

staron®
Solid Surfaces



www.staron.com



LOTTE CHEMICAL

LOTTE CHEMICAL DEUTSCHLAND GMBH - Dubai Office
1702 Arenco Tower, Media City, Dubai UAE
Tel: +971 4 2451400 E: info-mea@lotte.net

MIDDLE EAST & AFRICA

STARON
SOLID SURFACES



STARON

SOLID SURFACES



LOTTE, a Lifetime Value Creator that enriches the lives of all. LOTTE continues to push further beyond and pursue innovation across the diverse areas of food, retail, tourism and chemicals to continuously offer the most up-to-date lifestyle for its customers. A life of greater convenience and delight paired with a flourishing future of shared growth for all.

This is what awaits us in the future LOTTE aims to create.





CONTENTS

ABOUT

- 06 Lotte Group
- 08 Lotte Chemical
- 10 Global Presence
- 11 Interior Materials

STARON

- 12 Introduction, Design Inspiration
- 14 Benefits
- 16 Colors
- 22 Pattern trends (Supreme, Terrazzo, Solid)
- 46 Wall-cladding (Interior, Exterior)

FUNCTIONAL PRODUCTS

- 50 Evermoin
- 52 Super-Flex
- 54 Sink & Bowl

PRODUCT INFORMATION

- 56 Sheet Dimension, Treatment & Care, Certification, Warranty
- 57 Chemical Testing Results
- 58 Performance Properties (US, EU)



Lotte World Tower & Mall



Lotte World Complex



Lotte New York Palace Hotel



Lotte World Mall



Lotte Ria fast-food



Lotte Mart



Lotte Duty Free

LOTTE GROUP

Lifetime Value Creator

LOTTE's shining history began in 1967 and has successfully expanded through acquisitions and partnerships to become a pioneer group in Korea and globally in various industries such as Chemicals, Construction, Tourism, Retail, Finances and Food.

Today, as LOTTE looks ahead to the next fifty years, we are continuing to build a better world for everyone and continues to challenge itself to realize this ambitious dream by embracing bold change and innovation.

2020 SALES PERFORMANCE BY BUSINESS

| Retail | Chemical, Construction | Tourism, Service | Food |
|--------|------------------------|------------------|------|
| 39% | 34% | 14% | 13% |

| | |
|----------------------------|--------------------|
| Business ranking in Korea* | 5th |
| Companies | 46 |
| Assets* | KRW 125.7 trillion |
| Sales* | KRW 56.4 trillion |
| Employees | 180,000 |

* Source - May 2021 announcement by the Korea Fair Trade Commission.

LOTTE CHEMICAL

Business Unit

LOTTE's Chemical Business Unit is Korea's representative chemical company founded in 1976 and has been growing into a global top-7 chemical company' by procuring product competitiveness based on its superior R&D capacities and expertise.

Constructing a diverse business portfolio with total of 26 affiliated companies producing Polymers, Monomers, Basic petrochemical products, Megatrend products, Advanced construction and Interior materials.

MAIN PRODUCTS

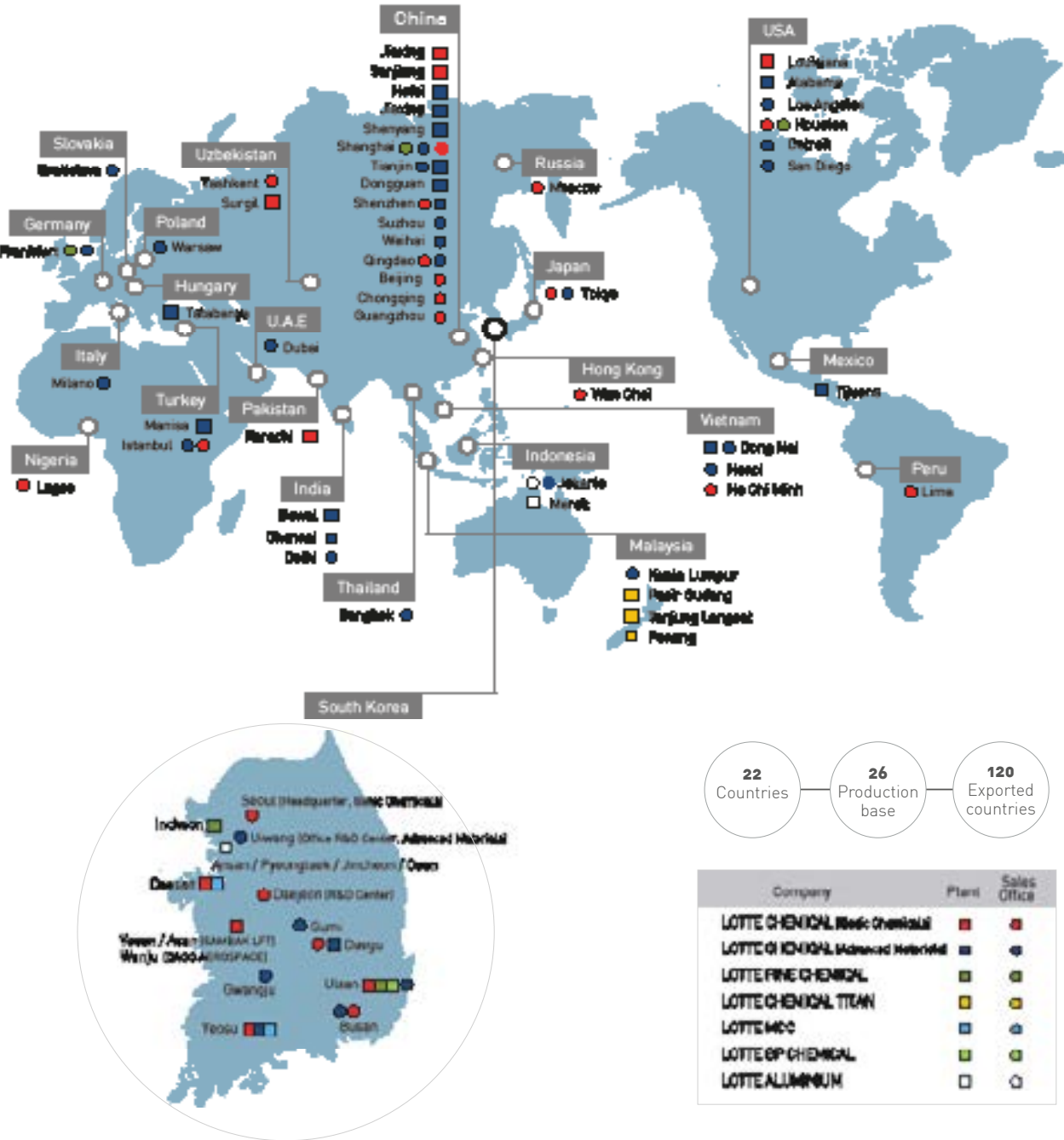
| Basic Chemicals | | | Advanced Materials | | |
|-----------------|---------|---------|--------------------|--------------------|--------------------------|
| Petro-chemicals | Polymer | Monomer | Plastics | Interior Materials | Water Treatment Membrane |

| | |
|--------------------|--------------------|
| Global ranking | 7 |
| Companies | 26 |
| Equity | KRW 13,712 billion |
| Sales | KRW 12,223 billion |
| Exported countries | 120 |
| Employees | 10,729 |

* As of 2020 business performance.



GLOBAL Presence



LOTTE CHEMICAL Interior Materials



LC - Yeosu plant, South Korea

1992, Company commenced the manufacture of premium acrylic solid surface product STARON® brand at Yeosu plant in South Korea with production capacity 970K sheets annually.

2006, Introduced the new Tempest® collection which accentuated the world's first translucent jewel-like colors.

2015, Launched Supreme® collection featuring a natural rhythmic as the next-generation solid surface choice with beautiful, flowing veined patterns that resemble those found in marble and other natural stone.

2016, The takeover of Samsung Chemical units which gained a foothold to jump into a leading chemical company and expanding globally with high value added product line-ups through the vertical integration in the Petrochemical sector and Interior materials.

