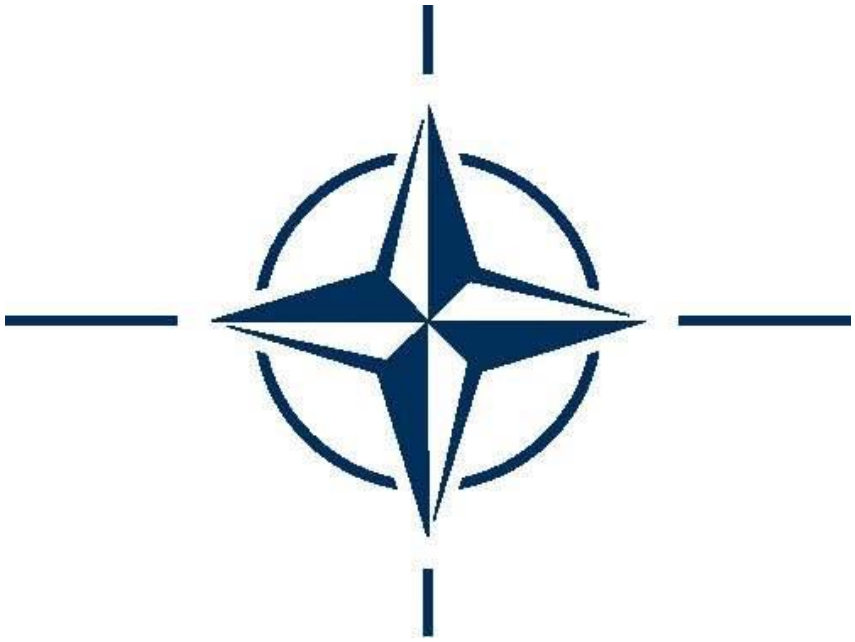
NATO STANDARD

AATMP-13

RUNWAY FRICTION AND BRAKING CONDITIONS

Edition A Version 1
MARCH 2018



NORTH ATLANTIC TREATY ORGANIZATION

ALLIED AIR TRAFFIC MANAGEMENT PUBLICATION
Published by the
NATO STANDARDIZATION OFFICE (NSO)

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

27 March 2018

1. The enclosed Allied Air Traffic Management Publication AATMP-13 Edition A, Version 1, RUNWAY FRICTION AND BRAKING CONDITIONS, which has been approved by the nations in the AIR TRAFFIC MANAGEMENT – COMMUNICATIONS, NAVIGATION AND SURVEILLENCE ADVISORY GROUP, is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 3634.

2. AATMP-13, Edition A, Version 1, is effective upon receipt.

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4. This publication shall be handled in accordance with C-M(2002)60.

Zoltán GULYÁS
Brigadier General, HUNAF
Director, NATO Standardization Office

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
CAN	(1) Canada reserves the right to follow the friction measurement test speed established by Transport Canada in "TP 312, 5th Edition – Aerodrome Standards and Recommended Practices" clause 9.1.2.2 (Note 2), which states; and "(c) the test speed is held constant at 65km/h (+/- 5 km/h)"; (2) Canada reserves the right to follow the corrective maintenance action levels established by Transport Canada in "TP 312, 5th Edition – Aerodrome Standards and Recommended Practices" clause 9.1.2.2, which states: "Corrective maintenance action is taken when: i. The average coefficient of friction (COF) for the entire runway is -below 0.50; or ii. Any portions of a runway surface that are 100m or greater in length have an average COF less than 0.30.
DEU	Germany reserves the right to realize the grip-measurements with devices which are currently neither listed in the relevant ICAO regulations nor in the STANAG 3634 ratification draft.
GRC	Hellenic Air Force is implementing the STANAG, cooperating fully with the Civil Aviation Authority, only in the joint airports, due to the lack of the appropriate friction measuring devices.
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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Related Documents

A. ICAO Convention on International Civil Aviation, Annex 14; Fifth Edition, July 2013.

B. ICAO Airport Services Manual Part 2 Pavement Surface Conditions; Document 9137, Fourth Edition 2002.

Introduction

1. The purpose of AATMP-13 is to standardize the assessment of runway surface friction which is measured and, where necessary, compared to agreed standards in order that participating nations can:

a. Maintain airfields in a timely and effective manner.

b. Carry out aircraft operations safely.

