

# **RAILSAFE**

Education, Qualification and Certification

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## **ADDED VALUE OF RAILS SAFE “WELDING PROCEDURE SPECIFICATION” WHEN COMPARED WITH CEN prEN 14730-1 AND prEN 14730-2**

Interim document of the European Welding Federation  
Prepared by RAILS SAFE



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## 1. Introduction:

This document intends to provide an explanation of the added value of the document 'Rail welding – Aluminothermic welding procedure specification' (RAILSAFE/GUIDE/CO/ISQ/JPH/050331/4) in comparison with the CEN standards prEN 14730-1:2006 and prEN 14730-2:2006.

## 2. Documents scopes/objectives:

### 2.1. RAILS SAFE/GUIDE/CO/ISQ/JPH/050331/7:

This document lists all welding procedure variables that influence the quality of an aluminothermic welded rail joint and defines the information that should be provided/made available in order to allow the correct reproduction and understanding of the welding procedure by those involved in the welding activity, regardless of supplier.

### 2.2. prEN 14730-1:2006

This standard defines the laboratory tests and requirements for approval of an aluminothermic welding process using welds produced in workshop conditions. Indirectly, this standard defines information (on the process/procedure details) that must be provided in order to the approval to take place.

### 2.3. prEN 14730-2:2006

This standard specifies:

- a) The system for training, testing and maintaining the skills of aluminothermic welders.
- b) The systems and requirements for the approval of aluminothermic welding contractors.
- c) Acceptance requirements for aluminothermic welds.

## 3. RAILS SAFE document contents in comparison with CEN standards:

The RAILS SAFE document used the CEN standards as reference, therefore all welding procedure variables that, according to prEN 14730-1, influence the scope of approval of the welding procedure or that were required to be mentioned for the approval of the welding procedure to take place and all information mentioned by prEN 14730-2 on variables that are considered essential for clarifying welder's competences and for the traceability of the welds, were considered.

The following can be used to locate where the variables mentioned on the RAILS SAFE document are mentioned in the CEN standards.

RAILSAFE Document	prEN 14730-1	prEN 14730-2
<b>Definitions:</b>	<b>Definitions:</b>	<b>Definitions:</b>
WPS	Fusion zone	Railway authority
pWPS	HAZ	Aluminothermic welder
WPQR	Heat Softened Zone	Welding contractor
Portion	Flashing	Welding subcontractor
Mould	Surface defect	Process supplier
Nominal welding gap	Internal defect	Employer
Vertical alignment	Stress range	Process manual
Horizontal alignment	Railway authority	Training establishment
Ballastless track	Process supplier	
High speed lines		
Conductor rail		

<b>RAILSAFE Document</b>	<b>prEN 14730-1</b>	<b>prEN 14730-2</b>
Related to the <b>rail welding contractor</b> (Identification of: the contractor; of the WPS reference number and of the welding procedure qualification record (WPQR) or other documents as required)	5.1 and 5.2	4.1 and 4.2
Related to the <b>work description</b> (Identification of the type of track and line where the welds are to be made and of the number of persons needed to perform the welding operation, and if is needed to deal with any differences in rail profile or rail head wear)	5.6.1.a)	4.2
Related to the <b>parent material</b> (Identification of the rail(s) material(s), reference standard(s) and group number(s) acc. to EN 13674-1)	5.6.1.c)	4.2 and 5.10
Related to <b>special limitations on local conditions</b> (Description of any limitations on the local conditions)	Not mentioned	Not mentioned
Related to the <b>welding equipment / consumables</b>  - <i>Kit reference identification</i>  - <i>Portion identification/details</i> (Trade name and/or designation; (weld metal) composition and/or elements weight, shelf life period and storage precautions)  <i>Mould identification/details</i> (Trade name and/or designation, number of pieces, shelf life period and storage precautions)  <i>Crucible / reaction chamber identification/details</i> (Trade name and/or designation, refractory chemical nature; storage precautions and maximum number of welds)  <i>Tapping system identification/details</i> (Trade name and/or designation, refractory chemical nature and type of releasing mechanism)  <i>Pouring system system identification</i> (Trade name and/or designation)	Indirectly see below  5.3.b); 5.6.1.c); 5.6.3; 6.1.5 and 7.6  5.3.c)  5.3.d) and 6.1.2  5.3.d) and 6.1.3  5.2.b)	Indirectly see below  5.10  Not mentioned  Not mentioned  Not mentioned  Not mentioned
Related to the <b>joint</b>  Identification of the rail end preparation/cutting method. Rail stressing equipment (if used) Identification the pre-welding cleaning method for oxide, dirt, grease, burns, fins and/or moisture removal Identification of special precautions to be observed Joint design sketch/configuration with identification of the dimensions of the (Nominal) welding gap; Vertical alignment (Flatness / Dip) and Horizontal alignment	5.6.1.d) and 5.6.1.e) Not mentioned Not mentioned Not mentioned 5.7 and 6.1.6.	4.1 and 4.2 5.10 Not mentioned Not mentioned 6.4

