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Global Reporting Format (GRF) for Runway Surface Conditions

1 INTRODUCTION

1.1 This Civil Aviation Circular (CAC) is issued by the Chief Executive Officer (CEO) of the Civil Aviation Authority of Malaysia, as CAC 05/2021, in exercise of the powers conferred by section 24O of the Civil Aviation Act 1969 [*Act 3*].

1.2 A CAC is a legally binding document that supersedes current published standards, requirements, procedures, or guidelines in the CAD.

1.3 The standards, requirements, procedures, or guidelines stated in this CAC will be incorporated into the relevant CAD in the next planned revision cycle.

1.4 Without prejudice, any revision(s) in this CAC is only applicable to the aforementioned chapter or paragraph of the CAD related herewith thereto.

2 CAD 6 Part I – CAT: Aeroplane operating procedures for landing performance.

2.1 Para 4.4.11.2 shall read as follows:

Operators shall develop a training programme for all flight crew operating aeroplanes with a maximum certificated take-off mass greater than 5 700 kg intended for the carriage of passengers or cargo or mail operating into and out of international airports. The training for current flight crews shall be completed before the Global Reporting Format applicability date on 4th November 2021. Thereafter, operators shall ensure training is provided to newly recruited flight crew to ensure compliance.

Note. – Attachment M provides additional guidance on Global Reporting Format and training syllabus for the training programme as stated in paragraph 4.4.11.2.

2.2 'Attachment M – Global Reporting Format for runway surface conditions' shall be added into CAD 6 Part I – CAT. The attachment is available in Attachment A of this circular.

2.3 **Reason for change:**

a) Runway safety-related events, in particular runway excursions, are among the highest risk factor for aviation safety. A runway excursion is defined as a "veer off or overrun of the runway surface", which can happen during landing or take

off. One main contributing factor involves adverse weather that results in the runway surface being contaminated by snow, ice, slush or water, with a potentially negative impact on an aircraft's braking, acceleration or controllability.

b) To help mitigate the risk of excursion ICAO has developed a harmonized methodology for the assessing and reporting of runway surface conditions. This methodology, known as the Global Reporting Format (GRF), will be globally applicable from 4th November 2021.

c) The GRF is intended to cover conditions found in all climates. It provides a means for aerodrome operators to rapidly and correctly assess runway surface conditions, whether they are exposed to wet runway conditions, snow, slush, ice or frost, including rapidly changing conditions such as those experienced during winter or in tropical climates.

3 INCORPORATING CHANGES INTO CADs AND/OR CAGMs

3.1 The changes stated in this CAC will be incorporated into the next revision of the applicable CAD.

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

4 Attachment A

Attachment M – Global Reporting Format for runway surface conditions

1 Global Reporting Format

1.1 The Global Reporting Format comprises an evaluation of a runway by human observation (normally done by airport operations staff) and, using a runway condition matrix, the consequent assignment of a Runway Condition Code (RWYCC). This code is complemented by a description of the surface contaminant based upon its type, depth and coverage for each third of the runway. This evaluation should, of course, be performed by a trained runway assessor.

1.2 The outcome of the evaluation and associated RWYCC are then used to complete a standard report called the Runway Condition Report (RCR) which is forwarded to air traffic services and the aeronautical information services for dissemination to pilots.

Runway condition assessment 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	• FROST • WET (The runway surface is covered by any visible dampness or water up to and including 3 mm depth) ***Up to and including 3 mm depth:*** • SLUSH • DRY SNOW • WET SNOW	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	GOOD
4	***−15°C and Lower outside air temperature***: • COMPACTED SNOW	Braking deceleration OR directional control is between Good and Medium.	GOOD TO MEDIUM
3	• WET ("slippery wet" runway) • DRY SNOW or WET SNOW (any depth) ON TOP OF COMPACTED SNOW ***More than 3 mm depth:*** • DRY SNOW • WET SNOW ***Higher than −15°C outside air temperature***[1]: • COMPACTED SNOW	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 water or slush:*** • STANDING WATER • SLUSH	Braking deceleration OR directional control is between Medium and Poor.	MEDIUM TO POOR
1	• ICE [2]	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	POOR
0	• WET ICE [2] • WATER ON TOP OF COMPACTED SNOW [2] • DRY SNOW or WET SNOW ON TOP OF ICE [2]	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	LESS THAN POOR

1.3 Pilots use the RWYCC to determine their aircraft's performance by correlating the code with performance data provided by their aircraft's manufacturer. This helps pilots to correctly carry out their landing and take-off performance calculations for wet or contaminated runways.

