

# **APPENDIX 'E'**

## **MMA AREA MARKINGS**

## CycleGrip® MMAX SPECIFICATION Methyl Methacrylate Bike Lane Treatment

CycleGrip MMAX

1. **USE:** CycleGrip® MMAX is a specialized bike lane treatment system that combines state-of-the-art Methyl Methacrylate resins with hardwearing aggregate and premium pigments to deliver an extremely durable, highly visible and color stable lane delineation treatment that meets the non-slip requirements needed for cyclists.

CycleGrip® MMAX shall be used to delineate bike lanes and increase bicycle lane presence in applications such as, but not limited to, corridor treatment along the length of a bike lane or cycle track especially at areas where bicycle and vehicular conflict are expected and added safety is needed.

1.1. CycleGrip® MMAX is only available through Ennis-Flint, or an authorized distributor of Ennis-Flint.

2. **MATERIAL:** Materials used to create CycleGrip® MMAX shall consist of CycleGrip® MMAX Resin, CycleGrip® MMAX Aggregate and catalyst.

2.1. CycleGrip® MMAX resin.

2.1.1. CycleGrip® MMAX resin shall have the following properties:

Density	8.1 +/- .35	Lbs/Gal
Tensile	>400 PSI	ASTM D638
Elongation	>180%	ASTM D638
Flash Point	>10°C	ASTM D1310

2.1.2. CycleGrip® MMAX resin shall be pigmented to meet the following color coordinates:

2.1.2.1. Daytime chromaticity:

1		2		3		4	
X	y	x	y	x	y	x	y
0.230	0.754	0.266	0.500	0.367	0.500	0.444	0.555

The daytime luminance factor (Y) shall be at least 20, but no more than 35.

2.1.2.2. Nighttime chromaticity:

1		2		3		4	
X	y	x	y	x	y	x	y
0.230	0.754	0.336	0.540	0.450	0.500	0.479	0.520

- 2.2. CycleGrip® MMAX aggregate shall be provided by the manufacturer and will have a hardness of 9 on the Mohs scale. Aggregate shall be a neutral, light color that will not affect the color of the finished product, and will have a mesh sizing of 24 Grit.

- 2.3. Catalyst shall come in a powder form and be supplied in bulk at the maximum usage rate of 0.51 +/- 0.2 lbs (.23 +/- .09 kg) per pail of resin.

3. **APPLICATION EQUIPMENT:**

3.1. Squeegees shall be designed for heavy duty usage and sourced locally.

3.2. Rollers shall be medium nap in texture and require a roller cage and handle.

3.3. Drill shall be high speed, high torque capable of supplying enough power to thoroughly mix CycleGrip® MMAX additives when paired with a paint mixing paddle.

4. **APPLICATION:**

- 4.1. Pre-conditions. Aged surfaces containing reflective cracking should be repaired, or it should be expected that reflective cracking may re-appear.

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- 4.2. Surface preparation.** Clean the intended application area thoroughly. All loose particles, dirt, sand dust, etc. must be removed. Broom and use a power blower or compressed air. The surface must be clean, dry and free of all dust, oil, debris and any other material that might interfere with the bond between CycleGrip® MMAX and surface to be treated.
- 4.2.1. Concrete:** All curing compounds shall be completely removed from concrete surfaces prior to installation by shot blasting or grinding. Existing concrete surfaces shall be wire brushed, but may require shot blasting or grinding dependent on condition.
- 4.2.2. Chemical contaminants:** Clean areas containing chemical contaminants such as vehicle fluids, using a degreasing solution, and ensure removal of contaminants and degreasing solution well in advance of the application.
- 4.2.3. Obstacles:** Pavement markings that are to be left in place, utilities, drainage structures, curbs and any other structure within or adjacent to the treatment location shall be masked to protect from application. Existing pavement markings conflicting with the surface treatment should be removed by grinding or water blasting. Extra care should be taken to thoroughly remove the dust and debris caused from grinding.
- 4.3. Mixing.** Catalyst quantity shall be based on ambient and pavement temperature and must be mixed very thoroughly at specified rates and into materials listed in the materials mixing guide. Material shall mix to approximately 2.79 gallons (10.55 liters) and weigh approximately 52 lbs (23.6 kg).

