

Introduction document

Sphera SD/EC Homogeneous ESD vinyl sheet

May (pre-introduction) / September 2020



Forbo Flooring Systems

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Contents

Introduction	3
Design Concept	4
Functionality and USP's.....	5
Technical specifications	8
Marketing tools.....	9
Service products.....	12
Specials Procedure.....	12
Collection running time	12
Logistics.....	12
Appendix I: SAP hierarchy and article numbers.....	13

Introduction

This introduction document provides information about the launch of the new Sphera SD/EC homogeneous vinyl sheet collection. The collection is available from May 2020, with a limited selection of marketing tools. A full global introduction has been postponed, depending on the global covid-19 situation it is likely to become September 2020.

Controlled Environments are areas which require certain control measures. This can be related to for example pressure, temperature and moisture, but also to electrostatics and/or to particle control where flooring needs to fulfill certain requirements to meet the criteria for the controlled area. Sphera SD/EC is a technical homogeneous vinyl sheet collection specifically designed to control static discharge in sensitive areas.

Sphera SD/EC consists of two sub collections: Sphera EC (Electrostatic Conductive) and Sphera SD (Static Dissipative). This type of floor covering is also known as ESD (Electro Static Discharge) or controlled environments flooring.

Key segments are Industry and Health care, opportunistic sales are in Education and Office. Each segment has it's specific needs, requirements and control related risks. Functionality is the first priority in most controlled environments, with permanent conductive/dissipative properties as the main characteristic and Sphera SD/EC has been developed with this in mind. The contemporary design offer with a recognizable Forbo design signature is covering the needs of both key segments.

Sphera SD/EC will be made available in a full sample book presenting 27 items, the key benefits and the basics about ESD control. The collection will be part of the **Under Control** portfolio.

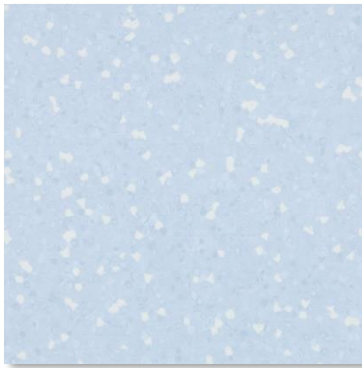
This introduction document provides information, containing the final collection offer, relevant details, USP and sales information on the planned (pre-)launch of the new Sphera SD/EC collection in May/September 2020.

Design Concept

Controlled environments flooring is used in very specific application areas, where colour and design choice is often based on functionality. The industry segment is a very diverse segment, where a strong offer in neutrals like white and greys is important. In healthcare the greys are also important, but there is more room for colour, especially tones related to nature.

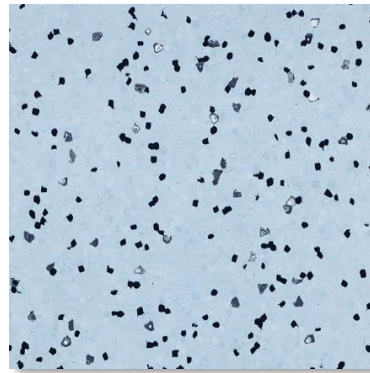
There are two different designs, both based on the Sphera Element visual. A functional chip is added to give the product the functional, conductive properties which are crucial for controlled environment flooring.

sphera® SD



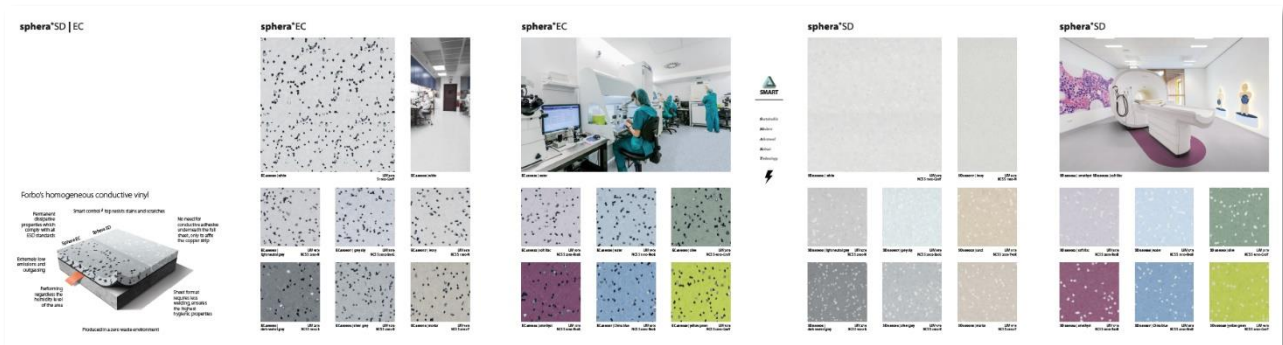
a clean, clear visual with a functional, dissipative chip. The bright chip is chosen to create a fresh look and connect all items.

