



# ADVANCES IN FIELD APPLIED UV CURABLE FLOOR COATINGS

## 现场施工UV固化地坪涂料的优势



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# Presentation Outline 演讲概要

- **UV CURING REVIEW UV固化回顾**
  - **History and Basics of UV Curing** 历史和UV固化基本原理
  - **UV, From Factory to Field Applied** UV, 从工厂到现场施工
- **CONCRETE FLOOR COATINGS 混凝土地坪涂料**
  - **Review of Conventional and UV Coatings** 传统的和UV涂料回顾
  - **Floor Selection, Preparation, Application, and Cure** 地坪选择, 施工和固化
  - **New UV Resin and Formulation Developments** 新的UV树脂和配方开发
- **WOOD FLOOR COATINGS 木质地板涂料**
  - **Review of UV Coatings** UV涂料回顾
  - **New UV Resin Development** 新的UV树脂开发
- **VCT (Vinyl Composition Tile) FLOOR COATINGS VCT (乙烯基地材) 地坪涂料**
  - **Review of UV Coatings** UV涂料回顾
  - **New UV Resin Development** 新的UV树脂开发
  - **Comparison of UV and Conventional Coatings** UV涂料和传统涂料的对照
- **SUMMARY AND CONCLUSION 总结和结论**

# Brief History of UV Curing UV固化的简要历史

- **1960's – industrial settings 工业化**

- Graphics industry; high gloss coating on cards

印刷行业；卡片高光涂料



- **1990's – numerous industrial applications 各种工业应用**

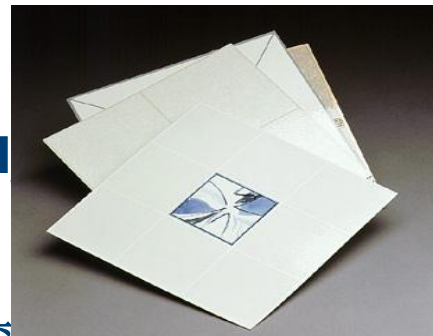
- Inks and coatings 涂料和油墨
- Wood coatings 木器涂料
- Metal, plastic coatings 金属和塑料涂料
- Electronics 电子电器涂料



- **2000's – field applied settings**

**2000年开始 - 现场施工**

- Floor coatings: concrete, wood vinyl, tile 地坪涂料：混凝土，木质和乙烯基片材涂料
- Automotive refinishing 汽车修补漆



# UV Curing Value Proposition UV固化的价值

- **“Drying” process “干性” 过程**

- **Very fast – fractions of a second** 非常快速 – 几分之一秒
- **Fast return to service with fully developed properties**  
瞬间达到最佳性能，可快速使用

- **Regulatory/Safety issues 规定/安全**

- **Very low VOCs and HAPs**  
极低VOC和对人体有害物
- **No inhalation issues**无可吸入问题
- **No flammability hazards**  
无可燃毒害物质
- **Non-hazardous materials** 无毒害物



- **Performance Properties 表现特性**

- **Enhanced over conventional technologies** 比传统技术更出色

# UV, From Factory to Field Applied UV, 从工厂到现场

## • DIFFERENCES 区别

### – Substrate variations 基材

- Composition 组成
- Condition (roughness, porosity, surface contamination, hardness, etc.) 条件（粗糙度，气性，表面污染程度，硬度等）

### – Application method is not precise 施工方式不精细

- Coating thickness 涂料厚度

### – Cure unit is mobile 移动固化

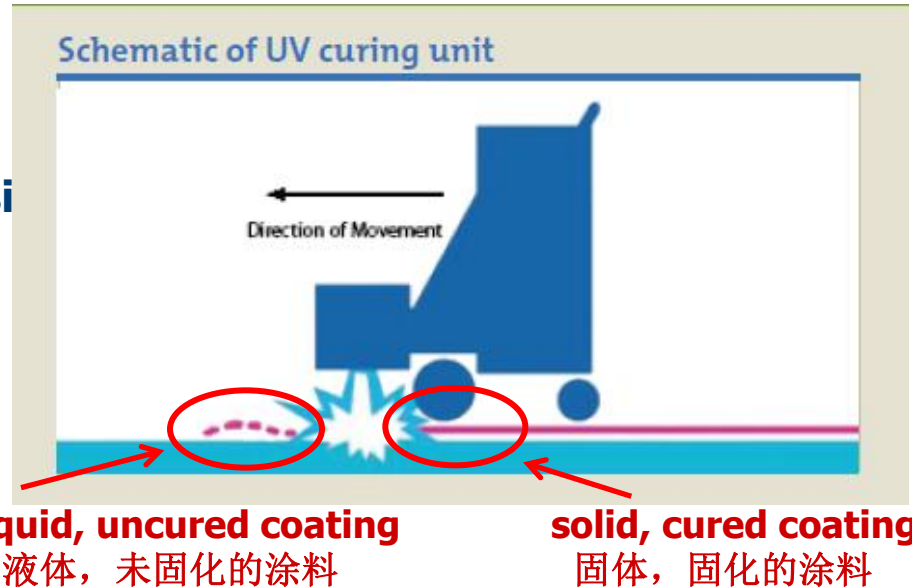
### – Cure unit moves over substrate instead of substrate moving under cure unit 固化装置经过基材，而不是基材经过固化装置

