ENVIRONMENTAL PRODUCT DECLARATION

CORIAN® QUARTZ

At DuPont, we lead by example—creating innovative, sustainable solutions while reducing our footprint and supporting communities in which we operate around the world. Corian® Quartz offers architects and designers the right combination of aesthetic and performance capabilities for public space design. Radiantly beautiful, as unique as the natural, quartz crystal within, and available in a broad range of colors, Corian® Quartz is also strong and durable. It possesses a signature, beguiling luster attained without extras, sealants, or treatments—perfect for high-traffic areas that demand high-impact design. Timeless, enduring beauty and strength—these are the reasons designers go with Corian® Quartz.

At DuPont, we are innovating so you can achieve sustainable designs without sacrificing durability or beauty. The Corian® Quartz Terra Collection is made with a minimum of 25% post-consumer and pre-consumer recycled content.

We have committed to reducing our footprint, and encourage our partners and suppliers to work with us to enhance sustainability throughout our supply chain and theirs.

UL CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

CORIAN® DESIGN
Make Your Space™

CORIAN® QUARTZ
QUARTZ SURFACE

According to ISO 14025

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	DuPont
DECLARATION NUMBER	4787059050.104.1
DECLARED PRODUCT	Zodiaq® Quartz
REFERENCE PCR	NSF International. (2013). PCR for Residential Countertops.
DATE OF ISSUE	July 11, 2017
DATE OF EXPIRATION	December 11, 2023
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications

The PCR review was conducted by:	NSF PCR Review Panel ncss@nsf.org
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL	Wade Stout, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria, Industrial Ecology Consultants

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Key Environmental Parameters

Key environmental parameters are summarized upfront in Table 1.

Table 1: Key environmental parameters

Parameter	Amount
Global warming [kg CO_2 eq.]	94.3
Primary energy demand [MJ]	1,770
Post-consumer recycled content percentage [%]	2%

Company Description

DuPont is a science company dedicated to solving challenging global problems, while creating measurable and meaningful value for its customers, employees and shareholders. Our dynamic portfolio of products, materials and services meets the ever-changing market needs of diverse industries in more than 90 countries. We unite around a set of core values—safety and health, environmental stewardship, highest ethical behavior and respect for people—just as we have for two centuries.

Agricultural systems that yield ample, safe and nutritious food while reducing the impact on the environment. Abundant, sustainable energy that decreases our dependence on non-renewable sources. Protection for the things that matter most—the planet and its inhabitants. DuPont creates products and services that help meet these needs. And we are resolved to meet these needs responsibly, working directly in the communities in which we operate. We have committed to reducing our footprint, and encourage our partners and suppliers to work with us to enhance sustainability throughout our supply chain and theirs.

Product Specifications

Product Description

Our scientists created Corian® Quartz, previously known as Zodiaq®, for the demanding ones—the architects, designers, and homeowners who are as exacting about aesthetics as they are about performance.

The sparkling crystal within Corian® Quartz balances stunning light-play with mesmerizing depth. Long-lasting and GREENGUARD and GREENGUARD Gold Certified as a low-emitting material, Corian® Quartz surfaces are a high-performance material, delivering strength, and heat and scratch resistance. The Corian® Quartz Terra Collection is the same sophisticated quartz surface as ever, but its composition includes a percentage of pre-consumer and post-consumer recycled content (Post-consumer content percentages vary by color). When properly cleaned, Corian® Quartz does not promote the growth of mold and mildew. Corian® Quartz may help contribute to U.S. Green Building Council (USGBC) LEED® points. Most colors of Corian® Quartz are NSF/ANSI Standard 51 Certified for the strictest level – Food Zone.

Application

Corian® Quartz can be used in residential applications, including kitchens and bathrooms, as well as in commercial applications for both horizontal and vertical installations. Corian® Quartz is an ideal choice for interior public spaces, homes, healthcare and food preparation facilities, schools, and offices.

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Product Photos

Figure 1: Photographs of Corian® Quartz in its various applications

Product Characteristics

Corian® Quartz conforms to the following technical specifications for engineered stone:

- NSF/ANSI 51 – Food equipment materials
- ISFA-3-01 (2013) Classification and standards for quartz surfacing material
- ISFA-3-02 (2013) Fabrication standards for quartz surfacing material

Technical details and product characteristics are detailed in Table 2 and Table 3. Additional information on Corian® Quartz performance properties can be found online.

