European Aviation Safety Agency

Notice of Proposed Amendment 2016-10

Maintaining aerodromes rules —

AMC/GM for Aerodromes — Amendment 2

RMT.0591 — 26.9.2016

EXECUTIVE SUMMARY

This Notice of Proposed Amendment (NPA) addresses safety issues related to the prevention of runway incursions, runway surface evenness. It also proposes publication of information on the installation of aircraft arresting system

This NPA is linked with ICAO State Letter AN 4/1.2.26 – 16/19 adopting Amendment 13 to ICAO Annex 14, Volume I.

The specific objective of this proposed amendment is to mitigate the risk of runway incursions and maintain a high level of safety for aerodrome and flight operations.

This NPA gives the option for aerodrome operators to install autonomous runway incursion warning system as an additional measure to prevent runway incursions. Furthermore, it proposes the publication of information concerning the installation of an arresting system at the runway end, for overrunning aircraft, to mitigate the absence of a runway end safety area (RESA).

The proposed changes are expected to maintain safety and to ensure alignment with ICAO provisions.

Applicability	
Affected regulations and decisions:	ED Decision 2014/012/R – 'AMC & GM Aerodromes – Initial Issue'
Affected stakeholders:	Aerodrome Operators
Driver/origin:	Safety
Reference:	ICAO State Letter AN 4/1.2.26 – 16/19

Process map	
Concept Paper:	No
Terms of Reference:	29.07.2016
Rulemaking group:	No
RIA type:	None
Technical consultation during NPA drafting:	No
Duration of NPA consultation:	1 month
Review group:	No
Focussed consultation:	TBD
Publication date of the Opinion:	N/A
Publication date of the Decision:	Q4/2016

Table of contents

1. Procedural information

1.1. The rule development procedure

The European Aviation Safety Agency (EASA) developed this Notice of Proposed Amendment (NPA) in line with Regulation (EC) No 216/2008[1] (hereinafter referred to as the 'Basic Regulation') and the Rulemaking Procedure[2].

This rulemaking activity is included in the EASA 5-year Rulemaking Programme under RMT.0591 'Maintaining aerodrome rules'. The issue of preventing runway incursions is also part of the strategic objectives of EASA, already included in the European Plan for Aviation Safety (EPAS) 2016 – 2020.

The text of this NPA has been developed by EASA. It is hereby submitted for consultation of all interested parties[3].

The process map on the title page contains the major milestones of this rulemaking activity to date and provides an outlook of the timescale of the next steps.

1.2. The structure of this NPA and related documents

Chapter 1 of this NPA contains the procedural information related to this task. Chapter 2 (Explanatory Note) explains the core technical content. Chapter 3 contains the proposed text for the Amendment 2 to AMC & GM for Aerodromes – Initial Issue. This NPA does not require a regulatory impact assessment (RIA)

1.3. How to comment on this NPA

Please submit your comments using the automated **Comment-Response Tool (CRT)** available at http://hub.easa.europa.eu/crt/

The deadline for submission of comments is **26 October 2016.**

1.4. The next steps in the procedure

Following the closing of the NPA public consultation period, EASA will review all the comments received. The outcome of this consultation will be reflected in a comment-response document (CRD) which EASA will publish together with the decision amending 'AMC & GM for aerodromes – Initial Issue'.

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1 Regulation (EC) No 216/2008 of the European Parliament and the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.3.2008, p. 1).

2 EASA is bound to follow a structured rulemaking process as required by Article 52(1) of the Basic Regulation. Such process has been adopted by the EASA Management Board and is referred to as the 'Rulemaking Procedure'. See Management Board Decision concerning the procedure to be applied by EASA for the issuing of Opinions, Certification Specifications and Guidance Material (Rulemaking Procedure), EASA MB Decision No 01-2012 of 13 March 2012.

3 In accordance with Article 52 of the Basic Regulation and Articles 6(3) and 7 of the Rulemaking Procedure.

2. Explanatory Note

2.1. Overview of the issues to be addressed

GM1 ADR.OPS.A.005 Aerodrome data

EASA proposes to add in this GM, guidance on the provision of data regarding the installation of an aircraft arresting system.

AMC2 ADR.OPS.B.030 Surface movement guidance and control system

This is a new AMC proposed by EASA, that describes the operational use of an autonomous runway incursion warning system (ARIWS).

