

Approval & Reception Procedure

DMC –Departamento de Materiais de Construção	
Parking Floor Anti-Slip System	Document no. ARP/DMC/024
	Rev. no. A
	Date 2025-09-15
	Page no. 1 of 7

1 Reference Standards

1. Transport Bureau Technical Specification for Parking Floor Anti-Slip Systems
2. Administrative Regulation No. 39/2022 Approval of Technical Regulations for Fire Safety in Buildings and Sites
3. ASTM D4263 Standard test method for indicating moisture in concrete by the plastic sheet method
4. BS 8204 SR2 Surface regularity - straightedge method
5. EN 196-1 Methods of testing cement - Determination of strength
6. EN 1542 Pull off test
7. EN 1062-7 Paints and varnishes - Coating materials and coating systems for exterior masonry and concrete - Determination of crack bridging properties
8. EN ISO 5470-1 Rubber- or plastics-coated fabrics — Determination of abrasion resistance Part 1: Taber abrader
9. EN 13036-4 Method for measurement of slip/skid resistance of a surface: The pendulum test
10. EN 13501-1 Fire classification of construction products and building elements - Classification using data from reaction to fire tests
11. EN 13501-2 Fire classification of construction products and building elements - Classification using data from fire resistance and/or smoke control tests, excluding ventilation services
12. EN 13529 Products and systems for the protection and repair of concrete structures - Test methods - Resistance to severe chemical attack
13. EN 13892 - Methods of test for screed materials
14. DIN 53505 Shore A and Shore D hardness testing of rubber
15. DIN 53515 Determination of tear strength of rubber elastomers and plastic film using Graves angle test piece with nick
16. DIN ISO/TS 11665 Measurement of radioactivity in the environment — Air: radon 222
17. ISO 2808 Paints and varnishes — Determination of film thickness
18. ISO 4624 Paints and varnishes — Pull-off test for adhesion
19. ISO 9001 Quality management systems – Requirements

Additional standards may be included if specified or applicable.

Approval & Reception Procedure

DMC –Departamento de Materiais de Construção	
Parking Floor Anti-Slip System	Document no. ARP/DMC/024
	Rev. no. A
	Date 2025-09-15
	Page no. 2 of 7

2 Approval Procedures

2.1 Submission and Approval

a) Manufacturer and Products:

Manufacturers: Products must meet the technical material requirements of the project. Reference brands:

- a. Mapei / Fosroc / Caparol or
- b. Products with equivalent or superior technical specifications approved by the owner/supervisor/management entity.

✧ Manufacturer's Products:

The listed manufacturers and their flooring systems represent the minimum technical requirements for the project. As long as the technical requirements are met, flooring systems from the listed manufacturers or other manufacturers may be submitted for comparison to determine which system best meets the project's requirements.

✧ Flooring System Materials:

The system, including primer, intermediate layer, top layer, mixed aggregates (if any), sealing or finishing coat, UV-resistant coating (if required), and moisture barrier, must be produced by the same manufacturer. Other auxiliary materials, such as repair and filling materials, joint sealants, and repair material types, shall be recommended in writing by the flooring system material manufacturer to ensure compatibility between the flooring system and auxiliary materials.

b) Product Data:

For each specified product type, technical data, installation instructions, and relevant recommendations for the composition materials of each layer of the flooring system shall be provided by the manufacturer.

c) Material Certificates/Test Reports:

Material certificates/test reports must clearly indicate the qualified testing institution, validity period, and reference standards. The test reports must include the specified test parameters for the product.

d) Initial Selection Samples:

The flooring system manufacturer shall provide available colors, textures, and

Approval & Reception Procedure

DMC –Departamento de Materiais de Construção	
Parking Floor Anti-Slip System	Document no. ARP/DMC/024
	Rev. no. A
	Date 2025-09-15
	Page no. 3 of 7

- patterns for each layer of materials.
- e) **Product Specification List:**
The specification list for the flooring system shall clearly indicate the flooring system used in the areas specified in the design drawings.
- f) **Installation Instructions:**
Submit the construction plan for the flooring system provided by the manufacturer.
- g) **Contractor Qualifications:**
- The contractor must be a person or company approved by the manufacturer with at least 5 years of professional experience in similar flooring systems, supported by proof.
 - The hired flooring system contractors must be trained and certified by the manufacturer.
- h) **Third-Party Test Reports:**
Submit valid material test reports issued by a third-party testing agency, covering (but not limited to) physical properties, chemical properties, moisture resistance, UV resistance, and fire safety. Refer to Section 3.2 Material Acceptance Upon Delivery for test parameters.
- i) **6-Year Warranty for the Finished Surface**
- j) **All Information Described in Section 3**
- k) **Additional Information Deemed Necessary by the Owner/Management Entity**

Before on-site work begins, the substrate must undergo surface treatment as required (including but not limited to expansion joints and construction joints). Flatness shall be measured using a 3m straightedge (BS 8204; SR2) with an average deviation not exceeding 5mm. Moisture content shall not exceed 4% as tested per ASTM D4263, and the construction environment conditions must be met.

