min, 10 N                 | 97       | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                                              |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 2300     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                                              |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 16/29/64 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                                              |
| Compression modulus                   | 5 mm / min, 10 N                 | 2000     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                                              |
| Impact strength (Charpy)              | max. 7,5 J                       | n. b.    | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                                              |
| Notched impact strength (Charpy)      | max. 7,5 J                       | 14       | kJ/m <sup>2</sup> | DIN EN ISO 179-1eA    |                                                                                                                                                                                                                                                                                                                              |
| Ball indentation hardness             |                                  | 128      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                                              |





## Material data sheet

### PC transparent

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                                                  |
|------------------------------|-----------------|-------|----------------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | 149   | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) n.a. = not applicable<br>3) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | n.a.  | °C                               | DIN EN ISO 11357 2)  |                                                                                                                                                          |
| Service temperature          | short term      | 140   | °C                               | 3)                   |                                                                                                                                                          |
| Service temperature          | long term       | 120   | °C                               |                      |                                                                                                                                                          |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 8     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                                                          |
| Thermal expansion (CLTE)     | 23-100 °C, long | 8     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                                                          |
| Specific heat                |                 | 1.3   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                                                          |
| Thermal conductivity         |                 | 0.25  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                                                          |

| electrical properties | parameter | value            | unit | norm          | comment |
|-----------------------|-----------|------------------|------|---------------|---------|
| surface resistivity   |           | 10 <sup>14</sup> | Ω    | DIN IEC 60093 |         |
| volume resistivity    |           | 10 <sup>14</sup> | Ω*cm | DIN IEC 60093 |         |

| other properties              | parameter                        | value     | unit | norm                | comment                                                                        |
|-------------------------------|----------------------------------|-----------|------|---------------------|--------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C)              | 0.3 / 0.6 | %    | DIN EN ISO 62 1)    | 1) Ø ca. 50 mm, h = 13 mm<br>2) – poor resistance<br>3) (+) limited resistance |
| Resistance to hot water/bases |                                  | -         |      | - 2)                |                                                                                |
| Resistance to weathering      |                                  | (+)       |      | - 3)                |                                                                                |
| Flammability (UL94)           | Listed (value at 0,4 and 1,5 mm) | HB        |      | DIN IEC 60695-11-10 |                                                                                |

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Date: 2020/05/13


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## Material data sheet

### PEEK natural

Chemical Designation: Polyetheretherketone  
DIN-abbreviation: PEEK  
Colour / Fillers: beige opaque  
Density: 1,31 g/cm<sup>3</sup>

#### Main features

- high creep resistance
- inherent flame retardant
- very good chemical resistance
- good machinability
- good heat deflection temperature
- resistance against high energy radiation
- hydrolysis and superheated steam resistant
- good slide and wear properties

#### Target Industries

- chemical technology
- mechanical engineering
- aircraft and aerospace technology
- electronics
- food technology
- automotive industry
- vacuum technology
- semiconductor technology
- oil and gas industry
- energy industry

#### Characteristics

| mechanical properties                 | parameter                        | value     | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------|----------------------------------|-----------|-------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 4200      | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen. n. b. = not broken<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 116       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Tensile strength at yield             | 50 mm / min                      | 116       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at yield                   | 50 mm / min                      | 5         | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Elongation at break                   | 50 mm / min                      | 15        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                              |
| Flexural strength                     | 2 mm / min, 10 N                 | 175       | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                                              |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 4200      | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                                              |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 23/43/102 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                                              |
| Compression modulus                   | 5 mm / min, 10 N                 | 3400      | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                                              |
| Impact strength (Charpy)              | max. 7,5 J                       | n. b.     | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                                              |
| Notched impact strength (Charpy)      | max. 7,5 J                       | 4         | kJ/m <sup>2</sup> | DIN EN ISO 179-1eA    |                                                                                                                                                                                                                                                                                                                              |
| Ball indentation hardness             |                                  | 253       | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                                              |



## Material data sheet

### PEEK natural

| thermal properties           | parameter        | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|------------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                  | 150   | °C                               | DIN 53765            | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                  | 341   | °C                               | DIN 53765            |                                                                                                                              |
| Heat distortion temperature  | HDT, Method A    | 162   | °C                               | ISO-R 75 Method A    |                                                                                                                              |
| Service temperature          | short term       | 300   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term        | 260   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long   | 5     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long  | 5     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 100-150 °C, long | 7     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                  | 1.1   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                  | 0.27  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties        | parameter                                    | value            | unit  | norm          | comment                                                         |
|------------------------------|----------------------------------------------|------------------|-------|---------------|-----------------------------------------------------------------|
| surface resistivity          | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>15</sup> | Ω     | DIN IEC 60093 | 1) Specimen in 20 mm thickness<br>2) Specimen in 1 mm thickness |
| volume resistivity           | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>15</sup> | Ω*cm  | DIN IEC 60093 |                                                                 |
| Dielectric strength          | 23 °C, 50% r.h.                              | 73               | kV/mm | ISO 60243-1   |                                                                 |
| Resistance to tracking (CTI) | Platin electrode, 23 °C, 50% r.h., solvent A | 125              | V     | DIN EN 60112  |                                                                 |

| other properties              | parameter                | value     | unit | norm                | comment                                                                     |
|-------------------------------|--------------------------|-----------|------|---------------------|-----------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C)      | 0.2 / 0.3 | %    | DIN EN ISO 62       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) good resistance<br>3) - poor resistance |
| Resistance to hot water/bases |                          | (+)       |      | -                   |                                                                             |
| Resistance to weathering      |                          | -         |      | -                   |                                                                             |
| Flammability (UL94)           | Listed (value at 1,5 mm) | VO        |      | DIN IEC 60695-11-10 |                                                                             |

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Date: 2019/12/19


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## Material data sheet PEEK GF30 natural

Chemical Designation: Polyetheretherketone  
DIN-abbreviation: PEEK  
Colour / Fillers: beige opaque / glass fibres  
Density: 1,53 g/cm<sup>3</sup>

### Main features

- very high creep resistance
- inherent flame retardant
- good chemical resistance
- improved toughness
- very high stiffness
- resistance against high energy radiation
- hydrolysis and superheated steam resistant
- high dimensional stability

### Target Industries

- chemical technology
- mechanical engineering
- aircraft and aerospace technology
- electronics
- automotive industry
- vacuum technology
- oil and gas industry

### Characteristics

| mechanical properties                | parameter                        | value     | unit              | norm                  | comment                                                                                                                                                         |
|--------------------------------------|----------------------------------|-----------|-------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test) | 1 mm / min                       | 6300      | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) Specimen 10 x 10 x 10 mm<br>3) For Charpy test: support span 64 mm, norm specimen.<br>4) Specimen in 4 mm thickness |
| Tensile strength                     | 5 mm / min                       | 113       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                 |
| Elongation at break                  | 5 mm / min                       | 5         | %                 | DIN EN ISO 527-2      |                                                                                                                                                                 |
| Compression strength                 | 1% / 2% / 5%<br>5 mm / min, 10 N | 29/52/120 | MPa               | EN ISO 604 2)         |                                                                                                                                                                 |
| Impact strength (Charpy)             | max. 7,5 J                       | 52        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 3) |                                                                                                                                                                 |
| Ball indentation hardness            |                                  | 280       | MPa               | ISO 2039-1 4)         |                                                                                                                                                                 |



## Material data sheet

### PEEK GF30 natural

| thermal properties           | parameter        | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|------------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                  | 147   | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                  | 341   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term       | 300   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term        | 260   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long   | 4     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long  | 4     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 100-150 °C, long | 5     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                  | 1.0   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                  | 0.35  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties | parameter       | value            | unit  | norm           | comment                       |
|-----------------------|-----------------|------------------|-------|----------------|-------------------------------|
| surface resistivity   |                 | 10 <sup>14</sup> | Ω     | DIN IEC 60093  | 1) Specimen in 1 mm thickness |
| volume resistivity    |                 | 10 <sup>14</sup> | Ω*cm  | DIN IEC 60093  |                               |
| Dielectric strength   | 23 °C, 50% r.h. | 36               | kV/mm | ISO 60243-1 1) |                               |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                                      |
|-------------------------------|---------------------|-----------|------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.2 / 0.3 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) good resistance<br>3) – poor resistance<br>4) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory |
| Resistance to hot water/bases |                     | (+)       |      | - 2)                   |                                                                                                                                                                                                                                                                              |
| Resistance to weathering      |                     | -         |      | - 3)                   |                                                                                                                                                                                                                                                                              |
| Flammability (UL94)           | corresponding to    | VO        |      | DIN IEC 60695-11-10 4) |                                                                                                                                                                                                                                                                              |

