Government of India
Ministry of Railways
(Railway Board)

RBE No. 143 /2003

No.E(MPP)2003/19/2/Recom. No.58 New Delhi, dated 22.08.2003.

The General Manager,
All Indian Railways including Production Units
CORE/Allahabad
Metro Railway/Kolkata.
COFNOW/New Delhi.
The Director General,
RDSO/Lucknow.

Sub: Report of the Railway Safety Review Committee (Part-II-1998)- Guidelines on handling of rails- Recommendation No.58).

The Railway Safety Review Committee vide Recommendation No.58 have recommended as under:

"the RDSO guidelines on handling of rail should form an integral part of the training courses for all categories of staff of Civil Engineering Department.

2. The recommendation has been accepted and Board has decided that the Manual on Instructors on handling of Rails as developed by RDSO (copy enclosed) be taught to all Group`C' and `D' staff of Civil Engineering Department (P.Way). The Manual be numbered as CE 900 of the "Approved Training Module" of Civil Engineering Department and be made part of all Induction, Promotion and Refresher Courses for the above category of staff.

However, care must be taken that the overall duration of the Courses does not change due to inclusion of the above lesson plan.

The implementation of the above training course be advised to Board.

DA: as above

(P. Ananth)
Director(Manpower Planning)
Railway Board.

...2)-

No.E(MPP)2003/19/2/Recom.No.58 New Delhi, Dated 22.08.2003

Copy to:-

1. The General Secretary, NFIR, 3 Chelmsford Road, New Delhi, for information with 35 spares.
2. The General Secretary, AIRF, 4 State Entry Road, New Delhi for information with 35 spares.
3. The Secretary General, FROA, R.No.256-A, Rail Bhawan, New Delhi for information with 5 spares
4. The Secretary General, IRPOF, R.No.268, Rail Bhawan, New Delhi for information with 5 spares.
5. All Members, Departmental Council and National Council and Secretary Staff Side National Council, 13-C, Ferozeshah Road, New Delhi (90 spares)
6. The Secretary General, All Indian RPF Association, Room No.256, Rail Bhawan, New Delhi - 110 001 for information with 5 spares.

For Secretary/Railway Board.

No.E(MPP)2003/19/2/Recom.No.58 New Delhi, Dated 22.08.2003

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22/08/03

(P Ananth)
Director(Manpower Planning)
Railway Board

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भारत सरकार
रेल मंत्रालय (रेलवे बोर्ड)

आर बी ई सं. 143/2003

सं. ई (एम पी पी)2003/19/2/रिको नं.58 नई दिल्ली, दिनांक 22.8.2003

महाप्रबंधक,
सभी भारतीय रेलें तथा उत्पादन इकाइयां,
कोर/इलाहाबाद
मेट्रो रेल/कोलकाता
काफमो/नई दिल्ली

महानिदेशक,
अ.अ.मा.सं./लखनऊ.

विषय :- रेल संरक्षा समीक्षा समिति की रिपोर्ट (भाग-II 1998-पटरियों की सम्हलाई संबंधी दिशानिर्देश- सिफारिश सं. 58)

रेल संरक्षा समीक्षा समिति ने सिफारिश सं.58 के तहत निम्नानुसार सिफारिश की है :-

"पटरी की सम्हलाई संबंधी अ.अ.मा.सं. के दिशानिर्देश सिविल इंजीनियरी विभाग के कर्मचारियों की सभी कोटियों के लिए प्रशिक्षण पाठ्यक्रमों का अभिन्न अंग होने चाहिए".

2. इस सिफारिश को स्वीकार कर लिया गया है और बोर्ड ने यह विनिश्चय किया है कि अ.अ.मा.सं. द्वारा यथा विकसित पटरियों की सम्हलाई संबंधी अनुदेशक नियमावली (प्रतिलिपि संलग्न है) सिविल इंजीनियरी विभाग (रेलपथ) के सभी ग्रुप 'सी' और 'डी' कर्मचारियों को पढ़ाई जाए. इस नियमावली को सिविल इंजीनियरी विभाग के "अनुमोदित प्रशिक्षण मानदंड" के सी ई 900 में क्रमांकित किया जाए और कर्मचारियों की उपर्युक्त कोटि के लिए सभी भर्ती, पदोन्नति तथा पुनश्चर्या पाठ्यक्रमों का एक भाग बनाया जाए.

