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Global methodology for assessing and reporting runway surface conditions

ICAO ESAF

Regional Office Nairobi

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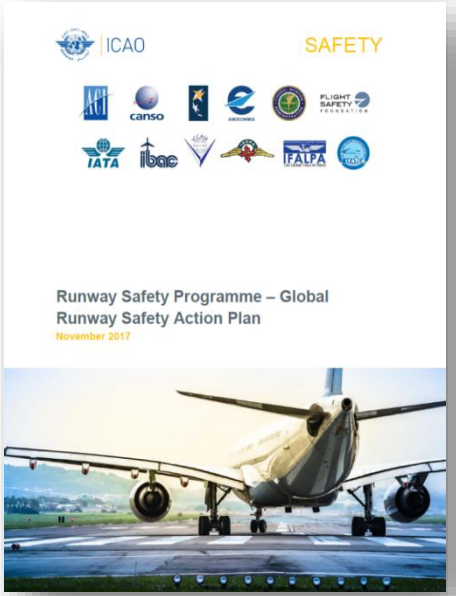
Overview

- Background
- SARPs development process
- Development of GRF-related provisions
- Methodology - Runway Condition Report
- Assessing and reporting runway surface conditions
- Dissemination of information
- In-Flight procedures for International Commercial Air Transport / General Aviation
- Performance data
- Implementation task list

Background

- Runway Safety: A global safety priority
- Runway excursions: highest risk category
- Poor braking action: a top contributing factor
- Mitigation by ICAO's Global Reporting Format (GRF)
  - World-wide implementation agreed
  - Applicability November 2020



Background

Runway surface conditions have contributed to many safety events and investigations have revealed **shortfalls in the accuracy and timeliness of assessment and reporting methods** currently provided for in ICAO provisions and guidance material.

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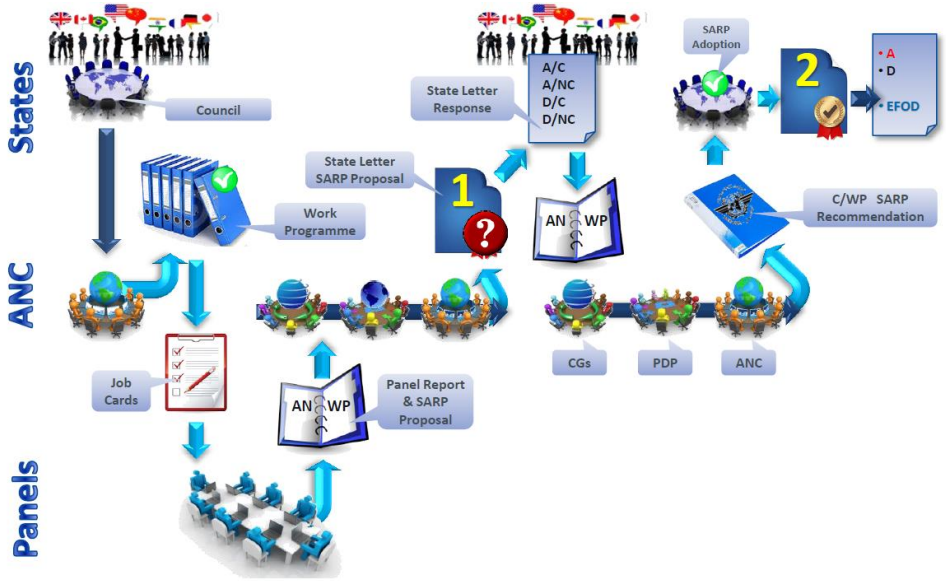
Background (cont'd)

- Runway Friction inlcuded in the ICAO Aerodromes Panel work programme in 2004;
- Questionnaire on Runway Surface Friction Characteristics sent to States (SL06/48) in 2006
- Friction task force (FTF) established in 2008
- Supported by ICAO panels: METP, FLTOPS, AIRP, AIM-AIS SG, ATMOPSP
- Developed a globally-harmonized methodology for runway surface condition assessment and reporting

SARPs Development Process



- Council reviews ANC proposal
- Within weeks of adoption, interim edition sent to States
- 3 months to indicate disapproval of adopted amendments
- Effective Date approximately 4 months after adoption by Council
- Normally, 4 months between Effective Date and Applicability Date
- One month prior to the Applicability Date, States notify the Secretariat of any differences