→ PEEK products may be based on Victrex® PEEK or Solvay KetaSpire® polymer

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Date: 2019/12/20

## Material data sheet

### PEEK PVX black

Chemical Designation: Polyetheretherketone  
 DIN-abbreviation: PEEK  
 Colour / Fillers: black opaque / carbon fibres, PTFE, graphite  
 Density: 1,44 g/cm<sup>3</sup>

#### Main features

- high creep resistance
- inherent flame retardant
- very good chemical resistance
- good wear properties
- good heat deflection temperature
- good slide and wear properties
- hydrolysis and superheated steam resistant

#### Target Industries

- chemical technology
- mechanical engineering
- aircraft and aerospace technology
- automotive industry
- energy industry

#### Characteristics

| mechanical properties                 | parameter                        | value     | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                   |
|---------------------------------------|----------------------------------|-----------|-------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 5500      | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen.<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 84        | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Tensile strength at yield             | 50 mm / min                      | 84        | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Elongation at yield                   | 50 mm / min                      | 3         | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Elongation at break                   | 50 mm / min                      | 3         | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Flexural strength                     | 2 mm / min, 10 N                 | 142       | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                           |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 6000      | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                           |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 22/43/102 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                           |
| Compression modulus                   | 5 mm / min, 10 N                 | 4000      | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                           |
| Impact strength (Charpy)              | max. 7,5 J                       | 28        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                           |
| Ball indentation hardness             |                                  | 250       | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                           |



## Material data sheet

### PEEK PVX black

| thermal properties           | parameter        | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|------------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                  | 146   | °C                               | DIN EN ISO 11357     | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                  | 341   | °C                               | DIN 53765            |                                                                                                                              |
| Service temperature          | short term       | 300   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term        | 260   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long   | 3     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long  | 3     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 100-150 °C, long | 4     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                  | 1.1   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                  | 0.82  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties | parameter                            | value                             | unit | norm             | comment                           |
|-----------------------|--------------------------------------|-----------------------------------|------|------------------|-----------------------------------|
| surface resistivity   | Conductive rubber<br>23 °C, 12% r.h. | 10 <sup>4</sup> -10 <sup>11</sup> | Ω    | DIN EN 61340-2-3 | 1) Specimen in<br>20 mm thickness |
| volume resistivity    | Conductive rubber<br>23 °C, 12% r.h. | 10 <sup>7</sup> -10 <sup>12</sup> | Ω*cm | DIN EN 61340-2-3 |                                   |

| other properties              | parameter           | value     | unit | norm                | comment                                                                                                                                                                                                                                                                                                  |
|-------------------------------|---------------------|-----------|------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.2 / 0.3 | %    | DIN EN ISO 62       | 1) Ø ca. 50 mm,<br>h = 13 mm<br>2) (+) good resistance<br>3) – poor resistance<br>4) Corresponding means<br>no listing at UL (yellow<br>card). The information<br>might be taken from<br>resin, stock shape or<br>estimation. Individual<br>testing regarding<br>application conditions is<br>mandatory. |
| Resistance to hot water/bases |                     | (+)       |      | -                   |                                                                                                                                                                                                                                                                                                          |
| Resistance to weathering      |                     | -         |      | -                   |                                                                                                                                                                                                                                                                                                          |
| Flammability (UL94)           | corresponding to    | VO        |      | DIN IEC 60695-11-10 |                                                                                                                                                                                                                                                                                                          |

→ PEEK products may be based on Victrex® PEEK or Solvay KetaSpire® polymer

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Date: 2018/02/20



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## Material data sheet PEEK CF30 black

Chemical Designation: Polyetheretherketone  
DIN-abbreviation: PEEK  
Colour / Fillers: black opaque / carbon fibres  
Density: 1,38 g/cm<sup>3</sup>

### Main features

- very high creep resistance
- inherent flame retardant
- good chemical resistance
- improved toughness
- very high stiffness
- resistance against high energy radiation
- hydrolysis and superheated steam resistant
- high dimensional stability

### Target Industries

- chemical technology
- mechanical engineering
- aircraft and aerospace technology
- automotive industry
- vacuum technology
- oil and gas industry

### Characteristics

| mechanical properties                | parameter                        | value     | unit              | norm                  | comment                                                                                                                                                         |
|--------------------------------------|----------------------------------|-----------|-------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test) | 1 mm / min                       | 6000      | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) Specimen 10 x 10 x 10 mm<br>3) For Charpy test: support span 64 mm, norm specimen.<br>4) Specimen in 4 mm thickness |
| Tensile strength                     | 50 mm / min                      | 112       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                 |
| Elongation at break                  | 50 mm / min                      | 10        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                 |
| Compression strength                 | 1% / 2% / 5%<br>5 mm / min, 10 N | 25/47/111 | MPa               | EN ISO 604 2)         |                                                                                                                                                                 |
| Impact strength (Charpy)             | max. 7,5 J                       | 92        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 3) |                                                                                                                                                                 |
| Ball indentation hardness            |                                  | 298       | MPa               | ISO 2039-1 4)         |                                                                                                                                                                 |



## Material data sheet

### PEEK CF30 black

| thermal properties           | parameter        | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|------------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                  | 147   | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                  | 341   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term       | 300   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term        | 260   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long   | 4     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long  | 4     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 100-150 °C, long | 6     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                  | 1.2   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                  | 0.66  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties | parameter | value                             | unit | norm             | comment |
|-----------------------|-----------|-----------------------------------|------|------------------|---------|
| surface resistivity   |           | 10 <sup>3</sup> -10 <sup>12</sup> | Ω    | DIN EN 61340-2-3 |         |
| volume resistivity    |           | 10 <sup>3</sup> -10 <sup>12</sup> | Ω*cm | DIN EN 61340-2-3 |         |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                                      |
|-------------------------------|---------------------|-----------|------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.2 / 0.3 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) good resistance<br>3) – poor resistance<br>4) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory |
| Resistance to hot water/bases |                     | (+)       |      | - 2)                   |                                                                                                                                                                                                                                                                              |
| Resistance to weathering      |                     | -         |      | - 3)                   |                                                                                                                                                                                                                                                                              |
| Flammability (UL94)           | corresponding to    | VO        |      | DIN IEC 60695-11-10 4) |                                                                                                                                                                                                                                                                              |

→ PEEK products may be based on Victrex® PEEK or Solvay KetaSpire® polymer

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Date: 2019/12/20



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## Material data sheet

### PET white

Chemical Designation: Polyethylene terephthalate  
DIN-abbreviation: PET  
Colour / Fillers: white opaque  
Density: 1,36 g/cm<sup>3</sup>

Data generated directly after machining  
(standard climate Germany).

#### Main features

- high toughness
- electrically insulating
- very high strength
- good weldable and bondable
- good chemical resistance
- easy to polish
- good slide and wear properties
- good machinability

#### Target Industries

- mechanical engineering
- energy industry
- electronics
- food technology
- automotive industry

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                   |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 3100     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen.<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 79       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Tensile strength at yield             | 50 mm / min                      | 79       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Elongation at yield                   | 50 mm / min                      | 5        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Elongation at break                   | 50 mm / min                      | 10       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Flexural strength                     | 2 mm / min, 10 N                 | 121      | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                           |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 3200     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                           |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 19/35/83 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                           |
| Compression modulus                   | 5 mm / min, 10 N                 | 2700     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                           |
| Impact strength (Charpy)              | max. 7,5 J                       | 81       | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                           |
| Notched impact strength (Charpy)      | max. 7,5 J                       | 4        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eA    |                                                                                                                                                                                                                                                                                                           |
| Ball indentation hardness             |                                  | 175      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                           |





## Material data sheet

### PET white

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | 81    | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 244   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 170   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 110   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 8     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 10    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.2   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.31  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties        | parameter | value            | unit | norm          | comment |
|------------------------------|-----------|------------------|------|---------------|---------|
| surface resistivity          |           | 10 <sup>14</sup> | Ω    | DIN IEC 60093 |         |
| volume resistivity           |           | 10 <sup>14</sup> | Ω*cm | DIN IEC 60093 |         |
| Resistance to tracking (CTI) |           | 600              | V    | DIN EN 60112  |         |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                             |
|-------------------------------|---------------------|-----------|------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.2 / 0.3 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) - poor resistance<br>3) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | -         |      | - 2)                   |                                                                                                                                                                                                                                                     |
| Resistance to weathering      |                     | -         |      | -                      |                                                                                                                                                                                                                                                     |
| Flammability (UL94)           | corresponding to    | HB        |      | DIN IEC 60695-11-10 3) |                                                                                                                                                                                                                                                     |

