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Gas cylinders — Identification and marking using radio frequency identification technology —

Part 2: Numbering schemes for radio frequency identification

Bouteilles à gaz — Identification et marquage à l'aide de la technologie d'identification par radiofréquences —

Partie 2: Schémas de numérotage pour identification par radiofréquences

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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 58, *Gas cylinders*, Subcommittee SC 4, *Operational requirements for gas cylinders*.

This third edition cancels and replaces the second edition (ISO 21007-2:2013), which has been technically revised with the following changes:

— a new registration body has been added to Annex B;

— a new Annex E has been added;

— the former Annex C, which provided a list of RFID codes, as well as marks for gas cylinder manufacturers, has been removed from this part of ISO 21007 and will be published in a separate document, ISO/TR 17329.

ISO 21007 consists of the following parts, under the general title *Gas cylinders — Identification and marking using radio frequency identification technology*:

— *Part 1: Reference architecture and terminology*

— *Part 2: Numbering schemes for radio frequency identification*

Introduction

Cylinders can contain a wide variety of gases, and identification is of paramount importance. It could be desirable to identify not only the type of gas or liquid contained in the GC, but also such details as the filling station where the cylinder was filled, the batch of cylinders filled and the date the cylinder was filled.

Various methods and technologies such as physical identification through indentation; paper, card, metal and plastic labelling; colour code identification; bar coding and, in some circumstances, vision systems are already used to make or assist such identifications.

The technology of radio frequency identification (RFID) involves a reader/interrogator station that transmits a predetermined signal of inductive, radio or microwave energy to one or many transponders located within a read zone. The transponder returns the signal in a modified form to the reader/interrogator and the data are decoded. The data component in a portable gas or liquid cylinder environment provides the basis for unambiguous identification of the transponder and also can provide a medium for a bi-directional interactive exchange of data between the reader/interrogator and transponder. The signal can be modulated or unmodulated according to architecture of the system.

Recently, RFID has started using new, higher frequencies called ultra high frequency (UHF). These higher frequencies facilitate a faster reading and writing process and deliver longer reading/writing distances. Therefore, the UHF band frequency has been included in this part of ISO 21007. The aim of this part of ISO 21007 is to provide the data structure respectively suitable for all frequency bands including UHF.

In many cases, it is necessary or desirable to use one air carrier frequency and protocol; however, this will not always be the case. Within a global market, different applications could require different solutions for the carrier frequency (e.g. reading distance and velocity) and protocols (e.g. security, company rule).

However, there is benefit in using a standard common core data structure that is capable of upwards integration and expandable from the simplest low-cost cylinder identification system to more complex functions. Such a structure will have to be flexible and enabling rather than prescriptive, thus enabling different systems degrees of interoperability within and between their host systems.

The use of Abstract Syntax Notation One (ASN.1, as defined in the ISO/IEC 8824 series) from ISO/IEC 8824-1 as a notation to specify data and its associated Packed Encoding Rules (PER) from ISO/IEC 8825-2 is widely used and gaining popularity. Its usage will provide maximum interoperability and conformance to existing standards and will meet the specifically defined requirements for a generic standard model for gas cylinder identification in that it

— enables and uses existing standard coding,

— is adaptable and expandable,

— does not include unnecessary information for a specific application, and

— has a minimum of overhead in storage and transmission.

RFID standards other than ASN.1, for definition of frequencies and protocols, have been developed within recent years [see ISO/IEC 18000 (all parts)].

ISO 21007-1 provides a framework reference architecture for such systems. This part of ISO 21007 is a supporting part to ISO 21007-1 and provides a standardized yet flexible and interoperable framework for numbering schemes. This part of ISO 21007 details individual numbering schemes within the framework for the automatic identification of gas cylinders.

Central to the effective use of many of the constructs is a structure to provide unambiguous identification. This part of ISO 21007 provides a standardized data element construct for the automatic identification of gas cylinders.

The inconvenience of such a flexible concept is that a large storage memory is needed, particularly if a large amount of information has to be stored and read directly from the RFID tag.

The following two alternatives could be used to address this issue:

— limit the information directly accessible on the RFID tag and obtain the additional information from the host (ERP system);

— use a fixed data structure and length as shown in Annex E, as this can minimize the storage demand.

This part of ISO 21007 is intended to be used under a variety of national regulatory regimes, but has been written so that it is suitable for the application of the UN Model Regulations.[1] Attention is drawn to requirements in the relevant national regulations of the country (countries) where the cylinders are intended to be used that might override the requirements given in this part of ISO 21007. Where there is any conflict between this part of ISO 21007 and any applicable regulation, the regulation always takes precedence.