

IIW Guideline INTERNATIONAL WELDER



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



IAB-089r5-14-SV00



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

INTERNATIONAL WELDER **(IW)**

**This Guideline, part I and II, replaces document IAB-089-
2003/EFW-452-467-480-481, Rev 3 January 2005**

Approved January 2012

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

INTERNATIONAL AUTHORISATION BOARD (IAB)

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Part I

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Preface

This document is based upon the European Welder series (former docs. EWF-452, EWF-467, EWF-480 and EWF-481), 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 (IIW) in San Francisco, California, USA, and which has been further developed since then. It is established in that Agreement that the International Welder Diploma is equivalent to the European Welder Diploma within the same scope.

This document – known in the WG#A3a as the 'Bratislava Agreement' - reflects the results of thorough in-depth discussions to the basics of welding technology and skill, and was finally issued after a meeting of the working group in Bratislava, Slovakia.

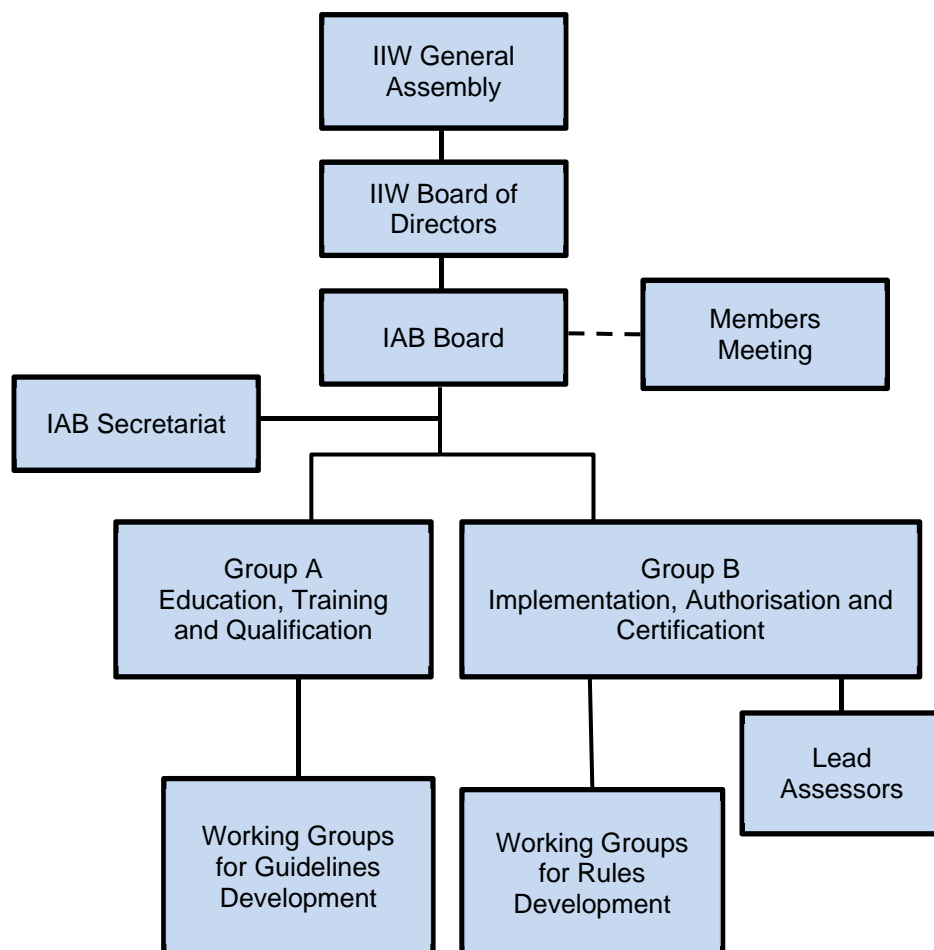
This Guideline is split up into two parts, I and II.

Part I is dealing with the standard scheme for educating welders.

Part II it is optional and provides details on test objects and WPSs to be used for test object examination.

Any EWF 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 IIW IAB Secretariat or their designated distributor.



Organisation of the IAB



Minimum requirements for the Theoretical Education, Practical Training and Examination of International Welders

The use of this Guideline is restricted to organisations approved by the Authorised National Body as Approved Training Bodies (ATB). The requirements for gas welding and arc welding are described in this Guideline in general. Special requirements for welding processes and materials are described in modules

The practical exercises mentioned in this Guideline applies to steels and aluminium and may be used as a basis for other materials.

