

EWF Special Course Risk Management in Welding Fabrication



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



EWF-640-07

Table of Contents

1. INTRODUCTION	3
2. ACCESS TO THE EDUCATION	3
3. STRUCTURE OF THE SPECIAL COURSE	4
SECTION I: MINIMUM REQUIREMENTS FOR THE EDUCATION	6
Module 1: Fundamentals of welding technology and fabrication	6
Module 2: Risk management in welding fabrication	7
1. Management of welding fabrication	7
2. Risk management	9
SECTION 2: EXAMINATION AND QUALIFICATION	14
1. Introduction	14
2. Requirements for Training and Examination centres	14
3. Board of Examiners	14
4. Admission to the examination	14
5. Examination procedures	14
5.1 Written examination	15
5.2 Oral examination	15
6. Evaluation of performance	15
7. Re-examination and appeals procedure	15
8. Record of achievement	15

The use of this guideline is restricted to organisations approved by the Authorised National Body (ANB)

1. Introduction

This guideline for the European education and training on Risk Management in Welding Fabrication has been prepared, evaluated and formulated by the Working Group "Quality, Environment, Health and Safety" of the Technical Committee of EWF. It is designed to provide the education and training in Risk Management in the field of welding fabrication activities.

Section 1 of the guideline covers the minimum requirements for education and training, agreed upon by all national welding societies within the EWF in terms of objectives, keywords, expected results and recommended times devoted to them. It will be revised periodically by the Technical Committee to take into account any changes which may affect the "state of the art". Students having successfully completed this course of education will be expected to be capable of considering the risk related to welding fabrication activities and to consider appropriate investments in education, qualification and equipment in order to manage the relevant risk.

A subsequent section covers the examination and qualification.

The contents are given in the following structure:

Education	Teaching Hours
1. Fundamentals of welding technology and fabrication	121
2. Risk management in welding fabrication	132
Total	253

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 and choice in the arrangements of the syllabus is permitted. The depth to which each topic is dealt with is indicated by the recommended number of hours allocated to it in the guideline. This will be reflected in the scope and depth of the examination.

It is also allowed for students having already participated to IIW/EFW training courses in the field of welding co-ordination activities and/or welding Inspection activities and/or other training courses in the field of quality management to waive a corresponding part of the courses. This waiving shall be based on the guidance provided by part 3 of this document and on the approval of the ANB.

2. Access to the education

Participants should have a primary degree in an engineering discipline or its equivalent recognised by the national government and assessed by the ANB. In a separate document (Directory of Access Conditions) the definitions for every country are given in detail. The ones for the Engineer level apply to this guideline.

Applicants not fulfilling the access conditions may follow the course as guests, but entry to the EWF examination is not permitted.

3. Structure of the special course

The course is based on 2 Modules, each one covering differing aspects of risk management in welding fabrication.

The chart of diagram 1 shows the education routes.

Waiving of module 1 is possible if an “intermediate examination” is performed and passed (in order to access module 2) covering all the relevant items of module 1.

Waiving modules or sub-modules is also possible, subject to ANB evaluations, provided the following conditions are satisfied (see Table1).

- Participants having already achieved the International/European Welding Engineer and or Technologist Diploma can waive modules 1¹ and 2.1;
- Participants having already achieved the International/European Welding Inspector at the Comprehensive Level Diploma can waive module 1
- Participants having already followed a training course in the field of quality management according to ISO 9001), can waive the relevant part of module 2 (item 1.1);
- Participants having already followed a training course in the field of quality management in welding fabrication according to ISO 3834, can waive the relevant part of module 2 (item 1.2);
- Participants having already followed a training course in the field of environmental management in welding fabrication according to EWF EMS, can waive the relevant part of module 2 (item 1.3);
- Participants having already followed a training course in the field of health and safety management in welding fabrication according to EWF SMS, can waive the relevant part of module 2 (item 1.4).

