FLOORING
SIKA TECHNOLOGY AND CONCEPTS FOR ESD AND CONDUCTIVE FLOORING REQUIREMENTS WITH

THE IMPORTANCE OF ESD

Reduction of risk

STATIC ELECTRICITY can result in significant damage, injury and financial loss in industries where electronic components or volatile chemicals are involved. All active electronic components and equipment e.g. micro-chips, integrated circuits and machinery are sensitive to electrostatic discharges (also known as ESD events).

WHAT IS CONDUCTIVITY AND HOW DOES IT WORK?

Conductivity refers to the ability of a material to conduct an electrical charge to earth or 'ground'. In non-technical terms, this can be described as the ability of a material to carry or 'conduct' an electrical current. The electrical conductivity or the specific conductance of a flooring system is therefore also a measure of the material's ability to conduct an electric current. An electric current is a quantitative measure of the amount of charged particles passing through a medium, and in order for an electric current to be created, there needs to be an electrical potential difference between two points in a conductive medium with an energy source to drive the charge.

The electrical resistance of a material is a measure of its resistance to the flow of an electric current. An ohmmeter is a device that is used to measure this conductivity or electrical resistance. The conductivity or electrical resistance of a flooring system is therefore also measured with an ohmmeter.

The ohmmeter measures the amount of electrical friction generated as the charged particles pass through an electrical conductor e.g. -235 ESD. This measured value is then expressed in units of "ohm", which are governed by "Ohm's Law". This states that "the current passing through an electrical circuit is directly proportional to the amount of voltage used to create the flow and is inversely proportional to the resistance when the temperature is constant". It can be written in three ways: V = I x R, or I=V/R, or R=V/I Where: V = voltage in volts (V), I = current in amps (A), R = resistance in ohms (Ω) Or alternatively it can be used where: V = voltage in volts (V), I = current in milliamps (mA), R = resistance in kilohms (kΩ).

For most electronic circuits the amp is too large and the ohm is too small, therefore it is usual to measure the current in milliamps (mA) and therefore to obtain the resistance in kilohms (kΩ). 1 mA = 0.001 A and 1 kΩ = 1000 Ω.
These Ohm's Law equations work if you use V, A and Ω and also if you use V, mA and kΩ, but you cannot mix these sets of units in the same equations.

WHAT IS ESD?

Controlling electrostatic discharge begins with understanding how an electrostatic charge occurs in the first place. An Electro Static Discharge (ESD) is the transfer of an electrostatic charge between two objects. This is a very rapid event that happens when two objects with different electrical potentials come into direct contact with each other. This charging results in one object gaining electrons on its surface area to become negatively charged, whilst the other object loses electrons from its surface area and therefore becomes positively charged. The creation of an electrical discharge by this contact and separation of objects is known as triboelectrical charging, which also explains the small static electric shock you may receive from touching certain objects.

Electrostatic charges are therefore commonly created by the contact and separation of two similar or dissimilar materials. For example, a person walking across the floor generates static electricity as shoe soles contact and then separate from the floor surface. A metal component or an electronic device sliding into or out of a case or against another piece of equipment also generates an electrostatic charge as multiple contacts and separations are made.

WHAT ARE THE RISKS?

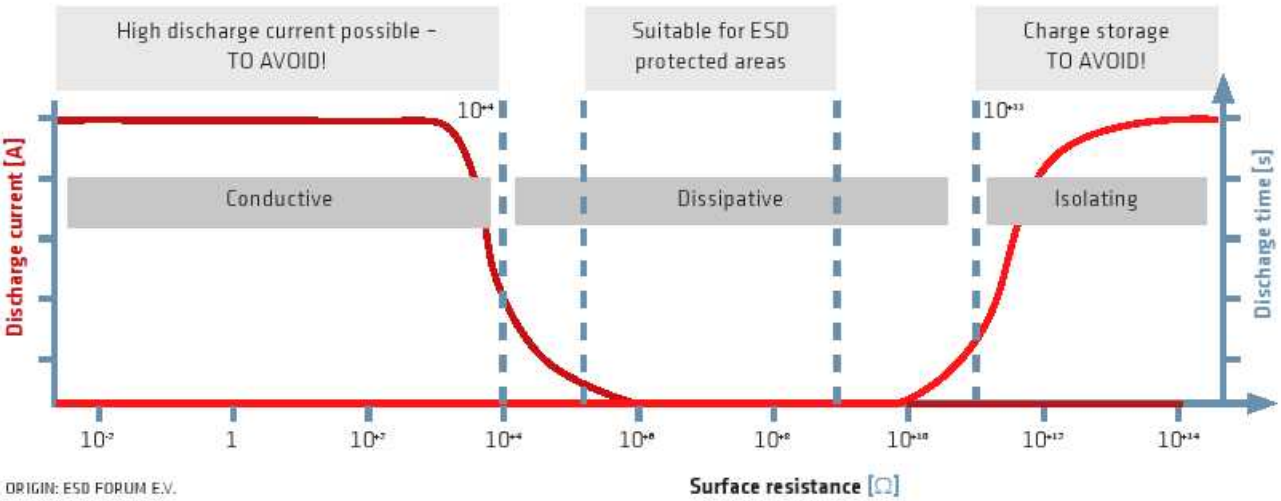
What are the risks if ESD protection and control is not taken into consideration where there are electrostatic sensitive devices? The devices could be damaged or completely destroyed.

