



Technical Plan for Colored Anti-Skid Overlay on Cement Concrete Pavements

I. Introduction to Colored Anti-Skid Overlay

The colored anti-skid overlay consists of several layers: a concrete base sealing layer (acrylic sealing paint), an anti-skid base layer (methyl methacrylate resin anti-skid coating/binder), an anti-skid surface layer (colored ceramic aggregate), and a stain-resistant sealing layer (aliphatic polyurethane topcoat).

Concrete Base Sealing Layer: The acrylic sealing paint has a thickness of 30–80 μ m. It penetrates the pores of the concrete, solidifying within them to form a strong, dense barrier that prevents water, chloride ions, acids, and other substances from penetrating and corroding the rebar and calcium oxide in the concrete.

Anti-Skid Base Layer: The methyl methacrylate resin anti-skid coating (binder) has a thickness of 1500–2000 μ m. It is applied over the concrete surface, bonding the ceramic aggregate and the sealing primer layer together. This layer provides protection against impact, rolling, corrosion, and wear.

Anti-Skid Surface Layer: The ceramic aggregate layer is 2000–3000 μ m thick. It offers protection in terms of skid resistance, wear resistance, impact resistance, and rolling resistance, while also contributing to aesthetics and warning functions.

Stain-Resistant Sealing Layer: The aliphatic polyurethane topcoat has a thickness of 100–150 μ m. It forms a dense, tough, and well-adhered protective coating on the aggregate surface, providing protection against wear, stains, and water.

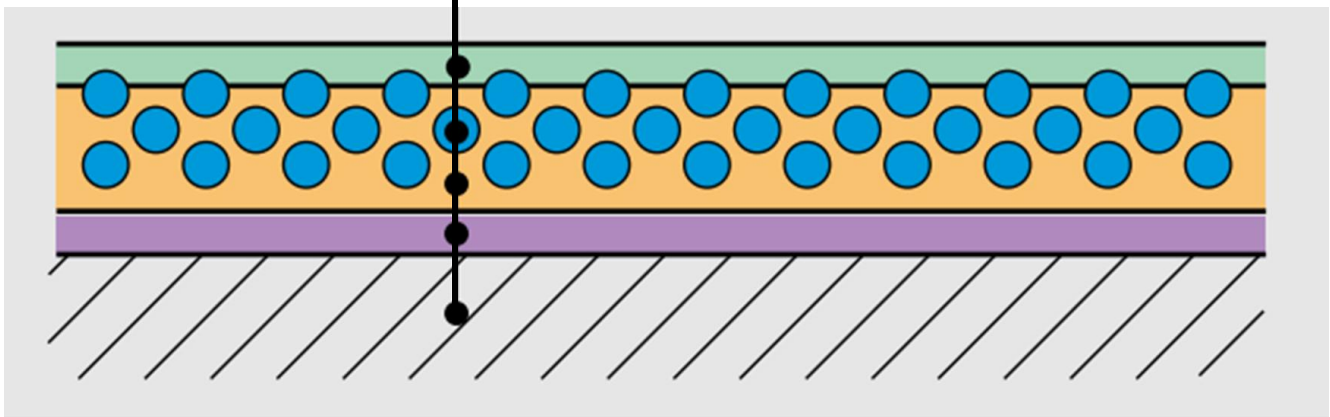
Stain-Resistant Sealing Layer (Aliphatic Polyurethane Topcoat):
(0.2-0.3 kg/m²)

Anti-Skid Surface Layer (Colored Ceramic Aggregate): (5.0-7.0
kg/m²)

Anti-Skid Base Layer (MMA Resin Binder): (2.5-3.5 kg/m²)

Concrete Base Sealing Layer (Acrylic Sealing Paint): (0.3-0.4 kg/m²)

