



# colorex<sup>®</sup> sphaera<sup>®</sup> SD | EC onyx impact

Leading the way in cleanroom and ESD solutions for electronics



# PROVIDING PEACE OF MIND IN ELECTRONICS MANUFACTURING

Forbo Flooring Systems is an international market leader with a wealth of experience in providing ESD and cleanroom flooring. Within the wide range of Forbo products, there are several collections which offer a solution for the highest requirements and needs of controlled environments. These collections are featured in Forbo's Under Control portfolio. Even if challenges of semiconductor size reduction within the nanoscale must be matched by very precise control of micro contamination and static discharge in the manufacturing environment, Forbo's Under Control solutions will protect your products and processes.

Each solution within the portfolio contains specific properties that we offer to meet very high requirements of a controlled environment in ESD cleanroom, manufacturing and assembly across the electronics industry.

Keep everything **Under Control**. Under Control refers to what is important: making sure the environment is managed, everything is controlled and kept safe. It also refers to the base, to the floor.

One of the most trusted brands on the market is the homogeneous vinyl tile collection Colorex. You can have peace of mind that Colorex complies to every standard and norm that is required today and likely to be required tomorrow.

Sphera SD | EC homogeneous vinyl sheet flooring provides permanent ESD control and was designed specifically to give the highest possible performance within controlled environments.

The newest addition is a wall covering for controlled environments. Onyx impact is developed according to the same high quality standards and coordinated with Colorex and Sphera SD | EC to offer the most aesthetically pleasing experience.



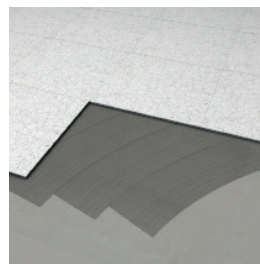
# IDEAL FOR STERILE ENVIRONMENTS IN THE SEMICONDUCTOR INDUSTRY

Electronics manufacturing environments present their own flooring issues, particularly through the combination of demand for a cleanroom environment, strict ESD control and the ever increasing recognition of the need to control micro contamination. Forbo's high performance floor covering systems are designed for use in both high classification cleanroom as well as non-classified and even industrial areas found with electronics manufacturing.

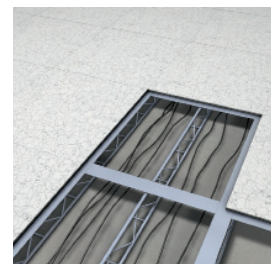
## Colorex SD | EC

Colorex SD | EC are premium conductive glue down tiles that are highly dimensionally stable, offer low emissions and are available with two ranges of conductivity: static dissipative and electrostatic conductive. They can be installed by fully adhering them directly to the subfloor. The unique dimensional stability ensures no shrinkage and therefore a correctly installed weld will never open up.

Often Colorex is bonded to a raised access floor panel that can be used in cleanrooms. Due to the strength and unique properties of Colorex, it is suitable for use on all formats of raised access floor panels, including those designed to withstand heavy point loading. Since Colorex has extremely low emissions and a high density, it can be perforated for air flow systems that are often used in combination with raised access floors.



Colorex with welded seams fully adhered directly to the floor

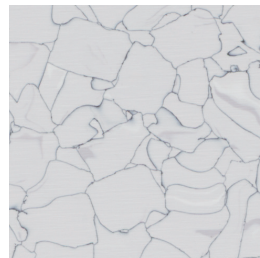


Colorex bonded to a raised access floor panel

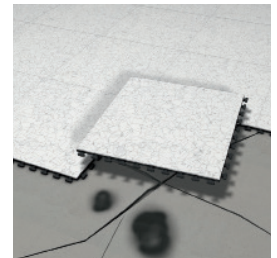
## Colorex Plus

Colorex Plus is a loose lay conductive floor system with a surface composed of Colorex tile material. This ensures all the benefits of standard Colorex, such as 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. Specific, expensive sub floor treatment or preparation is not necessary.



colorex® SD | EC | plus



Colorex as loose lay tile: colorex® plus EC

## Sphera SD | EC

Sphera SD | EC is Forbo's homogeneous vinyl collection with conductive properties in sheet format. The collection is specifically designed to control static discharges and particle emissions in the most sensitive environments, such as electronics and semiconductor facilities.

Sphera SD | EC provides permanent ESD control, reducing the build up of static electricity which can cause attraction of powders, dust and other contaminants. Thanks to the SMART control ⚡ top, the surface is easy to clean ensuring the highest hygienic properties.



sphera® SD



sphera® EC

## Onyx Impact wall covering

Onyx Impact is a wall covering with a smooth surface for easy cleaning. The flexibility of the material makes the product both easy to install and durable.



Onyx Impact



Wall/floor connection



# CLEANROOM SUITABILITY

## GETTING IT RIGHT FIRST TIME

Following a comprehensive programme of testing, the suitability for use in cleanroom applications has been certified by the renowned Fraunhofer IPA Institute in Germany. ISO standards and GMP regulations for air purity require compliance by presenting consistent results that are verified on a regular basis.

### Contamination control

In cleanroom environments in the electronics industry, airborne particles and outgassing of materials can be a major source of contamination. Not only they can cause yield loss, they can also lead to corrosion and product degradation. Colorex satisfies the strictest requirements for particle release behaviour and outgassing, helping to reduce any threat of contamination. For ISO class 5 cleanrooms and lower Sphera SD | EC offers an excellent option where a sheet product is preferred.

### GMP

Good Manufacturing Practice requires a smooth floor which is tight and free from cracks. Colorex complies with the requirements once installed for the life span of the product and is less vulnerable to cracking than poured floors. In highly sensitive areas, and other places that have strict hygiene requirements, it's vital that floor-to-wall transitions are water-tight, perfectly hygienic and aesthetically pleasing.

Our integrated coving system and skirting, create a perfect seal for these critical areas using the same Colorex material. The radius of the preformed Colorex and Sphera SD | EC corners is linked to the size of cleaning pads found on most commercial cleaning machines.

This ensures that no sharp corners are created that would prove difficult to clean. Preformed corners are prevented from tearing thanks to their special construction.

