



**CIVIL AVIATION SAFETY AND
SECURITY OVERSIGHT AGENCY**

Order

CAA-O- AGA002

June 2010

AERODROME DATA QUALITY REQUIREMENTS

1. PURPOSE

This Order provides guidance to aerodrome inspectors on the quality requirements of the aeronautical data provided by the operator to ensure integrity and accuracy.

2. REFERENCE

- 2.1 ICAO Annex 14 – Volume I (Appendix 5)
- 2.2 WGS-84 DOC 9674

3. DEFINITIONS

- 3.1. **‘Aeronautical data’** means a representation of aeronautical facts, concepts or instructions in a formalized manner suitable for communication, interpretation or processing;
- 3.2. **‘Aeronautical information’** means information resulting from the assembly, analysis and formatting of aeronautical data;
- 3.3. **‘Data quality’** means a degree or level of confidence that the data provided meets the requirements of the data user in terms of accuracy, resolution and integrity;
- 3.4. **‘Accuracy’** means a degree of conformance between the estimated or measured value and the true value;
- 3.5. **‘Integrity’** means a degree of assurance that a data item and its value have not been lost or altered since the data origination or authorized amendment;

4. INTRODUCTION

Determination and reporting of aerodrome-related aeronautical data shall be in accordance with the accuracy and integrity requirements set forth by the relevant ICAO SARPs contained in Appendix 5 while taking into account the established quality system procedures. Accuracy requirements for aeronautical data are based upon a 95 per cent confidence level and in that respect, three types of positional data shall be identified:

- **Surveyed points** (e.g. runway threshold),
- **calculated points** (mathematical calculations from the known surveyed points of points in space, fixes) and;
- **Declared points** (e.g. flight information region boundary points).

5. SURVEY POINTS

Surveyed points include locations which require on site survey methods to establish the geographical coordinates or any other, in relation to the mean sea level or reference datum. The inspector must ensure that the aerodrome operator conduct surveys of the points and provide such data to the Aeronautical Information Services (AIS) as required. Normally, the aerodrome operator may employ the services of an external registered surveyed firm equipped with the knowledge of survey procedures of an aerodrome. The Inspector shall at all times ensure that the survey points are reported in World Geodetic System (WGS-84) reference datum. The survey points shall include the following, among several others mentioned in this order:

- a. Aerodrome reference point
- b. Aerodrome and runway elevations
- c. Geoid undulations of runway ends
- d. Navaids locations
- e. Highest Elevation of the Touch Down Zone (TDZ) etc
- f.

In essence, the surveyed points are divided into the following groups:

- g. Those points requiring establishment of coordinates in latitude and longitude in accordance with WGS-84 reference datum (**Table 1**)
- h. Those points requiring establishment of elevations/altitude/height (**Table 2**)
- i. Those points requiring establishment of declination and magnetic variations (**Table 3**)
- j. Those points requiring establishment of magnetic bearing or azimuths (**Table 4**)

k. Those points requiring establishment of lengths/distance/dimensions (**Table 5**)

l. Detailed information on the surveyed points is provided in ICAO Annex 14 – Volume I and World Geodetic System — 1984 (WGS-84) Manual (Doc 9674).

Table 1: Latitude and Longitude

Latitude and longitude	Accuracy Data type	Integrity Classification
Aerodrome reference point	30 m surveyed/calculated	1×10^{-3} routine
Nav aids located at the aerodrome	3 m surveyed	1×10^{-5} essential
Obstacles in Area 3	0.5 m surveyed	1×10^{-5} essential
Obstacles in Area 2 (the part within the aerodrome boundary)	5 m surveyed	1×10^{-5} essential
Runway thresholds	1 m surveyed	1×10^{-8} critical
Runway end (flight path alignment point)	1 m surveyed	1×10^{-8} critical
Runway centre line points	1 m surveyed	1×10^{-8} critical
Runway-holding position	0.5 m surveyed	1×10^{-8} critical
Taxiway centre line/parking guidance line points	0.5 m surveyed	1×10^{-5} essential
Taxiway intersection marking line	0.5 m surveyed	1×10^{-5} essential
Exit guidance line	0.5 m surveyed	1×10^{-5} essential
Apron boundaries (polygon)	1 m surveyed	1×10^{-3} routine
Aircraft stand points/INS checkpoints	0.5 m surveyed	1×10^{-3} routine

