

# colorex<sup>®</sup> – ELECTRONICS

**Leader in electro static dissipative flooring**



creating better environments

**forbo**  
FLOORING SYSTEMS





*Colorex has been designed with electronics manufacturing in mind.*

The challenges of semiconductor size reduction within the nanoscale must be matched by even greater control of micro contamination and static discharge in the manufacturing environment.

Colorex is an advanced technical flooring system specifically designed to control static discharge in ESD sensitive areas and is widely used in ESD cleanrooms and manufacturing and assembly environments across the electronics industry.

Not only does Colorex provide an ideal solution for any electronics manufacturer demanding premium quality floor coverings with electro-conductive or static dissipative characteristics, it is also aesthetically pleasing and will enhance any commercial interior, from specialised scientific research establishments to highly industrialised manufacturing and assembly environments.

Colorex is a high density floor covering that offers superior heavy load resistance to conventional PVC flooring, together with excellent resistance to chemical contamination and staining. Longevity is further enhanced by the ease with which the surface can be repaired and refinished in situ.

## A UNIQUE MANUFACTURING METHOD

It is the unique way in which Colorex is made that gives this advanced technical floor covering its exceptionally high density, outstanding particle release and outgassing behaviour. In cleanroom environments in the electronics industry, airborne particles and outgassing of materials within the cleanroom can be a major source of contamination.

Other benefits of Colorex's dense construction are heavy load resistance and durability; critical performance properties for non-classified transit, storage and warehousing areas, where resistance to high point loading and heavy rolling traffic is demanded yet clean environment must be maintained.

The dense construction and pore-free surface, resulting from the application of intense heat and pressure, combine to give Colorex its inherent resistance to chemicals and staining, and allow extensive and effective surface repairs to be made, avoiding the need to replace tiles.

Whilst offering the performance features normally associated with ESD 'sheet' products Colorex tiles do not require the high plasticiser content that gives sheet vinyl its flexibility, but which can also result in out-gassing and poor mechanical performance such as indentation. Colorex has only minimal plasticiser content and exceptionally low VOC emissions, providing the perfect solution for any environment where micro-contamination has to be controlled.



### WE OFFER COLOREX IN TWO MAIN FORMS:

#### Colorex SD/EC:

A premium conductive glue down tile that is highly dimensionally stable, offers low emissions and is available with two ranges of conductivity SD and EC.

#### Colorex Plus:

A loose lay conductive floor system with a surface composed of Colorex tile material. This ensures all the benefits of standard Colorex like high density, easy repair and stain resistance but also combines the benefits of a heavy duty loose lay tile. Colorex Plus can be installed quickly and easily without the need for conductive adhesive.

## HOW COLOREX IS MADE

### STEP 1: CHIPS AND CONDUCTIVE COATING

Small vinyl chips are coated with a conductive substance.

#### ADVANTAGES

- The conductive coating on the chips ensures that the unique electrostatic dissipative properties are consistent throughout the product.
- The construction guarantees a lifelong conductivity that remains unaffected by changes in humidity and temperature.

### STEP 2: HIGH PRESSURE PRODUCTION

By applying very high pressure and temperature, these coated chips are then compressed into solid blocks of homogeneous material.

#### ADVANTAGES

- The conductive coating on the chips forms a dense network of tiny black veins. These 'conductor paths' enable safe electrostatic discharge through the whole thickness of the tile.
- The compressed construction creates an extremely dense product with high traffic durability, ensuring suitability for a range of manufacturing environments including those where pallet trucks and forklift trucks operate.

### STEP 3: SPLITTING AND SURFACE TREATMENT

Colorex tiles are cut from the solid blocks of homogeneous material and machine-finished to create a pore-free surface.

#### ADVANTAGES

- The compressed construction and pore-free surface give Colorex its easy to clean and repairable properties.
- The tiles are more convenient to work with than large rolls of sheet, and installation is easier and more straightforward.
- As with all modular products, less waste is generated during the installation.