2018, Developing evermoin® antimicrobial 'more innovation & functional integrations' materials brand from Staron created based on the exclusive technology of LOTTE Chemical.



STARON Interior Materials

PREMIUM SOLID SURFACES

STARON® Solid Surfaces is an acrylic-based material made of natural minerals. Just as decorative as natural stone, but with all the advantages of a solid surface material. As it is solid and non-porous, it can be processed three-dimensionally, offering architects and designers maximal freedom.

Although STARON® incorporates all important qualities of stone, it can be worked by fabricators in a similar way as hardwood. Unlike stone however, STARON® feels warm and pleasant to the touch.

With its many advantages and versatile application possibilities, STARON® is a convincing contribution to the private, commercial and medical sectors alike.

LIFESTYLE YOUR DESIGN SOLUTIONS BY STARON

NATURAL

Displaying graceful and delicate patterns, Staron evoke the natural character of stone while offering all the practical benefits of a solid surface. For those looking to create a warmer scheme, Latte Cream is the ideal choice and perfectly suited to any type of residential environment.



LIVELY

From your house to your favourite café and restaurant, Staron can inject dynamism and spirit into any space, ensuring everybody can feel the energy in all directions. Arctic White, perfect for creating unique and remarkable spaces. A Staron colour adds drama and sophistication to any interior scheme.



URBAN

Designed with modern living in mind, The Urban Series collection from Staron introduces an effortless urban chic to interiors. Our collection is inspired by the wave of contemporary industrial design trends that have captured the world of interiors. Select the deeper and more detailed Noir Concrete to create a subtle urban style.





Supreme Flux VF113

STRETCH YOUR IMAGINATION

To Experience The Possibilities With Staron®

WHY STARON?

Staron® solid surface materials boast dimensional flexibility and low maintenance and is ideal for a multitude of interior applications. Comprised of a wide range of color and pattern options, Staron® is non-porous, ultra-hygienic and ultimately durable. The Tempest and Supreme collections offer high-transparent gemstone textures and elegant, refined vein patterns like natural marble.

STARON BENEFITS



RELIABLE PERFORMANCE

- Cutting-edge technology sets a new standard in surface
- Able to be inconspicuously repaired due to its homogenous composition



INFINITE RANGE OF COLORS

- Over 150 color options ranging from natural to vivid
- Ongoing collaboration with color trend experts keeps Staron® commercially relevant



GLOBAL NETWORK

- Regional branch offices and product distribution networks worldwide



HYGIENIC SURFACE

- Non-porous surface inhibits growth of mold and bacteria
- Resistant to heat and abrasion
- Able to refurbish to a new condition



IMPERCEPTIBLE SEAMS

- Consistent color and texture on every sheet provides a smooth and seamless surface
- Installed without gaps, crevices, or obvious joint-lines



TRANSLUCENCY

- Creative back-lighting effects created by altering the thickness of the material to allow transmission from a low-energy light source



DIMENSIONAL FLEXIBILITY

- Thermo-formable into three-dimensional shapes
- Excellent workability enables virtually unlimited design possibilities

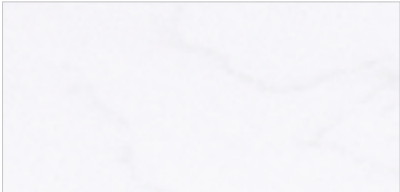


RELIABLE QUALITY

- Advanced quality control policy and a commercial 10-year warranty
- Certified eco-friendly by Greenguard and Scientific Certification System