लेकिन, यह सावधानी अवश्य बरती जाए कि उपर्युक्त पाठ को शामिल किए जाने के कारण पाठ्यक्रमों की समग्र अवधि में परिवर्तन न हो.

उपर्युक्त प्रशिक्षण पाठ्यक्रम को लागू करने के संबंध में बोर्ड को सूचित किया जाए.

संलग्न : यथोक्त.

(पी. अनंत)
निदेशक (जनशक्ति योजना)
रेलवे बोर्ड.

G-2

सं. ई (एम पी पी)2003/19/2/रिको नं.58 नई दिल्ली, दिनांक 22.8.2003

प्रतिलिपि प्रेषित-

1. महासचिव, एन एफ आई आर, 3 चेम्सफोर्ड रोड, नई दिल्ली, 35 अतिरिक्त प्रतियों सहित सूचनार्थ
2. महासचिव, ए आई आर एफ, 4 स्टेट एंट्री रोड, नई दिल्ली, 35 अतिरिक्त प्रतियों सहित सूचनार्थ
3. महासचिव, फ्रोआ, कमरा नं.256-ए, रेल भवन, नई दिल्ली, 5 अतिरिक्त प्रतियों सहित
4. महासचिव, इरपोफ, कमरा नं. 268, रेल भवन, नई दिल्ली, 5 अतिरिक्त प्रतियों सहित
5. विभागीय परिषद तथा राष्ट्रीय परिषद के सभी सदस्यगण तथा कर्मचारी पक्ष के सचिव, 13-सी, फिरोजशाह रोड, नई दिल्ली (90 अतिरिक्त प्रतियां)
6. महासचिव, सभी भारतीय आरपीएफ एसोसिएशन, कमरा नं.256, रेल भवन, नई दिल्ली-110 001, 5 अतिरिक्त प्रतियों सहित

कृते सचिव, रेलवे बोर्ड.

G-2

CE-900

MANUAL OF INSTRUCTIONS

ON

HANDLING OF RAILS

JULY – 2000

RESEARCH DESIGNS AND STANDARDS ORGANISATION
LUCKNOW –226 011

FOREWORD

90 UTS rails have been adopted by the Indian Railways for mass utilization. These rails possess some special features vis-à-vis conventional 72 UTS rails in use in the past:

- 90 UTS rails have higher tensile strength and are more wear resistant as compared to 72 UTS rails
- 90 UTS rails are having lower % elongation (10%min) as compared to 72 UTS rails (14% min), and are more sensitive to bad handling practices.

Indian Railways receive 90 UTS rails from Bhilai Steel Plant and also through imports. In order to prevent any damage to 90 UTS and Head Hardened rails during handling, special care should be taken in order to:

i) maintain perfect straightness,
ii) avoid surface notching,
iii) prevent metallurgical damage,
iv) isolate from injurious substances,
v) protect personnel,
vi) prevent point line loading

It is acknowledged that in special cases, strict adoption of these guidelines and recommendations may not be considered possible with the present level of facilities available in the field. Nevertheless, the principles set out in this manual remain valid in all cases and must be employed in order to ensure successful and damage free handling and transportation of rails.

