EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 18219

June 2025

ICS 35.240.63; 13.020.20

English version

Digital product passport - Unique identifiers

Digitaler Produktpass - Eindeutige Kennungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/CLC/JTC 24.

If this draft becomes a European Standard, CEN and CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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European foreword

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164 This document (prEN 18219:2025) has been prepared by Technical Committee CEN/CLC/JTC 24
165 "Digital product passport – Framework and system", the secretariat of which is held by DIN.

166 This document is currently submitted to the CEN Enquiry.

167 This document has been prepared under a standardization request addressed to CEN by the European
168 Commission. The Standing Committee of the EFTA States subsequently approves these requests for its
169 Member States.

170 For relationship with EU Legislation, see informative Annex ZA, which is an integral part of this
171 document.

172 This document has been prepared as one of eight standards developed under Standardization Request
173 M/604, issued by the European Commission to CEN and CENELEC.

Introduction

0.1 General

In 2019, the European Commission introduced the European Green Deal, a detailed strategic plan aimed at sustainable growth. A key component of this plan is the Ecodesign for Sustainable Product Regulation (ESPR) [1], which is designed to guide the European Union towards achieving climate neutrality by 2050. The ESPR promotes a vision of a society that is equitable and thriving, functioning within a modern, competitive, and circular economy, all while preserving a toxin-free environment.

In detail, the ESPR mandates the adoption of production and consumption patterns that are in harmony with the Union's comprehensive sustainability goals related to climate change, environmental protection, energy use, resource efficiency, and biodiversity conservation, all within defined planetary boundaries. To achieve these goals, the regulation introduces a set of stringent ecodesign requirements. These are specifically crafted to enhance the durability, reliability, repairability, upgradability, reusability, and recyclability of products. Such measures are vital for reducing waste, diminishing the presence of hazardous substances in products, and improving their energy and resource efficiency. Collectively, these requirements establish a rigorous framework for sustainability within the industry, pivotal for supporting the Union's transition to sustainability.

To support the implementation of these comprehensive requirements, the ESPR highlights Digital Product Passports (DPP) as a key element and a pivotal tool to ensures that all stakeholders in the value chain – manufacturers, distributors, consumers, and recyclers – have access to essential, traceable, and reliable product information, supporting informed consumer choices, and promoting better resource management and sustainability practices.

The rollout of the Digital Product Passport (DPP) concept is set to occur gradually over the coming years. Specific details, including what will be included in the DPP for various product groups will be outlined in delegated acts. This approach ensures a comprehensive strategy that balances environmental objectives with regulatory requirements and stakeholder expectations. This also includes other EU policies and regulations, such as construction products or batteries.

To support the implementation of the DPPs, this document establishes a framework for the creation and management of unique identifiers. These identifiers connect products, economic operators, and facilities to their digital counterparts, and are designed to be distinct, reliable, and universally recognizable. They are crucial for establishing robust and resilient digital product passports, enabling effective tracking of environmental attributes and compliance across the life cycle. This improves the accessibility of product information through data carrier scans, giving consumers, business partners, and regulators access to a digital product passport. This digital passport provides valuable insights into the product's durability, reparability, recycled content, availability of spare parts, and more.

To ensure interoperability and reduce implementation costs for businesses, these identifiers are designed to integrate with existing International Standards and align with current technological advancements, while maintaining consistency and coherence with established industry practices.

0.2 Orientation

This document provides the foundation for the identification of products, economic operators, and facilities to be used for digital product passports.

Clause 4 sets out the principles, requirements, and guidelines that apply across all identification use cases. These are structured around six key areas: global uniqueness, persistence, syntax, semantics, interoperability, and openness.

— *Principles:* Provide the intent and purpose for each area.

— *Requirements:* Define what must be fulfilled when implementing identifiers and identification schemes, serving as the foundation for assessment and compliance.

— *Guidelines:* Offer optional recommendations that can support or enhance implementation but are not mandatory.

Clause 5 specifies the permitted identification schemes for creating a unique product identifier. Five different schemes are described, each of which may be used to meet the requirements established in Clause 4, provided that both the rules of the chosen scheme and the requirements of Clause 4 are fully satisfied.

Clause 6 specifies the permitted identification schemes for creating a unique economic operator identifier and unique facility identifier. Four schemes are described, each of which may be used to meet the requirements established in Clause 4, provided that both the rules of the chosen scheme and the requirements of Clause 4 are fully satisfied.

In addition, the document includes informative annexes to support practical understanding and implementation:

— *Annex A*: Guidance on selecting item-level identification for products.

— *Annex B*: Overview of identification schemes for products.

— *Annex C*: Overview of identification schemes for economic operators and facilities.

— *Annex ZA:* Relationship between this European Standard and the essential requirements of 2024/1781.

1 Scope

This document defines the principles and specifies the requirements and guidelines for unique product identifiers, unique economic operator identifiers, and unique facility identifiers used in digital product passports. It covers the following areas:

a) global uniqueness;

b) persistence;

c) syntax;

d) semantics;

e) interoperability;

f) openness.

This document accommodates unique product identifiers at three granularity levels of specificity: model, batch, or individual item, to support various operational needs.

~~This document describes identification (ID) schemes that use issuing agencies, self-issuing systems, or a combination of both.~~

This document describes how identifiers self-issued by product manufacturers utilise various mechanisms to ensure uniqueness. These mechanisms include ISO/IEC 15459, ISO/IEC 6523, ICANN, DOI Registration Authorities or some combination of them.

Commented [SG1]: As Annex B3, Reliance of domain name for the unique identifier, clearly shows, in alignment with ESPR, all identification schemes proposed rely upon a Registration Authority external to the individual product manufacturing companies to ensure global, regional, national uniqueness between the identifiers each company issues. As further explained in this document beginning with Section 3.7, the mechanism may differ but all methods require a mechanism beyond self-issuing and self-issuing occurs in every scheme.

All methods rely on a hierarchal identifier structure and companies-issuing some part of the identifier beyond a segment licensed to them by registration authorities.

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.

ISO/IEC 646:1991, *Information technology -- ISO 7-bit coded character set for information interchange*

ISO/IEC 6523-1:2023, *Information technology — Structure for the identification of organizations and organization parts — Part 1: Identification of organization identification schemes*

ISO/IEC 6523-2:1998, *Information technology -- Structure for the identification of organizations and organization parts -- Part 2: Registration of organization identification schemes*

ISO/IEC 15418:2016, *Information technology - Automatic identification and data capture techniques - GS1 Application Identifiers and ASC MH10 Data Identifiers and maintenance*

ISO/IEC 15434:2019, *Information technology — Automatic identification and data capture techniques — Syntax for high-capacity ADC media*

ISO/IEC 15459-2:2015, *Information technology — Automatic identification and data capture techniques — Unique identification — Part 2: Registration procedures*

ISO/IEC 15459-3:2015, *Information technology — Automatic identification and data capture techniques — Unique identification — Part 3: Common rules*

Commented [SG2]: Reference missing. See its normative usage in Section 5.1.2.1 as the GS1 System is fully compliant with ISO/IEC 15459. It must be applied universally to every Section(s) that claims ISO/IEC 15459 compliance but GS1 does not utilise the other methods and therefore is not in a position to determine if they are ISO/IEC 15459 compliant or not.

ISO/IEC 15459-4:2014, *Information technology -- Automatic identification and data capture techniques -- Unique identification -- Part 4: Individual products and product packages*

ISO/IEC 15459-6:2014, *Information technology — Automatic identification and data capture techniques — Unique identification — Part 6: Groupings*

ISO/IEC 15961-1:2021, *Information technology - Data protocol for radio frequency identification (RFID) for item management - Part 1: Application interface*

ISO/IEC 17360:2023, *Automatic identification and data capture techniques — Supply chain applications of RFID — Product tagging, product packaging, transport units, returnable transport units and returnable packaging items*

ISO/IEC 18975:2024Information technology — Automatic identification and data capture techniques — Encoding and resolving identifiers over HTTP

Commented [SG3]: Editorial: As referenced by Section 5.1.2.1

ISO 17442-1:2020, *Financial services — Legal entity identifier (LEI) — Part 1: Assignment*

ISO/IEC 18975:2024, *Information technology — Automatic identification and data capture techniques — Encoding and resolving identifiers over HTTP*

ISO/IEC 19762:2016, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary*

ISO 26324:2025, *Information and documentation — Digital object identifier system*

EN IEC 61406-1:2022, *Identification Link - Part 1: General requirements*

EN IEC 61406-2:2024, *Identification link - Part 2: Types/models, lots/batches, items and characteristics*

Decentralized Identifier Resolution (DID Resolution) v0.3:2025, *https://www.w3.org/TR/did-resolution/*

Decentralized Identifiers (DIDs) v1.0:2022, *https://www.w3.org/TR/did-1.0/*

GS1 Digital Link Standard: URI Syntax, release 1.6.0

EPC Tag Data Standard (TDS), release 2.0 https://ref.gs1.org/standards/tds/

Verifiable Credentials Data Model v1.1:2022, *https://www.w3.org/TR/vc-data-model/*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19762:~~2016~~ 2025 and the following apply.

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

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
batch
usually refers to a subset of a specific model composed of all products produced in a specific manufacturing plant at a specific moment in time~~subset of a model that is grouped by the economic operator based on the identical properties~~

3.2
consumer
individual member of the general public purchasing or using goods, property or services for private purposes

[SOURCE: ISO 14025:2006]

3.3
digital product passport
DPP
a set of data specific to a product that includes the information specified in the applicable delegated act adopted pursuant to Article 4 and that is accessible via electronic means through a data carrier in accordance with Chapter III~~digital record of product characteristics throughout its life cycle~~

Note 1 to entry: Example characteristics include environmental sustainability, environmental impact, and recyclability.

3.4
economic operator
manufacturer, authorized representative, importer, distributor, dealer or fulfilment service provider

Commented [SG4]: Reference missing. Per Section 5.1.2.1, the reference to the GS1 Digital Link Standard: URI Syntax is necessary for GS1 users just as IEC 61406 is for users of ANS MH10.2 DIs.

For the standard, see https://ref.gs1.org/standards/digital-link/uri-syntax/

Commented [SG5]: Reference missing. The reference to the EPC Tag Data Standard (TDS) is necessary to go in line with its mentioning in the further sections (e.g., table B14).

Commented [SG6]: Editorial: According to ISO website the standard ISO/IEC 19762:2016 has been withdrawn by new version ISO/IEC 19762:2025 (see https://www.iso.org/standard/61301.html).

Commented [SG7]: Definition of a "batch" differs from the legal definition in the ESPR. If standards at the national, regional, or international level begin to diverge from legal definitions, this will cause confusion in the market. Legal definitions should be given priority and any effort to harmonise regulatory terms and definitions should be done via regulatory harmonisation initiatives so as not to invite unwarranted revisions. For the wording of the revised definition see ESPR, (33), p.9.

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337 **3.5**

338 **identification scheme**

339 ID scheme

340 system for allocating identifiers to ~~registered~~ objects

341 [SOURCE: ISO/IEC 6523-1:2023]

Commented [SG8]: An object does not have to be registered to be identified. If required by the standard, there could be a separate term for registered identifier but it does not seem to be needed.

3.6
interoperability
ability of independent systems to exchange meaningful information and initiate actions from each other, in order to operate together to mutual benefit (or for the benefit of a system that relies on more than one independent system)

[SOURCE: ISO/IEC 26324:2025, 3.11]

3.7
issuing agency
~~(centralized identification scheme~~
~~federated identification scheme)~~
organization entrusted by the Registration Authority to assign company identifying numbers in line with the requirements of the Registration Authority (e.g., ISO/IEC 15459-2 for AIDC unique identification within AIDC technology in the value chain, ISO/IEC 6523 for identification of organisations) (~~that~~allocates ~~company codes, defines rules and/or identification schemes~~

3.8
item
single unit of a model

3.9
life cycle
consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal

[SOURCE: ISO 14040:2006]

3.10
model
version of a product of which all units share the same technical characteristics and the same model identifier

3.11
object
entity to which specified requirements apply

Note 1 to entry: Product, process, service, system, installation, project, data, design, material, claim, person, body or organization, or any combination thereof.

[SOURCE: ISO/IEC 17000:2020]

3.12
persistence
existence, and ability to be used in services outside the direct control of the issuing assigner, without a stated time limit

[SOURCE: ISO 26324:2022]

3.13
placed on the market
first making available of a product on the market

3.14
product
any physical good that is placed on the market or put into service

3.15
put into service
first use, for its intended purpose, of a product

Commented [SG9]: Interoperability definition is insufficient as the benefit, especially within global, open value networks, is not always limited to mutual benefit.

Commented [SG10]: These two phrases seem out of place especially centralised unless it was used in the context of centralised rules incumbent upon all Issuing Agencies such as ISO/IEC 15459-3. So long as there are standards for uniqueness and interoperability, these identification schemes have a layered decentralisation approach similar to phone numbers, domain addresses, etc.

They could perhaps be referred to as hierarchical identification schemes as there is:

A Registration Authority that authorises Issuing Agencies if they conform to requirements and rules

Issuing Agencies who allocate subdivisions of their identification capacity to other companies

Companies that use the capacity allocated to them to allocate identifiers to specific entities like a product or location

Commented [SG11]: Issuing Agency: There is already a definition on ISO/IEC level (ISO/IEC 19762:2025, 3.1.5.30) which should be adopted to be in line with international standards. For the purpose of this standard, the definition could be expanded to include 6523 as provided.

3.16
resolution
process in which an identifier translates or maps to associated information or metadata about the object it represents

Note 1 to entry: DNS resolution and HTTP/HTTPS resolution utilize standard web functionality and do not require additional software. In contrast, DID resolution typically requires additional software.

3.17
resolver
service that accepts an identifier or parameters as input and responds in some way specific to that input

Note 1 to entry: An economic operator can set up a resolver by themself or use a service of a designated service provider.

3.18
decentralized identification scheme
~~**self-issuing system**~~
~~decentralized identification scheme~~domains, specifications and rules (mechanisms) used by organisations to generate identifiers unique within that domain and interoperable within the scope of use as defined (e.g., value chain, finance, document exchange).

Company internal identification scheme
system or mechanism that an organization uses to generate and assign unique identifiers to its objects ~~without the intervention or oversight of an external authority and~~ without regard for uniqueness or interoperability of the identifiers outside their organization

3.19
unique economic operator identifier
unique string of characters for the identification of actors involved in a product's value chain

3.20
unique facility identifier
unique string of characters for the identification of locations or buildings involved in a product's value chain or used by actors involved in a product's value chain

3.21
unique identifier
identifier which is guaranteed to be unique among all identifiers used for those objects and for a specific purpose

Note 1 to entry: A unique identifier refers to *unique product identifier* (3.22), *unique economic operator identifier* (3.19), and *unique facility identifier* (3.20).

[SOURCE: ISO 29404:2015, modified – Note 1 to entry added]

3.22
unique product identifier
unique string of characters for the identification of a product that also enables a web link to the digital product passport

4 General principles, requirements and guidelines

4.1 Global uniqueness

4.1.1 Principle

The principle of global uniqueness ensures that each identifier is distinct, at least exclusive within its domain of use, and non-coexisting, enabling clear object differentiation and preventing misidentification. Products (3.14) receive at least one globally unique product identifier (3.22) at one of the three levels of granularity (model, batch, or individual item), and when necessary, economic

Commented [SG12]: This term and definition conflates decentralised identifiers and internal company identifiers. It would be appropriate to add some precision to avoid confusion. See proposed edits.

