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ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: FAA SPECIFICATION L-853, RUNWAY AND TAXIWAY CENTERLINE REFLECTIVE MARKERS

1. PURPOSE. This circular describes specification requirements for L-853, Runway and Taxiway Reflective Markers, for the guidance of the public.

2. DESCRIPTION OF SPECIFICATION. This specification establishes the performance and pertinent construction details for reflective markers used to delineate centerlines of airport runways and taxiways.

3. HOW TO OBTAIN THIS CIRCULAR. Additional copies of this circular, AC 150/5345-39, FAA Specification L-853, Runway and Taxiway Centerline Reflective Markers, may be obtained from the Department of Transportation, Distribution Unit, TAD-484.3, Washington, D.C. 20590.

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Initiated by: AS-580

1. SCOPE.

1.1 Scope.-The equipment covered by this specification consists of bidirectional reflective markers for delineating centerlines of airport runways and taxiways, or for marking apron surfaces. The reflective markers are small, low profile units designed for cementing in place on concrete or asphaltic surfaces. The reflective markers shall conform to one of the following types:

Type I - Bidirectional clear

Type II - Bidirectional red-clear

Type III - Bidirectional green

Type IV - Bidirectional yellow-clear

Type V - Bidirectional red

Type VI - Unidirectional green

2. APPLICABLE DOCUMENTS.

2.1 Military specifications.-The following Military Publications of the issue in effect on the date of Application For Qualification (paragraph 4.1) form a part of this specification to the extent specified herein:

MIL-C-25050 Colors, Aeronautical Lights and Lighting Equipment, General Requirements for

MIL-STD-129 Marking of Shipment and Storage

(Copies of the Military specification and standard may be obtained from the Commanding Officer, Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120).

3. REQUIREMENTS.

3.1 Performance requirements.

3.1.1 Optical performance.

3.1.1.1 Definitions.

3.1.1.1.1 Angle of divergence.-The angle formed by a ray of light from the light source to the reflective marker, and the returned ray from the marker to the measuring receptor.

3.1.1.1.2 Angle of incidence.-The angle formed by a ray from the light source to the marker, and the normal to the leading edge of the marker face.

3.1.1.1.3 Specific intensity.-The candlepower of the reflected light at a given divergence and incidence angle per footcandle at the reflector on a plane perpendicular to the incident light.

3.1.1.2 Minimum reflectance values.-The specific intensity of each reflective surface shall not be less than the values shown in the table below:

Incidence Angle Degrees	Divergence Angle Degrees	Specific Intensity			
		Clear	Yellow	Red	Green
0	0.2	3.0	1.5	0.6	1.0
20	0.2	1.2	0.60	0.24	0.42
0	0.5	1.7	0.85	0.34	0.60
20	0.5	0.68	0.34	0.14	0.24

3.1.1.3 Chromaticity requirements.-The chromaticity of the reflected light shall conform to the requirements of Specification MIL-C-25050 for Type I colors.

3.1.2 Environmental conditions.-Each type of reflective marker shall perform satisfactorily under the following conditions:

3.1.2.1 Temperature.-Any ambient temperature ranging from +65° C. to -43° C. (see paragraphs 4.1.2 and 4.1.3).

3.1.2.2 Humidity.-Any relative humidity up to 100 percent. (see paragraph 4.1.5).

3.1.2.3 Service.-The reflective marker shall be designed, constructed, and bonded to the surfaces of portland cement concrete or asphalt concrete pavements to withstand normal operations of aircraft and airport maintenance vehicles.

3.2 Design requirements.

3.2.1 General.-The shape of the reflective marker is optional. Shapes which in plan view appear as squares, circles, or regular polygons are considered best for this application. The area of the base shall not be less than 15 square inches and not more than 50 square inches. All exterior surfaces, except the base underside, shall be smooth. The bidirectional design shall incorporate retroreflectors in two opposing faces. Retroreflectors shall consist of a mosaic of retroreflecting elements.