Development of GRF SARPs

Friction Task Force
10 Member States
7 IOs

ADOP/1
17 Member States
7 IOs

SL Replies
59 States
6 IOs

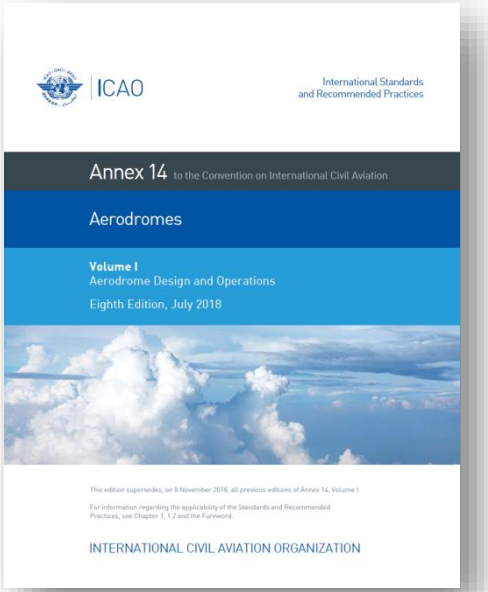
Approval by
ANC
19 Members

Adoption by
Council
36 Members States

2008 — Q1 2015 — Q2 2015 — Q1 2016

Development of GRF SARPs (cont'd)

- Proposals for the amendment of Annexes 3; 6, Parts I and II; 8; 14, Volume I; 15; PANS-Aerodromes; PANS-ATM and PANS-AIM
- State and International organizations consultation from 29 May to 28 August 2015
- 59 States and 6 international organizations replied
- Adoption of amendment during the 207th Session of the Council (February 2016)
- Effective on 11 July 2016
- Applicable on 5 November 2020



ICAO Provisions on GRF

- **Annex 14, Volume 1 and PANS-Aerodromes:** fundamental provisions for assessing and reporting runway surface conditions
- **Annex 6, Parts I and II:** assessment by the pilot-in-command of the landing performance and report for commercial air transport operations
- **Annex 8:** nature of the information provided by the aircraft manufacturers in flight manuals;
- **Annex 3:** removal of the runway state group for METAR/SPECI
- **Annex 15 and PANS-AIM:** syntax and format used for dissemination;
- **PANS-ATM:** phraseology and communication of special air-reports concerning runway braking
- **Guidance materials**
  - *Aeroplane Performance Manual* (Doc 10064)
  - Circular 355 *Assessment, Measurement and Reporting of Runway Surface Conditions*

Stakeholder responsibilities

- **Aerodrome operators** assess the runway surface conditions, including contaminants, for each third of the runway length, and report them by means of a uniform runway condition report (RCR)

- **Air traffic services (ATS)** convey the information received via the RCR and/or special air-reports (AIREP) to end users.

- **Aeronautical information services (AIS)** provide the information received in the RCR to end users (SNOWTAM)

Stakeholder responsibilities

- **Aircraft operators** utilize the information in conjunction with the performance data provided by the aircraft manufacturers to determine if landing or take-off operations can be conducted safely and provide runway braking action special air-reports (AIREP)

- **Aircraft Manufacturers** provide the necessary performance data in the aeroplane flight manual

Methodology – Runway Condition Report (RCR)

- Designed to report runway surface condition in a standardized manner

- Common language between all actors of the system: aircraft manufacturers, aerodrome operators, aircraft operators, ANSPs, AIM, MET and other stakeholders.

Methodology – Runway Condition Report (RCR)

- Allow flight crew to accurately determine aeroplane take-off and landing performance
- Based on the impact on aeroplane performance of the runway surface condition
- There are two scenarios. A State may:
  - not be exposed to snow and ice and thereby have no need to use the full global reporting format other than for water; or
  - be fully prepared to use the global reporting format (fully equipped, fully trained).