The contractor shall construct a stepped mock-up of the complete system, with a flat area of at least one parking space and ramp dimensions agreed upon by all parties. Dry film thickness, pull-off tests, and wet surface PTV or BPN slip resistance tests shall be conducted for each layer. Work may only commence after the mock-up test results meet the project requirements and are approved by the owner/supervisor/management entity. °

Approval & Reception Procedure

DMC –Departamento de Materiais de Construção	
Parking Floor Anti-Slip System	Document no. ARP/DMC/024
	Rev. no. A
	Date 2025-09-15
	Page no. 4 of 7

3. Acceptance Procedures

3.1 Submission of Acceptance Plan

The contractor shall submit an acceptance plan for the parking floor anti-slip system for approval before acceptance. The plan must include at least the acceptance date, type, and scope.

3.2 Material Acceptance Upon Delivery

Upon delivery, the parking floor anti-slip system materials shall be accompanied by a quantity list and product qualification documents for on-site acceptance. If necessary, material sampling tests may be conducted, with the following test items:

Primer - Must be polyurethane or epoxy material

Test Items	Test Methods
Adhesion Strength	EN 13892-8, ISO 4624
Compressive Strength	EN 196-1
Shore D Hardness	DIN 53505
Radon Diffusion Measurement	DIN ISO/TS 11665
Reaction to Fire	EN 13501-1

Intermediate Layer - Must be polyurethane or polyurea material

Test Items	Test Methods
Direct Tensile Adhesion Strength	EN 1542, ISO 4624
Dynamic Crack Bridging Capability	EN 1062-7
Impact Resistance	EN ISO 6272
BCA Wear Resistance	EN 13892-4

Approval & Reception Procedure

DMC –Departamento de Materiais de Construção	
Parking Floor Anti-Slip System	Document no. ARP/DMC/024
	Rev. no. A
	Date 2025-09-15
	Page no. 5 of 7

Adhesion Strength	EN 13892-8
Thermal Shock Resistance	EN 13687-5
Reaction to Fire	EN 13501-1
Aggregate or Filler Mixing Ratio	Any aggregate or filler mixed into the intermediate layer shall not exceed 50% of the intermediate layer material's weight.

Top Layer - Must be polyurethane or polyurea material

Test Items	Test Methods
Elongation at Break after 7 Days (+23°C)	DIN 53504
Tear Strength after 7 Days (+23°C)	DIN 53515
Tensile Strength after 7 Days (+23°C)	DIN 53504
Shore A Hardness	DIN 53505
Shore D Hardness	DIN 53505
Abrasion Resistance (Taber Test, H22 Wheel/1kg/1,000 Cycles)	EN ISO 5470-1
Thermal Shock Resistance (Ix)	EN 13687-5
Reaction to Fire	EN 13501-1

Approval & Reception Procedure

DMC –Departamento de Materiais de Construção	
Parking Floor Anti-Slip System	Document no. ARP/DMC/024
	Rev. no. A
	Date 2025-09-15
	Page no. 6 of 7

Resistance to Severe Chemical Attack: -Class I: 3 Days (No Pressure) -Class II: 28 Days (No Pressure) -Class III: 28 Days (With Pressure) Recommended: Use 20 test liquid categories specified in EN 13529, covering all commonly used chemical reagents. °	EN 13529
Impact Resistance Measured on MC (0.40) Coated Concrete Sample per EN 1766	EN ISO 6272-1

4. Final Acceptance

The completed flooring system shall be tested by a Macau government-approved laboratory for pull-off tests, dry film thickness, and wet surface PTV slip resistance. One set of pull-off, dry film thickness, and slip resistance tests shall be conducted for each parking floor level and ramp, with locations selected on-site by the owner/supervisor/management entity.

The pull-off test results for the completed flooring system shall be $\geq 1.5\text{N/mm}^2$. For flat areas, the wet surface PTV or BPN slip resistance value shall be >55 , with a total dry film thickness $\geq 3.0\text{mm}$ and intermediate layer dry film thickness $\geq 2.5\text{mm}$. For ramp areas, the wet surface PTV or BPN slip resistance value shall be >65 , with a total dry film thickness $\geq 5.0\text{mm}$ and intermediate layer dry film thickness $\geq 4.5\text{mm}$.

Refer to the table below for layer thickness requirements for flat and ramp areas. If results do not meet standards, the owner/supervisor/management entity shall select new locations for retesting. If results still fail after two retests, the flooring system does not meet acceptance requirements. If site conditions do not allow separate dry film thickness tests for primer, intermediate, and top layers, total dry film thickness testing may be used as an alternative acceptance criterion with the agreement of the owner and all parties. Dry film thickness tests shall follow BS EN ISO 2808 requirements.

Approval & Reception Procedure

DMC –Departamento de Materiais de Construção	
Parking Floor Anti-Slip System	Document no. ARP/DMC/024
	Rev. no. A
	Date 2025-09-15
	Page no. 7 of 7

Flat Area Finished Surface

Primer Film Thickness	< 0.2mm
Intermediate Layer Dry Film Thickness	≥ 2.5mm
Top Layer Dry Film Thickness	≥ 0.3mm

Ramp Area Finished Surface

Primer Film Thickness	< 0.2mm
Intermediate Layer Dry Film Thickness	≥ 4.5mm
Top Layer Dry Film Thickness	≥ 0.3mm

Note: Acceptance shall be conducted per the above table or the approved material requirement standards.