APPENDIX 10

AERODROME MAINTENANCE

Contents

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1.0 INTRODUCTION

1.1 This appendix expands on the requirements for aerodrome maintenance.

1.2 A maintenance programme, including preventive maintenance where appropriate, shall be established at an aerodrome to maintain facilities in a condition which does not impair the safety, regularity or efficiency of air navigation.

Note 1. — Preventive maintenance is programmed maintenance work done in order to prevent a failure or degradation of facilities.

Note 2. — "Facilities" are intended to include such items as pavements, visual aids, fencing, drainage systems, electrical systems and buildings.

1.3 The design and application of the maintenance programme should observe Human Factors principles.

Note. — Guidance material on Human Factors principles can be found in the Human Factors Training Manual (Doc 9683) and in the Airport Services Manual (Doc 9137), Part 8.

2.0 PAVEMENTS

2.1 The surfaces of all movement areas including pavements (runways, taxiways and aprons) and adjacent areas shall be inspected and their conditions monitored regularly as part of an aerodrome preventive and corrective maintenance programme with the objective of avoiding and eliminating any foreign object debris (FOD) that might cause damage to aircraft or impair the operation of aircraft systems.

Note 1. — Procedures on carrying out daily inspections of the movement area and control of FOD are given in the PANS-Aerodromes (Doc 9981), the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476) and the Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual (Doc 9830).

Note 2. — Additional guidance on sweeping/cleaning of surfaces is contained in the Airport Services Manual (Doc 9137), Part 9.

Note 3. — Guidance on precautions to be taken in regard to the surface of shoulders is given in ICAO Annex 14 Attachment A, Section 9, and the Aerodrome Design Manual (Doc 9157), Part 2.

Note 4. — Where the pavement is used by large aircraft or aircraft with tire pressures in the upper categories, particular attention should be given to the integrity of light fittings in the pavement and pavement joints.

2.2 The surface of a runway shall be maintained in a condition such as to prevent formation of harmful irregularities.

Note. — See ICAO Annex 14 Attachment A, Section 5.

2.3 A paved runway shall be maintained in a condition so as to provide surface friction characteristics at or above the minimum friction level specified by the Authority.

Note. — The Airport Services Manual (Doc 9137), Part 2 and Assessment, measurement and Reporting of Runway Surface Conditions (Cir 329), contains further information on this subject.

2.4 Runway surface friction characteristics for maintenance purposes shall be periodically measured with a continuous friction measuring device using self-wetting features and documented. The frequency of these measurements shall be sufficient to determine the trend of the surface friction characteristics of the runway.

Note 1. — Guidance on evaluating the friction characteristics of a runway is provided in ICAO Annex 14 Attachment A, Section 7, Airport Services Manual (Doc 9137), Part 2 and Assessment, measurement and Reporting of Runway Surface Conditions (Cir 329).

Note 2. — The objective of 2.3 to 2.6 is to ensure that the surface friction characteristics for the entire runway remain at or above a minimum friction level specified by the Authority.

Note 3. — Guidance for the determination of the required frequency is provided in Annex 14 Attachment A, Section 7 and in the Airport Services Manual (Doc 9137), Part 2, Appendix 5.

2.5 As of 5 November 2020, when runway surface friction measurements are made for maintenance purposes using a self-wetting continuous friction measuring device, the performance of the device shall meet the standard set or agreed by the Authority.

2.6 As of 5 November 2020, personnel measuring runway surface friction required in 2.5 shall be trained to fulfil their duties.

2.7 Corrective maintenance action shall be taken to prevent the runway surface friction characteristics for either the entire runway or a portion thereof from falling below the minimum friction level specified by the Authority.

Note. — A portion of runway in the order of 100m long may be considered significant for maintenance or reporting action.

2.8 Until 4 November 2020, when there is reason to believe that the drainage characteristics of a runway, or portions thereof, are poor due to slopes or depressions, then the runway surface friction characteristics should be assessed under natural or simulated conditions that are representative of local rain, and corrective maintenance action should be taken as necessary.

