



# ColoRex<sup>®</sup> SD/EC

HOMOGENEOUS CONDUCTIVE TILE  
PROJECT VINYL





# Let's make it clear!

## Conductivity is not a random matter

Even if comparing the mere conductivity values might not provide much of an informative basis at first sight, conductive floor coverings are often showing significant differences in performance. These are, for example, the way static charges are grounded, the factors influencing this process and most important of all, the ability to long time performance. As a matter of fact, the performance of a conductive floor covering is closely linked to the manufacturing process.

## Outdated technology

Conductivity by antistatic additives.  
(mostly applying to sheet products)

### Disadvantages:

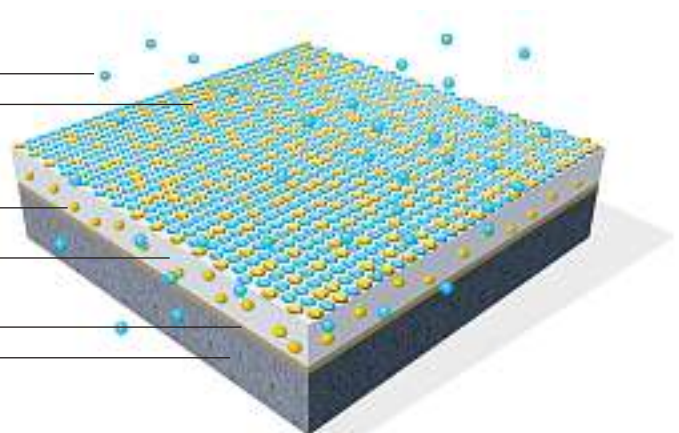
- Conductivity is dependant from ambient humidity and decreases over time.
- The antistatic additives generate volatile emissions.
- Oily surface, dirt retention, cleaning problems.

water particles  
"antistatic" film

migrating additives

floor covering

regular glue  
subfloor



## Modern technology

Chips with conductive coating.  
(pressed tiles such as ColoRex®)

### Advantages:

- Conductivity is not dependant from ambient humidity.
- Permanent conductivity over the entire life time of the tiles.
- No chemical additives.
- No cleaning and maintenance problems.

conductive “veins”

conductive adhesive

grounding strip

subfloor



## Play it safe with ColoRex®

Conductive floor coverings made of conductive coated chips show a definitely better and long lasting performance.

Conductive coated chips are forming a solid , homogeneous compound which is stable in size and dimensions, a far better solution than “liquid” chemical additives like antistatic surfactants. This is the reason why the electrical properties of ColoRex® tiles are constant, permanent and not influenced by either ambient humidity or aging of the product. This is a most important selection criterion, considering that the properties of a floor covering are required to be permanent and that performance to specifications will be subject to regular inspection.

3

## ColoRex® is produced in 2 versions

### ColoRex® EC

with an electrical resistance range between  $5 \times 10^4$  and  $1 \times 10^6 \Omega$

### ColoRex® SD

with an electrical resistance between  $1 \times 10^6$  and  $1 \times 10^8 \Omega$

## Absolute homogeneity

### Advantages:

- No visible wear signs, possibility of abrasive cleaning.
- Total appearance retention also in case of strong abrasion.
- Material properties remain constant over the entire time of use.
- Completely repairable without optical or functional impairment of the floor.
- Neat transitions from floor to walls with the same flooring material.

## Uniform high density

### Advantages:

- Compact and pore-free surface, meeting highest hygiene requirements.
- Resistant against chemical and mechanical strains.
- Abrasion resistant surface, suitable for repeated, intensive cleaning procedures.
- Resistance to indentation and dynamic loads far better than conventional synthetic or rubber floor coverings.
- Possibility to completely remove discolorations caused by iodine based disinfectants.



## Electronic industry

4

### **Permanent, lifetime conductivity**

With ColoRex®, static charges are securely drained throughout the entire thickness of the tile by a dense network of tiny conductive veins. No antistatic additives or surfactants are used. Conductivity is therefore independent from ambient conditions and will not decrease over time, remaining constant and stable throughout the entire lifetime of the tiles.

### **Guaranteed Electrical Resistance**

The electrical resistance values of ColoRex® are continuously monitored by our ISO 9001 certified quality control laboratory, thereby delivering a certificate of electrical resistance measurement for each production batch. Forbo is the only manufacturer offering this unique service to customers. The electrical resistance range reported in the certificate is guaranteed for the entire lifetime of the tiles.

