IIW Guideline
Alternative Route

Minimum Requirements for the Education, Examination and Qualification

IAB-442r0-22

MINIMUM REQUIREMENTS FOR THE EDUCATION, TRAINING, EXAMINATION AND QUALIFICATION

ALTERNATIVE ROUTE (AR)

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

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 ANBs contacts)

Published by: **Management Team**
Av. Prof. Dr. Cavaco Silva, 33
Taguspark – Apartado 023
P-2741-901 Porto Salvo
Portugal

Tel: +351.21.5815200
E-mail: ewf@ewf.be
Web Site: www.iiwelding.org
www.ewf.be

Table of Contents

Part I – Basic requirements concerning the application for the Alternative Route (AR) within IIW and EWF Systems 4
1 General introduction and scope of the document 4
2 Application and Access Conditions for the Alternative Route (AR) 4
2.1 For International Welding Engineer - IWE 5
2.2 For International Welding Technologist - IWT 6

Part II – The Alternative Route Application Evaluation Process 9
1 Requirements for ANB Detailed Assessment used in Alternatives Routes 9

Appendix II (Rev 0) – Evaluation Matrix 18
Appendix III (Rev 0) - Technical Interview 19
Appendix IV - Optional Requirement - Project 22

Part I – Basic requirements concerning the application for the Alternative Route (AR) within IIW and EWF Systems

1 General introduction and scope of the document

To gain an IIW Diploma under the IIW (and EWF) System, the following routes for qualification are applicable:

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

On each qualification guideline it is describe the routes: Standard, Experiential and Transition. Regarding the Blended Learning route, the training programme and examination are defined on the qualification guideline, but the structure of the blended learning courses are defined on the guideline IAB-195 (latest edition).

This document has the aim to define the rules and requirements for applicants that want to apply for the Alternative Route.

The Alternative Route is aimed at individuals who may already have experience of the job function at a particular level and relevant education 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 in a documented way, 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

This guideline can be applied for the following qualification levels:

- IWE – International Welding Engineer
- IWT – International Welding Technologist
- IWS – International Welding Specialist
- IWP – International Welding Practitioner

See the more information about these qualification levels on the guideline IAB-252 (latest edition)

2 Application and Access Conditions for the Alternative Route (AR)

Applicants shall submit the Application Form (see Appendix I) to the ANB together with the appropriate documents indicated in the sub clauses 2.1, 2.2, 2.3 or 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 (see Part II).

2.1 For International Welding Engineer - IWE

The applicant shall submit:

- The Application Form (see Appendix I)
- 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

