BS EN 9300-200:2018

BSI Standards Publication

Aerospace series - LOTAR - LOng Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data

Part 200: Common Concepts for LOng Term Archiving and Retrieval of Product Structure Information

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National foreword

This British Standard is the UK implementation of EN 9300-200:2018.

The UK participation in its preparation was entrusted to Technical Committee ACE/1, International and European Aerospace Policy and Processes.

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This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

Aerospace series - LOTAR - LOng Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data - Part 200: Common Concepts for LOng Term Archiving and Retrieval of Product Structure Information

Série aérospatiale - LOTAR - Archivage long terme et récupération des données techniques produits numériques telles que CAD 3D et PDM - Partie 200 : Concepts généraux pour l'archivage long terme et la réutilisation des informations de structure de produits

Luft- und Raumfahrt - LOTAR - Langzeit-Archivierung und -Bereitstellung digitaler technischer Produktdokumentationen, wie zum Beispiel von 3D-, CAD- und PDM-Daten - Teil 200: Allgemeine Konzepte für die Langzeitarchivierung und Bereitstellung von Produktstruktur-Informationen

This European Standard was approved by CEN on 8 January 2018.

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European foreword

This document (EN 9300-200:2018) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2018, and conflicting national standards shall be withdrawn at the latest by October 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Foreword

This standard was prepared jointly by AIA, ASD-STAN, PDES Inc. and the PROSTEP iViP Association.

The PROSTEP iViP Association is an international non-profit association in Europe. For establishing leadership in IT-based engineering it offers a moderated platform to its nearly 200 members from leading industries, system vendors and research institutions. Its product and process data standardization activities at European and worldwide levels are well known and accepted. The PROSTEP iViP Association sees this standard and the related parts as a milestone of product data technology.

PDES, Inc. is an international non-profit association in USA. The mission of PDES, Inc. is to accelerate the development and implementation of ISO 10303, enabling enterprise integration and PLM interoperability for member companies. PDES, Inc. gathers members from leading manufacturers, national government agencies, PLM vendors and research organizations. PDES, Inc. supports this standard as an industry resource to sustain the interoperabity of digital product information, ensuring and maintaining authentic longevity throughout their product life cycle.

Readers of this standard should note that all standards undergo periodic revisions and that any reference made herein to any other standard implies its latest edition, unless otherwise stated The Standards will be published under two different standards organizations using different prefixes.

ASD-STAN will publish the standard under the number EN 9300–xxx. AIA will publish the standard under the number NAS 9300–xxx. The content in the EN 9300 and NAS 9300 documents will be the same. The differences will be noted in the reference documentation (i.e. for EN 9300 Geometric Dimensioning & Tolerancing will be referenced in ISO 1101 and ISO 16792, and for NAS 9300 the same information will be referenced in ASME Y14.5M and Y 14.41). The document formatting etc. will follow that of the respective editorial rules of ASD-STAN and AIA. rein to any other standard implies its latest edition, unless otherwise stated.

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1 Preface

The EN 9300 series defines long term archiving and retrieval (LTA&R) for digital product data. Product data comprises both the content data defining a product and the respective metadata.

In complex product environments, the metadata are managed in a product data management (PDM) system. Consequently, the EN 9300 series will comprise a series of domain specific standards to deal with LTA&R of PDM data.

1.1 Justification

LTA&R of only the original technical data defining a product does not give sufficient information to satisfy the obligation to provide supporting documents for proof of evidence, since essential usage information for these data will be missing. Hence evidential weight of these data in most cases can only be guaranteed by long term archiving and retrieval of a minimum set of the respective metadata.

Two business scenarios describe the basic requirements for LTA&R of PDM data:

1) Assure evidence of product data for verification, certification, or product liability.

This is the minimum requirement for LTA&R and provides sufficient product management data to indicate the proper usage of the primary technical data. Since this is limited to static information on defined product instances and their configurations and is only intended to enable viewing of these data, it can be extracted from PDM systems with attached primary technical data in a viewing format. However this will not allow the re-use of the PDM data.

2) Enable reuse of the archived product data.

LTA&R of PDM data which enables reuse of product data over the complete life cycle of a product is needed for business requirements which increasingly assume the availability of this data. However, this requires deeper integration of processes and PDM data compared to the previous scenario.

