PPG Architectural Finishes
19699 Progress Drvie
Strongsville, OH 44149

Environmental Product Declaration – Coraflon® Platinum

Certified Environmental Product Declaration
www.nsf.org

Coraflon® Platinum powder coatings are formulated to provide exceptional durability, colorfastness and gloss retention. Available in a rich range of colors, satin glosses and high-luster glosses, including micas, Coraflon coatings are highly resistant to weather, marring, abrasion, chalking, fading and other forms of discoloration. Coraflon coatings make an excellent choice for curtain walls, storefronts and other highly visible, high-end monumental applications.

The product image to the right is an example of one of the formulas covered by the EPD. A list of all relevant formulas is shown in Table 1 *in this EPD.*

Declaration Holder	PPG Architectural Finishes (email: jim.kantola@ppg.com); website: www.ppg.com for additional information)	
Declaration Number	EPD10701	
Declared Product	Coraflon® Platinum	
Product Category and Subcategory	Powder Coatings	
Program Operator	NSF International (ncss@nsf.org)	
PCR	PCR for Powder Coatings – May 2020	
Date of Issue	May 26, 2022	
Period of Validity	5 years from date of issue	
Product Contents	See Table 2.	
The PCR review was conducted by	Thomas P. Gloria, PhD – Industrial Ecology Consultants (t.gloria@industrial-ecology.com)	
This EPD was independently verified by NSF Certification, LLC in accordance with ISO 14025, ISO 21930 and the PCR by	Tony Favilla afavilla@nsf.org	☐ Internal ☒ External
This life cycle assessment was independently verified in accordance with ISO 14044, ISO 21930 and the PCR by	Jack Geibig – EcoForm jgeibig@ecoform.com	☐ Internal ☒ External
Functional Unit	1 kg of the referenced products	
Allocation Rules Utilized	Mass-based, in accordance with Ecoinvent 3.5 database.	
Cut-off procedure employed	Cut-off by classification, in accordance with Ecoinvent 3.5 database.	
Data Quality Assessment Score	Very Good	
Manufacturing Location(s)	Gainesville, Texas	
LCA Software and Version Number Used	SimaPro v 9.2.1.	

Contents of the Declaration:

In order to support comparative assertions, this EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the building level per ISO 21930 guidelines. The results of this EPD reflect an average performance by the product and its actual impacts may vary on a case-to-case basis.

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Product Definition, Characteristics and Specifications:

Coraflon® Platinum powder coatings are formulated to provide exceptional durability, colorfastness and gloss retention. Available in a rich range of colors, satin glosses and high-luster glosses, including micas, Coraflon coatings are highly resistant to weather, marring, abrasion, chalking, fading and other forms of discoloration. Coraflon coatings make an excellent choice for curtain walls, storefronts and other highly visible, high-end monumental applications.

Table 1 - List of Coraflon Platinum formulas assessed by LCA model and report

EPD Product Name
Coraflon® Platinum - White
Coraflon® Platinum - Black
Coraflon® Platinum - Gray
Coraflon® Platinum - Brown
Coraflon® Platinum - Silver Aluminum
Coraflon® Platinum - Silver Mica
Coraflon® Platinum - Gold Mica

Reuse, recycling and energy recovery

No components for reuse, materials for recycling, materials for energy recovery or recovered energy from the product system are specified in this EPD.

Properties of declared product as delivered

Coraflon® Platinum products covered by this EPD are shipped in 55-lb cardboard boxes.

Base materials/ancillary materials

The compositional range of the Coraflon® Platinum products covered by this EPD is shown by % weight in Table 2.

Table 2 – Compositional range of Coraflon® Platinum formulas covered by this EPD

Ingredient category	Additives	Binders	Fillers	Pigments	Titanium dioxide
% of product by weight	2-4%	60-90%	0-25%	0-15%	0-30%

