

~~Original~~
GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

INDIAN RAILWAY
STANDARD SPECIFICATION
FOR
ELASTIC RAIL CLIPS
SERIAL NO. T-31-1992

RESEARCH DESIGNS AND STANDARDS ORGANISATION

LUCKNOW-226011

C O N T E N T S

<u>Para No.</u>	<u>Description</u>	<u>Page No.</u>
0	Foreword	1
1	Scope	2
2	Reference documents	2
3	Raw Material Procurement	4
4	Technical specification of raw material	4
5	Manufacture of clips	7
6	Lot & sample size for testing	8
7	Tests	8
8	Final inspection/testing & documentation	11
9	Protection	11
10	Packing	11
11	Test facilities	12
12	Inspection gauges	12
13	Disposal of rejected clips	12
14	General	12

Appendix I to XIII
Figures 1 & 2

INDIAN RAILWAY STANDARDS SPECIFICATION

FOR ELASTIC RAIL CLIPS

S.No. T-31-1992

(Third Revision)

0. FOREWORD :

- 0.1 This specification was first adopted in 1976 and was revised in 1984, when new clause for the 'toe load' test was included. Subsequently the specification was amended in 1987 when the range of toe-load value of Elastic Rail Clip was changed from 645-775 kg to 645-800 kg. Subsequently in April 1988, the scope of specification was extended to flat toe Elastic Rail Clips. In 1989 the specification was further revised to enhance its scope to cover all types of Elastic Rail Clips such as ERC MK II, ERC MK III and amendment no.1 of September 1990 for ERC MK IV.
- 0.2 To improve the quality and serviceability of clips, the specification has been revised as third revision and issued in 1992 with a view to cover the specification and sources for raw material for use by the manufacturer of Elastic Rail Clips and to exercise checks on inclusion rating, grain size and heterogeneity of steel. Further, in this revision the sampling plan has been also revised for tests under clause No.7.2, 7.6, 7.7 and 7.8 as follows for which reference has been drawn from IS:2500 (Part I) - 1973.
- 0.3 The toe-load range of ERC-MK III in Annexure VII has been revised to 850-1100 kg.

1. SCOPE

This standard covers the specification and the approved sources for the raw material for the production of Elastic Rail Clips for the guidance of clip manufacturers. This standard also covers the technical requirement, inspection and testing procedure of the different designs of Elastic Rail Clips viz. ERC, ERC flat, ERC MK II, ERC MK III and ERC MK IV, hereinafter referred as 'clips' which call for stricter control in the quality of raw material, testing standards for implementation of quality assurance programme by the manufacturer. Contract awarding party has been referred as 'purchaser' and its nominated inspection agency/representative as 'inspection agency/officer'. The firm entrusted with manufacture and supply of clips, is referred to as 'manufacturer'.

2. REFERENCE DOCUMENTS

2.1 This standard refers to the following Indian Standards of the BIS. These should be available at the manufacturers' works for reference.

<u>IS NO.</u>	<u>TITLE</u>
✓ 1. IS: 77 - 1976	Linseed oil, boiled for paints.
✓ 2(i) IS:228(Part 1):1987 -	Determination of carbon by volumetric method (for carbon 0.05 to 2.50 percent.
(ii) IS:228(Part 2):1987 -	Determination of Manganese in plain carbon and low alloy steels by arsenite method.

- (iii) IS: 228(Part 8): 1975 - Determination of silicon by gravimetric method (for silicon greater than or equal to 0.1 percent).
- (iv) IS: 223(Part 3): 1987 - Determination of phosphorus by alkalimetric method.
- (v) IS: 228(Part 9): 1975 - Determination of sulphur in plain carbon steels by evolution method.
- 3. IS: 1500-1983 - Method for Brinell hardness test for metallic materials (second revision)
- 4. IS: 1501(Part 1) : 1984 - Method for Vickers Hardness Test for Metallic Materials.
- 5. IS: 1586-1968 - Method for Rockwell Hardness Test (B&C scale) for steel.
- 6. IS: 2500(Part 1)-1973 - Sampling Inspection tables.
Inspection by Attributes and by count of defects (First revision)
- 7. IS: 2853-1964 - Method of determining austenitic grain size of steel(Amendment No.1)
- 8. IS: 3195-1992 - Steel for the manufacture of volute and helical springs (For Railway Rolling stock) - specification(Third revision)
- 9. IS: 4163-1982 - Method of determination of inclusion content in steel by microscopic method (First revision)
- 10. IS: 6396-1983 - Method of measuring decarburised depth of steel(First revision)
- 11. IS: 7739-
Part V-1976 - Code of practice for preparation of metallographic specimen, Part V iron and steel and their examination.

2.2 A reference to the specifications quoted herein shall be taken as reference from the latest edition of the specification concerned.

2.3 The specific provision in this specification will override those in the above specifications, where these are not in conformity with one another. Any special requirements given in the drawing of the clips will override the relevant provisions of this specification.

2.4 RDSO drawings relevant to the clip under production should be available for reference at the manufacturers' works.

3. RAW MATERIAL PROCUREMENT

Spring steel rounds shall be procured from approved manufacturers only. RDSO (I&L Directorate) issues the list of approved manufacturers biannually. List of approved manufacturers for spring steel rounds as in July 1992 is given in the Annexure I of this standard.

4. TECHNICAL SPECIFICATION OF THE RAW MATERIAL

4.1 Silico Manganese spring steel as rolled bars to Grade 55 S17 of IS:3195- 1992 shall be used in the manufacture of clips. The technical specification of as rolled steel bars relate to supply condition of the bars in the as rolled and straightened condition for hot forming.

4.2 MANUFACTURING PROCESS FOR STEEL

4.2.1 Steel shall be manufactured by any process of steel making except the bessemer process. It shall be followed by secondary refining or vacuum melting.

4.2.2 The size of ingots, billets or continuous cast billets for any given size of finished steel product shall be such that a minimum reduction ratio of 16:1 from the minimum cross sectional area of the ingot billet or continuous cast billets to the maximum cross sectional area of the product is ensured.

