

SECTION B.
CITY OF HOUSTON
TECHNICAL SPECIFICATIONS
FOR
THERMOPLASTIC PAVEMENT MARKING COMPOUND MATERIALS
FOR THE
PUBLIC WORKS & ENGINEERING DEPARTMENT

1.0 PURPOSE FOR HOT APPLIED THERMOPLASTIC PAVEMENT MARKING MATERIALS (TPMM):

This specification covers a durable retro-reflective pavement marking material suitable for use as pavement delineation marking that can be used on roadways, intersections, airports, or parking lots.

2.0 THERMOPLASTIC PAVEMENT MARKING MATERIALS (TPMM) COMPOUND SPECIFICATION:

- 2.1 Provide TPMM compounded for traffic marking applied to asphaltic or Portland cement concrete surfaces.
- 2.2 Clearly mark each bag to indicate color, weight, pigment type (for yellow only), and lot or batch number. (A lot or batch is each individual mix or blend that produces a finished product.)
- 2.3 Each bag must contain 50 lbs. of material.
- 2.4 The bag must be composed of a compatible material to allow the placement of the bag and its contents into the melter.
- 2.5 Notify the City if production lots exceed 4,500 lbs.

3.0 FINISHED PRODUCT REQUIREMENTS:

3.1 Physical Characteristics:

Unless otherwise specified, the finished TPMM must be a free flowing granular material. The material must remain in the free flowing state in storage for a minimum of six (6) months when stored at temperatures of 100° F or less. Produce material that is readily sprayable through nozzles commonly used on thermoplastic spray equipment at temperatures between 400° F and 425° F.

3.2 Toxicity:

At temperatures up to and including 445° F, materials must not give off fumes that are toxic or otherwise injurious to persons, animals, or property.

3.3 Uniformity:

Manufacture material so that, when sampled in accordance with TxDOT's testing procedures, any 100-g sample will be representative of the batch or lot of material.

3.4 Temperature versus Characteristics:

The temperature versus viscosity characteristics of the material in the plastic state must remain constant throughout up to four (4) reheatings to 400° F and from batch-to-batch.

3.5 Chemical Resistance:

Produce material that is unaffected by contact with sodium chloride, calcium chloride or similar chemical on the roadway surface; by contact with the oil content of pavement materials; or by contact from oil droppings from traffic.

3.0 FINISHED PRODUCT REQUIREMENTS (CONTINUED):

3.6 Softening Point:

The material must not soften at 194° F when tested by the ring and ball method (ASTM E28).

3.7 Color:

3.7.1 The daytime CIE chromaticity coordinates of the material, when determined in accordance with Tex 839-B, must fall within an area having the following corner points:

Table 1

Daytime CIE Chromaticity Coordinate Corner Points (TPMM)

	1		2		3		4		Brightness
	x	y	x	y	x	y	x	y	Y
White	0.290	0.315	0.310	0.295	0.350	0.340	0.330	0.360	Min. 65
Yellow	0.435	0.429	0.510	0.489	0.460	0.400	0.560	0.440	30 - 60

3.7.2 The white and yellow material must meet the specified color requirements listed in Table 1 for each color before and after 70 hr. for white and 500 hr. for yellow of Weather-O-meter exposure. Weather-O-meter exposure will be in accordance with ASTM G 155 using Exposure Cycle 1 with a quartz inner filter glass and Type "S" Borosilicate outer filter glass.

3.7.3 The nighttime CIE chromaticity coordinates for yellow thermoplastic, when determined utilizing a retro-reflect-o-meter capable of measuring night color of pavement markings in accordance with ASTM E1710, must fall within an area having the following corner points during the life of the stripe:

Table 2

Nighttime CIE Chromaticity Coordinate Corner Points (TPMM)

	1		2		3		4		5	
	x	y	x	y	x	y	x	y	x	y
Yellow	0.53	0.47	0.49	0.44	0.50	0.42	0.51	0.40	0.57	0.43

4.0 GRADED GLASS BEADS:

- 4.1 Provide glass traffic beads used in the formulation meeting the requirements for AASHTO M247 Type I.
- 4.2 Binder: The binder must consist of a mixture of resins, at least one of which is a solid at room temperature and high boiling point plasticizers. At least 1/3 of the binder composition must be a maleic-modified glyceryl ester of rosin and must be no less than 8% by weight of the entire material formulation.
- 4.3 Silica: The total silica used in the formulation must be in the form of glass traffic beads.

