IIW Guideline for
International Welding Engineers, Technologists,
Specialists and Practitioners

PERSONNEL WITH QUALIFICATION FOR WELDING COORDINATION

Minimum Requirements for the Education, Examination and Qualification

IAB-252r4-18/SV-01

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

PERSONNEL WITH QUALIFICATION FOR WELDING COORDINATION

(as described in ISO 14731 and other International and National Standards)

International Welding Engineer (IWE)
former : Doc. IAB-002-2000/EWF-409 Rev. 2

International Welding Technologist (IWT)
former : Doc. IAB-003-2000/EWF-410 Rev. 2

International Welding Specialist (IWS)
former : Doc. IAB-004-2000/EWF-411 Rev. 1

International Welding Practitioner (IWP)
former : Doc. IAB-005-2002/EWF-451 Rev. 1

Prepared and issued by the IAB-International Authorisation Board based on the EWF above mentioned Guidelines
Under the authority of the IIW-International Institute of Welding

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

For more information regarding the Qualifications System, the IAB/EWF Management Team or the National ANB should be contacted
(see in the IIW and EWF sites the ANB contacts)

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Preface

This document is based upon the European Welding Engineer/ Technologist/ Specialist/ Practitioner Guidelines as developed by the European Federation for Welding, Joining and Cutting (EWF), through an Agreement first signed 19 July, 1997, at the Annual Meeting of the International Institute of Welding (IIW) in San Francisco, California, USA and which has been renewed and further developed since then. It has been established in that Agreement that the International Welding Engineer/ Technologist/ Specialist/ Practitioner Diploma is equivalent to the European Welding Engineer/ Technologist/ Specialist/ Practitioner Diploma.

The International Institute of Welding IIW has delegated the responsibility for the management of the qualification and certification systems to the International Authorisation Board (IAB).

This guideline for the international education, training, examination and qualification of welding personnel has been prepared, evaluated and formulated by Group A "Education, Training and Qualification" of the IAB.

Any EWF Authorised National Body ANB is permitted to issue EWF diplomas equivalent to IIW ones that have been issued by the same ANB (Automatic Route).

Copies of this document are available from the EWF/IAB Secretariat or the national ANB's.

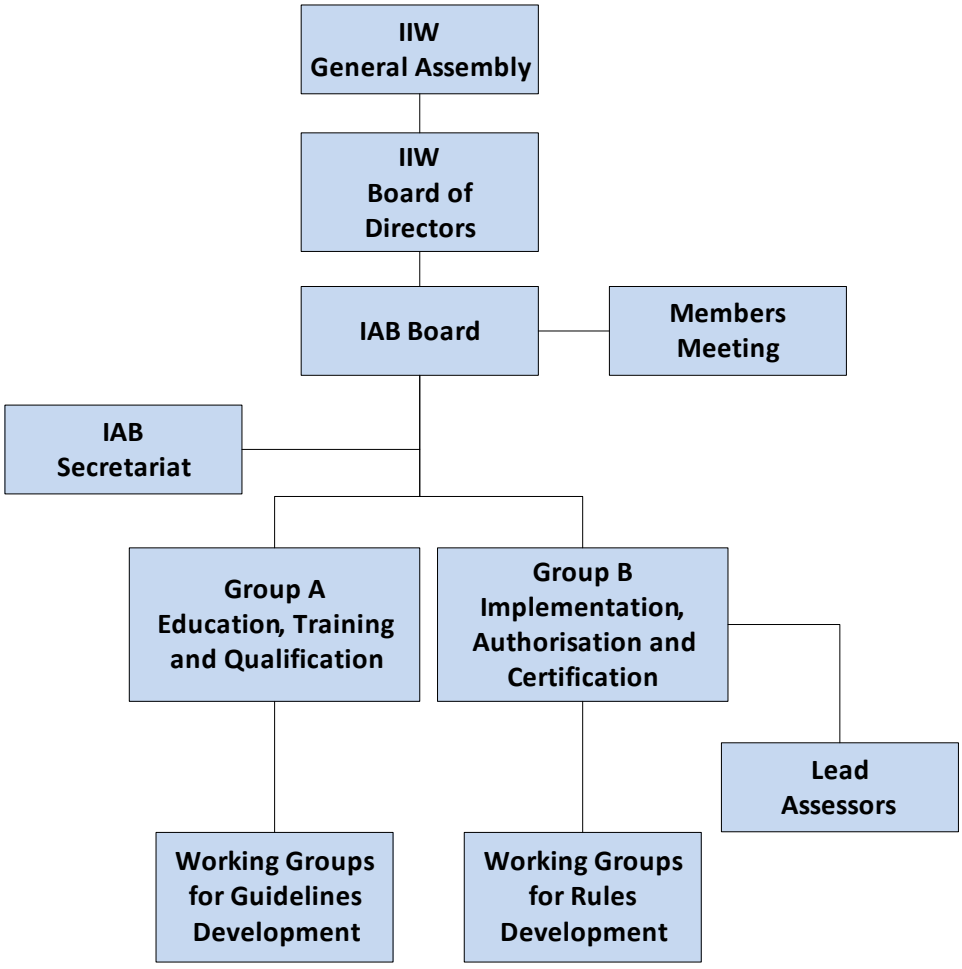

Figure 1: Organisation of the IAB

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

1 Introduction

Section I of the guideline covers the minimum requirements for education and training, which have been agreed upon by all IAB - ANBs, in terms of objectives, scope, Learning Outcomes and the teaching hours to be devoted to achieving them. It will be revised periodically by IAB Group A to take into account changes to reflect the "state of the art". Students successfully completing a course of education and examinations will be expected to be capable of applying the welding technology at a level consistent with the qualification diploma.

Section II of the guideline covers the rules for examination and qualification.

The modular course contents are given in the following structure (overview):

Modules of theoretical education and fundamental practical skills	Teaching hours*							
	IWE		**IWT**		**IWS**		**IWP**	
	MT	**P1**	**MT**	**P1**	**MT**	**P1**	**MT**	**P1**
1. Welding processes and equipment	95	46	86	46	53	20	32	19
2. Materials and their behaviour during welding	115	33	96	31	56	16	23	10
3. Construction and design	62	14	44	14	24	4	6	0
4. Fabrication, applications engineering	116	0	83	0	56	0	29	0
Sub-total	**388**	**93**	**309**	**91**	**189**	**40**	**90**	**29**
Fundamental practical skills (Part 2)	60		60		60		60	
Total	**448**		**369**		**249**		**150**	

* Teaching hours are the minimum for the Standard Route, see 2.6;
MT = Module Total (Part 1 + Part 3);
P1 = Part 1;
Figures under P1 are given for the Standard Route (see 4.1).

It is to be noted that the overall structure of the syllabus for all levels (IWE, IWT, IWS, and IWP) is similar, but some topics are not considered in all levels of qualification. These topics are indicated by 0 hours in this guideline. The depth to which a topic is dealt with is indicated by the number of hours allocated to it in the guideline. This will be reflected in the scope and depth of the examination.

The objectives of the education, training and examinations in terms of learning outcomes are described in two ways: generically for each level as mentioned in Appendix V; and more specifically and in more detail under the heading of 'Expected Results' in each section of the Syllabus.
Additionally Appendix V shows a classification for each level of learning outcome (general) into an EQF-level (EQF= European Qualification Framework).

The text on the following page is the IIW view of the relevant **Task Descriptions** and should be considered only as guidance to explain the level of knowledge, competence and skills, for each qualification level under this guideline.

Task Descriptions: Knowledge, skills and competence levels achieved for each qualification level and their correlation with ISO 14731

IWE – Knowledge, Competence and Management
A candidate completing the IWE training under this program is expected to acquire advanced knowledge and critical understanding of welding technology application.
He / she shall have advanced competence and skills at a level that is required in the field of welding technology which demonstrate:

- technology mastery and required innovation
- being able to solve high-level complex and unpredictable problems
- the ability to manage high complex technical and professional activities or projects related to welding applications
- taking responsibility for decision making in unpredictable work or study context
- taking responsibility for managing professional development of individuals and groups

IWT – Knowledge, Competence and Management
A candidate completing the IWT training under this program is expected to acquire an overall knowledge and understanding of welding technology application.
He / she shall have competence and skills at a level that is required in the field of welding technology which demonstrate:

- being able to solve low-level complex problems
- the ability to manage in detail the welding applications and related professional activities or projects
- taking responsibility for decision making in low-level complex work or study context
- taking responsibility to define the tasks of welding or related personnel
- being able to manage professional development of individuals and groups

IWS – Knowledge, Competence and Management
A candidate completing the IWS training under this program is expected to acquire a specialized and factual knowledge in the field of welding technology.
He / she shall have competence and skills at a level that is required in the field of welding technology which demonstrate:

- being able to develop solutions on common/regular problems
- being able to manage and supervise common or standard welding applications and related professional activities
- taking responsibility for decision making in common or standard work
- taking responsibility to supervise the tasks of welding and related personnel.

