

USER GUIDE EPA MATERIAL SPECIFICATION

Appendix I

RESISTANCE, RESISTIVITY AND CHARGE DECAY IN ESD PROTECTED AREAS

Item requirements	Surface resistance R_s or end-to-end resistance R_e or point-to-point resistance R_p Ω	Resistance to EPA ground or groundable point R_g Ω	Charge decay (see note 5)
Working surfaces storage Racks, trolleys and carts	$1 \times 10^4 \leq R_p \leq 1 \times 10^{10}$ see note 6	$7.5 \times 10^5 \leq R_g \leq 1 \times 10^7$ see note 6	
Floors		$\leq R_g \leq 1 \times 10^9$ For minimum value See note 1 See note 2	
Seating		$R_g \leq 1 \times 10^{10}$	
Garments	$\leq R_p \leq 1 \times 10^{12}$ For minimum value, see note 1		To 10% of initial value (maximum 1 000 V) in less than 2 s
Gloves and finger cots			To 10% of initial value (maximum 1 000 V) in less than 2 s
Wrist bands not worn		$R_p \leq 1 \times 10^5$	
Cords for wrist bands	$7.5 \times 10^5 \leq R_e \leq 5 \times 10^8$ See note 3		
Tools	See note 4	$R_g \leq 1 \times 10^{12}$ See notes 1 and 4	To 10% of initial value (maximum 1 000 V) in less than 2 s
Ionizer			To decay from 1 000 V to 100 V in 20 s maximum
System Requirements			
Wrist strap as worn		$7.5 \times 10^5 \leq R_g \leq 3.5 \times 10^7$	
Gloves and finger cots as worn		$7.5 \times 10^5 \leq R_g \leq 1 \times 10^{12}$	
Footwear as worn on metal plate		5×10^4 (1×10^5 per shoe) $\leq R_g \leq 1 \times 10^8$ See note 2	

Note 1 – There is no minimum value of resistance for the protection of ESDS. However, a minimum resistance value may be required for the protection for safety.

Note 2 – When the footwear/floor systems are used as the primary means of grounding personnel, the resistance of the combination shall be determined by the ESD co-ordinator, and is recommend to be between $7.5 \times 10^5 \Omega$ and $3.5 \times 10^7 \Omega$

Note 3 – Maximum resistance to EPA ground values may be increased to ensure compliance with a resistance of $7.5 \times 10^5 \Omega$ minimum per 250 a.c. or 500 V d.c. ($1 \times 10^8 \Omega$ nominal). The resistance shall have a minimum power rating of $1/4 \text{ W}$ per 250 V a.c. or 500 Vd.c.

Note 4 – See IEC 61340-5-2.

Note 5 – Only mandatory where surface resistance, point-to-point resistance or resistance-to-groundable point $> 10^{10} \Omega$ or where material is of non-homogeneous woven or other construction containing insulating areas.

Note 6 – It is allowed, when approved by the ESD co-ordinator, to use surfaces which are “hard ground” i.e. less than $1 \times 10^4 \Omega$ to EPA ground.

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MATERIAL SPECIFICATION

Appendix II

THE PACKAGING ESD

	INSIDE EPA		OUTSIDE EPA	
	INTIMATE	PROXIMITY	INTIMATE	PROXIMITY
ESDS	Either low-charging and electrostatic conductive or Low-charging and electrostatic dissipative (for powered ESDS only low charging and electrostatic dissipative above $1 \times 10^8 \Omega$ shall be used)	Low-charging and electrostatic discharge shielding or low-charging and electrostatic conductive or electronic dissipative	As for inside EPA	Electrostatic discharge shielding
Non-ESDS	Packaging suitable for ESDS or low charging		No requirements	

Note

Where surface resistance $> 10^9 \Omega$ is used the material shall be procured with charge decay characteristic of 10% of the initial value (maximum 1 000V) in less than 2s. It is allowed when approved by ESD co-ordinator, to use outer surfaces which are “hard ground” i.e. less than $1 \times 10^4 \Omega$ surface resistance.

Glossary of Terms

Intimate Packaging	Material which makes direct contact with ESD'S
Proximity Packaging	Material not making contact with ESD'S but which is used to enclose one or more devices
Electric Static Discharge Shielding	Barrier or enclosure that limits the passage of current and attenuates the energy resulting from an electrostatic discharge such that the maximum energy from 1000V human body model discharge is less than or equal to 50 nJ.
Electrostatic Conductive	Packaging with a surface resistance $\geq 1 \times 10^2 \Omega$ and $< 1 \times 10^5 \Omega$
Electrostatic Dissipative	Packaging with a surface resistance $\geq 1 \times 10^5 \Omega$ and $< 1 \times 10^{11} \Omega$

ECP SUGGESTED FORMAT FOR AUDIT REPORT

APPENDIX III

Report on audit of electrostatic protection facilities		
Date.....Report No..... Previous Report No.....		
Location		
Operation		
Date of Audit Next Audit No.....		
General		
Protective procedures and practices for ESDS and equipment as required by IEC 61340-5-1 part were audited by.....Authority		
Summary of Audit		
Status Codes		
SatisfactoryUnsatisfactoryNot Applicable		
S1. Critical		
2. Major N/A		
3. Minor		
Electrostatic Precautions audit check list	Status code	Rec Number
Notices, signs and labels		
Working surfaces and storage racks		
Floors		
Seating		
Garments		
Gloves and finger cots		
Wrist strap		
Footwear		
Ionizers		
Tools, machinery, dispensers and test equipment		
Trolleys and carts		
Grounding		
Electrostatic fields		
Field Work		
Working practices		
Packaging: availability		
Packaging: application		
Purchase: requirements		
Training: content		
Training: records		
Product: selection		
Checks: procedures		
Checks: record		