

CIVIL AVIATION GUIDANCE MATERIAL – 1402

GLOBAL REPORTING FORMAT FOR RUNWAY SURFACE CONDITION

CIVIL AVIATION AUTHORITY OF MALAYSIA

ISSUE 01 REVISION 00 - 17TH DECEMBER 2021



Introduction

This Civil Aviation Guidance Material 1402 (CAGM – 1402) is issued by the Civil Aviation Authority of Malaysia (CAAM) to provide guidance for the Runway Global Reporting Format for Runway Surface Condition, pursuant to Civil Aviation Directives 14 Vol. I – Standards for Aerodrome (CAD 14 Vol. I – Standards for Aerodrome).

Organisations shall use these guidelines to ensure compliance with the respective provisions of the relevant CAD's issued. Notwithstanding the Regulation 65 of the Civil Aviation (Aerodrome Operations) Regulations 2016 (CA (AO) R 2016), when the CAGMs issued by the CAAM are complied with, the related requirements of the CAD's may be deemed as being satisfied and further demonstration of compliance may not be required.

(Captain Chester Voo Chee Soon) Chief Executive Officer Civil Aviation Authority of Malaysia



Civil Aviation Guidance Material components and Editorial practices

This Civil Aviation Guidance Material is made up of the following components and are defined as follows:

Standards: Usually preceded by words such as *"shall"* or *"must"*, are any specification for physical characteristics, configuration, performance, personnel or procedure, where uniform application is necessary for the safety or regularity of air navigation and to which Operators must conform. In the event of impossibility of compliance, notification to the CAAM is compulsory.

Recommended Practices: Usually preceded by the words such as "*should*" or "*may*", are any specification for physical characteristics, configuration, performance, personnel or procedure, where the uniform application is desirable in the interest of safety, regularity or efficiency of air navigation, and to which Operators will endeavour to conform.

Appendices: Material grouped separately for convenience but forms part of the Standards and Recommended Practices stipulated by the CAAM.

Definitions: Terms used in the Standards and Recommended Practices which are not selfexplanatory in that they do not have accepted dictionary meanings. A definition does not have an independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

Tables and Figures: These add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

Notes: Included in the text, where appropriate, Notes give factual information or references bearing on the Standards or Recommended Practices in question but not constituting part of the Standards or Recommended Practices;

Attachments: Material supplementary to the Standards and Recommended Practices or included as a guide to their application.

The units of measurement used in this document are in accordance with the International System of Units (SI) as specified in CAD 5. Where CAD 5 permits the use of non-SI alternative units, these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this document, which is identified by a number and/or title, includes all subdivisions of that portion.

Throughout this Civil Aviation Guidance Material, the use of the male gender should be understood to include male and female persons.



Record of Revisions

Revisions to this CAGM shall be made by authorised personnel only. After inserting the revision, enter the required data in the revision sheet below. The *'Initials'* has to be signed off by the personnel responsible for the change.

Rev No.	Revision Date	Revision Details	Initials
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Summary of Changes

ISS/REV no.	Item no.	Revision Details





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1 General

1.1 Introduction

- 1.1.1 The International Civil Aviation Organisation (ICAO) has identified runway safety, particularly runway excursions, as a primary concern for aviation safety. Indeed, lessons learnt from investigations into accidents and incidents suggest that the principal cause for excursions occurring during landing stem from ineffective braking action due to runway contamination. This trend has been corroborated by aircraft operators and aircraft manufacturers.
- 1.1.2 It has been acknowledged that a lack of standardised runway assessment and reporting methodology has created deficits in the processes employed by aerodrome operators around the world which indirectly contribute to the highlighted concerns pertaining runway safety. Consequently, to address these shortfalls, ICAO has developed a new congruous methodology for assessing and reporting runway surface conditions. This methodology is known as Global Reporting Format (GRF) and shall be globally applicable from 4th November 2021.