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Date: 2018/02/20


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## Material data sheet

### PET black

Chemical Designation: Polyethylene terephthalate  
DIN-abbreviation: PET  
Colour / Fillers: black opaque  
Density: 1,39 g/cm<sup>3</sup>

#### Main features

- high toughness
- good chemical resistance
- very high strength
- easy to polish
- good weldable and bondable
- good slide and wear properties
- good machinability

#### Target Industries

- mechanical engineering
- automotive industry
- electronics
- food technology

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                   |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 3400     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen.<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 91       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Tensile strength at yield             | 50 mm / min                      | 91       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Elongation at yield                   | 50 mm / min                      | 4        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Elongation at break                   | 50 mm / min                      | 15       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Flexural strength                     | 2 mm / min, 10 N                 | 134      | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                           |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 3400     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                           |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 19/36/86 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                           |
| Compression modulus                   | 5 mm / min, 10 N                 | 2800     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                           |
| Impact strength (Charpy)              | max. 7,5 J                       | 27       | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                           |
| Ball indentation hardness             |                                  | 195      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                           |



## Material data sheet

### PET black

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | 81    | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 244   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 170   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 110   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 8     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 10    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |

| electrical properties | parameter | value            | unit | norm             | comment                                                                                                                                                                              |
|-----------------------|-----------|------------------|------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| surface resistivity   |           | 10 <sup>14</sup> | Ω    | DIN IEC 60093    | 1) Due to the black colourant and moisture uptake off the material the electrical insulation properties cannot be 100% guaranteed, despite single measurements suggesting otherwise. |
| volume resistivity    |           | 10 <sup>14</sup> | Ω*cm | DIN IEC 60093 1) |                                                                                                                                                                                      |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                                          |
|-------------------------------|---------------------|-----------|------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.2 / 0.3 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) - poor resistance<br>3) (+) limited resistance<br>4) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | -         |      | - 2)                   |                                                                                                                                                                                                                                                                                  |
| Resistance to weathering      |                     | (+)       |      |                        |                                                                                                                                                                                                                                                                                  |
| Flammability (UL94)           | corresponding to    | HB        |      | DIN IEC 60695-11-10 4) |                                                                                                                                                                                                                                                                                  |

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Date: 2018/02/20

## Material data sheet

### POM-C natural

Chemical Designation: Polyacetal (Copolymer)  
 DIN-abbreviation: POM-C  
 Colour / Fillers: white opaque  
 Density: 1,41 g/cm<sup>3</sup>

Data generated directly after machining  
 (standard climate Germany).

#### Main features

- high toughness
- stiff
- high strength
- good machinability
- resistant to cleaning agents
- difficult to bond
- very good electrical insulation
- good slide and wear properties

#### Target Industries

- mechanical engineering
- aircraft and aerospace technology
- electronics
- food technology
- automotive industry
- oil and gas industry

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                              |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 2800     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen. n. b. = not broken<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 67       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Tensile strength at yield             | 50 mm / min                      | 67       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Elongation at yield                   | 50 mm / min                      | 9        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Elongation at break                   | 50 mm / min                      | 32       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                                      |
| Flexural strength                     | 2 mm / min, 10 N                 | 91       | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                                      |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 2600     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                                      |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 20/35/68 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                                      |
| Compression modulus                   | 5 mm / min, 10 N                 | 2300     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                                      |
| Impact strength (Charpy)              | max. 7,5 J                       | n. b.    | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                                      |
| Notched impact strength (Charpy)      | max. 7,5 J                       | 8        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eA    |                                                                                                                                                                                                                                                                                                                      |
| Ball indentation hardness             |                                  | 165      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                                      |

## Material data sheet

### POM-C natural

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | -60   | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 166   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 140   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 100   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 13    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 14    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.4   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.39  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties        | parameter                                    | value            | unit  | norm             | comment                                                         |
|------------------------------|----------------------------------------------|------------------|-------|------------------|-----------------------------------------------------------------|
| surface resistivity          | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω     | DIN IEC 60093 1) | 1) Specimen in 20 mm thickness<br>2) Specimen in 1 mm thickness |
| volume resistivity           | Silver electrode, 23 °C, 12% r.h.            | 10 <sup>14</sup> | Ω*cm  | DIN IEC 60093    |                                                                 |
| Dielectric strength          | 23 °C, 50% r.h.                              | 49               | kV/mm | ISO 60243-1 2)   |                                                                 |
| Resistance to tracking (CTI) | Platin electrode, 23 °C, 50% r.h., solvent A | 600              | V     | DIN EN 60112     |                                                                 |

| other properties              | parameter           | value      | unit | norm                   | comment                                                                                                                                                                                                                                                                          |
|-------------------------------|---------------------|------------|------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.05 / 0.1 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) – poor resistance<br>4) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | (+)        |      | - 2)                   |                                                                                                                                                                                                                                                                                  |
| Resistance to weathering      |                     | -          |      | - 3)                   |                                                                                                                                                                                                                                                                                  |
| Flammability (UL94)           | corresponding to    | HB         |      | DIN IEC 60695-11-10 4) |                                                                                                                                                                                                                                                                                  |

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Date: 2020/05/04



## Material data sheet

### POM-C GF25 natural

Chemical Designation: Polyacetal (Copolymer)  
DIN-abbreviation: POM-C  
Colour / Fillers: white opaque / glass fibres  
Density: 1,53 g/cm<sup>3</sup>

#### Main features

- very high stiffness
- difficult to bond
- good chemical resistance
- good wear properties
- electrically insulating
- high strength

#### Target Industries

- mechanical engineering
- electronics
- automotive industry

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                     |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 4200     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm<br>Modulus range between 0,5 and 1 % compression.<br>5) For Charpy test: support span 64 mm, norm specimen.<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 51       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                             |
| Tensile strength at yield             | 50 mm / min                      | 51       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                             |
| Elongation at yield                   | 50 mm / min                      | 9        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                             |
| Elongation at break                   | 50 mm / min                      | 12       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                             |
| Flexural strength                     | 2 mm / min, 10 N                 | 88       | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                             |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 4100     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                             |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 23/39/74 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                             |
| Compression modulus                   | 5 mm / min, 10 N                 | 3600     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                             |
| Impact strength (Charpy)              | max. 7,5 J                       | 36       | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                             |
| Ball indentation hardness             |                                  | 180      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                             |



## Material data sheet

### POM-C GF25 natural

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | -60   | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 170   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 140   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 100   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 8     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 8     | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.2   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.47  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties | parameter | value            | unit | norm          | comment |
|-----------------------|-----------|------------------|------|---------------|---------|
| surface resistivity   |           | 10 <sup>14</sup> | Ω    | DIN IEC 60093 |         |
| volume resistivity    |           | 10 <sup>14</sup> | Ω*cm | DIN IEC 60093 |         |

| other properties              | parameter           | value     | unit | norm                   | comment                                                                                                                                                                                                                                                                         |
|-------------------------------|---------------------|-----------|------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.7 / 0.2 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) – poor resistance<br>4) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory |
| Resistance to hot water/bases |                     | (+)       |      | - 2)                   |                                                                                                                                                                                                                                                                                 |
| Resistance to weathering      |                     | -         |      | - 3)                   |                                                                                                                                                                                                                                                                                 |
| Flammability (UL94)           | corresponding to    | HB        |      | DIN IEC 60695-11-10 4) |                                                                                                                                                                                                                                                                                 |

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Date: 2018/02/20



## Material data sheet

### POM-C black

Chemical Designation: Polyacetal (Copolymer)  
DIN-abbreviation: POM-C  
Colour / Fillers: black opaque  
Density: 1,41 g/cm<sup>3</sup>

#### Main features

- high stiffness
- difficult to bond
- good chemical resistance
- good slide and wear properties
- high toughness
- high strength
- good machinability

#### Target Industries

- mechanical engineering
- aircraft and aerospace technology
- automotive industry
- food technology
- oil and gas industry

