


Enduro Shield

easy clean glass treatments



Glass stays cleaner for longer
Protects against staining & etching
Protects against cement slurry

Overview & Technical Journal



WARRANTY



- Easy to clean
- Durability tested

TIME magazine ranks EnduroShield as one of 10 most compelling products that are trying to save the world

We are proud to be at the forefront of the glass coating industry, turning ordinary glass into easy-clean, non-stick surfaces which provides protection against cement slurry during construction, and reduced ongoing maintenance costs for building owners. We are increasingly being used as a standard on shower glass, interiors, vehicles, architectural glass and commercial projects.

EnduroShield® is the ideal accompaniment to your project specification and has featured on significant global projects such as the One World Trade Center in New York and the Infinity Tower in Brisbane, Australia.



At a minimal cost per sq. m/ft the treatment to the glass can be applied either by major glass fabricators, or in situ to installed glass. EnduroShield® is simple to include in your specification:

- Once-only application
- Protects glass against corrosion and etching from contaminants
- Protects glass against etching and pitting from cement slurry during construction
- Provides a real cost saving on cleaning for the client, whilst providing a noticeably cleaner surface between cleaning.

EnduroShield is backed by a 10 year warranty, independently tested and certified by TÜV Rheinland. In addition to being a partner to some of the world's largest glass processors, we also supply consumer strength DIY products to major retailers such as The Home Depot who range EnduroShield in over 2,000 stores across North America.

We have a world class team with extensive experience and look forward to developing a strong solution for your business.

The PCT Global team
Manufacturer of EnduroShield

Project 2

Overview 3-4

Technical 5-6

Certification 7-8

Specifications 9

Project 10

Project 11

Media 12

ONE WORLD TRADE CENTER (FREEDOM TOWER) NYC USA

One World Trade Center (previously known as Freedom Tower) is the primary building of the new World Trade Center complex in Lower Manhattan, New York City, New York. The 104-story super tall skyscraper stands on the northwest corner of the 16 acre (6.5 ha) World Trade Center site, occupying the location of what used to be the original World Trade Center.

On May 10, 2013, the final component of the antenna was installed atop the skyscraper, tentatively making One World Trade Center the tallest building in the Western Hemisphere and the third-tallest building in the world by pinnacle height. Commemorating the year of the United States Declaration of Independence, the antenna reaches the symbolic height of 1,776 feet.

On March 30, 2009, the Port Authority of New York and New Jersey confirmed that the building will be known by its legal name, One World Trade Center, rather than the colloquial name, Freedom Tower. The construction is part of an effort to memorialize and rebuild following the destruction of the original World Trade Center complex during the terrorist attacks of September 11, 2001.

APPLICATION

EnduroShield's easy clean surface treatment for glass was chosen to protect the exterior side of the building's 408 foot, 758 ton glass spire, which will be utilized as a world class broadcast antenna. The high end glass was supplied by a major EnduroShield partner in North America. The EnduroShield glass treatment was sprayed onto the glass panels in factory before the glass was installed into the antenna's steel frame structure. EnduroShield chemically bonds to the glass substrate, transforming the glass into a high performance, hydrophobic surface, and protecting the surface against staining and etching.