IWP – Knowledge, Competence and Management
A candidate completing the IWP training under this program is expected to acquire a basic knowledge in the field of welding technology.
He / she shall have competence and skills at a level that is required in the field of welding technology which demonstrate:

- being able to develop solutions on basic and specific problems
- being able to supervise basic welding applications and related professional activities
- taking responsibility for decision making in basic work
- taking responsibility to supervise the tasks of welding and related personnel

In correlation with essential coordination tasks as detailed in EN ISO 14731, the previous mentioned competences and skills will enable the candidate to effectively perform the following tasks:

Type of Construction concerned	IWE	IWT	IWS	IWP
	Any type	With a low level of complexity	Regular and common	Basic specific works
Welding construction contract requirements	able to review			not able to perform
Technical review of the welding construction	able to perform the task			not able to perform
Subcontracting activities	able to specify requirements and assessment protocol, to supervise implementation and monitor			able to supervise implementation and monitor
Welding personnel and related personnel needs and competences/ skills;	able to specify, supervise and manage			able to supervise the welding personnel and monitor
Equipment and means needed for the construction;	able to specify, validate and manage the equipment, including the calibration if needed			able to understand and supervise the proper use
Manufacturing plan;	able to specify, develop, validate and manage			able to monitor and implement
Welding procedures needed for the construction;	able to specify, develop, evaluate, validate and manage			able to understand, implement
Working instructions;	able to specify, develop, evaluate and manage			able to understand, implement
Base materials and welding consumables;	able to specify, validate and manage			able to monitor and supervise the proper use
Inspection Testing Plan;	able to specify, review, develop, evaluate, validate and manage			able to understand, implement and monitor
Heat treatments;	able to specify, develop, evaluate, validate and manage			able to understand, implement, supervise and monitor
Corrective actions to solve welded construction non-conformances;	able to specify, review, develop, evaluate, validate and manage			able to implement, monitor and control
Identification and traceability used in welding manufacturing;	able to specify, develop, evaluate, validate and manage processes			able to understand, control and supervise
Construction quality records.	able to specify, develop, evaluate, validate and manage processes related to monitor and control			able to collect, control, perform and supervise

Characterization of the general description of IIW Qualifications, describing the Qualification descriptors in terms of Knowledge – K, Skills – S, Competences - C for each IIW welding coordination qualification

SUMMARY DESCRIPTION							
QUALIFICATION	**KNOWLEDGE APPLICATION**	**SKILLS APPLICATION**	**COMPETENCES**	**EQF LEVEL**	**TEACH-ING HOURS**	**WORK-LOAD (hours)**	**ECVET POINTS**
INTERNATIONAL WELDING ENGINEER	Highly specialised and forefront knowledge including original thinking, research and critical assessment of theory, principles and applicability of welding related technologies.	Highly specialised problem- solving skills including critical and original evaluation, allowing to define or develop the best technical and economical solutions, when applying welding processes and related technologies, in complex and unpredictable conditions.	Manage and transform the welding processes and related technologies in a highly complex context. Act as the full responsible person for the definition and revision of the welding and related personnel's tasks.	7	448	836	75
INTERNATIONAL WELDING TECHNOLOGIST	Advanced knowledge and critical understanding of the theory, principles and applicability of welding and related technologies.	Advanced problem-solving skills including critical evaluation, allowing to choose the proper technical and economical solutions, when applying welding and related technologies, in complex and unpredictable conditions.	Manage the applications of welding and related technologies in a highly complex context. Act autonomously as the responsible person for the decision making and the definition of the welding and related personnel's tasks.	6	309	534	50
INTERNATIONAL WELDING SPECIALIST	Specialised, factual and theoretical knowledge of the theory, principles and applicability of the welding and related technologies.	Specialised range of cognitive and practical skills, allowing to develop solutions or choose the appropriate methods, when applying welding and related technologies, in common/regular problems.	Manage and supervise common or standard welding applications and related technologies, in an unpredictable context. Take responsibility with limited autonomy for decision making in common or standard work and supervise the welding and related personnel's tasks.	5	189	312	30
INTERNATIONAL WELDING PRACTITIONER	Factual and theoretical knowledge (basic understanding) of the theory, principles and applicability of the welding and related technologies.	Fundamental range of cognitive and practical skills required to identify proper solutions, when applying welding and related technologies, in basic and specific problems.	Self-manage within the guidelines of work, the applications of welding and related technologies, in a predictable context, but subject to change. Take responsibility without autonomy for decision making in basic work and supervise basic tasks of welding and related personnel.	4	150	247	8

2 Routes to Qualification

Three distinct routes to gaining the qualifications described in this document have been agreed.

1. The Standard Route
2. The Alternative Route
3. Distance Learning Route
4. The Experiential Route
5. Transition Route

2.1 The Standard Route

The Standard Route requires successful completion of IAB approved courses which are designed to meet all the requirements in this Guideline. This is the route (Path 1 in diagrams 1, 2, 3, and 4) recommended by IAB as offering the fastest, most comprehensive manner in which the syllabus may be covered.

The Standard Route also allows a limited amount of prior learning (Part 1 of each qualification course, see Section I) to be taken into account, for example during University or College courses or by blended learning (Path 2 in diagrams 1, 2, 3, and 4). This prior learning shall be approved by the ANB.

2.2 The Alternative Route

The Alternative Route is aimed at individuals who may already have experience of the job function at a particular level without holding the appropriate qualification diploma. These individuals will have already gained full or part knowledge of the syllabus defined in this guideline and can demonstrate their capability to proceed to examination either directly without compulsory attendance at an ANB approved training course or by attending only part of such a course.

2.3 Distance Learning Route

The Part 1 theory module may be taught in Blended Learning Programs under control of the ANB.

When the Part 1 and Part 3 theory modules are combined or the Part 3 theory module is taught separately the requirements of the latest edition of the Distance Learning Guideline IAB 195 shall be followed.

2.4 The experiential Route or “The Career Development Route”

The Experiential Route allows considering whether professional experiential learning can be recognised for career progression either from IWP diploma holders to IWS or IWS diploma holders to IWT courses who do not satisfy the relevant general access conditions. By this route it is possible to run a career path from the welder through the IWP and IWS up to the IWT, more detailed information is given on items 3.2 and 3.3.

2.5 The Transition Route

The Transition Route is described in Section II, item 10.

2.6 Teaching hours

The meaning of the teaching hours is the following:

Standard Route:	minimum number of hours devoted to the subject
Alternative Route:	recommended number of hours devoted to the subject
Distance Learning:	recommended number of hours devoted to the subject
Part 1 (P1):	maximum number of hours devoted to the subject in Part 1
Part 3 (P3):	minimum or recommended number of hours devoted to the subject in Part 3

A "teaching hour" shall contain at least 50 minutes of direct teaching time.

3 General Access Conditions

In a separate document (Directory of Access Conditions, Doc. IAB-020-see latest edition) the defined access conditions approved by Group B "Implementation and Authorisation" of the IAB are given in detail for all countries participating in the IAB system. Applicants not fulfilling the access conditions may follow the course as guests, but entry to the related examination is not permitted.

The following general conditions shall be applied to all courses:

1. Students who have successfully passed the intermediate examination (Part 1) of the course are al-lowed to attend Part 2 and Part 3 of the course;

2. The implementation of the access conditions is the responsibility of the ANB.

In following parts of chapter 3 and in Special Requirements in chapter 4 of the guideline, diagrams are used for schematic illustration of the text. It should be noted that it is the text which is binding

3.1 International Welding Engineer IWE

It is agreed that entry to the program should be on a postgraduate level. Participants should have a primary degree in an engineering discipline or its equivalent recognised by the national government and assessed by the ANB. Therefore, it would be expected that participants should have at least a Bachelor degree at university level with a minimum study of 3 years, e.g.:

- a relevant qualification from an accredited program in accordance with the Washington Accord for professional qualification of engineers, or
- a First Cycle Bologna Framework engineering qualification, or
- an engineering qualification at EQF Level 6,
- or equivalent.

In case of co-operation arrangements, e.g. with universities, according to which the IWE Part 1 (IWE 1) of the syllabus with scope, objectives, and learning outcomes (see Section I) is presented under careful control of the ANB, the participant is allowed to enter the IWE course through the Path 2 (see item 2.1 and the diagram 1 below).

The following additional conditions shall be observed for the different routes through the IWE course:

1. Students who have authenticated evidence that they have passed the examinations in all subjects of their Bachelor engineering degree studies but still have to complete a thesis are allowed to attend Part 2 (IWE 2) and Part 3 (IWE 3) of the IWE course and the corresponding written parts of the final examination;

2. Students shall present their degree diploma to the Board of Examiners before being allowed to take the final oral examination for IWE.

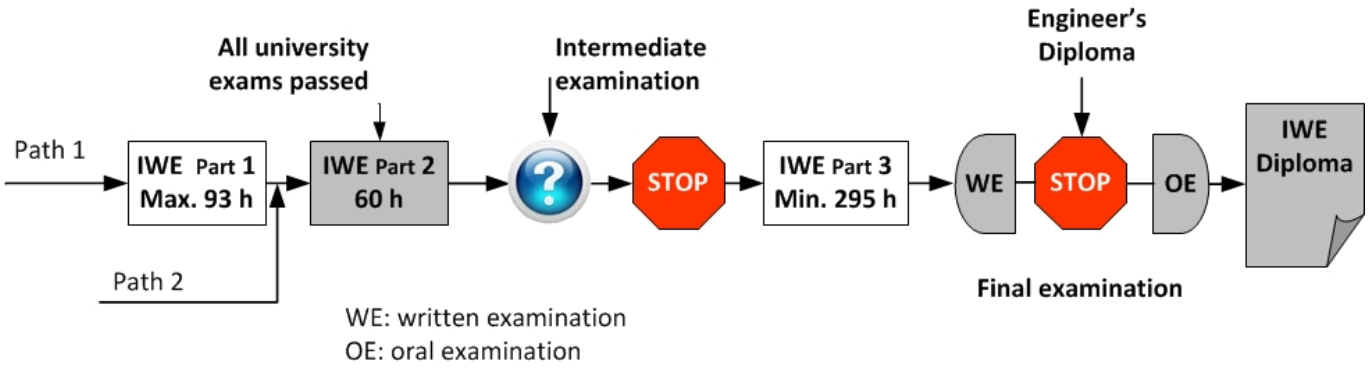

Diagram 1: IWE-route

3.2 International Welding Technologist IWT

It is agreed that entry to the program via Path 1 and 2 should be on the basis of a higher technical education below that required for the International Welding Engineer. Participants should have a primary degree in an engineering discipline, e.g.:

- a relevant qualification from an accredited program in accordance with the Sydney Accord for professional qualification of engineering technologists, or
- a Short Cycle Bologna Framework engineering qualification, or
- an engineering qualification at EQF Level 5,
- or equivalent.

