International Civil Aviation Organization

The Seventh Meeting of the Asia/Pacific Aerodrome Design and Operations Task Force (AP-ADO/TF/7)

(Bangkok, Thailand, 17 to 20 February 2026)

Agenda Item 5: Asia and Pacific Regional Guidance

ESTABLISHMENT OF A MINIMUM CONSPICUITY STANDARD FOR RUNWAY AND TAXIWAY MARKINGS IN ICAO ANNEX 14, VOLUME 1

(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 During the Sixth Meeting of the Asia Pacific Aerodrome Design and Operation Task Force (AP-ADO/TF/6) held in Langkawi, Malaysia on 17 – 21 February 2025, Malaysia presented a proposal on the establishment of measurable conspicuity standards for aerodrome runway markings in ICAO Annex 14, Volume 1, to enhance safety and visibility. The proposed measurable standards aimed to enhance runway safety, reduce risks associated with low visibility operations and mitigate potential runway incursions or navigational errors.

1.2 The paper urged ICAO to consider incorporating the measurable standard into ICAO Annex 14, Volume 1 which represents a critical step toward global harmonization of aerodrome marking assessment, ensuring safer and more efficient airport operations.

1.3 The meeting had formed a Small Working Group (SWG) led by Malaysia and supported by India, Thailand, Vietnam, and ACI to develop measurable conspicuity standards for runway and taxiway markings to provide aerodrome operators and regulators with clear, objective criteria for evaluating marking effectiveness.

1.4 This paper intended to share the current progress of AP-ADO/TF/6 on establishing measurable criteria for runway and taxiway markings' conspicuity including the off-airport and on-airport testing that been conducted at KL International Airport (KLIA / KUL)

2. DISCUSSION

Defining Conspicuity

2.1 In support of developing a standardized working definition of conspicuity applicable to runway and taxiway markings, both linguistic references and existing technical documents have been reviewed. From a linguistic perspective, reviews from the Oxford English Dictionary, The Macmillan Dictionary, and The Cambridge Dictionary have been gathered. These dictionaries consistently highlight key attributes of conspicuity, namely visibility, prominence, noticeability, and distinction from the surrounding environment.

2.2 From an operational and regulatory perspective, ICAO Annex 14, Volume 1 Aerodrome Design and Operation specifies that aerodrome markings must be "clearly visible". Similarly, the Federal Aviation Administration (FAA) outlines practices to enhance marking visibility, including the use of high-contrast paint, regular cleaning, and repainting cycles. However, it does not stipulate specific numeric thresholds for conspicuity performance.

2.3 Based on the literature and review of the current regulations and guidelines, the SWG committee had proposed the following definition for conspicuity: "***The degree to which markings are clearly visible and attract immediate attention to ensure safety and situational awareness. It is influenced by contrast against background surfaces, retro-reflectivity, lighting conditions, motions and color design, particularly under varying weather, daylight and operational conditions".***

2.4 The SWG committee agreed on the proposed methodology in establishing the measurable criteria for conspicuity as follows:

a) Contrast ratio;
b) Retro reflectivity level;
c) Size and thickness; and
d) Environmental conditions.

<u>Field Testing for Marking Durability</u>

2.5 The tests are conducted in two (2) stages; off-airport and on-airport test. The objective of the off-airport test is to evaluate the effectiveness of a marking and how it deteriorates over time before evaluating how the paint deteriorates due to aircraft movement.

2.6 The on-airport test will be specifically conducted at the following markings:

a) Aiming point marking;
b) Touchdown zone marking (4^{th} pair);
c) Runway side stripe marking; and
d) Runway centre line marking (300 meters from the runway transverse stripe extended up to 650 meters).

2.7 The test is conducted with newly painted markings. The results of the test are recorded together with other variables that may influence the value of the results, such as

