



ADCNT PA6 MB
ELECTRICALLY CONDUCTIVE
CARBON NANOTUBES-
PA6 MASTERBATCH

Electrically Conductive Carbon Nanotubes - PA6 Masterbatch

1. Product identification

- Product name: **ADCNT PA6 MB**
- Polymer matrix: **Polyamide 6 (PA6)**
- Conductive additive: **Customized carbon nanotubes (CNT)**
- Carbon nanotube loading: **15% ± 1 wt.%**
- Physical form: **Black pellets**



2. Product description

ADCNT-PA6 MB is a high performance concentrate masterbatch based on polyamide 6 and Customized carbon nanotubes, engineered to deliver permanent ESD and conductivity with very low filler loading. It achieves antistatic, ESD and highly conductive ranges, where conventional carbon black systems typically need much higher carbon levels and sacrifice flow and toughness.



3. Typical properties (masterbatch)

Property	Test method	Value
Color	Visual	Black
Occurrence	Visual	Black pellets
CNT loading	–	15% ± 1 wt.%
Real density	ISO 1183	556 g/L
MFI (275 °C / 2.16 kg)	ASTM D1238	Not measurable (very low flow)

4. Electrical properties after dilution in PA6

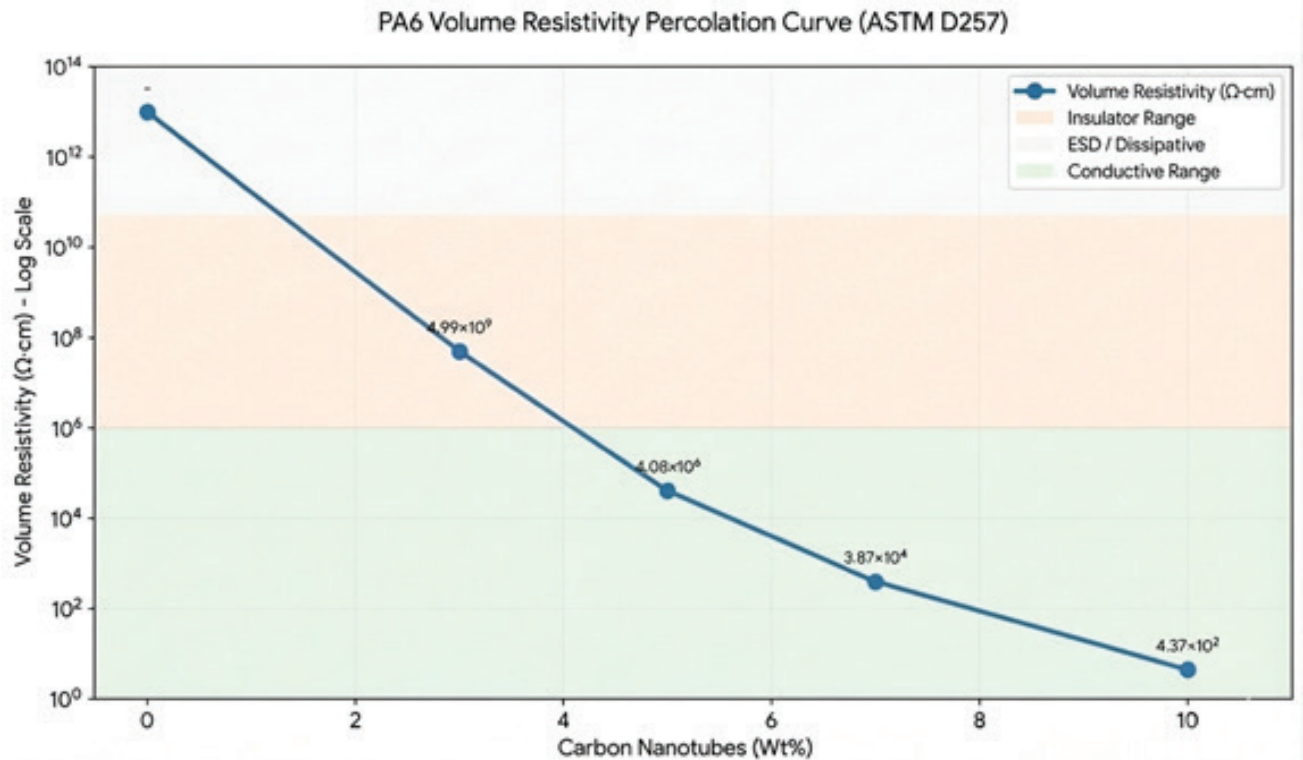
4.1 Appearance and flow after dilution of 15% MB to different wt.% of CNT