### Customer references for Colorex

- TSMC
- ASML
- Intel
- Seagate
- ST Microelectronics

### Customer references for Sphera SD | EC

- Nano Dimension
- Pelephone communications

FRAUNHOFER IPA RESULTS	Airborne particle emission and cleanroom suitability (ISO 146441-1)	Outgassing (ISO 14644-8) ISO Accm-class, 23 °C		Chemical resistance (ISO 2812-4)
		VOC	SVOC	
<b>Colorex®</b> SD	ISO 4	- 8.1	< - 9.6	Excellent
<b>Colorex®</b> EC	ISO 3	- 8.1	< - 9.6	Excellent
<b>Colorex®</b> EC plus	ISO 3	- 8.1	< - 9.6	Excellent
<b>Sphera®</b> SD	ISO 6	- 8.3	- 8.5	Very good
<b>Sphera®</b> EC	ISO 5	< - 9.6	< - 9.6	Very good
<b>Onyx</b> Impact	ISO 3	-7,6	< - 9.6	Very good



# ADDRESSING MAJOR CHALLENGES FACED IN ELECTRONICS ENVIRONMENTS

At Forbo we understand the needs and challenges of the electronics industry. Our solutions do not 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.

## Cleanroom conformity

Colorex and Sphera SD | EC ranges are independently certified as "Cleanroom Suitable Material" by Fraunhofer IPA. Colorex EC and plus EC are suitable for ISO class 3 and GMP A environments. We achieve this through Colorex's dense construction specifically designed to reduce particle emission both from abrasion and outgassing whilst having a bacteriostatic surface. Colorex SD is suitable for ISO class 4 and GMP class A environments.

The different product construction of Sphera SD | EC results in ISO class 6 for Sphera SD and ISO class 5 for Sphera EC. This is sufficient in most areas in electronics facilities, such as grade A - D cleanrooms, production and packaging areas.

Wall covering Onyx Impact is certified for ISO 3 cleanrooms and above. Outgassing of potentially harmful airborne molecular contaminants is low.

## Harsh cleaning processes

Common causes of functional and aesthetic degradation of floors are harsh cleaning methods in pharmaceutical manufacturing. Commonly used substances have been tested by Fraunhofer IPA. Colorex shows excellent chemical resistance thanks to its pore free surface and low plasticizer formulation. Also Sphera SD | EC ensures excellent resistance to chemicals, thanks to the SMART control ⚡ top. Both collections can withstand harsh cleaning processes.

Onyx Impact comes with a PUR finish, resistant to all commonly used disinfectants and cleaning methods in electronics environments. Test results show that washing and scrubbing of the wall covering can be part of the maintenance regime.



A piece of Colorex can be used for a seamless repair

## Cost and time required to uplift existing floors

Colorex plus can be overlaid onto existing cracked flooring once the damage has been patched. Our range of accessories still allow for full, hygienic coving.

## Avoid 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

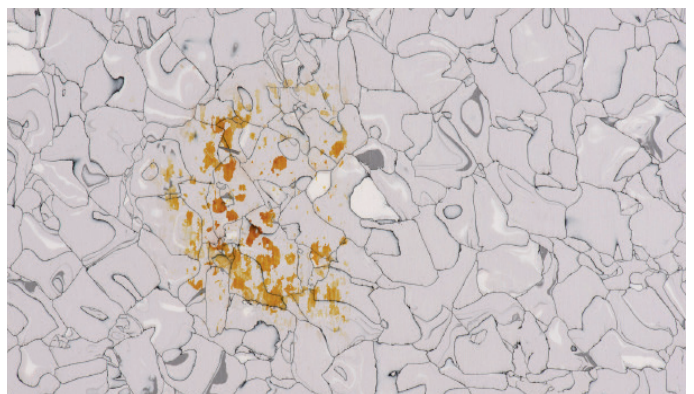
Commonly known to be one of the biggest causes of flooring failure, subfloor humidity will emulsify adhesives and cause poured resin floors to lift. Colorex plus is unaffected by subfloor humidity thanks to its unique raised and ventilated honeycomb.

## Cracked flooring

Unacceptable in any cleanroom or hygiene critical area is cracked flooring. Unlike resin poured floors, vinyl flooring has a minimal likelihood of cracking. Colorex is highly resistant to high point loading, rolling traffic and falling loads. If damage does occur, the floor can be easily repaired and restored.

## Repairs and unsightly patching

It is difficult to effectively repair many types of flooring commonly used in manufacturing environments, and over time, an unsightly patchwork effect can be created. If damage occurs, Colorex can be invisibly repaired with ease, ensuring that the appearance of the floor can be maintained for many years.



Stubborn stains left by iodine based substances can be fully removed

# A UNIQUE MANUFACTURING METHOD

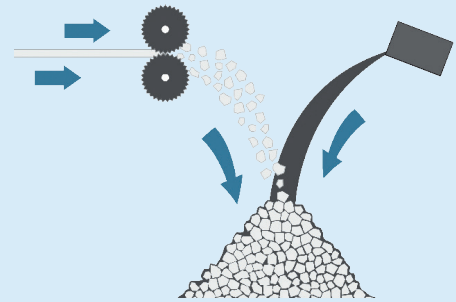
## HOW COLOREX IS MADE

For decades, Colorex has been produced by Forbo in a factory which specializes in the production of vinyl ESD and cleanroom tiles. The production process has been specifically set up for this product and the development work is carried out by ESD and cleanroom specialists with extensive knowledge of the application areas.

### Step 1: Chips and conductive coating

Vinyl chips are coated with a conductive substance.

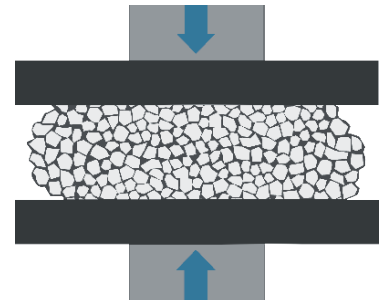
- The coating on the chips ensures that the ESD properties are consistent throughout the product.
- The construction ensures permanently conductive or dissipative properties over time.
- The technology used guarantees performance, regardless of changes in humidity and temperature.



