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Coding for radio frequency identification (RFID) tyre tags

Codage de tags d'identification des pneumatiques par radio fréquence (RFID)

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 31, *Tyres, rims and valves.*

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

This document describes data construction best practices, processes and methods for tyre identification, verification, traceability and product characteristics. An extensive effort has been undertaken to make data interchangeable between 2D (e.g. Data Matrix/QR Code) optical symbols and electronic media like RFID to permit the user to select the appropriate technology with a minimum impact on information technologies (IT) infrastructures. These technologies complement each other and may be used jointly or separately as the application can require. This document is focused on the application of RFID to achieve these ends.

The provisions in this document are intended to express the minimum requirements for passive RFID tags and are not intended to limit the development of the technology in the future.

This document also provides guidance to tyre manufacturers on using RFID tags for tyre identification during the manufacturing process or in the aftermarket (i.e. RFID patch application) in tyres, service life and for other purposes. Tyre dealers and retreaders may also use RFID tags for inventory and retread control of tyres, and fleets may use them for tyre record keeping, tyre performance analysis, maintenance and inventory control.

The use of an RFID tag in tyre application follows strict rules in order that the data format can be used globally within the tyre and transportation industries.

This standardization will allow for interoperability and the use of interchangeable hardware and software from multiple suppliers resulting in greater efficiencies.

This document:

— specifies the air interface standards required between the RFID interrogator (also known as a reader) and RFID tag;

— specifies the use of industry recognized GS1 codes;

— clarifies the role of the company prefix;

— specifies the semantics and data syntax to be used in the data construction for MB01;

— provides a unique item identifier for traceability (UII, stored in MB01);

— provides information on the use of the UII in MB01 as the link to database infrastructures;

— specifies the option for user memory bank (MB11).

This document is based on the requirements in the following:

— technology: only passive ultra high frequency (UHF) RFID tags are used;

— global interface: the air interface protocol is ISO/IEC 18000-63, which is equivalent to GS1 EPC Gen2 V2.0.1.

A unique item identifier (UII) is not the same as a part number, a DOT tire identification number (TIN), a CCC code, a branded ID, or other names for tyres. Foremost in making an ideal UII is to know who made the part. Because of this, the UII is often referred to as the “birth record”. A constraint with internally-derived numbering schemes is that they are only unique to the domain owner; they may have duplicates within the “world”, and rarely communicate intelligently who the owner actually is (outside of their domain). In order to clearly identify who, there must be a globally recognized register of companies. That is where GS1 play a key role.

The international role of the GS1 is to register companies and issue assigned company prefixes, much the same way that cell phones have assigned company IDs as provided by international telecommunications agencies.

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Coding for radio frequency identification (RFID) tyre tags

1 Scope

This document specifies the terms and definitions, general requirements and data structure for coding radio frequency identification (RFID) tyre tags.

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

ISO 20909, *Radio Frequency IDentification (RFID) tyre tags*

GS1 EPC™ Tag Data Standard[1)]

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19762 and ISO 20909 and the following apply.

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

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

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

3.1
memory bank
MB
designated name of a segmented memory structure

Note 1 to entry: ISO/IEC 18000-63 compliant tags have 4 (four) individually usable memory banks, numbered Memory Bank 00(MB00), Memory Bank 01(MB01), Memory Bank 10(MB10), Memory Bank 11(MB11). See Table 1.

3.2
company prefix
CP
number code of the tyre manufacturer provided by GS1 and encoded in SGTIN

1) This standard defines the Electronic Product Code™, and also specifies the memory contents of Gen 2 RFID Tags. In more detail, the Tag Data Standard covers two broad areas: the specification of the Electronic Product Code, including its representation at various levels of the EPC global Architecture and its correspondence to GS1 keys and other existing codes, and the specification of data that is carried on Gen 2 RFID tags, including the EPC, "user memory" data, control information, and tag manufacture information.

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3.3
global trade item number
GTIN
unique identifier for trade items used to look up product information in a database

3.4
serial number
number indicating place in a series and used as one of the components of the *unique item identifier* (3.6)

3.5
serialized global trade item number
SGTIN
electronic product code (3.7) including *GTIN* (3.3) and *serial number* (3.4) of a single trade item

3.6
unique item identifier
UII
birth record
unique identifier for a physical item that in this case is a tyre

Note 1 to entry: It refers to the unique identifier written into MB01 of the tyre RFID in this document.

Note 2 to entry: Item refers to products, transportation units, recyclable assets and services.

3.7
electronic product code
EPC
globally unique *serial number* (3.4) that identifies an object in the supply chain

Note 1 to entry: EPCs are administered by GS1.

3.8
lock
locking
ability of the tag protocol to cause:

— the reserved *memory bank* (3.1) MB00 to be read and write protected,

— the UII memory bank MB01 to be write protected,

— the user memory bank MB11 to be write protected

Note 1 to entry: Once “locked,” that memory bank can only be changed back to “readable / writable” by using the access password.

3.9
permalock
ability of the tag protocol to cause a *memory bank* (3.1) to be locked permanently

Note 1 to entry: Once “permalocked,” that memory bank cannot be unlocked whatever the access password.

3.10
Tag ID
TID
globally unique serialized identification of the individual silicon chip programmed and locked by the silicon manufacturer

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