More detailed information on these scenarios and their use cases is given in the detailed EN 9300-2xx Parts.

1.2 Long Term Archiving and Retrieval of PDM data in EN 9300 context

Since the EN 9300 series defines LTA&R for digital product data, it addresses both the data defining a product and the associated management data, including:

— product usage of the primary technical data;

— organization/structure of the data;

— configuration management of the data (effectivity, status, etc.).

The product management data describe the primary technical data generically in a PDM framework, independently of their specific type (CAD data, for example), which are described in the domain specific parts of EN 9300 series.

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1.3 Location in EN 9300 document structure

The EN 9300-2xx series of domain specific parts within the EN 9300 context are dedicated to product management data. All concepts of the generic process parts of EN 9300 apply unless stated otherwise.

Reflecting the standard EN 9300 document structure, the EN 9300-2xx series is structured as a Part 200 describing the fundamentals and concepts for the series, followed by several domain specific sub-parts.

The documents listed below define metadata requirements for specific PDM domains, see Table 1:

Table 1 — Mapping table for Part 2xx structure

Data domain specific part	Document Number
Product Management Data in an as designed view	EN 9300-210
Product Management Data in an as planned view	EN 9300-220
Product Management Data in an as delivered/maintained view	EN 9300-230
Product Management Data In-development (including prelim design review, critical design review, etc.)	EN 9300-240
Change documentation	EN 9300-250

2 Scope

2.1 PDM data in EN 9300 context

In most modern industrial environments, product data is maintained and managed using product data management (PDM) systems. In general, these systems:

— Manage the use of the primary technical data contained, for example, in CAD models and documents;

— Allow organization of primary technical data into structures to represent the relevant products;

— Support definition and maintenance processes for products.

Within the EN 9300 context, several domain specific parts address LTA&R for the primary technical data (e.g. CAD, CAx, Documents) as generated by the relevant technical “authoring” systems. The EN 9300-2xx series provides information for LTA&R of product management data for the relevant documents, structures and processes.

NOTE The terms “PDM data” and “product management data” are synonymous.

This is illustrated in the Figure below.

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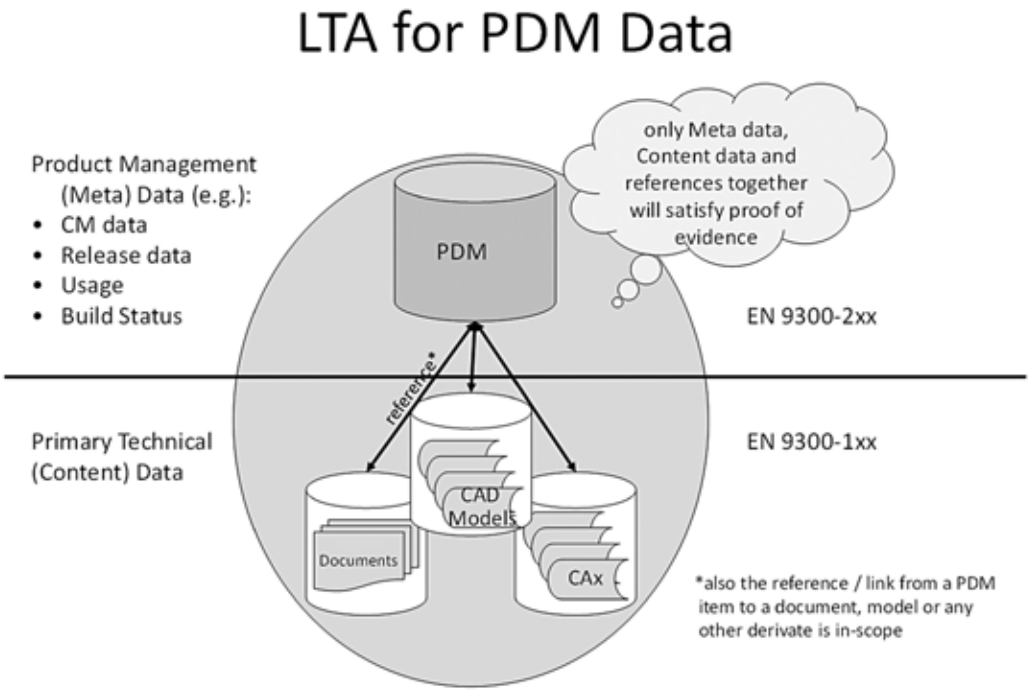