Property	Test method	Neat PA6	3% CNT	5% CNT	7% CNT	10% CNT	12% CNT	15% CNT
Color	Visual	White	Black	Black	Black	Black	Black	Black
Occurrence	Visual	White pellets	Black pellets	Black pellets	Black pellets	Black pellets	Black pellets	Black pellets
MFI (275 °C / 2.16 kg, g/10 min)	ASTM D1238	50	~27	~13	~2	~1	NM	NM

("NM" = not measurable)

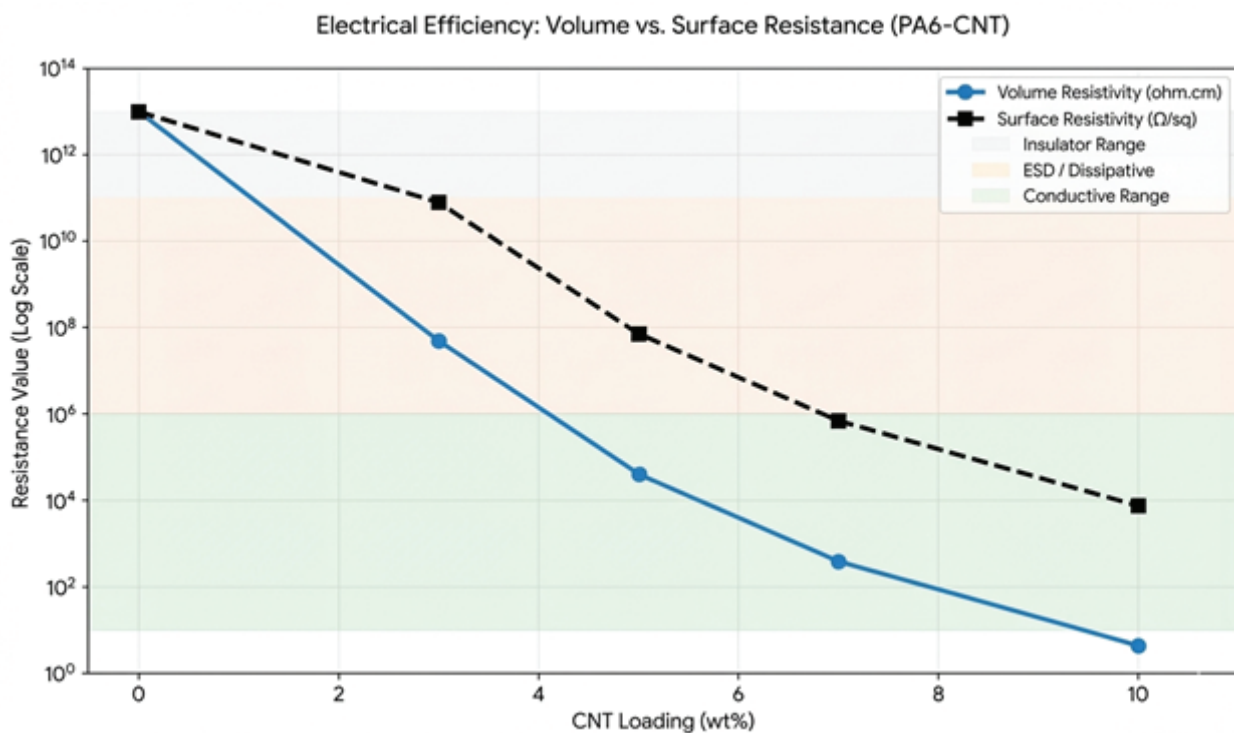
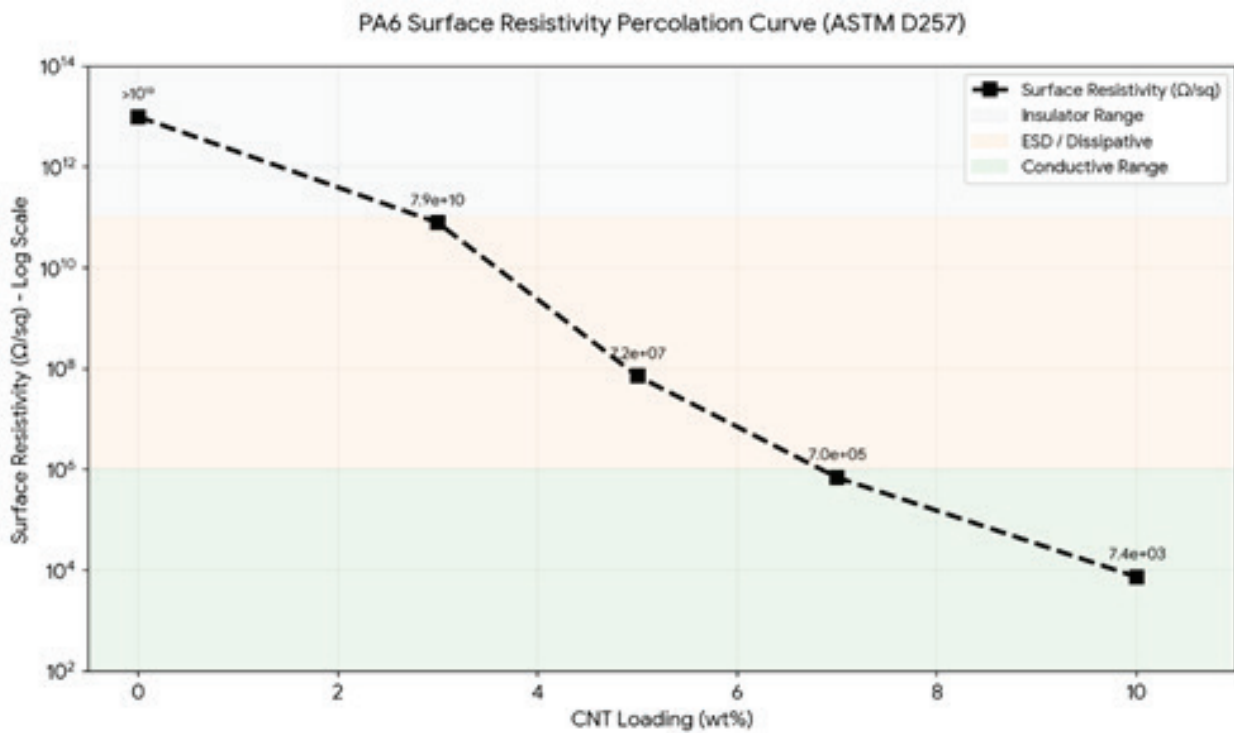
4.2 Volume resistivity vs CNT loading

Cnt in PA6 (Wt%)	Volume Resistivity ($\Omega \cdot \text{cm}$)
0	-
3%	$4.99 \times 10^9 \Omega \cdot \text{cm}$
5%	$4.08 \times 10^6 \Omega \cdot \text{cm}$
7%	$3.87 \times 10^4 \Omega \cdot \text{cm}$
10%	$4.37 \times 10^2 \Omega \cdot \text{cm}$



