

AERODROME DATA IN AERODROME CERTIFICATION

JOINT ICAO-ESAF/CASSOA AERODROME
CERTIFICATION WORKSHOP

Presented BY Uganda CAA



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Outline

- ▶ Introduction
- ▶ ICAO requirements for aerodrome data
- ▶ Aerodrome Survey requirements
- ▶ Obligations of the aerodrome operator
- ▶ Obligations of the CAA's
- ▶ Challenges in assembly and evaluation of aerodrome data
- ▶ Recommendations

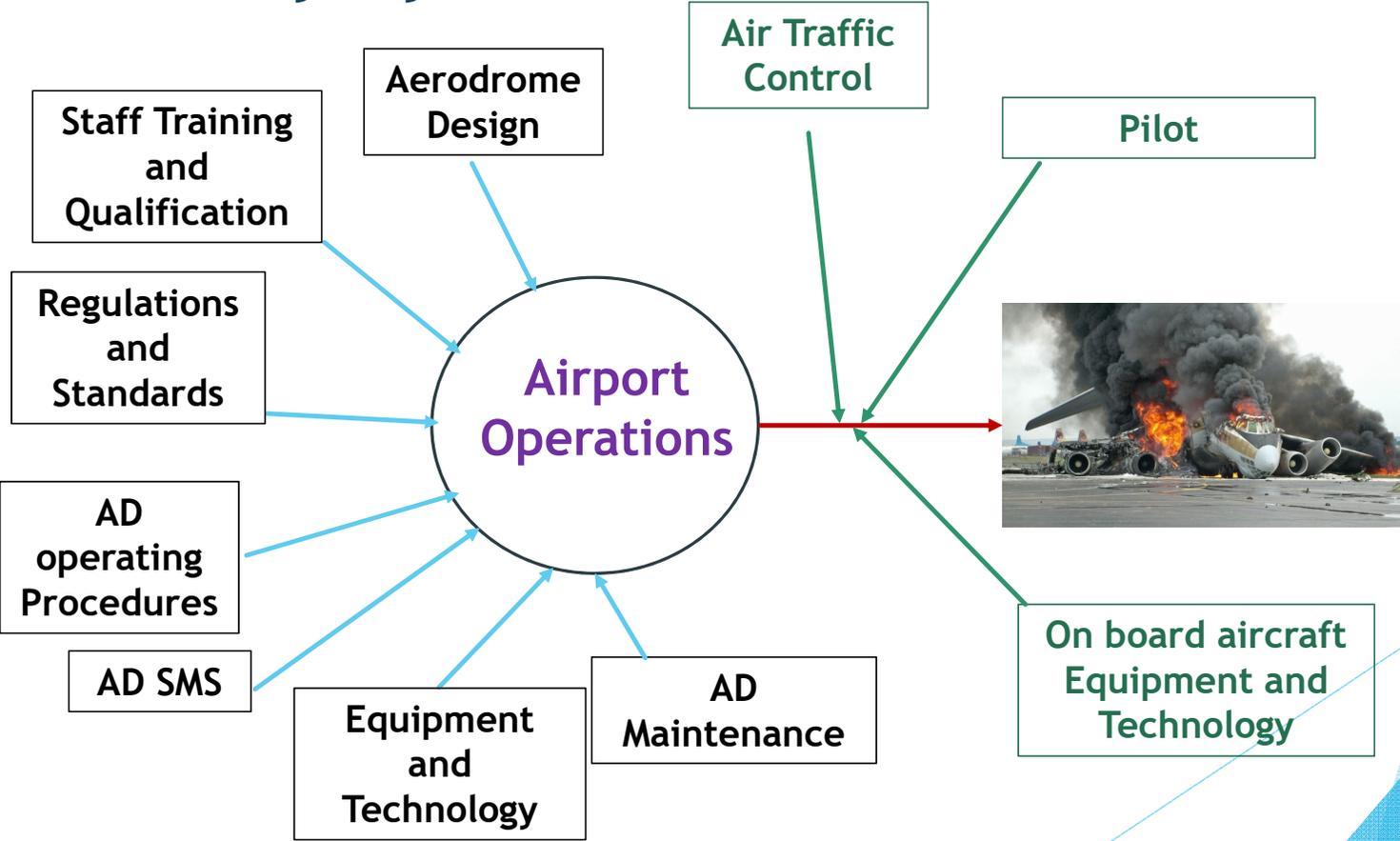


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Introduction

Airport Safety System



RFFS
Save as many Lives as possible



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Introduction

- ▶ Correct and accurate aerodrome data is an integral part of safe aerodrome operations.
- ▶ Held in the aerodrome manual
- ▶ Published in the State's AIP for aerodrome Users
Text and charts



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Introduction

▶ CERTIFICATION PROCESS

▶ The aerodrome certification process will comprise:

- ❖ dealing with the expression of interest by an intending applicant for the aerodrome certificate;
- ❖ **assessing the formal application, including evaluation of the aerodrome manual;**
- ❖ assessing the aerodrome facilities and equipment;
- ❖ issuing or refusing an aerodrome certificate; and
