

Transportation Safety Division

3M™ All Weather Paint Application Guidelines for Elements and Glass Beads on a High-Build Waterborne Traffic Marking Paint

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1 Description

3M All Weather Paint is a traffic paint system consisting of high-build waterborne paint and 3M Connected Roads All Weather Elements (“Elements”). 3M All Weather Paint incorporates a new optical technology intended for use with high-build waterborne traffic marking paint. The system also utilizes second drop glass beads to produce pavement markings.

1.1 3M Connected Roads All Weather Elements

Elements consist of an outer layer of microcrystalline ceramic beads partially embedded into composite cores to provide optimal performance under dry and/or wet conditions. Elements are specifically treated for application onto paint as the first drop of a double-drop system. Elements are visible when dry, during rainfall, and after rainfall, providing visibility to motorists under dry and wet weather conditions.

1.2 Paint

3M All Weather Paint is manufactured with a high-build polymer emulsion. 3M All Weather Paint is ideal for situations where existing waterborne paint application equipment is available. All weather visibility, ease of clean-up, and application frequency reduction, which may help enhance worker safety and reduce disposal costs, are inherent features of 3M All Weather Paint.

1.3 Second Drop Glass Beads

A second drop of glass beads is necessary to improve the durability of the finished marking and increase visibility during dry conditions. Improvements in dry reflectivity can be expected as the size and quality of the second drop beads are increased.

2 Application

Proper application is essential for the successful completion of a pavement marking project. Following the application procedure described below will contribute significantly to the success of your 3M All Weather Paint pavement marking project.

2.1 Temperature

Only apply 3M All Weather Paint, Elements, and glass beads when road and air temperatures are above 50 °F, rising, and expected to be >50 °F (10 °C) for a minimum of 6 hours after application. Overnight temperatures must not fall below 35 °F (2 °C) following application, otherwise the cure and durability of the high-build emulsion will be compromised.

2.2 Moisture

Road surfaces must be clean and dry prior to road marking application. Markings shall be applied when ambient relative humidity is 85% or lower and it must remain below 85% for 6 hours following application. To prevent wash-out, paint must have sufficient time to dry per the manufacturer's instructions prior to a rain event.

After periods of prolonged rainfall, verify that the pavement is dry prior to application.

2.3 Oil, Debris, and Dust

The pavement surface must be free of oil, dirt, dust, grease, and all other similar foreign materials at the time of application.

2.4 New Portland Cement Concrete

Curing compounds on new Portland Cement Concrete must be completely removed prior to the application of paint. Sandblasting, shotblasting, and grinding are acceptable methods to use to remove curing compounds.

New concrete typically has a weak surface layer of a powder-rich Portland cement material, known as laitance, on its top surface. Even if a new concrete surface has not been treated with a curing compound, the new surface still must be prepared using a grinder, sandblaster, or shotblaster to remove the layer of laitance and expose a solid concrete surface with better surface integrity.

2.5 New Asphalt Cement Concrete

New asphalt should, ideally, be allowed to age several months before being striped with 3M All Weather Paint.

2.6 Paint Thickness and Reflective Media Application Rates

Applying 3M All Weather Paint to the proper thickness and using correct reflective media application rates are essential to achieve optimally performing finished markings. Paint should be applied to a minimum wet thickness of 25 mils

To check paint thickness, apply a test line to an aluminum panel, then test the line with a wet film thickness gauge.

Elements and glass bead application rates are shown in Tables 1, 2 and 3.

Table 1. 3M Connected Roads All Weather Elements application rates for smooth surfaces.

Units	Minimum for Smooth Surface
Pounds per 4-inch lineal foot	0.009
Pounds per mile, 4-inch width	46.5
Grams per 4-inch lineal foot	4
Grams per square foot	12
Grams per square meter	130
Pounds per gallon - 20 mils ~240 ft/gal	2.1
Pounds per gallon - 25 mils ~190 ft/gal	1.7
Pounds/100 Sq ft	2.6

Table 2. Glass bead application rates.

Units	Glass Bead
Grams per 4-inch linear foot	15
Grams per square foot	45
Grams per square meter	490
Pounds per 4-inch linear foot	0.033
Pounds per mile, 4-inch width	170
Pounds per gallon applied to wet thickness of 25 mils (190 theoretical feet per gallon)	5.3 lbs/gal

Table 3. Elements application rates for improved durability.

30 mils Application Parameters		
	English	Metric
Elements Drop Rate for Rough or Open Pavement Surfaces	10+ grams/foot of linear 4-inch line equals 30+ grams/ft ²	322+ grams/m ²
Glass Bead Drop	15 grams/foot of linear 4-inch line equals 45 grams/ft ²	483 grams /m ²
Paint Applied Thickness ^a -Wet	30 mils	762 Microns
Approximate Paint Applied Thickness -Dry	18 mils	457 Microns
Paint Coverage at 30 mils wet, 18 mils dry Paint Coverage at 762 micron wet, 457 microns dry	160 feet of 4-inch line per gallon equals 53.3 ft ² /gallon	4.95 m ² /gallon or 1.31 m ² /L

- a. Increased paint usage may be necessary to compensate for increased surface area characteristic of rough or open pavement surfaces. Please contact 3M Pavement Marking Technical Service for more details when increased paint thickness is necessary.