In case of co-operation arrangements, e.g. with technical colleges, according to which the IWT Part 1 of the curriculum structure (see Section I) is presented under careful control of the ANB, the participant is allowed to enter the IWT course through Path 2 (see item 2.1 and the diagram 2 below).

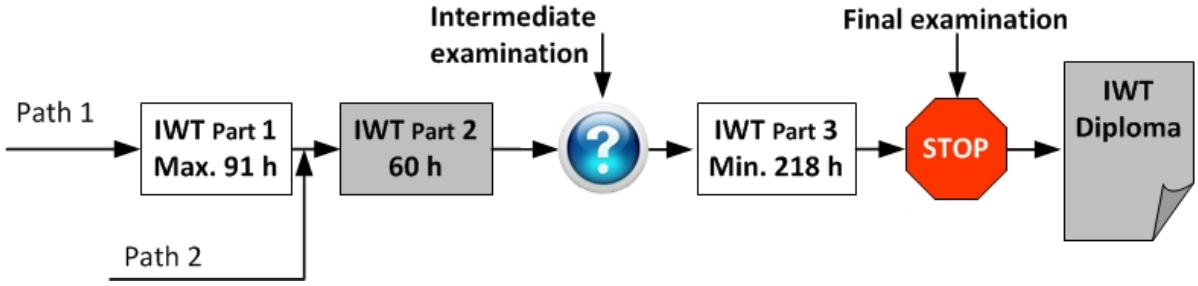

Diagram 2: IWT-Route

Applicants who have gained relevant industrial experience may take the Experiential Route to meet the General Access Conditions for IWT:

1. CIWS with a minimum of two years' experience, post certification, as responsible for welding coordination for a welded product manufacturer working in full compliance with the Standard Quality Requirements of ISO 3834-3 or above
   or

2. Six years of experience working at Technologist level, after gaining the IWS diploma and within the preceding eight years.

All Experiential Route applicants will be required to attend the IWT Part 3 taught course and pass all Technologist level examinations to gain the IWT diploma

3.3 International Welding Specialist IWS

It is agreed that entry to the program through Path 1 and 2 should be on the basis of a specific technical education below that required for the International Welding Technologist but higher than a professional worker, e.g. a relevant qualification from an accredited program:

- in accordance with the Dublin Accord for the professional qualification of engineering technicians, or
- an engineering qualification at EQF Level 4,
- or equivalent.

In case of co-operation arrangements, e.g. with technical colleges, according to which the IWS Part 1 of the curriculum structure (see Section I) is presented under careful control of the ANB, the participant is allowed to enter the IWS course through Path 2 (see item 2.1 and the diagram 3 below).

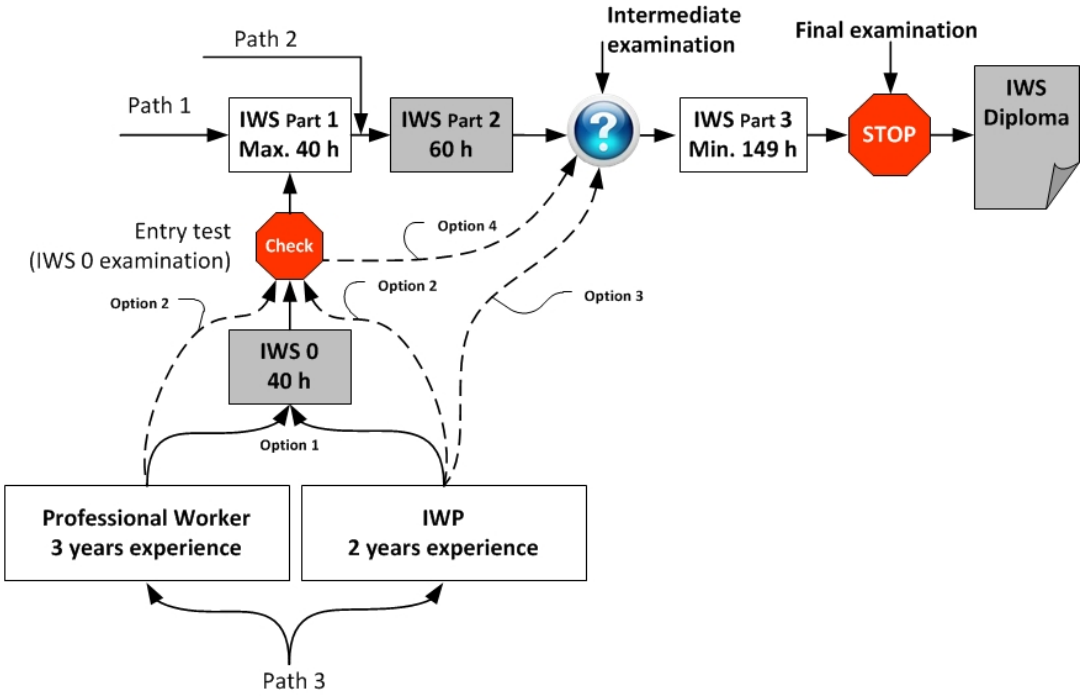

Diagram 3: IWS-Route

The following additional conditions shall be observed for the different routes through the IWS course:

1. Path 1 and 2: a minimum of 2 years job related experience is required;

2. Path 3: For the access to the module IWS Part 0 the minimum requirements are:

   - International Welding Practitioner (IWP) and minimum 2 years' experience (see on above diagram option 1) OR
   - Qualification of a professional worker (with diploma after examination) in metalworking professions at EQF Level 3, or equivalent and minimum 3 years' experience in welding related activities,
   - The education National definitions for a professional worker are given in the Directory of Access Conditions (see on above diagram 3, option 1).

3a. A qualified professional worker (as stated above) not fulfilling the IWS National Access Requirements should be allowed to go directly to the IWS Part 0 examination if they can prove that they have achieved the knowledge prescribed by the IWS Part 0 (see on above diagram 3, option 2).

3b. An IWP Diploma holder not fulfilling the IWS National Access Requirements should be allowed to go directly to the IWS Part 0 examination if they can prove that they have achieved the knowledge prescribed by the IWS Part 0 (see on above diagram option 2), if the applicant has success on this exam, he/she may skip the IWS Part 1 and only perform the IWS Part 1 intermediate exam. At the discretion of the ANB a partial or full exemption from Part 2 may be granted. (see diagram 3, option 2 and 4)

4. If the IWP Diploma holder fulfils the IWS National Access Requirements, he may skip the entry test (IWS Part 0 examination) and IWS Part 1 and only perform the IWS Part 1 intermediate exam (see on above diagram 3 option 3). At the discretion of the ANB a partial or full exemption from Part 2 may be granted.

3.4 International Welding Practitioner IWP

In order to enter the International Welding Practitioner course, participants are required to be skilled in practical welding and to have had experience as a welder in industry.
The course is intended to build theoretical knowledge and practical welding skills.

In case of co-operation arrangements, e.g. with technical colleges, according to which the IWP Part 1 of the curriculum structure (see Section I) is presented under careful control of the ANB, the participant is allowed to enter the IWP course through the Route 2 (see item 2.1 and the diagram 4 below).

The following standard access conditions are applicable to the IWP course. Applicants are required to

1. Hold a valid pipe welder qualification certificate in accordance with ISO 9606-1/-2 H-L045 ss nb or J-LO45 ss nb;

Or

2. Hold a valid plate welder qualification certificate in accordance with ISO 9606-1 for the conditions PE ss nb or PC and PF ss nb, or in accordance with ISO 9606-2 for the conditions PE bs or PC and PF bs;

Or

3. Hold an alternative national welder qualification with the same range of qualification as that in 1 or 2 above;

And

4. Have, a recommended minimum of, 2 years job-related experience as plate or pipe welder.

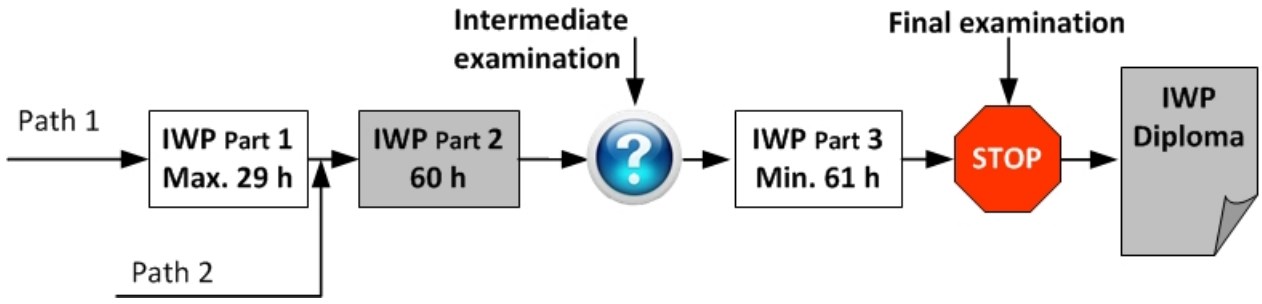

Diagram 4: IWP-Route

4 Special Requirements

4.1 Standard Route

Applicants (excluding guests) shall satisfy the ANB access conditions. If the ANB decides that the access conditions are adequately met, the applicants are then required to attend a training course conducted by an Approved Training Body (ATB) giving as a minimum the hours of instruction detailed in this Guideline as teaching hours. There will be written and oral examinations (where applicable) for the award of the applicable IIW Diploma.

The maximum amount of hours of the lectures, which can be included in Part 1 are given in the table included in Chapter 1 above. The definition of the elements of the syllabus which are included in Part 1 is the responsibility of the ANB.