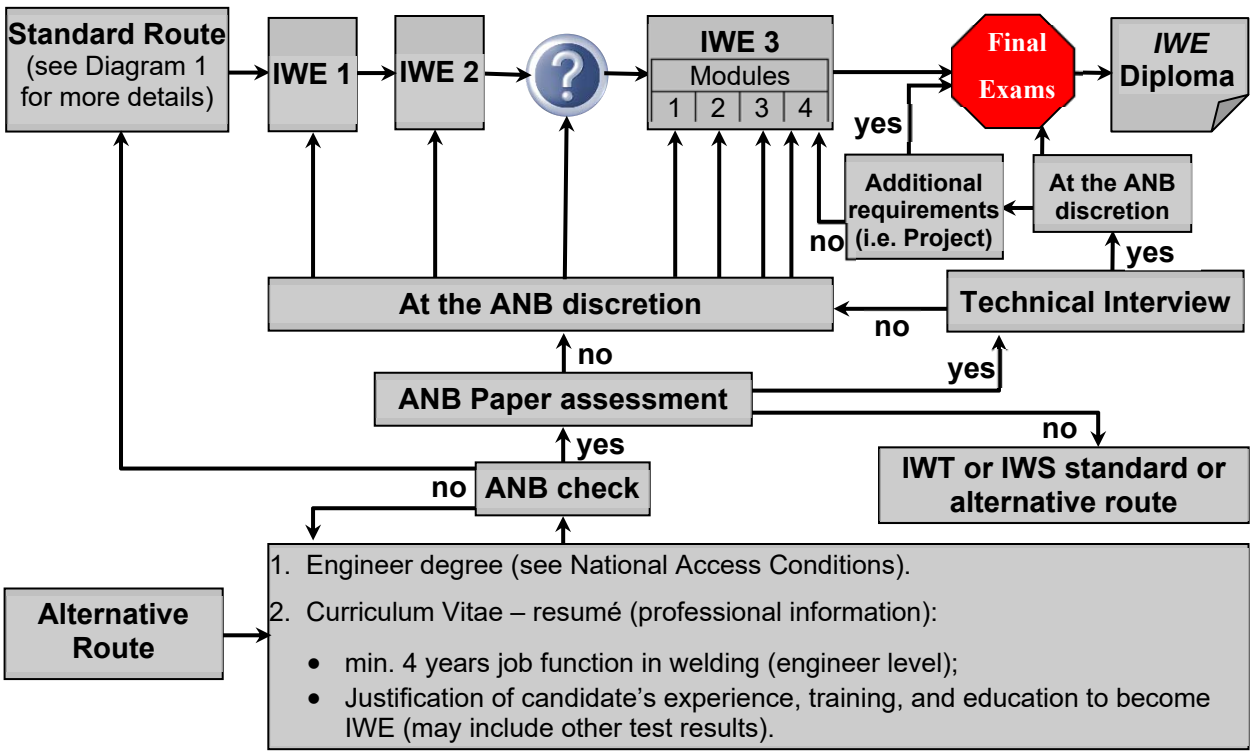

Diagram 1: Alternative versus Standard Routes for IWE qualification

(see also Part II – The Alternative Route Application Evaluation process)

2.2 For International Welding Technologist - IWT

The applicant shall submit:

- The Application Form (see Appendix I)
- 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.