Commented [SG13]: While it is not within the scope of this standard, it may be helpful to the reader to define internal identification schemes based on the way the term "self-issuing system" is being misappropriated in the text to suggest there is no registration authority involved with the IL, DOI, and DID schemes.

Companies often use internally assigned identifiers (self-issued) to distinguish factors known only to them but when the identifiers are used in the open product value chain they require some mechanism to render them unique vis-a-vie internal identifiers of other organisations.

operator or facility is assigned a globally unique economic operator identifier (3.19) or a globally unique facility identifier (3.20). Uniqueness for any identifier in an open environment of multiple economic operators requires a mechanism (e.g., ICANN domain names or prefixes, issuing agencies such as ISO/IEC 15459-2 or 6523-1), specifications and rules ~~The economic operator and/or issuing agency ensures this uniqueness~~ when placing products on the market (3.13) or putting them into service (3.15).)

Commented [SG14]: As stated above, some mechanism, whether it be managed by ICANN, ISO/IEC or other registrars, specifications and rules are necessary to create unique identification within open environments.

4.1.2 Requirements

The unique identifier shall be globally unique, by ensuring:

1) *No duplication:* The same unique identifier shall not be used to identify different objects.

2) *Distinct:* The unique identifier shall be unique at least within its domain and across all potential contexts in which it may be used.

3) *Non-coexistence:* A unique identifier, once issued, shall not coexist with or be reassigned to another object.

4.2 Persistence

4.2.1 Principle

The principle of persistence (3.12) ensures that the unique identifier remains associated with the same object at least throughout its life cycle (3.9). The purpose of a persistent identifier is to accurately represent an object for as long as it exists, regardless of changes in company status, ownership, location, including mergers, acquisitions, splits or spin-offs. The economic operator is responsible for recording, maintaining, and securely storing each identifier, either directly or through a service provider, to ensure persistency.

4.2.2 Requirements

The unique identifier shall provide persistence, with the economic operator responsible for:

1) *Consistency:* The unique identifier, once assigned, shall remain unchanged and consistently refer to the same object without ambiguity, for as long as the declarations made regarding the identified object remains within the control of the economic operator.

2) *Preservation:* The unique identifier shall be preserved, at least throughout its expected life cycle (3.9), or as long as required by applicable regulations.

3) *Permanence:* The unique identifier shall remain available including after an insolvency, a liquidation, or a cessation of the economic operator responsible for its creation.

NOTE For products placed on the European market, the EU DPP registry ensures a minimum level of preservation and permanence of identifiers.

4.3 Syntax

4.3.1 Principle

The principle of syntax establishes a clear, standardized structure for unique identifiers, ensuring consistent recognition and usage across systems, services, and platforms when needed. This structure supports interoperability and efficient processing, by enabling the mapping between different syntaxes. The unique identifiers maintain a distinguishable format to enhance identification, searchability and retrieval. The length is specified for optimized processing and storage, and the syntax structure enables accessibility and usability on smartphones, other similar consumer devices and common web browsers.

4.3.2 Requirements

The unique identifier shall follow a predefined syntax, by ensuring:

1) *Character set:* The character set for the unique identifier shall include alphanumeric characters and, where necessary, percent encoding and specific symbols as set out in ISO/IEC 646:1991.

2) *Web:* The unique product identifier shall either be in the form of a URL, or have specified transformation into a URL (e.g. resolvable from URI to URL), ensuring compatibility with web-based systems.

3) For identifiers conforming to ISO/IEC 15459-3 Unique Identification - Common Rules, see Sections 6

Commented [SG15]: Editorial: 1) Consistency: Sentence leaves room for ambiguity as it is unclear what is meant by control of the economic operator. It is recommended to adjust the text as proposed.

Identity for rules on syntax, structure, length of identity, and character set.

~~2)~~4) For identifiers conforming to ISO/IEC 15459-4: The identity for individual products and product packages shall not contain more than 50 characters.

Commented [SG16]: Two requirements are missing referring to ISO/IEC 15459-3 and ISO/IEC 15459-4.

4.3.3 Guidelines

1) *Structure:* The unique identifier may conform to a predefined structural pattern, ensuring it is easily parsed and recognized across various systems, services and platforms.

2) *Variable length:* Unique identifier may use variable length as long it does not exceed limitations of the chosen ID scheme.

4.4 Semantic

4.4.1 Principle

The principle of semantics ensures that a unique identifier accurately represents the object it refers to, when needed. Semantics also enable effective access to the data ~~encoded within~~ located by the identifier, supporting interpretation by both systems and users. Identifiers are aligned with the characteristics of the objects they represent, including distinctions between different types of identifiers and varying levels of granularity. Additionally, identifiers facilitate access to a digital product passport—either directly, via a data carrier, or through a resolution (3.16) mechanism.

4.4.2 Requirements

The unique identifier shall maintain specified semantics, by ensuring:

1) *Granularity:* Each product identifier shall be unique at least at the smallest granularity level it serves, whether it is a model (3.10), batch (3.1), or item (3.8).

2) *Granularity consistency:* The minimum granularity level required by the regulation shall remain available once the product is placed on the market ~~The granularity level of a unique product identifier shall remain consistent once the product is placed on the market~~ or put into service (3.15)

3) *Change in granularity:* For identifiers that do not utilize ISO/IEC 15418 or equivalent qualifiers with each identifier data element (e.g., model, batch, serial number), if a change in granularity becomes necessary that has not been foreseen, a new or extended unique product identifier shall be required. The new or extended identifier shall be linked to the old unique identifier to maintain traceability

For identifiers qualified by ISO/IEC 15418 ANSI MH10 Data Identifiers or GS1 Application Identifiers, model and batch and/or item levels of granularity can be supported by application specific requests for the granularity required by using the qualifiers. Granularity finer than model can be introduced or withdrawn without changing the model number (e.g., GTIN) and thereby avoid costly "hard-conversion" product introduction expenses for industry and consumers as well as avoiding potential stock-outs and obsoleted inventory. In the case where a change in the model level identifier is required, the new model number shall be linked to the previous model number to maintain traceability. It should be noted that in the GS1 system of identification, industry relies upon a version extension of the model number to isolate supply chain impacts where communication of minor variations occur and a change to this version extension may constitute a change to the model number for the purposes of DPP reporting and in this case, linkage to the previous model number, with or without the version extension is required.

~~If a change in granularity becomes necessary that has not been foreseen, a new or extended unique product identifier shall be assigned. The new or extended identifier shall be linked to the old unique identifier to maintain traceability.~~

4.4.3 Guidelines

1) *Granularity level:* The economic operator may adopt a more granular level of specificity for the unique product identifier than mandated by regulation (e.g., using batch instead of model, or item instead of batch) to enhance traceability or meet specific operational needs.

2) *Resolver:* The economic operator may utilize a resolver (3.17) for the resolution of a unique identifier, either established by themselves or provided by a designated service provider.

Commented [SG17]: Editorial: Identifiers serve as proxies to find data not constructs to derive data from in an open environment. Of course, many organisations may be able to derive meaning internally from the identifiers structure and content (e.g., batch number tells them the factory, machine, Julian date)

Commented [SG18]: Rationale for changing the sentence: One unique identifier can serve all three levels of granularity depending on the application they interface with. For example, a product with a model, lot and serial number are encoded together. The product's model level identifier (e.g., GS1's GTIN) is used for online sales and fulfilment processes, the product's model and lot number combined are used for traceability or recall, and the product's model and serial number are used for traceability and warranty return or service records.
It is up to the product manufacturer to determine what levels are required for non-regulatory purposes but the level required by the regulation must be used and remain persistent for the duration required by the regulation.

Commented [SG19]: The previous wording is correct in principle, but the required linkage differs by identification scheme. For schemes that do not permit parsing of the model number, an entirely new identifier must be linked to the old one. However for schemes that inherently permit parsing of identification data elements (model, batch, item), the only level of granularity where linkage is relevant is model as there is no rationale to link batches or item level identifiers to one another as the model achieves this.

3) *Hierarchy:* A unique product identifier may be structured to represent multiple levels of granularity, such as model, batch and individual item identification, within a single hierarchical format.

4.5 Interoperability

4.5.1 Principle

The principle of interoperability (3.6) is enabled by the global uniqueness and the digital product system. In addition, unique identifiers ensure seamless operation across systems, services, and platforms without modification of the identifier or the platform, enabling consistent interpretation and unambiguous data exchange. A structured format supports compatibility with external components to enable automated processing and integration across industries. Portability ensures continuity across technological and organizational transitions. Key interoperability interfaces include data carriers, web links, APIs, and digital product passports.

4.5.2 Requirements

The unique identifier shall be interoperable, by ensuring:

1) *ISO/IEC 15459 compliant identifiers:* For ISO/IEC 15459 identifiers, an organization can claim that it is compliant with ISO/IEC 15459 (all parts or a specific part) if it can allocate and process identities according to the rules defined in ISO/IEC 15459-3, Common rules, ISO/IEC 15459-2, Registration procedures and all or any other part.

2) *Non-ISO/IEC 15459 compliant identifiers:* For non-ISO/IEC 15459 identifiers, a specification establishing how automated systems will process the identifier as unique versus ISO/IEC 15459 identifiers used in the supply chain today, shall be made available.

3) *Data carrier:* The unique product identifier shall be retrievable from a data carrier specified in EN JTO24002, linking it to the digital product passport (3.3).

4) *Digital ~~copy~~access:* The economic operator shall give retailers and online marketplaces the link to its ~~access to the~~ unique product identifier ~~that they need to lead~~to enable consumer~~s~~ access to the DPP of ~~a given~~this product.

5) *Compatibility:* The unique product identifier shall be encoded via a syntax that is compatible with and implemented within broadly available external components, such as professional scanning devices, smartphones and similar digital consumer devices.

6) *Portability:* The unique identifier shall be portable across different systems, services, and platforms without losing their meaning or function. For ISO/IEC 15459 identifiers, compliance with ISO/IEC 15459-3 Common Rules ensures portability and interoperability for unique identifiers (e.g., requires one the ISO/IEC 15418 qualifier methods such as GS1 Application Identifiers or ANS MH10 Data Identifiers to ensure portability.

7) *Existing ID:* Wherever possible, the economic operator shall be permitted to continue using their existing ID scheme to generate unique identifiers for the digital product passport. The method differs by identification scheme (e.g., use of internet domain address preceding their existing scheme, use of ISO/IEC 15459 as their existing scheme).

4.6 Openness

4.6.1 Principle

The principle of openness promotes transparency by ensuring that policies, processes, and standards are publicly accessible, allowing stakeholders to study and implement them. The use of widely accessible rules and procedures (e.g., ISO/IEC 15459-3 Common Rules) foster broad adoption and interoperability. Identifiers are used to access DPP public information without requiring registration, download DPP specific software, or authentication. Openness aims to avoid unnecessary restrictions that could limit access, use, or innovation. Openness also facilitates the transition or switching between systems, services, and platforms without compromising functionality or data integrity.

4.6.2 Requirements

The unique identifier shall remain open and transparent, by ensuring:

1) *Transparency:* The ID scheme and unique identifier shall be based on a system where policies, processes, and standards can be studied, influenced, and used under fair, reasonable, and non-discriminatory terms.

2) *End consumer usage:* For end consumer (3.2) usage, the unique identifier shall be useable to access DPP public information without the need to register, download DPP-specific software, or add user credentials.

3) *No undue restrictions:* The unique identifier shall not result in vendor lock-in. It shall also not impose limitations on use, except where such restrictions are technically necessary to ensure uniqueness

Commented [SG20]: This amendment clarifies the way through which economic operators must give access to the DPP to retailers and online marketplaces:
- It replaces the word "copy" – which could be prone to misinterpretation – with access.
- It clarified that access should be provided via a link. The link is the most practical way to provide access to the DPP, as this can be easily accessible from both a computer and smart device.

This is in line with Article 10 of ESPR, according to which,

3.The economic operator shall:
(b) provide the digital copy referred to in point (a) ***or a webpage link*** *free of charge promptly and in any event within five working days of receiving a request to do so.*

Commented [SG21]: This sentence requires more precision to be measured for conformity as it does not specify what makes the product identifier compatible with devices vis-a-vie other identifiers. It also does not require the unique product identifier to be implemented which could be its own requirement, but if not, it must be expressed somewhere as the organisations who intend to implement product identifiers not currently supported pervasively by AIDC encoding, printing, scanning, reading, verification systems MUST provide the specifications and rules for their deployment and drive their adoption within a critical mass of AIDC systems without burdening those using already pervasively deployed identification systems.

We also add "broadly available" with the aim of narrowing the compatibility concept to a reasonable level to ensure the compatibility requirement is attainable. By inserting the words "**broadly available**", the standard would clarify that there should not be compatibility with every single device that may exist (e.g. niche scanners or obsolete gadget), and that compatibility should be with broadly available external components. Note that in the same spirit, 4.6.3 of the Draft standard mentions "*state-of-the-art smartphones*" and "*major operating systems and browsers*".

Commented [SG22]: The first sentence is not specific enough to determine if conformity with the requirement exists for users of ISO/IEC 15459 compliant identifiers. It is unclear if it is sufficient for the novel identifiers being proposed for product identification in the open value chain.

Commented [SG23]: The term existing ID does not distinguish between 'existing internal IDs' that cannot be used externally and 'existing open IDs' that can. Additional detail is required to make this distinction clear.

Commented [SG24]: An example would be very helpful in terms of measuring conformity to the normative requirements of this standard. If there are any other 'widely accessible rules' for product identification encoded in AIDC data carriers in today's value chain, they could be added to the example, but GS1 users rely on those mentioned.

Commented [SG25]: The requirement can be met by ISO/IEC 15459 standards and industry standards like GS1 as sufficient transparency exists for the policies, processes and standards. However for this requirement to be met by DOIs or DIDs, as well as any novel RFID identification scheme, AIDC systems developers need to know where these policies, processes, and standards exist.

For example, are DOIs prefaced by an ISO/IEC 15459-2 Issuing Agency Code XID still DOIs? Are they conformant with ISO/IEC 15459-3 and if so, by whom, how, and ... [1]

and interoperability (e.g., for ISO/IEC 15459-2 identifiers, ISO/IEC 15459-3 Common Rules).)

4.6.3 Guidelines

1) *Smartphones and similar devices:* The ID scheme and unique identifier should be automatically usable by state-of-the-art smartphones and similar consumer devices, and compatible with all major operating systems and browsers.

Commented [SG26]: Editorial: Per Section 5.1.2.1, adding examples here would benefit the standard.

5 ID schemes for products

5.1 ID scheme 5.1: Web enabled, structured path and query ID for products

5.1.1 Description

This ID scheme ensures globally unique identification based on ISO/IEC 15459-4 (individual products) and ISO/IEC 15459-6 (grouped products). It structures identifiers using ISO/IEC 15418 and encodes them in URLs or resolves them via HTTP as per ISO/IEC 18975. Users can choose between two web-enabled approaches: a structured path format or a query string format. The scheme enables direct web access to digital product passports and supports offline parsing for supply chain and point-of-sale processes. This ID scheme is based on issuing agencies (3.7) as per ISO/IEC 15459-2.