COLORS OF STARON®

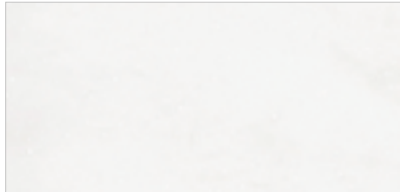
SUPREME



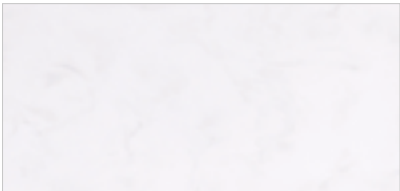
Cotton White VC110



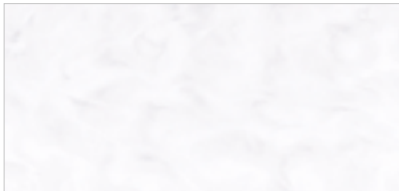
Morning Sky VM114



Tranquil VT115



Downy White SF100



Downy Dove SP105



Flux VF113



Arctic White VA311



Rotor Cloud VR322



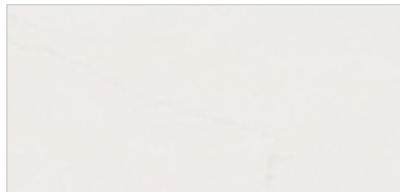
Latte Cream VL343



Ocean View V0171



Magnolia VM143



Beige Granite VB172



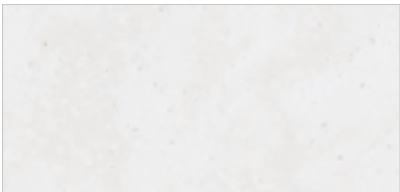
Natural Bridge VN144



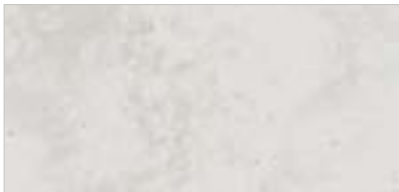
Dandelion VD175



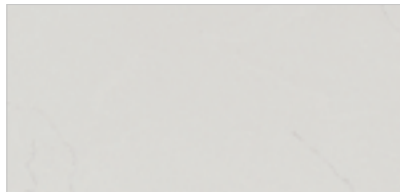
Loam VL155



Cloudbank VC118



Dawn VD126



Urban Grey VU127



Ash Concrete VA129



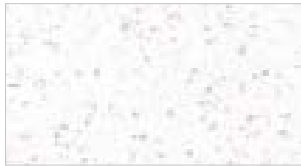
Noir Concrete VN180



Presto VP159



TEMPEST



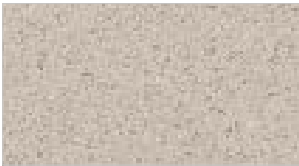
Peak FP100



Twilight FT113



Shell FS115



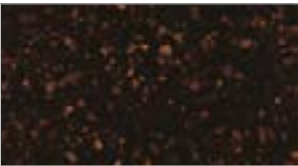
Mystic FM178



Rattan FR124



Coffee Bean FC158



Radiance(Shimmer) FR148



Terrazzo Como FT191

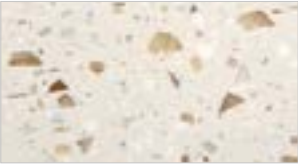
QUARRY



Mosaic Dalmatian QD212



Quarry Oyster T0310



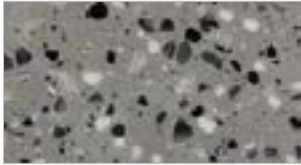
Terrazzo Bologna NT970



Quarry Ridge QR278



Terrazzo Venezia NT150

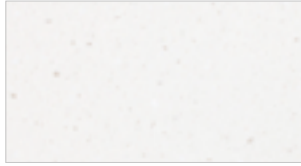


Terrazzo Torino NT981



Quarry Starred(N) QS288

PEBBLE



Pebble Moon PM832



Pebble Frost PF812



Pebble Swan PS813



Pebble Boulder PB852



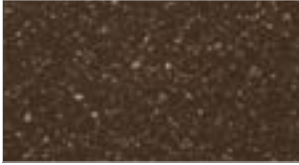
Pebble Saratoga PS820



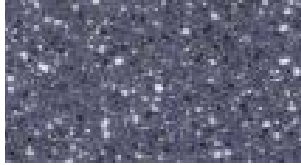
Pebble Chiffon PC842



Pebble Gold PG840



Pebble Terrain PT857



Pebble Blue PB870

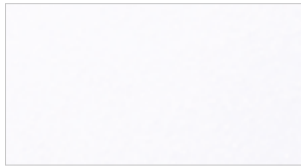


Pebble Grey PG810

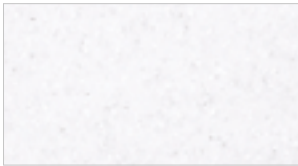


Pebble Ebony PE814

ASPEN



Aspen Glacier AG612



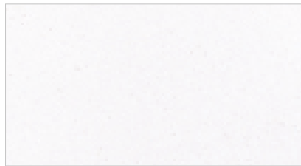
Aspen Snow AS610



Aspen Alder AA625



Aspen Concrete AC629



Aspen Eggshell AE642



Aspen Iceberg AI612



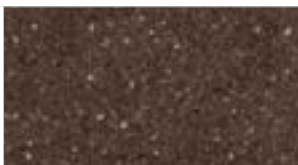
Aspen Glow AG636



Aspen Brown AB632

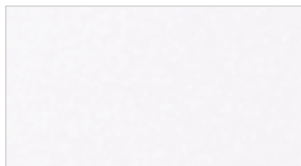


Aspen Grey AG620

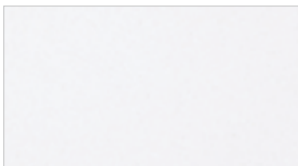


Aspen Mine AM633

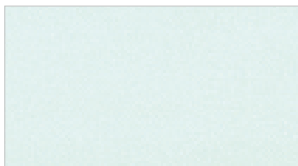
SANDED



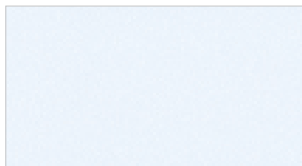
Sanded Icicle SI414



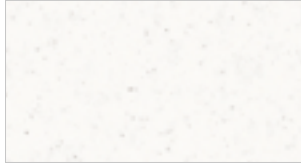
Sanded Dover SD413



Sanded Mint SM463



Sanded Iceblue SI462



Sanded Birch SB412



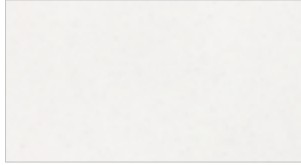
Sanded W-Pepper WP410



Sanded Grey SG420



Sanded Heron SH428



Sanded Cream SM421



Sanded Sahara SS440



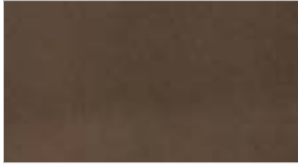
Sanded Gold Dust SG441



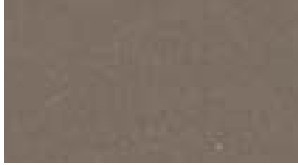
Sanded Vermillion SV430



Sanded Clay SC475



Sanded Chestnut SC457



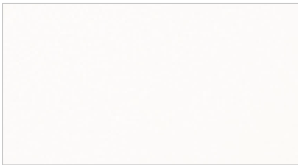
Sanded Taupe ST486



Sanded Onyx SO423



METALLIC



Metallic Yukon EY510



Metallic Sleeksilver(N) ES582

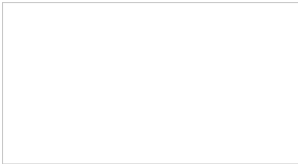


Metallic Atrous EA599

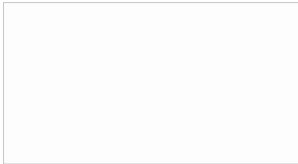


Metallic Galaxy EG595

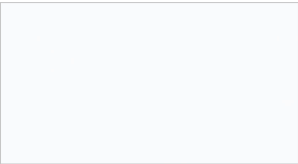
SOLID



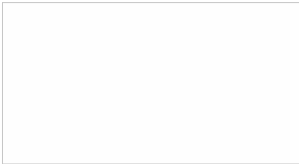
Dazzling White SD001 



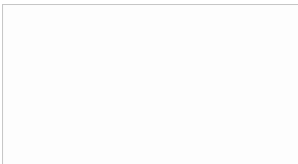
Bright White BW010 



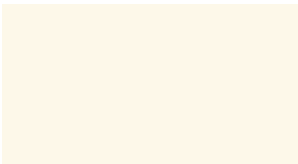
Quasar White SQ019 



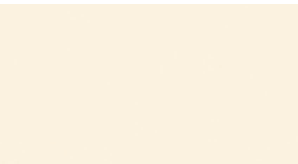
Pearl SP011 



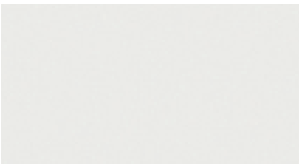
Infinity IF188 



Natural SV041



Ivory SI040



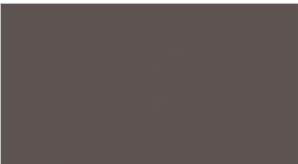
Fog SF020



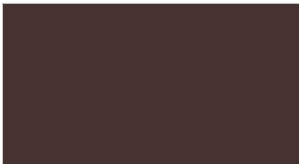
Bliss SB022



Serene SS023



Steel ST023



Iris SI056



Oasis SO064



Sunflower(N) SS042 



California Poppy(N) SC052



Univers(N) SU053



Ultramarine SU067

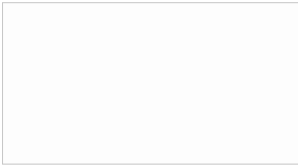


Forest SF061

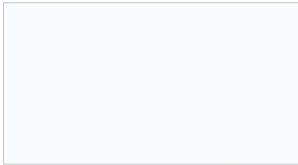


Piano Black GP790

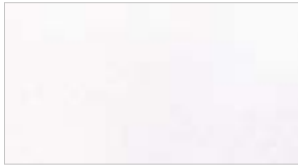
EVERMOIN (Antimicrobial)



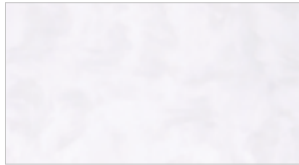
Angel White MA020 



Ultra Bright MU010 



Limpio ML612 








Granville MG030 



Downy White SF100

Printed representation of colors may vary from actual samples.
Please review actual sample prior to selection.
To view new colors in greater detail, please visit www.staron.com

-  Translucent
-  Antimicrobial
-  Exterior Material
-  Eco-Friendly
-  Super Flex