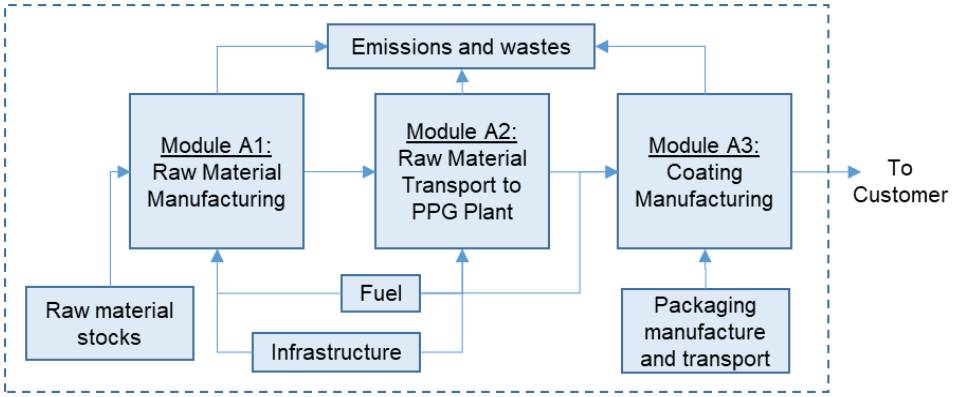
Manufacturing:

The manufacturing process for powder coatings primarily involves the mixing and dispersing of raw materials into a homogeneous mixture; melting the mixture in an extruder, cooling and breaking the extruded product into chips, and milling and sieving to make a fine powder. Raw materials include pigments and fillers, which provide color, hiding, and gloss control; resin/binders, which dry to form a solid film and act as the glue or adhesive to adhere the coating to the substrate; and additives, which assist with various coating properties.

The large majority of energy use and environmental emissions typically oc-curs in the raw material extraction and processing stage, outside of PPG's direct con-trol. At the PPG plant, energy use typically consists of space heating for plant buildings and electricity for running equipment such as mixers and

pumps. Once formulations are fully mixed and quality tests have been performed, the product is then packaged for distribution to the customer. A simplified version of this process is shown in Figure 1.

Figure 1. Schematic representation of the LCA system boundaries for each module



Hazardous or toxic material content

Table 3 lists the ingredients present in the products covered by this EPD which are classified as hazardous to health or the environment and hence require reporting on the product Safety Data Sheets (SDS). For additional information about product hazards, please refer to the SDS for the specific Coraflon formula available on www.ppgindustrialcoatings.com.

Table 3 – Hazardous ingredients listed on Coraflon® Platinum Safety Data Sheets

Substance	CAS	Range of values
Aluminium hydroxide	21645-51-2	0 - ≤5.0
Aluminium powder (stabilized)	7429-90-5	0 - ≤5.0
Barium sulfate	7727-43-7	0 - ≤34
Chrome antimony titanium buff rutile	68186-90-3	0 - ≤10
Copper chromite black spinel	68186-91-4	0 - ≤20
Crystalline silica, respirable powder (<10 microns)	14808-60-7	0 - <1.0
Diiron trioxide	1309-37-1	0 - ≤5.0
Iron cobalt black spinel	68187-50-8	0 - <1.0
Mica-group minerals	12001-26-2	0 - ≤5.0
Saturated polyester polymer	Proprietary	0 - ≤75
Titanium dioxide	13463-67-7	≤1.0 - ≤50

Environment and health during manufacturing

Products are manufactured in the United States in facilities that comply with all applicable regulations.

Packaging

Cardboard may be recycled in accordance with local guidelines for corrugated cardboard.

Life Cycle Assessment Methodology and Calculation Rules:

Declared unit:

The declared unit is 1 kg for each Coraflon® Platinum product covered by this EPD.

System Boundary

The EPD is declared as cradle-to-gate, and hence only modules A1 to A3 are declared. Losses and disposal of waste are accounted for in the module in which they occur. Infrastructure processes (e.g. industrial plants, roads and vehicles) are included in all modules. Module A1 includes all processes necessary for the manufacture of the raw materials for the powder coating products. Module A2 includes the transportation of the raw materials to the PPG plant. Module A3 includes all processing at the PPG plant, as well as the manufacture and transportation of the packaging for the finished products and disposal of all waste. The manufacture and transportation for packaging of the raw materials and primary packaging is not included in the system boundary. Table 4 shows the modules included in the life cycle assessment underpinning this EPD.