RAILSAFE Document	prEN 14730-1	prEN 14730-2
<b>Datum marking</b> information (e.g. number of marks; position; checking intervals and amount of movement accepted; corrections to be made if necessary)	Not mentioned	5.10
<b>Mould adjustment</b> information if required (e.g. maximum mould depth removal; mould areas required to fit; other indications)	Not mentioned	Not mentioned
<p><b>Weld details:</b></p> <p><i>Pre-heating</i> (Identification of: the heating equipment reference, the method and fuel type to be used, the minimum temperature applied at the start of welding and the rail length from weld face to be pre heated)</p> <p><i>Ignition Method</i> to be used</p> <p><i>Critical process timings / temperatures / mould removing instructions</i> Time from ignition to tap: Rate of cooling or time/temperature until mould removal Time/temperature before course grinding Time/temperature before trains can pass</p> <p><i>Stripping</i> (Stripping equipment, method description / Mould removing instructions, removal of rail stressing equipment (if used))</p> <p><i>Final grinding</i> (Method to be used, manufacturer and trade name of machine to be used, maximum grinding length and finished profile requirements)</p> <p><i>Weld collar geometry</i> sketch and dimensions</p> <p>Description of the <i>inspection</i> to be done by the welder and the acceptance requirements</p>	<p>5.3.e); 5.6.1.f) and 6.1.4</p> <p>Not mentioned</p> <p>5.6.1.g) 5.6.1.h) 5.6.1.h) 5.6.1.i)</p> <p>Not mentioned</p> <p>Not mentioned</p> <p>5.6.2 and 6.1.1</p> <p>7. (indirectly)</p>	<p>Not mentioned</p> <p>Not mentioned</p> <p>Not mentioned</p> <p>Not mentioned</p> <p>6.4.</p> <p>Not mentioned</p> <p>6.4.(Indirectly)</p>
Critical <b>safety information</b> about the welding process and subsequent operations	5.6.1.j)	Not mentioned

#### 4. Conclusions:

The RAILS SAFE document intends to systematize the elaboration of a 'welding procedure specification' that is a documents that provides all the required variables for the welding task to be correctly made and reproduced. Also presents a suggested form, which can be used for direct application. The variables were grouped considering the order of the tasks to be made.

Although the CEN standard, prEN 14730-1, mentions some of these variables, they are dealt regarding responsibilities and requirements to be respected in order to approve the 'welding process'.

The prEN 14730-1 standard also mentions that "*the supplier shall produce a manual identifying all the consumable materials and equipment used, as well as the operating method to be followed for all steps of welding. (...). The manual shall specify the critical parameters of the welding process and their safe bounds, and shall include*"<sup>(1)</sup> the minimum information specified. Nevertheless, 'Process Manuals' are current practice in the rail welding industry and usually they can be large documents and do not particularly lend themselves to day-to-day use by site welding teams.

The RAILS SAFE document provides a mechanism for distilling from a 'Process Manual' all the essential data needed by a welder to execute a weld correctly in a specific set of circumstances.

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<sup>1</sup> extract from clause 5.5.1 of prEN 14730-1:2003