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

Part 2: Plastic returnable transport items

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

Partie 2: Emballages de transport réutilisables en plastique

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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

The demand for more advanced traceability and reduction in both distribution costs and logistics materials has recently increased in supply chains worldwide, and the use of radio-frequency identification (RFID) in supply chains is regarded as an ideal solution. In actual logistics and material handling, many materials and items are lost or go missing due to the lack of an efficient returnable transport item (RTI) management system, imposing extra costs on companies and enterprises due to additional ordering.

Today, there is strong demand for efficient plastic RTI management especially in the automobile industry where many parts and components are designed exclusively for automotive use. Plastic RTIs are used to store and transport a variety of stored items. In this document, the measurement results of evaluations of RF tag on RTIs for the transport of automotive parts are presented. The results show the changes in durability and communication performance of RF tags attached to plastic RTIs when exposed to various environmental stresses. The results provide insight into the durability of RF tags in various RTI environments and will be useful in many situations where RF tags are attached to plastic RTIs.

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

Part 2:
Plastic returnable transport items

1 Scope

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

This document describes the followings:

— materials of plastic RTIs,

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

— measurement results for the use of RFID on plastic 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 (all parts), *Packaging — Vocabulary*

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, the ISO 21067 series 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

ETSI European Telecommunications Standards Institute

FCC Federal Communications Commission

PE polyethylene

PP polypropylene

RSSI received signal strength indicator

SUS stainless steel

4 Characteristics of RFID for plastic RTIs

4.1 General

When RF tags are attached to inexpensive plastic RTIs used for various purposes and RFID is used for operation management, the following points are considered.

— First, RF tags attached to inexpensive plastic RTIs also need to be low cost, but inexpensive RF tags marketed for general use are generally manufactured for use in the distribution industry, so it is unclear whether they are reliable enough for long-term use when attached to plastic RTIs. For example, price tag labels are attached to RF tags used in the distribution industry, but because they are used in one-way disposable applications, the conditions for attaching them are very different from plastic RTIs for returnable applications.

— Also, since plastic RTIs are generally transported using conveyor belts and forklifts, RF tags are subject to various forms of physical stress, such as vibration, impact, rough handling of plastic RTIs by operators, and shrinkage of plastic material due to temperature changes. In addition, they are also exposed to chemical stresses from chemicals and plastic RTI washing. However, few evaluations have been performed to assess the extent to which commercially available RF tags attached to RTIs are affected by stresses attached to plastic RTIs during transport and washing.

— As used RF tags are generally incinerated or dissolved, the safety of written data is not considered. In addition, for example, as the data of RF tags used in the automobile industry is common data based on ISO standards, there is no problem even if the data is leaked. However, if security information other than ISO standards is written, it is desirable to destroy used RF tags and IC chips so that the information cannot be read, and to incinerate or dissolve them.

4.2 Unit reliability evaluations

4.2.1 Overview of test methods

RF tags attached to plastic RTIs are subject to physical stresses such as vibrations, shocks, rough handling of plastic RTIs, temperature changes, and chemical stresses due to chemicals and washing during parts transport.

Therefore, 7 kinds of commercially available RF tags were attached to the materials used for plastic RTI, and 14 kinds of tests (see Table 1 " Summary of main results ") were conducted under the assumed conditions to evaluate the physical and the performance changes of the RF tags after the tests.

4.2.2 Plastic RTI types and materials

Plastic RTI includes special types such as containers, pallets, folding containers, and dunnages, but the materials themselves are broadly divided into PE and PP materials. (See Annex A Examples of Plastic RTIs for Supply Chain)

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