Part I

1 Introduction

This Guideline for the international education and training of welders has been prepared, evaluated and formulated by Group A of the International Authorisation Board (IAB) of the International Institute of Welding (IIW). The Guideline seeks to achieve harmonisation in the training, examination and qualification testing of welders in the world. It provides for the assessment of both theoretical knowledge and practical skills, the latter being linked to the requirements of ISO 9606 (or equivalent standard) and test objects if part II of this Guideline is applied.

The ISO 9606- series of International Standards provides a scheme for qualification testing of welders, to evaluate their skill for limited ranges of welding conditions. It serves for quality assurance for a specific job, but does not provide an education and training programme. However, the industry needs welders with more skill for the sake of flexibility in production and this Guideline provides a combination of comprehensive theoretical knowledge and high practical skills, assessed by tests of increasing difficulty, including ISO 9606 qualification tests and by theoretical examinations.

This Guideline takes care of both requirements and gives methods for practical training and theoretical education of fillet, plate and pipe welders.

The education and training programme consists of three theoretical modules “A”, “B” and “C”, which provide basic theoretical knowledge in welding, and six practical modules (3 pairs) corresponding to the three levels of skill. Special requirements for each welding process are given in modules S. Special requirements per material (group) are described in modules P.

For each level of skill, two alternative types of practical examinations can be made. Either ISO 9606 tests only or a combination of ISO 9606 tests and a test object.

It is for the ANB to decide whether it is desirable to add knowledge on specific materials to the course. Such knowledge should be in addition to the basic knowledge as specified in this Guideline.

The Guideline will be revised periodically by Group A of the IAB, to take into account any changes, which may affect the 'state of the art'.



2 Access to the course

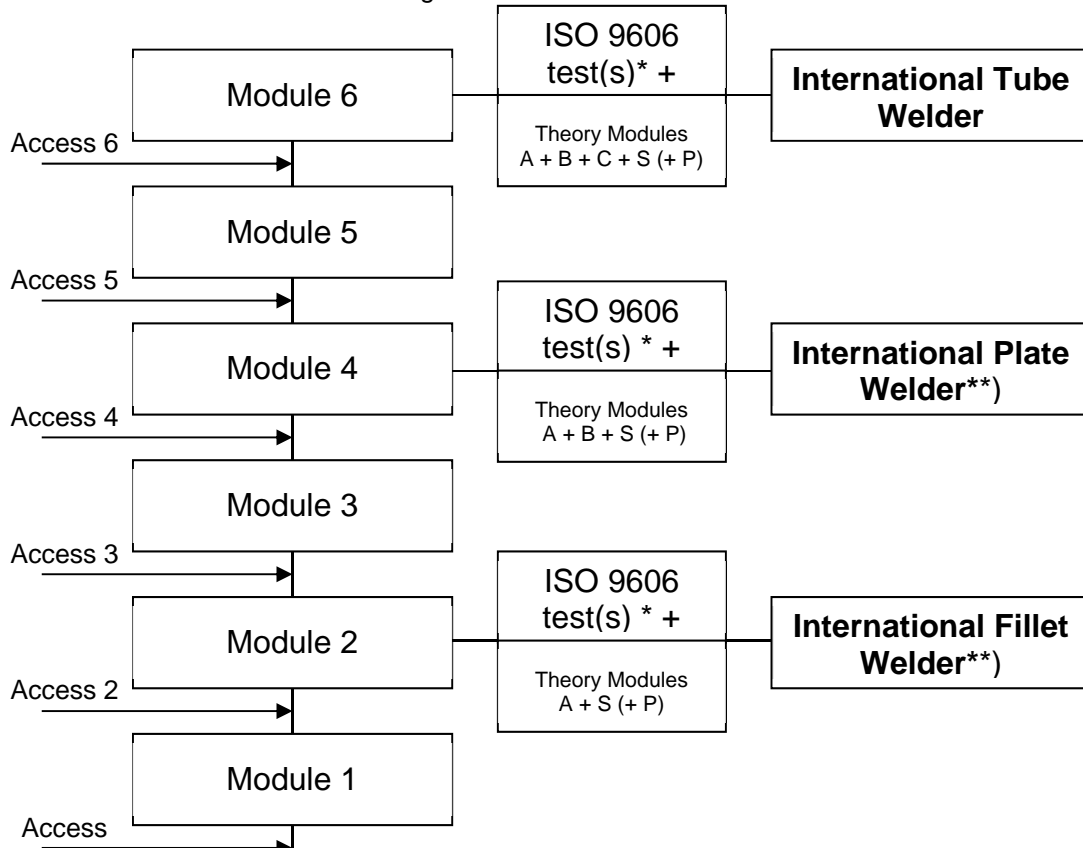
For entry to the module 1, appropriate health, physical and mental capability is assumed. Enough knowledge or education in metal working in order to follow the course is required.

