

IIW Guideline

# INTERNATIONAL WELDING INSPECTION PERSONNEL



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



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

**INTERNATIONAL WELDING INSPECTION PERSONNEL**

**(IWIP)**

**International Welding Inspector Level Comprehensive (IWI-C)**

**International Welding Inspector Level Standard (IWI-S)**

**International Welding Inspector Level Basic (IWI-B)**

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

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

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

Guideline of the International Institute of Welding

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## Preface

This document is based upon the European Welding Inspection Personnel Guideline (former Document EWF-450) as developed by the European Federation for Welding, Joining and Cutting (EWF), through an Agreement first signed in 19 July 1997 at the Annual Meeting of the International Institute of Welding in San Francisco, California, USA and which has been renewed and further developed since then.

Any EWF ANB is permitted to issue EWF diplomas equivalent to the IIW ones that have been issued by the same ANB.

Copies of this document are available from the IIW IAB Secretariat or their designated distributor.



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## MINIMUM REQUIREMENTS FOR THE EDUCATION, TRAINING AND QUALIFICATION OF INTERNATIONAL WELDING INSPECTION PERSONNEL (IWIP)

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### 1. Introduction and scope

This Guideline covers education, training and qualification of Welding Inspection Personnel. It does not cover Certification of these personnel.

This Guideline is designed to provide the core education and training in welding and inspection technology required by those responsible for performing inspection tasks at various levels. It is possible that additional training and/or experience may be necessary beyond the core education and training to meet the requirements of specific applications or job functions or local requirements or legislation.

Section 1 of this Guideline covers the minimum requirements for education and training, agreed upon by all national welding societies within the IIW, in terms of objectives, scope, learning outcomes and teaching hours to be devoted to achieving them. These will be revised periodically by IIW IAB Group A to take into account any changes that may affect the “state of the art”. Students having successfully completed this course of education and training will be expected to be capable of applying welding inspection technology as covered by this Guideline.

Section 2 of this document covers rules for examination and qualification.

### 2. Definitions and acronyms

For the scope of this Guideline, the following definitions apply:

- **Education and training:** A process of instruction in relevant theory and practice that takes the form of courses of an approved syllabus and periods of practical work under qualified supervision (but shall not include the use of specimens used in the practical examination). All educational courses leading to the award of qualification covered by this Guidelineshall be approved by the IIW Authorised Nominated Body (ANB).
- **Qualification:** A demonstration in accordance with the IIW Guidelines and rules, conducted by the Authorised Nominated Body, involving an examination of the knowledge and skill related to specified criteria. Success in this examination leads to the issue of the related IIW diploma gained. Such diplomas remain valid for the lifetime of the holder.
- **Relevant inspection experience:** The period during which the candidate performed welding inspection as his/her main activity under qualified supervision including personal application of inspection to materials, parts or structures.

In the scope of this Guideline, the following acronyms are used for the inspection personnel:

- **IWIP:** International Welding Inspection Personnel qualified according to this Guideline;
- **IWI-C:** International Welding Inspector at the Comprehensive level;
- **IWI-S:** International Welding Inspector at the Standard level;
- **IWI-B:** International Welding Inspector at the Basic level;

In the scope of this Guideline, the following acronyms are used for the education and training modules:

- **WT-C:** Welding Technology education and training, Comprehensive Level
- **WT-S:** Welding Technology education and training, Standard Level
- **WT-B:** Welding Technology education and training, Basic Level
- **WI-C:** Welding Inspection education and training, Comprehensive Level
- **WI-S:** Welding Inspection education and training, Standard Level



- **WI-B:** Welding Inspection education and training, Basic Level

In the scope of this Guideline, the following acronyms are used for the examinations:

- **WTE-C** Welding Technology Exam, Comprehensive Level
- **WTE-S** Welding Technology Exam, Standard Level
- **WTE-B** Welding Technology Exam, Basic Level
- **WIE-C** Welding Inspection Exam, Comprehensive Level
- **WIE-S** Welding Inspection Exam, Standard Level
- **WIE-B** Welding Inspection Exam, Basic Level
- **PE-C** Practical Exam, Comprehensive Level
- **PE-S** Practical Exam, Standard Level
- **PE-B** Practical Exam, Basic Level
- **IWS 0** Examination as related to IWS 0 training, see Doc. IAB 252 in its last revision

### **3. The Inspector's role**

The inspector's role begins well before welding starts, continues during the welding operation, involves action after welding is completed, and is finalised only when the results are properly reported. As part of the quality system, inspection activities are defined in an inspection and test plan, which clearly describes what is required. The inspector is frequently responsible for producing documents that ensure traceability of the components and related fabricating action.

Prior to welding, the inspector must be assured that the materials are correct and that the shop has approved welding procedures and appropriately qualified welders. Written procedures and competent operators are important to the production of a quality welded product, but the actual execution of the weld is also a critical point for the inspector. Once the inspector is satisfied that all is in order for the welding to proceed, the task becomes one of witnessing and monitoring. There are two basic interests at this point: ensuring that the written procedures are being followed; and checking for any physical signs of non-conformance of the final product.

The inspector's responsibilities are to verify base metals and welding consumables, observe the fit-up and preparation for the weld, and watch the welding operation itself. Once the welding is completed, a new series of inspection tasks begin, which start with executing an inspection programme according to an approved procedure, maintaining the status of examination and testing and selecting specific welds for further NDT or mechanical testing.

