IEC 63278-4

Edition 1.0 2026-09

INTERNATIONAL STANDARD

Asset Administration Shell for industrial applications - Part 4:Applications of Asset Administration Shell

ICS 25.040.01; 35.240.50

ISBN 978-2-8327-1512-3

IEC 63278-4:2026-09(en)

IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC
The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications
The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform
The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, …). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished
Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc
If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch
Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org
The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

Asset Administration Shell for industrial applications - Part 4: Applications of Asset Administration Shell

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at https://patents.iec.ch. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63278-4 has been prepared by IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
65/1206/FDIS	65/1246/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 63278 series, published under the general title *Asset Administration Shell for industrial applications*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

INTRODUCTION

0.1 General

The Asset Administration Shell (AAS) is seen as one interoperable manifestation of a digital twin in manufacturing industries. IEC 63278-1 describes the conceptual framework for the AAS, the structure of the AAS and requirements associated with the AAS and related entities.

This document complements IEC 63278-1 by describing in a systematic way applications of the AAS.

0.2 Context of this document

The current work foresees parts covering the following topics:

– Asset Administration Shell structure (IEC 63278-1);
– Information meta model (IEC 63278-2[1] [1][2]);
– Security provisions for Asset Administration Shells (IEC 63278-3[3] [2]);
– Applications of AAS (this document);
– Interfaces (IEC 63278-5[4] [3]).

Figure 1 illustrates the relationships between the documents currently being worked on.

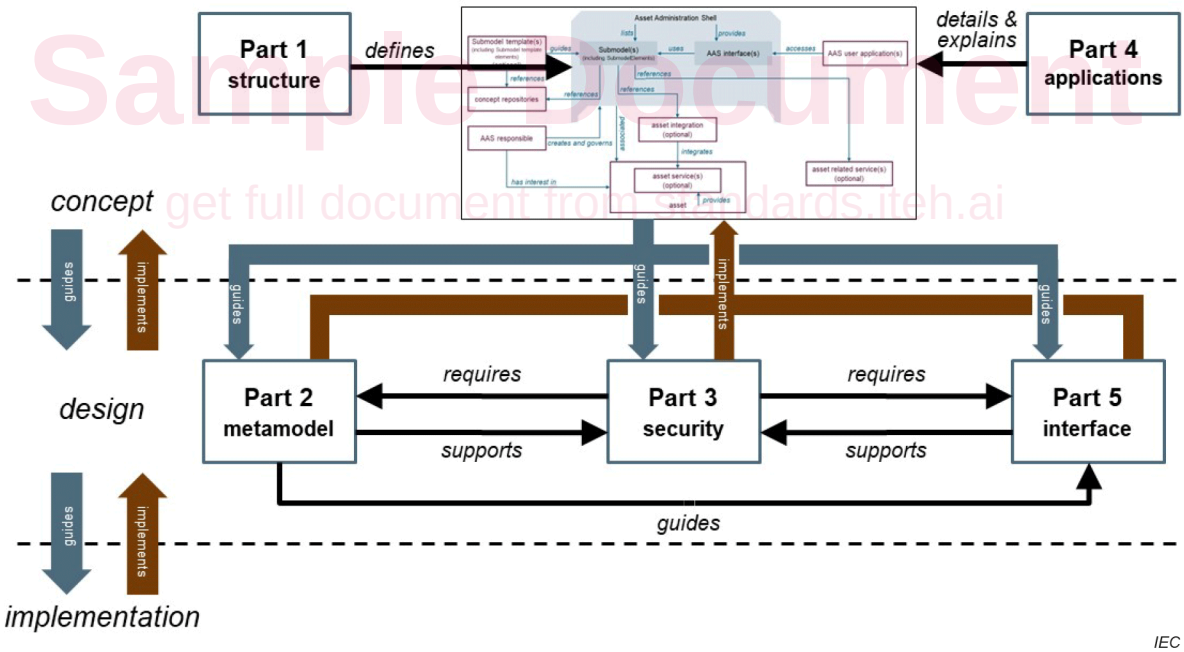

Figure 1 – Relationships between the documents

[1] Under preparation. Stage at the date of publication: IEC/CDV 63278-2:2026.