Table 2: Engineered stone characteristics

Characteristic	Nominal Value	Unit
Primary material thickness	20 – 30 (0.75 – 1.13)	mm (inch)
Slab length	305 (120)	cm (inch)
Slab width	160 (63)	cm (inch)
Primary material weight	49 – 73 (10 – 15)	kg/m^2 ($lbs./ft.^2$)
Underlayment included	None	–
Underlayment type	None	–
VOC emissions test method	UL 2818 - 2013 Standard for Chemical Emissions for Building Materials, Finishes and Furnishings ANSI/BIFMA M7.1-2011(R2016) and determined to comply with ANSI/BIFMA X7.1-2011(R2016) and ANSI/BIFMA e3-2014e Credit 7.6.1, 7.6.2, and 7.6.3 in an Open Plan Office Environment. Products also determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.1-2010 in the office environment.	
Other characteristics	GREENGUARD and GREENGUARD GOLD certification	

Table 3: Additional engineered stone characteristics

Characteristic	Nominal Value	Test Method
Bulk density	2.4 g/cm^3	ASTM C97
Gloss	45 – 50	ANSI Z124
Water absorption	0.12%	ASTM C373
Coefficient of linear thermal expansion	1.4×10^{-5} m/m°C	ASTM D696
Flexural strength	> 5,300 psi	ASTM D790
Flexural modulus	$5.3 – 5.7 \times 10^6$ psi	
Boiling water resistance rating	None to slight effect	NEMA LD 3-3.5
High temperature resistance rating	None to slight effect	NEMA LD 3-3.6

Characteristic	Nominal Value	Test Method
Mohs hardness	7	Mohs Hardness Scale
Compressive strength, dry	27,300 psi	ASTM C170
Compressive strength, wet	24,400 psi	
Color fastness	No effect	NEMA LD 3-3.3
Ball impact resistance: Slabs No fracture - ½ lb. ball – 2 cm & 3 cm slab	164 in. (no failure at height)	NEMA LD 3-3.8
Wear and cleanability	Pass	CSA B45.5-11 / IAPMO Z124-2011
Stain resistance	Pass	CSA B45.5-11 / IAPMO Z124-2011
Fungal resistance	ASTM rating of 0, no observed growth on product at 100x power	ASTM G21
Bacterial resistance	No observed growth on product at 100x power	ASTM G22
Microbial resistance	Highly resistant to mold growth	UL Environment, UL 2824 (ASTM D6329)
Abrasion resistance	139	ASTM C501
Point impact	Passes	ANSI Z124.6.4.2.1
Static coefficient of friction (as received)	0.89 dry / 0.61 wet	ASTM C1028
Long and short term	< 0.04%	ASTM D570
Moisture expansion	< 0.01%	ASTM C370
Freeze thaw resistance	Unaffected	ASTM C1026
Flammability	Class A	NFPA 101®: Life Safety Code®
Flame spread index (FSI)	FSI = 0 for 3cm, FSI = 5 for 2 cm	ASTM E84, NFPA 255 & UL 723
Smoke developed index (SDI)	SDI = 40 for 3 cm, SDI = 75 for 2 cm	
Flame spread value (FSV)	FSV = 0 for 3 cm, FSV = 5 for 2 cm	CAN/ULC-S102
Smoke developed value (SDV)	SDV = 10 for 3 cm, SDV = 40 for 2 cm	

Material Content

Corian® Quartz is a quartz-based engineered stone. It is composed primarily of recycled glass and quartz in various forms, along with pigments and a resin binder. Ingredients are summarized in Table 4.

Table 4: Corian® Quartz material composition

Material	Mass [%]	Mass [kg]
Quartz (silica)	80 – 95%	50 – 60 kg
Resin	< 10%	< 6.7 kg
Other ingredients (including recycled glass and pigments)	< 5%	< 3.2 kg

Engineered Stone Production

Corian® Quartz is produced at facilities in Canada and China. Production is weighted by North American sales. At the facilities, raw materials are mixed, cast, cured, and molded into slabs. The slabs are then polished before being packaged for distribution.

Underlying Life Cycle Assessment

The analysis was conducted according to NSF's product category rule for residential countertops (NSF International, 2013) and accompanying addendum (UL, 2017). The analysis represents the average environmental performance of Corian® Quartz from DuPont's two facilities, as weighted by sales to North America. All colors and slab dimensions are included.

Functional Unit

The functional unit is 1 m^2 (10.8 ft^2) of 26.5-mm thick surface for a period of 10 years in use.