### **Unigridd® - a unique feature**

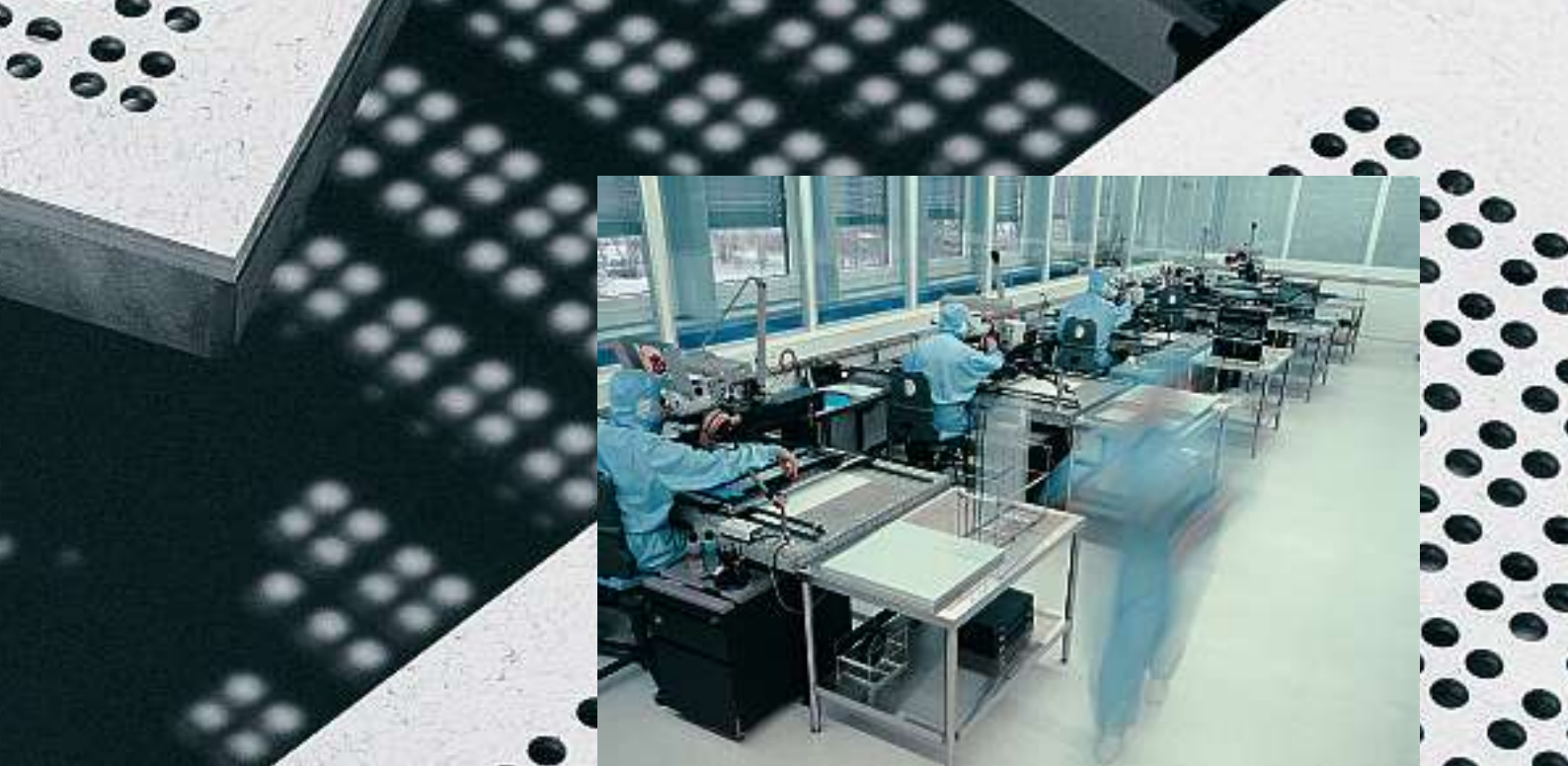
The Unigridd® is a conductive mesh printed on the back side of the ColoRex® tiles, designed to secure perfect electrical contact between the tiles and the conductive adhesive. It contributes to consistent and reliable electrical resistance values over the whole surface of the tiles.