TECHNICAL SPECIFICATIONS FOR THERMOPLASTIC PAVEMENT MARKING COMPOUND MATERIALS FOR THE PUBLIC WORKS AND ENGINEERING DEPARTMENT, (CONTINUED):

5.0 PIGMENTS:

5.1 Prime:

5.1.1 The white pigment must be a rutile titanium dioxide meeting the standards of ASTM D 476, Type V.

5.1.2 The yellow pigment must be heat-resistant and weather-stable. The yellow pigment may be either a double-encapsulated medium chrome yellow or a lead-free, organic yellow pigment (C.I. Pigment Yellow 83, opaque version). Do not mix pigment types within a batch. Alternate pigments other than those listed must be evaluated and approved prior to use in the formulation.

5.2 Filler:

The filler pigment must be calcium carbonate of 95% purity.

6.0 SKID RESISTANCE:

6.1 TPMM must have a loss between 4.0 and 12.0g when tested for abrasion in accordance with Tex-851-B using the following test parameters:

6.1.1 Test Distance – 5 inches

6.1.2 Blast Pressure – 40 psi

6.1.3 Sample Angle - 10°

6.1.4 Blast Media – 1200 g

7.0 ENVIRONMENTAL RESISTANCE:

The molten material must not break down or deteriorate when temperatures are held at 400°F for 4 hours.

8.0 RETRO-REFLECTIVITY:

8.1 The material, when applied in accordance with manufacturer's guidelines, must demonstrate a uniform level of sufficient nighttime retroreflection when tested in accordance to ASTM E 1710. The applied material must have an

8.2 initial minimum intensity reading of $500 \text{ mcd}\cdot\text{m}^{-2}\cdot\text{lx}^{-1}$ for white and $300 \text{ mcd}\cdot\text{m}^{-2}\cdot\text{lx}^{-1}$ for yellow as measured with an LTL-2000 or LTL-X Retro-Reflect-O-Meter.

8.3 Note: Initial retro-reflection is affected by the amount of heat applied during installation. When ambient temperatures are such that greater amounts of heat are required for proper installation, initial retroreflection levels may be affected.

9.0 GUARANTEE-WARRANTEE

There shall be a minimum two (2) year guarantee/non-prorated warrantee on workmanship, material, and durability under normal urban traffic conditions.

TECHNICAL SPECIFICATIONS FOR THERMOPLASTIC PAVEMENT MARKING COMPOUND MATERIALS FOR THE PUBLIC WORKS AND ENGINEERING DEPARTMENT, (CONTINUED):

10.0 FORMULA (TPMM):

Table 3

White	% by Weight	Yellow	% by Weight
Binder	20 min.	Binder	20 min.
Titanium Dioxide	12 - 15	C.I. Pigment Yellow 83 or medium-chrome yellow	1.5 min. 5 min.
Calcium Carbonate	20 - 42	Calcium Carbonate	20 - 42
Glass Traffic Beads	30 - 45	Glass Traffic Beads	30 - 45
Total	100	Total	100

Note 1 – The above requirement will be determined by testing in accordance with Tex-863B.

Note 2 – Alternate pigments and pigment loading for yellow formulations may be considered if the City evaluates and approves the alternate formulation prior to use.

11.0 TECHNICAL SERVICES:

The successful bidder shall provide technical services as required.

12.0 PERFORMANCE:

The thermoplastic pavement marking materials shall meet the City specifications and be approved for use by the appropriate City department.

13.0 PRICE ADJUSTMENT:

13.1 Direct Cost:

In this section means Supplier's cost from the manufacturer of any item or if Supplier is the manufacturer, the cost of raw materials required to manufacture the item, plus costs of transportation from manufacturer to Supplier and Supplier to the City.

13.2 Price Decreases:

13.2.1 If the Supplier's Direct Cost **decreases** at any time during the full term of this award, Supplier shall **immediately** pass the decrease on to the City and lower its prices by the amount of the decrease in Direct Cost.

13.2.2 Supplier shall notify the City Purchasing Agent of price decreases in the same way as for price increases set out below. The price decrease shall become effective upon City Purchasing Agent's receipt of Supplier's notice.