It is this potentially unseen, unfelt or unheard 'micro lightning' spark that can occur without warning, which must be prevented or controlled.

WHERE IS AN ESD FLOOR NEEDED?

In industries where electronic components or volatile chemicals are involved, static electricity can result in significant damage, injury and financial loss. All active electronic components and equipment e.g. micro-chips, integrated circuits and machinery are sensitive to ESD events. Even when areas and people are equipped to handle such static-sensitive devices, inadvertent contact and damage can still occur.
ESD (Electro Static Discharge) and ECF (Electrically Conductive Flooring) Systems, can safeguard your entire process. These systems can be used to design and produce a floor that is' tailor-made' to meet your specific needs.

MATERIALS FOR ELECTROSTATIC PROTECTED AREAS

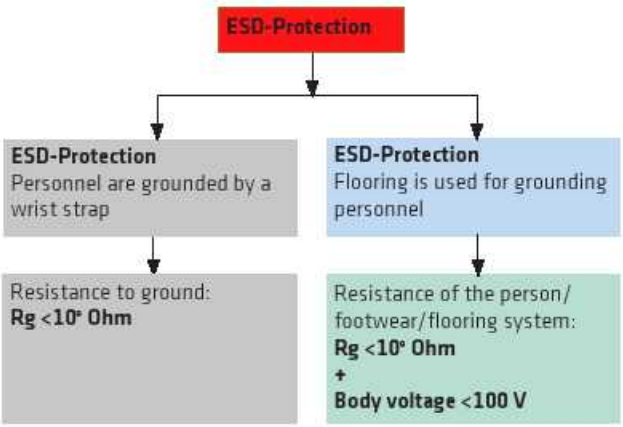


ORIGIN: ESD FORUM E.V.

GLOBAL SOLUTIONS FOR ESD PROTECTION AND ELECTRO-STATIC DISCHARGE CONTROL

EVEN WHEN AREAS AND PEOPLE are equipped to handle such static-sensitive devices, inadvertent contact and damage can occur. ESD (Electro Static Discharge), DIF (Dissipative Flooring) and ECF (Electrically Conductive Flooring) systems, can safeguard your entire process. These systems can be designed to produce a floor tailored to meet your specific needs.

ESD PROTECTION WITH FLOOR COVERINGS 2016 VERSION
ESD protection with floor coverings 2016 Version requirements according IEC 61340-5-1 & ANSI/ESD S20.20-2014



Definition: Conductive/Dissipative Flooring Materials (ECF/DIF)

- Conductivity refers to the ability of a material to conduct a charge to ground. In non-absolute technical terms, this means its ability to conduct an electrical current.
- Conductive floors and electrostatic dissipative floors are classified according to their electrical resistance to ground.

Conductive Flooring Material (ECF)
(e.g. according to ASTM F150) A floor material that has a resistance to ground between 2.5 x 10^4 and 1.0 x 10^6 ohms

Dissipative Flooring Material (DIF)
(e.g. according to ASTM F150) A floor material that has a resistance to ground between 1.0 x 10^6 to 1.0 x 10^9 ohms

ANSI/ESD S 20.20
This Standard covers the requirements necessary to design, establish, implement and maintain an **E**lectro**s**tatic **D**ischarge (ESD) Control Program for activities that manufacture, process, assemble, install, package, label, service, test, inspect or otherwise handle electrical or electronic components, plus assemblies and equipment susceptible to damage by electrostatic discharges greater than, or equal to 100 volts **H**uman **B**ody **M**odel (HBM). This Standard is also harmonized with the IEC 61340-5-1.

ASTM F 150
This Standard is a test method that covers the determination of electrical conductance or resistance of resilient flooring, either in tile or sheet form, for applications such as hospitals, computer rooms, clean rooms, access flooring, munitions plants, or any other environment concerning personnel-generated static electricity.

SJ/T 11294-2003
This Chinese Standard is the general Chinese specification standard for floor coatings for electrostatic protection.

DIN VDE 0100
Central regulations for the German and partly European area of application can be found in the DIN VDE 0100 in which the fundamental principles, of low-voltage electrical installations are stated.

OVERVIEW STANDARDS & RELATED PRODUCTS

Standards & Requirements / Systems	ESD: IEC 61340-5-1 (IEC 61340-4-1 Resistance to ground $R_g < 1 \times 10^9 \Omega$)	ESD: IEC 61340-5-1 (IEC 61340-4-5 System resistance $< 1 \times 10^9 \Omega$ + Walking test (BVG) < 100 Volt)	Explosion protection: ATEX137 / TRGS 727 (DIN EN 1081 Resistance to ground $R_g < 1 \times 10^9 \Omega$)	Protection against electrical shock DIN VDE 0100-410 (DIN EN 1081 Isolation resistance > 50 k Ω)
Smooth and textured, hygienic ECF floors				
-262 AS N	▲	-	▲	-
-262 AS N Thixo	▲	-	▲	-
-3240 ECF				
High chemical resistance				
-381 ECF	▲	-	▲	-
-390 ECF				
Approved for clean rooms				
-269 ECF CR	▲	-	▲	-
Food and Pharma Industry				
-25 PurCem EFC	▲	-	▲	-
Approved for Electronic Industry				
-235 ESD	▲	▲	▲	-
-262 AS N + -305 W ESD	▲	▲	▲	-
-236 SL/-326 + -305 W ESD	▲	▲	▲	▲

