

Transportation Safety Division

3M™ All Weather Paint

Product Bulletin AWP
April 2020

Replaces Product Bulletin All Weather Paint Dated January 2010

1 Description

3M™ All Weather Paint (“AWP”) is a traffic paint system consisting of high-build waterborne paint, 3M Connected Roads All Weather Elements (“Elements”) and second drop glass beads. AWP incorporates an optical technology intended for use on high-build waterborne traffic marking paint and utilizes second drop glass beads to produce pavement markings. Designed for use as maintenance markings on secondary highways, AWP provides the highest level of wet reflective performance for a drop-on bead system.

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 the high-build paint, as the first drop of a double-drop system. Elements are visible when dry, during rainfall, and after rainfall, providing marking visibility for motorists under all weather conditions.

1.2 Paint

The paint component of AWP is manufactured with a high build polymer emulsion. All weather visibility, ease of clean-up, enhanced worker safety, and reduced disposal costs are inherent features of AWP.

AWP is an ideal pavement marking system for situations where waterborne paint equipment is already available.

1.3 Second Drop Glass Beads

A second drop of glass beads is used to improve the durability of the finished marking and provide increased visibility during dry conditions. Improved dry reflectivity can be expected as the size and quality of the second drop bead is increased.

2 Specifications

2.1 Retroreflectivity

Average initial coefficient of retroreflected luminance values are shown in Table 1. Some variance should be expected across applications, and all values represent initial properties unless otherwise noted.

Table 1. Typical average initial coefficients of retroreflected luminance^a [mcd/m²/lx].

Property/test method	Series Dry, Dry E, Dry M	Series 50, 50E, 50M	Series 90, 70E, 70M	Series Wet, Wet E, Wet M
Retroreflectivity, Dry Average ASTM E1710	White: 1250 Yellow: 900	White: 700 Yellow: 525	White: 500 Yellow: 375	N/A
Retroreflectivity, Wet Recovery Average ASTM E2177	N/A	White: 275 Yellow: 225	White: 375 Yellow: 300	White: 400 Yellow: 325
Retroreflectivity, Wet Continuous Average ASTM E2832	N/A	White: 200 Yellow: 150	White: 275 Yellow: 225	White: 300 Yellow: 250

a. Typical retroreflectivity results represent average performance for smooth pavement surfaces. Results may vary due to differences in pavement type and surface roughness. Increased Elements drop rate may be necessary to compensate for increased surface area characteristic of rough pavement surfaces. Wet retroreflectivity testing of markings applied in grooved or recessed surfaces is difficult since water pools in recesses. In such cases, consider installing sections of pavement markings for testing on either a smooth section of the pavement surface, or on rigid panels (50 mil aluminum). If markings are applied to panels, allow them to cure, then move them carefully for retroreflectivity testing - make sure to protect the optics when transporting.

Initial retroreflective performance of AWP pavement markings shall be measured within 7 days of application.

3 Installation

The installer of the markings is required to comply with the following installation conditions and procedures.

3.1 Weather and Pavement Conditions

AWP should be applied within guidelines and application criteria established in [3M Information Folder 5.22](#). For smooth dense pavement surfaces optimal performance is achieved when the paint is applied at a wet thickness of 25 mils (635 micron).

3.2 Equipment

AWP must be installed using a double-drop bead system. Elements are installed as the first drop of the two-drop system. Elements must be installed at a truck speed of 8 mph or less to prevent rolling and paint pick-up by the Element. Contact your 3M Application Engineer for additional information regarding equipment modifications.

3.3 Paint Application Rates

Paint should be applied at a wet thickness of 25 mils (635 micron) and one gallon of paint will cover a distance of 190 feet (58 meters) with a four inch (100 mm) line on a smooth surface. It may be necessary to increase paint usage rate for rough or open pavement surfaces.

3.4 Marking Dimensions

Marking dimensions shall conform to the Manual on Uniform Traffic Control Devices and project specifications.

3.5 Placement of Elements and Beads

Elements and beads must be dropped into waterborne paint such that the Elements and beads do not roll, thus ensuring that their exposed portions are free of paint material.

3.6 Elements Application

Minimum Elements application rates for smooth or densely-packed pavement surfaces are presented in Table 2. The stated application rates provide good initial retroreflectivity and match the longevity, or restripe frequency, of pavement marking paint. More heavily traveled roads will require greater quantities of Elements to achieve similar longevities.

