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Asset Administration Shell for industrial applications - Part 1: Asset Administration Shell structure (IEC 63278-1:2023)

Verwaltungsschale für industrielle Anwendungen - Teil 1: Struktur der Verwaltungsschale (IEC 63278-1:2023)

Enveloppe de Gestion d'Actif pour applications industrielles - Partie 1: Structure de l'Enveloppe de Gestion d'Actif (IEC 63278-1:2023)

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

Enveloppe de Gestion d'Actif pour applications industrielles
- Partie 1: Structure de l'Enveloppe de Gestion d'Actif
(IEC 63278-1:2023)

Verwaltungsschale für industrielle Anwendungen - Teil 1:
Struktur der Verwaltungsschale
(IEC 63278-1:2023)

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EN IEC 63278-1:2024 (E)**European foreword**

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The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2024-10-18 level by publication of an identical national standard or by endorsement
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In the official version, for Bibliography, the following notes have to be added for the standard indicated:

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 62443	series	Security for industrial automation and control systems	EN IEC 62443	series

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NORME INTERNATIONALE



**Asset Administration Shell for industrial applications –
Part 1: Asset Administration Shell structure**

**Enveloppe de Gestion d'Actif pour applications industrielles –
Partie 1: Structure de l'Enveloppe de Gestion d'Actif**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ASSET ADMINISTRATION SHELL FOR INDUSTRIAL APPLICATIONS –**Part 1: Asset Administration Shell structure****FOREWORD**

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65/1012/FDIS	65/1027/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

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INTRODUCTION

0.1 General

The production system life cycle focuses on the design, deployment, commissioning, operation and decommissioning of an entire production facility. Product life cycle management is the process of managing the entire life cycle of a product with the information flows and controls from inception, through engineering design and manufacture, to service and end of life treatment of manufactured products. The supply chain management is the management of the flow of products and services and includes processes that transform raw materials and parts components into final products, and it involves the streamlining of business activities to maximize customer value and gain a competitive advantage in the marketplace. Each of these dimensions intersects at the vertical integration of machines, plants, and enterprise systems in the equipment hierarchy of an enterprise pyramid. The integration of manufacturing software applications along each dimension and across dimensions helps to enable advanced controls at the shop floor and optimal decision-making at the enterprise. Details of existing manufacturing standards for each of the three life cycle dimensions are provided in [1]¹.

Several integration technologies have been individually put into practical use (e.g. CAD/CAM) aiming to accelerate product innovation cycles, streamline supply chains, and increase production system flexibility through information exchange between the dimensions. Details of the integration technologies and capabilities supported by them are provided in [1].

The Asset Administration Shell (AAS) is seen as one interoperable manifestation of a digital twin in manufacturing that facilitates tighter integration within and across the three dimensions mentioned above.

This document is the first part of the series "Asset Administration Shell for industrial applications". The multiple parts of the series will detail structure, information models, definition of services and online interfaces, required security aspects and communication languages including mapping contents of OPC UA and AutomationML models to the Asset Administration Shell.

0.2 Overview on parts of the series

The current planning foresees parts covering the following topics:

- Asset Administration Shell structure (this document)
- information meta model (to allow to access standardized information)
- security provisions for Asset Administration Shells
- use cases and modelling examples
- interfaces to Asset Administration Shells
- communication language among sets of Asset Administration Shells
- specification of content of Asset Administration Shells for various domains

This part of IEC 63278 describes requirements towards the general structure, that each possible Asset Administration Shell should comply with. In a following part of the series, this structure will be developed further towards a meta-model of the Asset Administration Shell. Based on these specifications, individual Asset Administration Shells can be created. These individual Asset Administration Shells will be the actual containers of information and will provide information and services with respect to the described asset.

¹ Numbers in square brackets refer to the Bibliography.

0.3 Interoperability

The Asset Administration Shell pursues the overall purpose to support interoperability of software applications. According to ISO/IEC 21823-1, different facets for interoperability can be considered (see Figure 1).

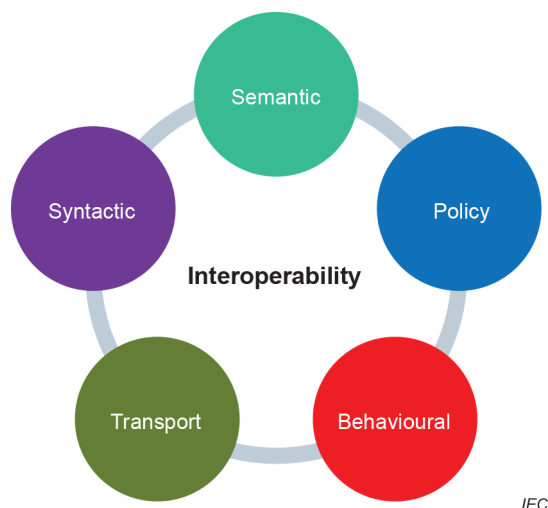


Figure 1 – Facets of interoperability according to ISO/IEC 21823-1

Semantic interoperability considers the meaning of the data model within the context of a subject area so that it is understood by the participating software applications. The Asset Administration Shell addresses semantic interoperability by associating well-known concepts to the data, which is exchanged between the software applications.

Policy interoperability considers the compliance with the legal, organizational, and policy frameworks applicable to the participating software systems. The Asset Administration Shell addresses policy interoperability in the following way:

- The Asset Administration Shell provides uniform identity and access control management including usage restriction for information and services of assets.
- The Asset Administration Shell enables uniform structuring of information and services of assets. This allows the Asset Administration Shell to define and maintain the structure of information and services of an asset and not the individual software applications. This simplifies information management in manufacturing industries by both reducing the effort and increasing the quality of information.

Transport interoperability considers the data transfer between software applications based on an established communication infrastructure between the participating software applications. This facet is not addressed in this part of the series but will be considered in further parts of the series.

Syntactic interoperability considers the data format by which the exchanged information can be understood by the participating software applications. This facet is not addressed in this part of the series but will be considered in further parts of the series.

Behavioural interoperability considers the expected outcomes to interface operations. This facet is addressed by the Asset Administration Shell in the sense that the Asset Administration Shell provides a standardized interface to software applications. The concrete behaviour of this standardized interface will be considered in further parts of the series.