Surface Solutions Consulting

Performance Standards
Epoxy & Resinous Flooring Systems

Commercial Flooring Performance & Specification Reference

Version 1.0

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This document is intended to provide performance guidance and specification support based on field experience and industry standards. Final system selection and design decisions remain the responsibility of the design team and project stakeholders.

Executive Performance Snapshot

Category	**Performance Profile**
Best For	Industrial, healthcare, labs, back-of-house, manufacturing
Avoid In	Unmitigated high-moisture slabs without vapor barrier
Initial Cost	Moderate to High (system-dependent)
Lifecycle Cost	Moderate
Moisture Tolerance	Low without mitigation (high risk variable)
Slip Engineering Capability	High (engineered texture options)
Chemical Resistance	High (system-dependent)
Maintenance Intensity	Moderate
Thermal Shock Resistance	Low to High (urethane cement required for severe exposure)

1. System Definition & Baseline

Resinous flooring systems are seamless, polymer-based applied systems designed to provide chemical resistance, impact durability, hygienic performance, and engineered slip resistance.

Unlike polished concrete, resinous systems are surface-applied and rely on mechanical bond to the concrete substrate.

System performance is dependent on:

- Surface preparation
- Moisture conditions
- Proper system selection
- Thickness control
- Environmental exposure

Design Implication:
Resinous flooring failures are rarely material failures.

They are almost always the result of improper substrate conditions, moisture mismanagement, or insufficient surface preparation.

2. System Categories

Resinous systems may include:

- Thin-mil epoxy coatings
- High-build epoxy systems
- Full broadcast quartz systems
- Decorative flake systems
- Mortar systems
- Urethane cement systems
- Epoxy or urethane topcoats

• Polyaspartic systems

Each system has different thickness, durability, chemical resistance, and thermal shock tolerance.

System selection must be driven by environmental exposure — not aesthetics alone.

Design Implication:

System selection must be driven by environmental exposure and performance requirements, not visual preference.

Thin-mil systems function as coatings.

Broadcast and mortar systems function as flooring systems.

3. Division Coordination & Substrate Requirements

Resinous systems require coordination between:

Division 03 – Concrete
Division 09 – Finishes

Critical considerations:

• Vapor barrier presence beneath slab
• ASTM F2170 in-situ RH testing
• ICRI Concrete Surface Profile (CSP) requirements
• Surface contaminant removal
• Slab age and curing

Failure to define moisture thresholds creates significant bond failure risk.

Design teams should clearly define responsibility for moisture testing and mitigation within the specification.

Design Implication:
Resinous systems are not moisture-tolerant by default. Moisture mitigation may be required.

4. Surface Preparation Requirements

Mechanical preparation is mandatory.

Acceptable methods may include:

- Shot blasting
- Diamond grinding
- Scarification (system dependent)

Minimum surface profile should align with ICRI CSP standards:

- Thin-mil: typically CSP 2–3
- Broadcast systems: CSP 3–5
- Mortar systems: CSP 4–7

Insufficient prep is the leading cause of delamination.

Design Implication:
Epoxy does not adhere to smooth concrete.

5. Moisture & Vapor Transmission

Moisture vapor transmission is the primary cause of resinous flooring failure.

Testing should be performed per ASTM F2170 (in-situ RH).

Acceptable RH levels vary by system:

- Standard epoxy systems: typically 75–95% RH (manufacturer dependent)

• Moisture vapor barrier (MVB) systems: up to 100% RH when properly installed

Design Implication:

Failure to define moisture testing protocol and acceptable RH thresholds creates significant risk of:

• Delamination

• Blistering

• System failure

Epoxy is not waterproof from below.

Moisture mitigation is not optional when conditions require it.

6. Slip & Traction Engineering

Resinous systems allow engineered traction through:

• Broadcast aggregate
• Textured topcoats
• Aluminum oxide additives
• Silica broadcast

Higher traction increases cleanability complexity.

Balance between slip resistance and maintenance must be defined.

Design Implication:
Slip engineering is adjustable. Cleanability is not infinitely adjustable.