5.1.2 Requirements

5.1.2.1 Web enabled, structured path ID for products

To ensure compliance with this ID scheme, the economic operator shall:

a) adhere to ISO/IEC 15459-4:2014 for individual products and/or ISO/IEC 15459-6:2014 for product groupings to ensure identifier uniqueness,

b) apply the GS1 Application Identifier (AI) format (or the ASC MH10 Data Identifiers (DI) format) in accordance with ISO/IEC 15418:2016,

c) follow the structured path approach specified in ISO/IEC 18975:2024 for encoding and resolving identifiers over HTTP, ~~and~~

d) use a registered ~~numerical issuing~~ Issuing ~~agency~~ Agency Code according to ISO/IEC 15459-2:2015, and~~.~~

(~~c~~conform to ISO/IEC 15459-3 Common Rules as per ISO/IEC 15459-3, Section 6.4 “Compliance with ISO/IEC 15459: An organization can claim that it is compliant with ISO/IEC 15459 (all parts or a specific part) if it can allocate and process identities according to the rules defined in ISO/IEC 15459-3, Common rules, ISO/IEC 15459-2, Registration procedures and all or any other part.”)

~~d)~~e) For users of GS1 Application Identifiers, conformance with GS1 Digital Link URI SHALL be (required).

5.1.2.2 Web enabled, query string ID for products

To ensure compliance with this ID scheme, the economic operator shall:

a) adhere to ISO/IEC 15459-4:2014 for individual products and/or ISO/IEC 15459-6:2014 for product groupings to ensure identifier uniqueness,

b) apply the ASC MH10 Data Identifiers (DI) format in accordance with ISO/IEC 15418:2016,

c) follow the query approach specified in ISO/IEC 18975:2024 for encoding and resolving identifiers over HTTP, and

d) use a registered (~~alphanumerical issuing agency~~Issuing Agency Code (IAC)) according to ISO/IEC 15459-2:2015.

5.2 ID scheme 5.2: Identification Link (IL)

5.2.1 Description

This ID scheme, based on IEC 61406-1 and IEC 61406-2, enables unique product identification using Identification Links (IL) in URL format. It allows economic operators to encode existing product IDs (model, batch, or item) directly into the IL, ensuring integration with their IT systems. The IL is based on internet domain names issued via registrars ultimately managed by ICANN ~~a (self-issuing system (3.18)), removing external dependencies while supporting additional structuring via ANSI MH10.8.2 Data Identifiers specified in ISO/IEC 15418~~. This approach ensures compatibility with existing ID schemes and enables direct web access to digital product passports. These identifiers are only

Commented [SG27]: This method, while not used by non-GS1 15459 Issuing Agencies involved in the CEN/CENELEC process, is not specified for use by GS1 only. It therefore is appropriate to permit its use with ASC MH10 Data Identifiers and therefore to state the Issuing Agency Code could be alphanumeric (see point d). If the European Standard prohibits the use of ISO/IEC 18975’s Web enabled, structured path ID approach to all except GS1, the word numeric would then be appropriate even if this restriction is not mentioned in ISO/IEC 18975, but this is inconsistent with the use of this Scheme presumably by non-GS1 Issuing Agencies for organisation and facility identification.

Commented [SG28]: ISO/IEC 15459 enables unique identification (part 2) and interoperability (part 3). Scanning systems deployed rely on the rules of part 3 such as requiring qualifiers in front of identifier strings in order to allow their parsing and subsequent processing and storage.

GS1 uses Web enabled, structured path ID (GS1 Digital Link URI) and requires conformity to ISO/IEC 15459-2 and -3 as both are necessary for GS1 to claim the GS1 System is compliant with ISO/IEC 15459. An organisation that complies with part 2 but not 3 or the reverse cannot claim compliance.

For example, getting an ISO/IEC 15459-2 Issuing Agency Code allows an identifier to be unique vis-a-vie all other identifiers beginning with an Issuing Agency Code but unless the organisation using that Issuing Agency Code conforms to the Common Rules, they do not have an ISO/IEC 15459 compliant system. For this reason, both part 2 and 3 must be normatively referenced in Section 5.1.2.1 and actually any other section in the standard that references one but not the other (if the Section(s) claim 15459 compliance.

Commented [SG29]: Per the previous comment, if the European Standard intends to limit the use of web enabled, structured path identification only to GS1, then the Section title should either be “Web enabled, structured path ID per GS1 Digital Link URI Standard”. If however the European Standard does not intend to prohibit non-GS1 Issuing Agencies from using this method, then the Section title should remain as is and point e) added for GS1 standards users where the GS1 Digital Link URI Standard SHALL be used. Either way, GS1 Digital Link URI must be added to the Normative References of this standard.

Commented [SG30]: Editorial: Edit for consistency with the previous sub-section.

Commented [SG31]: This further illustrates the confusion between “self-issuing systems” which would logically not require any “third party involvement” versus this method that, like ISO/IEC 15459 or 6523 that relies on a registration authority to ensure uniqueness and licensing to ensure persistence of the identifier. IL, DOI, and DID all rely on ICANN to register domains (mechanism) which, when coupled with specifications and rules of other organisations, provide for uniqueness provided these methods produce a pattern which AIDC service providers can use with a high degree of certainly to distinguish one scheme from another as all methods, including those relying on ISO/IEC 15459, 15418, and 18975, are web-enabled.

persistent for as long as the domain address license remains active as it is integral to the identifier.

Commented [SG32]: Editorial: For clarity this sentence should be added covering the subject of persistency.

5.2.2 Requirements

5.2.2.1 Item level identification (only)

To ensure compliance with this ID scheme, the economic operator shall:

a) adhere to EN IEC 61406-1:2022, with optional use of [2], when a unique string of characters is sufficient, and no syntactical or semantic intelligence is required.

5.2.3 Guidelines

The economic operator should use:

a) [3], IL, where the string of characters of the IL should be short, e.g. to be encoded into a 96-bit RFID chip or to allow a compact 2D-code for small products; or where protection against the threat of counting up the product serial number shall be intercepted by masking model and serial number with a random alphanumerical string.

b) [2] for comprehensive product identification across model, batch, and item levels, ensuring semantic interoperability with existing ID schemes. It also can contain internal further information about the kind of identified object, for example product, person, location or document or additional data elements or classifications.

Commented [SG33]: Would it be also be appropriate to mention this IEC 61406-2 could be used to encode ANS MH10 Data Identifiers in the web enabled, structured path identification scheme or is there a prohibition against this?

If this is prohibited then no edits should be made, but if this is permitted, there should be a point f) added to 5.1.2.1 that states, f) For users of ANS MH10 Data Identifiers, conformance with IEC 61406-2 provides conformity with this method.

5.2.4 Model, batch and item level identification

To ensure compliance with this ID scheme, the economic operator shall:

a) use EN IEC 61406-1:2022 combined with EN IEC 61406-2:2024 when encoding standardized syntax and semantics is required. This includes ANSI MH10.8.2 Data Identifiers (DI) as specified in ISO/IEC 15418:2016 to define model, batch, and item identification.

5.3 ID scheme 5.3: Decentralized identifiers (DID) for products

5.3.1 Description

This ID scheme is a self-issuing system that utilizes Decentralized Identifiers (DIDs) for self-generated, globally unique identification. DIDs support cryptographic authentication and privacy preserving information management. The scheme ensures interoperability with centralized, federated, and decentralized ID systems. Methods such as did:web, did:ethr, and did:ebsi provide flexible implementations, with did:web offering a lightweight, non-DLT solution and did:ebsi/did:ethr enabling dynamic updates. This approach enhances security, flexibility, and adaptability for digital identity management.

5.3.2 Requirements

To ensure compliance with this ID scheme, the economic operator shall:

a) adhere to Decentralized Identifiers (DIDs) v1.0:2022 to ensure proper DID syntax, core properties, serialized representations, and resolving DIDs to the resources they represent.

The economic operator should also use one of the following:

b) DID methods: did:web [4], did:ethr [5] or did:ebsi [6] or their successors.

Commented [SG34]: To measure conformity to this standard in terms of implementation by AIDC service providers, this must be SHALL and the organisation(s) determining the allowable DID methods for product identification via AIDC in the open product value chain MUST be identified so that the service providers know who is using this scheme. This will allow them to make business decisions regarding the value of implementing DIDs (based on the number of users)within their service offerings by 2027 in a manner that will not compromise existing service performance levels.

Commented [SG35]: Editorial: If these methods are subject to succession by other methods.

5.4 ID scheme 5.4: Product and group identification

5.4.1 Description

This ID scheme is suitable for limited capacity identifiers, namely RFID and QR-codes, that utilize resolvers to access DPP. The alternative of encoding a URL is also supported. The method ensures globally unique identification using ISO/IEC 15459-4 (individual products) and ISO/IEC 15459-6

Commented [SG36]: This method requires the use of resolvers. Are there expected number of requests, service level agreements, etc.?

(grouped products). It structures and encodes data for RFID applications based on ISO/IEC 15961, ISO/IEC 15962, ~~and~~ ISO/IEC 17360 and the EPC Tag Data Standard (TDS) and uses ISO/IEC 15434 for encoding data in QR-codes. The scheme standardizes application communication with data processors and operates independently of the ISO/IEC 18000 air interface. It supports offline processing of product details and follows ISO/IEC 15459-3~~2~~ and 15418 for identifier allocation and syntax. For additional security, the economic operator may optionally apply ISO/IEC 20248 for digital signatures.

Commented [SG37]: Part 2 covers uniqueness. ISO/IEC 15459-3 covers identification allocation and syntax within Common Rules including the reference to ISO/IEC 15418.

5.4.2 Requirements

5.4.2.1 Product and group identification, RFID

To ensure compliance with this ID scheme, the economic operator shall:

a) adhere to ISO/IEC 15459-4:2014 for individual products, and/or ISO/IEC 15459-6:2014 for groupings of products, to ensure the uniqueness of product identifiers (for GS1 identification users, per the EPC Tag Data Standard (TDS)),

Commented [SG38]: This is required for compliance for GS1 identification users.

b) follow ISO/IEC 15961-1:2021, ISO/IEC 17360:2023 or the EPC Tag Data Standard (TDS) for semantic structuring and logical representation of data, and

Commented [SG39]: Edits to a) and b) for completeness and clarity for the many products covered by ESPR using GS1 standards.

c) use a registered ~~issuing agency~~Issuing Agency Code (IAC) according to ISO/IEC 15459-2:2015.

Commented [SG40]: Editorial: For consistency with the ISO/IEC term.

5.4.2.2 Product and group identification, 2D-symbols

To ensure compliance with this ID scheme, the economic operator shall:

a) adhere to ISO/IEC 15459-4:2014 for individual products, and/or ISO/IEC 15459-6:2014 for groupings of products, to ensure the uniqueness of product identifiers,

b) structure the data transfer syntax for high-capacity automatic data capture media according to ISO/IEC 15434:2019[Format Header "06" - Data using ASC MH 10 Data Identifiers to encode, for instance, URLs in QR-codes. Format Header "05" - Data using GS1 Application Identifiers is not a part of this specification as GS1 Application Standards do not utilise ISO/IEC 15434.]

Commented [SG41]: These edits are needed to ensure the reader does not use Format Header "05" as this is approved for use in GS1 standards and any introduction of it in any existing application standard would require approval at the GS1 General Assembly level.

c) use an [alpha]Issuing Agency Code ~~registered issuing agency~~ according to ISO/IEC 15459-2:2015.

Commented [SG42]: Cannot be numeric as GS1 does not use this method. Were GS1 ever to use a method for switching between AIs and DIs, it would likely embrace a simpler approach that equates to DI 4N.

5.4.3 Guidelines

If instrumental, the economic operator may additionally use:

a) [7] or [13] for RFID data encoding and decoding; [13] defines Electronic Product Code (EPC) encodings for ISO/IEC 18000-63 complaint tags to identify serialized product instances.

b) [8] to encode HTTP URIs in RFID,

~~c)~~ [9] for digital signatures.

5.5 ID Scheme 5.5: Digital Object Identifier (DOI) for products

5.5.1 Description

This ID scheme, based on ISO 26324, enables unique identification of products using Digital Object Identifiers (DOI) that can be expressed in URL format. which is consistent with the structured path approach defined in ISO/IEC 18975 (see Section 5.1.2.1). It allows economic operators to encode existing product IDs (model, batch, or item) directly into the DOI. The DOI is based on a flexible system of either self-issuing or assignment by a service provider depending on the practices of the enabling service provider. This ID scheme is based on issuing agencies as per ISO 26324. It allows compatibility with existing ID schemes and enables direct web access to digital product passports.

Commented [SG43]: Editorial: This might be helpful for clarity.

5.5.2 Requirements

To ensure compliance with this ID scheme, the economic operator shall:

~~a)~~ Declare whether the DOI applies to the product model, batch or item as set out in ISO 26324:2025~~adhere to ISO 26324:2025 for model, batch or item identification,~~

~~b)~~ use the ISO/IEC 15459-2:2015 Issuing Agency Code~~assigned code~~ at the start of the DOI to ensure uniqueness vis-a-vie ISO/IEC 15459 product identifiers currently used in the open value chain. This does not represent an ISO/IEC 15459 compliant system as ISO/IEC 15459-3 Common Rules are not used.

Commented [SG44]: Without the specifications, it is hard to determine how DOIs designate the qualification of identification components as they are typically used to work in other areas (e.g.,, publications) rather than product identification.

Commented [SG45]: The use of an ISO/IEC IAC does not mean interoperability with 15459 compliant systems.

It also should be clarified if a DOI prefaced by an 15459 IAC remains a DOI or if this method is in fact a compound 15459/DOI identifier.

The number of organisations intent on using the DOI method for product identification via AIDC in the open product value chain should be quantified to incentivize service providers to make business decisions regarding the value of implementing DOIs with a leading IAC (based on the number of users) within their service offerings (by 2027 in a manner that will not compromise existing service performance levels).

6 ID schemes for economic operators and facilities

[ID schemes for economic operators and facilities are not mandatory according to the ESPR and should only be set where appropriate and where required by delegated acts setting EcoDesign requirements.]

~~5.6~~6.1 ID scheme 6.1: Structured path identification for organizations and facilities

~~5.6.1~~6.1.1 Description

This ID scheme is based on ISO/IEC 6523-1, providing a standardized framework for unique identification of economic operators and facilities. The scheme allows hierarchical assignment of identifiers, enabling multinational companies to allocate unique IDs to parent entities, subsidiaries, and operational divisions, as well as to facilities such as factories, warehouses, and offices. It facilitates access to organizational data via web browsers and supports offline parsing for system integration and backup processes. Adhering to ISO/IEC 6523, it ensures identifiers follow defined structure, format, and syntax, promoting global interoperability in supply chain and administrative workflows [and is fully compatible with Product ID Scheme 5.1.2.1]

~~5.6.2~~6.1.2 Requirements

To ensure compliance with this ID scheme, the economic operator shall:

a) adhere to ISO/IEC 6523-1:2023 to ensure unique economic operator identifiers and unique facility identifiers,

b) use a registered ID scheme according to ISO/IEC 6523-2:1998.

~~a)~~c) [where the economic operator identifier or facility identifier will never be used in an AIDC data carrier, any ISO/IEC 6523-1:2023 identifier will be unique, but where an economic operator identifier will be used within an AIDC data carrier, the subset of ISO/IEC 6523-1:2023 identifiers that conform to ISO/IEC 15459 shall be used to ensure uniqueness.]