### Step 2: High pressure production

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

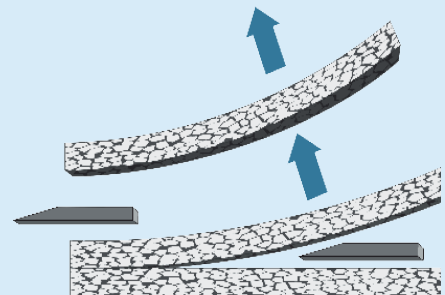
- After pressing, the conductive coating around each chip forms a dense, continuous network of tiny black veins.
- The continuous paths enable safe electrostatic discharge across both the width and the depth of the tile.



### Step 3: Splitting and surface treatment

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

- Colorex is a highly compressed tile with a compact pore free, easy to clean and repairable surface.
- Batch information is printed on the back of each tile to enable easy identification.



### Finished product

To ensure the integrity of the product post-production, special care is taken to get the product to the final location in good shape.

- Distinct labelling of the pallet.
- Protection to prevent damage during transport and handling.





# THE BENEFITS OF COLOREX

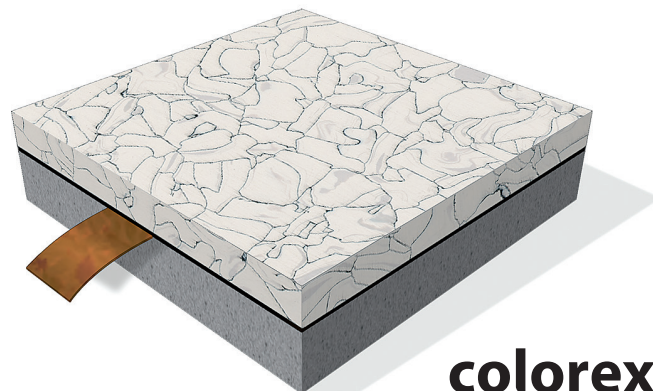
It is the unique way in which Colorex is made that gives this advanced technical floor covering its exceptionally high density, limited particle release and outgassing. In cleanroom environments in the electronics industries, airborne particles can be a major source of contamination.

The dense construction and pore free surface combine to give Colorex its inherent resistance to chemicals and staining. This makes Colorex compatible with the industry's aggressive cleaning chemicals. The surface permits extensive and effective surface repairs to be made nearly invisible and avoiding the need to replace tiles.

Whilst offering the performance features normally associated with ESD 'sheet' products, Colorex tiles do not require the high plasticizer content that gives sheet vinyl its flexibility, but which can also result in outgassing and poor mechanical performance.

Colorex has only minimal plasticizer content and exceptionally low VOC emissions, providing the perfect solution for any environment where micro contamination has to be controlled.

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



## Why choose Colorex?

**1** | The technology ensures a permanently conductive product guaranteeing optimal performance throughout the life of the product, regardless of the humidity level of the area. Colorex fully complies with all ESD standards with the resistance to electricity being monitored continuously, online, through the production process.

**2** | The surface of Colorex can be fully repaired extending the useful life of the product.

**3** | The low plasticizer content in Colorex tiles creates a unique dimensional stability and prevents shrinkage.

**4** | The low plasticizer content also ensures extremely low emissions and outgassing making Colorex the right choice for cleanrooms. Colorex fully complies with all cleanroom standards, as confirmed by the Fraunhofer Institute.

**5** | The dense construction of Colorex and the Colorex plus loose lay system provides excellent resistance to heavy loads making it an ideal solution for commercial and industrial environments.

**6** | Colorex is available in tile format, a prerequisite for raised access floors found in areas with laminar airflow or HVAC systems.

**7** | There is an option to add safety signs and guiding with signal and glow.



Under light



In the dark

\*Measurement reports are available upon request.

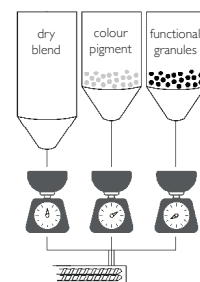
# STATE-OF-THE-ART PROCESS

## HOW SPHERA SD | EC IS MADE

Forbo has invested in the most up to date equipment and technology available to provide customers with products and solutions of constant and exceptional quality from sources that are fully operated and controlled by Forbo employees. The manufacturing process for Sphera SD | EC includes five main steps:

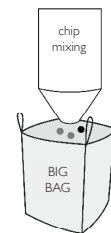
### Step 1: Producing granulate

Forbo's new internal extrusion process enables the controlled creation of granules in an efficient way. PVC granules are created by extruding PVC dry blend and colour pigments. The functional granules are separately produced using a similar process, with a conductive black carbon component for Sphera EC.



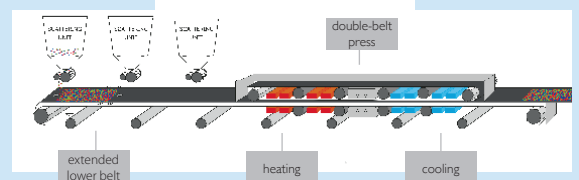
### Step 2: Mixing

The size and ratio of coloured and functional chips is carefully set to make sure that the distribution of the functional granules is sufficient to consistently meet all conductivity requirements. No matter which spot on the floor is chosen to do the measurement.



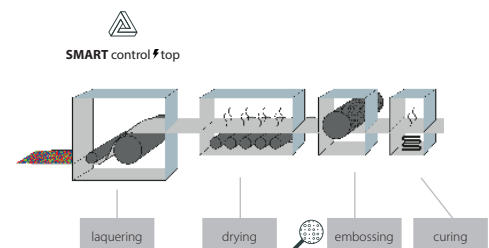
### Step 3: Sheet making

The granules are then released by precision scatter units onto a conveyor belt. A steel-belt press forms a homogeneous sheet with a truly non-directional visual. Unlike conventional manufacturing, there is no need to back sand the product, which means there is no over-application of granules (less waste) and the process is more energy efficient.