Heat treatment (such as preheating, post-heating and post-weld heat treatment) can be a critical parameter in a welding operation and the inspector is often required to ensure that it has been done properly. Heat treatment must be carried out following an approved written procedure. The inspector must know enough about the technique, the equipment and the reports to have confidence in the results.

#### **3.1 Reports**

When preparation, production and inspection are over, the inspector must collate the observations, checklists, and results into a report that is structured to meet the needs of the client, a jurisdiction, or a code. This report is the document of reference, which could allow the tracing of a production parameter that proves after years of service to be contributing to a failure. It allows the tracing of responsibility to a specific supplier or contractor.

One or more interim reports might well be necessary to show progress during a long or complicated construction project. Reports must detail the inspection stages, parameters, and results, including corrective actions if required. It is important to identify quality related problems as early as possible. Interim reports and observations are extremely valuable as they provide engineering and production personnel with information they might not otherwise be aware of.



The inspector's observations might highlight quality problems that could, perhaps, be remedied by design or production changes if found early enough. The inspector should remember to quantify observations where possible.

Typical duties of a welding inspector amongst others, are as follows:

- 1) Interpretation of drawings and specifications;
- 2) Verification of procedure (WPS) and welder or welding operator qualifications;
- 3) Verification of the application of approved welding procedures;
- 4) Selection of production test samples;
- 5) Interpretation of test results;
- 6) Preparation of reports and keeping of records;
- 7) Preparation of inspection procedures; and
- 8) Check the correct application of NDT methods.

The authority to stop work or call for immediate remedial action to resolve a quality problem is particularly important in defining the responsibility of the inspector.

## **4. Levels of Inspection Personnel**

This guideline sets out the education and training for three levels of welding inspection personnel, as follows:

**4.1 BASIC (IWI-B):** A candidate completing the "Basic" level of training under this programme shall possess a general knowledge of welding and inspection application and theory. This knowledge base will enable the candidate to effectively perform the following tasks:

- Conduct direct unaided visual inspection to identify and evaluate welding imperfection according to acceptance criteria;
- Verify, witness and understand all welding related activities in fabrication, including (but not limited to) the following points:
  - Verify the adequacy of information on NDT reports (VT, PT, MT, RT, UT) for conventional techniques;
  - Verify data and adequacy of material certificates (base and filler materials);
  - Verify identification and traceability of the materials during the fabrication process;
  - Verify the compliance of raw materials and consumables against the applicable standards, codes and specifications;
  - Verify the implementation of the WPS in production for conventional applications (e.g. *arc welding processes, steels - see Section 1 for detailed information*);
  - Verify the implementation of PWHT specifications in production;
  - Witness welder approval tests including testing of the specimens or test coupons;
  - Witness production test coupons;
- Read and understand an Inspection Testing Plan;
- Read and understand the construction drawings in relation to inspection activities; and
- Report any of the above actions to a qualified supervisor.

**4.2 STANDARD (IWI-S):** A candidate completing the "Standard" level of training under this programme shall possess an advanced knowledge of welding and inspection theory and application. This knowledge base will enable the candidate to perform the following tasks (in addition to the IWI-B):

- Supervise the activities of the IWI-B;
- Develop and provide instructions to IWI-B;
- Develop, comment and review Quality Control Plans and Inspection and Testing Plans based on product standards, codes, specifications, drawings and regulatory requirements;
- Witness procedure qualification tests including testing of the specimens;



- Verify the compliance of WQPRs and WPSs and welder qualifications and approvals against the applicable standards, codes and specifications for conventional applications (*e.g. arc welding processes, steels, aluminium alloys - see Section 1 for detailed information*);
- Verify the compliance of PWHT specifications against the applicable standards, codes and specifications;
- Verify the compliance of raw materials and consumables certificates against the applicable standards, codes and specifications;
- Take decisions on acceptance of quality documents related to welding fabrication (*e.g. NDT, material testing, production testing, etc.*);
- Take decisions based on quality documents (*e.g. NDT, material testing, production testing, etc.*) according to the requirements defined for the construction;
- Verify radiographic films quality adequacy (no interpretation);
- Identify and verify the relevant NDT techniques for a welded construction; and
- Report on all the above actions.

**4.3 COMPREHENSIVE (IWI-C):** A candidate completing the “Comprehensive” level of training under this programme shall possess an intimate knowledge of welding and inspection theory and application. This knowledge base will enable the candidate to perform the following tasks (in addition to the IWI-S and IWI-B):

- Manage the whole of the Welding Inspection activities;
- Supervise the activities of the IWI-S and IWI-B;
- Develop and provide instructions to IWI-S and IWI-B;
- Act as a technical expert for the Inspection function;
- Develop, comment and review Quality Control Plans and Inspection Testing Plans for applications not covered by product standards, codes, specifications, drawings and regulatory requirements; and
- Manage inspection activities for non-conventional applications with reference to materials, processes, and advanced destructive testing and NDT techniques (*see Section 1 for detailed information*).

## **5. 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; and
3. Distance Learning Programs (see IAB-195 in its last revision).

It is also recognised that personnel certified for NDT at levels 1, 2 or 3 may be exempted from part of the training, see paragraph 8.

## **6. Standard Routes to Qualification**

This Guideline provides different routes to qualification, based on different access conditions and experience as follows.

### **6.1 Routes to qualification to IWI-C**

**Route 1** This route is for those fulfilling the national standard access conditions for IWT or higher, as defined in the directory of access conditions, doc. IAB 020 in its last revision.

