
**Radio frequency identification
(RFID) tyre tags — Tyre attachment
classification**

*Tags d'identification de pneumatiques par radiofréquence (RFID) —
Classification de la fixation sur le pneumatique*

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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.

Introduction

Since there are many types of tyres, tyre compounds and tyre manufacturing processes (some proprietary to each tyre manufacturer), the tyre tag insertion details, durability requirements and engineering specifications are not part of this specification.

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Radio frequency identification (RFID) tyre tags — Tyre attachment classification

1 Scope

This document specifies RFID tyre tag classification of the different technologies (embedding, patching, sticking) to benefit the user's understanding of their differences, targets, possible applications as well as their limitations.

This document includes:

- generic description of the main features for each technology;
- marking recommendation.

This document excludes:

- references to items related to tyre quality and the testing thereof;
- detailed references to embedded locations;
- detailed references to rubber compound properties;
- detailed references to tyre manufacturing processes.

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 20909, *Radio frequency identification (RFID) tyre tags*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in 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

RFID enabled tyre

tyre featuring an RFID tag by means of an embedded, patch or sticker solution

4 RFID technology classification

4.1 Embedded

4.1.1 Embedding technology

Embedded technology is intended to be used throughout the life of the tyre. Possible uses are manufacturing, service, retreading, removal and/or recycling and scrapping.

Since the tyre is composite, made of several layers and compounds, the RFID tag can be placed into the tyre in or between any layer and during any point of the manufacturing process. This shall be done under the responsibility of the tyre manufacturer.

4.1.2 Embedded location/positioning

4.1.2.1 Generalities

RFID tyre tags are radio-frequency devices. Performance and functionalities may be influenced by several parameters, including but not limited to:

- dielectric and conductive properties of surrounding materials such as
 - detuning of the RFID tyre tag,
 - attenuations and/or shielding of radio propagation, and
 - induced currents;
- mechanical stresses and strains (possible damage of the RFID tyre tag).

4.1.2.2 Location

Therefore, design, placement and orientation of the RFID tyre tag into the tyre, should be chosen appropriately by the tyre manufacturer to ensure RFID-enabled tyre conformance as per ISO 20912. An example of one such area is shown in [Figure 1](#).

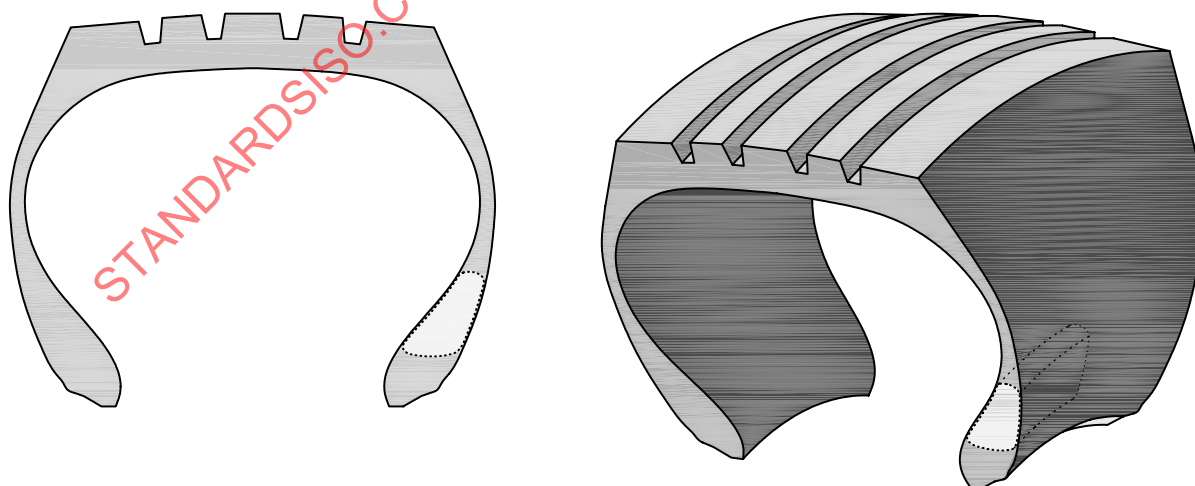


Figure 1 — Example position of an embedded RFID tag

Once the RFID tag is embedded, the RFID tyre tag may no longer be visible. Therefore, the recommendation contained in [Clause 5](#) should be followed.

