

**EWF Guideline
EUROPEAN ARC WELDER FOR RAILWAY
TRACKS: European Arc Welder for Rail Joining
and European Arc Welder for rail Restoration**



**Minimum Requirements for the Education, Training,
Examination, Qualification and Certification**



EWF-653-10

RAILSAFE

Education, Qualification and Certification

www.ewf.be/railsafe2

MINIMUM REQUIREMENTS FOR THE EDUCATION, TRAINING, EXAMINATION, QUALIFICATION AND CERTIFICATION OF A EUROPEAN ARC WELDER FOR RAILWAY TRACKS:

- **EUROPEAN ARC WELDER FOR RAIL JOINING
(EAWRJ)**
- **EUROPEAN ARC WELDER FOR RAIL
RESTORATION (EAWRR)**

Interim Guideline of the European Welding Federation
Prepared under the RAILS SAFE 2 Project



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Preface

This document has been prepared by the partners in the RAILS SAFE 2 project.

The aim of the RAILS SAFE project is the “Development of a Harmonised System for Education, Qualification and Certification of Railway Track Welders - Phase 2”. Phase 2 is RAILS SAFE 2 and is dedicated arc welding processes.

The project is financially supported by the European Union *LEONARDO DA VINCI* Education and Culture Lifelong Learning Programme.

RAILSAFE 2 started on 1 October 2008 with a two year duration.

Partners in the RAILS SAFE 2 project are:

- Ir. J.B. van den Brug Raadgevend Ingenieur, the Netherlands, Project coordinator
- Instituto de Soldadura e Qualidade, Portugal
- European Federation for Welding, Joining and Cutting Secretariat, Portugal
- Swedish Welding Commission, Sweden
- TWI (TWI Ltd), UK, Project promoter
- National R&D Institute for Welding and Material Testing, Romania.

The document is based on the input of in total 39 railway welding experts from 4 different European countries by discussions in workshops in Sweden, UK, and Romania held during 2009.

Scope

Arc welding processes are used for joining rail track sections and for restoring worn or defective rail heads. Successful joining or restoration requires competent welders who possess an appropriate level of technical knowledge and practical skill. This Guideline describes in detail a regime for the education, training, examination, qualification and certification of such welders. The Guideline covers:

- Access conditions for people wishing to attend the course of education and training
- Details of the instruction programme - theoretical and practical - divided into different combinations of welding processes and skill modules
- Examinations and tests leading to the award of a diploma which is valid for the life of the holder
- Track welding experience requirements leading to the award of a certificate of competence which has a limited validity
- Ongoing requirements for the renewal of certificates of competence for increasing/changing their scope
- Transition arrangements under which existing competent welders can achieve appropriate qualification and certification.

European Federation for Welding, Joining and Cutting

Enquiries about RAILS SAFE may be addressed to:

Secretariat of the European Federation for Welding, Joining and Cutting
C/o: ISQ
Av. Prof. Cavaco Silva, 33
Tagus Park - Apartado 012
P-2741-901 PORTO SALVO
PORTUGAL

Telephone: +351 21 421 1351
Email: ewf@isq.pt
Web site: www.ewf.be/railsafe2

References

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- EN 15594:2009 Railway applications – Track – Restoration of rails by electric arc welding
- EN 14811:2006 Railway applications. Track. Special purpose rail. Grooved and associated construction
- EN 13674-1:2003+A1:2007 Railway applications. Track. Rail. Vignole railway rails 46 kg/m and above
- EN 13674 Part 2:2006 Railway applications. Track. Rail. Switch and crossing rails used in conjunction with Vignole railway rails 46 kg/m and above
- EN 13674 Part 3:2006 Railway applications. Track. Rail. Check rails
- EN 13674 Part 4:2006 Railway applications. Track. Rail. Vignole railway rails from 27 kg/m to, but excluding 46 kg/m
- prEN 13231-3:2009 - Railway applications - Track - Acceptance of works - Part 3: Acceptance of reprofiling rails in track
- EN 287-1:2004 Qualification test for welders - Fusion welding - Part 1: Steels
- EN 15689:2009 Railway applications - Track - Switches and crossings - Cast austenitic manganese steel for crossing components
- EN 10083-1:2006 Steels for quenching and tempering. General technical delivery conditions
- EN 15016 -1,-2,-3:2004 and -4:2006 Technical drawings - Railway applications
- Inspection and maintenance of cast manganese steel products.. Balfour Beatty Rail for Edgar Allen cast manganese crossings.
- Recommended operation and maintenance manual - for cast manganese fishplated monoblock crossings and cast manganese centre block crossings with weldable leg ends. Outreau Technologies, Edition 2.
- EWF-635 Minimum requirements for the Education, Training, Examination, Qualification and Certification of a European Aluminothermic Welder (EAW)
- Rules for the implementation of RAILS SAFE Guidelines for the education, examination, qualification and certification of European railway track welding and related personnel. Interim Rules of the European Federation for Welding, Joining and Cutting Prepared by RAILS SAFE. RAILS SAFE/RULES/PU/EWF/TR/090727/4.

Terms and definitions

European Federation for Welding, Joining and Cutting (European Welding Federation - EWF)

EWF is an association of welding institutes and societies throughout Europe, see www.ewf.be. In relation to the RAILS SAFE system for rail welder education, training, qualification and certification, EWF operates the system and applies special rules for RAILS SAFE Authorised National Bodies that wish to implement the system.

RAILSAFE Authorised National Body (RANB)

Organisation assessed and authorised by EWF, which operates the RAILS SAFE education, training, qualification and certification system in its country.

Approved Training Body (ATB)

Training organisation approved by the RAILS SAFE Authorised National Body (RANB) for training of arc welders for railway tracks; "training establishment" in the definition of EN 15594.

European Arc Welder Instructor (Railway Tracks)

Instructor teaching theoretical knowledge and practical skills for courses leading to EAWRJ/EAWRR qualifications.

Authorised Examiner (AE)

Person authorised by the RAILS SAFE Authorised National Body to examine knowledge and/or skills of a welder for a Diploma and/or a Certificate.

Railway Authority (RA)

Either the railway regulator or the owner of a railway infrastructure or the custodian with a delegated responsibility for a railway infrastructure

Preliminary Welding Procedure Specification (pWPS)

Provisional welding procedure specification, which is assumed to be adequate, but which has not been qualified according to the relevant standard or specification. Welding of test pieces which are needed for approval of a welding procedure specification has to be carried out on the basis of a preliminary welding procedure specification.

Welding Procedure Specification (WPS)

Procedure approved according to European standards and agreed by the RA for use on the railway infrastructure. An example is given in Annex B of EN 15594.

Employer

Company which employs welders.

Contractor or Sub-contractor

Company approved by the RA to carry out the restoration or joining of rails by electric arc welding. This may include staff from the RA.

Diploma

Lifelong valid document issued to a person having successfully passed an examination after his/her education and training for knowledge and skills.

Certificate

Document with limited validity and range of scope issued to a Diploma holder showing current knowledge and skills.

Restoration

A generic term used in EN 15594 which covers activities such as repairing of defects, 'building up' of worn areas, refurbishment, etc

Joining

This means joining two lengths of rail by welding the ends together. EN 15594 does not cover this activity.

Minimum requirements for the Education, Training, Examination, Qualification and Certification of a European Arc Welder for Railway Tracks (EAWRJ/EAWRR)

1. Introduction

The RAILS SAFE 2 harmonised system provides for theoretical education and practical training of European Arc Welders for Railway Tracks. The specific requirements for the theoretical education, practical training, examination, qualification and certification of arc welders for restoration and/or joining of railway tracks are described in this guideline. The guideline applies only to the welding of tracks and associated components like switches and crossings, and describes the know-how and skills which the welder requires to produce satisfactory welds independently on rails according to EN 13674-1, EN 14811 or other rails grades and profiles which are not covered by these standards.

Specific national or local requirements which are not covered by the training and examination requirements described in this Guideline must be dealt with separately. The requirements described in this Guideline are the minimum ones that must be followed in order to comply.