[2] Numbers in square brackets refer to the Bibliography.

[3] Under preparation. Stage at the date of publication: IEC/CD 63278-3:2026.

[4] Under preparation. Stage at the date of publication: IEC/CD 63278-5:2026.

IEC 63278-1 and IEC 63278-4 both address a concept view, whereas IEC 63278-2, IEC 63278-3, and IEC 63278-5 address a design view. An implementation is distinguished from the concept and design. Currently the implementation view is not addressed by the IEC 63278 series.

In this document, an application perspective is always taken. This document considers selected Smart Manufacturing use cases, see [4], and refines aspects of these use cases, but other input was also considered. However, the terms and concepts introduced in IEC 63278-1 are used. IEC 63278-4 does not introduce concepts which are not considered in IEC 63278-1.

NOTE IEC 63278-2 introduces concepts which are not introduced in IEC 63278-1 (e.g., qualifier, semanticID of Submodels), but such concepts are not in the scope of IEC 63278-4.

Nevertheless, IEC 63278-4 details and explains requirements, recommendations, and permissions that are not described precisely enough in IEC 63278-1. These requirements, recommendations, and permissions are not regarding the AAS itself, but the application of the AAS in the context of the related entities.

0.3 Structure of this document

Clause 4 of this document introduces additional actors in form of humans or organizations and describes how these actors interact with the AAS and the related entities by stating requirements, recommendations, and permissions. Clause 4 also describes examples about possible modelling and procedures using the AAS following the statements. This completes IEC 63278-1 regarding an application of the AAS. The claim is that these descriptions are complete regarding the level of detail considered.

Clause 5 describes – in addition to Clause 4 – selected examples about possible modelling and procedures using the AAS. It is the responsibility of a human or organization to determine how to apply the concepts provided by the AAS regarding their own objectives. In this respect, these examples neither claim to be complete nor to provide guidance about good practices. Clause 5 does not state any requirement.

0.4 Intended audience and purpose of the document

This document addresses humans or organizations that want to use the concepts provided by the AAS. This concerns how the AAS can be used in the context of the related entities and how to represent assets using the AAS.

Additionally, this document provides a framework to better understand the context of the AAS and thus lays a basis for further parts of the IEC 63278 series. This also concerns software developers, who want to provide software that supports AASs, be it to provide AASs or to use AASs.

1 Scope

The Asset Administration Shell is a standardized digital representation of an asset. The Asset Administration Shell gives uniform access to information of an asset and services of or related to an asset.

The purpose of the Asset Administration Shell is to enable two or more software applications to exchange information and to mutually use the information that has been exchanged in a trusted and secure manner.

This document assumes an application perspective of the Asset Administration Shell to develop a common understanding on how to use an Asset Administration Shell.

This document defines how the Asset Administration Shell can be used in the context of the related entities and how to represent assets using the Asset Administration Shell.

Due to the more detailed description compared to IEC 63278-1, additional requirements, recommendations, and permissions for the AAS are stated towards application of the AAS in selected scenarios.

2 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.

IEC 63278-1:2023, *Asset Administration Shell for industrial applications - Part 1: Asset Administration Shell structure*

IEC 62832-1:2020, *Industrial-process measurement, control and automation - Digital factory framework - Part 1: General principles*

3 Terms, definitions, abbreviated terms, and conventions

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62832-1 and the following apply.

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

– IEC Electropedia: available at https://www.electropedia.org/

– ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
asset
physical or non-physical entity that has value to a human or an organization

Note 1 to entry: A physical asset can provide asset services.

[SOURCE: IEC 60050-741:2020, 741-01-04, modified – "digital entity" has been replaced by "non-physical entity", "an individual, an organization or a government" has been replaced by "a human or an organization".]