It is not obligatory to follow exactly the order of the topics given in this guideline and choice in the arrangement of the syllabus is permitted, with the exception that **training must conclude with Module 4 "Fabrication, applications engineering" in Part 3.**

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

The objectives of the education, training and examinations in terms of learning outcomes are described in two ways: generically for each level (see Introduction) ; and more specifically and in more detail under the heading of 'Expected Result' in each section of the Syllabus.

The rules for the conduct of the final examination by the ANB are prescribed under Examination and Qualification in this guideline (Section II).

4.2 Alternative Route

Applicants shall submit an application form to the ANB together with the appropriate documents indicated in the sub clauses 4.2.1, 4.2.2, 4.2.3 or 4.2.4 for a paper assessment.

The ANB shall check the documentation submitted to ensure the applicant meets the national Access Conditions (see doc IAB-020- latest edition). In addition the ANB check should evaluate and verify the applicant's experience, training, education and practice of the job function in welding at the relevant qualification level. The result of this assessment shall determine if the applicant is suitable for further detailed assessment (Appendix III).

4.2.1 International Welding Engineer IWE

The applicant shall submit:

- An application form
- A copy of a diploma showing graduation in an engineering subject complying with the Access Conditions.
- A curriculum vitae (CV) - resume containing professional information:
  - evidence of at least 4 years job function in welding at the level of an engineer (in a period of 6 years before application);
  - justification of candidate's experience, training, and education to become IWE (may include other test results).

Applicants who satisfy the Access Conditions AND already hold an IWT diploma should be considered under the Alternative Route

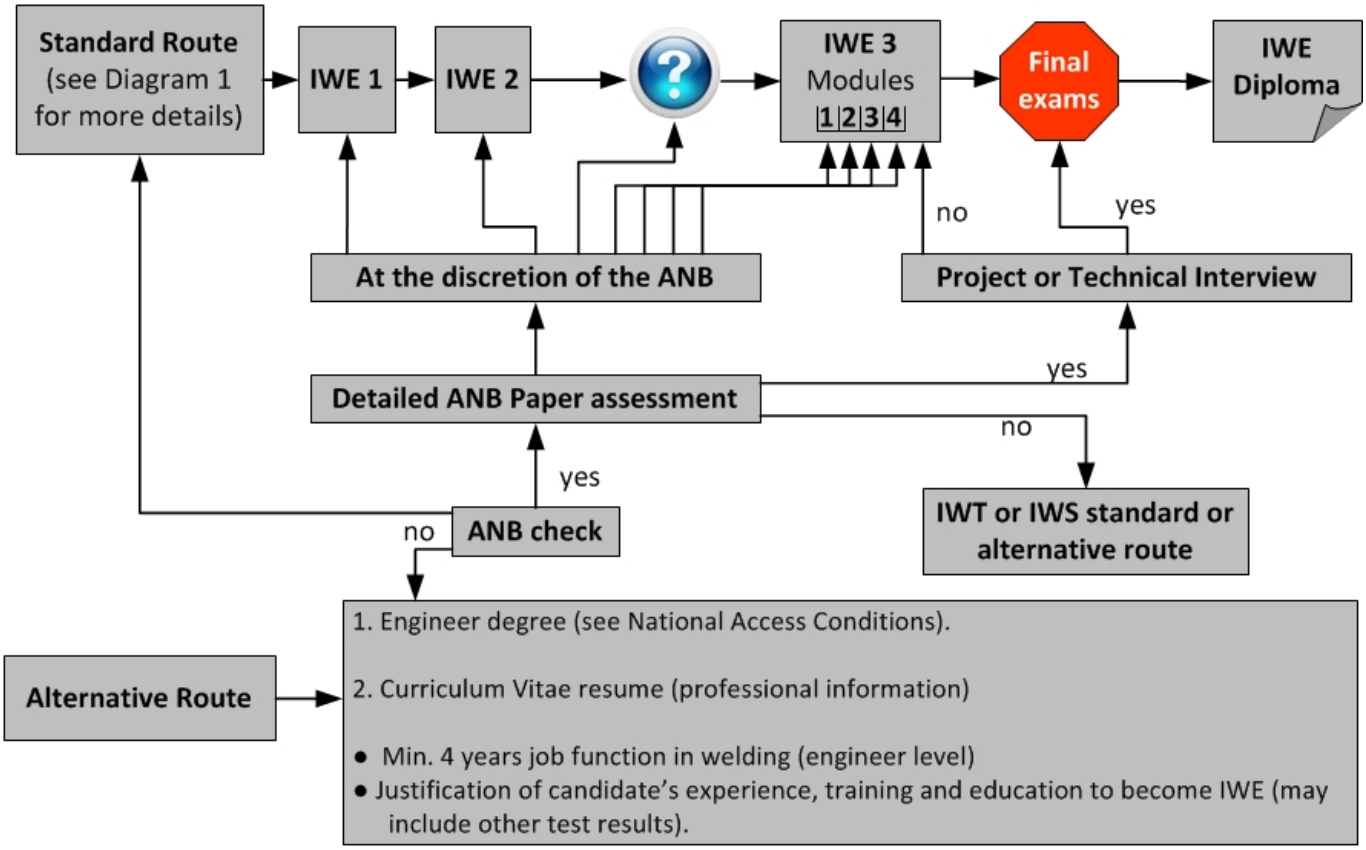

Diagram 5: Alternative versus Standard Routes for IWE qualification
(see also

Appendix II: Requirements for ANB Detailed Assessment)

4.2.2 International Welding Technologist IWT

The applicant shall submit:

- An application form
- A copy of a diploma showing graduation as technologist complying with the Access Conditions.
- A curriculum vitae (CV) - resume containing professional information:
  - evidence of at least 4 years job function in welding at the level of a technologist (in a period of 6 years before application);
  - justification of candidate's experience, training, and education to become IWT (may include other test results).

Applicants who satisfy the Access Conditions AND already hold an IWS diploma should be considered under the Alternative Route.

Applicants who satisfy the Access Conditions AND hold an IWI-C diploma should be considered under the Alternative Route.

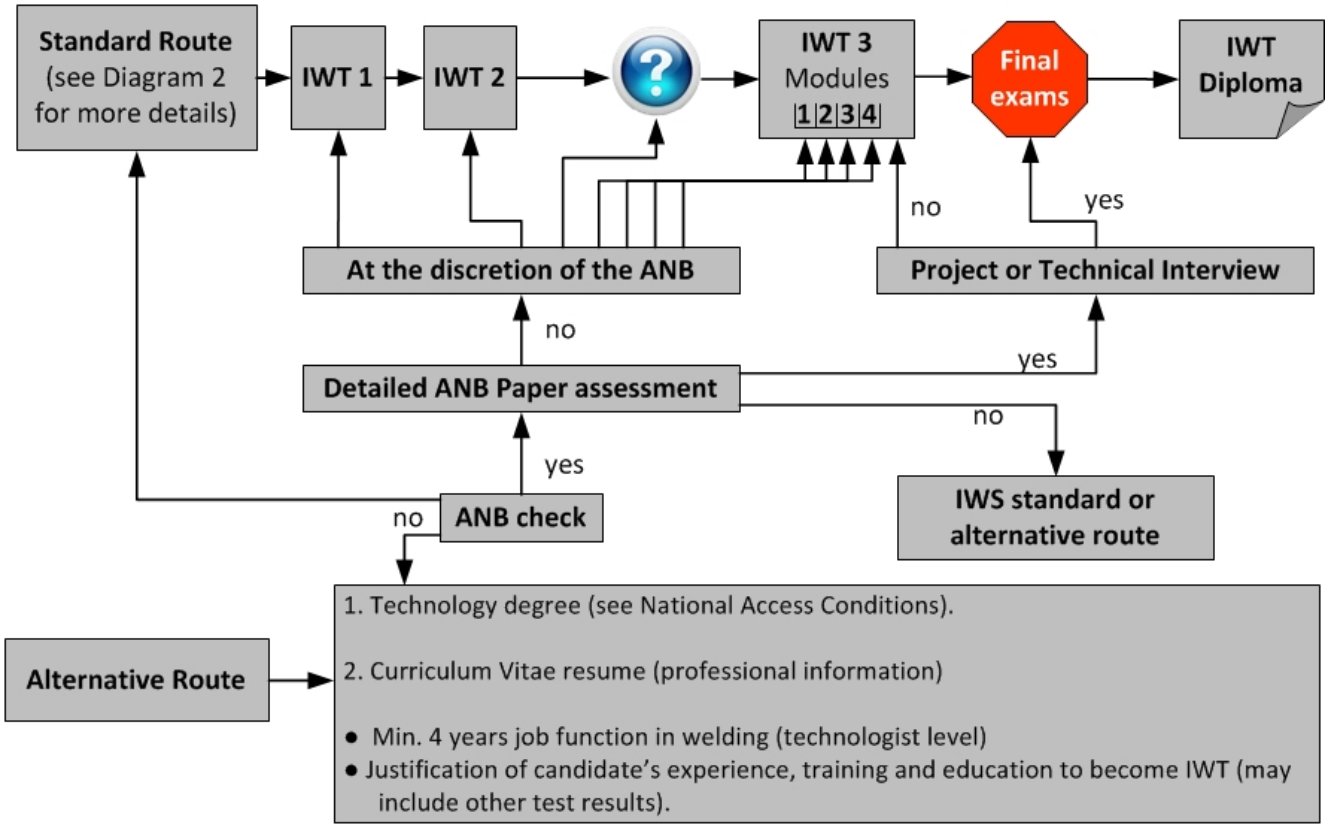

Diagram 6: Alternative versus Standard Routes for IWT qualification

(see also

Appendix II: Requirements for ANB Detailed Assessment)

4.2.3 International Welding Specialist IWS

The applicant shall submit:

- An application form
- A copy of documentary proof showing compliance with the Access Conditions for IWS.
- A curriculum vitae (CV) - resume containing professional information:
  - evidence of at least 3 years job function in welding at a level equivalent to that of a specialist (in a period of 6 years before application);
  - justification of candidate's experience, training, and education to become IWS (may include other test results).