~~b) use a registered ID scheme according to ISO/IEC 6523-2:1998.~~

~~5.6.3~~6.1.3 Guidelines

If instrumental, the economic operator may additionally use:

a) [8] for encoding and resolving identifiers over HTTP,

b) [~~3] and/or~~ [2] and/or GS1 Digital Link URI Syntax] for constructing identifiers as URLs.

~~5.7~~6.2 ID scheme 6.2: Legal Entity Identifier (LEI)

~~5.7.1~~6.2.1 Description

[This ID scheme is based on the ISO 17442 series, defining the Legal Entity Identifier (LEI) as a standardized, globally unique identifier for legal entities engaged in financial activities. Each LEI consists of 20 alphanumeric characters, structured with a 4-character prefix, a 2-character reserved segment, and a 14-character unique identifier. Managed by Local Operating Units (LOUs), the centralized registration system prevents duplication and ensures global interoperability. The LEI integrates with financial reporting systems, adhering to ISO 17442 for cross-platform compatibility. Governance is provided by the Global Legal Entity Identifier Foundation (GLEIF), ensuring compliance, standardization, and maintenance]

~~5.7.2~~6.2.2 Requirements

To ensure compliance with this ID scheme, the economic operator shall:

a) assign their unique economic operator identifiers according to ISO 17442-1:2020.

~~5.7.3~~6.2.3 Guidelines

Commented [SG46]: It is important to clarify that ID schemes for economic operators and facilities are non-mandatory according to the ESPR (pending the Commission's Delegated Acts):

- *"In addition, **where appropriate,** the digital product passport should be linked to a unique operator identifier and a unique facility identifier which would allow the actors and manufacturing facilities related to that product to be traced"* (Recital 36)
- ID schemes for economic operators and facilities are not mentioned as the essential requirements for Digital Product Passports (Art. 10 (1), but Annex III provides that these UI can be requirements that the Commission decides to include in the DPP in Delegated Acts.

Commented [SG47]: Editorial: For alignment with content presented in Section 6.1.1

Commented [SG48]: Editorial: For clarity as this section title omits the words "web enabled" from the method.

Commented [SG49]: Where there is a requirement to know the facility where a product was manufactured, a look-up via a model + batch in the data carrier could be used, but an alternative could also be a model + facility identifier. As this would require facility identifiers used in AIDC data carriers, this should be added.

Commented [SG50]: EN IEC 61406-2: 2024 is not included in the web enabled, structured path identification scheme for products but is included here. Per earlier comments, use of IEC 61406-2 should be clarified in Section 5.1.2.1.

In addition, GS1 Digital Link URIs are conformant with the ISO/IEC 18975 web-enabled, structured path identifier method. GS1 Digital Link URI must be included to cover the consumer goods industry using GS1 standards.

Commented [SG51]: If this scheme is included, how will it be unique to the ISO/IEC 15459 compliant identifiers used in AIDC data carriers in the open value chain today. It was intended for financial institutions and begins with numeric values that overlap GS1's ISO/IEC 15459 Issuing Agency Code (IAC) just as DOIs and DIDs overlap NATO's.

If instrumental, the economic operator may additionally use:

a) [8] for encoding and resolving identifiers over HTTP,

b) [3] and/or [2] for constructing identifiers as URLs.

~~5.8~~6.3 ID scheme 6.3: Decentralized identifiers (DID) for organizations

~~5.8.1~~6.3.1 Description

This Decentralized Identity (DID) framework is a self-issuing system that provides a globally unique, self-sovereign identifier that is based on W3C Decentralized Identifiers (DIDs). Each DID ~~includes~~ resolves to a public DID document that defines its properties and contains a public key for verification. A DID becomes an Economic Operator Identifier when an authoritative Company Register issues a Verifiable Credential (VC) to it. This enables economic operators to sign and issue verifiable, tamper-proof digital product passports. The public key for verification can be found in the public DID document, ensuring transparency and trust. Decentralized Authentication and Access Control can be implemented via Role Verifiable Credentials issued to the economic operator DID. This allows third parties to authenticate themselves for access to non-public Digital Product Passport (DPP) data.

~~5.8.2~~6.3.2 Requirements

To ensure compliance with this ID scheme, the economic operator shall:

a) adhere to Decentralized Identifiers (DIDs) v1.0:2022 for creation of self-sovereign identities including public-private key pairs,

b) follow Verifiable Credentials Data Model ~~v1.1:2022~~v2.0:2025 to associate verifiable credentials to the economic operator DID or the facility DID,

c) use Decentralized Identifier Resolution (DID Resolution) v0.3:2025 to find the DID document ~~and the attached verifiable credentials~~.

~~5.8.3~~6.3.3 Guidelines

If instrumental, the economic operator may additionally:

a) use trusted company registries, for example, national company registries or global company registries, such as the Global Legal Entity Identifier Foundation (GLEIF). To bind a DID to an LEI ~~a company~~, GLEIF would issue a vLEI (Verifiable Legal Entity Identifier) [10] based on a national company register (see also ID Scheme 1) to the DID at hand.

b) associate other relevant Verifiable Credentials with the economic operator DID—such as sustainability disclosures, compliance reports, or ISO certifications—to create a chained provenance trail.

c) for facilities, trusted companies or registries, such as the US Facility Registry or a GS1 GLN, can issue identification credentials to the facility DID perhaps supported by a Verifiable Credential. Auditors and regulatory bodies can then issue audit reports as Verifiable Credentials to that facility DID, such as due diligence reports, compliance audits, and risk assessments.

~~5.9~~6.4 ID scheme 6.4: Digital Object Identifiers (DOI) for organizations

~~5.9.1~~6.4.1 Description

This ID scheme, based on ISO 26324, enables unique identification of organizations and facilities using the Digital Object Identifiers (DOI) in URL format. This ID schema is based on issuing agencies as per ISO 26324. It allows the use of existing identifiers or allocation of new identifiers depending on the practices of the issuing agency. It allows compatibility with existing ID schemes and enables direct web access to information about the identified object.

Commented [SG52]: Editorial: For clarity as a DID does not "include" a DID document, it resolves to one.

Commented [SG53]: Editorial: For precision.

Commented [SG54]: Editorial: The current version, whatever that is, is always at https://www.w3.org/TR/did-resolution/. The immutable version 0.3 is at https://www.w3.org/TR/2025/WD-did-resolution-20250619/. This is the same approach used at ref.gs1.org. There is a URL for the latest version, which may point to different versions over time, and a versioned URL that leads to an immutable document. There could be a different version of that document published every day for the rest of the year (each with its own version number and immutable copy at the dated URL) so it's unhelpful to include the year in the reference.

Commented [SG55]: DID Docs may, but do not need to, point to VCs. Suggest simply removing the clause.

Commented [SG56]: Editorial: With vLEI GLEIF binds a DID to a LEI, not to a company.

Commented [SG57]: Editorial: For clarity.

Commented [SG58]: The term digital object identifier is about a digital identifier for an object. Is an organization an object? Well, theoretically it could be, but can someone qualify who is using or talking about using a DOI for an organizational ID. No harm in leaving this as is technically, but again it is a question about who needs this.

~~5.9.2~~6.4.2 Requirements

To ensure compliance with this ID scheme, the registrant shall:

a) adhere to ISO 26324:2025 to ensure unique economic operator and facility identifiers were sufficient metadata is required by the issuing agency to ensure uniqueness of the organization or facility to which the identifier is assigned.

Annex A
(informative)

~~Guidance~~ Background on selecting ~~item-level~~ identification granularity levels for products

Prior to the market release of a product, a determination should be made whether to assign identification at the model, batch or item level, balancing different consideration of regulatory, technical, ecological, and economic factors. Opting for the appropriate level of object identification can lead to significant cost and effort reductions throughout the product's life cycle.

For most retail consumer products that utilize GS1 identifiers, are qualified by GS1 Application Identifiers, and encoded per ISO/IEC 18975 web enabled, structured path identification using GS1 Digital Link URI syntax, finer granularity levels can be introduced or withdrawn at any time per the discretion of the product manufacturer as long as the minimum granularity level required by ESPR is maintained. Therefore, when considered at the Delegated Act level, typical identification granularity would be:

— at the model level (e.g., GTIN) is required. This level of identification is required for most online order and retail store fulfilment, used to manage inventory, and for alignment of data between trading partners.

— In cases where a Delegated Act requires the product's manufacturing facility be known, but no other requirement for finer granularity of identification is present, the use of a product model and facility identifier may be a suitable alternative to consider during the Delegated Act assessments.

— Where item level granularity is required by some trading partner agreements on consumer products (e.g., those with EPC RFID tags) but is not required by the regulation, this should remain a commercial agreement.

Default identification at the item level is advisable for products that meet any of the following criteria:

— they can be repaired and/or refurbished and/or overhauled by changing parts or components,

— they can be upgraded/enhanced by changing parts or components,

— its (embedded) software can be upgraded,

— regular maintenance and/or inspection or statutory audit is required by the economic operator, or by regulation,

— its wear level and/or operated hours and/or any other information about its use, will be recorded.

— they have to be identified uniquely on item level to fulfil their intended purpose (e.g. a Bluetooth module).

~~(In scenarios not explicitly covered above, but where item-level identification emerges as beneficial during the product life cycle, economic operators are encouraged to default to this mode of identification. For instance, gathering data on the installed product base for strategic product planning purposes may warrant such an approach.)~~

~~In exceptional circumstances~~For products where additional levels of identification granularity cannot be introduced without changing the product identifier (Section 4.4.2. 3), a product typically identified at the model level may require subsequent identification at the batch and/or item level later in its life cycle. In such cases, economic operators needing batch and/or item-level identification should generate and apply a unique product identifier according to the standard practices outlined herein. This approach maintains the linkage to the original economic operator's product information (typically associated with ~~batch~~model-level identification) while enabling the assignment of specific data to the production batch or individual item through the additional identifier.

This guidance aims to streamline the decision-making process regarding granularity levels of product identification, ensuring compliance with regulatory requirements while optimizing ecological and

Commented [SG59]: Annex A appears to be advising product manufacturers to deploy finer levels of granularity as a default, but this comes at great expense and complexity for many product categories and ignores the fact that granularity can easily be introduced or withdrawn for identification scheme 5.1.2.1 and perhaps 5.1.2.2. Should this Annex remain, the guidance should be based on assessments conducted during the Delegated Act stage. A change to the name of the Annex and the additional text is recommended to be more inclusive of the products covered by the regulation.

The legal text of the Ecodesign for Sustainable Products Regulation (ESPR) does not refer to any default mode of identification. Article 9 (2) clearly defers any decision on the level of granularity to the future delegated acts setting ecodesign requirements. Recital 33 of the ESPR reiterates that "*the impact assessments carried out when preparing the delegated acts setting ecodesign requirements should analyse the costs and benefits of setting information requirements through digital product passports at model, batch or item level*". When making such a decision, Recital 33 further highlights that the choice of the level of granularity shall "*avoid costs for companies and for the public that are disproportionate to the wider benefits*" and that such a cost-benefits assessment depends on *"for example, the complexity of the value chain, the size, nature or impacts of the products considered."*

As a background, the identification of a product at an item level (default item-level IDs) entails significant costs:
- •High economic costs for companies to manage UPI at batch or item level due to the need to invest in online label printing ability at all manufacturing plants.
- •Environmental costs due to the need to store large quantities of data.
- •Limited benefits, since products belonging to the same model have similar environmental characteristics, in such a way that it is redundant to go to the batch/item level.

Any decision to select the item level should balance the costs above with potential benefits. This is more important at a time where the EU Commission has set competitiveness and reduction of administrative burden as its key priorities.

To sum up, EN standard should introduce any default mode of identification since this runs counter to the legal text of the ESPR that defers this decision to the product-specific delegated acts. While for product groups complying with certain criteria the item level may be considered, the selection of the granularity level should only come at the end of a thorough impact assessment. That is why EN standards should not refer to any no... [2]

Commented [SG60]: Editorial: This paragraph has no relevance to the regulatory requirements, focuses on non-regulatory requirements that are subject to trading partner agreements or commercial requirements, and should be removed.

Commented [SG61]: This paragraph appears to be written as guidance for those utilising identification schemes where any change in granularity would result in a new product identifier. It is not advisable to introduce this guidance for those who utilise an identification scheme where granularity levels can be introduced or withdrawn per the product manufacturers discretion to allow them to incur the expense and complexity of it only as required.

891 economical outcomes.

Annex B
(informative)

Overview of ID schemes for products

B.1 General information

See Table C.2 for general information.

Table B.1 — General information

ID scheme	5.1.2.1	5.1.2.2	5.2.2.1	5.2.2.2	5.3	5.4.1.1	5.4.1.2	5.5
Title	Web enabled structured path ID for products	Web enabled query string ID for products	Identification link	Identification link (structured ID link)	Decentralized identifer	Identification for products and product groups, RFID	Identification for products and product groups, 2D-symbols	Digital object identifier
Identifier standard	ISO/IEC 15459 + AI (subset of or DI of ISO/IEC 15418	ISO/IEC 15459 + DI subset of ISO/IEC 15418	EN IEC 61406-1	EN IEC 61406-1 + EN IEC 61406-2	DIDs v1.0:2022	ISO/IEC 15459 with ISO or GS1 subsets	ISO/IEC 15459 with ISO or GS1 subsets	ISO 26324
Uniqueness	ISO/IEC 15459	ISO/IEC 15459	Web domain (RFC 3986)	Web domain (RFC 3986), optionally with ISO/IEC 15459, DID or other ID	DIDs v1.0:2022	ISO/IEC 15459	ISO/IEC 15459	ISO 26324 + ISO/IEC 15459
Technical standard for syntax	GS1 Digital Link (subset of ISO/IEC 18975) ISO/IEC 15459-2 and -3 GS1 Application Identifiers (subset of ISO/IEC 15418) RFC 3986)	ISO/IEC 15459 + RFC 3986	RFC 3986	RFC 3986	RFC 3986	RFC 3986	RFC 3986	ISO 26324 + ISO/IEC 15459

Commented [SG62]: Editorial: No such chapter exists.

Commented [SG63]: Editorial: No such chapter exists.

Commented [SG64]: Editorial: If after review of 5.1.2.1, it is decided that the standard should not prohibit the use of DIs with the web enabled, structure path scheme, this edit is needed.

Commented [SG65]: Editorial: Adjust references in box of second column to be correct and complete

Application standard syntax	~~GS1 Digital Link (subset of ISO/IEC 18975)~~ GS1 General Specifications, ESPR DPP AIDC Application Standard	AutoID-URL 1.3 (compatible to query string subset of ISO/IEC 18975)	EN IEC 61406-1	EN IEC 61406-1 and EN IEC 61406-2 (compatible to query string subset of ISO/IEC 18975)	DIDs v1.0:2022	ISO/IEC 15961 (all parts), ISO/IEC 15962, ISO/IEC 17360, ISO/IEC 20248	ISO/IEC 17360, ISO/IEC 20248, ISO/IEC 15434	ISO 26324
Technical standard for semantics	ISO/IEC 15459 + ISO/IEC 18975	ISO/IEC 15418 + ISO/IEC 18975	N/A, structure-only, no embedded semantics	ANSI MH 10.8.2 Data Identifier (subset of ISO/IEC 15418)	DIDs v1.0:2022	ISO/IEC 15459, ISO/IEC 15962, ISO/IEC 18975	ISO/IEC 15418, ISO/IEC 15424	ISO 26324

Commented [SG66]: Editorial: GS1 Digital Link URI is a technical syntax standard, not an application standard. The correct reference has been added.