### – Cure conditions can vary 固化条件可以区分为

- Cure distance 固化距离
- Cure speed 固化速度

### – Substrate is larger than UV cure unit 基材比UV固化装置大

- UV leakage can prematurely partially cure coating at edges of cure path  
UV泄漏可能过早地固化每次固化路径的边缘
- Overlap criteria provided by coating supplier 重叠标准由涂料供应商提供



# Concrete Floor Coatings 混凝土地坪涂料

- **CONVENTIONAL COATINGS 传统涂料**
  - **Wide variety of chemistries** 广泛的化学原理
  - **Many differences in dry to touch and full cure times** 表干到实干变化大
  - **Variations in physical and chemical performance** 物理化学表现各异
- **MOST COMMON CONVENTIONAL COATINGS 最常用的传统涂料**
  - **2K Epoxy-Amine and 2K PU** 双组分环氧/胺类和双组分聚氨酯
  - **2-6 hours dry time between coats** 涂料间需要2-6小时干燥时间
  - **Greater than 24 hours for full cure** 完全固化需要至少24小时
  - **May contain solvents** 可能含有溶剂
- **FAST CONVENTIONAL COATINGS 快速传统固化涂料**
  - **MMA and Polyaspartics (isocyanate + amine/maleate prepolymers)**  
**MMA和聚天冬氨酸（异氰酸酯+胺/马来酸预聚物）**
  - **Cure time is minutes to hours** 固化时间从几分钟到几小时
  - **Potlife issues (dual spray may be required)** 储存性问题（可能要双喷涂）
  - **Ventilation/air filtration due to VOC or odor** VOC/气味需通风/空气过滤
  - **Flammability** 可燃性



# Concrete Floor Coatings 混凝土地坪涂料

## • **VALUE PROPOSITION OF UV CURABLE CONCRETE COATINGS**

### **UV固化混凝土涂料的价值**

- **Very fast cure** 非常快速固化
- **Immediate re-coatability after UV cure (100% solids UV) or after dry but before UV cure (waterbased UV)**  
**UV固化（100%固含UV）或干燥后但固化前（水性UV）立即可重涂**
- **Fast return to service with fully developed properties**  
完全达到性能，可快速使用地坪
- **Indefinite pot life** 无限长储存
- **Improved cleanability** 提高清洁
- **Low to zero VOCs** 低或零VOC
- **Non-flammable** 不易燃
- **Non-hazardous materials**  
无害材料
- **Excellent exterior durability** 优异的户外耐候性
- **Excellent abrasion resistance** 优异的耐刮擦性



# Concrete Floor Coatings 混凝土地坪涂料

## COMPARISON OF COMMERCIAL FLOOR COATING CHEMISTRIES

### 商业化地坪涂料化学机理的比较

COATING TECHNOLOGY 涂料技术	POT LIFE 储存期	VOC	ODOR 气味	CURE SPEED 固化速度	EASE OF CLEANING 易清洁性	ABRASION RESISTANCE 耐磨性
EPOXY 环氧	1-4 hours	Low 低	Low 低	hours to days 数小时至数天	Moderate 中等	Low 低
URETHANE 聚氨酯	< 1 hour	Low 低	Low 低	hours to days 数小时至数天	Moderate 中等	Moderate 中等
POLYUREA 聚脲	< 1 hour	Low 低	Low 低	minutes to hours 数分至数小时	Moderate 中等	Moderate 中等
POLYASPARTIC 聚天冬氨酸	<30 minutes	Low 低	Low 低	minutes to hours 数分至数小时	Moderate 中等	High 高
METHYL METHACRYLATE 甲基丙烯酸甲酯	<10-20 minutes	High 高	High 高	1 hour 1 小时	Good 良好	High 高
UV CURABLE UV固化	Infinite 无限长	Low 低	Low 低	Instant 即刻	Excellent 优异	High 高

**UV FAC: All desired properties in ONE system**

**UV现场施工：一个体系，满足所有要求**



# Concrete Floor Coatings 混凝土地坪涂料

- **FLOOR SELECTION 地坪选择**

- **Suitability of coating type 涂料类型的适应性**

- **Assessed for all floors 评估所有的地坪**
    - **Small test area(s) for coating suitability 小面积试验涂料适应性**