2. Overall structure

Qualification, resulting in the issue of the European Arc Welding Diploma for Railway Tracks, requires theoretical education, practical training and theoretical and practical examination.

Certification requires qualification as above plus track welding experience.

Figure 1 shows the overall structure.

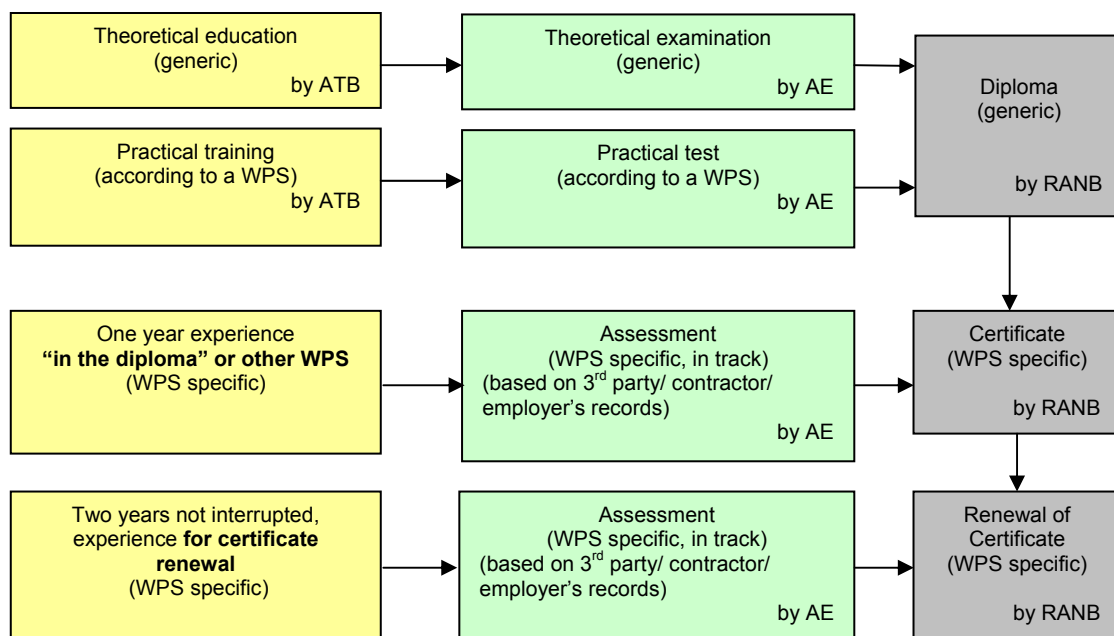


Figure 1 Overall structure of education, training, qualification and certification

Legend: RANB = RAILS SAFE Authorised National Body
ATB = Approved Training Body
AE = Authorised Examiner

The theoretical education and examination for a Diploma is generic and the practical training for a Diploma is specific to a welding procedure specification (WPS) (for joining or restoration of rails). The practical examination for a Diploma is also WPS specific. After passing the examinations the welder will receive a generic Diploma valid his/her whole life.

Diploma holders are required to demonstrate a one year period of supervised, documented and satisfactory experience in order to receive a Certificate, which is WPS specific. This applies to the Certificate relating to the WPSs in which the welder has been trained for the Diploma. If the Diploma holder is successful in passing the experience assessment, the Certificate is awarded; if not, the Diploma holder must undergo an 'in-track' practical test. To get a Certificate relating to another WPS, the welder must also undergo additional practical training and an 'in-track' practical test in that WPS.

Certificates are valid for two years. In order to renew a Certificate for another two-year period, holders are required to demonstrate supervised, documented and satisfactory experience in the WPS for which the certificate was awarded during the period of validity of the Certificate. The holder must not have had interruptions to work lasting any longer than six months. If the certificate holder is successful in passing the experience assessment, the Certificate is renewed; if not, the Certificate holder must undergo an 'in-track' practical test.

3. Access to the course

For entry to the course, health, and physical and mental capability may be specified by the RANB according to any national or other requirements. The participants are required to have knowledge and skills on health and safety, track construction, cutting and grinding as specified by the RANB.

The minimum age is 18 years. Participants must have a spoken and written command of the language in which the course is offered.

Holders of the European Aluminothermic Welder diploma (see document EWF-635) are exempt from modules 1, 2, 3, 4.2 and 4.4 of the theoretical education.

Students entering the course are not required to have undergone any prior training or experience in welding, but persons with a welding background may be eligible to have the number of training hours reduced, see section 4.

4. Instruction programme

In the context of the current Guideline, two arc welding processes are used:

Manual metal arc welding (MMA)
Flux cored arc welding (FCAW)

By following this Guideline, a welder can achieve qualification and certification in any (one or more) welding processes and skill modules combinations:

Combination 1 - Joining rails by MMA welding

Combination 2 - MMA restoration of plain rail, all rail grade groups

Combination 3 - MMA restoration of crossings, all rail grade groups

Combination 4 - MMA restoration of switchblades, all permissible rail grade groups

Combination 5 - FCAW restoration of plain rail and crossings, all rail grade groups

Combination 6 - FCAW restoration switchblades, normal rail grade groups

Combination 7 - FCAW restoration of plain rail, and switch and crossing components, using fully automatic equipment

Combination 1 is 'stand-alone' but combinations 2 to 4 and 5 to 7 are progressive, which means that combination 2 has to be completed before moving on to combination 3 and then 4. Combination 5 has to be taken before moving on to combination 6 and then 7.

The theoretical part of the course is generic in that it covers both welding processes and all the rail components mentioned above. However, the student must choose whether the theoretical part is to cover joining, restoration or both. Supplementary theoretical training can be taken later as required.

The practical parts are specific to each of the combinations given in the list above. There is only one practical part for joining see Combination 1 above. For students aiming to achieve a qualification in rail restoration, the first practical part to be taken must be Combination 2 or Combination 5. Additional restoration combinations require additional practical parts of 63 hours duration each (including examination). However, it is possible to limit the practical restoration training to Combination 2 (or 5) and add other competencies via the certification route, see section 6.3.

Joining of rails requires additional knowledge and skill in the area of rail cutting (oxy-fuel and mechanical) as well as grinding of the completed welds.

The restoration combinations will require additional skill in grinding (for preparation and completion) and in NDT (for preparation and completion).

The durations of the theoretical education part(s) and the practical training part(s) are shown in Table 1. The parts are divided into modules, each with has a number of teaching hours allocated to it. The course can be configured to suit the combination(s), see above, for which qualification is sought.

Part / Module	Recommended teaching hours		
	Joining only	Restoration only	Joining and restoration
Theoretical education part			
1. Health, safety and environment	7		
2. Track fabrication	2		
3. Materials and their behaviour during welding	11		
4. Application of arc welding to rails	24 ^A	18 ^B	34
Theoretical examination	1 ^C	1 ^D	1
Total Part 1	45^E	39^F	55^G
Practical training part (per combination)			
1. Joining only (1 combination)/ Restoration only (1 combination)/ Joining and Restoration (2 combinations)	43	59	102
Practical test	4	4	8
Total Part 2	47^H	63^I	110^J
Total Parts 1 and 2	92	102	165

Table 1 - Parts comprising the training course including examinations

The examples below show the training and examination modules required to achieve some of the specific combinations.

New students:

Combination 1: E plus H

Combination 2: F plus I

Combinations 1 and 7: G plus J (includes practical for Combination 5) plus I (for Combination 6) plus I (for Combination 7).

Students with existing qualifications:

Holding Combination 1, seeking Combination 2: B plus D plus I

Holding Combination 2 seeking Combination 5: I only

Holding Combination 2, seeking Combinations 1 and 4: A plus C plus H (all for Combination 1) plus I (for Combination 3) plus I (for Combination 4)

The recommended periods of time in the theoretical part are the minimum times required for the student to attain the expected level of knowledge. However, students entering the course from a welding background as a welder from another industrial sector may be eligible for a reduction in the number of theoretical teaching hours as appropriate.

