TECHNICAL NOTE

Gerard Roof Paint Testing Protocol

This document presents the Gerard Roof Paint Testing Protocol, a framework designed to uphold the highest global standards for our products. Backed by over 60 years of expertise in delivering premium paint to New Zealanders and an international clientele, this protocol underscores our commitment to excellence. Our rigorous testing ensures that Gerard Roof Paint remains at the forefront of industry innovation, delivering performance and durability on steel and concrete roofs.

At Gerard, we test our paint under all environmental conditions it may face, alongside evaluating its physical properties to ensure performance. Our testing involves state-of-the-art environmental simulations that align with global standards for paint quality and adhesion.[1] Additionally, Gerard conducts comprehensive assessments of physical properties aligning with international adhesion standards (ISO 19402[2]) to ensure durability, aesthetics, and long-term reliability.

1. Environmental simulators

Gerard uses industry leading equipment from Q-lab to accurately simulate environmental conditions and ensure the performance of our paints.

1.1 Corrosion Testing

1.1.1 Q-FOG

The Q-FOG simulates real-world corrosive environments, enabling Gerard to evaluate corrosion resistance of its paints and tiles. This includes assessing whether the paint enhances or diminishes the corrosion resistance any title to which it's applied.

Figure 1: Q-FOG in Gerard Laboratory

The Q-FOG chamber allows for seamless cycling through a variety of corrosive conditions, including high humidity, salt spray, and shower testing. By cycling through these conditions, Q-FOG

[1] The international standards include General Motors Worldwide Standards (GMW), SAE International (SAE), the American Society for Testing and Materials (ASTM), and the International Organization for Standardization (ISO).
[2] International Organization for Standardization [ISO]. (2018). *Paints and varnishes — Adhesion of coatings.* https://www.iso.org/standard/64807.html

replicates the dynamic changes found in real-world environments. Furthermore, the Q-FOG allows for testing under both typical and extreme conditions, ensuring the paint's performance in the most challenging scenarios.

This model complies with major corrosion test standards, including GMW 14872, SAE J2334.

1.2 Paint Degradation Testing

1.2.1 Q-SUN

Figure 2: Q-SUN in Gerard Laboratory

The Q-SUN chamber utilises a xenon arc lamp to simulate the full spectrum of sunlight, making it ideal for replicating real-world light conditions. This testing method is best suited for evaluating paint colour degradation, such as fading and pigment discoloration.

Complying with ISO 4892-3[3], the Q-SUN ensures high-quality, repeatable testing standards.

Additionally, the Q-SUN chamber features precise humidity control. This feature helps identify potential issues such as colour shifting and adhesion loss under high-humidity conditions.

By integrating the Q-SUN into our testing regimen, Gerard ensures its paints resist colour fading, gloss loss, cracking, and bubbling, guaranteeing long-term performance and aesthetic appeal.

1.2.2 Q-UV

The Q-UV tester excels at simulating short-wave UV exposure. Analysing short-wave UV is important as it's particularly aggressive and is often responsible for polymer degradation. This degradation leads to issues such as gloss loss, yellowing, cracking, crazing, and embrittlement.

In addition to its strength in UV simulation, the Q-UV provides a more aggressive and realistic simulation of outdoor moisture exposure compared to other water spray systems. This makes it particularly effective at testing for blistering and other moisture-related damage in paints.

[3] https://www.iso.org/standard/83802.html

By using the Q-UV tester, Gerard can evaluate its paints for resistance to gloss loss, cracking, bubbling, and other forms of physical degradation. The tests adhere to ASTM G154[4] and ISO 4892-2[5] standards, ensuring results are of the highest quality and reliability.

1.2.3 The Advantage of Combining Q-UV and Q-SUN Testing

As Gerard uses both Q-UV and Q-SUN, we can evaluate all modes of polymer degradation. The QUV Accelerated Weathering Tester is used for physical property degradation, while the Q-SUN Xenon Test Chamber focuses on colour degradation. This approach allows Gerard to optimise both the durability and visual performance of its paints, ensuring superior protection and aesthetics across all applications.