Applicants who satisfy the Access Conditions AND hold an IWI-S diploma should be considered under the Alternative Route.

Applicants who do not satisfy the Access Conditions but who have a minimum of six years of experience in welding coordination and demonstrate to the ANB that their combination of education, training and experience in welding technology has provided a level of knowledge equivalent to the current IIW requirements should be considered under the Alternative Route.

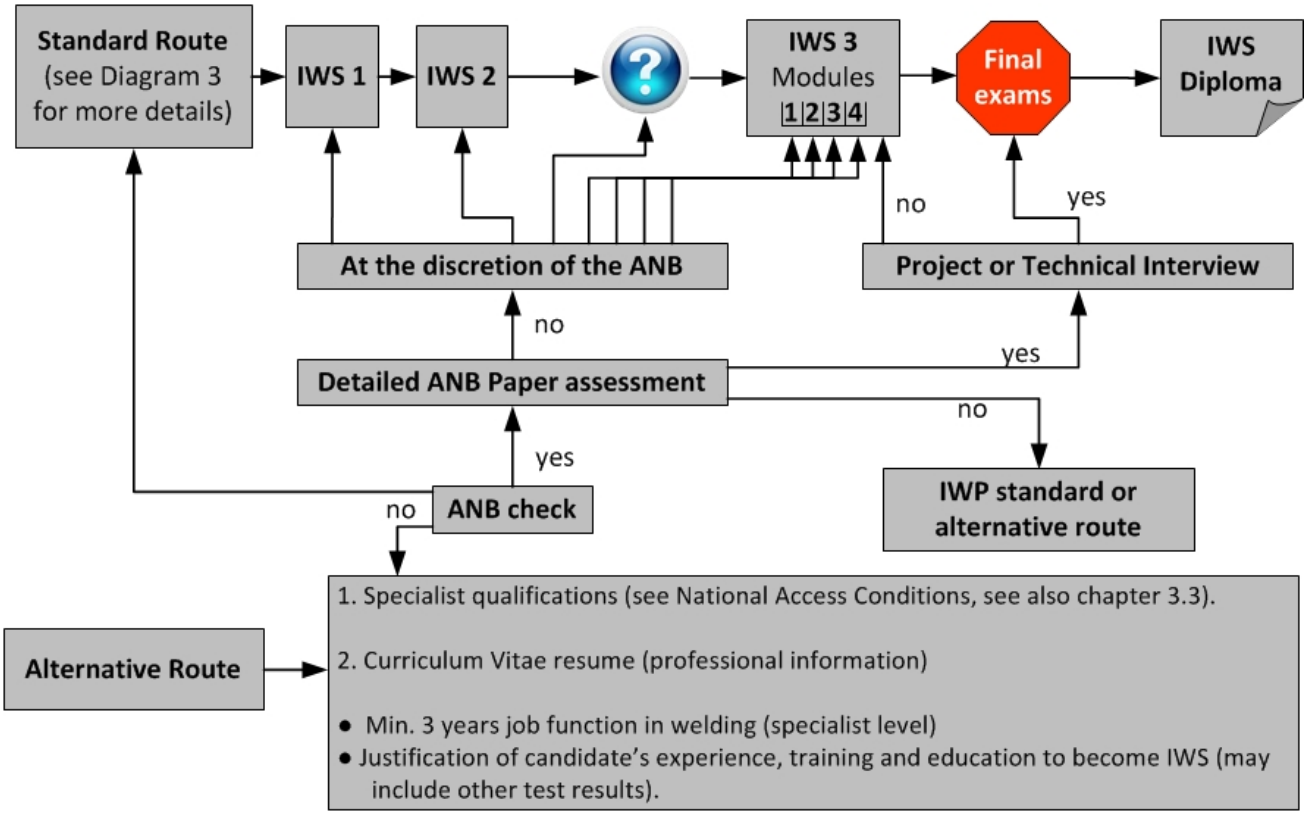

Diagram 7: Alternative versus Standard Routes for IWS qualification
(see also

Appendix II: Requirements for ANB Detailed Assessment)

4.2.4 International Welding Practitioner IWP

The applicant shall submit

- An application form
- A copy of a valid welder qualification certificate according with chapter 3.4 of the standard route.
- A curriculum vitae (CV) - resume containing professional information:
  - min. 3 years job function in welding as a certified plate or tube welder in a period of 5 years before application plus
  - min. 1 year job function in welding practitioner level in a period of 3 years before application;
  - justification of candidate's experience, training, and education to become IWP (may include other test results).

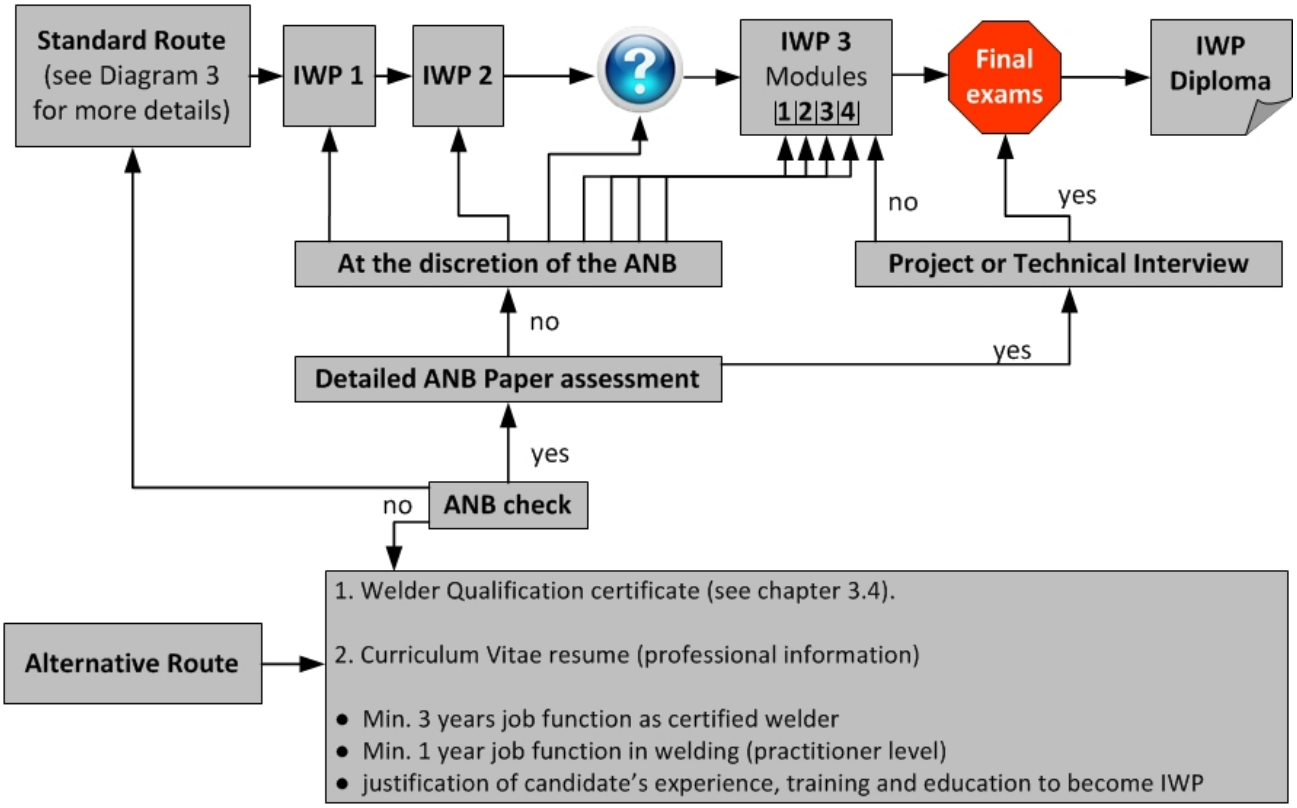

Diagram 8: Alternative versus Standard Routes for IWP qualification

(see also

Appendix II: Requirements for ANB Detailed Assessment)

Section I: Theoretical and Practical Education – Part 1, Part 2 and Part 3, Syllabus and Performance Objectives

I.1. Theoretical Education - Part 1 and Part 3

Module 1: Welding processes and equipment

Characterization of the general description of Module 1 – Welding Processes and Equipment, describing the Qualification descriptors in terms of Knowledge – K, Skills – S, Competences - C for each IIW welding coordination qualification