SUPREME Intimate Moments

Translucent / Mystical / Organic Pattern

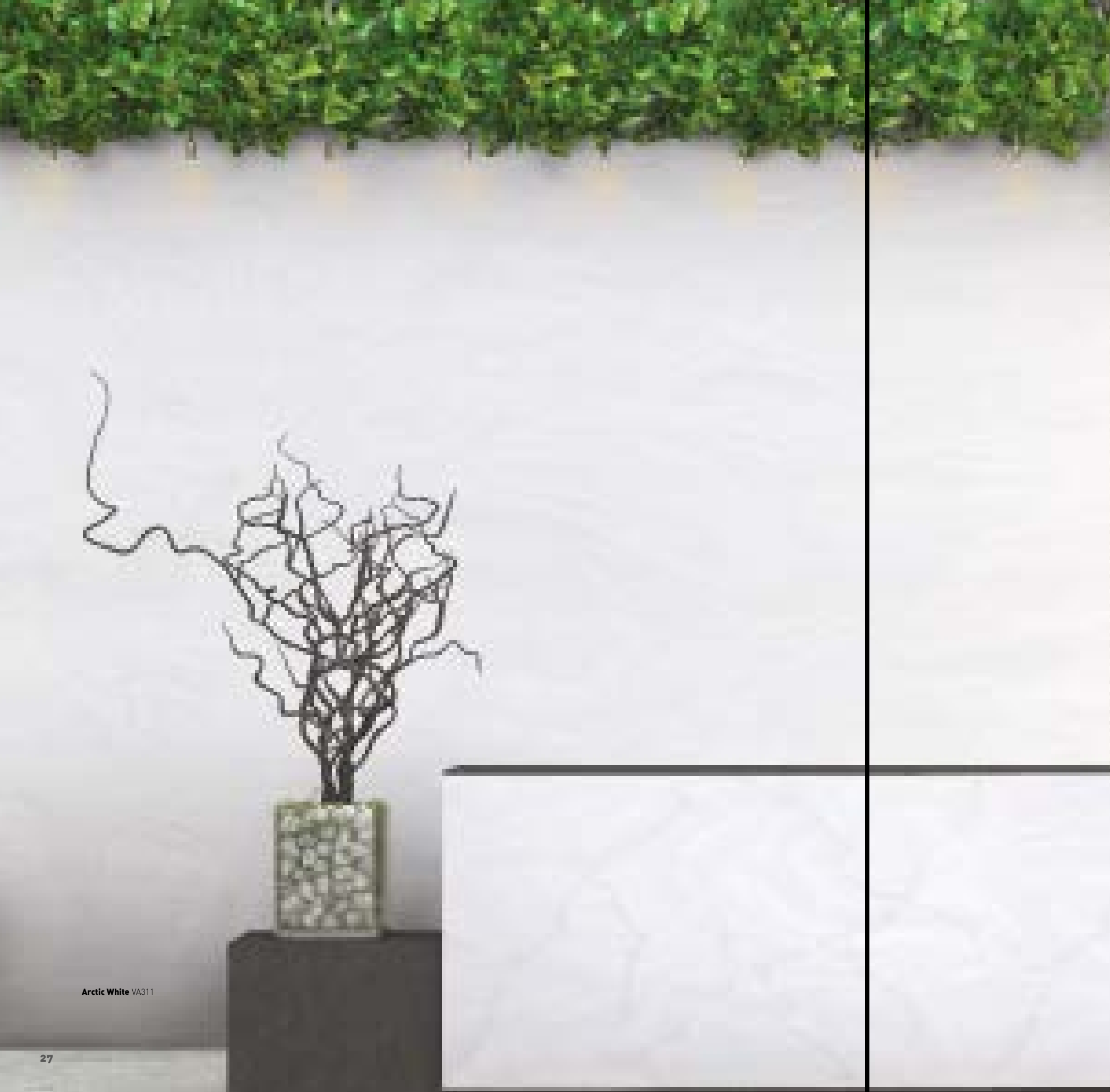
The upgraded Supreme III from Staron® is inspired by marble that have unexpected movements and cracks of nature formed by long-enduring harsh natural conditions. The vein conveys a sense of depth by the effects of reflection, refraction, and overlay through light. The lighting transmission effect relieves people's anxiety and isolation by providing emotional stability. Depending on the presence or absence of lighting, three types of interpretation are possible, so it can be used not only for countertops but also as wall-claddings.

Enjoy our three new fabulous decors in the Supreme III series;

Arctic White with marble-like veins on subtle white.

Rotor Cloud that stands out with the harmony of tinted grey and bold white veins.

Latte Cream like the dawn of winter, laid down onto the color of the vast lands.



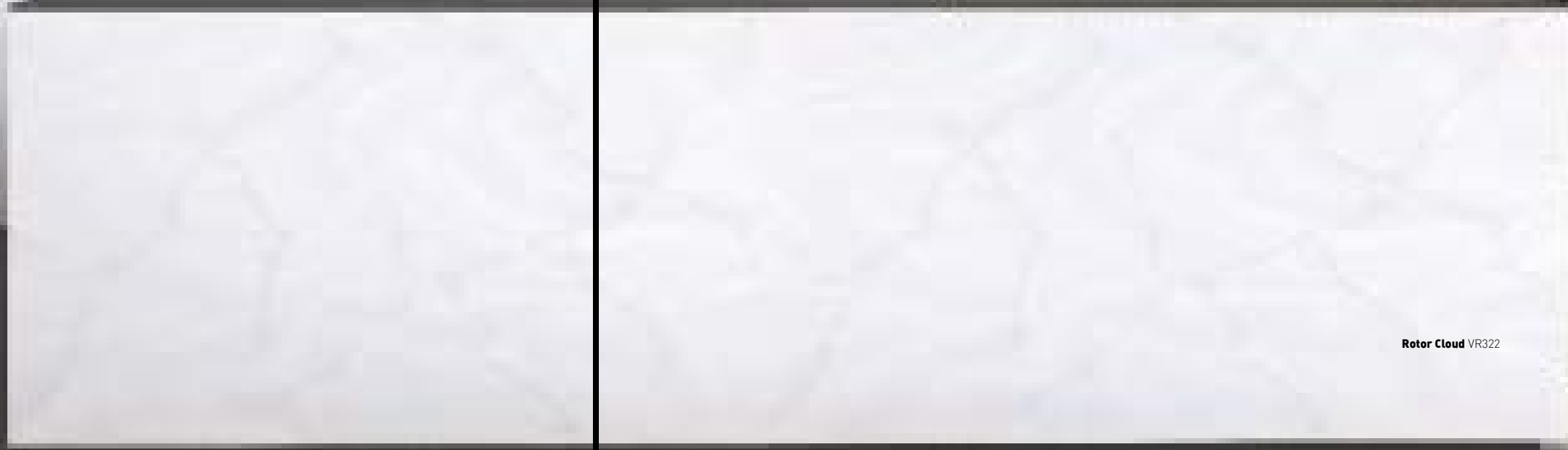
Arctic White VA311



Arctic White VA311

Rotor Cloud VR322

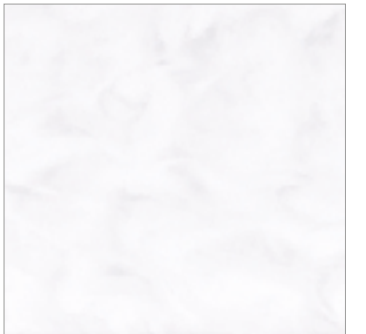
Latte Cream VL343



Rotor Cloud VR322



Downy White SF100



Downy Dove SP105



Evermoin Granville MG030

Downy White SF100 and **Ultramarine** SU067

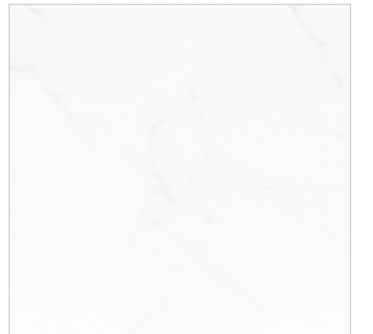




Cotton White VC110



Cotton White VC110



Morning Sky VM114



Urban Grey VU127



Dandelion VD175

Magnolia VM143



Dandelion VD175

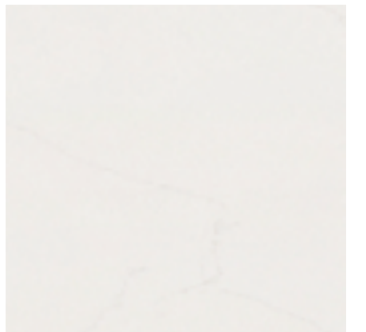


Loam VL155





Design by Tania Kloester, TK Design, Australia.



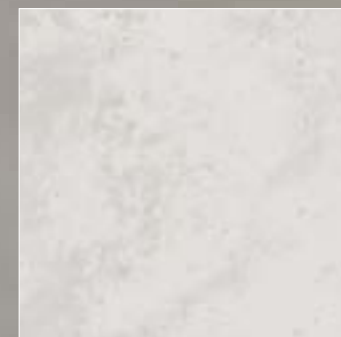
Beige Granite VB172



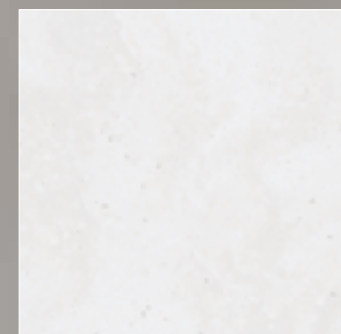
Ocean View V0171

Ocean View V0171





Dawn VD126



Cloudbank VC118



Ash Concrete VA129

Ash Concrete VA129



TERRAZZO

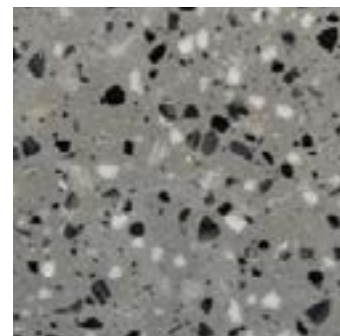
Designed With Modern Living

Introducing the Terrazzo Collection, a new addition to the Staron portfolio. Featuring contrasting flecks, these new Terrazzo shades offer homeowners and interior designers the authentic look of Terrazzo and the exceptional qualities of Staron. An on-trend surface suited to any kind of space. Packed full of contrasting flecks, which run through the entire thickness of the material, the new design combines a stunning appearance with a seamless finish.