Cement Concrete Pavement/Bridge Deck



II. Application

- Intersections or Crossroads
- Pedestrian and Bicycle Paths
- Community and Park Scenic Roads
- Bus Lanes and Stops
- Inclines and Sharp Turns
- Entrances and Exits to Schools, Hospitals, Supermarkets, Stations, Parking Lots, and Garages
- Highway Toll Stations and Service Area Entrances and Exits
- Culverts and Tunnel Entrances and Exits

III. Typical Characteristics

- **High Strength and Moderate Flexibility:** MMA resin anti-skid binder has high strength, moderate flexibility, and excellent wear resistance, heat resistance, aging resistance, and corrosion resistance.
- **Good Adhesion:** MMA resin anti-skid coating has good adhesion to ceramic aggregates and concrete surfaces (both asphalt and cement concrete), maintaining strong adhesion even under vehicle traffic and pressure without delaminating.

- **Significant Surface Roughness:** Provides excellent anti-slip properties.
- **Decorative and Aesthetic:** Offers good decorative and aesthetic qualities with various color options for colored sands.
- **Quick Curing:** Cures within 1 hour, with short curing time and minimal road closure, allowing for quick usage.
- **Low-Temperature Curing:** Can cure at low temperatures (-20 °C), making it suitable for a wide range of applications.
- **Easy Application:** Can be applied using spraying, rolling, or squeegeeing methods, and can be carried out during nighttime or early morning hours.

IV. Reasons for Selection

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- **Superior to Epoxy Resin Coatings:** Compared to existing epoxy resin anti-skid coatings, methyl methacrylate resin coatings offer better elongation, flexibility, water resistance, aging resistance, corrosion resistance, and adhesion to asphalt surfaces.
 - **Superior to Polyurethane Coatings:** Compared to existing polyurethane anti-skid coatings, methyl methacrylate resin coatings have better tensile strength, tear strength, water resistance, aging resistance, corrosion resistance, aggregate bonding, and asphalt adhesion.
 - **Excellent Anti-Slip Performance:** Provides outstanding anti-slip properties, wear resistance, and adhesion.
 - **Rapid Curing:** Can cure and dry within 60 minutes at normal and low temperatures, with short curing and traffic closure times, minimizing traffic disruption.
 - **Nighttime and Low-Impact Application:** Can be applied at night or during early morning hours, with minimal impact on traffic due to its low sensitivity to temperature and humidity. Allows for lane-by-lane application.
 - **Simple and Efficient Application:** Requires no large equipment; can be applied manually using rollers and squeegees. This method is simple, convenient, requires less space, and has minimal environmental impact.
 - **Quick Repairs:** Allows for fast repairs without affecting traffic flow.
 - **Suitable for Various Climates:** Ideal for both rainy seasons in the south and cold winters in the north.

V. Technical Properties

- Acrylic Sealing Primer

Properties	Value	Test Method
Non-Volatile Content (%)	≥ 50	GB/T 1725
Surface Dry Time (h, $23 \pm 2^\circ\text{C}$)	≤ 2	GB/T 1728
Fully Dry Time (h, $23 \pm 2^\circ\text{C}$)	≤ 24	GB/T 1728
Alkali Resistance (Saturated Calcium Hydroxide Solution 168h)	No blistering, cracking, or peeling of film	GB/T 9274
Adhesion to Concrete Base (MPa)	≥ 3.0 or base failure	GB/T 5210

- Methyl Methacrylate Resin Anti-Skid Coating (Binder)

Properties	Value	Test Method
Appearance	Red viscous liquid (or other colors)	-----
Viscosity ($23 \pm 2^\circ\text{C}$, mPa · s)	Adjustable	GB/T 7193
Solid Content (wt%)	≥ 90	GB/T 16777
Gel Time ($23 \pm 2^\circ\text{C}$, min)	15-45	GB/T 7193
Surface Dry Time ($23 \pm 2^\circ\text{C}$, min)	20-40	GB/T 16777
Fully Dry Time ($23 \pm 2^\circ\text{C}$, min)	30-60	GB/T 16777
Tensile Strength (MPa)	8-20	GB/T 528
Elongation at Break (%)	50-250	GB/T 528
Shore Hardness (D)	≥ 40	GB/T 531
Adhesion to Concrete Base (MPa)	≥ 2.5	GB/T 5210
Adhesion to Asphalt Base (MPa)	Failure of asphalt base	GB/T 5210

