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No. MW/RFID

Date : 08.10.2018

All CMEs, CRSEs, All CWMs & Wagon Builders (as per attached list)

Sub: Fitment of RFID tags: specification of RFID tags.

Ref: (i) This office letter of even no. dated 09.05.2018.

(ii) CRIS letter no. 2016/CRIS/NDLS-HQ/CC/Project/RFID/0225/Pt.1 dated 05.10.18

Vide letter under reference (ii) above, revised version of RFID tags specification (v4,1 date 05.10.2018) has been advised

Copy of above referred (ii) letter is enclosed herewith for information and further necessary action.

D.A. As above.

P.K. Pandey
9.10.18

(P.K. Pandey)
Director/Wagon
for Director General

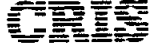
Copy to:

1. Exe. Director/QA (Mech.), RDSO, Lucknow-226011
2. Director/I&L, 3, Koilaghat Street, Kolkata-700 001.



रेलवे सूचना प्रणाली केन्द्र

(रेल मंत्रालय भारत सरकार का संगठन)



CENTRE FOR RAILWAY INFORMATION SYSTEMS
(An Organisation of the Ministry of Railways, Govt. of India)

No.: 2016/ CRIS/ NDLS-HQ/CC/PROJECT/RFID/ 0225/ Pt-1

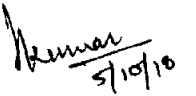
05/10/18

EDME/ Fr,
Railway Board,
New Delhi 110001

Sub: Specification of Tags for use for Identification of Vehicles on Indian Railways (V4.1)

Ref: This office's letter of even no. dated 27/04/18 (for specification.)

- 1 Vide reference above Specification of RFID Tags (v4.0) was issued.
- 2 The new revised version (v4.1) of the specification for RFID tags for the Indian Railways is attached herewith incorporating some minor changes.
 - 2.1 The drawing sketch of RFID tag incorporates a few minor changes and has been updated to VD,1
 - 2.2 A few paras, as enumerated in the change list of revised specification, have been reworded/renumbered to bring in more clarity.
- 3 The EOI for vendor registration for RFID tags has been done as per version 4.1.
- 4 The new revised version (v4.1) of the specification for RFID tags for the Indian Railways is attached for necessary action at your end.


5/10/18
GM/ IC/ CRIS

Encl: As above in 8 pages

Copy for information and necessary action to:

EDS(W), EDS(Chg) - RDSO, Manak Nagar, Lucknow, CAO/ COFMOW

EDME/ Dev; EDME/ Chg; EDEE/RS - Railway Board, New Delhi

चाणक्यपुरी, नयी दिल्ली-110021

CHANAKYAPURI, NEW DELHI-110021

टेलीफोन/TELEPHONE : 24104525, 24106717 फ़ैक्स/FAX : 91-11-26877893

Sub: Specification of Tags for use for Identification of Vehicles on Indian Railways (V4,1)

CHANGE LIST (of latest changes):

V4,1:

- Para 2.7 – combined relevant portions of the earlier para 2.8.
- Para 3.3 – dropped since duplicate; *succeeding paras renumbered*.
- Para 3.4 – the word ‘material’ added to clarify
- Para 3.5.1.6 – Paras 3.5.1.6.1 & 3.5.1.6.2 merged in and reworded accordingly. In the table: s/n 2 standard reference corrected, s/n 5, 9, 10 and 12 test detail clarified.
- Para 3.5.2 & 3.5.3 – reworded for clarity. Agency approval reworked.
- Para 3.5.3.2 – Para number referred to corrected.
- Para 3.5.4 – Renumbered and reworked.
- Para 5.2 – reworded to make it clear.
- Drawing sketch updated to VD,1

V4,0:

- Para 1.5 – Elements moved to Para 2 (Design Basis) and Para 3 (Specifications)
- Para 1.6 – Moved to Para 2 (Design Basis)
- Para 2.1 – Moved to Para 3.1 and standard revised to V2 from v1.2
- Para 2.2.1 – Moved to Para 2.1
- Para 2.2.2 – Moved to Para 2.2
- Para 2.3 – Moved to Para 2.6
- Para 2.4 – azimuth angle changed to 90° from 110°
- Para 2.5 – Moved to Para 3.2
- Para 2.6 – Moved to para 3.3 and renamed as ‘Tag dimensions’
- Para 2.7 – Revised and moved under para 3.5.1.6
- Para 2.8 – Revised and moved to para 3.4
- Para 2.9 – Moved to para 4.
- Para 2.10 – Moved to para 5.
- Para 2.11 – Moved to para 7.
- New Para 2 created on ‘Design basis’. All elements moved in from earlier specification’s para as indicated above.
- New Para 3 – Added para on ‘Specifications’. Moved in some elements from earlier specification’s para as indicated above.
- New Para 6 added on ‘Requirement of Country Code for privately owned wagons’.

