

Item P-620

Runway and Taxiway Marking

DESCRIPTION

620-1.1 This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer/Owner. The terms “paint” and “marking material” as well as “painting” and “application of markings” are interchangeable throughout this specification.

MATERIALS

620-2.1 Materials acceptance. The Contractor shall furnish manufacturer’s certified test reports for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. The reports can be used for material acceptance or the Engineer/Owner may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer/Owner upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers 55 gallons or smaller for inspection by the Engineer/Owner. Material shall not be loaded into the equipment until inspected by the Engineer/Owner.

620-2.2 Marking materials. Paint shall be waterborne, in accordance with the requirements of paragraph 620-2.2a. Paint shall be furnished in yellow (33538 or 33655), white (37925) and black (37058) in accordance with Federal Standard No. 595.

a. Waterborne. Paint shall meet the requirements of Federal Specification TT-P-1952E, Type II. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis.

620-2.3 Reflective media. Glass beads shall meet the requirements for Federal Specification TT-B-1325D, Type III. Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

CONSTRUCTION METHODS

620-3.1 Weather limitations. The painting shall be performed only when the surface is dry and when the surface temperature is at least 45°F (7°C) and rising and the pavement surface temperature is at least 5°F (2.7°C) above the dew point or meets the manufacturer’s recommendations. Markings shall not be applied when the pavement temperature is greater than 130°F (55°C). Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns.

620-3.2 Equipment. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray.

620-3.3 Preparation of surface. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material that would reduce the bond between the paint and the pavement. The area to be painted shall be cleaned by waterblasting, shotblasting, grinding or sandblasting or by other methods as required to remove all contaminants without damage to the pavement surface. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the Engineer/Owner. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

Paint shall not be applied to Portland cement concrete pavement until the areas to be painted are clean of curing material. Sandblasting or high-pressure water shall be used to remove curing materials.

~~At least 24 hours prior to remarking existing markings, the existing markings must be removed such that 90% of the existing markings are removed with low (3,500-10,000 psi) waterblaster. After waterblasting, the surface shall be cleaned of all residue or debris either with sweeping or blowing with compressed air or both.~~

Prior to the initial application of markings, the Contractor shall certify in writing that the surface has been prepared in accordance with the paint manufacturer’s requirements, that the application equipment is appropriate for the type of marking paint and that environmental conditions are appropriate for the material being applied. This certification along with a copy of the paint manufacturer’s surface preparation and application requirements must be submitted and approved by the Engineer/Owner prior to the initial application of markings.

620-3.4 Layout of markings. The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans.

620-3.5 Application. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the Engineer/Owner/Owner. The edges of the markings shall not vary from a straight line more than 1/2 inch (12 mm) in 50 feet (15 m), and marking dimensions and spacings shall be within the following tolerances:

Dimension and Spacing	Tolerance
36 inch (910 mm) or less	±1/2 inch (12 mm)
greater than 36 inch to 6 feet (910 mm to 1.85 m)	±1 inch (25 mm)
greater than 6 feet to 60 feet (1.85 m to 18.3 m)	±2 inch (50 mm)
greater than 60 feet (18.3 m)	±3 inch (76 mm)

The paint shall be mixed in accordance with the manufacturer’s instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted. A period of 30 days shall elapse between placement of a bituminous surface course or seal coat and application of the paint.

Prior to the initial application of markings, the Contractor shall certify in writing that the surface has been prepared in accordance with the paint manufacturer's requirements, that the application equipment is appropriate for the marking paint and that environmental conditions are appropriate for the material being applied. This certification along with a copy of the paint manufacturer's application and surface preparation requirements must be submitted to the Engineer/Owner/Owner prior to the initial application of markings.

620-3.6 Test strip. Prior to the full application of airfield markings, the Contractor shall produce a test strip in the presence of the Engineer/Owner/Owner. The test strip shall include the application of a minimum of 5 gallons (4 liters) of paint and application of 35 lbs (15.9 kg) of Type I/50 lbs (22.7 kg) of Type III glass beads. The test strip shall be used to establish thickness/darkness standard for all markings. The test strip shall cover no more than the maximum area prescribed in Table 1 (e.g., for 5 gallons (19 liters) of waterborne paint shall cover no more than 575 square feet (53.4 m²).

**Table 1. Application Rates For Paint And Glass Beads
(See Note regarding Red and Pink Paint)**

Paint Type	Paint Square feet per gallon, ft²/gal (Sq m per liter, m²/l)	Glass Beads, Type III Pounds per gallon of paint-lb/gal (Km per liter of paint-kg/l)
Waterborne Type II	115 ft ² /gal max (2.8 m ² /l)	10 lb/gal min (1.2 kg/l)

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment should be performed.

All emptied containers shall be returned to the paint storage area for checking by the Engineer/Owner. The containers shall not be removed from the airport or destroyed until authorized by the Engineer/Owner.

620-3.7 Application--preformed thermoplastic airport pavement markings.

a. Asphalt and Portland cement. To ensure minimum single-pass application time and optimum bond in the marking/substrate interface, the materials must be applied using a variable speed self-propelled mobile heater with an effective heating width of no less than 16 feet (5 m) and a free span between supporting wheels of no less than 18 feet (5.5 m). The heater must emit thermal radiation to the marking material in such a manner that the difference in temperature of 2 inches (50 mm) wide linear segments in the direction of heater travel must be within 5% of the overall average temperature of the heated thermoplastic material as it exits the heater. The material must be able to be applied at ambient and pavement temperatures down to 35°F (2°C)

without any preheating of the pavement to a specific temperature. The material must be able to be applied without the use of a thermometer. The pavement shall be clean, dry, and free of debris. A non-volatile organic content (non-VOC) sealer with a maximum applied viscosity of 250 centiPoise must be applied to the pavement shortly before the markings are applied. The supplier must enclose application instructions with each box/package.

620-3.8 Protection and cleanup. After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose or unadhered reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the Engineer/Owner. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

TESTING REQUIREMENTS

ASTM C371	Standard Test Method for Wire-Cloth Sieve Analysis of Nonplastic Ceramic Powders
ASTM D92	Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
ASTM D711	Standard Test Method for No-Pick-Up Time of Traffic Paint
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM E2302	Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

MATERIAL REQUIREMENTS

ASTM D476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
40 CFR Part 60,	Appendix A-7, Method 24 Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings
29 CFR Part 1910.1200	Hazard Communication
FED SPEC TT-B-1325D	Beads (Glass Spheres) Retro-Reflective American Association of State Highway and Transportation Officials (AASHTO) M247 Standard Specification for Glass Beads Used in Pavement Markings
FED SPEC TT-P-1952E	Paint, Traffic and Airfield Marking, Waterborne Commercial Item Description A-A-2886B Paint, Traffic, Solvent Based
FED STD 595	Colors used in Government Procurement
AC 150/5340-1	Standards for Airport Markings

END OF ITEM P-620