- ❖ **promulgating the certified status of an aerodrome and the required details in the AIP.**



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References

- ▶ ICAO Annex 14 Volume 1- Aerodrome design and operation
- ▶ ICAO Annex 15 – Aeronautical Information Services
- ▶ ICAO Doc 9981 - PANS Aerodromes
- ▶ ICAO Doc 10066 - PANS AIM (with the data catalogues)
- ▶ ICAO Doc 9774 – Aerodrome Certification Manual
- ▶ ICAO Doc 9674 – WGS-84 Manual
- ▶ ICAO DOC 8126 – AIS Manual



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Aerodrome data Requirements



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REFERENCE CODE

- ▶ The intent of the reference code is to provide a simple method for interrelating the numerous specifications concerning the characteristics of aerodromes so as to provide a series of aerodrome facilities that are suitable for the aeroplanes that are intended to operate at the aerodrome.
- ▶ The code is not intended to be used for determining runway length or pavement strength requirements.
- ▶ The code is composed of two elements which are related to the aeroplane performance characteristics and dimensions.



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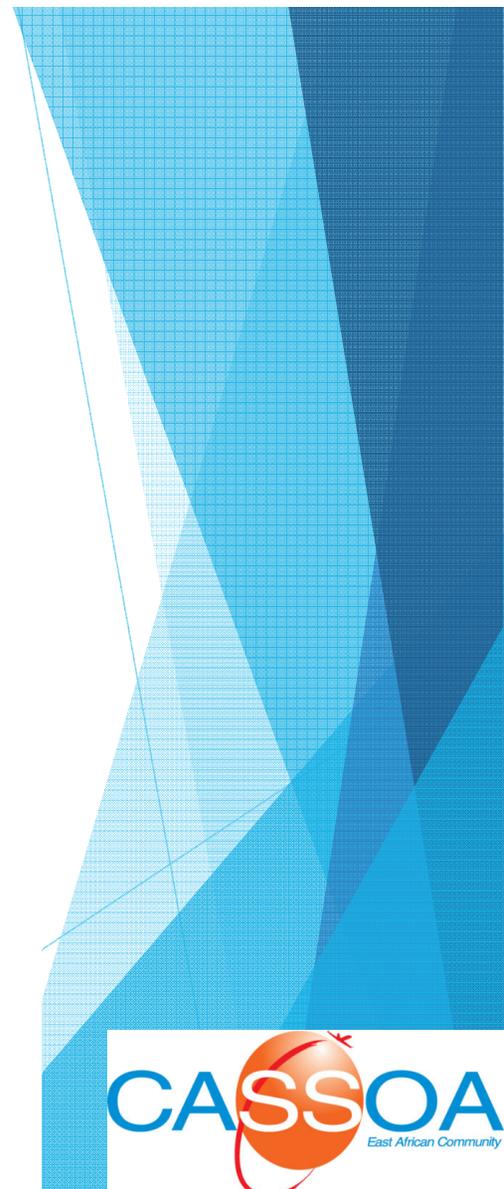
REFERENCE CODE