3.2.2 Material.-All markers shall have a clean, flat, hard, rough-textured base surface to promote adhesive bonding. Adhesive material furnished with the marker shall meet the bond requirement in paragraph 4.1.5. The deviation of the base of the marker from a flat surface shall not exceed 0.05 inch.

3.2.3 Construction details.-The design of the marker shall be such that no portion of the unit will project more than 3/4-inch above the adjacent paved surfaces when the marker is installed in place. The retroreflector faces shall have maximum slopes of 30°. All edges and corners shall be rounded to radii of not less than 1/8-inch.

4. QUALITY ASSURANCE PROVISIONS.

4.1 Qualification testing.-The manufacturer shall furnish two copies of certified test reports, samples, and installation instructions for each type of reflective marker to the Federal Aviation Administration, Airports Service, Washington, D. C. 20590, for inspection, review, and approval in accordance with this specification. These tests may be witnessed by a representative of FAA, Airports Service. When approved, the name of the qualified manufacturer and a description of his equipment will be included in AC 150/5345-1B, Approved Airport Lighting Equipment. The manufacturer will bear all testing costs.

4.1.1 Optical test.-In the optical test, the general arrangement of test equipment and test sample shall be as shown in Figure 1. The reflective marker shall be located with the center of the reflecting face at a minimum distance of five feet from a uniformly bright light source. When a five-foot test distance is used, the light source shall have an effective diameter of 0.2 inch, and the photocell receptor width shall be 0.05 inch and shall be shielded to eliminate stray light. The distance from the center of the light source aperture to the center of the photocell shall be 0.21 inch and 0.525 inch for divergence angles of 0.2 degrees and 0.5 degrees, respectively. If a test distance of other than five feet is used, the source and receptor and their separation shall be modified in the same proportion as the test

distance. The color of the light source shall be 2854K. The response of the photocell shall be corrected to approximate the CIE luminous efficiency function.

4.1.2 High temperature test.-The reflective marker shall be subjected to a high ambient environment temperature of +65° C. (± 2° C.) for a period of not less than seven hours. Any evidence of heat damage, such as deformation, blistering, cracking or crazing of the plastic material, or deterioration of filler material shall be cause for rejection.

4.1.3 Low temperature test.-The reflective marker shall be totally immersed in water, and while immersed, subjected to a temperature of -43° C. (± 2° C.) for a period of 24 hours. This shall result in a total encasement of the marker with a minimum of one inch of ice on all exposed surfaces above the base surface. Immediately following this 24-hour period, the marker shall be heated to +55° C. (± 2° C.) and maintained at this temperature for not less than three hours. Evidence of damage or porosity shall be cause for rejection.

4.1.4 Humidity test.-The sample reflective marker shall be immersed in a saturated salt solution for not less than six hours. At the end of that period the unit shall be removed from the bath and allowed to dry naturally for not less than 18 hours. The drying shall not be assisted by wiping, fanning, or heating. This 24-hour wetting and drying cycle shall be repeated three times. The bath temperature and the ambient air temperature shall be within the range of plus 16° C. and plus 30° C. At the end of the three cycles, any evidence of damage, rust, or corrosion shall be cause for rejection.

4.1.5 Bond test.-A steel fitting with a 2½-inch ± ½-inch diameter shall be sealed to the bottom surface of the marker with a material compatible with the marker and portland concrete or asphaltic pavement. After the sealer material cures, the steel fitting shall be pulled away from the marker at a rate not greater than 2,500 pounds per minute. The sealer material and bottom surface of the marker shall be considered unsatisfactory if there is complete separation with a pull of 1,500 pounds.

4.1.6 Load test.-This test shall be the last test made. The reflective marker shall be placed on a flat steel plate mounted in a standard testing machine. The load shall be applied to the top part of the marker through a block of rubber, four inches in diameter, one inch thick with Shore A hardness of 55 to 70. A total of 10,000 pounds shall be applied uniformly over the area of the rubber at a rate of not greater than 2,500 pounds per minute. The reflective marker shall be considered unsatisfactory if there is any permanent deformation, cracking or breaking of any materials used.