GM2 ADR.OPS.B.030 Surface movement guidance and control system

This is a new GM proposed by EASA, that provides a general description of the ARIWS.

AMC4 ADR.OPS.B.070 Aerodrome works safety

This is a new AMC transferring a part of CS-ADR-DSN.R.855 'Closed runways and taxiways, or parts thereof'

GM5 ADR.OPS.B.070 Aerodrome works safety

This is a new GM transferring a part of GM1 ADR-DSN.L.520 'General – Colour and conspicuity"

AMC1 ADR.OPS.B.080 Marking and lighting of vehicles and other mobile objects

EASA proposes to amend this AMC concerning the display of flags on mobile objects, in order to align with ICAO Annex 14.

AMC1 ADR.OPS.C.010 Pavements, other ground surfaces and drainage

EASA proposes to amend this AMC in order to address the need to evaluate the surface of a paved runway when constructed or resurfaced.

GM3 ADR.OPS.C.010(b)(2) Pavements, other ground surfaces and drainage

EASA proposes to amend this GM to align with ICAO Annex 14.

2.2. Objectives

The overall objectives of the EASA system are defined in Article 2 of the Basic Regulation. This proposal will contribute to the achievement of the overall objectives by addressing the issues outlined in Chapter 2 of this NPA.

The specific objective of this proposal is to amend the AMC and GM for aerodromes in order to mitigate the risk of runway incursions and maintain a high level of safety for aerodromes and flight operations. The proposed amendments are based on ICAO Amendment 13 to Annex 14, Volume I.

2.3. Summary of the regulatory impact assessment (RIA)

The majority of the proposals do not introduce new requirements, since their purpose is mainly to provide clarifications and additional guidance. Concerning the ARIWS, the installation of the system is not a requirement. The decision whether to install such a system depends on local conditions and it may be implemented when cost is justified and other measures to mitigate the risk of runway incursions have been ineffective. EASA includes this proposal to ensure that if such a system is installed, the functionality of the system meets the operational needs.

2.4. Overview of the proposed amendments

GM1 ADR.OPS.A.005 Aerodrome data

EASA proposes to add in this GM information concerning the provision of data regarding the existence of an arresting system. The arresting system is a mitigation measure in the absence of RESA and the availability of such information to the flight crew is very useful for aircraft operations.

AMC2 ADR.OPS.B.030 Surface movement guidance and control system

ARIWS has already been installed in different Member States. The lights characteristics have already defined in ICAO Annex 14 and are in the process of being transposed into EASA CS-ADR.DSN. Apart from the technical details, it is also important to provide information on the operational use of the system. In this way a standardised development and functioning of the system is ensured.

GM2 ADR OPS.B.030 Surface movement guidance and control system

The new GM is providing general information on the system and its possible interfaces. In this way it supports the aerodrome operator during the development phase.

AMC4 ADR.OPS.B.070 Aerodrome works safety

CS-ADR.DSN.855 describes when closed runway and taxiway markings are required, the procedures for the operation of lighting system in such cases, as well as the actions that should be taken when a closed part of a taxiway or runway is intercepting a usable runway or taxiway. This part of the CS has been considered to have an operational nature, therefore, it is transferred to Part-ADR.OPS with the same wording.

GM5 ADR.OPS.B.070 Aerodrome works safety

GM1 ADR-DSN.L.520 contains guidance concerning the use of temporary markings when work is in progress. Since the guidance provided is of operational nature, EASA proposes to transfer the GM to Part-ADR.OPS without changing its content.

AMC1 ADR.OPS.B.080 Marking and lighting of vehicles and other mobile objects

Point (c) of the AMC is amended to align with ICAO Annex 14. It details how the marking of a mobile object should be done by using flags, and it ensures that the need to mark with flags do not increase the hazard presented by the object.

AMC1 ADR.OPS.C.010 Pavements, other ground surfaces and drainage

Point (g) is added to align with ICAO Annex 14. The AMC proposes the evaluation of the runway surface when constructed or resurfaced to ensure that it meets the design objectives.

GM3 ADR.OPS.C.010(b)(2) Pavements, other ground surfaces and drainage

The proposed amendment corrects the surface irregularity bump heights corresponding to the applicable minimum lengths. Additionally, data was added to define the unacceptable region of the roughness criteria, thereby aiding in the planning or undertaking any corrective actions which may be required for a pavement. Furthermore, guidance is provided for step type bumps which typically are found on rigid pavements that have undergone some differential settlement.

