



Shenzhen Zhenghao High-tech Materials Technology Co., Ltd.

Technical Data Sheet

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TULEFU® Two-Component MMA Resin Pavement Marking System

I. Introduction

The TULEFU® MMA Resin Marking System is a reflective pavement marking system composed of a two-component reactive tough marking paint sprayed or screeded onto the road surface and a reflective glass bead layer. The main components of this marking paint are high-performance MMA resin, titanium dioxide, inorganic fillers, and additives. After being mechanically mixed by specialized construction equipment, the paint is automatically screeded or sprayed onto the road surface at room temperature, where it quickly cures and adheres to the glass beads, forming a tough, wear-resistant, and reflective bright marking.

TULEFU® DF100 Sealing Layer is a special sealing layer for cement concrete pavements, with a thickness of 30-50 μm , penetrating into the pores of the concrete and solidifying to form a dense barrier layer that adheres tightly, preventing water, chloride ions, acids, and other media from entering the concrete pores and corroding the steel bars and calcium oxide. Asphalt concrete pavements do not require a sealing layer.



TULEFU® DP100 Two-Component MMA Resin Marking Paint is a sprayable marking paint with a thickness of 600–1500 μm , sprayed onto cement concrete or asphalt concrete pavements, binding reflective glass beads into a cohesive unit, and providing impact resistance, compression resistance, corrosion resistance, and wear resistance for the entire marking system.

TULEFU® DG100 Two-Component MMA Resin Marking Paint is a screedable marking paint with a thickness of 1500–4000 μm , screeded onto cement concrete or asphalt concrete pavements, binding reflective glass beads into a cohesive unit, and providing impact resistance, compression resistance, corrosion resistance, and wear resistance for the entire marking system. It can also be made into structured markings such as rumble strips, dot patterns, or drainage markings.

Reflective glass beads are special high-retroreflective performance glass beads for pavement markings, with a particle size of 400–850 μm and a roundness rate of over 90%. They are scattered on the surface of the wet marking paint or mixed into the liquid marking paint, eventually bonding with the marking paint to enhance reflectivity and brightness.

II. Application

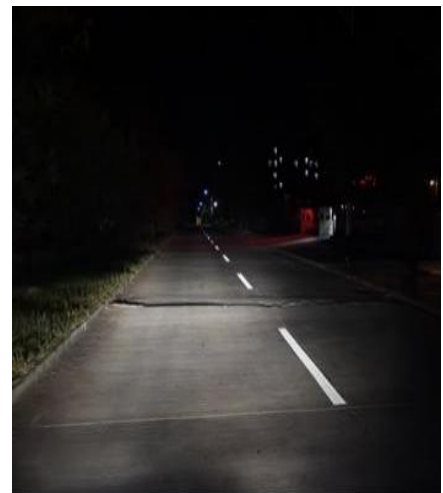
- High-grade roads and highway markings
- Road markings in accident-prone areas
- Markings in areas requiring clear road contour visibility
- Any other reflective marking requirements

III. Characteristics

- **Excellent reflectivity:** High retroreflective coefficient, up to 500 or more.
- **High tensile and compressive strength:** Can withstand repeated vehicle compression.
- **Good flexibility:** Capable of extending and adapting to road surface deformation, resistant to vehicle pressure cracks.
- **Strong adhesion to road surfaces:** Not easy to peel off.
- **Strong bonding with glass beads:** Long-lasting reflectivity.
- **Good chemical resistance:** Resistant to oil stains and de-icing salts, maintaining a bright appearance without cracking or blistering.
- **Excellent aging resistance:** No surface chalking, cracking, or peeling, long-lasting durability.
- **Good wear resistance:** Long service life (over five years).
- **Good temperature resistance:** Does not become brittle at low temperatures or sticky at high temperatures, suitable for various regional road conditions.
- **Environmentally friendly:** Solvent-free with extremely low VOC emissions.

IV. Reasons to Choose

Excellent Reflectivity: The two-component MMA resin marking paint remains liquid for several minutes after spraying or screeding, allowing glass beads to settle properly. By adjusting the paint's viscosity and selecting the appropriate bead size, about 2/3 of the beads settle into the paint film. The chemical cross-linking reaction during curing forms a hard film with excellent bonding strength, significantly reducing bead loss. The screed paint contains 18-25% mixed-in glass beads, ensuring long-term high reflectivity. In comparison, hot-melt marking paint quickly solidifies after being applied to the road surface, leading to lower bead settlement and higher bead loss, making it difficult to maintain long-term high reflectivity. Existing two-component markings maintain a retroreflective coefficient above 160 after 7 years, exceeding the national requirement of an initial retroreflective coefficient of no less than 150.