sphera® EC



a marble chip added to support and camouflage the functional, conductive carbon black chip.

The logical flow of the book on a fresh white background and photography is in line with other Forbo (vinyl) collections. Location pictures and (details of) humans in their working environment make a clear link to the key (sub)segments.



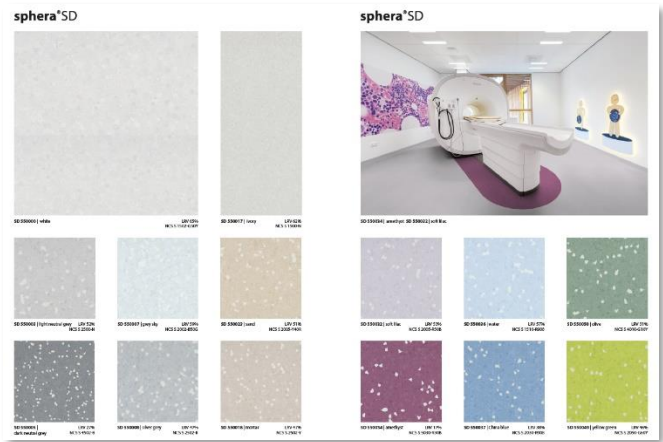
Adding colour differentiates us from competing products and gives our portfolio a bright and daring twist. We added color of the sky and the sea that are associated with peace and tranquility. Blue is seen as the color of trust, clear communication and reliability. Green stands for nature and innovation. A balanced amount of green gives you a sense of satisfaction. It creates optimism and offers confidence. Lilac and purple are colours of trust and faith. All elements that can be of good use in a healthcare environment, whether it is for work or for the patient. Blue and green colours are also used in the industry subsegment pharma.

Sphera SD

Sphera SD contains 14 items. To ensure consistent, reliable performance, a certain amount of dissipative chips has to be used. The neutral colour blends in nicely in case of a light background colour. In the darker and brighter colours the functional chip becomes more prominent.

The clean sabbia embossing structure gives the product an easy to clean and matt surface.

An overview with all Sphera SD items can be found in appendix 1.

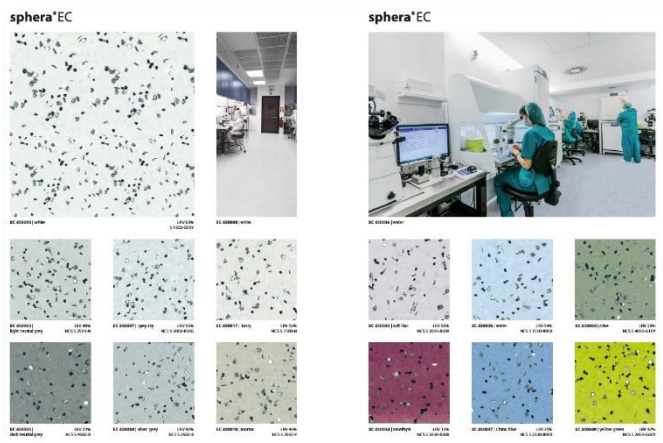


Sphera EC

Sphera EC contains 13 items. To ensure consistent, reliable performance, a certain amount of carbon black chips has to be used. The marbled design chip softens the appearance and gives the floor its authentic look.

The clean sabbia embossing structure gives the product an easy to clean and matt surface.

An overview with all Sphera EC items can be found in appendix 1.



