



High Performance Bio-based Functional Coatings for Wood and Decorative Applications

Introduction to Wall & Trim Paint Testing

Webinar 3

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Introduction to Paint Testing

Agenda

- **Wall Paints Testing**

- ✓ EN 13300 Standards Overview
- ✓ Key Tests: Wet Scrub Resistance, Contrast Ratio (Hiding Power), Gloss Levels, Grain Size



- **Trim Paints Testing**

- ✓ ISO Standards Overview
- ✓ Key Tests: Weathering, Water Permeability, Adhesion, Hardness, Chemical Resistance



EN 13300 Standards Overview for Interior Wall Paints

The EN 13300 standard classifies interior wall paints based on several performance criteria within the European market:

- 1. Wet Scrub Resistance:** This measures the paint's durability against cleaning and scrubbing
- 2. Contrast Ratio (Hiding Power):** Evaluates the opacity and coverage quality of paint
- 3. Gloss Level:** Assesses the paint's sheen from various viewing angles
- 4. Grain Size:** Indicates the paint's texture

Wet Scrub Resistance (ISO 11998)

Objective: Evaluate paint durability against wet scrubbing and cleanability.

Testing Process:

- 1. Application:** Uniform application on a test panel.
- 2. Drying:** Panel dried under controlled conditions.
- 3. Scrubbing:** Subjected to 200 wet-scrub cycles.
- 4. Evaluation:** Assess changes in weight and appearance for scrub resistance and cleanability.

Importance:

- Ensures paint durability against regular cleaning.
- Helps consumers in choosing robust, maintenance-friendly paints.

Classification of Results:

Class 1: <5 μm loss (Highest resistance) **Class 2:** $\geq 5 \mu\text{m}$ to <20 μm loss **Class 3:** $\geq 20 \mu\text{m}$ to <70 μm loss

Class 4: <70 μm loss at 40 scrubs **Class 5:** $\geq 70 \mu\text{m}$ loss at 40 scrubs (Lowest resistance)



Contrast Ratio (Hiding Power) (ISO 6504-3)

Objective: Evaluate the opacity of paint coatings using Contrast Ratio measurements to ensure comprehensive coverage.

Testing Procedure:

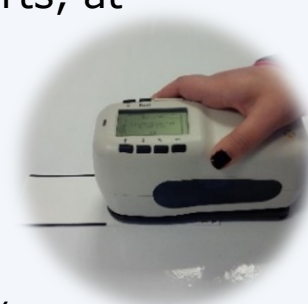
- **Application:** Apply paints to achieve a wet film thickness of 100 microns on black-and-white charts, at least 70mm wide.
- **Curing:** Cure films at $(23\pm 2)^{\circ}\text{C}$ and $(50\pm 5)\%$ humidity for 16 hours.
- **Measurement:** After 7 days, use a spectrophotometer to measure the Contrast Ratio.

Classification of Results:

- **Class 1:** Contrast Ratio $\geq 99.5\%$ (Excellent coverage); **Class 2:** Contrast Ratio $\geq 98\%$ and $< 99.5\%$
- **Class 3:** Contrast Ratio $\geq 95\%$ and $< 98\%$; **Class 4:** Contrast Ratio $< 95\%$ (Lowest coverage)

Importance:

- Assesses and confirms paint quality regarding coverage, critical for aesthetic and functional purposes.
- Helps refine formulations based on precise opacity requirements.



Gloss (ISO 2813)

Objective: To assess the gloss level of coatings on glass substrates, ensuring compliance with EN ISO 2813 standards.

Testing Procedure:

- **Application:** Apply a 75-micron thick wet film on a glass panel, ensuring uniform thickness for consistent gloss measurement.
- **Curing:** Allow the coating to cure in controlled climatic conditions for 16 hours to achieve optimal hardness and reflectivity.
- **Measurement:** Perform three gloss readings using a glossmeter to capture consistent data across the surface.

