सत्यमेव जयते
Government of India

RDSO Standard of
Rail Surface Friction Meter
(Document No.: IS/RDSO-TMM/0001:2023)

अअमासं RDSO
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1.0 Purpose-Indian Railway is a large network. Indian Railway track network has lots of curves which are lubricated on Gauge face corner of outer rail by lubricants to avoid gauge face wear. Track based Lubricators are being adopted by Indian Railway for lubrication.

2.0 Scope

2.1 Purpose of this device to measure coefficient of friction (Dynamic) on the Gauge face Corner, Gauge face & top of rail on curve section as well as straight section of the track.

2.2 Preference to make in India: Compliance of the instructions contained in Public procurement (Preference to Make in India) order-2017 shall be ensured.

2.3 Definitions:

Gauge: The distance between the inside running (or gauge) faces of the two rails measured between points 13-15 mm below the top of the rail head.

Gauge face corner: The single point in the gauge corner region, the tangent of which is at 45° to the horizontal, with or without rail inclination.

Gauge face: The zone of the rail head facing the inside of the track. In the tighter curves the gauge face may be worn due to contact with the wheel flange.

Top of Rail: The distance of rail crown (or rail head) is known as Top of rail.

3.0 Service Conditions-

3.1 System should be able to work under following service condition:

i)	Ambient temperature:	0°c to 50°C
ii)	Rail temperature:	(-) 10°C to (+) 75°C
iii)	Humidity:	40- 90%
iv)	Rainfall:	No
v)	Atmospheric condition:	Very Dusty, heavy fog

3.2 The system should be such that it does not affect the signaling system.

4.0 Functional requirement :

4.1 Device should be able to measure value of coefficient of friction (Dynamic) on the Gauge face Corner, Gauge face & top of rail at desired location on curve section as well as straight section of track.

4.2 It should be able to work on BG track which is being generally used in Indian railway.

4.3 Device must be able to work under Indian environmental conditions.

4.4 It should be robust portable, lightweight & easy to operate so that one man can manage it.

4.5 It should work on rechargeable battery. Rechargeable battery should have sufficient capacity to be able to work for at least 8hrs continuously without need for recharging.

4.6 This will be automatic digital type device that will give a value of friction (Dynamic) at desire location on track.

4.7 It should containing a display screen that indicates the average value of coefficient of friction (Dynamic) after minimum 50cm to maximum 3m distance during measurement and not the instantaneous value. The device should save at least 100 readings and there should also be a facility to transfer that reading to PC.

4.8 **Data Transfer Module**: This module is used for transferring data from Display Unit to Personal Computer (PC) through USB/Pen drive/Bluetooth/mobile set. Data transferred in Computer should create a file in ASCII format compatible to TMS software as given below:-

(i) Location record format: I,RRRR,DDDD,SSSS,SSSS where I is 1 for this type of record, RRRR is name of Railway, DDDD is name of Division and SSSS,SSSS is name of the two stations in between coefficient of friction measuring is being done.

(ii) Kilometer and curve record format: I,KKKK,CCCC where I is 2 for this type of record, KKKK is kilometer post and CCCC is curve number reading where coefficient of friction measuring is being done.

(iii) Coefficient of friction record format: I,DD/MM/YY,HH:MM,FF.FF,LLLLL,TP,TP where I is 3 for this type of record, DD/MM/YY is date, month and year, HH:MM is time, FF.FF is coefficient of friction in μ, LLLLL is the name of line and TP,TP is name of the two electric poles in between coefficient of friction measuring is being done.

Thus file generated on PC will be in following format:-

1,RRRR,DDDD,SSSS,SSSS

2,KKKK,CCCC

3,01/01/23,16:26,02.25,LLLLL,TP,TP

(, stands for blank space)

This data can also be further accessed in EXCEL files. The supplier shall provide software on Pen drive for both the functions. This module shall be designed in such a way that it can be fitted easily in Display Unit and does not contain any power source or battery.

4.9 The Device shall have menu based and user friendly man machine dialogue by using in-built/detachable key board which enables:

- Setting of date and time.
- Setting of name of Railway, Division, from Station to Station upto 4 alphabets maximum.
- Setting of Kilometer upto 4 numeric maximum.
- Setting of Line name upto 5 alphanumeric maximum.
- Setting of "from TP to TP" upto 2 numeric maximum each.