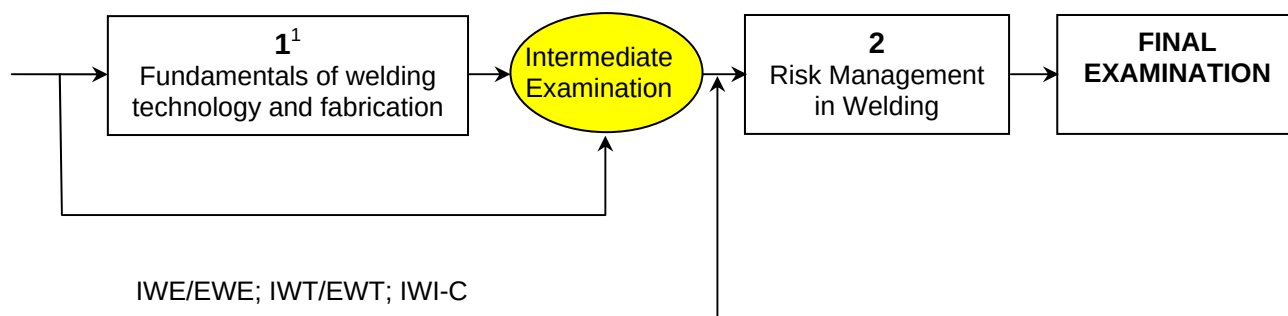


Diagram 1: Routes to access the final examination

¹ Module 1 is equivalent to the guideline for the education and training of International Welding Inspectors, Comprehensive level.

Education or Qualification	Waiving		
	Hours of teaching	Module	Sub-Module
IWE/EWE and IWT/EWT Diploma	129	1	Complete
		2	2.1
IWI-C Diploma	121	1	Complete
Quality Management (ISO 9001) *	16	2	1.1
Quality Management in welding fabrication (ISO 3834) *	16	2	1.2
Environmental Management in welding fabrication (EWF EMS) *	8	2	1.3
Health and Safety Management in welding fabrication (EWF SMS) *	8	2	1.4

* to be approved by the ANB

Table 1 – Waiving of modules

Maximum possible waiving is 177 hours of teaching.

Section I: Minimum Requirements for the Education

Module 1: Fundamentals of welding technology and fabrication

The minimum requirements for the education for these modules are those reported in the Guideline IAB-041 / EWF 450 "Minimum Requirements for the Education and Training of International Welding Inspection Personnel" as relates to the Theoretical Education, Welding Technology Module, for Comprehensive Level (IWI-C).

TOTAL MODULE 1²

121 h

² The total amount of hours is indicative; refer to doc. IAB-041 / EWF 450

Module 2: Risk management in welding fabrication

1 Management of welding fabrication **48**

1.1 Quality management system according to ISO 9001 **16**

Objective:

Understand in detail the principles of quality assurance and quality control according to ISO 9000 standards as applied to welded fabrication.

Scope:

Quality assurance history and principles

The eight principles of quality management (ref. ISO 9000)

Detailed analysis of ISO 9001 requirements

Application of ISO 9001 requirements to welding fabrication activities

Typical documents to be used for compliance with the standard (records, procedures, manual)

Benefits for a company in applying ISO 9001 requirements

Certification of welding manufacturers according to ISO 9001

Expected results

1. Explain the principles of quality management according to ISO 9000 standard
2. Properly interpret ISO 9001 requirements for quality management in welding fabrication
3. Evaluate compliance of internal procedures and records to ISO 9001
4. Evaluate the benefits to the manufacturer in the application of, and certification to, ISO 9001

1.2 Welding fabrication management according to ISO 3834 **16**

Objective:

Understand in detail the principles of welding fabrication management according to ISO 3834.

