Data product specification for Aerodrome Geopackage

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Change History

Version	Date	Reason for Change	Affected Sections
0.1	2021-07-30	Creation of document	All
1.0	2022-02-01	Changes ITRF epoche Way of delivery Data Capture	Chap. 6.1. Chap. 9.2. Chap. 10

Table of Content

1. SCOPE

This document specifies a harmonised data specification for the transmission of aeronautical data in digital form as defined in ICAO Annex 15, ICAO Doc 10066 and Commission Regulation (EU) 2020/2148 and is the basis for implementing the rules according to Chapter 5. The Aerodrome Geopackage includes all aeronautical data for each aerodrome.

This document compromises in particular aeronautical data and information related to Austrian aerodromes.

Purpose

This data product specification is intended for individuals responsible for collecting electronic aeronautical data and defines the technical requirements for data collection.

The purpose of these guidelines is:

- to provide a consistent basis for data collection agencies and their contracted survey companies,
- to provide a technical documentation of the requirements of the detection of the quality assurance up to the submission of data,
- to provide a definition of all values and characteristics (features and attributes) of the data that is necessary,
- to provide a summary of quality and integrity requirements of international standards.

2. OVERVIEW

2.1. Name and acronyms

Data specification for Aerodrome Geopackage

DPS Aerodrome Geopackage

2.2. Informal description

This Data Product Specification describes the features and attributes which are related to aerodromes. The geospatial data shall be delivered as a Geopackage file.

2.3. Normative References

[COMMISSION REGULATION (EU) 2020/469]	COMMISSION IMPLEMENTING REGULATION (EU) 2020/469 of 14 February 2020
[COMMISSION REGULATION (EU) 139/2014]	COMMISSION IMPLEMENTING REGULATION (EU) 139/2014 of 12 February 2014
[COMMISSION REGULATION (EU) 2020/2148]	COMMISSION IMPLEMENTING REGULATION (EU) 2020/2148 of 8 October 2020
[ECTL DO]	ECTL Specification for the Origination of Aeronautical Data (DO) V 2.0
[ICAO Annex 4]	ICAO Annex 4 - Aeronautical Charts
[ICAO Annex 15]	ICAO Annex 15 - Aeronautical Information Services
[ICAO Doc 9674]	ICAO Doc 9674 - World Geodetic System - 1984 (WGS-84) Manual
[ICAO Doc 10066]	ICAO Doc 10066 - Procedures for Air Navigation Services Aeronautical Information Management
[ISO 19111]	EN ISO 19111:2003, Geographic information – Spatial referencing by coordinates
[ISO 19115]	EN ISO 19115:2005, Geographic information – Metadata
[ISO 19131]	EN ISO 19131:2007, Geographic information – Data product specification
[OGC GPKG]	OGC Geopackage Encoding Standard

2.4. Information about the creation of the specification

Document title:	Data product specification for Aerodrome Geopackage

Reference date:	2021-07-30
Responsible party:	Austro Control GmbH - ATM/AIM/SDM
Language:	English

2.5. Terms and definitions

Many of terms and definitions in this document are taken from the International Standards ISO 19131 (Geographic Information – Data product specification).

2.6. Symbols and abbreviations

This is a list of abbreviations and acronyms used in the data specification

AIM	Aeronautical Information Management
AIP	Aeronautical Information Publication
AIC	Aeronautical Information Circular
NOTAM	Notice to Airmen
AIS	Aeronautical Information Service
AIXM	Aeronautical Information Exchange Model
ATM	Air Traffic Management
DPS	Data Product Specification
ECTRL	Eurocontrol
EPSG	European Petroleum Survey Group Geodesy
EVRS	European Vertical Reference System
GPKG	Geopackage
ICAO	International Civil Aviation Organization
ISO	International Organization for Standardization
ITRS	International Terrestrial Reference System
ITRF	International Terrestrial Reference Frame
OGC	Open Geospatial Consortium

PDF	Portable Document Format
SDM	Static Data Management
UML	Unified Modelling Language

2.7. Conformance

Any dataset claiming conformance with this data specification shall pass the requirements as described in ICAO Annex 15 and ICAO Doc 10066.

3. SPECIFICATION SCOPE

3.1. General specification scope

This data product specification is valid for all aeronautical data, which are published in the Aeronautical Information Products according to ICAO Annex 15 - especially in the Aeronautical Information Publication (AIP) - and are related to Austrian aerodromes.

This data product specification specifies minimum requirements. In cases where it is appropriate the minimum requirements can be exceeded.