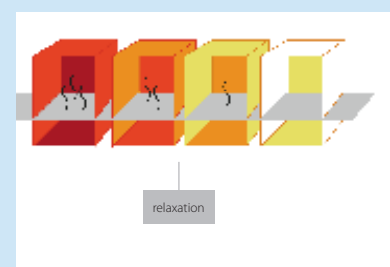
### Step 4: Lacquering, embossing and backside primer

In-line, Sphera SD | EC has a conductive UV-cured lacquer applied on the top of the product. The embossing achieves a particularly matt finish, which diffuses light and conceals any minor sub-floor imperfections. Forbo calls this SMART control ⚡ top, as it provides permanent and consistent conductivity and very good resistance to stains and scuffmarks. On the reverse of the product, a permanently conductive primer is applied.



### Step 5: Relaxation

Homogeneous vinyls acquire tension during production. The tension in Sphera SD | EC is removed by heating the material again and then slowly cooling to achieve the most dimensionally stable sheet product in this category.



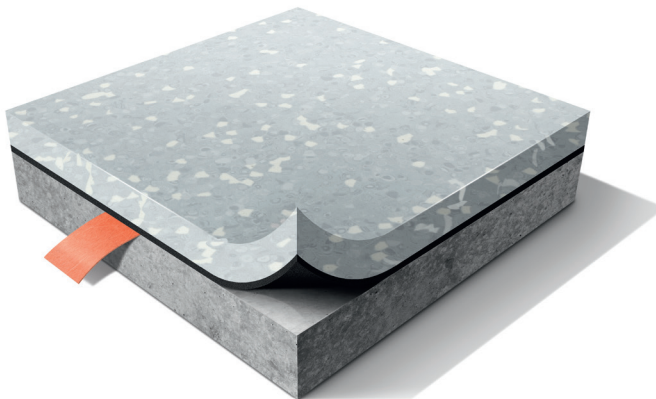


# THE BENEFITS OF SPHERA SD | EC

The Forbo Sphera SD | EC sheet collection offers a trustworthy solution delivering consistently high quality for the most demanding of controlled environments. Our technical flooring solution will perform regardless of the conditions of the area.

Forbo's Sphera SD | EC collection is an innovative addition to the product category of homogeneous conductive vinyl flooring. Design, technology and performance meet in this high-quality and visually attractive flooring solution.

For Sphera SD an innovative technology is used to create a permanent dissipative, consistently performing granule. Integration of this granule in the product ensures an electrical resistance of  $1 \times 10^6 \leq R \leq 10^8 \Omega$ .



## sphera® SD

### Why choose Sphera SD | EC?

- 1 | In critical areas, control of cleanliness of the air and surfaces is essential to reduce the risk of contamination with particles or microorganisms. Sphera SD has been approved for cleanrooms to class 6 and Sphera EC for cleanrooms to class 5, as confirmed by the Fraunhofer Institute.
- 2 | The bacterial resistance of Sphera SD | EC is excellent and the mould resistance very good, as also confirmed by the Fraunhofer Institute.
- 3 | Innovative product development and carefully controlled production processes ensure a solution with permanent conductive and dissipative properties, which comply with all ESD standards.

For the production of Sphera EC ingredients from our Colorex technology are used; a proven consistent high performance technology and product with many years of experience. These ingredients ensure that Sphera EC has an electrical resistance of  $5 \times 10^4 \leq R \leq 10^6 \Omega$ .

The SMART control ⚡ top is the finishing touch on both Sphera SD and EC. It protects the floor against stains, scuffmarks and gives the floor an easy to clean surface.



## sphera® EC

- 4 | Optimal performance of the product will remain throughout the lifetime of the product, regardless of the conditions of the environment, such as the relative humidity level in the area.
- 5 | Low TVOC emissions and outgassing. Vital for application areas where sensitive materials are used, contributing to a healthy indoor environment. TVOC emissions are  $\leq 0,01 \text{ mg/m}^3$ .
- 6 | The unique SMART control ⚡ top makes Sphera SD | EC resistant to stains and scratches, for a durable and hygienic solution.
- 7 | Thanks to the conductive backing on Sphera SD | EC, the flooring material itself allows horizontal diverting of static electrical buildup. The installation depends less on proper use of conductive adhesive and skills of an installer which drastically reduces the risk of a malfunctioning floor and non conductive spots across the surface.

# HOW TO CHOOSE COLOREX OR SPHERA SD | EC

We constantly strive to produce sustainable flooring solutions that create better environments across all application areas. At the same time we help to take care of the natural environment through our commitment to sustainable development, responsible raw material procurement and manufacturing processes.

Colorex offers complete peace of mind as it fully complies with all ESD and cleanroom standards. Sphera SD | EC is a trustworthy solution for most application areas in controlled environments. Both products have been extensively tested and verified by independent bodies including Fraunhofer IPA. Which product is the best solution depends on the specific circumstances of the premises, application area and requirements. Contact a Forbo specialist for detailed information.

	Permanent and consistent ESD control	Cleanroom conformity and particle control	Dimensional stability and seams	Chemical resistance	Contamination control and hygienics	Heavy loads resistance	High point loads resistance	Repairability and restorability
<b>colorex® SD</b>	Static dissipative	ISO 4	≤ 0.05%, more seams	Excellent	Excellent	Extreme	1500 PSI	Can be fully restored and repaired
<b>colorex® EC</b>	Electrostatic conductive	ISO 3	≤ 0.05%, more seams	Excellent	Excellent	Extreme	1500 PSI	Can be fully restored and repaired
<b>colorex® plus EC</b>	Electrostatic conductive	ISO 3	≤ 0.25%, interlocking dovetails	Excellent	Excellent	Heavy	1500 PSI	Can be fully restored and repaired
<b>sphera® SD</b>	Static dissipative	ISO 6	≤ 0.4%, less seams	Very good	Excellent	Moderate	250 PSI	Polishing by dry buffing
<b>sphera® EC</b>	Electrostatic conductive	ISO 5	≤ 0.4% , less seams	Very good	Excellent	Moderate	250 PSI	Polishing by dry buffing