2.9 As of 5 November 2020, the runway surface should be visually assessed, as necessary, under natural or simulated rain conditions for ponding or poor drainage and where required, corrective maintenance action taken.

2.10 When a taxiway is used by turbine-engine aeroplanes, the surface of the taxiway shoulders should be maintained so as to be free of any loose stones or other objects that could be ingested by the aeroplane engines.

Note. — Guidance on this subject is given in the Aerodrome Design Manual (Doc 9157), Part 2.

3.0 REMOVAL OF CONTAMINANTS

3.1 Standing water, mud, dust, sand, oil, rubber deposits and other contaminants shall be removed from the surface of runways in use as rapidly and completely as possible to minimize accumulation.

3.2 Taxiways should be kept clear of standing water, mud, dust, sand, oil, rubber deposits and other contaminants to the extent necessary to enable aircraft to be taxied to and from an operational runway.

3.3 Aprons should be kept clear of standing water, mud, dust, sand, oil, rubber deposits and other contaminants to the extent necessary to enable aircraft to manoeuvre safely or, where appropriate, to be towed or pushed.

4.0 RUNWAY PAVEMENT OVERLAYS

Note. — The following specifications are intended for runway pavement overlay projects when the runway is to be returned temporarily to an operational status before resurfacing is complete. This may necessitate a temporary ramp between the new and old runway surfaces. Guidance on overlaying pavements and assessing their operational status is given in the Aerodrome Design Manual (Doc 9157), Part 3.

4.1 The longitudinal slope of the temporary ramp, measured with reference to the existing runway surface or previous overlay course, shall be:

a) 0.5 to 1.0 per cent for overlays up to and including 5 cm in thickness; and

b) not more than 0.5 per cent for overlays more than 5 cm in thickness.

4.2 Overlaying should proceed from one end of the runway toward the other end so that based on runway utilization most aircraft operations will experience a down ramp.

4.3 The entire width of the runway should be overlaid during each work session.

4.4 Before a runway being overlaid is returned to a temporary operational status, a runway centre line marking conforming to the specifications in SD-AD Appendix 5 (3.5) shall be provided. Additionally, the location of any temporary threshold shall be identified by a 3.6m wide transverse stripe.

4.5 The overlay should be constructed and maintained above the minimum friction level specified in 2.3 of this appendix.

5.0 VISUAL AIDS

Note 1. — These specifications are intended to define the maintenance performance level objectives. They are not intended to define whether the lighting system is operationally out of service.

Note 2. — The energy savings of light emitting diodes (LEDs) are due in large part to the fact that they do not produce the infra-red heat signature of incandescent lamps.

Note 3. — Enhanced vision systems (EVS) technology relies on the infra-red heat signature provided by incandescent lighting. Annex 15 protocols provide an appropriate means of notifying aerodrome users of EVS when lighting systems are converted to LED.

5.1 A light shall be deemed to be unserviceable when the main beam average intensity is less than 50 per cent of the value specified in ICAO Annex 14 Appendix 2. For light units where the designed main beam average intensity is above the value shown in ICAO Annex 14 Appendix 2, the 50 per cent value shall be related to that design value.

5.2 A system of preventive maintenance of visual aids shall be employed to ensure lighting and marking system reliability.

Note. — Guidance on preventive maintenance of visual aids is given in the Airport Services Manual (Doc 9137), Part 9.

5.3 The system of preventive maintenance employed for a precision approach runway category II or III should include at least the following checks:

a) visual inspection and in-field measurement of the intensity, beam spread and orientation of lights included in the approach and runway lighting systems;

b) control and measurement of the electrical characteristics of each circuitry included in the approach and runway lighting systems; and

c) control of the correct functioning of light intensity settings used by air traffic control.