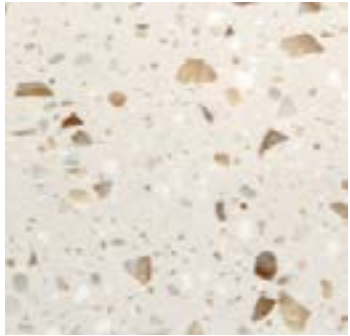
Terrazzo Torino NT981



Terrazzo Torino NT981



Terrazzo Como FT191



Terrazzo Bologna NT970



Terrazzo Venezia NT150



Terrazzo Venezia NT150





SOLID

Color Healing

Distinct / Optimistic / Energizing

Color conveys simple yet powerful messages, and it contains numerous emotions. Intense colors communicate rich sensibility as well as lively and friendly atmosphere full of positive energy. These refreshing colors inspired by nature can be expected to have greater effects when harmonized with the existing STARON® colors in various commercial spaces.

Ultramarine

Brings tranquility and comfort to people with its positive color soothing effect. Blue energizes the space and at the same time calms the mind, giving a sense of comfort and relief.

Forest

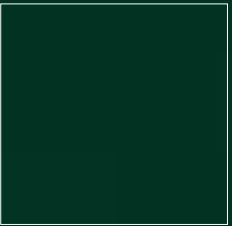
Is a vivid mint color with a hint of bluish green. It carries a pleasant, modern and outgoing mood. The positive energy of Forest gives life to the space and helps alleviate people's anxiety and depression, since it inherits healing aspects.

Piano Black

Is a vivid black with an elegant, sophisticated and modern mood that can emphasize the sensual simplicity of a space when used within an appropriate color scheme. This is a timeless beauty that allows unlimited design.



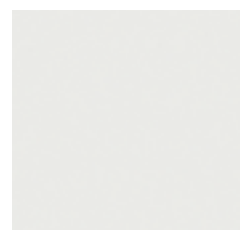
Ultramarine SU067



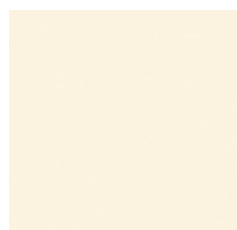
Forest SF061



Piano Black GP790



Fog SF020



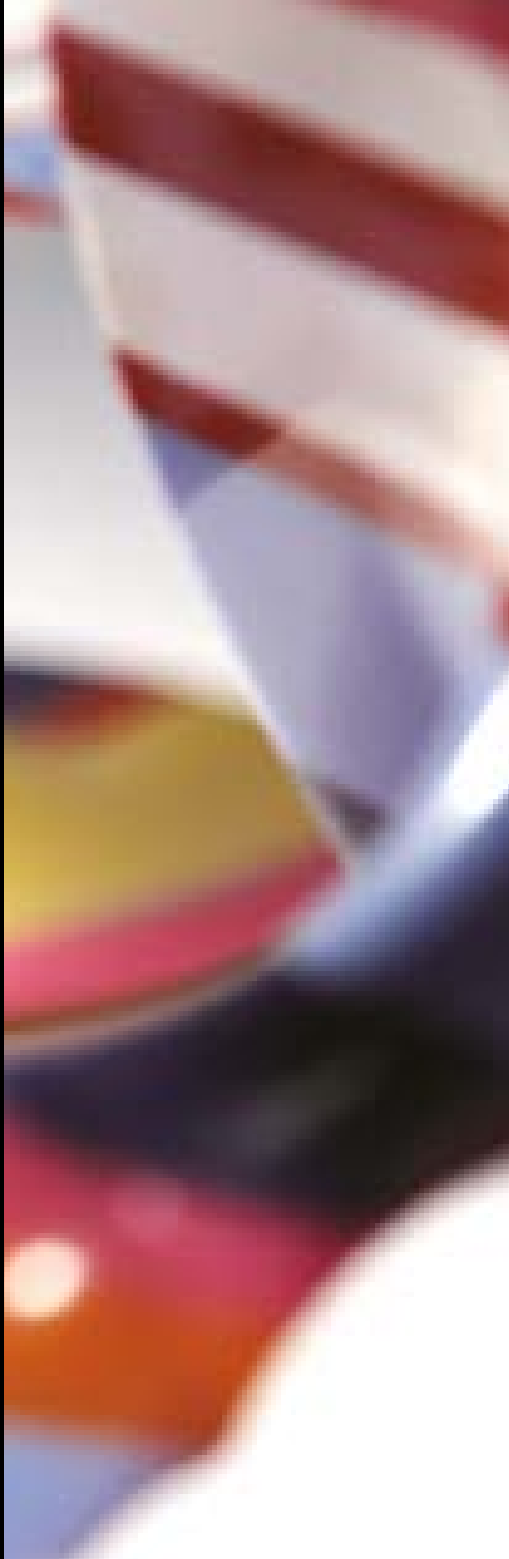
Ivory SI040



Sunflower(N) SS042



Oasis SO064



California Poppy(N) SC052



Univers(N) SU053



Serene SS023



Steel ST023

INTERIOR
Wall-cladding



Samsung HR Development Center - Exhibition Hall, Korea

EXTERIOR
Wall-cladding



ANTIMICROBIAL STARON®

For Healthcare



The healthiest Ultra-Hygienic choice for your design

Staron evermoin® can be applied to almost any interior space within a healthcare facility. Imagine casework, work-stations and wall-cladding in a functional and renewable material that is durable as well as ultra-hygienic.

BENEFITS OF STARON EVERMOIN®

Ultra-Hygienic

Speedy ultra-hygienic effect and action on representative bacteria and fungi

Durability

Excellent Ultra-Hygienic retention and Confirm quality stability and durability

Safety

Material certification harmless to human body and environment (EPA, NSF, FDA)