To gain the qualification, candidates should attend the education and training and pass the relevant exams as reported in Table 1 with the exception that candidates may decide on the basis of prior learning and/or experience and subject to an ATB assessment and authorisation to proceed directly to the Welding Technology Exams





(WTE-S and WTE-C); only in this case, passing the WT exams is required before entering the Welding Inspection Education and Training Courses (WI-B, WI-S and WI-C).

At the discretion of the ANB, and only for students attending the full standard courses education and training, the Welding Technology Exams (WTE-S and WTE-C) can be performed on the same day as the Welding Inspection Exams (WIE-S and WIE-C) and the Practical Exams (PE-S and PE-C). Route 1 is represented in figure 1.

**Route 2** This route is for those already holding an existing IIW qualification as International Welding Technologist or higher who may proceed directly to the Welding Inspection Modules at the relevant level. In this case, it is not required that applicants are subject to WT examinations at the relevant level. Route 2 is represented in figure 1.

**Route 3** This Guideline considers a system for career development for those qualified IWI-S who have gained two years of relevant inspection experience at IWI-S level to progress to IWI-C (without complying with the access condition given in route 1) only attending WT-C and WI-C training and passing relevant Welding Technology, Inspection and Practical Exams (WTE-C, WIE-C and PE-C) via Route 3 as shown in figure 2.

Candidates may decide, on the basis of prior learning and/or experience and subject to an ATB assessment and authorisation, whether to take the Welding Technology Module (WT-C) first, or proceed directly to the Welding Technology Exam (WTE-C); only in this case, passing the exam is required before entering the Welding Inspection Module (WI-C).

At the discretion of the ANB, and only for students attending the full standard courses education and training, the Welding Technology Exam (WTE-C) can be taken on the same day of the Welding Inspection Exam (WIE-C) and the Practical exam (PE-C). Route 3 is represented in figure 2.

## 6.2 Routes to qualification to IWI-S

**Route 1** This route is for those fulfilling the national standard access conditions for IWS/EWS as defined in the directory of access conditions., doc. IAB 020 in its latest revision, Route 1 and 2, without any limitation in age or experience. To gain the IWI-S qualification, candidates should attend the education and training and pass the relevant exams as reported in table 1, with the exception that candidates may decide on the basis of prior learning and/or experience and subject to an ATB assessment and authorisation to proceed directly to the Welding Technology Exam (WTE-S); only in this case, passing the WT exams (WTE-S) is required before entering the Welding Inspection Education and Training Courses (WI-B and WI-S).

At the discretion of the ANB, and only for students attending the full standard courses education and training, the Welding Technology Exam (WTE-S) can be performed on the same day as the Welding Inspection Exam (WIE-S) and the Practical Exam (PE-S). Route 1 is represented in figure 2.

**Route 2** This route is for those already holding an existing IIW qualification as International Welding Specialist (or higher) who may proceed direct to the Welding Inspection Module at the relevant level. In this case it is not required that applicants are subject to WT examination (WTE-S). Route 2 is represented in figure 1.

**Route 3** This Guideline considers a system for career development for those qualified to IWI-B who have gained two years of relevant inspection experience at IWI-S level, to progress to IWI-S (without complying with the access condition given in route 1) by



only attending WT-S and WI-S education and training and passing relevant Welding Technology, Inspection and Practical Exams (WTE-S, WIE-S and PE-S). Those entering IWI-S via route 3 without satisfying the access condition for Route 1, have to proceed to IWS 0 training and examination, see doc. IAB 252 in its last revision, before entering the Welding Technology education and training. Route 3 is shown in figure 2.

In addition, candidates may decide on the basis of prior learning and/or experience and subject to an ATB assessment and authorisation, to proceed directly to the Welding Technology Exam (WTE-S); only in this case, passing the exam is required before entering the Welding Inspection Module and Practical Examinations (WIE-S and PE-S).

At the discretion of the ANB, and only for students attending the full standard courses education and training, the Welding Technology Exam (WTS-S) can be performed on the same day of the Welding Inspection Exam (WIE WIS-S) and the Practical Exam (PE-C). Route 3 is represented in figure 2.

## 6.3 Routes to qualification to IWI-B

**Route 1** This route is applicable to persons having educational backgrounds in science or engineering, to professional workers and to those having at least two years of professional welding related experience. To gain the IWI-B qualification, candidates should attend the education and training and pass the relevant exams as reported in table 1, with the exception that candidates may decide on the basis of prior learning and/or experience and subject to an ATB assessment and authorisation to proceed directly to the Welding Technology Exam (WTE-B); only in this case, passing the WT Exams is required before entering the Welding Inspection Education and Training Course (WI-B).

At the discretion of the ANB, and only for students attending the full standard courses education and training, the Welding Technology Exam (WTE-B) can be performed on the same day as the Welding Inspection Exam (WIE-B) and the Practical Exam (PE-B). Route 1 is represented in figure 1.

**Route 2** This route is for those already holding an existing IIW qualification as International Welding Practitioner or higher who may proceed direct to the Welding Inspection Module at the relevant level. In this case it is not required that applicants are subject to WT examination at the relevant level. Route 2 is represented in figure 1.

## 6.4 General rules for all standard routes

For all Routes, if the candidate fails the Welding Technology Examination twice at the appropriate level, having exercised an option to proceed directly to that examination, he/she must take the omitted training module before resitting the failed examination.