- **FLOOR PREPARATION 地坪准备**

- **Necessary for all types of coatings 所有涂料都需要**

- **Two types 二种类型**

- **Chemical washing and cleaning 化学清洗和清洁**
    - **Mechanical etching 机械蚀刻**

- **Shot blast 喷砂**

- » **Quick 快速**

- » **Results in extreme roughness or unevenness 产生优异的粗糙和不平整**

- **Diamond grinding 金刚石砂轮**

- » **Eliminates roughness – very flat surface 消除粗糙 – 非常平整的表面**

- » **Best for UV 最适合UV施工**

- **FLOOR SEALING 地坪封闭**

- **Necessary for porous concrete 对透气性混凝土是必需的**

- **Can improve adhesion and appearance 能增强附着力和效果**

# Concrete Floor Coatings 混凝土地坪涂料

## • COATING APPLICATION 涂料施工

– Same process for conventional and UV coatings 与传统的和UV涂料相同工艺

### – PROCESS 工艺

- Dispense coating onto area to be coated  
将涂料分散在需涂装的地面上
- Spread evenly with rubber squeegee or 1/8 inch nap, lint-free roller 用橡胶刮片或滚轮涂布
- Back roll with a larger 1/8 inch nap, lint-free roller until coating is of uniform thickness with minimal or no lapping marks 用无皮棉大背辊，直到涂料厚度均匀，没有或极少刷痕



**Recommended: 推荐:**  
**150-200  $\mu$  on sealed concrete in 2-3 coats**  
在封闭混凝土地坪上**2-3道**,  
**150-200微米**

# Concrete Floor Coatings 混凝土地坪涂料

## • COATING CURE 涂料固化

- Different processes for conventional and UV coatings

传统涂料和UV固化工艺不同

- **CONVENTIONAL 传统涂料**

- Allow to cure (time for complete cure) 允许固化（完全固化时间）

- **UV**

- Allow to dry (if waterborne UV), then UV cure (complete cure instantly) 允许干燥（水性UV），然后固化（立即完全固化）
- Allow to level and de-air (if 100% solids), then UV cure (complete cure instantly) 允许流平和脱气（100%UV）
- Follow coating supplier's recommendations to avoid under or over cure: **Speed & Overlapping criteria**

听从供应商推荐，防止不完全固化或过固化



**Recommended: 推荐:**

600-800 mJ/cm<sup>2</sup> for cure of under coats

1300 mJ/cm<sup>2</sup> for final cure of topcoat

600-800 mJ/cm<sup>2</sup> 固化底涂，

1300 mJ/cm<sup>2</sup> 最终固化面涂

# Concrete Floor Coatings 混凝土地坪涂料

## **TARGET MARKETS FOR UV** UV涂料的目标市场

- **Factories/other buildings that cannot afford downtime** 工厂及其他无法承担养成时间的建筑
- **Refrigerated warehouses (low temperature cure)** 冷冻仓库（低温固化）
- **Food storage warehouses (no/low VOC; low odor)** 食品仓库（无气味）
- **Decorative concrete markets** 装饰性混凝土市场
- **Road and safety marking** 道路和安全标志线





# Concrete Floor Coatings 混凝土地坪涂料

**CONDITIONS OF USE: VARIOUS AND POSSIBLY SEVERE** 使用场合:

- **Strong chemicals in factories**  
工厂强烈的化学物质
- **Pickle juice in grocery stores**  
杂货店里的蔬菜汁
- **Buggy traffic in retail stores**  
零售店里的繁重交通
- **Hot tires in garages and warehouses**  
车库和仓库里的车轮痕迹



## **ROBUST COATING**

- **Maintain good appearance** 保持良好的外观
- **Maintain performance** 保持地坪涂料表现
- **Non yellowing during cure and use** 在固化和使用过程中不泛黄
- **Both clear and pigmented** 可以是透明的，也可以是加颜料的

