

Supplement Notice

Information for users

The attached standard:

RT/CE/S/013

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 ►**

Ref	NR/SP/TRK/013
Issue	I
Date	June 1996

Eletroslag Welded Vees For Part-Welded Crossing (formerly RT/CE/S/013)

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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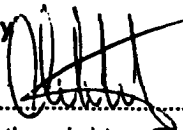
SPECIFICATION

ELECTROSLAG WELDED VEES FOR PART-WELDED CROSSINGS

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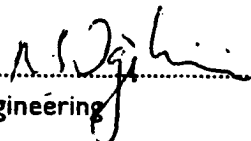
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**ELECTROSLAG WELDED VEES FOR
PART-WELDED CROSSINGS****Summary**

This specification gives the requirements for welded vees in part-welded crossings manufactured using the electroslag welding process.

Issue record

This specification will be updated when necessary by distribution of a complete replacement. Amended or additional parts of revised pages will be marked by a vertical black line in the margin.

Issue: 1 **Date:** June 1996 **Comments:** Supersedes BR1220

Responsibilities

This specification shall be complied with by all persons procuring or supplying welded vees in part-welded crossings for use in Railtrack's infrastructure.

Persons using this specification shall ensure that they use the latest version of any document to which reference is made.

Implementation

The provisions of this specification are mandatory and apply from two months after the issue date shown at the top of this page unless a temporary non-compliance has been authorised by Director Civil Engineering.

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Supply

Persons requiring controlled copies of this specification shall obtain them from their Directorate's Document Control Point.

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PART-WELDED CROSSINGS****CONTENTS**

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**ELECTROSLAG WELDED VEES FOR
PART-WELDED CROSSINGS****1 PURPOSE**

This specification gives the requirements for welded vees in part-welded crossings.

2 SCOPE

This specification relates to the production of welded vees manufactured from BS 11 Wear Resisting Grade A rail steel and welded using the electroslag welding process.

3 DEFINITIONS**Critical zones**

The crossing nose areas as shown in the following table and the last 200mm of the weld.

Angle of crossing	Distance from nose end (mm)	Angle of crossing	Distance from nose end (mm)
1 in 3 to 1 in 5	300	1 in 18.5	900
1 in 5.5 to 1 in 7.5	400	1 in 21	1000
1 in 8 to 1 in 10	500	1 in 24	1100
1 in 10.75	600	1 in 28	1200
1 in 13 to 1 in 15	700	1 in 32	1400
1 in 16	800		

Engineer

The competent Engineer appointed by Railtrack to represent its technical interest. Where certain approvals are given by the Railtrack HQ Permanent Way Engineer this is stated in full.

Rail

113A flat bottom rail complying dimensionally with BS 11.

Welded vee

Two pieces of rail with parts of the head and foot removed by machining placed either side of a filler plate so as to form a weld preparation, welded using the electroslag welding process and subsequently machined to the drawing requirements.

4 MATERIALS**4.1 Rail**

The rail steel used in the manufacture of the vees shall be BS 11 Wear Resisting Grade A. The chemical composition is shown below.

Chemical composition %						
C	Mn	Si	S max	P max	Cr	Others
0.65 - 0.78	0.80 - 1.30	0.05 - 0.50	0.050	0.050	-	-

The use of other grades of steel is subject to approval by the Railtrack HQ Permanent Way Engineer.

ELECTROSLAG WELDED VEES FOR PART-WELDED CROSSINGS

4.2 Welding wire

Unless otherwise agreed by the Engineer solid welding wire shall be used. The welding wire shall be to BS2901 : Part 1 : Type A33.

The chemical composition of the welding wire is shown below.

Chemical composition %								
C	Mn	Si	S max	P max	Cr	Mo	Ni max	Cu* max
0.12 max	0.40 - 10.60	0.20 - 0.90	0.030	0.030	2.00 - 2.70	0.90 - 1.10	-	0.40

* The copper content includes the content of the wire and of any coating thereon.

Notes:

1. It should be appreciated that BS2901 specifies a wider range of welding wires than those which manufacturers of welded vees normally use. Although type A33 wire allows a minimum of 0.20% Si this takes into account the use of wire types for submerged-arc welding (where a low Si content is preferred) and for gas-shield arc welding (where a high Si content is preferred).
2. For electroslag welding a minimum Si content of 0.30% should be allowed for, implying that gas-shielded arc wires are more suited for electroslag welding of rails.
3. If the Manufacturer wishes to use flux-cored wire he shall demonstrate its suitability to the Engineer and obtain his approval, in writing, for its use in the manufacture of welded vees.

4.3 Flux

The flux shall be compatible with the welding wire and the welding process.