Table 1-1. Aerodrome reference code
(see 1.6.2 to 1.6.4)

Code element 1	
Code number	Aeroplane reference field length
1	Less than 800 m
2	800 m up to but not including 1 200 m
3	1 200 m up to but not including 1 800 m
4	1 800 m and over
Code element 2	
Code letter	Wingspan
A	Up to but not including 15 m
B	15 m up to but not including 24 m
C	24 m up to but not including 36 m
D	36 m up to but not including 52 m
E	52 m up to but not including 65 m
F	65 m up to but not including 80 m



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REFERENCE CODE

- ▶ Reference code downgrade based on runway width.

Code number	Outer Main Gear Wheel Span (OMGWS)			
	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m
1 ^a	18 m	18 m	23 m	–
2 ^a	23 m	23 m	30 m	–
3	30 m	30 m	30 m	45 m
4	–	–	45 m	45 m

a. The width of a precision approach runway should be not less than 30 m where the code number is 1 or 2.



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Aeronautical Data

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- ▶ STD 2.1.1 Determination and reporting of aerodrome-related aeronautical data shall be in accordance with the accuracy and integrity classification required to meet the needs of the end-users of aeronautical data.
- ▶ RP 2.1.2 *Aerodrome mapping data should be made available to the aeronautical information services for aerodromes deemed relevant by States where safety and/or performance-based operations suggest possible benefits.*



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Aerodrome reference point

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- ▶ STD 2.2.1: An aerodrome reference point shall be established for an aerodrome. (Surveyed/calculated)
- ▶ STD 2.2.2: The aerodrome reference point shall be located near the initial or planned geometric centre of the aerodrome and shall normally remain where first established.
- ▶ STD 2.2.3: The position of the aerodrome reference point shall be measured and reported to the aeronautical information services authority in degrees, minutes and seconds.



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Aerodrome and runway elevations

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- ▶ STD 2.3.1: The aerodrome elevation and geoid undulation at the aerodrome elevation position shall be measured to the accuracy of one-half metre or foot and reported to the AIS.



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Aerodrome and runway elevations

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- ▶ STD 2.3.2: For an aerodrome used by international civil aviation for **non-precision approaches**,
 - a. **the elevation and geoid undulation of each threshold,**
 - b. **the elevation of the runway end and any significant high and low intermediate points along the runway**shall be measured to the accuracy of **one-half metre or foot** and reported to the AIS.



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Aerodrome and runway elevations

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- ▶ STD 2.3.3 For precision approach runway,
 - a. the elevation and geoid undulation of the threshold,
 - b. the elevation of the runway end and the highest elevation of the touchdown zone
- shall be measured to the accuracy of one-quarter metre or foot and reported to the AIS.



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Aerodrome reference temperature

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- ▶ STD 2.4.1 An aerodrome reference temperature shall be determined for an aerodrome in degrees Celsius.
- ▶ RP: 2.4.2 *The aerodrome reference temperature should be the monthly mean of the daily maximum temperatures for the hottest month of the year (the hottest month being that which has the highest monthly mean temperature).*

This temperature should be averaged over a period of years.

Ideally, should be the reference temperature used in design to make corrections to runway length (Ref ICAO Doc 9157 Part 1)



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Aerodrome dimensions and related information

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▶ STD 2.5.1 The following data shall be measured or described, as appropriate, for each facility provided on an aerodrome:

a) **runway** —

- ✓ true bearing to one-hundredth of a degree,
- ✓ designation number,
- ✓ length and width to the nearest metre or foot,
- ✓ displaced threshold location to the nearest metre or foot,
- ✓ slope,
- ✓ surface type,
- ✓ type of runway and,
- ✓ for a precision approach runway category I, the existence of an obstacle free zone when provided;



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Aerodrome dimensions and related information

