

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)**

**INDIAN RAILWAY STANDARD SPECIFICATION
for
FAIL-SAFE ELECTRONIC FLASHER DEVICE
for
RAILWAY SIGNALLING
(DRAFT)**

0. FOREWORD

- 0.1 This specification is issued under the fixed serial No. RDSO/SPN/173/2002. The final number indicates the year of issue or, in the event of revision, the year of last revision.
- 0.2 This specification requires reference to the following Indian Railways Standard (IRS) specification, Indian Standards (IS) specification & British Railways Specifications (BRS).
- | | |
|-----------------------|---|
| IRS:S 23 | - Electrical Signalling and Interlocking Equipment. |
| IRS:S 34 | - Testing of Railway Signalling Relays (General) |
| RDSO/SPN/144 | - Reliability & Safety Requirement of Electronic & Signalling Equipments. |
| IS: 7405 (Part I) | - Printed wiring boards-General requirement and tests. |
| BRS:930-A | - Miniature Tractive Armature D.C. Neutral Line Relay Plug-in type for Railway Signalling purposes. |
| IS:9000 (Pt. I to IV) | - Basic environment testing procedures for electronic and electrical items. |
- 0.3 Above specifications are referred by number only, without mentioning the year of issue. The latest issue of all specifications is implied.

1. SCOPE

- 1.1 This specification covers the operational and functional requirements of fail safe electronic flasher device suitable for giving direct flashing supply to be used on interlocking panel(s) and/or driving a 24V DC neutral relay conforming to BRS:930 series.
- 1.2 This device shall work on 24V DC and shall give 24V DC nominal output.
- 1.3 This specification is intended chiefly to cover the technical provisions and does not include all the necessary provision of a contract.

2. TERMINOLOGY

- 2.1 For the purpose of this specification, terminology is given in IRS:S 23 and IRS:S 34, in addition to the following, shall apply.

3. GENERAL REQUIREMENTS

3.1 Design, Material and Drawing

- 3.1.1 The electronic flasher device shall be of substantial design, robust and capable to withstand such handling as may be encountered in service, storage, transit and installations. It shall meet the requirements of the relevant specifications for material, design, assembly, finish etc. in their entirety.
- 3.1.2 The design of the circuit shall be of fail safe nature so that no steady output is delivered in case of failure or open circuit/short circuit or ageing of any component or any momentary switching OFF/ON of the power supply or external surges due to picking up and dropping of relays connected across the supply to the flasher device.
- 3.1.3 The device shall be provided with protection against reverse polarity of supply. Any supply wrongly connected across its output shall not damage the device.
- 3.1.4 Relays, if any used in the device, shall normally be proved energised and de-energised in sequence during normal working. However any non-vital relay shall not be used in output circuit. Input and output shall be electrically isolated.
- 3.1.5 Glass epoxy copper clad laminates conforming to IS:7405 (Pt-I), climatic severity class 2, shall be used for printed circuit card. The thickness of laminate shall not be less than 1.6 mm. The thickness of the copper foil shall not be less than 35 microns, corresponding to a weight of 305 grams per square meter.
- 3.1.6 Solid-state components of industrial grade shall only be employed for mounting on the PCBs. Components having long term availability shall only be used.
- 3.1.7 The printed circuit cards shall be designed to suit the circuitry and no extra wires shall be used for interconnections of components on the PCBs. Soldering of the components shall be neat and flat preferably of wave soldering. If double sided PCBs are used, all resistors and components have to be lifted by 2 mm., wherever conducting track travels underneath the components.
- 3.1.8 The maker's name and trademark shall be printed on the PCBs. The PCBs shall be provided with testing points and the corresponding voltages and waveforms shall be indicated in the fault diagnosis procedure in the service manual.
- 3.1.9 All the resistors used shall be at least double the power capacity which is supposed to be dissipated by them. The voltage rating of capacitors shall be at least 200% of the circuit voltage.
- 3.1.10 After assembly and soldering of components and testing, the printed circuit shall be coated with transparent epoxy painting to a thickness of not less than 5 microns for environmental protection.
- 3.1.11 The device shall be mounted on 'Q' series relay housing as per Cl. 5 of BRS: 930A. The whole assembly shall be capable of being mounted on a relay rack and shall be protected against dust and moisture. Gasketing by suitable material conforming to IS: 11149 shall be provided.
- 3.1.12 Registration pins shall be provided as per Cl. 3.4.2.
- 3.1.13 Circuit shall be suitably designed for overload protection. Such protective device shall be of self-restoring type so that on removal of fault, normal working resumes.
- 3.1.14 The material for the cover shall be transparent polycarbonate. The cover shall be tough, self-extinguishing, non-hygroscopic, smooth, homogeneous and free from surface streaks, splash marks, surface sinking, joints and repairs.
- 3.1.15 Handle clip and handle support shall be made of stainless steel.