7. Chemical & Environmental Resistance

Epoxy and resinous systems provide:

• Chemical resistance (acids, oils, solvents — system dependent)
• Impact resistance
• Seamless hygienic surface
• UV sensitivity (epoxy may amber without UV-stable topcoat)

Urethane cement systems are preferred for:

• Thermal shock environments
• Continuous wet exposure
• Food processing

Design Implication:
System chemistry must match environmental exposure.

8. Failure Modes & Risk Factors

Common resinous failures include:

• Delamination due to moisture
• Blistering from vapor pressure
• Cohesive concrete failure
• Thin-mil wear-through in heavy traffic
• Topcoat yellowing in UV exposure
• Thermal shock cracking

Most failures are preventable through proper system selection and moisture evaluation.

Design Implication:

Most resinous flooring failures are preventable through:

• Proper moisture evaluation

• Correct surface preparation

• Appropriate system selection

9. System Positioning & Use Case Alignment

System types should be aligned to performance expectations:

- Thin-mil coatings (1–3 mil)
  - Cosmetic improvement
  - Light duty
  - Short lifecycle in traffic areas
- High-build epoxy systems
  - Baseline commercial durability
  - Moderate traffic environments
- Broadcast systems (quartz / flake)
  - Enhanced durability
  - Slip resistance
  - Balanced lifecycle performance
- Urethane cement systems
  - Heavy industrial environments
  - Thermal shock resistance
  - Wet and washdown conditions

Design Implication:

Specifying a low-build system in a high-demand environment significantly increases failure risk and lifecycle cost.

10. Cost & Lifecycle Positioning

Relative Initial Cost (Lowest to Highest)

Thin-mil coating
High-build epoxy
Quartz broadcast
Urethane cement

Lifecycle Profile

Thin-mil: cosmetic, shorter lifecycle
Broadcast: balanced durability
Urethane cement: high durability, high performance

Maintenance Intensity

Moderate
Recoating may be required in high-traffic environments.

Design Implication:
Low initial cost systems may increase long-term maintenance costs.

11. When Epoxy / Resinous Systems Are Not Appropriate

- Slabs without vapor barrier and elevated RH
- Exterior UV-exposed areas without UV-stable chemistry
- Severe thermal shock without urethane cement
- Heavy industrial traffic with thin-mil coating

System selection must reflect environmental realities.

12. Specification Baseline Requirements

Resinous flooring specifications should define:

- System type and thickness
- Moisture testing requirements
- Acceptable RH thresholds
- Surface prep method and CSP
- Slip resistance expectations
- Topcoat chemistry
- Environmental exposure

Generic “epoxy flooring system” language is insufficient and introduces significant ambiguity.

Incomplete specifications frequently result in:

- Improper system selection
- Inadequate surface preparation
- Increased risk of failure and warranty disputes

Clear, performance-based specifications are essential.

13. Sustainability & Environmental Considerations

- Low-VOC options available
- Seamless hygienic systems reduce contamination risk
- Long service life reduces replacement waste
- Moisture mitigation systems may increase embodied material

Sustainability depends on correct system selection.

14. Comparative Performance Considerations

Compared to polished concrete:

- Higher chemical resistance
- Higher slip engineering capability
- Lower vapor tolerance without mitigation

• Higher installation complexity

System selection should prioritize environmental exposure and lifecycle performance.

15. Early Phase Consultation

Surface Solutions provides:

• System selection guidance
• Moisture evaluation coordination
• Division 03 / 09 review
• Slip engineering consultation
• Failure risk assessment

Early involvement reduces bid ambiguity and warranty disputes.

16. Installation Quality Considerations

Successful resinous flooring installation requires strict adherence to:

• Manufacturer coverage rates (sq ft per gallon)

• Proper surface profiling (CSP standards)

• Environmental controls (temperature, humidity, HVAC)

• Clean installation conditions

Design Implication:

Material performance is dependent on installation quality.

Deviations in coverage or preparation significantly impact system durability.

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