4. IDENTIFICATION INFORMATION

Title:	Data product specification for Aerodrome Geopackage
Abstract:	This data product specification is valid for all aeronautical data, that have to be published in the Aeronautical Information Products according to ICAO Annex 15 - especially in the Aeronautical Information Publication (AIP) - and are related to Austrian aerodromes.
Topic categories:	Transportation (018)
Geographic description:	This data product specification is valid for international aerodromes in the state territory of Austria
Purpose:	The purpose of this document is to specify a harmonised data specification for aeronautical spatial data related to international Austrian aerodromes.
Spatial representation type:	Vector (001)
Spatial resolution:	See chapter 7.
Supplementary information:	The structure follows the ISO standard for data specification (ISO19131).

5. DATA CONTENT AND STRUCTURE

5.1. Feature based data

5.1.1. Narrative information

The provided Geopackage template with features and their attributes for geospatial data exchange is based on the OGC Standard for Geopackage. The Geopackage template is a derived and simplified version of AIXM for the purpose of the electronic and digital transfer of originated aeronautical data and information related to Austrian aerodromes.

5.1.2. Geopackage

A GeoPackage (GPKG) is an open, standards-based, platform-independent, portable, self-describing, compact format for transferring geospatial information. It is a platform-independent SQLite database file that contains the GeoPackage data and metadata tables. The GeoPackage Encoding Standard describes a set of conventions for storing the following within an SQLite database:

- vector features;
- tile matrix sets of imagery and raster maps at various scales;
- attributes (non-spatial data); and
- extensions.

Since a GeoPackage is a database container, it supports direct use. This means that the data in a GeoPackage can be accessed and updated in a "native" storage format without intermediate format translations. GeoPackages that comply with the requirements in the standard and do not implement vendor-specific extensions are interoperable across all enterprise and personal computing environments.

5.2. Feature catalogue

Name:	Feature Catalogue for Aerodrome Geopackage
Scope:	Identification of all geospatial entities and their attributes.
Field of Application:	Aeronautical Information Products according to ICAO Annex 15 - especially in the Aeronautical Information Publication (AIP)
Version Number:	1.0
Version Date:	2021-07-30
Feature Catalogue Producer:	
Producer Name:	Katrin Stepanek
Producer Organisation:	Austro Control GmbH
Producer Address:	A-1030 Wien, Schnirchgasse 17
Producer Country:	Austria
Phone:	+43(0)517033282
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Electronic Mail Address:	aim.sdm@austrocontrol.at

See Annex A for details.

5.3. UML Model

Name:	UML Model for geospatial data and information related to Austrian aerodromes
Scope:	Identification of all geospatial entities and their attributes.
Field of Application:	Aeronautical Information Products according to ICAO Annex 15 - especially in the Aeronautical Information Publication (AIP)
Version Number:	1.0
Version Date:	2021-07-30
Feature Catalogue Producer:	
Producer Name:	Katrin Stepanek
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See Annex B for details.

5.4. Business Rules

Name:	Business Rules for geospatial data and information related to Austrian aerodromes
Scope:	Identification of all business rules related to aeronautical data.
Field of Application:	Aeronautical Information Products according to ICAO Annex 15 - especially in the Aeronautical Information Publication (AIP)
Version Number:	1.0
Version Date:	2021-07-30

Feature Catalogue Producer:	
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See Annex C for details.

6. REFERENCE SYSTEMS

6.1. Horizontal reference system

The horizontal reference system used for all geographical coordinates is the World Geodetic System-1984 (WGS-84). The WGS-84 coordinate system is aligned with the International Terrestrial Reference System (ITRS), realised through the International Terrestrial Reference Frame (ITRF) at a defined epoch.

Following information for the reference system shall be considered:

Name element	Entry	Comments
Coordinate system name	WGS-84	
Coordinate system alias	World Geodetic System - 1984	
Coordinate system type	geodetic	
Datum realization epoch	2010.0 (ITRF2014)	
Datum validity	Latitude: [-90°, 90°] Longitude: [-180°, 180°]	
Reference ellipsoid	WGS-84	
Semi-major axis	6378137,0 m	
Inverse flattening	298,257223563	
Remarks	See website: https://itrf.ign.fr/	

6.2. Vertical reference system

The vertical reference system used for all elevations and heights is the European Vertical Reference System (EVRS), which is based on orthometric heights in relation to the tide gauge of Amsterdam (NAP).