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1.0 General Precautions

1.1 Protection of Straightness

Barely visible straightness deviations, for example a deflection of 0.50 mm over 2.0 metres span, renders a rail unacceptable and requires careful handling and stacking. Therefore, special care should be taken to avoid loss of straightness during all handlings, stacking and transport operations. In particular:-

- Avoid heavy static loading and sudden impact (or dynamic) loading
- Avoid single point slinging and ensure minimum two point slinging. More slings should be used for longer rails as specified.
- Ensure that rails are kept horizontal and straight when lifting, carrying or placing them.
- Avoid end drop and flange overlap.
- Guard against localized point or line contact loading when stacking.
- Align rails uniformly, avoiding flange overlap or crossing.
- Ensure that rails of the same length are stacked together on a firm level base providing uniform support.
- Subsequent layers should be separated with consistently and uniformly placed spacers or dunnage in vertical alignment with the base supports.
- All necessary precautions are taken to protect rail ends. Extra care should be exercised with longer rails.

1.2 Protection of rail surface

Surface notches of even less than 0.25 mm in depth are likely to cause rail fracture in service. Therefore, insufficient care in handling and transport operations can lead to serious rail surface damage. To prevent rail surface from any damage, the following precautions should be taken:

- Avoid impact or abrasion of rails and rail bundles against structures, buildings, ships, hatches, wagons, vehicles, etc
- Ensure perfect straightness of rails in each layer.
- Avoid crossing or flange overlap
- Avoid use of round-link chain sling. Ideally, lift the rails by using electro-magnetic lifting devices.
- Where conventional slings are employed, use of fabric, e.g. polypropylene slings and sleeves are recommended. As an alternative, if flat link chains are used, these must be fitted with fabric sleeves.
- Avoid bruising, notching or scoring of surface

It is important that any rail support, handling or clamping device and rail pinch rollers do not apply localized or point contact to the rail. Where it is possible, ensure that these items are profile contoured to match the rail profile as appropriate.

1.3 Prevention of Metallurgical Damage

These rails are thermally very sensitive and likely to develop metallurgical defects if exposed to localized heating, which produces very hard, brittle and cracked metallurgical structures which may lead to sudden failures. Therefore,

- all heatings, flame cutting, welding and spot welding operations must be strictly prohibited during rail handling or transit.
- every precaution must be taken to protect rail from electric arc from adjacent cables or molten metal splashes from nearby welding operations.

1.4 Protection from contact with injurious substances

These rails can withstand normal degree of rusting. In unfavourable environments, this normal rusting may be accelerated. A more serious risk is posed by localized corrosion pitting which has effect to short surface notching and may cause subsequent rail fracture. Therefore, during storage, handling and transport operations, it is of the utmost importance that every precaution is taken to:

- Avoid contact with injurious substances which are known to, or likely to react with and produce high levels of corrosion in steel. Special attention should be given to acids, alkalis, salts, fertilizers, sulphates, chlorides and nitrates. Do not overstack or stack rails adjacent to such harmful substances.
- Rail stockpiles should be built on a well drained base of inert material with uniform supports and preferably above ground level on concrete as per drawing No.RDSO/T-4962.

1.5 Minimising Danger to Personnel

It is recommended that special attention should be given with respect to :

- Use of effective protective gloves and clothings to reduce risk of skin abrasions and lacerations. Gloves will also mitigate against the effects of extremes of temperature experienced when rails are exposed to either very cold or very hot climatic conditions.
- Insist on wearing of steel toe-capped protective footwear. Ensure wearing of distinctive coloured helmets and clothings to provide ease of identification and location of personnel by machine or crane operations.
- Avoid standing under suspended rails.
- Avoid sudden dropping or impact on rails
- Forbid the use of bundle strapping in lifting, slinging or handling of rails
- Ensure safe working in the vicinity of electrical conductors and wiring to avoid contact with rails.

1. Stacking

2.1 Base preparation

Stacking of rails shall be done on proper concrete base as per drawing No.RDSO/T-4962. Base supports and dunnage should be evenly speced along the rail length, with special care to support near rail ends. Rails forming the bottom layer should be carefully aligned and care should be taken to avoid overlapping of rail flanges.

