
**Supply chain applications of RFID —
Product packaging**

*Applications de chaîne d'approvisionnements de RFID — Empaquetage
de produit*

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ISO 17366:2009

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 17366 was prepared by Technical Committee ISO/TC 122, *Packaging*, in collaboration with Technical Committee ISO/TC 104, *Freight containers*.

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Introduction

The *supply chain* is a multi-level concept that covers all aspects of taking a product from raw materials to a final product including shipping to a final place of sale, use and maintenance and potentially disposal. Each of these levels covers many aspects of dealing with products and the business process for each level is both unique and overlapping with other levels.

This International Standard has been created in order to ensure compatibility at the physical, command and data levels with the four other International Standards under the general title: *Supply chain applications of RFID*. Where possible, this compatibility takes the form of interchangeability. Where interchangeability is not feasible, the International Standards within this suite are interoperable and non-interfering. The International Standards within the complete series of *Supply chain applications of RFID* include

- ISO 17363, *Supply chain applications of RFID — Freight containers*,
- ISO 17364, *Supply chain applications of RFID — Returnable transport items (RTIs)*,
- ISO 17365, *Supply chain applications of RFID — Transport units*,
- ISO 17366, *Supply chain applications of RFID — Product packaging*, and
- ISO 17367, *Supply chain applications of RFID — Product tagging*.

These International Standards define the technical aspects and data hierarchy of information required in each layer of the supply chain. The air-interface and communications protocol standards supported within the *Supply chain applications of RFID* International Standards are ISO/IEC 18000; commands and messages are specified by ISO/IEC 15961 and ISO/IEC 15962; semantics are defined in ISO/IEC 15418; syntax is defined in ISO/IEC 15434.

Although not pertinent to this International Standard, the work of

- ISO/IEC JTC 1, *Information technology*, SC 31, *Automatic identification and data capture techniques*, in the areas of air interface, data semantic and syntax construction and conformance standards, and
- ISO/TC 104, *Freight containers*, in the area of freight container security, including electronic seals (e-seals) (i.e. ISO 18185) and container identification

is considered valuable.

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Supply chain applications of RFID — Product packaging

1 Scope

This International Standard defines the basic features of RFID for the use in the supply chain when applied to product packaging. In particular it

- provides specifications for the identification of the product packaging,
- makes recommendations about additional information on the RF tag,
- specifies the semantics and data syntax to be used,
- specifies the data protocol to be used to interface with business applications and the RFID system,
- specifies the minimum performance requirements,
- specifies the air interface standards between the RF interrogator and RF tag, and
- specifies the reuse and recyclability of the RF tag.

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2 Conformance and performance specifications

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All of the devices and equipment that claim conformance with this International Standard shall also conform to the appropriate sections and parameters specified in ISO/IEC TR 18046 for performance and ISO/IEC TR 18047-6 (for ISO/IEC 18000-6, Type C) and ISO/IEC TR 18047-3 (for the ASK interface of ISO/IEC 18000-3, Mode 3) for conformance.

When, through trading-partner agreement, other specific ISO/IEC 18000 air interfaces are employed (i.e. ISO/IEC 18000-2, Type A and ISO/IEC 18000-7) the corresponding part of ISO/IEC 18047 shall be used.

3 Normative references

The following referenced documents are indispensable for the application 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 445, *Pallets for materials handling — Vocabulary*

ISO 830, *Freight containers — Vocabulary*

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

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

ISO/IEC 15459-4, *Information technology — Unique identifiers — Part 4: Individual items*

ISO 17366:2009(E)

ISO/IEC 15961, *Information technology — Radio frequency identification (RFID) for item management — Data protocol: application interface*

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

ISO/IEC 15963, *Information technology — Radio frequency identification for item management — Unique identification for RF tags*

ISO 17364, *Supply chain applications of RFID — Returnable transport items (RTIs)*

ISO/IEC 18000-3, *Information technology — Radio frequency identification for item management — Part 3: Parameters for air interface communications at 13,56 MHz*

ISO/IEC 18000-6, *Information technology — Radio frequency identification for item management — Part 6: Parameters for air interface communications at 860 MHz to 960 MHz*

ISO/IEC TR 18001, *Information technology — Radio frequency identification for item management — Application requirements profiles*