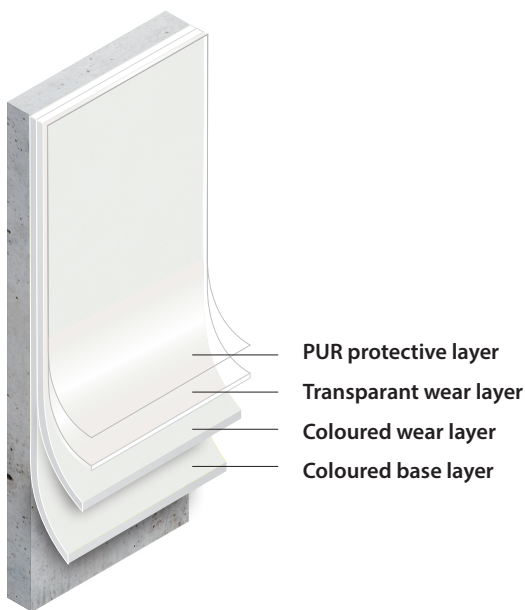




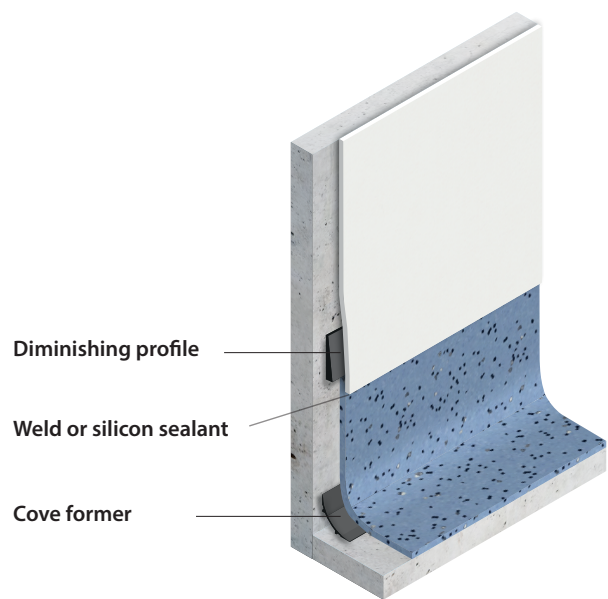
# THE BENEFITS OF ONYX IMPACT WALLCOVERING

Onyx Impact is a durable vinyl wall covering perfectly suited for corridors, production and packaging areas in electronics. Maintenance is easy thanks to the PUR protection.

## Onyx Impact construction



## Onyx Impact installed



## Why choose Onyx Impact?

- 1** | Developed in coordination with Colorex and Sphera SD | EC floor coverings to offer a complete solution for controlled environments from floor to wall.
- 2** | Certified by the Fraunhofer Institute to use in cleanrooms up to ISO 3 and proven low emissions.
- 3** | The surface protection makes Onyx Impact easy to clean and provides excellent bacteria and fungi resistance.
- 4** | Phthalate free manufacturing ensures Onyx Impact can contribute to a healthy indoor environment.
- 5** | Onyx Impact can be hot welded with colour matching welding rods for perfect water tightness and a hygienic finish.
- 6** | Produced with over 20% recycled material and fully recycable.
- 7** | The colour offer of Onyx Impact is also aligned with other Forbo Flooring ranges for the electronics environment, like the homogeneous vinyl collection Sphera Element and Step safety vinyl.



# UNDER CONTROL PORTFOLIO

Within the wide range of Forbo products, there are several collections which offer a solution for the highest requirements and needs of controlled environments. Colorex and Sphera SD | EC form the base of the Forbo's **Under Control** portfolio.

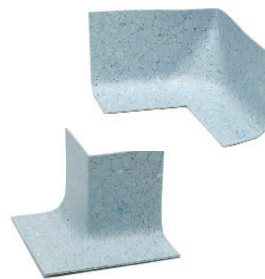
The installation and final finish of the floor will have significant impact on the floors performance and lifespan. Forbo has developed a series of products and pre-formed accessories to ensure the final result will keep functioning for the protection of your product.

## Accessories

In hygiene sensitive areas, high quality finishes are a must from a hygienic point of view. The use of preformed corners and skirtings provides the perfect solution for water-tight floor-to-wall transitions which are perfectly hygienic and aesthetically pleasing. Our integrated coving system for Colorex creates a perfect seal for these critical areas.

Preformed corners with a radius linked to the size of cleaning pads found on most commercial cleaning machines. This ensures that no sharp corners are created that would prove difficult to clean. Preformed outer corners are prevented from tearing thanks to their special construction. The inner reinforcement prevents the outer corners tearing or breaking due to high mechanical pressure, e.g. the rotation of a cleaning machine.

The accessories shown on the right are frequently used accessories. More options are available, please ask your local Forbo contact or visit our website for the complete offer.



Inner and outer corners  
(Colorex and Sphera SD | EC)



Skirting  
(Colorex only)



Colour matching welding rod  
(Colorex and Sphera SD | EC)



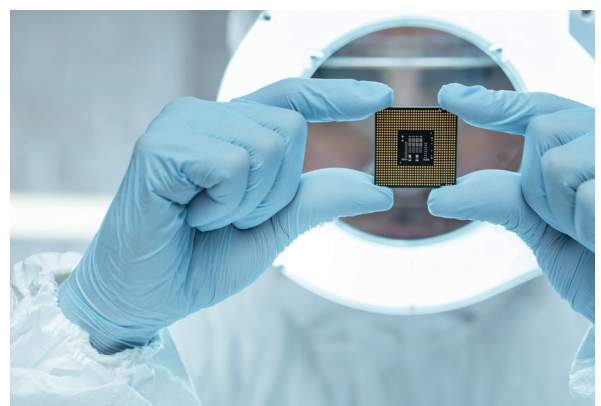
Ventilated skirting  
(Colorex and Sphera SD | EC)

## eurocol

Installation of controlled environment flooring can require the use of specific accessories such as conductive adhesive and copper strips, as offered by Eurocol or other high quality brands.