4.3 CHEMICAL COMPOSITION:

The ladle analysis of the steel for the as rolled bars shall conform to following chemical composition as given in IS:3195 for grade 55 S17 when tested in accordance with IS:228 or spectrographically.

4.3.1 Ladle analysis

Carbon	0.50	- 0.60%
Manganese	0.80	- 1.0%
Silicon	1.50	- 2.0%
Sulphur	0.04 (Max.)	%
Phosphorus	0.04 (Max.)	%

4.3.2 Product analysis

The variation for the product analysis shall be within the following permissible range over ladle sample analysis:

<u>Element</u>		<u>Permissible variation</u>
Carbon	+	0.03 %
	-	
Manganese	+	0.04 %
	-	
Silicon	+	0.03 %
	-	
Sulphur	+	0.005%
Phosphorus	+	0.005%

4.4 GRAIN SIZE

The grain size of steel shall be 6 or finer as per IS: 2853-1964.

4.5 INCLUSION RATING

The inclusion rating when determined as per IS:4163-1982 shall not be worse than 2.5 A, B, C, D both for thick and thin series given at fig.2 of IS:4163-1982.

4.6 HARDNESS

The hardness of as rolled bars when tested in accordance with IS:1500-1983, the average of three readings shall be approximately 270 BHN or its equivalent in HRC or HV scales. This value is for general guidance only.

4.7 DEPTH OF DECARBURISATION

The average total depth of decarburisation (partial + complete) tested in accordance with IS:6396-1983 with magnification of x100 of 5 deepest decarburised zones shall not be more than 0.15 mm.

4.8 FREEDOM FROM DEFECTS

- 4.8.1 The surface of the as rolled bars shall be reasonably smooth and free from distortion, twist and kinks, and shall be substantially straight.
- 4.8.2 The as rolled bars shall be free from harmful defects namely seams, folds, laps, cracks, deep pits, grooves, excessive scaling which may lead to cracking during hardening or impair the serviceability. The material shall be free from harmful internal defects, such as piping and segregation, which may impair serviceability.

4.9 SECTION

Section of as rolled bars shall be as per order. The tolerances on the diameter shall be :

- + 1.0 % with a min. of 0.20 mm
- 0.8 % with a min. of 0.15 mm

4.10 MARKING

4.10.1 Each bar shall be stamped with name or Trade mark of the manufacturer, Grade and heat no. or other identification marks by which steel may be traced to the cast from which it has been made. Such marking shall be made at the extreme end of each bar.

4.10.2 The bars supplied shall also be distinctly marked with paint at the extreme end with different colours to be related with the heat number of material. The bars of different heats shall not be mixed up and shall be stored in stacks heatwise.

4.11 TEST CERTIFICATE AND RAW MATERIAL CHECKING

4.11.1 The test certificate from the producer of steel bars showing the following should be available with the manufacturer.

- (i) Heat number & Grade
- (ii) Colour code
- (iii) Chemical analysis
- (iv) Inclusion rating
- (v) Grain size

- (vi) Depth of decarburisation (C, P & T)
- (vii) Freedom from harmful defects
- (viii) Section
- (ix) Hardness
- (x) Weight of consignment.

The above particulars shall be furnished by the manufacturer for each heat of the raw material whenever requested by the inspecting agency.

4.11.2 The bars shall be checked by the manufacturer for the properties (iii) to (ix) of para 4.11.1 above at the rate of two sample bars per heat, (except for the diameter of the bar) and 20 sample bars per heat for the diameter. The observations shall be recorded in the proforma given in Annexure II & Annexure III respectively and shall be compared with the test certificate and shall be examined for acceptability with respect to specification for raw material before its use in the manufacture of clips.

4.11.3 The raw material may also be inspected by the purchaser/his inspection agency for inspection of clips at his discretion. It shall be the responsibility of the manufacturer to inform in writing to the inspecting agency about the arrival of raw material well before its use.

5 MANUFACTURE OF CLIPS

5.1 The clips shall be manufactured from as rolled silico-manganese spring steel rounds as per technical specification (reference para 4) by hot forming and shall be subsequently oil hardened and tempered to give uniform hardness across the section. The clips shall conform to the requirements of the relevant drawing and tests stipulated hereinafter.

5.2 MARKING : All clips shall bear stamping to indicate date, month and last two digits of the year of manufacture and initials of the firm as per code of stamping given in Annexure IV.

6. LOT AND SAMPLE SIZE FOR TESTING

- 6.1 For the purpose of testing the number of clips manufactured from the same Heat No. of the raw material, heat treated in a similar manner in a day subject to a maximum of 10,000 nos. using continuous type temperature controlled furnace or clips manufactured in one shift in a day and heat treated in a similar manner shall form a lot for testing.
- 6.2 For Hardness test, dimensional check, application and deflection test and toe load tests, the sample size and the acceptance and rejection numbers for Inspection Level IV and AQL of 1.5 percent shall be as per IS:2500 (Part I) 1973 and reproduced in Annexure V of this standard.
- 6.3 For chemical analysis, depth of decarburisation, freedom from defect, and inclusion rating, the sample size shall be as given under relevant clause.
- 6.4 The test samples for different tests shall be drawn at random from each lot.
- 6.5 The clips shall be offered for inspection as per letter given in Annexure VI.

7. TESTS

7.1 Chemical analysis

One sample clip drawn from the production of each lot shall be tested for chemical analysis for determination of Carbon, Silicon, Manganese, Sulphur and Phosphorus as per relevant part number of IS:228 or the sample shall be spectrographically analysed. The sample shall conform to the requirements of chemical composition stipulated in para 4.3.1 above with permissible variation given in para 4.3.2. If the chemical composition does not conform to the specified chemical composition, the lot shall be rejected.

7.2 HARDNESS TEST

The sample clips shall be tested for Hardness in accordance with IS:1586-68 "Rockwell Hardness Test (B&C Scales) for steels" or IS:1501(part-I)-1984 "Vickers Hardness Test for Steel" or IS:1500-1983 "Brinell Hardness Test for Steel" and shall conform to the following requirements as the case may be:

<u>HARDNESS</u>	<u>HARDNESS NUMBER</u>
RC	40-44
HV	380-435
HB	375-415

7.3 DECARBURISATION TEST

7.3.1 For decarburisation test, the sample clips shall be microscopically examined at magnification x 100 for decarburisation as per IS:6396-1983. The average total depth of decarburisation (partial + complete) of five deepest decarburised zones of each sample clip shall not be more than 0.25 mm for acceptance of material.