Table 4 – System boundaries and modules included

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE					END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY	
	A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**C1**	**C2**	**C3**	**C4**	**D**	
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential	Reference Service Life
						B6 Operational Energy Use of Building Integrated System During Product Use										
						B7 Operational Water Use of Building Integrated System During Product Use										
Cradle to grave	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

MND = Module Not Declared

Estimates and assumptions

In addition to processes outside the system boundary, the following key assumptions were made:

- All raw materials were assumed to travel a distance of 1200 miles from the site of their manufacture to the PPG plant, consistent with the assumptions documented in the PCR.
- Packaging materials were also assumed to travel the distances used in the PCR.

Cut-off criteria

For processes included in the system boundary, no known flows are deliberately excluded from this EPD.

Background data

Primary data on the content of products is collected from the declaration of raw material composition from PPG raw materials suppliers. Primary data on resource use, emissions and waste from PPG plants were taken from PPG's environmental reporting system. The regional U.S. electric power grid generation mix for each plant was used in the LCA model according to the percentage of product made at that plant. For life cycle modeling of all processes, SimaPro V.9.2.1 was used. All relevant background datasets were taken from Ecoinvent V3.5 database and are documented in supporting Ecoinvent documentation.

Data quality

To assess the input quality of the specific product data used in the LCA modeling, the pedigree matrix developed by Weidema and Wesnaes (1996) was used. The pedigree matrix rates data on a scale of 1 to 5 (1-poor, 2-fair, 3-good, 4-very good, 5-excellent) for each of 5 rating criteria: reliability of source, completeness, temporal correlation, geographical correlation, and technological correlation. Primary data for the year 2019 was obtained from PPG environmental reporting systems dealing with manufacturing plant operations. When primary data was for processes not directly under PPG's control, data was taken from the Ecoinvent v3.5 database. Ecoinvent is widely accepted by the LCA community. The regional U.S. electric power grid generation mix for each plant was used in the LCA model according to the percentage of product made at that plant. The primary data is considered to be of excellent quality and Ecoinvent very good. Considering that the majority of environmental impact is in the stages for which the data was of higher quality, the overall data quality rating was assessed as Very Good.

Allocation

In the LCA model, the only allocation used was a mass-based allocation during the manufacturing process, to assign PPG manufacturing plant inputs and outputs across multiple products produced at the same plant.

Key Environmental Parameters:

The Life Cycle Impact Assessment (LCIA) step of the analysis groups emissions and resource consumption into categories by known environmental impacts to which they contribute, and applies characterization factors to calculate the relative importance of each substance in a category. The U.S.-based TRACI 2.1 (Bare 2011) method was used to calculate the impacts in the following impact categories, in accordance with the PCR:

- Climate change or global warming potential (GWP 100 years) [kg CO_2-eq.]: Biomass carbon uptake and its re-release of CO_2 and CH_4 were reported separately based on the biogenic carbon content of the products and/or packaging.
- Acidification potential of land and water sources (AP) [kg SO_2-eq]:
- Photochemical ozone creation potential (POCP, or "Smog Formation") [kg O_3 eq.]
- Eutrophication potential (EP) [kg N eq.]
- Stratospheric ozone depletion potential (ODP) [kg CFC-11 eq.]

Additional life cycle inventory results reported in accordance with the PCR are the following:

- Depletion of abiotic resources – elements [kg Sb eq]
- Depletion of abiotic resources – fossil [MJ]
- Depletion of non-renewable energy resources [MJ]
- Depletion of non-renewable material resources [kg]
- Use of renewable primary energy [MJ] - defined as renewable non-fossil energy sources: wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.
- Use of renewable material resources [kg] - defined as materials that can be readily replaced by natural means on a level equal to their consumption.
- Consumption of freshwater [m^3] – limited to the net value between uptake and re-release, accounting only for evaporation and other forms of water displacement.
- Hazardous waste [kg] – as defined by RCRA under 40 CFR 261.33
- Non-hazardous waste [kg]
- Radioactive waste [kg]

The total LCIA results for each product are shown in Table 5. Average results for products included in this EPD are grouped separately into the different life cycle stages from ISO 21930 (as shown in Table 2) and are shown in Table 6. Results for individual products are similar to the average product shown.