Successful completion of one module qualifies for participation in the next module. With existing knowledge and proven skill, the program may be entered at a higher level, provided that the candidate demonstrates a capability (practically and theoretically) to meet the entry requirements as described below (see also figure 1.).

- Access to Module 2: Demonstrate the required level of skill by passing the tests as described in module 1.
- Access to Module 3: Demonstrate the required level of skill by passing the full examination as described in module 2.
- Access to Module 4: Demonstrate the required level of skill by passing the full examination as described in module 2 and passing the tests as described in module 3.
- Access to Module 5: Demonstrate the required level of skill by passing the full examination as described in module 2 and in module 4.
- Access to Module 6: Demonstrate the required level of skill by passing the full examination as described in module 2 and in module 4 and by passing the tests as described in module 5.

Practical skill may be proven by adequate and valid ISO 9606 or equivalent certificates. At the discretion of the ANB proof of practical skills at a lower level may be delivered after the completion of the training module involved but before awarding the corresponding diploma.

Figure 1: The over-all structure of the training and examination of the international welder.



*)The modules 2, 4 and 6 may be completed either by comprehensive ISO 9606 tests or by less comprehensive ISO 9606 tests and test objects. See Part II of this Guideline for test objects.

***) At the option of the ATB and in agreement with the ANB, it may not be necessary to issue intermediate certificates and diplomas.



3 Instruction programme

The full IIW course consists of modules, which are divided into theoretical education, practical training and examination. The practical training - practice in welding and test welding - is based on the relevant instruction and exercise schedules as per this Guideline. It comprises of three levels of education and training: "Fillet welder", "Plate welder" and "Tube welder".

The recommended periods of time given in the modules A to C and P and S and in the practical part represent the average time required to attain the expected level of knowledge. The time needed may vary individually according to the capability of the student. A teaching hour will contain at least 50 minutes of direct teaching time. It is not obligatory to follow exactly the order of the topics given in this Guideline.

The theoretical education given to the students aims at a basic understanding of the appropriate welding process and the materials behaviour including standards and safety regulations. The themes and keywords are given as 'scope' in the module descriptions, together with the 'objective' and the 'expected result'. After each module a theoretical examination is performed.

The practical training advised in this Guideline will bring the students to the comprehensive skill, required for practical work in industry.

At the beginning of a course the students should be informed about the Constitution of IIW and role in the world, the structure of harmonised system from Welder to welding Engineer and the routes from International Welder to Practitioner and Specialist.

4 IW Diploma via the Alternative Route

The Alternative Route allows those who have gained the knowledge and expertise of the instruction programme in this Guideline and who can demonstrate their capability in all respects, to proceed to examination without compulsory attendance at an ANB approved Training Course.

4.1 Entry Requirements

- Any candidate who can show a welder qualification (i.e. ISO 9606) valid under the scope for the Diploma he/she wants.
- 3 years of experience as a welder.

4.2 Evaluation process

- To perform the theoretical examinations, related to the level of the IW Diploma that the candidate is seeking for, e.g.
 - a candidate for Tube Welder Diploma, must perform examinations Mod. A, B, C, Examination Process related (SX) and the Examination Material related (PSS or PAL).
 - a candidate for Plate Welder Diploma, must perform examinations Mod. A, B, Examination Process related (SX) and the Examination Material related (PSS or PAL).
 - a candidate for Fillet Welder Diploma, must perform examinations Mod. A Examination Process related (SX) and the Examination Material related (PSS or PAL).
 -
- To perform the practical examinations that are defined in the Guideline for the level of the IW Diploma that the candidate is applying for, including the lower levels examinations.
 - a candidate for Tube Welder Diploma, must perform practical examinations Mod. 2,4,5 and 6
 - a candidate for Plate Welder Diploma, must perform practical examinations Mod. 2,3 and 4
 - a candidate for Fillet Welder Diploma, must perform practical examinations Mod. 1 and 2

See figure 1.



- Re-examination in the case of candidate failure on the theoretical examination(s) or on the practical exam(s):

For theoretical examinations candidates are allowed to have two more attempts (in total three attempts). In case of failure on the third attempt the candidate must take the theoretical module(s) that he/she failed.

For practical exams candidates are allowed to have one more attempt. In case of failure on the second attempt the candidate must take the practical module he/she has failed.

4.3 Awarding the IW Diploma

If the candidate is successful in the theoretical and practical examinations, the IW Diploma shall be awarded.

5 Theoretical education

The full IIW theory course consists of modules A to C, supplemented by specific modules per welding process and material.

The modules A – C provide basic theoretical knowledge in welding.

5.1 Module A

The module A provides theoretical education to the level of the International Fillet Welder. The matters to be dealt with and the recommended hours devoted to them are listed below.