7.3.2 Sample size will be 5% of that for Hardness Test, and the sample clips drawn accordingly will constitute the first sample.

7.3.3 All the sample clips tested in the first sample must pass the test for acceptance of the lot. In case, more than one clip fails, the lot will be rejected. If only one clip fails in the first sample, a second sample of clips will be drawn such that the sample size is twice the sample size of the first sample. All the clips in the second sample of clips should be tested and each clip should pass the test for acceptance of the lot, i.e. in case one clip fails the lot will be rejected.

7.4 FREEDOM FROM DEFECTS

7.4.1 Sample clips will be checked for freedom from defects and should be free from harmful surface defects such as seams, laps, rough or jagged and imperfect edges. The sample clips shall also be examined for the heterogeneity of steel and freedom from internal defects by the micro-etching process as per IS-7739 (part-V) 1976.

lot for freedom from defects will be as per 7.3.2 and 7.3.3 above.

7.5 INCLUSION RATING

7.5.1 Minimum sample size required for the test shall be six. The sample clips of the decarburisation test and additional samples required to make up the number to six, depending upon the lot size, shall be taken up for testing for inclusion rating. The inclusion rating in the material of the clips when determined as per IS: 4163-1982 shall not be worse than 2.5 A, B, C, D both for thick and thin series given at Fig.2 of IS:4163-1982.

7.6 DIMENSIONS

7.6.1 The sample clips shall be checked for the dimensions by means of inspection gauges as per RDSO drawings, and shall meet with requirement of dimensions and tolerances as provided in the drawings of Inspection gauges.

7.6.2 The sample clips shall also be examined for the flat bearing lengths of the major & minor axis of toe of the clip with the rail flange in the rail seat assembly or in a fixture, which deflects the clip to the same extent as in the rail fastening assembly. For this purpose, the major and minor axis of the elliptical contact surface shall be measured to meet the requirements given in Annexure- VII. For ensuring that the flat toe bearing area of the toe of the clip with rail flange slope surface at the major and minor axis, a filer 0.05 mm thick shall not pass under the toe of clip along the major and minor axis of the clip.

7.7 APPLICATION AND DEFLECTION TEST

The sample clips shall be tested by driving into a rail fastening assembly in a fixture, which deflects the clip to the same extent as in the rail fastening assembly as approved by the purchaser. The clips shall then be removed from the fixture and checked for compliance with the dimension and tolerances as per clause 7.6.1

7.8 TOE LOAD TEST

The sample clips shall be tested for toe load, with the help of toe load test arrangement approved by the purchaser/Inspecting agency. The toe load test arrangement and toe load values of the different clips shall comply with the requirements shown in Annexure VII.

8. FINAL INSPECTION/TESTING & DOCUMENTATION

The manufacturer shall carry out the final inspection and testing internally in accordance with the plan of testing given under 'Tests' clause 7 above, and shall maintain the records as per Annexures VII to XIII to ensure that the clips have passed inspection criteria.

9. PROTECTION

After inspection and approval, the clips shall be cleaned off all rust and protected with one coat of boiled Linseed oil as per IS:77-1976 or any other rust preventing compound approved by the purchaser.

10. PACKING

10.1 The clips shall be packed in double gunny bags, each bag containing 50 clips. In the consignment to be sent by the manufacturer, not more than one gunny bag shall be filled with less than 50 clips which should be clearly mentioned by the manufacturer in the despatch particulars giving the bag numbers (as painted thereon) and number of clips. The packing shall be sound to ensure that there is no loss or damage to the clips during transit.

10.2 The gunny bags should not have any exterior stitching whatsoever, except for the edge to be sealed. The hessian thread used for stitching the gunny bag edge should be free from any knots except at the sealing point.

11. TEST FACILITIES

The manufacturer shall be required to instal all the necessary test facilities for inspection of clips in a separate well lit, clean and properly ventilated laboratory room provided with easily maintainable floor and platform.

12. INSPECTION GAUGES

The inspection gauges for dimensional check should conform to RDSO Drawings. The manufacturer shall submit two sets of inspection gauges for the approval of Inspecting officer. Out of these, one set of inspection gauges shall be used as master gauge and shall be preserved safely by the clip manufacturer. The second set shall be used by the Inspecting Officer. For internal quality checks, the firm should use an additional set of gauges as per drawing.

13. DISPOSAL OF REJECTED CLIPS

The rejected clips shall be cut in two pieces by the manufacturer using oxy-acetylene flame and shall then be disposed of as scrap.

14. GENERAL

14.1 The manufacturer shall furnish, at his cost, the clips required for all tests and shall also provide necessary man-power and facilities for carrying out tests at his works.

14.2 Purchaser/Inspecting officer shall have free access to the works of manufacturer at all reasonable times and shall be at liberty to inspect the manufacture at any stage and to call for any records, pertaining to manufacture, which shall be made available to him within reasonable time.

S.No. NAME AND ADDRESS OF MANUFACTURERS OF
SPRING STEEL ROUNDS AS ON 1.7.1992

1. Ferro Alloy Corporation Ltd., 46, A&B, MIDC
Industrial Estate, Hingna Road, Nagpur-440016
2. ~~Guest Keen Williams Ltd., (Steel Division),
98 Andul Road, Howrah-711103~~
3. ~~Mukund Iron and Steel Works Ltd., Thane
Belapur Road, Kelwa, Thane~~
4. Partap Steels Ltd., 21/3, Mathura Road,
Ballabgarh-121004
5. Panchmahal Steels, Ltd. Kothari Chambers,
3rd floor, Kothi Road, Baroda-390 001
6. ~~Sun flag Iron & Steel Co. Ltd., 33 Mount Road,
Sadar, Nagpur-440001~~
7. Upper India Steel Manufacturing & Engineering
Co. Ltd., Dhandari Industrial area,
Ludhiana-141010