With regard to the practical part, it is recognised that students' ability to acquire practical skills vary. Therefore the hours shown are considered to be the time that an average student would require. The time needed may vary individually according to the capability of the student and is at the discretion of the Arc Welder Instructor (Railway Tracks), see section 5.

A teaching hour will contain at least 50 minutes of direct teaching time. It is not obligatory to follow exactly the order of the topics given in this guideline.

The theoretical education given to the students aims at a basic understanding of the processes and the materials behaviour including standards and safety regulations. The themes and keywords are given as "scope" in the module descriptions, together with the "objective" and the "expected result".

If a person successfully completes the 'Joining Only' theoretical course and then wishes to take the 'Restoration Only' course sometime later, he/she is exempt those theoretical modules which are common (1, 2, 3, 4.1, 4.4, 4.5 and 4.6).

The practical training advised in this guideline will bring the students to the skill, required for practical work in industry. Practical training shall be done in accordance with welding procedures that are agreed by the applicable Railway Authority.

The order of theoretical education and practical training is at the discretion of the training establishment. It is advisable for each day of the course to contain a blend of theoretical training, demonstrations and practical training.

It is permitted to run the course in separate sessions with gaps in between, but the full course, examination and testing must be completed in an overall time period of nine months for each combination.

Training courses are conducted by Authorised Training Bodies (ATBs). The courses are normally conducted in the training school, but parts of the course may be conducted at the track site, at the discretion of the ATB.

Participants will only be admitted to the examination if they have participated in all aspects of the training course.

ATBs must include in the training programme any applicable national requirements defined by the Railway Authority that approved the applicable welding procedures.

In the following paragraphs the minimum requirements for education and training courses are given, with the indication of teaching hours, making particular reference to the 'expected results' (welder performance objectives).

	<u>teaching hours recommended</u>
Theoretical education	55
1. Health, safety and environment	7
Objective:	
Interpret health and safety hazards associated with welding and fabrication processes Welders responsibility with respect to health and safety during welding of rail track joints	
Scope:	
- Introduction to health and safety requirements - Risks of electrical equipment - Personal safety equipment - Risk of gases, fumes and vapours in use of oxy-fuel- and mechanical cutting - Risk of smoking in combination with gases, fumes and vapours - Fire prevention and control/ extinguishing agent - First aid - Handling and transportation of compressed-gas cylinders in the area of the track - Oxy-fuel cutting measures in areas where there is a risk of fire and explosions in the vicinity of the track - Oxy-fuel cutting measures on bridges with an open carriageway and in tunnels - Risks associated with arc welding processes - Risk connected to ancillary operation (mechanical cutting, grinding, NDT, etc.) - Noise levels and ear protection - Standards and regulations - Protection of the workplace in respect of train circulation - Manual handling of heavy welding and ancillary equipment - Environmental consideration for welding waste	
Expected results:	
1. Describe the risks associated with arc welding processes and equipment, including transportation of gases and other consumables in accordance with regulations and published guidance documents 2. Interpret Health and Safety regulations with respect to the above hazards 3. Understand risk and risk assessments associated with arc welding operations 4. Describe safe working procedures to ensure the requirements are met. 5. Correctly use protection devices 6. Recognise and have an understanding of the relevant safety documentation 7. Understanding measures of prevention of fire, environmental pollution, etc	

**teaching hours
recommended**

2. Track fabrication

2

Objective:

Describe the effects and limitations when welding on railway infrastructure

Scope:

- Methods of building, maintaining and repairing railway tracks by welding
- Basic knowledge of track welding projects
- Different type of rail track construction (e.g. sleepers, ballast, slab track, embedded rails, switches and crossings, etc)
- Causes and effects of thermal expansion and contraction
- Rail tensioning
- Restrictions on the location of welded joints

Expected results:

1. Describe the types of rail track construction, including switches and crossings, and rail tensioning
2. Awareness of the relevant rail fabrication standards, specifications and documents
3. Correctly describe measures of thermal movement control in welding

3. Materials and their behaviour during welding

11

3.1 Basics of metallurgy

2

Objective:

Understand the basics of metallurgy of steels, phenomena due to heating and cooling and mechanical properties with regard to the rail steel

Scope:

- Alloying elements (influence of carbon and manganese in rail steel)
- Composition of rail steel
- Purpose and events at the heat treatment of the rails
- Quenching phenomena and relevant factors
- Destructive testing (tensile test, hardness test)
- Concepts of brittle and ductile behaviour

Expected results:

1. Describe properties of steel
2. Understand the effects of heat treatment and cooling rate
3. Interpret mechanical properties

3.2 Welding metallurgy and structure of welded joints

4

Objective:

Understand the formation of the different metallurgical structures within an arc weld and the significant factors involved, with regard to rail steel

**teaching hours
recommended****Scope:**

- Thermal cycle
- Preheat
- Cooling rate
- Structure of the weld
- Weld metal
- Solidification of weld metal
- Post-weld heating
- Dilution
- Heat-affected zone (HAZ)
- Welding parameters
- Heat input

Expected results:

1. Understand the effect of the preheat on rail welds
2. Name the main regions constituting a weld
3. Identify the effects of the welding parameters on the thermal cycle and resulting thermal stresses
4. Understand the effect of post-weld heating

3.3 Rails and rail components

5

Objective:

Describe welding problems dealing with the fundamental aspects of steels used for the rails

Scope:

- Type of rails in current service: profiles, including grooved rails, and steel grades (for example, EN 13674, EN 14811 and applicable national standards)
- Rail steels, properties, classifications, marking, rail wear measurement and limitations
- Marking minimum tensile strengths and /or hardness on rail rolling marks
- Rail cutting, grinding and weld preparation
- Oxy-fuel cuts in CWR (continuously welded rails)
- Production and creation of plain line and switches and crossings
- Cast manganese and bainitic crossings
- Welding processes for joining and restoration of rails and rail components
- Weldability of rail steels, depending on rail defects (e.g. production and traffic)

Expected results:

1. Identify different type of rail steel grades and profiles in current service using the roll markings and rail wear measurements
2. Appraise the susceptibility to cracking by reference to chemical composition of steels
3. Identify welding processes depending on different factors affecting weldability
4. Describe the correct procedure for oxy-fuel cutting of CWR
5. Identify the properties of the rail steel
6. Understand the need for heat treatment of rails prior to oxy-fuel cutting
7. Have basic knowledge of the production of plain line and S&C
8. Have a basic knowledge of failures from production and traffic

**teaching hours
recommended**

4. Application of arc welding to rails

34

4.1 Principles of arc welding (applies to both joining and restoration)

2

Objective:

Understand principles of the arc welding processes

Scope:

- Principles of arc welding and power sources used for arc welding on site
- MMA and FCAW processes
- The application of the arc welding process in rail welding
- Arc processes used for rail joining and restoration
- Welding consumables
- Welding parameters

Expected results:

1. Understand the principles of arc welding processes
2. Understand the principles of arc welding of rails
3. Understand the different arc welding processes used on rails

4.2 Cutting processes for rails (applies only to joining)

7

Objective:

Application of cutting processes for weld gap preparation (oxy-fuel cutting and mechanical cutting), and associated equipment, applications, procedures and common problems

Scope:

- Mechanical and oxy-fuel cutting:
 - Principles and limitations
 - Equipment (including gases used for oxy-fuel cutting)
 - Parameters and techniques
 - Cutting rails
 - Accident and damage prevention
 - Duties and competences of the cutting operator

Expected results:

1. Recognise gas equipment and explain the principle of oxy-fuel cutting
2. Know how to use (including assembly, testing, lighting up and closing down), and care for, the equipment and accessories (mechanical and oxy-fuel cutting)
3. Explain limitations of oxy-fuel cutting, e.g. need of pre-heating
4. Compare mechanical and oxy-fuel cutting
5. Identify the main activities to be performed during rail cutting (mechanical and oxy-fuel)

4.3 Arc welding application

19

teaching hours
recommended

Objective:

Apply principles of arc welding processes and associated equipment, applications and procedures, outlining the main phases and operations for joining and restoration of rails, and, in the latter case being familiar with the requirements of EN 15594

Scope:

Joining of rails by arc welding (applies only to joining)

9

- Cutting (1.4.2)
- MMA process
- Welding preparation
 - Equipment
 - Installation procedures (including cleaning and aligning of rail ends)
 - Controlling rail tension
 - Welding procedures and WPSs
 - Selection of consumables
- Pre-heating
- Welding (including enclosing equipment)
- Post welding: heating, grinding, inspection and NDT
- Typical imperfections, origin and factors
- Care and control of consumables
- Cause and effect of operating outside the correct procedures

Restoration of rails by arc welding (applies only to restoration)

10

- In-service defects that can occur in rail heads and their causes, for example, cracking, wheel burns, squats, headwear, sidewear, defects in welding zones, rail damage, etc
- Grinding/gouging, NDT, grinding
- MMA and FCAW processes
- Welding preparation
 - Equipment
 - Installation procedures
 - Welding procedures and WPSs
 - Selection of consumables
- Pre-heating
- Welding
- Post welding: heating, grinding, inspection and NDT
- NDT procedures
- Typical imperfections, origin and factors
- Care and control of consumables
- Cause and effect of operating outside the correct procedures

Expected results:

1. Know about the occurrence and causes of rail head defects
2. Identify correct equipment, consumables, parameters and procedures for the execution of joining or restoration of rails by arc welding
3. Understand the detailed steps to use arc welding effectively for joining or restoration of rails, including tensioning and preparation by grinding and NDT
4. Know how to avoid welding defects by correct process control
5. Know how regarding post-weld NDT for surface defects
6. Know how to use and care for the equipment and consumables
7. Identify good and bad practices in welding and in storage and transportation of welding and related equipment
8. Understand the requirements of EN 15594

**teaching hours
recommended**

4.4 Grinding of completed welds (applies to both joining and restoration)

2

Objective:

Explain grinding processing of rail and rail components: equipment, procedures and associated problems

Scope:

- Principles of grinding rail and rail components; EN 13231-3
- Equipment and accessories (grinding tools) for rail grinding
- Influence of rail temperature on grinding operation
- Procedures for the rail grinding (rough grinding, fine grinding)
- Checking the height and side position

Expected results:

1. Select correct equipment and grinding material
2. Understand working temperatures
3. Identify the correct tolerances to be achieved

4.5 Welding imperfections and defects (applies to both joining and restoration)

4

Objective:

Explain the most common imperfections which can occur during the rail welding execution

Scope:

- Metallurgical imperfections
- Process anomalies
- Pre-heating deficiencies
- Operative imperfections (before, during and after welding)
- Geometric imperfections and associated measurements
- Visual inspection and NDT
- Acceptance criteria
- Control and testing of welded joints
- Marking of welds
- Typical documents, procedures and specifications in use

Expected results:

1. Understand common types of welding imperfections and defects and their causes
2. Understand the application of visual inspection and surface NDT
3. Understand the principles of volumetric NDT methods applied to welds in track
2. Understand and apply imperfection acceptance criteria
3. Identify actions to be taken after rejections of welds
4. Understand the documentation to be completed by the welders

4.6 Other joining processes (applies to both joining and restoration)

0

This subject is not part of the teaching, but should be included in the handout material

**teaching hours
recommended****Scope**

- Aluminothermic welding of rails (principle, parameters, field of application and testing)
- Flash butt welding of rails (principle, parameters, field of application and testing)
- Adhesive bonding of rails (principle, parameters, field of application and testing)

Theoretical examination**1**

	<u>training hours recommended</u>
2 Practical training	110
2.1 Joining of rail by arc welding	43
2.1.1 <u>Pre-welding activities</u>	
1. Correct preparation of the welding place and environment	
2. Safe and correct use of mechanical cutting equipment (including selection, inspection and mounting of abrasive wheels)	
3. Safe and correct use of oxy-fuel cutting equipment	
4. Correct alignment of rail ends	
5. Preheating	
2.1.2 <u>Arc welding</u>	
1. Competent and full execution of an arc weld including ability to weld in both directions	
2. Adopt good practice in the execution of welds (copper backing, stop/start, interpass temperature,)	
3. Correct use of welding procedure specification	
2.1.3 <u>Post-welding activities</u>	
1. Carry out all pre-start checks on the rail grinding machine and to understand correct use	
2. Grind welds to the required standard	
3. Verify track alignment and weld geometry after welding an grinding	
4. Visually inspect the weld and decide on acceptability for service, before leaving the site	
5. Mark the weld and complete all necessary documentation before leaving site	
Practical test (in accordance with a WPS)	4
	<u>training hours recommended</u>
2.2 Restoration of rail	59
2.2.1 <u>Pre-welding activities</u>	
1. Correct preparation of the welding place and environment	
2. Safe and correct use of grinding/gouging equipment (including selection, inspection and mounting of abrasive wheels)	
3. Safe and correct use of visual and surface NDT equipment	
4. Preheating	

**training hours
recommended****2.2.2 Arc welding**

1. Understand and identify safety requirements for arc welding
2. Ensure correct functioning of arc welding equipment and associated power plant
3. Identify consumables to be used and the rail grades to be welded
4. Competent and full execution of an arc welding restoration task including ability to weld in both directions
5. Adopt good practice in the execution of welds in accordance with the applicable WPS
6. Correct use of welding procedure specification

2.2.3 Post-welding activities

1. Carry out all pre-start checks on the rail grinding machine and to understand correct use
2. Grind welds to the required standard
3. Visually inspect the weld and carry out the required surface NDT
4. Decide on acceptability for service, before leaving the site
5. Mark the weld and complete all necessary documentation before leaving site

Practical test (in accordance with a WPS)**4****5. Arc Welder Instructor (Railway Tracks)**

Instructors teaching theoretical knowledge and practical skills for courses leading to EAWRJ/EAWRR qualifications must possess:

- (i) Qualification to European/International Welding Practitioner (E/IWP) or equivalent with additional training in the area of railway track welding
- (ii) Competence in instructional techniques (transfer of practical skills and theoretical knowledge)
- (iii) Arc Welder (for instructors for practical skills) with appropriate industrial experience of 3 years (minimum)

The Approved Training Body (ATB) must install a system for ensuring that instructors keep up to date and maintain their competence.

6. Examinations and Tests

There are common RAILSAFE rules for the conduct of examinations and tests. These are provided in a separate document, reference RAILSAFE/RULES/PU/EWF/TR/090727/1, and they must be applied to all RAILSAFE examination and tests, including those related to the European Arc Welder for Railway Tracks.

The paragraphs below deal with special additional requirements for examinations and tests which are required for the European Arc Welder for Railway Tracks.

6.1 Authorised Examiner (AE)

The RANB shall administer examinations and tests for the European Arc Welder for Railway Tracks through the appointment of competent persons, to be known as RANB Authorised Examiners, who shall be responsible for the functions listed below and for complying with the rules concerning re-examination.

RANB Authorised Examiners shall be competent to perform the duties they are requested to undertake and may be specific appointees of the RANB or an RANB approved appointee of another organisation, for example the Approved Training Body (ATB) or of a rail welding contractor. The Examination Board of the RANB is responsible for the appointment of the Authorised Examiners and for supervising their work.

Authorised Examiners must be able to demonstrate impartiality in reaching decisions about the results of the examinations they are supervising.

