



Strongcoat Conductive

[Self-leveling, epoxy resin system with conductive properties for floors and antistatic dissipative properties for walls]



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Section A : General Comments

General Notes:

The information below is a detailed overview for the application of DCP's **Strongcoat Conductive** flooring system and should be read in conjunction with the relevant technical data sheet prior to application. All DCP Products should be applied by experienced specialist contractors.

All the points below assume correct preparation of the relevant surface.

High-Temperature Working:

Application temperature ranges from 10°C - 35°C and Substrate's relative humidity must not exceed 80%. It is suggested that, for temperatures above 35°C, the following guidelines are adopted as good working practice:

- i. Unmixed materials and equipment should be stored in a cool place and away from direct sunlight.
- ii. Avoid application during peak temperature of the day.
- iii. Plan for enough materials, tools and labor to ensure continuous applicant process.
- iv. Avoid applying the material if the ambient temperature is around 35°C and rising.

Low-Temperature Working:

It is suggested that, for temperatures below 10°C, the following guidelines are adopted as good working practice:

- i. Unmixed materials should be stored in a warm.
- ii. Cold temperatures will affect the properties of the material.
- iii. Avoid applying the water proof coating if the temperature is around 10°C and falling.
- iv. The material may form crystals when stored at temperatures below 10°C, in such cases, conditioning for 1 - 2 days at temperatures between 30 - 35°C with simple manual mixing is needed before application.

System Products:

Primer: **Strongcoat Primer.**

Highly conductive roll applied epoxy base coat: **Strongcoat Conductive Base Coat**

Self-leveling epoxy top coat for floors: **Strongcoat Conductive Top Coat F**

Vertical applied wall coating: **Strongcoat Conductive Top Coat W**

Tools and Equipment:

It is suggested that the following list of equipment are adopted as a minimum requirement


<i>Personal protection</i>	:	<i>Protective overalls</i>	
	:	<i>Goggles or a face mask</i>	
	:	<i>Good quality gloves</i>	
	:	<i>Safety shoes</i>	
	:	<i>Safety helmet</i>	
<i>Mixing equipment</i>	:	<i>Slow speed drill mixer fitted with helix type paddle (Fig.1)</i>	
	:	<i>Empty bucket (25 litre) (Fig.2)</i>	
	:	<i>Casco or creteangle type mixer (Fig.3)</i>	
<i>Application equipment</i>	:	<i>Spike roller (Fig.4)</i>	
	:	<i>Rubber spike shoes (Fig.5)</i>	
	:	<i>Pin leveler screed (Fig.6)</i>	
	:	<i>V-shape notch trowel (Fig.7)</i>	
	:	<i>Short hair roller (Fig.8)</i>	



Fig.1: Slow speed drill mixer fitted with helix type paddle



Fig.2: Empty bucket



Fig.3: Casco or creteangle type mixer



Fig.4: Spike roller



Fig.5: Rubber spike shoes



Fig.6: Pin leveler screed



Fig.7: V-shape notch trowel

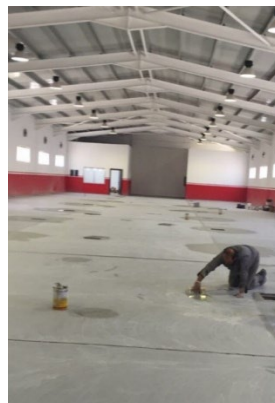


Fig.8: Short hair roller

Section B : Application

1.0 Substrate Preparation

- 1.1 New concrete or cementitious substrates should be at least 28 days old and/or have moisture content not exceeding 4% or a relative humidity of less than 75%.
- 1.2 Existing concrete floors, which require refurbishment, must be prepared to ensure a strong adhesive bond between the flooring system and the existing floor.
- 1.3 The substrate (new or existing) should be clean, sound, levelled, and free from contamination such as mortar and paint splashes, curing compounds, oil, and grease.
- 1.4 Excess laitance deposits are best removed by light mechanical scabbling, grinding, or grit/captive blasting followed by vacuum cleaning to remove dust debris. All preparation equipment should be of a type approved by DCP.
- 1.5 All blowholes, cracks, and surface undulations greater than 0.6 mm in depth should be repaired with a proprietary, repair compound. Consult the DCP's Technical Department for specific recommendations.