Rough pavement surfaces (open-graded mixes, large stone mixes, etc.) can have up to 50% more surface area than smooth surfaces. As a result, rough pavement surfaces require greater quantities of marking materials (paint, Elements, and second-drop beads) than smooth surfaces to achieve similar coverages.

Table 2. 3M Connected Roads All Weather Elements application rates for high build paint.

Units	Minimum for Initial Performance or Temporary Markings on Smooth Surface	Minimum for More Durable Markings on Smooth Surface
Pounds per 4-inch lineal foot	0.009	0.018
Pounds per mile, 4-inch width	46.5	93
Grams per 4-inch lineal foot	4	8
Grams per square foot	12	24
Grams per square meter	130	260
Pounds per gallon - 25 mils ~190 ft/gal	1.7	3.4
Pounds/100 Sq ft	2.6	5.2

3.7 Second Drop Glass Beads

A second drop of glass beads is necessary to improve physical characteristics, durabilities of finished markings, and assure expected track-free times. Glass beads usually provide some measure of increased visibility during dry conditions as well.

Many different glass bead gradations are currently used for pavement markings. Table 3 presents glass bead gradations appropriate for AWP applications.

Table 3. Typical gradations of second drop glass beads.

Common bead types with liquid pavement markings Bead gradations - mass percent passing (ASTM D1214)			
US Mesh	Microns	Missouri Specification Type P ^a	18/50 (Utah) Performance Specification
12	1700		
14	1410		
16	1180		
18	1000		65–80
20	850	90–97	
25	710		
30	600	60–87	0–30
40	425		
50	300	0–15	0–5
70	212	0–5	
80	180		
100	150		

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

Typical glass bead application rate ranges are shown in Table 4.

Table 4. Typical glass bead application rates.

Binder Type Units	High Build Waterborne Paint
Pounds per 4" lineal foot	0.026–0.053
Grams per 4" lineal foot	12–24
Pounds per gallon - 25 mils ~190 ft/gal	5.1–10.2
Pounds/100 Sq ft	7.94–15.87
Preferred bead type	Missouri Type P or 18/50 (Utah)

3.8 Quality of Second Drop Glass Beads

The required glass beads shall have an index of refraction of 1.5 when tested by the immersion method at 25 °C (77 °F). The glass beads shall be surface treated for optimal performance with the liquid binder traffic marking. The glass beads shall have a 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 a minimum crush strength of 30 pounds, in accordance with ASTM D1213.

4 Storage

Store AWP components in a cool, dry, well ventilated area indoors. Use within one year of receipt. Follow glass bead manufacturer and paint manufacturer recommendations for storage. Paint must not be allowed to freeze.

5 Health and Safety Information

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

6 Quality Policy and Warranty Information

6.1 3M Basic Product Warranty

3M has no control over application methods or the quality of the surface to which materials are applied. Therefore, 3M's warranty for AWP shall be limited to the quality of materials supplied.

AWP is warranted ("Basic Warranty") to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in this product bulletin. If AWP is proven not to have met the Basic Warranty on the shipment date, then a buyer's exclusive remedy, and 3M's sole obligation, at 3M's option, will be refund or replacement of AWP.

6.2 Disclaimer

THE 3M WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING OR OF PERFORMANCE, CUSTOM, OR USAGE OF TRADE.

6.3 Limitation of Liability

Except for the limited remedy stated above, and except where prohibited by law, 3M will not be liable for any loss or damage arising from the use of or the inability to use the Elements or any 3M product, whether direct, indirect, special, incidental, or consequential damages (including but not limited to lost profits, business, or revenue in any way), regardless of the legal theory asserted including warranty, contract, negligence, or strict liability. Before using, the user shall determine the suitability of Elements for his/her intended use and the user assumes all risk and liability whatsoever in connection therewith.

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7 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>.

8 Literature References

- [3M IF 5.22](#) All Weather Paint Application Guidelines for Elements and Glass Beads on a High-Build Waterborne Traffic Marking Paint
- [3M IF 5.23](#) 3M™ Connected Roads All Weather Elements Application Guidelines for 3M Connected Roads All Weather Elements
- [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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