Functionality and USP's

The best information on technical performance and how we create our differentiation can be found in the e-learning for the Sphera SD|EC collection. If not achieved yet, please contact Wendy Rijkhoff for access.

Reliability and trust are essential values for customers when it comes to the functionality of conductive properties. The floor must perform, regardless of humidity levels or the number of years that the floor is installed. Sphera SD/EC has been developed with this in mind.

Permanent conductive properties

The product construction of Sphera SD is innovative. The functional chip is based on a material which is permanently conductive (in the dissipative range) by nature, meaning that the product will function no matter the indoor environment or the age of the floor. Most competitor products are based on conductive additives, which have the tendency to lose their functionality over time. Besides, they rely on a certain humidity level to function. If the humidity drops the additive does not work and it becomes regular, antistatic flooring. Some SD floors in the market do have permanent properties, however, the solution is based on carbon black which makes the design less favourable.

Reduction of installation risks

One of the critical aspects when it comes to discharging conductivity to earth is the installation. There are products on the market which require good installation skills to become a functional solution. These floors have conductive chips leading away the charges from the top of the product to the bottom. The carbon fibres in the conductive adhesive underneath created the path for the charges flow away via a copper strip to earth. Without this path, the floor will not be functional. When the adhesive is under or over applied, not properly distributed or when carbon fibres in the adhesive are not making good contact with each other or the floor, the solution will not be reliable.

To be less dependent on installation, a conductive backing is applied to Sphera SD|EC. This backing allows the charges to flow away horizontally within the floor. Only the copper strip needs to be attached with conductive adhesive, the rest of the surface can be installed with regular adhesive. Using a conductive adhesive is of course still possible. Test installations have proven that both methods are safe and give consistent conductivity values across the floor and over time.



The flexible formulation is easy to fit, groove and handle. Working on a 90 degrees angle is as easy as it gets with homogeneous in the market. Detailed installation instructions can be found on the technical database sharepoint: <https://forbo365.sharepoint.com/sites/F-NL-Team-TechnicalDatabase/Installation>

Smart ⚡ control top

The conductive PUR lacquer that was developed is similar to the lacquer known for the other Sphera collections, with the addition of a conductive component. In combination with the clean sabbia embossing; the surface is scratch and chemical resistant, performing similar to all other Sphera collections. Reports can be found on the technical database. Smart ⚡ control top has been tested on regular cleaning performance; it keeps performing for the lifetime of the lacquer. Some competitor products do not have a lacquer and are very sensitive to chemicals and scuffmarks. Other competitor products do have a lacquer, but mechanical cleaning can cause the conductive particles in the lacquer to break out and the lacquer becomes an isolator. More information and benchmark test results can be found on the Under Control sharepoint: [Link to Under Control sharepoint](#)

Other benefits

The production process and product construction are similar to Sphera and so are the benefits:

- **Colour and design.** We offered the **most fresh colour pallet** through our 1 step chip making process and are able to create a 100% non-directional design in our consolidation process. With a light fastness value of ≥ 7 , we are at par with the leading players in homogeneous vinyl.