## coral<sup>®</sup> & nuway<sup>®</sup>

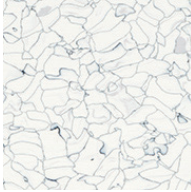
Entrance flooring systems such as Coral and Nuway are not meant to be installed in controlled environments, but they are essential for almost every building. Soil and dirt can inhibit the conductive properties of ESD flooring. Capturing dirt in an early stage by the use of entrance flooring can be part of a contamination control plan for facilities with strict hygienic requirements. Entrance flooring can even be used for internal and external entrance areas where heavy duty loads and intense pedestrian and/or wheeled traffic are to be catered.





# THE COLLECTIONS

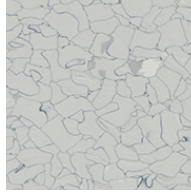
## colorex® SD | EC | plus



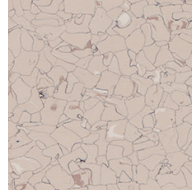
SD 150201 | EC 250201  
everest\*



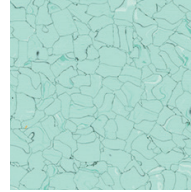
SD 150204 | EC 250204  
montblanc\*



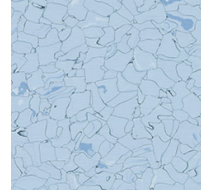
SD 150206 | EC 250206  
moonstone



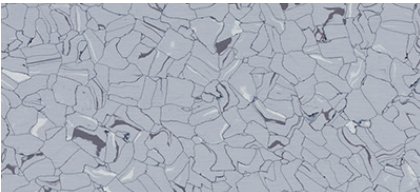
SD 150213 | EC 250213  
sahara\*



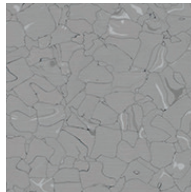
SD 150225 | EC 250225  
kiwi



SD 150221 | EC 250221  
pacific



SD 150205 | EC 250205  
adula\*



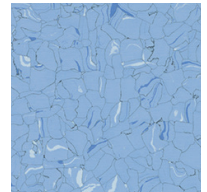
SD 150262 | EC 250262  
nebo



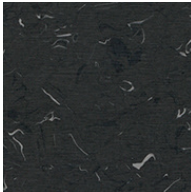
SD 150264 | EC 250264  
meru



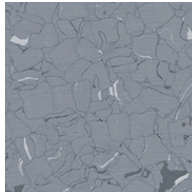
SD 150234 | EC 250234  
twilight



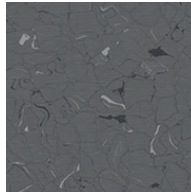
SD 150222 | EC 250222  
niagara\*



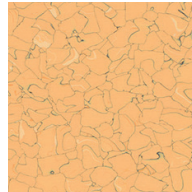
SD 150240 | EC 250240  
etna



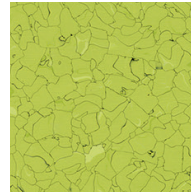
SD 150207 | EC 250207  
quartz\*



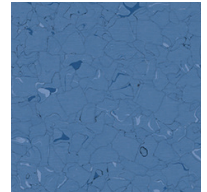
SD 150263 | EC 250263  
massif



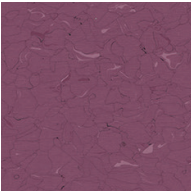
SD 150219 | EC 250219  
assuan



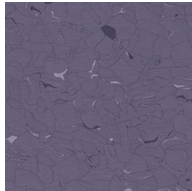
SD 150268 | EC 250268  
pelion



SD 150265 | EC 250265  
blue ridge



SD 150266 | EC 250266  
fuji



SD 150267 | EC 250267  
montserrat

\* items also available in Colorex plus

colorex®	plus EC	plus basic	plus R10
everest	621001		
montblanc	621004	611004	
adula	621005	611005	
quartz	621007	611007	661007
sahara	621013	611013	
niagara	621022	611022	