▲ Meets the requirements - Doesn't meet the requirements

GLOBAL Sikafloor® SOLUTIONS FOR ESD PROTECTION AND ELECTRO-STATIC DISCHARGE CONTROL

OVERVIEW STANDARDS & RELATED SYSTEMS

Application Standards / Field & Products	ESD: IEC 61340-5-1 (IEC 61340-4-1 Resistance to Ground $R_g < 1 \times 10^9\ \Omega$)	ESD: IEC 61340-5-1 (IEC 61340-4-5 System resistance $< 1 \times 10^9\ \Omega$ + Walking test (BVG) < 100 Volt)	Explosion protection: ATEX137 / TRGS 727 (DIN EN 1081 Resistance to Ground $R_g < 1 \times 10^9\ \Omega$)	Protection against electrical shock DIN VDE 0100-410 (DIN EN 1081 Isolation resistance > 50 k Ω)
Smooth and textured, hygienic ECF floors				
MultiDur ES-24 ECF	▲	–	▲	–
MultiDur ET-14 ECF	▲	–	▲	–
MultiFlex PS-32 ECF	▲	–	▲	–
MultiDur ES-47 ECF	▲	–	▲	▲
High chemical resistance				
MultiDur ES-31 ECF	▲	–	▲	–
MultiDur ET-31 ECF/V	▲	–	▲	–
MultiDur EB-31 ECF	▲	–	▲	–
MultiDur ES-39 ECF	▲	–	▲	–
MultiDur ET-39 ECF/V	▲	–	▲	–
MultiDur EB-39 ECF	▲	–	▲	–
MultiDur ES-48 ECF	▲	–	▲	▲
MultiDur ES-49 ECF	▲	–	▲	▲
Approved for clean rooms				
MultiDur ES-28 ECF/EQ	▲	–	▲	–
Food and Pharma Industry				
PurCem HS-25 ECF	▲	–	▲	–
PurCem® HS-25 ESD	▲	▲	▲	–
Approved for Electronic Industry				
MultiDur ES-25 ESD	▲	▲	▲	–
MultiDur ET-25 ESD	▲	▲	▲	–
MultiFlex PS-27 ESD	▲	▲	▲	▲
MultiFlex PS-32 ESD	▲	▲	▲	▲
MultiFlex PS-33 ESD	▲	▲	▲	–
MultiDur ES-43 ECF	▲	▲	▲	–
MultiDur ES-46 ESD	▲	▲	▲	▲
MultiDur ES-47 ESD	▲	▲	▲	▲
MultiDur ES-52 ESD	▲	▲	▲	▲

▲ Meets the requirements – Doesn't meet the requirements

SOLUTIONS FOR MARKETS IN THE AMERICAS

Standards & Requirements / Products	ANSI/ESD S20.20 (ANSI-ESD STM 97.1) System Test $< 1 \times 10^9\ \Omega$	ANSI/ESD S20.20 (ANSI/ESD STM97.2) Walking Test (BVG) < 100 Volt	ANSI/ESD S20.20 (ANSI-ESD STM 7.1) Resistance to Ground $R_g < 1 \times 10^9\ \Omega$	ASTM F150 (ECF) Surface to Ground Test: $> 2.5 \times 10^4$ – $1 \times 10^9\Omega$	ASTM F150 (ECF) Surface to Surface Test: $> 2.5 \times 10^4$ – $< 1 \times 10^9\Omega$	ASTM F150 (DIF) Surface to Ground Test: $> 1 \times 10^6$ – $< 1 \times 10^9\Omega$	ASTM F150 (DIF) Surface to Surface Test: $> 1 \times 10^6$ – $< 1 \times 10^9\Omega$
Smooth ESD roller coating (Epoxy)							
-200 ESD	▲	▲	▲	–	–	▲	▲
-200C ESD	▲	▲	▲	▲	▲	–	–
Roller coating for high chemical resistance (Epoxy Novolac)							
-700 ESD	▲	▲	▲			▲	▲
-700C ESD	▲	▲	▲	▲	▲	–	–
Smooth ESD roller coating (Polyurethane)							
-340 ESD	▲	▲	▲	–	–	▲	▲

▲ Meets the requirements – Doesn't meet the requirements

SOLUTIONS FOR MARKETS IN EMEA

Standards & Requirements / Products	DIN EN 1081 Resistance to Ground $R_e < 1 \times 10^9\ \Omega$	IEC 61340-5-1 (IEC 61340-4-5) System Test: $< 1 \times 10^8\ \Omega$	IEC 61340-5-1 (IEC 61340-4-5) Walking Test (BVG) < 100 Volt	IEC 61340-5-1 (IEC 61340-4-1) Resistance to Ground $R_e < 1 \times 10^9\ \Omega$	ATEX 137 / TRGS 727 European Standard Resistance to Ground $R_e < 1 \times 10^9\ \Omega$	DIN VDE 0100-410 (IEC 60364-4-41) Isolation Resistance > 50 kΩ
Smooth and textured, hygienic ECF floors						
-262 AS N	▲	–	–	▲	▲	–
-221 W Conductive -262 AS N	▲	–	–	▲	▲	▲
High chemical resistance						
-381 ECF	▲	–	–	▲	▲	–
-221 W Conductive -381 ECF	▲	–	–	▲	▲	▲
-390 ECF	▲	–	–	▲	▲	–
-221 W Conductive -390 ECF	▲	–	–	▲	▲	▲
Approved for clean rooms						
-269 ECF CR	▲	–	–	▲	▲	–
Food and Pharma Industry						
-25 PurCem EFC	▲	–	–	▲	▲	–
-25 PurCem ECF + -305 W ESD	▲	▲	▲	▲	▲	–
ESD systems with very low body voltage generation						
-235 ESD	▲	▲	▲	▲	▲	–
-221 W Conductive -235 ESD	▲	▲	▲	▲	▲	▲
-3240 ECF + -305 W ESD	▲	▲	▲	▲	▲	–
-262 AS N + -305 W ESD	▲	▲	▲	▲	▲	–
-263 SL N + -305 W ESD	▲	▲	▲	▲	▲	▲

