

► This RA has been substantially re-written; for clarity no change marks are presented – please read RA in its entirety ◀

RA 3272 – Evaluation of Runway Surface Conditions

Rationale

Runway surface conditions, including friction qualities, are subject to change due to the continuous use of the surface over time by Aircraft and / or weather. Continuous use and / or weather can cause doubt to exist over the Runway surface braking conditions. To ensure the safe operation of Aircraft, the condition of the Runway needs to be evaluated regularly and reported as appropriate in order to reduce Risk to Life.

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Regulation 3272(1)

Continuous Friction Measuring Equipment

3272(1) Continuous Friction Measuring Equipment (CFME) **shall** be used in specific circumstances.

Acceptable Means of Compliance 3272(1)

Continuous Friction Measuring Equipment

1. CFME **should** only be used for Friction tests, and in extremis on runways contaminated with compacted snow and ice. CFME, such as Griptester and Mu-meter, are considered unreliable on Runways contaminated with wet snow, slush or water and may indicate a surface condition that is better than the actual condition.
2. **Contaminated Runway**¹. Contaminated Runway conditions **should** be reported detailing the contamination for each third of the Runway as detailed in RA 3272(2).
3. Friction tests **should** be completed utilizing CFME:
 - a. If doubt exists as to the braking conditions of the Runway, except on a contaminated Runway².
 - b. Following an Aircraft Incident / Accident on the Runway, where a possibility exists that the surface conditions may have been a contributing factor, a full evaluation of those sections of the Runway considered to be associated with the Incident / Accident **should** be carried out, in accordance with (iaw) the Post Crash Management procedures contained in the Manual of Aircraft Post Crash Management. Records of readings and traces **should** be retained iaw with RA 3204³.
 - c. When required as part of an Aerodrome preventive and corrective Maintenance programme iaw RA 3590(2)⁴.
4. A friction test, with the exception of those conducted as part of an Aerodrome preventive and corrective Maintenance programme⁴, **should** consist of:
 - a. One run over the usable length of the Runway on a line between 2 m and 10 m each side of the centreline.
 - b. Additional runs at varying distances from the centreline **should** be conducted where poor areas are known to exist, or to cover Aircraft formation operations.
5. Mean values **should** be recorded for each third of the Runway length available.

¹ Refer to Annex A Table 2. Reporting Terms for definition.

² Other than a Runway contaminated with compacted snow and ice.

³ Refer to RA 3204 – Air Traffic Management Records.

⁴ Refer to RA 3590(2): Maintenance – Pavements – Friction.

Acceptable Means of Compliance 3272(1)

6. A plan of the Runway(s) **should** be maintained by Air Traffic Control (ATC) showing where pooling occurs and where areas of low friction caused by rubber deposits, Runway markings etc exist, especially if a recurring equivalent coefficient reading of 0.35 or below is recorded. If this is the case the Defence Infrastructure Organisation **should** be advised.

7. A record **should** be kept by ATC of all evaluation monitoring runs. A copy of the rainfall trace for the day **should** be attached to the record. If the rainfall trace is not available a full rain report for the day **should** be requested and attached to the record.

Guidance Material 3272(1)

Continuous Friction Measuring Equipment

8. Nil.

Regulation 3272(2)

Reporting of Runway Surface Conditions

3272(2) Deteriorating and / or changing Runway surface conditions **shall** be reported iaw the International Civil Aviation Organization's Global Reporting Format (GRF)⁵.

Acceptable Means of Compliance 3272(2)

Reporting of Runway Surface Conditions

9. The Aerodrome Operator (AO) **should** be responsible for assessing Aerodrome surface conditions and disseminating Runway surface conditions. However, in practice, arrangements can be made for the assessment and dissemination of Runway surface conditions to be delegated to the Air Traffic Services (ATS) unit and / or Station Operations.

10. Reporting, in compliance with the Runway Condition Report (RCR), **should** commence when a significant change in Runway surface condition occurs due to water, snow, slush, ice or frost. Reporting of the Runway surface condition **should** continue to reflect significant changes until the Runway is no longer contaminated. When this situation occurs, the Aerodrome **should** issue a RCR that states the Runway is wet or dry as appropriate.

11. RCRs **should** be reported on the Automatic Terminal Information System (ATIS). If ATIS is not available or significant changes occur, this information **should** be reported by ATC to Aircraft concerned in plain language on the radiotelephony (RTF) either:

- a. Individually, or
- b. Via the use of an all-stations broadcast, obtaining acknowledgement from each of the Aircraft concerned.

12. When reported, the presence or otherwise of contaminants on the surface of a Runway **should** be assessed over the most significant portion of the Runway, ie the area most likely to be used by Aircraft taking-off and landing. The assessed area may be different on Runways with a displaced threshold or other unusual configuration. The AO **should** be responsible for determining the exact dimensions and location of the area that is assessed.