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Application standard for semantics	AI subset of ISO/IEC 15418	DI subset of ISO/IEC 15418	N/A – no embedded semantics	EN IEC 61406-2	DIDs v1.0:2022	ISO/IEC 15961, ISO/IEC 17460, ISO/IEC 18975, ISO/IEC 20248	ISO/IEC 15418, ISO/IEC 15424	ISO 26324
~~Syntactic interoperability~~	~~Yes~~	~~Yes~~	~~Yes~~	~~Yes~~	~~Yes~~	~~Yes~~	~~Yes~~	~~Yes~~
~~Semantic interoperability~~	~~Yes, parse GS1 Digital Link (URI) or structured path subset of ISO/IEC 18975~~	~~Yes, parse query parameters (RFC 3986) and semantics via ANSI MH 10.8.2~~	~~No semantics by default~~	~~Yes, interpret parameters per IEC 61406-2, ANSI MH 10.8.2~~	~~Yes, self-describing or aliasing via "alsoKnownAs"~~	~~Yes, structured encoding supports semantic resolution~~	~~Yes, structured encoding supports semantic resolution~~	~~Partial, requires resolution to access associated semantics~~
Decoding of level of uniqueness (model, batch, item) from encoded data	From encoded structure for GS1 Application Identifiers and ANS MH10 Data Identifiers ~~model, batch, item~~	From query parameters and ANS MH10 Ddata identifiers	~~Parse URL parameters (RFC 3986) and exclude names starting with a dot.~~ Not available from decoded data	From encoded structure for ANS MH10 Data Identifiers ~~Structured identifiers support decoding of level (model, batch, item)~~ Not available from decoded data	~~On QR codes: decode QR code, get link, open browser and let Internet resolve it.~~ Not available from decoded data	From tag content (e.g., EPC Tag Data Standard)~~)~~ or system data model (e.g., ??)	From 2D symbol content (ISO/IEC 15434 Format Header "06" for ANS MH10 Data Identifiers)	~~Resolution provides access to descriptive data that will specify level of uniqueness~~ Not available from decoded data

B.2 Issuing and ownership

See Table B.2 for information on issuing and ownership.

Table B.2 — Issuing and ownership

ID scheme	5.1.2.1	5.1.2.2	5.2.2.1	5.2.2.2	5.3	5.4.1.1	5.4.1.2	5.5
Title	Web enabled structured path ID for products	Web enabled query string ID for products	Identification link	Identification link (structured ID link)	Decentralized identifer	Identification for products and product groups, RFID	Identification for products and product groups, 2D-symbols	Digital object identifier
~~Type of issuing~~	ISO/IEC 15459 Issuing agency then self issuing by produc	ISO/IEC 15459 Issuing agency then self issuing by produc	ICANN domain then self issuing by product manufacturer	ISO/IEC 15459 Issuing agency then self issuing by produc	ICANN prefix then self issuing by product manufacturer	ISO/IEC 15459 Issuing agency then self issuing by produc	ISO/IEC 15459 Issuing agency then self issuing by produc	ICANN domain plus DOI Registration Agencies then self issuing

Commented [SG67]: This row should be deleted or clarified as to where this interoperability will occur (EU Registry). For example, a DID that is prefaced by 'XID' within the EU Registry will provide syntactic interoperability and uniqueness vis-a-vie GS1 and NATO identifiers, but would not be syntactically interoperable with any other DID implementation.

That said, the GS1 communication on implementation, pages 4 and 5, to the Commission and the GS1 DPP Standards WG provides some initial thinking on how AIDC service providers could process the scanned data for the various identification schemes for storage in the EU Registry if these specifications are known.

That paper is available here.

Commented [SG68]: GS1 shared a communication with the Commission and its Global Standards Management Process WG related to Interoperability and Implementation. On pages 4 and 5, the document begins to explore how patterns could be used within encoded strings to determine what identification scheme is present and how it should be processed.

Without this level of differentiation specified for the new identification schemes being introduced, how would a scanner or reader know what specification to follow to parse the string? If this is not clarified, this row should be deleted until it is.

Commented [SG69]: Editorial: If this content is maintained, add URI as this is the formal name of the standard.

Commented [SG75]: Editorial: An example for tag content is helpful but it should be clarified by example what system data model means.

Commented [SG70]: Editorial: Edited to be consistent with the column to the right and to delete model. Batch, item as this is on the title of the row.

Commented [SG73]: Editorial: If after review of 5.1.2.1, it is decided that the standard should not prohibit the use of DIs with the web enabled, structure path scheme, this edit is needed.

Commented [SG74]: Editorial: Wording consistent across columns 2, 3, and 5

Commented [SG71]: Editorial: If after review of 5.1.2.1, it is decided that the standard should not prohibit the use of DIs with the web enabled, structure path scheme, this edit is needed.

Commented [SG76]: Editorial: This is required as GS1 does not utilise ISO/IEC 15434 and therefore that Mode is not to be included.

Commented [SG72]: Editorial: This is required for three columns as the level of granularity is not known from the decoded data. It can only be obtained via online access.

Commented [SG77]: These edits are necessary as, again, the term "self-issuing" occurs in every case and there is some form of registration authority (mechanism) to ensure no two identifiers overlap. This could be a domain, an Issuing Agency Code, a 15434 format header, but all require some mechanism before "self-issuing" occurs.

	t manuf actuer	t manuf actuer	~~Self-issuing system~~	t manuf actuer ~~Self-issuing system~~	~~Self-issuing system~~	t manuf actuer~~Issuing agency~~	t manuf actuer~~Issuing agency~~	by produc t manuf actuer ~~Issuing agency~~
Owner of ID	Economic operator	Economic operator	Economic operator	Economic operator	Economic operator	Economic operator	Economic operator	Economic operator

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Translation mechanism	No need for translation mechanism for DPP access.	No need for translation mechanism for DPP access.	No translation needed. Existing IDs can be used directly.	No translation needed. Existing IDs can be used directly.	No translation needed. DIDs are self-describing, optional aliasing via "alsoKnownAs"	No translation needed. Auto-discriminating, open RFID standards	No translation needed. Auto-discriminating, open 2D standards	Resolver always required – some translation is inherent

B.3 General technical properties

See Table B.3 for information on general technical properties.

Table B.3 — General technical properties

ID scheme	5.1.2.1	5.1.2.2	5.2.2.1	5.2.2.2	5.3	5.4.1.1	5.4.1.2	5.5
Title	Web enabled structured path ID for products	Web enabled query string ID for products	Identification link	Identification link (structured ID link)	Decentralized identifer	Identification for products and product groups, RFID	Identification for products and product groups, 2D-symbols	Digital object identifier
Number of identifiers	Unlimited.	Unlimited.	Practically unlimited IDs (66^250), no third-party needed, no risk of exhaustion.	Practically unlimited IDs (66^250), no third-party needed, no risk of exhaustion.	Unlimited, no third-party required, no risk of identifier limits.	Unlimited.	Unlimited.	Unlimited.
Physical data carrier encoding: 2D	Can be encoded in 2D symbols, including QR codes and DataMatrix (without graphical symbol of IEC 61406 on consumer products)	Can be encoded in 2D symbols, including QR codes and DataMatrix Any AIDC media, technology independent	Can be encoded in 2D symbols including QR codes and DataMatrix (with IEC 61406 conformant frame).	Can be encoded in 2D symbols including QR codes and DataMatrix (with IEC 61406 conformant frame).	Can be encoded in 2D symbols, including QR codes and DataMatrix Any data carrier / data carrier agnostic	(Possible) but not typical. Focus is on RFID. Not applicable	Can be encoded in 2D symbols, including QR codes and DataMatrix Yes, 2D symbols like DataMatrix or QR.	Can be encoded in 2D symbols, including QR codes and DataMatrixYes, commonly used with QR codes.
Physical data carrier decoding: 2D	String begins with https:// followed by GS1 ID patterns (e.g., /01/{14di							

Commented [SG78]: Translation of what? To what? For what? Clarify or delete this row.

This mixes several concepts but in a non-uniform manner.

Translation for DPP access?
ID use directly?
Autodiscrimination?
Resolver?

If this row is intended for the AIDC level, then AIDC service providers need to know what identification scheme has been encountered, how to process the scheme according to specifications, and must be assured with a high degree of certainty that no collisions of identification will occur based upon these specifications. Please see GS1's communication to the Commission and its standards WG on Interoperability and Implementation considerations as referenced previously.

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Commented [SG81]: Editorial: Is it really an option for product identification? If it is not foreseen, text should be changed as proposed.

Commented [SG79]: Editorial: "Any AIDC media, technology independent" needs to be revised as this row is about 2D and not "any AIDC media" which would include biometrics, magstripe, OCR-B, and others. Edited for consistency with the first column across this and other columns where applicable.

Commented [SG80]: This 'frame' graphical symbol is problematic for consumer products as explained in GS1's position paper. Furthermore some consumer product companies have commented that the graphical symbol frame with one highlighted corner is already used on some consumer products to indicate this is a peel-off coupon. Consumer product companies would conduct extensive research to determine how consumers will interact with any mark that is intended to influence uniform consumer behavior.

Commented [SG82]: Encoding is mentioned. But what about decoding by professional scanners and smart devices? Clarification needed how the decoding of ID schemes is performed.

Please see GS1's communication to the Commission and GS1 Standards WG related to pattern recognition by AIDC scanning and reading systems. The first column is filled in for GS1 users based on the DRAFT decision tree approach to discern patterns for decoding but the other columns should be filled in by users of the other identification schemes.

	gits})							
Physical data carrier: RFID/NFC	Yes, can be encoded in RFID/NFC ~~(e.g., EPC URIs)~~, noting that web-enabled, structured path ID for products using EPC RFID encoding would correspond only to the supplementary GS1 Application Identifiers encoded in +AIDC data, following the EPC, as introduced in TDS 2.0.	Yes, can be encoded in RFID/NFC.	Yes, can be encoded in RFID/NFC.	Yes, can be encoded in RFID/NFC.	Any data carrier / data carrier agnostic	Yes, primary carrier for this scheme.	~~Not typically used.~~ Not applicable	Yes, can be encoded in RFID, NFC.
Reliance of domain name for the unique identifier	No, unique identifier is independently of domain name.	No, unique identifier is independently of domain name.	Yes, uses domain name as part of the identifier for global uniqueness.	Yes, uses domain name as root in case of usage in conjunction with IEC 61406-2 (not in case of usage in conjunction with IEC 61406-1), though alternative methods possible.	No, identifier is self-resolving ~~using DID~~ method syntax.	For URI identifiers: No. For ISO/IEC 20248: Yes.	For URI identifiers: No. For ISO/IEC 20248: Yes.	Yes, relies on centralized DOI resolution via domain infrastructure.

Commented [SG84]: Editorial: For consistency

Commented [SG83]: Editorial: For consistency

Commented [SG85]: Editorial: For clarity

Commented [SG86]: Editorial: Adjustment proposed as it holds true only for IEC 61406-2 but not IEC 61406-1.

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B.4 Requirements

See Table B.4 for information on requirements.

Table B.4 — Requirements

ID scheme	5.1.2.1	5.1.2.2	5.2.2.1	5.2.2.2	5.3	5.4.1.1	5.4.1.2	5.5
Title	Web enabled structured path ID for products	Web enabled query string ID for products	Identification link	Identification link (structured ID link)	Decentralized identifer	Identification for products and product groups, RFID	Identification for products and product groups, 2D-symbols	Digital object identifier
4.1 Global uniqueness								
4.1.2 (1) No duplication	Ensured by the rules set in ISO/IEC 15459.	Ensured by the rules set in ISO/IEC 15459.	Ensured by the rules in IEC 61406-1.	Ensured by the rules in IEC 61406-1 and IEC 61406-2.	Ensured by W3C Decentralized Identifiers (DIDs) v1.0	Ensured by the rules set in ISO/IEC 15459.	Ensured by the rules set in ISO/IEC 15459.	Checked by issuing agency – each ID is registered with unique metadata.
4.1.2 (2) Distinct	Yes, globally unique and context independent per ISO/IEC 15459-3.	Yes, globally unique and context independent per ISO/IEC 15459-3.	Yes, the web domain remains the anchor for global uniqueness.	Yes, the web domain remains the anchor for global uniqueness.	Yes, globally unique.	Yes, globally unique per ISO/IEC 15459-3	Yes, globally unique per ISO/IEC 15459-3	Yes, globally unique per ISO/IEC 15459-3 and ISO 26324
4.1.2 (3) Non-coexistence	Prohibits reusing or reassigning identifiers.	Prohibits reusing or reassigning identifiers.	Prohibits reusing or reassigning identifiers.	Prohibits reusing or reassigning identifiers.	Ensured by cryptography and DID method rules – reassignment and reuse are prohibited.	Prohibits reusing or reassigning identifiers	Prohibits reusing or reassigning identifiers	Prohibits reusing or reassigning identifiers
4.2 Persistence								
4.2.2 (1) Consistency	ISO/IEC 15459-3	ISO/IEC 15459-3	Ensured by the rules in EN IEC 61406-1 and the EU DPP System Registry.	Ensured by the rules in EN IEC 61406-1 and EN IEC 61406-2 and the EU DPP System Registry.	Ensured by W3C DID v1.0 – persistence is technology-driven, not process-based.	ISO/IEC 15459-3	ISO/IEC 15459-3	Ensured by requiring descriptive metadata for each entity provided to issuing agency.