▲ Meets the requirements – Doesn't meet the requirements

GLOBAL SOLUTIONS FOR ESD PROTECTION AND ELECTRO-STATIC DISCHARGE CONTROL

SOLUTIONS FOR MARKETS IN APAC

Standards & Requirements / Products	SJ/T 11294-2003 (ECF) Resistance to Ground RG > 5 x 104 – < 1 x 106 Ω	SJ/T 11294-2003 (DIF) Resistance to Ground RG > 1 106 – < 1 x 109 Ω	IEC 61340-5-1 (IEC 61340-4-5) System Test: < 1 x 109 Ω	IEC 61340-5-1 (IEC 61340-4-5) Walking Test (BVG) < 100 Volt	IEC 61340-5-1 (IEC 61340-4-1) Resistance to Ground RG < 1 x 109 Ω
Smooth, hygienic floors					
-262 AS N	▲	–	–	–	▲
-239 EDF	–	▲	–	▲	▲
High chemical resistance					
°390 AS	▲	–	–	–	▲
-381 AS	▲	–	–	–	▲
ESD system with very low body voltage generation					
-235 ESD	–	–	▲	▲	▲
°262 AS N + -305 W ESD	–	–	▲	▲	▲

▲ Meets the requirements – Doesn't meet the requirements

SELECTION GUIDE

Type of area	ESD / ECF System
Areas with explosive atmospheres or substances (i.e. gas, dust, explosives, fireworks etc.)	MultiDur ES-24 ECF / ES-31 ECF / EB-39 ECF
Areas with explosive atmospheres or Substances (i.e. gas, dust, explosives, fireworks etc.) in combination with requrements to protect pesonell against electrical shock acc. VDE 100	MultiDur PS-46 ECF
Areas involved in the handling, production, assembly or storage of ESD-sensitive Devices	°MultiDur ES-25 ESD / ET-25 ESD / PS-27 ESD / ES-43 ESD / ES-44 ESD
Areas involved in the handling, production, assembly or storage of ESD-sensitive devices in combination with requrements to protect pesonell against electrical shock acc. VDE 100	MultiDur PS-32 ESD / ES-46 ESD / ES-47 ESD / ES-52 ESD
Areas requiring conductivity and chemical resistance	MultiDur ES-31 ECF / ET-31 ECF/V / ET-39 ECF/V / SikaCor® VEL
Areas requiring conductivity and chemical resistance in combination with requrements to protect pesonell against electrical shock acc. VDE 100	PS-48 ECF / PS-49 ECF
Clean Rooms requiring conductivity	Sikafloor® MultiDur ES-28 ECF/EQ
Areas requiring conductivity and increased slip resistance	EB-31 ECF / EB-39 ECF
Areas requiring conductivity and orange peel texture	MultiDur ET-14 ECF
Areas requiring static crack bridging	ES-39 ECF / PS-32 ECF
Areas requiring low VOC Polyurethane ESD Floor system	MultiFlex PS-33 ESD
Areas requiring a heavy duty conductive flooring system or food and pharma industry	PurCem® HS-25 ECF
Conductive wall coating	WallCoat WS-11 ESD

EARTHING KIT

An electrostatic charge, which occurs during materials contact and separation, has to be discharged via an earthing point. provides the -Earthing Kit , a unique tool box containing all of the necessary components for up to 10 earthing points.

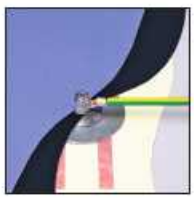
Every earthing point is able to conduct approximately 300 m^2 to earth. Ensure the longest distance between each earthing point in each room or area is a maximum of 10 m apart. In larger areas with longer distances, additional earthing points must be installed in accordance with the Electrical Engineer's requirements.

If site conditions or other constraints do not allow the positioning of any additional earthing points that are required, then any longer distances (>10 m) must be bridged by the use of additional adhesive copper tapes in accordance with the relevant specifications. All of the earthing points have to be connected to an appropriate ring-main to ground them, and this work must be carried out and approved by the responsible Electrical Engineer in accordance with all relevant local regulations.

- Prepare and prime the substrate in accordance with the relevant Sikafloor® PDS.
- When primer has cured, drill a hole: diameter 8 mm, depth > 50 mm
- Remove all dust, loose and friable material around the hole and insert a size 8 plastic plug. The plug must be flush with the floor surface.
- Screw the threaded dowel rod with a hexagonal socket into the plastic plug with an Allen key. Dowel rod must extend 16 mm above the floor.