## **POLYESTER ACRYLATES A and B** 聚酯丙烯酸酯 A 和 B

- **Developed to meet requirements of robust coating**

为达到涂料功能强大而设计

# Clear Concrete Floor Coatings 透明混凝土地坪涂料

PROPERTY 特性	用A面涂 TOPCOAT BASED ON POLYESTER ACRYLATE A	面涂+B TOPCOAT + POLYESTER ACRYLATE B
Substrate 基材	Concrete Tiles 混凝土地材	Concrete Tiles 混凝土地材
Sealer — Coat Weight 封闭和涂装质量	UV PUD	UV PUD
	2 x 50 µm dry (2 x 2 mils dry)	2 x 50 µm dry (2 x 2 mils dry)
Topcoat and Coat Weight 面涂质量	Polyester Acrylate A	Polyester Acrylate A + B
	1 x 150µm (6 mils)	1 x 150µm (6 mils)
Monomer Dilution in Topcoat 面涂单体	15% NPG(PO) <sub>2</sub> DA and 30% DPGDA	15% NPG(PO) <sub>2</sub> DA and 30% DPGDA
UV Cure Exposure UV固化照射量	1 x 410 mJ/cm <sup>2</sup>	1 x 410 mJ/cm <sup>2</sup>
Gloss (60°) 光泽	92	90
Appearance 外观	High clarity; No surface defects	High clarity; No surface defects
X-Cut Adhesion (3M 610 tape) 划格法	4A	4A
Coin Test 硬币划痕测试	Very slight burnish 极轻微磨痕	Very slight burnish 极轻微磨痕
Pencil Hardness 铅笔硬度	5B	4B
MEK Double Rubs MEK双向摩擦	200+	200+
Steel Wool (0000) Double Rubs 钢丝球	25	135
Chemical Resistance 耐化学性 (24 hour spot test, with cottonball, covered) (24小时滴注, 用棉球覆盖)		
Mustard 芥末酱	Slight stain (no stain at 30 min)	Slight stain (no stain at 30 min)
Betadine 碘酒	Slight stain (no stain at 30 min)	Slight stain (no stain at 30 min)
RIT® Dye (navy, undiluted) 染料	Slight stain (no stain at 30 min)	Slight stain (no stain at 30 min)
Xylene 二甲苯	No Effect	No Effect
Olive Oil 橄榄油	No Effect	No Effect
Formula 409® 409号润滑油	No Effect	No Effect
Vinegar 醋	No Effect	No Effect
Water 水	No Effect	No Effect
Ethanol (50%) 50%乙醇	Slight distortion 轻微扭曲	Slight distortion 轻微扭曲
Isopropanol (70%) 70%异丙醇	No Effect	No Effect
Windex®	No Effect	No Effect
Pickle Juice 泡菜汁	No Effect	No Effect
Brake Fluid 刹车油	No Effect	No Effect
Transmission Fluid 传动油	No Effect	No Effect



# Pigmented Concrete Floor Coatings 地坪有色涂料

PROPERTY 特性	VALUE 值
Substrate 基材	Fiber Cement Panels 纤维混凝土块
Sealer and Coat Weight 封闭和涂装质量	UV PUD
	1 x 50µm dry (2 mils dry)
Topcoat and Coat Weight 面涂和质量	Polyester Acrylate A
	2 x 75 µm (2 x 3 mils)
Monomer Dilution in Topcoat 面涂稀释单体	20% Trimethylolpropane Triacrylate
UV Cure Exposure UV固化照射量	Air dry sealer: <3% moisture content
	1 x 580 mJ/cm <sup>2</sup> first topcoat
	1 x 830 mJ/cm <sup>2</sup> second topcoat
Gloss (60°) 光泽 (60°)	84
X-Cut Adhesion (Tesa 4104 tape) 划格法附着力测试	5A
Pencil Hardness 铅笔硬度	3H
Water Double Rubs 水双向摩擦	200+
Isopropanol Double Rubs 异丙醇双向摩擦	200+
Chemical Resistance 耐化学性	
(24 hour spot test, with cottonball, covered)	
Ketchup 番茄酱	No Stain 无影响
Mustard 芥末酱	Slight Stain; No stain at 4 hours 4小时无影响
Coffee 咖啡	No Stain 无影响
Arachide Oil (vegetable oil) 植物油	No Stain 无影响
Ethanol (50%) 50% 乙醇	No Stain 无影响
NaOH (10%) 10% 氢氧化钠	No Stain 无影响
NH <sub>3</sub> (10%) 10% 氨水	No Stain 无影响
Acetic Acid (7%) 7% 醋酸	No Stain 无影响
Javel (sodium hypochlorite) (9%) 次氯酸钠	No Stain 无影响
Eosin (red dye) (2%) 2% 红色染料	Moderate Stain 中等影响
Hot Tire Pick Up Resistance 耐轮胎痕迹	
Dry 干燥时	No coating pick up; No marks; No impression
Wet 湿润时	No coating pick up; Very slight marks; No impression

# Pigmented Concrete Floor Coatings 混凝土地坪有色涂料

## HOT TIRE PICKUP RESISTANCE 耐热轮胎印

## UV Curable Coatings UV固化涂料

Figure 1. Dry Hot Tire Pick Up Resistance



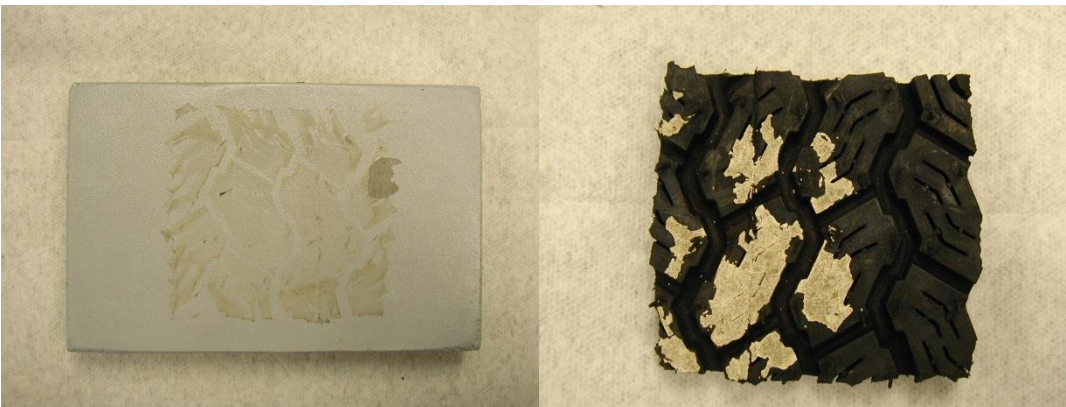
Figure 2. Wet Hot Tire Pick Up Resistance