System Boundary

The analysis represents the cradle-to-grave life cycle of Corian® Quartz. The following life cycle stages are included in the analysis:

- **Material Acquisition and Pre-Processing:** This stage includes the extraction of materials from nature, processing required to create the raw materials used in surfaces production, and transportation of the materials to the construction stage. Any processing of secondary materials used in surfaces production is also included.
- **Construction:** During construction, raw materials for the countertop are processed into slab. The stage also includes production and inbound transport of packaging materials.
- **Installation:** The installation stage starts with the transportation of the slab to a warehouse, distributor, and/or fabricator. The fabricator, who is responsible for customizing the slab, is assumed to travel to the installation site to take initial measurements. These measurements are used to customize the slab back at the fabrication facility. Since Corian® Quartz is used for more than residential countertops, a 10% scrap rate is assumed. Lastly, the customized slab is transported to the installation site and installed with Corian® joint adhesive.
- **Use and Maintenance:** Use includes product maintenance—typically cleaning with tap water and soap—over the 10-year timeframe. No sealing or additional maintenance is needed.

– **End-of-Life:** The end-of-life stage includes the disposal of the surface, as well as the disposal of packaging from installation. Corian® Quartz is assumed to be disposed entirely to landfill or incinerated.

Cut-off Criteria

No cut-off criteria were applied in this study. All reported data was incorporated and modeled using best available Life Cycle Inventory (LCI) data.

Allocation

No allocation was necessary for primary data collected from DuPont's manufacturing facilities. The cut-off allocation approach was used to address secondary material use, as well as any packaging material recycling at end-of-life.

Background Data

Background datasets for upstream and downstream data are representative of the years 2009 – 2015 and were obtained from the GaBi 2016 databases (thinkstep, 2016).

Data Quality

A variety of tests and checks were performed throughout the project to ensure high quality of the completed LCA. Checks included an extensive review of project-specific LCA models as well as the background data used.

Data included first-hand industry data from DuPont in combination with consistent background life cycle inventory information from the GaBi 2016 databases. The data are representative of Corian® Quartz produced for the North American market in 2015.

Life Cycle Assessment Results and Analysis

Life cycle assessment results are presented per the functional unit.

Materials Resources

Materials resources, listed in Table 5, consist of all of the elementary flows included in the entire product system. Virgin renewable resources consist largely of air and carbon dioxide needed in materials acquisition, while virgin non-renewable resources mainly consist of rock and quartz resources. Recycled materials consist of post-consumer and post-industrial glass used in the product formulation.

Table 5: Corian® Quartz materials resource results per functional unit

	Units	Materials acquisition	Construction	Installation	Use & maint.	End-of-life	Total
Virgin renewable resources	kg	3.25E+02	8.69E+01	2.87E+01	2.95E+00	3.95E+01	**4.83E+02**
Recycled resources	kg	1.55E+00	-	-	-	-	**1.55E+00**
Virgin non-renewable resources	kg	8.67E-02	3.66E-02	3.73E-02	1.35E-03	7.88E-02	**2.41E-01**

Energy Consumption

Table 6: Corian® Quartz energy consumption results per functional unit

	Units	Materials acquisition	Construction	Installation	Use & maint.	End-of-life	Total
Non-renewable							
Fossil-fuel based	MJ	8.64E+02	1.71E+02	3.46E+02	6.85E+00	6.48E+01	**1.45E+03**
Nuclear	MJ	2.58E+01	5.26E+00	1.23E+01	2.05E-01	4.08E+00	**4.77E+01**
Renewable							
Solar	MJ	2.06E+01	5.92E+00	8.63E+00	4.24E-02	2.37E+00	**3.75E+01**
Wind	MJ	8.47E+00	1.82E+01	2.00E+00	3.73E-02	8.55E-01	**2.96E+01**
Hydro	MJ	4.98E+00	1.86E+02	2.41E+00	3.76E-02	8.17E-01	**1.94E+02**
Biomass	MJ	-	7.11E+00	-	-	-	**7.11E+00**
Geothermal	MJ	3.07E-01	4.28E-03	4.35E-01	6.71E-03	1.19E-01	**8.72E-01**

Impact Assessment

Impact assessment results are listed in Table 7. Acidification potential (AP), photochemical ozone creation potential (POCP), eutrophication potential (EP), and ozone depletion potential (POCP) results were calculated using the TRACI 2.1 methodology. Global warming potential (GWP) results were calculated based on the 5th assessment report of the Intergovernmental Panel on Climate Change (IPCC), and abiotic depletion potential (ADP) results are based on CML 2001 (v4.7, January 2016).

