



MINIMUM REQUIREMENTS FOR THE EDUCATION, TRAINING,  
EXAMINATION, AND QUALIFICATION OF PERSONNEL

EUROPEAN WELDING SPECIALIST FOR RESISTANCE WELDING  
(EWS-RW)

**This is a reduced version; it is not the full Guideline**

**For more information regarding the EWF Qualification System,**  
**the EWF-IAB/IIW Combined Secretariat or the National ANB**  
**should be contacted**

**(see in the EWF and/or IIW sites the ANB contacts)**

**GUIDELINE OF THE EUROPEAN FEDERATION FOR  
WELDING, CUTTING AND JOINING - EWF**

**Issued June 2001**

Published by: EWF– Secretariat  
C/o: ISQ  
Av. Prof. Dr. Cavaco Silva, 33  
Taguspark – Apartado 012  
P-2780-994 Oeiras  
PORTUGAL

Tel: +351 21 4211351  
Fax: +351 21 4228122  
E-Mail: [ewf@isq.pt](mailto:ewf@isq.pt)

**Minimum Requirements for the Education, Examination and Qualification of  
European Welding Specialists for Resistance Welding**

**Table of Contents**

**Section I: Minimum Requirements for the Education of European Welding Specialists for  
Resistance Welding**

Introduction.....	4
Access to education.....	5
Education program.....	7
1. Resistance Welding processes and equipment.....	7
2. Materials and their behaviour during resistance welding.....	8
3. Construction and design.....	8
4. Fabrication, application engineering.....	9
Practical part.....	9
Appendix I.....	10
Appendix A.....	11

## **Section I: Minimum Requirements for the Education of European Welding Specialists for Resistance Welding**

**Issued: June 2001**

The use of this guideline is restricted to organizations approved by the Authorized National Body (ANB). The section II of the guideline covers the examination and qualification.

### **Introduction**

This guideline for the European education and training of Welding Specialists for resistance welding has been prepared, evaluated and formulated by members of Technical Committee of the EWF .

It is designed to provide the basic core education in resistance welding as required by welding personal who is active in job functions such as welding coordination in accordance to EN ISO 14 554 - 1 (chapter 6.4), supervision, inspection, instruction, technical sales etc.

It is possible, that additional training and/or experience may be required by the welding personnel beyond the basic core education to loud to qualifications in the applicable job functions. Additional training programmes will be established as required to meet this need.

The guideline covers the minimum requirements for education and training which is related to resistance welding within the EWF, in terms of objectives, keywords and recommended times devoted to them.

It will be revised periodically by Technical Committee of the EWF who will take into account any changes that may effect the "state of the art".

Students who have successfully completed this course of education and training should be able to apply and to coordinate resistance welding technology as covered in this guideline.

A subsequent section covers examination and diploma.

The contents are given in the following structure:

<b>Theoretical Education (Part I and Part III)</b>	teaching hours
1. Resistance welding processes and equipment	36
2. Materials and their behaviour during resistance welding.	12
3. Construction and design	2
4. Fabrication, applications engineering	<u>25</u> 75
<b>Fundamental practical skill (Part II)</b>	<u>34</u> 109
<b>Examination (oral, written and practical)</b>	<u>4</u>
	total: <u>113</u>

The content is described in greater detail in section II.

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.