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▶ STD 2.5.1 The following data shall be measured or described, as appropriate, for each facility provided on an aerodrome:

b) **strip, runway end safety area and stopway**

- ✓ length, width to the nearest metre or foot,
- ✓ surface type; and

arresting system —

- ✓ location (which runway end) and
- ✓ description;



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Aerodrome dimensions and related information

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- ▶ STD 2.5.1 The following data shall be measured or described, as appropriate, for each facility provided on an aerodrome:
 - c) taxiway – designation, width, surface type;
 - d) apron – surface type, aircraft stands;
 - e) the boundaries of the air traffic control service;
 - f) clearway –
 - ✓ length to the nearest metre or foot,
 - ✓ ground profile;



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Aerodrome dimensions and related information

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▶ 2.5.1 The following data shall be measured or described, as appropriate, for each facility provided on an aerodrome:

- g)
- ✓ visual aids for approach procedures,
 - ✓ marking and lighting of runways, taxiways and aprons,
 - ✓ other visual guidance and control aids on taxiways and aprons, including taxi-holding positions and stopbars,
 - ✓ location and type of visual docking guidance systems;

✓ Apply downgrade criteria where applicable



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Aerodrome dimensions and related information

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- ▶ 2.5.1 The following data shall be measured or described, as appropriate, for each facility provided on an aerodrome:
 - h) location and radio frequency of any VOR aerodrome checkpoint;
 - i) location and designation of standard taxi-routes; and
 - j) distances to the **nearest metre or foot** of localizer and glide path elements comprising an instrument landing system (ILS) in relation to the associated runway extremities;



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Aerodrome dimensions and related information

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- ▶ STD 2.5.2 The geographical coordinates of each threshold shall be measured and reported to the AIS in degrees, minutes, seconds and hundredths of seconds. *AD Survey*
- ▶ STD 2.5.3 The geographical coordinates of appropriate taxiway centre line points shall be measured and reported to the AIS in degrees, minutes, seconds and hundredths of seconds. *AD Survey*



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Aerodrome dimensions and related information

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- ▶ STD 2.5.4 The geographical coordinates of each aircraft stand shall be measured and reported to the AIS in degrees, minutes, seconds and hundredths of seconds. *AD Survey*
- ▶ STD 2.5.5 The geographical coordinates of obstacles in Area 2 (the part within the aerodrome boundary) and in Area 3 shall be measured and reported to the AIS in degrees, minutes, seconds and tenths of seconds. In addition, the top elevation, type, marking and lighting (if any) of obstacles shall be reported to the AIS. *AD Survey*

PANS-AIM (Doc 10066), Appendix 8, provides requirements for obstacle data determination in Areas 2 and 3.



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Strength of pavements

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- ▶ STD 2.6.1 The bearing strength of a pavement (runways, taxiways and aprons) shall be determined.
- ▶ STD 2.6.2 The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5 700 kg shall be made available using the ACN-PCN method by reporting all of the following information:
 - a) pavement classification number (PCN);
 - b) pavement type for ACN-PCN determination;
 - c) subgrade strength category;
 - d) maximum allowable tire pressure category or maximum allowable tire pressure value; and
 - e) evaluation method.



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Strength of pavements

AN 14 Vol 1

- ▶ STD 2.6.3 The PCN reported shall indicate that aircraft with ACN equal to or less than the reported PCN can operate on the pavement subject to any limitation on the tire pressure or aircraft all-up mass for specified aircraft type(s).
- ▶ STD 2.6.4 The ACN of an aircraft shall be determined in accordance with the standard procedures associated with the ACN-PCN method.



