

What is PE 1000 conductive black

PE 1000 conductive black

PE 1000 (PE-UHMW), electrically conductive

PE 1000 conductive black is an ultra-high molecular weight polyethylene (PE-UHMW, PE 1000) from virgin material, made electrically conductive with conductive carbon black (surface resistivity $\leq 10^6 \Omega$). It combines the extreme wear resistance, impact strength and sliding properties typical of PE 1000 with safe dissipation of electrostatic charges – for example in conveyor systems for bulk materials or in potentially explosive areas.

Properties

In the sand slurry test, PE 1000 conductive black shows a wear resistance that exceeds most metals and all other thermoplastics, does not break in the notched impact test and retains its toughness down to -150°C . The coefficient of sliding friction of about 0.2 enables jerk-free dry running; water absorption is practically zero, the material is resistant to most acids, alkalis and solvents and physiologically harmless. The low volume resistivity ($\leq 10^4 \Omega\cdot\text{cm}$) permanently prevents electrostatic charging and dust attraction.

PE-UHMW has low stiffness and strength (yield stress $\approx 20 \text{ MPa}$), high thermal expansion and can only be used continuously up to 80°C ; it cannot be bonded and is not resistant to strongly oxidising acids. The conductive formulation is available in black only; food contact is only possible after separate confirmation.

Advantages

- Electrically conductive ($\leq 10^6 \Omega$), permanent and independent of humidity
- Highest wear resistance, no break in the notched impact test
- Very low friction, no stick-slip, practically no water absorption
- Service down to -150°C , chemically resistant, UV-stabilised

Disadvantages

- Low stiffness and strength, high thermal expansion
- Continuous service temperature only 80°C , cannot be bonded
- Not generally declared for food contact (see FDA declaration)

Processing

PE 1000 conductive black can be machined using all conventional cutting methods; sharp HSS or carbide tools with a large rake angle and good chip removal prevent smearing – because of the low thermal conductivity, heat build-up should be avoided. Cooling with compressed air or water is sufficient.

Because of the high thermal expansion, tolerances and installation clearances must be designed for temperature; bonding is only possible after surface pretreatment, mechanical joints (screwing, riveting) are preferable.

Typical Applications

PE 1000 conductive black is used wherever sliding and wear parts must also dissipate electrostatic charges – for example in conveyor technology for bulk materials and powders, in mechanical engineering, in the electrical industry and in potentially explosive areas.

- Linings of silos, hoppers and chutes for bulk materials
- Wear strips, chain guides and deflection elements in hazardous areas
- Guide and wear parts in electronics and packaging production

Typical Properties

- Electrically conductive (surface resistivity $\leq 10^6 \Omega$)
- Highest wear resistance and impact strength

Product Examples

- Silo and hopper linings
- Wear strips and chain guides
- Guide and wear parts

Typical Industries

- Conveyor Technology
- Mechanical Engineering
- Electrical Industry
- Potentially Explosive Areas

- Very low friction, no stick-slip
- Service down to -150 °C, UV-stabilised

	Test Method	Unit	Value
General Properties			
Density	ISO 1183-1	g / cm ³	< 0.96
Molecular weight	Average	million g / mol	> 5
Water absorption (23 °C)	ISO 62	%	< 0.01
Flammability	UL 94		HB
Mechanical Properties			
Yield stress	ISO 527-2	MPa	≈ 20
Elongation at break	ISO 527-2	%	> 300
Tensile modulus of elasticity	ISO 527-2	MPa	> 700
Notched impact strength	ISO 179	kJ / m ²	no break
Ball indentation hardness	ISO 2039-1	MPa	> 30
Shore hardness	ISO 868	scale D	61 – 63
Abrasion resistance (sand slurry test)	ISO 15527	%	110
Coefficient of sliding friction	Average		≈ 0.2
Thermal Properties			
Melting temperature	ISO 11357	°C	130 – 135
Thermal conductivity (23 °C)	DIN 52612	W / (m * K)	0.40
Coefficient of linear thermal expansion (23–60 °C)	ISO 11359-2	10 ⁻⁶ / K	200
Service temperature, long term	Average	°C	-150 ... 80
Service temperature, short term (max.)	Average	°C	90
Electrical Properties			
Volume resistivity	IEC 60093	Ω · cm	≤ 10 ⁴
Surface resistivity	IEC 60093	Ω	≤ 10 ⁶