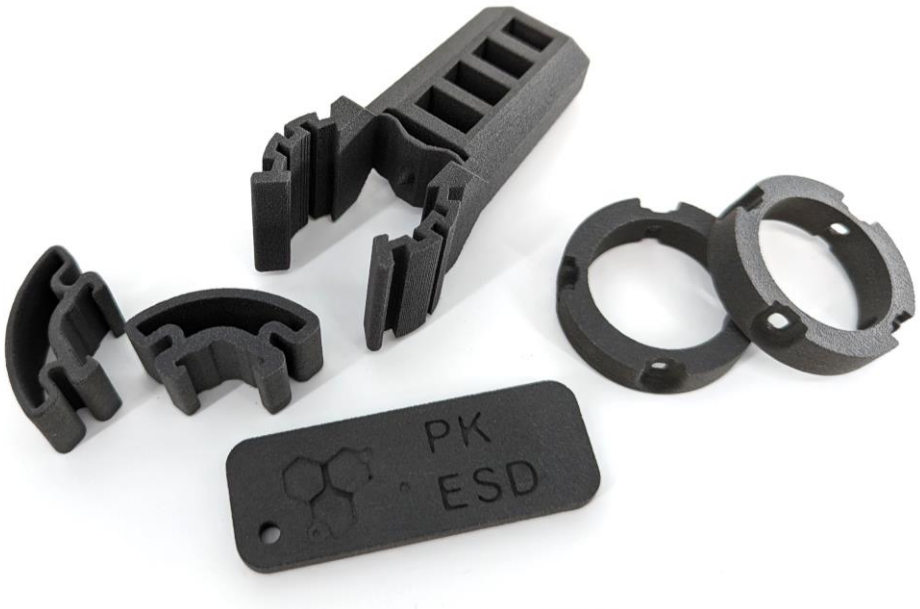
mechnano

Technical Datasheet

PK ESD

Strong, Tough, & Ductile Static Dissipative Powder for Laser Sintering

Gray



PK ESD

PK ESD is a tough static dissipative engineered polymer for laser sintering. It consists of an eco-friendly and non-toxic PolyKetone made from carbon monoxide and olefins coated with discrete functionalized carbon nanotubes (D'Func) to achieve consistent static dissipative properties.

Advantages
- Consistent surface resistivity
- Impact resistance 100 J/m
- Good elongation
- Fuel resistance
- Low toxicity

Industries
- Electronics
- Automotive
- Aerospace & Defense
- Industrial Manufacturing
- Oil & Gas

Applications
- Electronic housings
- Jigs & fixtures
- Wear-and-tear parts
- Tools for electronics shops
- Fuel systems

PROPERTIES

Mechanical Properties	xy (virgin)	xy (50/50)	z (50/50)	Units	Method
Ultimate Tensile Strength	55.6	51.8	49.4	MPa	ASTM D 638-14
Tensile Modulus	1101.6	1049.4	980.2	MPa	ASTM D 638-14
Elongation at Break	48.7	44.2	20.2	%	ASTM D 638-14
Flexural Stress @5% Strain[1]	**	35.8	**	MPa	ASTM D 790-15
Flexural Modulus	**	1021.6	**	MPa	ASTM D 790-15
IZOD Impact Strength (Notched)	**	103.6	**	J/m	ASTM D 256-10
Hardness Shore "D"	75.4	75.0	74.8		ASTM D 2240
Electrical Properties					
Surface Resistivity[2]	10^7	10^7	10^7	Ω	ANSI ESD S11.11
Thermal Properties					
Heat Deflection Temperature (0.455 MPa)		146.5		°C	ASTM D 648[3]
Heat Deflection Temperature (1.82 MPa)		126.7		°C	ASTM D 648[3]
Other Properties					
Water Absorption		0.9		%	ASTM D 570-98
Powder Properties					
Color		Gray			Visual
Bulk Density		0.51		g/cm^3	ASTM D1895
Melt Temperature		197		°C	DSC
Particle Size Distribution (µm)		D10: 35 D50: 50 D90: 76		µm µm µm	Laser Diffraction

Notes

[1]Specimens did not break within the 5% strain limit when tested by Procedure A and B per ASTM D790-15. Beyond 5% strain, this test is not applicable. Testing continued until 20% strain without a break.
[2]The surface resistivity is consistent from specimen to specimen and independent of part orientation and powder refresh rate.
[3]Measured using ElectroForce DMA in air.

PROCESS GUIDE

Key Process Parameters

Farsoon CO_2 & FLIGHT Systems

Parameter	Value	Unit
Part Bed Temperature	177	°C
Feed Temperature	140	°C
Piston Temperature	165	°C
Cylinder Temperature	135	°C
Layer Thickness	0.1	mm
Energy Density	18.5	mJ/mm^2

Printing

1. The Laser Sintering machine is required to uphold an inert environment of less than 1% oxygen throughout the build process to prevent oxidation and material degradation.
2. To optimize powder flow and prevent clumping, the machine must recoat effectively. If issues arise, improve flow by reducing temperature and material quantity fed.
3. To ease machine transition from certain PA materials, clean roller thoroughly. Use gentle media blasting or sand roller with 240 grit sandpaper for complete residue removal.
4. Material susceptibility to machine leaks can cause oxidation and formation of cold spots, leading to undesirable orange peel effect. Maintain optimal condition of all machine seals to prevent such occurrences.
5. The material does not exhibit a tendency to curl, thus the occurrence of curling phenomena in parts within the part bed usually suggests:
    - Extremely low temperature in the part bed.
    - Excessive energy causing the powder to clump and adhere around the perimeters of the melt pool.
6. When exposed to high temperatures, the material may clump together. This can happen around the build plate near the part bed. It's unlikely that these clusters will affect the part quality unless the temperature reaches exceedingly high levels.

Post Printing

1. Keep part cake in machine under inert atmosphere until part bed surface temp cools to 60°C, then transfer to inert environment to continue cooling till cake center reaches 60°C.
2. Exposing semi-molten parts to oxygen for over 15 minutes can trigger an exothermic reaction, causing temperatures over 280°C in the part bed center. Ensure cooling under an inert environment.
3. Part cake, overflow, and remaining feed material should be sieved at 140 mesh (106µm) for reuse.
4. Material refresh: 40% virgin content needed for steady processing. Reduced content impacts lifespan and performance.
5. Material degraded by oxidation turns brown/amber and produces odor. This material should be discarded.

Changes from Version 1.1 to 1.2 include Process Guide.