13. Reports of the runway condition, to be used on ATIS or RTF for each third **should** be given in the direction of take-off or landing. Reports on the Runway surface condition **should** include the Aerodrome location, the date and time of assessment and the Runway-in-use designator followed as applicable by the elements below (associated phraseology is contained within CAP 413⁶):

- a. Runway Condition Code (RWYCC) for each Runway third;
- b. Type of contaminant;
- c. Depth of contaminant;

⁵ Refer to CAP 493 – Manual of Air Traffic Services – Part 1.

⁶ Refer to CAP 413 – Radiotelephony Manual

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- d. Percentage coverage of contaminant;
- e. Available width and / or length (if less than published); and
- f. Other related information.

14. **Unofficial Observations:** Pilots of Aircraft may report, or observations from the Visual Control Room (VCR) may indicate, that the amount of contaminant water present or Runway surface condition is different from that being reported. Under no circumstances **should** a Controller pass pilot's information which suggests that the Runway surface condition is better than the official report. However, when a pilots report or an observation from the VCR indicates a worse Runway surface condition, this information **should** be passed to other Aircraft.

- a. Unofficial observations from the VCR or pilot reports **should** be prefixed by the words "Unofficial observation". In this case, the Runway surface conditions will be advised using a single term for the entire Runway.

15. Pilot reports of braking action **should** be passed to the AO⁷ as soon as practicable to enable the AO⁷ to consider reassessing the RWYCC. The use of downgrading / upgrading is discouraged in the UK but AOs at Aerodromes outside of the UK considering the process **should** follow the procedure in CAP 2179⁸.

16. GRF is only applicable to paved surfaces and **should not** be used for grass / natural surface Runways.

17. In reporting the surface condition of a grass Runway, the report relates to the whole of the surface, and not to individual thirds. When the surface condition of a grass Runway or grass taxiway is assessed as being WET or CONTAMINATED a RWYCC **should not** be passed. Instead, its condition together with any other related information, is to be reported on the RTF to each Aircraft concerned and, where appropriate, on the ATIS in plain language using the descriptions contained in Annex A Tables 2 – 4.

Guidance Material 3272(2)

Reporting of Runway Surface Conditions

18. Aircraft performance can be considered to be impacted whenever the coverage of any water-based contaminants on any Runway third exceeds 25 per cent. GRF standardizes the assessment and reporting procedures to ensure that Runway surface conditions impacted by any contamination are communicated to Aircraft operators in a manner consistent with the effect on Aircraft performance. There are 5 fundamental elements of the methodology for the reporting and assessment of Runway surface conditions; these are:

- a. RCR: Is used by pilots to inform their Aircraft performance calculations and to provide them with situational awareness. The data contained within the RCR originate from the elements below:
- b. Runway Condition Assessment Matrix (RCAM): The matrix is used by the AO's personnel conducting Runway surface assessments to determine the appropriate RWYCC for each third of the Runway, and for pilots to decode the RWYCC into meaningful performance information (See Annex A Table 1).
- c. RWYCC: The RWYCC is determined through the assessment of the following aspects:
 - (1) Percentage of coverage of contamination in each Runway third; Type of contaminant, selected from the Runway Surface Conditions (see Annex A Table 2) and Runway Surface Condition Descriptors (see Annex A Table 3);
 - (2) Depth of the contamination; and
 - (3) Outside Air Temperature (OAT).
- d. Runway Surface Conditions (Reporting term) (See Annex A Table 2) and,

⁷ Or the delegated ATS unit and / or Station Operations.

⁸ Refer to CAP 2179 – Global Reporting Format: Guidance to Aerodrome Operators on How to Respond to Changing Conditions.

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e. Runway Surface Condition Descriptors (see Annex A Table 3).

19. The RCAM enables Aerodrome personnel to make an assessment based on visual observation of contaminants on the Runway surface, specifically the contaminant type, depth and coverage, as well as the OAT. The assessment information is used to develop the RCR. Once promulgated, there is an operational need for the information in the RCR to be kept up to date and accurate. Consequently, for the Aerodrome personnel monitoring and reporting the Runway surface conditions, it is important to focus on identifying and reporting any significant changes whenever they occur. A significant change is a change that requires new information in any item of the RCR.
20. Further details regarding Runway surface condition assessments can be found in CAP 2174⁹.
21. Throughout the weather event, it is expected the AO will maintain the accuracy of the RCR through reassessment as the conditions change and issue a new RCR if any of the reported items change. The use of Downgrading and Upgrading is discouraged as they relate to a specific process not designed or expected to be used in the UK iaw CAP 2179⁸

Civil Equivalence

22. This regulation is in line with CAP 493 – Manual of Air Traffic Services Part 1.

⁹ Refer to CAP 2174 – Assessment, Measurement and Reporting of Runway Surface Conditions for Licensed Aerodromes.