### **Low triboelectric charge and body voltage generation**

In most ESD protected areas, just the presence of static charges is a concern, whether discharges occur or not. By its own material structure, ColoRex® effectively contributes to preventing the generation and accumulation of static charges in moving personnel and mobile equipment.

### **Outgassing and contamination control in cleanrooms**

Electronic components and devices are getting increasingly smaller and faster but also more vulnerable to airborne molecular contamination. With every drop in size, cleanroom managers are tightening qualification requirements for cleanroom flooring as regards to contamination by outgassing. Thanks to its outstanding outgassing performance resulting from our continuous investments in R&D, leading device manufacturers and cleanroom contractors have qualified ColoRex® for unrestricted cleanroom use.



## The opinion of:

**Michael T. Brandt**  
Lakewood, CO USA



*In most electronics manufacturing environments people are the single, major cause of static problems. When even the simple movement of arms or hands or walking across the floor can generate electrostatic charges as high as several thousand volts, reducing personnel-generated static charges is a primary objective of static control programs.*

*Although wrist straps are often considered as a primary tool in the controlling of personnel-generated static, companies are turning to the use of flooring materials (and footwear) as an effective static control component. Floor materials (and proper footwear) perform two primary static control functions: they reduce the generation and accumulation of electrostatic charges at the interface of the shoe with the floor and they dissipate existing charges from personnel and moving equipment that are in contact with the floor material.*

*Various studies, tests and practical experience have shown that the combination of static control flooring and footwear can reduce static gene-*

*ration from several thousand volts to less than a hundred volts. Also, the combination dissipates static charges from the body very rapidly when a person steps or walks on the flooring material. Static control flooring and footwear can control static problems throughout the work area, especially in areas where personnel have to be quite mobile. Also, floor materials can help control static on carts or other similar movable equipment as well as on people.*

*Because static control flooring and appropriate footwear tend to be passive control methods and require less frequent monitoring, employees do not need to take any additional actions to assure that the system is functioning properly.*

*Floor materials can be used in most areas, especially those requiring high employee mobility. These include receiving and inspection; stores and warehouses; clean rooms and assembly, test and inspection; packaging; field service repair; offices and laboratories.*

*Like all static control procedures, flooring (and footwear) is part of a*

*complete program that also may include packaging and materials handling, ionization, wrist straps, or garments. In combination with appropriate footwear as part of an overall static control program, static control floor coverings can significantly reduce static control problems resulting from personnel-generated static.*



## Pharma & Biotech

6

### **Aseptic areas**

ColoRex® tiles are cut from homogeneous blocks of material pressed at very high pressure. Additionally, the surface of each tile is mechanically treated in various steps so as to achieve a completely smooth and absolutely pore free surface, without the use of any finishing product which might be worn out by intensive cleaning procedures. The outstanding bacteriostatic properties of ColoRex® have been certified by independent testing institutes.

### **Bacteriostatic, cohesive seam welding**

Tiles with welded seams are usually a concern in aseptic or hygiene critical areas. Our welding rods are made from the same base material as ColoRex®, so that hot seam welding will produce a true material cohesion between the tiles. Welded seams are watertight, free of micro-pores and resistant to dynamic or static mechanical stress. Antibacterial activity tests of heat welded ColoRex® tiles carried out by independent organisations have proved that no micro organisms can live or grow onto or across the welded seams.

### **Complete cGMP compliance**

Current GMP regulations also require that interfaces of the floor with vertical surfaces such as walls and partitions must be accessible for cleaning and disinfection. With ColoRex®, coved and seamless skirting, as well as inner and outer corners can be realised as a standard, taking advantage of the outstanding surface quality of the product also for critical, usually hard to reach areas within an aseptic environment.

### **Chemical resistance**

ColoRex® shows excellent resistance and chemical stability against a wide number of strong acids and alkalis in any concentration, even after extended exposure. This will ensure that intensive and repeated cleaning or exposure to etching chemicals will not affect the surface quality and performance of the tiles.



