Nu-Calgon

INTRODUCING

# COOL WORX™

## Energy Savings & Corrosion Protection

### For HVAC/R Systems

GLOBAL APPLICATIONS

Powered by GMG® GRAPHENE

SINGAPORE GREEN BUILDING PRODUCT SGBC GOOD

DATA CENTER WORLD INNOVATION challenge WINNER

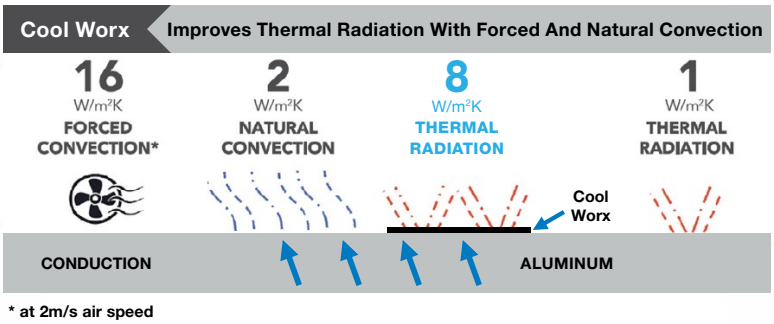
PATENT PENDING

# COOL WORX™

Cool Worx is a transformative graphene-powered coating for HVAC/R and process cooling coils. Cool Worx, a patent-pending coating, uniquely expedites heat transfer plus provides superior corrosion resistance to the coil. Benefits include:

- Superior Heat Transfer
- Energy Savings
- Corrosion Protection
- Extended Equipment Life
- Improved System Performance
- Lower Peak Demand

## HOW DOES IT WORK?

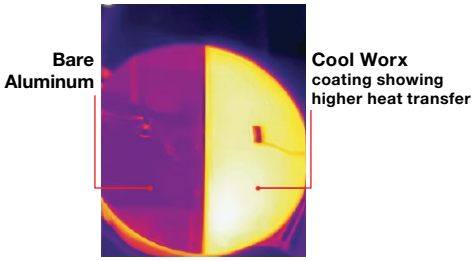


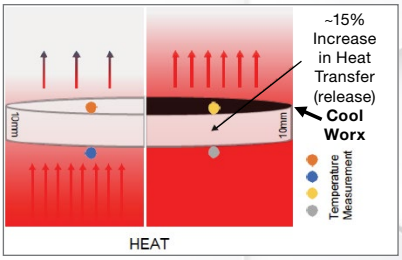

* at 2m/s air speed

## UNIVERSITY VERIFIED

Kiln Test Rig

Kiln with Aluminum Plates



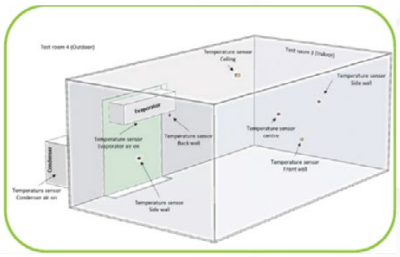

*Verified by The University of Queensland (Aluminum Top Side only)*

## SPECIFICATIONS

| | | | |
|---|---|---|---|
| Salt Spray, ASTM B117 | 30,000 Hours | Volume, Solids | 25% +2% Vol/Wt |
| Salt Spray- Acidic, ASTM G85 A1 | 3000+ Hours, No Blisters, Flaking Or Loss Of Adhesion | Touch Dry | 1 Hour at 77°F |
| Salt/So2 Testing, ASTM G85-09, Annex 4 | 720 Hours, No Corrosion Or Defects | Color | Black |
| Water Immersion, ASTM 870 | No Blisters, Flaking, Cracks, Rust Or Softening Of Coating | Gloss Level | Matte To Semi-Gloss Based On Curing Conditions |
| Uv Resistance, ASTM D4587 | 1000 Hours, No Fading, Blistering, Flaking Or Loss Of Adhesion | Emissivity | 0.95 (Out Of 1.0) |
| Adhesion (Cross Hatch) ASTM D3359-88 53151 | Level European 5b, B-A | Typical Thickness | Dry Film Thickness: 8-20 Microns |
| Flexibility, ASTM D522 | No Cracking, Flaking Or Loss Of Adhesion | Coverage | 20 Sq. Ft Of Coil Surface (Triple Light Coat Method) |
| Antifungal, ASTM G21 | After 28 Days Growth Is Greatly Reduced – Score Two | Application Temperature | 45°F To 100°F |
| Maximum Operating Range | 300°F (Continuous) 570°F (Brief Period Max) | Application Method | Field: Spray Applicator OEM: Spray Applicator Or Dip Formulation |
| Ph Of Cool Worx | 8-10 | Storage | Cool, Dry Place – Prevent From Freezing |
| Ph Tolerance Of Cool Worx Coating | 1-12 | Storage Life | Five Years (Unopened Packaging) One Year (Open Packaging) |
| Viscosity | 50-80 Secs (Zhan Type Cup #2) | Warranty | Five-Year Limited Warranty |

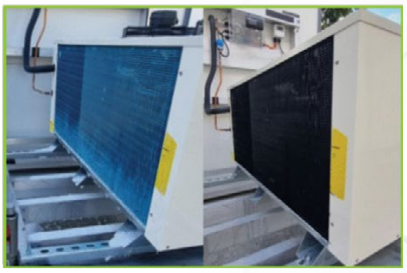
# INDEPENDENTLY TESTED IN GLOBAL LABS

- **NEW Condenser Coil**
- ISO-Approved Facilities By SuperTest.
- Equipment: 4.3kw (1.2 Ton) Refrigeration Unit