ISO/IEC TR 18046, *Information technology — Automatic identification and data capture techniques — Radio frequency identification device performance test methods*

ISO/IEC TR 18047-3, *Information technology — Radio frequency identification device conformance test methods — Part 3: Test methods for air interface communications at 13,56 MHz*

ISO/IEC TR 18047-6, *Information technology — Radio frequency identification device conformance test methods — Part 6: Test methods for air interface communications at 860 MHz to 960 MHz*

ISO/IEC 19762-1, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 1: General terms relating to AIDC*

ISO/IEC 19762-3, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 3: Radio frequency identification (RFID)*

ISO 21067, *Packaging — Vocabulary*

ISO/IEC TR 24729-1, *Information technology — Radio frequency identification for item management — Implementation guidelines — Part 1: RFID-enabled labels and packaging supporting ISO/IEC 18000-6C*

ANS MH10.8.2, *Data Identifiers and Application Identifiers*

EPCglobal, *Tag Data Standards, Version 1.3*

GS1 *General Specifications*

ICNIRP Guidelines, *Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)*

IEEE 1451.7, *Smart Transducer Interface for Sensors and Actuators — Transducers to Radio Frequency Identification (RFID) Systems Communication Protocols and Transducer Electronic Data Sheet Formats*

IEEE C95-1, *IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 445, ISO 830, ISO 17364, ISO/IEC 19762-1, ISO/IEC 19762-3 and ISO 21067 apply.

5 Concepts

5.1 Supply chain model

Figure 1 gives a graphical representation of the supply chain. It shows a conceptual model of possible supply chain relationships, not a one-for-one representation of physical things. Although several layers in Figure 1 have clear physical counterparts, some common supply chain physical items fit in several layers depending on the use case. For example, a repetitively used pallet under constant ownership would be covered by ISO 17364 as an RTI; a pallet that is part of a consolidated unit load would be covered by ISO 17365 as a transport unit; and a pallet that is integral to a single item would be covered by this International Standard as product packaging.

Layers 0 to 4 are addressed within the series of International Standards *Supply chain applications of RFID* (see Introduction). Layer 5 is addressed by the work of ISO/TC 204/WG 7.

Layer 1 in Figure 1 and product packaging (as defined in ISO 17364:2009, 4.9) are the subject of this International Standard.