PTO...

1 BACKGROUND:

1.1 The tags are for use with ALL types of Rolling Stock of the Indian Railways as well as major assemblies. These shall be an integral part of the Rolling Stock or the assembly itself.

1.2 The tags for vehicles shall be mounted on metal nominally at sole bar level. The base metal can be steel, stainless steel or aluminium as per relevant Indian Railways standards. For assemblies, the location shall be specified for each use case separately.

1.3 The tag specifications shall, in general, be as per GS1 standards and broadly aligned with the 'European Guideline for the Identification of Railway Assets using GS1 Standards'. The basic encoding standard applicable is GIAI-202 of GS1.

1.4 For understanding the data formats for use on the tags please read the latest version of the associated document 'Guidelines for Data onboard RFID Tags of the Indian Railways'.

2 DESIGN BASIS

2.1 Metal mount type of tags.

2.2 Generic: All standards as applicable for use of UHF RFID tags in India are applicable.

2.3 Railway's Working Environment:

2.3.1 The tags will work in conditions of EMI/ RFI since 25kV AC is used in overhead lines on tracks. Also, at the time of maintenance electric welding shall be done close to tags.

2.3.2 Trains run under the most severe climatic conditions. This includes sandstorms, pelting rain, snow, heat, vibrations etc.

2.4 Dynamic Performance: Minimum read rate based on circularly polarised reader antennas with 90° or more azimuth angle at a minimum distance of 1.5m under clear conditions with RSSI of -75 or better at 110 kmph. 10 reads

2.5 Data Retention: Tags should be able to retain data for a period of 20 years or more.

2.6 Memory:

2.6.1 EPC memory suitable for GIAI-202 encoding. This area shall be password locked for write only.

2.6.2 User memory of 3 kb or higher. It is expected that the user memory shall be logically split into four functional areas (please read the latest tag data guidelines document in this connection)

2.6.3 Read-Write cycles endurance 100,000 cycles

2.7 Tag Housing:

2.7.1 Life of housing material is expected to be 20 years or more.

2.7.2 Fixing Arrangement: The tag is expected to be directly attached to the solebar using fasteners to the vehicle body. The fastener will be 1/4th inch (approximately 6.3 mm) in diameter.

2.7.3 For some specific rolling stock the fastening system may be different and shall be specified later.

2.7.4 The tags are to be fitted as per the relevant drawing for that particular vehicle/ assembly.

3 SPECIFICATIONS:

3.1 **Base standard:** EPC Gen2 V2 or higher.

3.2 **Static Performance:** Static performance shall be measured, in principle, as per TIPP (Tagged Item Performance Protocol) Testing Methodology R1.0. However, the following variations in test conditions would apply:

3.2.1 Tag shall be tested while mounted centrally using non-break stem fasteners on a IS-2062 plate with a size of 300 mm x 100 mm with 8 mm thickness, i.e., similar to actual working conditions.

3.2.2 Tag shall be kept on the test platform with the backing plate vertical, i.e., similar to condition of actual operation.

3.2.3 The measuring equipment shall run parallel to the tag backing plate at a distance of 1.5m in a manner similar to the usage in the Railways. The orientation of the tag relative the measuring equipment shall not be changed during the test

3.2.4 Measurements would be limited to elevation angles of 0° and 30° only (antenna 1 and 2 positions).

3.2.5 Platform orientation shall be limited to azimuth angles of 0° and 60°.

3.2.6 Commonly, the worst case scenario could be 60° azimuth and 30° elevation.

3.2.7 Accordingly, Sensitivity should be as under:

3.2.7.1 The best case sensitivity should be equal or better than –17 dBm

3.2.7.2 The worst case values should be more than –25.5 dBm, i.e., the variation between the worst case and the best case should 50% or less, keeping in mind that the scale is negative.

3.3 Tag Housing Material: The material of the housing should be such that it does not have a permanent set exceeding 0.5 mm at the boss when clamped with a force of 18kN.

3.4 Tests & Verification: The equipment shall be tested for functional capability, ability to withstand environmental conditions and for reliable performance under simulated field conditions as set forth below:

3.4.1 Type tests: These tests shall be done on a sampled lot of RFID tags. Such tests are required if any of the below criterion applies:

3.4.1.1 First approval of the tag manufacturer,

3.4.1.2 Change of this specification,

3.4.1.3 Change by manufacturer of his design and

3.4.1.4 Change by manufacturer of his manufacturing processes.

3.4.1.5 The manufacturer will be required to submit 8 (eight) prototypes to CRIS out of which one pair will randomly selected for type testing. At the actual time of testing one out of the pair shall be randomly chosen for the actual test and the other retained as control sample.