3. Proposed amendments

The text of the amendment is arranged to show deleted text, new or amended text as shown below:

(a) deleted text is marked with ~~strike through~~;

(b) new or amended text is highlighted in grey;

(c) an ellipsis (…) indicates that the remaining text is unchanged in front of or following the reflected amendment.

3.1. Draft Acceptable Means of Compliance and Guidance Material (Draft EASA Decision)

Amend GM1 ADR.OPS.A.005 as follows:

GM1 ADR.OPS.A.005 Aerodrome data

(…)

(b) Strip/Runway End Safety Area/Stopway

(1) Length, width to the nearest metre or foot; ~~and~~

(2) Surface type~~.~~; and

(3) Arresting system – location(which runway end) and description

(…)

A new AMC2 ADR.OPS.B.030 is added as follows:

AMC2 ADR OPS.B.030 Surface movement guidance and control system

AUTONOMOUS RUNWAY INCURSION WARNING SYSTEM (ARIWS)

An ARIWS:

(a) should provide autonomous detection of a potential incursion or of the occupancy of an active runway and a direct warning to a flight crew or vehicle operator;

(b) should function, be powered and be controlled independently of any other visual system on the aerodrome;

(c) failure or of a part of it should not interfere with normal aerodrome operations. To this end, provision should be made to allow air traffic services to partially or entirely shut down the system;

(d) should operate independently from air traffic services communications;

(e) should be supported by local procedures in the case of malfunction or failure of the system or part of it.

(f) should be operational under all-weather conditions, including low visibility;

(g) may share common sensory components of an SMGCS or A-SMGCS, however, it should operate independently of either system;

Information on ARIWS characteristics and status should be provided to the appropriate aeronautical information services for promulgation in the Aeronautical Information Publication (AIP).

A new GM2 ADR.OPS.B.030 is added as follows:

GM2 ADR.OPS.B.030 Surface movement guidance and control system

AUTONOMOUS RUNWAY INCURSION WARNING SYSTEM (ARIWS) – GENERAL DESCRIPTION

(a) The operation of an ARIWS is based upon a surveillance system which monitors the actual situation on a runway and automatically returns this information to warning lights at the runway (take-off) thresholds and entrances. When an aircraft is departing from a runway (rolling) or arriving at a runway (short) final, red warning lights at the entrances will illuminate, indicating that it is unsafe to enter or cross the runway. When an aircraft is aligned on the runway for take-off and another aircraft or vehicle enters or crosses the runway, red warning lights will illuminate at the threshold area, indicating that it is unsafe to start the take-off roll.

(b) In general, an ARIWS consists of an independent surveillance system (primary radar, multilateration, specialised cameras, dedicated radar, etc.) and a warning system in the form of extra airfield lighting systems connected through a processor which generates alerts independent from air traffic services directly to the flight crews and vehicle operators.

(c) An ARIWS does not require circuit interleaving, secondary power supply, or operational connection to other visual aid systems.

(d) In practice, not every entrance or threshold needs to be equipped with warning lights. Each aerodrome operator should assess its needs individually depending on the characteristics of the aerodrome.

A new AMC4 ADR.OPS.B.070 is added as follows:

AMC4 ADR.OPS.B.070 Aerodrome works safety

CLOSED RUNWAYS AND TAXIWAYS, OR PARTS THEREOF

The aerodrome operator should ensure that:

(a) A closed marking is displayed on a temporarily closed runway, or taxiway, or portion thereof, except that such marking may be omitted when the closing is of short duration, and adequate warning by air traffic services is provided;

(b) Lighting on a closed runway, or taxiway, or portion thereof is not operated, except as required for maintenance purposes; and

(c) In addition to closed markings, when the runway, or taxiway, or portion thereof, is closed and is intercepted by a usable runway or taxiway which is used at night, unserviceability lights and markings should be placed across the entrance to the closed area at intervals not exceeding 3 m.

A new GM5 ADR.OPS.B.070 is added as follows:

GM5 ADR.OPS.B.070 Aerodrome works safety

USE OF TEMPORARY MARKINGS

(a) Circumstances may occur when it is not practicable to install permanent markings, for example during runway resurfacing. In order to provide sufficient visual guidance to aircraft, the following markings should be considered:

(1) runway centre line – required for operations below PA Category I;

(2) taxiway centre line lead on/off;

(3) runway edge line;

(4) runway threshold; and

(5) touchdown zone and aiming point markings.