# MAJOR PROBLEMS FACED BY CUSTOMERS

## CLEANROOM CONFORMITY

Colorex has a dense construction. Specifically designed to reduce particle emission. Both from abrasion and outgassing.

## RAISED ACCESS FLOOR SUITABILITY

Colorex is supplied in formats suitable for most major raised floor company's panel sizes. Our product is designed to retain stable conductivity when drilled and adhered to raised floor panels.

## MICROCONTAMINATION

Colorex is manufactured specifically to give industry leading performance in microcontamination. Forbo can provide laboratory test results for Colorex performance in relation to the critical sources of microcontamination relevant to your industry.

Forbo recognises the link between microcontamination and it's impact on product yield, we have designed Colorex to meet the strictest requirements on microcontamination within the industry.

## COST AND TIME REQUIRED TO UPLIFT EXISTING FLOORS

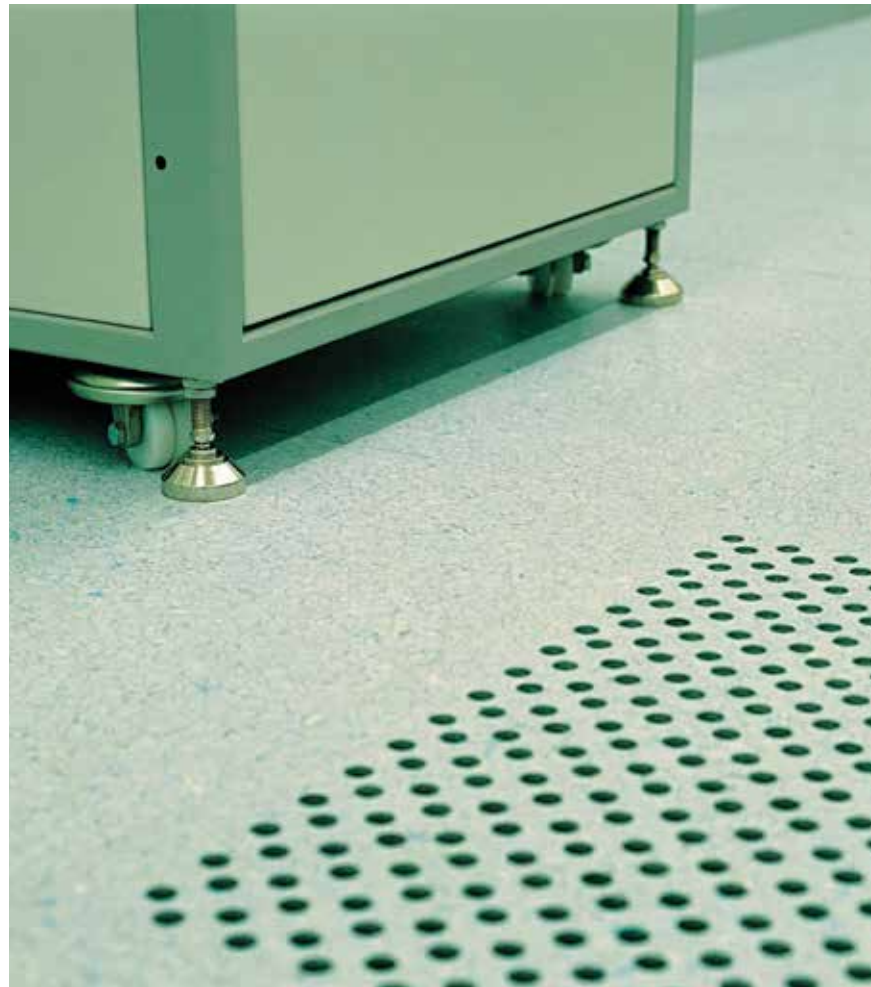
Where not supplied on raised floor Colorex Plus can be overlaid onto existing cracked flooring once the damage has been patched and without the need for adhesive.

## COSTLY DOWNTIME FOR FLOORING RENOVATION

Colorex Plus can be fitted dust-free in a fraction of the time required to lay a traditional poured floor or install glue-down sheet options.