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                  |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 2800     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm modulus range between 0,5 and 1 % compression.<br>5) For Charpy test: support span 64 mm, norm specimen.<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 67       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                          |
| Tensile strength at yield             | 50 mm / min                      | 67       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                          |
| Elongation at yield                   | 50 mm / min                      | 9        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                          |
| Elongation at break                   | 50 mm / min                      | 32       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                          |
| Flexural strength                     | 2 mm / min, 10 N                 | 91       | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                          |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 2600     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                          |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 20/35/68 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                          |
| Compression modulus                   | 5 mm / min, 10 N                 | 2300     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                          |
| Impact strength (Charpy)              | max. 7,5 J                       | 150      | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                          |
| Notched impact strength (Charpy)      | max. 7,5 J                       | 6        | kJ/m <sup>2</sup> | DIN EN ISO 179-1eA    |                                                                                                                                                                                                                                                                                                          |
| Ball indentation hardness             |                                  | 165      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                          |



## Material data sheet

### POM-C black

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | -60   | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 166   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 140   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 100   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 13    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 14    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.4   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.39  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties        | parameter                                     | value            | unit  | norm             | comment                                                                                                                                                                                                                                               |
|------------------------------|-----------------------------------------------|------------------|-------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| surface resistivity          | Silver electrode, 23 °C, 12 % r.h.            | 10 <sup>14</sup> | Ω     | DIN IEC 60093 1) | 1) Specimen in 20 mm thickness<br>2) Due to the black colourant and moisture uptake of the material the electrical insulation properties cannot be 100% guaranteed, despite single measurements suggesting otherwise<br>3) Specimen in 1 mm thickness |
| volume resistivity           | Silver electrode, 23 °C, 12 % r.h.            | 10 <sup>14</sup> | Ω*cm  | DIN IEC 60093 2) |                                                                                                                                                                                                                                                       |
| Dielectric strength          | 23 °C, 50 % r.h.                              | 38               | kV/mm | ISO 60243-1 3)   |                                                                                                                                                                                                                                                       |
| Resistance to tracking (CTI) | Platin electrode, 23 °C, 50 % r.h., solvent A | 600              | V     | DIN EN 60112     |                                                                                                                                                                                                                                                       |

| other properties              | parameter           | value      | unit | norm                   | comment                                                                                                                                                                                                                                                 |
|-------------------------------|---------------------|------------|------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.05 / 0.1 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory |
| Resistance to hot water/bases |                     | (+)        |      | - 2)                   |                                                                                                                                                                                                                                                         |
| Resistance to weathering      |                     | (+)        |      | -                      |                                                                                                                                                                                                                                                         |
| Flammability (UL94)           | corresponding to    | HB         |      | DIN IEC 60695-11-10 3) |                                                                                                                                                                                                                                                         |

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Date: 2018/02/20



## Material data sheet

### POM-C black ELS

Chemical Designation: Polyacetal (Copolymer)  
DIN-abbreviation: POM-C  
Colour / Fillers: black opaque / conductive carbon black  
Density: 1,41 g/cm<sup>3</sup>

#### Main features

- electrically conductive
- difficult to bond
- good chemical resistance
- good wear properties
- high toughness
- high strength
- good machinability
- good UV and weather resistance

#### Target Industries

- mechanical engineering
- electronics
- automotive industry
- chemical technology

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                  |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 1800     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm modulus range between 0,5 and 1 % compression.<br>5) For Charpy test: support span 64 mm, norm specimen.<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 42       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                          |
| Tensile strength at yield             | 50 mm / min                      | 42       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                          |
| Elongation at yield                   | 50 mm / min                      | 11       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                          |
| Elongation at break                   | 50 mm / min                      | 11       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                          |
| Flexural strength                     | 2 mm / min, 10 N                 | 56       | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                          |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 1500     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                          |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 16/25/45 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                          |
| Compression modulus                   | 5 mm / min, 10 N                 | 1500     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                          |
| Impact strength (Charpy)              | max. 7,5 J                       | 74       | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                          |
| Ball indentation hardness             |                                  | 96       | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                          |





## Material data sheet

### POM-C black ELS

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | -60   | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 169   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 140   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 100   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 13    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 14    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.3   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.46  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties | parameter                          | value            | unit | norm             | comment                        |
|-----------------------|------------------------------------|------------------|------|------------------|--------------------------------|
| surface resistivity   | Silver electrode, 23 °C, 12 % r.h. | 10 <sup>14</sup> | Ω    | DIN IEC 60093 1) | 1) Specimen in 20 mm thickness |
| volume resistivity    | Silver electrode, 23 °C, 12 % r.h. | 10 <sup>14</sup> | Ω*cm | DIN IEC 60093 2) |                                |

| other properties              | parameter           | value      | unit | norm                   | comment                                                                                                                                                                                                                                                 |
|-------------------------------|---------------------|------------|------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | 0.05 / 0.2 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) limited resistance<br>3) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory |
| Resistance to hot water/bases |                     | (+)        |      | - 2)                   |                                                                                                                                                                                                                                                         |
| Resistance to weathering      |                     | (+)        |      | -                      |                                                                                                                                                                                                                                                         |
| Flammability (UL94)           | corresponding to    | HB         |      | DIN IEC 60695-11-10 3) |                                                                                                                                                                                                                                                         |

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Date: 2018/02/20


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## Material data sheet

### PP natural

Chemical Designation: Polypropylene  
DIN-abbreviation: PP  
Colour / Fillers: white opaque  
Density: 0,9 g/cm<sup>3</sup>

#### Main features

- excellent chemical resistance
- excellent stiffness
- heat stabilized
- very good weldable

#### Target Industries

- agricultural machinery
- chemical technology
- food engineering
- pharmaceutical industry

#### Characteristics

| mechanical properties                | parameter | value | unit              | norm             | comment             |
|--------------------------------------|-----------|-------|-------------------|------------------|---------------------|
| Modulus of elasticity (tensile test) |           | 1400  | MPa               | DIN EN ISO 527-1 | 1) n.b.= not broken |
| Tensile strength at yield            |           | 32    | MPa               | DIN EN ISO 527-1 |                     |
| Elongation at yield                  |           | 8     | %                 | DIN EN ISO 527-1 |                     |
| Impact strength (Charpy)             |           | n. b. | kJ/m <sup>2</sup> | DIN EN ISO 527-1 |                     |
| Ball indentation hardness            |           | 70    | MPa               | ISO 2039-1       |                     |
| Shore hardness                       | Shore D   | 70    |                   | DIN EN ISO 868   |                     |

| thermal properties       | parameter | value     | unit                             | norm                 | comment                                                                                          |
|--------------------------|-----------|-----------|----------------------------------|----------------------|--------------------------------------------------------------------------------------------------|
| Service temperature      |           | +0 - +100 | °C                               |                      | 1) 1) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Thermal expansion (CLTE) |           | 12        | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                  |





## Material data sheet

### PP natural

| electrical properties | parameter | value            | unit  | norm          | comment |
|-----------------------|-----------|------------------|-------|---------------|---------|
| surface resistivity   |           | 10 <sup>14</sup> | Ω     | DIN IEC 60093 |         |
| Dielectric strength   |           | 58               | kV/mm | ISO 60243-1   |         |

| other properties | parameter        | value | unit | norm     | comment                                                                                                                                                                      |
|------------------|------------------|-------|------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flammability     | corresponding to | B2    |      | DIN 4102 | 1) 1) Corresponding means no listing The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |

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Date: 2017/11/23

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## Material data sheet

### PTFE natural

Chemical Designation: Polytetrafluorethylene  
DIN-abbreviation: PTFE  
Colour / Fillers: white opaque  
Density: 2,15 g/cm<sup>3</sup>

#### Main features

- very good chemical resistance
- inherent flame retardant
- continuous service temperature up to 260 °C
- good UV and weather resistance
- very good electrical insulation
- very good slide and wear properties

#### Target Industries

- aircraft and aerospace technology
- chemical technology
- food technology
- cryogenic engineering
- mechanical engineering
- semiconductor technology