Runway Condition Report Principles

a) **an agreed set of criteria** used in a consistent manner for runway surface condition assessment, aeroplane (performance) certification and operational performance calculation;

a) **a unique runway condition code (RWYCC)** linking the agreed set of criteria with the aircraft landing and take-off performance table, and related to the braking action experienced and eventually reported by flight crews;

a) **reporting of contaminant type and depth** that is relevant to take-off performance;

Runway Condition Report Principles

a) **a standardized common terminology and phraseology** for the description of runway surface conditions that can be used by aerodrome operator inspection personnel, air traffic controllers, aircraft operators and flight crew;

and

a) **globally-harmonized procedures** for the establishment of the RWYCC with a built-in flexibility to allow for local variations to match the specific weather, infrastructure and other particular conditions.

Runway Condition Report (cont'd)

- The RCR consists of two sections:
  - aeroplane take-off and landing performance calculations; and
  - situational awareness of the surface conditions on the runway, taxiways and aprons.

Runway Condition Report (cont'd

- Aeroplane performance calculation section (for each runway third)
  - a one digit number identifying the runway condition code
  - the percentage coverage of the contaminant
  - the depth of loose contaminant
  - a harmonized term for runway surface condition description
- Situational awareness section (including, but not limited to): reduced runway length; presence of drifting snow, snowbanks, loose sand or chemical treatment on the runway; taxiway and apron conditions; and plain language remarks

Runway Condition Report (cont'd

LIST OF TABLES AND FIGURES

Table II-1-1. Percentage of coverage for contaminants

Assessed per cent	*Reported per cent*
10 – 25	25
26 – 50	50
51 – 75	75
76 – 100	100

Table II-1-2. Depth assessment for contaminants

Contaminant	*Valid values to be reported*	*Significant change*
STANDING WATER	04, then assessed value	3 mm up to and including 15 mm
SLUSH	03, then assessed value	3 mm up to and including 15 mm
WET SNOW	03, then assessed value	5 mm
DRY SNOW	03, then assessed value	20 mm

Reporting of RCC From ATS to Pilots

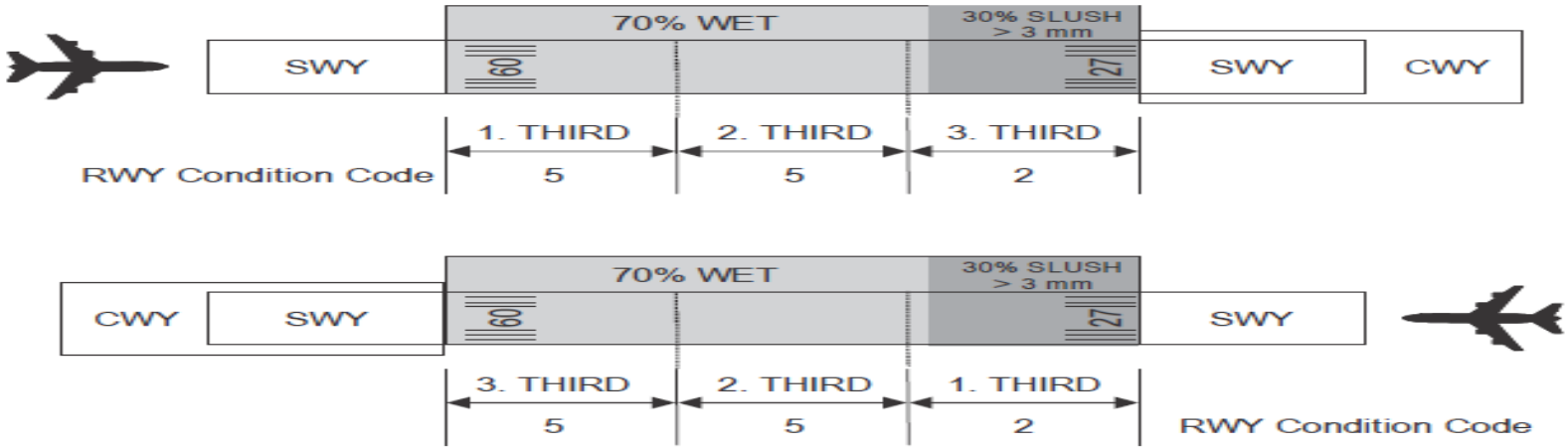


Figure II-1-1. Reporting of runway condition code from ATS to flight crew for runway thirds

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 less than 3 mm deep) ***Less than 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 ***3 mm and more 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	***3 mm and more 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

Runway Condition Report (cont'd

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.— For SLUSH, WET SNOW and DRY SNOW, 03 (3 mm) is the minimum depth value at and above which the depth is reported.