3.1.16 Electronic flasher device shall have input and output terminals as under -

On a Q-base plug-board, the input & output terminals shall be located as under:-

Input (positive)	B24	-	R1
Input (negative)	N24	-	R2
Output (positive)	B24	-	A8
Output (negative)	N24	-	B8

3.1.17 The current carrying capacity of the wires used shall be double of the actual current flowing and shall conform to IRS:S 76.

3.1.18 The device shall be suitably protected from high voltage.

3.1.19 Rating / value of each component shall be given in the circuit diagram to be supplied with the device.

3.1.20 The following indications shall be provided –

- a) Flasher working - Yellow flashing
- b) Input overload voltage - Red
- c) Output overload voltage - Red

3.2 DIMENSIONS

3.2.1 All the dimensions of the Fail Safe Electronic Flasher device with plug-board shall be in accordance with the Cl. 5.1 of BRS:930A.

3.2.2 The retaining clip of the relay shall be in accordance with the Cl. 5.2 of BRS:930A.

3.2.3 Fail Safe Electronic Flasher device with the same registration pin coding shall be interchangeable.

3.3 LIFE

3.3.1 Normal working life of the device shall be minimum 7 years.

3.3.2 The unit shall have a storage life of minimum 2 years in reasonable storage conditions without any adverse effect on its operating characteristics.

3.4 OPERATING CHARACTERISTICS

3.4.1 The electronic flasher device shall operate satisfactorily either from primary or secondary cells or unsmooth full-wave rectifier supply (true RMS) from single phase, 50 Hz sinusoidal AC supply. The rated current, voltage and ambient temperature shall be as follows:-

- i) Input voltage - 24V, +30%, -10%
- ii) Output voltage - 24V±20%, 3A
- iii) Flash rate - 50±2 flashes per minutes.
- iv) Duty cycle - 'ON' time for the flashing output shall be 44% to 46% of the duty cycle.
- v) Operating temperature - -10°C to 70°C & 95% RH

3.4.2 The registration code (pin configuration) for the electronic fail safe flasher device shall be as under (see Annexure 'A'):-

Pin Code No.	Arrangement No.	Registration Code (Pin Configuration)	Remarks
0148	69	BCEHJ	Plug-board drawing/dimension as per Appendix A1 of BRS:930A.

3.4.2.1 The manufacturer shall provide a suitable sealing arrangement to the cover.

4 MARKING AND IDENTIFICATION

- 4.1 A nameplate shall be provided in a conspicuous position giving the following information:-
- (a) Unit - Flasher
 - (b) Manufacturer's name
 - (c) Month and year of manufacture
 - (d) Serial number of the device
 - (e) Flashing rate
 - (f) Rated input and output voltage
- 4.2 The words "Manufactured as per RDSO specification No. RDSO/SPN/173/2002" shall be given on non-removable and non-erasable sticker on the device at a conspicuous place.

5 TESTS AND PERFORMANCE REQUIREMENT

- 5.1 Unless otherwise specified, all tests shall be carried out under ambient atmospheric condition.
- 5.1.1 For inspection of material relevant clauses of IRS:S 23 & IRS:S 34 shall also apply.

5.2 TYPE TEST

- 5.2.1 The following shall constitute type tests and shall be carried out once in three years, or earlier, at the discretion of inspecting authority.