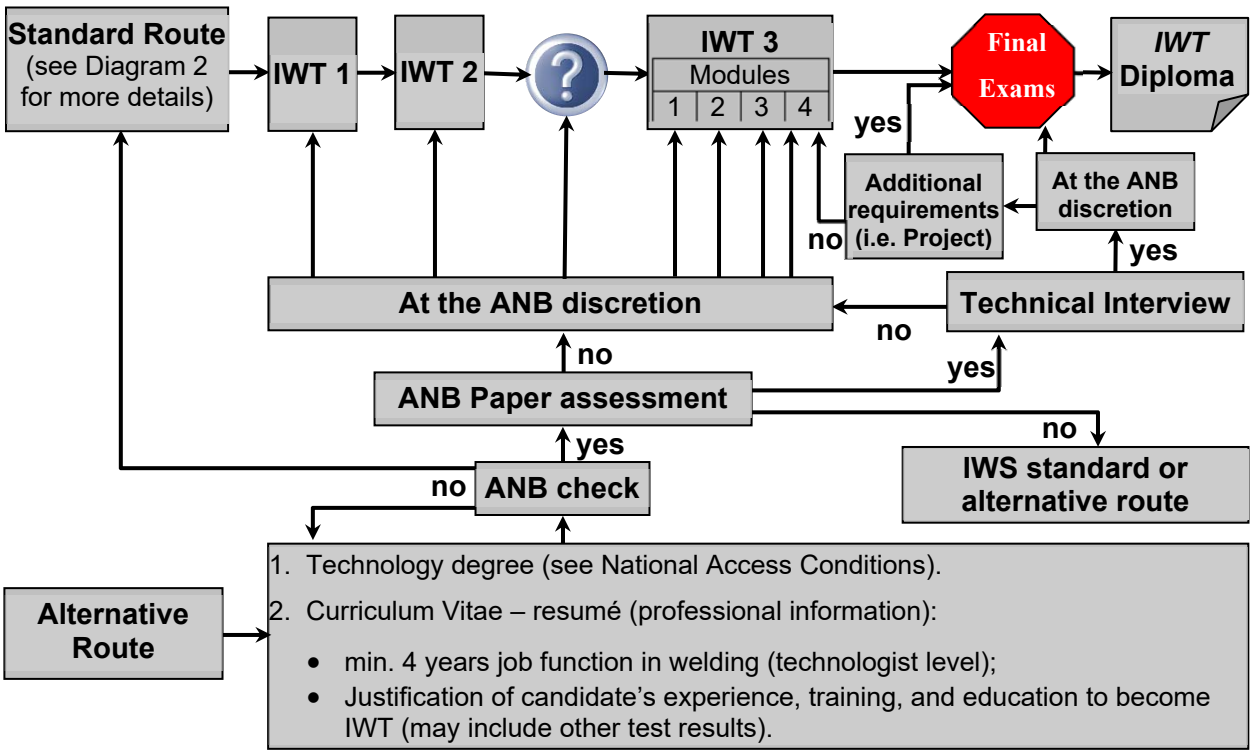

Diagram 2: Alternative versus Standard Routes for IWT qualification

(see also Part II – The Alternative Route Application Evaluation process)

Part II – The Alternative Route Application Evaluation Process

1 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 5).

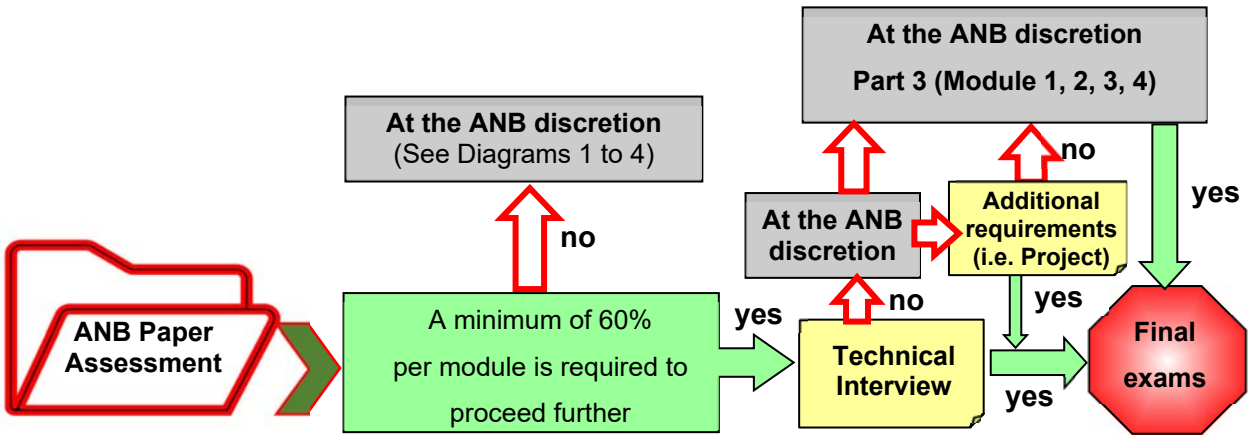

Diagram 5: ANB detailed Assessment

The ANB detailed assessment shall include:

a) The applicant shall submit a fully completed Harmonized Application form (see Appendix I). The applicant is responsible to provide all required evidence to support the information detailed on the Application (e.g. curriculum vitae, course outline, transcripts, certification documents, diplomas, degrees etc.).

b) ANB shall conduct a detailed assessment of the Application and supporting documents against the IIW guideline and access conditions. The assessment will use the Evaluation Matrix (see Appendix II) for the purpose of determining if the candidate's education and experience are consistent with the relevant qualification level of the subject matter in Modules 1 to 4.

The ANB shall apply the Alternative Route Evaluation Matrix, to score the self-evaluation applicant form. As a minimum, the applicant shall reach 60% in each module to be admitted to the technical interview:

Note: If an applicant has a valid certification at the relevant level which covers a module the ANB may accept this as equivalent to the required 60% level.

c) A technical interview to test the candidate's ability to logically apply the knowledge expected by the relevant qualification guideline in Modules 1 to 4 shall be completed (see Appendix III).

In Modules 1 to 4, at least 50% of the applicant scoring points achieved when the paper assessment was done shall be verified in the Technical Interview

d) At the ANBs discretion, an optional requirement may be included prior to the final exams (i.e. project, see Appendix IV).

e) When the ANB has confirmed that the applicant has met the requirements of the detailed assessment (see b) above), technical interview (see c) above) and where applicable, the optional requirement (see d) above), they can be admitted to the final examination defined for the relevant guideline.