2. Runway friction is measured under standardized test conditions, with self-wetting, continuous friction measuring devices fitted with a smooth tread tyre, in order to establish friction values which can then be compared to standard Maintenance Friction Levels as detailed in paragraphs 6 to 13 and Annex A. These values are used primarily by engineers in order to support the planning and funding of maintenance. Operating Authorities will, however, be required to review operations if readings fall below the Minimum Friction Levels.

3. Runway friction is measured under ambient conditions with either continuous friction measuring devices or spot measuring devices in order to establish ambient friction values. Operating Authorities compare these values with agreed Operating Friction Levels and notify Operators in order that aircrew, be they either military or civilian, can be advised on braking action. Where appropriate, ambient friction levels, when compared to Operating Friction Levels, could be used to initiate works related investigations in order to determine the causes of specific circumstances. Such investigations may well include further tests under standardized conditions.

4. Correlation has not yet been officially established between Maintenance Friction Levels and Operating Friction Levels.

5. STANAG 3634 only considers Maintenance Friction Levels in detail. Whilst the setting of Operating Friction Levels remains the responsibility of individual participating nations, recommendations on such levels and the associated braking action are contained in References A and B.

Maintenance Friction Levels

6. Maintenance Friction Levels for self-wetting, continuous friction measuring devices are in Annex A.

7. Participating nations wishing to use either the decelerometer vehicle or the locked-wheel spot measuring devices may do so provided that adequate correlation data in respect of a recognised, continuous friction measuring device exists and

sufficient tests are carried out in order to make the overall analysis valid. Such participating nations are to make other participating nations aware of all cases where the device is used and, where requested by another participating nation, provide documentary evidence to support its use.

8. Testing should be carried out on runways when first constructed, after resurfacing and periodically thereafter. Nations should determine the time interval between testing that will enable any significant change in runway surface friction characteristics to be identified and a trend established and, if appropriate, for remedial maintenance to be conducted before the friction level falls below the Minimum Friction Level (see Annex A). Factors, which will influence the time interval between testing, include aircraft type, frequency of usage, climatic conditions, and pavement type and pavement service/maintenance requirements.

9. Due to the high level of costs associated with runway maintenance and resurfacing, the impact of such work on operations and the scope for individual interpretation of the significance of friction values, the following variables need to be standardized:

a. The minimum number and disposition of standard friction survey runs.

b. The method of calculating the friction values to be evaluated.

c. The size and dispositions of areas of low friction deemed to be critical.

10. The minimum number of Standard Friction Survey Runs to be carried out dependent on the nominal width of the runway is set out in Table 1. The survey runs are to be parallel to the runway centreline. Four of these shall be spaced symmetrically about the centreline, concentrated on the main trafficked areas and within the centre third. In the case of runways used regularly for formation take-offs, it is recommended that the number of Standard survey runs be increased to give an even spacing of friction readings across the full width of the trafficked area. The standard survey runs should cover the full length of the runways.

Nominal Runway Width (m)	Nominal Runway Width (ft)	Minimum Number of Runs
30	100	6
45	150	6
60	200	6
90	300	8

Table 1: Minimum Number of Standard Friction Survey Runs.

11. The average value of all the survey runs is the Maintenance Friction Level and should be interpreted in accordance with Annex A. In addition there will be occasions when the average of the end to end friction value will be in the acceptable category, but certain portions of the runway give low readings due either to variations in the condition/wear of pavements or to contaminants or other reasons. Where a significant portion(s) of the runway is below the acceptable level, rectification action should be taken in accordance with Annex A. For this purpose, Reference A sets a length in the order of 100 m as being significant for maintenance or reporting action.

12. When the friction values for either the entire runway or a portion thereof are below the Maintenance Planning Level detailed in Annex A, corrective maintenance action should be initiated. When the friction value for either the entire runway or portion thereof is below the Minimum Friction Level detailed in Annex A, corrective maintenance action shall be taken and information that the runway may be slippery when wet promulgated by NOTAM.

Other Factors

13. In determining appropriate remedial action for a runway (as a whole or in part) in accordance with Annex A, other factors besides the Maintenance Friction Level for the whole or portion thereof should be considered. These include transverse and longitudinal profiles, drainage characteristics, prevailing winds, surface age and condition (including structural integrity), surface contaminants, size and disposition of areas of low friction, the need to avoid significant asymmetrical friction and operational requirements.