- | | |
|---|------------|
| (a) Visual inspection | Cl. 6.7 |
| (b) Dimensional check | Cl. 3.2 |
| (c) Dielectric strength test | Cl. 6.1 |
| (d) Insulation resistance test | Cl. 6.2 |
| (e) Overload protection | Cl. 3.1.13 |
| (f) Operating characteristics test | Cl. 6.3 |
| (g) Fail safe feature test on one sample | Cl. 6.6 |
| (h) Climatic severity test on two samples | Cl. 6.5 |
| (i) Performance test on two samples | Cl. 6.4 |
| (j) Vibration test on one sample | Cl. 6.5.5 |

- 5.2.2 Test samples – Total 5 samples selected randomly shall be required for complete range of type tests as per Cl. 5.2. These samples shall be selected at random, as far as possible from regular production lot. These samples shall be selected and sealed by the Inspecting Officer. Samples of electronic fail safe flasher device identified for type tests shall not form part of the supply. For initial type approval, minimum 10 samples shall be manufactured.

- 5.2.3 Validity of type approval shall be 3 years.

5.3 ACCEPTANCE TEST

- 5.3.1 The following shall constitute acceptance tests
- | | |
|------------------------------------|------------|
| (a) Visual inspection | Cl. 6.7 |
| (b) Dimensional check | Cl. 3.2 |
| (c) Dielectric strength test | Cl. 6.1 |
| (d) Insulation resistance test | Cl. 6.2 |
| (e) Operating characteristics test | Cl. 6.3 |
| (f) Overload protection | Cl. 3.1.13 |

- 5.3.2 Tests shall be carried out on 100% devices in a lot to be supplied subject to a maximum of 25 samples selected at random.
- 5.3.3 In case, results of acceptance test vary by more than 5% from the results of routine test, the lot shall be rejected.

5.4 ROUTINE TEST

The following shall constitute routine tests -

- | | |
|------------------------------------|------------|
| (a) Visual inspection | Cl. 6.7 |
| (b) Dimensional check | Cl. 3.2 |
| (c) Dielectric strength test | Cl. 6.1 |
| (d) Insulation resistance test | Cl. 6.2 |
| (e) Operating characteristics test | Cl. 6.3 |
| (f) Overload protection | Cl. 3.1.13 |

- 5.4.1 The results of routine test shall be made available to the inspecting authority along with the inspection call letter.

6 TESTS

6.1 DIELECTRIC STRENGTH TEST

- 6.1.1 The flasher device shall withstand for one minute a test voltage of 1KV (r.m.s.), 50Hz sine wave applied for 1 minute between all parts of electric circuits except electronic components and other metallic parts insulated therefrom.

6.2 INSULATION RESISTANCE TEST

- 6.2.1 After the dielectric strength test as per Cl. 6.1, immediately the insulation resistance shall be measured between all parts of electric circuits and other metallic parts insulated therefrom at potential not less than 500V DC. The insulation resistance shall not be less than 50 Mega ohm.

6.3 OPERATING CHARACTERISTICS TEST

- 6.3.1 After dielectric and insulation resistance tests, the device shall be tested for its operating characteristics at the minimum, maximum and rated input voltage as per Cl. 3.4. The output voltage, current and number of flashes shall be measured. It shall be within specified limits. This test shall be conducted at minimum, maximum and at ambient temperature as specified in Cl. 3.4. However, for acceptance test the device shall be tested at ambient temperature.

6.4 PERFORMANCE LIFE TEST

- 6.4.1 Two flasher device, one at room temperature and another at 70°C shall be worked for continuous one month each at 24V, 31.2V & 21.6V with 3A load. Throughout the test, device shall operate efficiently and without failure. After completion of test, flash rate & duty cycle shall be within limits as per Cl. 3.4.1 (iii) & (iv) respectively.

6.5 CLIMATIC SEVERITY TEST

6.5.1 DRY HEAT TEST

This test shall be conducted as per IS:9000 (Part-III, Section 3) for 16 hours at $55\pm 2^{\circ}\text{C}$. The device shall be energised with the external, dummy load during this test. After completion of the cycle, insulation resistance of the device and number of flashes shall be measured with the device kept inside the chamber. The insulation resistance shall not be less than 50 Mega ohm. The device shall then be removed from the chamber and visually inspected to see that no part is damaged or cracked.

6.5.2 DAMP HEAT (ACCELERATED) TEST - FIRST CYCLE

This test shall be conducted as per IS:9000 (Part V, Section 1) at $55\pm 2^{\circ}\text{C}$ and relative humidity 90-95%. The device shall not be energised during this test. After removal from the test chamber, the device shall be wiped with a dry cloth to remove condensed water from the surface and the insulation resistance measured as per Cl. 6.2 after a period of 1 to 2 hours shall not be less than 1 Mega ohm.