2.2. Subsequent Layers

- Form stacks from rails of the same length. Where this is not possible place the shorter rails in the upper layers.
- Avoid a leaning stack by placing rail ends (rails of the same length) in vertical alignment.
- When dunnage is used, do not cross layers. Keep the rails in a uniform lengthways direction.
- Ensure good vertical alignment of dunnage or spacers in the completed stack by placing them in identical positions along the rail length.
- Timber dunnage should be of a uniform and adequate thickness (say 100 mm) to withstand loading and allow for sling removal without 'ripping out'.
- Each successive layer of rails should be either of a constant or decreasing width.

Use of suitable rail handling equipment, such as electromagnetic lifting devices,rail grips etc. is essential, and special care should be taken to ensure a firm and level base, standard lengths and uniform alignment.

3.0 Handling, Lifting and Slinging Techniques

3.1 Basic Principles

i) Use Two (or more) point slinging. Two point slinging has been found satisfactory for handling of rails up to 13 metre length. Three or more point slinging is recommended for longer rails.

ii) Use lifting (spreader) beams fitted with slings, grips or other lifting devices of uniform length to ensure that rails remain horizontal and straight.

iii) Avoid excessive rail end overhang. The overhang beyond the outer lifting point should be less than one half the distance between lifting points. Recommended location of lifting points for various rail lengths during loading of rails in Flash Butt Welding Plants are tabulated below:

Rail length (m)	No. of lifting points	Distance between lifting points (m)	Max. rail end overhang (m)
12-13	2	6 – 6.5	3 – 3.25
26	4	6.5	3.25
39	6	6.5	3.25
130	20	6.5	3.25
260	40	6.5	3.25

3.2 Handling of rails

Handling of rails can be classified into the following four categories:

(a) Handling in production units
(b) Handling in Flash Butt Welding Plants
(c) Handling at the track renewal sites (in Open Line)
(d) Handling at Construction sites

These can be further discussed in the following three contexts:

(i) Handling of single rails
(ii) Handling of three rail panels
(iii) Handling of 10/20 rail panels

3.2.1 Handling of Rails in Production Units

3.2.1.1 *Single rail panels* should be handled invariably with magnetic lifting devices. The magnets should be suspended from a lifting spreader beam in accordance with the basic handling principles, as outlined in para 3.1. above.

3.2.1.2 *39 m long rails*, should be handled invariably with magnetic lifting devices. The magnets should be suspended from a lifting spreader beam in accordance with the basic handling principles, as outlined in para 3.1. above.

3.2.1.3 *10/20 rail panels* should be handled invariably with magnetic lifting devices. The magnets should be suspended from a lifting spreader beam in accordance with the basic handling principles, as outlined in para 3.1. above.

3.2.2 Handling of Rails in Flash Butt Welding Plants

3.2.2.1 *Single rails* should be unloaded from the BFRs with the help of magnetic lifting devices, as specified for handling of single rails in Production Units, in para 3.2.1.1 above.

In case magnetic lifting devices for rails cannot be provided in Flash Butt Welding Plants, all handling of single rails should be done with electric hoists and spreader beams, in accordance with the basic principles outlined in para 3.1. above.

3.2.2.2 *39 m long rails* should be unloaded from BFRs with the help of magnetic lifting devices, as specified for handling of 39 m long rails in the Production Units, in para 3.2.1.2 above.

In case magnetic lifting devices for rails cannot be provided in Flash Butt Welding Plants, all handling of 39 m long rails should be done with synchronized electric hoists and spreader beams, in accordance with the basic principles outlined in para 3.1 above.

3.2.2.3 *10/20 rail panels* should be handled with the help of the magnetic lifting devices, as specified for handling of 10/20 rail panels in the Production Units, in para 3.2.1.3 above.

In case magnetic lifting devices for rails cannot be provided in Flash Butt Welding Plants, all handling of 10/20 rail panels should be done with synchronized electric hoists and spreader beams, in accordance with the basic principles outlined in para 3.1 above.