## The opinion of:

*Dr. sc. techn.*

**Hans H. Schicht**

Contamination control consultant  
Zumikon, Switzerland

Floors for cleanrooms are required to meet a most exacting combination of requirements: they should be free of pores, non-slippery, abrasion-resistant, electrically conductive if required, easy to clean and durable against chemical, static and dynamic loads. Floors for pharmaceutical and other life science applications do not only have to attend these rigid technical performance standards. In addition, they must fulfil and meet the hygienic and microbiological safety determinations of the regulatory authorities and inspectorates as established in their Good Manufacturing Practice (GMP) guides.

The GMP guide for medicinal products of the Pharmaceutical Inspection Convention (PIC) and of the European Union establish, for instance, the following criteria for floors installed in facilities employed for the manufacture of sterile pharmaceuticals: floors should be smooth, impervious and unbroken in order to minimize the shedding or accumulation of particles or micro-organisms and to permit the application of cleaning agents and disinfectants.

Similar requirements are to be found in the guidance documents of the U.S. Food and Drug Administration FDA: floors should have smooth, hard surfaces that are easily cleanable. Floors in the pharmaceutical industry must be capable of resisting the strains and stresses to which they are continually submitted in their operational environment - especially those of spillages of aggressive substances, and those due to heavy transport movement. The impeccable initial surface quality is to be maintained throughout the entire life cycle of the facility.

Similar combinations of performance criteria are to be met in other life science areas: manufacturing of active pharmaceutical ingredients by chemical or biotechnological processing, the hospital field, the food and beverages industry, and laboratories of all kinds.

ColoRex® floors have been specifically optimized for attending the needs of the pharmaceutical and life science fields. They maintain their characteristics over extended periods.

With their high-density, homogeneous and smooth surface, they offer excellent mechanical and chemical resistance, are easy to clean and to disinfect, resilient to the stresses of material transport movements, and remain 100% repairable even after many years of use - without impairing their original properties and their optical appearance. They offer permanent electrostatic control without antistatic chemical additives independently of room temperature and air humidity. In case of emergency, they are distinguished by low flame spread, smoke generation and out-gassing.



## Healthcare environments

8

### **Hospital hygiene**

The surface quality of ColoRex® is subject to rigorous, real time monitoring by quality control already during production. The surface is not only pore free, its smoothness is precisely defined to stay within exacting and measurable parameters, adding remarkable soil resistance to the certified antibacterial properties. ColoRex® is very easy to clean and to disinfect, allowing for unconditionally clean and hygienic floors in any hospital area at sustainable costs.

### **Safety**

Modern medical care technologies are heavily dependent on sophisticated and sensitive equipment. ESD events, which are usually accompanied by the release of electromagnetic radiation, may put the safety of patients and medical care personnel at serious risk. Protection from ESD is a prime feature of ColoRex®, the first choice flooring solution for critical treatment areas.

### **Infection control**

Hospital hygiene managers are increasingly placing great emphasis on infection control. ColoRex® tiles and welded seams have certified antibacterial properties. Thus, they will effectively contribute to prevent the spreading of infections throughout healthcare facilities.

### **Mechanical resistance**

Many hospital areas are subject to intense traffic by beds on wheels. Resistance of both the floor and the welded seams against dynamic loads are a major concern in this respect. ColoRex® tiles are cut from highly compressed homogeneous blocks, resulting in superior indentation resistance properties. The seams are heat welded using the same base material as ColoRex®, so that a true material cohesion between the tiles can be produced. Welded seams will therefore resist any dynamic load without cracking or opening up, even at typically critical points like curves or doorways.



## The opinion of:

*PD Dr. med.*

**Christian Ruef**

*Head of Hospital Epidemiology  
University Hospital of Zurich  
Switzerland*

*The term healthcare environment includes a wide variety of establishments related to medical care and particular areas within these establishments. These areas typically include surgery rooms, intensive care units, diagnostic facilities for imaging procedures and outpatient treatment units, where both patients and medical care personnel are expected to receive and provide medical attention under conditions of absolute safety. Therefore, the selection of adequate floor surfaces is an important part of the safety measures in a healthcare environment.*

*One source of potential hazard for patients, medical personnel and equipment is represented by electrostatic discharges (ESD) which may occur during surgery or intensive care activities. In addition, ESD events are accompanied by the release of electromagnetic radiation (EMI, electromagnetic interference), which could seriously interfere with sensitive medical care equipment. These hazards can be prevented by the use of electrically conductive floor coverings, which will prevent the generation of electrostatic charges*