**EnduroShield sits
atop the tallest
building in the
Western Hemisphere**



ENDUROSHIELD IS LEADING THE WAY

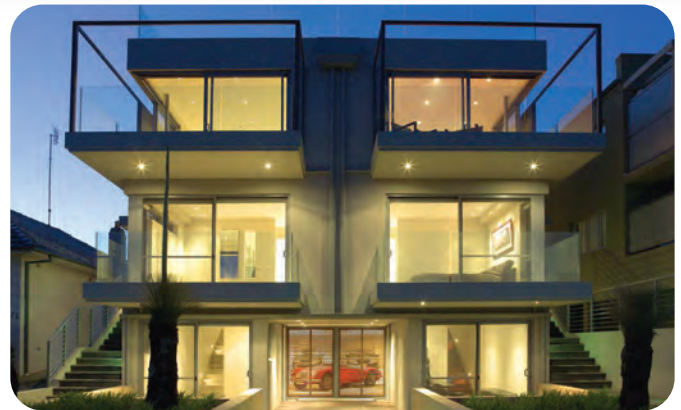
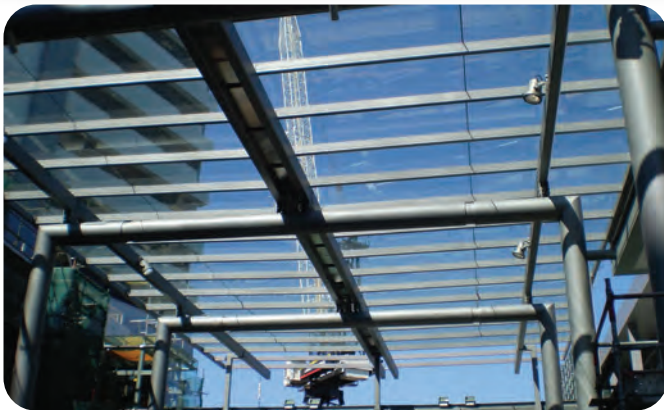
The demand for glass protective coatings will continue to grow at an exponential rate as new advances in nanotechnology are allowing for exciting product developments. As an industry innovator, EnduroShield is recognized as being at the forefront of this technology, with architects and developers specifying EnduroShield on residential and commercial projects.

APPLICATIONS

Commercial & Residential

- Insulated Glass units
- Railings and Balustrades
- Curtain Walls
- Mirrors
- Windows and Doors
- Shower Glass

EnduroShield project example:	→	Key specified application benefit:
Air traffic control tower - Panama	→	Increased visibility
International embassy - Bangkok; Thailand	→	Environmental protection and reduced maintenance
Glass labyrinth – Kansas City; USA	→	Resistance to fingerprints and reduced maintenance
Glass awnings of train station - Sydney; Australia	→	Protection and reduced maintenance costs
Glass handrails in Biodome – Montreal; Canada	→	Resistance to fingerprints
Glass spire of World Trade Center – NYC; USA	→	Protect against surface staining, and etching.
Glass facade of multiple towers - Tel Aviv; Israel	→	Glass keeps cleaner between cleans, and cost saving on building upkeep
Glass facade of multi-story residential tower - Brisbane; Australia	→	Protect against cement slurry during construction



EnduroShield solves challenges and provides benefits on diverse projects globally. It should be considered on projects that are looking to provide real solutions to the reduction of maintenance, and protection of the glass substrate.

ONCE-ONLY APPLICATION

EnduroShield is not a traditional coating that sits on the glass, but instead chemically bonds with it, becoming a permanent* extension to the surface. Unlike some competitive products, it does not require regular revitalizer products to maintain performance over the clearly stated lifetime of the product.

PROTECTS GLASS AGAINST CORROSION AND ETCHING FROM CONTAMINANTS

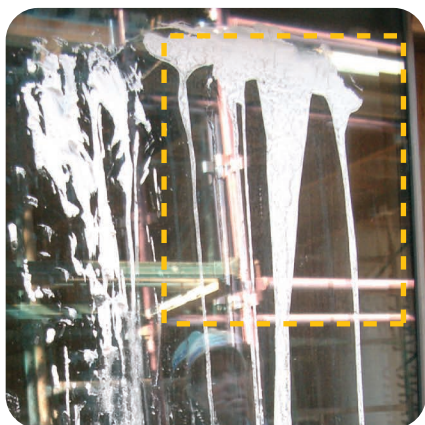
Glass is porous and as a result absorbs contaminants and pollution which causes deterioration and discoloration. The deterioration of the surface makes cleaning more frequent and much more difficult. EnduroShield seals the porosity of the glass, and protects against deterioration.

PROTECTS GLASS AGAINST ETCHING AND PITTING FROM CEMENT SLURRY

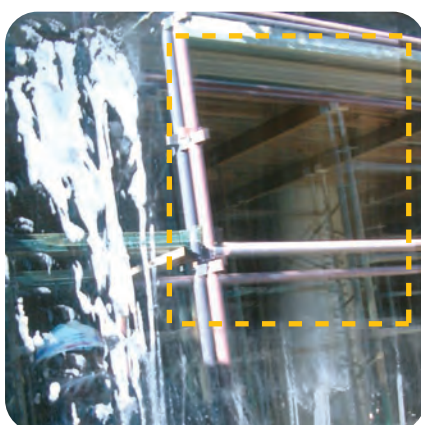
Glazing in the building industry often receives splatter and run-off from concrete and cement. If this is allowed to remain on the glass, etching and pitting can occur, necessitating the costly replacement of the glass. EnduroShield is an inexpensive and easy-to-apply treatment that protects the glass during the building process. When building is complete EnduroShield continues to provide a permanent*, invisible coating that makes the surface easier to clean and protects the glass from staining over time.