CODE FOR STAMPING OF ELASTIC
RAIL CLIPS

<u>Date</u>	<u>Code</u>	<u>Month</u> -	<u>Code</u>	<u>Year</u> -	<u>Code</u>
1	A	January -	A	1992 -	2
2	B	February -	B	1993 -	3
3	C	March -	C	1994 -	4
4	D	April -	D	1995 -	5
5	E	May -	E	1996 -	6
6	F	June -	F	1997 -	7
7	G	July -	G	1998 -	8
8	H	August -	H	1999 -	9
9	I	September -	I		
10	J	October -	J		
11	K	November -	K		
12	L	December -	L		
13	M				
14	N				
15	O				
16	P				
17	Q				
18	R				
19	S				
20	T				
21	U				
22	V				
23	W				
24	X				
25	Y				
26	Z				
27	1				
28	2				
29	3				
30	4				
31	5				

Example:

SH2
F1

SH - Firm's initial

2 - Year of manufacture - 1992

F - Month of manufacture - June

1 - Date of manufacture - 27th

DOUBLE SAMPLING AQL PLANS
INSPECTION LEVEL-IV

(ref: Table 3 of IS:2500 Part 1-1973)

Lot Size	Sample size code letter	Sample	Sample size	Cumulative sample size	Accepted quality level percent defectives - 1.5	
					acceptance number (a)	rejection number (r)
301-500	H	First	32	32	0	3
		second	32	64	3	4
501-1000	J	First	50	50	1	4
		second	50	100	4	5
1001-3000	K	First	80	80	2	5
		second	80	160	6	7
3001-10,000	L	First	125	125	3	7
		second	125	250	8	9

- Notes:
- (i) For any other lot size less than 301, reference may be made to Table 2 of IS:2500 Part 1-1973 for sample size, acceptance and rejection numbers.
 - (ii) In the first sample if the number of failed pieces are equal to the acceptance number (a), the lot shall be accepted.
 - (iii) If the failed pieces exceeds the acceptance number (a) but is less than the number given under column (r), the second sample should be considered.
 - (iv) If the cumulative failed pieces equal or exceed the rejection number (r), the lot shall be rejected. The cumulative failed pieces are the total number of failed pieces in the first and second samples.

Date

(Address of Inspection Agency)

Dear Sirs,

Sub: Railway Board contract No.....dt.....
for manufacture and supply of clips to
drg. no RDSO/T... .. Alt.

Clips as per the following details are offered for inspection. The clips have been internally checked as per drg. no. _____ & IRST-31-92 and found satisfactory.

The test results have been mentioned in the proforma prescribed in the RDSO Specification No. IRST-31-92.

It is requested to please undertake the inspection:

1. Instalment No.
2. Qty. on order
3. Qty. previously inspected & passed.
4. Qty. offered for inspection
5. Lot No./Batch Nos.
6. Corresponding Cast/Heat No. of raw material & its source of procurement.
7. Rate
8. Delivery period
9. Marking on clip
10. Packing
11. Consignee
12. Consignee authority letter reference (copy enclosed)
13. Test certificate No. of raw material

Thanking you,

Yours faithfully,

Copy to: D.G.(M&C)RDSO
LUCKNOW

(Signature with date)
Name -

TOE-LOAD, TOE-DEFLECTION, HEIGHT & FLAT HEADING

TOE-LOAD, TOE-DEFLECTION, WEIGHT & FLAT HEARING CONTACT
LENGTH OF MAJOR & MINOR AXIS OF DIFFERENT ELASTIC RAIL
CLIPS

ANNEXURE VII
 IRST-31-92

Drawing No.	Type of clip	Dia (mm)	approximate weight of clip (kg.)	Toe deflection (mm)	Toe load range (kg.) Cl:7.8	Toe load test arrangement drg.no.	Contact of surface for flat toe clips clause 7.6.2	
							Major axis (mm) minimum	Minor axis (mm) minimum
1	2	3	4	5	6	7	8	9
ISO/T-1892	ERC round toe.	20.64	1.0	11.4	645-800	EDO/T-1939*
ISO/T-3700	ERC flat toe.	20.64	1.0	11.4	645-800	EDO/T-2135**	28	9.5
ISO/T-3701	ERC Mk III Flat toe.	20.64	0.91	13.5	850-1100	EDO/T-2135	28	9.5
ISO/T-3722	ERC Mk-II Flat toe.	18.0	0.60	11.2	700-900	EDO/T-2135	20	8
ISO/T-4054	ERC-Mk-IV	20.64	0.885	13.5	1100-1300	EDO/T-2135	28	9.5

* Refer Fig.1
 ** Refer Fig.2

FINAL INSPECTION REPORT
(CHEMICAL ANALYSIS)

ANNEXURE VIII
IRST-31-92

NAME OF THE FIRM: M/s.

S. No.	OF CAST/HEAT No.	OF COLOUR CODE	LOT No.	QUANTITY (Nos.)	SAMPLE No.	CHEMICAL ANALYSIS (%)					REMARKS	ACCEPTED OR NOT ACCEPTED	SIGNATURE OF SUPERVISOR
						C	Si	Mn	S	P			
						0.47-0.63	1.47-2.03	0.76-1.04	0.045 (Max.)	0.045 (Max.)			

A Yellow P 1
2

FINAL INSPECTION REPORT
(INCLUSION RATING, DEPTH OF DECARB. & FREEDOM FROM DEFECTS)

NAME OF THE FIRM : M/s.

S. No.	OF CAST/HEAT No.	OF COLOUR CODE	LOT NO.	QUANTITY IN NOS.	SAMPLE SIZE	SAMPLE NO.	DEPTH OF DECARB. (Max.)	INCLUSION RATING (NOT WORSE THAN A, B, C, D)	FREEDOM FROM DEFECTS	REMARKS OF SUPERVISOR ACCEPTED OR NOT ACCEPTED	STATUS OF SUPERVISOR

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

FINAL INSPECTION REPORT
(HARDNESS)

ANNEXURE X
IRST-31-92

NAME OF THE FIRM : M/s.