- Fully bond the copper strips (2 x 100 mm) on both sides of the hole.
- Place large (D = 60 mm) washer followed by the smaller (D=30 mm) washer over the threaded dowel rod and secure with the nut (M6) so the washers are pressed onto the copper strips ensuring good contact.

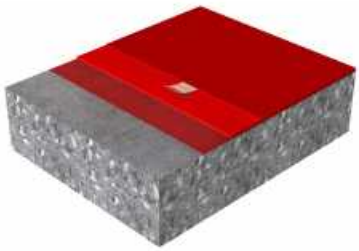
- Push the transparent plastic hose over the threaded dowel rod so the hose fits tightly.



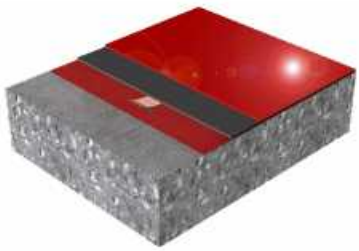
- Apply the selected Sikafloor® conductive primer and conductive wearing finish ensuring all washers and copper tape are completely covered.
- After curing the Sikafloor® products, remove the transparent plastic hose.
- Clean the head of the threaded dowel rod. Fix the brass eyelet using the self-locking nut (M6) onto the threaded dowel rod. Connect the grounding cable with the brass eyelet.
- Connect the earthing main cable with the brass eyelet (only by a qualified Electrical Engineer).

ESD AND ECF FLOORING SYSTEMS

SYSTEM			
			
DESCRIPTION	Textured, unicolor, conductive epoxy roller coat.	Smooth, unicolor, conductive epoxy floor covering.	Smooth, unicolor, high performance ESD epoxy floor covering.
NOMINAL THICKNESS/ LAYERS	~ 0.6 – max. 0.8 mm 3	~ 1.0 – 1.5 mm 3	1.0 – 1.5 mm 3
CHARACTERISTICS	■ Electrostatic conductive ■ Good chemical and mechanical resistance ■ Slip resistance ■ Easy to clean ■ Economical ■ Liquid proof ■ Total solid	■ Electrostatic conductive ■ Good chemical and mechanical resistance ■ Easy to clean ■ Economical ■ Liquid proof ■ Semi-gloss finish ■ Slip resistant surface possible	■ Good mechanical and chemical resistance ■ Easy application & easy to clean ■ Tough elastic ■ Conforms to the requirements of ANSI/ESD S20.20 and IEC 61340-5-1 ■ Low VOC and particle emissions ■ Fulfils ESD-requirements at > 25% RH/+23 °C

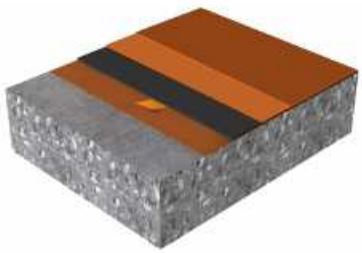
SYSTEM			
			
DESCRIPTION	Seamless, smooth, low VOC, tough elastic ESD polyurethane floor covering.	Smooth, unicolor, epoxy floor covering with polyurethane ESD roller coating.	2-part, smooth, highly chemically resistant and electrostatic, conductive epoxy floor covering.
NOMINAL THICKNESS/ LAYERS	~ 1.5 – 2.0 mm 3	~ 1.5 – 2.0 mm 3	~ 1.5 mm 3
CHARACTERISTICS	■ Very low VOC emissions ■ Water based ■ Easy to apply ■ Easy to refurbish, can be overcoated directly with itself ■ Low odor ■ Good UV resistance, non-yellowing ■ Easy to clean ■ Conforms to the requirements of ANSI/ESD S20.20 and IEC 61340-5-1 ■ Matt surface	■ Very low VOC emissions ■ Water based ■ Easy to apply ■ Easy to refurbish, can be overcoated directly with itself ■ Low odor ■ Good UV resistance, good resistance to yellowing ■ Easy to clean ■ Conforms to the requirements of ANSI/ESD S20.20 and IEC 61340-5-1 ■ Matt surface ■ Suitable as floor covering acc. DIN VDE 0100-410/T610 as top coat of non-conductive Sikafloor® products	■ Very high chemical resistance ■ Resilient ■ High mechical resistance ■ Impervious to liquids ■ Crack bridging ■ Abrasion resistant ■ Electrostatically conductive

ESD AND ECF FLOORING SYSTEMS

SYSTEM		
		
DESCRIPTION	Smooth, ultra-low VOC, electrostatically dissipative floor covering.	Seamless, smooth, low VOC, tough elastic, conductive polyurethane floor covering
NOMINAL THICKNESS/ LAYERS	~ 1.0 – 1.5 mm 3	~ 1.0 – 1.5 mm 3
CHARACTERISTICS	■ ISO 14644 compliant ■ Good chemical resistance ■ Electrostatically conductive ■ Low particle emissions ■ Smooth surface ■ Ultra low VOC ■ Color options	■ Electrostatic conductive ■ Flexible and tough-elastic ■ Crack-bridging ■ Good chemical and mechanical resistance ■ Solvent-free and low VOC emissions ■ Easy to apply and to keep clean ■ Economical