4.2.2 (2) Preservation	Supported by life cycle management rules per ISO/IEC 15459-3.	Supported by life cycle management rules per ISO/IEC 15459-3.	Ensured by life cycle management rules per EN IEC 61406-1 and the EU DPP System.	Ensured by the life cycle management rules per EN IEC 61406-1 and -2 and the EU DPP System.	Through decentralized structure and governance throughout the life cycle.	Supported by life cycle management rules per ISO/IEC 15459-3.	Supported by life cycle management rules per ISO/IEC 15459-3.	Issuing agency responsible for preservation of identifiers.
4.2.2 (3) Permanence	Per ISO/IEC 15459-3, does not relay on persistency of domain name.	Per ISO/IEC 15459-3, does not relay on persistency of domain name.	Ensured by the DPP system – web domains can be transferred or redirected.	Ensured by the DPP system – web domains can be transferred or redirected.	DIDs remain valid long-term; permanence depends on the chosen DID method.	Per ISO/IEC 15459-3, does not relay on persistency of domain name.	Per ISO/IEC 15459-3, does not relay on persistency of domain name.	Issuing agency ensures identifiers remain permanently linked to item metadata.
4.3 Syntax								
4.3.2 (1) Character set	Numerical on Model level (GTIN) and Alphanumerical on Batch and Item (serial) level.	Alphanumerical	Alphanumerical	Alphanumerical	Alphanumerical	Alphanumerical	Alphanumerical	ISO 26324 defines characters that may be used
4.3.2 (2) Web	URI HTTP and URL per RFC 3986, plus a few additional rules set in ISO/IEC 18975.	URI HTTP and URL per RFC 3986, plus a few additional rules set in ISO/IEC 18975.	URL according to RFC 3986, plus few restrictions specified in EN IEC 61406-1.	URL according to RFC 3986, plus few restrictions specified in EN IEC 61406-1 and EN IEC 61406-2.	URI according to RFC 3986.	URI per RFC 3986	URI per RFC 3986, plus additional rules set in ISO/IEC 15434.	URL per IETF RFC 3986 mandatory
4.3.3 (1) Structure	Predefined structure usable across operators and service providers	Based on ISO/IEC 15459 (Data Identifiers)	Can optionally integrate ISO/IEC 15459 (DIs), GUIDs, DIDs, or internal IDs (e.g., product name + serial number)	Can optionally integrate ISO/IEC 15459 (DIs), GUIDs, DIDs, or internal IDs (e.g., product name + serial number)	"did:" prefix with method (e.g., web, ethr, ebsi) and method-specific ID	ISO/IEC 15459 ISO/IEC 15961 ISO/IEC 15962 ISO/IEC 17360	ISO/IEC 15434	ISO 26324 – issued prefix + constructed suffix (by operator or agency)

4.3.3 (2) Variable length	A fixed-length identifier with optional variable-length extensions within the same hierarchy.	Yes	Variable between 6 and 255 characters	Variable between 6 and 255 characters	Variable	Combination of fixed, structured, and variable elements	Combination of fixed, structured, and variable elements	Variable – can be fixed depending on issuing agency requirements
4.4 Semantics								
4.4.2 (1) Granularity	Model, batch, item via qualifier without graphical frame for retail consumer products.	Model, batch, item via Data Identifier (ANSI MH 10.8.2).	Item via graphical marking and parameter names.	Model, batch, item via Data Identifier or graphical marking.	Model, batch, item as DID document attributes.	Model, batch, item via qualifier.	Model, batch, item via qualifier.	Model, batch, item.
4.4.2 (2) Granularity consistency	Supports multiple levels.	Supports multiple levels.	Item level only.	Supports model, batch, item.	Granularity set in DID document.	Supports multiple levels.	Supports multiple levels.	Fixed once registered.
4.4.2 (3) Change in granularity	Change in granularity requires new identifier.	Change in granularity requires new identifier.	Change in granularity requires new identifier.	Change in granularity requires new identifier.	Allowed – managed via DID document.	Change in granularity requires new identifier.	Change in granularity requires new identifier.	Change in granularity requires new identifier.
4.4.3 (1) Granularity level	Allowed	Flexible	Only item level	Allowed	All levels supported	Allowed	Allowed	Flexible
4.4.3 (2) Resolver	Browser-based, no special resolver	Browser-based, no special resolver	DNS-based resolution	DNS-based resolution	DID resolver + DNS (per W3C spec)	DNS, HTTP, or DID-based resolution	DNS, HTTP, or DID-based resolution	HTTP resolution per ISO 26324
4.4.3 (3) Hierarchy	Yes	Yes	No	Yes	Yes	Yes	Yes	Per issuing agency
4.5 Interoperability								
4.5.2 (1) Data carrier	Data carrier agnostic and web-enabled.	Data carrier agnostic and web-enabled.	Web-enabled data carriers.	Web-enabled data carriers.	Data carrier agnostic and web-enabled.	RFID	2D-symbols	Web-enabled data carriers.
4.5.2 (2) Digital copy	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok

4.5.2 (3) Compatibility	Compatible with most external components used in supply chain.	Compatible with most external components used in supply chain.	Compatible with most external components used in supply chain.	Compatible with most external components used in supply chain.	Compatible with all web technologies and external components.	Compatible with most external components used in supply chain.	Compatible with most external components used in supply chain.	Can be used with web technologies and existing supply chain equipment as per ISO/IEC 15459
4.5.2 (4) Portability	Standardized, cross-system	Portable across platforms	Globally unique, cross-platform	Globally unique, cross-platform	Globally unique, platform-independent	Standardized, cross-system	Standardized, cross-system	Standardized, cross-system
4.5.2 (5) Existing ID	Ok	Ok	Ok	Ok	Ok	Ok	Ok	OK
4.6 Openness								
4.6.2 (1) Transparency	Public ISO/IEC + web standards	Public ISO/IEC + web standards	Public EN IEC + web standards	Public EN IEC + web standards	Public W3C	Public ISO/IEC standards	Public ISO/IEC standards	Public ISO + ISO/IEC standards
4.6.2 (2) End consumer usage	No additional software needed.	No additional software needed.	No additional software needed.	No additional software needed.	No additional software needed.	IDs may need to be parsed and resolved.	IDs may need to be parsed and resolved.	No additional software needed.
4.6.2 (3) No undue restrictions Also see B.6	No lock-in	No lock-in	No lock-in, only requires domain registration, which is transferable between providers	No lock-in, only requires domain registration, which is transferable between providers	No lock-in, DIDs are fully controlled by the owner and do not rely on any third party.	No lock-in	No lock-in	No lock-in, operator can switch issuing agencies or methods; existing IDs remain valid
4.6.3 (1) Smartphones	QR/NFC via URLs, smartphone compatible and readable in browsers	QR/NFC via URLs, smartphone compatible and readable in browsers	QR/NFC via URLs, smartphone compatible and readable in browsers	QR/NFC via URLs, smartphone compatible and readable in browsers	DID links via QR/NFC, smartphone compatible with an installed app and readable in browsers	IDs/URLs readable in browsers	IDs/URLs readable in browsers	QR/NFC via URLs, browser-compatible

B.5 Security

See Table B.5 for information on security.

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Commented [SG87]: Does smartphones mean URLs read in browsers on smartphones too?

If so this should be added across all columns as URLs meet that criteria.

Also should QR here be revised to 2D as Data Matrix, while not as pervasively supported by smartphones as QR, it is supported in many and trending up.

Table B.5 — Security

ID scheme	5.1.2.1	5.1.2.2	5.2.2.1	5.2.2.2	5.3	5.4.1.1	5.4.1.2	5.5
Title	Web enabled structured path ID for products	Web enabled query string ID for products	Identification link	Identification link (structured ID link)	Decentralized identifer	Identification for products and product groups, RFID	Identification for products and product groups, 2D-symbols	Digital object identifier
Combine with ISO/IEC 20248	Yes, supports digital signature for data authentication.	Yes, supports digital signature for data authentication.	Yes	Yes		Yes, supports digital signature for data authentication.	Yes, supports digital signature for data authentication.	
Combine with ISO 22376	Yes, compatible for data element structure and transfer syntax.	Yes, compatible for data element structure and transfer syntax.	Yes	Yes		Yes, compatible for data element structure and transfer syntax.	Yes, compatible for data element structure and transfer syntax.	
Use of public/ private key pair	Yes, required for signing and verifying data when using ISO/IEC 20248.	Yes, required for signing and verifying data when using ISO/IEC 20248.	Not by default, but can be combined with	Not by default but can be combined with	Yes, DIDs come with security on board.	Yes, required for signing and verifying data when using ISO/IEC 20248.	Yes, required for signing and verifying data when using ISO/IEC 20248.	

B.6 Issuing process and prerequisites

See Table B.6 for information on issuing process and prerequisites.

Table B.6 — information on issuing process and prerequisites

ID scheme	5.1.2.1	5.1.2.2	5.2.2.1	5.2.2.2	5.3	5.4.1.1	5.4.1.2	5.5
Title	Web enabled structured path ID for products	Web enabled query string ID for products	Identification link	Identification link (structured ID link)	Decentralized identifer	Identification for products and product groups, RFID	Identification for products and product groups, 2D-symbols	Digital object identifier

Prerequisite for web enabled access to DPP	Registered web domain of company or service provider (e.g. issuing agency)	Registered web domain of company or service provider (e.g. issuing agency)	Registered web domain of company or service provider	Registered web domain of company or service provider	Registered web domain of company or service provider	Not web-enabled	Not web-enabled	Registered web domain of company or service provider (e.g. issuing agency)
Process of issuing of product identifier	1. Get CIN from ISO/IEC 15459 agency 2. Issue product ID	1. Get CIN from ISO/IEC 15459 agency 2. Issue product ID	1.) Issue ID based on web domain	1.) Issue ID based on web domain	For did:web: 1.) Use web domain 2.) Create DID 3.) Publish DID document	1. Get CIN from ISO/IEC 15459 agency 2. Issue product ID	1. Get CIN from ISO/IEC 15459 agency 2. Issue product ID	Agency provides or approves prefix; ID issued by operator or agency
Sovereignty about the data in the product identifier	Operator controls ID elements.	Operator controls ID elements.	Operator controls self-issued elements	Operator controls self-issued elements	Full control; verifiable via cryptography	Operator controls product IDs	Operator controls product IDs	ID not reusable; operator holds admin control
Obligations of economic operator from technical terms in contracts	Contract with issuing agency	Contract with issuing agency	Only domain registrar contract, if no third-party used	Only domain registrar contract, if no third-party used.	No contract – self-issued	ISO/IEC 15459; optional X.509 cert (ISO/IEC 20248)	ISO/IEC 15459; optional X.509 cert (ISO/IEC 20248)	Contract with issuing agency.
Changes in technology that would effect the product identifier	Changes in ISO/IEC standards or RFC 3986.	Changes in ISO/IEC standards or RFC 3986.	Changes in ISO/IEC standards or RFC 3986.	Changes in ISO/IEC standards or RFC 3986.	Changes in W3C DID standards or RFC 3986.	Changes in ISO/IEC standards or RFC 3986.	Changes in ISO/IEC standards or RFC 3986.6.	Changes in ISO/IEC standards or RFC 3986.
Ceases of the service of a contracted service provider	Not applicable	Not applicable	Only domain registrar contract to manage.	Only domain registrar contract to manage.	No contracts – self-issued.	Not applicable.	Not applicable.	Fallback ensured by other agencies
Termination of contracts	Business decision	Business decision	Web domain contracts easily terminated	Web domain contracts easily terminated	Not applicable – self-managed; optional alias via "alsoKnownAs".	No restrictions.	No restrictions.	Set by issuing agency.

Conclusion of new contracts	Business decision	Business decision	Domain services can be contracted flexibly	Domain services can be contracted flexibly	Not applicable	No restrictions.	No restrictions.	Set by issuing agency
Unbundling of services	Yes	Yes	Domain transfer is standard and automated.	Domain transfer is standard and automated.	Not applicable	No restrictions.	No restrictions.	Ownership transfer supported by DOI agencies.
Procedures for switching a service provider	No restrictions.	No restrictions.	Domain transfer is standard and automated.	Domain transfer is standard and automated.	Not applicable.	No restrictions.	No restrictions.	Switching between agencies allowed.
Reference to an online register, where the product identifier or elements of it are registered	Not applicable	Not applicable	Domain Name registry	Domain Name registry	Not applicable	No restrictions.	No restrictions.	Maintained by issuing agency.
Additional services required to issue and maintain the product identifier	No additional services needed.	No additional services needed.	Only web domain required.	Only web domain required.	See resolver; examples may vary.	No additional services needed	No additional services needed	No additional services needed

B.7 Examples

B.7.1 ID scheme 5.1: Web enabled, structured path and query string identification for products

B.7.1.1 ID scheme 5.1.2.1: Web enabled, structured path identification for products

See Table B.7 for an example of web enabled structured path identification for products.

Table B.7 — Web enabled, structured path identification for products

Component	Meaning	Value
GTIN (01)	Global Trade Item Number	09524000059109
Consumer product variant (22)	Used to distinguish one variant of a retail consumer trade item from another if the change does not require the allocation of a different GTIN.	2A
Batch Number (10)	Unique batch-level identifier when combined with GTIN	~~9876~~ABC123
Serial Number (21)	Unique item-level identifier when combined with GTIN	1234~~5~~XYZ
~~Date of Expiry (11)~~	~~YYMMDD format~~	~~250101~~)

Commented [SG88]: Editorial: Revised to include batch as dates are not applicable to ESPR but batch and serial are. Also clarified that uniqueness in the GS1 system requires the combination of GTIN with batch and serial.

Commented [SG89R88]: Also should Expiry Date be used, it is AI (17) not (11)

Component	Meaning	Value
Data carrier	QR-code example	
Scheme & Domain	https://example.com	
Full Example	https://example.com/01/09524000059109/22/2A/10/ABC123/21/12345XYZ 21/1234?17=250101	

B.7.1.2 ID scheme 5.1.2.2: Web enabled, query string identification for products

See Table B.8 for an example of web enabled query string identification for products.

Table B.8 — Web enabled, query string identification for products

Component	Meaning	Value
Product ID (.25P)	IAC + CIN + Product Number (IEC 61406-2 approach)	QCELMI12345
Serial number (.S)	Unique serial number	654321
Data carrier	QR-code example	
Scheme & Domain	HTTPS://WWW.DOMAIN-ABC.COM	
Full Example	HTTPS://WWW.DOMAIN-ABC.COM/?.25P=QCELMI12345&.S=654321	

Commented [SG90]: Editorial: It would be helpful to cite IEC 61406-2 here as distinct from -1.

Commented [SG91]: Editorial: Example given in "Scheme & Domain" and "Full Example" should consider use of the example domains reserved for documentation purposes (RFC 6761). "domain-abc.com" is not reserved for use in documentation and https://abc.com/ is also the domain of the American Broadcasting Company.

Whatever domain is used, it should be applied consistently throughout the examples.

B.7.2 ID scheme 5.2: Identification Link (IL)

B.7.2.1 ID scheme 5.2.2.1: Identification Link (IL)

See Table B.9 for an example of Identification Link (IL) without structure.

Table B.9 — Identification Link (IL) without structure

Component	Meaning	Value
Identifier (freetext)	Unstructured ID string (IEC 61406-1 approach)	freetext
Data carrier	QR-code example with graphical frame to indicate item.	
Scheme & Domain	https://www.domain-abc.com	
Full example	https://www.domain-abc.com/freetext	

Commented [SG92]: Editorial: It would be helpful to cite IEC 61406-1 here as distinct from -2.

B.7.2.2 ID scheme 5.2.2.2: Identification Link (IL) with structure

See Table B.10 for an example of Identification Link (IL) with serial number per ISO/IEC 15418 used for item and batch.

Table B.10 — Identification Link with serial number per ISO/IEC 15418

Component	Meaning	Value
Scheme & Domain	Protocol and domain (IEC 61406-2 approach)	https://www.domain-abc.com
Serial Number (.S)	Serial number, free format or per standard	freetext
Batch Number (.10B)	Batch or lot number	freetext
Data carrier	QR-code example with graphical frame to indicate batch or item.	
Full example:	https://www.domain-abc.com/?.S=freetext&.10B=freetext	

Commented [SG93]: Editorial: It would be helpful to cite IEC 61406-2 here as distinct from -1.

See Table B.11 for an example of Model Identification (Product Code Level with optional reuse of existing ID solutions).

Table B.11 — Model Identification (Product Code Level with optional reuse of existing ID solutions)

Component	Meaning	Value
Scheme & Domain	Protocol and domain	https://www.domain-abc.com
Product Code (.P)	Model-level identifier	freetext *(or from ID scheme)*
Data carrier	QR-code example with graphical frame to indicate model.	
Full example	https://www.domain-abc.com/?.P=freetext *(or other ID scheme)*	

B.7.3 ID scheme 5.3: Decentralized identifiers (DIDs) for products

See Table B.12 for an example of Decentralized Identifiers (DIDs) for products.