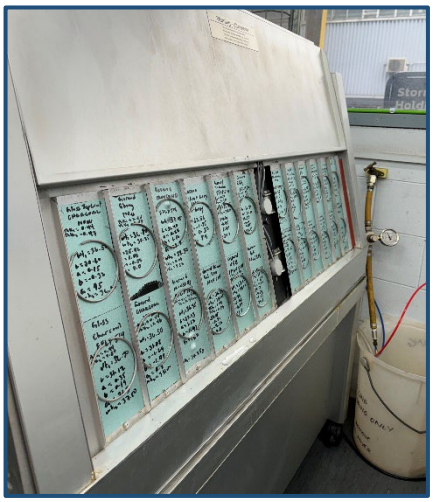

Figure 3: Q-UV in Gerard Laboratory

2 Physical Property Testing

Beyond environmental simulations, we assess the key physical properties of our paint to ensure long-lasting performance. Specifically, we evaluate adhesion, resistance to cracking, and the fluid properties over time.

The physical property tests are designed to represent both typical and extreme abrasion and tension conditions that a roof may endure. By ensuring all Gerard paints pass these rigorous tests, we know our products can withstand the wear and damage experienced by roofs.

To prepare our paint for testing, we apply the selected paint to a small section of Zincalume®. The following outlines the testing protocols used to evaluate its performance.

2.1 Adhesive Strength Testing with Surface Scratches

The purpose of the scraping tests is to evaluate the strength of the paint's adhesion to the substrate under abrasive conditions. See the two tests below:

[4] https://www.astm.org/g0154-23.html
[5] https://www.iso.org/standard/55481.html

2.1.1 Load Scrape Testing: The load scrape test is an internally developed procedure that enables Gerard to engineer paint with industry-leading adhesive properties. The paint is scraped in one direction under progressively increasing loads. Gerard paint is specifically formulated to minimise the amount of paint removed under these conditions, outperforming alternative paints in adhesion strength.

Figure 4: Gerard Chemist Performing a Scrape Test

2.1.2 Cross-Hatch Testing: The cross-hatch test is an international standard for evaluating the adhesion of coatings after scratching, as outlined in ISO 19402. In this test, a grid of closely spaced cuts (cross-hatch pattern) is made on the paint surface. Adhesion is assessed by applying tape over the cross-hatched area and then removing it. To pass the test, no more than one small paint particle may detach. Gerard paint is specifically designed to resist peeling under this evaluation, and all Gerard products meet the requirements of the cross-hatch test. This ensures that the paint's adhesive properties remain intact even after agitation.

2.2 Adhesive Strength Testing Under Mechanical Deformation

The mechanical deformation tests ensure that Gerard paint retains its adhesive strength and visual appeal (no cracks) under tensile forces. These tests are conducted in accordance with internationally recognised standards set by the International Organization for Standardization (ISO) for paint adhesion testing.

2.2.1 Reverse Impact Test: A convex dent is created by striking the back of the Zincalume® sheet with controlled force. Tape is then applied to the dented area and removed to test adhesion.

2.2.2 180° Bend Test: The sample is bent a full 180 degrees to simulate extreme mechanical stress. Again, tape is applied and removed from the stressed area.

Gerard paint remains adhered to the substrate and shows no signs of cracking under both testing conditions. Furthermore, all Gerard paint meets the adhesion strength standard (no more than one particle may detach) required by both tests. These results clearly indicate that Gerard paint is capable of withstanding high mechanical forces while maintaining its visual appeal and adhesion.

2.3 Thixotropic Testing

The test for the thixotropic properties of our paint is detailed below:

2.3.1 Sagging Test: A painted sample is positioned vertically, and shear forces are applied to evaluate the paint's resistance to sagging or uneven distribution. This test ensures the paint maintains its integrity and consistency under gravity and stress over time.

3 Chemical Properties

3.1 pH test

Gerard conducts pH testing to ensure the paint remains chemically stable and does not react with the substrate or environment.