U.S. TIRE MANUFACTURERS ASSOCIATION

Mobilizing the Future

TIRE INFORMATION SERVICE BULLETIN

TIRE RADIO FREQUENCY IDENTIFICATION (RFID) PASSIVE RFID TAGS

RFID is an enabling technology upon which companies, including tire manufacturers, tire dealers, fleets, and tire retreaders can develop applications that create value for end-users and manufacturers based on a unique serialized ID. RFID technology can be used by producers, suppliers, transporters, regulators, national security, consumers, and many other stakeholders involved in not only North American commerce but globally as well. The global tire industry has defined a set of standards for application of RFID by tire manufacturers. Terms, definitions, and requirements for RFID are specified in ISO 20909 - "Radio frequency identification (RFID) tyre tags".

The passive RFID transponder (RFID tag) used in tires is a single solid state electronic chip with an antenna. Each tag that passes within the radio frequency transmission range of a reader/interrogator will be energized and have its circuit activated. In turn, the tag will respond by transferring its encoded identification and any additional data stored in memory.

Global standards, such as listed in the references on page 3, have been established to standardize the identification information provided by a RFID transponder installed during the tire manufacturing process or as an aftermarket installation such as RFID patch application to tires. These standards provide basic performance criteria for use of this technology. It is recommended that RFID tags in tire applications adhere to these standards in order that the data format is standardized within the tire industry. This consistency will allow for the interchangeability of hardware and software that will be used as well as how data will be accessed, either "on tag" or, when applicable, stored "on network".

RFID Tag Data Encoding

There are two key "on tag" memory areas used for storing data. The first area contains standardized read only data. The second area is read and write capable and may contain user or manufacturer-defined data. Example use cases include: asset control, tracking and other tire service management information. Requirements and data structure for coding RFID tire tags can be found in ISO 20910 - "Coding for radio frequency identification (RFID) tyre tags".

RFID Tag Attachment

RFID tags can be attached to the tire in four ways:

- Cured in the tire during the manufacturing process (see Figures 1 and 2)
- Encapsulated in a patch and bonded to the inner liner or outside surfaces (see Figures 3 and 4)
- Adhered directly to the inner liner (see Figure 4)
- A sticker-applied tire label (see Figure 5 and 6)

ISO specifies RFID tag classification and technologies for the tire industry, including embedded tags, patches, and stickers/labels. Refer to ISO 20911, "Radio frequency identification (RFID) tyre tags - Tyre attachment classification" for details. The look and placement of tags and how they are attached on or in the tire may differ slightly from the figures shown below. Embedded tags may not be seen during visual inspection of the tire.

FIGURE 1: Example of an RFID embedded tag

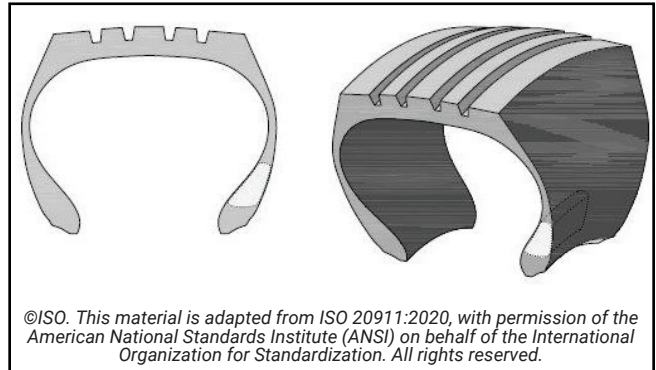**FIGURE 2: Example positions of an embedded RFID tag**
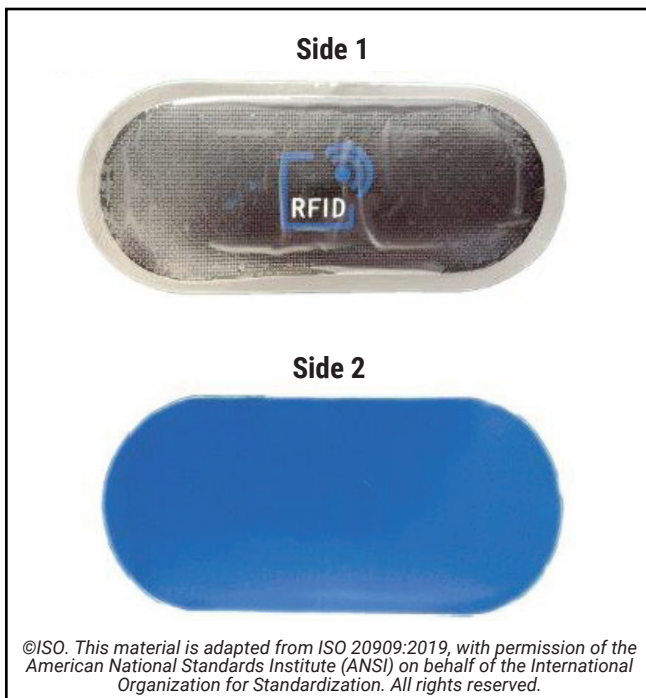
FIGURE 3: Example of RFID patch