Table 5 - LCIA Results – Totals for Coraflon® Platinum

Impact category	Units	Formulations						
		Coraflon® Platinum - White	Coraflon® Platinum - Black	Coraflon® Platinum - Gray	Coraflon® Platinum - Brown	Coraflon® Platinum - Silver Aluminum	Coraflon® Platinum - Silver Mica	Coraflon® Platinum - Gold Mica
Key Environmental Parameters (TRACI Categories)								
Ozone depletion	g CFC-11 eq	0.85	0.85	0.85	0.86	0.81	0.84	0.80
Global warming	kg CO2 eq	34.23	32.38	33.66	33.88	33.26	33.55	32.06
Biogenic CO2 from biobased products	*kg CO2 eq*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Biogenic CO2 from biobased packaging	*kg CO2 eq*	*0.022*	*0.022*	*0.022*	*0.022*	*0.022*	*0.022*	*0.022*
Smog	kg O3 eq	0.38	0.26	0.32	0.32	0.38	0.34	0.31
Acidification	kg SO2 eq	0.042	0.029	0.035	0.034	0.039	0.036	0.033
Eutrophication	kg N eq	0.028	0.019	0.023	0.023	0.026	0.024	0.022
Other Indicators Derived from LCI								
Depletion of abiotic resources - elements	g Sb eq	0.42	0.29	0.33	0.30	0.32	0.31	0.31
Depletion of abiotic resources - fossil	MJ	97.97	78.5	95.9	97.7	104.6	102.5	94.5
Depletion of non-renewable energy resources	MJ	114.10	92.02	111.63	113.63	121.11	118.93	109.94
Non renewable, fossil	*MJ*	*106.05*	*85.23*	*103.88*	*105.83*	*113.15*	*110.96*	*102.41*
Non-renewable, nuclear	*MJ*	*8.05*	*6.79*	*7.75*	*7.80*	*7.96*	*7.97*	*7.52*
Non-renewable, biomass	*MJ*	*0.006*	*0.006*	*0.001*	*0.001*	*0.006*	*0.006*	*0.006*
Depletion of non-renewable material resources	kg	4.50	3.02	3.42	3.28	4.20	3.67	3.34
Use of renewable primary energy	MJ	5.93	4.40	5.18	5.10	6.02	5.33	5.05
Renewable, biomass	*MJ*	*2.25*	*1.60*	*1.92*	*1.89*	*2.06*	*2.03*	*1.87*
Renewable, wind, solar, geothermal	*MJ*	*1.11*	*0.94*	*1.03*	*1.02*	*1.05*	*1.04*	*1.00*
Renewable, water	*MJ*	*2.56*	*1.86*	*2.22*	*2.19*	*2.92*	*2.26*	*2.18*
Use of renewable material resources	g	0.434	0.423	0.075	0.072	0.414	0.424	0.410
Consumption of freshwater	m3	0.111	0.090	0.103	0.104	0.106	0.112	0.099
Hazardous waste disposed	kg	0.66	0.20	0.32	0.25	0.47	0.31	0.27
Non hazardous waste disposed	kg	3.69	2.21	2.82	2.67	3.47	2.86	2.69
Radioactive waste disposed	g	0.20	0.14	0.16	0.16	0.18	0.17	0.16

Note 1: Significant data limitations currently exist within the LCI data used to generate waste metrics for Life Cycle Assessments and Environmental Product Declarations. The waste metrics were calculated in a way conformant with the requirements of ISO 21930:2017, but these values represent rough estimates and are for informational purposes only. As such, no decisions regarding actual cradle-gate waste performance between products should be derived from these reported values.

Note 2:No secondary materials, renewable or nonrenewable secondary fuels, or recovered energy, are included in this EPD.