S. No.	OF CAST/HEAT No.	OF COLOUR CODE	LOT NO.	QUANTITY IN NOS.	SAMPLE SIZE	HARDNESS VALUES	NO. OF DEFECTIVES	(CUMULATIVE)	REMARKS
						40-44 RC 375-415 BHN		No. OF DEFECTIVES	
1.	A (e.g.)	Yellow (e.g.)	-P (e.g.)	2000	80	44, 42, 43, 44, 45, 46 ...upto 80 values	2		Accepted.

ANNEXURE XI

IRST-31-92

FINAL INSPECTION REPORT
(DIMENSIONS)

NAME OF THE FIRM: N/s.

S. No.	OF CAST/HEAT NO.	OF COLOUR CODE	LOT No.	QUANTITY IN NOS.	SAMPLE SIZE	MAIN GAUGE ACCEPTANCE YES/NO	FAILING IN GAUGES		FLAT BEARING AREA CLAUSE 7.8.2	NO. OF DEFECTIVES	No. of cumulative defective	Remarks
							GO DIMENSION	NO GO DIMENSION				
1	A	Yellow	P	2000	80	Yes				2		Accepted

FINAL INSPECTION REPORT
(APPLICATION & DEFLECTION TEST)

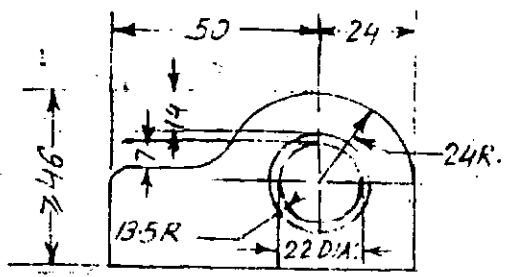
ANNEXURE XII
IRST-31-92

S. No.	OF CAST/HEAT No.	OF COLOUR CODE	LOT NO.	QUANTITY IN NOS.	SAMPLE SIZE	NO. OF DEFECTIVES	NO. OF CUMULATIVE DEFECTIVES	REMARKS
1	A	Yellow	P	2000	80	3	-	Go for double sampling
					80	3	6	Accepted.

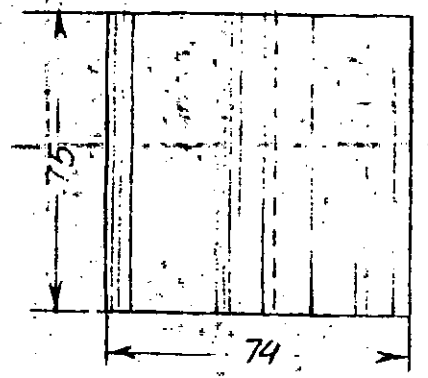
FINAL INSPECTION REPORT
(TOE LOAD TEST)

NAME OF THE FIRM: M/s.

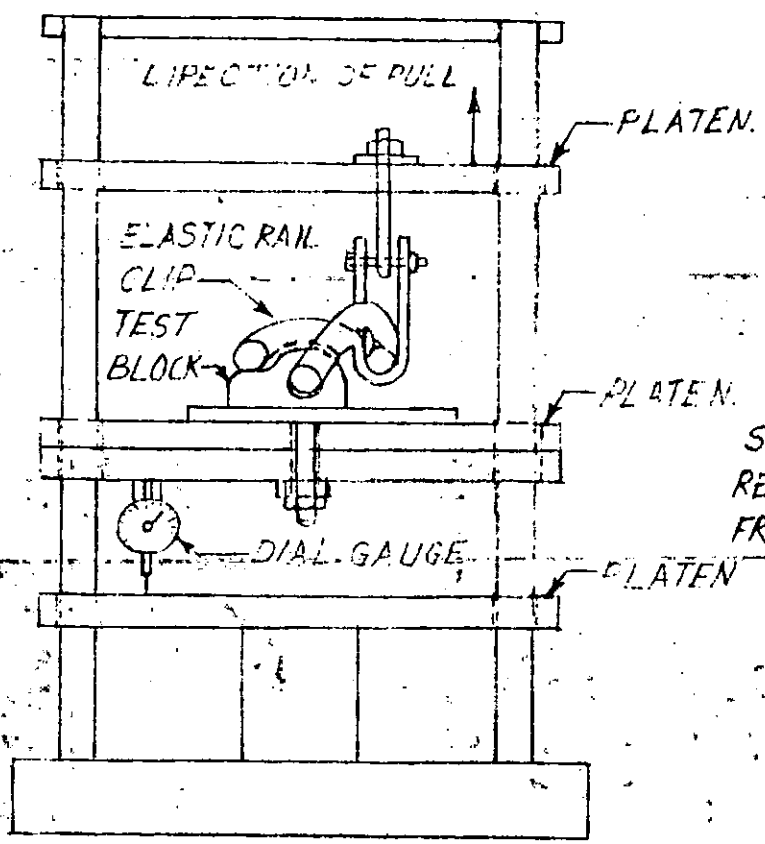
S. No.	OF CAST/HEAT NO.	OF COLOUR CODEs	LOT NO.	QUANTITY IN NOS.	SAMPLE SIZE	TOE LOAD VALUES (Kg.)	No. OF DEFECTIVES	NO. OF CUMULATIVE DEFECTIVES	REMARKS
1.	A.	Yellow	P	2000	80	845, 890, 910, 835 ... upto 80 values	5	-	Rejected