Table B.12 — Decentralized identifiers (DIDs) for products

Component	Meaning	Value
Product DID	Full DID identifying a product (DID method = web)	did:web:abc.com:model4TR
Service Endpoint	Optional service query parameter – specifies what to retrieve	?service=item-dpp
DID Method	Method part of the DID – determines resolution rules	web
Resolution Standard	Resolver must follow Decentralized Identifier Resolution (DID Resolution) v0.3:2025	W3C-compliant
Returned Resource	Based on service: may return a UI, machine-readable Verifiable Credential, or other digital product passport data	DPP (e.g. for item)

Commented [SG94]: Editorial: abc.com" is the American Broadcasting Company's domain. Please use the example domains defined in Ref 6761 (https://www.rfc-editor.org/rfc/rfc6761)

Component	Meaning	Value
Data carrier	QR-code example	
Scheme & Domain	https://resolver.io (DID resolver domain used to resolve the DID)	
Full example	https://resolver.io/did:web:abc.com:model4TR/?service=item-dpp	

Commented [SG95]: Editorial: abc.com" is the American Broadcasting Company's domain. Please use the example domains defined in Ref 6761 (https://www.rfc-editor.org/rfc/rfc6761)

B.7.4 ID scheme 5.4: Product and group identification

B.7.4.1 ID scheme 5.4.2.1: Product and group identification, RFID

See Table B.13 for an example of identification based on ISO-registered RAIN Alliance System.

Table B.13 — Identification based on ISO-registered RAIN Alliance System

Component	Meaning	Value
Protocol Control Word	Includes Numbering System Indicator (NSI)	31AE
Company ID	Company Identification Number (assigned under ISO by RAIN Alliance)	ABC001
~~Product Code (NDC)~~	~~National Drug Code – product identifier~~	~~01AB~~
Lot Number	Batch or production lot	02CD
Expiration Date	Coded expiration date (per issuer's internal rules)	04FC
Serial Number	Unique serial number per item	000001
Full Example (raw)	31AE ABC001 01AB 02CD 04FC 000001	
URN Representation (optional)	urn:rain:abc001:01AB:02CD:04FC:000001	
Decoded identifier as stored in the EU Registry		

Commented [SG96]: What is the ISO Registration Authority for this identifier?

When highlighting RAIN RFID with RAIN Identifiers, the identifier SHALL begin with RAIN's ISO/IEC 15459 compliant, 15459-2 Registered Issuing Agency Code 'XRA' as required in Section 5.4.2.1.

While other tables include the IACs, it might be useful to add a row for encoded and decoded identifiers to all examples so that AIDC solution providers can begin to establish the pattern recognition required to ensure unique processing and storage of the various schemes in the EU Registry.

Commented [SG97]: The example using NDC seems problematic for three reasons.
1)This is a US-FDA Issued Identifier.
2)The NDC, when encoded in AIDC data carriers, uses a GS1 Issuing Agency Code before the Labeler Code.
3)Drugs are not in scope for ESPR.

See Table B.14 for an example of identification based on EPC RFID SGTIN-96 (Pure Identity URI).

Table B.14 — Identification based on ISO/IEC 15459-2 Registered Issuing Agency Code per EPC RFID encoding SGTIN-96 EPC (Pure Identity URI) ~~Identification based on SGTIN-96 (Pure Identity URI)~~

Component	Meaning	Value
~~Company Prefix~~	~~GS1 Company Prefix~~	~~086699~~
~~Item Reference~~	~~GTIN Item Reference~~	~~0010034~~
~~Serial Number~~	~~Unique serial number for the item~~	~~10140309~~
~~Full example~~	~~urn:epc:tag:sgtin-96:0.086699.0010034.10140309~~	
~~NOTE Business-level ID (used in EPCIS and data exchange)~~		
GTIN	Global Trade Item Number	09506000134352
Serial Number	Unique serial number for the item	123456789
EPC Pure Identity URI	Carrier-neutral URN representation for legacy data sharing	urn:epc:id:sgtin:950600001343.05.123456789

EPC Tag URI	RFID tag-specific URN representation	urn:epc:tag:sgtin-96:3.95060001343.05.123456789
EPC Hex	Binary encoding on RFID tag, beginning with address 20h of MB01	3066C4409047E140075BCD15
Note: The SGTIN-96 and other EPC encodings specified in TDS 1.13 and earlier explicitly indicate the length of the GS1 Company Prefix (GCP), used as a basis to allocate GTINs and other GS1 identification keys. In this example, GTIN 09506000134352 has an 11-digit company prefix of 95060001343.		

Formatted Table

See Table B.15 for an example of identification based on EPC RFID SGTIN-96 (Tag URI).

Table B.15 — Identification based on ISO/IEC 15459-2 Registered Issuing Agency Code per EPC RFID encoding SGTIN-96 (Tag URI)

Component	Meaning	Value
~~Company Prefix~~	~~GS1 Company Prefix~~	~~086699~~
~~Item Reference~~	~~GTIN Item Reference~~	~~0010034~~
~~Serial Number~~	~~Unique serial number for the item~~	~~10140309~~
GTIN	Global Trade Item Number	09506000134352
Serial Number	Unique serial number for the item	123456789
EPC Hex	Binary encoding on RFID tag, beginning with address 20h of MB01	F700950600013435 2091D6F3454
~~Full example~~	~~urn:epc:tag:sgtin-96:0.086699.0010034.10140309~~	
NOTE RFID-centric identifier (includes filter value)		

Commented [SG98]: Editorial: Tables B14 and B15 titles have been revised to match B13 in terms of the content reflecting Issuing Agency Registration.

Tables B14 and B15 have been edited by GS1 EPC RFID experts (GS1 EPC RFID encoding GS1 identifiers as opposed to RAIN RFID encoding RAIN identifiers).

Formatted: Normal, Indent: Left: 0,07 cm, Space Before: 0,75 pt, Tab stops: 1,48 cm, Left

B.7.4.2 ID scheme 5.4.1.2: Product and group identification, 2D-symbols

See Table B.16 for an example of product and group identification, 2D-symbols.

Table B.16 — Product and group identification, 2D-symbols

Component	Meaning	Value
~~GTIN (10)~~	~~Global Trade Item Number used as a base for batch-level identification (ISO/IEC 15459-6)~~	~~09506000134352~~
~~Batch Number (17)~~	~~Batch/lot identifier (e.g. production or packaging batch)~~	~~250101~~
Data Carrier Syntax	Encoded using high-capacity AIDC media syntax (e.g. QR code) per ISO/IEC 15434	Encoded in QR Code using ISO/IEC 15434
Resolution	Web resolver returns batch-level Digital Product Passport	Handled via example.com
~~Data carrier~~	~~QR-code example~~	
Scheme & Domain	https://example.com	
~~Full example~~	~~https://example.com/10/09506000134352/17/250101~~	

B.7.5 ID Scheme 5.5: Digital Object Identifier for products

See Table B.17 for an example of identification with DOI and ISO/IEC 15459 structure.

Table B.17 — Identification with DOI ~~and~~ prefaced by ISO/IEC 15459 ~~structure~~Registered Issuing Agency Code (DOI+IAC)

Component	Meaning	Value
Scheme & Domain	DOI resolver domain	https://doi.org
Path Prefix (XID)	Identifier prefix signalling ISO/IEC 15459-2 compliant structure (not 15459 compliant as 15459-3 Common Rules must also be followed).	XID
DOI Indicator	Constant prefix defined in ISO 26324 for DOI	10
Issued Org Code	Code assigned by the DOI issuing agency (registered under ISO/IEC 15459)	21
Product ID (Suffix)	Unique ID assigned by the org or agency (e.g. product, batch, item)	PRW82MJF
Resolution	DOI resolver translates to the Digital Product Passport location	Handled via doi.org
Data carrier	QR-code example	
Full Identifier	ISO 26324 compliant identifier including prefix and suffix	XID10.21/ PRW82MJF
Full example	https://doi.org/XID10.21/PRW82MJF	

Commented [SG99]: It is not permissible to use GS1 identifiers in an example of ISO/IEC 15434 encoding as GS1 does not utilise this method within any Application Standard and introduction of this syntax would require GS1 General Assembly approval.

When this example is revised it needs to specify which Format Header is being used, presumably the Format Header 6 for ANS MH10 Data Identifiers.

Commented [SG100]: The use of XID is required when introducing an identification scheme into a domain it was not designed for nor is it implemented within (encoded AIDC data carriers for use in the open, product value chain). It is not that it cannot be introduced, but it begins with '10' which conflicts with GS1's ISO/IEC 15459-2 Registered Issuing Agency Code '1'. This, in turn, means the DOI is no longer conformant to DOI specifications as a DOI. It is in fact a hybrid identifier and must be referred to as a DOI with a ISO/IEC 15459-2 Registered Issuing Agency Code (IAC) prefix. In this way, AIDC service providers know they are not processing the DOI, but the DOI+IAC.

It should also be clarified that this identifier, or any identifier, that claims compliance with ISO/IEC 15459 must comply with parts 2 and 3, not simply 2. Another approach to pattern recognition for this identifier is made for consideration with GS1's communication to the Commission and GS1's standards WG on interoperability and implementation.

Commented [SG101]: "Handled via doi.org" is mentioned. However, there are multiple resolvers for DOIs, not just one. For example, dx.crossref.org, so it is wrong to only cite doi.org.
Therefore, add further examples and not doi.org alone.

Commented [SG102]: Preliminary testing of 'XID' with a known DOI failed so perhaps it is best to remove Table B17 until an example that works is provided.

Annex C
(informative)

Overview of ID schemes for economic operators and facilities

C.1 General information

See Table C.1 for general information.

Table C.1 — General information

ID scheme	6.1	6.2	6.3	6.4
Title	Structured path identification for organizations	Legal Entity Identifer (LEI)	~~Digital Object Identifiers (DOI)~~Decentralised Identifiers for organizations	Digital Object Identifiers (DOIs) fororganizations
Identifier standard	ISO/IEC 15459 conformant identifier subset of ISO/IEC 6523-1~~ISO/IEC 6523~~	ISO 17422	DIDs v1.0:2022	ISO 26324
Unique economic operator identifier	Yes	Yes	Yes	Yes
Unique facility identifier	Yes (if ISO/IEC 15459 applies)	No	Yes	Yes
Uniqueness	ISO/IEC 6523-1	ISO 17422-1	DIDs v1.0:2022	ISO 26324
Interoperability with other ID schemes.	In case of AIDC media, (interoperability with all identifiers issued according to ISO/IEC 15459 by an issuing agency, as it follows the same structure and logic.	-	Yes. Can make different economic operator/ facility identifier schemes interoperable, such as ISO/IEC 15459 and GLEIF identifiers)	Other ID schemes can be used within DOIs as long as the uniqueness is maintained within the prefix allocated for use by economic operator

Commented [SG103]: Editorial: Typo

Commented [SG104]: As previous wording is true for AIDC media, but not for 6523-1 identifiers that are not intended for use with AIDC.

Commented [SG105]: It is unclear how DIDs can be made interoperable with ISO/IEC 15459 given they start with NATO's Registered Issuing Agency Code. Please clarify.

C.2 Issuing and ownership

See Table C.2 for information on issuing and ownership.

Table C.2 — Issuing and ownership

ID scheme	6.1	6.2	6.3	6.4
Title	Structured path identification for organizations	Legal Entity Identifer (LEI)	~~Digital Object~~Decentralised Identifiers (DIDs~~OI~~) for organizations	Digital Object Identifiers (DOIs) for organizations
Type of issuing	ISO/IEC 15459-2 Registered Issuing Agencies then self-issuing by product manufacturer ~~Issuing agency~~	Centralised registration of Local Operating Units (LOUs) as governed by GLEIF ~~Issuing agency~~	ICANN prefix then self-issuing by product manufacturer ~~Self-issuing system~~	ICANN prefix plus DOI Registration Agencies then self-issuing by product manufacturer ~~Issuing agency~~
Owner of ID	Economic operator	Economic operator	Economic operator	Economic operator

~~Translation mechanism~~	~~Not needed.~~	~~Not needed.~~	~~Not needed.~~	~~Not needed.~~

Commented [SG106]: Moreover, what has translation to do with issuing and ownership? Clarify or delete the row.

C.3 General technical properties

See Table C.3 for information on general technical properties.

Table C.3 — General technical properties

ID scheme	6.1	6.2	6.3	6.4
Title	ISO/IEC 18975 Structured path identification for organizations	Legal Entity Identifer (LEI)	~~Digital Object Identifiers (DOI)~~Decentralised Identifiers (DIDs) for organizations	Digital Object Identifiers (DOIs) for organizations
Number of identifiers	Unlimited	Unlimited	Unlimited	Unlimited
Physical data carrier	Optional	Optional	Optional	Optional
Reliance of domain name for identifier	No	No	No	No
Web enabled/access by smartphones with or without app.	Yes, can be included in a URL; scannable by smartphones for direct access to web-based product info without the need for additional software or an app.	Yes, can be included in a URL; not scannable by smartphones for direct access to web-based product info without the need for additional software or an app and will conflict with ISO/IEC 15459 compliant identifiers.	W3C standard; inherently web-enabled via resolvers and service endpoints but is not scannable by smartphones for direct access to product info without the need for additional software or an app.~~.~~	If encoded as a URL, a resolver ensures every DOI returns information about the referent. If not, the DOI is not scannable by smartphones for direct access to product info without the need for additional software or an app.

C.4 Requirements

See Table C.4 for information on requirements.

Table C.4 — Requirements

ID scheme	6.1	6.2	6.3	6.4
Title	Structured path identification for organizations	Legal Entity Identifer (LEI)	~~Digital Object Identifiers (DOI)~~ Decentralised Identifiers (DIDs) for organizations	Digital Object Identifiers (DOIs) for organizations
4.1 Global uniqueness				
4.1.2 (1) No duplication	Yes	Yes	Yes	Yes, registered with issuing agency and requires disambiguation metadata to prevent duplication.
4.1.2 (2) Distinct	Yes, ISO/IEC 6523-2	Yes, ISO 17422-1	Yes, DIDs v1.0:2022	Yes, issuing agency checks that identifier is unique within prefix
4.1.2 (3) Non-coexistence	Yes, prohibits reusing or reassigning identifiers.	Yes, prohibits reusing or reassigning identifiers.	Yes, prohibits reusing or reassigning identifiers (enforced by cryptography)	Yes, identifiers connected with referent through referent description – no reuse allowed
4.2 Persistence				

Commented [SG107]: This row mixes two concepts, web-enabled and scannable by smartphones with or without the use of additional software or apps loaded on the device. The edits are intended to create a uniform treatment of the subject across columns.

LEI itself is not web-enabled for direct access so this has been corrected and a note added regarding the uniqueness consideration.

Additional wording added to DOI as well given most DOIs are expressed as URLs.

