

## Supplement Notice

## Information for users

The attached standard:

RT/CE/S/131

Issue 1

has essential supplementary information

## Instructions for use

It is essential that you first read and understand the supplement pertaining to the standard before proceeding to the standard. You must then apply the requirements of the supplement to the standard.

[Proceed to supplement ►](#)

**I have read & understand the supplement.**  
**[Proceed to standard ►](#)**

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|       |                      |
|-------|----------------------|
| Ref   | <b>NR/SP/TRK/131</b> |
| Issue | 1                    |
| Date  | August 2003          |

## Flash-welded rails – crossings, switch rails and transition rails (formerly RT/CE/S/131)

**This temporary front sheet facilitates change to the new Network Rail Standards referencing nomenclature.**

**The Ref above will be formally allocated to this standard when it is next changed in the meantime the contents, date and issue number of this Network Rail Standard are UNCHANGED and with immediate effect it should be referred to as “(new ref) formerly (old ref)”.**

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# Network Rail

## Company Product Specification

Flash-welded rails — crossings, switch rails and transition rails

### Endorsement & Authorisation

Endorsed by:



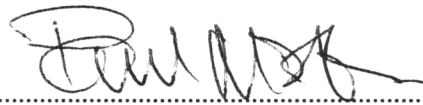
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**Issue record**

| Issue | Date        | Comments          |
|-------|-------------|-------------------|
| I     | August 2003 | New specification |

**Implementation**

This product specification shall be implemented from the date of issue.

**Compliance**

This product specification is mandatory upon persons carrying out flash welding of leg-ends on cast crossings, and flash-welding in transition rails and switch rails.

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## 1 PURPOSE

To ensure the serviceability of flash welded joints incorporated in cast austenitic manganese steel crossings, switch rails and transition rails.

## 2 SCOPE

This specification covers joints made by flash welding between pearlitic rails of the 56EI and 60EI profiles and either grade 260 or grade 350HT steel and cast austenitic manganese crossings. It also covers switch rails which incorporate flash welded joints between grade 260 or grade 350HT pearlitic rails of the following profiles:

60EI - 60EIA1

60EI - 60EIA4

56EI - 54EIA1

and transition rails which incorporate flash welded joints between grade 260 pearlitic rails of the following profiles:-

60EI - 56EI

56EI - 95RBH

See RT/CE/S/001 for the depot flash-welding of strings of new rail, and RT/CE/S/130 for on-site flash-welding of rail.

## 3 DEFINITIONS

**As-welded** The condition of a weld which has been trimmed, heat treated if appropriate, and cooled to ambient temperature.

**Contractor** A company contracted to manufacture crossings, switch rails or transition rails for installation in Network Rail's permanent way.

**Finished weld** A weld which has been trimmed, pressed if necessary, and profile finished.

**Flat spot** An area in a flash weld, revealed by breaking the joint, that has a dull, flat and relatively smooth appearance, with a fine texture differing from that of the remainder of the fracture face.

**Insert** A short length of special steel interposed between an austenitic manganese steel casting and a pearlitic rail to facilitate the joining of the rail to the casting by welding.

**Operator** The person operating a welding machine.

**Nominal area** The product of the length and height of a flat spot.

**Upset** Those parts of the parent rail, adjacent to the weld line, that stand proud of the rest of the rail as a result of deformation associated with the welding process.

**Welding process** Any part of the sequence from the selection of the rail prior to welding through to the certification by the contractor that the product conforms with this specification and any other special requirements.

## **4 QUALITY MANAGEMENT SYSTEMS**

The contractor shall maintain an independently approved and audited quality management system complying with the requirements of EN ISO 9001:2000.

The contractor shall ensure that machine operators can be identified, are competent, and that there is documentary evidence of an operator's competence.

## **5 SELECTION AND PREPARATION OF RAILS FOR WELDING**

Rails shall comply with RT/CE/S/061. Grade 260 or 350HT rail shall be used for switch rails and leg ends. Grade 260 shall be used for transition rails.

Crossing leg ends shall be pre-curved if the final radius required is less than 500m.

## **6 WELD PRODUCTION**

### **6.1 General**

Only procedures approved and endorsed by Network Rail shall be used; these shall not be modified without Network Rail's written agreement. This includes the procedures for the handling of rails and crossings, for the preparation of rails for welding, for weld heat treatment, where appropriate, and for the weld finishing and inspection operations as well as those for the making of the weld itself.