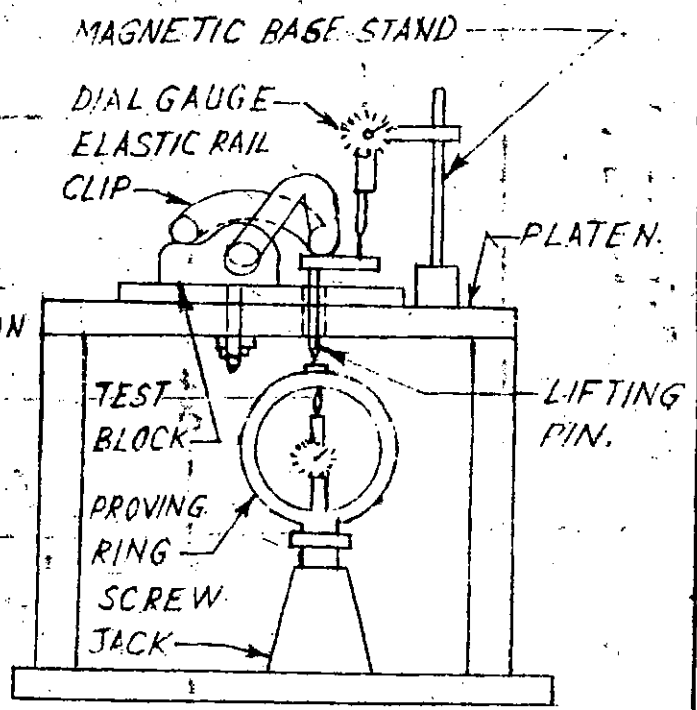
ELEVATION



PLAN
TEST BLOCK



ARRANGEMENT 'A'
USING U.T. MACHINE

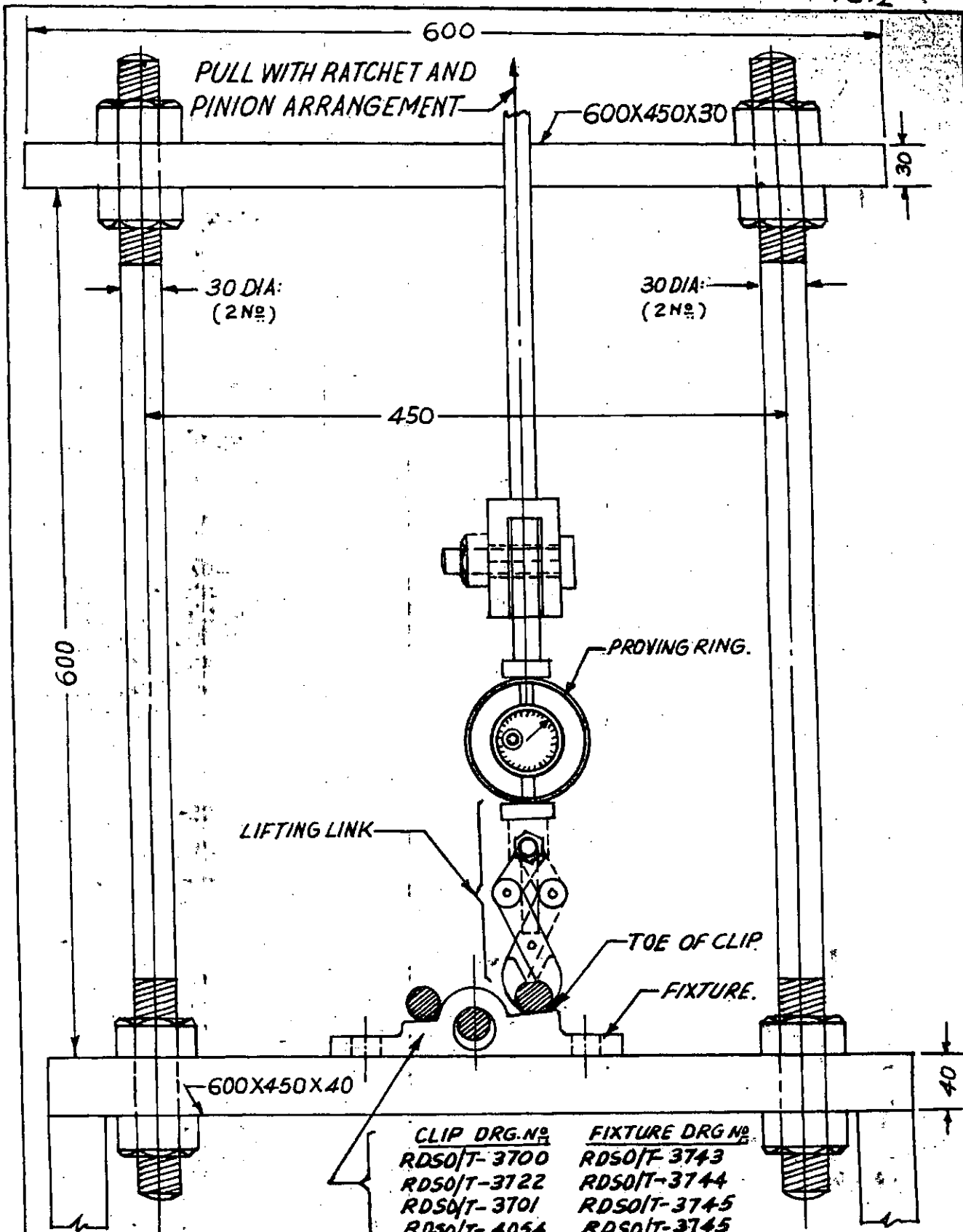


ARRANGEMENT 'B'
USING PROVING RING

ARRANGEMENTS FOR TOE LOAD MEASUREMENTS OF ELASTIC RAIL CLIP

4. TOE DEFLECTION SHALL BE MEASURED WITH THE HELP OF DIAL GAUGE IN STEPS UP TO 11.4 mm TO ASCERTAIN TOE LOAD OF THE CLIP. RATE OF LOADING SHALL BE CONTROLLED. (NOT TO SCALE)
3. CALIBRATION OF THE PROVING RING SHALL BE ASCERTAINED FROM N.P.L. CERTIFICATE OR ANY GOVT. APPROVED TEST HOUSE ONCE IN A YEAR OR AS DESIRED BY INSPECTING OFFICER WHICHEVER IS EARLIER.
2. DIMENSIONS OF TEST BLOCK SHALL BE ADHERED TO WITHIN ± 0.025 mm.
1. ALL DIMENSIONS ARE IN MILLIMETRES.

EDO/T-1939



CLIP DRG. NO.	FIXTURE DRG. NO.
RDSO/T-3700	RDSO/F-3743
RDSO/T-3722	RDSO/T-3744
RDSO/T-3701	RDSO/T-3745
RDSO/T-4054	RDSO/T-3745

ARRANGEMENT FOR TOE LOAD MEASUREMENTS OF ELASTIC RAIL CLIP-FLAT TOE.