Repair of pinholes using Quickmast 341

- 1.6 Oil and grease contamination must be completely removed by grinding down to sound, clean concrete. Alternatively, grit blasting techniques can be used to provide the required substrate.
- 1.7 Where these methods are considered impracticable, alternative methods may be considered but a clean, sound, and dry substrate must still result. In particular, it is essential that the substrate does not suffer from conditions of rising damp. Any alternative preparations must be approved by DCP prior to the commencement of work, as the final performance of the system relies upon the performance of sound and level substrates.

Note: For the best results, the application should be done when the ambient temperature is greater than 15°C, if the expected temperature onsite is lower than this, it is recommended to store the product in warm rooms (i.e. 25°C) 24 hours prior to the application, In all ways, the substrate and ambient temperatures must stay above 10°C so that epoxy resin can cure.

2.0 Priming

- 2.1 Immediately prior to priming, the substrate should be thoroughly cleaned to remove any remaining traces of dust or other loose material.
- 2.2 Add the entire contents of the hardener tin to the base tin and mix the two components thoroughly for at least 2 minutes – under no circumstances should part mixing be considered.

- 2.3 Once mixed, the primer should be applied immediately to the prepared substrate at a rate of 5 m²/kg using short hair rollers. The primer should be well 'scrubbed' into the substrate to ensure full coverage, but care should be taken to avoid over-application or 'puddling'.



Application of Strongcoat Primer

- 2.4 Allow the primer to dry before proceeding to the next stage, do not proceed whilst the primer is 'tacky'.
- 2.5 Porous substrates may require a second primer coat – when the first coat is directly absorbed into the substrate – but minimum over-coating times must still be observed.
- 2.6 The minimum over-coating times will vary slightly according to the porosity of the substrate. However, they should be in accordance with the following:

Ambient temperature at time of primer application

20°C	30°C	40°C
16 - 24 hours	12 - 24 hours	8 - 16 hours

3.0 Installation of Copper Tape and Earthing

- 3.1 Once the primer is dry, self-adhesive copper tape with a minimum width of 12 mm and around 60 micron thickness should be placed on the primed concrete. The end of the tapes should be connected to suitable earth points.

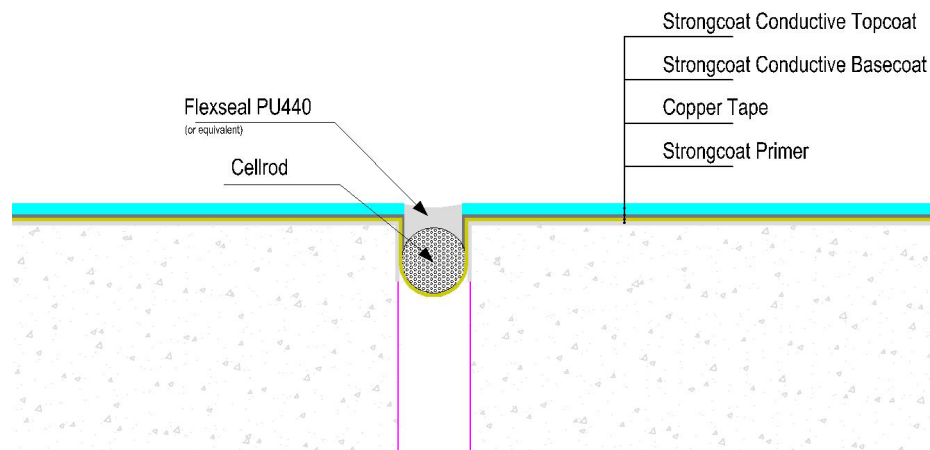


Placement of copper tape

- 3.2 Make sure that no part of the floor is more than 2 m away from the copper tape and the perimeter tape is overlapped and applied at 300 – 500 mm from the edge of the wall.
- 3.3 Extend the copper tape to adequate number of earthing points depending on the floor area and condition. In general, it is recommended to have at least one earthing point for every 92 m² area, provided that 2 earthing points are needed for each separate area.