A Items for the theoretical education

A.1 Using electricity for arc welding

A.2 Welding equipment

A.3 Health and Safety

A.4 Safe working in the fabrication shop

A.5 Welding consumables

A.6 Welding practice (1)

A.7 Welding practice (2)

A.8 Introduction to steel

A.9 Qualification of welders

Total number of recommended hours for A:

20h



5.2 Module B

The module B provides in addition to module A, theoretical education to the level of the International Plate Welder. The matters to be dealt with and the recommended hours devoted to them are listed below.

B Items for the theoretical education

- B.1 Methods for joint preparation for welding
- B.2 Welded joints in plates
- B.3 Weldability of steels
- B.4 Shrinkage, residual stress, distortion
- B.5 Weld imperfections
- B.6 Overview of fusion welding processes
- B.7 Safe working on site
- B.8 Inspection and testing
- B.9 Quality Assurance in welding (QA)

Total number of recommended hours for B:

18h

5.3 Module C

The module C provides in addition to module A and B, theoretical education to the level of the International Pipe Welder. The matters to be dealt with and the recommended hours devoted to them are listed below.

C Items for the theoretical education

- C.1 Welded joints in pipes
- C.2 Materials other than non-alloy steel
- C.3 Review and consequences of failures
- C.4 International Welding Standards

Total number of recommended hours for C:

7h



6 Modules S, dedicated to one specific welding process.

Modules S: dedicated to one specific welding process to be taught after or in parallel to theoretical modules per material required.

Module SG: Supplementary theoretical education for gas welding (311).

SG.1 Construction and maintenance of gas welding equipment & typical parameters

SG.2 Welding consumables

SG.3 Health and safety

Total number of recommended hours for SG: 5h

Module SA: Supplementary theoretical education for MMA welding (111).

SA.1 Construction and maintenance of MMA welding equipment & typical parameters

SA.2 Covered electrodes

SA.3 Health and safety

Total number of recommended hours for SA: 5h

Modules SM: Supplementary theoretical education for MIG/MAG and FCAW welding (13X).

SM.1 Construction and maintenance of MIG/MAG and FCAW equipment & typical parameters.

SM.2 Welding consumables

SM.3 Health and safety

SM.4 MIG/MAG and FCAW welding characteristics and typical parameters.

Total number of recommended hours for SM: 7h

Module ST: Supplementary theoretical education for TIG welding (141).

ST.1 Construction and maintenance of TIG welding equipment

ST.2 Tungsten electrodes and welding consumables

ST.3 Health and safety

Total number of recommended hours for ST: 5h



7 Modules P, dedicated to one specific material.

Modules P: dedicated to one specific material to be taught after or in parallel to theoretical modules if the sought qualification is for stainless steel or aluminium.

Module PSS: Instruction items for supplemental theoretical education for stainless steel.

PSS.1 Basics of stainless steel, welding processes and health aspects

PSS.2 Weldability, welded joints and distortion of stainless steel

PSS.3 Welding consumables for stainless steel

PSS.4 Corrosion, post weld treatment

Total number of recommended hours for PSS: 8h

Module PAL: Instruction items for supplemental theoretical education for aluminium.

PAL.1 Basics of aluminium, welding processes and health aspects

PAL.2 Weldability and welding technique

PAL.3 Welding consumables for aluminium welding

PAL.4 Welding joints and distortion in aluminium alloys

Total number of recommended hours for PAL: 8h

8 Practical Training and Tests

8.1 General

This Guideline applies mainly to ferritic steels (group 1, 2, 3 and 11 according to CR/ISO TR 15608) and – where applicable – stainless steels (group 8 and 10 according to CR/ISO TR 15608) and may be used as a basis for other materials until the moment a corresponding guideline exists. The application of this program to other materials than given with the exercises may require slight changes to the work pieces and / or the positions to be welded. Such changes require principal approval of the ANB.

8.2 All modules

In all modules the following expected results apply:

1. Assemble and tacking the joint.
2. Take the necessary precautions to avoid distortion prior to, during and after welding.
3. Follow the welding symbols and the (p)WPS (related to the proposed weld).
4. Perform safe welding according to the (p)WPS (or welding instruction).
5. Select the appropriate type of consumable and the desired size according to the (p)WPS (or welding instruction).



9 Process 111 (MMA-welding) for ferritic and stainless steel.

9.1 Module E 1

The average recommended time for the exercises is about 90 h.

9.2 Module E 2

The average recommended time for the exercises is about 50 h.

9.3 Module E 3

The average recommended time for the exercises is about 75 h.

9.4 Module E 4

The average recommended time for the exercises is about 75 h.