Note 3.— Above 4 mm for STANDING WATER and 3 mm for SLUSH, WET SNOW and DRY SNOW an assessed value is reported and a significant change relates to observed change from this assessed value.

Assessing the runway surface conditions

- The aerodrome operator assesses the runway surface conditions whenever water, snow, slush, ice or frost are present on an operational runway, using runway condition assessment matrix (RCAM)
- A runway condition code (RWYCC) will be assigned based on the assessment, along with a description of the runway surface condition, which can be used by the flight crew for aeroplane performance calculations

Assessing the runway surface conditions

- This report, based on the type, depth and coverage of contaminants, is the best assessment of the runway surface condition by the aerodrome operator
- All other pertinent information may be taken into consideration
- Upgrading or downgrading RWYCC using procedures in PANS-Aerodromes, including RCAM

Reporting the runway surface conditions

- The RCR shall be established when a significant change in runway surface condition occurs due to water, snow, slush, ice or frost (and should continue to reflect significant changes until the runway is no longer contaminated).
- Significant change:
  - any change in the runway condition code associated with type and depth of contaminant or in reportable contaminant coverage; and
  - any other information (e.g. a pilot report of runway braking action).

PANS-Aerodrome (Doc 9981), 1.1 Runway surface condition assessment and reporting

Dissemination of information

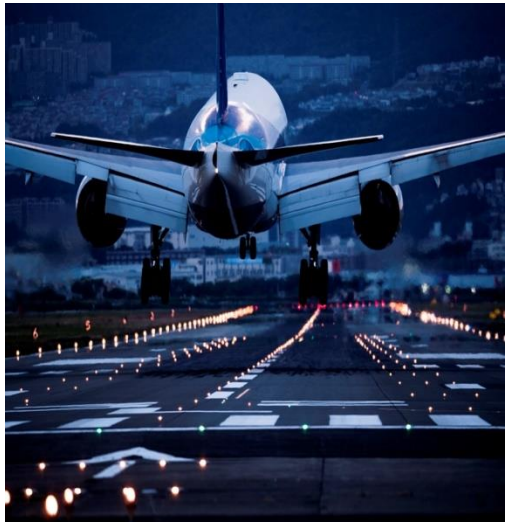
- **Through the AIS and ATS services:** when the runway is wholly or partly contaminated by standing water, snow, slush, ice or frost, or is wet associated with the clearing or treatment of snow, slush, ice or frost.
- **Through the ATS only:** when the runway is wet, not associated with the presence of standing water, snow, slush, ice or frost.

PANS-Aerodrome (Doc 9981), 1.1 Runway surface condition assessment and reporting

In-Flight procedures for International Commercial Air Transport / General Aviation

- The pilot-in-command shall / should **report the runway braking action special air-report (AIREP)** when the runway braking action encountered is not as good as reported.

- **An approach to land shall / should not be continued below 300 m** above aerodrome elevation unless the pilot-in-command is satisfied that, with the runway surface condition information available, the aeroplane performance information indicates that a safe landing can be made.



Annex 6 Part I (Part II), 4.4 In-flight procedures

Performance data

- The following stages considered for performance data:
  - Take-off performance data
  - *Landing performance data at the time of take-off*
  - *At time of landing performance data*
- Performance data shall be determined and furnished in the flight manual.

Annex 8, 2.2 Performance

Performance data

The take-off performance data during and at the time of landing, performance data **shall include the effect of the** gradient and **conditions (dry, wet, or contaminated) of the take-off or landing surface as appropriate for landplanes**, and water surface conditions, density of water, and strength of current for seaplanes

Training is important

- Aerodrome personnel
- Air traffic controller
- AIS personnel
- Dispatcher
- Pilots

Implementation task list

- Updating State's regulatory framework
  - updating National regulations (transposition of ICAO provisions to the national regulations)
  - filing differences / publishing significant differences in AIP (if required)
- Establishment of a national implementation plan that takes into account the modified ICAO provisions;

Implementation task list

- Notification to affected aerodromes, ATS units and users of the new requirements and changes;
- Training of inspectors and Operators on GRF;
- Encourage the establishment of a **GRF Implementation Team** to ensure proper planning and coordination at the State and/or regional level
- Oversight by the State of the implementation of regulations

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