3.4.1.6 Tags shall be subjected to the following tests to be carried out by a reputed agency certified to carry out the same.

S/n	Parameter	Standard	Test Detail
1	Visual inspection	None	Visual inspection shall be carried out on all samples to ensure that there is no major damage
2	Dimensions of RFID Tags	As per drawing attached with this document.	—
3	Marking	As per para 4 of this document.	—
4	Static Performance	As per para 3.2 of this document.	—
5	Shock test	AAR S-5702	As per clause no. 3.2.4.3.3 (of the AAR specification)
6	Spillage of liquid on housing of Tags	MIL-STD-810G Method 504.1 procedure II (clause 2.2 b)	Only with the following in Table 504.1-II: 1. Petrol [Gasoline, commercial] 2. Simulated sea water 3. Other Solvents (Isopropyl alcohol (2-propanol), acetone, etc)
7	Ingress Protection	IEC 60529	IP66
8	Impact protection	IEC 62262	IK10
9	Cold Test	IEC 60571	At -20°C for 16 hours as per clause 12.2.15 of the specification
10	Dry heat Test	IEC 60571	70°C for 16 hours as per clause 12.2.5 of the specification
11	Damp heat test, cyclic	IEC 60571	—
12	Salt mist test	IEC 60571	Class ST4 in the specification
13	Vibration Tests (Simulated Long Life Testing)	IEC 60571	As per Category 2 of clause 9 in the connected specification IEC 61373

3.4.2 Routine tests: These tests are required to verify that the product is manufactured to the required quality standards set by the OEM themselves. Routine tests shall be conducted by the tag manufacturer as per their own quality assurance plan (QAP) during manufacturing. The QAP itself shall require prior approval from CRIS.

3.4.2.1 Records maintained during manufacture shall be made available for inspection by an agency so approved jointly by CRIS along with the tenderer.

3.4.3 Acceptance tests: The acceptance test shall include:

3.4.3.1 Verification of type test reports, routine test conducted at manufacturer's premises.

3.4.3.2 Functional tests of the equipment as per item 1 to 3 from para [3.4.1.6](#) above.

3.4.3.3 Multiple write followed by read test. At least 10 full cycles to be carried out in immediate succession. One set at 0° and another set at 45° azimuth. No errors should be found in either a write operation or in a read after a write.

3.4.3.3.1 This test is to be done using portable readers. For each model of portable reader, CRIS shall indicate the distance from which the test is to be carried out – this information is model specific and as such cannot be given generically.

3.4.3.4 These tests shall be done by an agency so approved jointly by CRIS along with the tenderer, based on sampling plan given below for regular supply.

Manufacturing Batch size	Sample size
0-250	5
251-1000	10
1001-5000	15
more than 5000	20

3.4.3.5 Manufacturing batch here refers to the tags manufactured from a single combination of raw materials, i.e., a change in any of the raw materials used for tag manufacture shall imply a separate manufacturing batch.??

4 Tag marking:

4.1 To be done at the back of the tag such that it is easily readable and is not obscured/ rubbed out over time due to vibration etc.

4.2 It should be moulded in raised letters as per tag drawing and indicate at the very least:

- 4.2.1 Manufacturer's identification mark.
- 4.2.2 Year (YY) and month (MM) of manufacture
- 4.2.3 Manufacturing Batch
- 4.2.4 Packaging Lot (optional)

4.3 QA/ QC marking of the manufacturer in the form of a Non-removable Holographic sticker on each tag.

5 Packaging of Tags:

5.1 10 tags to be kept in One package, each tag to be temporarily numbered individually using permanent marker/ sticker or equivalent. Such 10 tags to be kept in a suitable cardboard box or plastic pouch.

5.2 Each box should contain a sheet with the list of TIDs (of the tags in that box) with space in front of each TID so that it is possible to record wagon id as and when the tag is installed.

5.3 Each package, whether secondary or tertiary should have an associated Datamatrix or barcode on it with the corresponding HRI available on the package to identify the same. These should be as per the relevant GS1 standards.

5.4 Damage protection during transit to be ensured

5.5 Holographic seal on each tag and package from the manufacturer to indicate their original nature.

6 Requirement of Country Code for privately owned wagons: All RFID tags fitted on vehicles running over the Indian Railways need to necessarily identify the owner of the vehicle as per the relevant international standards. As such, for privately owned wagons in India, their owning companies need to get a Company Code from GS1 India.

7 Warranty: Each tag shall be warrantied for two years from the date of fitment, i.e., the date when the tag has valid data written into it for the first time and this data is available for monitoring.

– X –

Schematic drawing for Tag