#### Characteristics

| mechanical properties | parameter  | value | unit | norm           | comment                                                                                    |
|-----------------------|------------|-------|------|----------------|--------------------------------------------------------------------------------------------|
| Tensile strength      |            | 22    | MPa  | ASTM D 4894 1) | 1) Tested on extruded and machined specimen<br>2) Tested on extruded and machined specimen |
| Elongation at break   |            | 220   | %    | ASTM D 4894 2) |                                                                                            |
| Compression strength  | 1 % strain | 5     | MPa  | ASTM D 695     |                                                                                            |
| Shore hardness        | Shore D    | 55    |      | ASTM D 2240    |                                                                                            |

| thermal properties          | parameter        | value | unit                             | norm                | comment                                                                                                                      |
|-----------------------------|------------------|-------|----------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glas transition temperature |                  | -20   | °C                               | DIN EN ISO 11357 1) | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Service temperature         | short term       | 260   | °C                               | - 2)                |                                                                                                                              |
| Service temperature         | Long term        | 260   | °C                               | -                   |                                                                                                                              |
| Thermal expansion (CLTE)    | 23-100 °C, long. | 13    | 10 <sup>-5</sup> K <sup>-1</sup> | ASTM D 696          |                                                                                                                              |
| Thermal conductivity        |                  | 12    | 10 <sup>-5</sup> K <sup>-1</sup> | ASTM C 177          |                                                                                                                              |





## Material data sheet

### PTFE natural

| electrical properties | parameter              | value     | unit                     | norm          | comment            |
|-----------------------|------------------------|-----------|--------------------------|---------------|--------------------|
| surface resistivity   |                        | $10^{16}$ | $\Omega$                 | ASTM D 257 1) | 1) Without defects |
| volume resistivity    |                        | $10^{17}$ | $\Omega \cdot \text{cm}$ | ASTM D 257    |                    |
| Dielectric strength   | In air, 0,125 mm thick | 80        | kV/mm                    | ASTM D 149    |                    |
| Dielectric constant   | 50-109 Hz              | 2,1       |                          | ASTM D 150    |                    |

| other properties | parameter        | value  | unit | norm                   | comment                                                                                                                                                                                        |
|------------------|------------------|--------|------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption | 23 °C            | < 1.01 | %    | ASTM D 570             | 1) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Flammability     | corresponding to | V0     |      | DIN IEC 60695-11-10 1) |                                                                                                                                                                                                |

Our information and statements reflect the current state of our knowledge and shall inform about our products and their applications. They do not assure or guarantee chemical resistance, quality of products and their merchantability in a legally binding way. Our products are not defined for use in medical or dental implants. Existing commercial patents have to be observed. The corresponding values and information are no minimum or maximum values, but guideline values that can be used primarily for comparison purposes for material selection. These values are within the normal tolerance range of product properties and do not represent guaranteed property values. Therefore they shall not be used for specification purposes. Unless otherwise noted, these values were determined by tests at reference dimensions (typically rods with diameter 40-60 mm according to DIN EN 15860) on extruded and machined specimen. As the properties depend on the dimensions of the semi-finished products and the orientation in the component (esp. in reinforced grades), the material may not be used without a separate testing under individual circumstances. The customer is solely responsible for the quality and suitability of products for the application and has to test usage and processing prior to use. Technical changes reserved.

Date: 2020/05/13


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## Material data sheet

### PVDF natural

Chemical Designation: Polyvinylidene fluoride  
 DIN-abbreviation: PVDF  
 Colour / Fillers: white opaque  
 Density: 1,78 g/cm<sup>3</sup>

#### Main features

- very good chemical resistance
- very good electrical insulation
- inherent flame retardant
- good slide and wear properties
- continuous service temperature up to 150 °C
- very good weldable
- very good UV and weather resistance

#### Target Industries

- mechanical engineering
- chemical technology
- electronics
- food technology
- energy industry

#### Characteristics

| mechanical properties                 | parameter                        | value    | unit              | norm                  | comment                                                                                                                                                                                                                                                                                                   |
|---------------------------------------|----------------------------------|----------|-------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Modulus of elasticity (tensile test)  | 1 mm / min                       | 2200     | MPa               | DIN EN ISO 527-2 1)   | 1) For tensile test: specimen type 1b<br>2) For flexural test: support span 64 mm, norm specimen.<br>3) Specimen 10 x 10 x 10 mm<br>4) Specimen 10 x 10 x 50 mm, modulus range between 0,5 and 1% compression.<br>5) For Charpy test: support span 64 mm, norm specimen.<br>6) Specimen in 4 mm thickness |
| Tensile strength                      | 50 mm / min                      | 62       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Tensile strength at yield             | 50 mm / min                      | 62       | MPa               | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Elongation at yield                   | 50 mm / min                      | 8        | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Elongation at break                   | 50 mm / min                      | 17       | %                 | DIN EN ISO 527-2      |                                                                                                                                                                                                                                                                                                           |
| Flexural strength                     | 2 mm / min, 10 N                 | 77       | MPa               | DIN EN ISO 178 2)     |                                                                                                                                                                                                                                                                                                           |
| Modulus of elasticity (flexural test) | 2 mm / min, 10 N                 | 2100     | MPa               | DIN EN ISO 178        |                                                                                                                                                                                                                                                                                                           |
| Compression strength                  | 1% / 2% / 5%<br>5 mm / min, 10 N | 16/28/59 | MPa               | EN ISO 604 3)         |                                                                                                                                                                                                                                                                                                           |
| Compression modulus                   | 5 mm / min, 10 N                 | 1900     | MPa               | EN ISO 604 4)         |                                                                                                                                                                                                                                                                                                           |
| Impact strength (Charpy)              | max. 7,5 J                       | 150      | kJ/m <sup>2</sup> | DIN EN ISO 179-1eU 5) |                                                                                                                                                                                                                                                                                                           |
| Ball indentation hardness             |                                  | 129      | MPa               | ISO 2039-1 6)         |                                                                                                                                                                                                                                                                                                           |





## Material data sheet

### PVDF natural

| thermal properties           | parameter       | value | unit                             | norm                 | comment                                                                                                                      |
|------------------------------|-----------------|-------|----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------|
| Glass transition temperature |                 | -40   | °C                               | DIN EN ISO 11357 1)  | 1) Found in public sources.<br>2) Found in public sources. Individual testing regarding application conditions is mandatory. |
| Melting temperature          |                 | 171   | °C                               | DIN EN ISO 11357     |                                                                                                                              |
| Service temperature          | short term      | 150   | °C                               |                      |                                                                                                                              |
| Service temperature          | long term       | 150   | °C                               |                      |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-60 °C, long  | 16    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Thermal expansion (CLTE)     | 23-100 °C, long | 18    | 10 <sup>-5</sup> K <sup>-1</sup> | DIN EN ISO 11359-1;2 |                                                                                                                              |
| Specific heat                |                 | 1.3   | J/(g*K)                          | ISO 22007-4:2008     |                                                                                                                              |
| Thermal conductivity         |                 | 0.25  | W/(K*m)                          | ISO 22007-4:2008     |                                                                                                                              |

| electrical properties | parameter | value            | unit | norm          | comment |
|-----------------------|-----------|------------------|------|---------------|---------|
| surface resistivity   |           | 10 <sup>14</sup> | Ω    | DIN IEC 60093 |         |

| other properties              | parameter           | value       | unit | norm                   | comment                                                                                                                                                                                                                                               |
|-------------------------------|---------------------|-------------|------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water absorption              | 24 h / 96 h (23 °C) | <0.1 / <0.1 | %    | DIN EN ISO 62 1)       | 1) Ø ca. 50 mm, h = 13 mm<br>2) (+) good resistance<br>3) Corresponding means no listing at UL (yellow card). The information might be taken from resin, stock shape or estimation. Individual testing regarding application conditions is mandatory. |
| Resistance to hot water/bases |                     | +           |      | - 2)                   |                                                                                                                                                                                                                                                       |
| Resistance to weathering      |                     | +           |      | )                      |                                                                                                                                                                                                                                                       |
| Flammability (UL94)           | corresponding to    | HB          |      | DIN IEC 60695-11-10 3) |                                                                                                                                                                                                                                                       |

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## Material data sheet

### PE 500 green

PE 500 – is a high molecular low pressure polyethylene with a molecular weight of approx. 500.000 g/mol. (HMW-PE).