Scope:

The welding fabrication process management: ISO 3834

Comparison between ISO 3834 and ISO 9001

Review of EN ISO 3834, Parts 1, 2, 3 and 4 and use of part 5

Relationship to EN 45011 and EN 45 012

EFW and EA interpretation of EN ISO 3834

Role of personnel in the welding fabrication process management: welding coordination personnel (ref. ISO 14731)

Principles of manufacturer assessment (second and third party) and role of auditors and technical experts

Questionnaires and check lists for assessment

Procedures for evaluation of welding co-ordinators according to ISO 14731

Benefits for a company in applying ISO 3834 requirements

Certification of welding manufacturers according to ISO 3834 (EFW scheme)

Expected results

1. Explain in detail the ISO 3834 requirements
2. Evaluate the need for application of IOS 3834 Part 2, 3 or 4
3. Appraise the use of ISO 3834 part 5
4. Produce a check list (or a part of it) for manufacturer assessment according to ISO 3834

5. Evaluate compliance of documents and records to ISO 9001
6. Evaluate the benefits to the manufacturer in the application of, and certification according to, ISO 3834 standards
7. Explain the role of EWF and ANBCCs in the field of Welding Manufacturer Certification.

1.3 The environmental management of welding fabrication activities **8**

Objective:

Understand in detail the principles of environmental management of welding fabrication activities.

Scope:

The environmental management system according to ISO 14001: detailed analysis of the standard
Application of ISO 14001 to welding fabrication activities (the EWF Environmental Management System – EWF EMS).

Role of personnel in the management process (the environmental welding coordinator)

Environmental check list (EN 14717)

Relation of environmental management to other management systems (ISO 9001 and ISO 3834)

Principles of manufacturer assessment (second and third party) and role of environmental auditors and technical experts

Questionnaires and check lists for assessment

The environmental benefit improvement expected after the analysis and related work programme implementation

Expected results

1. Explain ISO 14001 requirements as applicable to welding fabrication activities
2. Produce a check list (or a part of it) for manufacturer assessment according to EWF EMS
3. Perform the Environmental Analysis for a given welding manufacturer activity
4. Evaluate the benefits to the manufacturer the in application of, and certification according to, EWF EMS
5. Explain the role of EWF and ANBCCs in the field of Welding Manufacturer Certification.

1.4 The health and safety management of welding fabrication activities **8**

Objective:

Understand in detail the principles of Health and safety management of welding fabrication activities.

Scope:

The Health and Safety management system according to BSI 8800 and other national and international references: analysis of typical requirements

Application of H&S management systems to welding fabrication activities (the EWF Health and Safety Management System – EWF SMS)

Role of personnel in the management process (the H&S welding coordinator)

Health and Safety analysis

Relation of H&S management to other management systems (ISO 9001 and ISO 3834)

Principles of manufacturer assessment (second and third party) and role of H&S auditors and technical experts

Questionnaires and check lists for assessment

The improvement expected after the analysis and related work programme implementation

Expected results

1. Explain typical Health and Safety requirements as applicable to welding fabrication activities
2. Produce a check list (or a part of it) for manufacturer assessment according to EWF SMS
3. Perform the Health and Safety Analysis for a given welding manufacturer activity
4. Evaluate the benefits to the manufacturer in the application of, and certification according to, EWF SMS
5. Explain the role of EWF and ANBCCs in the field of Welding Manufacturer Certification.

2 Risk management**84****2.1 Technological innovation and perspectives****8****Objective:**

Appraise fields for innovation and trends in the field of welding fabrication technologies and relevant criteria to evaluate the return of investments.

Scope:

Innovative welding processes
Innovative welding consumables
Innovation in the field of traditional welding processes
Weldability of innovative materials
Industrial needs for innovation

Expected Result:

1. Explain in detail the innovative welding processes and consumables.
2. Describe technological trends and innovation
3. Evaluate the need for innovation in the different welding fabrication activities.

2.2 Economics**8****Objective:**

Understand in detail the economics of welding operations applied to welded fabrications.