Rules for IWS 0 are reported in doc. IAB 252, in its last revision.

The rules for the conduct of the examinations by the IIW Authorised Nominated Body (ANB) are prescribed in Section 2 of this Guideline.



| Level   | Education and training   |  | Examinations (route 1)            |                                   |                   |
|---|--|--|-----------------------------------|-----------------------------------|-------------------|
|   | Welding technology (*)   | Welding inspection   | Welding technology                | Welding inspection                | Practical         |
| IWI-C   | WT-B (47h)<br>+<br>WT-S (30h)<br>+<br>WT-C (26h)<br><br><b>Total: 103h</b> | WI-B (55h)<br>+<br>WI-S (41h)<br>+<br>WI-C (32h)<br><br><b>Total: 128h</b> | WTE-C<br>+<br>WTE-S<br>+<br>WTE-B | WIE-C<br>+<br>WIE-S<br>+<br>WIE-B | PE-C<br>+<br>PE-S |
| IWI-S   | WT-B (47h)<br>+<br>WT-S (30h)<br><br><b>Total: 77h</b>                     | WI-B (55h)<br>+<br>WI-S (41h)<br><br><b>Total: 96h</b>                     | WTE-S<br>+<br>WTE-B               | WIE-S<br>+<br>WIE-B               | PE-S              |
| IWI-B   | WT-B (47h)<br><br><b>Total: 47h</b>  | WI-B (55h)<br><br><b>Total: 55h</b>  | WTE-B                             | WIE-B                             | PE-B              |
| (*) Subject to an ATB assessment, the Welding Technology exams can be skipped at the appropriate level before entering Welding Inspection education and training. |  |  |                                   |                                   |                   |