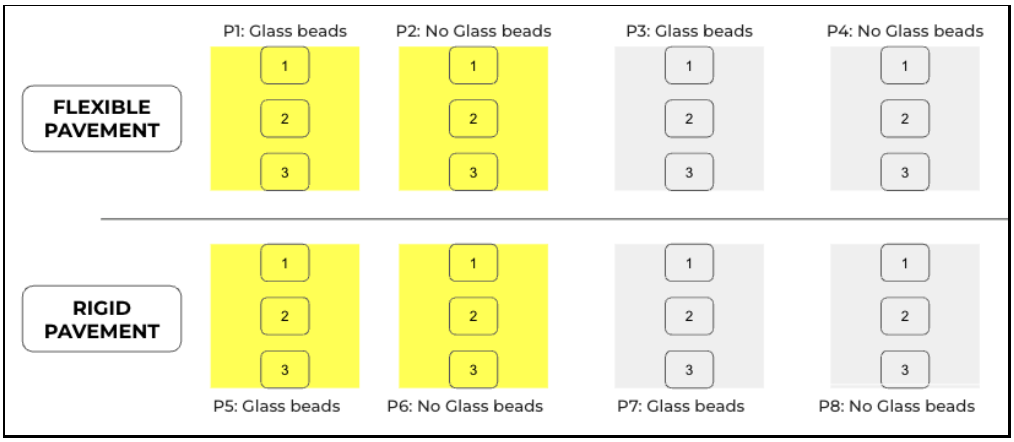
a) Temperature;
b) Surface condition;
c) Weather;
d) Qd value; and
e) 6-points of sampling are taken for each marking, and the results are averaged as the final value.

<u>Assessment Progress: Off-airport Testing</u>

2.8 An off-airport field testing was conducted since October 2025 with the following 0.5 x 0.5 m specimens labeled and set up as follows:

Label	Type of Pavement	Colour	Materials
P1	Flexible	Yellow	Glass beads
P2	Flexible	Yellow	Non-glass beads
P3	Flexible	White	Glass beads
P4	Flexible	White	Non-glass beads
P5	Rigid	Yellow	Glass beads
P6	Rigid	Yellow	Non-glass beads
P7	Rigid	White	Glass beads
P8	Rigid	White	Non-glass beads

2.9 The sampling points for each P1 – P8 specimens are as follows:



Note: The recommended sampling points are 6-points. However, only 3-points of sampling were taken for off-airport testing due to the small sampling size.

2.10 The following observations and findings are recorded during the testing:

a) Reflectivity and color (spectrophotometer) value were constant and did not significantly deteriorate over time when the paint was set in a controlled environment where it was not rolled over by any vehicles. The objective of this testing is to see how the paint deteriorates over time.

b) The value of reflectivity of paint that has glass beads compared with non-glass beads is almost the same. This may be because the reflective materials may not be reflective due to daylight exposure.

c) The Qd value varies depending on the time of the measurement, which was taken, e.g., a sunny day compared to cloudy or late evening, resulting in a significant value difference.

d) Based on the observation and findings, the time of sampling should be constant.

SAMPLING FOR TWO POINTS

GLASS BEADS PAINT - FLEXIBLE PAVEMENT

Date	Time Recorded	Point of Marking	RL	Average (RL)	Qd	Average (Qd)	Surface Condition	Weather/Sky Condition
21-Oct-2025	11:00 AM	Point 1 - 1st Reading	1091		123		Dry	Cloudy/ Partly cloudy
		Point 1 - 2nd Reading	1095	1094	123	123	Dry	Cloudy/ Partly cloudy
		Point 1 - 3rd Reading	1096		123		Dry	Cloudy/ Partly cloudy
4-Nov-2025	11:36 AM	Point 1 - 1st Reading	1109		113		Dry	Cloudy/ Partly cloudy
		Point 1 - 2nd Reading	1109	1108	113	113	Dry	Cloudy/ Partly cloudy
		Point 1 - 3rd Reading	1106		113		Dry	Cloudy/ Partly cloudy
18-Nov-2025	12:30 PM	Point 1 - 1st Reading	1091		113		Dry	Cloudy/ Partly cloudy
		Point 1 - 2nd Reading	1095	1094	113	113	Dry	Cloudy/ Partly cloudy
		Point 1 - 3rd Reading	1096		113		Dry	Cloudy/ Partly cloudy

NON GLASS BEADS PAINT - FLEXIBLE PAVEMENT

21-Oct-2025	11:00 AM	Point 2 - 1st Reading	1126		124		Dry	Cloudy/ Partly cloudy
		Point 2 - 2nd Reading	1135	1132	124	124	Dry	Cloudy/ Partly cloudy
		Point 2 - 3rd Reading	1134		124		Dry	Cloudy/ Partly cloudy
4-Nov-2025	11:36 AM	Point 2 - 1st Reading	1114		121		Dry	Cloudy/ Partly cloudy
		Point 2 - 2nd Reading	1104	1110	121	121	Dry	Cloudy/ Partly cloudy
		Point 2 - 3rd Reading	1112		121		Dry	Cloudy/ Partly cloudy
18-Nov-2025	12:30 PM	Point 2 - 1st Reading	1095		121		Dry	Cloudy/ Partly cloudy
		Point 2 - 2nd Reading	1094	1095	121	121	Dry	Cloudy/ Partly cloudy
		Point 2 - 3rd Reading	1097		121		Dry	Cloudy/ Partly cloudy

Note: The RL value for glass beads and non-glass beads paint recorded a range of the same value if the time of observation is on the same hour.

