SVENSK STANDARD
SS-EN 4818:2012

Fastställd/Approved: 2012-05-21
Publicerad/Published: 2012-05-23
Utgåva/Edition: 1
Språk/Language: engelska/English
ICS: 35.240.60; 49.020; 49.035

SWEDISH STANDARDS INSTITUTE

Aerospace series – Passive HF RFID tags intended for aircraft use

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Europastandarden EN 4818:2012 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 4818:2012.

The European Standard EN 4818:2012 has the status of a Swedish Standard. This document contains the official version of EN 4818:2012.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 4818

May 2012

ICS 35.240.60; 49.035

English Version

Aerospace series - Passive HF RFID tags intended for aircraft use

Série aérospatiale - Tags passifs d'identification par radiofréquence Haute Fréquence (RFID HF) pour usage aéronautique

Luft- und Raumfahrt - HF Passiv RFID-Tags Für Luftfahrtverwendung

This European Standard was approved by CEN on 25 February 2012.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 4818:2012) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2012, and conflicting national standards shall be withdrawn at the latest by November 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The requirements for RFID tags to be used in the aerospace industry are very different from non-aviation uses. The parts identified by the RFID tags are high value items, which are often used for ten years or more. Reading and writing across a moderate distance, and over the life-spans of these tagged-parts, is expected to improve data accuracy and cost savings. Furthermore, the aerospace industry is subject to unique considerations regarding qualification, regulations, and safety, which are enforced by aviation authorities such as the EASA, FAA, etc.

These requirements, coupled with the relatively low manufacturing volumes, will drive up the per-part cost of tags developed for the aerospace industry. This will generate the need for a set of RFID tags specifically designed for use on aircraft. Adherence to this European Standard will decrease the development cost of these low-volume, high-capability RFID tags.

1 Scope

The scope of this European Standard is to:

- Provide a requirements document for RFID Tag Manufacturers to produce passive HF tags for the Aerospace industry.
- Identify the minimum performance requirements specific to passive HF tags used on aircraft parts, accessed only during ground operations.
- Specify the test requirements specific to passive HF tags for airborne use, in addition to EUROCAE ED-14 / RTCA DO-160 latest issue compliance requirements separately called out in this document.
- Identify existing standards applicable to passive HF tags.
- Provide a qualification standard for passive HF tags which will use permanently-affixed installation on aircraft and aircraft parts.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained. All RFID applications must be compliant with local regulation in force (i.e. FCC for US, CEPT/ETSi for Europe).

ISO/IEC 18000-3, *Information technology — Radio frequency identification for item management — Part 3: Parameters for Air Interface Communications at 13,56 MHz* [1)]

ISO/IEC 18046-3, *Information technology — Radio frequency identification device performance test methods — Part 3: Test methods for tag performance* [1)]

ISO/IEC TR 18047-3, *Information technology — Radio frequency identification device conformance test methods — Part 3: Test methods for air interface communications at 13,56 MHz* [1)]

DO-160 / ED-14, *Environmental Conditions and Test Procedures for Airborne Equipment* [2)]

ATA SPEC 2000, *E-Business Specification for Materials Management* [3)]

MIL-STD-810, *Department of Defense Test Method Standard for Environmental Engineering Considerations and Laboratory Tests* [4)]

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1) Published by: ISO International Organization for Standardization http://www.iso.ch/.

2) Published by: International Radio Technical Commission for Aeronautics http://www.rtca.com/ and by EUROCAE Regional (EU) EURopean Organisation for Civil Aviation Equipment http://www.eurocae.org/.

3) Published by: Air Transport Association Publications.

4) Published by: DoD National (US) Mil. Department of Defense http://www.defenselink.mil/.

FAR 14 CFR 25, *Aeronautics and Space — Part 25: Airworthiness standards: Transport Category Airplanes*

AC 20-162, *Airworthiness Approval and Operational Allowance of RFID Systems*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
AEROSPACE APPLICATIONS
used on products created for the aerospace industry

3.2
AIRBORNE USE
used on aircraft while in flight—as opposed to Ground Service Equipment, which is used on aircraft, but only while, the aircraft is on the ground

3.3
ATA: AIR TRANSPORT ASSOCIATION
airline trade association whose purpose is to foster a business and regulatory environment that ensures safe and secure air transportation. ATA coordinates standards-creation in support of this purpose.

3.4
BACKSCATTER
the Radio Frequency (RF) energy reflected by the tag to transmit information to the interrogator. The RFID tag's chip and antenna modulates the incident energy and reflects it back (same orientation but opposite direction). Backscatter is what the interrogator device "reads." An inert piece of aluminium will reflect RF energy, but in the absence of modulation, it is "reflection", not "backscatter."

3.5
BAP
Battery Assisted Passive — RFID tags that have an on-board battery to power the electronics in the tag, minimizing the power required from the interrogator Radio Frequency Beam. They backscatter like a passive UHF tag only when they are interrogated. BAP tags have greater read ranges than purely passive tags.

3.6
BAR-CODE
a standard method of identifying items based on lines of varying widths and spacing that are visually read by a scanner

3.7
BLINK RATE
the rate at which an active Chip/Tag sends out s signal to look for, this can be adjusted from hours to seconds depending on the application and desired battery life of the RFID tag

3.8
CHIP
"chip", or "microchip", refers to integrated circuits, or ICs. This is the "brain" of the RFID tag. RFID chips modulate reflected RF power to transmit data back to an RFID reader, or "interrogator".

3.9
EASA
European Aviation Safety Agency

3.10
EIRP
Equivalent Isotropically Radiated Power — the amount of power that would have to be emitted by an isotropic antenna (that evenly distributes power in all directions and is a theoretical construct) to produce the peak power density observed in the direction of maximum antenna gain

3.11
EUROCAE
European Organisation for Civil Aviation Equipment

3.12
FAA
Federal Aviation Administration — the airworthiness and aviation authority in the United States of America

3.13
FAR FIELD ZONE: D

$$D > (2.a)^2/l$$

where

D far field zone;

a maximal size of the antenna;

l wavelength = c/f.

3.14
HF
High Frequency covers the 13,56 MHz frequency band

3.15
HUMAN-READABLE
human-readable refers to a representation of information that can be naturally read by humans. In most contexts, the alternative representation is data primarily designed for reading by a machine, e.g., scanner/computer/etc.

3.16
INLAY
the RFID inlay is comprised of four primary components: chip, attachment harness, antenna, and substrate. An antenna is either laid or printed on a substrate material (typically a polymer). Designers create antenna patterns to satisfy specific performance requirements. The “chip” is harnessed to the antenna pattern so that the contacts on the chip make contact with the appropriate legs of the antenna.

3.17
INTEGRATED CIRCUIT
(IC)
see “Chip”

3.18
INTERROGATOR (READER/WRITTER)
Radio Frequency device whose purpose is to read data from RFID tags or write data to them. There exist both hand-held versions and desk-top versions. Hand-held interrogators have battery power and on-board modulator/demodulators to allow reading permanently-affixed tags while moving past them, and are usually limited in power output.