

9710202 PAVEMENT MARKING MATERIALS  
COMMENTS FROM INTERNAL/INDUSTRY REVIEW

Paul Gentry  
414-4118  
[paul.gentry@dot.state.fl.us](mailto:paul.gentry@dot.state.fl.us)

Comments: (12-20-18)

1. 971-2.2 Specific Properties, FM 5-620 is not showing as an active Florida Method to review on the SMO website. How can one review this criteria change for Specific Properties is unable to read? Is it still being written?

Response: FM 5-620 draft was written to establish computerized optical method as test method for gradation and roundness. After further consideration, we have determined to use AASHTO PP74. AASHTO PP74 has been used for National Transportation Product Evaluation Program (NTPEP) evaluations, other DOT's and glass bead industry.

2. 971-2.4 Containers; why the strike out for 2000 pound triwall boxes. These totes are the "primary" method of sale for glass spheres to be used on paint and thermos longliners. Check the APL Spec. 971 pictures and labels. Change this to reflect 50 lb. bags or 2000 - 2200 lb. triwall boxes.

Response: Thank you for the recommendation. We will keep triwall boxes.

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Ananth Prasad  
850-942-1404  
[aprasad@ftba.com](mailto:aprasad@ftba.com)

Comments: (1-3-18)

1. Reference to FM 5-620 for Roundness----we need to see FM 5-620 / cannot locate the test method

Response: FM 5-620 draft was written to establish computerized optical method as test method for gradation and roundness. After further consideration, we have determined to use AASHTO PP74. AASHTO PP74 has been used for National Transportation Product Evaluation Program (NTPEP) evaluations, other DOT's and glass bead industry.

2. Reference to FM 5-620 Gradation ----we need to see FM 5-620 / cannot locate the test method

Response:

3. Packaging: They need to allow 50lb bags, bulk triwall boxes and bulk supersack packaging. No state specification that we are aware of specifies only 50lb bags ? I believe in the fact the current FLDOT maintenance forces and specification utilize bulk packaging containers.

Response: Thank you for the recommendation. We will keep triwall boxes.

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Jerry Britt, Ennis-Flint  
 601-757-7008  
 jerry@ennisflint.com

Comments: (1-7-18)

1. What is FM 5-620? I assume it is a Florida test method, but I do not find this method listed on the web site under FDOT Test Methods. I would question referencing a test method that is not under publication and available for review.

Property	Test Method	Specification
Roundness*	ASTM D1155 FM 5-620	Min: 70% by weight
Roundness**	ASTM D1155 FM 5-620	Min: 80% by weight
Refractive Index*	Becke-Line Method (25+/-5C)	1.5 minimum
Refractive Index**	Becke-Line Method (25+/-5C)	1.9 minimum

\*Type 1, 3, 4 and 5 beads  
 \*\*High index beads

Sieve Size	Percent by Mass Passing Designated Sieve (ASTM D1214 FM 5-620)				
	Grading Designation				
	Type 1 (AASHTO)	Type 3 (FP-96)	Type 4 (FP-96)	Type 5 (FP-96)	High Index
No. 8				100	
No. 10			100	95-100	
No. 12		100	95-100	80-95	
No. 14		95-100	80-95	10-40	
No. 16	100	80-95	10-40	0-5	100
No. 18		10-40	0-5	0-2	
No. 20	95-100	0-5	0-2		95-100
No. 25		0-2			
No. 30	75-95				55-85
No. 40					15-45
No. 50	15-35				0-5
No. 80					
No. 100	0-5				

RECOMMENDATION: I recommend that FDOT retain the current ASTM D1155 test method or reference the AASHTO method for testing size and roundness, "AASHTO PP 74 - Standard Practice for Determination of Size and Roundness of Glass Beads Used in Traffic Markings by Means of Computerized Optical Method". This AASHTO method is currently active and being used by several state DOTs for testing and is in general use by the glass bead manufacturers.

Response: FM 5-620 draft was written to establish computerized optical method as test method for gradation and roundness. After further consideration, we have determined to use AASHTO PP74. AASHTO PP74 has been used for National Transportation Product Evaluation Program (NTPEP) evaluations, other DOT's and glass bead industry.

2. 971-2.4 Containers: A 2000-pound triwall boxes is a standard packaging type for glass beads and is preferred by some customers. It provides improved productivity in loading beads into striping equipment and is less likely to present opportunities of paper contamination in the loading process.

→ **§71-2.4-Containers:** The spheres shall be furnished in new 50-pound moisture-proof bags or 2000-pound triwall boxes. All containers shall meet Interstate Commerce Commission requirements for strength and type.

**RECOMMENDATION:** I recommend that FDOT continue to allow the use of Triwall boxes. Additionally, we would recommend that you open the spec up to allow for any packaging that is agreed to between the manufacturer and supplier. This could include, for example 50-pound bags, 500 lb. fiber drums, triwall boxes, plastic tote containers, etc.