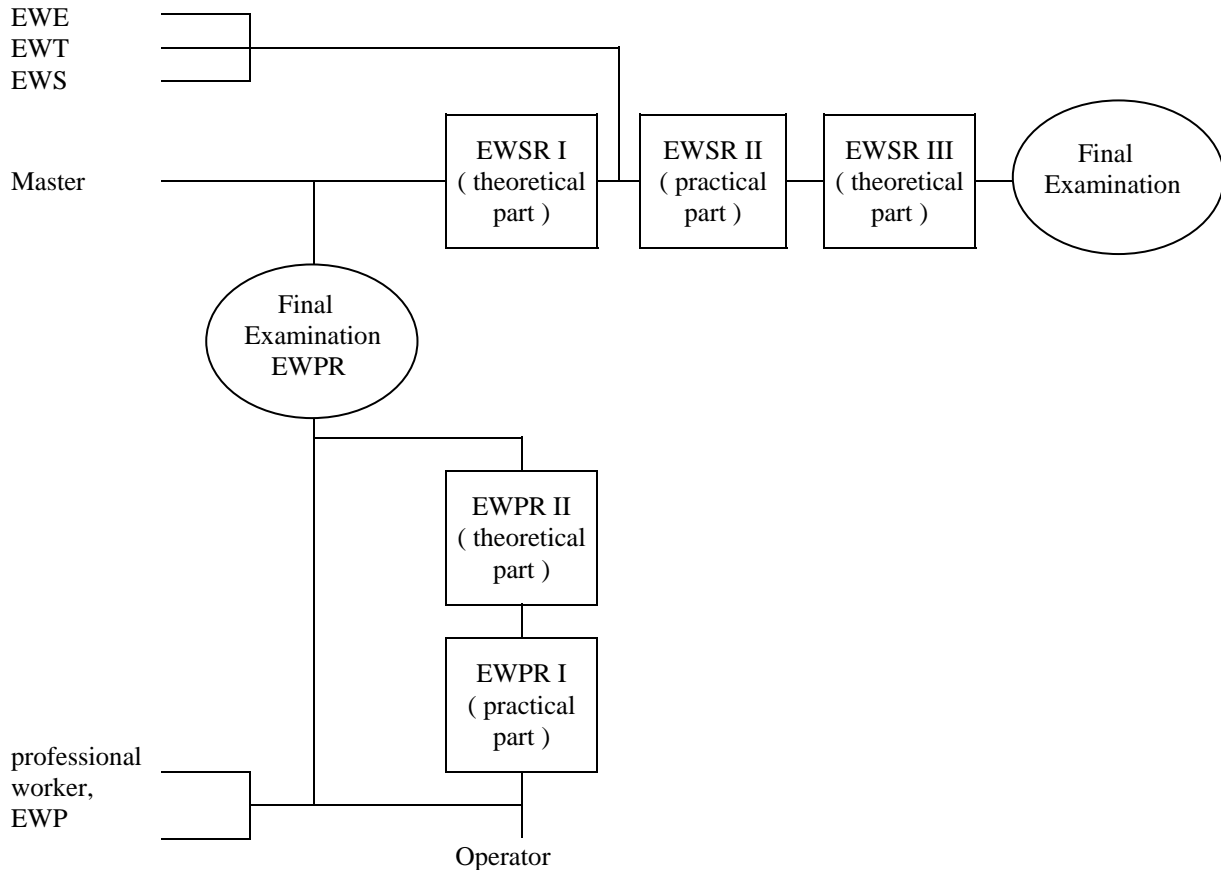
It exists the choice in arrangement of the syllabus by the authorised welding school.

The depth to which each topic is dealt with is indicated by the objectives and the number of hours allocated to it in the guideline.

This will be reflected in the scope and depth of the examination to meet the required result.

### Access to Education

For the entry to this program three routes are available



#### Route 1:

For the access to the module EWSR part I the minimum requirements are :

Specific technical qualification, the national definitions are given in the Access conditions directory and a minimum age of 20 years including 2 years of job related experience.

In the case of co-operation arrangements e.g. with technical colleges, according to which basic parts of the course IWS Part I are given under careful control of the ANB, before the participant complies with the access conditions, the access may be according to route 2 indicated in the graph.

#### Route 2:

For the access to the module EWSR part II and part III the minimum requirements are :

- European Welding Engineer
- European Welding Technologist
- European Welding Specialist

#### Route 3:

For the access to the module EWSR I the minimum requirements are :

EWP qualification or

Qualification of a professional worker ( with certificat after examination ) in metal working professions and minimum of 3 years experience in resistance welding related activities, and a minimum age of 20 years national definitions are given in the Access conditions directory.

Students, who enter from the EWP or professional worker ( route 3 ) must pass the final examination of the European Welding Practitioner for Resistance Welding.

Those who feel they lack the necessary basic resistance technical education may take the EWPR course before the test. If a student fails in this test, he must take the full EWPR course before the next test.

The specific requirements of EWPR course is defined in the own EWF guideline.