*and will securely drain static from personnel, patients and equipment. Furthermore, floor surfaces in a healthcare environment should be easy to clean and to disinfect. While floor surfaces are most likely to play a minor role in the transmission of micro-organisms in a hospital, it is nevertheless generally accepted that the characteristics of floor surfaces in hygiene critical areas such as surgery rooms and intensive care units should permit easy and effective cleaning and disinfecting. This will only be possible if the floor surface is free of crevices and pores where bacteria and dirt may accumulate and remain inaccessible to conventional surface cleaning treatments.*

*Seamless and perfectly coved skirting as well as inner and outer corners will be equally important to make all areas of the floor easily accessible for cleaning, especially where single disk machines are used. As disinfectants and cleaning solutions may often contain strong chemicals, floor surfaces should also offer a good resistance against them. But cleaning with strong chemicals may not be sufficient to remove stubborn stains*

*typically produced by the spillage of iodine during surgery activities. In these cases, harsh cleaning by abrasion will be necessary. Floor surfaces in these areas should therefore be viable for abrasive cleaning techniques, which should not alter their surface characteristics and appearance. A further aspect to be considered are the heavy dynamic loads applied on the floor by beds on wheels, as these rolling loads may leave more or less deep indentation marks on the floor. Mechanical resistance to heavy dynamic stress is therefore another important characteristic.*

*To summarize, it can be said that the ideal flooring material for healthcare environments should combine ESD/EMI protection characteristics while meeting hygienic and optical properties of the highest standard together with excellent resistance to mechanical stress and dynamic loads.*

# Collection colours

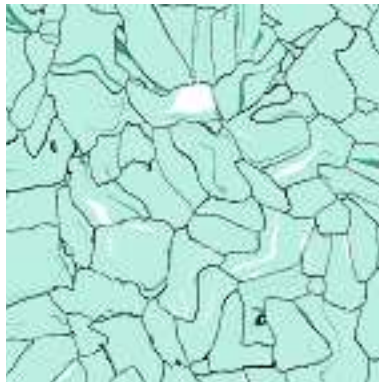
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SD 15 02 12