Figure 3. Wet Hot Tire Pick Up Resistance, Cleaned



## Conventional Cure Coatings 传统固化涂料



# Concrete Floor Coatings 混凝土地坪涂料

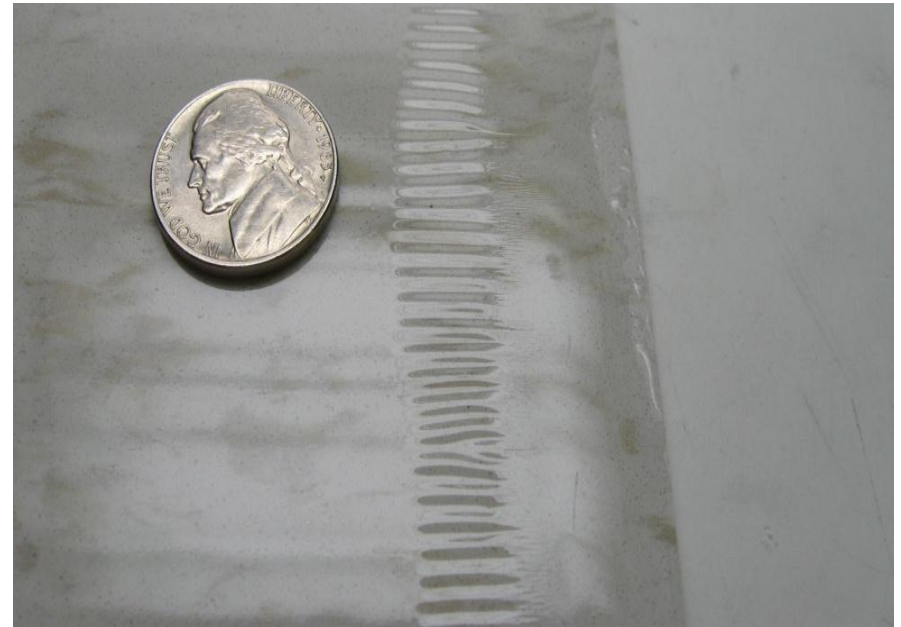
## ZIPPERING IN UV CURABLE CONCRETE COATINGS

### UV固化混凝土涂料的拉链效果

– **Appearance aberration due to** 由于下列因素存在拉链效果

- **light leakage** 紫外光的泄漏
- **shrinkage differential at the coating surface and in depth**

涂料表面和内部的收缩差异



# Concrete Floor Coatings 混凝土地坪涂料

## ZIPPERING IN UV CURABLE CONCRETE COATINGS

### UV固化混凝土涂料的拉链效果

#### Several approaches to minimize or eliminate 几步减少或消除

PROPERTY 特性	APPROACH 步骤
Light Leakage from Equipment 设备光泄漏	Use of shielding; Improved lamp design 用保护罩; 改善灯设计
Time between first cure (light leakage) and second cure (full cure) 首次和二次固化时间	Minimize time between cures; 减少二次固化时间间隔; Appropriate design of coating/curing plan 适当设计涂装/固化计划
Cure Speed or Energy 固化速度或能量	Slower cure speeds (higher UV energy) give better results 更慢的固化速度(更高的UV能量)导致更好的结果
Coating Thickness 涂料厚度	Use thinner coatings; 使用薄涂料; Thicknesses below 10 mils (250 $\mu$ ) recommended 厚度小于250 $\mu$
Coating Viscosity 涂料粘度	Formulate for higher viscosity; 设计更高粘度; Target 目标 1000-2000 cP (mPas)
Coating Flow/Leveling/Defoaming 涂料流动 / 流平 / 消泡	At higher formulation viscosity, additive selection becomes more important 在配方粘度增高时, 助剂选择更加重要
Photoinitiator Package 光引发剂方案	Photoinitiator blends should be chosen to enable both surface cure and in depth cure 选择组合光引发剂保证表干和实干
Coating Shrinkage 涂料收缩	Minimize shrinkage through monomer and oligomer choice; However, basic coating properties must be maintained 选择单体和预聚物减少收缩; 当然, 应保留基本涂料特性