**Table 1 – Standard routes for qualification for IWIP, Route 1**

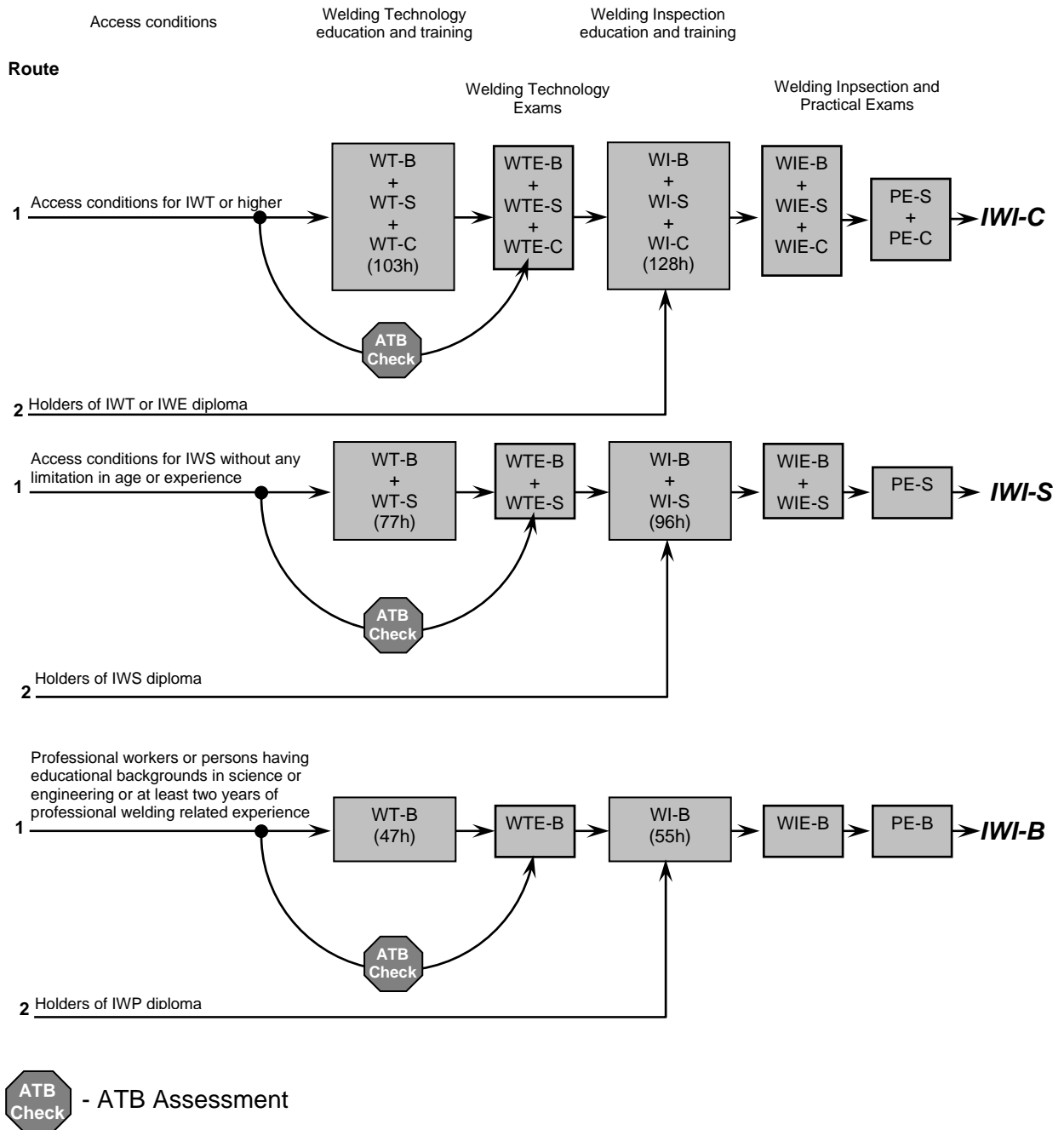
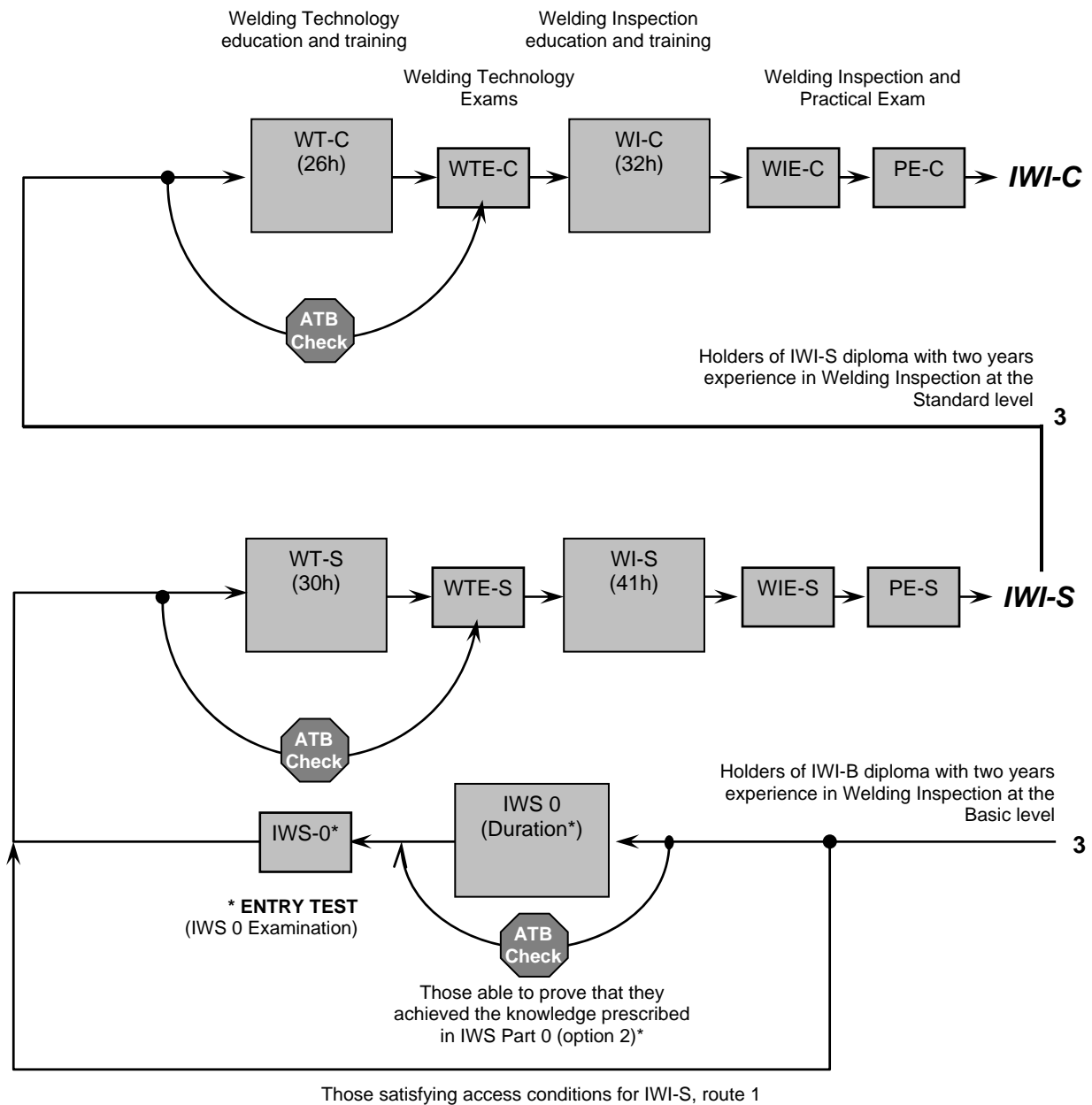


Figure 1. Standard Routes 1 and 2

(The diagram has the only scope to show routes to qualification, see text for requirements)