ANNEX A

EVALUATION / REPORTING OF RUNWAY SURFACE CONDITIONS

Table 1. Runway Condition Assessment Matrix

Runway Condition Assessment Matrix			
Assessment Criteria		Downgrade Assessment Criteria	
Runway Condition Code	Runway Surface Description	Aircraft Deceleration or Direction Control Observation	Pilot Report of Runway Braking Action
6	<ul style="list-style-type: none"> • DRY 	-	-
5	<ul style="list-style-type: none"> • FROST • WET (The Runway surface is covered by any visible dampness or water up to and including 3 mm depth) <p>Up to and including 3 mm depth:</p> <ul style="list-style-type: none"> • SLUSH • DRY SNOW • WET SNOW 	Braking deceleration is normal for the wheel braking effort applied and direction control is normal.	GOOD
4	<p>-15°C and colder OAT:</p> <ul style="list-style-type: none"> • COMPACTED SNOW 	Braking deceleration OR Directional control is between Good and Medium.	GOOD to MEDIUM
3	<ul style="list-style-type: none"> • WET ("slippery wet" Runway) • DRY SNOW or WET SNOW (any depth) ON TOP OF COMPACTED SNOW <p>More than 3 mm depth:</p> <ul style="list-style-type: none"> • DRY SNOW • WET SNOW <p>Warmer than -15°C OAT:</p> <ul style="list-style-type: none"> • COMPACTED SNOW 	Braking deceleration is noticeably reduced for the wheel braking effort applied OR Directional control is noticeably reduced.	MEDIUM
2	<p>More than 3 mm depth of water or slush:</p> <ul style="list-style-type: none"> • STANDING WATER • SLUSH 	Braking deceleration OR Directional control is between Medium and Poor.	MEDIUM to POOR
1	<ul style="list-style-type: none"> • ICE 	Braking deceleration is significantly reduced for the wheel braking effort applied. OR Directional control is significantly reduced.	POOR

0	<ul style="list-style-type: none"> • WET ICE • WATER ON TOP OF COMPACTED SNOW • DRY SNOW or WET SNOW ON TOP OF ICE 	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR Directional control is uncertain.	LESS THAN POOR
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Table 2. Reporting Terms

Reporting Term	Runway Surface Conditions
DRY	The Runway surface is considered dry if it is free of visible moisture and not contaminated within the area intended to be used.
WET	The Runway surface is covered by any visible dampness or water up to and including 3 mm depth within the intended area of use. Note: If the surface shows a change of colour due to moisture, the Runway will be reported as wet.
SLIPPERY WET	A wet Runway where the surface friction characteristics of a significant portion of the Runway have been determined to be degraded.
CONTAMINATED	A Runway is considered to be contaminated when a significant portion of the Runway surface area (whether in isolated areas or not) within the required length and width being used, is covered by one or more of the substances listed in the Runway surface condition descriptor table (see Table 3). The term 'CONTAMINATED' should not be used in RTF phraseology, the Runway surface condition descriptors (see Table 3) are to be used.

Table 3. Runway Surface Condition Descriptor

Runway Surface Condition ^a Descriptor	
COMPACTED SNOW	Snow that has been compacted into a solid mass such that Aircraft tyres at operation pressure and loadings, will run on the surface without significant further compaction or rutting of the surface.
DRY SNOW	Snow from which a snowball cannot readily be made.
FROST	Frost consists of ice crystals formed from airborne moisture on a surface whose temperature is below freezing. Frost differs from ice in that the frost crystals grow independently and therefore have a more granular texture. Note: <ol style="list-style-type: none"> 1. Below freezing refers to air temperature equal to or less than the freezing point of water (0°C). 2. Under certain conditions frost can cause the surface to become very slippery and it is then reported appropriately as reduced braking action.
ICE	Water that has frozen or compacted snow that has transitioned into ice, in cold and dry conditions.
SLUSH	Snow that is so water-saturated that water will drain from it when a handful is picked up or will splatter if stepped on forcefully.
STANDING WATER	Water of depth greater than 3 mm.

WET ICE	Ice with water on top of it or ice that is melting. Note: Freezing precipitation can lead to Runway conditions associated with wet ice from an Aircraft performance point of view. Wet ice can cause the surface to become very slippery.
WET SNOW	Snow that contains enough water content to be able to make a well compacted, solid snowball, but water will not be squeezed out.
^a In providing information on Runway surface conditions, many of the terms described above may be used in combination as follows: DRY SNOW ON TOP OF COMPACTED SNOW, DRY SNOW ON TOP OF ICE, WATER ON TOP OF COMPACTED SNOW, WET SNOW ON TOP OF COMPACTED SNOW and WET SNOW ON TOP OF ICE.	

Table 4. Other Related Information

Other Related Information
<p>For example, provide details of any:</p> <ul style="list-style-type: none"> • Runway de-icing activity that has taken place, such as chemical treatment. • Provide details of any snowbanks on the Runway giving the distance left / right from the Runway centreline. • Frozen ruts and ridges.

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