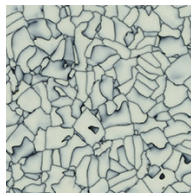
## colorex® signal



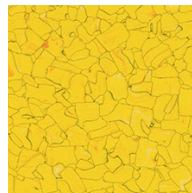
Colorex signal glow  
under light



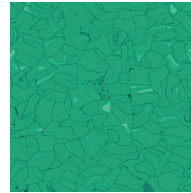
Colorex signal glow  
in the dark



EC 250299  
glow



SD 150231  
sole



SD 150237  
amazonas

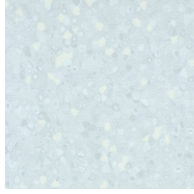


SD 150233  
fuego

## sphera® SD



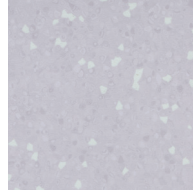
**SD 550000**  
white



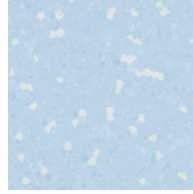
**SD 550007**  
grey sky



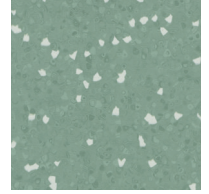
**SD 550017**  
ivory



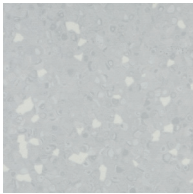
**SD 550032**  
soft lilac



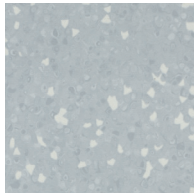
**SD 550036**  
water



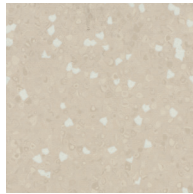
**SD 550050**  
olive



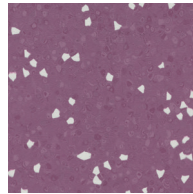
**SD 550003**  
light neutral grey



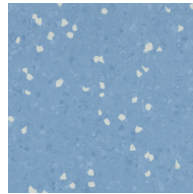
**SD 550008**  
silver grey



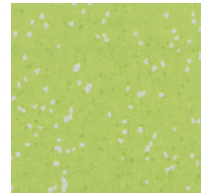
**SD 550023**  
sand



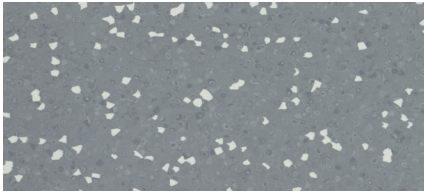
**SD 550034**  
amethyst



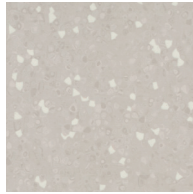
**SD 550037**  
China blue



**SD 550049**  
yellow green

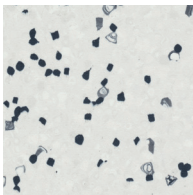


**SD 550005**  
dark neutral grey

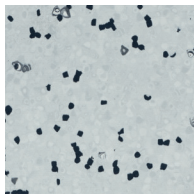


**SD 550018**  
mortar

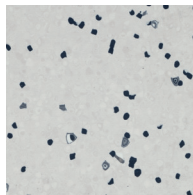
## sphera® EC



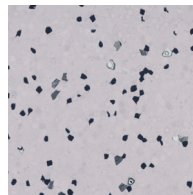
**EC 450000**  
white



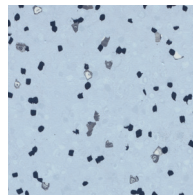
**EC 450007**  
grey sky



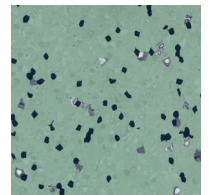
**EC 450017**  
ivory



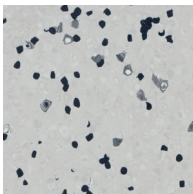
**EC 450032**  
soft lilac



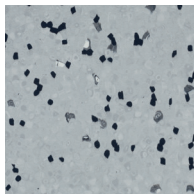
**EC 450036**  
water



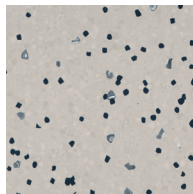
**EC 450050**  
olive



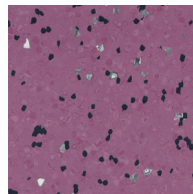
**EC 450003**  
light neutral grey



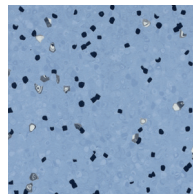
**EC 450008**  
silver grey



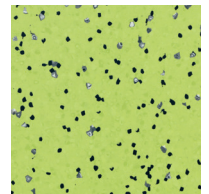
**EC 450018**  
mortar



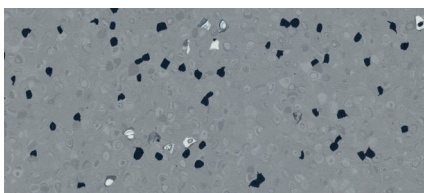
**EC 450034**  
amethyst



**EC 450037**  
China blue



**EC 450049**  
yellow green



**EC 450005**  
dark neutral grey

# Technical specifications

Colorex® meets the requirements of EN ISO 10581 and ASTM 1700  
Sphera® SD | EC meets the requirements of EN ISO 10581

		Colorex® SD	Colorex® EC	Colorex® plus EC	Sphera® SD	Sphera® EC	
	Binder content	EN ISO 10581	type 1	type 1	type 1	type 1	
	Total thickness	EN ISO 24346	2.0 mm / 3.0 mm*	2.0 mm / 3.0 mm*	10.3 mm	2.0 mm	
	Surface finish		n.a.	n.a.	n.a.	SMART control ⚡ top	
	Commercial use	EN ISO 10874	34 very heavy	34 very heavy	34 very heavy	34 very heavy	
	Light industrial use	EN ISO 10874	43 heavy	43 heavy	43 heavy	43 heavy	
	Roll width	EN ISO 24341	n.a.	n.a.	n.a.	2 m	
	Roll length	EN ISO 24341	n.a.	n.a.	n.a.	≤ 27 m ~ 26 m	
	Tile size	EN ISO 24342	615x615 mm 615x1230 mm*	615x615 mm 615x1230 mm*	607x607 mm	n.a.	
	Total weight	EN ISO 23997	3.1 kg/m <sup>2</sup>	3.1 kg/m <sup>2</sup>	12.0 kg/m <sup>2</sup>	2.9 kg/m <sup>2</sup>	
	Electrostatics (general requirements)	IEC 61340-5-1	Compliant	Compliant	Compliant	Compliant	
	Electrical resistance	IEC 61340-4-1 ESD STM7.1	$1 \times 10^6 \leq R \leq 10^8 \Omega$	$5 \times 10^4 \leq R \leq 10^6 \Omega$	$2.5 \times 10^4 \leq R \leq 10^6 \Omega$	$1 \times 10^6 \leq R \leq 10^8 \Omega$	$5 \times 10^4 \leq R \leq 10^6 \Omega$
	Electrical resistance in combination with ESD control footwear	IEC 61340-4-5 ESD STM97.1	$R \leq 1 \times 10^9 \Omega$	$R \leq 3.5 \times 10^7 \Omega$	$R \leq 3.5 \times 10^7 \Omega$	$R \leq 1 \times 10^9 \Omega$	$R \leq 3.5 \times 10^7 \Omega$
	Body Voltage Generation, in combination with ESD control footwear <i>Typical value</i>	IEC 61340-4-5 ESD STM97.2	< 100 V ~ 40 V	< 100 V ~ 20 V	< 100 V ~ 20 V	< 50 V ~ 0 V <> 30 V	< 50 V ~ 0 V <> 30 V
	Electrical insulation to ground	DIN VDE 0100	≥ 50 kΩ	n.a.	n.a.	≥ 50 kΩ	n.a.
	Dimensional stability	EN ISO 23999	≤ 0.05%	≤ 0.05%	≤ 0.25%	≤ 0.4 %	≤ 0.4 %
	Residual indentation <i>Typical value</i>	EN ISO 24343-1	≤ 0.10 mm ~ 0.02 mm	≤ 0.10 mm ~ 0.02 mm	≤ 0.10 mm ~ 0.05 mm	≤ 0.10 mm ~ 0.03 mm	≤ 0.10 mm ~ 0.03 mm
	Resistance to loads		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/cm <sup>2</sup> - dynamic loads: 90 kg/cm <sup>2</sup> (performance may vary, subject to local conditions)			n.a.	n.a.
	Castor chair continuous use	ISO 4918	Pass	Pass	Pass	Pass	Pass
	Impact sound reduction	EN ISO 140-8	2 dB	2 dB	12 dB	4 dB	4 dB
	Light fastness	EN ISO 105-B02	≥ 6	≥ 6	≥ 6	≥ 7	≥ 7
	Resistance to chemicals	EN ISO 26987	Excellent	Excellent	Excellent	Very good	Very good
	Slip resistance	DIN 51130	R9	R9	R9	R9	R9
	Bacteria resistance	ISO 846	All products do not support growth of bacteria				
	Outgassing: VOC	ISO 14644-8	- 8.1	- 8.1	- 8.1	- 8.3	< - 9.6
	Indoor Air Emissions: TVOC after 28 days	EN 16516	≤ 0.025 mg/m <sup>3</sup>	≤ 0.025 mg/m <sup>3</sup>	≤ 0.025 mg/m <sup>3</sup>	≤ 0.01 mg/m <sup>3</sup>	≤ 0.01 mg/m <sup>3</sup>
	Cleanroom particle emission	ISO 14644-1	ISO 4	ISO 3	ISO 3	ISO 6	ISO 5
	<b>Creating better environments</b>						
	Renewable electricity		Colorex SD, Colorex EC, Sphera SD and Sphera EC are manufactured using 100% electricity from renewable sources				
	Recycled content (mass)		25%	25%	69%	n.a.	n.a.
	Colorex and Sphera® SD   EC products meet the requirements of EN 14041						
	Reaction to fire**	EN 13501-1	B <sub>fl</sub> -s1, G, CS	B <sub>fl</sub> -s1, G, CS	B <sub>fl</sub> -s1, L, CS	B <sub>fl</sub> -s1,G, NCS	B <sub>fl</sub> -s1,G, NCS
	Slip resistance	EN 13893	μ ≥ 0.30	μ ≥ 0.30	μ ≥ 0.30	μ ≥ 0.30	μ ≥ 0.30
	Thermal conductivity	EN 12524	0.25 W/(m·K)	0.25 W/(m·K)	0.25 W/(m·K)	0.25 W/m·K	0.25 W/m·K
	Body voltage	EN 1815	≤ 2 kV	≤ 2 kV	≤ 2 kV	≤ 2 kV	≤ 2 kV
	Electrical behaviour - static dissipative	EN 1081	≤ 1 x 10 <sup>9</sup> Ω	≤ 1 x 10 <sup>9</sup> Ω	≤ 1 x 10 <sup>9</sup> Ω	≤ 1 x 10 <sup>9</sup> Ω	≤ 1 x 10 <sup>9</sup> Ω
	Electrical behaviour - conductive	EN 1081	n.a.	≤ 1 x 10 <sup>9</sup> Ω	≤ 1 x 10 <sup>9</sup> Ω	n.a.	≤ 1 x 10 <sup>9</sup> Ω