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Strength of pavements

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- ▶ STD 2.6.5 For the purposes of determining the ACN, the behaviour of a pavement shall be classified as equivalent to a rigid or flexible construction.
- ▶ STD 2.6.6 Information on pavement type for ACN-PCN determination, subgrade strength category, maximum allowable tire pressure category and evaluation method shall be reported using the codes:

Codes



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Pre-flight altimeter check location

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- ▶ STD 2.7.1 One or more pre-flight altimeter check locations shall be established for an aerodrome.
- ▶ RP 2.7.2 *A pre-flight check location should be located on an apron.*
- ▶ STD 2.7.3 The elevation of a pre-flight altimeter check location shall be given as the average elevation, rounded to the nearest metre or foot, of the area on which it is located. The elevation of any portion of a pre-flight altimeter check location shall be within 3 m (10 ft) of the average elevation for that location.



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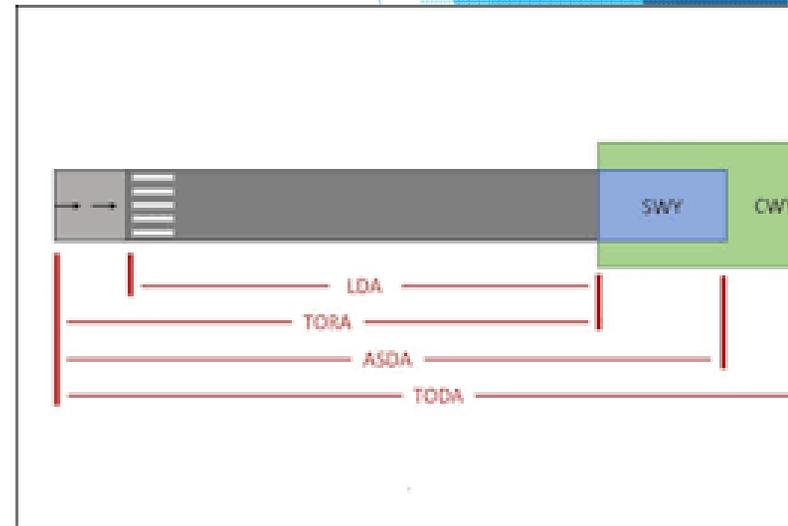


Declared distances

STD 2.8: The following distances shall be calculated to the nearest metre or foot for a runway intended for use by international commercial air transport:

- a) take-off run available;
- b) take-off distance available;
- c) accelerate-stop distance available; and
- d) landing distance available.

Often wrongly reported.



Condition of the movement area and related facilities

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- ▶ STD 2.9.1 Information on the condition of the movement area and the operational status of related facilities shall be provided to the AIS, and similar information of operational significance to the ATS units, to enable those units to provide the necessary information to arriving and departing aircraft.
- ▶ The information shall be kept up to date and changes in conditions reported without delay.



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Disabled aircraft removal

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- ▶ RP 2.10.1 *The telephone/telex number(s) of the office of the aerodrome coordinator of operations for the removal of an aircraft disabled on or adjacent to the movement area should be made available, on request, to aircraft operators.*
- ▶ RP 2.10.2 *Information concerning the capability to remove an aircraft disabled on or adjacent to the movement area should be made available.*

Consider reviewing agreements/ during the data evaluation



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Rescue and firefighting

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- ▶ STD 2.11.1 Information concerning the level of protection provided at an aerodrome for aircraft rescue and firefighting purposes shall be made available.
- ▶ RP 2.11.2 *The level of protection normally available at an aerodrome should be expressed in terms of the category of the rescue and firefighting services as described in 9.2 and in accordance with the types and amounts of extinguishing agents normally available at the aerodrome.*



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Rescue and firefighting

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- ▶ STD 2.11.3 - Changes in the level of protection normally available at an aerodrome for rescue and firefighting shall be notified to the appropriate air traffic services units and aeronautical information services units to enable those units to provide the necessary information to arriving and departing aircraft. When such a change has been corrected, the above units shall be advised accordingly.
- ▶ RP 2.11.4 - *A change should be expressed in terms of the new category of the rescue and firefighting service available at the aerodrome.*



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Rescue and firefighting

AIP Template AD 2.6

1	<i>AD category for fire fighting</i>	Within AD HR: CAT 7
2	<i>Rescue equipment</i>	Yes, 2 boats of 40 persons
3	<i>Capability for removal of disabled aircraft</i>	Lifting bags and hydraulic jacks available
4	<i>Remarks</i>	Outside AD HR, fire fighting service to be requested. Request to be submitted not later than 1500 (1400) UTC.