1.2 Objective

1.2.1 The purpose of this document is to introduce and provide information pertinent to the implementation of GRF in Malaysia for assessment and reporting of runway surface conditions by aerodrome operators.

1.3 Abbreviations

The following abbreviations are used in this document:

AC	=	Advisory Circular
CAAM	=	Civil Aviation Authority of Malaysia
GRF	=	Global Reporting Format
ICAO	=	International Civil Aviation Organization
N/A	=	Not applicable
NOTAM	=	Notice to airman
RCAM	=	Runway Condition Assessment Matrix
RCR	=	Runway Condition Report
RWY	=	Runway
RWYCC	=	Runway Condition Code
TWY	=	Taxiway



2 Runway Surface Condition Assessment and Reporting

- 2.1 General
- 2.1.1 Assessing and reporting the condition of the movement area and related facilities is necessary in order to provide the flight crew with the information needed for safe operation of the aeroplane. The runway condition report (RCR) is used for reporting assessed information.
- 2.1.2 On a global level, movement areas are exposed to a multitude of climatic conditions and consequently a significant difference in the condition to be reported. The RCR describes a basic structure applicable for all these climatic variations. Assessing runway surface conditions rely on a great variety of techniques and no single solution can apply to every situation.
- 2.1.3 The philosophy of the RCR is that the aerodrome operator assesses the runway surface conditions whenever contaminants are present on an operational runway. From this assessment, a runway condition code (RWYCC) and a description of the runway surface are reported which can be used by the flight crew for aeroplane performance calculations. This format, based on the type, depth and coverage of contaminants, is the best assessment of the runway surface condition by the aerodrome operator; however, all other pertinent information will be taken into consideration and be kept up to date and changes in conditions reported without delay.
- 2.1.4 The RWYCC reflects the runway braking capability as a function of the surface conditions. With this information, the flight crew can derive, from the performance information provided by the aeroplane manufacturer, the necessary stopping distance of an aircraft on the approach under the prevailing conditions.
- 2.1.5 CAD 14 Vol. I contain standards related to the assessment and reporting of runway surface condition. Associated objectives and operational practices are described in 2.2 and 2.3.
- 2.1.6 The operational practices are intended to provide the information needed to fulfil the syntax requirements for dissemination and promulgation specified in CAD 1501 Aeronautical Information Management and the Procedures for Air Navigation Services Air Traffic Management (PANS-ATM, Doc 4444).

Note.— For practical reasons, the RCR information string has been provisionally incorporated in CAD 15 as a revision of the SNOWTAM format.

2.1.7 When the runway is wholly or partly contaminated by standing water, the runway condition report shall be disseminated through the AIS and ATS services. When the runway is wet, not associated with the presence of standing water, the assessed information shall be disseminated using the runway condition report through the ATS only.

Note.— Operationally relevant information concerning taxiways and aprons are covered in the situational awareness section of the RCR.

- 2.1.8 The operational practices describe procedures to meet the operationally needed information for the flight crew and dispatchers for the following sections:
 - a) aeroplane take-off and landing performance calculations:
 - 1) dispatch pre-planning before commencement of flight:
 - i) take-off from a runway; and
 - ii) landing on a destination aerodrome or an alternate aerodrome;
 - 2) in flight when assessing the continuation of flight; and
 - i) before landing on a runway; and
 - b) situational awareness of the surface conditions on the taxiways and aprons.