CEMENT SLURRY TESTS

Extensive on site testing with Bovis Lend Lease has proven EnduroShield® successful in protecting glass surfaces against etching from concrete and cement slurry during the building process. Testing has shown that glass panels treated with EnduroShield can be simply cleaned with a glass cleaner without the need to use razor blades. Tests were carried out where both concrete and cement slurry were poured on glass facade panels and left for extended periods. Results proved that over periods ranging from 8 days to 4 months the concrete and cement slurry were equally as easy to remove. No marks, pitting, or signs of etching were evident.



Before



After

Before: Treated with EnduroShield® and covered in cement slurry.

After: A section at the top right of the panel was easily cleaned after 4 months, showing no signs of etching.

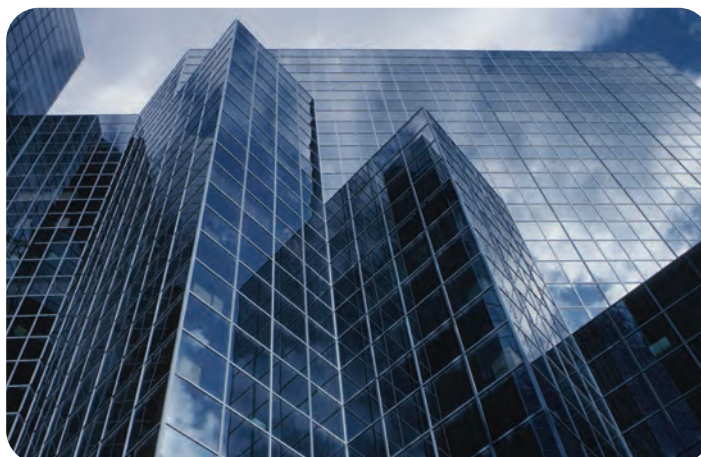
ONGOING MAINTENANCE COSTS ARE SIGNIFICANTLY REDUCED

Since EnduroShield is a permanent* non-stick coating which reduces both the frequency and time spent cleaning; maintenance costs can be significantly reduced. Glass stays visibly cleaner for longer. EnduroShield also protects the glass from staining and etching over time, eliminating the need for commercial and private properties to undertake the cost of glass restoration or replacement.

HOW TO APPLY

EnduroShield® can be applied in factory to the glass before installation or in situ by professional applicators. The product is a clear liquid that is sprayed onto the glass, creating a permanent* bond. Application comes complete with a 10 year limited warranty when applied to new glass, or a 5 year limited warranty when applied to existing glass.

**Based on 10 years of simulated normal use and certified by TÜV Rheinland*



ENDUROSHIELD TECHNOLOGY

EnduroShield® for Glass is an optically clear protective coating that chemically bonds to the surface, creating a non-stick barrier resistant to corrosion, etching, and staining. However, while cleaning is made easier and less frequent, the need to clean is not eliminated. Treated glass becomes both hydrophobic and oleophobic (water and oil repellent) protecting against most forms of dirt, minerals and grime. The molecule is highly resistant to chemical breakdown by UV light giving it long term stability. This protection thereby reduces staining and etching that often forms on exterior glass such as railings, curtain walls, facades, windows, and other areas where glass is subjected to harsh conditions. EnduroShield eliminates the need to use harsh and often toxic cleaners. In all but the hardest water areas, all that is needed to keep the surface clean is a simple wipe with a damp microfiber cloth and a mild detergent or vinegar.

For the construction industry, EnduroShield has been shown to significantly reduce the etching caused by cement render splashing on the glass. Also, the treatment protects from the concrete dust blown from nearby buildings during post construction and cleanup.

EnduroShield can be applied to most types of glass, including annealed and tempered glass. For tempered glass, the coating is applied after the tempering process. The treatment is ideal for sandblasted and acid etched glass, providing the same easy-clean and protective properties.