- Ceramic Aggregate for Anti-Skid

Properties	Value	Test Method
Appearance	Uniform and consistent	Visual Inspection
Particle Size (mm)	0.5-1, 1-2, 2-4	JT/T 712
Mohs Hardness	≥6	JT/T 712

- Anti-Skid Coating and Aggregate Composite

Properties	Technical	Test Method
Coating Appearance	After drying, color and aggregate particles are evenly distributed, no cracks or aggregate detachment	JT/T 712
Non-Tire Dry Time (23 ± 2°C, min)	≤60	JT/T 712
Water Resistance (168h immersion)	No abnormal phenomena	JT/T 712
Alkali Resistance (168h immersion in Saturated Calcium Hydroxide Solution)	No abnormal phenomena	JT/T 712
Acid Resistance (168h immersion in 2% Sulfuric Acid Solution)	No abnormal phenomena	GB/T 9274
Salt Resistance (168h immersion in Saturated Sodium Chloride Solution)	No abnormal phenomena	GB/T 9274
Low-Temperature Crack Resistance (-20°C, 23°C, 4h)	No cracks after 3 cycles	JT/T 712
Heat Resistance (80 ± 2 ° C, 168h)	No abnormal phenomena	GB/T 9274
Anti-Slip Performance (BNP Value)	No flow, blistering, or sliding	JT/T 712
Base Material Adhesion (Circle Test)	No cracks	JT/T 712
Artificial Accelerated Weathering	No abnormal phenomena	JT/T 712

- Aliphatic Polyurethane Topcoat

Properties	Value	Test Method
Non-Volatile Content (%)	≥50	GB/T 1725
Surface Dry Time (23 ± 2°C, h)	≤2	GB/T 1728
Fully Dry Time (23 ± 2°C, h)	≤24	GB/T 1728
Wear Resistance (750g/500r, g)	≤0.05	GB/T 1768
Water Resistance (168h)	No blistering or peeling	GB/T 1733
Alkali Resistance (168h in Saturated Calcium Hydroxide Solution)	No blistering or peeling	GB/T 9274
Salt Water Resistance (168d in Saturated NaCl Solution)	No blistering or peeling	GB/T 9274
Impact Resistance	100 cm	GB/T 1732
Artificial Weathering Resistance (240h)	No blistering, cracking, or peeling	GB/T 23987

.....●.....Acrylic Sealing Paint: 0.2 – 0.4 kg/m².....

VI. Theoretical Consumption

- Methyl Methacrylate Resin Anti-Skid Coating (Binder): 2.0 – 3.0 kg/m² (dry film thickness approximately 1.0 – 1.5 mm), with a minimum single-layer film thickness of not less than 1 mm
- Colored Ceramic Anti-Skid Aggregate: 3.0 – 5.0 kg/m², thickness 2 – 4 mm
- Aliphatic Polyurethane Topcoat: 0.2 – 0.4 kg/m²

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VII. Construction Key Points

- Construction Methods

Section	Product Name	Coating Thickness
Sealing Layer	Acrylic Sealing Paint	Roll coating, brushing, spraying
Anti-Skid Base Layer	Methyl Methacrylate Resin Anti-Skid Coating (Binder)	Rolling, Brushing, Spraying
Anti-Skid Surface Layer	Colored Ceramic Aggregates	Broadcasting
Stain-Resistant Sealing Layer	Aliphatic Polyurethane Topcoat	Rolling, Brushing, Spraying

Remove dust, dirt, mud, laitance, loose attachments, and water from asphalt surfaces to ensure the base is clean and dry.