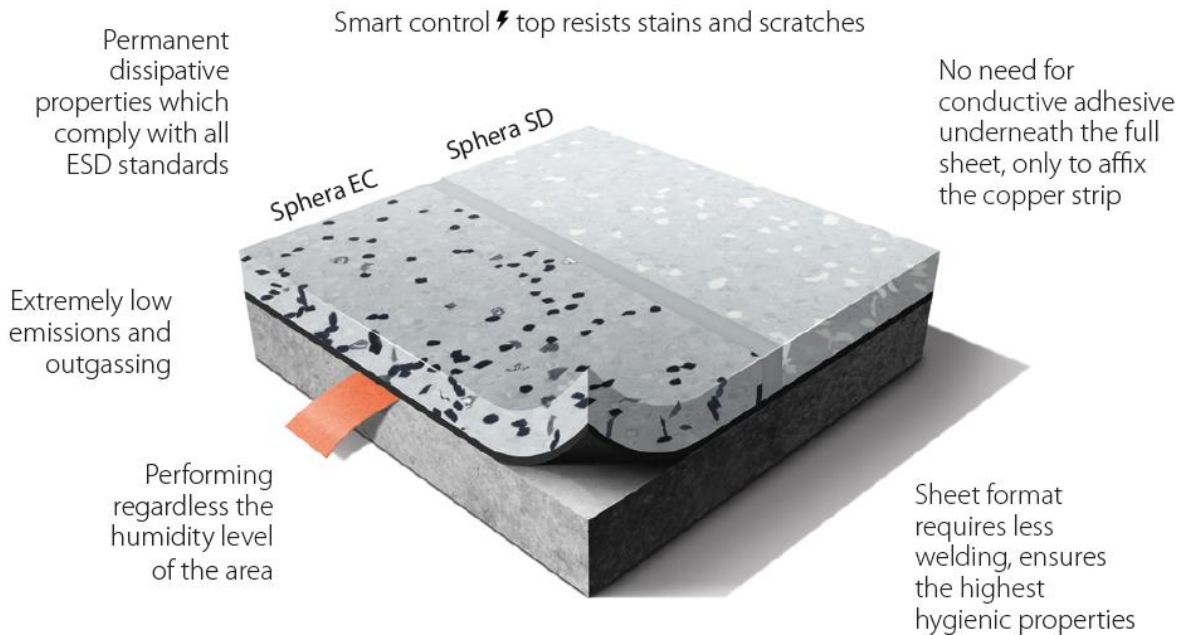


- Dimensional stability. Through our extensive relaxation process we are able to create a product that can claim a **better dimensional stability** ($\leq 0.20\%$) than any competitor. This is a result of high temperature, consistently throughout the whole product, in a longer cool down process with zero tension. Those who have experience with competitor products at installations will know that the bad performance on this characteristic is regularly a problem with welding and seams over time.
- Embossing. For Sphera we have developed an exclusive embossing that is part of making the **matt high end appearance** for our product. By breaking the light it **also hides small imperfections** on the product (and underneath). The embossing is exactly the right deepness to give the visual appeal, achieve the conductivity levels and still capable of easy cleaning and maintenance.
- Consistent quality. Using the latest technology and cooperation with external colour experts, ensures a **high colour consistency from batch to batch**. Because of the process efficiency we create less waste and since we do not put the waste back into the product we **do not have the risk of recycled material influencing the product quality and colour**.
- Sustainability. Sphera is produced **100% phthalate free** and has **close to zero emissions** ($<10\mu\text{g}/\text{m}^3$). It is produced with green energy in a **zero waste environment**; meaning all production waste (which is a lot less than competitors through our new and efficient set up) is re-used in other products and more specifically in the backing of our heterogeneous compact products.

Further technical testing showed a superior bonding performance of the welding rod and great results in peak pressures; a factor really relevant to environments with hospital beds and industrial equipment.

There is a reference to the most important benefits and USP's inside the sample book and the incorporated mini brochure:

Forbo's homogeneous conductive vinyl



Produced in a zero waste environment

Technical specifications

The Sphera SD/EC specifications are similar to existing Sphera constructions, except for the conductivity. Electrical behavior according to ESD specific standards (IEC) and essential product characteristics (EN14041, CE mark) are separated on purpose; the measuring methods and purpose of the tests is different. The pdf can be found on the technical database SharePoint.