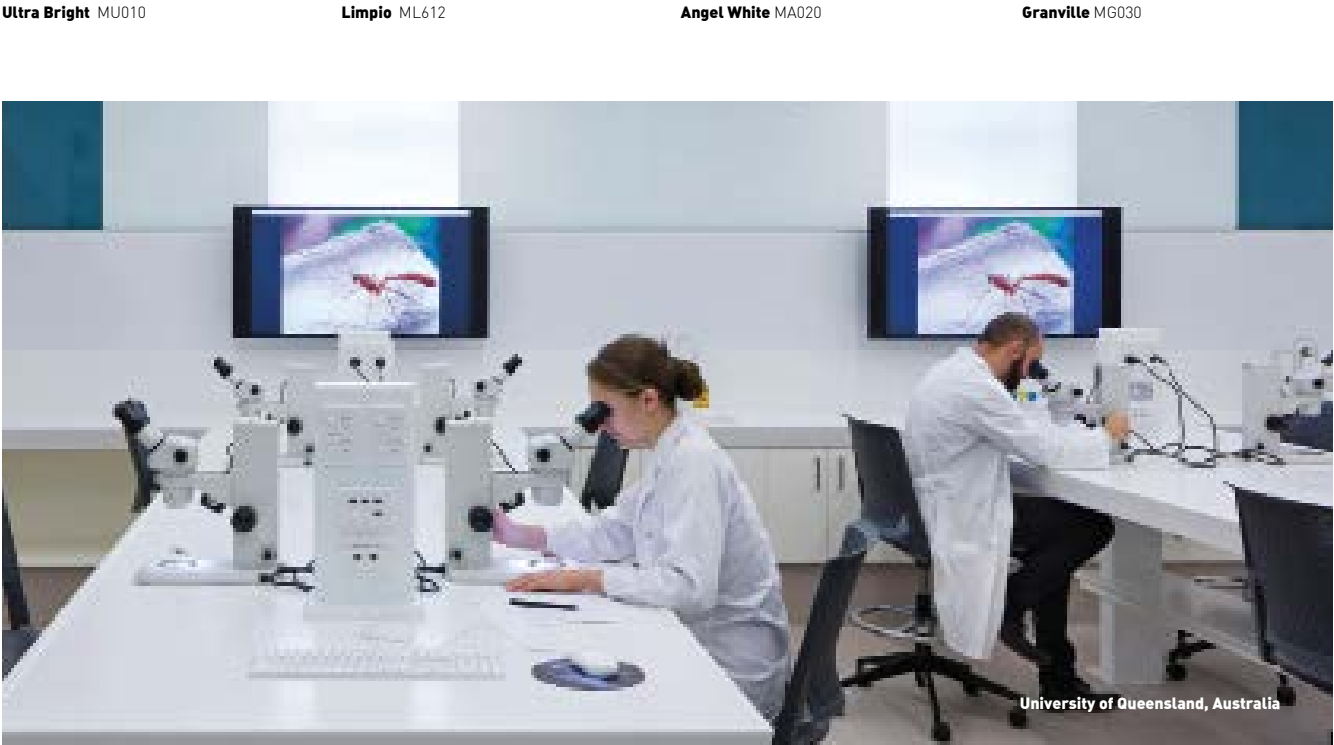
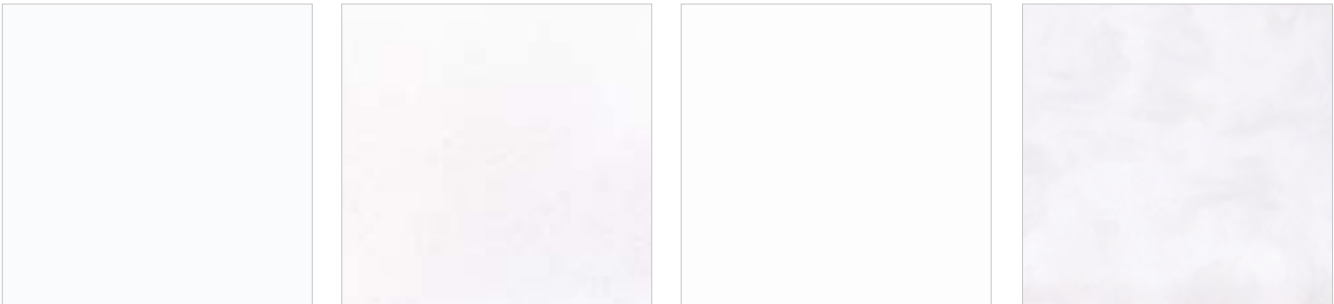
Eco-friendly

Achieved SCS RECYCLED CONTENT CERTIFICATION which demonstrates our commitment to conserving natural resources. [SCS Recycle 6%]

SAFETY PROPERTIES

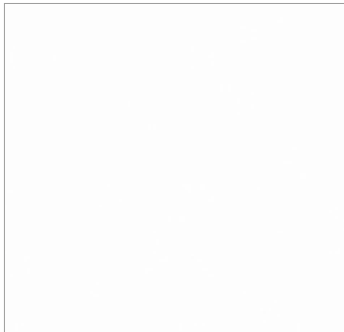
Obtained certification that guarantees sanitary safety and reliability harmless to the human environment such as Japan SIAA and US NSF and FDA.

| Harmless to human body | | | Safe for food contact | Eco-friendly |
|---|--|---|--|--|
| | | | | |
| SIAA Society of International sustaining growth for Ultra-Hygienic Articles | EPA US Environmental Protection Agency | FDA US Food & Drug Administration | NSF National Sanitation Foundation | Eco-Friendly SCS Global Services |



SUPER-FLEX STARON®

For Dramatic Curves & Flexibility



Infinity IF188



DRAMATIC CURVES & DESIGN

Minimum Radius: 0mm
Staron® Super Flex boasts superior thermoplastic capabilities that can create limitless possibilities of shapes and designs from the slightest curves to extreme bends.

HIGH ELONGATION

The elongation rate of Staron® Super Flex is two times higher than that of existing Staron®.
Staron® Super Flex can be used for architectural and interior applications, such as high-performance wall-cladding or kitchen, bathroom and furniture surfaces.

TIME REDUCTION

Staron® Super Flex can be thermoformed at lower temperature and in shorter heating time compared to the thermoforming process of existing Staron®.

| Product | Oven Temperature |
|-----------------------|--------------------------------|
| Staron Solid (12T) | 302°F (150°C) |
| Staron Infinity (12T) | 284°F (140°C) 302°F (150°C) |

| Time | Folding limit (Radius) |
|------------------------|------------------------|
| 45-80 min | 2" (50mm) |
| 20-30 min 15-30 min | 0" (0mm) |

CAUTIONS FOR PROCESSING

Please note that variations in heating time and temperature conditions depending on the oven equipment. The table above shows the thermoforming conditions using convection ovens.
Thermoforming at temperatures above 180° can lead to decreased performance. Damage on Staron® Super Flex sheet can occur at temperatures above 185°. (using convection ovens)
Thermoforming time is shorter when using platen ovens.



Dongdaemun Design Plaza & Park, Korea



University of Economics & Business, Vienna



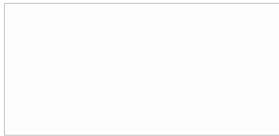
Heidi.com Flagship Store, Switzerland

Designs by Zaha Hadid Architects

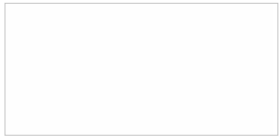


SINK & BOWL FROM STARON®

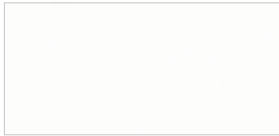
COLOR OPTIONS



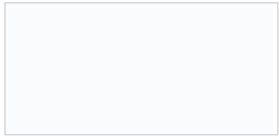
Bright White BW010



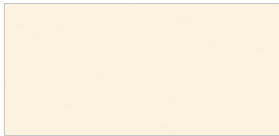
Pearl SP011



Pure white SP016



Quasar White SQ019



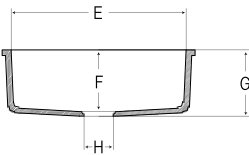
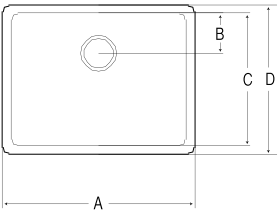
Ivory SI040



A2311

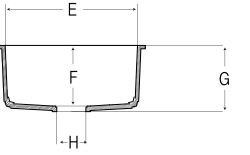
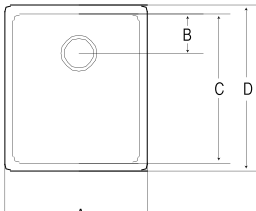
NEW KITCHEN / UTILITY SINKS

B1212



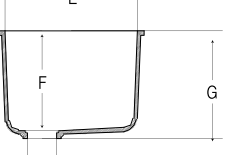
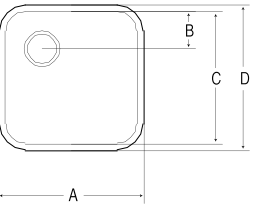
| | | | |
|---|-------|---|-------|
| A | 581mm | E | 530mm |
| B | 122mm | F | 185mm |
| C | 400mm | G | 200mm |
| D | 451mm | H | 90mm |

B1177



| | | | |
|---|-------|---|-------|
| A | 450mm | E | 400mm |
| B | 120mm | F | 185mm |
| C | 450mm | G | 200mm |
| D | 500mm | H | 90mm |

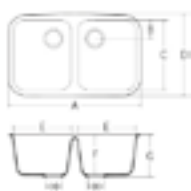
B1160



| | | | |
|---|-------|---|-------|
| A | 440mm | E | 400mm |
| B | 112mm | F | 300mm |
| C | 400mm | G | 325mm |
| D | 440mm | H | 90mm |

