

#### Product description

Ultramid® A 216 Black 21 N is an unreinforced polyamide 66, standard viscosity, for injection moulding. This grade offers all of the primary properties of unreinforced polyamide 66 : thermal and mechanical properties, chemical resistance, impact and abrasion resistance.

#### Injection Notes

The material is supplied in airtight bags, ready for use. In case that the virgin material has absorbed moisture, it must be dried with a dehumidified air drying equipment, dew point mini -20°C. Recommended time 2-4h.

Injection Advice:

- For unfilled polyamides, BASF SE recommends the use of high alloy steel with a low chromium content. For example: X38CrMoV5-1 (EN Norm) - 1.2367 /1.2343 (DIN Norm). In the case of high requirements on surface quality a mould temperature of up to 120°C can be considered.
- The processing parameters like processing temperatures are a recommendation and can be adjusted in function of injection machine size, part geometry / design.

#### Disclaimer

The information contained in this document is given in good faith based on our current knowledge. It is only an indication and it is in no way binding. This information must on no account be used as a substitute for necessary prior tests which alone can ensure that a product is suitable for a given use. ANY WARRANTY OF PRODUCT PERFORMANCE, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY EXCLUDED. Users are responsible for ensuring compliance with local legislation and for obtaining the necessary certifications and authorizations. Users are requested to check that they are in possession of the latest version of this document, and BASF SE is at their disposal to supply any additional information.

#### Safety Information

Detailed information regarding safety are available on the safety data sheet (MSDS). MSDS is sent with the first material order or available by contacting our customer services

#### Regulations Compliance

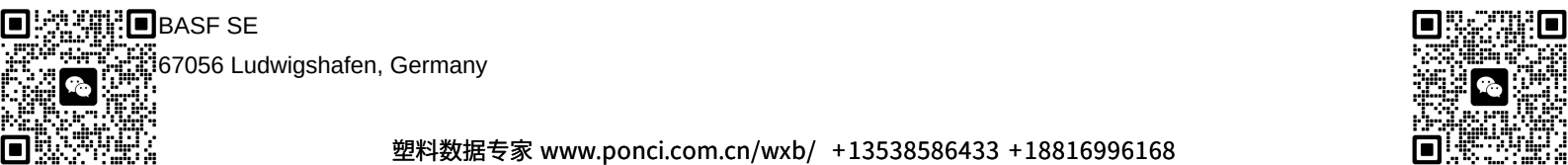
This product is not intended to be used for the following regulated market: food contact, drinking water, toys, cosmetics or medical devices.

This grade complies with RoHS Directive 2011/65/EU, 2015/863 and local regulations as amended.

#### Customer Services

Our customer services are not only concerned with manufacturing and supply of Engineering Plastics products. We are available to assist our customers in finding technical solutions that meet their requirements. Specific support is in particular offered on:

- Material selection
- Material testing
- Parts design advice, training for design engineers
- Part testing
- Design simulation
- Processing through different technologies
- Assembly and post-processing technology expertise
- Parts optimization through Computer Aided Design