Listed below are the information about the EVRS:

Element name	Entry	Comments
Vertical datum name	European Vertical Reference System (EVRS)	
Identifier	EPSG Code 9274	
Datum validity	Europe	
Citation	Web Project EVRS, see http://www.euref.eu/	

For more information, please visit GEN 2.1.4 of the AIP AUSTRIA.

https://eaip.austrocontrol.at/

6.3. Temporal reference system

The Gregorian calendar shall be used for as a reference system for date values, and the Universal Time Coordinated (UTC) or the local time including the time zone as an offset from UTC shall be used as a reference system for time values.

7. DATA QUALITY

The data quality requirements are specified in the national data catalogue provided by Austro Control which is based on the aeronautical data catalogue as specified in the Commission Regulation (EU) 2020/469.

According to the requirement ADR.OPS.A.030 of Commission Regulation (EU) 2020/2148 the aerodrome operator shall ensure that the aeronautical data conform to the data catalogue specification.

8. METADATA

8.1. Regulations and references

[ISO 19131] Geographic information - Data product specification	"The core metadata elements as defined in ISO 19115 shall be included with the data product. Any additional metadata items required to be supplied shall be stated in the data product specification. The format and encoding of the metadata shall be stated in the data product specification."
[ISO 19115] Geographic information - Metadata	This International Standard (ISO 19115) defines an extensive set of metadata elements; typically only a subset of the full number of elements is used. However, it is essential that a basic minimum number of metadata elements be maintained for a dataset. Listed are the core metadata elements required to identify a dataset, typically for catalogue purposes. This list contains metadata elements answering the following questions: “Does a dataset on a specific topic exist (‘what’)?”, “For a specific place (‘where’)?”, “For a specific date or period (‘when’)?” and “A point of contact to learn more about or order the dataset (‘who’)?” *Dataset title* *Dataset reference date* *Geographic location of the dataset* *Dataset language* *Dataset character set* *Dataset topic category* *Abstract describing the dataset* *Metadata language* *Metadata character set* *Metadata point of contact* *Metadata date stamp*
[ADR Regulation] Commission Regulation (EU) No 139/2014	Commission Regulation (EU) No 139/2014 amended by Commission Delegated Regulation (EU) 2020/2148 ADR.OPS.A.045 Metadata: The aerodrome operator shall ensure that metadata include, as a minimum: (a) The identification of the organisations or entities performing any action of originating, transmitting or manipulating the aeronautical dats; (b) The action performed; (c) The date and time the action was performed.

8.2. Metadata elements

Listed below are the core metadata elements (mandatory and recommended optional) required for describing a dataset.

Metadata Element [ISO 19115]	Regulation	Description
Dataset title MD_Metadata > MD_DataIdentification.citation > CI_Citation.title	ISO 19115 Core	Title of the dataset e.g. Aerodrome Heliport/Runway XY
Dataset responsible party MD_Metadata.identificationInfo > MD_Identification.pointOfContact > CI_ResponsibleParty CI_ResponsibleParte.role: with CI_RoleCode = originator	ADR Regulation: a) Data originator of data ICAO Annex 15: Data originator identifier	Name of organization and persons who are collecting the data e.g. name of surveyor`s office
Lineage MD_Metadata.dataQualityInfo > DQ_DataQuality.lineage > LI_Lineage.processStep > LI_ProcessStep	ADR Regulation: b) Information about amendments made to the data ADR Regulation: c) The persons or organisations that have interacted with the data and when ;	LI_ProcessStep.description: Details of any validation and verification of the data that has been performed LI_ProcessStep.description: Origination method horizontal LI_ProcessStep.description: Origination method vertical LI_ProcessStep.processor: The persons or organisations that have interacted with the data and when LI_ProcessStep.dateTime: Date and time of processing the data
Geographic location of the dataset MD_Metadata > MD_DataIdentification.extent > EX_Extent > EX_GeographicExtent > EX_GeographicBoundingBox or EX_GeographicDescription	ISO 19115 Core ICAO Annex 15: Area of coverage	Coordinates or Bounding Box of a feature e.g. Latitude / Longitude of Runway Centre Line Point.
Abstract describing the	ISO 19115 Core	Short description about the dataset,

Metadata Element [ISO 19115]	Regulation	Description
dataset MD_Metadata > MD_DataIdentification.abstract		this will be covered by the dataset title.
Data Quality MD_Metadata.dataQualityInfo > DQ_DataQuality.report > DQ_QuantitativeAttributeAccuracy	ADR Regulation: e) For numerical data: — the statistical accuracy of the measurement or calculation technique used, — the resolution, — the confidence level as required by the ICAO standards referred to in points 1 and 12 of Annex III and in other relevant ICAO standards; ICAO Annex 15: Horizontal accuracy, Horizontal confidence level, Horizontal resolution, Vertical accuracy, Vertical confidence level, Vertical resolution, Integrity	These attributes are mandatory for coordinates: Horizontal accuracy Horizontal confidence level Horizontal resolution Vertical accuracy Vertical confidence level Vertical resolution Integrity Accuracy, confidence level and resolution are described in the chapter 7, data quality. The integrity classification (routine, essential and critical) is defined in ICAO Annex 15.
Constraints MD_Metadata.identificationInfo > MD_DataIdentification.resource Constraints which can contain MD_LegalConstraints or MD_SecurityConstraints	ISO 19115 Core	Limitations on the use of the data can be declared for the data to be delivered.