2.2 Objectives

2.2.1 The RWYCC shall be reported for each third of the runway assessed, example as shown in Figures 1 and 2.





Figure 1. Reporting of runway condition code





Figure 2. Reporting of runway condition code for runway thirds from ATS to flight crew on a runway with displaced threshold

- 2.2.2 The assessment process shall include:
 - a) assessing and reporting the condition of the movement area;
 - b) providing the assessed information in the correct format; and
 - c) reporting significant changes without delay.
- 2.2.3 The information to be reported shall be compliant with the RCR which consists of:
 - a) aeroplane performance calculation section; and
 - b) situational awareness section.
- 2.2.4 The information shall be included in an information string in the following order using only AIS compatible characters:
 - a) aeroplane performance calculation section:
 - 1) aerodrome location indicator;
 - 2) date and time of assessment;
 - 3) lower runway designation number;

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- 4) RWYCC for each runway third;
- 5) per cent coverage contaminant for each runway third;
- 6) depth of loose contaminant for each runway third;
- 7) condition description for each runway third; and
- 8) width of runway to which the RWYCCs apply if less than published width.
- b) situational awareness section:
 - 1) reduced runway length;
 - 2) loose sand on the runway;
 - 3) taxiway conditions;
 - 4) apron conditions;
 - 5) CAAM approved, and published use of, measured friction coefficient; and
 - 6) plain language remarks.
- 2.2.5 The syntax for dissemination as described in the RCR template in the *Procedures* for Air Navigation Services Aeronautical Information Management (PANS-AIM, Doc 10066), Appendix 4 is determined by the operational need of the flight crew and the capability of trained personnel to provide the information arising from an assessment.
- 2.2.6 The syntax requirement in 2.2.5 shall be strictly adhered to when providing the assessed information through the RCR.

2.3 **Operational Practices**

- 2.3.1 Reporting, in compliance with the runway condition report, shall commence when a significant change in runway surface condition occurs due to contaminant.
- 2.3.2 Reporting of the runway surface condition shall continue to reflect significant changes until the runway is no longer contaminated. When this situation occurs, the aerodrome will issue a runway condition report that states the runway is wet or dry as appropriate.
- 2.3.3 A change in the runway surface condition used in the runway condition report is considered significant whenever there is:
 - a) any change in the RWYCC;
 - b) any change in reportable contaminant coverage according to Table 1;
 - c) any change in contaminant depth according to Table 2; and
 - d) any other information, for example a pilot report of runway braking action, which according to assessment techniques used, are known to be significant.

Runway Condition Report — Aeroplane performance calculation section

2.3.4 The aeroplane performance calculation section is a string of grouped information separated by a space " " and ends with a return and two line feed "≪≡". This is to distinguish the aeroplane performance calculation section from the following

situational awareness section or the following aeroplane performance calculation section of another runway.

The information to be included in this section consists of the following.

a) **Aerodrome location indicator:** a four-letter ICAO location indicator in accordance with Doc 7910, *Location Indicators*.

This information is **mandatory.** Format : nnnn Example : WMKK

b) **Date and time of assessment:** date and time (UTC) when the assessment was performed by the trained personnel.

This information is **mandatory**.

Format : MMDDhhmm Example : 09231357

c) **Lower runway designation number:** a two- or three-character number identifying the runway for which the assessment is carried out and reported.

This information is **mandatory**.

Format : nn[L] or nn[R] Example : 14L

d) Runway condition code for each runway third: a one-digit number identifying the RWYCC assessed for each runway third. The codes are reported in a three-character group separated by a "/" for each third. The direction for listing the runway thirds shall be in the direction as seen from the lower designation number.

This information is **mandatory**.

When transmitting information on runway surface conditions by ATS to flight crews, the sections are, however, referred to as the first, second or third part of the runway. The first part always means the first third of the runway as seen in the direction of landing or take-off as illustrated in Figure 1 and 2 and detailed in PANS-ATM (Doc 4444).

Format : n/n/n Example : 5/5/2

Note 1.— A change in RWYCC from, say, 5/5/2 to 5/5/3 is considered significant. (See further examples below).

Note 2.— A change in RWYCC requires a complete assessment taking into account all information available.

e) **Per cent coverage contaminant for each runway third:** a number identifying the percentage coverage. The percentages are to be reported in an up-to-nine-character group separated by a "/" for each runway third. The assessment is based upon an even distribution within the runway thirds using the guidance in Table 1.

This information is **conditional**.