5.0 Technical Features:

i.	Resolution	0.01
ii.	Accuracy	± 0.02
iii.	Measurement range (μ)	0.1-0.75
iv.	Weight	Light weight easy to carry by one man. (Maximum wt. 20kg)
v.	Power	Rechargeable battery
vi.	Work on	Curve & Straight section
vii.	Measuring Area	Gauge face, Gauge face corner & Top of Rail (Details given in Annexure A)

6.0 Acceptance test

6.1 **Visual test**: The device shall be visually checked for defects like rough finishing, loose fittings bend in frame etc.

6.2 The device should have all the technical features of para 5.0 of the Standard.

6.3 **Repeatability test**: Repeatability test shall be conducted on without lubricated rail at gauge face. Repeatability test shall be conducted for atleast 5 nos. of reading at same point with minimum 5 such locations out of which atleast two locations should be on curve of minimum 1.25^0. For same location, reading in different measurement should be within ± 0.02 of average of the reading at the same point. Repeatability (or test–retest reliability) is described as the variation in successive measurements.

6.4 If the device fails in any acceptance test, it shall be rejected.

7.0 Marking And Packing:

Each device shall be legibly and indelibly marked with the following details:

(i) Name and trade mark/brand of the original manufacturer.
(ii) Serial no. of the device.
(iii) Make & Model

The device shall be packed in suitable box after covering with good quality material as per best trade practice to avoid any damage during transshipment.

8.0 Details to be provided by Firms:

The following details shall be submitted by firms-

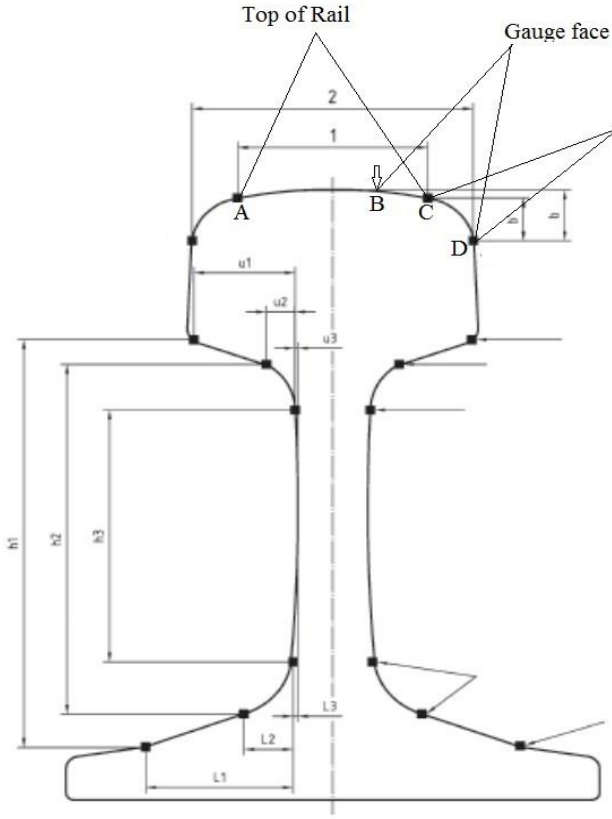
i. Description of working principal of the equipment/system.
ii. Working instruction manual
iii. Detailed description, function and weight of each unit of the equipment/system
iv. Technical literature, drawing and Standard of each unit of the equipment along with details of relevant codes, if applicable.
v. Method of calibration of equipment and details methodology for validation of the equipment/system.

9.0 Training and Commissioning:

9.1 Adequate training for operation and maintenance of the Rail Surface friction meter shall be imparted to at Consignee's end or at manufacturer's premises as mutually agreed between the manufacturer and the purchaser at the rate of one operator per Rail Surface friction meter during supply which shall be treated as commissioning.

9.2 After the Rail Surface friction meter has been supplied at consignee premises, the supply shall be considered as complete only after field training is provided by the supplier as stated above.

Annexure-A



1.	Point A to C	Top of Rail
2.	Point B to D	Gauge face
3.	Point C to D	Gauge face corner

Key
■ transition point 0,01 mm

Table A- Rail transition references (see Figure A) **IRST-12**

Rail profile	Dimension in mm												
	1	2	b	b'	h 1	h 2	h 3	L1	L2	L3	u 1	u 2	u 3
60E1	52.05	72.00	14.30	12.00	118.57	101.50	87.06	36.61	8.25	3.20	26.83	8.25	3.20