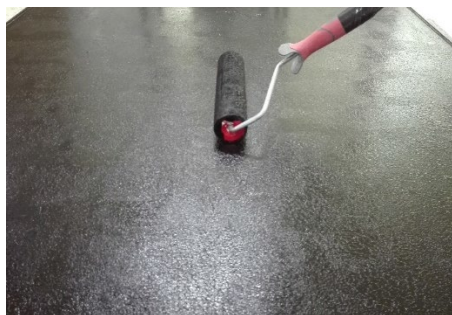
Important: The placement of copper tape and earthing works should be approved by an electrical engineer/consultant who has extensive experience in the implementation and testing of electrostatics discharge flooring systems.

- 3.4 Where continuous connection is needed, expansion joints should be bridged following these steps
- 3.4.1 Prime concrete surface as usual. Apply copper tape on either side of the joint ensuring that the tape within the joint is looped freely in the joint to a length sufficient for accommodating the expected joint movement.
 - 3.4.2 Using a short hair roller, apply **Strongcoat Conductive Basecoat** over the exposed copper tape including the inner and outer sides of the joints taking into account the allowable over-coating time.
 - 3.4.3 Upon completion of the **Strongcoat Conductive Topcoat F** layer (as will be illustrated later), fill the joints with a suitable proprietary elastic sealant from Flexseal Range in conjunction with a compressible backing rod (i.e. **Cellrod**).



4.0 Application of Strongcoat Conductive Basecoat

- 4.1 **Strongcoat Conductive Basecoat** should only be applied within the over-coating time stated above.
- 4.2 The Basecoat should be mixed with a slow-speed drill and a suitable helix-type paddle. The entire contents of the base should be added to the hardener and mixed for at least 3 minutes. Frequently scrape the sides and bottom of the container. When mixed, the Basecoat should be applied to the primed concrete using a proper short hair roller.



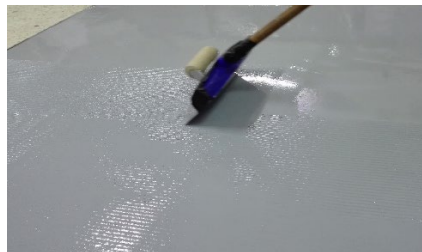
Application of Strongcoat Conductive Basecoat

- 4.3 On a reasonably smooth substrate, aim to maintain a coverage of 7.5 m²/kg. This is best achieved by measuring and marking out the floor in the form of a grid so that the area corresponding to each pack of material is clearly visible.

- 4.4 Use a small (25 mm) paintbrush to apply the Basecoat into any earthing or bridging points (where used) as a good contact is essential at these points.
- 4.5 The Basecoat will cure in around 24 hours depending upon conditions and is ready to receive the Topcoat when a finger drawn across the surface does not pick up any black traces. At this point, the Basecoat should be foot trafficable in clean footwear without exhibiting tack.

5.0 Application of Strongcoat Conductive Topcoat F

- 5.1 Transfer the entire contents of the resin and hardener and colour pack into a separate mixing container and mix them using a jiffy-type mixer for 2 minutes until a uniform consistency is achieved.
- 5.2 Transfer the entire contents of the mixture into a creteangel-type mixer, and start mixing while adding the filler part gradually for two minutes until a uniform lumps-free consistency is active.
- 5.3 Once mixed, the Topcoat should be laid using a V-shape notched trowel or pin leveler at a coverage rate of 3.2 kg/m² to achieve 2.0 mm thickness. Good lighting conditions will assist in even application and spotting the poorly covered areas.
- 5.4 The following steps are crucial to ensure that the Strongcoat Conductive will work effectively:
 - 5.4.1 Large application areas must be divided into small manageable areas to ensure proper coverage.
 - 5.4.2 The Topcoat should be laid using a pin leveler in one uniform direction.
 - 5.4.3 Directly after laying the Topcoat, V-shape notched trowel should be used to comb the layer in the same direction as laying. This is highly recommended so that active conductive ingredients are aligned in one direction prior to spiking.