It is not reported for one runway third if it is dry or covered with less than 25 per cent.

Format : [n]nn/[n]nn/[n]nn Example : 25/50/100

NR/50/100 if contaminant coverage is less than 10% in the first third 25/NR/100 if contaminant coverage is less than 10% in the middle third 25/50/NR if contaminant coverage is less than 10% in the last third

With uneven distribution of the contaminants, additional information is to be given in the plain language remark part of the situational awareness section of the runway condition report. Where possible, a standardised text shall be used.

Note.— When no information is to be reported, insert "NR" at its relevant position in the message to indicate to the user that no information exists (/NR/).

Assessed per cent	Reported per cent
≤ 9	NR
10 - 25	25
26 – 50	50
51 – 75	75
76 – 100	100

Table 1. Percentage of Coverage for Contaminants

f) Depth of loose contaminant - standing water for each runway third: a two- or three-digit number representing the assessed depth (mm) of the contaminant for each runway third. The depth is reported in a six to ninecharacter group separated by a "/" for each runway third as defined in Table 2. The assessment is based upon an even distribution within the runway thirds as assessed by trained personnel. If measurements are included as part of the assessment process, the reported values are still reported as assessed depths, as the trained personnel have placed their judgment upon the measured depths to be representative for the runway third.

Format	: [n]nn/[n]nn/[n]nn
Example	: 04/06/12 [STANDING WATER]

This information is **conditional**.

It is reported only for STANDING WATER.

Example of reporting depth of contaminant whenever there is a significant change

- 1) After the first assessment of runway condition, a **first runway condition report** is generated. The initial report is:
- 2) With continuing precipitation, a new runway condition report is required to be generated as subsequent assessment reveals a change in the runway condition code. A **second runway condition report** is therefore created as:

2/2/2 100/100/100 04/04/04 STANDING WATER/STANDING WATER

- 3) With even more precipitation, further assessment reveals the depth of precipitation has increased from 4 mm to 6 mm along the entire length of the runway. However, a new runway condition report is not required because the runway condition code has not changed (change in depth is less than the significant change threshold of 3 mm).
- 4) A final assessment of the precipitation reveals that the depth has increased to 8 mm. A new runway condition code is required because the change in depth from the last runway condition report (second runway condition code) i.e., from 4 mm to 8 mm is greater than the significant change threshold of 3 mm. A third runway condition report is thus created as below:

2/2/2 100/100/100 08/08/08 STANDING WATER/STANDING WATER

For contaminant other than STANDING WATER, the depth is not reported. The position of this type of information in the information string is then identified by /NR/. *Example: /NR/*

When the depth of the contaminants varies significantly within a runway third, additional information is to be given in the plain language remark part of the situational awareness section of the runway condition report.

Note.— In this context a significant variation in depth in the lateral direction is more than twice the depth indicated in column 3 of Table 2. Further information is available in ICAO Circular 355— Assessment, Measurement and Reporting of Runway Surface Conditions.

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Contaminant	Valid values to be reported	Significant change
STANDING WATER	04, then assessed value	3 mm up to and including 15 mm

Table 2.	Depth	Assessment for	Contaminants
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Note 1.— For STANDING WATER, 04 (4 mm) is the minimum depth value at and above which the depth is reported. (From 3 mm and below, the runway third is considered WET).

Note 2.— Above 4 mm for STANDING WATER an assessed value is reported and a significant change relates to observed change from this assessed value.

g) **Condition description for each runway third:** to be reported in capital letters using terms specified in 2.9.5 of CAD 14, Vol. I. The condition type is reported by any of the following condition type descriptions for each runway third and separated by an oblique stroke "/".

This information is **mandatory**.

DRY STANDING WATER WET

Format : nnnn/nnnn/nnnn Example : DRY/WET/STANDING WATER

h) Width of runway to which the RWYCCs apply if less than published width is the two-digit number representing the width of cleared runway in metres.