**Theoretical Education EWSR I and EWSR III****Theoretical and Practical Education.**

(Only the main Syllabus Themes)

The amount of hours of the lectures, which can be included in part I are given in brackets and marked with an \* in the following definition of the theoretical education. The definition of the precise syllabus of part I is the responsibility of the Authorized National Body ( ANB ).

	<b>teaching hours</b>
<b><u>1. Resistance Welding processes and equipment</u></b>	
1.1. General introduction to resistance welding technologies	1 (*1)
1.2. Electrotechnics, a review	4 (*4)
1.3. Electrotechnics of resistance welding processes	5
1.4. Characteristics of resistance welding machines	2
1.5. Control unit of resistance welding machines	6
1.6. Resistance Welding electrode	3
1.7. Spot welding	5
1.8. Projection welding	4
1.9. Roller Seam Welding	4
1.10. Fully mechanized resistance welding processes with robotics and other equipments	2
<hr/>	
Total	36

**2. Materials and their behaviour during resistance welding**

2.1. Materials	4(*3)
2.2. Weldability of steel	2
2.3. Weldability of surface treated Sheet Metal Panels	2
2.4. Weldability of non ferrous metals	4
<hr/>	
Total	<b>12</b>

**3. Construction and design**

3.1. General requirements for a design of products for successful fabrication 2

---

Total      **2**

**4. Fabrication, application engineering**

4.1. Introduction to quality assurance in resistance welded constructions	3
4.2. Quality control during manufacture	
<b>-Destructive and non destructive test methods</b>	<b>3 (*2)</b>
<b>-Documentation</b>	<b>2</b>
<b>-Checking, recording, feedback control</b>	<b>3</b>
<b>- Maintenance</b>	<b>2</b>
4.3. Machines, resistance welding jigs and fixtures	2
4.4. Health and safety	4
4.5. Economics	2 (1*)
4.6. Installation of resistance welding machines	4
<hr/>	
Total	<b>25</b>

**Practical part**

1. Spot welding	6
2. Projection welding	5
3. Roller Seam welding	3
4. Measurement, control and recording in resistance welding	3
5. Resistance Welding electrode	2
6. Resistance welding of surface refined sheet metal panels	2
7. Resistance Welding of non-ferrous and metal combinations	2
8. Resistance Weld control unit	1
9. Resistance welding devices and fixtures fully mechanized resistance welding and robotics	1
10. Testing materials and resistance weldjoint	8 (3*)
11. Demonstration of other processes Pressure butt welding, flash butt welding, stud welding, mechanical joining precesses.	1
<hr/>	
Total	34
<hr/>	
<b>TOTAL: minimum hours</b>	<b>113</b>

## **Appendix 1**

### **1.1. Resistance Welding equipment**

Equipment for the following processes must be available for practical exercises.

- Spot welding
- Projection welding
- Roller Seam welding

Further processes covered by the syllabus may be shown by means of demonstrations or video presentations.

### **1.2. Other equipment**

Mechanical testing, metallurgical examination and NDT equipment must be available for both demonstration and laboratory work purposes.

## **2. Specimens**

A reference collection of well documented weld specimens, polished and etched, should reflect the processes covered by the Guideline and, as a minimum, one specimen per process is required. Preferably the specimens should cover a number of materials and thicknesses.

**Appendix A: Practical examination**

No.:	Procedure	Examination subjects	Approval standard
1	Resistance spot welding	<b>Straight line spot welding according to specifications in a manufacturing drawing</b> selection of electrodes, set-up of the welding machine and welding parameters based on a) test experience b) tables of standard values including optimization of welding parameters, measurement of welding parameters, checking and evaluation of the weld quality (strength and surface)	EN 1418
2	Resistance projection welding	<b>Welding of a multiprojection joint according to specifications in a manufacturing drawing</b> Alignment of the electrodes, set-up of the welding machine and the welding parameters based on a) test experience b) tables of standard values including optimization of welding parameters, measurement of welding parameters, checking and evaluation of the weld quality (strength and surface)	EN 1418
3	Resistance seam welding	<b>Welding of a seam joint according to specifications in a manufacturing drawing</b> Determination of the electrode geometry, set-up of the welding machine based on a) test experience b) tables of standard values including optimization of welding parameters, measurement of welding parameters, checking and evaluation of the weld quality (strength and surface)	EN 1418