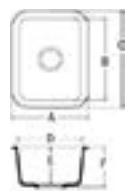
KITCHEN / UTILITY SINKS

A2311



| | |
|---|-------|
| A | 794mm |
| B | 110mm |
| C | 421mm |
| D | 481mm |
| E | 348mm |
| F | 235mm |
| G | 250mm |
| H | 90mm |

A1121



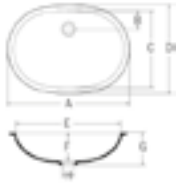
| | |
|---|-------|
| A | 326mm |
| B | 356mm |
| C | 416mm |
| D | 266mm |
| E | 165mm |
| F | 180mm |
| H | 90mm |

A1231



| | |
|---|-------|
| A | 592mm |
| B | 422mm |
| C | 482mm |
| D | 532mm |
| E | 187mm |
| F | 202mm |
| H | 90mm |

A3211



| | |
|---|-------|
| A | 548mm |
| B | 86mm |
| C | 356mm |
| D | 396mm |
| E | 508mm |
| F | 156mm |
| G | 173mm |
| H | 45mm |

A3181



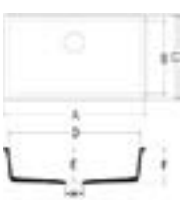
| | |
|---|-------|
| A | 462mm |
| B | 94mm |
| C | 336mm |
| D | 376mm |
| E | 422mm |
| F | 139mm |
| G | 156mm |
| H | 45mm |

A1181



| | |
|---|-------|
| A | 460mm |
| B | 400mm |
| C | 460mm |
| D | 400mm |
| E | 208mm |
| F | 225mm |
| H | 90mm |

B3290



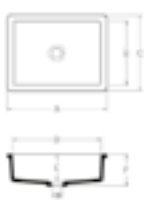
| | |
|---|-------|
| A | 750mm |
| B | 400mm |
| C | 450mm |
| D | 700mm |
| E | 185mm |
| F | 200mm |
| H | 90mm |

B3180



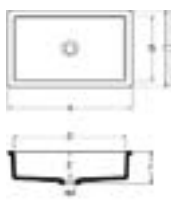
| | |
|---|-------|
| A | 450mm |
| B | 400mm |
| C | 450mm |
| D | 400mm |
| E | 175mm |
| F | 190mm |
| H | 90mm |

B3150



| | |
|---|-------|
| A | 427mm |
| B | 278mm |
| C | 327mm |
| D | 378mm |
| E | 116mm |
| F | 138mm |
| H | 45mm |

B3190

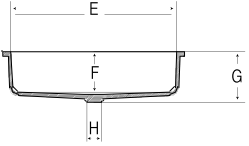
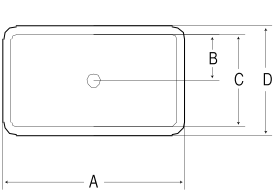


| | |
|---|-------|
| A | 524mm |
| B | 274mm |
| C | 327mm |
| D | 474mm |
| E | 116mm |
| F | 138mm |
| H | 45mm |

BOWLS (BASINS)

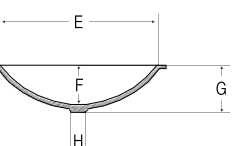
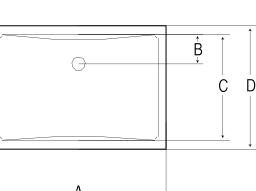
NEW BOWLS (BASINS)

B3200



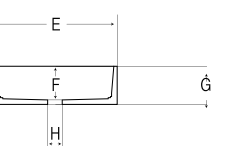
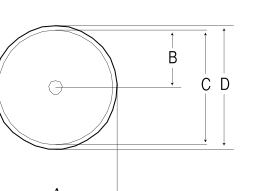
| | | | |
|---|-------|---|-------|
| A | 550mm | E | 500mm |
| B | 140mm | F | 120mm |
| C | 280mm | G | 140mm |
| D | 330mm | H | 44mm |

B3192



| | | | |
|---|-------|---|-------|
| A | 530mm | E | 480mm |
| B | 89mm | F | 121mm |
| C | 320mm | G | 141mm |
| D | 370mm | H | 44mm |

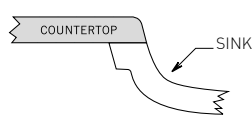
A3148



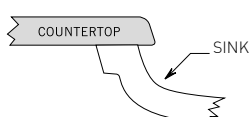
| | | | |
|---|-------|---|-------|
| A | 376mm | E | 350mm |
| B | 175mm | F | 97mm |
| C | 35mm | G | 115mm |
| D | 376mm | H | 44mm |

MOUNTING OPTIONS

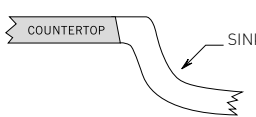
Seam mount



Under mount



Angled mount



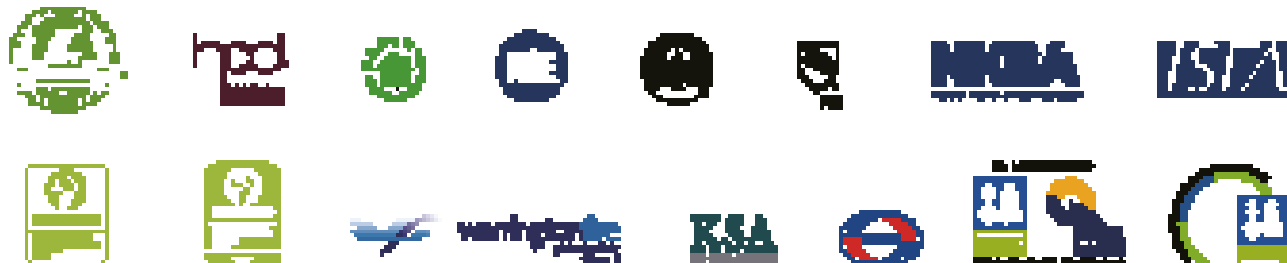
STA

| STARON GROUP | THICKNESS | WIDTH | LENGTH |
|--|-----------|-------|--------|
| | mm | mm | mm |
| Solid, Sanded, Aspen, Metallic | 6 | 760 | 2,500 |
| | 12 | 760 | 3,680 |
| Solid, Sanded, Aspen, Pebble, Metallic, Quarry, Tempest, Supreme | 12 | 760 | 3,680 |

TRE

STARON® surfaces offers you an easy-care, durable material that can be cleaned, maintained or repaired with little effort. The maintenance effort required for STARON® and its durable flawless surface in general depends on the colour and the selected finish. Brighter colours and matt finishes require less care than dark colours and glossy finishes. For standard care and maintenance, wipe STARON® surfaces with a damp cloth or sponge on a daily basis. To get more info about Staron maintenance instructions, please visit our website.

STA



STA

The 10-year warranty applies to Staron, Tempest and Supreme Collection products that have been installed in an interior, commercial-use or residential application.

For more details, please consult with your Staron products distributor, or visit www.staron.com

These contaminants were dropped onto the surface and covered with glass plates for 16 hours. Surfaces of these areas were then scrubbed with damp pads with detergent and tested for the results.

| Content | Content | Content |
|--------------------------------|--------------------------------------|-------------------------------|
| - Acetic acid (10%) | - Acetic acid (10%) | - Acetic acid (10%) |
| - Ammonia | - Sodium hydroxide solution | - Citric (1%) |
| - Amyl acetate | - E, 10, 25, 40% | - Lemon juice |
| - Bell pepper juice | - Sodium sulfate | - Monochloroacetic (2%) |
| - Benzoin resin (concentrated) | - Euphorbia (concentrated) | - Methylamine (10%) |
| - 6-A body conditioner | - Sulfuric acid (25, 40, 60%) | - Methylmeth (1%) |
| - Carbon disulfide | - Trichloroethylene | - Muriatic |
| - Carbamide (urea) | - Toluene | - Naphthalene |
| - Cigarette (inactive and air) | - Zinc acid | - Linoleic |
| - Cooking oil | - Methylalcohol | - Trichloroacetic |
| - Copper chloride | - Nitric | - Silver acetate |
| - Potassium | - Nitrate | - Sodium bisulfate |
| - Lumpy ether | - Nitrobenzene (hydrocarbon 5, 20%) | - Soybean oil |
| - Gasoline | - Amyl alcohol | - Sulfuric acid (25, 40, 60%) |
| - Glycerol | - Ethanol | - Tea |
| - Hydrochloric acid | - Fluorine | - Triacetate |
| - Hydrogen peroxide | - Methyl alcohol | - Urea (5%) |
| - Hydroxy | - Carbon tetrachloride | - Vinegar |
| - Iodine | - Sulfuric acid (concentrated) (75%) | - Wine |
| - Hexamine | - Toluene | - Zinc chloride |
| - Methyl orange (1%) | - Undecyl alcohol | |
| - Mineral oil | - Oxidizing liquid (powder) | |
| - Nail polish | - Ethylacetate | |
| - N-hexane | - Potassium | |
| - Nickel acid | - Carbon tetrachloride | |
| - Potassium chloride | - Zinc | |