Technical specifications

Sphera SD | EC meets the requirements of EN ISO 10581

		Sphera SD	Sphera EC
	Binder content	EN ISO 10581	type 1
	Total thickness	EN ISO 24346	2.0 mm
	Surface finish	SMART control \neq top	SMART control \neq top
	Collection size	14	13
	Commercial use	EN ISO 10874	34 very heavy
	Light industrial use	EN ISO 10874	43 heavy
	Roll width	EN ISO 24341	2 m
	Roll length	EN ISO 24341	≤ 27 m ~ 26 m
	Total weight	EN ISO 23997	2.9 kg/m ²
	Electrostatics (general requirements)	IEC 61340-5-1	Compliant
	Electrical resistance	IEC 61340-4-1 ESD STM7.1	$1 \times 10^6 \leq R \leq 10^9 \Omega$
	Electrical resistance in combination with ESD control footwear	IEC 61340-4-5 ESD STM97.1	$R \leq 3.5 \times 10^7 \Omega$
	Body voltage generation, in combination with ESD control footwear <i>Typical value</i>	IEC 61340-4-5 ESD STM97.2	< 50 V ~ 0 V $< > 30$ V
	Electrical insulation to ground	VDE0100	≥ 50 k Ω
	Dimensional stability <i>Typical value</i>	EN ISO 23999	≤ 0.4 % ~ 0.2 %
	Residual indentation <i>Typical value</i>	EN ISO 24343-1	≤ 0.10 mm ~ 0.03 mm
	Castor chair continuous use	ISO 4918	pass
	Light fastness	EN ISO 105-802	≥ 7
	Flexibility	EN ISO 24344	$\emptyset 10$ mm
	Resistance to chemicals	EN ISO 26987	very good
	Slip resistance	DIN 51130	R9
	Bacteria resistance	EN 846	Does not support growth
	Indoor Air Emissions: TVOC after 28 days	ISO 16516	≤ 0.01 mg/m ³
	Creating better environments		
	Renewable electricity	Sphera SD is manufactured using 100% electricity from renewable sources	Sphera EC is manufactured using 100% electricity from renewable sources
	Sphera SD EC meet the requirements of EN 14041	 EN 14041 0200304-04P-003	 EN 14041 0200303-04P-003
	Reaction to fire	EN 13501-1	B _f -s1,G, NCS
	Slip resistance	EN 13893	$\mu \geq 0.30$
	Thermal conductivity	EN 12524	0.25 W/m-K
	Body voltage	EN 1815	≤ 2 kV
	Electrical behaviour - static dissipative	EN 1081	$\leq 1 \times 10^9 \Omega$
	Electrical behaviour - conductive	EN 1081	n.a.

Marketing tools

The aim of an overarching portfolio for controlled environments is to strengthen the market position of Forbo floors suitable for ESD and cleanroom applications, to ensure synergy between the collections and to prevent cannibalization.

“Under Control” will be the pay-off of the portfolio. This indicates what matters: the environment is managed, controlled and is safe. "Under" also refers to the base, the floor. Each solution within the portfolio contains specific properties that can be requested to meet very high requirements of a controlled environment in industry and healthcare.

Sphera SD/EC is part of a portfolio with collections suitable for controlled environments:

- Sphera SD/EC
- Updated Colorex SD/EC/Plus collection
- Marmoleum Ohmex

In the pre-introduction document, the needlefelt product Forte was also indicated to be part of the Under Control portfolio. The planned renewal of this collection in 2021 and the need for more knowledge and supporting documents related to the use in ESD applications has lead to the decision not to incorporate Forte at this moment.

There are communication tools for the portfolio and tools dedicated to the Sphera SD/EC collection. The look and feel of the tools will be professional with a human touch. All communication will reflect expertise and reliability.

<i>Sphera SD/EC</i>	<i>Under Control portfolio</i>
<ul style="list-style-type: none"> • Swatches • Sample book (postponed) <ul style="list-style-type: none"> - with mini brochure • Loose samples • Digital brochure • Product page on Forbo website • Page on Under Control landings page (postponed) • E-mail banner • Sales presentation <ul style="list-style-type: none"> - Which can be uploaded on the interactive sample book 	<ul style="list-style-type: none"> • Under Control E-Learning <ul style="list-style-type: none"> - With focus on the Sphera SD/EC and Colorex SD/EC/Plus collections • Segment related brochures (postponed) <ul style="list-style-type: none"> - Healthcare - Life sciences - Semiconductor industry - Manufacturing • Landing page on Forbo website (postponed) • Under Control SharePoint for internal use, with: <ul style="list-style-type: none"> - Whitepapers - FAQ section - Competitor information - Forum / discussion area • Interactive sample book (postponed) <ul style="list-style-type: none"> - Adjustable video / sales presentation - Showing samples from different collections - USP's and benefits per collection explained

Sample book with mini brochure

The collection will be presented in a sample book, supported by location pictures and (details of) humans in their working environment with a clear link to the key segments. The logical flow of the book on a fresh white background and photography is in line with other Forbo (vinyl) collections. Infographics are used to explain the USP's and segments further. There is a mini brochure included in the sample book, with more pictures and technical information. The price is €17,50 per sample book. The sample books will be available for the full launch in September.