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Rescue and firefighting

AIP Template AD 1.2

Rescue and fire fighting services

<i>Aerodrome category</i>	<i>Amount of water in litres for production of performance level A foam</i>
3	1 800
4	3 600
5	8 100
6	11 800
7	18 200
8	27 300
9	36 400

(Category 1 and 2 are not used in (State)).



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Visual approach slope indicator systems

The following information concerning a visual approach slope indicator system installation shall be made available:

- a) associated runway designation number;
- b) type of system;
- c) where the axis of the system is not parallel to the runway centre line, the angle of displacement and the direction of displacement, i.e. left or right, shall be indicated;
- d) nominal approach slope angle(s); and
- e) minimum eye height(s) over the threshold of the on-slope signal(s)

Require the documentation relating to sitting of the system installed



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Aerodrome obstacle data

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Survey and publish all obstacles in the aerodrome and in the aerodrome vicinity and meet requirements for aerodrome obstacle data in Annex 15



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Aerodrome Surveys



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Aerodrome Surveys

- ▶ Aerodrome data that is required to be surveyed should be submitted to the CAA in form of **Aerodrome Survey Reports**.
- ▶ The structure of the AD survey report should follow requirements in ICAO Doc 9674 – WGS-84 Manual – Ref Chapter 5
- ▶ Cover requirements for eTOD



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Aerodrome Surveys

- ▶ The geodetic datum to which coordinates of navigation elements must be referenced is WGS-84.
- ▶ All aeronautical coordinate data which meet the specifications of WGS-84 manual must be such that their quality can be demonstrated.
- ▶ The aerodrome surveys should be updated periodically.



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Aerodrome Surveys

- ▶ The vertical reference should be that adopted by the state- Mean sea level (MSL) datum,
- ▶ The Earth Gravitational Model — 1996 (EGM-96) (ICAO AN 15)
 - ▶ used as the global gravity model for international air navigation.
 - ▶ where the accuracy of EGM-96 does not meet the accuracy requirements for elevation and geoid undulation on the basis of EGM-96 data, regional, national or local geoid models containing high resolution gravity field data shall be developed and used.
 - ▶ When a geoid model other than the EGM-96 model is used, a description of the model used, including the parameters required for height transformation between the model and EGM-96, shall be provided in the Aeronautical Information Publication (AIP)



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Obligations of Aerodrome Operator

- ▶ Ensure the aerodrome data provided is accurate and meets the specifications for aerodrome data in National Regulations.
- ▶ Ensure the aerodrome data is maintained and up to date
 - ▶ Aerodrome Manual
 - ▶ AIP

The Operator



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Obligations of CAAs

- ▶ Verify the aerodrome data in the aerodrome manual
- ▶ Ensure promulgation of the certified status of an aerodrome and the required aerodrome data details in the AIP.
- ▶ Validate and regulate the changes to the published aerodrome data. (Post certification)



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Challenges

- ▶ Competent and qualified Aerodrome surveyors not available in the region
- ▶ Limited technical expertise for the review of aerodrome data
- ▶ Missing aerodrome data details
- ▶ Updating of aerodrome data not done in a timely manner



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Recommendations

- ▶ Provide appropriate guidance to aerodrome surveyors, cross checking with national requirements,
- ▶ During review of aerodrome data include different aerodrome and ANS expertise, (Operator and Regulator)
- ▶ Validate the data provided before approval, (Operator and Regulator)
- ▶ Ensure the aerodrome data is kept up to date – in AIP and AD Manual.
- ▶ Adopt the checklist for AIP template (ICAO DOC 8126) and [Aerodrome data catalogue](#)
- ▶ Avoid Pitfalls of relying on checklist to provide information on facilities not at the aerodrome.



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THANK
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