4.2 Patch

4.2.1 Patching technology

Patching technology is intended to be used from the patch date of installation until the tyre's end of life. Possible uses are for:

- logistics and traceability;
- product information at the tyre dealer;
- RFID retrofitting of already manufactured (new) or tyres in service;
- after retreading for non-RFID casings;
- RFID tag replacement, as needed (e.g. embedded solution damaged, non-functional).

As a consequence, RFID enabled tyre traceability will depend on the date of the patch installation.

4.2.2 Patch requirements

Since the patch is intended to be put on the tyre, its positioning is limited to the external composite surfaces both inside and outside of the tyre (e.g. inner liner and outside sidewall, respectively).

As RFID tyre tags are radio-frequency devices, observations as mentioned in [4.1.2.1](#) shall be taken into account.

Therefore, design, placement and orientation of the RFID tyre tag, onto the tyre, should be chosen appropriately by the installer without infringing the patch and/or tyre manufacturer guidelines to ensure proper operation.

Examples of such areas are shown in [Figure 2](#).

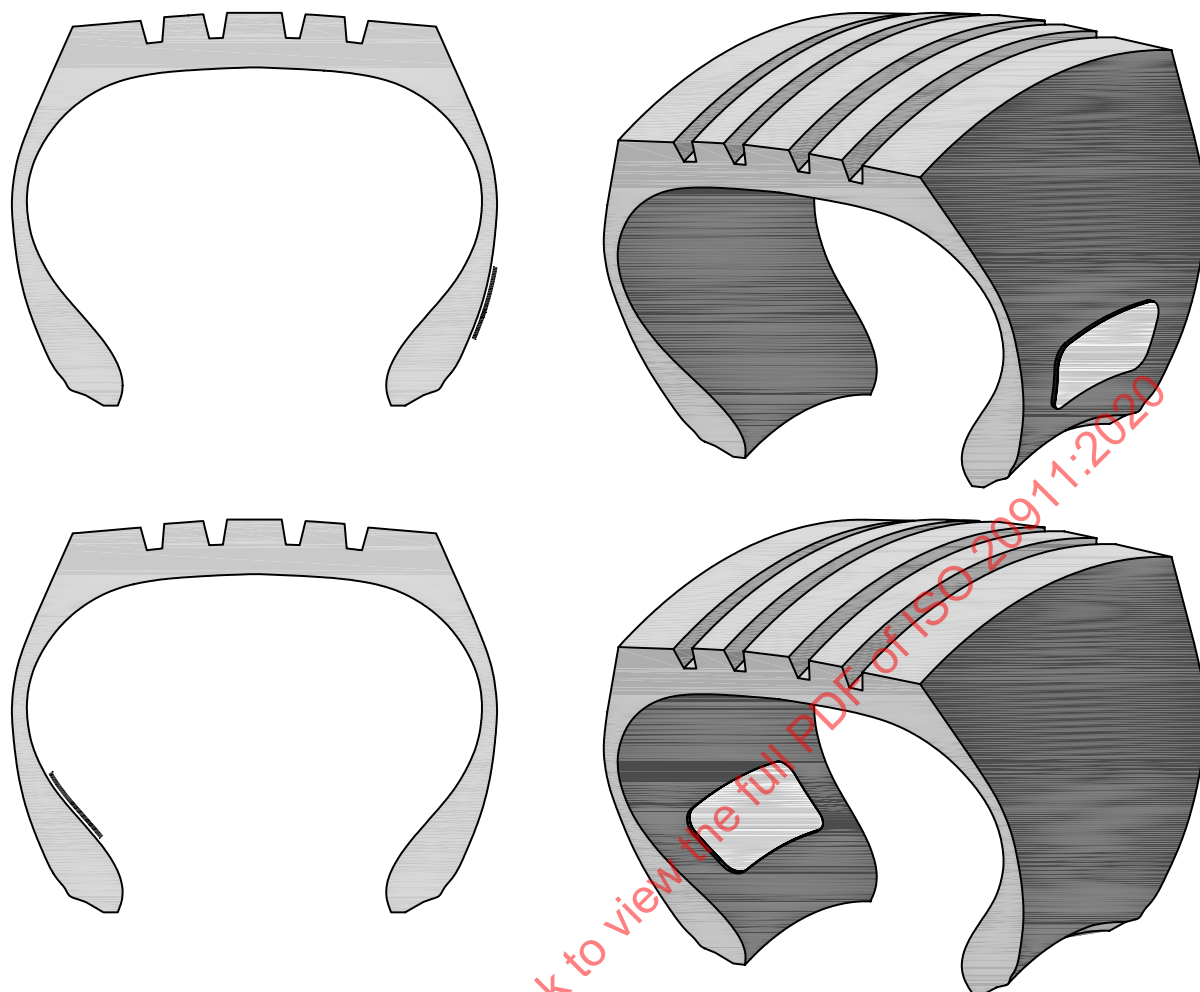


Figure 2 — Example positions of an RFID patch

4.3 Sticker

4.3.1 Sticker technology