TECHNICAL SUMMARY

Unlike a weaker hydrogen bond used by some other products, EnduroShield forms a strong chemical (covalent) bond with the surface. Cross-linking takes place to modify the surface's properties. As it cures a network of minute brush-like filaments cover the surface. Thus, as no cohesive film is formed, no flaking or peeling can occur. Once curing is complete, the molecules of the coating are chemically inert under normal conditions. A permanent* bond is created, meaning that EnduroShield can only be removed by abrasion, strong acids or alkalis, or the removal of the top layer of glass surface. This distinguishes EnduroShield from most other products on the market that quickly wear out over time.

The EnduroShield coating bonds to the microscopic hills and valleys of the glass (Fig. 2) as opposed to filling them in like some competitive products (Fig. 1). An advantage is that the glass is less slippery and easier to handle. Furthermore - silicone, seals, clamps, and suction lifting devices are able to adhere to the surface. Competitive coatings that fill in the surface reduce the ability for adhesives to create or maintain a bond, and require taping and/or edge deletion prior to application. As EnduroShield does not require edge deletion it does not have this added labor cost to apply and remove these barriers. Figures 1 and 2 below illustrate the differences between EnduroShield and competing products.

A permanent* coating that is both water and oil repellent



Fig 1. Competitive products that fill in the hills and valleys of the glass

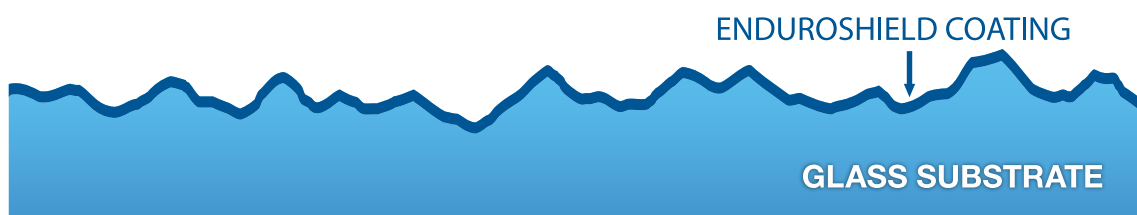


Fig 2. EnduroShield follows the hills and valleys of the glass

TESTING & CERTIFICATION

EnduroShield's performance was independently tested by one of the leading global testing and certification houses, TÜV Rheinland in Germany for durability, easy-clean functionality, safety, and quality. All testing was carried out to simulate a lifetime of 10 years on glass for both interior and exterior use, and EnduroShield passed all tests.



COMPARATIVE TESTING

Rather than only measure the coatings' ability to repel water as some competitive companies often tend to do, it was our requirement of Architectural Testing Inc. to follow our internal test method which also measures the coating's ability to repel oils (oleophobicity). The ability to repel water and oil based stains whilst maintaining durability is one of the ways that clearly sets EnduroShield apart from the competition. Our team feels it is important to highlight that all the competitive samples were applied by trained applicators in companies using the coating, or following the instructions published by the supplier.

ARCHITECTURAL TESTING INC. FACTS



- Does testing for 90 of the top 100 manufacturers in the building envelope industry with over 30 years of leadership in fenestration and building-product testing.
- Leads the industry with over 200,000 sq ft (18,600 m²) of testing facilities across the United States.
- Accredited by most national and international industry and governmental bodies responsible for our industry.
- Provides testing and analysis submittals to over 20 certification bodies, including AAMA, WDMA, CSA, NFRC, UL, VSI, IGCC, SGCC, and more.

Many easy-clean coatings available are not oleophobic, or are only moderately (and temporarily) so, and some coatings which claim to be oleophobic show low oleophobic contact angles as is the case in this test. EnduroShield differs such that as with being water repellent, it will remain oil repellent for 10 years with a single application. Because of these properties, EnduroShield repels almost all known stains and contaminants that are likely to soil, stain, or etch a glass substrate.