Side 1

Side 2

FIGURE 4: Example positions of an RFID patch
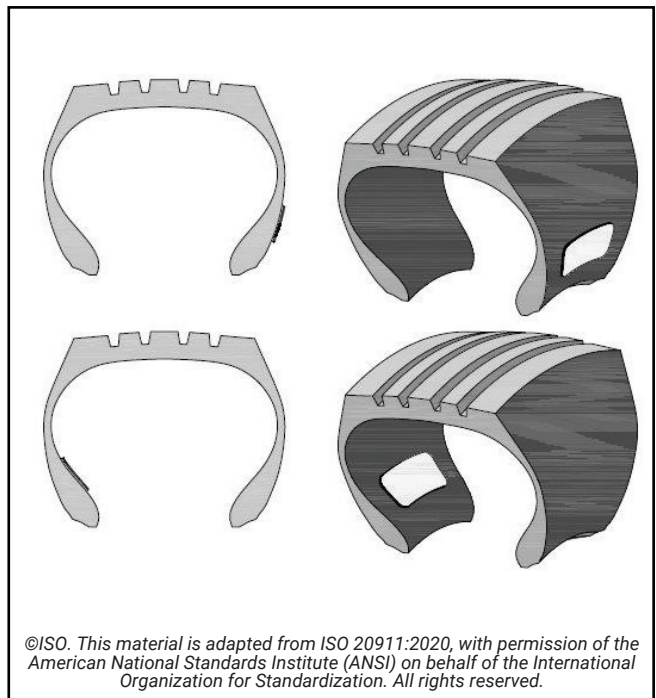
FIGURE 5: Examples of an RFID Tyre sticker

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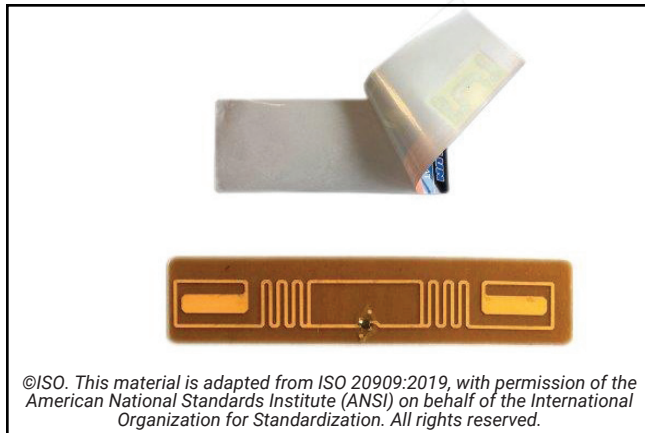
FIGURE 6: Example positions of an RFID sticker

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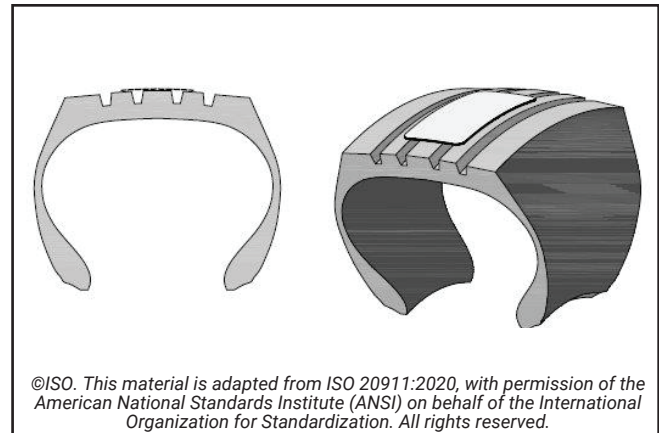
RFID Emblem

ISO 29160, "Information technology - Radio frequency identification for item management - RFID Emblem" (See Figure 7) has standardized several RFID emblems as a means of informing the public about the use of RFID in consumer and workplace environments. The symbol shown below is one such suggested emblem which may be used to identify the existence of an RFID tag. The manufacturer may alternatively indicate the presence of the RFID tag by making the text "RFID" somewhere visible on the tire (see Figure 8).

FIGURE 7: RFID ISO symbol 7000-3010

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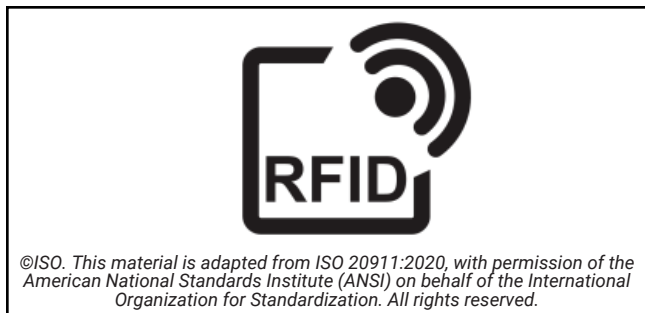
FIGURE 8: Symbol marked on tire
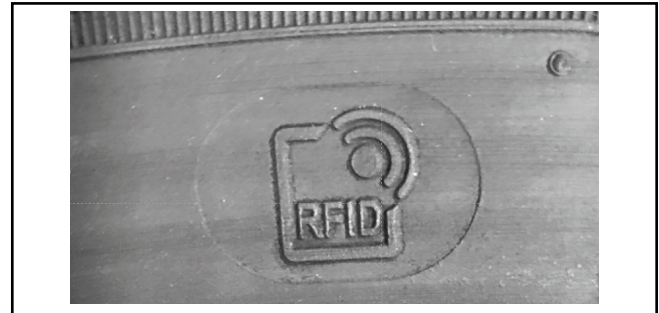
REFERENCES:

1. International Organization for Standardization (ISO):

    a. ISO 29160: Information technology - Radio frequency identification for item management - RFID Emblem

    b. ISO 20909: Radio frequency identification (RFID) tyre tags

    c. ISO 20910: Coding for radio frequency identification (RFID) tyre tags

    d. ISO 20911: Radio frequency identification (RFID) tyre tags - Tyre attachment classification

All ISO standards available from ANSI's eStandards Store at http://webstore.ansi.org.

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