GLASS BEADS PAINT

1100AM

Point of Marking	RL	Average (RL)	Qd	Average (Qd)
P1	1091		123	
P1	1095		123	
P1	1096		123	
P1	1109		109	
P1	1109	1106	109	115

NON GLASS BEADS PAINT

1230PM

P2	1095		124	
P2	1094		124	
P2	1097		124	
P2	1114		121	
P2	1104	1112	121	122

Note: The Qd value for glass beads and non-glass beads records variation with the time of the observations.

Assessment Progress: On-airport Testing

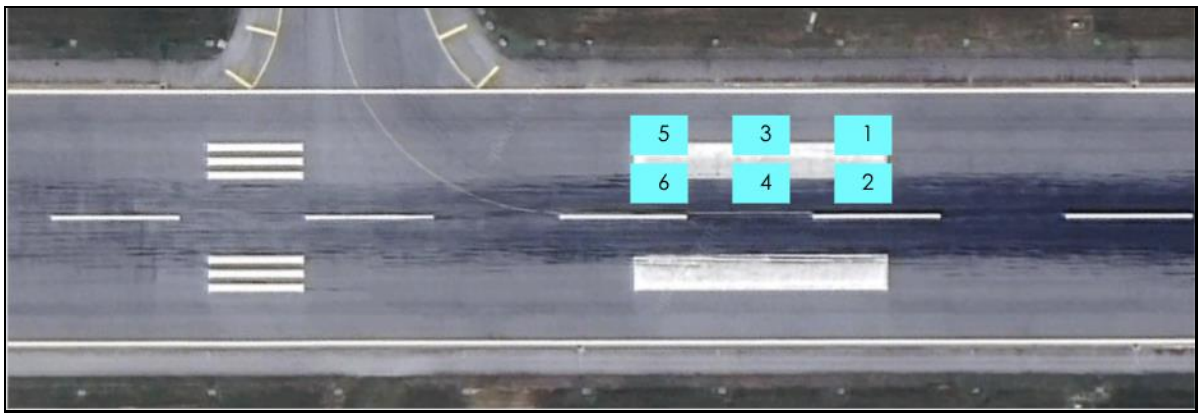
2.11 An on-airport testing was conducted (and is still progressing) at the following markings of Runway 15/33:

a) Aiming point marking;
b) Touchdown zone marking;
c) Runway centre line marking; and
d) Runway side stripe marking.

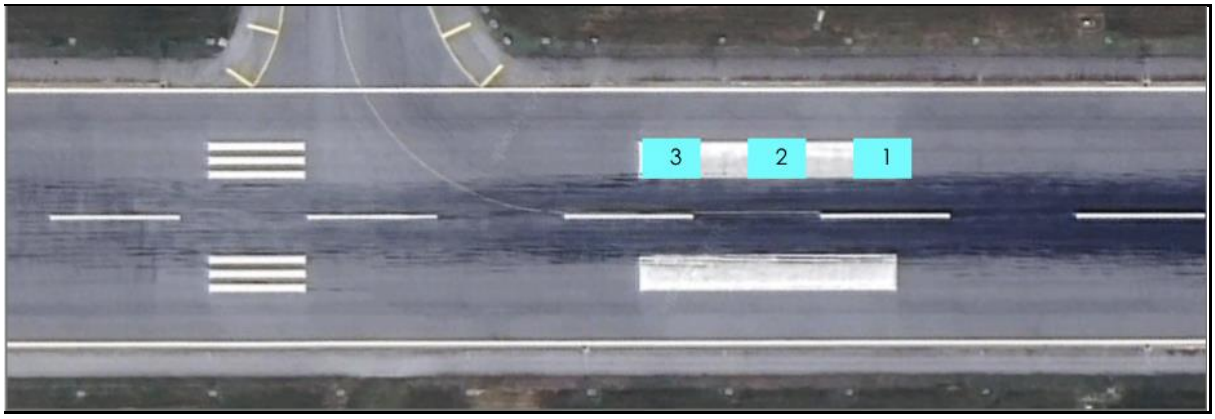
2.12 The following observations and findings are recorded during the testing:

a) Heavy flight movement significantly disrupts the sampling process for each marking.
b) Weather conditions may influence the test results.
c) The use of 6-sampling points resulted increased time required on the runway.
d) It is proposed that the sampling recording frequency be revised to once weekly, with 3-sampling points for the aiming point, touchdown zone, runway centre line, and runway sidestripe markings.

e) Point sampling for each marking shall be repeated using both retro-reflectivity and spectrophotometer methods.