All examinations shall be conducted under the general supervision of an Authorised Examiner. It is the responsibility of the RANB Authorised Examiner to verify compliance with applicable welder qualification requirements, in particular with respect to:

- (i) fitness for purpose of welding equipment
- (ii) checking welding parameters
- (iii) approving the practical test assessment regime, see Appendix 3.
- (iv) availability of a (WPS) for each test
- (v) compliance of test piece materials, consumables and joint preparations with specifications. All materials and consumables must be properly identified
- (vi) conduct of qualification tests, including check of candidate's ID
- (vii) visual examination of the welds and reporting the results; where appropriate further tests required must be authorised
- (viii) conduct and marking of theoretical examinations
- (ix) reporting results to the Examination Board of the RANB for the issue of the appropriate Diplomas and Certificates

6.2 Examinations leading to the EAWRJ/EAWRR Diploma

The examination/test centre for the final theoretical examinations and qualification tests may be a part of the training body or a separate organisation. In either case, the operations of examinations and tests shall be independent of the training activities and subject to RANB approval. The theoretical examination and the practical test must conform to the applicable welder qualification requirements.

6.2.1 Theoretical examination

After the theoretical training part, there is a final theoretical examination of the multi-choice type covering the whole syllabus: examination papers shall comprise questions selected by the Authorised Examiner from a bank of questions approved by the RAILS SAFE Authorised National Body.

The time to be allocated to the theoretical examination should be a minimum of 1 hour's duration and contain at least 40 multiple choice questions. The examination should take place at the ATB.

The theoretical examination pass mark is 60% minimum. Failure requires re-examination. A second failure requires re-entry into the training part leading to the examination.

Appendix 2 contains sample questions of the theoretical examination.

6.2.2 Practical test

After the practical training part, there is a final practical test in a specific arc welding process and skill combination selected by the candidate and/or his/her employer according to a WPS. The test shall follow EN 287-1 as much as is reasonably practicable. It shall be administered by the Authorised Examiner and shall take place at a location approved by the AE.

The time to be allocated to the practical test should be a maximum of 4 hours, excluding cooling time.

A suggested checklist for an assessment regime that could be used by the AE to carry out practical tests is attached as Appendix 3.

There are no special rules concerning re-examination in the event of failure in the practical test. However, more than one failure is an indication that further training is required.

6.2.3 Award of EAWRJ/EAWRR Diploma

After successfully completing the theoretical examination and the practical test, the candidate is awarded the EAWRJ and/or EAWRR Diploma as applicable. The combination of arc welding process and skill module used for the practical test is indicated on the Diploma as well as any additional skill tests passed, like cutting, grinding and NDT. An example of a diploma is shown in Appendix 4.

Diplomas are the property of the holder and are valid for the life of the holder.

6.3 Certification as an EAWRJ/EAWRR

Certificates as described in the current document are not 'Permits to Weld' as described in EN 15594, but railway authorities may use such certificates as a basis for issuing 'Permits to Weld'. The ownership of the Certificate rests with the RANB.

6.3.1 Initial certification

To receive a Certificate in any combination of arc welding process and skill module the Diploma holder is required to demonstrate a minimum period of one year of supervised, documented and satisfactory experience in that combination with a minimum of 10 welds being completed by the applicant every six months. RANBs are permitted to accept a lower number of welds as dictated by the circumstances. Justification for doing so must be documented.

If the combination to be used for certification is not the same as the combination indicated on the Diploma, the candidate must also provide evidence of at least 8 hours of training in the combination to be used for certification.

Evaluation of the supervised, documented and satisfactory experience and training, if applicable, is carried out by the RANB Authorised Examiner, based on a 3rd party/contractor/employer's records of welder training and competences, weld records, number of welds produced in a given period, number of welds rejected and notified number of welds failed in service. Evidence of experience may be presented in the form of a log book with appropriate signatures.

If the welder is not successful in passing the experience assessment, the Authorised Examiner conducts an 'in-track' practical test of the welder in the combination indicated on the Diploma. In case of a combination which is different from the one indicated on the Diploma the "in-track" practical test is obligatory.

After successful assessment a Certificate is awarded to the candidate by the RAILS SAFE Authorised National Body. The Certificate shall be issued in at least one of the official CEN languages (English, French or German). The certificate is specific to the applicable combination of arc welding process and skill module. Extra skills may also be shown, for example, cutting, grinding and NDT.

An example of a Certificate and Identity Card (optional) are shown in Appendix 5.

There are no special rules regarding re-examination in the event of failure in the practical test for certification (or re-certification). However, more than one failure is an indication that further training is required.

The validity of the certificate begins from the date when all necessary tests have been passed. A certificate shall remain valid for a period of two years. This is providing that the welding coordinator or the responsible personnel of the employer can confirm that the welder has been working satisfactorily within the initial range of qualification. This shall be confirmed every six months. Evidence of unsatisfactory work must be reported to the certificate issuing authority and may result in the certificate being rendered invalid.

6.3.2 Renewal of certification

For prolongation of their Certificate after it has been expired, Certificate holders are required to demonstrate a 2 year period of supervised, documented and satisfactory experience with a minimum of 10 welds being completed per six month period in the combination indicated on the certificate and with no interruption of work longer than a period of 6 months. All records and evidence used to support prolongation must be traceable to the welder, must identify the WPS(s) that have been used by the welder, and must demonstrate that the welder has consistently achieved the quality levels required in the original test. As indicated above, log book evidence is acceptable. RANBs are permitted to accept a lower number of welds per year and a longer period of un-interruption of work as dictated by the circumstances. Justification for doing so must be documented.

If the welder is not successful in passing the experience assessment, the renewal candidate is then required to repeat the 'in-track' practical test in the applicable combination of welding process and skill module.

Success in the practical assessment leads to the issue of a new Certificate, in accordance with section 6.3.1 above.

In order to ensure continuity of certification it is recommended that the RANB is advised well before the expiry date of the certificate. A successful renewal test taken within three months before the expiry date of the existing certificate shall result in a new certificate being issued from the date of expiry of the existing certificate.

6.4 Transition Arrangements

An RANB can offer Transitional Arrangements for a period of up to three years from the implementation of this guideline by the RANB.

Practising arc welders for railway tracks may be eligible for the award of the RAILS SAFE Diploma if they can prove that they have successfully undergone a programme of training and examination that is equivalent to the minimum requirements described in this guideline. The programme may have been conducted under the control of the RANB or under another recognised qualification body.

Practising arc welders for railway racks may be eligible for the award of the RAILS SAFE Certificate if, firstly, they have satisfied the conditions for the award of the Diploma under transition arrangements and, secondly, if they can prove that they have gained the required experience and passed the practical tests in accordance with this guideline or under equivalent technical conditions.

Diplomas and Certificates may only be awarded under Transitional Arrangements in the following cases:

- a) by the RANB in the country in which the applicant received his/her welding diploma/certificate, or
- b) by the RANB in the country in which the applicant is currently practising, in contact with the RANB of the country that issued the original diploma/certificate.

7. Entry in database (optional)

There is an option to upload the all the details of the welder's Diplomas and Certificates to the arc welder for railway tracks database on the RAILS SAFE website. Details are to be found in Document RAILS SAFE/Guide/PR/EWF/IF/070109.

Installing any data on the database requires the permission of both the welder and the employer concerned.

8. EUROPASS

People who are looking for a job – whether in their own country or abroad – need to be able to present their qualifications and skills so that employers can correctly understand and appreciate them.

The Europass service, provided through a network of national centres and an internet portal, provides a number of instruments to make this process easier.

8.1 CV service

The portal - available in 26 languages – provides useful information and an interactive tool to complete the Europass CV and the Europass Language Passport with the help of online tutorials and guidelines.

The Europass CV highlights what users can do, including skills acquired outside formal education and training. Language skills are described in both documents through the widespread reference framework established by the Council of Europe. The CVs can be downloaded in several formats which can be uploaded directly onto online employment databases.

Every day on average more than 7,000 CVs are created on line throughout Europe.

A number of other Europass documents have been defined. A key one in the current context is the Europass Certificate Supplement which explains in terms of competences a vocational training certificate, so that employers can better appreciate what its holders can do.

Each Member State is responsible for the implementation of the Europass instrument at national level. For this purpose, each Member State shall designate a National Europass Centre (NEC), which shall be responsible for the coordination at national level of all activities and which shall replace or develop, where appropriate, existing bodies currently carrying out similar activities.