4.2.2 (1) Consistency	Yes	Yes	Yes	Yes, ensured by requiring descriptive metadata for each entity provided to issuing agency.
4.2.2 (2) Preservation	Yes	Yes	Yes	Yes
4.2.2 (3) Permanence	Yes, rules depend on issuing agency.	Yes, via GLEIF persistence.	Yes, under the control of the DID owner.	Yes, issuing agencies require the identifiers remain associated with the described referent
4.3 Syntax				

4.3.2 (1) Character set	Alphanumeric	Alphanumeric	Alphanumeric	ISO 26324 defines characters that may be used.
4.3.3 (1) Structure	Predefined (ICD + Org ID).	Fixed structure.	Partly fixed (did:<method>:).	Prefix/Suffix structure.
4.3.3 (2) Variable length	Variable within limits	Fixed length (20 chars)	Variable	Variable suffix
4.4 Semantics				
4.4.3 (2) Resolver	Optional	Yes (via GLEIF API)	Yes (DID resolver)	Yes (via doi.org)
4.4.3 (3) Hierarchy	Depending on ID scheme	No	Yes	No
4.5 Interoperability				
4.5.2 (1) Data carrier	Compatible with 2D/ RFID	Encodable in QR/ RFID	Yes any, if encoded	Encodable in QR/ RFID
4.5.2 (2) Digital copy	Yes	Yes	Yes	Yes
4.5.2 (3) Compatibility	Yes, with external components used in supply chain.	Yes, with external components used in supply chain.	Yes	Yes, can be used with web technologies
4.5.2 (4) Portability	Yes	Yes	Yes	Yes
4.5.2 (5) Existing ID	-	-	Semantics are added using verifiable credentials.	Specified in ISO 26324
4.6 Openness				
4.6.2 (1) Transparency	Open, ISO standard	Public, managed by GLEIF	Open W3C standard	Open, ISO-based
4.6.2 (2) End consumer usage	Yes, no additional software needed.	Yes, no additional software needed.	Yes, verifiability of identifier data.	Yes, no additional software needed. Can be resolved to access any publicly available referent information.
4.6.2 (3) No undue restrictions Also see C.6	No lock-in	No vendor lock-in	No lock-in, self-sovereign	No undue restrictions
4.6.3 (1) Smartphones	QR codes, RAIN tags, NFC enabled via ISO/IEC 18975. Compatible with smartphones, major operating systems, and browser.	QR codes, RAIN tags, NFC enabled via ISO/IEC 18975. Compatible with smartphones, major operating systems, and browser.	Hardware agnostic. Compatible with any device that runs a web browser.	Compatible with smartphones, major operating systems, and browser.

C.5 Security

See Table C.5 for information on security.

Table C.5 — information on security

ID scheme	**6.1**	**6.2**	**6.3**	**6.4**
Title	Structured path identification for organizations	Legal Entity Identifer (LEI)	Digital Object Identifiers (DOI) for organizations	Digital Object Identifiers (DOIs) for organizations

Combine with ISO/IEC 20248	~~Possible, not standard practice~~Not typical	Not typical	Yes, for verifiable credentials and metadata signatures	Possible, especially for content authentication
Combine with ISO 22376	Yes, for traceability and provenance documentation	Possible if mapped to products	Yes, well-aligned with credential-based traceability	Yes, especially with XID-structured DOIs
Use of public/private key pair	No (unless paired with 20248 such as XML Digital Signatures, JSON Web Signatures, Verifiable Credentials)~~or other mechanisms~~	No (central registry model)	Yes, integral to DID authentication and verification	Optional – depends on resolution and registry design

Commented [SG108]: Editorial: Consistent with the next column

Commented [SG109]: Be more specific regarding "other mechanisms" or delete.

C.6 Issuing process and prerequisites

See Table C.6 for information on issuing process and prerequisites.

Table C.6 — information on issuing process and prerequisites

ID scheme	6.1	6.2	6.3	6.4
Title	Structured path identification for organizations	Legal Entity Identifer (LEI)	Digital Object Identifiers (DOI) for organizations	Digital Object Identifiers (DOIs) for organizations
Prerequisite for web enabled access to DPP	Can be embedded in URL	Resolvable via GLEIF services	DID resolver and method required	Resolvable via DOI resolver
Process of issuing of product identifier	Get ICD and Org ID, then issue	Register via LOUs under GLEIF	Self-issued using DID method	Apply via DOI agency
Sovereignty about the data in the product identifier	Controlled by the economic operator	Maintained by economic operator and LOU	Full sovereignty by economic operator	Shared between economic operator and agency
Obligations of economic operator from technical terms in contracts	Contract with issuing authority	Based on GLEIF and LOU rules	None – self-governed	Depends on DOI agency
Changes in technology that would affect the product identifier	Minimal impact	Low impact, long-term stable	Depends on DID method	Resolver dependency
Ceases of the service of a contracted service provider	Not applicable	Other LOUs take over	Not applicable	Fallback via DOI federation
Termination of contracts	Yes	Standard process exists	Not applicable	Yes
Conclusion of new contracts	Yes	Yes	Freely possible	Yes
Unbundling of services	Yes	Yes	Yes	Yes
Procedures for switching a service provider	Yes	Yes	Yes	Yes

Commented [SG110]: Do any of these resolvers create a vendor lock-in requirement?

Reference to an online register, where the product identifier or elements of it are registered	ICD and Org ID in ISO registry	GLEIF public register	Public DID document	DOI agency registry

Commented [SG111]: Is this limited to ISO/IEC 6523? If so, does this mean facility IDs used in AIDC per ISO/IEC 15459-2 Registered Issuing Codes (IACs) must be included in ISO/IEC 6523 to be compliant?

Additional services required to issue and maintain the product identifier	None	None	No, unless using certs	Resolver service needed

C.7 Examples

C.7.1 ID scheme 6.1: Structured path identification for organizations

See Table C.7 for a few examples of structured path identification for organizations, ID schemes included in ISO/IEC 6523-1.

Table C.7 — Structured path identification for organizations

Name of ID scheme	ICD Code	Description
GS1 Global Location Number (GLN)	0088	Used to identify legal entities, functional entities, and physical locations globally.
Dun & Bradstreet (DUNS)	0060	Unique business identifiers used globally for legal entities and company verification.
SIRENE (France)	0012	Used to identify French companies and establishments.
VAT Identifier (Germany)	0195	Identifier for German companies (based on VAT registration).
Legal Entity Identifier (LEI	0199	Identifies legal entities involved in financial transactions. Used for regulatory reporting, finance, and in supply chain transparency.

C.7.2 ID scheme 6.2: Legal Entity Identifier (LEI)

See Table C.8 for an example of a Legal Entity Identifier (LEI).

Table C.8 — Legal Entity Identifier (LEI)

Component	Meaning	Value
LEI	20-character LEI, issued under ISO 17442.	5493001KJTIIGC8Y1R12
Scheme & Domain	https://www.domain-abc.com	
Example 1: LEI (020)	LEI in ISO/IEC 18975 format	5493001KJTIIGC8Y1R12
Full example 1	https://www.domain-abc.com/020/5493001KJTIIGC8Y1R12	
Example 2: LEI (.020)	LEI in EN IEC 61406-2 format	5493001KJTIIGC8Y1R12
Full example 2	https://www.domain-abc.com/?.020=5493001KJTIIGC8Y1R12	

Commented [SG112]: Editorial: Please use the example domains reserved for documentation purposes (RFC 6761) instead of the current examples.

Commented [SG113]: Editorial: Please use the example domains reserved for documentation purposes (RFC 6761) instead of the current examples.

C.7.3 ID Scheme 6.3: Decentralized identifiers (DIDs) for organizations

See Table C.9 for an example of Decentralized identifiers (DIDs) for organizations.

Table C.9 — Decentralized identifiers (DIDs) for organizations

Component	Meaning	Value
DID Scheme	DID method prefix as per DIDs v1.0:2022	did:
Method	DID method (e.g., web, ethr, ebsi)	web
Domain & Path	Fully qualified domain controlled by the economic operator	abc.com:facility:plant-12
Metadata	DID Document may include public keys, service endpoints, facility roles, granularity, etc.	Stored in DID Document
Full example	did:web:abc.com:facility:plant-12	

C.7.4 ID Scheme 6.4: Digital Object Identifiers (DOIs) for organizations

See Table C.10 for an example of Digital Object Identifiers (DOIs) for organizations.

Table C.10 — Digital Object Identifiers (DOIs) for organizations

Component	Meaning	Value
Scheme & Domain	Protocol and resolver domain	https://doi.org
Prefix (10.23)	Issuing agency prefix assigned under ISO 26324	10.23
Suffix	Identifier created by the economic operator or issuing agency	BB55-375D-4B8F-A0DD-3FEB
Full DOI	Complete identifier (prefix + suffix)	10.23/BB55-375D-4B8F-A0DD-3FEB
Resolution	Handled by DOI resolver, redirects to Digital Product Passport (DPP) URL	Redirect managed by doi.org
Full example	https://doi.org/10.23/BB55-375D-4B8F-A0DD-3FEB	

Annex ZA
(informative)

Relationship between this European Standard and the essential requirements of 2024/1781

This European Standard has been prepared under a Commission's standardization request M/604to provide one voluntary means of conforming to essential requirements of Article 10 and 11 of 2024/1781 Ecodesign for Sustainable Product Regulation (ESPR).

Once this standard is cited in the Official Journal of the European Union under that 2024/1781, compliance with the normative clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding requirements of that 2024/1781, and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and the essential requirements of Article 10 and 11 of 2024/1781

Essential requirements specified in Article 10 and 11 of 2024/1781	Sub-clause(s) of this EN	Remarks/Notes
Article 10, (1), (a)	4.1.2, 4.2.2, 4.5.2	Ensures the identifier is unique, persistent, and encoded in a data carrier
Article 10, (1), (b)	N/A	-
Article 10, (1), (c)	N/A	-
Article 10, (1), (d)	4.3.2, 4.4.2, 4.5.2, 4.6.2	Ensures structured, machine-readable data using open, interoperable standards without vendor lock-in.
Article 10, (1), (e)	4.6.2	Public DPP information is accessible without credentials, preventing unauthorized personal data storage.
Article 10, (1), (f)	4.4.2	Supports identifier granularity (model, batch, item) and traceability through consistent linking.
Article 10, (1), (g)	N/A	-
Article 10, (2)	N/A	-
Article 10, (3), (a)	4.5.2	Retailers and marketplaces can access and use identifiers where physical access is not possible.
Article 10, (3), (b)	N/A	-
Article 10, (4)	N/A	-
Article 11, (a)	4.5.2, 4.6.2	Open standards and no vendor lock-in enable interoperability across DPP systems.
Article 11, (b)	4.6.2	Open, non-discriminatory access ensures availability of public DPP data to all stakeholders.
Article 11, (c)	4.2.2	Ensures DPP persistence even after insolvency or cessation, supported by registry use.
Article 11, (d)	4.4.2	New DPPs are linked to originals for traceability when changes in granularity occur.
Article 11, (e)	4.2.2	DPP remains available throughout life cycle, including after economic operators exit.
Article 11, (f)	N/A	-

Commented [SG114]: Without specifications and rules for the exact encoding in data carriers you cannot determine if uniqueness will be achieved.
Therefore, refer to or define rules for the exact encoding in data carriers.

Essential requirements specified in Article 10 and 11 of 2024/1781	Sub-clause(s) of this EN	Remarks/Notes
Article 11, (g)	4.6.2	Open and transparent design supports data authenticity, reliability, and integrity.
Article 11, (h)	4.6.2	Transparency and minimal access barriers help ensure privacy, security, and fraud prevention.
Article 11 (2)	N/A	-

WARNING Presumption of conformity stays valid only as long as a reference to this European Standard is maintained in the list published in the Official Journal of the European Union. Users of this standard should consult frequently the latest list published in the Official Journal of the European Union.

WARNING Other Union legislation may be applicable to the products falling within the scope of this standard.

Bibliography

Commented [SG115]: Editorial: Entry 12 added per its 'informative' reference in Annex B

[1] Ecodesign for Sustainable Product Regulation (ESPR) - https://eur-lex.europa.eu/eli/reg/2024/1781/oj

[2] EN IEC 61406-2:2024, *Identification link - Part 2: Types/models, lots/batches, items and characteristics*

[3] EN IEC 61406-1:2022, *Identification Link - Part 1: General requirements*

[4] did:web Method Specification - https://w3c-ccg.github.io/did-method-web/

[5] did:ethr - https://github.com/uport-project/ethr-did

[6] did:ebsi - https://hub.ebsi.eu/vc-framework/did/legal-entities

[7] ISO/IEC 15962:2022, *Information technology — Radio frequency identification (RFID) for item management — Data protocol: data encoding rules and logical memory functions*

[8] ISO/IEC 18975:2024, *Information technology — Automatic identification and data capture techniques — Encoding and resolving identifiers over HTTP*

[9] ISO/IEC 20248:2022, *Information technology — Automatic identification and data capture techniques — Digital signature data structure schema*

[10] vLEI (Verifiable Legal Entity Identifier) - https://www.gleif.org/en/vlei/introducing-the-verifiable-lei-vlei

[11] Decentralized Identifiers (DIDs) v1.0:2022, *https://www.w3.org/TR/did-1.0/*

[12] GS1 General Specifications, ESPR DPP AIDC Application Standard

[13] GS1 EPC Tag Data Standard (TDS), https://ref.gs1.org/standards/tds/

Page 18: [1] Commented [SG25] **Nadi Gray** **05/07/2025 22:44:00**

The requirement can be met by ISO/IEC 15459 standards and industry standards like GS1 as sufficient transparency exists for the policies, processes and standards. However for this requirement to be met by DOIs or DIDs, as well as any novel RFID identification scheme, AIDC systems developers need to know where these policies, processes, and standards exist.

For example, are DOIs prefaced by an ISO/IEC 15459-2 Issuing Agency Code XID still DOIs? Are they conformant with ISO/IEC 15459-3 and if so, by whom, how, and where are the specifications and rules developed to ensure conformity to ISO/IEC 15459 and this European Standard?

For DIDs, by whom, how, and where are the specifications and rules developed to ensure conformity to this European Standard?

For RFID, industry wide agreements are pending on what to use for smart device encoding/decoding. Without these specifications and rules, this requirement cannot be measured for conformity nor implemented in a uniform manner by AIDC service offerings. Please see the comment regarding the timing of these specifications from GS1 in the Data Carrier Standard Section 6.3.4.3.

Page 28: [2] Commented [SG59] **Nadi Gray** **06/07/2025 14:30:00**

Annex A appears to be advising product manufacturers to deploy finer levels of granularity as a default, but this comes at great expense and complexity for many product categories and ignores the fact that granularity can easily be introduced or withdrawn for identification scheme 5.1.2.1 and perhaps 5.1.2.2. Should this Annex remain, the guidance should be based on assessments conducted during the Delegated Act stage. A change to the name of the Annex and the additional text is recommended to be more inclusive of the products covered by the regulation.

The legal text of the Ecodesign for Sustainable Products Regulation (ESPR) does not refer to any default mode of identification. Article 9 (2) clearly defers any decision on the level of granularity to the future delegated acts setting ecodesign requirements. Recital 33 of the ESPR reiterates that "*the impact assessments carried out when preparing the delegated acts setting ecodesign requirements should analyse the costs and benefits of setting information requirements through digital product passports at model, batch or item level".* When making such a decision, Recital 33 further highlights that the choice of the level of granularity shall "*avoid costs for companies and for the public that are disproportionate to the wider benefits"* and that such a cost-benefits assessment depends on *"for example, the complexity of the value chain, the size, nature or impacts of the products considered."*

As a background, the identification of a product at an item level (default item-level IDs) entails significant costs:

- High economic costs for companies to manage UPI at batch or item level due to the need to invest in online label printing ability at all manufacturing plants.
- Environmental costs due to the need to store large quantities of data.
- Limited benefits, since products belonging to the same model have similar environmental characteristics, in such a way that it is redundant to go to the batch/item level.

Any decision to select the item level should balance the costs above with potential benefits. This is more important at a time where the EU Commission has set competitiveness and reduction of administrative burden as its key priorities.

To sum up, EN standard should introduce any default mode of identification since this runs counter to the legal text of the ESPR that defers this decision to the product-specific delegated acts. While for product groups complying with certain criteria the item level may be considered, the selection of the granularity level should only come at the end of a thorough impact assessment. That is why EN standards should not refer to any notion of "default" identification.