INTERNATIONAL STANDARD

ISO
17364

Supply chain applications of RFID — Returnable transport items (RTIs) and returnable packaging items (RPIs)

Applications de chaîne d'approvisionnements de RFID — Éléments restituables de transport (RTIs) et éléments d'empaquetage restituables (RPIs)

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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 17364 was prepared by Technical Committee ISO/TC 122, *Packaging.*

This second edition cancels and replaces the first edition (17364:2009).

This International Standard has three annexes, two of which, A and B, provide normative information, and one which provides informative information.

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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) and returnable packaging items (RPIs);*

— ISO 17365, *Supply chain applications of RFID — Transport units;*

— ISO 17366, *Supply chain applications of RFID — Product packaging;*

— 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 these International Standards are ISO/IEC 18000 and ISO/IEC/IEEE 8802; 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 following work is considered valuable:

— 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;

— ISO/TC 104, *Freight containers*, in the area of freight container security, including electronic seals (e-seals) (i.e. ISO 18185) and container identification;

— ISO/TC 51*, Pallets for unit load method of materials handling*, in the area of associated terminology, pallet dimensions, design, and testing.

This International Standard defines the requirements for RFID tags for returnable transport items (RTIs). RTIs are defined as all means to assemble goods for transportation, storage, handling and product protection in the supply chain which are returned for further usage, including, for example, pallets with and without cash deposits as well as all forms of reusable crates, trays, boxes, roll pallets, barrels, trolleys, pallet collars and lids.

An important concept here is the use cases of such things as *unitized loads*, pallets and returnable transport items. How a pallet is used can determine whether it is covered under this International Standard as a *returnable transport item* or within ISO 17365 as a *transport unit*. If ownership title of the pallet remains with its owner (shipper) then this International Standard is applicable. If the ownership title of a pallet is transferred to the customer as part of a unitized load then it is considered an element of that unitized load, and the applicable International Standard is ISO 17365.

Additionally, this edition of 17364 introduces the concept of returnable packaging items (RPIs). RPIs are components of the RTI that must be tracked as well as the RTI itself as an asset of the owner/shipper. Annex A provides guidance on RPIs.

Specific to RTIs is the placement of tagged packed products and products inside the RTI.

Owners and other users of RTIs can use this International Standard. It ensures the unambiguous and optimal use of RTIs in the supply chain. In conjunction with the complete series of these International Standards, a seamless application of the RTIs within the total supply chain is enabled.

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Supply chain applications of RFID — Returnable transport items (RTIs) and returnable packaging items (RPIs)

1 Scope

This International Standard defines the basic features of RFID for use in the supply chain when applied to returnable transport items (RTIs). In particular it

— provides specifications for the identification of the RTI and the returnable packaging item (RPI),

— 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.

2 Conformance and performance specifications

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 18046 (all parts) for performance and ISO/IEC 18047-6 (for ISO/IEC 18000-63, Type C) and ISO/IEC 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 8601, *Data elements and interchange formats — Information interchange — Representation of dates and times*

ISO/IEC/IEEE 8802-15, 4, *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements — Part 15.4: Wireless medium access control (MAC) and physical layer (PHY) specifications for low-rate wireless personal area networks (WPANs)*

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

ISO/IEC 15459-5, *Information technology — Automatic identification and data capture techniques — Unique identification — Part 5: Individual returnable transport items (RTIs)*

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

ISO/IEC 15962:—[1]), *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 17365, *Supply chain applications of RFID — Transport units*

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 18000-63, *Information technology — Radio frequency identification for item management — Part 63: Parameters for air interface communications at 860 MHz to 960 MHz Type C*

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

ISO/IEC 18047-2, *Information technology — Radio frequency identification device conformance test methods — Part 2: Test methods for air interface communications below 135 kHz*

ISO/IEC 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 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 18047-7, *Information technology — Radio frequency identification device conformance test methods — Part 7: Test methods for active air interface communications at 433 MHz*

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

ISO 21067, *Packaging — Vocabulary*

ISO/IEC/IEEE 21451-7, *Information technology — Smart transducer interface for sensors and actuators — Part 7: Transducer to radio frequency identification (RFID) systems communication protocols and Transducer Electronic Data Sheet (TEDS) formats*

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*

GS1 EPC, *Tag Data Standard,* Version 1.6

GS1 *General Specifications*

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

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

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1) To be published.

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 445, ISO 830, ISO/IEC 19762-1, ISO/IEC 19762-3, ISO 21067 and the following apply. For the purposes of this document, hexadecimal characters are represented as 0xnn, where "nn" is the hexadecimal value.