Combing of Strongcoat Conductive Topcoat F using V-shape trowel

- 5.4.4 10 minutes after laying and combing the topcoat layer, it should be rolled using a spike roller. This first rolling should be at a right angle to the direction of laying and should be carried out in a controlled backward/forward motion.
- 5.4.5 After further 15 - 20 minutes, a second roller of the coat should be done in a perpendicular direction to the first rolling (i.e. the same direction of laying and combing)



Spiking of Strongcoat Conductive Topcoat F

- 5.4.6 It is recommended that each kit is laid and finished within 40 - 45 minutes after mixing



6.0 Application of Strongcoat Conductive Topcoat W

- 6.1 Prior to mixing, stir individual components of Resin, Hardener. Drill the hardener for 2 minutes till it is uniform. Add the entire contents of the base container to the hardener and mix thoroughly for at least 3 minutes.
- 6.2 Use brush or lambs wool roller, or airless spray machine to apply the mixed Strongcoat Conductive Top Coat W on the prepared surfaces.
- 6.3 Apply 2 coats of Strongcoat Conductive Top Coat W at 6 m²/kg per coat, second coat should be applied at a right angle to the first coat.
- 6.4 The second coat may be applied as soon as the first coat has initially dried. Drying time will depend on the substrate and the ambient conditions. If the over coating time is exceeded the first coat must be abraded with sand paper prior to the application of the second coat.
- 6.5 Adequate ventilation must be provided to ensure that necessary drying and curing of the material is achieved.

7.0 On-Site Verification and Testing

- 7.1 The testing procedure depends on the intended function of the ESD flooring system. In general, for usages other than areas where explosives, flammables, and ordnance are handled, follow the compliance verification in accordance with ANSI/ESD S20.20 Table 2. See Appendix A for further information.
- 7.2 For application in areas where explosives, flammables, and ordnance are handled, follow the testing procedure as in ASTM F150. See Appendix B for further information.
- 7.3 When applied in accordance with this Method Statement, Strongcoat Conductive is designed to fulfill the requirements of the above-mentioned standards with electrical resistance between 2.5×10^4 and 1.0×10^6 ohms. However, Strongcoat Conductive must be viewed as part of an ESD system which includes the floor, footwear, wrist strap, and individuals. The entire ESD system must be tested in accordance with ANSI/ESD S20.20 Personnel Grounding Requirement (Table 2) to ensure the safety of the users.
- 7.4 On large areas of application where some of the above-mentioned instructions cannot be precisely followed, it is expected to have some variations in the electrical characteristics of the ESD flooring system. However, the performance should be accepted as long as the below criteria are achieved:
 - 7.4.1 For areas other than where explosives, flammables, and ordnance are handled, the criteria of ANSI/ESD S20.20-2007 should be followed which is stated that the required limit for flooring/footwear systems shall not exceed 3.5×10^7 ohms when the system is tested in accordance with the ESD TR53-01-15 as shown in Appendix A.
 - 7.4.2 For areas where explosives, flammables, and ordnance are handled, DOD Contractor's Safety Manual For Ammunition and Explosives criteria should be followed which states that the maximum resistance of a body, plus the resistance of the conductive shoes, plus the resistance of the floor to the ground system shall not exceed 1.0×10^6 ohms total (i.e. surface to ground resistance not more than 5×10^5 ohms and combined resistance allowed for the person's body plus the resistance of the conductive shoes not more than 5×10^5 ohms) when tested in accordance with appendix B.

Section C : Appendixes

Appendix A: Onsite testing and verifications for areas other than where explosives, flammables, and ordnance are handled.

