Addendum & Correction Slip No. 1 of April-2024
To
IRS Specification for Fusion Welding of Rails by Alumino Thermic Process
Serial No. IRST-19-2021

1. Para 3.4.1 (i) has been modified as:

3.4.1 52 kg & above Rail Sections:

(i) The portion of 52 kg and above rail sections shall be packed in bags of different colour as per Rail Grades and combination of Rail grades. The colour of bags containing portions shall be as per table below:

S.No.	Rail grade	Colour
1.	72 UTS	Red
2.	90 UTS	Green
3.	R260	Violet
4.	1080HH	Yellow
5.	R350HT	Blue
6.	R260 with 90 UTS	Orange
7.	R260 with R350HT	Pink
8.	R350HT with 90 UTS	Brown
9.	R260NC	Black
10.	R260NC with R260	Purple

2. Para 4.4.2 Table-1B has been modified as:

4.4.2 Hardness test

Brinell hardness test shall be carried out at the welded zone, heat affected zones and parent metal of the rails in accordance with IS: 1500, “Method for Brinell Hardness test for steel”. The test shall be done on the top surface of the head of the test weld with a ball of 10 mm Dia. and a test load of 3000 kg maintained for 10 secs. The average hardness values of different rail chemistry on rail running surface of unaffected parent rail as per testing procedure and provisions specified in IRS/T-12-2009 along with its latest revision and updated correction slips are given in Table 1A for reference –

Table - 1A

Type of rail	72 UTS rail	90 UTS rail	R260 rail	1080 Head Hardened rail	R350HT rail
Running Surface Hardness (BHN)	229*	Min 260	260-300	340-390	350 -390

* For 72 UTS rail, average hardness (BHN) is 229

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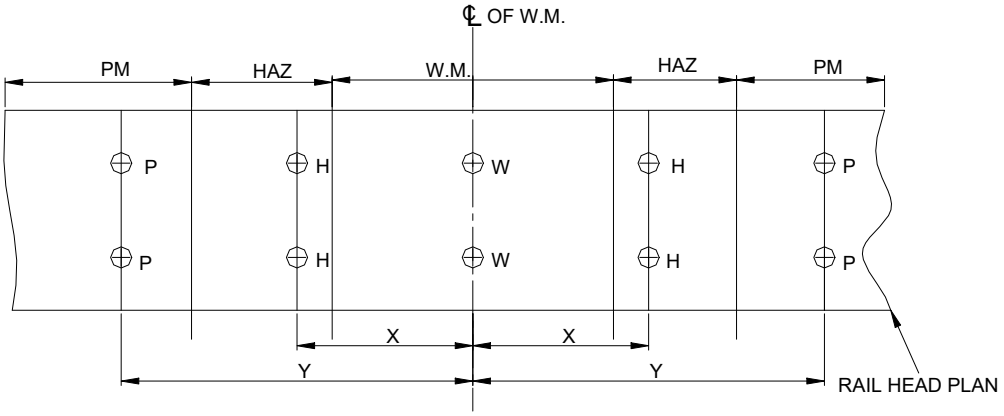

Fig.1

The average hardness number (of two readings) determined for the weld metal (WM), heat affected zone (HAZ) and parent metal (PM) at location shown as 'W' 'H' & 'P' respectively in fig. 1 shall be as per table – 1B given below:

(i) For 25mm gap SKV welding & for any preheating device used.
  (a) For 52 kg Section
    X = 40 mm
    Y = 100 mm
  (b) For 60 kg/60 E1 Section
    X = 45 mm
    Y = 100 mm

(ii) For 50mm gap combination joint welding & for any preheating device used
  X = 60 mm
  Y = 120 mm

(iii) For 75 mm wide gap welding & for any preheating device used
  X = 80 mm
  Y = 150 mm

Table- 1B

S. No.	Rail Section/ Grade	Hardness BHN	
		Weld Metal (W) (Weld centre-line)	Heat affected zone (H) (at locations shown in Fig. 1 above)
1.	72 UTS rail of all sections with normal & wide gap	229 + 20 - 0	± 20 of actual parent metal hardness (location 'P')
2.	90 UTS (880 grade) rails of all sections with normal & wide gap	265 + 30 - 0	+30 to -10 of actual parent metal Hardness (Location 'P')
3.	52 kg (90 UTS) Vs 90R (72 UTS) combination joint with 50mm gap	265 + 30 - 0	+30 to -10 of actual parent metal Hardness (Location 'P')
4.	60 kg, 1080 HH rail	321 (min.)	Not less than [actual parent metal hardness (Location 'P') – 60] BHN
5.	60 kg/60 E1, R260 grade rail	265 + 30 - 0	+30 to -10 of actual parent metal hardness (location 'P')
6.	60 kg/60 E1, R350HT grade rail	350±20	Not less than [Actual parent metal hardness (location 'P')-60] BHN
7.	60 kg/60E1, R260NC rail	265 + 30 - 0	+30 to -10 of actual parent metal Hardness (Location 'P')

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Note: For Combination Joint of 60 kg (R260) Vs 60 kg (90UTS) rail with 25mm nominal gap, Hardness values corresponding to R260 grade rail as specified above shall be considered.

For AT welding Joints of 60 kg/60E1 (R260) Vs 60 kg/60E1, R260NC grade rails, with 25 mm Nominal gap, Hardness values corresponding to 60 kg/60E1, R260NC grade rail as specified above shall be considered.

Similarly, for AT welding Joints of 60 kg (90UTS) Vs 60 kg/60E1, R350HT grade rails and 60 kg/60E1 (R260) Vs 60 kg/60E1, R350HT grade rails, with 25 mm Nominal gap, Hardness values corresponding to 60 kg/60E1, R350HT grade rail as specified above shall be considered.