4.1
product
useable content of a package

Note 1 to entry: A special case exists where the usable content is not enclosed in any form of packaging.

4.2
product package
packaging, containing one or more products (same or different), together with any protective or other materials where required to ease handling, storage, transport, etc

Note 1 to entry: A product package may be an item packaged singularly, multiple quantities of the same item packaged together, or a group of parts packaged together.

Note 2 to entry: Adapted from ISO 22742:2010, definition 3.32.

4.3
returnable transport item
RTI
any product for the purposes of transport, handling and/or distribution of one or more products or product packages that are returned for further usage

EXAMPLE   Pallets with and without cash deposits, as well as all forms of reusable crates, trays, boxes, roll pallets, barrels, and trolleys.

Note 1 to entry: The term "returnable transport item" implies that the ownership title of the item, e.g. pallet, remains with its owner (shipper), in which case this International Standard is applicable. If the ownership title of the item, e.g. pallet, is transferred to the customer as part of a unitized load then it is considered an element of that unitized load, and the applicable International Standard is ISO 17365.

Note 2 to entry: Freight containers, trailers and other similar enclosed modules are not covered by the term "returnable transport item".

Note 3 to entry: The term "returnable transport equipment" is considered to have the same definition as the term "returnable transport item" within an electronic data interchange environment.

Note 4 to entry: Ownership does not change at time of purchase or delivery.

4.4
freight container
article of transport equipment which is

a)   of a permanent character and accordingly strong enough to be suitable for repeated use;

b)   specially designed to facilitate the carriage of goods by one or more modes of transport, without intermediate reloading;

c)   fitted with devices permitting its ready handling, particularly its transfer from one mode of transport to another;

d)   so designed as to be easy to fill and empty;

e)   having an internal volume of 1 m^3 (approximately 35,3 ft^3)

[ISO 830:1999, definition 3.1]

3

4.5
packaging
any material used for the containment, protection, handling, delivery, storage, transport and presentation of goods

Note 1 to entry: Ownership changes at time of purchase or delivery.

4.6
transport package
transport packaging
any material used for the purposes of transport, handling and/or distribution of one or more products or product packages

Note 1 to entry: Ownership changes at time of purchase or delivery.

4.7
transport unit
transport packaging containing a single product/product package or collection of product/product packages (same or different) designed to enable these to be handled as a single transport entity

Note 1 to entry: Either a transport package or a unit load.

4.8
unitized
secured together so as to be handled as an entity

4.9
unit load
one or more transport packages or other items held together by means such as pallet, slip sheet, strapping, interlocking, glue, shrink wrap, or net wrap, making them suitable for transport, stacking, and storage as a unit

4.10
returnable packaging item
RPI
any material used for the "protection" of goods during handling, delivery, storage and transport that are returned for further usage

Note 1 to entry: See Annex A.

Note 2 to entry: Ownership does not change at time of purchase or delivery.

4.11
integrity
designed such that any modification of the electronically stored information, without proper authorization, is not possible

4.12
ISO tag
international unique identification tag
ISO/IEC 18000-63, Type C or ISO/IEC 18000-3 Mode 3 tag with Protocol Control bit 17 set at "1" indicating that what follows is an Application Family Identifier (AFI)

4.13
EPC tag
ISO/IEC 18000-63, Type C or ISO/IEC 18000-3 Mode 3 tag with Protocol Control bit 17 set at "0" indicating that what follows is an EPC header

4.14
monolithic memory structure
memory storage that is addressable by a single addressing element

4.15
segmented memory structure
memory storage that is separated into more than one element and requires multiple addressing elements for access

4.16
conveyable
item that can be moved efficiently and safely on handling devices used to move material over a fixed line of travel

Note 1 to entry: For the purposes of this International Standard, such material handling devices or conveyors are considered to be continuous-loop belted systems moving packages or objects in a predetermined path and having fixed or selective points of loading or discharge. The width of the belt, height permitted within the facility, and weight capacity of the belt may determine whether the items are conveyable.

4.17
non-conveyable
item of such width, height or mass to preclude its movement on conveyor systems

4.18
use case
detailed description of a single activity in a business process that identifies data inputs and outputs, performance/timing requirements, the handling of error conditions and interfaces with external applications

5   Concepts

## 5.1   Differentiation between this layer and the preceding layers

Figures 1 and 2 give a graphical representation of the supply chain. They show a conceptual model of possible supply chain relationships, not a one-for-one representation of physical things. Although several layers in Figure 2 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 this International Standard 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 ISO 17366 as product packaging.