**MATERIALS MIXING GUIDE**

CycleGrip® MMAX resin	2 (7.6)	gallons (liters)
CycleGrip® MMAX aggregate	25.0 (11.34)	lbs (kg)
Catalyst < 70° F / 18° C	8 (0.24)	fluid ounces (liters)
Catalyst > 70° F / 18° C	4 (0.12)	fluid ounces (liters)

- 4.4. Installation.** CycleGrip® MMAX shall immediately be poured on to pavement and distributed at 45-50 sq. ft. per pail using a squeegee. Trowels can be used where a squeegee is not effective. Use roller to back roll CycleGrip® MMAX to remove working lines and create a consistent, anti-slip texture. Remove masking as material gels, but before it cures.
- 4.5. Opening to traffic.** CycleGrip® MMAX must be 100% cured, which will be a hardened solid state, before traffic is permitted. Curing typically takes 30-60 minutes and is based on temperature and amount of catalyst added.

**5. PERFORMANCE PROPERTIES:**

**5.1.** CycleGrip® MMAX will have the following performance properties:

Density	18.5 +/- 0.5	Lbs / Gallon
Solids	>99%	D2205
Build Thickness	90 +/-10	Mils
VOC	<100	Grams/Liter
Pot Life	~15min	AASHTO T237
Skid	>60	ASTM E303
Hardness	50-60	ASTM D2240
Water Absorption	<0.25%	ASTM D570

**6. PACKAGING:**

- 6.1.** CycleGrip® MMAX resin must be supplied in compliant metal pails that have a UN1A2Y1.9/100 rating.
- 6.2.** CycleGrip® MMAX Aggregate must be supplied in 25.0 +/- 0.5 lbs. (11.34 +/- .23 kg) pre-packaged bags or pails.

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7. **STORAGE:** Avoid extreme storage temperatures. Keep materials in dry, protected areas, between 40°F – 80°F. Keep out of direct sunlight and protected from open flame. Use within six months of receipt.
8. **TECHNICAL SERVICES:** Shall be available from the manufacturer upon request.

# APPLICATION INSTRUCTIONS

## MMAX AREA MARKINGS

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### Overview:

MMAX AREA MARKINGS conveniently combine state-of-the-art Methyl Methacrylate resins with hardwearing aggregate and premium pigments to deliver an extremely durable, highly visible and color stable lane delineation treatment that meets the non-slip requirements needed for pedestrians, cyclists and vehicles.

MMAX AREA MARKINGS are mixed onsite and is distributed on to the pavement substrate using squeegees and cure in a wide range of temperatures with predictable back to traffic times of 20-60 minutes.

### EQUIPMENT:

The following items are needed during the different stages of application.

<u>Surface prep &amp; layout</u>	<u>Mixing</u>	<u>Installation</u>	<u>Clean up</u>
Stiff broom	High speed / torque drill (with power source / spare batteries)	Long handled squeegees	Solvent resistant gloves
Blower / compressed air	Mixing paddles	Spare rubber squeegee blades	Safety glasses
Measuring tape	Measuring cup	Straight hand trowels	Acetone
Chalk line	Small tarp	Long handled roller cages	Large cleaning tub
Marking crayons	Screw driver/bucket opener	Rollers - med. nap (5 per 1000 sqft)	Solvent resistant brushes
Duct tape	Utility knife		Cloth rags
Roofing paper	Misc tools		Trash bags

### GENERAL REQUIREMENTS:

**SURFACE:** MMAX AREA MARKINGS can be applied on stable, well compacted asphalt or non-bituminous concrete surfaces, such as Portland cement concrete. New substrates should be allowed to age harden or cure for minimum 15 days (asphalt) to 30 days (concrete) before installation. Pavement surface must be completely free of dirt, debris, moisture, curing compounds and other contaminants that can affect adhesion. Chemical contaminants such as vehicle fluids must be removed well in advance using a degreasing solution and power washer, ensuring all residues are removed. Existing pavement markings within the application area may be removed by gently sandblasting, shot-blasting, water-blasting or grinding making sure that minimal damage is done to the substrate. Aged surfaces containing reflective cracking should be repaired, or reflective cracking should be expected to re-appear after installation.