(BASED ON DRG NO EDO/T- 2135)

2. THE TOE OF THE CLIP SHOULD BE LIFTED BY LIFTING LINK SO THAT IT JUST BREAKS CONTACT WITH THE SLOPING SURFACE OF THE FIXTURE THE CORRESPONDING LOAD VALUE ON THE PROVING RING SHALL BE THE TOE LOAD OF THE CLIP.
1. CALIBRATION OF THE PROVING RING SHALL BE ASCERTAINED FROM N.P.L. CERTIFICATE OR ANY GOVT. APPROVED TEST HOUSE ONCE IN A YEAR OR AS DESIRED BY INSPECTING OFFICER WHICHEVER IS EARLIER.

Government of India
Ministry of Railways
(Railway Board)

Corrigendum No. 1 of May 1998

to

Indian Railway Standard Specification
for

Elastic-Rail Clips

Serial No. T-31-1992

1. Page 10, Clause 7.4.3.
In addition to clause 7.4

7.4.3a. Examination of Micro Structure

One sample clip drawn from each day's production heat treated in similar manner (subject to maximum of 10,000 nos. of clips) shall be subjected to micro examination. Sample prepared for micro examination shall be etched with 2% Nital. Micro structure of the clip should reveal grain size ASTM-5 or finer with fully tempered martensite structure having no ferrite patches as per figure attached.

(5a/)

Lucknow-226 011

for Director General/Track.

Dated : June 1998.

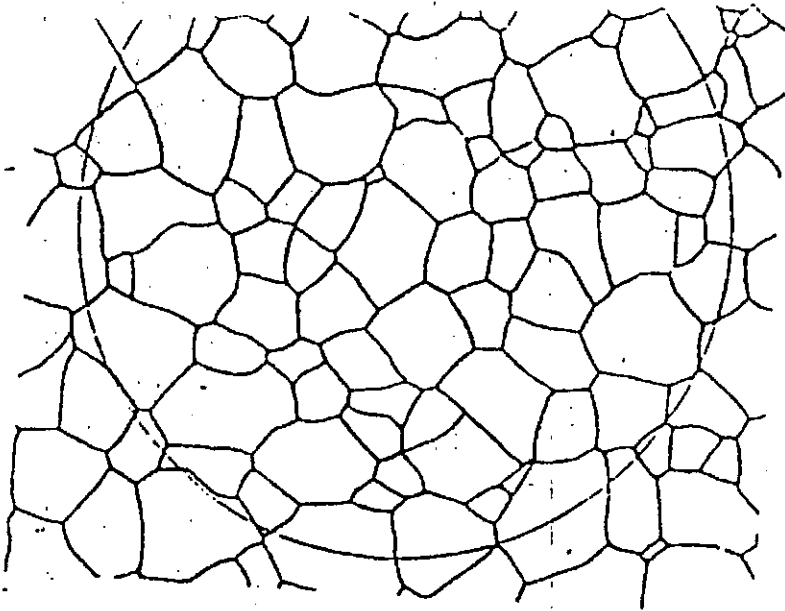
Letter no. CT/EF/Policy/dtd. 09.06.98

Copy forwarded for information to :-

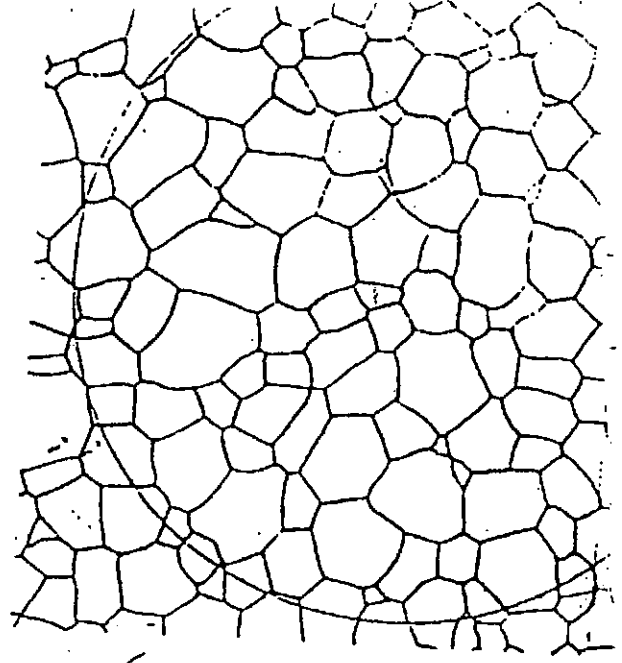
1. All manufacturers of Elastic Rail Clips.
2. The Chief Engineer (Const.) :
 - i) Central Railway, Mumbai CST.
 - ii) Eastern Railway, 4th Floor, New Bungalow Building, Strand Road, Calcutta.
 - iii) Northern Railway, Barada House, New Delhi.
 - iv) North Eastern Railway, Gorakhpur.
 - v) Northeast Frontier Railway, Maligaon, Guwahati.
 - vi) Southern Railway, Park Town, Madras.
 - vii) South Central Railway, Rail Mill, Secunderabad.
 - viii) South Eastern Railway, Garden Reach, Calcutta.
 - ix) Western Railway, Churchgate, Mumbai.
3. The Principal, Railway Staff College, Vadodra.
4. The Director, Indian Railway Institute of Civil Engg., Pune.
5. The Executive Director, Track (M), Railway Board, Rail Bhawan, New Delhi.
6. The Managing Director, Rail India Technical & Economic Services Ltd., 27, Barakhamba Road, New Delhi.
7. The Chairman-cum-Managing Director, Eastern Railway Corporation Ltd., Belapur Bhawan, Plot no. 6, Sector 11, C.B.D., Belapur, New Bombay-400 614.
8. Director (M&C), RDSO, Lucknow.

(VIPUL KUMAR)

for Director General/Track.