Safety Annex

14. Safety considerations in implementing STANAG 3634 are contained in Annex B.

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Annex A. Maintenance Friction Levels

Friction Level	Test Speed (km/h)[1]	Water Depth (mm)[1]	Mu Meter [1]	Skiddometer BV11[1]	Surface Friction Tester[1]	Runway Friction Tester[1]	TATRA Friction Tester[1]	Grip Tester[1]	IMAG μ_d[2]
Maintenance Planning Level [1,3]	65	1.0	0.52	0.60	0.60	0.60	0.57	0.53	0.37
	95	1.0	0.38	0.47	0.47	0.54	0.52	0.36	0.27
Minimum Friction Level [1,4]	65	1.0	0.42	0.50	0.50	0.50	0.48	0.43	0.30
	95	1.0	0.26	0.34	0.34	0.41	0.42	0.24	0.20

Notes:

1. Data extracted from ICAO Airport Services Manual Part 2 Pavement Surface Conditions; Document 9137, Fourth Edition 2002, Table 3-1.
2. French continuous friction measuring trailer device operated at fixed 15% slip and using smooth PIARC tyre inflated to 150 kPa (22 psi). Friction coefficient (μ_d) based on horizontal traction due to the skid resistance of surface measured with force sensors.
3. The friction level below which corrective maintenance action should be initiated.
4. The friction level, below which information that a runway may be slippery when wet, should be made available.

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Annex B. Safety Considerations in Implementing STANAG 3634 – Runway Friction and Braking Conditions.

Introduction:
This Annex is intended for NATO Led Service Providers in implementing this STANAG at existing or planned airfields as well as during deployed operations.

It includes general considerations such as the suitability of the STANAG/AATMP for the required operations, currency with regard to edition number and amendments, applicability of related documents, nations ratifying and reservations.

Specific safety considerations are identified by the custodian of the STANAG/AATMP and national SMEs along with consequences and possible mitigations.

Custodian POC. For users to provide any comments and lessons learned: John Cook (UK) John.Cook664@mod.uk

General:
In the implementation of any STANAG/AATMP, the NATO Led Service Provider should verify the items listed below using the NATO Standardization Office (NSO)pass word protected Website https://nso.nato.int

A. Suitability	Review STANAG 7210 (AEP-68) *Guidance in the Selection of STANAGs for Deployed Operations, to determine* if the STANAG/AATMP is suitable for the type of operation required.
B. Currency	Ensure that STANAG/AATMP Edition and any Amendments are the most current as shown on the NSO website.
C. Related Documents	Obtain related documents cited in the STANAG/AATMP and, in particular, review those documents where criteria have been adopted. STANAGs are available on the NSO Website whereas civilian documents, such as ICAO, may be available from your Aviation or Engineering Commands.
D. Implementation Status	Review the ratification status along with any reservations to the STANAG/AATMP on the NSO Website and, in particularly, the status for those for nations taking part in the operation.
E. Compliance	For existing airfield facilities and procedures, determine if they are in compliance with the criteria and standards specified in the STANAG/AAMTP.

Specific:
The safety considerations, consequences and possible mitigations listed below by the STANAG/AATMP Custodian assisted by Subject Matter Experts are by no means exhaustive or fully applicable to all environments or situations.

Full safety surveys in accordance with STANAG 4720 *NATO Standard for Air Traffic Management (ATM) Safety Management System (SMS)*, shall still be carried out.

Safety Considerations	Consequences	Possible Mitigations
Low friction coefficient on pavement surface.	Aircraft skids on slippery pavement surface or overruns runway leading to an incident or accident.	1) Ensure friction coefficient of pavement surface is above the required level through regular inspection, testing, and maintenance procedures. 2) Notify aircrew when friction coefficient is below the minimum permitted value.
Incorrect friction measurements	Aircraft skids on slippery pavement surface or overruns runway leading to an incident or accident.	1) Ensure personnel undertaking friction measurement process are competent and follow recognized practices and standard procedures. 2) Ensure friction measurement equipment is maintained in accordance with manufacturer's instructions and calibration certificate is valid.
Inappropriate remedial action to improve runway surface friction	Aircraft skids on slippery pavement surface or overruns runway leading to an incident or accident.	1) Ensure personnel undertaking remedial action are competent and follow recognized practices and standard procedures. 2) Repeat friction measurement tests to confirm friction coefficient is acceptable following remedial action.
Airfield pavement maintenance personnel training	Potential injury, including death, to airfield pavement maintenance personnel while undertaking maintenance tasks.	1) Ensure airfield pavement maintenance personnel are aware of and follow a suitable and sufficient safe system of work. 2) Ensure airfield pavement maintenance personnel are aware and briefed of local hazards that may give rise to danger. 3) Ensure that the airfield manager and ATC are aware of the work.

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