Liquid Pavement Marking

Series 1200

Product Bulletin 1200 **October 2009**

Replaces PB 1200 dated March 2004

Description

3M™ Liquid Pavement Marking (LPM) Series 1200 is designed for use on roadways and highways primarily as long line pavement markings on new surfaces or pavements with multiple years remaining before resurfacing. Series 1200 markings are highly visible day and night and retain their effectiveness over a long period of time.

Series 1200 markings consist of a durable, sprayable, polyurea binder that hardens rapidly after application, composite reflective elements that are highly reflective and resistant to wear, and glass beads. The polyurea binder consists of two components that are mixed at a ratio of 3 parts Part A to 1 part Part B prior to spraying. The elements and beads are dropped onto the polyurea binder immediately after the binder is sprayed. The composite reflective elements have a durable glass core and high index, microcrystalline ceramic beads partially embedded on their surface. The microcrystalline ceramic beads provide excellent abrasion and fracture resistance so the elements can continue to perform in the tough road environment. Factory control of bead embedment ensures consistent retroreflective performance.

Series 1200 markings can be used for long lines (center, edge and skip), channelizing lines and gore markings.

Product Features

- Resistant to discoloration by ultraviolet exposure and dirt pickup.
- Excellent adhesion to asphalt and Portland cement concretes.
- White and yellow color conforming to highway standards.
- Good nighttime yellow color.
- Manufactured without the use of heavy metals, lead chromate pigments or other similar lead containing metals.
- Skid resistant.
- Low temperature application.
- Quick cure time.
- No significant VOC's.

Component References

1200	Part A White
1201	Part A Yellow
1230	Part B
1270I	White Composite Reflective Elements
1271I	Yellow Composite Reflective Elements

Glass beads specifically designed for Series 1200 markings are available from a number of suppliers. Contact 3M Customer Service at 1-800-553-1380 for sources and specifications.

Typical Initial Properties

The values reported are to be regarded as typical. Some reasonable variance should be expected. All are initial properties, unless otherwise noted.

Property	Typical Initial Value	Test Method
Reflectivity (Average)	White: 900 [(mcd)(m^{-2})(lux^{-1})] Yellow: 700 [(mcd)(m^{-2})(lux^{-1})]	ASTM E1710 (-97)
Color	Must meet respective daytime color specification as stated in ASTM D6628 (-01), and Initial / 1000 hr White Cap Y Coating only >90 / >89 With beads and elements >80 Yellow Cap Y Coating only 57-62 / 57-62 With beads and elements 45-55	ASTM E1349 (-90) -45/0 (0/45) CIE Illuminant D65 and CIE 1931 (2˚) Standard Observer
Adhesion to Portland Concrete	100% Portland concrete failure	ACI Method 503. Samples shall be conditioned at room temperature (75˚± 2˚F) for a minimum of 24 hours and maximum of 72 hours prior to the performance of the tests indicated.
Adhesion to Asphalt Concrete	100% Asphalt concrete failure	ACI Method 503. Samples shall be conditioned at room temperature (75˚± 2˚F) for a minimum of 24 hours and maximum of 72 hours prior to the performance of the tests indicated.
Drying Time (Laboratory)	No pick-up condition within 5 minutes, insensitive to temperature	ASTM D 711, 15 mil binder thickness with ASHTO Type 1 beads coated at 0.099 pounds per square foot.
Drying Time (On the Road)	No track condition within 3 minutes; insensitive to temperature.	77˚F air temperature; 15 mil binder thickness with normal bead and element loading; no visibile tracking from distance of 50 feet.
Skid Resistance	Greater than or equal to 45 BPN	ASTM E303
Volatile Organic Compound (VOC) Content	Upon mixing liquid components in appropriate ratio, the VOC content will meet all local and national regulations in the United States for Architectural coatings and paints. Typical VOC=2.1 grams/liter or less.	Testing of the mixed liquid components shall be in accordance to EPA Reference Method 24 - Determination of Volatile Matter Content, Density, Volume Solids, and Weight Solids of Surface Coatings.
TiO2 Content (White)	>13%	By weight
Index of refraction of microcrystalline ceramic beads	1.8 minimum	ASTM E 1967-98
Acid resistance of glass and microcrystalline ceramic beads	No more than 15% of beads showing distinct opaque surface corrosion upon microscopic examination (20x).	Exposure of 1% solution (by weight) of sulfuric acid.