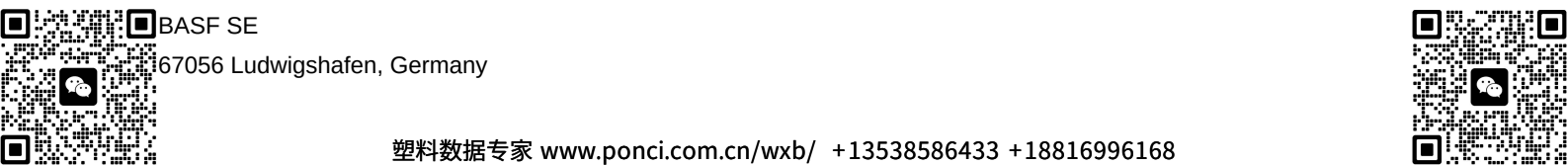
## Product Information

| Typical values for uncoloured product at 23 °C <sup>1)</sup>         | Test method       | Unit              | Values <sup>2)</sup> |
|----------------------------------------------------------------------|-------------------|-------------------|----------------------|
| <b>General Properties</b>                                            |                   |                   |                      |
| Asia Pacific                                                         | -                 | -                 | +                    |
| Processing: Injection moulding (M), Extrusion (E), Blow moulding (B) | -                 | -                 | M                    |
| Colour: black (bk), uncoloured (un), coloured (co), transparent (tr) | -                 | -                 | bk,un,co             |
| Pellets                                                              | -                 | -                 | +                    |
| <b>Physical</b>                                                      |                   |                   |                      |
| Molding shrinkage (parallel)                                         | ISO 294-4         | %                 | 1.60                 |
| Molding shrinkage (normal)                                           | ISO 294-4         | %                 | 1.60                 |
| Water absorption, 24 h in water, 23 °C                               | ISO 62            | %                 | 1.3                  |
| Moisture absorption, equilibrium 23°C/50% r.h                        | similar to ISO 62 | %                 | 2.90                 |
| Density                                                              | ISO 1183          | kg/m <sup>3</sup> | 1140 / -             |
| <b>Mechanical properties</b>                                         |                   |                   |                      |
|                                                                      |                   |                   | dry / cond.          |
| Tensile modulus                                                      | ISO 527-1/-2      | MPa               | 3300 / 1500          |
| Yield stress, 50 mm/min                                              | ISO 527-1/-2      | MPa               | 85 / 25              |
| Tensile stress at yield, 2 in/min (ASTM)                             | ASTM D 638        | MPa               | 85 / -               |
| Stress at break                                                      | ISO 527-1/-2      | MPa               | 80 / 45              |
| Yield strain, 50 mm/min                                              | ISO 527-1/-2      | %                 | 4.5 / 50             |
| Strain at break                                                      | ISO 527-1/-2      | %                 | > 30 / > 100         |
| Tensile elongation at break, 2 in/min (ASTM)                         | ASTM D 638        | %                 | 30 / -               |
| Flexural modulus                                                     | ISO 178           | MPa               | 2800 / 1300          |
| Flexural modulus (ASTM)                                              | ASTM D 790        | MPa               | 3000 / -             |
| Flexural strength                                                    | ISO 178           | MPa               | 120 / 70             |
| Flexural strength (ASTM)                                             | ASTM D 790        | MPa               | 125 / -              |
| Charpy notched impact strength ISO 179/1eA (23°C)                    | ISO 179/1eA       | kJ/m <sup>2</sup> | 4.5 / 10             |
| Charpy impact strength ISO 179-1eU (23°C)                            | ISO 179/1eU       | kJ/m <sup>2</sup> | 110 / -              |
| Izod notched impact strength ISO 180/A (23°C)                        | ISO 180/A         | kJ/m <sup>2</sup> | 5 / 9                |
| Izod notched impact strength ASTM D 256 (23 °C)                      | ASTM D 256        | J/m               | 55 / -               |
| Izod impact strength ISO 180/U (23°C), MPTS                          | ISO 180/U         | kJ/m <sup>2</sup> | N / N                |
| <b>Thermal properties</b>                                            |                   |                   |                      |
| HDT B (0.45 MPa)                                                     | ISO 75-1/-2       | °C                | 200                  |
| HDT B (0.45 MPa), ASTM                                               | ASTM D 648        | °C                | 220                  |
| HDT A (1.80 MPa)                                                     | ISO 75-1/-2       | °C                | 75                   |
| HDT A (1.82 MPa), ASTM                                               | ASTM D 648        | °C                | 75                   |
| Melting temperature, DSC (10°C/min)                                  | ISO 11357-1/-3    | °C                | 263                  |
| <b>Electrical properties</b>                                         |                   |                   |                      |
|                                                                      |                   |                   | dry / cond.          |
| Surface resistivity                                                  | IEC 62631-3-2     | Ohm               | 1E15 / 1E14          |
| Volume resistivity                                                   | IEC 62631-3-1     | Ohm*m             | 1E13 / 1E12          |
| Electric strength (d = 0.8 mm)                                       | IEC 60243-1       | kV/mm             | 35 / -               |
| Electric strength (d = 2.0 mm)                                       | IEC 60243-1       | kV/mm             | 22 / -               |
| Relative permittivity (1 MHz)                                        | IEC 62631-2-1     | -                 | 3.5 / -              |
| Dissipation factor (1 MHz)                                           | IEC 62631-2-1     | E-4               | 0.033 / -            |
| Comparative tracking index, CTI, test liquid A                       | IEC 60112         | -                 | 600 / 600            |
| <b>Flammability</b>                                                  |                   |                   |                      |
| Burning Behav. at 1.6 mm nom. thickn.                                | IEC 60695-11-10   | class             | V-2                  |
| Burning Behav. at thickness 0.8 mm                                   | IEC 60695-11-10   | class             | V-2                  |
| Burning Behav. at thickness 3.2 mm                                   | UL-94, IEC 60695  | class             | V-2                  |
| Glow Wire Flammability Index (0.8 mm)                                | IEC 60695-2-12    | °C                | 650                  |
| Glow Wire Ignition Temperature (1.6 mm)                              | IEC 60695-2-13    | °C                | 650                  |

### Footnotes

1) If product name or properties don't state otherwise.

2) The asterisk symbol "\*" signifies inapplicable properties.



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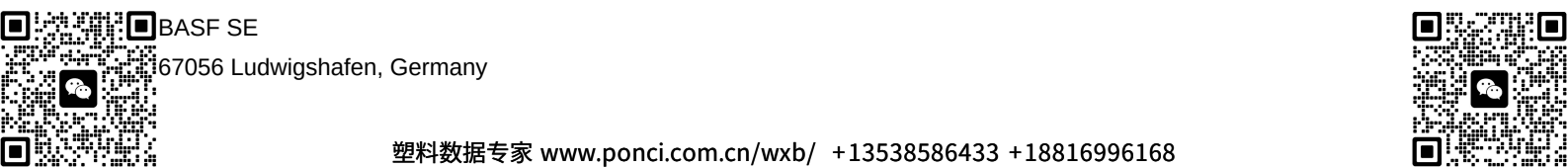
67056 Ludwigshafen, Germany

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|------------------------------------------------------------------------------|-------------|------|----------------------|
| <b>Injection</b>                                                             |             |      |                      |
| Pre/Post-processing, Pre-drying, Temperature                                 | -           | °C   | <b>80</b>            |
| Pre/Post-processing, max. allowed water content                              | -           | %    | <b>0.2</b>           |
| Injection molding cylinder temperature 1 (feed zone)                         | -           | °C   | <b>265 - 275</b>     |
| Injection molding cylinder temperature 2 (compression)                       | -           | °C   | <b>270 - 280</b>     |
| Injection molding cylinder temperature 3 (metering-zone, head room of screw) | -           | °C   | <b>280 - 285</b>     |
| injection molding, Mold temperature, range                                   | ISO 294     | °C   | <b>60 - 80</b>       |

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