EC 25 02 12

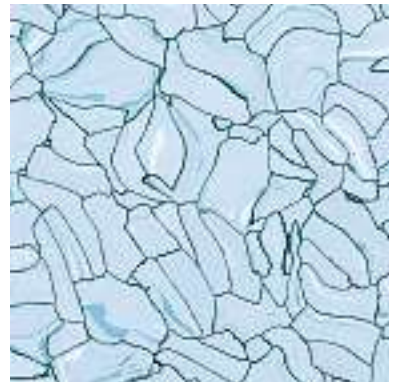
lux



SD 15 02 25

EC 25 02 25

kiwi



SD 15 02 21

EC 25 02 21

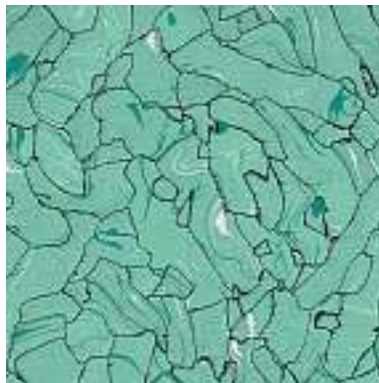
pacific



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EC 25 02 15

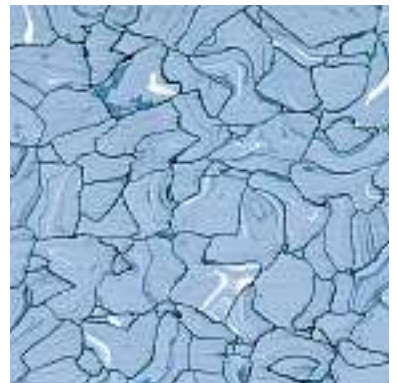
oasis



SD 15 02 28

EC 25 02 28

basil



SD 15 02 22

EC 25 02 22

niagara



SD 15 02 13

EC 25 02 13

sahara



SD 15 02 27

EC 25 02 27

jasmine



SD 15 02 23

EC 25 02 23

atlantic



SD 15 02 11

EC 25 02 11

gobi



SD 15 02 01

EC 25 02 01

everest



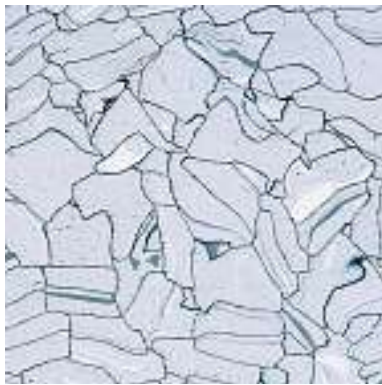
SD 15 02 31

sole



SD 15 02 37

amazonas



SD 15 02 04

EC 25 02 04

montblanc



SD 15 02 05

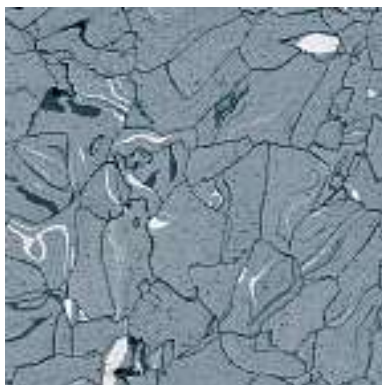
EC 25 02 05

adula



SD 15 02 35

azzurro



SD 15 02 07

EC 25 02 07

quartz



SD 15 02 09

EC 25 02 09

basalt



SD 15 02 33

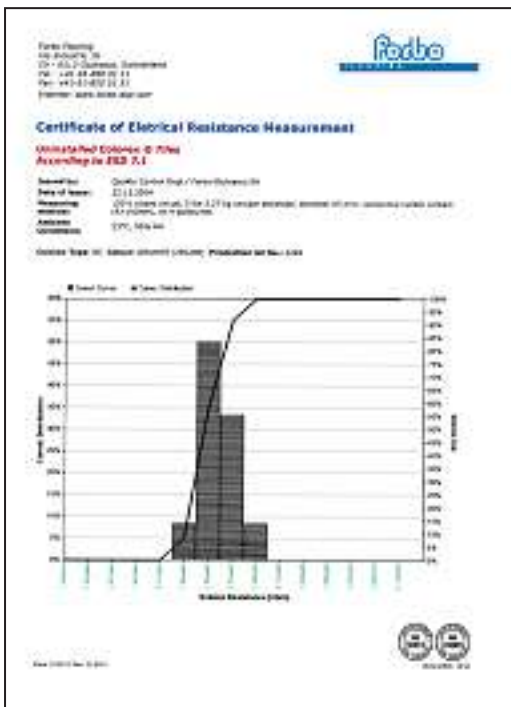
fuego



# A unique service from Forbo

12

In order to provide our customers with highest safety, we measure and report the conductivity of each production batch. As a result of this quality control procedure, we establish a measurement report showing the distribution of conductivity values within a single batch. These reports are generated as a standard, ISO 9001 compliant and freely available to the customer upon request.





# Installation and seam welding

## Subfloor requirements

ColoRex® must be installed on a smooth, flat, level, clean and permanently dry subfloor. The moisture content of concrete subfloors should not exceed 2,5% CM. Apply an adequate moisture barrier if uprising humidity is existent or to be expected. Levelling with a cement based self-levelling compound is recommended.

## Acclimatisation

Prior to installation, the ColoRex® tiles must be acclimatised for at least 24 hours at a minimum temperature of 18°C. The tiles must be completely unpacked for acclimatisation and displayed on the floor in small and neat stacks of not more than 10 tiles.

## Laying of the tiles

The installation of ColoRex® should not begin until the work of all other trades has been completed, especially overhead trades. Areas should be cleaned, fully enclosed and maintained at a minimum temperature of 18°C for 72 hours before, during and after installation is completed. Use a self adhesive copper strip for earth connection. ColoRex® tiles must be installed in a wet adhesive bed, the use of a conductive acrylic dispersion adhesive from Forbo is recommended.

## Seam welding

Heat welding of the ColoRex® tiles is strongly recommended for those environments where wet cleaning methods will be used. Welding rods in ColoRex® matching colours are available in 100m coils. Welding should not be carried out earlier than 24 hours after the installation is completed, observing a minimum room temperature of 16°C. Groove the tiles along the junction lines with an appropriate grooving machine or by hand for difficult to reach areas. Grooving depth must be at least  $\frac{3}{4}$  of the tile thickness. Use original ColoRex® welding rods ( $\varnothing$  4mm) observing a welding temperature of 400°- 450°C. Best results are obtained by using automatic welding machines.