The endorsed procedures shall be available at all reasonable times for inspection by Network Rail's representatives. Approval will be withdrawn if the endorsed procedures are not available.

**Note 1.** Network Rail's requirements for procedural approval are given in Appendix A.

**Note 2.** Nothing in this clause should be construed as contradicting the requirement of ISO 9001:2000 for the continual improvement of the contractor's quality management system. However, as stated above, Network Rail's approval shall be sought before process changes are introduced.

### **6.2 Equipment**

All welds shall be manufactured on a machine with an automatic, programmed welding sequence or sequences such that once a programme has been selected, the current and force applied to the rails, and the rail travel, cannot be varied by the operator.

### **6.3 Welding Parameter Records**

The following shall be recorded automatically as a function of elapsed time in such a way that the records can be referenced to the appropriate weld:

- Welding current

- Upset force or upset cylinder pressure
- Displacement.

For each weld, the maximum forging force or upset cylinder pressure and the forging displacement shall be within the range approved by Network Rail (see Appendix A).

The welding programme identity, machine setting details and date of welding shall also be recorded. The contractor shall maintain a system whereby the above records for a given weld can be identified and accessed for a minimum of 5 years after welding. The weld itself shall be identified in such a way that its associated records can be traced. The means of weld identification shall be approved by Network Rail.

## 6.4 Profiling

The profile of all welds shall be blended smoothly with that of the parent rail(s), the insert and the casting, as appropriate. On the top of the rail head and gauge face, the operation shall be carried out over a length not exceeding 450 mm on either side of the weld.

On other surfaces, when the rolled rail on one side of the joint stands proud, the step shall be blended out over a distance at least 100 times the step size or 200mm whichever is the greater. Where the forged or cast section stands proud, the step shall be blended out to create a smooth profile. Radii produced by blending shall be maximized.

**Note:** dimensional minima are given in 7.5.

## 7 INSPECTION AND TESTING

### 7.1 General

The eyesight of all staff involved in product inspection shall be checked and, if necessary, corrected annually. Natural light shall be augmented if necessary so that the light level during inspection is not less than 350lx.

All welds shall be inspected, in accordance with the contractor's documented procedures, before despatch from the contractor's works.

### 7.2 Visual Inspection

There shall be no loss of rail section due to localized melting near the rail ends. There shall be no evidence of cracking, linear defects transverse to the rail or hot tears, excessive spatter, die burn or excessive heating. In addition, the requirements of RT/CE/S/012 apply to inserts and cast leg end sections.

**Note.** Some of the above weld defects are described in BS 6944: 1988 Appendix C.

In the event that any of the above defects are present, the cause shall be investigated and corrective action taken before welding continues.

### 7.3 Rail length

Rail lengths in the finished product shall exceed the minima specified in RT/CE/S/004 and RT/CE/S/102.

### 7.4 End squareness

The ends of the finished product shall be square and vertical within the tolerances specified in RT/CE/S/004.

### 7.5 Other finished product dimensions

All dimensions shall be within the range shown on the drawings approved by Network Rail.

For leg ends and transition rails, if specific limits are not given on the drawings approved by Network Rail, the following minima are required.

|               | <b>60E1</b> | <b>56E1</b> | <b>95RBH</b> |
|---------------|-------------|-------------|--------------|
| Foot width    | 146 mm      | 136 mm      | 66 mm        |
| Rail height   | 170 mm      | 157 mm      | 143 mm       |
| Web thickness | 13 mm       | 16 mm       | 16 mm        |

### 7.6 Deviation from straight

The deviation from a straight edge of finished welds shall be measured, with the rail at ambient temperature, at the weld or insert centreline and at points on the rail 500 mm on either side. The vertical deviations shall be measured on the running surface centreline. The horizontal head deviations shall be measured on the intended running edge. After pressing and profiling,  $[(D1 + D3) / 2] - D2$ , shall not exceed the following limits (see Figure 1):

|                          |                   |
|--------------------------|-------------------|
| Vertical hog at the head | - 0.0 to + 0.4 mm |
| Horizontal at head       | $\pm 0.4$ mm      |