This information is **optional**.

Format : nn Example : 30

If the cleared runway width is not symmetrical along the centre line, additional information is to be given in the plain language remark part of the situational awareness section of the runway condition report.

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 2.3.5 RCR Information String RCR information string that consists of all eight elements as described above is expressed as below:
RCR _____ //_ //_ //_ //_ .../../...

Aerodrome	Date &Time	RWY	RWYCC	%Coverage of	Depth	Contaminant	Reduced
				Contaminant		type	RWY Width

Runway condition report — Situational awareness section:

2.3.6 All individual messages in the situational awareness section end with a full stop sign. This is to distinguish the message from subsequent message(s).

The information to be included in this section consists of the following:

a) Reduced runway length

This information is **conditional** when a NOTAM has been published with a new set of declared distances affecting the LDA. *Format* : *Standardized fixed text*

RWY nn [L] or nn [C] or nn [R] LDA REDUCED TO [n]nnn

Example : RWY 14L LDA REDUCED TO 2450.

b) Loose sand on the runway

This information is **optional**.

Format	: RWY nn[L] or nn[C] or nn[R] LOOSE SAND
Example	: RWY 14R LOOSE SAND.

c) Taxiway conditions

This information is **optional**.

Format	: TWY [nn]n POOR
Example	: TWY B POOR.

d) Apron conditions

This information is **optional**.

Format	: APRON [nnnn] POOR
Example	: APRON CARGO POOR.

e) CAAM approved and published use of measured friction coefficient

This information is **optional**.

Format	: [State set format and associated procedures]
Example	: [Function of State set format and associated procedures].

f) Plain language remarks using only allowable characters in capital letters

Where possible, standardised text shall be developed.

This information is **optional**.

g) Format : Combination of allowable characters where use of full stop « . » marks the end of the message.

Allowable characters:

A B C D E F G H I J K LM N O P Q R S T U V W X Y Z 0 1 2 3 4 5 6 7 8 9 / [oblique stroke] "." [period] "" [space]

Assessing a runway and assigning a runway condition code (RWYCC)

- 2.3.7 The assessed RWYCC to be reported for each third of the runway is determined by following the procedure described in 2.3.12 to 2.3.16.
- 2.3.8 If 25 per cent or less area of a runway third is wet or covered by contaminant, a RWYCC 6 shall be reported.
- 2.3.9 If the distribution of the contaminant is not uniform, the location of the area that is wet or covered by the contaminant is described in the plain language remarks part of the situational awareness section of the runway condition report.
- 2.3.10 A description of the runway surface condition is provided using the contamination terms described in capital letters in Table 3 *Assigning a runway condition code (RWYCC)*.
- 2.3.11 If multiple contaminants are present where the total coverage is more than 25 per cent but no single contaminant covers more than 25 per cent of any runway third, the RWYCC is based upon the judgment by trained personnel, considering what contaminant will most likely be encountered by the aeroplane and its likely effect on the aeroplane's performance.
- 2.3.12 The RWYCC is determined using Table 3.
- 2.3.13 The variables, in Table 3, that may affect the runway condition code are depth of contaminant.
- 2.3.14 An assigned RWYCC 5, 3 or 2 shall not be upgraded.
- 2.3.15 The RWYCC determined from Table 3 shall be appropriately downgraded considering all available means of assessing runway slipperiness, including the criteria given in Table 4 *Correlation of runway condition code and pilot reports of runway braking action.*

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- 2.3.16 Where available, the pilot reports of runway braking action shall be taken into consideration as part of the ongoing monitoring process, using the following principle:
 - a) a pilot report of runway braking action is taken into consideration for downgrading purposes; and
 - b) a pilot report of runway braking action can be used for upgrading purposes only if it is used in combination with other information qualifying for upgrading.
- 2.3.17 Two consecutive pilot reports of runway braking action of POOR shall trigger an assessment if an RWYCC of 2 or better has been reported.
- 2.3.18 Table 4 shows the correlation of pilot reports of runway braking action with RWYCCs.
- 2.3.19 Table 3 and Table 4 combined form the runway condition assessment matrix (RCAM) in Table 5. The RCAM is a tool to be used when assessing runway surface conditions. It is not a standalone document and shall be used in compliance with the associated procedures of which there are two main parts:
 - a) assessment criteria; and
 - b) downgrade assessment criteria.