# Maintenance and repair

## Maintenance

Routine maintenance of ColoRex® should consist in sweeping the floor with impregnated one-way tissues or spray buffing with a red pad at low speed, using a specific, neutral and wax-free cleaning solution. Spray buffing is also the ideal solution for raised access floors. If the wet method is preferred for routine maintenance, damp mop the floor with a neutral detergent only and rinse well. For large areas with heavy traffic, the use of a scrubber drier machine with a specific detergent is indicated.

## Repair

Deep and long scratches, holes, burns and other more or less severe surface damages on ColoRex® can be effectively repaired by simple operations, without leaving any trace and without impairing the original floor performance. 100% reparability is a unique ColoRex® feature, made possible by the perfect homogeneity of the tiles and the low content of plasticizer.

14

### Abrasive cleaning

Surface damages like burns, dulling or discoloration caused by chemicals, stubborn stains and alike can be perfectly removed by abrasion using a normal eccentric grinding machine. Proceed in several steps, starting with a coarse sand paper disk and finishing with a fine grade one. Complete the operation by polishing the repaired spot with a red pad, thereby restoring the original surface quality of ColoRex®.



### Homogeneous welding

Deep scratches and other physical damages of the ColoRex® tiles can be repaired by homogeneous welding. Cut a stripe of ColoRex® from a tile of the same colour reference, slide the stripe into the flat welding nozzle of a hot air gun and firmly weld it straight into the damaged spot, setting a temperature of approx. 400–450°C. Remove the excess material with a sharp crescent shape knife and complete the operation by grinding and polishing the repaired spot.



## Technical specifications

### ColoRex® SD/EC

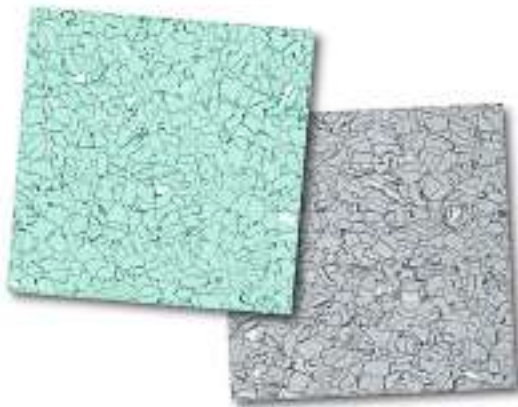


		SD	EC
Classification	EN 685	34/43	34/43
CE-marking	EN 14041	compliant	compliant
Collection size		19	15
Total thickness	EN 428	2.0 mm / 3.0 mm *	2.0 mm / 3.0 mm*
Tile size(s)	EN 427	610 x 610 mm	610 x 610 mm
		615 x 615 mm*	615 x 615 mm*
		613 x 1226 mm*	613 x 1226 mm*
Weight	EN 430	3.2 kg/m <sup>2</sup>	3.2 kg/m <sup>2</sup>
Electrical resistance	IEC 61340-4-1	10 <sup>6</sup> ≤ R ≤ 10 <sup>8</sup> Ω	5 x 10 <sup>4</sup> ≤ R ≤ 10 <sup>6</sup> Ω
	IEC 61340-4-5**	-	7.5 x 10 <sup>5</sup> ≤ R ≤ 3.5 x 10 <sup>7</sup> Ω
	EN 1081	R ≤ 10 <sup>8</sup> Ω	R ≤ 10 <sup>6</sup> Ω
	ANSI/ESD STM 7.1**	10 <sup>6</sup> ≤ R ≤ 10 <sup>8</sup> Ω	2.5 x 10 <sup>4</sup> ≤ R ≤ 10 <sup>6</sup> Ω
	ANSI/ESD STM 97.1	-	7.5 x 10 <sup>5</sup> ≤ R ≤ 3.5 x 10 <sup>7</sup> Ω
Body voltage generation	IEC 61340-4-5	< 70V	< 30V
	ANSI/ESD STM 97.2**	< 70V	< 30V
Outgassing	IDEMA M11-99	TD-GC-MC results available upon request	
	EN 13419-2	SVOC: 64µg/m <sup>2</sup> x h after 28 days	
Slip resistance	EN 13893	µ: 0.6	µ: 0.6
	DIN 51130	R9	R9
Fire rating	EN 13501-1	B <sub>fl</sub> , S1	B <sub>fl</sub> , S1
	ASTM E648/NFPA253	Class 1 (1.13 W/cm <sup>2</sup> )	Class 1 (1.13 W/cm <sup>2</sup> )
	ASTM E662/NFPA258	< 450	< 450
Wear resistance	EN 660-1	group M	group M
Castor chair resistance	EN 425	No effect	No effect
Residual indentation	EN 433	0.035 mm	0.035 mm
	ASTM F970-00	0.005 inch at 1500 Lbs. (residual compression)	
Colour fastness	EN20105-Bo2method3	7- 8	7- 8
Thermal conductivity	DIN 5085-1	0.007 m <sup>2</sup> K/W (suitable for floor heating systems)	
Chemical resistance	EN 423	Excellent (details available upon request)	
Dimension stability	EN 434	0.05% lengthwise/crosswise	0.05% lengthwise/crosswise
Bacteriostatic and fungicidal behaviour	SNV 195 920	yes	yes
	SNV 195 921	yes	yes
Ease of nuclear decontamination	DIN 25415 Part 1	Excellent	Excellent
	ISO 8690	Excellent	Excellent