Sticker technology is intended to be used after tyre manufacturing or retreading and up till the tyre mounting. Possible uses are for:

- logistic and traceability;
- product information at the tyre dealer.

4.3.2 Sticker requirements

Since the sticker is intended to be put on the tyre, its positioning is limited to the external composite layers.

As RFID tyre tags are radio-frequency devices, observations mentioned in [4.1.2.1](#) shall be taken into account.

Therefore, design, placement and orientation of the RFID tyre tag, onto the tyre, should be chosen appropriately by the installer without infringing the sticker and/or tyre manufacturer guidelines to ensure proper operation.

An example of one such area is shown in [Figure 3](#).

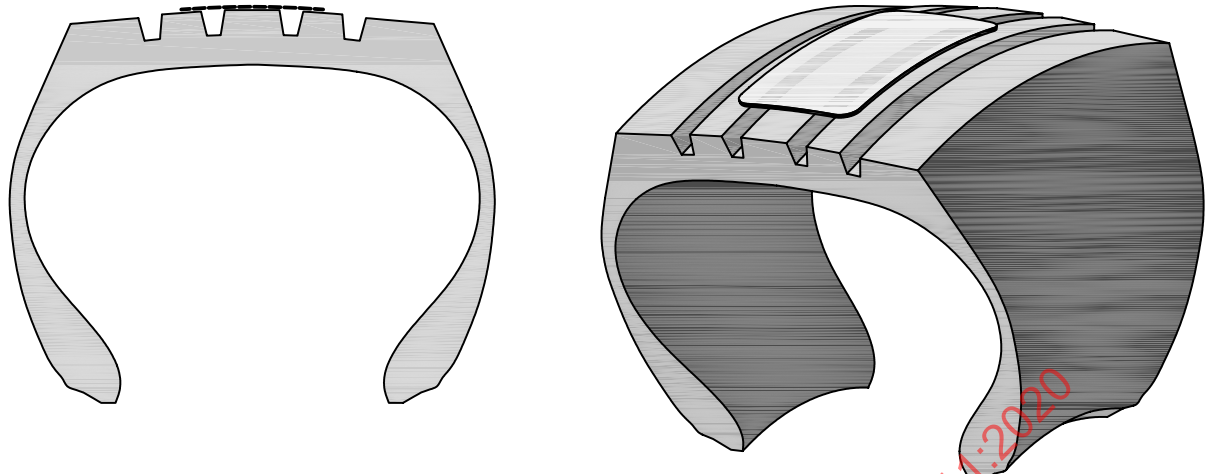


Figure 3 — Example position of an RFID sticker

5 Example of identification mark

It is recommended for the tyre manufacturer to put the RFID symbol ISO 7000-3010 on the RFID-enabled tyre or on the RFID sticker as applicable.

The RFID symbol, as shown in [Figure 4](#), can be used according to ISO/IEC 29160¹⁾. The manufacturer may alternatively indicate the presence of the RFID tag by making the text "RFID" visible somewhere on the tyre.



Figure 4 — RFID symbol ISO 7000-3010

1) Under preparation. Stage at the time of publication: ISO/DIS 29160:2020.