*International Civil Aviation Organization*

Sixth Meeting of the Asia/Pacific Aerodrome Design and Operations Task Force (AP-ADO/TF/6)

*Langkawi, Malaysia, 18 - 21 February 2025*

**Agenda Item 4: Planning, Design and Construction of Aerodromes**

# ESTABLISHMENT OF A MINIMUM CONSPICUITY STANDARD FOR RUNWAY MARKINGS IN ICAO ANNEX 14, VOLUME I

(Presented by Malaysia)

**SUMMARY**

This paper presents the proposal of the establishment of a measurable conspicuity standard for aerodrome runway markings in ICAO Annex 14, Volume I. The objective is to enhance the safety and visibility of runway markings by setting measurable criteria for conspicuity, such as minimum contrast ratios and retro-reflectivity thresholds. This will ensure markings remain effective under diverse operational and environmental conditions, reducing safety risks associated with marking deterioration or contamination. The proposal emphasizes the need for global standardization to guide States in assessing and maintaining marking visibility effectively.

## 1. INTRODUCTION

1.1 ICAO Annex 14, Volume I, specifies standards and recommended practices (SARPs) for aerodrome design and operations. It emphasizes that markings "shall be conspicuous" to ensure visibility during all operational visibility at all operational conditions. However, the Annex lacks a measurable or standardized definition of conspicuity.

1.2 The absence of measurable criteria presents challenges for aerodrome operators and regulators to evaluate and assess compliance objectively. This issue becomes critical in scenarios where markings are affected by contaminants, e.g. rubber deposits and tyre marks or environmental factors such as weather and low visibility.

## 2. DISCUSSION

Challenges with the current conspicuity requirement

***Location***

5.2.5.3 The aiming point marking shall commence no closer to the threshold than the distance indicated in the appropriate column of Table 5-1, except that, on a runway equipped with a visual approach slope indicator system, the beginning of the marking shall be coincident with the visual approach slope origin.

5.2.5.4 An aiming point marking shall consist of two conspicuous stripes. The dimensions of the stripes and the lateral spacing between their inner sides shall be in accordance with the provisions of the appropriate column of Table 5-1. Where a touchdown zone marking is provided, the lateral spacing between the markings shall be the same as that of the touchdown zone marking.

***Marking***

6.2.3.1 All fixed objects to be marked shall, whenever practicable, be coloured, but if this is not practicable, markers or flags shall be displayed on or above them, except that objects that are sufficiently conspicuous by their shape, size or colour need not be otherwise marked.

***Colour and conspicuity***

5.2.1.4 Runway markings shall be white.

*Note 1.— It has been found that, on runway surfaces of light colour, the conspicuity of white markings can be improved by outlining them in black.*

*Note 2.— It is preferable that the risk of uneven friction characteristics on markings be reduced in so far as practicable by the use of a suitable kind of paint.*

*Note 3.— Markings may consist of solid areas or a series of longitudinal stripes providing an effect equivalent to the solid areas.*

5.2.1.5 Taxiway markings, runway turn pad markings and aircraft stand markings shall be yellow.

5.2.1.6 Apron safety lines shall be of a conspicuous colour which shall contrast with that used for aircraft stand markings.

5.2.1.7 **Recommendation.—** *At aerodromes where operations take place at night, pavement markings should be made with reflective materials designed to enhance the visibility of the markings.*

*Quoted from ICAO Annex 14, Volume I - Non measurable conspicuity*

**GENERAL**

1. To ensure that runway and taxiway markings have adequate conspicuity and durability, care must be exercised in the selection and application of paint. Guidance on these factors is provided in this appendix. Repainting operations must be carefully safeguarded and coordinated with air traffic operations for the safety of aircraft and of the painting crews and equipment.

**Type of service**

6. Typically, markings on runways and taxiways do not fail from abrasive wear as do highway markings. Instead, failure of threshold, touchdown zone and runway centre line markings is caused by rubber deposited during the spin-up of the wheels of landing aircraft. Failure of the other markings, particularly side stripe markings, is usually caused by the effects of weather and the accumulation of dirt. Hence abrasion resistance is not a prime consideration in the selection of materials to be used for aerodrome pavement markings. A more suitable choice of marking materials is a paint which is compatible with the type of pavement, maintains good conspicuity, and can be readily applied at the proper thickness. A wet-film thickness of 0.4 mm has been found suitable for most installations.

*Quoted from ICAO Aerodrome Design Manual Part 4 - Visual Aids, Appendix 3*

2.1 While Annex 14 specifies dimensions, colours and positions for runway markings, the requirement for markings to be conspicuous is undefined in measurable terms. This creates ambiguity for aerodrome operators and inspectors when assessing the markings.

2.2 Marking visibility is often compromised by:

a) Tyre marks and rubber deposits that obscure marking over time;

b) Wear and tear caused by frequent aircraft movements; and

c) Environmental conditions such as rain, discoloration – white paint turning yellow, fading etc.

Proposed Measurable Conspicuity Standards

2.3 The following measurable for conspicuity standards are proposed as follows that are made of 2 elements i.e. Retro-reflectivity and area of coverage.

2.4 Retro-reflectivity, quoted from what has been established by FAA and An IPRF Research Report Innovative Pavement Research Foundation Airport Concrete Pavement Technology Program of Airfield Marking Handbook:

a) Runway Markings e.g. RCL, THR: Minimum 100 milicandella/m2/lx under dry conditions and 70 mcd/m2/lx under wet conditions.

b) Taxiway Markings: Minimum 70 mcd/m2/lx under dry conditions and 50 mcd/m2/lx under wet conditions.

2.5 Coverage area of not more than 50% of individual markings: e.g a single runway centre line marking of 60M meet the 100mcd/m2/lx but was faded 55%, does not meet the proposed measurables.

Benefits of Measurable Standards

2.6 Adopting measurable conspicuity standards will:

a) Enhance Safety: Ensure markings remain visible in various operational conditions, reducing risks of runway incursions, excursions and navigational errors.

b) Standardize assessment: Provide aerodrome operators and regulators with clear, objective criteria for evaluating marking effectiveness.

c) Improve maintenance practices: Encourage timely cleaning, repainting and use of durable materials to maintain marking visibility.

## 3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) discuss the proposed conspicuity standards for incorporation into ICAO Annex 14, Volume I; and

c) Consider recommending the development of guidance material in implementing and monitoring the proposed conspicuity standard.

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