8.3. Delivery of metadata and format

ADR.OPS.A.010 Data quality requirements by Commission Delegated Regulation (EU) 2020/2148:

The aerodrome operator shall have formal arrangements with the organisations with which it exchanges aeronautical data or aeronautical information and shall ensure the following:

(a) all data relevant to the aerodrome and available services is provided with the required quality; data quality requirements (DQRs) are complied with at data origination and maintained during data transmission;

(b) the accuracy of aeronautical data is as specified in the aeronautical data catalogue;

(c) the integrity of aeronautical data is maintained throughout the data process from origination to transmission, based on the integrity classification specified in the aeronautical data catalogue. In addition, procedures shall be put in place so that:

(1) for routine data, corruption is avoided throughout the processing of the data;

(2) for essential data, corruption does not occur at any stage of the entire process and additional processes are included, as needed, to address potential risks in the overall system architecture to ensure data integrity at that level;

(3) for critical data, corruption does not occur at any stage of the entire process and additional integrity assurance processes are included to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks;

(d) the resolution of the aeronautical data is commensurate with the actual data accuracy;

(e) the traceability of the aeronautical data;

(f) the timeliness of the aeronautical data, including any limits on the effective period;

(g) the completeness of the aeronautical data;

(h) the format of the delivered data meets the specified requirements.

Requirements on accuracy, integrity, resolution and format are explicitly stated in the National Data Catalogue provided by Austro Control.

9. DELIVERY INFORMATION

9.1. Commission Regulation (EU) No 2020/2148

ADR.OPS.A.050:

The aerodrome operator shall ensure that aeronautical data is transmitted by electronic means.

9.2. Way of delivery

The web platform for the transmission of aeronautical static data provided by Austro Control GmbH shall be used in order to comply with the data quality requirements of Commission Regulation (EU) No 2020/2148.

Details on the web platform, how to proceed with respect to the supply and further process (e.g. approval) of aeronautical data are announced on the website of the Austro Control GmbH under

https://www.austrocontrol.at/flugsicherung/aim/qualitaetsanforderungen_datenauflieferung/luftfahrtdaten_flugplaetze

9.2.1. Delivery of geospatial aerodrome related data

Aerodrome related geospatial data, which are specified in the feature catalogue as described in chapter 5, shall be delivered in a specified Geopackage format to support the data exchange by direct electronic connection.

The data originator shall deliver a Geopackage file that are valid against the provided Geopackage validator.

9.2.2. Delivery of non-geospatial aerodrome related data

Aerodrome related data, which are not specified in the feature catalogue for geospatial data and cannot, thus, be expressed by means of the specified Geopackage format, shall be delivered in digital plain text formats that allow to copy and paste the data during the AIS process.

Proper digital file formats are DOC, DOCX, XLS, XLSX, TXT, and XML. Examples for non-geospatial aerodrome related data are aerodrome administration data, operational hours, description of services and facilities et cetera.

10. DATA CAPTURE

The “EUROCONTROL Specification for the Origination of Aeronautical Data (DO) V 2.0” has been designed to support Commission Regulation (EU) 2020/2148, laying down requirements on the quality of aeronautical data and aeronautical information for the single European sky.

The EUROCONTROL specification provides guidance and comprehensive requirements, stemming from different recognised sources, which should be met when originating aeronautical data in order to comply with requirements concerning the quality of aeronautical data and aeronautical information.

11. BIBLIOGRAPHY

Austro Control GmbH

http://www.austrocontrol.at

EUR-Lex

https://eur-lex.europa.eu/homepage.html

EUROCONTROL

http://www.eurocontrol.int/aim/public/standard_page/aixm.html

IDS – Ingegneria dei sistemi S.p.A.

http://www.idscompany.it/index.php

Annex A

see FC_AerodromeGPKG_V1_YYYYMMDD.xlsx

Annex B

see UML_AerodromeGPKG_V1_YYYYMMDD.vsdx

Annex C

See BusinessRules_AerodromeGPKG_V1_YYYYMMDD.xlsx