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.

Appendix II (Rev 0) – Evaluation Matrix

(The Evaluation Matrix is available as an excel file secured, it is also available a pdf file with instructions how the Evaluation Matrix performs the calculations and what column shall be fill up by the ANB and with what information)

The **Evaluation Matrix** shall be completed by the ANB with the following scoring system on the checklist:

Classification of education/experience	**Points**
Job Function and Education/Training	3
Training at an ATB in accordance with the guideline	3
Job Function	2
General education/training	1
None	0

The ANB shall apply the Alternative Route Evaluation Matrix, to score the self-evaluation applicant form. As a minimum, the applicant shall reach 60% in each module to be admitted to the technical interview

Note: If an applicant has a valid certification at the relevant level which covers a module the ANB may accept this as equivalent to the required 60% level.

Welder Qualification Certificate (for IWP candidate only)

A minimum of two valid welder qualification certificates corresponding to IAB-252 (latest edition) Section I, Chapter 6 of the standard route shall demonstrate in common with the paper assessment.

Below can be seen part of the Evaluation Matrix

	IAB-442 - Appendix II - Alternative Route Application Evaluation Matrix - Rev 0 - 2022-07-19					
	Applicant Full Name					
	Date of Application and IIW Qualification Level					
	ANB name					
	Date of review					
	Name of the Reviewer					
	Reviewer Comemnts/Observations					
	Course			IWE		
	Total	374		743	57	
	(weight x 3) or %(Total/(weightx 3))	1122		66%	15%	
		Weight of the item	Evaluation (0,1, 2, or 3)	Score = Weight x Evaluation	Non attendance (=weight if evaluation=0)	Recommandation of the ANB
1	**Welding processes and equipment**	85		136	34	
1-01	General introduction to welding technology	3	2	6		
1-02	Oxy-gas Welding and related processes	2	3	6		
1-03	Electrotechnics	1	1	1		
1-04	The arc	3	0	0	3	
1-05	Power sources for arc welding	4	0	0	4	
1-06	Introduction to gas shielded arc welding	2	1	2		
1-07	TIG Welding	5	3	15		
1-08-1	MIG/MAG	8	3	24		
1-08-2	Flux Cored Arc Welding	2	3	6		
1-09	MMA Welding	6	3	18		
1-10	Submerged-Arc Welding	6	3	18		
1-11	Resistance Welding	6	0	0	6	
1-12-1	Laser; Electron Beam; Plasma	8	0	0	8	
1-12-2	Other Welding Processes	6	0	0	6	
1-13	Cutting, Drilling and other edge preparation processes	4	3	12		
1-14	Surfacing and Spraying	2	0	0	2	
1-15	Procédés totalement mécanisés et automatiques ; robotique	8	2	16		
1-16	Brazing and soldering	4	3	12		
1-17	Joining processes for plastics	4	0	0	4	
1-18	Joining processes for ceramics and compositescomposites	1	0	0	1	
1-19	Welding laboratory - Not to be scored					
	maximum score (=weight sum x 3):	255	score sum / maximum score	53%	40%	

Appendix III - Technical Interview

The candidate shall be assessed via a technical interview using the prescribed script.

The Minimum duration for the Technical Interview (assuming 5 minutes per question):

Qualification level	IWE	IWT	IWS	IWP
Duration (minimum)	2 hours	1,5 hours	1 hour	45 minutes

Note:

A) The purpose of the Technical Interview is to verify the accuracy of the information on the application and is not an assessment of knowledge;

B) Questions may be applicable for all levels, but answers will be evaluated by the ANB at the qualification level being sought by the candidate. Each qualification level shall have different depth in terms of knowledge and skills expected.