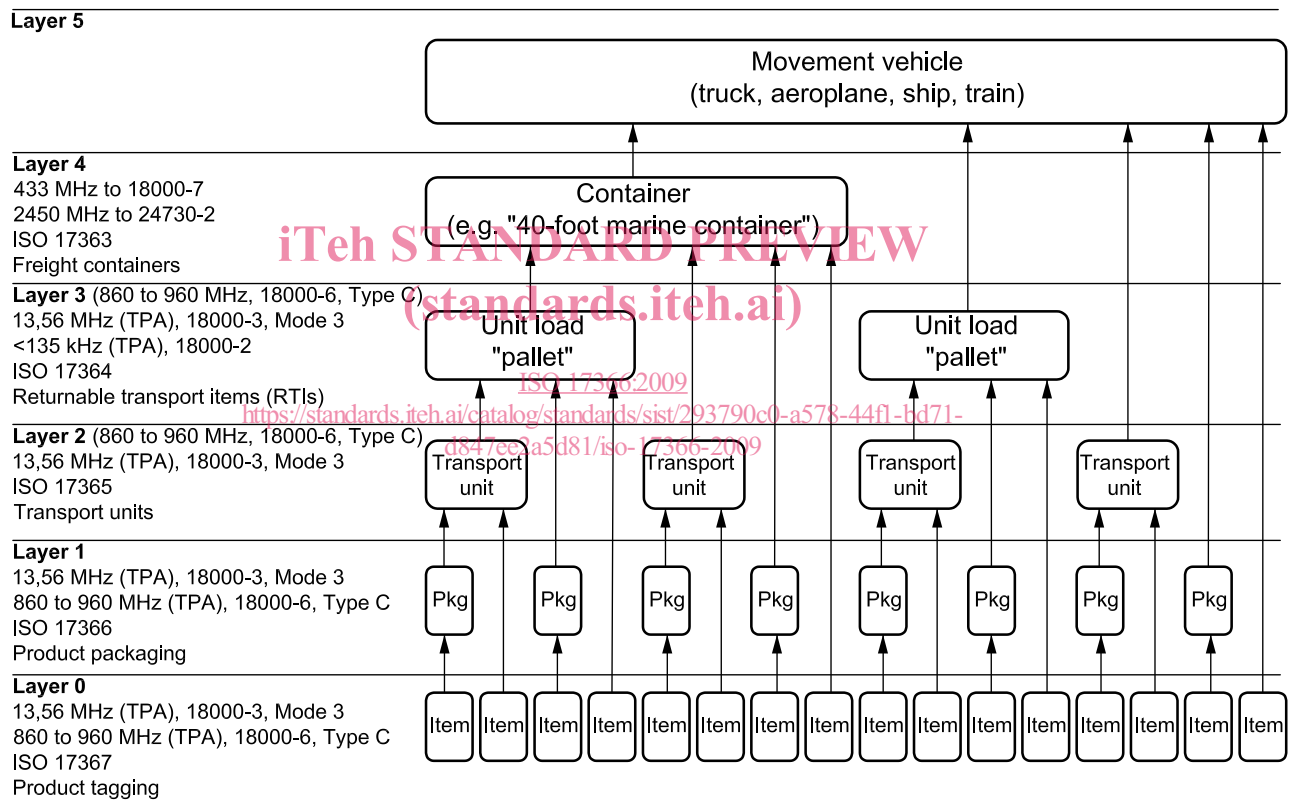


Figure 1 — Supply chain layers

Once tagged, product packaging layer tags can be distinguished from other layer tags by use of a *group select* methodology contained in the RFID interrogator/reader. This group select function allows the interrogator and supporting automated information systems (AIS) to quickly identify product packaging layer tags. As depicted in 5.2.2, the groups select methodology is further elaborated in ISO/IEC 15961.

5.2 Unique identification of product packaging

5.2.1 General

Unique product packaging identification is a process that assigns a unique data string to an individual package, or in this case to an RFID tag that is associated to the product package. The unique data string is called the unique transport unit identifier. Unique item identification of transport units allows data collection and

management at a granular level. The benefits of granular level data are evident in such areas as maintenance, warranties and enabling electronic transactions of record. This granularity is possible only if each tagged item has a unique item identifier.

Product package layer tagging can uniquely identify products, thus providing differentiation between like and unlike product packages. Product package layer tagging can also be used to identify product packages by differentiating unlike product packages but not differentiating between like product packages. This is used for commodities where individualization is impractical or undesirable.

The unique product packaging identifier described above is a unique identifier as described in ISO/IEC 15459-5. The unique item identifier (UII) provides granular discrimination between like items that are identified with RFID tags. The unique tag ID (as defined by ISO/IEC 15963) is a mechanism to uniquely identify RFID tags and is not the unique product packaging identifier defined in this International Standard.

The minimum data elements required for unique identification are an enterprise identifier and a serial number that is unique within that enterprise identifier. Commonly, a part or model number is also required to achieve unique identification.

This International Standard uses the following identification mechanisms for unique product package identification:

- unique identifiers for supply chain items (ISO/IEC 15459-4);
- GS1 Serialized Global Trade Item Number (SGTIN).

5.2.2 International unique identification of product packages

The unique identifier of ISO/IEC 15459 provides identification schemes for various layers of the supply chain, from layer 0 (products) up to layer 3 (returnable transport items). The unique identification of product packages shall use ISO/IEC 15459-4. Unique identification is provided by three components:

- a) issuing agency code (IAC), <https://standards.iteh.ai/catalog/standards/sist/293790c0-a578-44f1-bd71-17366-2009>
- b) company identification number (CIN), [d847ee2a5d81/iso-17366-2009](https://standards.iteh.ai/catalog/standards/sist/293790c0-a578-44f1-bd71-17366-2009)
- c) serial number (SN),

preceded by an AFI and Data Identifier (DI). The AFI code assignments table in ISO/IEC 15961:2004, Annex B, permits identification of the supply chain layer, i.e. product = A1_{HEX}, transport unit = A2_{HEX}, returnable transport item = A3_{HEX} and product package = A5_{HEX}.