Good Flexibility: The use of specially modified MMA resin results in a paint film with excellent flexibility, capable of folding 180 ° without cracking. This flexibility adapts to road surface deformation, making it highly suitable for cold regions in northern China, where hot-melt markings and ordinary two-component markings tend to crack under cold conditions.

Good Wear Resistance: The drying and film-forming process of the two-component marking paint involves a chemical cross-linking reaction among active molecules, forming a network polymer with strong cohesion. This polymer is resistant to melting and dissolving, offering excellent wear resistance, capable of withstanding two million vehicle passes without significant wear. In contrast, hot-melt markings are nearly worn away after two million passes.

Good Heat Resistance: The cured two-component marking forms a thermosetting network polymer, resistant to melting under the heat generated by vehicle compression during hot summers, ensuring that the glass beads remain intact and do not drop off. This characteristic makes it particularly suitable for use in southern China, where hot-melt markings lack such heat resistance.

Good Resistance to Oil Stains and De-icing Salts: The thermosetting network polymer formed by the cured two-component marking is resistant to dissolution and can withstand contamination and immersion in engine oil and de-icing salts without cracking or blistering, maintaining a long-lasting bright appearance, making it ideal for use in northern China.

Good Aging Resistance: The use of special weather-resistant methyl methacrylate resin prevents surface chalking, cracking, and peeling, ensuring long-term durability.



V. Technical Properties

Properties		Technical	Test Method
Appearance		Uniform color liquid, no wrinkles, spots, bubbles, cracks, peeling, or adhesion after curing	JT/T 280
Viscosity (23 ± 2°C, mpa•s)		Adjustable	GB/T 10247
Solid content (wt%)		≥ 95	GB/T 16777
Gel Time (23 ± 2°C, min)		5~40	GB/T 7193
Surface Dry Time (h, 23 ± 2 °C)	23 ± 2°C	10~30	GB/T 16777
	0 ± 2°C	20~50	
Dry Through time (min, 0 ± 2 °C)	23 ± 2°C	15~35	
	0 ± 2°C	25~60	
Tensile strength (MPa)		8~20	GB/T 5210
Elongation at break (%)		10~50	
Adhesion to Concrete Substrate (MPa)		≥2.5	GB/T 5210
Adhesion to Asphalt Substrate (MPa)		Asphalt substrate failure	GB/T 5210

Tack-Free Drying Time (min)	≤35	JT/T 280
Abrasion Resistance (mg, weight loss after 200 cycles/1000g)	≤40 (JM-100 rubber wheel)	
Water Resistance	No abnormalities after 24h immersion	
Alkali Resistance	No abnormalities after 24h immersion in saturated calcium hydroxide solution	
Flexibility (mm)	≤5	
Artificial Accelerated Weathering	No cracking, peeling of the coating	

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VI. Usage Parameters

Road Condition	Material Name	Suggested Usage	Film Thickness	Application Method
New or Relatively New Road	Two-Component Marking Paint	1.0~ 1.2kg/m ²	0.6~0.8mm	Spraying
Old or Uneven Road	Primer Putty	1.2~ 1.4 kg/m ²	0.2~0.4mm	Screeding
	Two-Component Marking Paint	1.0~ 1.2kg/m ²	0.6~0.8mm	Spraying
	Glass Beads	0.4~0.5Kg/ m ²		

VII. Test Data

中路高科交通检测检验认证有限公司
(国家交通安全设施质量检验检测中心)
检测报告

编号:2022-CA02-008

编号:2022-CA02-008

检测项目				技术要求	检测结果	
					检测值	单项结论
1.	容器中状态			应无结块、结皮现象，易于搅匀。	符合要求	合格
2.	密度(g/cm ³)			1.5~2.0	1.83	合格
3.	施工性能			按生产厂的要求，将 A、B 组份按一定比例混合搅拌均匀后，喷涂、刮涂施工性能良好。	符合要求	合格
4.	涂膜外观			涂膜固化后应无皱纹、斑点、起泡、裂纹、脱落、粘贴等现象，涂膜颜色与外观应与样板差别不大。	符合要求	合格
5.	不粘胎干燥时间(min)			≤35	19	合格
6.	色度性能	白色	色品坐标(x,y)	在以下四角点色品坐标组成的四边形内 (0.350,0.360);(0.300,0.310); (0.290,0.320);(0.340,0.370)	x:0.324 y:0.341	合格
			亮度因数	≥0.75	0.84	合格
		黄色	色品坐标(x,y)	在以下四角点色品坐标组成的四边形内 (0.519,0.480);(0.468,0.442); (0.427,0.483);(0.465,0.534)	/	/
			亮度因数	≥0.45	/	/
7.	耐磨性 (mg) (200 转/1000g 后减重)			≤40 (JM-100 橡胶砂轮)	23.4	合格
8.	耐水性			在水中浸 24h 应无异常现象。	符合要求	合格
9.	耐碱性			在氢氧化钙饱和溶液中浸 24h 应无异常现象。	符合要求	合格
10.	附着性 (划圈法)			≤4 级 (不含玻璃珠)	2 级	合格
11.	柔韧性 (mm)			5 (不含玻璃珠)	1	合格