Rail used for AT welding shall be conforming to IRST-12-2009 along with its latest revision and updated correction slips. Certificate regarding parent metal hardness shall be provided by AT weld portion manufacturer firms at the time of approval of AT welding technique and whenever required by RDSO.

3. Para 4.4.3.1 Table-2 has been modified as:

4.4.3 Transverse breaking load test

4.4.3.1 The test weld shall be supported on cylindrical or semi cylindrical supports having a distance of one meter between them from centre to centre. The weld shall be at the centre of the span and loaded in such manner that the foot of the rail is in tension. The diameter of mandrel and the supports shall be between 30 to 50mm. The load shall be gradually increased (rate of loading shall not exceed 2.5 t/sec) till rupture occurs. The test weld shall withstand minimum transverse breaking load as indicated in column 4 of Table-2. The deflection at center at the actual transverse breaking load shall not be less than that specified in column 5 of Table-2.

Table – 2

S. No.	Rail Type	Rail Section	Min. transverse breaking load in tonnes	Min. deflection in mm at the centre at the actual transverse breaking load
1	2	3	4	5
A.	72 UTS to IRS T-12 for normal gap welding & wide gap (75 mm) welding	60R 75R 90R 52 kg 60 kg	50 55 65 85 95	15 15 15 18 18
B.	90 UTS to IRS T-12 for normal & wide gap (75mm) welding	75R 90R 52 kg 60 kg	60 80 90 115	15 15 15 15
C.	1080 Head Hardened Rails to IRS T-12 for normal gap welding	60 kg	115	12

D.	60 kg / 60E1, R260 grade rail for normal & wide gap (75mm) welding	60 kg / 60E1	122.5	15
E.	60 kg / 60E1, R350HT grade rail for normal & wide gap (75mm) welding	60 kg / 60E1	122.5	12
F.	60 kg / 60E1, R260NC grade rail for normal & wide gap (75mm) welding	60 kg / 60E1	115	15

Note: For Combination AT welding Joint of 60 kg (R260) Vs 60 kg (90UTS) rails with 25mm nominal gap –transverse breaking load and min. deflection values corresponding to 60 kg/60E1, R260 grade rail as specified above shall be considered.

For combination AT welding joints of 60 kg/60E1 (R260) Vs 60 kg/60E1, R260NC grade rails, with 25 mm nominal gap, transverse breaking load and min. deflection values corresponding to 60 kg/60E1, R260NC grade rail as specified above shall be considered.

Similarly, for AT welding Joints of 60 kg (90UTS) Vs 60 kg/60E1, R350HT grade rails and 60 kg/60E1 (R260) Vs 60 kg/60E1, R350HT grade rails, with 25 mm nominal gap, transverse breaking load and min. deflection values corresponding to 60 kg/60E1, R350HT grade rail as specified above shall be considered.

4. Para 4.5 has been modified as:

4.5 Weld Metal Chemistry Test:

Full chemical analysis is to be conducted on the rail weld running surface at 10mm away from the weld transverse axis. The chemical composition of the weld so determined shall conform to the following:

Grade of rail	C %	Mn %	Si %+	S %	P %	V %*	Mo %*	Al %	Cr %	Cu %	Ni %	Sn %	Sb %	Ti %	Nb %
90UTS/ R260, 1080 HH	0.45 - 0.70	0.80 - 1.30	0.50 (max)	0.05 (max)	0.05 (max)	0.10 - 0.15	0.1 - 0.25	0.02 - 0.60	0.20 (max)	–	–	–	–	–	–
72 UTS	0.40 - 0.55	0.80 - 1.20	0.50 (max)	0.05 (max)	0.05 (max)	0.10 - 0.15	0.10 - 0.25	0.02 - 0.60	0.20 (max)	–	–	–	–	–	–
R350HT	0.50 - 1.00	0.50 - 1.40	0.00 - 1.75	0.00 - 0.035	0.00 - 0.035	0.10 - 0.65	0.10 - 0.40	0.02 - 0.60	0.00 - 0.80	0.00 - 0.20	0.00 - 0.20	0.00 - 0.02	0.00 - 0.02	0.00 - 0.05	0.00 - 0.02
R260NC	0.60 - 0.80	0.80 - 1.30	0.10 - 0.50	0.04 (Max)	0.05 (Max)	–	0.25 (Max)	0.02 - 0.60	0.50 - 0.65	0.30 - 0.40	0.25 - 0.40	–	–	–	–

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Working range of each element for R350HT grade shall be as mentioned below:

SN	Element	Working range
1	Carbon	± 0.12
2	Silicon	± 0.25
3	Manganese	± 0.20
4	Phosphorous	Not Specified
5	Sulphur	Not Specified
6	Chromium	± 0.20
7	Aluminium	± 0.20
8	Vanadium	Not Specified
9	Niobium	Not Specified
10	Nickel	Not Specified
11	Copper	Not Specified
12	Tin	Not Specified
13	Antimony	Not Specified
14	Titanium	Not Specified
15	Molybdenum	Not Specified

The firm shall define the mean value for each element with a working range in Table above. Actual values shall not vary by more than the working range and this range shall fit within the permitted range.

+ In case single shot crucible is used, the maximum limit of Si% may be taken as 1.20% for 90 UTS /R260/1080 Head Hardened rails and 72 UTS rails.

* Either Vanadium or Molybdenum may be used as grain refiner.

Weld metal chemistry for AT welding Joint of 90 UTS/R260 Vs R350HT grade rails shall be same as that specified for R350HT grade rails.

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