(b) Centre line and edge marking widths can be replaced by temporary markings of reduced width from 0.9 m to 0.6 m if required.

(c) Touchdown zone and aiming point markings should be painted as soon as practicable after the resurface of the runway.

(d) Threshold markings should be painted as soon as possible, using temporary materials, before making them permanent.

Amend AMC1 ADR.OPS.B.080 as follows:

AMC1 ADR.OPS.B.080 Marking and lighting of vehicles and other mobile objects

(…)

(c) When flags are used to mark mobile objects, they should comply with the applicable CSs. They should be displayed around, on top of, or around the highest edge of the object. Flags should not increase the hazard presented by the object they mark.

(…)

Amend AMC1 ADR.OPS.C.010 as follows:

AMC1 ADR.OPS.C.010 Pavements, other ground surfaces and drainage

(…)

(g) The surface of a paved runway should be evaluated when constructed or resurfaced to determine that the surface friction characteristics achieve the design objectives.

Amend GM3 ADR.OPS.C.010(b)(2) as follows:

GM3 ADR.OPS.C.010(b)(2) Pavements, other ground surfaces, and drainage

RUNWAY SURFACE EVENNESS

(a) The operation of aircraft and differential settlement of surface foundations will eventually lead to increases in surface irregularities. Small deviations in the above tolerances will not seriously hamper aircraft operations. In general, isolated irregularities of the order of 2.5 cm to 3 cm over a 45 m-distance are ~~tolerable~~ acceptable, as shown in Figure 1. Although maximum acceptable deviations vary with the type and speed of an aircraft, the limits of acceptable surface irregularities can be estimated to a reasonable extent. The following table describes ~~maximum~~ acceptable, ~~and temporarily acceptable~~ tolerable and excessive limits~~.~~:

Surface Irregularity	~~Minimum acceptable l~~Length of irregularity (m)								
	3	6	9	12	15	20	30	45	60
Acceptable surface irregularity height (cm)	2.9	3.8	4.5	5	5.4	5.9	6.5	8.5	10
~~Maximum surface irregularity height (or depth) (cm)~~	~~3~~	~~3.5~~	~~4~~	~~5~~	~~5.5~~	~~6~~	~~6.5~~	~~8~~	~~10~~
~~Temporary~~ Tolerable ~~acceptable~~ surface irregularity height ~~(or depth)~~ (cm)	~~3.5~~ 3.9	5.5	~~6.5~~ 6.8	~~7.5~~ 7.8	~~8~~ 8.6	~~9~~ 9.6	11	~~13~~ 13.6	~~15~~ 16
Excessive surface irregularity height (cm)	5.8	7.6	9.1	10	10.8	11.9	13.9	17	20

Table 1

~~If the maximum limits are exceeded, corrective action should be undertaken, as soon as reasonably practicable, to improve the ride quality. If the temporarily acceptable limits are exceeded, the portions of the runway that exhibit such roughness should have corrective measures taken immediately if aircraft operations are to be continued.~~

(1) If the surface irregularities exceed the heights defined by the acceptable limit curve but are less than the heights defined by the tolerable limit curve, at the specified minimum acceptable length, herein noted by the tolerable region, then maintenance action should be planned. The runway may remain in service. This region is the start of possible passenger and pilot discomfort.

(2) If the surface irregularities exceed the heights defined by the tolerable limit curve, but are less than the heights defined by the excessive limit curve, at the specified minimum acceptable length, herein noted by the excessive region, the maintenance corrective action is mandatory to restore the condition to the acceptable region. The runway may remain in service but should be repaired within a reasonable period. This region could lead to the risk of possible aircraft structural damage due to a single event or fatigue failure over time.

(3) If the surface irregularities exceed the heights defined by the excessive limit curve, at the specified minimum acceptable length, herein noted by the unacceptable region, then the area of the runway where the roughness has been identified warrants closure. Repairs are required to restore the condition within the acceptable limit region and the aircraft operators may be advised accordingly. This region runs the extreme risk of a structural failure and must be addressed immediately.