Detailed distribution of points for Modules 1, 2, 3 and 4 and Questions Script

Module 1: Welding processes and equipment	**Max. number of points**		
	IWE and IWT	**IWS**	**IWP**
111 - MMA	3	3	4
14 - TIG and 15 - Plasma	2	2	2
131 - MIG	2	2	2
135 - MAG	2	2	2
114, 136 and 138 - Flux-cored methods	3	3	3
91, 93 and 97 - Brazing methods	2	2	0
81, 82 and 83 - Thermal cutting	2	2	3
12 - SAW	3	3	3
Other methods	3	3	3
Total	**22**	**22**	**22**
Questions Script:			
The ANB shall assess the information on the Application Form by verifying the applicant's knowledge, experience, training and at least 50% of applicant scoring point shall be verified by using the below question script regarding the topics from the above list. The questions shall address: - Working principles; - Consumables - Filler materials, Electrodes, Shielding and Purging Gases (applications, role/functions, handle/storage, classification, basic principles how to choose) - Main process variables and influence on the weld bead shape or cutting surface - Typical imperfections			

Module 2: Materials (acc. to ISO/TR 15608) and their behaviour during welding	Max. number of points		
	IWE and IWT	IWS	IWP
Steel alloys groups 1 – 3 and 11	4	4	6
Cr-Mo- and vanadium steels: groups 4 - 6	2	1	1
Ferritic and martensitic steels group 7	2	2	2
Austenitic and aust./fer. steels groups 8 and 10	4	2	3
Steel-Ni- alloys, max 10% Ni group 9	1	1	1
Aluminium and alloys groups 21 - 26	3	2	2
Copper and alloys groups 31 - 38	1	1	0
Nickel and alloys groups 41 - 48	1	1	0
Ti, Zr and alloys groups 51 – 54 and 61 - 62	1	0	0
Cast iron groups 71 - 76	1	1	0
Total	**21**	**15**	**15**
Questions Script:			
The ANB shall assess the information on the Application Form by verifying the applicant's knowledge, experience, training and at least 50% of applicant scoring point shall be verified by using the **below** question script **regarding** the topics from the above list The questions shall address: - Main properties and applications; - Weldability issues and how to overcome			

Module 3: Construction and design	Max. number of points		
	IWE and IWT	IWS	IWP
Stresses and strains	5	2	0
Design of welded structures - static loading	3	3	4
Design of welded structures - cyclic loading	3	1	2
Joint design & design principles of welded structures	4	2	4
Joint design & design principles of pressure vessels	4	2	1
Total	19	11	11
Questions Script:			
The ANB shall assess the information on the Application Form by verifying the applicant's knowledge, experience, training and at least 50% of applicant scoring point shall be verified by using the below question script regarding the topics from the above list The questions shall address: - Types of stresses and how to minimize the problems when welding; - From a certain type of weld joint explain the applications, advantages and disadvantages - Identify welding symbols - Identify measures to increment fatigue strength - Discuss the behaviour of welded joints under different types of loading			

Module 4: Fabrication and applications engineering	Max. number of points	
	IWE and IWT	IWS and IWP
Quality assurance in welded fabrication	4	3
Quality control during manufacture	3	3
Welding stresses and distortion	4	4
Plant facilities, welding jigs and fixtures	2	2
NDT	3	3
Economics	2	1
Health and safety	2	2
Repair welding	2	2
Total	**22**	**20**

Questions Script:

The ANB shall assess the information on the Application Form by verifying the applicant's knowledge, experience, training and at least 50% of applicant scoring point shall be verified by using the below question script regarding the topics from the above list

The questions shall address:

- Quality Control and Quality Assurance Control – differences and application;
- Why and how qualification testing of welders shall be performed;
- Why and how *Welding Procedure Qualification Test* shall be done;
- Types of deformations, how to prevent and solve it;
- Residual stresses on weld joints, why and how to minimise the possible problems;
- Main characteristics of NDT methods and applications;
- Health and Safety risks, identification of the risks and how to solve them;
- Repair welding the main factors for success, the content of a repair plan

Appendix IV - Optional Requirement - Project

An ANB may choose to assess the candidate by Technical Interview and Project.

The project shall be in form of a case study. The purpose of the project is to evaluate the candidate's ability to apply knowledge in the area of Fabrication, applications engineering (module 4). The project should be of sufficient complexity and detail that the typical time allocated for completion meets the requirements set out in the table below. Once started the project should be completed within a maximum period of time which is also shown in the table below.

At the discretion of the ANB the case study may be performed as a group exercise. Each candidate shall, however, prepare a final report and presentation (b.1-3 below) individually.