A.1 Referenced Standards

- **ANSI/ESD S20.20-2007:** Protection of Electrical and Electronic Parts, Assemblies, and Equipment (Excluding Electrically Initiated Explosive Devices)
- **ESD TR53-01-15:** Compliance Verification of ESD Protective Equipment and Materials

A.2 Equipment

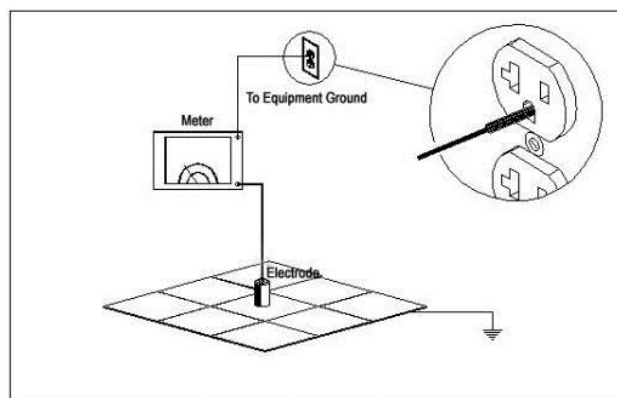
- **Resistance Measurement Apparatus:** A meter that is capable of making measurements or making indications from 1.0×10^3 ohms to 1.0×10^{12} ohms. Typically the measurements will be made at 10 volts or 100 volts
- **Resistance Measurement Electrode:** Cylindrical electrode, $2.27 \text{ kg} \pm 0.05 \text{ kg}$ with a diameter of $63.5 \text{ mm} \pm 3 \text{ mm}$ and Shore-A durometer hardness between 50 and 70
- **Two test leads of sufficient length**

A.3 Verification Steps

- The flooring system should be always kept clean and free from any contaminations or foreign materials that may affect the electrical conductivity.
- Connect one end of the first test lead to the electrode, and the other end of the first test lead to the integrated checker or meter.
- Connect one end of the second test lead also to the integrated checker or meter, and the other end of the second test lead to ground reference.
- Place the electrode on the ESD floor surface.
- Apply 10 volts and wait 5 seconds for the meter to stabilize. If the indicated resistance is less than 1.0×10^6 ohms, note the resistance. If the indicated resistance is equal to or greater than 1.0×10^6 ohms, switch the meter to 100 volts and retest.

Note the resistance after the meter stabilizes or after 15 seconds.

- Switching the test voltage to 100 volts may result in a resistance reading of less than 1.0×10^6 ohms. When this occurs, the reading made with the 100 volt test voltage is used.



ESD flooring Test in accordance with ESD TR53-01-15



Appendix B: Onsite testing and verifications for areas where explosives, flammables and ordnance are handled

B.1 Referenced Standards

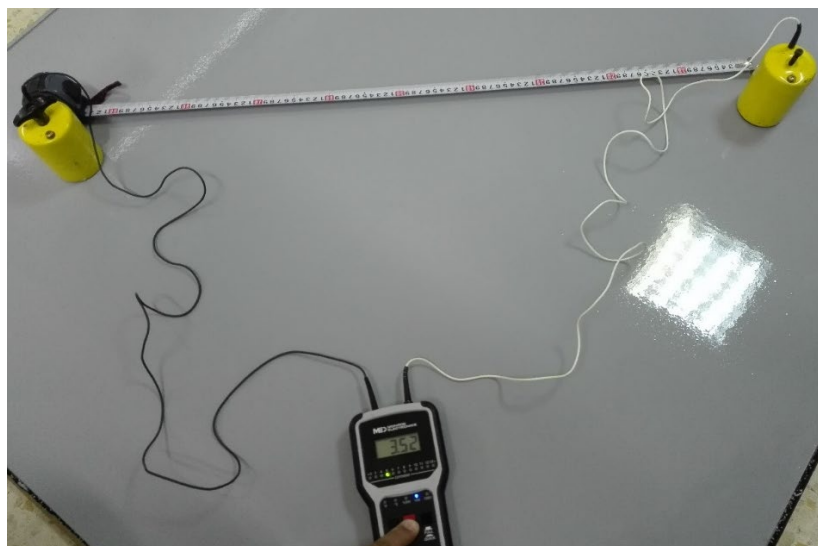
- **ASTM F150-13:** Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring
- **DoD 4145.26-M:** DOD Contractor's Safety Manual For Ammunition and Explosives