Table 6 - LCIA Results – Average by Stage for Coraflon® Platinum

Impact category	Units	Modules			Total
		Stage I			
		A1	A2	A3	
Key Environmental Parameters (TRACI Categories)					
Ozone depletion	g CFC-11 eq	0.84	0.00	0.00	0.84
Global warming	kg CO2 eq	32.67	0.11	0.51	33.29
Biogenic CO2 from biobased products	*kg CO2 eq*	*0.00*	*0.00*	*0.00*	*0.00*
Biogenic CO2 from biobased packaging	*kg CO2 eq*	*0.00*	*0.00*	*0.02*	*0.02*
Smog	kg O3 eq	0.31	0.01	0.01	0.33
Acidification	kg SO2 eq	0.034	0.000	0.001	0.035
Eutrophication	kg N eq	0.018	0.000	0.005	0.024
Other Indicators Derived from LCI					
Depletion of abiotic resources -elements	g Sb eq	0.32	0.00	0.00	0.32
Depletion of abiotic resources -fossil	MJ	88.90	1.70	5.35	95.95
Depletion of non-renewable energy resources	MJ	102.61	1.83	7.19	111.62
Non renewable, fossil	*MJ*	*96.16*	*1.80*	*5.97*	*103.93*
Non-renewable, nuclear	*MJ*	*6.45*	*0.02*	*1.22*	*7.69*
Non-renewable, biomass	*MJ*	*0.004*	*0.000*	*0.000*	*0.005*
Depletion of non-renewable material resources	kg	3.36	0.19	0.08	3.63
Use of renewable primary energy	MJ	1.65	0.00	0.29	1.94
Renewable, biomass	*MJ*	*102.61*	*1.83*	*7.19*	*111.62*
Renewable, wind, solar, geothermal	*MJ*	*0.61*	*0.00*	*0.42*	*1.03*
Renewable, water	*MJ*	*2.27*	*0.01*	*0.04*	*2.31*
Use of renewable material resources	g	0.29	0.00	0.03	0.32
Consumption of freshwater	m3	0.10	0.00	0.00	0.10
Hazardous waste disposed	kg	0.34	0.00	0.01	0.35
Non hazardous waste disposed	kg	2.64	0.16	0.12	2.92
Radioactive waste disposed	g	0.14	0.01	0.02	0.17

Note 1: Significant data limitations currently exist within the LCI data used to generate waste metrics for Life Cycle Assessments and Environmental Product Declarations. The waste metrics were calculated in a way conformant with the requirements of ISO 21930:2017, but these values represent rough estimates and are for informational purposes only. As such, no decisions regarding actual cradle-gate waste performance between products should be derived from these reported values.

Note 2:No secondary materials, renewable or nonrenewable secondary fuels, or recovered energy, are included in this EPD.

Material and Energy Resources, Emissions and Wastes:

Emissions to Water, Soil, and to Indoor Air:

Because coatings are a passive product during use, the only impacts occurring during this phase are generally due to the off-gassing of material components in the paint. No VOC emissions are generated by the powder coating products covered in this EPD.

LCA Interpretation

The LCA results show that the raw materials (Module A1) tend to contribute highly to the impact of many indicators. This high contribution of raw materials to the impact indicators is not unexpected. As paints are primarily mixtures of pre-processed ingredients, much of the expenditure of energy, raw materials, processing, waste processing, etc. in bringing the product to existence has occurred prior to the entry of the raw materials onto the PPG production site.

References:

ASTM International, West Conshohocken, PA, 2014, www.astm.org.

American Coating Association Product Category Rule for Architectural Coatings. Available at http://standards.nsf.org/apps/group_public/download.php/28098/ACA%20PCR%20%2006-17-15%20-%20Final.pdf. Published June, 2015.

Bare, J., TRACI 2.0: the tool for the reduction and assessment of chemical and other environmental impacts 2.0. Clean Technologies and Environmental Policy, 2011, Vol 13/5, p. 687.

EPA VOC Calculation Rules. http://www3.epa.gov/ttn/atw/183e/aim/fr1191.pdf

ISO 14025:2006 *Environmental labels and declarations – Type III environmental declarations – Principles and procedures*.

ISO 14040:2006 *Environmental management - Life cycle assessment – Principles and framework*.

ISO 14044:2006 *Environmental management - Life cycle assessment – Requirements and guidelines*.

ISO 21930:2007 *Sustainability in building construction – Environmental declaration of building products*.

Weidema, B.P., M.S. Wesnaes, Data quality management for life cycle inventories – an example of using data quality indicators. Journal of Cleaner Production, 1996, Vol 4, p. 167.