6.5.3 COLD TEST (AFTER FIRST CYCLE OF DAMP HEAT)

This test shall be conducted as per IS:9000 (Part-II, Section 3) for 2 hours at -10°C continuously to see that the device is working satisfactorily and that there is no seizure. The device shall be visually inspected to see that no part is damaged or cracked.

6.5.4 DAMP HEAT (ACCELERATED) REMAINING 5 CYCLES TEST

The heat cycle test shall be performed as per Cl. 6.5.2. The insulation resistance measured after each damp heat cycle shall not be less than 1 Mega ohm and not less than 10 Mega ohm after final cycle and full recovery period.

6.5.5 VIBRATION (SINUSOIDAL) TEST

This test shall be conducted on the device [as per IS:9000, Pt. VIII, Vibration (Sinusoidal) Test 1981] with following severities –

i) Frequency range	1 Hz - 35 Hz
ii) Amplitude	0.15 mm or 2g
iii) No. of axes	3
iv) Number of sweep cycle	10
v) Total duration for the 10 sweep cycles	1 hour 45 min. when frequency of vibrations is changed as per Cl. 6.3 of IS:9000 (Pt. VIII)-1981 during each sweep.
vi) If resonance is observed, endurance test at resonant frequencies.	10 minutes at each resonant frequency.

After the test device shall be visually inspected to see that no part is damaged or cracked.

6.6 FAIL-SAFE FEATURE TEST

Fail-safe feature of the device shall be tested by opening/short-circuiting the individual components, by momentarily switching off the power supply, by picking up and dropping of the relays connected across the power supply and creating a fault in the circuit. Flasher device shall work satisfactorily and shall not give a steady output under any fault condition.

6.7 VISUAL INSPECTION

The physical condition of the device shall be visually inspected to ensure compliance of general requirements covered by Cl. 3 and it shall be free from any physical defect as mentioned therein.

7 PACKING

- 7.1 The flasher device shall be so packed as to permit convenient handling and to protect against loss or damage and ingress of moisture during transit and storage.
- 7.2 The package/box containing flasher devices and ready for dispatch to the consignee shall be plainly marked on the packet top with the following particulars:-
 - (a) Name and address of consignee and consignor
 - (b) Packing number
 - (c) Number of devices packed and their serial numbers
 - (d) Purchase order number and date
 - (e) The marking “FRAGILE” and “HANDLE WITH CARE”, each letter being not less than 50 mm in height
- 7.3 Each package shall contain an operation manual for the device incorporating general description, operating characteristics, schematic diagram showing each component and its value, overall dimensions of the device, etc.

Pin Code 0148

Arrangement No. 69

	A	B	C	D	
1					
2					
3					
4					
5					
6					
7	O/P	O/P			
8					
R1	I/P			I/P	R2
R3					R4

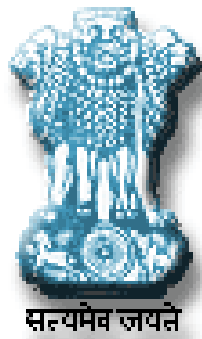
Flasher Device

R1 – B24 I/P

R2 – N24 I/P

A8 – B24 O/P

B8 – N24 O/P



FAIL SAFE ELECTRONIC FLASHER DEVICE

SPECIFICATION NO. : RDSO/SPN/173/2002

Amendment : 1

Number of pages : 5

**SIGNAL DIRECTORATE
RESEARCH DESIGNS & STANDARDS ORGANISATION
LUCKNOW-226011**

DOCUMENT DATA SHEET	
Designation RDSO/SPN/173/2002	Amendment 1
Title of Document Fail Safe Electronic Flasher Device	
Authors Name : Mukesh Mehrotra Designation : Director/Signal/RDSO	
Approved by Name : Shri S.K.Vyas Designation : Executive Director/Signal/RDSO	
Abstract This document specifies Technical specification for Fail Safe Electronic Flasher Device to provide flashing supply for use in signalling installations.	

DOCUMENT CONTROL SHEET

NAME	ORGANISATION	FUNCTION	LEVEL
Mukesh Mehrotra	RDSO	Member	Prepare
S.K.Vyas	RDSO	-	Approve

AMENDMENTS

Version	Chapter/Annexure	Amendment	Effective date
RDSO/SPN/173/2002	-	FIRST ISSUE	2002
RDSO/SPN/173/2002	Cl. 5.3.2, Appendix 'A'	Amendment-1	15 th January 2009

Specification No. : RDSO/SPN/173/2002
Amendment No. 1

The amended clauses are given below:-

Clause 5.3.2 Tests shall be carried out on 100% devices in a lot to be supplied.