9.5 Module E 5

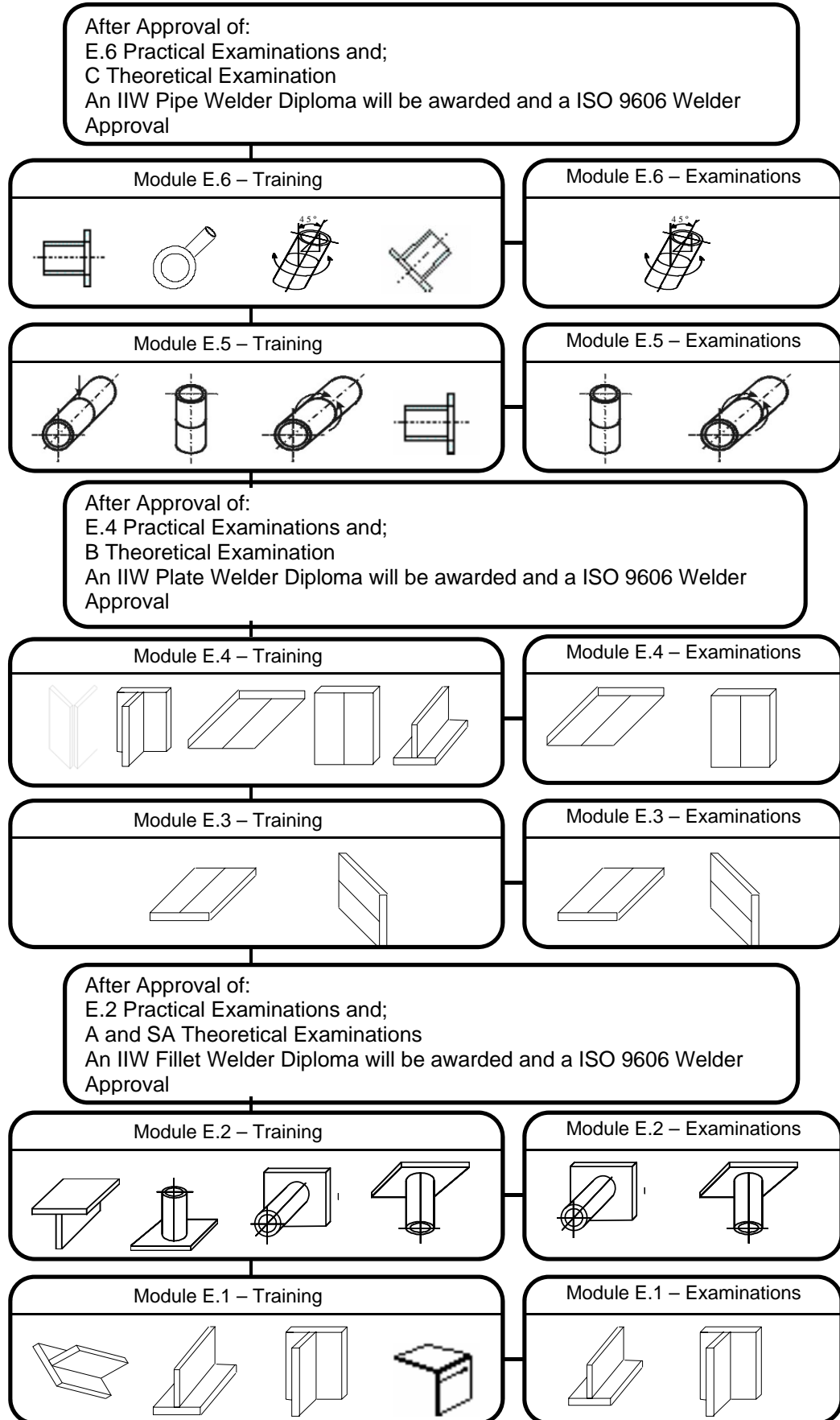
The average recommended time for the exercises is about 75 h.

9.6 Module E 6

The average recommended time for the exercises is about 75 h.



9.7 Training and test pieces for MMA welding of steel.





10 Process 135, 136 and 138 (MAG-welding) for ferritic and stainless steel.

Module M covers normally welding both processes 135 and 136. In certain cases the training and examination may be limited to either welding process 135 or 136.

10.1 Module M 1

The average recommended time for the exercises is about 90 h.

10.2 Module M 2

The average recommended time for the exercises is about 90 h.

10.3 Module M 3

The average recommended time for the exercises is about 75 h

10.4 Module M 4

The average recommended time for the exercises is about 75 h.