Outside

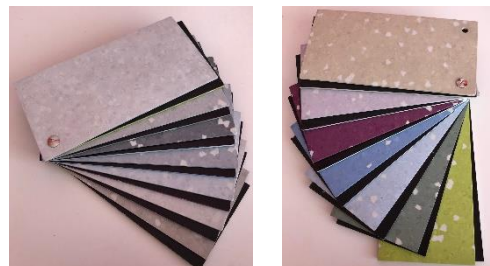
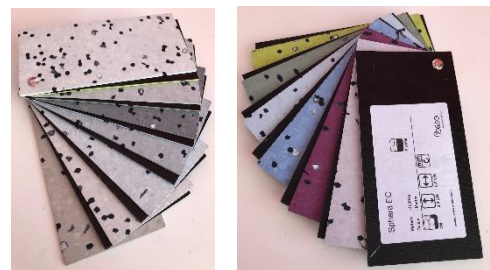


Inside



Swatches

Mini swatches will be available 1st of May and orders will be shipped as soon as possible. The technical specifications are printed on the cover and labels are used on the backside of each sample to indicate the design and item name and number. There is a separate mini swatch for Sphera SD and one for Sphera EC. Samples are face-to-face/back-to-back to avoid contamination from the conductive backing on the colours. All neutrals are on one side, the colourful part on the other side. Samples on the pictures are dummies, the final swatches will have a cover. The price is €20,- per set (1 Sphera SD and 1 Sphera EC swatch).



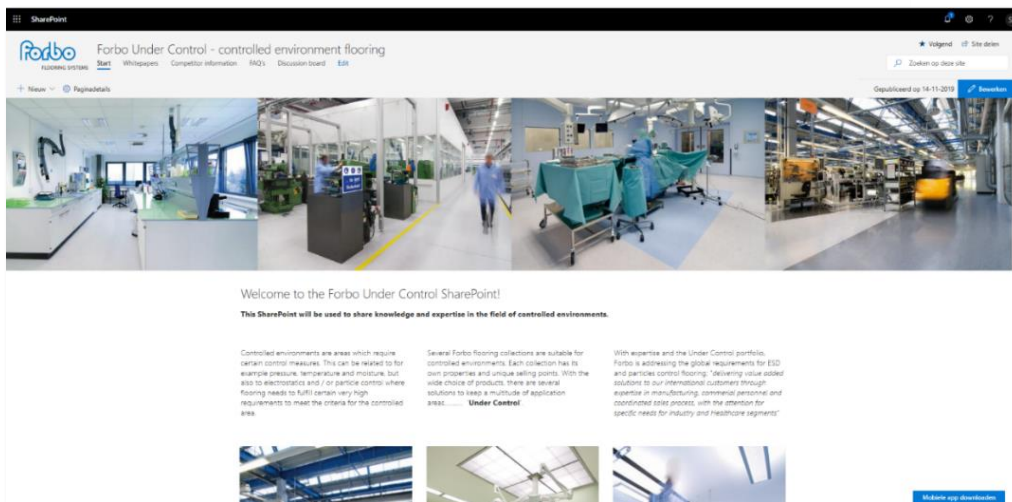
Interactive sample book

The interactive sample book is a tool in which all the collections of the Under Control portfolio are shown. One or more physical samples will be combined with pictures and text (USP's). In the middle there will be a screen to show a video or sales presentation. Customization to a specific subsegment or even customer can easily be done by uploading the file from your own computer to the interactive sample book. Budget price is €25,- per sample book. The interactive sample book will be available for the full launch in September.

Under Control SharePoint

A SharePoint is used internally to collect and share knowledge about controlled environments. It is a user friendly, visually appealing SharePoint. Some content will be available before the launch, more documents will be uploaded in the coming months. There will be whitepapers available with topics such as: "ESD essentials", "ESD standards, measuring methods and tests" and segment specific whitepapers. There will also be an FAQ section and competitor information. Access to the Under Control SharePoint can be requested via:

<https://forbo365.sharepoint.com/sites/Forbo-controlledenvironmentflooring>



ESD Essentials

Service products

The conductive lacquer is giving a slight blue tone compared to the similar Sphera Element colour, so using the same welding rod as for the Sphera Element may not always be the nicest option. An overview with matching Sphera Element Vinylwelds is in Appendix 1. Colour matching of the welding rods is in progress at the time of publication of this introduction document but hindered by the Corona-virus situation. When the welding rod references are available, the list with VW and SAP numbers will be shared with the sales and marketing group and added to this document (available on the technical database).