4.3 Surface resistivity vs CNT loading

CNT in PA6 (wt%)	Surface Resistivity (Ω/sq)	Approx. Surface Resistivity Band
0	>10 ¹³ Ω/sq	Insulator
3	7.91 × 10 ¹⁰ Ω/sq	~10 ¹⁰ Ω/sq
5	7.16 × 10 ⁷ Ω/sq	~10 ⁷ Ω/sq
7	6.97 × 10 ⁵ Ω/sq	~10 ⁵ Ω/sq
10	7.41 × 10 ³ Ω/sq	~10 ³ Ω/sq



- Volume Percolation:** At 3% loading, the volume resistivity drops from an insulator state to 4.99×10^9 ohm-cm, marking the onset of the conductive network.
- Conductive ESD Level:** By 7% loading, the material reaches 3.87×10^4 ohm-cm volume resistivity and 6.97×10^5 ohm/sq surface resistivity, putting it firmly in the Conductive ESD regime.

- **High Conductivity Peak:** At 10% loading, volume resistivity reaches its lowest point at 4.37×10^2 ohm-cm, providing high-performance electrical shielding.
- **Network Synchronization:** The curves for surface and volume resistance follow the same downward trend, ensuring the entire part is protected against static and interference.
- **Efficiency Advantage:** Unlike carbon black which requires much higher loads in PA6, this CNT system achieves highly conductive ratings (10^3 to 10^4 ohm range) with just 10% filler.

5. Recommended applications (PA6 + CNT MB)

Typical PA6 applications at 3–10 wt.% CNT:

- ESD and conductive connectors, housings and covers in automotive and E&E.
- Fuel system components and under hood parts requiring static dissipation.
- Conductive cable ties, clips, brackets and structural parts where PA6 stiffness and heat resistance are needed.
- EMI attenuating housings and shields at 7–10 wt.% CNT.

6. Processing guidelines (PA6 + CNT MB)

- **Drying:**
 - Dry PA6 and CNT MB to <0.1% moisture (e.g. 80 °C, 4–6 h in dehumidified air) before processing.
- **Processing temperature:**
 - Melt: 240–270 °C, depending on PA6 base grade.
 - Mold: 60–90 °C for good surface quality and dimensional stability.
- **Shear and mix:**
 - Use standard PA6 screws but avoid very high shear and long residence times to limit CNT breakage and maintain conductivity network.
 - Ensure good premixing of base PA6 and CNT masterbatch (tumbler or gravimetric dosing).

7. Storage and handling

- Store in sealed moisture proof packaging, in a cool, dry place.
- Protect from direct sunlight and high temperature.
- If bags have been open for a long time, re dry before use.
- Handle pellets to minimize dust; follow CNT related SDS recommendations for personal protection.

8. Required Masterbatch loading to achieve target CNT wt% in final PA6

- CNT concentration in Masterbatch: 15 ± 1 wt% in PA6.
- MB Loading = (Target CNT in final polymer / CNT concentration in Masterbatch)*100

Target Surface Resistivity band	Target CNT in PA6 (wt%)	Required CNT PA6 MB (wt%) loading in PA6
10^9 – 10^{11} Ω /sq (Antistatic)	3%	~ 20% MB
10^7 – 10^9 Ω /sq (ESD / dissipative)	5%	~ 33% MB
10^5 – 10^7 Ω /sq (Conductive ESD)	7%	~ 47% MB
10^3 – 10^4 Ω /sq (Highly conductive / EMI assist)	~10%	~ 67% MB

Disclaimer

The values are typical and are for very general guidance and must not be used as a basis for specifications as concrete. Information contained in this publication, and otherwise supplied to users, is based on our general experience and is given in good faith, but we are unable to accept responsibility in respect of factors which are outside our knowledge or control. No warranty, either expressed or implied, is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. Please refer to MSDS of respective products for safe use.

Contact us

Adnano Technologies Pvt Ltd

Address

Plot No 62/P D Ward No 35,
1st Cross Machenahalli Industrial
Area Bhadravati
Shivamogga - 577222
Karnataka, India

Tel: +91-8296734214

Email: info@ad-nanotech.com

Web: www.ad-nanotech.com