Initial proposed 6-sampling points.



Due to an increase in the time required in runway, sampling points were reduced to 3.

AIMING POINT RWY 3 - 15 (Right marking)

Date	Time Recorded	Point of Marking	RL	Average (RL)	Qd	Average (Qd)	Temperature (°C)	Surface Condition	Weather/Sky Condition
3-Dec-2025	11:27 AM	P1	1861	1865	258	258	32	Dry	Clear/ Sunny
		P1	1870		258		32	Dry	Clear/ Sunny
		P1	1865		257		32	Dry	Clear/ Sunny
		P2	1587	1596	267	267	32	Dry	Clear/ Sunny
		P2	1602		267		32	Dry	Clear/ Sunny
		P2	1600		267		32	Dry	Clear/ Sunny
		P3	1943	1940	264	265	32	Dry	Clear/ Sunny
		P3	1934		265		32	Dry	Clear/ Sunny
		P3	1942		265		32	Dry	Clear/ Sunny

AIMING POINT - RWY 15 (RIGHT MARKING)

Date	Time Recorded	Point of	RL	Average	Qd	Average	Temperature	Surface	Weather/Sky Condition
10-Dec-2025	11:20 AM	P1	1207	1206	139	139	29	Dry	Clear/ Sunny
		P1	1202		139		29	Dry	Clear/ Sunny
		P1	1208		139		29	Dry	Clear/ Sunny
		P2	1474	1479	228	228	29	Dry	Clear/ Sunny
		P2	1483		228		30	Dry	Clear/ Sunny
		P2	1480		228		30	Dry	Clear/ Sunny
		P3	1611	1614	259	259	30	Dry	Clear/ Sunny
		P3	1612		259		30	Dry	Clear/ Sunny
		P3	1620		259		31	Dry	Clear/ Sunny

Note: The average reflectivity of the aiming point markings (RL value) significantly reduced after an observation for a week.

CENTRELINE RWY 3 - 15

Date	Time Recorded	Point of Marking	RL	Average (RL)	Qd	Average (Qd)	Temperature (°C)	Surface Condition	Weather/Sky Condition
3-Dec-2025	11:15 AM	P1	1588	1595	237	237	28	Dry	Clear/ Sunny
		P1	1594		238		28	Dry	Clear/ Sunny
		P1	1603		237		28	Dry	Clear/ Sunny
		P2	2379	3059	150	192	29	Dry	Clear/ Sunny
		P2	3399		213		29	Dry	Clear/ Sunny
		P2	3399		214		29	Dry	Clear/ Sunny
		P3	2941	2947	204	204	29	Dry	Clear/ Sunny
		P3	2945		204		30	Dry	Clear/ Sunny
		P3	2954		205		30	Dry	Clear/ Sunny
		P4	3663	3667	196	196	30	Dry	Clear/ Sunny
		P4	3669		196		30	Dry	Clear/ Sunny
		P4	3670		197		30	Dry	Clear/ Sunny

CENTERLINE 10 - RWY 15

Date	Time Recorded	Point of	RL	Average	Qd	Average	Temperature	Surface	Weather/Sky Condition
10-Dec-2025	11:25 AM	P1	1385	1394	71	72	33	Dry	Clear/ Sunny
		P1	1396		72		33	Dry	Clear/ Sunny
		P1	1401		72		33	Dry	Clear/ Sunny
		P2	1721	1711	59	59	33	Dry	Clear/ Sunny
		P2	1700		59		33	Dry	Clear/ Sunny
		P2	1711		59		33	Dry	Clear/ Sunny
		P3	721	708	92	93	34	Dry	Clear/ Sunny
		P3	708		93		34	Dry	Clear/ Sunny
		P3	696		93		34	Dry	Clear/ Sunny

Note: Average reflectivity of the runway centre line markings (RL value) significantly reduced after an observation for a week.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the progress report of the Task 6/1; and

b) discuss the proposed methodology and field testing.

— END —