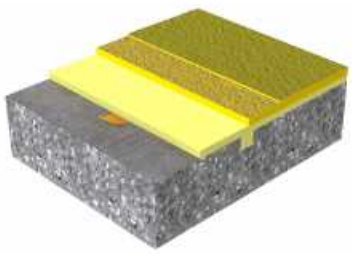
SYSTEM			
			
DESCRIPTION	Tough-elastic, epoxy and polyurethane combination ESD flooring system.	Smooth, unicolor, high performance, dissipative epoxy floor covering.	Smooth, unicolor, high performance, dissipative epoxy floor covering.
NOMINAL THICKNESS/ LAYERS	1.5 – 2.0 mm 4	1.0 – 1.5 mm 3	0.5 – 0.8 mm 2
CHARACTERISTICS	■ Low VOC emissions wearing layer ■ Water-based ESD wearing layer ■ Easy to refurbish, wearing layer can be recoated ■ Improved yellowing resistant wearing layer ■ Smooth matt surface finish, easy to clean ■ Conforms to the requirements of ANSI/ESD S20.20, IEC 61340-5-1, and VDE 100-610	■ Electrostatically dissipative ■ Good chemical and mechanical resistance ■ Easy to clean ■ Easy application ■ Liquid proof ■ Semi-gloss surface	■ Maintains electrical conductivity throughout the entire thickness of the system. ■ Does not depend on relative humidity for conductive properties ■ Tough and smooth, ■ Easy to clean and maintain. ■ Good abrasion resistance
SYSTEM COMPONENTS	■ -156/-160/-161/-150/-151 + Sika® Earthing Kit ■ -221 W Conductive ■ -390 ECF ■ -305 W ESD	■ -156/-160/-161/-150/-151 + Earthing Kit ■ -220 W Conductive ■ -239 EDF filled with ®Filler 1	■ -156/-160/-161/-150/-151 + Earthing Kit ■ -200/C ESD

ESD AND ECF FLOORING SYSTEMS

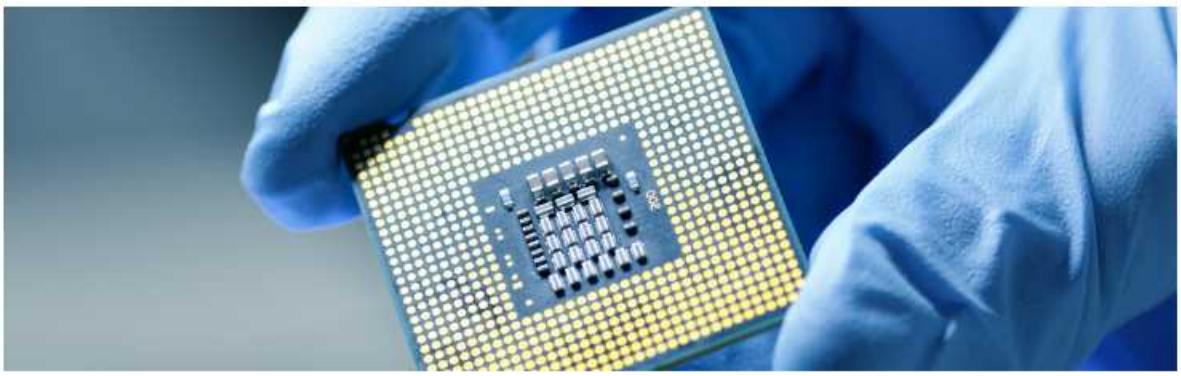
SYSTEM			
			
DESCRIPTION	Smooth low VOC polyurethane ESD floor system.	Epoxy and polyurethane combination ESD flooring system.	Epoxy smooth ESD flooring system with increased electrical resistance.
NOMINAL THICKNESS/ LAYERS	~ 1.5 – 2.0 mm 4	~ 1.5 – 2.0 mm 3	~ 1.5 – 2.0 mm 4
CHARACTERISTICS	■ Very low VOC emissions ■ Water-based ESD top coat ■ Easy to refurbish, topcoat can be recoated ■ Top coat resistant to UV exposure ■ Improved yellowing resistant top coat ■ Smooth matt surface finish, easy to clean ■ Conforms to the requirements of ANSI/ESD S20.20, IEC 61340-5-1	■ Low VOC emissions top coat ■ Water-based, Chemical resistant ESD top coat ■ Easy to refurbish, topcoat can be recoated ■ Top coat resistant to UV exposure ■ Improved yellowing resistant top coat ■ Smooth matt surface finish, easy to clean ■ Conforms to the requirements of ANSI/ESD S20.20, IEC 61340-5-1	■ High mechanical resistance ■ Chemical resistant wearing layer ■ Low VOC and particle emission wearing layer ■ Fulfils ESD-requirements at > 25% RH/+23°C ■ Wearing layer available in various colors ■ Smooth gloss surface finish, easy to clean ■ Conforms to the requirements of ANSI/ESD S20.20, IEC 61340-5-1 and VDE 100-600
			*-156/-160/-161/-150/-151 + Sikafloor