# Concrete Floor Coatings

**STARTING POINT FORMULATION: 起始配方:**  
**CLEAR CONCRETE COATING THAT CURES WITHOUT ZIPPERING 透明**

PRODUCT 产品	PARTS BY WEIGHT
POLYESTER ACRYLATE A 聚酯丙烯酸酯 A	80.0
TMPEOTA (ethoxylated trimethylolpropane triacrylate)	20.0
FLOW/LEVELING AGENT 流动/ 流平剂	0.5
DEFOAMER 消泡剂	1.0
RHEOLOGY MODIFIER 流变助剂	0.5
FUMED SILICA 气相二氧化硅	<u>3.0</u>
	100.0
50/50 blend of BENZOPHENONE and 50/50 二苯甲酮和 1-HYDROXY-CYCLOHEXYLPHENYL-KETONE 1-羟基环己酮	4.0
2,4,6-TRIMETHYLBENZOYL DIPHENYL PHOSPHINE OXIDE 2, 4, 6 - 三甲基二苯基氧化磷	4.0
AMINE SYNERGIST 胺增效剂	4.0
Viscosity (cP or mPas @ 25° C) 粘度	1000-2000
1 coat for 75-250 µm (3-10 mils) total coat weight on sealed concrete 1涂料, 在封闭混凝土上75-250 微米总涂料质量	
UV cure speed with Bulldog 15-3000 from HID for full cure (fpm) UV固化速度, 用HID 斗牛犬 15-3000 完全固化	15-20
UV cure exposure for full cure (mJ/cm <sup>2</sup> ) 完全固化UV照射量	1300-1350



# Concrete Floor Coatings 混凝土地坪涂料

## **POLYESTER ACRYLATES A (and B) 聚酯丙烯酸酯A（和B）**

**Meet requirements of robust coating: 达到涂料功能强大要求:**

**–Excellent stain, solvent, and chemical resistance (including pickle juice)**

优异的耐污性，耐溶剂性和耐化学性（包括耐泡菜汁）

**–Excellent scratch and abrasion resistance when formulated with 15%**

**Polyester B 与15%的聚酯B配伍，具有优异的耐刮擦性和耐磨性**

**–Superior hot tire pickup resistance 超级的耐热轮胎印性**

**–Very low yellowing values 极低的黄变值**

**–Eliminate zippering with proper formulation**

用适当的配方消除拉链效应

**–No pot life issues 无储存性问题**

**–Very low VOCs 极低的VOC值**

**–Non-flammable 不燃**

**–Non-hazardous 无毒**

**–Good/better coating properties 好/更好特性**

**compared to conventional coatings**

与传统的涂料相比较

**–Same floor preparation and coating techniques**

**as conventional coatings 与传统涂料同样的涂装**





# Wood Floor Coatings 木质地板涂料

## UV WATERBORNE COATINGS PREFERRED 推荐水性UV涂料

- **Same application methods, drying times, and sanding procedures as conventional coatings** 与传统涂料同样的施工方式，干燥时间以及打磨流程
- **Dries tack-free to the touch for quick sanding and recoating**  
干燥到指触干，可以打磨和重涂
- **After UV cure: immediate return to service with fully developed properties** UV固化：完全达到特性可立即使用
- **One day finishing possible** 可以一天涂装完工
- **Eliminate post-coat defects for contractor**  
消除施工方后续涂装的缺点
- **Minimize downtimes for the floor owner** 减少业主等待
- **1K system with no potlife issues** 1K体系，无储存问题
- **Very low VOCs** 极低的VOC
- **Non-flammable** 不燃
- **Non-hazardous** 无毒
- **Better coating properties than conventional coatings**  
比传统涂料更好的涂料特性



# Wood Floor Coatings 木质地板涂料

## **MATTING ISSUES 消光问题**

- **Matte is preferred finish** 一般推荐低光涂料
- **Problems with inconsistent matting** 不连续的消光难题
  - **More noticeable in hallways and large open areas** 在大开放式场合更易察觉
- **Shelf stability of matte coatings problematic** 低光涂料储存问题
- **Problems have hindered market acceptance, especially residential** 难题阻止了市场的接受程度，特别是居住场合
- **Cause is inorganic particles:** 由于无机颗粒导致此难题：
  - **drying process can cause localized concentration gradients** 干燥导致浓度差
  - **Sedimentation** 沉降
- **Angle of light incidence is also problematic** 光入射角也是难题
- **Wax matting agents help, but very low gloss is not attainable** 消光蜡可以有帮助，但达不到极低光泽