**Cool Worx Achieved The Following Outcomes:**

| Pull Down Test (High to Low Temp Test) Energy Reduction | Low Temp Test (Maintain Low Temp Test) Energy Reduction |
|---|---|
| 15.9% ▼ | 4.7% ▼ |



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## *Confidential Major Transportation Company*

- New Aluminum/Copper radiator
- 6.5% gain in efficiency
- Similar gains verified with second major transportation company

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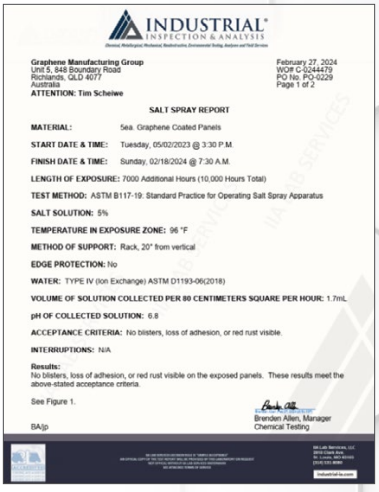
## *Independent Corrosion Testing Results*

- Salt Spray Test, ASTM B117: Exceeds 20,000 hours
- Acidic Salt Spray Test, ASTM G85-A1: Passed 3000 hours
- Cyclic SO2 Salt Spray, ASTM G85-09: Passed 720 hours



INDUSTRIAL INSPECTION & ANALYSIS

Graphene Manufacturing Group
Unit 5, 848 Boundary Road
Richlands, QLD 4077
Australia
ATTENTION: Tim Scheiwe

February 27, 2024
WO# C-0244479
PO No. PO-0229
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SALT SPRAY REPORT

MATERIAL: 5ea. Graphene Coated Panels
START DATE & TIME: Tuesday, 05/02/2023 @ 3:30 P.M.
FINISH DATE & TIME: Sunday, 02/18/2024 @ 7:30 A.M.
LENGTH OF EXPOSURE: 7000 Additional Hours (10,000 Hours Total)
TEST METHOD: ASTM B117-19: Standard Practice for Operating Salt Spray Apparatus
SALT SOLUTION: 5%
TEMPERATURE IN EXPOSURE ZONE: 96 °F
METHOD OF SUPPORT: Rack, 20° from vertical
EDGE PROTECTION: No
WATER: TYPE IV (Ion Exchange) ASTM D1193-06(2018)
VOLUME OF SOLUTION COLLECTED PER 80 CENTIMETERS SQUARE PER HOUR: 1.7mL
pH OF COLLECTED SOLUTION: 6.8
ACCEPTANCE CRITERIA: No blisters, loss of adhesion, or red rust visible.
INTERRUPTIONS: N/A

Results:
No blisters, loss of adhesion, or red rust visible on the exposed panels. These results meet the above-stated acceptance criteria.

See Figure 1.

Brenden Allen, Manager
Chemical Testing

BA/jp

# GLOBAL APPLICATIONS

## CONDENSER COILS

| APPLICATION | LOCATION | EQUIPMENT | ENERGY SAVING |
|---|---|---|---|
| Hospital | Singapore | Daikin Chiller | 24.3% |
| Data Centre | Singapore | CRAU (18 units) | 15.4% |
| Warehouse | Singapore | Daikin RUR10YN1 | 14% |
| Food Manufacturing | Singapore | Daikin Chillers HE 402C | 11.6% |
| Fitness Club | Australia | 85kW AC Unit | 22% |
| Bank Branch | Singapore | Daikin VRV | 10-20% |
| Fast Food Restaurant Chain | Australia | 50 kW AC Unit | 5.4-19% |
| High School Gymnasium | Texas, USA | 30-ton AAON Rooftop AC | 36.7% |
| Industrial Manufacturing | Romania | TRANE Air-Cooled Chiller | 18% |

## EVAPORATOR COILS

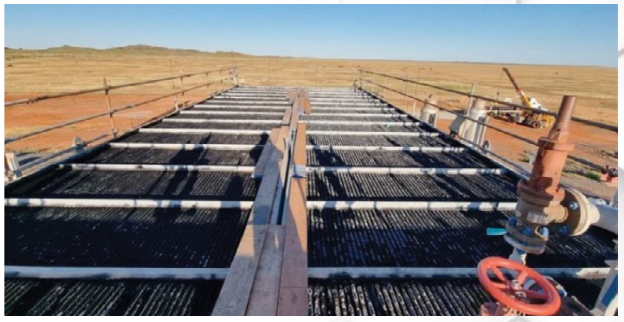
***Changi Airport, Singapore***

- Large, Commercial Air Handling Unit; Evaporator Coil
- 10.6% Improvement Temperature Drop Across Cooling Coil
- 6.6% Decrease In Pressure Drop Across Coil

## PROCESS COOLING

***Australian LNG Production Facility***

- Ammonia Pre-Cooler
- Production Capacity Bottleneck On High Ambient Days
- 16.6% Performance Improvement Eliminating Bottleneck



**www.coolworxhvacr.com**

Nu-Calgon

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