More information can be found at http://ec.europa.eu/education/lifelong-learning-policy/doc46_en.htm

Appendix 1: Examples of Welding Procedure Specifications

1A: MMA centre of railhead repair

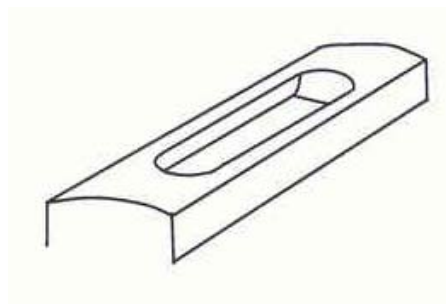
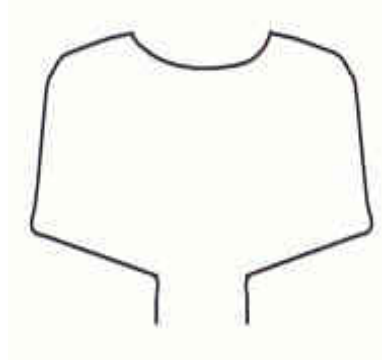
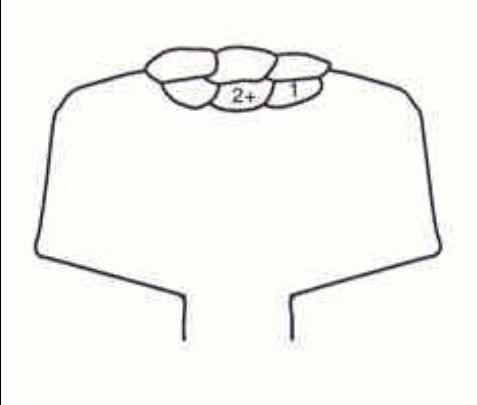
Location: Site

Manufacturer's Welding Procedure Specification No: WP/001

WPAR No: EWF 01

Manufacturer: **AA Rail**
 Welder's name: **N/A**
 Welding Process: **111: MMA**
 Joint Type: **Centre of railhead repair**

Method of Preparation and cleaning
Grinding and wire brushing
 Parent Material Specification
EN 13674-1, Grade: R 220 & R 260
 Material Thickness (mm): **3-15 depth**
 Outside Diameter: **N/A**
 Welding Position: **PA (Flat)**

Joint Design	Welding sequences
 Excavation details: Width: As required Depth: 15mm maximum 	

Welding details

Run	Process	Size of Filler Metal	Current A	Voltage V	Type of Current/Polarity	Wire Feed Speed	Travel Speed*	Heat input*
All	MMA	4.0mm	155-180	N/A	DC+ve	N/A	3-4mm/sec	

Filler Metal Classification and trade name	EN 1599: E Cr Mo 2L B 42 H5 (Filarc KV3-L or equivalent)
Any Special Baking or Drying	Vacuum packed electrodes to be used. Loose electrodes to be dried at 250-300°C for 2 hrs
Gas/Flux: Shielding/Backing	N/A
Details of Back Gouging/Backing	N/A
Preheat Temperature	300°C minimum, maintained
Interpass Temperature	500°C maximum
Post-Weld Heat Treatment and/or Ageing	N/A

Other information: **Weld excavation to be checked using MPT/LPT prior to welding to confirm absence of defects. Length of weld bead: 200mm maximum. Stop/start positions to be staggered. Stringer beads only to be used. Weld beads to overlap adjacent weld beads by approximately 1/3.**

Signed:

1B: FCAW centre of railhead repair

Location: Site

Manufacturer's Welding Procedure Specification No: WP/002

WPAR No: EWF/02

Manufacturer: **AA Rail**
 Welder's name: **N/A**
 Welding Process: **114: FCAW**
 Joint Type: **Centre of railhead repair**

Method of Preparation and cleaning

Grinding and wire brushing

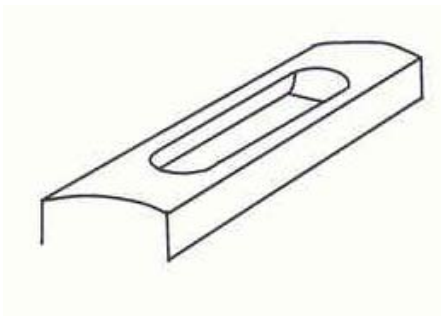
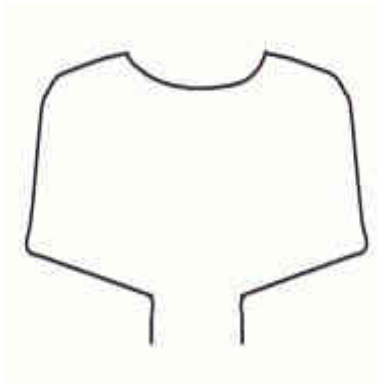
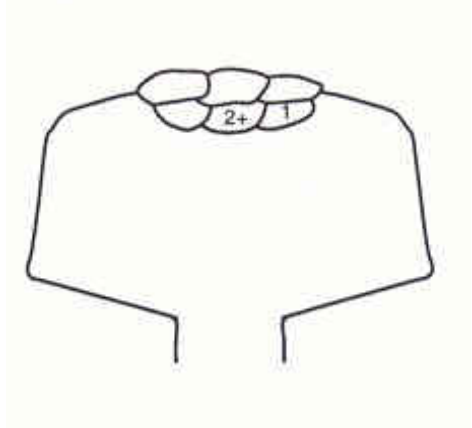
Parent Material Specification

EN 13674-1, Grade: R 220 & R 260

Material Thickness (mm): **3-15 depth**

Outside Diameter: **N/A**

Welding Position: **PA (Flat)**

Joint Design	Welding sequences
 Excavation details: Width: As required Depth: 15mm maximum 	

Welding details

Run	Process	Size of Filler Metal	Current A	Voltage V	Type of Current/Polarity	Wire Feed Speed	Travel Speed*	Heat input*
All	FCAW	1.2mm	150-190	N/A	DC+ve	N/A	3-4mm/sec	

Filler Metal Classification and trade name	DIN 8555(Esab Tubrod15.43, Corewire BS11B, Welding Alloys TN3-O)
Any Special Baking or Drying	N/A
Gas/Flux: Shielding/Backing	N/A
Details of Back Gouging/Backing	N/A
Preheat Temperature	350°C minimum, maintained
Interpass Temperature	500°C maximum
Post-Weld Heat Treatment and/or Ageing	N/A

Other information: **Weld excavation to be checked using MPT/LPT prior to welding to confirm absence of defects. Weld beads to be deposited using a weave technique of approximately 20mm width and shall overlap adjacent beads by approximately 25%. Preheat to be measured using 343degC Tempilstik at a distance of 75mm from edge of weld excavation and at bottom of rail Head.**

Signed:

1C: MMA joining of rail

Location:
Examiner or examining body:
WPS No:
Method of preparation and Cleaning: cutting and grinding.