(b) The term ‘surface irregularity’ is defined herein to mean isolated surface elevation deviations that do not lie along a uniform slope through any given section of a runway. For the purposes of this concern, a ‘section of a runway’ is defined herein to mean a segment of a runway throughout which a continuing general uphill, downhill, or flat slope is prevalent. The length of this section is generally between 30 and 60 m, and can be greater, depending on the longitudinal profile and the condition of the pavement.

(c) The maximum tolerable step type bump, such as that which could exist between adjacent slabs, is simply the bump height corresponding to zero bump length at the upper end of the tolerable region of the roughness criteria of Figure 1.

(d) Deformation of the runway with time may also increase the possibility of the formation of water pools. Pools as shallow as approximately 3 mm in depth, particularly if they are located where they are likely to be encountered at high speed by landing aeroplanes, can induce aquaplaning which can then be sustained on a wet runway by a much shallower depth of water. Improved guidance regarding the significant length and depth of pools relative to aquaplaning is the subject of further research. It is, of course, especially necessary to prevent pools from forming whenever there is a possibility that they might become frozen.

(e) Macrotexture and microtexture are taken into consideration in order to provide the required surface friction characteristics. This normally requires some form of special surface treatment.

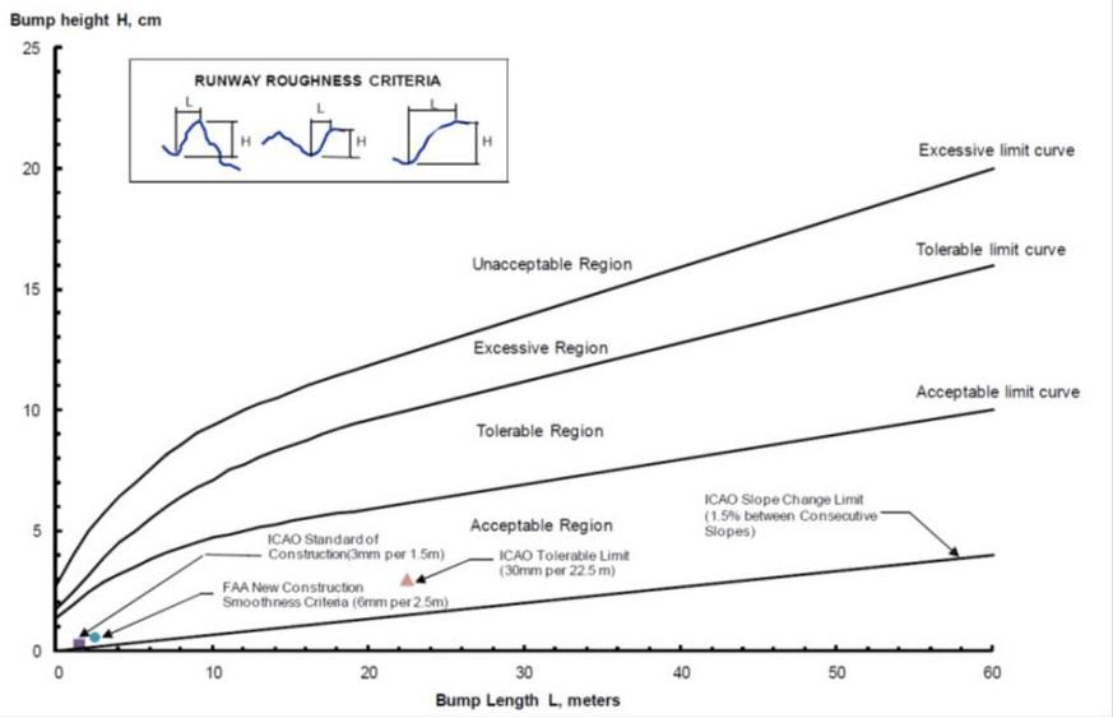

Figure 1

4. References

4.1. Affected regulations

N/A

4.2. Affected CS, AMC and GM

— Decision 2014/012/R of the Executive Director of the Agency of 27 February 2014, adopting Acceptable Means of Compliance and Guidance Material to Regulation (EU) No 139/2014 'AMC/GM for Aerodromes – Initial Issue'

4.3. Reference documents

— ICAO State Letter AN 4/1/2/26 – 16/19 'Adoption of Amendment 13 to Annex 14, Volume I'

— European Plan for Aviation Safety, 2016 – 2020, 25 January 2016