Figure 1a

Let ω_1 and ω_2 be the angular frequencies of the two waves. Then $\omega_1 = 2\pi f_1$ and $\omega_2 = 2\pi f_2$. The angular frequency of the resultant wave is $\omega = \omega_1 + \omega_2 = 2\pi(f_1 + f_2)$. The period of the resultant wave is $T = 1/f = 1/(f_1 + f_2)$. The wavelength of the resultant wave is $\lambda = v/f = v/(f_1 + f_2)$. The wave number of the resultant wave is $k = 2\pi/\lambda = 2\pi(f_1 + f_2)/v$. The phase of the resultant wave is $\phi = \omega t - kx = 2\pi(f_1 + f_2)t - 2\pi(f_1 + f_2)x/v$. The amplitude of the resultant wave is $A = 2A_0 \cos(\Delta\phi/2)$, where $\Delta\phi$ is the phase difference between the two waves. The intensity of the resultant wave is $I = 4I_0 \cos^2(\Delta\phi/2)$, where I_0 is the intensity of each wave. The average intensity of the resultant wave is $I_{avg} = 2I_0$. The beat frequency is $f_{beat} = |f_1 - f_2|$. The beat period is $T_{beat} = 1/f_{beat} = 1/|f_1 - f_2|$. The beat wavelength is $\lambda_{beat} = v/f_{beat} = v/|f_1 - f_2|$. The beat wave number is $k_{beat} = 2\pi/\lambda_{beat} = 2\pi|f_1 - f_2|/v$. The beat phase is $\phi_{beat} = \omega_{beat}t - k_{beat}x = 2\pi|f_1 - f_2|t - 2\pi|f_1 - f_2|x/v$. The amplitude of the beat wave is $A_{beat} = 2A_0 \cos(\phi_{beat}/2)$. The intensity of the beat wave is $I_{beat} = 4I_0 \cos^2(\phi_{beat}/2)$. The average intensity of the beat wave is $I_{avg} = 2I_0$.

DISCLAIMER

The information contained herein is provided by LOTTE CHEMICAL Co., Ltd. for information purposes only and should be used by individuals with technical experience and knowledge in the area. LOTTE CHEMICAL Co., Ltd. does not make any representation or warranties of the usefulness or expected result of the information, and does not assume any responsibility whatsoever related to the use of the information. Exclusion of the implied warranties may not apply in certain jurisdictions.

PERFORMANCE
Properties

EU STANDARDS

| PROPERTY | TEST RESULT | UNIT | TEST PROCEDURE |
|---|--|--|---|
| Tensile strength | 6,000 | psi | ASTM D 638 |
| Tensile modulus | 600,000 | psi | ASTM D 638 |
| Flexural strength | 10,000 | psi | ASTM D 790 |
| Flexural modulus | 1,000,000 | psi | ASTM D 790 |
| Elongation | 0.5 | % | ASTM D 638 |
| Hardness | 92 65 | Rockwell "M" Scale Barcol impressor | ASTM D 785 ASTM D 2583 |
| Thermal expansion | 2.0x1.0 ⁻⁵ | in/in F ⁰ | ASTM D 696 |
| Gloss (60 Gardner) | Between 5-20 | | NEMA LD-3 |
| Color stability | No change-200 | hrs | NEMA LD-3 |
| Stain resistance | Passed Rating 41 | | ANSIZ 124 |
| Abrasion resistance | Passed | | ANSIZ 124 |
| Boiling water surface resistance | No effect | | NEMA LD-3 |
| High temperature resistance | No effect | | NEMA LD-3 |
| IZON Impact resistance (Notched) | 0.28ft. | lbf/in | ASTM D 256 |
| Ball drop 1/2" (12 mm) sheet | 144" No failure | w/1/2lb ball | NEMA LD-3 |
| Fungi and Bacterial resistance | No growth | | ASTM G 21, G22 |
| Specific gravity Solid colors Patterened colors | 1.72 1.69 | | ASTM D 792 |
| Water absorptionw | 0.04 0.11 | %,(1/2", 24hrs) %,(1/8", 24hrs) | ASTM D 570 |
| Flammability Flame spread Smoke density | Class A/Class 1 10 10 | | UBC 8-1 ASTM E 84 ASTM E 84 |
| Radiant heat resistance | No visual effect | | NEMA LD-3 |
| Toxicity | 84.4 (Solid color) 81.8 (Patterned color) | g g | Pittsburgh test protocol (LC50 Test) |

EU STANDARDS

| PROPERTY | | TEST RESULT | UNIT | TEST PROCEDURE |
|-----------------------------------|--------------|---------------------|-----------------|-------------------|
| Density | | 1.74 | g/cm³ | DIN ISO 1183 |
| Flexual modulus | | 9030 | Mpa | DIN EN ISO 178 |
| Flexual strength | | 64.5 | Mpa | DIN EN ISO 178 |
| Elongation at break | | 0.83 | % | DIN EN ISO 178 |
| Compressive strength | | 181 | Mpa | EN ISO 604 |
| Impact resistance (Spring force) | | →25 | N | DIN EN 438 -2 |
| Impact resistance (Height) | | 180 | cm | DIN EN 438 -2 |
| Surface hardness(Moh's index) | | 2-3 | | DIN EN 101 |
| Abrasion behavior (Lost weight) | | 0.56 | g | ISO 4586 p6 |
| | | 0.26 | % | ISO 4586 p6 |
| Anti-slip properties with 100µm | | R9 | | DIN 51130:2009 -5 |
| Anti-slip properties with 120µm | | R9 | | DIN 51130:2009 -5 |
| Anti-slip properties with 150µm | | R9 | | DIN 51130:2009 -5 |
| Light fastness | | → 6 | Blue wool scale | DIN EN 105 -B02 |
| Electrostatic surface resistance | | →1x10 ¹² | Ω | EN 61340 -4-1 |
| Electrostatic surface resistivity | | 960x10 ⁹ | Ω | EN 61340 -5-1 |
| Dimensions stability at 20 °C | Dimension | -0.02 | mm | DIN ISO 4586 p10 |
| | Gross weight | -0.02 | % | |
| Thermal conductivity | | 0.53 ~ 0.57 | W/(m.K) | DIN EN 12664 |
| Thermal resistance | | 0.083 ~ 0.092 | m².K/W | DIN EN 12664 |
| Thermal expansion | | 3.6 * 10-5 | mm/mm°C | ASTM D 696 |
| Fungal and Bacterial resistance | | No growth | - | ASTM G 21, G22 |
| Euroclass for reaction to fire | | B-s1 d0 | - | EN 13501 -1 |
| Fire properties (British) | | class0 | - | BS 476 part 6 & 7 |
| Fire properties (Germany) | | B1 | - | DIN 4102 -1 |
| Fire properties (France) | | M2 | - | NF P 92 -501 |





Building on the 50 years of growth we achieved through our ceaseless efforts to push ever further and pursue innovation, we are now bounding ahead yet once more to become a truly lasting centennial company. We will emerge as a company that contributes to the creation of social value and pursues a sustainable future and one that is both beloved and trusted by customers the world over.

At LOTTE, our journey continues to bring our ambitious goal to fruition, as we become a global business that lends itself to the creation of a more flourishing life for all.