\* Available on request

\*\* Product also tested to ASTM. Fire ASTM E648: class 1, Smoke ASTM 662: pass

All Forbo Flooring Systems' sales organisations worldwide have a certified Quality Management System in accordance with ISO 9001.

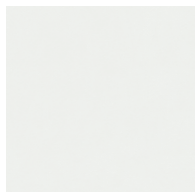
All Forbo Flooring Systems' manufacturing operations have a certified Environmental Management System in accordance with ISO 14001.

The Life Cycle Assessment (LCA) of Forbo Flooring Systems' products is documented in individual Environmental Product Declarations (EPDs) which can be found on all of our websites.

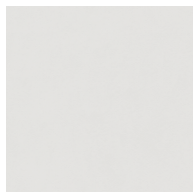




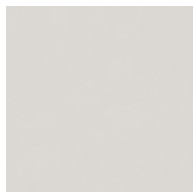
# onyx impact wallcovering



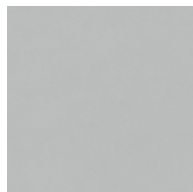
**27500**  
white



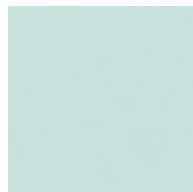
**27501**  
light grey



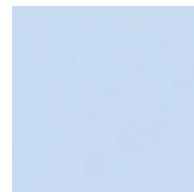
**27502**  
mid grey



**27503**  
grey



**27505**  
teal



**27504**  
blue



Onyx Impact 27500 | white Sphera SD 550003 | light neutral grey

## Technical specifications

Onyx Impact meets the requirements of EN 15102 and EN 233



	Total thickness	EN ISO 24346	1,50 mm
	Thickness wear layer	EN ISO 24340	0,10 mm
	Surface finish		PUR
	Collection size		6
	Roll width	EN ISO 24341	2,0 m
	Roll length	EN ISO 24341	21 m
	Total weight	EN ISO 23997	2500 g/m <sup>2</sup>
	Dimensional stability	EN ISO 23999	≤ 0,4 %
	Light fastness	ISO 105-B02	≥ 6
	Resistance to chemicals	EN ISO 26987	good
	Impact resistance	EN 235	resistant to impact
	Indoor Air Emissions: TVOC after 28 days	ISO 16000-6	≤ 0,01 mg/m <sup>3</sup>
	Bacteria and fungi resistance	ISO 846	does not favour growth
	Cleanroom particle emission	ISO 14644-1	ISO 3
	Washability	EN 233	washable and scrubbable
	Recycled content		≥ 20%
	Onyx Impact meets the requirements of EN 15102		
	Reaction to fire	EN 13501-1	B-s2,d0





Forbo Flooring Systems is part of the Forbo Group, a global leader in flooring and movement systems, and offers a full range of flooring products for both commercial and residential markets. High quality linoleum, vinyl, textile, flocked and entrance flooring products combine functionality, colour and design, offering you total flooring solutions for any environment.

**For Sphera SD | EC  
& Onyx Impact**

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[www.forbo-flooring.com](http://www.forbo-flooring.com)

**For Colorex**

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