Classification of Results:

- **High Gloss:** 70-85 GU (Gloss Units) at 60°
 - **Semi-Gloss:** 35-70 GU at 60°
 - **Low Gloss (Matte):** 10-35 GU at 60°
 - **Very Low Gloss:** Below 10 GU at 60°
- **Importance of Test:**
- Ensures coatings meet required aesthetic and performance standards for gloss.
 - Critical for applications where visual appearance and durability are important.



Largest Grain Size (EN 13300)

Objective: Classify material grain sizes according to established international standards.

Grain Size Categories:

- **Fine:** Up to 100 μm (EN 21524)
- **Medium:** Up to 300 μm (ISO 787-7 / EN ISO 787-18)
- **Coarse:** Up to 1500 μm (ISO 787-7 / EN ISO 787-18)
- **Very Coarse:** Above 1500 μm (ISO 787-7 / EN ISO 787-18)

Testing Procedure:

- **Sample Preparation:** Ensure representative sampling from the material batch.
- **Measurement Technique:** Use microscopy or sieving, as appropriate for the grain size range.
- **Analysis:** Apply the relevant standard to determine the classification of each grain size.

Importance of Classification:

- Provides essential data for evaluating material properties and suitability for specific applications.
- Influences manufacturing decisions, quality control, and research development.

ISO Standards Overview for Trim Paints

Focuses on the performance of interior/exterior wood coatings to ensure durability against environmental challenges.

- 1. Artificial Weathering Test - EN 927-6:** Examines the effects of artificial weathering on exterior wood coatings, including exposure to UV light and moisture.
- 2. Water Permeability Test - EN 927-5:** Assesses how well a coating resists water penetration, essential for protecting exterior wood surfaces.
- 3. Cross Cut Adhesion Test - ISO 2409:** Measures the adhesion of paint coatings on various substrates, evaluating the strength of bond between the paint and its underlying surface.
- 4. Pendulum Damping Hardness Test - ISO 1522:** Evaluates the hardness of paint surfaces using a pendulum damping method, determining the durability of the paint film.
- 5. Resistance to Liquids Test - ISO 2812:** Determines a coating's resistance to various liquids to assess potential damage or degradation from spills and splashes.
- 6. Chemical Resistance Test - DIN 68861:** Assesses the resistance of furniture surface coatings to chemical attacks, vital for maintaining surface integrity under potentially harsh environmental conditions.

Artificial Weathering Test (EN 927-6)

Objective: To examine the effects of artificial weathering on exterior wood coatings, including exposure to UV light and moisture.

Key Points:

- **Purpose:** Assess the durability of exterior wood coatings under simulated weather conditions.
- **Testing Parameters:** Exposure to UV light and moisture to replicate outdoor environmental conditions.
- **Significance:** Provides insight into the coating's ability to withstand weathering, ensuring long-term protection and aesthetic appeal.
- **Importance:** Crucial for determining the suitability of coatings for outdoor applications, such as wooden facades, decks, and furniture.
- **Standard Reference:** EN 927-6 specifies the testing procedure and acceptance criteria for evaluating the performance of exterior wood coatings.
- **Benefits:**

Helps manufacturers develop coatings that can withstand outdoor exposure for extended periods.

Guides consumers in selecting durable coatings for their exterior wood surfaces.

Facilitates compliance with regulatory requirements and quality standards in the coatings industry.



Water Permeability Test (EN 927-5)

Objective: To evaluate the water resistance of exterior wood coatings.

Key Points:

- **Purpose:** Assess the coating's ability to repel water, crucial for outdoor durability.
- **Testing:** Follow EN 927-5 standards, immersing coated wood samples in water.
- **Significance:** Determines coating's effectiveness against moisture, impacting durability.
- **Importance:** Ensures suitability for outdoor use, protecting wood surfaces.

Procedure:

- **Material:** Use 15 x 7 x 2 cm spruce wood, apply two coats evenly, seal with 2K epoxy.
- **Conditioning:** Dry for 7-14 days, stabilize moisture content.
- **Test:** Immerse in water for 72 hours, measure water uptake in g/m².

EN 927-5 water permeability testing is crucial for assessing exterior wood coating's moisture resistance, ensuring durability and protection for outdoor applications.



