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Packaging — Measurement results for the use of RFID on returnable transport items —

Part 1: Metal returnable transport items

Emballages — Résultats de mesure pour l'utilisation d'étiquettes RFID sur les emballages de transport réutilisables —

Partie 1: Emballages de transport réutilisables en métal

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Foreword

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

A list of all parts in the ISO 22251 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

In recent years, the use of Radio Frequency Identification (RFID) in the supply chain has been seen as an ideal solution to the increasing demand for higher traceability and reduction of logistics costs and materials in supply chains around the world. In actual logistics and material handling, the introduction of returnable transport item (RTI) management with RFID makes it easy to establish remote bulk reading systems, which can significantly reduce management costs compared to management with conventional barcode systems.

Various RTIs, such as plate pallets and box pallets, are subject to RFID systems, but when RF tags are attached to metal RTIs, the RF tags can fail to operate because the reading distance becomes very short due to the inherent properties of the metal. Various RF tags can be used on metal, but the performance, durability and other properties of RF tags, the conditions for attachment and the conditions for using metal RTIs are not clear.

This document verifies the characteristics of RF tags attached to metal RTIs through experiments, and the results of these experiments will be useful for the actual use of RF tags on metal RTIs.

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Packaging — Measurement results for the use of RFID on returnable transport items —

Part 1:
Metal returnable transport items

1 Scope

This document summarizes measurement results for the use of RFID on metal returnable transport items (RTIs).

This document describes the following:

— types of metal RTIs,

— features, reliability of RFID used for metal RTIs, and

— measurement results for the use of RFID on metal RTIs.

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 19762, *Information technology — Automatic identification and data capture (AIDC) techniques — Vocabulary*

ISO 445, *Pallets for materials handling — Vocabulary*

ISO 21067-1, *Packaging — Vocabulary — Part 1: General terms*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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

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

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

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

3.1.1
serial number
SN
codes, such as sequential numbers, used for uniqueness

Note 1 to entry: The structure of the serial number can be decided by the company that is under the control of the issuing agency. This is normally composed of an item number and its production number (serial number).

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3.2 Abbreviated terms

EIRP	effective isotropic radiated power
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission
MB	memory bank
RF	radio frequency
RSSI	receiver signal strength indicator
SUS	stainless steel
UII	unique item identifier memory bank
USER	user memory bank

4 Characteristics of RFID for metal RTIs

4.1 General

In the automotive industry and other manufacturing industries, there is a need for metal RTI, and actual management systems using RFID have already been introduced in some manufacturing industries. However, insufficient results have been achieved due to a lack of experience and knowledge about the capabilities and performance of RFID and the effects of metals. In addition, many tests and examinations have been carried out toward the practical application of RFID. Annex B to Annex F present measurement results useful for the introduction of RFID, especially RF tags designed for metal RTIs. The concepts and data described in this document can be applied to other objects and materials.

The characteristic of RF tags attached on the “metal” and “durability test” has been confirmed in four validation studies in particular.

— communication distance: measurement of the RF tag’s communication performance (possible communication distance)

— communication time: measurement of the time it takes to write data to the RF tag

— durability test: verification of the durability of the RF tag

— field-application test: indication of the RFID implementation test points.

4.2 RF tag

The types of RF tags supported by the UHF band include passive tags, active tags and semi-active tags. This document covers inexpensive passive tags that do not need special maintenance such as battery replacement. When a RF tag is attached to a metal RTI as defined in this document, the communication performance of the RF tag is significantly degraded due to the following unfavourable effects:

— Radio interference is generated by reflected waves from the metal.

— Interfering with the magnetic field around the RF tag.

— Impedance at the IC’s connection is changed by the metal and the energy loss increases.

In these operating environments, standard RF tags such as general-purpose RF tags are completely unable to communicate.

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