The term "supply chain layers" is a multi-level concept that covers all aspects of taking a product from raw materials to a final product to shipping to a final place of sale, use, maintenance and potentially disposal and returned goods. 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.

The Item Level through to the Freight Container Level layers are addressed within the suite of standards for "supply chain applications of RFID" (see Introduction) and are intended to enhance supply chain visibility. The Movement Vehicle Level is the purview of ISO TC 204/WG 7.

The RTI Level in Figure 2 and the RPIs (as defined in 4.10) are the subject of this International Standard.

RTI and RPI 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 RTI or RPI layer tags. As indicated in 5.2.2, the group select methodology is further elaborated in ISO/IEC 15961.
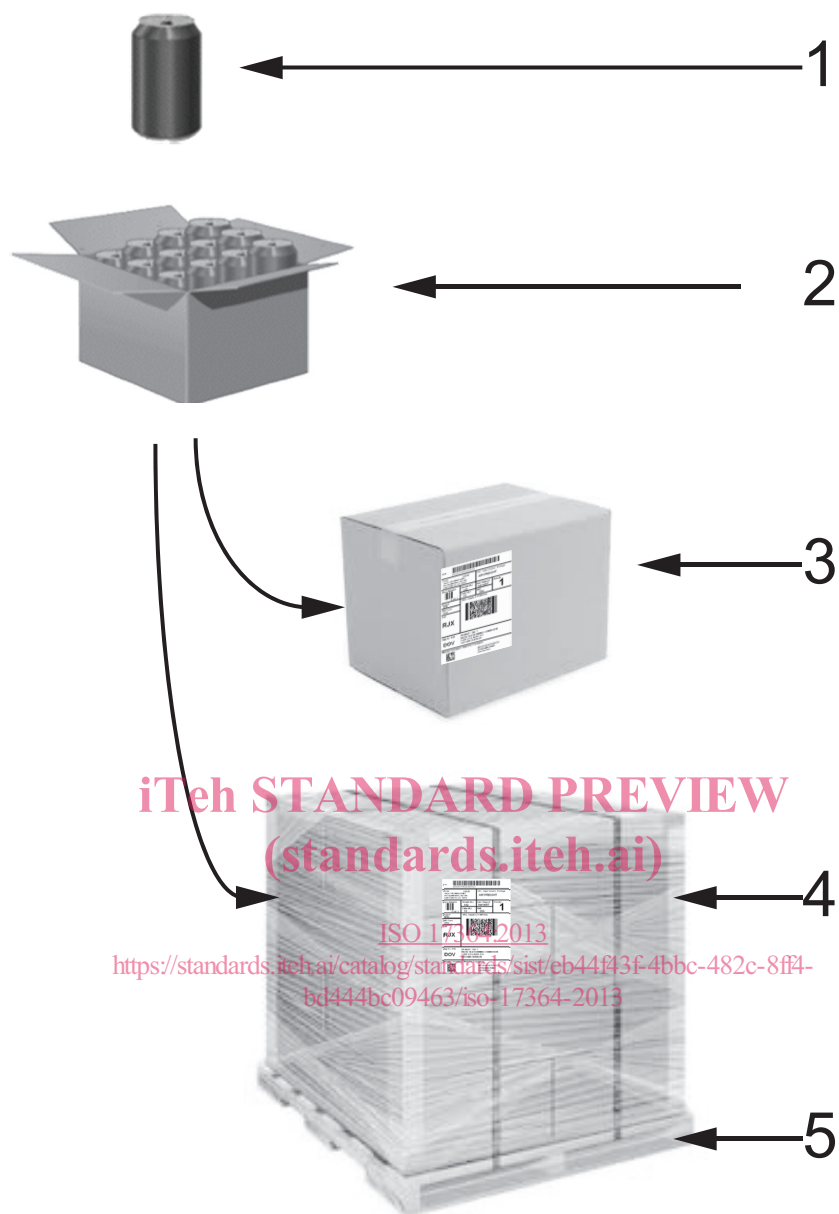
Key