Application Requirements

The applicator of the markings is responsible for meeting the following requirements:

Binder Coating Thickness and Corresponding Application Rates

Surface Type	Recommended Liquid Pavement Marking Thickness (1 inch=1000 mils) and Rates of Application[1]
Existing Smooth Asphalt or Concrete Surface	15-18 mils (320-270 4-inch lineal feet per gallon)
New Concrete Surface[2]	15-20 mils (320-240 4-inch lineal feet per gallon)
Established Asphalt Surface (Standard Asphalt Mix) - Older than one year[*]	18-20 mils (270-240 4-inch lineal feet per gallon)
Open Grade Friction Course (OGFC) or Stone Matrix Asphalt (SMA)[3]	20-22 mils (240-220 4-inch lineal feet per gallon)
Rough Concrete or Asphalt	18-20 mils (270-240 4-inch lineal feet per gallon)
Concrete or Asphalt After Grinding Off Pavement Markings[4]	15-20 mils (320-240 4-inch lineal feet per gallon)
Chip Seal	20-25 mils (240-190 4-inch lineal feet per gallon)
Slurry Seal	15-18 mils (320-270 4-inch lineal feet per gallon)

[1] Application rates calculated using a conversion of 231 cubic inches per US liquid gallon.

[2] Use thicker binder (20 mils) on new concrete surfaces with heavy tines.

[3] Very large aggregate sizes for open grade friction course or stone matrix asphalt mixes may require a thickness of 25 mils for proper coverage.

[4] Pavement marking thickness determined by type of surface and roughness/texture created from grinding operation.

[*] 3M™ LPM 1000, 1200 and 1400 can be applied directly to ACC Surfaces opened to traffic 12 months or more. New ACC Surfaces < 12 months after opening to traffic have asphalt rich surface and are generally week in tensile/cohesive strength. Therefore it is recommended to install a test application of 3M™ LPM 1000, 1200, or 1400 on new ACC pavement mixes and approve based on your own experience prior to using for large projects.

Glass Bead and Composite Element Application Rates

Elements and glass beads shall be applied at the rates shown in the table below.

Table 1 - Glass Bead Application Rates

Units	Glass Bead
Pounds per 4-inch linear foot	0.026 lbs/4-inch lf
Grams per 4-inch linear foot	12 grams per 4-inch lf
Pounds per gallon 20 mils, 240 theoretical feet per gallon	6.4 lbs/gal
Pounds per gallon 25 mils, 190 theoretical feet per gallon	5.0 lbs/gal

Table 2 - Microcrystalline Element Application Rates

Units	Composite Reflective Elements
Pounds per 4-inch linear foot	0.011 lbs/4-inch lf
Grams per 4-inch linear foot	5 grams per 4-inch lf
Pounds per gallon 20 mils, 240 theoretical feet per gallon	2.65 lbs/gal
Pounds per gallon 25 mils, 190 theoretical feet per gallon	2.1 lbs/gal

Marking Dimensions

In accordance with the "Manual on Uniform Traffic Control Devices" and the project plans.

Proportioning and Mixing

Continuous proportioning at 3 volumes of Part A to every 1 volume of Part B and adequate mixing so that markings are hardened throughout and are free of soft and uncured or "blackened" areas and streaks.

Placement of Beads and Elements

Beads and elements must be dropped in the polyurea binder so that their upper exposed portions are free of binder material.

Control of Overspray

The markings must not exhibit excessive overspray.

Weather and Pavement Conditions

- Dry weather only.
- Air temperature of at least 40˚F (4ºC).
- Road surface completely dry.
- Road surface free of dirt, sand, dust, oil, grease and all other contaminants.
- Curing compound and laitance removed from new Portland concrete surfaces.
- Existing markings removed so that at least 80% of the pavement is exposed where Series 1200 markings are to be applied.
- See Information Folder 5.20 for additional application guidelines

Typical Minimum Initial Brightness

White: 600 [(mcd)(m^{-2})(lux^{-1})]

Yellow: 400 [(mcd)(m^{-2})(lux^{-1})]

- 30 meter retroreflectometer
- Average value in a zone of measurement, determined in accordance with the sampling procedures outlined in ASTM D 6359.

Over many applications, the initial brightness typically should average 900 [(mcd)(m^{-2})(lux^{-1})] for white and 700 [(mcd)(m^{-2})(lux^{-1})] for yellow. The standard deviation over many applications should be no more than 130 [(mcd)(m^{-2})(lux^{-1})] for both white and yellow.