3.2.3 Handling of rails at track renewal sites in open line

3.2.3.1 *Single rails* are usually required for renewal of points and crossings in running lines. These should be unloaded from BFRs/BRNs by providing a ramp of two unserviceable hardwood crossing timbers kept at 6.5 m apart, one end resting on the BFR/BRN and the other end held firmly on the ground. The rail to be unloaded should be fastened by 'J' type hooks at two places 6.5 m apart, held properly with hardwood packing to avoid bruising of rails. The hooks should be held with nylon ropes.

The rails to be unloaded, are made to slide over the sleeper one by one and care being taken that overhang does not increase by 3.25 m each side. When a rail reaches the ground, it is to be lifted by rail-dolly or tongs to clear the end of ramp. Rails can later be carried with the help of rail dollies to sites, wherever required, without causing any damage to them.

3.2.3.2 Use of rail panels of length less than 10 rails should be avoided. If however unloading of short welded panels of 39 m length is unavoidable on track renewal sites, in running lines, these are to be unloaded by providing a ramp of adequate number of unserviceable hard wood crossing timbers, kept 6.5 m apart, as per the procedure outlined for unloading of single rails in para 3.2.3.1 above. It is preferable to unload these panels on the nearest railway station in loop line following the procedure mentioned above and later on carried out with the help of rail dollies to the site wherever required, without causing any damage to them.

3.2.3.3 On track renewal sites, in running lines, *long welded panels* are unloaded from special end unloading rakes at work site at cess during TRR. Immediately after unloading of rails/panels at site, they should be kept in upright (head up) in straight alignment. On long bridges, panels are to be supported on bridge timbers and not allowed to sag over the opening.

2.4 Handling of rails at construction sites

2.4.1 Rails in a minimum length of 3 rail panels should be used for construction of new lines. If however, the use of *single rails* is unavoidable due to difficult terrain or other limitations, the single rails meant for use on the construction sites of new lines, may be unloaded from BFRs/BRNs, as per the procedure given in para 3.2.3.1 above. These rails can then be loaded into and unloaded from road vehicles with the help of road cranes, with a special spreader beam, made in accordance with the basic handling principles, as outlined in para 3.1 above.

2.4.2 Rails in a minimum length of 3 *rail panels* should be used for construction of new lines. The three rail panels, meant for use on construction sites of new lines may be unloaded from BFRs/BRNs as per the procedure given in para 3.2.3.2 above. These rails can then be loaded into and unloaded from road vehicles with the help of road cranes, with a special spreader beam, made in accordance with the basic handling principles, as outlined in para 3.1. above.

3.2.4.3 On the construction sites like doubling projects, rails should invariably be obtained in *special end unloading rakes,* on the running line and unloaded in accordance with instructions given in para 3.2.3.3. above.

4.0 General instructions on usage of 90 UTS rails in field

4.1 Following precautions on usage of 90 UTS rails are required to be observed strictly:

- Notch sensitivity is higher in 90 UTS rails and therefore, precautions are required to be taken while taking care of what can lead to formation of notches and corrosion pittings.
- Micro-structure of 90 UTS rail is different as percentage of carbon is too high and therefore, hardenability is more. It is therefore necessary that rail when heated above 700° C which changes its structure to austenite should be slowly cooled, so that aUTSenite is able to convert again into pearlite.

4.2 Keeping in view the above, following precautions are required to be taken:

- Flame cutting be done only when it is unavoidable. A minimum length of 100 mm of either side of cut should be pre-heated to 250-350° C by uniform movement of heating torch before start of cutting operation.

While carrying out heating and welding operations on 90 UTS rails, it should be ensured that after heating 90 UTS rails above 700° C, rails are slowly cooled to 550 to 560° C.

During Flash Butt Welding of 90 UTS rails, proper capacity butting load should be used because low capacity butting load plant increases number of preheats, causing very pronounced heat affected zone.

In case of bending of rails (for manufacture of switches, etc.), proper wooden supports be provided to avoid dent or scar on bending line i.e. to avoid development of stress centre.

No holes be drilled unless required for operational use and therefore, no fish plated joints should be provided in lead rail except for the end touching with crossing or switch, i.e. intermediate joints should be welded without making any hole.