**UV PUD 1 DEVELOPED TO  
SOLVE MATTING PROBLEMS**  
开发出**UV PUD 1**解决消光问题



# Wood Floor Coatings 木质地板涂料

## GLOSS LEVELS OF UV PUD 1 FORMULATIONS UV PUD 1 配方光泽水平

FORMULATION* 配方	GLOSS (20°) 光泽	GLOSS (60°) 光泽	GLOSS (85°) ** 光泽
UV PUD 1	3	21	--
UV PUD 1 + 2.0% aqueous wax dispersion 2% 水性蜡分散体	2	17	--
UV PUD 1 + 3%水性蜡分散体 3.0% aqueous wax dispersion	1	6	10
UV PUD 1 + 5.0% aqueous dispersion	<b>Matte and dead matte coatings achievable with no or very low amounts of inorganic particles</b> 用极少无机颗粒即可达到低光和无光涂料		
UV PUD 1 + 2.0% aqueous wax dispersion 1.4% silica matting agent			
UV PUD 1 + 2.0% aqueous wax dispersion 2.4% silica matting agent	1	4	5

\*Three coats of matte formulation on oak or beech wood. 橡木或榉木上的三层低光涂料

\*\*Only reported for 60° gloss values <10, based on ASTM D523. 根据ASTM D523, 只报道60度光泽低于10

# Wood Floor Coatings 木质地板涂料

## UV PUD 1 BASED WOOD FLOOR COATINGS UV PUD 1 木地板涂料

- **Uniform matte aspect** 统一的低光外观
- **Ability to achieve very low gloss levels**  
可以达到极低的光泽水平
- **Increased open and wet edge times**  
增加施工时间和湿边缘时间
- **Improved shelf life** 提高储存性
- **Performance properties equal to** 表现与PU coatings based on typical UV PUDs 一致
  - **Excellent adhesion and hardness** 附着力硬度
  - **Superior chemical and solvent resistance**  
超级的耐化学性和耐溶剂性
- **Performance properties much better than conventional wood coatings**  
表现特性远优于传统的木器涂料
  - **Improved hardness** 更高的硬度
  - **Superior solvent and chemical resistance** 超级的耐溶剂和耐化学性
  - **Fast return to service with fully developed properties** 完全达到性能，快速使用



# VCT Floor Coatings VCT地坪涂料

## VALUE PROPOSITION FOR UV on resilient flooring

用于弹性地材的UV涂料的价值

- **Immediate property development**  
after UV cure UV固化即刻达到性能
- **Quick return to service with fully developed properties** 可立即使用
- **Minimize post-coat defects**  
降低后续涂装缺陷
- **Low maintenance requirements**  
低维护要求
- **Low aggregate costs** 低综合费用  
(maintenance + equipment)
- **Durability** 耐侯性
- **High performance coating** 高性能涂料





# VCT Floor Coatings VCT地材涂料

## TARGET MARKETS FOR UV on resilient flooring

### 弹性地材UV涂料的目标市场

- **Retail** 零售
- **Institutional** 机构
- **Hospitals** 医院
- **Education** 学校
- **“Back Rooms”**  
“储藏室”
- **Refinish** 翻新
- **New construction**  
新的建筑





# VCT Floor Coatings VCT地材涂料

## UV WATERBORNE AND UV 100% SOLIDS BOTH USED

同时可使用水性UV和100% 固含UV

- **Waterborne advantages** 水性UV的优势
  - **Similar handling and application techniques to conventional finishes** 同传统涂装类似的操作和施工应用
  - **Decreased shrinkage** 降低收缩率
  - **Tack-free after dry but before UV cure** 干燥后但UV固化前可表干
  - **No zippering issues** 无拉链效应问题
  - **Improved stain resistance** 提升了耐污性
- **100% solids advantages** 100%固含UV的优势
  - **No drying time before UV cure** 在UV固化前无需干燥时间
  - **Higher gloss levels** 更高的光泽
- **Market prefers high gloss, but expensive to maintain**  
市场需要高光，但维持费用更高
- **Some markets using lower gloss or matte coatings** 有些市场需低光
- **Matte coatings have same appearance and stability issues as wood**  
低光泽涂料需要与木质地材同样的表现和稳定性

**UV PUD 1 ALSO SOLVES VCT MATTE PROBLEMS**

**UV PUD 1同样解决VCT 低光难题**

# VCT Floor Coatings VCT地材涂料

## SPFs FOR MATTE COATINGS BASED ON UV PUD 1 低光涂料特性

COATING GLOSS LEVEL (60°) 光泽度	52	38	26	15	8
PRODUCT 产品	PERCENT 百分比				
UV PUD 1	97	95	93	92.5	92
DEFOAMER 消泡剂	0.5	0.5	0.5	0.5	0.5
FLOW/LEVELING AGENT 流平剂	0.5	0.5	0.5	0.5	0.5
AQUEOUS WAX DISPERSION蜡分散体	--	2	4	4	4
SILICA MATTING AGENT 硅消光剂	--	--	--	0.5	1.0
PHOTOINITIATOR 光引发剂	2	2	2	2	2
PERCENT TOTAL 总百分比	100	100	100	100	100
Deionized Water 去离子水	10	10	10	15	20
Solids (%, calculated) 固含量（计算）	30.7	30.8	30.8	29.8	28.8
Viscosity (DIN Flow Cup 53211; seconds @ 20° C) 粘度	20 - 30				
Coat at 4-6 mils with a T-bar or flat pad applicator on VCT, and allow to dry (typically 2-4 hours) 用T-棒或平刮片在VCT上刮100-150微米，允许干燥（通常是2-4小时）					
UV cure at exposure necessary to get a mar free surface (mJ/cm²) 光强度	425 typical 通常425				

