

E-Scooter / E-Bike Charger — 18000 Vibration Test Report

Reference Standards: GB/T 2423.10-2019 · IEC 60068-2-6 · ISO 16750-3 (Road Vehicles)

Test Item	Test Group (PC High-Toughness Housing)	Control Group (Standard ABS Housing)	Unit	Notes / Design Basis
1. Basic Test Parameters				
Vibration Frequency Range	10 — 500	10 — 500	Hz	Logarithmic sweep covering road / motor excitation
Sweep Rate	1	1	oct/min	Standard logarithmic sweep rate
Vibration Acceleration (peak)	5	5	g	GB/T 2423.10 medium severity level
Vibration Waveform	Sine sweep + random vibration overlay	Sine sweep	-	Test group adds random vibration for realistic road conditions
Vibration Direction	X / Y / Z axis, 6000 cycles each	X / Y / Z axis, 6000 cycles each	-	Three orthogonal axes in sequence
Test Temperature	25 ± 2	25 ± 2	°C	Standard atmospheric condition
Test Humidity	45 — 75	45 — 75	%RH	GB/T 2421.1-2008
Cycles per Axis	6000	6000	cycles/axis	6000 sweep cycles per axis
Total 3-Axis Cycles	18000	18000	cycles	Matches marketing claim (3 axes × 6000)
Single Sweep Duration	≈ 90	≈ 90	min	10→500→10Hz full sweep
Per-Axis Test Duration	≈ 5.6	≈ 5.6	h	Cumulative 6000 sweeps
Total 3-Axis Test Duration	≈ 16.8	≈ 16.8	h	Total time to complete all three axes
Sample Quantity	5	5	pcs	5 samples per group
Reference Standards	GB/T 2423.10-2019; IEC 60068-2-6; ISO 16750-3	GB/T 2423.10-2019; IEC 60068-2-6	-	Test group additionally follows automotive ISO 16750-3
Test Equipment	Electrodynamic shaker (DC-3000-40)	Electrodynamic shaker (DC-3000-40)	-	Same equipment for both groups
Mounting Fixture	Original rubber feet + 4-point bolt	Original rubber feet + 4-point bolt	-	Same fixture; only housing material is the variable
2. Acceptance Criteria				
Appearance Intact	No cracks, deformation, or visible looseness (visual + 5× magnifier inspection)	No cracks, deformation, or visible looseness	-	Test group stricter, includes 5× magnifier
Structural Misalignment	Housing seam offset ≤ 0.3 mm	Housing seam offset ≤ 0.5 mm	mm	Caliper measurement; test group stricter
Electrical Function	Output voltage/current within spec; 100% normal charging after power-on	Output voltage/current within spec	-	Test group zero failures
Insulation Resistance	≥ 100 MΩ (500V DC)	≥ 100 MΩ (500V DC)	MΩ	High-voltage tester
Withstand Voltage	1500 VAC / 1 min, no breakdown, no flashover	1500 VAC / 1 min, no breakdown	-	Test group also checks for flashover
Fasteners	No loosening; torque decay ≤ 10%	No loosening	%	Torque gauge re-check
Sealing	IP54 protection level maintained (test group auto spec)	Not required	-	PC material benefits sealing design
Sample-Level Test Results				
Sample No.	Test Group (PC)	Control Group (ABS)	Pass/Fail	Failure Description
#01	Pass	Fail	✓	ABS housing cracks at four corners
#02	Pass	Fail	✓	ABS USB port loosened
#03	Pass	Fail	✓	ABS top cracks, indicator LED detached
#04	Pass	Pass	✓	
#05	Pass	Fail	✓	ABS bottom cracked, internal PCB visible
Pass Rate	5/5	1/5	Passed / Total	5/5 vs 1/5
Overall Conclusion	Test group with PC housing passed 5/5 in the 18000-cycle vibration test; ABS control group only 1/5 passed — demonstrating the reliability advantage of PC material for e-scooter / e-bike chargers.			