COMPETENCE UNIT 1: WELDING PROCESSES AND EQUIPMENT							
QUALIFICATION	**KNOWLEDGE**	**SKILLS**	**COMPETENCES**	**EQF LEVEL (EQF L)**	**TEACH-ING HOURS**	**WORK-LOAD (WL)**	**ECVET POINTS**
INTERNATIONAL WELDING ENGINEER	Highly specialized knowledge (able to deduce, detail and explain) and critical assessment of the principles of welding and cutting processes and applications, either manual or mechanized or automatic or robotized.	Highly specialised problem-solving skills including critical and original evaluation, allowing to define or develop the best technical and economical solutions when applying welding processes and related technologies, in complex and unpredictable conditions.	Manage in detail the welding processes and cutting applications in a highly complex context. Act as the responsible person for the definition of the welding personnel tasks.	6	155	250	20
INERNATIONAL WELDING TECHNOLOGIST	Advanced knowledge (able to deduce, detail and explain) and critical assessment of the principles of welding and cutting processes and applications, either manual or mechanized or automatic or robotized.	Advanced problem-solving skills including critical evaluation, allowing to choose the proper technical and economical solutions when applying welding processes and related technologies, in complex and unpredictable conditions.	Manage in detail the welding processes and cutting applications in a highly complex context. Act as the responsible person for the definition of the welding personnel tasks.	6	86	129	10
INTERNATIONAL WELDING SPECIALIST	Specialized and factual knowledge (able to understand and identify) of the principles of welding and cutting processes and applications, either manual, mechanized, automatic or robotized.	Specialised range of cognitive and practical skills, allowing to develop solutions or choose the appropriate methods when applying welding and related technologies in common/regular problems.	Manage and supervise the welding and cutting processes applications in unpredictable modifications. Act as the responsible person for supervise the welding personnel tasks	5	53	80	5
INTERNATIONAL WELDING PRACTITIONER	Factual and theoretical knowledge (basic understand) of the principles of welding and cutting processes and applications, either manual, mechanized, automatic or robotized.	Range of cognitive and practical skills required to identify/choose the proper technical and economical solutions when applying welding and cutting processes on basic and specific problems.	Self-manage the welding and cutting processes applications usually predictable but subject to changes. Will act as the responsible person for supervise the welding personnel tasks	4	32	71	2,5

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Module 1: Welding processes and equipment

Subject Title	Qualification Level* (Part 3 – Training Hours / Part 1 – Training Hours)			
	IWE	IWT	IWS	IWP
1.1 General introduction to welding technology	0/3	0/3	0/1	0/1
1.2 Oxy-gas Welding and related processes	0/2	0/2	0/1	0/1
1.3 Electrotechnics, a review	0/1	0/1	0/2	0/2
1.4 The arc	0/3	0/3	1/0	1/0
1.5 Power sources for arc welding	0/4	0/4	4/0	3/0
1.6 Introduction to gas shielded arc welding	0/2	0/2	0/1	0/1
1.7 TIG Welding	0/5	0/5	0/3	0/2
1.8.1 MIG/MAG	0/8	0/8	0/6	0/6
1.8.2 Flux Cored Arc Welding	0/2	0/2	0/2	0/2
1.9 MMA Welding	0/6	0/6	0/4	0/4
1.10 Submerged-Arc Welding	0/6	0/6	4/0	4/0
1.11 Resistance Welding	6/0	6/0	3/0	0/0
1.12.1 Other Welding Processes – Laser; Electron Beam; Plasma	8/0	5/0	2/0	1/0
1.12.2 Other Welding Processes, other than 1.12.1	6/0	4/0	2/0	2/0
1.13 Cutting, Drilling and other edge preparation processes	0/4	0/4	2/0	2/0
1.14 Surfacing and Spraying	2/0	2/0	1/0	0/0
1.15 Fully mechanised processes and robotics	8/0	6/0	4/0	0/0
1.16 Brazing and soldering	4/0	4/0	2/0	0/0
1.17 Joining processes for plastics	4/0	4/0	2/0	0/0
1.18 Joining processes for ceramics and composites	1/0	1/0	0/0	0/0
1.19 Welding laboratory	10/0	8/0	6/0	0/0
Total	**95/46**	**86/46**	**53/20**	**32/19**

***** P1 = Part 1, Figures under P1 are given for the Standard Route (see 4.1)

Module 2: Materials and their behaviour during welding

Characterization of the general description of Module 2 – Materials and their behaviour during welding, describing the Qualification descriptors in terms of Knowledge – K, Skills – S, Competences - C for each IIW welding coordination qualification

COMPETENCE UNIT 2: MATERIALS AND THEIR BEHAVIOUR DURING WELDING							
QUALIFICATION	**KNOWLEDGE**	**SKILLS**	**COMPETENCES**	**EQF LEVEL (EQF L)**	**TEACH-ING HOURS**	**WORKLOAD (WL)**	**ECVET POINTS**
INTERNATIONAL WELDING ENGINEER	Highly specialized knowledge (able to deduce, detail and explain) and critical assessment regarding materials processing and applications and their behaviour during welding and cutting.	Highly specialized skills including critical evaluation (able to predict and deduce), to determine the correct technical solutions in terms of materials processing by welding and cutting and be able to find solutions and predict problems due to the materials behaviour during welding in complex and unpredictable conditions	Manage in detail the materials applications and their behaviour due to welding and related technologies in a highly complex context. Act as the responsible person for the definition of the welding personnel tasks	7	115	230	20
INTERNATIONAL WELDING TECHNOLOGIST	Advanced knowledge (able to deduce, detail and explain) and critical assessment regarding materials processing and applications and their behaviour during welding and cutting.	Advanced skills including critical evaluation (able to predict and deduce), to determine the correct technical solutions in terms of materials processing by welding and cutting and be able to find solutions and predict problems due to the materials behaviour during welding in complex and unpredictable conditions	Manage in detail the materials applications and their behaviour due to welding and related technologies in a highly complex context. Act as the responsible person for the definition of the welding personnel tasks	6	96	192	20
INTERNATIONAL WELDING SPECIALIST	Specialized and factual knowledge (able to understand and identify) regarding materials processing and applications and their behaviour during welding and cutting.	Specialised range of cognitive and practical skills which will allow choosing the proper technical solutions in terms of materials processing by welding and be able to develop solutions due to the materials behaviour during welding on common/regular problems.	Manage and supervise the materials applications and their behaviour due to welding and related technologies in unpredictable modifications. Act as the responsible person for supervise the welding personnel tasks	4	56	112	10
INTERNATIONAL WELDING PRACTITIONER	Factual and theoretical knowledge (basic understand) regarding materials processing and applications and their behaviour during welding and cutting.	Range of cognitive and practical skills required to identify/choose the proper technical solutions in terms of materials processing and materials behaviour during welding and cutting on basic and specific problems.	Self-manage the materials applications and their behaviour due to welding and related technologies usually predictable but subject to changes. Will act as the responsible person for supervise the welding personnel tasks	4	23	54	2

Module 2: Materials and their behaviour during welding

Subject Title	Qualification Level* (Part 3 – Training Hours / Part 1 – Training Hours)			
	IWE	IWT	IWS	IWP
2.1 Structure and properties of metals	0/4	0/4	0/2	0/0
2.2 Phase Diagrams and Alloys	0/4	0/4	0/2	0/2
2.3 Iron – carbon alloys	0/5	0/5	0/3	0/1
2.4 Manufacture and classification of steels	0/4	0/4	0/2	0/2
2.5 Behaviour of structural steels in fusion welding	0/4	0/4	0/2	0/2
2.6 Cracking phenomena in welded joints	8/0	6/0	4/0	2/0
2.7 Fractures and different kinds of fractures	0/4	0/2	0/1	0/0
2.8 Heat treatment of base materials and welded joints	0/4	0/4	0/2	0/1
2.9 Structural (unalloyed) steels	0/4	0/4	0/2	0/2
2.10 High strength steels	10/0	8/0	4/0	1/0
2.11 Application of structural and high strength steels	2/0	2/0	2/0	1/0
2.12 Creep and creep resistant steels	4/0	3/0	2/0	0/0
2.13 Steels for cryogenic applications	4/0	3/0	2/0	0/0
2.14 Introduction to corrosion	4/0	3/0	2/0	1/0
2.15 Stainless and heat resistant steels	12/0	9/0	5/0	2/0
2.16 Introduction to wear and protective layers	5/0	3/0	2/0	0/0
2.17 Cast irons and steels	2/0	2/0	2/0	0/0
2.18 Copper and copper alloys	2/0	2/0	1/0	0/0
2.19 Nickel and nickel alloys	2/0	1/0	1/0	0/0
2.20 Aluminium and aluminium alloys	6/0	4/0	2/0	2/0
2.21 Titanium and other metals and alloys	3/0	2/0	1/0	0/0
2.22 Joining dissimilar materials	4/0	3/0	2/0	1/0
2.23 Destructive testing of materials and welded joints	14/0	14/0	8/0	3/0
Total	**115/33**	**96/31**	**56/16**	**23/10**

***** P1 = Part 1, Figures under P1 are given for the Standard Route (see 4.1)

Module 3: Construction and design

Characterization of the general description of Module 3 – Construction and design, describing the Qualification descriptors in terms of Knowledge – K, Skills – S, Competences - C for each IIW welding coordination qualification

COMPETENCE UNIT 3: CONSTRUCTION AND DESIGN							
QUALIFICATION	**KNOWLEDGE**	**SKILLS**	**COMPETENCES**	**EQF LEVEL (EQF L)**	**TEACH-ING HOURS**	**WORKLOAD (WL)**	**ECVET POINTS**
INTERNATIONAL WELDING ENGINEER	*Highly specialized knowledge (able to deduce, detail and explain) and critical assessment of the theory, principals concerning the design and construction related to welding technology.*	*Highly specialized skills including critical evaluation (able to predict and deduce), to define/determine the best technical and economical solutions that shall be applied in terms of metal fabrication and design when applying welding technology in complex and unpredictable conditions.*	*Manage in detail the construction and design of welded products applications in a highly complex context.* *Act as the responsible person for the definition of the welding personnel tasks.*	7	62	124	15
INTERNATIONAL WELDING TECHNOLOGIST	*Advanced knowledge (able to deduce, detail and explain) and critical assessment of the theory, principals concerning the design and construction related to welding technology.*	*Advanced skills including critical evaluation (able to predict and deduce), to define/determine the best technical and economical solutions that shall be applied in terms of metal fabrication and design when applying welding technology in complex and unpredictable conditions.*	*Manage in detail the construction and design of welded products applications in a highly complex context.* *Act as the responsible person for the definition of the welding personnel tasks.*	6	44	88	10
INTERNATIONAL WELDING SPECIALIST	*Specialized and factual knowledge (able to understand and identify) of the theory and principles concerning the design and construction related to welding technology.*	*Specialised range of cognitive and practical skills which will allow choosing the proper technical and economical solutions in terms of metal fabrication and design when applying welding technology on common/regular problems.*	*Manage and supervise construction and design of welded products applications in unpredictable modifications.* *Act as the responsible person for supervise the welding personnel tasks.*	5	24	36	5
INTERNATIONAL WELDING PRACTITIONER	*Factual and theoretical knowledge (basic understand) of the theory and principles concerning the design and construction related to welding technology.*	*Range of cognitive and practical skills required to identify/choose the proper technical and economical solutions in terms of metal fabrication and design when applying welding technology on basic and specific problems.*	*Self-manage the construction and design of welded products applications usually predictable but subject to changes.* *Will act as the responsible person for supervise the welding personnel tasks.*	*4*	*6*	13	0,5