3.1.2
Asset Administration Shell
AAS
standardized digital representation of an asset

3.1.3
AAS interface
interface of an AAS giving uniform access to information and services

Note 1 to entry: The two entities according to interface are an AAS user application (i.e., a software application) and an AAS (i.e., a representation).

3.1.4
AAS responsible
human or organization having interest in an asset and governing an Asset Administration Shell

3.1.5
AAS user application
software application which accesses an AAS via its AAS interface(s) for usage by humans or for automatic processing

3.1.6
AAS user application operator
human or organization operating an AAS user application

3.1.7
asset integration
software service needed to access asset services

3.1.8
asset owner
human or organization owning an asset

3.1.9
asset service
service that is provided by the considered asset

3.1.10
asset related service
service that is not provided by the considered asset, but by software service outside of the considered asset

3.1.11
concept
unit of knowledge created by a unique combination of characteristics

[SOURCE: IEC 61360-1:2017, 3.1.8]

3.1.12
concept repository
collection of entries that allows lookup by concept identifier and where relationships between entries can be described

[SOURCE: IEC 62832-1:2020, 3.1.5, modified – "concept dictionary" has been changed to "concept repository", Note 1 to entry has been deleted, "and where relationships between entries can be described" has been added.]

3.1.13
concept repository entry
description of a concept containing, at a minimum, an unambiguous concept identifier, a preferred name, and a description

[SOURCE: IEC 62832-1:2020, 3.1.6]

3.1.14
concept repository owner
human or organization owning a concept repository

3.1.15
entity
anything (physical or non-physical) having a distinct existence

[SOURCE: ISO/IEC 20924:2024, 3.1.17]

3.1.16
interface
shared boundary between two entities defined by functional characteristics, signal characteristics, or other characteristics as appropriate

3.1.17
meta information
information used to describe an entity

3.1.18
service
distinct part of the functionality that is provided by an entity through interfaces

[SOURCE: IEC 60050-741:2020, 741-01-28]

3.1.19
software application
software functional element specific to the solution of a problem in industrial-process measurement and control

Note 1 to entry: A software application requires a computing infrastructure to be deployed and executed.

[SOURCE: IEC TR 62390:2005, 3.1.2, modified − software was added to the term, program was deleted form the term, Note has been replaced.]

3.1.20
software service
software functional element that provides the functionality through interfaces

Note 1 to entry: A software service requires a computing infrastructure to be deployed and executed.

3.1.21
Submodel
representation of an aspect of an asset

3.1.22
SubmodelElement
element of a Submodel

3.1.23
Submodel template
template for the representation of an aspect of an asset

3.1.24
Submodel template element
element of a Submodel template

3.1.25
Submodel template owner
human or organization owning a set of Submodel templates

3.2 Abbreviated terms

AAS	Asset Administration Shell
CFP	carbon footprint of product
HMI	human machine interface
IT	information technology
OPC UA	open platforms communications - unified architecture
P&ID	process and instrumentation diagram
PLC	programmable logic controller

3.3 Conventions

Annex A describes the interpretation of the graphical elements of figures illustrating AASs.

4 Application of the Asset Administration Shell

4.1 General

The application of the Asset Administration Shell described in this clause is based on Figure 2, which shows the Asset Administration Shell and related entities. This clause defines how the Asset Administration Shell can be used in the context of the related entities and how to represent assets using the Asset Administration Shell.