4.4 Filler plate

The steel used in the manufacture of the filler plate shall be non-alloy steel to BS970: Part 1. The chemical composition is shown below:

Chemical composition %				
C	Mn	Si	S	P
0.60 max	0.50 - 0.35	0.05 - 0.35	0.050 max	0.050 max

4.5 Certification

The manufacturer shall ensure that all the materials comply with the specified requirements and shall be in possession of test certificates identifiable to the materials used. The test certificates shall be made available to the Engineer upon request.

5 MANUFACTURE

5.1 Rail bending

When a rail is required to be bent it is permissible to apply heat. The temperature of the rail shall not exceed 360 degC.

**ELECTROSLAG WELDED VEES FOR
PART-WELDED CROSSINGS**

5.2 Weld preparation

The component parts of the vee shall be machined in such a way that when assembled they give a standard weld preparation as shown in Figure 1. Requests for the acceptance of preparations deviating from the standard preparation shall be referred to the Engineer.

5.3 Fit-up prior to welding

Welding to assist in the fit-up prior to electroslag welding shall be carried out in accordance with the procedures detailed in Appendix A.

5.4 Extension/run-on piece

To ensure that weld stability is achieved before the weld reaches the position at which the nose of the crossing vee will be formed, an extension/run-on of sufficient length shall be incorporated in the assembly. The welding conditions shall be set so that adequate penetration of the electroslag weld into the side of the head is achieved in this area.

5.5 Preheat

All vees shall be thoroughly dried prior to electroslag welding. The initial 330mm of all vees shall be preheated to a temperature of between 340 and 360 degC immediately prior to the commencement of electroslag welding.

5.6 Welding process

The electroslag welding process shall be used at all times. Any proposed changes to the agreed process shall be subject to written approval by the Railtrack HQ Permanent Way Engineer prior to their introduction.

5.7 Deposition of weld metal

Deposition of weld metal in the critical zones (para. 3) shall be continuous. Restarts in the critical zones are not permitted. Stop/start defects occurring outside the critical zones may be rectified using the weld repair procedure detailed in Appendix B. Burn-through of the head and foot welds in the web region is not acceptable and the finish shall be such that upon drilling out the weld finish area no excess metal shall be present in the web area.

6 INSPECTION AND TESTING

6.1 General

Each welded vee and the extension/run-on pieces shall be subjected to the inspection and testing detailed in the following clauses. The inspections and tests shall be carried out by a competent person suitably experienced to establish compliance or otherwise with specified requirements. The results of all inspections shall be recorded and made available to the Engineer upon request. All records shall be retained for a period of at least one year from the date of acceptance of the vee by the Engineer.

**ELECTROSLAG WELDED VEES FOR
PART-WELDED CROSSINGS****6.2 Vee dimensions and defects**

Each welded vee shall be dimensionally checked to establish compliance with the drawing requirements, visually inspected for welding imperfections and freedom from surface defects established using approved non-destructive methods.

6.2.1 Undercut

Undercut shall be dealt with in accordance with the table below.

	Undercut not exceeding 1.5mm	Undercut exceeding 1.5mm
In critical zones	Grind to a smooth profile	Not acceptable and not repairable
In non-critical zones	Grind to a smooth profile	Repair by welding in accordance with the procedures detailed in Appendices A and B

6.2.2 Weld finish area

The profile in the weld finish area shall be such that the circumference of the drilled relief is tangential to the edge of the rail head, key-hole effect shall be kept to a minimum and shall not extend more than 2mm into the rail head (see Figure 2). Sharp corners shall be removed by grinding to produce a radius of not less than 10mm.

6.2.3 Non-destructive testing

Non-destructive testing shall be carried out in the critical zones on all welded vees using a procedure approved in writing by the Railtrack HQ Permanent Way Engineer. Defects are not permitted in critical zones in either the weld or the parent metal. The repair of defects by welding is not permitted unless authorised by the Engineer.

6.3 Prepared weld samples

Weld test samples, identifiable to the welded vee they represent, shall be prepared from the end of the extension/run-on piece adjacent to the nose end of the welded vee. The samples shall be ground and etched with a suitable medium to facilitate the identification of the weld interfaces. Each section shall be subjected to the following inspections and tests.

6.3.1 Depth of weld metal

The depth of weld metal, when measured from the centre line of the section shall be greater than 50mm (see Figure 3).

6.3.2 Weld bias

The difference in vertical height between each side of the filler plate shall not exceed 2.5mm for the weld in the head section and 5mm for the weld in the foot section (see Figure 4). The difference in the web widths of the vee rails in the weld region shall not exceed 0.5mm (see Figure 1).