Figure 1 — PDM Data and Primary Technical Data

2.2 Objectives and scope of application

This part covers long term archiving (LTA&R) for product management data and relevant process related information (e.g. product structure requirements). Regarding process related information, only the process results are considered in scope as these have stable and static characteristics. The workflow used to create the information is not in scope. The resulting information, e.g. change authorization document, approvals/signatures, CAD models, attribute data, are in scope.

Product management data closely reflects the local business and data handling processes of each company. Therefore, an open standard can define only a common generic subset of the overall requirements. Other data that are only of local relevance or dependent on the local application environment are defined by local procedures. For each application environment, the complete set of standards, methods, and procedures related to the archived product management data shall be defined and documented by open standards, industry standards, or company standards and procedures. It is strongly recommended to use open standards whenever possible to ease data exchange, sharing, archiving, and ability to audit.

Three main objectives for LTA&R of product management data are:

— enable the proper retrieval of archived primary technical data when performing queries relative to product structure, relationships, effectivity, status, etc.;

— preserving the links between primary technical data and the associated product management data;

— providing all relevant properties of primary technical data as contained within the associated product management data.

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2.2.1 Architecture Definition

The product management data and the primary technical data may be managed in different environments (e.g. a database system for the product management data and a file system for the primary technical data with a reference in the database to the unique identifier and location for the file). In many cases, the primary technical data are held by the primary generating systems (e.g. CAD, systems engineering tool set) attached to a PDM backbone architecture.

The relationship between product management data and primary technical data is typically established by referencing mechanisms. The referencing mechanisms and the systems managing them shall be taken into account when archiving.

This can be done by describing the complete architecture of systems involved in the management of the relevant information and by defining common system requirements and procedures, such as synchronization, applied quality level, security requirements, and auditing. The overall capability of the architecture requires all systems within the architecture to comply with the common requirements.

The complete architecture definition shall comply with requirements defined in the applicable EN 9300 common process parts.

2.2.2 Archival of frequently changing PDM data

Product management data frequently changes and methods are employed to properly document the changes, and to provide traceability to authorizing change documentation.

The long term archiving process may be applied to frequently changing data to record its condition at a specific point in time, as defined by the management process. The granularity and timing of long term archival processes can vary depending on relevant business processes, the system architecture, and the application environment (i.e. versions of applications).

2.2.3 CAD Authored Data Replicated in PDM

CAD assembly structures (defined within CAD assembly models) show how parts are organized into higher level assemblies, showing their interrelationships and hierarchy. For example, some systems show the configuration of one product instance by visualizing the 3D CAD models in relevant position, where the position information is defined in the CAD Assembly. Another example would be mass properties which are defined in the CAD Assembly, but are also shown as meta data in the PDM system.

The ability to view CAD assembly structures in the context of a product configuration requires configuration management aspects such as change control, variants (e.g. optional configurations), and effectivities. However, these are only provided in a PDM environment.

CAD model defined assembly structures are not in scope for the LTA&R use cases defined in the EN 9300-2xx series, and are addressed in the EN 9300-115.

2.3 Out of Scope

The EN 9300-2xx series does not address primary technical data content or operation of the configuration management process itself. The EN 9300-2xx series only delivers methods for long term archiving and retrieval of PDM data. Methods for long term archiving and retrieval of primary technical data (content data) attached to PDM data is not in scope of the EN 9300-2xx series. These are delivered within the scope of other parts of EN 9300 as 1xx series for CAD or by applying existing available standards.

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Examples for these are given below:

— 3D Geometry → EN 9300-1xx series;

— 2D Drawings → TIFF G4;

— Documents → PDF A (ISO 19005);

— Document/Database → XML (W3C recommendation);

— Technical Publications → Spec. S1000D.