From our experience, oleophobic properties are extremely important for an easy-clean coating. In hard water areas, soaps react with the minerals in the water to form Calcium Stearate and Calcium Palmitate, both oily in nature. These, along with other water insoluble substances such as body fats adhere to hydrophobic-only surfaces making cleaning significantly more difficult, and can lead to etching of the glass. Reactions of this type will occur to a lesser extent in softer water areas, but still happen nonetheless. In our experience as a global supplier, we have found that coatings with poor oleophobicity fail in the field in a relatively short period of time without revitalizers.

COMPARISON OF COATING WARRANTIES

When factory applied, EnduroShield provides a true performance warranty, that it will remain water repellent with a bead angle greater than 70 degrees, which we accept as a minimum measurement for an easy to clean surface.

Some factory applied coatings claim they will last the distance, but only warrant that they will remain more water repellent than untreated glass. Untreated glass is measured at a low angle of approximately 15 degrees. These coatings therefore do not hold themselves to a minimum water repellency measurement. These coatings often require unrealistic daily cleaning tasks to be performed or revitalizer products to be purchased in order to maintain the coating and the warranty. This is why not all products and warranties are the same.

Should you require our full technical report or have any specific testing requirements, please don't hesitate to contact us.

ROBERT DREWE B App Sc

Technical Director
PCT Global Pty Ltd

**We hold ourselves to a true
10 year performance warranty**

*Based on 10 years of simulated normal use and certified by TÜV Rheinland

Zertifikat

Certificate



Zertifikat Nr. *Certificate No.*
Q 60039967

Blatt *Page*
0001

Ihr Zeichen <i>Client Reference</i>	Unser Zeichen <i>Our Reference</i>	Ausstellungsdatum	<i>Date of Issue</i> (day/mo/yr)
-------------------------------------	------------------------------------	-------------------	-------------------------------------

Genehmigungsinhaber *License Holder*
PCT Global Pty Ltd.
5/21 Bearing Road
Seven Hills 2147
Australia

Fertigungsstätte *Manufacturing Plant*
PCT Global Pty Ltd.
5/21 Bearing Road
Seven Hills 2147
Australia

Prüfzeichen *Test Mark*

Geprüft nach *Tested acc. to*
2 PFG 1921/06.11



- Property 1
- Property 2
- Property 3

Zertifiziertes Produkt (Geräteidentifikation)
Certified Product (Product Identification)

Lizenzentgelte - Einheit
License Fee - Unit

Hydrophobic Surface/Coating System

Bezeichnung/Designation: EnduroShield

7

Qualitätseigenschaften *Qn** / *Quality Aspects Qn**:

Q1: Reinigungsfreundlich/easy to clean
Q2: Haltbarkeit geprüft/Durability tested

*) n = 1 bis/to 2

Beschreibung/Description:

Beschichtungssystem zur Herstellung von hydrophoben Oberflächen auf Glas im Innen- und Außenbereich von Gebäuden.
Coating system to create hydrophobic screens on glass for Indoor and outdoor use of buildings.

Vorreiniger/Pre cleaner: EnduroClean

Beschichtung/Coating: EnduroShield

7

Dem Zertifikat liegt unsere Prüf- und Zertifizierungsordnung zugrunde.
Das Produkt entspricht den o.g. Anforderungen, die Herstellung wird überwacht.
This certificate is based on our Testing and Certification Regulation. The product fulfills above mentioned requirements, the production is subject to surveillance.

Zertifizierungsstelle



TÜV Rheinland LGA Products GmbH, Tillystraße 2, 90431 Nürnberg
Tel.: +49 221 806-1371 e-mail: cert-validity@de.tuv.com
Fax: +49 221 806-3935 http://www.tuv.com/safety

Dipl.-Ing. S. Scheuer

ID No. 000033462: PCT Global Pty Ltd.

Hydrophobic Surface/Coating System, EnduroShield



- Easy to clean
- Durability tested



Certified by the prestigious TÜV Rheinland, Germany for a simulated lifetime of 10 years
 PCT Global Pty Ltd

EnduroShield for Glass is a permanent protective coating system to create hydrophobic screens on glass for indoor and outdoor use of buildings. The durability test was carried out to simulate a lifetime of 10 Years on interior and exterior use. Application was carried out using both the hand spray and wipe methods, as well as application with an atomised spray gun. The following tests were carried out on the coating:

- UV resistance
- Chemical resistance
- Temperature shock resistance
- Mechanical resistance
- Adhesive properties.