2.7 Existing Pavement Markings

3M All Weather Paint may be applied over a variety of existing pavement markings. The user should verify that existing markings are securely adhered to the pavement prior to application of paint, Elements, and second drop glass beads. There is no need to grind off existing well-adhered pavement markings prior to applying 3M All Weather Paint.

2.8 General Equipment Operating Procedures

Maintain spray guns, bead and Elements guns, paint trucks, and other paint equipment in good working order both before and during application to reduce chances for application problems. Equipment used for 3M All Weather Paint applications shall be capable of producing markings that meet the specifications contained herein using the materials specified in Sections 1.1, 1.2, and 1.3.

Mobile truck mounted applicators shall be capable of traveling at uniform, predetermined speeds over variable road grades to produce uniform applications of striping materials, following straight lines, and making normal curves in true arcs. Mobile truck applicators shall be capable of air blasting the pavement, applying the stripe, and immediately dropping Elements and glass beads in a single pass at speeds of up to 8 mph (13 km/hr).

Walk-behind cart applicators shall be capable of uniform applications of striping material at walking speeds, following straight lines, and making tight turns, symbols, and legends. Mobile equipment must be available to air blast application area immediately prior to application. Walk-behind carts shall be capable of applying liquid binder and immediately dropping Elements and glass beads, in a single pass and at walking speeds.

2.9 Gradation of the Second Drop of Glass Bead

The gradation of the second drop used must be within the limits presented in Table 8.

Table 4. Gradation of second drop glass beads.

Common Bead Types with Liquid Pavement Markings Bead Gradations - Mass Percent Passing (ASTM D1214)			
US Mesh	Micron	Missouri Specification Type P ^a	Utah Performance Specification
14	1410		
18	1000		65-80
20	850	90-97	
30	600	60-87	0-30
40	425		
50	300	0-15	0-5
70	212	0-5	

- a. A minimum of 15% of the total weight of beads shall be from direct melt glass. All +30 US Mesh beads shall be 85% minimum rounds and have minimum crush strengths of 30 lbs. in accordance with ASTM D1213

2.10 Quality of Second Drop Glass Beads

The required glass beads should have an index of refraction of 1.5 when tested by the immersion method at 77 °F (25 °C). The glass beads shall be surface treated for optimal performance with waterborne traffic marking paint. The glass beads shall have an overall minimum of 70% Rounds as measured according to ASTM D1155. The surfaces of the glass beads shall be free of pits and scratches. The glass beads retained on a #40 U.S. Mesh Sieve (425 microns) shall have minimum crush strength of 30 pounds, in accordance with ASTM D1213.

2.11 Application Record

Application record cards should be placed on the surface to be marked at locations where new pavement markings are to be applied. Tape application cards to the road using duct tape (Figure 1). Retrieve cards after the marking applicator has passed over them and the paint has cured. Orient each application card on the road such that the long direction of the card is parallel to the direction of paint application.



Figure 1. Application card after marking application.

Application cards serve as a record of each application and are useful for identifying problems that may have occurred during the application.

Application cards are available from 3M and can be requested by calling 3M Technical Service at 1-800-553-1380.

3 Storage and Handling

All vehicles with 3M All Weather Paint components on board must have MSDS sheets available for each component being transported. Store 3M All Weather Paint components indoors in a cool, dry, well ventilated area.

Use materials within one year of date of receipt. Paint must not be allowed to freeze.

4 Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Safety Data Sheets (SDS) and Article Information Sheets for important health, safety, and environmental information. To obtain SDSs and Article Information Sheets for 3M products, go to [3M.com/SDS](http://www.3M.com/SDS), contact 3M by mail, or for urgent requests call 1-800-364-3577.

5 Other Product Information

Always confirm that you have the most current version of the applicable product bulletin, information folder, or other product information from 3M's Website at <http://www.3M.com/roadsafety>.

For situations not specifically covered in this document, and for any other question regarding 3M All Weather Paint application, it is the responsibility of the installer to contact the appropriate 3M sales representative or 3M Application Engineer at 1-800-533-1380 for guidance.

6 Literature References

3M IF 5.23	3M™ Connected Roads All Weather Elements Application Guidelines
3M PB AWP	3M™ All Weather Paint
3M PB AWT	3M™ All Weather Thermoplastic
3M PB CR AWE	3M™ Connected Roads All Weather Elements

ASTM Test Methods are available from ASTM International, West Conshohocken, PA.

For Information or Assistance

Call: 1-800-553-1380

In Canada Call:

1-800-3M HELPS (1-800-364-3577)

Internet:

<http://www.3M.com/roadsafety>

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