✓ ASTM Grain Size Number 4.5
 Average Number of Grains per mm² 175
 Area of Average Grain Section, x 10⁻³m² 5.70
 Nominal Diameter of Average Grain, mm 0.075



✓ ASTM Grain Size Number 5.0
 Average Number of Grains per mm² 246
 Area of Average Grain Section, x 10⁻³m² 4.00
 Nominal Diameter of Average Grain, mm 0.063

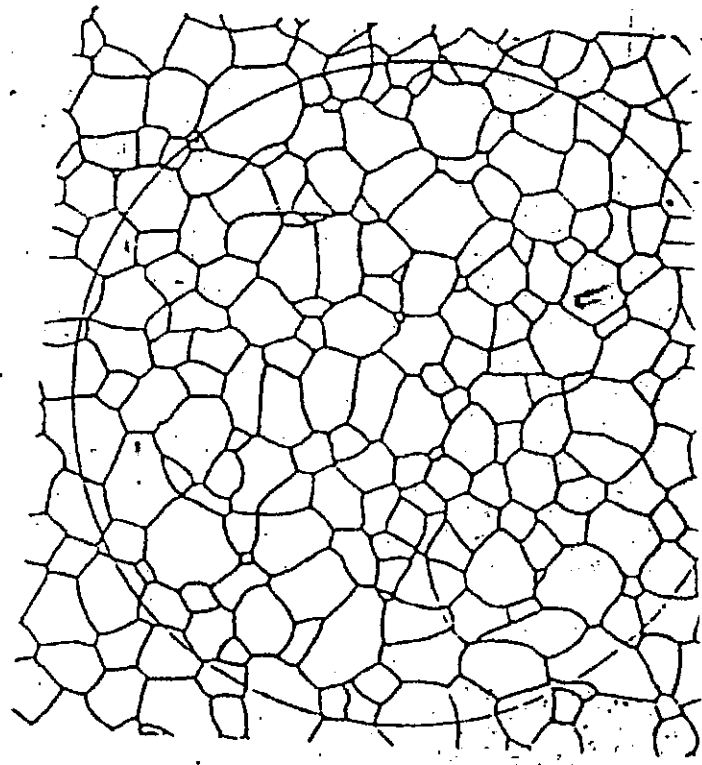
**METHODS FOR DETERMINING
THE AVERAGE GRAIN SIZE**

ASTM Methods E 112
 PCN 12-501121-19

Untwinned Grains (Flat Etch)
 100 X



© 1986 American Society for Testing and Materials
 1916 Race Street
 Philadelphia, PA 19103



✓ ASTM Grain Size Number 5.5
 Average Number of Grains per mm² 351
 Area of Average Grain Section, x 10⁻³m² 2.65
 Nominal Diameter of Average Grain, mm 0.055

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

Corrigendum No.2 of April, 1999

to

Indian Railway Standard Specification

for

Elastic Rail Clips
Serial No. T-31/1992

1. Page 1, Clause 0.3 shall now be read as follows:
0.3 Drawing No., Type of clip, dia., approximate weight of clip, Toe deflection, Toe-load Range and other relevant parameters for ERC Mk-V have been added in Annexure VII.
2. Page 2 Para 1 : In line 8 delete 'and ERC' & add ERC Mk-V after ERC Mk-IV.
3. Page 2 Clause 3 shall now be read as under :
RAW MATERIAL PROCUREMENT
Spring steel rounds shall be procured from RDSO approved manufacturers only. RDSO (I&L Directorate) issues the list of approved manufacturers bi-annually.
4. Page 13 Annexure-1 stands deleted

Contd.:2/

5. Page 6, Clause 4.8.2 shall now be read as follows:-

4.8.2 The as rolled bars shall be free from harmful defects namely folds, laps, cracks, deep pits, grooves, excessive scaling which may lead to cracking during hardening or impair the serviceability. However, the seam size upto 0.25 mm may be permitted in "As-rolled Bars". It shall, however, to be ensured that during the inspection of the raw material, a strict vigil is maintained and the raw material is purchased by the approved manufacturers of RDSO. The material shall be free from harmful internal defects, such as piping, and segregation which may impair serviceability.

Clause 4.9 shall now be read as follows:

4.9 Section of as rolled bars shall be as per order. The tolerance on the diameter shall be $\pm 1.0\%$ and $- 0.8\%$.

6. Page 7, Clause 5.1 shall now be read as follows:

5.1 The clips, except for ERC Mk V, shall be manufactured from as rolled silico-manganese spring steel rounds as per technical specification (reference para 4) by hot forming and shall be subsequently oil hardened and tempered to give uniform hardness across the section. The clips shall conform to the requirements of the relevant drawing and tests stipulated hereinafter. For ERC Mk V, inter alia, the clips shall be manufactured by using 23mm dia. rod of material specified in clause 4.1. To keep the central leg portion, fit to be used with existing design of sleeper, diameter in the central leg portion shall be reduced to 20.64 mm. This shall be achieved by precise profiling using machines like Hydro copying turning machine to avoid sharp edges/curves.

7. Clause 5.2, shall now be read as follows:

5.2 All clips shall bear inscription of stamp as per Annexure IV.

Contd. 3/

8. Clause 6.1, shall now be read as follows:

6.1 For the purpose of testing the number of clips manufactured from the same heat and heat treated in similar manner will form one 'lot'. The clips inspected by RDSO should be distinctly identifiable in the field. For ERC Mk III and ERC Mk V, a mark is to be made at the end face of straight leg with yellow paint and green paint respectively of approved quality, before giving one coat of boiled linseed oil as per clause 9 of specification.

9. Annexure IV shall now be read as follows:

ANNEXURE-IV
IRST-31-92

All the firms have been given code for inscription of stamps. All clips shall bear clear inscription of stamp at the heel of the clip to indicate manufacturer's initial, the last one digit of the year of manufacture and the 'lot number' of the year.

Example: AE 9

	1
AE	Firm's initial
9	last digit of year of manufacture
1	lot No.

10. Various parameters have been added to Annexure VII for ERC Mk-V, as follows:

Drawing No.	RDSO/T-5919
Type of clip	ERC Mk-V
Dia.(mm).	23.00mm and 20.64mm for central leg portion
Approximate weight of clip(Kg)	1.14(rod) and 1.08(clip)
Toe deflection(mm)	13.5
Toe load range(Kg)	1200-1500
Toe load test arrangement drg. no.	EDO/T-2135
Contact of surface for flat toe clips clause 7.6.2	Major axis(mm) 7.28 Minor axis(mm) 7.9.5