Cross Cut Adhesion Test (ISO 2409)

Objective: To assess the adhesion quality of paint coatings on various substrates.

Key Points:

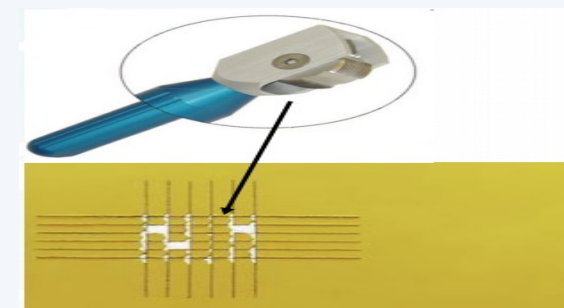
- **Purpose:** Determines the bond strength between paint and its substrate, crucial for coating durability.
- **Testing:** Follows ISO 2409 standards, using a cross-cut method to create a pattern on the painted surface.
- **Significance:** Evaluates how well the paint adheres under stress, influencing both aesthetic and functional longevity.
- **Importance:** Critical for ensuring that paint applications meet durability and performance standards.

Procedure:

- **Material Preparation:** Apply paint uniformly on substrates like wood, metal, or plastic.
- **Conditioning:** Allow paint to dry thoroughly before testing.
- **Test Execution:** Perform the cross-cut, apply tape over the pattern, remove it, and evaluate the adhesion based on how much paint remains.

Evaluation:

- The adhesion is rated on a scale from **0 (no paint removed)** to **5 (over 65% paint removed)**, providing a clear measure of the coating's adhesion quality.



Pendulum Damping Hardness Test (ISO 1522)

Objective: Evaluate the hardness of coatings using pendulum damping.

Key Points:

- **Purpose:** Measures mechanical hardness of paint and varnish.
- **Testing Method:** Employs König and Persoz pendulums under ISO 1522 standards.
- **König Pendulum:** Shorter, for harder, less elastic coatings.
- **Persoz Pendulum:** Longer, for softer, more elastic coatings.
- **Significance:** Indicates coating's wear resistance and durability.

Procedure:

- **Preparation:** Apply and cure coating on a flat substrate.
- **Execution:** Set the pendulum in motion; record the damping time.

Evaluation:

- Hardness inferred from the time (seconds) taken for oscillations to dampen. Longer damping times indicate higher hardness.



Resistance to Liquids Test (ISO 2812)

Objective: To check how well different coatings resist liquids.

Key Points

- **Liquids Tested:** Water, solvents like ethanol, oils, and thicker substances like gels.
- **Testing Steps**
 - 1.Application:** Paint coatings are applied and left to dry.
 - 2.Exposure:** Coatings are then exposed to the chosen liquids.
 - 3.Evaluation:** Look for changes such as fading, staining, or damage.

Importance

- **Quality Check:** Confirms coatings can handle common liquids.
- **Compliance:** Ensures products meet international quality standards.

Benefits

- **Better Products:** Helps manufacturers improve durability.
- **Consistent Quality:** Ensures coatings work well when exposed to liquids.



Chemical Resistance Tests for Coatings (DIN 68861)

Objective: To evaluate how paint and varnish coatings on furniture react to chemical exposure.

Key Points

- **Scope of Standard:** Expands beyond DIN EN 12720 to include everyday items like tea, coffee, red wine, mustard, hand cream, chocolate sauce, ketchup, alcohol, and ammonia.
- **Testing Agents:** Incorporates both household chemicals and common substances found in home.
- **Testing Procedure**
 1. **Application of Substances:** Different chemicals are applied to the coated surfaces of the furniture.
 2. **Exposure Time:** Duration varies with each chemical, from a few minutes to several hours.
 3. **Evaluation of Results:** Classified from 0 (no visible changes) to 5 (significant alteration or destruction of the surface).

Importance of the Standard

- **Quality Assurance:** Guarantees coating resilience against chemicals.
- **Consistency:** Standardizes evaluations for various coatings.

Benefits

- **Product Reliability:** Confirms coating durability under chemical stress.
- **Industry Support:** Establishes clear standards for manufacturers and consumers.



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Thank you for your attention !