5.4 In-field measurement of intensity, beam spread and orientation of lights included in approach and runway lighting systems for a precision approach runway category II or III should be undertaken by measuring all lights, as far as practicable, to ensure conformance with the applicable specification of ICAO Anne 14 Appendix 2.

5.5 Measurement of intensity, beam spread and orientation of lights included in approach and runway lighting systems for a precision approach runway category II or III should be undertaken using a mobile measuring unit of sufficient accuracy to analyse the characteristics of the individual lights.

5.6 The frequency of measurement of lights for a precision approach runway category II or III should be based on traffic density, the local pollution level, the reliability of the installed lighting equipment and the continuous assessment of the results of the in-field measurements but, in any event, should not be less than twice a year for in-pavement lights and not less than once a year for other lights.

5.7 The system of preventive maintenance employed for a precision approach runway category II or III shall have as its objective that, during any period of category II or III operations, all approach and runway lights are serviceable and that, in any event, at least:

a) 95 per cent of the lights are serviceable in each of the following particular significant elements:

1) precision approach category II and III lighting system, the inner 450 m;

2) runway centre line lights;

3) runway threshold lights; and

4) runway edge lights;

b) 90 per cent of the lights are serviceable in the touchdown zone lights;

c) 85 per cent of the lights are serviceable in the approach lighting system beyond 450 m; and

d) 75 per cent of the lights are serviceable in the runway end lights.

In order to provide continuity of guidance, the allowable percentage of unserviceable lights shall not be permitted in such a way as to alter the basic pattern of the lighting system. Additionally, an unserviceable light shall not be permitted adjacent to another unserviceable light, except in a barrette or a crossbar where two adjacent unserviceable lights may be permitted.

Note. — With respect to barrettes, crossbars and runway edge lights, lights are considered to be adjacent if located consecutively and:

— *laterally: in the same barrette or crossbar; or*

— *longitudinally: in the same row of edge lights or barrettes.*

5.8 The system of preventive maintenance employed for a stop bar provided at a runway-holding position used in conjunction with a runway intended for operations in runway visual range conditions less than a value of 350m shall have the following objectives:

a) no more than two lights will remain unserviceable; and

b) two adjacent lights will not remain unserviceable unless the light spacing is significantly less than that specified.

5.9 The system of preventive maintenance employed for a taxiway intended for use in runway visual range conditions less than a value of 350m shall have as its objective that no two-adjacent taxiway centre line lights be unserviceable.

5.10 The system of preventive maintenance employed for a precision approach runway category I shall have as its objective that, during any period of category I operations, all approach and runway lights are serviceable and that, in any event, at least 85 per cent of the lights are serviceable in each of the following:

a) precision approach category I lighting system;

b) runway threshold lights;

c) runway edge lights; and

d) runway end lights.

In order to provide continuity of guidance an unserviceable light shall not be permitted adjacent to another unserviceable light unless the light spacing is significantly less than that specified.

Note. — In barrettes and crossbars, guidance is not lost by having two adjacent unserviceable lights.

5.11 The system of preventive maintenance employed for a runway meant for take-off in runway visual range conditions less than a value of 550m shall have as its objective that, during any period of operations, all runway lights are serviceable and that in any event:

a) at least 95 per cent of the lights are serviceable in the runway centre line lights (where provided) and in the runway edge lights; and

b) at least 75 per cent of the lights are serviceable in the runway end lights.

In order to provide continuity of guidance, an unserviceable light shall not be permitted adjacent to another unserviceable light.

5.12 The system of preventive maintenance employed for a runway meant for take-off in runway visual range conditions of a value of 550m or greater shall have as its objective that, during any period of operations, all runway lights are serviceable and that, in any event, at least 85 per cent of the lights are serviceable in the runway edge lights and runway end lights. In order to provide continuity of guidance, an unserviceable light shall not be permitted adjacent to another unserviceable light.

5.13 During low visibility procedures the appropriate authority shall restrict construction or maintenance activities in the proximity of aerodrome electrical systems.

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