3 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 9300 (all parts), *Aerospace series — LOTAR — LOng Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data*

EN ISO 1101, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

EN ISO 9000, *Quality management systems — Fundamentals and vocabulary*

ISO 10007, *Quality management systems — Guidelines for configuration management*

ISO 10303-203, *Industrial automation systems and integration — Product data representation and exchange — Part 203: Application protocol: Configuration controlled 3D design of mechanical parts and assemblies*

ISO 10303-214, *Industrial automation systems and integration — Product data representation and exchange — Part 214: Application protocol: Core data for automotive mechanical design processes*

ISO 10303-239, *Industrial automation systems and integration — Product data representation and exchange — Part 239: Application protocol: Product life cycle support*

ISO 10303-242, *Industrial automation systems and integration — Product data representation and exchange — Part 242: Application protocol: Managed model-based 3D engineering*

ISO 12006 (all parts), *Building construction — Organization of information about construction works*

ISO 14721, *Space data and information transfer systems — Open archival information system (OAIS) — Reference model*

ISO 15226, *Technical product documentation — Life cycle model and allocation of documents*

ISO 15926 (all parts), *Industrial automation systems and integration — Integration of life-cycle data for process plants including oil and gas production facilities*

ISO 16792, *Technical product documentation — Digital product definition data practices*

ISO 19005 (all parts), *Document management — Electronic document file format for long-term preservation*

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ISO/IEC 2382-1, *Information technology — Vocabulary — Part 1: Fundamental terms*

IEC 61346-1, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 1: Basic rules*

ISO/IEC 82045 (all parts), *Document management*

Spec. S1000D, *International Specification for Technical Publications*

ASME Y14.5:2009, *Dimensioning and Tolerancing*

ASME Y14-41:2012, *Digital Product Definition Data Practices*

EIA 649 B, *National Consensus Standard for Configuration Management*

4 Terms, definitions and abbreviations

For the purposes of this document, the terms, definitions and abbreviations given in EN 9300-007, and the following apply.

Terms and definitions defined only in this standard or referenced from other standards are intended to be included in EN 9300-007.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4.1
archival storage
from the OAIS model, the process that ensures data remains available for access

[SOURCE: EN 9300-007:2017, 3.1.7]

4.2
archive
<1> repository for historical information

[SOURCE: EN 9300-007:2017, 3.1.8]

4.3
archive
<2> any repository conforming to the OAIS standard

[SOURCE: EN 9300-007:2017, 3.1.9]

4.4
certification
<1> process of assessing a process or product against some particular set of criteria

[SOURCE: EN 9300-007:2017, 3.1.14]

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4.5
certification
<2> particular process of certifying an aircraft type as being airworthy

Note 1 to entry: For clarity, LOTAR uses the term "Type certification" as defined in CFR in this context.

[SOURCE: EN 9300-007:2017, 3.1.15]

4.6
configuration
<1> product attributes of an existing or planned product, or a combination of products

[SOURCE: EIA 649 B]

4.7
configuration
<2> one of a series of sequentially created units or instances of a product

[SOURCE: EIA 649 B]

4.8
configuration
<3> configuration is the association of a Class condition association or a Class specification association object with a design or with a process in order to define a valid usage of it in the context of a certain Product_class

Note 1 to entry: The validity of the association may be limited by a time period through assigning an Effectivity object to it.

Note 2 to entry: The semantics of the kind of association is defined by the attributes "configuration_type" and "inheritance_type".

[SOURCE: ISO 10303-214:2010, 4.2.100]

4.9
configuration
arrangement of the elements of a system

[SOURCE: ISO 9000:2000]

4.10
configuration control
activities comprising the control of changes to a configuration item after formal establishment of its configuration documents

[SOURCE: ISO 10007:1995, 3.5]

4.11
configuration management
management process for establishing and maintaining consistency of a product's performance, functional, and physical attributes with its requirements, design and operational information throughout its life

[SOURCE: EIA 649 B]

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4.12
configuration management
<1> discipline of managing the information relating to a product design, encompassing planning and management, change management, configuration identification, status accounting and audit.

Note 1 to entry: This is the preferred sense in the aircraft industry, and in the EN 9300 documentation.