Runway condition description	Runway condition code (RWYCC)	
DRY	6	
WET (the runway surface is covered by any visible dampness or water up to and including 3 mm deep)	5	
N/A	4	
WET ("Slippery wet" runway)	3	
STANDING WATER (more than 3 mm depth)	2	
N/A	1	
N/A	0	

Table 3. Assigning a Runway Condition Code (RWYCC)

Table 4. Correlation of Runway Condition and Pilot Reports of

Pilot report of runway braking action	Description	Runway condition code (RWYCC)
N/A		6
GOOD	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal	5
GOOD TO MEDIUM	Braking deceleration OR directional control is between good and medium	4
MEDIUM	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced	3
MEDIUM to poor	Braking deceleration OR directional control is between medium and poor	2
POOR	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced	1
Less than poor	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain	0

Runway Braking Action

Table 5. Runway condition assessme	nt matrix (RCAM)
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	Runway condition as	sessment matrix (RCAM)	
	Assessment criteria	Downgrade assessment	criteria
Runway condition code	Runway surface description	Aeroplane deceleration or directional control observation	Pilot report of runway braking action
6	DRY	-	-
5	WET (The runway surface is covered by any visible dampness or water up to and including 3 mm depth)	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	GOOD
4	N/A	Braking deceleration OR directional control is between Good and Medium.	GOOD TO MEDIUM
3	WET ("slippery wet" runway)	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	MEDIUM
2	More than 3 mm depth of STANDING WATER	Braking deceleration OR directional control is between Medium and Poor.	MEDIUM TO POOR
1	N/A	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	POOR
0	N/A	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	LESS THAN POOR

3 Training

3.1 General

3.1.1 Aerodrome operators shall develop a training program for all personnel who will assess and report runway conditions. This training program shall include initial training and annual recurrent training.

3.2 Initial training

- 3.2.1 For the purpose of initial training, aerodrome operators shall utilize the information in this document to develop and conduct training which includes both:
 - a) a review of the theoretical concepts; and
 - b) practical exercises
- 3.2.2 Initial training shall include, but not limited to the following topics:
 - a) Aerodrome familiarization, including aerodrome markings, signs and lightings;
 - b) Aerodrome procedures as described in the aerodrome manual;
 - c) Aerodrome emergency plan;
 - d) NOTAM initiation procedures;
 - e) Aerodrome driving rules;
 - f) Air traffic control procedures on the movement area;
 - g) Radiotelephone operating procedures;
 - h) Phraseology used in aerodrome control, including the ICAO spelling alphabet;
 - i) Aerodrome inspection procedures and techniques;
 - j) Assessment and reporting of runway surface friction characteristics;
 - k) Calibration, maintenance and use of runway friction measurement device;
 - I) Low visibility procedures;
 - m) Basics of the Global Reporting Format (GRF);
 - n) Runway Condition Assessment Matrix Components (RCAM);
 - o) Determination along with Downgrade and Upgrade of RWYCC;
 - p) Runway Condition Reporting (RCR); and
 - q) Measurement technique and assessment.

3.3 Annual recurrent training

- 3.3.1 For the purpose of Annual Recurrent Training, aerodrome operators shall utilize the information in this document to develop and conduct appropriate training for their personnel which:
 - a) focuses primarily on the practical aspects of runway condition assessment and reporting; and
 - b) incorporates "lessons learned" from the previous year(s) operations.



4 Appendices

4.1 Appendix 1 – Runway Condition Assessment Worksheet