There was no difference in the results between the two application methods. EnduroShield has no requirements of "revitaliser, aftercare or top-up" products to be applied for sustained performance. The certification process included verification of all safety data sheets and product labeling requirements according to TÜV Rheinland standard 2 PfG 1921/06.11.

Certificates issued by TÜV Rheinland Group:

Certificate Type	Certificate Number	Model Designation
Quality Approved	60039967	EnduroShield

Further Information

- All certificates / IDs of PCT Global Pty Ltd.

Copyright ©2011 TÜV Rheinland. All rights reserved.
 Any utilization of this material - including the duplication on thereof - requires prior consent.

THE SMART CHOICE

10 YEAR WARRANTY

The EnduroShield Project Warranty system installs confidence for glass providers, contractors, and end customers with a simple and transparent approach to registering their EnduroShield 10 year warranty. The warranty process captures data such as the customer's name, address, date of installation, contractor, and customized warranty code. This data is maintained in a database, allowing for quick and accurate access to all necessary information in the event of a customer call.



LEED

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ is a third-party certification program which does not rate products, rather is used to rate green building projects.



As part of our commitment to green projects, EnduroShield is a proud member of the US Green Building Council (USGBC), the developer of the ratings systems, reinforcing the environmental benefits that a project can attain when EnduroShield® is specified.

Individual products like EnduroShield® can, however, contribute points to LEED® projects. EnduroShield reduces the need for glass replacement, and the need for harsh cleaning or restoration chemicals is negated. Cleaning frequency and time is also reduced, resulting in improved water efficiency.

Using EnduroShield as part of a LEED registered project can help the project team to realise several points in categories of Water Efficiency, Indoor Environment and Innovation.

GREEN

In a fragile world, with the difficulties we all share, every little change we bring about does make a difference. As a revolutionary, permanent* non-stick coating, EnduroShield reduces the need for glass replacement. In addition the need for harsh cleaning or restoration chemicals is negated and because cleaning frequency and time is reduced, a water usage saving can be achieved.

HOW TO SPECIFY

To make it easy to specify EnduroShield® for your next project, a two page specification on each product is available to download at: www.enduroshield.com/specifications



It's Easy To Be Green
With EnduroShield

EnduroShield® eliminates the need for harsh chemical cleaners and diminishes the water used in frequent cleaning.

INFINITY TOWER BRISBANE AUSTRALIA

The Infinity Tower is a 262 meter high-rise building situated in the heart of Brisbane's CBD in Queensland, Australia. Infinity is the latest creation by Karimbla Constructions (a division of Meriton Apartments). Completed in 2014, the uniquely designed tower contains 81 levels of commercial and serviced residential apartments. It is the tallest tower in Brisbane, and the third tallest skyscraper in Australia.

EnduroShield was chosen to protect the 20,800m² (223,890ft²) of glass facade utilized in the tower's distinctive architectural design. EnduroShield Protective Coating for Glass shields against staining and etching from exposure to cement slurry, dirt, and grime during the construction process. Having experienced the costly and problematic need for glass replacement on previous job sites, the developer required a reliable solution for this project.

APPLICATION

A number of options had been investigated, and EnduroShield was chosen above all due to the company's high level of technical knowledge, experience and training.

The application of EnduroShield was completed in the glass curtain wall factory. The factory received training, consultation and implementation of a quality assurance procedure. And having been certified, is now authorised to provide the EnduroShield 10 Year Warranty.

After construction was completed, the EnduroShield treated glass was easily cleaned, significantly reducing the risk of scratching, which often occurs when cleaning contractors try to remove stubborn concrete and debris from untreated glass with razor blades and abrasive cleaners.

**Applied to 20,800m²
(223,890ft²) of glass
on Australia's third
tallest skyscraper**



Project

We used EnduroShield Professional coating on the Infinity Tower in Brisbane as our client wanted protection during the building process and long term easy clean benefits after construction. The coating came into its own 20 stories up when there was a concrete spill which went over a large part of the façade. It was 2 days before the cleaning contractor could get to it and they commented on how easy the concrete was to remove. Best of all, it hadn't etched the glass, eliminating the need for any costly replacement.