\* available upon request, restrictions may apply \*\* with ESD shoes

Forbo Linoleum B.V.  
P.O. Box 13  
1560 AA Krommenie  
The Netherlands  
Tel. +31 75 647 74 77  
Fax +31 75 647 77 01  
contact@forbo.com  
www.forbo-flooring.com

Forbo-Flooring  
111024 Москва, ш. Энтузиастов, 14  
бизнес центр Мета-Дом, оф. 419  
т. 7-095-785-57-74  
7-095-785-57-99  
ф. 7-095-785-27-29  
forbo-rus@elnet.msk.ru  
www.forbo.ru



Forbo Flooring  
K. Ulmana gatve 5  
Riga, LV-1004,  
Latvija  
Talrunis +371 70 66 116  
Fakss +371 70 66 117  
info.lv@forbo.com  
www.forbo-flooring.com

Forbo Flooring  
Novodvorská 994  
142 21 Praha 4, Czech Republic  
Telefon + 420 239 043 150  
Fax + 420 241 490 230  
info@forbo-linoleum.cz  
www.forbo-flooring.com

Forbo Flooring Hungary  
Megyeri út 8.  
H-1044 Budapest  
Hungary  
Phone: + 36 12 72 05 63  
Fax: + 36 12 72 05 09  
E-mail info@forbo-linoleum.hu  
www.forbo-flooring.com

Forbo Flooring Poland  
ul. Wolsztyńska 2  
60-361 Poznań  
Tel: + 48 61 8 62 13 82  
Fax: + 48 61 8 62 13 83  
info@forbo-flooring.pl  
www.forbo-flooring.pl

Forbo Flooring (SE Asia)  
190 Middle Road,  
#19-05 Fortune Centre  
Singapore 188979  
Singapore  
Phone + 65 6852 9805  
Fax + 65 6759 9212  
leo.tan@forbo.com  
www.forbo-flooring.com

Forbo Flooring China  
Taipan Business Centre - Room 502  
N° 20 Dong Hu Road  
Shanghai 200031, P.R. China  
Phone + 86 21 5404 0550  
Fax + 86 21 5403 8458  
info.cn@forbo.com  
www.forbo-flooring.com.cn

Forbo Flooring Japan  
28 Kowa Bldg.  
2-20-1 Nishigotanda,  
Shinagawa-ku,  
Tokyo 141-0031, Japan  
Phone + 81-3-5740-2790  
Fax + 81-3-5740-2791  
info.jp@forbo.com  
www.forbo.co.jp

Forbo Flooring Korea  
#207 Koryo B/D  
88-7 Nonhyun-dong  
Kangnam-gu, 135-818  
Seoul, Korea  
Tel. 82 2 3443 0644  
Fax 82 2 3443 0284  
info@forbo.co.kr  
www.forbo.co.kr



creating better environments