Colour: green / similar RAL 6024

#### Properties

- EU 1935/2004 - conform
- EU 10/2011 - conform
- FDA - conform



#### Target Industries

- Food industry

#### Characteristics and standard values

| Properties<br>Physical properties             | Method                                        | PE 500 - green            |                                |
|-----------------------------------------------|-----------------------------------------------|---------------------------|--------------------------------|
|                                               |                                               | SI                        | US                             |
| Molecular-weight                              | k.a                                           | ~ 0.5 Mio. g/mol.         | ~ 0.5 Mio. g/mol.              |
| Density                                       | DINENISO 1183-1 (04/2013)<br>ASTM D792        | > 0.950 g/cm <sup>3</sup> | > 59.306 lb/ft <sup>3</sup>    |
| Notched impact strength                       | DINENISO 11542-2 (01/2010)                    | > 15 kJ/m <sup>2</sup>    | > 7.1325 ft-lb/in <sup>2</sup> |
| Abrasion-Index (Sand-Slurry)                  | DINENISO 15527 (05/2013)                      | 360 – 440                 | 360 – 440                      |
| Tensile strength at yield<br>(1B - 50mm/Min.) | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 26 N/mm <sup>2</sup>    | > 3770 psi                     |
| Elongation (Break / 1B – 50 mm/Min.)          | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 350 %                   | > 350 %                        |
| Tensile-E-modulus (1B – 1 mm/Min.)            | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 1100 N/mm <sup>2</sup>  | > 159500 psi                   |
| Static Friction                               | ASTM D 1894 (2011)                            | ~ 0.15 - 0.22             | ~ 0.15 - 0.22                  |
| Dynamic Friction                              | ASTM D 1894 (2011)                            | ~ 0.10 - 0.15             | ~ 0.10 - 0.15                  |
| Shore-D-Hardness, 3 sec. Value<br>6 mm plate  | DINENISO 868 (10/2003)                        | 65 – 67 D                 | 65 – 67 D                      |
| Ball indentation hardness                     | DINENISO 2039                                 | ~ 50 N/mm <sup>2</sup>    | ~ 7250 psi                     |
| Water absorption                              | DINENISO 62 (05/2008)                         | < 0.01 %                  | < 0.01 %                       |

## Werkstoffdatenblatt PE 500 green

| Thermal properties                           | Method                     | PE 500 - green               |                                |
|----------------------------------------------|----------------------------|------------------------------|--------------------------------|
|                                              |                            | SI                           | US                             |
| Melting Point (DSC)                          | DINENISO 11357-1 (03/2010) | 133 - 136 °C                 | 271.4 – 276.8 °F               |
| Thermal Conductivity                         | Wire method                | ~ 0.41 W/m*K                 | ~ 2.46 (BTU-in)/hr-ft²·°F      |
| Max. operation temperature                   | Literature                 | 80 °C                        | 176 °F                         |
| Coefficient of thermal expansion (23 – 80°C) | ISO 11359                  | ~ 0.00015 - 0.00020 mm/mm °C | ~ 0.000083 - 0.000111 in/in °F |

| Electrical properties          |                           |                  |                  |
|--------------------------------|---------------------------|------------------|------------------|
| Volume resistivity             | DINEN 62631-3-1 (01/2017) | > 1.0E+14 Ohm*cm | > 1.0E+14 Ohm*cm |
| Surface resistivity            | DINEN 62631-3-2 (10/2016) | > 1.0E+13 Ohm    | > 1.0E+13 Ohm    |
| ATEX-Directive – TÜV approved! | ATEX-Directive            | ---              | ---              |
| ESD-D                          | ---                       | --- Ohm          | --- Ohm          |

| Burning properties                    |          |          |          |
|---------------------------------------|----------|----------|----------|
| Fire resistance (Self-classification) | DIN 4102 | B2 Class | B2 Class |
| Fire resistance (Self-classification) | UL94     | HB Class | HB Class |

| Physiological properties |  |        |        |
|--------------------------|--|--------|--------|
| Food compliant           |  | EU/FDA | EU/FDA |

The above data are based on the present knowledge and are given without guarantee. Existing laws and conditions are to be respected by the user of our products. The decision about the suitability of a material for a certain application must be made by the user. We reserve the right to alter the indicated values after a 15 mm thick sheet.

2020/09/24

## Material data sheet PE 500 natural

PE 500 natural – is a high molecular low pressure polyethylene with a molecular weight of approx. 500.000 g/mol. (HMW-PE).

Colour: natural

### Properties

- EU 1935/2004 - conform
- EU 10/2011 - conform
- FDA – conform



### Target Industries

- Food industry
- Chemical industry

### Characteristics and standard values

| Properties<br>Physical properties             | Method                                        | PE 500 - natural          |                                 |
|-----------------------------------------------|-----------------------------------------------|---------------------------|---------------------------------|
|                                               |                                               | SI                        | US                              |
| Molecular-weight                              | k.a                                           | ~ 0.5 Mio. g/mol.         | ~ 0.5 Mio. g/mol.               |
| Density                                       | DINENISO 1183-1 (04/2013)<br>ASTM D792        | > 0.950 g/cm <sup>3</sup> | > 59.306 lb/ft <sup>3</sup>     |
| Notched impact strength                       | DINENISO 11542-2 (01/2010)                    | > 25 kJ/m <sup>2</sup>    | > 11.8875 ft-lb/in <sup>2</sup> |
| Abrasion-Index (Sand-Slurry)                  | DINENISO 15527 (05/2013)                      | 360 – 440                 | 360 – 440                       |
| Tensile strength at yield<br>(1B - 50mm/Min.) | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 26 N/mm <sup>2</sup>    | > 3770 psi                      |
| Elongation (Break / 1B – 50 mm/Min.)          | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 350 %                   | > 350 %                         |
| Tensile-E-modulus (1B – 1 mm/Min.)            | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 1100 N/mm <sup>2</sup>  | > 159500 psi                    |
| Static Friction                               | ASTM D 1894 (2011)                            | ~ 0.15 - 0.20             | ~ 0.15 - 0.20                   |
| Dynamic Friction                              | ASTM D 1894 (2011)                            | ~ 0.10 - 0.15             | ~ 0.10 - 0.15                   |
| Shore-D-Hardness, 3 sec. Value<br>6 mm plate  | DINENISO 868 (10/2003)                        | 65 – 67 D                 | 65 – 67 D                       |
| Ball indentation hardness                     | DINENISO 2039                                 | ~ 50 N/mm <sup>2</sup>    | ~ 7250 psi                      |
| Water absorption                              | DINENISO 62 (05/2008)                         | < 0.01 %                  | < 0.01 %                        |



## Werkstoffdatenblatt PE 500 natural

| Thermal properties                              | Method                     | PE 500 - natural                |                                   |
|-------------------------------------------------|----------------------------|---------------------------------|-----------------------------------|
|                                                 |                            | SI                              | US                                |
| Melting Point (DSC)                             | DINENISO 11357-1 (03/2010) | 133 - 136 °C                    | 271.4 – 276.8 °F                  |
| Thermal Conductivity                            | Wire method                | ~ 0.41 W/m*K                    | ~ 2.84253<br>(BTU-in)/hr-ft²·°F   |
| Max. operation temperature                      | Literature                 | 80 °C                           | 176 °F                            |
| Coefficient of thermal expansion<br>(23 – 80°C) | ISO 11359                  | ~ 0.00015 - 0.00020<br>mm/mm °C | ~ 0.000083 - 0.000111<br>in/in °F |

| Electrical properties          |                           |                  |                  |
|--------------------------------|---------------------------|------------------|------------------|
| Volume resistivity             | DINEN 62631-3-1 (01/2017) | > 1.0E+14 Ohm*cm | > 1.0E+14 Ohm*cm |
| Surface resistivity            | DINEN 62631-3-2 (10/2016) | > 1.0E+13 Ohm    | > 1.0E+13 Ohm    |
| ATEX-Directive – TÜV approved! | ATEX-Directive            | ---              | ---              |
| ESD-D                          | ---                       | --- Ohm          | --- Ohm          |

| Burning properties                    |          |          |          |
|---------------------------------------|----------|----------|----------|
| Fire resistance (Self-classification) | DIN 4102 | B2 Class | B2 Class |
| Fire resistance (Self-classification) | UL94     | HB Class | HB Class |

| Physiological properties |  |        |        |
|--------------------------|--|--------|--------|
| Food compliant           |  | EU/FDA | EU/FDA |

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2020/11/04





## Material data sheet

### PE 500 black

PE 500 – is a high molecular low pressure polyethylene with a molecular weight of approx. 500.000 g/mol.

