



Agenda Item 5: Other business

**PROPOSAL OF AMENDMENT TO DOC 9157, AERODROME DESIGN MANUAL,
PART 4, VISUAL AIDS — APPENDIX 3, SELECTION, APPLICATION AND
REMOVAL OF PAINTS**

(Presented by Uruguay)

SUMMARY

Annex 14 Volume I, Aerodrome Design and Operations, and Doc 9157, Aerodrome Design Manual, Part 4, Visual aids, should provide guidance on the selection, application and removal of retro-reflective paints with a view to enhancing aircraft safety on the aerodrome runway surface, and thus safety and situational awareness at aerodromes. This working paper recommends the introduction of amendments to Doc 9157, Aerodrome Design Manual, Part 4, Appendix 3, Selection of retro-reflective elements.

References:

- ICAO Annex 14, Volume I, Aerodrome Design and Operations
- ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids
- Evaluation of Retro-reflective Airfield Pavement Markings Ellsworth AFB, South Dakota and Tyndall AFB Florida, Air Force Civil Engineer Support Agency, Report
- FAA - AC 150/5370-10a Item 620 Runway and Taxiway Painting

Strategic Objectives

*This information paper relates to Strategic Objective
* Safety*

1. Introduction

1.1 Annex 14, Volume I, Aerodrome Design and Operations contains Recommendation 5.2.1.7 “At aerodromes where operations take place at night, pavement markings should be made with reflective materials designed to enhance the visibility of the markings.” and Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids describes aerodrome reflective markings that are used to improve the performance of the markings at night, especially in conditions when the markings may be wet. **Appendix 3**, in items 9, 10 and 11, contains details of the conditions under which retro-reflective markings are to be used, as well as glass bead specifications, but does not contain specifications concerning maintenance or the measurement of the coefficient of retro-reflection.

1.2 In order to ensure continuing guidance, enhanced safety in the movement area, reduction of aircraft accidents at the aerodrome, and improved aerodrome operations, it is proposed that a recommendation be added for improving reflective marking inspection, incorporating reflective paint maintenance requirements and minimum acceptable reflection coefficients.

2 Discussion

2.1 After reviewing the standards and recommended practices contained in Annex 14, Volume I, Aerodrome Design and Operation, and the guidelines contained in Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids, it is proposed that a recommendation be added in Appendix 3 – Maintenance of Markings and Measurement of the Coefficient of Retroreflection.

2.2 This test method for measuring reflection properties over horizontal pavement marked with materials containing retro-reflective beads, such as pavement surface markings, uses a portable retro-reflectometer that can be placed on aircraft circulation markings to measure retro-reflection in a given geometry.

2.3 This test will permit the establishment of minimum acceptable values below which corrective marking maintenance must be performed to avoid vision conflicts to viewers.

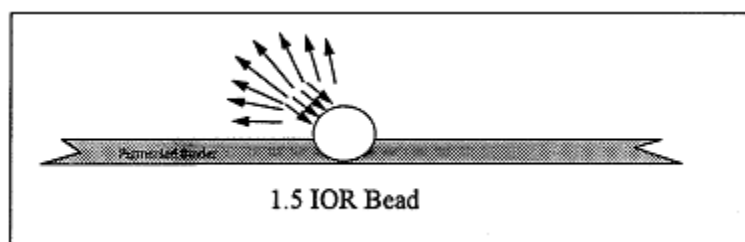


Figure 1. Beads with a refractive index of 1,5

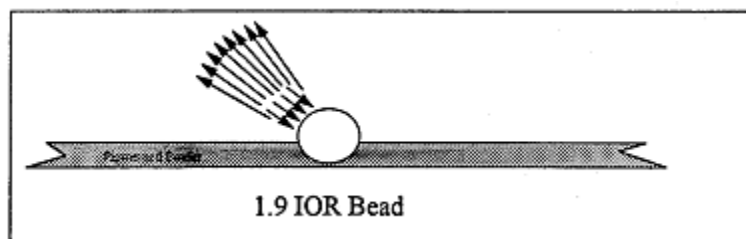


Figure 1. Beads with a refractive index of 1.9

2.4 Recommendation

Maintenance of markings and measurement of the coefficient of retro-reflection

2.4.1 The retro-reflective character of markings will be achieved through the addition of glass micro-beads to hot-applied thermoplastic paints or cold-applied plastics, in accordance with pavements specifically designed to maintain their properties under rainy or humid conditions, in accordance with that specified in 11.

2.4.2 In order to continue meeting reflective marking paint requirements and maintaining minimum acceptable reflection coefficients, the aerodrome operator shall develop a programme for measuring degradation of retro-reflective properties of pavement markings.

2.4.3 Taxiway, runway and apron markings should be maintained within acceptable reflection coefficient values as needed for aircraft circulation to/from an active runway.

2.4.4 Marking quality is determined by the coefficient of retroreflected luminance, RL, which depends on materials used, age and wear pattern. These conditions shall be observed and reported by the aerodrome operator.

2.4.5 The preventive maintenance system should use a retro-reflectometer to determine marking retroreflectivity values, using the retroreflectivity threshold values of Table 1 (Example) as the minimum acceptable values.

2.4.6 The aerodrome operator is responsible for selecting the appropriate measurement instrument and geometry, and for maintaining suitable safety levels and applying appropriate health methods to determine the adequacy of regulatory limitations before markings continue to be used below acceptable retroreflection minima.

2.4.7 Corrective maintenance measures will be taken when the retroreflective characteristics of all or part of the marking fall below the minimum retroreflection level specified in Table 1 (Example).

2.4.8 These specifications are aimed at defining target maintenance levels. They are not intended to determine whether markings are operationally unserviceable.

Table 1. Example

Type of marking	Evaluation parameter				
	Coefficient of retroreflection			Luminance factor	
	RL			Over bituminous pavement	Over shotcrete pavement
	30 days	180 days	360 days		
White	300	200	100	0.30	0.40
Yellow	150			0.20	

NOTE: THE METHODS FOR DETERMINING THE PARAMETERS IN THIS TABLE WILL BE THOSE RESULTING FROM THE EVALUATION USING PORTABLE EQUIPMENT (ASTM E1710 - 11 Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer)

3 Suggested action

3.1 The Meeting is invited to take note of the information provided in this paper and comment on the proposal of amendment to Doc 9157 Aerodrome Design Manual, Part 4, Visual Aids, Appendix 3.