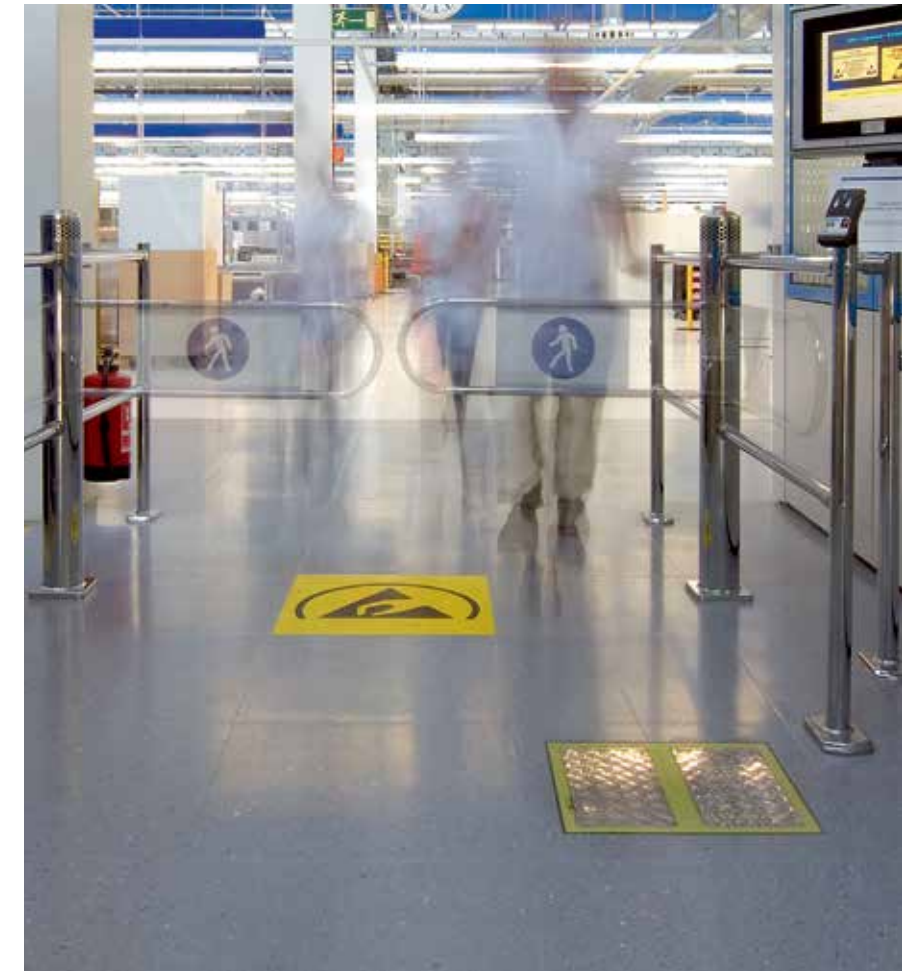
## SUBFLOOR HUMIDITY

Commonly known to be one of the biggest causes of flooring failure, subfloor humidity will emulsify adhesives and cause poured resin floors to lift. Colorex Plus is unaffected by subfloor humidity thanks to its unique raised and ventilated honeycomb backing.



# WHY CHOOSE COLOREX?

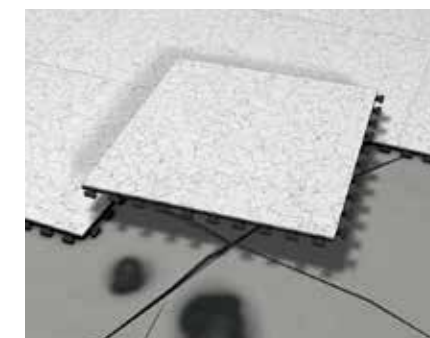
1. The low plasticiser content in Colorex tile creates a unique dimensional stability and prevents shrinkage.
2. The low plasticiser content also ensures extremely low VOC emissions and out-gassing making Colorex the right choice for any area where control over micro-contamination is required.
3. Colorex offers complete peace of mind as it fully complies with all ESD and cleanroom standards, and compliance has been verified by independent bodies including Fraunhofer IPA.
4. Colorex offers a lifetime conductive warranty assuring optimal ESD performance throughout the life of the product.
5. The surface of Colorex can be fully repaired extending the useful life of the product.
6. Carbon contamination is completely unacceptable within the electronics cleanroom. Forbo Guibiasco have invested years of research in developing the bonding technology of the carbon used in our tiles to ensure not only our sustained conductivity but the safety of your products.