# VCT Floor Coating Properties – UV PUD 1

## UV PUD 1 VCT地材涂料的特性

	WATERBORNE UV COATINGS (1 coat: 2 mils or 50 µm) 水性 UV 涂料 (1涂, 50微米)		WATERBORNE CONVENTIONAL COATINGS (4 coats: 1 mil or 25 µm) 水性传统涂料	
PROPERTY 特性	GLOSS UV COATING 高光UV	MATTE UV COATING (UV PUD 1) 低光UV	MEDIUM MAINTENANCE FINISH 中等维护涂层	LOW-MEDIUM MAINTENANCE FINISH 低维护涂层
Gloss (60°) 光泽	84	8 - 52	78	70
Appearance 外观	High clarity; No surface defects	Uniformly matte; No surface defects	High clarity; No surface defects	High clarity; No surface defects
Crosscut Adhesion (610 tape) 划格附着力	5B	5B	0B	0B
Coin Test 硬币测试	Very slight burnish	Very slight burnish	Severe lift	Severe lift
Black Heel Mark 耐黑鞋 Resistance (BHMR) 印	No marking 无痕迹	Slight marking; 轻微 Easily cleaned 易清	No marking 无痕迹	No marking 无痕迹
Pencil Hardness 铅笔	4B	B	4B	4B
MEK Double Rubs 擦拭	200+	160 – 200+	10	10
Chemical Resistance (24 hour spot test, w/ cottonball covered)	<b>UV curable coatings have better adhesion, solvent resistance, and chemical resistance</b> <b>UV固化涂料具有更好的附着力，耐溶剂性和耐化学性</b>			
Mustard 芥末酱				
Betadine 碘酒	No effect	Slight stain (no effect at 30 min)	Severe stain	Severe stain
RIT® Dye 红色染料 (navy, undiluted)	No effect	Slight stain (no effect at 30 min)	Moderate stain	Moderate stain
Olive Oil 橄榄油	No effect	No effect	No effect	Moderate distortion
Formula 409® 润滑油	No effect	No effect	Severe lift	Severe lift
Vinegar 醋	No effect	No effect	Severe distortion	Severe distortion
Water 水	No effect	No effect	Slight distortion	Moderate distortion
Isopropanol (99%)	No effect	No effect	Severe lift	Severe lift
Windex® 玻璃清洗液	No effect	No effect	Severe lift	Severe lift
Pickle Juice 泡菜汁	Not tested	No effect	Not tested	Not tested

# VCT Floor Coatings VCT地材涂料

## UV PUD 1 BASED VCT FLOOR COATINGS UV PUD 1 VCT地材涂料

- **Uniform matte aspect** 均匀的低光外观
- **Ability to achieve very low gloss levels** 可达到非常低的光泽
- **Increased open and wet edge times** 增加操作时间和湿边缘时间
- **Improved shelf life** 提高了储存性能
- **Performance properties much better than conventional VCT floor finishes** 表现特性比传统的VCT地材涂料好很多
  - **Superior adhesion, hardness, and solvent and chemical resistance**  
更好的附着力，硬度，和耐溶剂及耐化学性
  - **Fast return to service with immediate property development**  
可即刻投入使用



# Concrete, Wood, and VCT – Conclusion

## 混凝土，木质和VCT地材 – 结论

**COMMERCIAL USE OF UV FAC IS GROWING, BUT HAS BEEN SLOWED BY SOME PERFORMANCE DEFICIENCIES**

UV现场施工的商业应用在成长，但由于一些表现差异减缓了速度

**RECENT PRODUCT AND FORMULATION DEVELOPMENTS HAVE ADDRESSED THESE DEFICIENCIES:**

近期的产品和配方的开发，针对这些表现差异：

- **POLYESTER ACRYLATE A: HIGH PERFORMANCE CONCRETE COATING THAT DOES NOT YELLOW; NON-ZIPPERING COATING WITH NEW PI PACKAGE** 聚酯丙烯酸酯 A: 高表现混凝土涂料，不泛黄；使用新型光引发剂时无拉链效应；
- **POLYESTER ACRYLATE B: EXCELLENT SARC PROPERTIES FOR CONCRETE COATINGS**  
聚酯丙烯酸酯 B: 在混凝土涂料中有优异的表现
- **UV PUD 1: UNIFORM MATTING AND IMPROVED FORMULATION STABILITY IN WOOD AND VCT COATINGS**  
UV PUD 1: 在木质和VCT涂料中有均匀的低光表现和更好的配方稳定性

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