- ATB Assessments

\* See doc. IAB 252r1, last revision

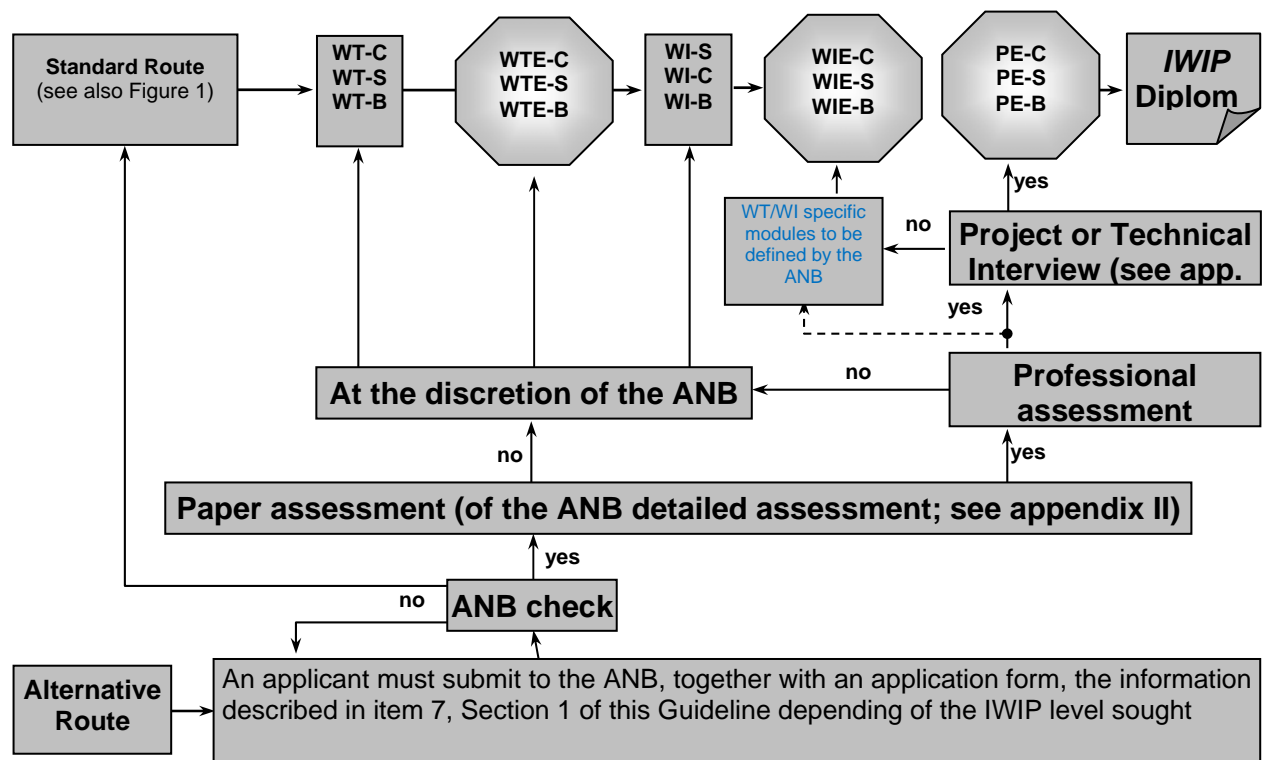
**Figure 2. Standard Route 3**

*(The diagram has the only scope to show route 3 to qualification, see text for requirements)*

**7. Alternative routes to qualification**

To gain qualification according to the Alternative Route, applicants shall submit an application form to the ANB together with the documents indicated in paragraphs 5.1 to 5.3 for a paper assessment.

The ANB shall conduct a paper assessment to ensure that the applicant meets the Access Conditions for the Alternative Route (see the list of access conditions, doc IAB 020 in its last revision) and evaluate the applicant’s practice and related job function in welding inspection. The result of this assessment shall determine if the applicant is suitable for further detailed assessment (see Appendix II).



**Figure 3. Alternative versus Standard Routes for IWIP qualifications**

**7.1 Qualification to IWI-C**

- IWT diploma or evidence of satisfying the access conditions for IWT or higher.
- A curriculum vitae (CV)/resume containing the following professional information:
  - Evidence of at least three years job function in welding and inspection at the Comprehensive level (in a period of 4 years before application)
  - A justification of the candidate’s experience, training, and education to become IWI-C (may include other test results)

**7.2 Qualification to IWI-S**

- IWS diploma or evidence of satisfying the access conditions for IWS or higher.
- A curriculum vitae (CV)/resume containing the following professional information:
  - Evidence of at least two years job function in welding and inspection at the Standard level (in a period of 3 years before application)
  - A justification of the candidate’s experience, training, and education to become IWI-S (may include other test results)



### **7.3 Qualification to IWI-B**

- IWP diploma or evidence of satisfying the access conditions defined for the IWI-B for Route 1 or higher.
- A curriculum vitae (CV)/resume containing professional information:
  - Evidence that the candidate was working in welding and inspection at the Basic level during the last two years before application
  - A justification of the candidate's experience, training, and education to become IWI-B (may include other test results)

The ANB shall determine, by paper check, if the application is suitable for further detailed assessment.

### **8. Recognition of NDT certification**

Those having certification in NDT in accordance with ISO 9712, or equivalent recognised by the ANB may be granted exemption from the NDT parts of the modules for Welding Inspection on a method by method basis, but not from the final examination. The approval of such arrangements is at the discretion of the ANB.

It is recommended that exemption for NDT Level 2 or 3 Certifications should apply to Modules WI-S and C; exemptions for NDT Level 1 certifications should apply to Module WI-B.



**Section 1 - Theoretical and practical education and training, Module welding technology and welding inspection: syllabus and performance objectives**