WPAR:
Welders name:
Parent material specification: 800 A

Company name:
Welding methods:111 **Material Thickness (mm):**
Weld preparation details: cutting

Welding position: PA

Joint Design	Welding Sequences
	Fig 1 Vertical alignment Fig 2 Horizontal alignment Fig 3 Preheating Fig 4 Welding layer 1 Fig 5 Welding layer 2 Fig 6 Welding layer 3 Fig 7 Welding layer 4 Fig 8 Welding layer 5 Fig 9 Welding rail heart Fig 10 Welding rail contact Fig 11 Postweld heat treatment

Welding Details

Run	Welding Process	Size of Filler Material (mm)	Current (A)	Voltage (V)	Type of current/ Polarity	Wire Feed Speed (m/min)	Travel Speed (cm/min)	Heat input (J/cm)
1 PA	111	Φ 5	240±5	25±0,2	c.c.(+)		16,8	17142
2 PA	111	Φ5	240±5	24±0,3	c.c. (+)		18,2	15191
3 PA	111	Φ5	240±5	24±0,2	c.c. (+)		17,8	15532
4 PA	111	Φ5	240±5	24±0,2	c.c.(+)		17,8	15532
5 PA	111	Φ5	240±5	24±0,2	c.c. (+)		17,8	15532
6 PA	111	Φ5	240±5	24±0,2	c.c. (+)		17,8	15532
7 PA 1	111	Φ 5	240±5	24±0,3	c.c.(+)		19,2	14400
7 PA 2	111	Φ5	240±5	24±0,2	c.c. (+)		19,2	14400
7 PA 3	111	Φ5	240±5	24±0,2	c.c. (+)		19,2	14400
7 PA 4	111	Φ5	240±5	24±0,2	c.c.(+)		19,2	14400
7 PA 5	111	Φ5	240±5	24±0,3	c.c. (+)		19,2	14400
7 PA 6	111	Φ5	240±5	24±0,2	c.c. (+)		19,2	14400
7 PA 7	111	Φ 5	240±5	24±0,2	c.c.(+)		19,2	14400
7 PA 8	111	Φ5	240±5	24±0,2	c.c. (+)		19,2	14400
	111	Φ5	240±5	24±0,2	c.c. (+)		19,2	14400
7 PA n	111	Φ5	240±5	24±0,2	c.c.(+)		19,2	14400
8 PA 1	111	Φ4	185±5	26±0,2	c.c. (+)		22,3	10353
8 PA 2	111	Φ4	185±5	26±0,2	c.c. (+)		22,3	10353
8.PA 3	111	Φ4	185±5	26±0,2	c.c.(+)		22,3	10353
	111	Φ4	185±5	26±0,2	c.c. (+)		22,3	10353
8 PA.n	111	Φ4	185±5	26±0,2	c.c. (+)		22,3	10353

Filler material designation and make:

EMoB 42-EN ISO 21952-A Root (Layer 1-2-3)

E 46 4.1. Ni B4 2H5 EN ISO 2560-A(Layer 4-9)

E I 350- EN 14700 (Layer 10)

Weaving: maximum width of run
Any Special Drying: 300⁰C 2,0 h

Backing: Copper plate
Preheat Temperature: min. 350⁰C
Torch angle: 80deg
Interpass Temperature: ≤200⁰
Post-Weld Heat Treatment: 600-650⁰ Time: 15 minutes

MANUFACTURER

EXAMINER OR EXAMINING BODY

(Name, date, signature)

(Name, date, signature)

Appendix 2: Specimen theoretical examination questions for the European Arc Welder for Railway Tracks

One answer is correct, circle the right answer:

1. Which of the following elements is added to iron to make steel?
 - a. Silicon
 - b. Oxygen
 - c. Carbon
 - d. Tungsten
2. What does the mark 60 E 1 mean according to EN 13674-1?
 - a. rail profile S 49
 - b. rail profile UIC 50
 - c. rail profile UIC 60
 - d. rail profile R 65
3. According to EN 559 the colour of an acetylene hoses is:
 - a. Blue
 - b. Red
 - c. Black
 - d. Yellow
4. The most common problem with self-shielded FCAW is:
 - a. Wire feed
 - b. Ultraviolet (UV) radiation
 - c. The core of the wire
 - d. The alloying elements
5. The composition of MMA electrodes most commonly used to restore rails is:
 - a. Plain carbon steel
 - b. Carbon steel containing 1.5%Mn
 - c. A low alloy steel containing 2¼%Cr 1%Mo
 - d. Stainless steel
6. Which of the following is not a destructive test?
 - a. Bend
 - b. Ultrasonic
 - c. Tensile
 - d. Hardness

Appendix 3: Example of a Practical Assessment - MMA restoration of plain rail, all rail grade groups

Assessor to brief the candidate on the following:

1. Candidates shall be in possession of all relevant personal protection equipment (PPE) and certification prior to commencement of the assessment. Failure to comply shall result in the candidate not being allowed to undertake the assessment.
2. The test shall be carried out using an approved WPS.
3. The rail shall be accurately marked up to indicate the exact position and extent of the repair such that a full head repair carried out in 2 stages will ensure complete removal of any defect.
4. At all times during the test follow the correct safety requirements, as well as the correct technical procedure.
5. 4 hours shall be allowed to complete the assessment.
6. The candidate shall select suitable equipment and consumables.
7. Candidates will be expected to deal promptly and effectively with problems within their control and report those that cannot be solved, to the assessor.

1. ENSURE THE WELDER IS IN POSSESSION OF ALL RELEVANT ITEMS OF PPE AND CERTIFICATION

1.1 PPE

- 1.1.1 Flame retardant, high visibility overalls
- 1.1.2 Welders boots
- 1.1.3 Eye protection
- 1.1.4 Ear defenders
- 1.1.5 Gauntlets/Gloves
- 1.1.6 Hand shield/Head-shield
- 1.1.7 Dust/fume mask

1.2 Valid Certification where applicable

- 1.2.1 Abrasive wheels
- 1.2.2 Powered plant appropriate to the process to be used

2. ENSURE THE WELDER IS IN POSSESSION OF ALL RELEVANT DOCUMENTATION

- 2.1 Relevant WPS(s)
- 2.2 Other relevant specifications

3. ENSURE THE WELDER POSITIVELY IDENTIFIES, MEASURES THE WEAR, AND INSPECTS THE RAILS AND RAIL COMPONENTS TO BE WELDED BEFORE COMMENCEMENT OF WELDING OPERATION.

- 3.1 Grade of rail steel positively identified for each repair
- 3.2 Angle of crossing is established and taper (where applicable)
- 3.3 Rail components correctly measured for wear using a 1 metre straight edge and a 300mm engineers rule
- 3.4 Running edge checked for straightness on both rails
- 3.5 Check rails for proximity of other welds / joints / features

4. SELECTION AND ASSEMBLY OF WELDING EQUIPMENT

- 4.1 Position the welding plant as far as possible from the work piece on level ground with the exhaust facing away from operator
- 4.2 Check equipment is in date
- 4.3 Check equipment for damage
- 4.4 All pre start checks are carried out correctly
 - ☐ Oil level
 - ☐ Fuel level
 - ☐ Pull cord condition/length
- 4.5 Check connections are clean and cable insulation is sound
- 4.6 Check cables are connected correctly and uncoiled

NOTE: Plug in ancillary equipment (rod oven/grinder) prior to starting welding plant or generator. From this stage a shore line supply can be used.

5. SELECTION OF WELDING CONSUMABLE AND ELECTRODE OVEN SET UP

- 5.1 Selects the correct electrode type for the grade of steel to be welded
- 5.2 Electrodes are handled in accordance with the manufacturer's instructions. **NOTE:** Vacuum packed electrodes which have been opened for longer than the specified time are dealt with in accordance with the manufacturers' instructions
- 5.3 Establish the drying conditions from the welder in accordance with manufacturer's instructions
- 5.4 Select electrode oven, check in service date and carry out pre use checks.
- 5.5 Set the oven to the correct temperature

6. PRE HEATING EQUIPMENT (RAIL HEATER/HAND HELD HEATER)

- 6.1 Welder to check the rail heater is in date and serviceable
- 6.2 Rail heater and equipment checked for signs of damage
- 6.3 Gas cylinder is checked for damage before use
- 6.4 Check all gas connections are correctly tightened
- 6.5 Pressurises system in correct sequence (fuel gas first)
- 6.6 Check all connections for leaks using leak detection spray

NOTE: applicable only to Normal Grade group

7. ENSURE THE WELDER SELECTS AN ANGLE GRINDER AND PRODUCES THE WELD PREPARATION TO THE CORRECT TOLERANCES USING APPROPRIATE METHODS

- 7.1 Checks the condition of the angle grinder including abrasive disc, service date and makes necessary pre start checks:
 - ☐ General condition
 - ☐ Guard
 - ☐ Flex/plug
- 7.2 Selects the correct abrasive wheel and checks the following:
 - ☐ Operating speed
 - ☐ Diameter
 - ☐ Use by date is current
 - ☐ No defects, cracks etc
 - ☐ Flange size is correct