10.5 Module M 5

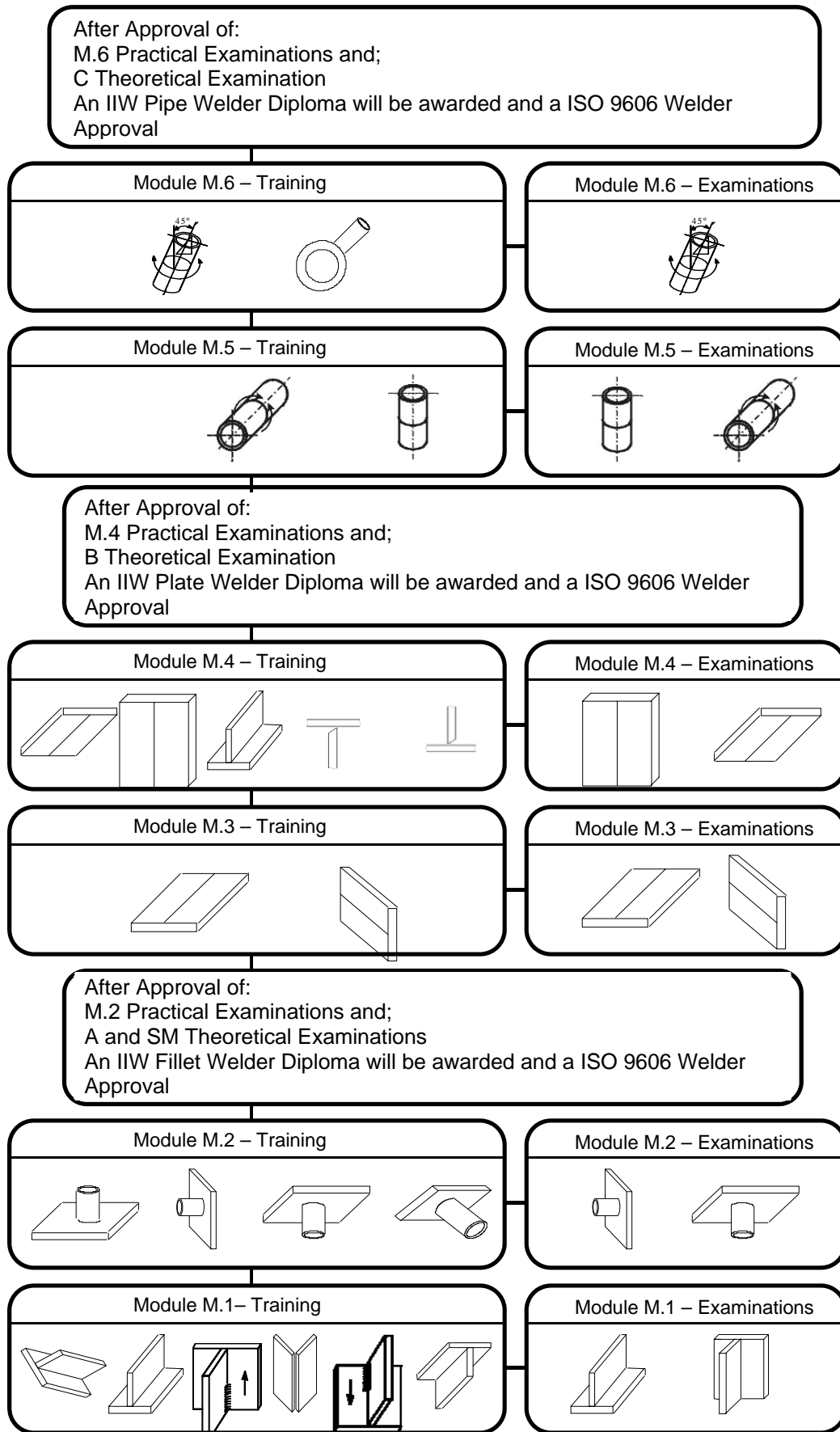
The average recommended time for the exercises is about 75 h.

10.6 Module M 6

The average recommended time for the exercises is about 50 h.



10.7 Training and test pieces for MAG welding of steel.





11 Process 131 (MIG-welding) for aluminium material groups.

11.1 Module MAI.1

The average recommended time for the exercises is about 75 h (reduced time, experience assumed).

11.2 Module MAI.2

The average recommended time for the exercises is about 75 h (reduced time, experience assumed).

11.3 Module MAI.3

The average recommended time for the exercises is about 60 h (reduced time, experience assumed).

11.4 Module MAI.4

The average recommended time for the exercises is about 60 h (reduced time, experience assumed).

10.5 Training and test pieces for MIG welding of aluminium material groups.

The exercises and examinations trials are not the ones shown on the table regarding the training in steel and stainless steel



12 Process 141 (TIG-welding) for ferritic and stainless steel.

12.1 Module T 1

The average recommended time for the exercises is about 50 h.