B.2 Equipment

- **Resistance Measurement Apparatus:** A meter that is capable of making measurements or making indications from 1.0×10^3 ohms to 1.0×10^{12} ohms. Typically the measurements will be made at 10 volts or 100 volts
- **Resistance Measurement Electrode:** Two Cylindrical electrode, $2.27 \text{ kg} \pm 0.05 \text{ kg}$ with a diameter of $63.5 \text{ mm} \pm 3 \text{ mm}$ and Shore-A durometer hardness between 50 and 70
- **Two test leads of sufficient length**

B.3 Verification Steps: Surface-to-Surface

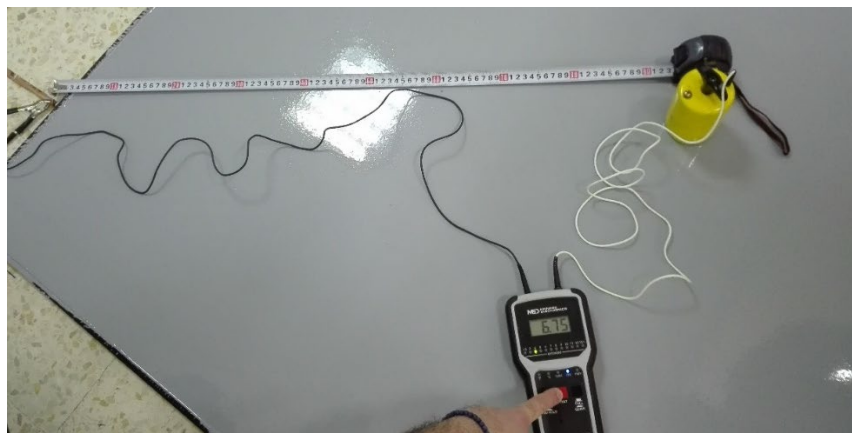
- Lightly wipe the area to be tested with a lint-free cloth to remove any foreign material prior to placing the electrodes.
- Place the electrodes at least 25.4 mm from an edge of the area to be tested and 914.4 mm apart. Set the meter to 10 VDC, apply the voltage, and take the reading 15 seconds after the application of voltage or once the reading has reached equilibrium. If the reading is below 1.0×10^6 ohms, record the reading.
- If the reading is higher than 1.0×10^6 ohms, change the voltage to 100 VDC and take the reading 15 s after the application of voltage or once the reading has reached equilibrium and record the reading.



Testing surface-to-surface (results 3.52×10^5 ohms)

B.4 Verification Steps: Surface-to-Ground

- Place the electrodes 914.4 mm apart and at 914.4 mm from any ground connection or grounded object resting on the floor. Attach the positive electrode or the positive wire from the resistance meter to the ground connection and place the negative electrode on the surface of the flooring material.
- Set the meter to 10 VDC, apply the voltage, and take the reading 15 seconds after the application of voltage or once the reading has reached equilibrium. If the reading is below 1.0×10^6 ohms, record the reading.
- If the reading is higher than 1.0×10^6 ohms, change the voltage to 100 VDC and take the reading 15 s after the application of voltage or once the reading has reached equilibrium and record the reading..



Testing surface to the ground (Result 6.75×10^4 ohms)

Notes:

- Perform a minimum of 5 surface-to-surface and 5 surface-to-ground tests for every 46 m² area of the installed floor.
- If the reported results are higher than the above-stated limits, the entire area should be put out of service and DCP's Technical Department should be immediately consulted for advice.

Section D : Approval and Variations

This method statement is offered by DCP as a 'standard proposal' for the application of **Strongcoat Conductive**. It remains the responsibility of the Engineer to determine the correct method for any given application. Where alternative methods are to be used, these must be submitted to DCP for approval, in writing, prior to commencement of any work. DCP will not accept responsibility or liability for variations to the above method statement under any other condition.