1   primary packaging — consumer packaging — *(product)*
2   secondary packaging — outer packaging — *(product package)*
3   tertiary packaging — transport packaging — *(transport unit)*
4   tertiary packaging — unitized transport packaging — *(transport unit)*
5   pallet — *(returnable transport item — RTI)*
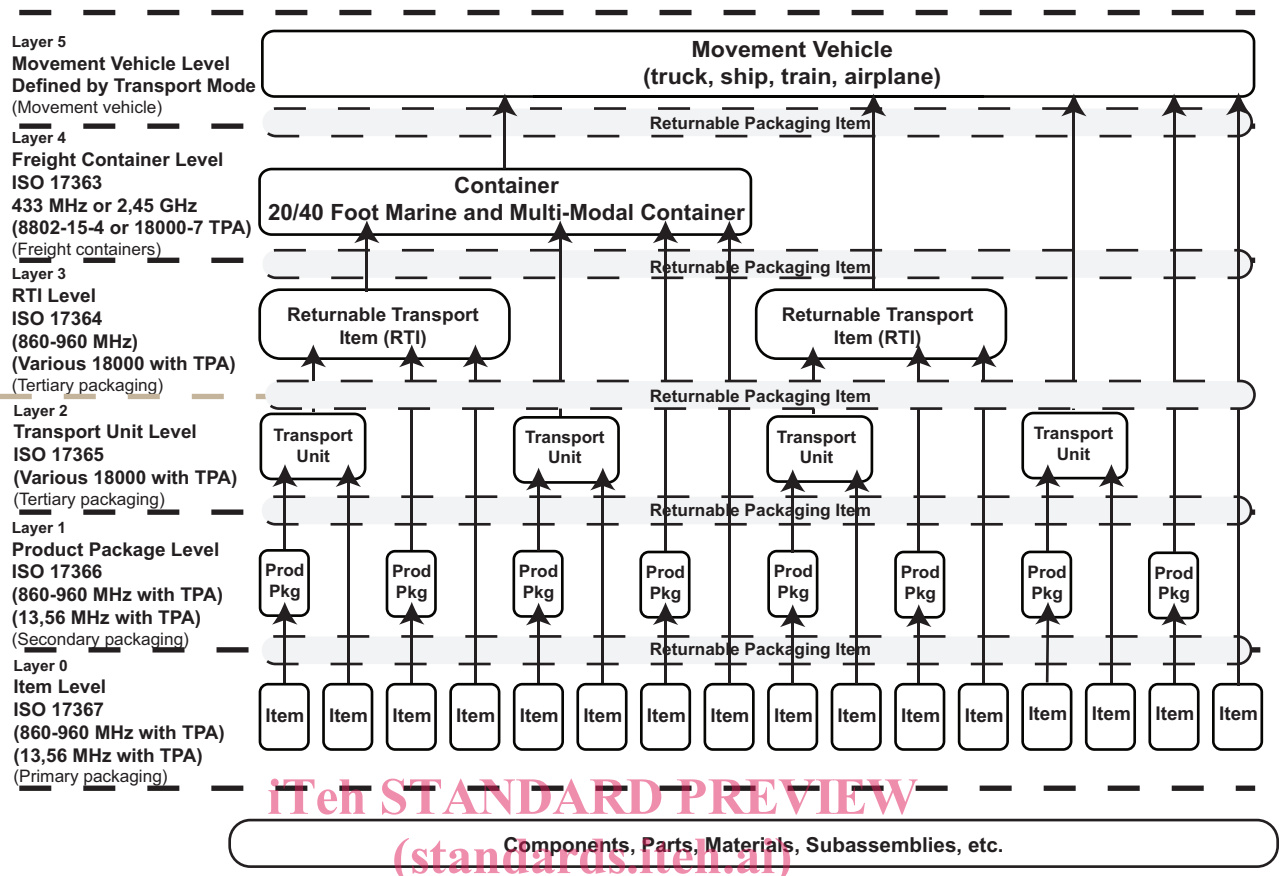
Figure 1 — Packaging

Figure 2 — Supply chain layers

5.2 Unique RTI and RPI identification

5.2.1 General

Unique RTI and RPI identification is a process that assigns a unique data string to an individual RTI or RPI, or in this case to an RFID tag that is associated to the RTI or RPI. The unique data string is called the unique RTI or RPI identifier. Unique item identification of RTIs or RPIs 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.

The information on items in the supply chain is often held on computer systems and may be exchanged between parties involved via electronic data interchange (EDI) and extensible mark-up language (XML) schemas. The unique item identifier should be used as a key to access this information.

The unique RTI or RPI identifier described above shall be the 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 RTI identifier defined in this International Standard.

RTI or RPI tagging provides unique identification of RTIs or RPIs. The minimum data elements required for unique identification are an enterprise identifier/company identification number (CIN) and a serial number (SN) that is unique within that enterprise identifier.

This International Standard uses the following identification mechanisms for unique RTI or RPI identification:

— unique identifier for RTIs (ISO/IEC 15459-5;