**MATERIAL:** Avoid extreme storage temperatures. Keep materials in dry, protected areas, between 40°F – 80°F. Keep out of direct sunlight and protected from open flame. Use within six months of receipt.

**TEMPERATURE:** Ambient and surface temperatures for installation should be between 40-100°F, and should be 5°F above the dew point temperature. There should also be less than 75% relative humidity when installing MMAX AREA MARKINGS.

### SAFETY PRECAUTIONS:

Review MSDS for MMAX AREA MARKING products before usage.

### INSTRUCTIONS FOR APPLICATION:

**Surface Prep:** Clean the intended application area thoroughly. All loose particles, dirt, sand dust, etc. must be removed. Concrete surfaces should be wire brushed, at minimum. Sweep completely. Use a power blower or compressed air. Clean areas containing chemical contaminants such as vehicle fluids, using a degreasing solution. Proper removal of contaminants and degreasing solution are necessary well in advance of the application.

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**Masking:** Using duct tape and roofing paper, mask off perimeter of area to be colored, as well as any object not to be colored such as manhole covers, drains and existing markings.

**Mixing:** Add the supplied 25.7 lbs of MMAX AREA MARKING Aggregate into the 2 gallons MMAX AREA MARKING Resin and mix with clean mixing paddle, using a high speed, high torque drill. Add the recommended amount of powder catalyst, based on ambient and pavement temperature (Table 1), and mix thoroughly.

After adding the catalyst, MMAX AREA MARKING will start curing and must be applied to the pavement immediately. There will be 4 to 10 minute working time, which is temperature dependent.

Material will mix to approximately 2.79 gallons (10.55 liters), weigh 52 lbs and cover 45-50 sqft @ 90 mils.

Caution: Clean the mixing paddle between uses or understand that material will immediately initiate curing if previously exposed to catalyzed material (and not cleaned).

Table 1: Recommended catalyst by temperature range:

< 70°F / 18°C	lbs (kg)	.51 (.23)
	fl oz (liters)	12 (.365)
70-90°F / 18-32°C	lbs (kg)	0.26 (.12)
	fl oz (liters)	6 (.185)
> 90°F / 32°C	lbs (kg)	0.13 (.06)
	fl oz (liters)	3 (.09)

**Installation:** Immediately, pour mixed material on to pavement to be treated and use a squeegee to evenly distribute at a coverage rate of 16-18 sq. ft. per gallon, or 45-50 sq. ft. per pail. Pre-measuring / pre-marking can assist to ensure proper coverage. Use trowel in small, tight areas where squeegee cannot effectively be used. After rough distribution with squeegee, back roll material (one direction only) to remove working lines created with squeegee and create a consistent, anti-slip texture. Roller will last longer during continuous usage when it remains wetted with new batches of MMA resin, but will need to be replaced when it starts ‘pulling’ material or creating differences in texture. Stopping and starting will decrease the useful life of the roller.

As material gels, but before it cures, remove masking.

**Clean up:** Clean all tooling in acetone before material is cured. Clean in well ventilated areas to reduce fume build-up and worker exposure. Do not come into direct contact with solvents - use proper personal protective equipment. Acetone is extremely flammable; take proper handling measures to reduce static discharge and combustion. Dispose of all contaminated materials in accordance with all applicable federal, state and local laws and regulations.

**Opening to traffic:** MMAX AREA MARKINGS must be 100% cured, which will be a hardened solid state, before traffic is permitted. Curing is based on temperatures and amount of catalyst added, but typically takes 30-60 minutes.