Appendix ‘A’

Pin Code 0148
Arrangement No. 69

	A	B	C	D	
1					
2					
3					
4					
5					
6					
7					
8	O/P	O/P			
R1	I/P			I/P	R2
R3					R4

Flasher Device

R1 – B24 I/P

R2 – N24 I/P

A8 – B24 O/P

B8 – N24 O/P

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No. STS/E/Relays/Genl. Misc. Vol. XII

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मुख्य संकेत एवं दूरसंचार अभियन्ता, मुख्य संकेत एवं दूरसंचार अभियन्ता (निर्माण), मुख्य संकेत एवं दूरसंचार अभियन्ता (प्रॉजेक्ट)	Chief Signal & Telecom Engineer, Chief Signal & Telecom Engineer (Const.), Chief Signal & Telecom Engineer (Project)
मध्य रेलवे, मुम्बई सी.एस.टी. – 400 001	Central Rly, Mumbai CST – 400 001
पश्चिम रेलवे, चर्च गेट, मुम्बई – 400 020	Western Rly, Churchgate, Mumbai – 400 020
पूर्व रेलवे, फेयरली प्लेस, कोलकाता – 700 001	Eastern Rly, Fairlie Place, Kolkata – 700 001
दक्षिण पूर्व रेलवे, गार्डन रीच, कोलकाता – 700 043	South Eastern Rly., Garden Reach, Kolkata – 43
उत्तर रेलवे, बड़ौदा हाउस, नई दिल्ली – 110 001	Northern Rly., Baroda House, New Delhi – 01
पूर्वोत्तर रेलवे, गोरखपुर – 273 012	Northeastern Rly., Gorakhpur – 273 012
पूर्वोत्तर सीमान्त रेलवे, मालीगांव, गुवाहाटी – 780 011	North Frontier Rly., Maligaon, Guwahati – 011
दक्षिण रेलवे, पार्क टाउन, चेन्नई – 600 003	Southern Rly., Park Town, Chennai – 600 003
दक्षिण मध्य रेलवे, सिकन्दराबाद – 500 371	South Central Rly, Rail Nilayam, Secunderabad – 71
पूर्व मध्य रेलवे, हाजीपुर – 841 101	East Central Railway, Hazipur - 841 101
उत्तर पश्चिम रेलवे, जयपुर – 302 006	North Western Railway, Jaipur – 302 006
पूर्व तटीय रेलवे, ग्राउन्ड तल, उत्तरी ब्लाक, समन्त विहार, भुवनेश्वर – 17	East Coast Railway, Rail Vihar, Ground floor, North Block, Samant Vihar, Bhubaneswar – 17
उत्तर मध्य रेलवे, गंगा काम्पलेक्स, सूबेदारगंज, इलाहाबाद	North Central Railway, Ganga Complex, Subedarganj, Allahabad
दक्षिण पश्चिम रेलवे, मुख्य कार्यालय, क्लब रोड, केशवपुर, हुबली – 580 023	South Western Railway, Main Office, Club Road, Keshavpur, Hubli – 23
पश्चिम मध्य रेलवे, द्वितीय तल, डी.आर.एम. ऑफिस, जबलपुर – 482 001	West Central Railway, II nd Floor, DRM Office, Jabalpur – 482 001
दक्षिण पूर्व मध्य रेलवे, आर0ई0 ऑफिस कॉम्पलेक्स, बिलासपुर – 495 004	South East Central Railway, R. E. Office Complex, Bilaspur – 495 004
मेट्रो रेलवे, 33/1, जवाहर लाल नेहरू रोड, कोलकाता – 700 071	Metro Railway, 33/1, Jawaharlal Nehru Road, Kolkata – 700071
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निदेशक/इरिसेट, तारनाका रोड, लालागुडा, पी. ओ. सिकन्दराबाद – 17	Director/IRISET, Tarnaka Road Lallaguda, P.O. Secunderabad – 17

Sub: Amendment No. 2 to RDSO Specification No. RDSO/SPN/173/2002 for Fail Safe Electronic Flasher Device for Railway Signalling.