- 7.3 Mounts abrasive wheel correctly onto the machine
- 7.4 Wears the correct PPE
- 7.5 Produces the weld preparation in accordance with appropriate WPS
- 7.6 Weld preparation checked to ensure it is within the specified tolerance

8. PRE HEATING, INTER-PASS TEMPERATURE CONTROL AND WELD DEPOSITION TECHNIQUE

- 8.1 Pre-heat the component to be welded and frequently check temperature of the component during pre-heat in accordance with relevant WPS using the appropriate temperature indicating crayon. (Normal Grade only)
- 8.2 Observe the specified inter-pass temperature for the grade of steel being welded in accordance with relevant WPS using the appropriate temperature indicating crayon.
- 8.3 Selects correct welding current (checked on striking plate)
- 8.4 Deposit weld beads in accordance with WPS
- 8.5 Maintains correct electrode angle/arc length/travel speed
- 8.6 Carry out correct inter-run cleaning
- 8.7 Checks bead shape/profile/fusion
- 8.8 Checks each completed layer
- 8.9 Deposits sufficient weld metal to effect a complete repair

9. PROFILING THE REPAIR

- 9.1 Ensures repair is below 50°C
- 9.2 Maintains correct grinding stone/wheel angle when using angle grinder
- 9.3 Removes excess material prior to profile finishing
- 9.4 Avoid overheating the repair (no blueing)
- 9.5 Makes good any damage to other rail components
- 9.6 Applies regular geometry checks using appropriate equipment
- 9.7 Ensure final profile is achieved in accordance with Trainer's Guidance Notes

Appendix 4: Diplomas

EUROPEAN FEDERATION FOR WELDING, JOINING AND CUTTING



RAILSAFE

Education, Qualification and Certification

Having met the education and training requirements of the latest version of
RAILSAFE Guideline EWF-XXX
and by examination having satisfied the
requirements of the Board of Examiners of the
RAILSAFE Authorised National Body

Name of welder

Date of birth: *day Month year*

is hereby awarded the

EUROPEAN ARC WELDER FOR RAIL JOINING DIPLOMA

Arc welding processes: *Processes*

Skill module(s) passed: *Skill modules*

Extra skills passed: *For example, cutting and grinding*

Date of examination: *day Month year*

Diploma No.: §§ / EAWRJ / ###

signature

signature

name of Chairman

Chairman of the Examination Board

name of Head

Head of Approved Training Body:

name of ATB

RAILSAFE Authorised National Body: *name of RANB/country*

logo or stamp of RANB (optional)

EUROPEAN FEDERATION FOR WELDING, JOINING AND CUTTING



RAILSAFE

Education, Qualification and Certification

Having met the education and training requirements of the latest version of
RAILSAFE Guideline EWF-XXX
and by examination having satisfied the
requirements of the Board of Examiners of the
RAILSAFE Authorised National Body

Name of welder

Date of birth: *day Month year*

is hereby awarded the

EUROPEAN ARC WELDER FOR RAIL RESTORATION DIPLOMA

Arc welding processes: *Processes*

Skill module(s) passed: *Skill modules*

Extra skills passed: *For example, grinding and NDT*

Date of examination: *day Month year*

Diploma No.: *§§ / EAWRR / ###*

signature

signature

name of Chairman

Chairman of the Examination Board

name of Head

Head of Approved Training Body:

name of ATB

RAILSAFE Authorised National Body: *name of RANB/country*

logo or stamp of RANB (optional)

Appendix 5: Certificates

EUROPEAN FEDERATION FOR WELDING, JOINING AND CUTTING



RANB
Logo*

RAILSAFE
Education, Qualification and Certification

EUROPEAN ARC WELDER FOR RAIL JOINING CERTIFICATE

Certificate No: *code/EAWRJ/serial code*

Employer: *name of employer, Country*

This is to certify that:

Name of welder

Photo of Welder
(if an Identity
Card is not
issued).

Date of birth: *day Month year*

Stamp number: *stamp number*

has demonstrated proficiency as a European Arc Welder in accordance with the requirements published in the latest version of RAILS SAFE Guideline EWF-XXX and amendments in force on the examination date.

This certificate is valid for:

Welding process: *Welding process, reference to WPS (copy attached)*
Track components: *Track components*
Skill modules: *Skill modules*
Cutting methods: *Cutting methods*
Grinding: *Grinding*
NDT: *NDT*
Line categories: *Line categories*
Certificate: *Optional for RANBs*

Date of issue: *day Month year*

Date of expiry: *day Month year*

Issued by: *name of RANB/country*

Date: *day Month year*

signature

signature

name of representative

Authorised Representative of RANB
PLEASE READ THE NOTES OVERLEAF

Signature of holder
Photocopies are unauthorised

EUROPEAN FEDERATION FOR WELDING, JOINING AND CUTTING



RANB
Logo*

RAILSAFE
Education, Qualification and Certification

EUROPEAN ARC WELDER FOR RAIL RESTORATION CERTIFICATE

Certificate No: *code/EAWRR/serial code*

Employer: *name of employer, Country*

This is to certify that:

Name of welder

Photo of Welder
(if an Identity
Card is not
issued).

Date of birth: *day Month year*

Stamp number: *stamp number*

has demonstrated proficiency as a European Arc Welder in accordance with the requirements published in the latest version of RAILS SAFE Guideline EWF-XXX and amendments in force on the examination date.

This certificate is valid for:

Welding process: *Welding process, reference to WPS (copy attached)*
Track components: *Track components*
Skill modules: *Skill modules*
Grinding: *Grinding*
NDT: *NDT*
Line categories: *Line categories*
Certificate: *Optional for RANBs*

Date of issue: *day Month year*

Date of expiry: *day Month year*

Issued by: *name of RANB/country*

Date: *day Month year*

signature

signature

name of representative

Authorised Representative of RANB
PLEASE READ THE NOTES OVERLEAF

Signature of holder
Photocopies are unauthorised

(REVERSE OF CERTIFICATE)

THIS IS A VALUABLE DOCUMENT WHICH SHOULD BE KEPT IN A SAFE PLACE. A FEE WILL BE CHARGED FOR DUPLICATES WHICH WILL ONLY BE ISSUED AFTER EXTENSIVE ENQUIRIES.

NOTES:

1. This Certificate is not a Permit to weld. However the Railway Authority may issue a Permit to weld in accordance with EN 15594 on the basis of this Certificate.
2. Some authorities require additional reassurance concerning equipment, quality of supervision and working conditions before permitting the use of a certificate holder on their work. This certificate does not constitute such approval which should be sought from the authority concerned.
Validity: Certificates are valid only if: a) they are within date; b) all fees have been paid; c) they are on standard cream RANB paper bearing the RANB logo, signed by an official of RANB and embossed with the RANB stamp; d) they are signed by the individual to whom the certificate is awarded. A certificate shall remain valid for a period of two years. This is providing that the welding coordinator or the responsible personnel of the employer can confirm that the welder has been working satisfactorily within the initial range of qualification. This shall be confirmed every six months.

IF ANY OF THESE CONDITIONS ARE NOT FULFILLED THE CERTIFICATE SHALL BE CANCELLED

In order to renew your certificate, a renewal test is required.

Please contact your RANB well in advance of the expiry date so that the above renewal test can be arranged.

3. New employers, who are shown this certificate should satisfy themselves that the certificate holder has been employed with reasonable continuity, see 2 above, on work for which the certificate was granted.
4. The ownership of this certificate rests with the RANB

Enquiries concerning this certificate may be addressed to:

Address of RANB

TO BE PRINTED BY THE RANB

Identity Card

<i>Photo of Welder</i>	<i>RANB Logo</i>
	<u><i>RANB Address</i></u>
European Arc Welder for Railway Tracks <u><i>Name of holder</i></u> <u><i>Combinations covered</i></u>	
RAILSAFE Education, Qualification and Certification	
This card is the property of the <u><i>RANB</i></u> and must be surrendered on demand.	

TO BE PRINTED BY THE RANB