检测: 周海峰 杨峰 审核: 马江峰



中科检测技术服务(广州)股份有限公司
CAS Testing Technical Services (GuangZhou) Co., Ltd.

报告编号: KK23051206

日期: 2023/06/05

样品名称	甲基丙烯酸树脂标线涂料	商标	涂乐夫
样品编号	KK23051206	样品性状	液体+固体
规格型号	/	样品数量	1 款
生产日期或批号	ZH102023042913	检测类型	委托送检
到样日期	2023/05/12	检测周期	2023/05/16-2023/05/29
生产单位	/		
生产单位地址	/		
检测项目	请参见结果页		
检测依据	请参见结果页		
检测结果/结论	所检项目的检测数据请参见结果页		
备注	委托方提供信息: 双组分甲基丙烯酸树脂标线涂料 A (白)、双组分甲基丙烯酸树脂标线涂料 B (白)、 BPO 粉 (A 组分:B 组分:BPO=50:49:1 质量比) 供样情况: 500mLA+500mLB+50g BPO		

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检测结果:

检测项目	检测方法	单位	检测结果	限量要求	单项判定
*VOC 含量	JT/T 1326-2020 《路面标线材料有害物质限量》	g/kg	46	≤200	符合
*铬 (Cr)		mg/kg	<5	≤100	符合
*砷 (As)		mg/kg	<5	≤100	符合
*锑 (Sb)		mg/kg	<5	≤100	符合
总铅 (Pb) 含量	GB 18582-2020 《建筑用墙面涂料中有害物质限量》	mg/kg	<10	≤100	符合
镉 (Cd) 含量		mg/kg	<10	≤100	符合
汞 (Hg) 含量		mg/kg	<10	≤100	符合