Theoretical Education: Welding Technology Modules

Welding Technology Modules

WT-C – Is applied for the Comprehensive Level

WT-S – Is applied for the Standard Level

WT-B – Is applied for the Basic Level

|   | WT-C      | WT-S      | WT-B      |
|---|-----------|-----------|-----------|
| <b>1. Welding processes and equipment</b>   | <b>13</b> | <b>5</b>  | <b>17</b> |
| 1.1 General introduction to welding technology  |           |           |           |
| 1.2 Oxy-gas welding and related processes   |           |           |           |
| 1.3 The arc and Power Sources for Arc Welding   |           |           |           |
| 1.4 Tungsten-inert gas welding  |           |           |           |
| 1.5 MIG / MAG and Flux Cored arc welding  |           |           |           |
| 1.6 Manual Metal arc welding  |           |           |           |
| 1.7 Submerged-arc welding   |           |           |           |
| 1.8 Resistance welding  |           |           |           |
| 1.9 LASER, electron beam and plasma arc welding   |           |           |           |
| 1.10 Other welding processes  |           |           |           |
| 1.11 Cutting and other edge preparation processes   |           |           |           |
| 1.12 Surfacing and Spraying   |           |           |           |
| 1.13 Fully Mechanised processes and robotics  |           |           |           |
| 1.14 Brazing and soldering  |           |           |           |
| 1.15 Joining processes for plastics   |           |           |           |
| 1.16 Welding processes demonstrations   |           |           |           |
|   | WT-C      | WT-S      | WT-B      |
| <b>2. Materials and their behaviour during welding</b>  | <b>11</b> | <b>20</b> | <b>19</b> |
| 2.1 Structure and properties of metals and alloys pure metals   |           |           |           |
| 2.2 Iron-Carbon alloys  |           |           |           |
| 2.3 Manufacture and classification of steels  |           |           |           |
| 2.4 Structure of the welded joint   |           |           |           |
| 2.5 Cracking phenomena and imperfections in welding of steels   |           |           |           |
| 2.6 Fractures and different kinds of fractures (including relation with defects)                          |           |           |           |
| 2.7 Heat treatments of base materials and welded joints   |           |           |           |
| 2.8 Carbon, low alloyed, fine grained and thermomechanically treated steels (ISO/TR 15608 groups 1, 2, 3) |           |           |           |
| 2.9 Introduction to weldability of low alloyed and high alloyed steels                                    |           |           |           |
| 2.10 Low alloyed creep resistant steels (ISO/TR 15608 groups 4, 5, 6)                                     |           |           |           |
| 2.11 Low alloy steels for cryogenic applications (ISO/TR 15608 group 9)                                   |           |           |           |
| 2.12 Introduction to Corrosion  |           |           |           |
| 2.13 Stainless and heat resistance steels (ISO/TR 15608 groups 7, 8, 10)                                  |           |           |           |
| 2.14 High Mn Carbon steels (ISO/TR 15608 group 11)  |           |           |           |





- 2.15 Cast irons (ISO/TR 15608 group 71 to 76) and cast steels
- 2.16 Nickel and Nickel alloys (ISO/TR 15608 Group 41 to 48)
- 2.17 Aluminium and aluminium alloys (ISO/TR 15608 Group 21 to 26)
- 2.18 Non ferrous materials (other than nickel and aluminium)
- 2.19 Joining dissimilar materials
- 2.20 Introduction to wear
- 2.21 Protective layers

|  | WT-C     | WT-S     | WT-B     |
|--|----------|----------|----------|
| <b>3. Construction and design</b>  | <b>2</b> | <b>3</b> | <b>5</b> |
| 3.1 Basic theory of structural systems and fundamentals of the strength of materials |          |          |          |
| 3.2 Joint design   |          |          |          |
| 3.3 Fabrication drawings   |          |          |          |
| 3.4 Behaviour of welded structures under different types of loading                  |          |          |          |
| 3.5 Design of structures in Aluminium and its Alloys                                 |          |          |          |
| 3.6 Introduction to Fracture mechanics   |          |          |          |

|   | WT-C     | WT-S     | WT-B     |
|---|----------|----------|----------|
| <b>4. Fabrication, applications engineering</b> | <b>0</b> | <b>2</b> | <b>6</b> |
| 4.1 Welding stresses and distortion             |          |          |          |
| 4.2 Plant facilities. welding jigs and fixtures |          |          |          |
| 4.3 Health and safety                           |          |          |          |
| 4.4 Repair-welding                              |          |          |          |

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|  |           |           |           |
|--|-----------|-----------|-----------|
| <b>Total Minimum hours for Welding Technology Modules:</b> | <b>26</b> | <b>30</b> | <b>47</b> |
|--|-----------|-----------|-----------|