Module 3: Construction and design

Subject Title	Qualification Level* (Part 3 – Training Hours / Part 1 – Training Hours)			
	IWE	**IWT**	**IWS**	**IWP**
3.1 Basic theory of structural systems	0/4	0/4	2/0	0/0
3.2 Fundamentals of the strength of materials	0/6	0/6	4/0	0/0
3.3 Joint design for Welding and Brazing	0/4	0/4	3/0	2/0
3.4 Basics of weld design	6/0	6/0	4/0	0/0
3.5 Behaviour of welded structures under different types of loading	4/0	2/0	1/0	0/0
3.6 Design of welded structures with predominantly static loading	8/0	5/0	3/0	2/0
3.7 Behaviour of welded structures under cyclic loading	8/0	5/0	2/0	1/0
3.8 Design of cyclic loaded welded structures	8/0	4/0	2/0	0/0
3.9 Design of welded pressure equipment	6/0	4/0	2/0	1/0
3.10 Design of aluminium alloys structures	4/0	2/0	1/0	0/0
3.11 Introduction to fracture mechanics	4/0	2/0	0/0	0/0
Total	**62/14**	**44/14**	**24/4**	**6/0**

***** P1 = Part 1, Figures under P1 are given for the Standard Route (see 4.1)

Module 4: Fabrication, applications engineering

Characterization of the general description of Module 4 – Fabrication, applications engineering, describing the Qualification descriptors in terms of Knowledge – K, Skills – S, Competences - C for each IIW welding coordination qualification

COMPETENCE UNIT 4: FABRICATION, APPLICATIONS ENGINEERING							
QUALIFICATION	**KNOWLEDGE**	**SKILLS**	**COMPETENCES**	**EQF LEVEL**	**TEACH-ING HOURS**	**WORK-LOAD (Hours)**	**ECVET POINTS**
INTERNATIONAL WELDING ENGINEER	Highly specialised knowledge, original thinking, research and critical assessment of the principles and applicability concerning the quality assurance and quality control applied to welding and related technologies.	Highly specialised problem-solving skills, including critical evaluation, allowing to define or develop the best technical and economical solutions for quality assurance and quality control of welded products in complex and unpredictable conditions.	Manage and transform the welding applications concerning the quality assurance and quality control of welded products in a highly complex context. Act as the full responsible person for the definition of the welding and related personnel's tasks.	7	116	232	200
INTERNATIONA WELDING TECHNOLOGIST	Advanced knowledge and critical understanding of the principles and applicability concerning the quality assurance and quality control applied to welding and related technologies.	Advanced problem-solving skills including critical evaluation, allowing to choose the proper technical and economical solutions for quality assurance and quality control of welded products in complex and unpredictable conditions.	Manage the applications concerning the quality assurance and quality control of welded products in a highly complex context. Act autonomously as the responsible person for decision making and the definition of the welding and related personnel's tasks.	6	83	125	10
INTERNATIONA WELDING SPECIALIST	Specialised, factual and theoretical knowledge of the theory, principles and applicability concerning the quality assurance and quality control applied to welding and related technologies.	Specialised range of cognitive and practical skills, allowing to develop solutions or choose the appropriate methods for quality assurance and quality control of welded products on common/regular problems.	Manage and supervise common or standard applications concerning the quality assurance and quality control of welded products in an unpredictable context. Take responsibility with limited autonomy for decision making in common or standard work and supervise the welding and related personnel's tasks.	4	56	84	10
INTERNATIONA WELDING PRACTITIONER	Fundamental factual and theoretical knowledge concerning the quality assurance and quality control applied to welding and related technologies.	Fundamental range of cognitive and practical skills required to identify/choose the proper solutions for quality assurance and quality control of welded products on basic and specific problems.	Self-manage within the guidelines of work, the applications concerning quality assurance and quality control of welded products usually predictable but subject to change. Take responsibility without autonomy for decision-making in basic work and supervise basic tasks of welding and related personnel.	4	29	49	1,6

Module 4: Fabrication, applications engineering

Subject Title	Qualification Level* (Part 3 – Training Hours / Part 1 – Training Hours)			
	IWE	**IWT**	**IWS**	**IWP**
4.1 Introduction to quality assurance in welded fabrication	8/0	8/0	4/0	2/0
4.2 Quality control during manufacture	16/0	12/0	10/0	6/0
4.3 Residual Stresses and Distortion	6/0	4/0	2/0	2/0
4.4 Plant facilities, welding jigs and fixtures	4/0	4/0	4/0	2/0
4.5 Health and Safety	4/0	4/0	4/0	4/0
4.6 Measurement, Control and Recording in Welding	4/0	4/0	4/0	2/0
4.7. Imperfections and Acceptance Criteria	4/0	3/0	2/0	1/0
4.8 Non Destructive Testing	18/0	8/0	8/0	8/0
4.9 Economics and Productivity	8/0	5/0	2/0	1/0
4.10 Repair Welding	2/0	2/0	1/0	1/0
4.11 Reinforcing-steel welded joints	2/0	1/0	1/0	0/0
4.12 Case Studies	40/0	28/0	14/0	0/0
Total	**116/0**	**83/0**	**56/0**	**29/0**

***** P1 = Part 1, Figures under P1 are given for the Standard Route (see 4.1)

I.2 Theoretical Education - IWS 0

The module IWS 0 aims at teaching basic technical knowledge, which in general is lacking in participants entering via the route 3 when compared to participants entering via routes 1 and 2. It provides the chance for professional workers and International Welding Practitioners to become qualified as International Welding Specialists

The module IWS 0 deals with the following subjects:

	Practical Training	**Teaching hours:**
0.1	Basic Metrology applicable to Welding	4
0.2	Technical Calculation	8
0.3	Technical Drawings	8
0.4	Basics of Electro-technology	2
0.5	Basics of Chemistry	2
0.6	Basics of Materials	2
0.7	Metal Products	2
0.8	Machining of Materials	2
0.9	Technical Mechanics	4
0.10	Joining Elements	2
0.11	Calculation of strength	4
		40

I.3. Practical Education – Part 2

I.3.1 For the IWE; IWT, and IWS

This part does not aim at providing practical skills to the welding engineer/technologist/specialist but on gaining knowledge on the control of the different welding processes. The students shall become as familiar as possible with the problems and typical defects associated with incorrect use of the different welding methods. During their exercises the students are guided by skilled welding teachers.

Practical Training	**hours:**
Oxygas welding and cutting	6
MMA	8
TIG	8
MIG/MAG + Flux Cored Arc Welding	16

It is possible to use the advantages of Virtual Weld Training systems but maximum to 50% of the practical training hours!

	hours:
Demonstration or video presentations of processes	22
Gouging	
Brazing	
Plasma welding	
Plasma cutting	
Submerged-arc welding	
Resistance welding	
Friction welding	
Electron beam welding	
Laser welding	
Other processes	
Total:	60

It is strongly recommended that ATBs provide demonstrations instead of videos wherever possible.

Candidates may be exempted by the ATB from the practical training, on a process by process basis, if they can demonstrate practical experience and/or training in the process concerned.

The laboratory exercises contained in the foregoing modules 1 to 4 of the theoretical part are additional and given usually at a later stage of the education.

I.3.2 For the IWP

The practical training has to be done on an individual basis.

The main processes are: MMA, MIG/MAG, FCAW, TIG and Gas Welding. 40 hours shall be reserved to broaden the student's skill in other relevant materials within his welder qualification/s. This training shall end with a practical examination in more than one process or more than one group of material (according ISO 9606 or national standards). For MIG welding only material group 22 and for Gas welding only material groups 1.1 and 1.2 are relevant.

If a student can demonstrate existing practical skill in and an understanding of the welding of different materials, it is accepted that he can sit for the practical examination in these processes and materials without prior practical training.

Typical test pieces and positions are given in Table 1. The test pieces shall be welded as single side welding without backing, except for aluminium, where backing is allowed. Each ANB will work to a similar table based on comparable national standards.

Valid national certificates are accepted as replacements for the practical examinations with test pieces in Table 1.

Table 1: Recommended test pieces and positions for practical examinations:
The dimensions given in the table are recommended/proposed, but not mandatory, other dimensions are accepted.