- Surface Preparation

Repair damaged or cracked surfaces in advance to meet the required strength. For newly laid asphalt concrete surfaces, allow at least 2 weeks of traffic before applying the anti-skid surface.

New concrete surfaces should have a minimum curing period of 7 days and reach the required strength. The base must be clean, dry, and solid, free from laitance, oil, or other contaminants (sandblasting or grinding is recommended). Use polymer mortar for repairing concrete defects.



- Application of the Sealing Layer

Open the acrylic sealing paint container. Mix the A and B components according to the instructions, and apply evenly to the pre-sandblasted concrete surface. Ensure uniform coverage and achieve the required thickness. The actual application rate should be adjusted based on the roughness and texture of the base.



- Application of the Anti-Skid Base Layer

Mark the application area according to design requirements. Use masking tape to protect edges or areas where the anti-skid surface is not to be applied.

Measure the application area and calculate the required amount based on coverage rate. Prepare the materials accordingly.

Open the anti-skid coating (binder) container, add the hardener (BPO powder) in the specified ratio, mix thoroughly, and apply promptly to the work area. Spread evenly with a roller or trowel, ensuring the required amount and thickness.



- Application of the Anti-Skid Surface Layer

Spread the colored ceramic aggregates onto the freshly applied anti-skid binder until fully covered (using tools such as shovels). The spreading should be uniform and applied before the binder starts to gel. Rely on the weight of the aggregates to create a level surface.



- Edge Removal and Protection

After the anti-skid aggregates are evenly spread, remove the edge and protective tape before the anti-skid binder gels.

- Removal of Excess Aggregate

Once the anti-skid binder is fully cured (approximately 40 minutes), use a broom or air blower to remove excess ceramic aggregate that has not fully bonded. Recycle the aggregates and sift them before the next use.



- Application of the Stain-Resistant Sealing Layer
 - Measure the application area and calculate the required amount based on coverage rate. Prepare the materials accordingly.
 - Open the topcoat container, mix the A and B components in the specified ratio.
 - Apply the topcoat evenly over the ceramic aggregates using a roller, ensuring the required amount is achieved.
 - Complete the application promptly to avoid increased viscosity after gelling, which can make cleaning difficult.
 - Clean all tools and equipment with organic solvents such as acetate, turpentine, or xylene. Dispose of used containers and packaging properly.



- Precautions
 - No smoking or open flames allowed on the construction site. Maintain cleanliness and display clear signs and warnings.
 - Do not work during rain, snow, hail, fog, or strong winds (wind speeds exceeding 4 levels).
 - Workers must receive training and wear protective gear such as masks, gloves, and shoe covers before starting work.
 - Areas not to be coated should be protected in advance.
 - The base temperature should not exceed 45°C. The surface must be dry, clean, and solid.
 - Pay attention to vehicle traffic and ensure safety.

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VIII. Storage Requirements

- All components must be stored in a cool, dry, well-ventilated area with protective conditions, avoiding direct sunlight.
 - Keep the materials away from open flames and food storage areas.
 - The storage temperature should not exceed 40°C.
 - Under normal storage conditions, the shelf life of unopened products is one year.
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IX. Safety and Health

- Before construction, ensure that the material safety data sheets (MSDS) and safety manuals are available on-site.
 - All construction personnel must read and understand the safety and handling instructions.
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X. Project Examples

- Wuhan Development Avenue Non-Motorized Vehicle Lane Anti-Skid Layer



- Chongqing Yuejin Road Anti-Skid Layer



- Xiangyang Changhong

Road Bicycle Lane

Anti-Skid Layer



- Chongqing Yuejin Branch

Road Anti-Skid Layer



The technical data and operational procedures provided in this document are based on our current professional knowledge and practical experience and are for reference only. For specific project applications, please consult our sales or technical staff. We are committed to providing detailed and comprehensive technical guidance and services.

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