Table 7: Corian® Quartz impact assessment results per functional unit

	Units	Materials acquisition	Construction	Installation	Use & maint.	End-of-life	Total
GWP	kg CO_2 eq.	4.24E+01	1.75E+01	2.62E+01	2.96E-01	7.92E+00	**9.43E+01**
AP	kg SO_2 eq.	2.62E-01	7.03E-02	1.90E-01	5.36E-04	2.01E-02	**5.43E-01**
POCP	kg O_3 eq.	4.71E+00	1.53E+00	4.30E+00	9.40E-03	3.67E-01	**1.09E+01**
EP	kg N eq.	1.23E-02	3.41E-03	1.16E-02	4.45E-05	1.27E-03	**2.86E-02**
ODP	kg R11 eq.	1.51E-09	1.29E-10	1.46E-09	2.28E-11	4.15E-10	**3.53E-09**
ADP, elements	kg Sb eq.	6.05E-05	6.23E-06	4.74E-06	3.69E-07	1.63E-06	**7.35E-05**
ADP, fossil	MJ	8.64E+02	1.71E+02	3.46E+02	6.85E+00	6.48E+01	**1.45E+03**

Emissions and Wastes

Table 8: Corian® Quartz emissions and wastes per functional unit

	Units	Materials acquisition	Construction	Installation	Use & maint.	End-of-life	Total
Emissions to air							
SO_x	kg	-	6.43E-05	-	-	-	**6.43E-05**
SO_2	kg	1.26E-01	4.39E-02	6.56E-02	2.61E-04	7.46E-03	**2.43E-01**
NO_x	kg	1.87E-01	3.54E-02	1.71E-01	3.57E-04	1.45E-02	**4.08E-01**
CO_2	kg	3.89E+01	1.61E+01	2.52E+01	2.64E-01	7.19E+00	**8.77E+01**
CO_2 (biogenic)	kg	1.57E+00	2.10E+00	8.20E-01	1.06E-02	6.83E-01	**5.17E+00**
Methane	kg	1.06E-01	4.30E-02	2.72E-02	9.99E-04	9.36E-03	**1.87E-01**
N_2O	kg	9.41E-04	3.06E-04	4.27E-04	4.84E-06	6.77E-05	**1.75E-03**
CO	kg	2.56E-01	2.16E-02	5.19E-02	1.72E-04	8.03E-03	**3.37E-01**
Emissions to water							
Phosphates	kg	1.60E-04	3.47E-05	4.45E-04	3.19E-07	3.03E-05	**6.70E-04**
Nitrates	kg	2.66E-03	1.01E-03	2.08E-03	1.82E-05	3.37E-04	**6.11E-03**
Dioxin	kg	6.92E-20	9.73E-22	9.78E-20	1.51E-21	2.68E-20	**1.96E-19**
Heavy metals, As	kg	2.90E-05	1.52E-06	2.37E-05	1.32E-07	2.01E-06	**5.64E-05**
Heavy metals, Cd	kg	1.33E-05	3.37E-07	1.04E-05	9.33E-08	1.02E-06	**2.51E-05**
Heavy metals, Cr	kg	2.41E-04	1.06E-05	1.13E-04	1.18E-05	5.93E-05	**4.35E-04**
Heavy metals, Pb	kg	2.12E-05	1.41E-06	1.46E-05	1.85E-07	1.78E-06	**3.92E-05**
Heavy metals, Hg	kg	3.67E-07	6.70E-08	9.20E-08	1.97E-09	1.35E-08	**5.42E-07**
Water input	kg	1.86E+04	2.06E+05	3.15E+03	7.94E+01	1.91E+03	**2.30E+05**
Freshwater consumption	kg	1.41E+02	6.89E+02	8.28E+01	2.06E+01	3.62E+01	**9.70E+02**
Waste management							
Incineration	kg	-	8.39E-01	1.41E+00	-	1.28E+01	**1.51E+01**
Landfill (non-hazardous waste)	kg	-	-	5.65E+00	-	5.14E+01	**5.70E+01**
Hazardous waste	kg	-	-	-	-		**-**
Landfill avoidance (recycling)	kg	-	2.67E+01	-	-	1.14E-01	**2.68E+01**

Additional Environmental Information

No toxicity impact category results are calculated, although one may reference Corian® Quartz HPD (DuPont, 2017). Material ingredients are disclosed in the Material Content section under the Product Specifications section.

Although the analysis assumes that the surface, at end-of-life, is disposed to landfill or incinerated, the material can also be re-purposed.

DuPont holds the following certifications and partnerships.

NGBS Green Partner	SCS Global Services Certification for Recycled Content	GREENGUARD Gold Certification for Low Chemical Emissions	NSF Certification for Food Contact	ISO 14001 Responsible Care Management System

Additional information, including product details and company information, can be found at www.dupont.com.

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Contact Information

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Study Commissioner

DuPont
+1 (800) 4-CORIAN
+1(800) 426-7426
http://www.corian.com/-call-a-dupont-office-143-

LCA Practitioner

thinkstep, Inc.
+1 (617) 247-4477
info@thinkstep.com
http://www.thinkstep.com

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