Welding process		Practical Test		
ISO 9606	**ISO 9606**	**Material Group (ISO TR 15608)**	**Welding Position**	**Test Dimension(s) Diameter/Thickness**
MMA	111	1	PF/BW	6,0 – 13,0
		3	PF/BW	6,0 – 13,0
		4, 5, 6	H-L045/BW	∅60,3 – ∅114.3/ 3.9 – 7.11
		7	PF/BW	6,0 – 13,0
		8	PB/FW	6,0 – 13,0
TIG	141	1	H-L045/BW	∅60,3 – ∅114.3 3.9 – 7.11
		3	PF/BW	2,0 – 6,0
		4, 5, 6	H-L045/BW	∅60,3 – ∅114.3 3.9 – 7.11
		7	PF/BW	2,0 – 6,0
		8	H-L045/BW	∅60,3 – ∅114.3 3.9 – 7.11
		22	PF/BW	2,0 – 6,0
MIG	131	22	PF/BW	6,0 – 13,0
MAG (and/or metal cored)	135 (136)	1	PF/BW	6,0 – 13,0
		8	PB/FW	6,0 – 13,0
FCAW (flux cored only)	136	1	PF/BW	6,0 – 13,0
		8	PF/BW	6,0 – 13,0
		3	PA/FW	6,0 – 13,0
GAS	311	1	H-L045/BW	∅60,3 – ∅114.3 3.9 – 7.11

Twenty hours shall be reserved to give the student basic understanding of the possibilities and limitations of the other processes mentioned in Table 1. The purpose of this training is only to demonstrate the possibilities and limitations of these processes, and no practical examination is required. If the student can demonstrate to the training establishment skill in and understanding of the other processes, he may be exempted from this training.

Acceptance criteria for the practical examination:

The quality of welding shall comply with ISO 9606, or comparable quality levels defined in National welders qualification standards used by IAB Group A countries. A welder qualification certificate may be issued.

Appendix I: Abbreviations for Processes

The following abbreviations used in the document show the relation between the ISO designation, the process abbreviations used in Europe and those used in the USA.

ISO 4063	European (EA) and American (AA) abbreviations		Full name
111	EA	MMA	Manual Metal Arc Welding
	AA	SMAW	Shielded Metal Arc Welding
114	EA	FCAW	Self-shielded tubular cored arc
	AA	FCAW	Self-shielded tubular cored arc welding
12	EA	SAW	Submerged Arc Welding
	AA	SAW	Submerged Arc Welding
13	EA	GMAW	Gas Shielded Metal Arc Welding
	AA	GMAW	Gas Metal Arc Welding
131	EA	MIG	MIG welding with solid wire electrode
	AA	GMAW	Gas metal arc welding using inert gas and solid wire electrode
132	EA	MIG	MIG welding with flux cored electrode
	AA	FCAW	Flux cored arc welding
135	EA	MAG	MAG welding with solid wire electrode
	AA	GMAW	Gas metal arc welding using active gas with solid wire electrode
136	EA	MAG	MAG welding with flux cored electrode
	AA	FCAW	Gas metal arc welding using active gas and flux cored electrode
138	EA	MAG	MAG welding with metal cored electrode
	AA	FCAW	Gas metal arc welding using active gas and metal cored electrode
141	EA	TIG	TIG welding with solid filler material (wire/rod)
	AA	GTAW	Gas tungsten arc welding using inert gas and solid filler material (wire/rod)

ISO 4063	European (EA) and American (AA) abbreviations		Full name
142	EA	TIG	Autogenous TIG welding
	AA	GTAW	Autogenous gas tungstenarc weldingusing inert gas
21	EA		Resistance spot welding
	AA	RSW	Spot Welding
25	EA		Resistance Butt Welding
	AA	RSEW	Upset Welding
3	EA		Gas Welding
	AA	OFW	Oxy-fuel Gas Welding
311	EA		Oxy-acetylene Welding
	AA	OAW	Oxy-acetylene Welding
42	EA	FW	Friction Welding
	AA	FW	Friction Welding
43	EA	FSW	Friction Stir Welding
	AA	FSW	Friction Stir Welding
81	EA		Flame Cutting
	AA	OFC	Oxygen Cutting, oxyfuel cutting
86	EA		Flame Gouging
	AA		Thermal Gouging

Appendix II: Requirements for ANB Detailed Assessment used in Alternatives Routes

After the candidate has fulfilled the requirements of the ANB paper check he will be admitted to the ANB Detailed Assessment (Diagram 9).

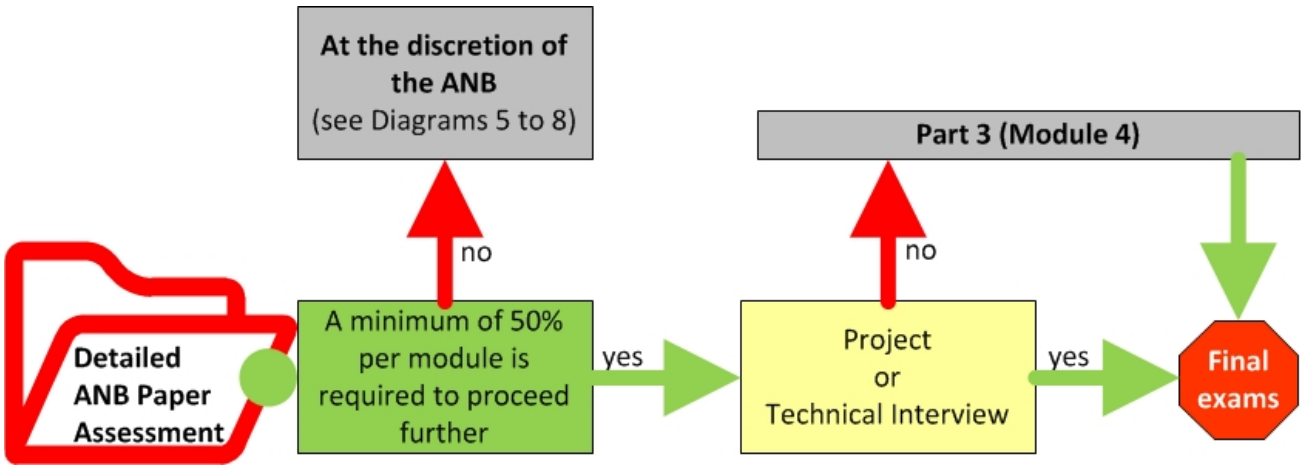

Diagram 9: ANB detailed Assessment

The ANB detailed assessment shall include:

a) a detailed paper assessment of the candidates CV for evidence of that the candidates knowledge of the subject matter in guidelines 1 to 4 is consistent with the relevant qualification level. This is achieved using a check list with point allocations

b) a project or a technical interview to test the candidates ability to logically apply the knowledge expected by the relevant qualification guideline in module 4 (Fabrication, applications engineering).

The sequence of this assessment shall be determined by the ANB. It is within the discretion of the ANB to terminate the assessment at any point and defer the application or re-direct the candidate to the standard route.

The paper assessment shall be based on a review of the applicant's experience and education against the IIW guideline and access conditions. This review will be based on the information provided by the applicant, as outlined in his/her Curriculum Vitae and in supporting documentation which may include course outline, transcripts, certification documents, diplomas, degrees, etc.

Appendix III: List of Referenced Standards

Standard (-series)	Title
ASME IX	American Society of Mechanical Engineers; Boiler and Pressure Vessel Code, Section IX: Welding and Brazing Qualifications
ISO/TR 581	Weldability – Metallic Materials, Definitions
ISO/TR 17671-1 (EN 1011-1)	Welding - Recommendations for welding of metallic materials - Part 1: General guidance for arc welding
ISO/TR 17671-2 (EN 1011-2)	Welding - Recommendations for welding of metallic materials - Part 2: Arc welding of ferritic steels
ISO 17639	Destructive tests on welds in metallic materials - Macroscopic and microscopic examination of welds
ISO 14732	Welding personnel — Qualification testing of welding operators and weld setters for mechanized and automatic welding of metallic materials
EN 1708	Welding - Basic weld joint details in steel (series)
ISO 2553	Welded, brazed and soldered joints - Symbolic representation on drawings
ISO 3834	Quality requirements for fusion welding of metallic materials (series)
ISO 4063	Welding and allied processes - Nomenclature of processes and reference numbers
ISO 5817	Welding - Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) - Quality levels for imperfections
ISO 9000	Quality management systems (series)
ISO 9606	Approval testing of welders - Fusion welding (series)
ISO 9692	Welding and allied processes - Recommendation for joint preparation (series)
ISO 9712	Non-destructive testing - Qualification and certification of personnel
ISO 10042	Welding - Arc-welded joints in aluminium and its alloys - Quality levels for imperfections
ISO 17635	Non-destructive examination of welds - General rules for metallic materials
ISO 13916	Welding - Guidance on the measurement of preheating temperature, interpass temperature and preheat maintenance temperature
ISO 13920	Welding - General tolerances for welded constructions - Dimensions for lengths and angles - Shape and position
ISO 14731	Welding coordination - Tasks and responsibilities
ISO/TR 15135	Welding - Design and non-destructive testing of welds

Standard (-series)	Title
ISO/TR 15235	Welding - Methods for assessing imperfections in metallic structures
ISO/TR 15481	Welding of reinforcing steel - Tack weldability - Test methods and performance requirements
ISO 15607	Specification and qualification of welding procedures for metallic materials - General rules
ISO/TR 15608	Welding - Guidelines for a metallic material grouping system
ISO 15609	Specification and qualification of welding procedures for metallic materials – Welding procedure specification (series)
ISO 15610	Specification and qualification of welding procedures for metallic materials - Qualification based on tested welding consumables
ISO 15611	Specification and qualification of welding procedures for metallic materials - Qualification based on previous welding experience
ISO 15612	Specification and qualification of welding procedures for metallic materials - Qualification by adoption of a standard welding procedure
ISO 15613	Specification and qualification of welding procedures for metallic materials - Qualification based on pre-production welding test
ISO 15614	Specification and qualification of welding procedures for metallic materials - Welding procedure test (series)
ISO/TR 16060	Destructive tests on welds in metallic materials — Etchants for macroscopic and microscopic examination
ISO 17660	Welding - Welding of Reinforcing Steel (series)
ISO 17662	Welding - Calibration, verification and validation of equipment used for welding, including ancillary activities
ISO 17663	Welding - Guidelines for quality requirements for heat treatment in connection with welding and allied processes