Equipment

The applicator is responsible for procuring equipment suitable for applying Series 1200 markings, as well as maintaining and operating the equipment in a manner that ensures that the application requirements are met.

Equipment for applying Series 1200 markings is available from suppliers independent of 3M. The machines pump the two binder components in the correct volumetric ratio through a mixing device and airless spray nozzle. Prior to mixing, the two liquids are heated and filtered. Elements and then beads are dropped onto the binder immediately after it is sprayed. The machines can have the capability of applying multiple lines at the same time, and can stripe at speeds up to 6 miles per hour, depending upon the application dimensions (thickness and width).

Storage

Store 3M™ Stamark™ Liquid Pavement Marking Series 1200 binder components in a cool, dry, well ventilated area indoors, 40˚F - 100˚F (4˚C - 38˚C). Use within 6 (six) months of receipt. If Part A is exposed to high heat for an extended period, a crust can form on the surface. If Part B is exposed to high heat for an extended period, the container can pressurize and possibly rupture. Pick-up of empty drums is the responsibility of the user. For more information, see 3M™ Stamark™ Liquid Pavement Marking Safe Handling Procedures brochure.

Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Material Safety Data Sheet (MSDS), and/or product labels prior to handling or use. Follow all precautions on the MSDS during the filling, use or cleaning of the application equipment. This product is intended for outdoor use only. Application in tunnels or enclosed areas may necessitate the use of additional precautions. For more information, see the 3M™ Liquid Pavement Marking Safe Handling Procedures brochure.

Quality Policy and Warranty

All statements, technical information and recommendations furnished by 3M are true and reliable to the best of our knowledge, however no guarantee of accuracy or completeness is given or implied, and the following is made in lieu of all warranties, express or implied.

1) 3M has no control over application, nor the quality of the surface to which the materials are applied. Thereby, 3M's warranty for 3M™ Liquid Pavement Marking (LPM) Series 1200 shall be limited to the quality of materials supplied to the applicator. 3M warrants that those materials shall be free of manufacturing defects and shall conform to 3M's manufacturing standards. 3M's only obligation shall be to provide replacement materials in the quantity proved to be defective. The applicator shall bear the application costs associated with repair or replacement of Series 1200 markings.

2) 3M assumes no responsibility for any injury, loss or damage arising out of the use of a product that is not of our manufacture. Where reference is made in our literature to a commercially available product made by another manufacturer, for example application equipment, it shall be the user's responsibility to ascertain its effectiveness and any precautionary measures for its use, outlined by its manufacturer.

3) 3M provides Technical Service with the goal of enabling users to achieve the best results possible. Training and recommendations provided by 3M Technical Service professionals are based upon our best knowledge, experience and judgement. However, statements or recommendations, technical or otherwise, not contained herein shall have no force or effect, unless in an agreement signed by officers of 3M.

4) 3M shall not be liable for any injury, loss or damage, direct or consequential, arising out of the use of or the inability to use Series 1200 markings or materials. Before using, the user shall determine the suitability of the product for his/her intended use, and the user assumes all risk and liability whatsoever in connection therewith.

Literature Reference

For additional information on 3M™ Liquid Pavement Marking Series 1200, refer to the following documents:

PB 3M™ All Weather Elements

IF 5.18	Guidelines for Pavement Markings Applications in Grooved Pavement Surfaces for 3M™ Stamark™ Pavement Marking Tape and 3M™ Liquid Pavement Markings
IF 5.20	Application Guidelines for 3M™ Liquid Pavement Markings Series 1000 and 1200
	3M™ Liquid Pavement Marking Safe Handling Procedures

FOR INFORMATION OR ASSISTANCE CALL:
1-800-553-1380

IN CANADA CALL:
1-800-265-1840

Internet:
www.3M.com/tss

3M

Traffic Safety Systems Division
3M Center, Building 235-3A-09
St. Paul, MN 55144-1000
1-800-553-1380
www.3M.com/tss

3M Canada Company
P.O. Box 5757
London, Ontario N6A 4T1
1-800-3MHELPS

3M México, S.A. de C.V.
Av. Santa Fe No. 55
Col. Santa Fe, Del. Alvaro Obregón
México, D.F. 01210

Bolger 10110363
Electronic Only