12.2 Module T 2

The average recommended time for the exercises is about 50 h.

12.3 Module T 3

The average recommended time for the exercises is about 50 h.

12.4 Module T 4

The average recommended time for the exercises is about 50 h.

12.5 Module T 5

The average recommended time for the exercises is about 50 h.

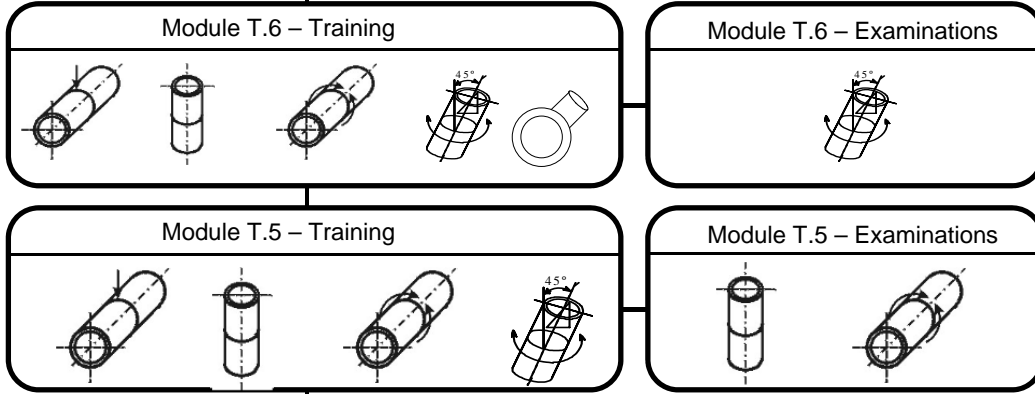
12.6 Module T 6

The average recommended time for the exercises is about 50 h.

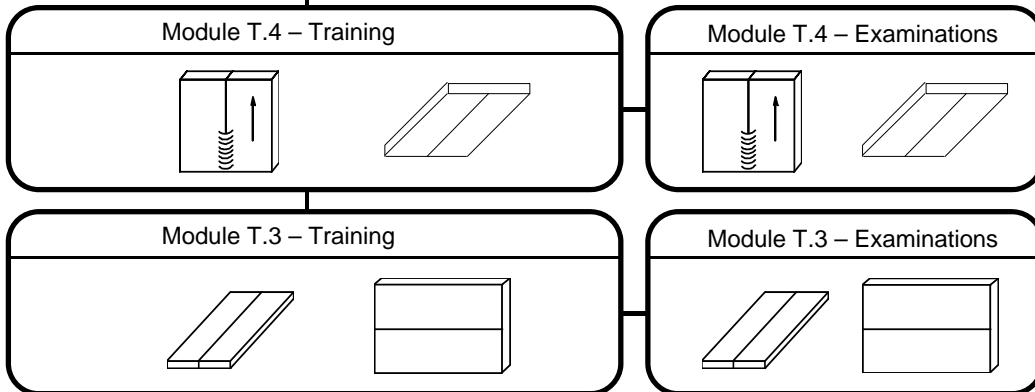


12.7 Training and test pieces for TIG welding of steel.

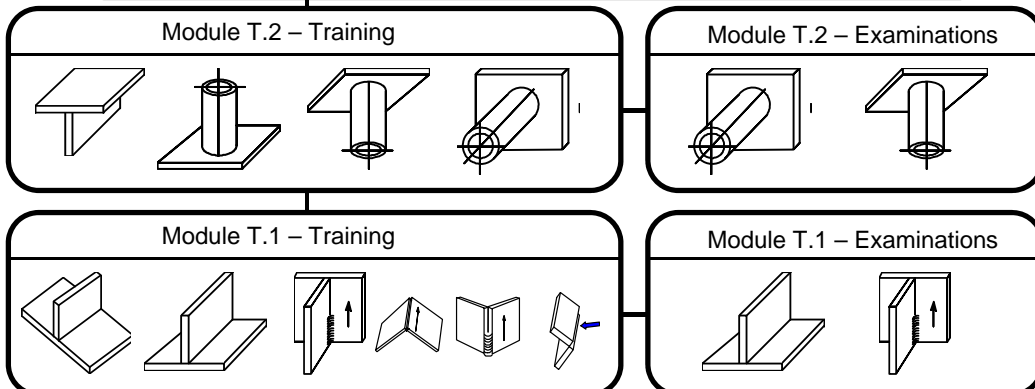
After Approval of:
T.6 Practical Examinations and;
C Theoretical Examination
An IIW Pipe Welder Diploma will be awarded and a ISO 9606
Welder Approval



After Approval of:
T.4 Practical Examinations and;
B Theoretical Examination
An IIW Plate Welder Diploma will be awarded and a ISO 9606 Welder
Approval



After Approval of:
T.2 Practical Examinations and;
A and ST Theoretical Examinations
An IIW Fillet Welder Diploma will be awarded and a ISO 9606 Welder
Approval





13 Process 141 (TIG-welding) for aluminium material groups.

13.1 Module TAI.1

The average recommended time for the exercises is about 50h (reduced time, experience assumed).