Time conditions	Qualification level			
	IWE	IWT	IWS	IWP
Time allocated for project completion	80 hours	60 hours	40 hours	8 hours
Maximum period in which the project should be completed.	4 weeks	3 weeks	3 weeks	1 week

The ANB shall decide on the choice of project construction and the applicable codes and/or product standards. One of the following types of construction shall be taken:

Type of construction	Qualification level			
	IWE	IWT	IWS	IWP
Pressure vessel	X	X	X	X
Construction – static loading	X	X	X	X
Construction – dynamic loading	X	X	X	
Other construction	X	X	X	X

Alternatively, the ANB may, at its discretion, accept a proposal for a project from the candidate based on the candidate's field of work. In such a case the project shall meet allocated time and maximum period requirements mentioned above.

The project work is detailed as following:

1 Pre-study	IWE	IWT	IWS	IWP
• Pre-study including a workmanship example.	-	-	-	X
• Understand the consequences of the desired manufacturing code.	X	X	X	-
• Evaluation of drawings and technical specifications.	X	X	-	-
• Read and understand drawings and technical specifications.	-	-	X	X
• Evaluation of and comments to the choice of base materials. Discuss the weldability of the materials. Any needs for pre- and post-weld heating.	X	X	-	-
• Knowledge about the choice of base materials. Discuss the weldability of the materials. Any needs for pre- and post-weld heating.	-	-	X	X
• Evaluation of the construction based on the choice of:	X	X	X	
• Discussion of the construction based on the choice of:	-	-	-	X
– Joining method(s) for the base material(s);	X	X	X	X
– Cutting method(s) for preparation of base material parts;	X	X	X	X
– Joint preparation and weld calculation;	X	X	X	-
– Joint preparation;	-	-	-	X
– Welding consumables;	X	X	X	X
– Need of surface treatment before welding;	X	X	X	X
– Surface treatment of finished construction - method(s) to be used.	X	X	-	-
• Preparation of necessary WPSs and testing methods.	X	X	X	-
• Interpretation of necessary WPSs.	-	-	-	X
• Evaluation of necessary welding qualification(s) for welder(s).	X	X	X	-
• Interpretation of necessary welding qualification test(s) for welder(s).	-	-	-	X
• Present NDT methods to be used during and after welding.	X	X	X	-
• Discuss possible NDT methods that can be used during and after welding, including special tests to check the entire quality of the construction.	-	-	-	X
• Prepare:				
– Production plan;	X	X	X	-
– Welding plan – including welding sequence and tack welding;	X	X	X	-
– List of standards needed for the project;	X	X	-	-
– Quality plan for the production based on relevant part of ISO 3834 or equivalent. Type of workshop for this kind of production shall be discussed.	X	X	X	-

2 Practical part on the construction or on test pieces – simulating the same construction – provided by the ANB	IWE	IWT	IWS	IWP
• Checking:				
– Marking(s) and certificate(s) on base material(s);	X	X	X	X
– Welder(s) qualification test certificate(s);	X	X	X	X
– Qualification of personnel for destructive testing, NDT and inspection.	X	X	X	-
• Evaluation of test results and compare with pre-study figures.	X	X	X	-
• Plan for inspection before and during welding.	X	X	X	-
• Inspection after welding based on pre-study plans – (visual inspection and other NDT methods, eventually pressure testing or other testing methods).	X	X	X	-
• Discussion of inspection reports.	-	-	-	X
• Evaluation of the welding and test results based on inspection and NDT reports.	X	X	X	-
• If evaluation shows need for repair, plan(s) for repair welding and eventually WPSs for repair welding to be made.	X	X	X	-
• Evaluation of fabrication costs.	X	-	-	-

3 Final report and presentation	IWE	IWT	IWS	IWP
• The candidate shall prepare a final written report with results from his project based on the pre-study figures and the practical part.	X	X	X	-
• The report shall include viewpoints regarding economy of production and at same time ensure the quality of the product.	X	X	X	-
• The candidate shall give an oral presentation of the project to the board of examiners.	X	X	X	-
• The candidate shall give an oral report of results from his project based on the pre-study figures and the practical part.	-	-	-	X