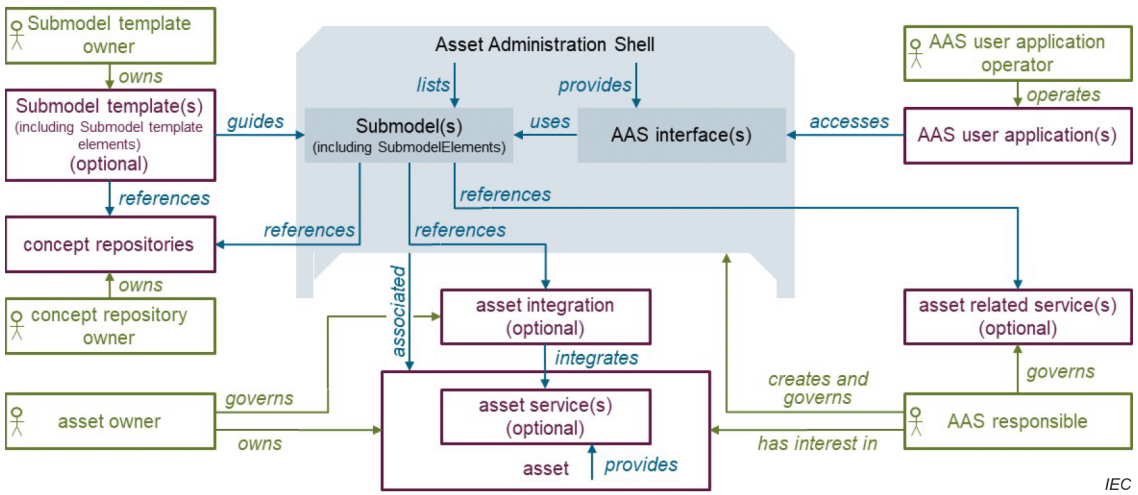

Figure 2 – Asset Administration Shell and related entities

IEC 63278-1 shall guide the applications of the Asset Administration Shell. Therefore, Figure 2 is an extension of IEC 63278-1:2023, Figure 4. A distinction is made between entities assumed by humans or organizations indicated in green and entities assumed by technical systems indicated in purple. To complete Figure 2, further entities were added in addition to the AAS responsible, which are assumed by humans or organizations.

Figures in this document use a uniform design and colour code, which is explained in Annex A.

4.2 Governance principles

Governance principles for the AAS delineate the power and options for action of the entities assumed by humans or organizations. They also set rules and guidelines for the interactions, and they define, guide, and provide for enforcement of these interactions.

In detail, this means for the entities assumed by humans or organizations, see also Figure 3:

– An AAS responsible creates and governs an AAS to be accessed by AAS user applications but has the interest to govern the application of the AAS. The concept to support the governance of an AAS responsible is described in 4.7. The AAS Interface ensures that only authorized users are allowed to interact with the AAS and enforces access control according to the governance rules defined by the AAS Responsible.

– A concept repository owner owns concept repository entries of a concept repository to be accessed and explored, but not modified, by other entities, but has the interest to grant and restrict the access and exploration for the entities. In the context of the AAS, the concept to support governance of a concept repository owner is described in 4.7, but the enforcement is not considered in the IEC 63278 series.

  NOTE Concept repositories can also be accessed and explored by entities not related to AASs, for example, the usage of concept repositories by traditional procurement systems.

– A Submodel template owner owns Submodel templates to be accessed and explored, but not modified, by AAS user applications via the AAS interface(s), but has the interest to grant and restrict access and exploration for AAS user applications. In the context of the AAS, the concept to support governance of a Submodel template owner is described in 4.7, but the enforcement is not considered in the IEC 63278 series.

– An asset owner owns an asset and governs the asset integration. The asset owner has an interest to grant and restrict the access to and execution of asset services. The asset integration serves that the asset owner can pursue this interest. The concept to support governance of an asset owner is described in 4.7.

– An AAS user application operator operates an AAS user application being of interest in a higher-level context. The AAS user application operator has an interest that AAS user applications can use information and services provided by the AAS and the related entities via the AAS interface. The AAS responsible aligns the own interests regarding to data exposure with the interests of the AAS user application operator. On this basis, the AAS responsible defines data exposure regarding the AAS user application. The AAS user application operator – and the developer of the AAS user application – shall be aware that this usage can be restricted by the other entities.

Figure 3 illustrates the governance scopes and subjects.