13.2 Module TAI.2

The average recommended time for the exercises is about 50h (reduced time, experience assumed).

13.3 Module TAI.3

The average recommended time for the exercises is about 50h (reduced time, experience assumed).

13.4 Module TAI.4

The average recommended time for the exercises is about 50h (reduced time, experience assumed).

13.5 Module TAI.5

The average recommended time for the exercises is about 50h (reduced time, experience assumed).

13.6 Module TAI.6

The average recommended time for the exercises is about 50h (reduced time, experience assumed).

12.7 Training and test pieces for TIG welding of aluminium material groups.

The exercises and examinations trials are not the ones shown on the table regarding the training in steel and stainless steel



14 Process 311 (Gas-welding) for ferritic steel.

14.1 Module G 3

The average recommended time for the exercises is about 50 h.

14.2 Module G 4

The average recommended time for the exercises is about 50 h.

14.3 Module G 5

The average recommended time for the exercises is about 50 h.

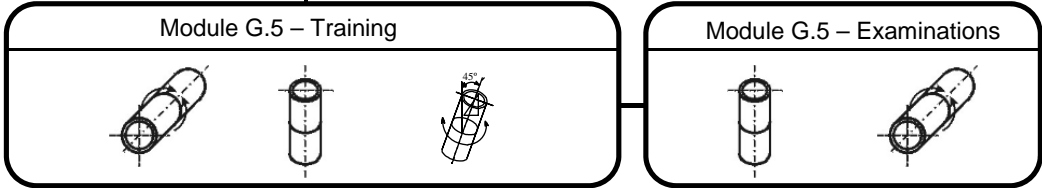
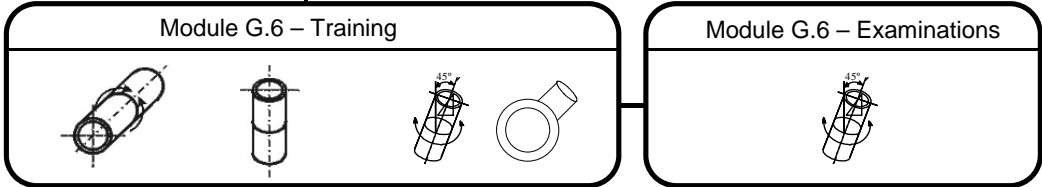
14.4 Module G 6

The average recommended time for the exercises is about 50 h.

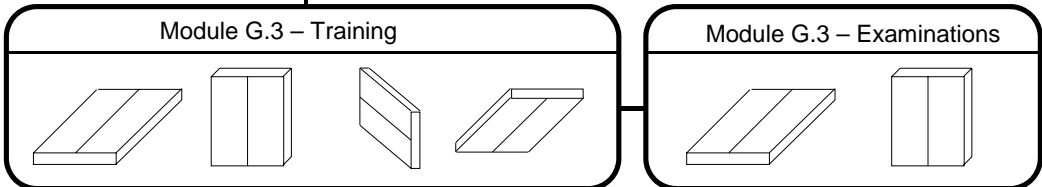
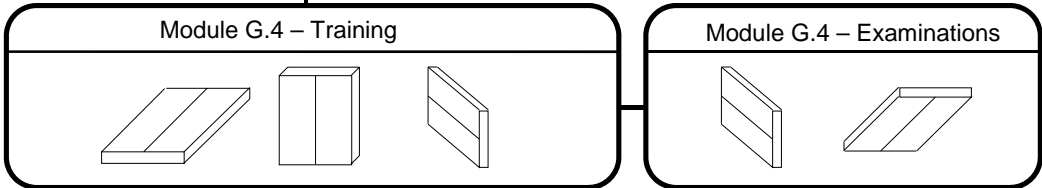


14.5 Training and test pieces for Gas welding of steel

After Approval of:
G.6 Practical Examinations and;
C Theoretical Examination
An IIW Pipe Welder Diploma will be awarded and a ISO 9606 Welder Approval



After Approval of:
G.4 Practical Examinations and;
A; B and SG Theoretical Examinations
An IIW Plate Welder Diploma will be awarded and a ISO 9606 Welder Approval



No Diploma or Welder Approval are issued. Due because for Gas Welding training the Modules G.1 and G.2 do not exist