Colour: black

#### Characteristics and standard values

| Properties<br>Physical properties             | Method                                        | PE 500 - black            |                                |
|-----------------------------------------------|-----------------------------------------------|---------------------------|--------------------------------|
|                                               |                                               | SI                        | US                             |
| Molecular-weight                              | k.a                                           | ~ 0.5 Mio. g/mol.         | ~ 0.5 Mio. g/mol.              |
| Density                                       | DINENISO 1183-1 (04/2013)<br>ASTM D792        | > 0.950 g/cm <sup>3</sup> | > 59.306 lb/ft <sup>3</sup>    |
| Notched impact strength                       | DINENISO 11542-2 (01/2010)                    | > 15 kJ/m <sup>2</sup>    | > 7.1325 ft-lb/in <sup>2</sup> |
| Abrasion-Index (Sand-Slurry)                  | DINENISO 15527 (05/2013)                      | 360 – 440                 | 360 – 440                      |
| Tensile strength at yield<br>(1B - 50mm/Min.) | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 26 N/mm <sup>2</sup>    | > 3770 psi                     |
| Elongation (Break / 1B – 50 mm/Min.)          | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 250 %                   | > 250 %                        |
| Tensile-E-modulus (1B – 1 mm/Min.)            | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 1100 N/mm <sup>2</sup>  | > 159500 psi                   |
| Static Friction                               | ASTM D 1894 (2011)                            | ~ 0.15 - 0.22             | ~ 0.15 - 0.22                  |
| Dynamic Friction                              | ASTM D 1894 (2011)                            | ~ 0.10 - 0.15             | ~ 0.10 - 0.15                  |
| Shore-D-Hardness, 3 sec. Value<br>6 mm plate  | DINENISO 868 (10/2003)                        | 65 – 67 D                 | 65 – 67 D                      |
| Ball indentation hardness                     | DINENISO 2039                                 | ~ 50 N/mm <sup>2</sup>    | ~ 7250 psi                     |
| Water absorption                              | DINENISO 62 (05/2008)                         | < 0.01 %                  | < 0.01 %                       |





## Werkstoffdatenblatt PE 500 natural

| Thermal properties                           | Method                     | PE 500 - black               |                                |
|----------------------------------------------|----------------------------|------------------------------|--------------------------------|
|                                              |                            | SI                           | US                             |
| Melting Piont (DSC)                          | DINENISO 11357-1 (03/2010) | 133 - 136 °C                 | 271.4 – 276.8 °F               |
| Thermal Conductivity                         | Wire method                | ~ 0.41 W/m*K                 | ~ 2.84253 (BTU-in)/hr-ft²-°F   |
| Max. operation temperature                   | Literature                 | 80 °C                        | 176 °F                         |
| Coefficient of thermal expansion (23 – 80°C) | ISO 11359                  | ~ 0.00015 - 0.00020 mm/mm °C | ~ 0.000083 - 0.000111 in/in °F |

| Electrical properties          |                           |                  |                  |
|--------------------------------|---------------------------|------------------|------------------|
| Volume resistivity             | DINEN 62631-3-1 (01/2017) | > 1.0E+14 Ohm*cm | > 1.0E+14 Ohm*cm |
| Surface resistivity            | DINEN 62631-3-2 (10/2016) | > 1.0E+13 Ohm    | > 1.0E+13 Ohm    |
| ATEX-Directive – TÜV approved! | ATEX-Directive            | ---              | ---              |
| ESD-D                          | ---                       | --- Ohm          | --- Ohm          |

| Burning properties                    |          |          |          |
|---------------------------------------|----------|----------|----------|
| Fire resistance (Self-classification) | DIN 4102 | B2 Class | B2 Class |
| Fire resistance (Self-classification) | UL94     | HB Class | HB Class |

| Physiological properties |  |        |        |
|--------------------------|--|--------|--------|
| Food compliant           |  | EU/FDA | EU/FDA |

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2020/09/24



## Material data sheet

### PE 1000 green

PE 1000 – is an ultra high molecular low pressure polyethylene (UHMW-PE) with a molecular weight ~ 500.000 g/mol.

Colour: green / similar RAL 6024

#### Properties

- EU 1935/2004 – conform
- EU 10/2011 – conform
- FDA – conform
- extremely versatile
- good wear resistance
- very high notched impact strength
- very good sliding properties



#### Target Industries

- Food industry
- Mechanical industry
- Conveying industry
- Chemical industry

#### Characteristics and standard values

| Properties<br>Physical properties             | Method                                        | PE 1000 - green           |                               |
|-----------------------------------------------|-----------------------------------------------|---------------------------|-------------------------------|
|                                               |                                               | SI                        | US                            |
| Molecular-weight                              | k.a                                           | ~ 0.5 Mio. g/mol.         | ~ 0.5 Mio. g/mol.             |
| Density                                       | DINENISO 1183-1 (04/2013)<br>ASTM D792        | > 0.930 g/cm <sup>3</sup> | > 58.058 lb/ft <sup>3</sup>   |
| Notched impact strength                       | DINENISO 11542-2 (01/2010)                    | > 140 kJ/m <sup>2</sup>   | > 66.57 ft-lb/in <sup>2</sup> |
| Abrasion-Index (Sand-Slurry)                  | DINENISO 15527 (05/2013)                      | 100                       | 100                           |
| Tensile strength at yield<br>(1B - 50mm/Min.) | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 18 N/mm <sup>2</sup>    | > 2610 psi                    |
| Elongation (Break / 1B – 50 mm/Min.)          | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 350 %                   | > 350 %                       |
| Tensile-E-modulus (1B – 1 mm/Min.)            | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 650 N/mm <sup>2</sup>   | > 94250 psi                   |
| Static Friction                               | ASTM D 1894 (2011)                            | ~ 0.15 - 0.20             | ~ 0.15 - 0.20                 |
| Dynamic Friction                              | ASTM D 1894 (2011)                            | ~ 0.10 - 0.15             | ~ 0.10 - 0.15                 |
| Shore-D-Hardness, 3 sec. Value<br>6 mm plate  | DINENISO 868 (10/2003)                        | 61 – 65 D                 | 61 – 65 D                     |
| Ball indentation hardness                     | DINENISO 2039                                 | ~ 35 N/mm <sup>2</sup>    | ~ 5075 psi                    |
| Water absorption                              | DINENISO 62 (05/2008)                         | < 0.01 %                  | < 0.01 %                      |





## Werkstoffdatenblatt

### PE 1000 green

| Thermal properties                           | Method                     | PE 1000 - green              |                                |
|----------------------------------------------|----------------------------|------------------------------|--------------------------------|
|                                              |                            | SI                           | US                             |
| Melting Piont (DSC)                          | DINENISO 11357-1 (03/2010) | 133 - 135 °C                 | 271.4 – 275 °F                 |
| Thermal Conductivity                         | Wire method                | ~ 0.41 W/m*K                 | ~ 2.84253 (BTU-in)/hr-ft²-°F   |
| Max. operation temperature                   | Literature                 | 80 °C                        | 176 °F                         |
| Coefficient of thermal expansion (23 – 80°C) | ISO 11359                  | ~ 0.00015 - 0.00020 mm/mm °C | ~ 0.000083 - 0.000111 in/in °F |

| Electrical properties          |                           |                  |                  |
|--------------------------------|---------------------------|------------------|------------------|
| Volume resistivity             | DINEN 62631-3-1 (01/2017) | > 1.0E+14 Ohm*cm | > 1.0E+14 Ohm*cm |
| Surface resistivity            | DINEN 62631-3-2 (10/2016) | > 1.0E+13 Ohm    | > 1.0E+13 Ohm    |
| ATEX-Directive – TÜV approved! | ATEX-Directive            | ---              | ---              |
| ESD-D                          | ---                       | --- Ohm          | --- Ohm          |

| Burning properties                    |          |          |          |
|---------------------------------------|----------|----------|----------|
| Fire resistance (Self-classification) | DIN 4102 | B2 Class | B2 Class |
| Fire resistance (Self-classification) | UL94     | HB Class | HB Class |

| Physiological properties |  |        |        |
|--------------------------|--|--------|--------|
| Food compliant           |  | EU/FDA | EU/FDA |

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2020/09/24



## Material data sheet

### PE 1000 natural

PE 1000 natural – is an ultra-high-molecular-low pressure polyethylene (UHMW-PE) with a molecular weight ~ 500.000 g/mol...