Steve Harrity, Project Manager
Micos Group, Australia



PACIFIC GUARDIAN CENTER HAWAII, USA

Project

Located in Honolulu's Central Business District the PACIFIC GUARDIAN CENTER (PGC) is a distinctive landmark building with over 630,000 sq ft of quality office and retail space.

Management were faced with two major problems in relation to the maintenance of the glass façade at the PGC, due to the close proximity to the air conditioning cooling tower.

-The first being that the glass was suffering from over 20 years of heavy staining as a result of the run off from the air conditioning onto the glass.

-The second was the ongoing protection of the glass to reduce maintenance time and costs.

SOLUTION

World Wide Windows who are the largest window washing company in Hawaii and a firm that has been featured on Discovery Channels "Dirty Jobs" were selected by the PGC management to complete the restoration and protection of the glass.

After extensive in field testing of over a dozen protective coatings available, the management of PGC selected the EnduroShield glass coating to help protect the restored glass against future staining and to reduce the ongoing time and maintenance costs.

EnduroShield was the only coating that passed the in field testing and provided the superior protection that the management at PGC were looking for. World Wide Windows partnered with Nano Tek-On have applied EnduroShield to over 30,000 sq ft at the PGC glass towers.

"We tested all the options from the major coating companies, however nothing worked and they all failed in a matter of weeks. We then learned of EnduroShield through their new applicator in Honolulu Nano Tek-On. It was field tested on the section exposed to the heaviest contamination, and it worked. This was an incredibly harsh environment and the EnduroShield not only worked, but was the only option strong enough to last more than a couple of weeks!"

Dino Pertzoff

Principal

World Wide Windows.

THE RESULT

EnduroShield is the smart choice for exterior glass surfaces providing an ultra-thin, transparent coating, that completely adheres to the glass surface. It provides a protection that repels both water and oil based stains. EnduroShield requires only a single application and comes complete with a 10-year limited warranty. Unlike some competitive products available on the market, EnduroShield does not require any "revitalizer" products, nor any special maintenance to be used to maintain the warranty. EnduroShield has been independently tested and certified by TUV Rheinland, Germany for durability to simulate a lifetime of 10 years on interior and exterior use



I love the coating, I can see it working, I can go out and run my hand on the glass and feel the difference, best of all it saves us money and I don't have to look at terribly dirty glass anymore

Michael Dowell, Manager
Pacific Guardian Center



MEDIA BUZZ

Growing international brand awareness creating customer demand



TIME Magazine Ranks EnduroShield in TOP 10 most compelling smartest gadgets trying to save the world.
July 7 2014 Edition

Media

Cuts Cleaning Time
new

untreated glass vs treated glass

repels soap scum & grime

fingerprints & grime wipe off stainless steel appliances with ease

EnduroShield Home

Apply EnduroShield once and clean less!
Just one application of EnduroShield makes surfaces easy to clean and lasts beyond 3 years.

enduroshieldusa.com

Oprah Magazine Included EnduroShield as 'FIRST WOW Collection Product'



USA TV Advertising
'EnduroShield gives me the time to do the things I want to do.'



Popular Mechanics Magazine EnduroShield in '57 Life-changing upgrades for every room in your home'

Enduro Shield



ASIA PACIFIC

PCT Global Pty Ltd
5/21 Bearing Road
Seven Hills NSW 2147
Australia
sales@enduroshield.com
Tel: +61 2 9674 9299

Zhuhai EnduroShield
Hi-Tech Material Co., Ltd
06-1206/1009 Jiuzhou Ave. Xiangzhou,
Zhuhai, Guangdong
P.R. of China
saleschina@enduroshield.com
Tel: +86 400 842 9152

AMERICAS

PCT Global LLC
110 El Paseo
Santa Barbara CA 93101
USA
salesusa@enduroshield.com
Tel: +1 805 617 4609

EUROPE

EnduroShield Europe B.V.
Kuiperbergweg 29
1101 AE Amsterdam
The Netherlands
saleseurope@enduroshield.com
Tel: +31 208 081 445

DISTRIBUTORS

EnduroShield has Distributors in over 25 countries. For a complete list, please visit our website www.enduroshield.com



It's Easy To Be Green
With EnduroShield

EnduroShield® eliminates the need for harsh chemical cleaners and diminishes the water used in frequent cleaning.



ISO 9001:2008
Quality System