Preformed corners, coving and skirting for Sphera SD|EC are not available as SKU's. Please contact product management in case of inquiries.

Specials Procedure

After the full launch, there is a possibility to use any of the existing Sphera Element colours, with the addition of the functional SD or EC chip. Minimum order quantity is 750m. Lead time is depending on the production planning to apply the conductive coating, this can be up to 8 weeks. Special designs are not possible for Sphera SD|EC.

Collection running time

The collection running time will be at least 4 years, phase out is currently planned for end of 2024. Depending on the sales a decision may be taken to keep the current offer longer, extend the Sphera SD|EC range or to change (part) of the collection.

Logistics

Sphera SD|EC is stocked in Coevorden. Vertical storage and transport is recommended for all homogeneous vinyl rolls and cuts to avoid pressure marks and damage. All items are available in roll and cut length. Standard roll length will be < 27m, typically around 26m.

Appendix I: SAP hierarchy and article numbers

Item names and numbers. The final vinyl weld codes are not available at the time of publication of the introduction document. Once available the document will be updated. Until then the Sphera Element vinyl welds can be used. For items marked with * the Vinyl Weld may be too clean / not blue enough.

						<i>Temporary Sphera Element vinylwelds</i>	
<i>SAP nr</i>	<i>Design</i>	<i>Material Description</i>	<i>SAP code</i>	<i>NCS</i>	<i>LRV %</i>	<i>VW code</i>	<i>Vinylweld SAP</i>
Sphera SD 020200004004005	White	SD 550000	223083	S 1502-G50Y	65	VW554*	189176
	Light Neutral Grey	SD 550003	223298	S 2500-N	52	VW 542*	188780
	Dark Neutral Grey	SD 550005	223341	S 4502-B	27	VW 541	188779
	Grey Sky	SD 550007	223342	S 2002-B50G	59	VW555 *	189177
	Silver Grey	SD 550008	223344	S 2502-B	47	VW26	130630
	Ivory	SD 550017	223345	S 1500-N	62	VW174 *	138273
	Sand	SD 550023	223347	S 2005-Y40R	51	VW502	184337
	Mortar	SD 550018	223346	S 2502-Y	47	VW131	132018
	Water	SD 550036	223350	S 1510-R90B	57	VW556	189178
	China Blue	SD 550037	223351	S 2030-R90B	38	VW550	189175
	Soft Lilac	SD 550032	223348	S 2005-R50B	53	VW511 *	185622
	Amethyst	SD 550034	223349	S 5030-R30B	17	VW517	186283
	Yellow Green	SD 550049	223352	S 2050-G60Y	46	VW557	189179
Olive	SD 550050	223353	S 4010-G10Y	31	VW558	189180	
Sphera EC 020200004004025	White	EC 450000	223354	S 1502-G50Y	63	VW554 *	189176
	Light Neutral Grey	EC 450003	223355	S 2500-N	48	VW 542 *	188780
	Dark Neutral Grey	EC 450005	223356	S 4502-B	23	VW 541	188779
	Grey Sky	EC 450007	223357	S 2002-B50G	55	VW555 *	189177
	Silver Grey	EC 450008	223358	S 2502-B	42	VW26	130630
	Ivory	EC 450017	223359	S 1500-N	56	VW174 *	138273
	Mortar	EC 450018	223360	S 2502-Y	46	VW131	132018
	Water	EC 450036	223363	S 1510-R90B	54	VW556	189178
	China Blue	EC 450037	223069	S 2030-R90B	35	VW550	189175
	Soft Lilac	EC 450032	223361	S 2005-R50B	50	VW511	185622
	Amethyst	EC 450034	223362	S 5030-R30B	13	VW517	186283
	Yellow Green	EC 450049	223364	S 2050-G60Y	42	VW557	189179
	Olive	EC 450050	223365	S 4010-G10Y	28	VW558	189180