1.4 Another important element of the GRF is a process that enables pilots to report their own observations of runway conditions, thereby confirming the RWYCC or providing an alert to changing conditions.

1.5 Other key qualities of the GRF are its relative simplicity and its global applicability. A methodology that is easily understood and implemented globally is an important means by which the runway excursion risk can be mitigated and the safety of runway operations improved.

2 Training Syllabus

2.1 Training and actual operations should be based on the fact that the assessment of the runway condition, friction measurement and estimation of braking action are not an exact science. Pilots should understand that the actual safety margins get smaller when conditions get worse and, at the same time, the assessment of the runway condition becomes more difficult in deteriorating weather. Therefore, the Runway Condition Assessment Matrix (RCAM), Runway Condition Code (RWYCC) and braking action are adaptive tools in decision-making rather than operating norms or rules. For example, a calculated 1 m margin in landing distance does not necessarily mean that the landing will be safe; the pilot must use his best judgment, taking different variables into account and cross-checking between sources when making decisions.

2.2 It is also good airmanship to determine how small changes in runway and/or weather conditions affect operations, for instance, how the downgrading of the RWYCC by one level or a predetermined wind change affect operations. It is good CRM to make some predetermined decisions regarding deteriorating conditions. These “canned decisions’ improve situational awareness, help in late-stage decision-making and improve workload management.

Note. – Items marked with an asterisk (*) are directly linked to runway surface condition reporting.

1. General	
Contamination	• Definition* • Contaminants that cause increased drag and therefore affect acceleration, and contaminants that cause reduced braking action and affect deceleration • Slippery when wet: status*

Contaminated runway	• Runway surface condition descriptors* • Operational observations with friction devices* • Operator's policy on the use of: o reduced take-off thrust; o runway thirds in take-off and landing performance calculations; and o low visibility operations and autoland. • Stopway • Grooved runway
RWYCCs*	• RCAM* o Differences between those published for aerodromes and flight crew* o Format in use* o The use of runway friction measurements* o The use of temperature* o The concept of performance categories and ICAO runway surface condition codes* o Interpretation of "slippery wet" o Downgrade/upgrade criteria* o Difference between a calculation and an assessment* • Braking action* o Reporting of LESS THAN POOR → no operations • Use of aircraft wind limit diagram with contamination
RCR (reference: Doc 10064)	• Availability* • Validity* • Performance and situational awareness* • Decoding* • Situational awareness (reference: Doc 10064)*

Aeroplane control in take-off and landing (reference: Doc 10064)	• Lateral control o Windcock effect o Effect of reversers o Cornering forces o Crosswind limitations □ Operations if cleared runway width is less than published width
	• Longitudinal control o V_1 correction in correlation with minimum control speed on ground o Aquaplaning o Anti-skid o Autobrake
Take-off distance	• Acceleration and deceleration • Take-off performance limitations • Take-off distance models • Factors involved • Reason for using the type and depth of contaminant instead of RWYCC* • Safety margins
Landing distance	• Model for distance at time of landing • Factors involved • Safety margins o Minimum equipment list (MEL) does not include any additional margins (e.g. 15%)
ICAO's exceptions in runway reporting	• States that do not comply with ICAO*
2. Flight planning	
Dispatch/in-flight conditions	
MEL/configuration deviation list (CDL) items affecting take-off and landing performance	
Operator's policy on variable wind and gusts	

Landing performance at destination and alternates	• Selection of alternates if airport is not available due to runway conditions o En-route o Destination alternates • Number • Runway condition
3. Take-off	
• Runway selection • Take-off from a wet or contaminated runway	
4. In-flight operations	
Landing distance	• Distance at time of landing calculations o Considerations for flight crew (reference: Doc 10064)* o Operator's policy • Factors involved • Runway selection for landing • Safety margins
Use of aircraft systems	• Brakes/autobrakes • Difference between friction-limited braking and different modes of autobrakes • Reversers • Aeroplane as a friction-measuring and/or reporting system
5. Landing techniques	
Pilot procedures and flying techniques when landing on length-limited runway (reference: Doc 10064)	
Use of the Engineered Materials Arresting System (EMAS) in case of overrun	
6. Safety considerations	
• Possible types of errors* • Mindfulness principles necessary for high reliability*	
7. Documentation and records*	
8. AIREPs (reference: Doc 10064)	
• Assessment of braking action* • Terminology* • Possible automated AIREPs* (aeroplane as a friction-measuring and reporting system) • Air safety reports if flight safety has been compromised	