Colour: natural

#### Properties

- good wear resistance
- very high notched impact strength
- very good sliding properties
- extremely versatile
- EU 1935/2004 - conform
- EU 10/2011 - conform
- FDA – conform



#### Target Industries

- Mechanical industry
- Conveying industry
- Food industry
- Chemical industry

#### Characteristics and standard values

| Properties<br>Physical properties             | Method                                        | PE 1000 - natural         |                                |
|-----------------------------------------------|-----------------------------------------------|---------------------------|--------------------------------|
|                                               |                                               | SI                        | US                             |
| Molecular-weight                              | k.a                                           | ~ 0.5 Mio. g/mol.         | ~ 0.5 Mio. g/mol.              |
| Density                                       | DINENISO 1183-1 (04/2013)<br>ASTM D792        | > 0.930 g/cm <sup>3</sup> | > 58.058 lb/ft <sup>3</sup>    |
| Notched impact strength                       | DINENISO 11542-2 (01/2010)                    | > 170 kJ/m <sup>2</sup>   | > 80.835 ft-lb/in <sup>2</sup> |
| Abrasion-Index (Sand-Slurry)                  | DINENISO 15527 (05/2013)                      | 100                       | 100                            |
| Tensile strength at yield<br>(1B - 50mm/Min.) | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 18 N/mm <sup>2</sup>    | > 2610 psi                     |
| Elongation (Break / 1B – 50 mm/Min.)          | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 350 %                   | > 350 %                        |
| Tensile-E-modulus (1B – 1 mm/Min.)            | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 650 N/mm <sup>2</sup>   | > 94250 psi                    |
| Static Friction                               | ASTM D 1894 (2011)                            | ~ 0.15 - 0.20             | ~ 0.15 - 0.20                  |
| Dynamic Friction                              | ASTM D 1894 (2011)                            | ~ 0.10 - 0.15             | ~ 0.10 - 0.15                  |
| Shore-D-Hardness, 3 sec. value<br>6 mm plate  | DINENISO 868 (10/2003)                        | 61 – 65 D                 | 61 – 65 D                      |
| Ball indentation hardness                     | DINENISO 2039                                 | ~ 35 N/mm <sup>2</sup>    | ~ 5075 psi                     |
| Water absorption                              | DINENISO 62 (05/2008)                         | < 0.01 %                  | < 0.01 %                       |



## Werkstoffdatenblatt PE 1000 natural

| Thermal properties                              | Method                     | PE 1000 - natural               |                                              |
|-------------------------------------------------|----------------------------|---------------------------------|----------------------------------------------|
|                                                 |                            | SI                              | US                                           |
| Melting Piont (DSC)                             | DINENISO 11357-1 (03/2010) | 133 - 135 °C                    | 271.4 – 275 °F                               |
| Thermal Conductivity                            | Wire method                | ~ 0.41 W/m*K                    | ~ 2.84253<br>(BTU-in)/hr-ft <sup>2</sup> -°F |
| Max. operation temperature                      | Literature                 | 80 °C                           | 176 °F                                       |
| Coefficient of thermal expansion<br>(23 – 80°C) | ISO 11359                  | ~ 0.00015 - 0.00020<br>mm/mm °C | ~ 0.000083 - 0.000111<br>in/in °F            |

| Electrical properties          |                           |                  |                  |
|--------------------------------|---------------------------|------------------|------------------|
| Volume resistivity             | DINEN 62631-3-1 (01/2017) | > 1.0E+14 Ohm*cm | > 1.0E+14 Ohm*cm |
| Surface resistivity            | DINEN 62631-3-2 (10/2016) | > 1.0E+13 Ohm    | > 1.0E+13 Ohm    |
| ATEX-Directive – TÜV approved! | ATEX-Directive            | ---              | ---              |
| ESD-D                          | ---                       | --- Ohm          | --- Ohm          |

| Burning properties                    |          |          |          |
|---------------------------------------|----------|----------|----------|
| Fire resistance (Self-classification) | DIN 4102 | B2 Class | B2 Class |
| Fire resistance (Self-classification) | UL94     | HB Class | HB Class |

| Physiological properties |  |        |        |
|--------------------------|--|--------|--------|
| Food compliant           |  | EU/FDA | EU/FDA |

The above data are based on the present knowledge and are given without guarantee. Existing laws and conditions are to be respected by the user of our products. The decision about the suitability of a material for a certain application must be made by the user. We reserve the right to alter the indicated values after a 15 mm thick sheet.

2020/09/24

## Material data sheet

### PE 1000 black

PE 1000 black – is an ultra-high-molecular-low pressure polyethylene (UHMW-PE) with a molecular weight ~ 500.000 g/mol..

Colour: black / similar RAL9005

#### Properties

- good wear resistance
- very high notched impact strength
- very good sliding properties
- extremely versatile



#### Target Industries

- Mechanical engineering
- Conveying industry
- Food industry
- Chemical industry

#### Characteristics and standard values

| Properties<br>Physical properties             | Method                                        | PE 1000 - black           |                               |
|-----------------------------------------------|-----------------------------------------------|---------------------------|-------------------------------|
|                                               |                                               | SI                        | US                            |
| Molecular-weight                              | k.a.                                          | ~ 0.5 Mio. g/mol.         | ~ 0.5 Mio. g/mol.             |
| Density                                       | DINENISO 1183-1 (04/2013)<br>ASTM D792        | > 0.930 g/cm <sup>3</sup> | > 58.058 lb/ft <sup>3</sup>   |
| Notched impact strength                       | DINENISO 11542-2 (01/2010)                    | > 140 kJ/m <sup>2</sup>   | > 66.57 ft-lb/in <sup>2</sup> |
| Abrasion-Index (Sand-Slurry)                  | DINENISO 15527 (05/2013)                      | 100                       | 100                           |
| Tensile strength at yield<br>(1B - 50mm/Min.) | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 18 N/mm <sup>2</sup>    | > 2610 psi                    |
| Elongation (Break / 1B – 50 mm/Min.)          | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 350 %                   | > 350 %                       |
| Tensile-E-modulus (1B – 1 mm/Min.)            | DINENISO 527-2 (06/2012)<br>ASTM D 638 (2010) | > 650 N/mm <sup>2</sup>   | > 94250 psi                   |
| Static Friction                               | ASTM D 1894 (2011)                            | ~ 0.15 - 0.20             | ~ 0.15 - 0.20                 |
| Dynamic Friction                              | ASTM D 1894 (2011)                            | ~ 0.10 - 0.15             | ~ 0.10 - 0.15                 |
| Shore-D-Hardness, 3 sec. value<br>6 mm plate  | DINENISO 868 (10/2003)                        | 61 – 65 D                 | 61 – 65 D                     |
| Ball indentation hardness                     | DINENISO 2039                                 | ~ 35 N/mm <sup>2</sup>    | ~ 5075 psi                    |
| Water absorption                              | DINENISO 62 (05/2008)                         | < 0.01 %                  | < 0.01 %                      |



## Werkstoffdatenblatt PE 1000 black

| Thermal properties                           | Method                     | PE 1000 - black              |                                |
|----------------------------------------------|----------------------------|------------------------------|--------------------------------|
|                                              |                            | SI                           | US                             |
| Melting Piont (DSC)                          | DINENISO 11357-1 (03/2010) | 133 - 135 °C                 | 271.4 – 275 °F                 |
| Thermal Conductivity                         | Wire method                | ~ 0.41 W/m*K                 | ~ 2.84253 (BTU-in)/hr-ft²-°F   |
| Max. operation temperature                   | Literature                 | ~ 80 °C                      | 176 °F                         |
| Coefficient of thermal expansion (23 – 80°C) | ISO 11359                  | ~ 0.00015 - 0.00020 mm/mm °C | ~ 0.000083 - 0.000111 in/in °F |

| Electrical properties          |                           |                  |                  |
|--------------------------------|---------------------------|------------------|------------------|
| Volume resistivity             | DINEN 62631-3-1 (01/2017) | > 1.0E+14 Ohm*cm | > 1.0E+14 Ohm*cm |
| Surface resistivity            | DINEN 62631-3-2 (10/2016) | > 1.0E+14 Ohm    | > 1.0E+14 Ohm    |
| ATEX-Directive – TÜV approved! | ATEX-Directive            | ---              | ---              |
| ESD-D                          | ---                       | --- Ohm          | --- Ohm          |

| Burning properties                    |          |          |          |
|---------------------------------------|----------|----------|----------|
| Fire resistance (Self-classification) | DIN 4102 | B2 Class | B2 Class |
| Fire resistance (Self-classification) | UL94     | HB Class | HB Class |

| Physiological properties |  |        |        |
|--------------------------|--|--------|--------|
| Food compliant           |  | EU/FDA | EU/FDA |

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