# LOOSE LAY MODULAR SOLUTIONS

## COLOREX PLUS

Renovating an industrial floor can be a very costly and labour intensive project. The downtime needed to move or disassemble heavy production equipment and the expense of renovating a complex subfloor have to be accounted for, in addition to the cost of installing the new floor surface. Colorex Plus, a high performance loose lay tile solution provides a cost effective alternative.



Colorex Plus tile overlaying existing flooring

Suitable for applications where expensive preparatory measures and lengthy downtimes are not acceptable, Colorex Plus can be installed without interrupting operations and (unlike a poured floor) is immediately accessible. There's no need for special subfloor treatments or preparations. The tiles are connected across the floor using a unique dovetailing system that remains hidden from view. As the tiles have a genuine Colorex surface they offer all the proven features and benefits of a standard Colorex tile.

## CLEANROOM SUITABLE

Following a comprehensive programme of testing, its suitability in cleanroom applications has been certified by the renowned Fraunhofer IPA Institute in Germany.

The cleanroom suitability certification of Colorex actually consists of three independent qualifications:



The CSM qualification, which defines the suitability of Colorex EC for a specific cleanroom class, based on particle release and outgassing behaviour.

This is the main qualification, typically dedicated to front-end semiconductor manufacturing but also to pharmaceutical cleanrooms.

The TESTED DEVICE certification, where the action of chemical and biological stresses on Colorex EC, as well as its decontamination capabilities, have been assessed. This test series will be typically dedicated to the pharmaceutical industry, to life science applications and to healthcare in general.





# IDEAL FOR CHALLENGING ELECTRONICS ENVIRONMENTS

## SUITABLE FOR THE MOST DEMANDING SETTINGS

Electronics manufacturing environments present their own flooring issues, particularly through the combination of demand for cleanroom environment, strict ESD control and the ever increasing recognition of the need to control microcontamination Forbo's Colorex high performance floor covering systems are designed for use in both high classification cleanroom as well as non-classified and even semi-industrial areas found within electronics manufacturing. Cut from a homogeneous, solid block of highly compressed material they have a high vinyl content and a well-balanced amount of mineral filler for optimum performance.

### COLOREX OFFERS:

- A cleanroom suitable pore-free surface and an exceptionally low plasticiser content resulting in a floor tile which meets the highest standard on outgassing within the electronics industry.
- High mechanical and wear resistance with no need for factory coatings or additional surface hardening treatments.
- Lifetime stable conductivity.
- A 100% repairable and restorable solution that leaves no trace of abrasive treatment methods.
- Resistance to high point loading (1,500 PSI).
- Minimal likelihood of cracking, (unlike resin poured floors).

### FULL SITE SOLUTION

Our ESD flooring doesn't stop at the threshold of the cleanroom; we can supply advanced high performance flooring for all ESD sensitive areas in industrial settings, extending across the factory floor and into every area of the site as required.

To complement our ESD flooring we can offer 'R10' and 'R11'; rugged, quick-lay general purpose warehousing flooring that addresses the need of customers for whom epoxy resin flooring is starting to fail or has already become unusable. The way that R11 integrates seamlessly with EC Plus means that ESD flooring need only be used in localised areas where it is needed.