In compliance to Vigilance Cell/RDSO's letter No. 13/Vig/Policy dt. 26.07.16 & 08.09.16, Amendment No. 2 to RDSO Specification No. RDSO/SPN/173/2002 for Fail Safe Electronic Flasher Device for Railway Signalling is hereby issued with the approval of competent authority for information & implementation please.

DA: Copy of Amendment No. 2 to RDSO
Specification No. RDSO/SPN/173/2002.

(V. K. Agarwal)
Jt. Director/Signal
for Director General/Signal

Copy to :-

कार्यकारी निदेशक / गुणवत्ता आश्वासन / अ0अ0मा0सं0, लखनऊ	Executive Director/QA/S&T/RDSO/Lucknow
निदेशक / गुणवत्ता आश्वासन / सिगनल एवं दूरसंचार, / अ0अ0मा0सं0, निकट इरकोट बिल्डिंग, शंकर मार्केट के पीछे, शिवाजी ब्रिज, नई दिल्ली – 110 001	Director/QA./S&T/RDSO, 1st Floor, Near IRCOT Building, Behind Shanker Market, Shivaji Bridge, New Delhi – 110 001
निदेशक / गुणवत्ता आश्वासन / संकेत एवं दूरसंचार, / अ0अ0मा0सं0, प्रथम तल, न्यू एनेक्सी बिल्डिंग, चर्चगेट, पश्चिम रेलवे, मुंबई – 400 020	Director/QA./S&T/RDSO, 1st Floor, New Annexe Building., Western Railway, Churchgate, Mumbai – 400 020
निदेशक / गुणवत्ता आश्वासन / सिगनल एवं दूरसंचार, / अ0अ0मा0सं0, भूतल, डी0आर0एम0 ऑफिस, बंगलोर – 560 023	Director/QA./S&T/RDSO, Ground Floor, DRM Office, Bangalore – 560 023
निदेशक / गुणवत्ता आश्वासन / सिगनल एवं दूरसंचार, / अ0अ0मा0सं0, चौथी मंजिल, 17 एन.एस. रोड, वेस्ट विंग, फेयरली प्लेस, कोलकाता – 700 001	Director/QA./S&T/RDSO, 4th Floor, 17 N.S. Road, West Wing, Fairlie Place, Kolkata – 700 001
निदेशक / गुणवत्ता आश्वासन / सिगनल एवं दूरसंचार, / अ0अ0मा0सं0, हसनपुरा रोड, जयपुर – 302 006	Director/QA/S&T/RDSO, Hasanpura Road, In Front of Railway Hospital, JAIPUR – 302 006
1. M/s. Epsilon Electronic Equipment & Co. Ltd., B-2, Electronic Industrial Estate, ECIL CROSS Road, Kushaiguda, Hyderabad – 500 062	
2. M/s. Urban Tekno-Systems Pvt. Ltd., 32/H, Sahitya Parisad Street, (G.Floor), Kolkata – 700 006	
3. M/s. Digital Communication & Control Pvt. Ltd., Webal Industrial Estate, Room No. 213/215/217, P-1, Taratalla Road, Kolkata – 700 088.	
4. M/s. G.G. Tronics, Plot No. 10, 3rd Phase, 6 th Main, Peenya Industrial Area, Peenya, Bangalore – 560 058	
5. M/s. Ram Electronics, Plot No. 149-D, Sector-I, Lane-8, Phase-II, IDA, Cherlapally, Hyderabad – 51	

DA: Copy of Amendment No. 2 to RDSO
Specification No. RDSO/SPN/173/2002.

(V. K. Agarwal)
Jt. Director/Signal
for Director General/Signal

28/07/17

Amendment No. 2

To

RDSO Specification No. RDSO/SPN/173/2002

For

Fail Safe Electronic Flasher Device for Railway Signalling

Following new clause is added to the RDSO Specification No. RDSO/SPN/173/2002 for Fail Safe Electronic Flasher Device for Railway Signalling.

Clause No. 8

“All the provisions contained in RDSO’s ISO procedures laid down in Document No. QO-D-7.1-11 dated 19.07.2016 (titled “Vendor Changes in approved status”) and subsequent versions/amendments thereof, shall be binding and applicable on the successful vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways”.

End of Amendment No. 2