Table 2: Elevation/altitude and height

Elevation/altitude/height	Accuracy Data type	Integrity Classification
Aerodrome elevation	0.5 m surveyed	1×10^{-5} essential
WGS-84 geoid undulation at aerodrome elevation position	0.5 m surveyed	1×10^{-5} essential
Runway threshold, non-precision approaches	0.5 m surveyed	1×10^{-5} essential
WGS-84 geoid undulation at runway threshold, non-precision approaches	0.5 m surveyed	1×10^{-5} essential
Runway threshold, precision approaches	0.25 m surveyed	1×10^{-8} critical
WGS-84 geoid undulation at runway threshold, precision approaches	0.25 m surveyed	1×10^{-8} critical
Runway centre line points	0.25 m surveyed	1×10^{-8} critical
Taxiway centre line/parking guidance line points	1 m surveyed	1×10^{-5} essential
Obstacles in Area 2 (the part within the aerodrome boundary)	3 m surveyed	1×10^{-5} essential
Obstacles in Area 3	0.5 m surveyed	1×10^{-5} essential
Distance measuring equipment/precision (DME/P)	3 m surveyed	1×10^{-5} essential

Table 3: Declination and magnetic variation

Declination/variation	Accuracy Data type	Integrity Classification
Aerodrome magnetic variation	1 degree surveyed	1×10^{-5} essential
ILS localizer antenna magnetic variation	1 degree surveyed	1×10^{-5} essential
MLS azimuth antenna magnetic variation	1 degree surveyed	1×10^{-5} essential

Table 4: Magnetic bearing/azimuths

Bearing	Accuracy Data type	Integrity Classification
ILS localizer alignment	1/100 degree surveyed	1×10^{-5} essential
MLS zero azimuth alignment	1/100 degree surveyed	1×10^{-5} essential
Runway bearing (True)	1/100 degree surveyed	1×10^{-3} routine

Table 5: Length/distance/dimension for survey method

Length/distance/dimension	Accuracy Data type	Integrity Classification
Runway length	1 m surveyed	1×10^{-8} critical
Runway width	1 m surveyed	1×10^{-5} essential
Displaced threshold distance	1 m surveyed	1×10^{-3} routine
Stopway length and width	1 m surveyed	1×10^{-8} critical
Clearway length and width	1 m surveyed	1×10^{-5} essential
Landing distance available	1 m surveyed	1×10^{-8} critical
Take-off run available	1 m surveyed	1×10^{-8} critical
Take-off distance available	1 m surveyed	1×10^{-8} critical
Accelerate-stop distance available	1 m surveyed	1×10^{-8} critical
Runway shoulder width	1 m surveyed	1×10^{-5} essential
Taxiway width	1 m surveyed	1×10^{-5} essential
Taxiway shoulder width	1 m surveyed	1×10^{-5} essential

6. CALCULATED POINTS

Such points are derived from mathematical calculations or transformation from known surveyed points established before. Degree of accuracy and integrity of such data are also established in accordance with the ICAO Annex 14 –Volume 1 Appendix 5. Table 6 below shows the aerodrome points whose data can be presented through calculation means.

Table 6: Length/distance/dimension for calculation method

Length/distance/dimension	Accuracy Data type	Integrity Classification
ILS localizer antenna-runway end, distance	3 m calculated	1×10^{-3} routine
ILS glide slope antenna-threshold, distance along centre line	3 m calculated	1×10^{-3} routine
ILS marker-threshold distance	3 m calculated	1×10^{-5} essential
ILS DME antenna-threshold, distance along centre line	3 m calculated	1×10^{-5} essential
MLS azimuth antenna-runway end, distance	3 m calculated	1×10^{-3} routine
MLS elevation antenna-threshold, distance along centre line	3 m calculated	1×10^{-3} routine
MLS DME/P antenna-threshold, distance along centre line	3 m calculated	1×10^{-5} essential

7. DATA QUALITY REQUIREMENTS

To ensure integrity and accuracy of data, the following merits shall apply:

1. Data quality requirements for each data item within the scope of aeronautical data and aeronautical information shall be as defined by the ICAO standards.
2. Data quality requirements for a data item within the scope of aeronautical data and aeronautical information shall be established based on a safety assessment of the intended uses of the data item where:
 - (a) a data item is **not defined** by the ICAO data quality standards
 - (b) the data quality **requirements** for a data item are not met by the ICAO data quality standards
3. The data quality requirements for the data items referred to in point 2 above shall be developed in accordance with a standardized process describing the methodology for

the derivation and validation of these requirements prior to publication, taking due account of the potential impact on relevant ICAO provisions.

4. Where a data item has more than one intended use, only the most stringent data quality requirements, arising from the safety assessment referred to in point 2, shall be applied to it.
5. Data quality requirements shall be defined to cover the following for each data item within the scope of aeronautical data and aeronautical information:
 - (a) the accuracy of the data;
 - (b) the integrity level of the data;
 - (c) the ability to determine the origin of the data;

Civil Aviation Authority