SYSTEM			
			
DESCRIPTION	Broadcast, tough elastic, unicolor, conductive, epoxy floor covering with high chemical resistance.	Epoxy smooth ESD flooring system with increased electrical resistance.	Epoxy smooth crack-bridging conductive flooring system with increased electrical resistance.
NOMINAL THICKNESS/ LAYERS	~ 2.0 – 2.5 mm 4	~ 1.5 – 2.0 mm 3	~ 1.5 – 2.0 mm 3
CHARACTERISTICS	■ High chemical resistance ■ Mechanical resistance ■ Impervious to liquids ■ Abrasion resistance ■ Easy to clean	■ Electrostatic conductive ■ Chemical resistant top layer ■ Good mechanical resistance ■ Waterproof ■ Easy to clean ■ Wearing layer available in various colors ■ Smooth gloss surface finish ■ Conforms to the requirements of VDE 100-600	■ Electrostatic conductive ■ Crack-bridging ■ Chemical resistant top layer ■ Waterproof ■ Abrasion resistant ■ Smooth gloss surface finish ■ Conforms to the requirements of VDE 100-600

ESD AND ECF FLOORING SYSTEMS

SYSTEM			
			
DESCRIPTION	Broadcast, tough-elastic, unicolor, conductive, epoxy floor covering with high chemical resistance.	Polyurethane hybrid, flow applied, heavy duty, conductive smooth floor screed.	Polyurethane hybrid heavy duty ESD flooring system.
NOMINAL THICKNESS/ LAYERS	~ 2.0 – 2.5 mm 4	~ 6 mm 2	~ 6 mm 3
CHARACTERISTICS	■ High chemical resistance ■ Mechanical resistance ■ Impervious to liquids ■ Abrasion resistant ■ Slip resistant surface	■ Good conductivity, fulfils the conductivity requirements from ATEX 137 ■ Seamless ■ Good chemical, abrasion, impact and thermal resistance ■ Easy application ■ Tolerant to substrate with high moisture content ■ Smooth, matt finish ■ Easy cleanability ■ Low maintenance	■ Low VOC emissions top coat ■ Hybrid system with water-based ESD top coat ■ Easy to refurbish, topcoat can be recoated ■ Top coat resistant to UV exposure ■ Improved yellowing resistant top coat ■ Smooth-textured matt surface finish ■ Conforms to the requirements of ATEX 137,ANSI/ESD S20.20, IEC 61340-5-1

ESD AND ECF WALL COATING SYSTEMS



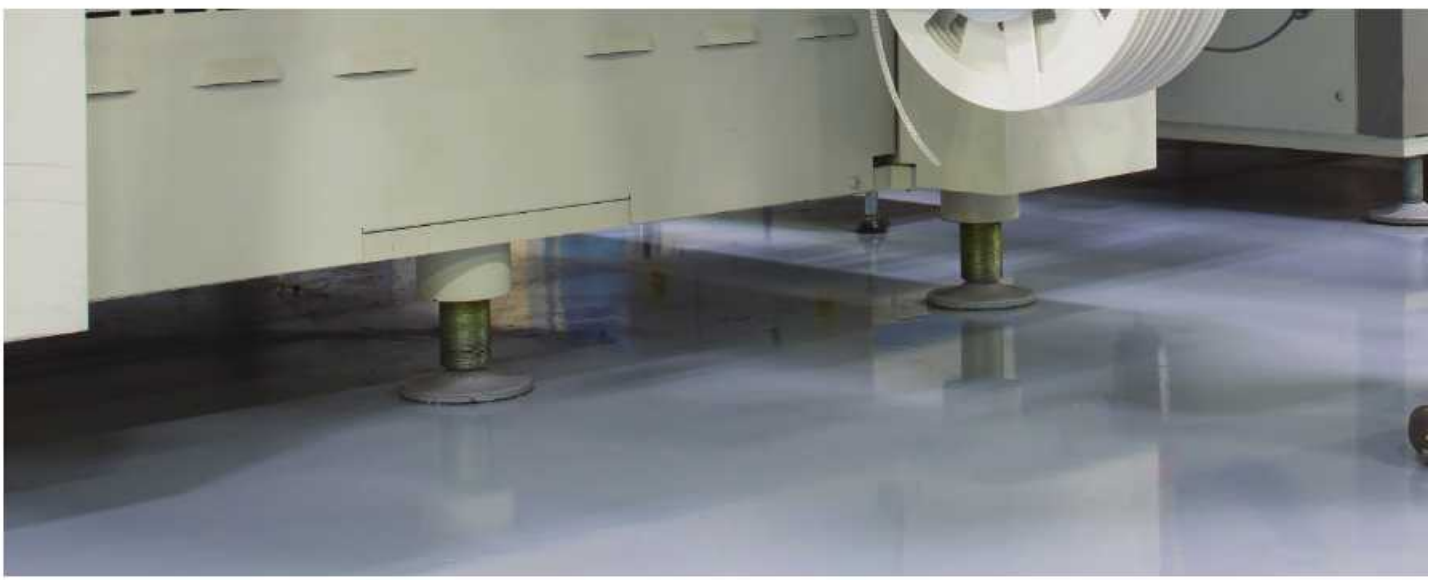
SYSTEM	VEL	WallCoat WS-11 ESD	
			
DESCRIPTION	A two part, highly chemical resistant, crack bridging, coloured, vinyl ester resin based binder for glass reinforced coating system.	Seamless, smooth, low VOC, resilient, two part, water dispersed, electrostatically conductive, colored, resin based, roller coating for ESD-requirements on walls and ceilings with medium mechanical loading, including concrete, renders and gypsum plasters.	
NOMINAL THICKNESS/ LAYERS	~ 3 mm 3	~ 0.4 mm 3	
CHARACTERISTICS	■ Wide range chemical resistance to acids, bleaches, solvents and notably to oxidising and flammable substances ■ Crack bridging ■ Conductive ■ Trafficable ■ Very fast hardening	■ Body voltage generation < 10 V ■ Conforms to the requirements of ANSI/ESD S20.20 and IEC 61340-5-1 ■ Fulfils ESD-requirements at > 12% RH/+23°C ■ Water based system ■ Easy to apply & easy to clean ■ Easy to refurbish, can be overcoated directly with itself ■ Low odour	