**Response:** Thank you for the recommendation. We will keep triwall boxes. We will consider other containers in the future.

3. 971-5.2: The table of values are not consistent in the degree of precision.

Component	Test Method	White	Yellow
Binder	AASHTO-T250	20.0% minimum	20.0% minimum
TiO <sub>2</sub> , Type II Rutile	ASTM-D476	10.0% minimum	-
Glass Spheres	AASHTO-T250	40.0% minimum	40.0% minimum
Yellow Pigment		-	% minimum per manufacturer
Calcium Carbonate and Inert Filler (-200 mesh sieve)		30.0% maximum	37.5% maximum

Percentages are by weight.

**RECOMMENDATION:** I recommend that the specified values be consistent in the degree of precision. If the spec is written for 40% Glass Spheres then make the adjustment to 20% binder, 10% TiO<sub>2</sub>, and 30 – 38% Calcium Carbonate and Inert Filler.

**Response:** Thanks for the recommendation. Intent was to change Glass Spheres to nearest whole number to be consistent with AASHTO M249. However, is reasonable to report all values to nearest whole number as follows: 20% Binder, 10% TiO<sub>2</sub>, 40% glass beads, 30% Calcium Carbonate and Inert Filler for White and 37% for Yellow. Specification will be updated to reflect this.

4. 971-9.2: Although apparently not a change there is no minimum requirement for intermix glass beads for profile thermoplastic. So theoretically a supplier could provide a product with 0% intermix beads. This eliminates the ability of the product to provide long term retroreflectivity during the life of the marking.

Component	Test Method	White	Yellow
Binder	AASHTO-T250	20.0% minimum	20.0% minimum
TiO <sub>2</sub> , Type II Rutile	ASTM-D476	10.0% minimum	-
Reflective Elements	AASHTO-T250	% minimum per manufacturer	% minimum per manufacturer
Yellow Pigment		-	% minimum per manufacturer
Calcium Carbonate and Inert Filler (-200 mesh sieve)		% minimum per manufacturer	% minimum per manufacturer

Note: Percentages are by weight.

**RECOMMENDATION:** I recommend that a minimum of 40% AASHTO Type 1 Intermix glass beads be required. This will insure that retroreflectivity is provided during the life of the marking.

Response: Thank you for your recommendation. At this moment, we are not submitting changes to this section. However, we will consider your recommendation and will evaluate this for future specification revision.

5. 971-10.2: Another option for the testing of both binder and reflective elements (i.e. Glass beads) is “ASTM D4797 Standard Test Methods for Gravimetric Analysis of White and Yellow Thermoplastic Pavement Marking”. FDOT may want to consider referencing this ASTM method for the testing of both Binder and Glass Beads as this would reference a method that is reviewed and updated on a 5-year cycle to keep current with industry changes. There are several sections in the spec that reference AASHTO T-250 for the testing of Binder and Reflective Elements

Component	Test Method	White
Binder	AASHTO T250	18.0% minimum
TiO <sub>2</sub> , Type II Rutile	ASTM D476	10.0% minimum
Reflective Elements	AASHTO T250	30% minimum per manufacturer
Skid-Resistant Elements		10% minimum per manufacturer
Note: Percentages are by weight		

Response: Thank you for the recommendation. While AASHTO T250 refers to ASTM D4797 it does include slight modifications to sample preparation. However, after further evaluation of test procedure in ASTM D4797, FDOT consider this as acceptable test method for determination of % Binder and % Glass Beads.

5. (comment 1-8-19) 971-2.4 Glass Spheres: A form of packaging that is becoming more popular around the country is plastic totes. The packaging can be returned to the glass bead manufacturer after use and be reused multiple times eliminating waste that is inherent in standard packaging which includes paper bags, pallets, shrink wrap, etc. Plastic tote packaging provides a totally "green" option for the packaging of glass beads. This packaging type should be allowed.

Response: Thank you for the recommendation. We will keep triwall boxes.

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Jon Sproul  
931-388-5900  
[jon.sproul@swarco.com](mailto:jon.sproul@swarco.com)

Comments: (1-3-19)

1. Reference to FM 5-620 for Roundness----we need to see FM 5-620 / cannot locate the test method Reference to FM 5-620 Gradation ----we need to see FM 5-620 / cannot locate the test method Packaging:

Response: FM 5-620 draft was written to establish computerized optical method as test method for gradation and roundness. After further consideration, we have determined to use AASHTO PP 74. AASHTO PP 74 has been used for National Transportation Product Evaluation Program (NTPEP) evaluations, other DOT's and glass bead industry.

2. Need to allow 50lb bags, bulk triwall boxes and bulk supersack packaging. No state specification that we are aware of specifies only 50lb bags ? We believe in the fact the current FLDOT maintenance forces and specification utilize bulk packaging containers

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