## ELECTRONICS CUSTOMER REFERENCES

TSMC

UMC

Intel

Seagate

ST Microelectronics

## Technical specifications

Colorex meets the requirements of EN 649

		Colorex SD	Colorex EC	Colorex EC Plus	Colorex Basic Plus	R11 Plus
CE marking	EN 14041	Compliant	Compliant	Compliant	Compliant	Compliant
ASTM**		Compliant	Compliant			
Total thickness	ISO 24346 / EN 428	2.0 mm / 3.0 mm*	2.0 mm / 3.0 mm*	10.5 mm	10.5 mm	10.5 mm
Tile size	EN 427	615 x 615 mm 615 x 1230 mm*	615 x 615 mm 615 x 1230 mm*	608 x 608 mm	608 x 608 mm	608 x 608 mm
Commercial very heavy	ISO 10874 / EN 685	34	34	34	34	34
Industrial heavy	ISO 10874 / EN 685	43	43	43	43	43
Electrical resistance	IEC 61340-4-1 EN 1081 (100V) ANSI/ESD 7.1	$10^6 \leq R \leq 10^9 \Omega$	$5 \times 10^4 \leq R \leq 10^6 \Omega$	$2.5 \times 10^4 \leq R \leq 10^6$	n.a.	n.a.
Electrical resistance in combination with ESD Shoes	IEC 61340-4-5 ESD STM 97.1	n.a.	$R < 3.5 \times 10^7 \Omega$	$R < 3.5 \times 10^7 \Omega$	n.a.	n.a.
Outgassing	IDEMA M11-99	total < 1 µg/cm²	total < 1 µg/cm²	total < 2 µg/cm²	total < 2 µg/cm²	n.a.
Total TVOC 28 days	AgBB guidelines	< 1 mg/m³	< 1 mg/m³	< 1 mg/m³	< 1 mg/m³	n.a.
Total TSVOS 28 days		< 0.1 mg/m³	< 0.1 mg/m³	< 0.1 mg/m³	< 0.1 mg/m³	n.a.
Bacteriostatic	SNV 195 920	Pass	Pass	Pass	Pass	n.a.
Chemical resistance	ISO 26787 / EN 423	Excellent	Excellent	Excellent	Excellent	Excellent
Slip resistance	DIN 51130	R9	R9	R9	R9	R11
Total weight	ISO 23997 / EN 430	3.2 kg/m²	3.2 kg/m²	12.4 kg/m²	12.4 kg/m²	11.4 kg/m²
Dimensional stability	ISO 23999 / EN 434	0.05%	0.05%	n.a.	n.a.	n.a.
Thermal dilation coefficient		n.a.	n.a.	0.11 mm/m°C	0.11 mm/m°C	0.11 mm/m°C
Residual indentation	ISO 24343-1 / EN 433	0.035 mm	0.035 mm	n.a.	n.a.	n.a.
Resistance to loads (performance may vary, subject to local conditions)		n.a.	n.a.	Powered pallet truck and forklifts: total weight up to 2.5 t with hard wheels and up to 5 t with air tyres. Static loads: 50 kg/cm² - dynamic loads: 90 kg/cm²		
Abrasion resistance	EN 660-2	Group M	Group M	Group M	Group M	n.a.
Castor chair continuous use	ISO 4918 / EN 425	no effect	no effect	no effect	no effect	n.a.
Light fastness	ISO ISO 105 B02	≥ 6	≥ 6	≥ 6	≥ 6	n.a.
Impact sound reduction	ISO ISO 140-8	2 dB	2 dB	12 dB	12 dB	12 dB

All Colorex products meet the requirements of EN 14041



Body voltage generation, with appropriate ESD shoes	IEC 61340-4-5 ESD STM97.2 EN 1815	40 V	20 V	20 V	< 2 kV	< 2 kV
Reaction to fire	EN 13501-1	B <sub>fl</sub> -s1	B <sub>fl</sub> -s1	B <sub>fl</sub> -s1	B <sub>fl</sub> -s1	B <sub>fl</sub> -s1
Slip resistance	EN 13893	μ = 0.60	μ = 0.60	μ = 0.60	μ = 0.60	n.a.
Thermal conductivity	EN 12524	0.28 W/(m·K)	0.28 W/(m·K)	0.28 W/(m·K)	0.28 W/(m·K)	0.28 W/(m·K)

\* Available on request

\*\* Product also tested to ASTM. Results available on request.



creating better environments

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FLOORING SYSTEMS