[SOURCE: EN 9300-007:2017, 3.1.17]

4.13
configuration management
<2> rules relating to the choice and combinations of options used when configuring a particular physical example of a product

[SOURCE: EN 9300-007:2017, 3.1.18]

4.14
content
subject information of a document

[SOURCE: ISO/IEC 82045-1:2001, 3.2.2]

4.15
data
reinterpretable presentation of information in a formalized manner suitable for communication, interpretation or processing

[SOURCE: ISO/IEC 2382-1:1993, 01.01.02]

4.16
designated community
from OAIS, the community for which the system is designed. In the case of EN 9300, it is the community that will use the information retained in an archive

[SOURCE: EN 9300-003:2017, 3.1.24]

4.17
document
this term covers a family of usages, from a physical paper document, through electronic files which can be thought as representing a document, to synthetic view derived from multiple sources for which the user's conceptual model is that of reading a document. See also EN 9300-003, 5.3.1 “Archiving Product Models vs. Archiving Documents”

[SOURCE: EN 9300-007:2017, 3.1.27]

4.18
domain specific part
LOTAR parts are either general or domain specific. LOTAR parts 100 upwards are the domain specific parts, and deal with the particularities of each type of data such as 3D CAD. The general parts (1 to 99) apply tom all types of data.

[SOURCE: EN 9300-007:2017, 3.1.28]

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4.19
effectivity
<1> attribute associated with PDM structures which define application of PDM structure nodes and associated documents to individual units. Values of effectivity attribution may include options, range of units, and date. A resolved product structure is determined by evaluating effectivity for selected options, range, and/or date

4.20
effectivity
<2> designation, defining the product range; e.g. serial numbers, block numbers, batch numbers, lot numbers, model, dates or event, at which a specific product configuration applies, a change is to be or has been affected, or to which a variance applies

[SOURCE: EIA 649 B]

4.21
effectivity
<3> this unit of functionality provides the capability to represent information concerning the validity of data. Implicit propagation of data specifying validity is not available. The validity of data can be expressed by effectivities that specify time ranges within which data may be used and by retention periods that specify how long data have to be kept and when they may or have to be deleted. Both concepts can make use of explicit dates or of dates expressed by events in order to represent the relevant points in time

[SOURCE: ISO 10303-214:2010, 4.1.25]

4.22
effectivity
<4> identification of the valid use of a document version tracked by date or event

[SOURCE: ISO/IEC 82045-1:2001, 3.4.2]

4.23
electronic signature
defined method to sign an object in electronic environments. It provides means to authenticate the signatory and the signed object in an unambiguous and safe way by attaching to or logically associating data in electronic form to other electronic objects. (See EN 9300-005)

[SOURCE: EN 9300-007:2017, 3.1.29]

4.24
evidential weight
from Code of Practice for Legal Admissibility, in the case where electronic information is used as evidence in a court case, the degree of reliance that the information is what it purports to be

[SOURCE: EN 9300-007:2017, 3.1.31]

4.25
fixity information
ancillary information that show a particular set of information is unchanged

[SOURCE: EN 9300-007:2017, 3.1.38]

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4.26
management data
see metadata

4.27
maturity level
purpose-oriented degree of completeness of information with regard to the intended final object which is reflected in documents

[SOURCE: ISO/IEC 82045-1:2001, 3.4.1]

4.28
media
physical material on which data is recorded, such as an optical disc

[SOURCE: EN 9300-007:2017, 3.1.51]

4.29
metadata
<1> data about data. For example, the file name is meta data about a CAD design held as a file

[SOURCE: EN 9300-007:2017, 3.1.52]

4.30
metadata
<2> data required for the management and use of information packages

Note 1 to entry: This is the preferred sense in the EN 9300 documentation.

[SOURCE: EN 9300-007:2017, 3.1.53]

4.31
metadata for documents
data for the description of documents and their management

[SOURCE: ISO/IEC 82045-1:2001, 3.2.1]

4.32
object
entity treated in the process of design, engineering, realization, operation, maintenance and demolition

Note 1 to entry: The entity may refer to something, which is either physical or non-physical or to a set of information associated with it.

Note 2 to entry: Depending on its purpose, an object may be viewed in different ways called “aspects”.

[SOURCE: IEC 61346-1:1996, 3.1 modified]

4.33
OAIS model
Open Archival Information System reference model (see normative references)

[SOURCE: EN 9300-007:2017, 3.1.55]

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