MEASUREMENT OF THE CONDUCTIVITY OR ELECTRICAL RESISTANCE OF ESD AND ECF SYSTEMS

As previously indicated at the beginning of this brochure, an Ohm meter, as pictured in the left photo, is the equipment that is used for the measurement of the conductivity or electrical resistance of these flooring systems. The range of the Ohm meter must be in within 1×10^3 Ohms (Ω) to 1×10^{12} Ω.

The metering voltage required for an electrical resistances of $< 1 \times 10^6$ Ω is 10 V, whilst the metering voltage for an electrical resistances of $\geq 1 \times 10^6$ Ω is 100 V. Body Voltage Generation (BVG) is measured separately with an 'electrostatic field meter'.

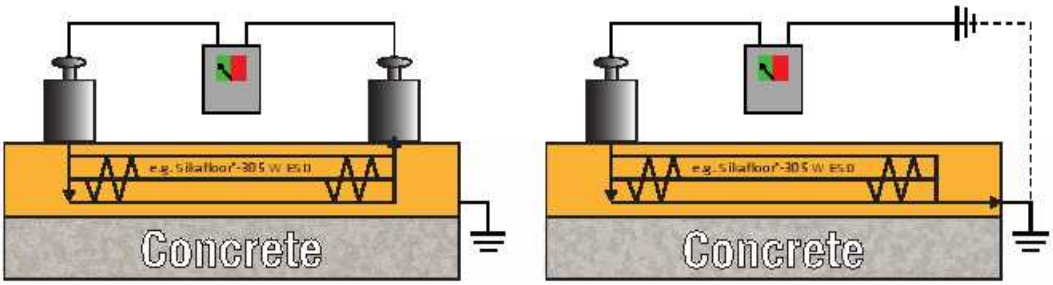
The main differences between different models and manufacturers of the measurement electrodes used for this are not their size or the weight, but the type and hardness of their contact surface. This can give misleading results and should only be carried out by suitably qualified and experienced people. Therefore Sika generally recommends for measurements according to IEC 61340, the use of metal electrodes with a contact area of 65 ± 5 mm, a conductive rubber pad of Shore Hardness A = 60 ± 10 and a weight of 2.5 ± 0.25 kg for hard resin floor surfaces.



DIFFERENT TYPES OF CONDUCTIVE FLOOR PERFORM DIFFERENTLY

In the example of testing for resistance below, Conductive "Carbon Fibre Fillers"-Technology is compared with Conductive "Pigment Fillers"-Technology

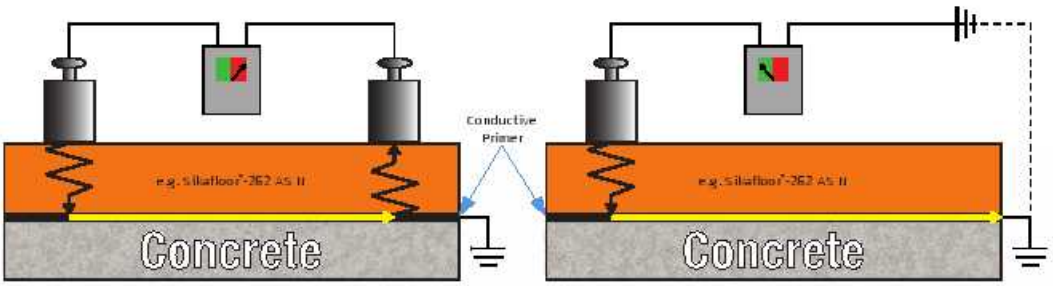
Controlled homogeneity of the floor surface using Sika Conductive "pigment fillers"-Technology



Note:
The conductive fillers are in permanent continuous contact and so there are many paths across & through the conductive system – the surface is suitable for point to point measurement.

Typically the Resistance to Ground (Rtg) with the Conductive Priming Layer is equal to or greater than the Resistance Point to Point (Rtt)

Variable Floor Surface with Sika Conductive "Carbon Fibre Fillers"-Technology



Note:
The resin around the fibres can insulate points on the surface and within the thickness of the resin. Therefore Point to Point measurement is NOT recommended on the surface of conductive flooring systems based on carbon fibre technology.

Typically the Resistance Point to Point (Rtt) is greater than the Resistance to Ground (Rtg)

These graphs show the effects of Multi-directional Conductivity and Uni-directional Conductivity obtained with the different filler types.
As an additional practical example:
It is not possible to refurbish (over-coat) existing conductive floors based on carbon fibre technology with each other, without the application of an intermediate conductive primer (such as -220 W Conductive). This is because there is a minimal chance that the carbon fibres in each layer will make an adequate connection to the carbon fibres in the other. As a result any electrical charges could not be discharged to ground. However this type of refurbishment and over-coating work is perfectly possible with systems based on conductive fillers (such as conductive fillers provide fully homogeneous conductivity.

GLOBAL BUT LOCAL PARTNERSHIP