The Data Identifier shall be “25S”. The ISO/IEC 15459 registration authority assigns the IAC. The CIN is assigned by the issuing agency. The company registered with the issuing agency assigns the serial number. The serial number shall be no longer than 20 alphanumeric characters.

Table 1 — 1736x AFI Assignments

AFI (HEX)	Assignment	International Standard
A1	17367_Non-EPC	ISO 17367 — <i>Supply chain applications of RFID — Product tagging</i>
A2	17365_Non-EPC	ISO 17365 — <i>Supply chain applications of RFID — Transport units</i>
A3	17364_Non-EPC	ISO 17364 — <i>Supply chain applications of RFID — Returnable transport items (RTIs)</i>
A4	17367_HazMat	ISO 17367 — <i>Supply chain applications of RFID — Product tagging (HazMat)</i>
A5	17366_Non-EPC	ISO 17366 — <i>Supply chain applications of RFID — Product packaging</i>
A6	17366_HazMat	ISO 17366 — <i>Supply chain applications of RFID — Product packaging (HazMat)</i>
A7	17365_HazMat	ISO 17365 — <i>Supply chain applications of RFID — Transport units (HazMat)</i>
A8	17364_HazMat	ISO 17364 — <i>Supply chain applications of RFID — Returnable transport items (RTIs) (HazMat)</i>
A9	17363_Non-EPC	ISO 17363 — <i>Supply chain applications of RFID — Freight containers</i>
AA	17363_HazMat	ISO 17363 — <i>Supply chain applications of RFID — Freight containers (HazMat)</i>

When stored on a tag with a technology that supports AFIs, the unique identifier shall also be associated with an AFI. EPC does not use AFIs; consequently, there are no AFIs used for product packages employed in retail applications using EPCglobal.

To define its class (in the ISO/IEC 15459 sense), the unique identifier shall have an associated class identifier, which is the Data Identifier "25S". For the purposes of this International Standard, a unique identifier of product packages can be up to 35 alphanumeric characters in length, including the Data Identifier (an3+an..32). See Table 2.

Table 2 — UII element string

Format of the license plate	
Data Identifier	IAC, company identification number (CIN), serial number
25S	N ₁ N ₂ N ₃ N ₄ N ₅ N ₆ N ₇ N ₈ N ₉ N ₁₀ N ₁₁ N ₁₂ N ₁₃ N ₁₄ N ₁₅ N ₁₆ N ₁₇ . . . N ₃₂

5.2.3 Serialized global trade identification number (SGTIN)

The EPCglobal serialized global trade identification number (SGTIN) is a unique item identifier (UII) capable of providing unique item identification of product packages.

Table 3 — SGTIN element string

	Header	Filter Value	Partition	Company Prefix	Item Reference	Serial Number
Number of bits	8	3	3	20 to 40	24 to 4	38
Reference	0011 0000 ^a	— ^b	— ^b	999 999 to 999 999 999 999 ^c	9 999 999 to 9 ^c	274 877 906 943 ^d
NOTE	Maximum decimal value range of Company Prefix and Item Reference fields vary according to the contents of the partition field.					
a	Binary value.					
b	Refer to EPCglobal, <i>Tag Data Standards</i> , Version 1.3 for values.					
c	Maximum decimal range.					
d	Maximum decimal value.					

The SGTIN consists of the following information elements:

- The *Header*, which is defined in EPCglobal, *Tag Data Standards*, Version 1.3. It is eight (8) bits long and for an SGTIN-96 is the value 30_{HEX}.
- The *Filter Value*, which is defined in EPCglobal, *Tag Data Standards*, Version 1.3. It is three (3) bits long and identifies whether an EPC is for a retail trade item, a standard trade item grouping, or a single shipping/consumer trade item.
- The *Partition*, which is defined in EPCglobal, *Tag Data Standards*, Version 1.3. It is three (3) bits long, carries one of seven (7) values, and identifies where the subsequent *Company Prefix* and *Item Reference* numbers are divided.
- The *Company Prefix*, assigned by GS1 to an organization. The Company Prefix is the same as the Company Prefix digits within a GS1 GTIN decimal code. The combined Company Prefix and Item Reference are 44 bits long (13 decimal digits).