Glossary:

Acronyms & Abbreviated Terms:

- ACA: American Coating Association
- ASTM: A standards development organization that serves as an open forum for the development of international standards. ASTM methods are industry-recognized and approved test methodologies for demonstrating the durability of an architectural coating in the United States.
- ecoinvent: a life cycle database that contains international industrial life cycle inventory data on energy supply, resource extraction, material supply, chemicals, metals, agriculture, waste management services, and transport services.
- EPA WARM model: Unite States Environmental Protection Agency Waste Reduction Model.
- EPD: Environmental Product Declaration. EPDs are form of as Type III environmental declarations under ISO 14025. They are the summary document of data collected in the LCA as specified by a relevant PCR. EPDs can enable comparison between products if the underlying studies and assumptions are similar.
- GaBi: Created by PE INTERNATIONAL GaBi Databases are LCA databases that contain ready-to-use Life Cycle Inventory profiles.
- LCA: Life Cycle Assessment or Analysis. A technique to assess environmental impacts associated with all the stages of a product's life from cradle to grave (i.e., from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling).
- NCSS: NSF International's National Center for Sustainability Standards
- PCR: Product Category Rule. A PCR defines the rules and requirements for creating EPDs of a certain product category.
- TRACI: Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts.
- VOC: Volatile organic compounds

Terminology from the PCR:

- Architectural coating: a coating recommended for field application to stationary structures or their appurtenances at the site of installation, to portable buildings, to pavements, or to curbs. For purposes of the PCR an 'architectural coating' does not include adhesives and coatings for shop applications or original equipment manufacturing, nor does it include coatings solely for application to non-stationary structures, such as airplanes, ships, boats, and railcars. Please see the product category requirements in Section 1.1 of the PCR. General architectural coatings are decorative or protective paints or coatings formulated for interior or exterior architectural substrates including, but not limited to: drywall, stucco, wood, metal, concrete, and masonry. Primers, sealers and undercoaters are coatings formulated for one or more of the following purposes: to provide a firm bond between the substrate and the subsequent coatings; to prevent subsequent coatings from being absorbed by the substrate; or to prevent harm to subsequent coatings by materials in the substrate; or to provide a smooth surface for the subsequent application of coatings; or to provide a clear finish coat to seal the substrate; or to prevent materials from penetrating into or leaching out of a substrate. Interior architectural coatings are defined as coatings that meet the product category requirements in section 1.1 of the PCR and that are applied to substrates that primarily reside in interior.
- Biologic growth or bio deterioration: any undesirable change in material properties brought about by the activities of microorganisms.
- Blistering: the formation of dome shaped hollow projections in paints or varnish films resulting from the local loss of adhesion and lifting of the film from the surface or coating.
- Burnish resistance: the resistance of a coating to an increase in gloss or sheen due to polishing or rubbing.
- Design life: The estimated lifetime of a coating based solely on its hiding and performance characteristics determined by results in certain ASTM durability tests.
- Durability: the degree to which coatings can withstand the destructive effect of the conditions to which they are subjected and how long they retain an acceptable appearance and continue to protect the substrate.
- Erosion: the wearing away of the top coating of a painted surface e.g., by chalking, or by the abrasive action of windborne particles of grit, which may result in exposure of the underlying surface. The degree of resistance is dependent on the amount of coating retained.
- Flaking/Peeling: the phenomenon manifested in paint films by the actual detachment of pieces of the film itself either from its substrate or from paint previously applied. Peeling can be considered as an aggravated form of flaking. It is frequently due to the collection of moisture beneath the film.
- Gloss: a value of specular reflection which is often used to categorize certain types of paints.
- Intermediate processing: the conversion of raw materials to intermediates (e.g. titanium dioxide ore into titanium dioxide pigment, etc.).
- Market-based life: The estimated lifetime of a coating based off the actual use pattern of the product type. In this instance, a repaint may occur before the coating fails.
- Pigment: the material(s) that give a coating its color.
- Primary materials: resources extracted from nature. Examples include titanium dioxide ore, crude oil, etc. that are used to create basic materials used in the production of architectural coatings (e.g., titanium dioxide).
- Resin/Binder: acts as the glue or adhesive to adhere the coating to the substrate.
- Scrubbability or scrub resistance: the ability of a coating to resist being worn away or to maintain its original appearance when rubbed repetitively with an abrasive material.
- Secondary materials: recovered, reclaimed, or recycled content that is used to create basic materials to be used in the production of architectural coatings.
- Washability: the ease with which the dirt can be removed from a paint surface by washing; also refers to the ability of the coating to withstand washing without removal or substantial damage.