## Welding Inspection Modules

WI-C – Is applied for the Comprehensive Level

WI-S – Is applied for the Standard Level

WI-B – Is applied for the Basic

|  | WI-C      | WI-S      | WI-B      |
|--|-----------|-----------|-----------|
| <b>1. Quality Assurance / Quality Control in Inspection</b>                    | <b>6</b>  | <b>9</b>  | <b>20</b> |
| 1.1 Scope of activity Terms and definitions                                    |           |           |           |
| 1.2 Role of Welding Inspection Personnel                                       |           |           |           |
| 1.3 Management of inspection function  |           |           |           |
| 1.4 Quality Assurance Principles in Welding                                    |           |           |           |
| 1.5 Welders/Welding Operators and Welding Procedures approval                  |           |           |           |
| 1.6 Measurement, inspection and control during welding                         |           |           |           |
| 1.7 Types of imperfections   |           |           |           |
| 1.8 Evaluation of Imperfections  |           |           |           |
| 1.9 Engineering Critical Assessment  |           |           |           |
| <b>2. Testing of welds and Reporting</b>                                       | <b>10</b> | <b>12</b> | <b>18</b> |
| 2.1 Destructive testing of welded joints                                       |           |           |           |
| 2.2 Overview of NDT methods  |           |           |           |
| 2.3 Visual Inspection  |           |           |           |
| 2.4 Liquid penetrant testing (PT)  |           |           |           |
| 2.5 Magnetic particle testing (MT)   |           |           |           |
| 2.6 Radiographic testing (RT)  |           |           |           |
| 2.7 Ultrasonic testing (UT)  |           |           |           |
| 2.8 Advanced and other NDT methods   |           |           |           |
| 2.9 Critical review of selection of NDT methods                                |           |           |           |
| 2.10 Other test methods (pressure testing, dimensional tests, etc.)            |           |           |           |
| 2.11 Qualification and certification of NDT personnel                          |           |           |           |
| 2.12 Documents for quality control in welding                                  |           |           |           |
| 2.13 Economics in Welding Inspection   |           |           |           |
| <b>3. Practical work on testing</b>  | <b>16</b> | <b>20</b> | <b>17</b> |
| 3.1 Radiographic interpretation  |           |           |           |
| 3.2 Witnessing mechanical tests  |           |           |           |
| 3.3 Visual inspection of Welds   |           |           |           |
| 3.4 Metallographic (Micro and Macros)  |           |           |           |
| 3.5 Liquid penetrant and magnetic particle testing                             |           |           |           |
| 3.6 Ultrasonic testing (advanced techniques for IWI-C)                         |           |           |           |
| 3.7 Witnessing Welders approval (for IWI-B) and WPQRs (for IWI-S)              |           |           |           |
| 3.8 Application of testing in different fields and case studies (not only NDT) |           |           |           |
| <b>Total Minimum hours for Welding Inspection Modules:</b>                     | <b>32</b> | <b>41</b> | <b>55</b> |



**Theoretical education: Basic technology “Module 0”**

This module is only applied for certain applicants who want to be engage on the Standard level training (see figure 2).

|   |           |
|---|-----------|
| <b>1. Introduction</b>  | <b>2</b>  |
| <b>2. Units</b>   | <b>2</b>  |
| <b>3. Technical Calculation</b>                               | <b>7</b>  |
| <b>4. Technical Drawing</b>                                   | <b>12</b> |
| <b>5. Basics of Electrotechnology</b>                         | <b>2</b>  |
| <b>6. Basics of Chemistry</b>                                 | <b>2</b>  |
| <b>7. Basics of Materials</b>                                 | <b>5</b>  |
| <b>8. Metal Products</b>                                      | <b>2</b>  |
| <b>9. Machining of Materials</b>                              | <b>2</b>  |
| <b>10. Technical Mechanics</b>                                | <b>2</b>  |
| <b>11. Calculation of strength</b>                            | <b>2</b>  |
| <b>Total Recommend hours for Basic Technology “Module 0”:</b> | <b>40</b> |

Note: This 40 hours course follows the syllabus of Module IWS-0, but only insofar as engineering knowledge required by the International Welding Inspection Specialist level is concerned.



**Appendix II**

**Alternative Route - ANB detailed assessment**

After the candidate has fulfilled the requirements of the ANB check, he will be admitted to the ANB detailed assessment.

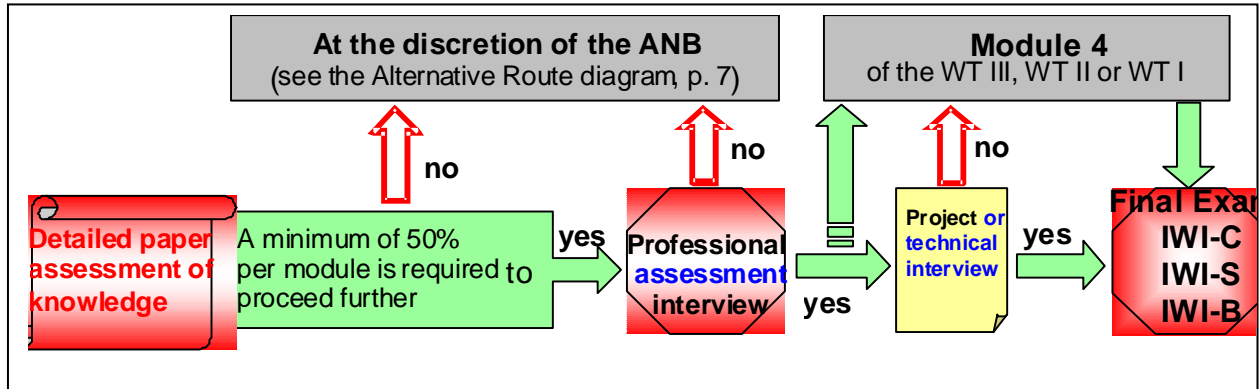


Figure 4: ANB detailed assessment

The full ANB detailed assessment shall contain:

- a detailed paper assessment of knowledge (checklist with points)
- a professional assessment interview designed to test understanding and ability to reason in the field of welding and the syllabus of the standard course and
- a project or a technical interview to test logical application of knowledge

The sequence of this assessment shall be determined by the ANB. It is at the discretion of the ANB to terminate the assessment and send the candidate back or into the standard route.

If he/she has a diploma of IIW ( IWE, IWT, IWS, or IWP) and valid certificates of ISO 9712 cover the syllabus of the Welding Inspection Modules of the present guideline he/she can proceed to professional assessment interview for equivalent level of qualification without detailed paper assessment.

**After fulfilling all of the requirements for a (detailed assessment) and b (Professional assessment interview) and c.1 (Project) or c.2 (Technical Interview) of the ANB detailed assessment, the candidate will be admitted to the final examination.**