Scope:

Analysis of welding costs
Deposition rate
Costs of labour
Costs of consumables
Costs of equipment
Return on investment
Costs of energy
Welder's duty cycle
Calculation of welding costs
The application of software, calculation programmes
Measures for decreasing welding costs
Mechanisation
Automation
Robotics

Expected Result:

1. Explain in detail the make up of costs associated with welding.
2. Calculate the cost of welding operations.
3. Devise welding and handling procedures including mechanisation and automation to minimise production costs.
4. Operate software packages used in weld cost calculations.

2.3 Legislative and normative context**8****Objective:**

Understand in detail the role of welding fabrication and relevant standards in compliance with European directives and national law.

Scope:

Structure and role of European Commission and Council in producing product directives
Relation of European directives to national law
New approach directives
Blue guide
Harmonised standards

Expected results

1. Explain the structure of the European Commission and Council
2. Identify the steps for implementing a European directive as a law
3. Apprise the role of harmonised standards to comply with the directives and national law
4. Correctly use the blue guide.

2.4 Application of European directives in welded product fabrication:**8**

Objective: Appraise fields for innovation and trends in the field of welding fabrication technologies

Scope:

Pressure equipment directive
Construction product directive
Simple pressure vessels directive
Other directives
European harmonised product standards: typical structure, requirements and use to comply with directives
Compliance to the European directives applying non-harmonised standards

Expected results:

1. Explain the structure of European directives (essential safety requirements) and relation to welding fabrication
2. Identify classes of requirements
3. Interpret the harmonised standard requirement to comply with European directives
4. Indicate procedures for compliance with the European directives

2.5 Legal and insurance aspects

16**Objective:**

Understand fundamentals of legal and insurance aspects and identify criteria for protecting the manufacturer's activities

Scope:

Fundamentals of economics' rights Note: I am not sure what 'economics' rights' means

National and European law

Industrial property (marks, patents, rights)

Supplying and sub supplying

Contracting and subcontracting

Extra-contractual and juridical relations

Expected result:

1. Explain the fundamentals of economics' right see comment above
2. Identify legal aspects which can be protected by assurance
3. Evaluate criteria for protecting industrial property
4. Evaluate the transmission of legal aspects to suppliers and contractors
5. Explain the extra-contractual and juridical relations

2.6 Company organisation

8**Objective:**

Understand principles of company organisation and criteria for managing resources.

Scope:

Fundamentals of company organisation

Parts of organisations and organisational role

Coordination mechanisms

Hierarchy and its functions

Process and objectives approaches

Models of the Organisation

Expected results:

1. Explain in detail principles of company organisation
2. Identify criteria for managing resources in relation to industrial processes.
3. Apply models for company organisation to welding fabrication parameters (as for market type, production features, work organisation, type of authority and personnel)

2.7 Management Control

4**Objective:**

Understand management control procedures and techniques.

Scope:

General and analytic accounting

Production factors and production costs

Direct costing and full costing

Responsibility

Management control procedures
Differential analysis Note: I am not sure what this means
Balance sheet

Expected results:

1. Explain the management control procedures
2. Explain the use of management control tools
3. Perform differential analysis see comment above
4. Understand a balance sheet

2.8 Fundamentals of risk management

4

Objective:

Understanding the risk management process and its functions

Scope:

Definitions and fundamentals
Steps in the risk management process
The risk matrix
Management of risk (transfer, cancelling, reduction and acceptance)
Applicability of risk management
Risk management review and report

Expected result:

1. Explain the fundamentals of risk management.
2. Explain risk management phases.
3. Describe criteria for the management of risk.
4. Evaluate applicability of risk management

2.9 Risk management with reference to contractual requirements

8

Objective:

Appraise the principles of risk management with reference to contractual requirements in relation to quality, environment, health and safety

Scope:

Risk analysis on contractual requirements
Risk management in supplying, sub-supplying and subcontracting welding fabrication activities
Relation of the risk to inspection
Cost/benefit evaluation with reference to contractual requirement

Expected results:

1. Evaluate the risk associated with contractual requirements in relation to quality, environment, health and safety.
2. Determine the risk management behaviour in order to reduce the risk associated to quality, environment, health and safety.
3. Evaluate the cost/benefit relation in the risk management behaviour

2.10 Risk management with reference to technical statutory regulations **8**

Objective:

Appraise the principles of risk management with reference to welding fabrication phases

Scope:

Risk analysis of fabrication phases

Risk management in supplying, sub-supplying and subcontracting welding fabrication activities with reference to statutory requirements

Relation of the risk to inspection

Possibility of risk transfer, cancelling, reduction or acceptance in case of statutory requirements

Cost/benefit evaluation in relation to statutory requirements

Expected results:

1. Evaluate the risk associated with statutory requirements in dependence of applicable product directive.
2. Determine the risk management behaviour in order to reduce the risk associated with statutory requirements.
3. Evaluate the cost/benefit relation in the risk management behaviour

2.11 Insurance covering **2**

Objective:

Understand the possible insurance covering applicable to welding fabrication

Scope:

Risk transfer through insurance covering

General structure of an insurance contract

General coverings and tailored coverings

Limit of liability in insurance coverings

Expected results:

1. Explain the type of insurance coverings
2. Explain the possible transfer of liability through insurance
3. Evaluate the appropriate limit of liability in the cost/benefit relation

2.12 Case studies **2**

Case studies are reported, giving evidence of the risk analysis report and the relevant possible scenario depending on different possible risk management behaviours.

TOTAL MODULE 2 **128 h**

Section II: Examination and qualification

1. Introduction

This guideline seeks to achieve European harmonisation and common standards in the education, training, and qualification of personnel in the field of risk management in welding fabrication.

The national welding organisations, being members of EWF, mutually acknowledge the "Record of Achievement" awarded in any Member State to people who have successfully followed this guideline,. Education must have followed Section 1 of the EWF guideline "Special Course on Risk Management in Welding Fabrication". The intermediate examination is under the responsibility of the Approved Training Body, while the final examination must have been conducted by the national body authorised by EWF for this purpose.

2. Requirements for Training and Examination centres

Requirements for teachers and instructors, examiners, training establishments, courses and examination / test centres are documented in EWF 416.

3. Board of Examiners and team of examiners

Reference to doc. EWF 416 shall be made.

4. Admission to the examination

Admission to the examination leading to the award of the Record of Achievement will be restricted to those who have participated in a course, approved by the Authorised National Body, according to this guideline.

Admission to the examination shall be denied for those who failed to attend 90 % of the training program. In case of special circumstances the board of examiners may use its discretion.

5. Examination procedures

The examination procedures described below are designed to simulate the different situations which can occur during typical risk managing activities in industry. The examination shall cover all topics in this Guideline as follows:

- intermediate examination shall cover the topics of module 1, and can be performed by the ATB under approval by the ANB;
- final examination shall cover the topics of module 2, and shall be performed by ANB.

5.1 Written examination

At the discretion of the Board of Examiners the final examination shall consist of:

- a) a series of essay questions covering the whole field of the subject, or
- b) a series of multiple choice questions covering the whole field of the subject, or
- c) a combination of a) and b) with equal marks allocated to each type.

The time devoted to the final written examination shall be a minimum of 2 hours.

5.2 Oral examination

The oral examination will be optional at the discretion of the board of examiners except in borderline cases where it will be mandatory.

6. Evaluation of performance

In order to pass the examination candidates must achieve at least 60% of the maximum possible mark.

7. Re-examination and appeals procedure

Refer to Doc. EWF-416.

8. Record of achievement

After successful examination the Authorised National Body awards a "Record of Achievement" to the candidate.