5. PREPARATION FOR DELIVERY.

5.1 Cleaning.-Each reflective marker shall be cleaned of oil, grease, and other foreign material by any process which will accomplish thorough cleaning without damage to the item.

5.2 Packaging.-Each reflective marker shall be packaged to the extent necessary for protection against physical damage during shipment from the supply source to the receiving activity. The unit package shall consist of (number) reflective marker(s).

5.3 Packing.-Packages that require over-packing shall be packed in shipping containers in a manner that will insure safe transportation at the lowest rate to the point of delivery and shall meet, as a minimum, the requirements of the rules and regulations of the mode of transportation selected.

5.4 Marking.-Unit packages and shipping containers shall be marked in accordance with MIL-STD-129.

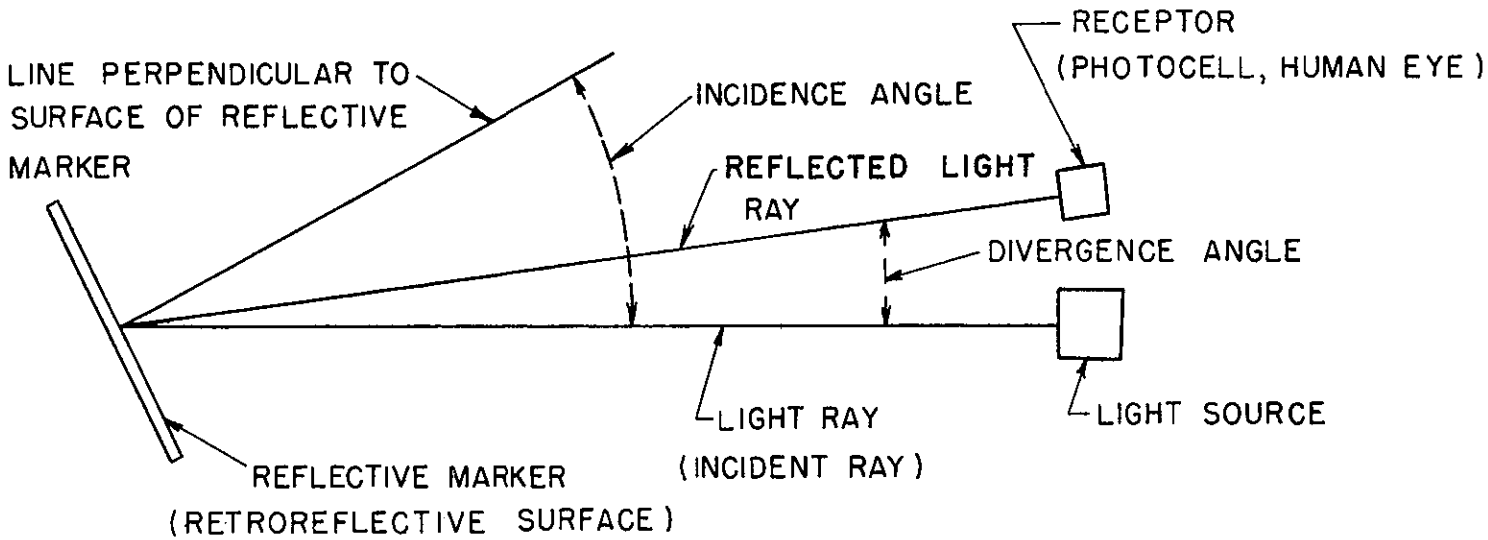

FIGURE 1 SKETCH ILLUSTRATING THE INCIDENCE AND DIVERGENCE ANGLE OF A LIGHT RAY REFLECTED BACK FROM A RETROREFLECTIVE SURFACE

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