备注: 1. A 组分:B 组分:BPO=50:49:1 质量比。

2. “< (X)”表示检测结果低于检出限 (X), 即未检出。

3. 限量要求参照 JT/T 1326-2020《路面标线材料有害物质限量》标准表 1 双组分路面标线涂料。

样品图片



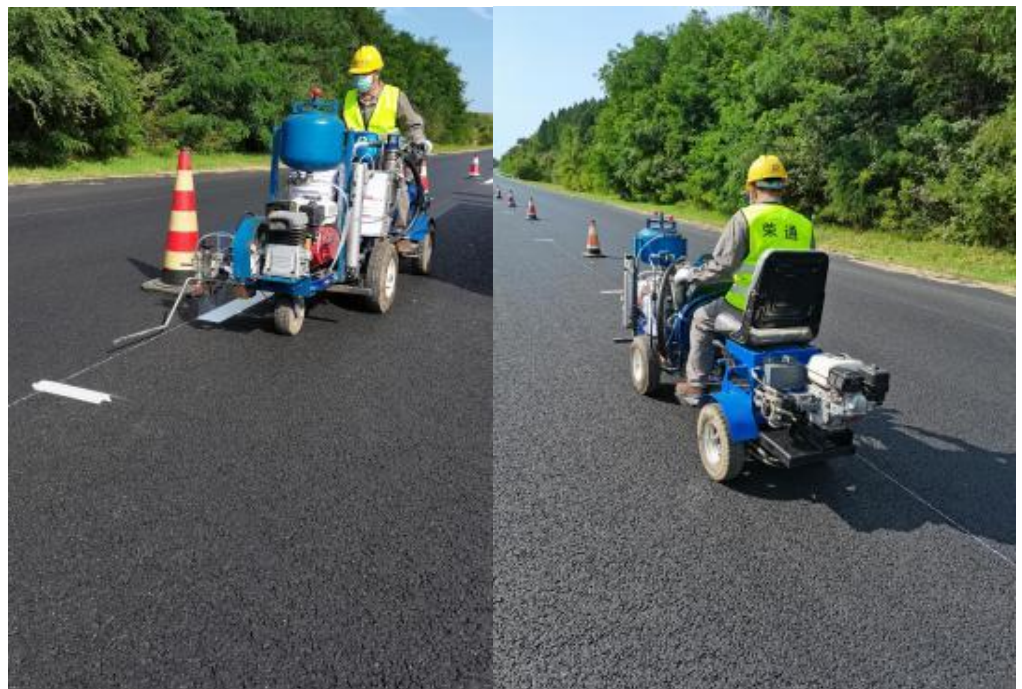
***** 报告结束 *****

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VIII. Construction Recommendations

Construction Equipment: It is recommended to use specialized two-component spraying machines for implementation. It is best to use fully automated spraying machines that include functions such as automatic walking, automatic material suction and spraying, automatic interval pausing, and automatic glass bead spraying.

Materials: The two-component marking paint consists of Component A, Component B, and the curing agent. Components A and B are viscous liquids, while the curing agent is a white powder. The amount of curing agent used is 2% of Component B by weight. The mixing ratio of Component A to the curing agent-prepared Component B is 1:1 by weight. Before use, thoroughly stir Components A and B separately. Then, add the curing agent to Component B and stir well (using specialized mixing equipment for 2-3 minutes). Afterward, pour the mixtures into their respective hoppers, and add the glass beads into their dedicated hopper. Turn on the machine to begin spraying.



Theoretical Coating Usage: 1 to 1.2 KG/m², with a dry film thickness of 0.6 to 0.8 mm. For old or uneven road surfaces, it is recommended to first use a matching primer putty to fill and level the surface. After the putty dries, proceed with the spraying application.

After the coating has dried, promptly measure the film thickness and retroreflective coefficient.

Please refer to the company's corresponding construction guide for specific

construction procedures.



Precautions: The liquid with added curing agent powder should be used as soon as possible. Open flames and stray sparks are strictly prohibited at the construction site. Construction personnel must wear specialized protective gear.

IX. Packaging and Storage

The product is available in 40L/set and 120L/set steel drum packaging. During transportation, prevent exposure to sunlight and rain. Keep away from heat sources, fire sources, and food. Each component must be stored in a cool, dry, and well-ventilated area, protected from direct sunlight. The storage temperature should not exceed 45°C or fall below 5°C. Under normal storage conditions, the product has a one-year shelf life if unopened.

X. Safety and Health

Ensure good ventilation in the construction area, and strictly prohibit smoking and open flames.

XI. Project Cases

Panshi Section of the
Shenji Expressway



Markings and parking
space lines in the
Dawan Industrial Park



Markings on the
Industrial Avenue in
the Dawan Industrial
Park



Markings on the
Nanning Ring
Expressway



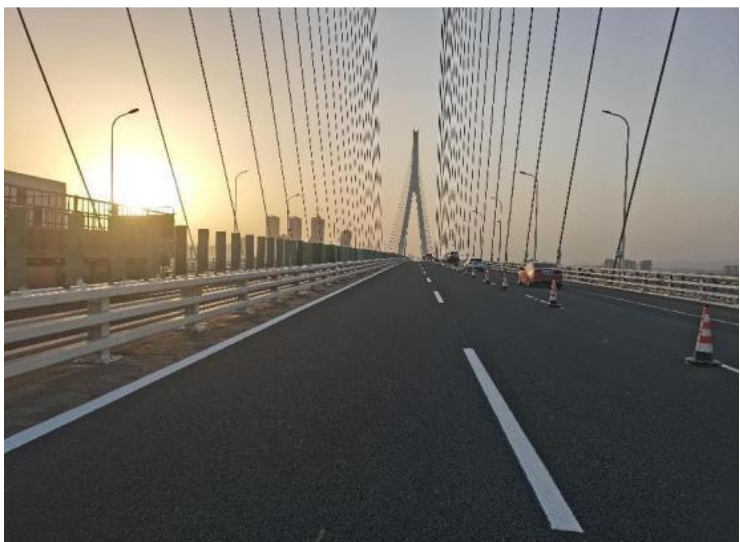
Spray-applied
markings on the
Guangxi Hechi test
section



Screed-applied
markings on the Guilin
Pingle ramp



Markings on the E'
dong Bridge in Hubei



XII. Patents



The technical data and operational handling 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 in a timely manner, and we will sincerely provide detailed and comprehensive technical guidance and services.

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