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## **Welding Engineering Certification Options Mogućnosti sertifikacije zavarivačkog inženjeringa**

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### **Abstract**

The University of Ottawa students asked the author about the options of Welding Engineering Certification available. Questions about how to get certification and which certification is best seem to reflect a general unfamiliarity with the process. But in all fairness to the Engineering novices, the processes are not uniform around the world so some of the answers to their questions may not always be understood due to variations from country to country. This paper is an attempt to point out some of the basic differences of the main system types and to offer ideas for those faced with prospect of lack of certification options in Welding Engineering.

Harmonisation of the main international methods of qualification and certification has been on-going but there are still a few differences that need to be addressed to allow worldwide mutual recognition to the two main third-party options.

The goal of this paper is to simplify the understanding of the certification options commonly used in Welding Engineering. When would be engineers ask; "Which certification is best?" they are perhaps not aware of all the facts. In some cases they have no choice as to which certification to get. But some agencies can actually accommodate several options. Today Welding Engineers often find it is convenient to hold more than one option of certification. Efforts are being made to have mutual recognition of certifications; however, unless we can agree on a common set of requirements this is still a future goal.

### **1. Introduction**

The University of Ottawa students asked the author about the options of Welding Engineering Certification available. Questions about how to get certification and which certification is best seem to

### **Rezime**

Studenti sa Univerziteta u Otavi pitali su autora o mogućnostima dostupnih sertifikata za zavarivački inženjering. Pitanja o tome kako dobiti sertifikat i koja sertifikacija je najbolja, ukazuju na opšte nepoznavanje procesa sertifikacije. Ali, da budemo fer prema mladim inženjerima (inženjerima početnicima), procesi širom sveta nisu jednoobrazni, pa neki odgovori na njihova pitanja ne mogu uvek biti razumljivi zbog varijacija od zemlje do zemlje. Ovaj rad je pokušaj da se ukaže na neke osnovne razlike glavnih tipova sistema i da se predlože ideje za one koji su suočeni sa nedostacima opcija sertifikacije u zavarivačkom inženjeringu.

Usaglašavanje glavnih međunarodnih metoda kvalifikacije i sertifikacije je u toku, ali još uvek postoji nekoliko razlika koje se moraju rešiti kako bi se omogućilo uzajamno priznavanje širom sveta dve glavne opcije treće strane.

Cilj ovog rada je da se pojednostavi razumevanje opcija sertifikacije koje se obično koriste u zavarivačkom inženjeringu. Kada bi inženjeri pitali; „Koji je sertifikat najbolji?“ oni možda nisu svesni svih činjenica. U nekim slučajevima nemaju izbora koji sertifikat bi dobili. Međutim, neke agencije mogu zaista da primene nekoliko opcija. Danas inženjeri za zavarivanje često smatraju da je prikladno da poseduju više od jedne mogućnosti sertifikacije. Ulažu se naponi na međusobnom priznavanju sertifikata; međutim, osim ako se ne možemo složiti oko zajedničkog niza zahteva, to je još uvek budući cilj.

### **1. Uvod**

Studenti sa Univerziteta u Otavi pitali su autora o mogućnostima dostupnih sertifikata za zavarivanje i inženjeringa. Pitanja o tome kako dobiti sertifikat i koja sertifikacija je najbolja, najviše odražava opšte



reflect a general unfamiliarity with the process. But in all fairness to the Engineering novices, the processes are not uniform around the world so some of the answers to their questions may not always be understood due to variations from country to country. This paper is an attempt to point out some of the basic differences of the main system types and to offer ideas for those faced with prospect of lack of certification options in Welding Engineering.

Harmonisation of the main international methods of qualification and certification has been on-going but there are still a few differences that need to be addressed to allow worldwide mutual recognition to the two main third-party options.

The goal of this paper is to simplify the understanding of the certification options commonly used in Welding Engineering. When would be engineers ask; "Which certification is best?" they are perhaps not aware of all the facts. In some cases they have no choice as to which certification to get. But some agencies can actually accommodate several options. Today Welding Engineers often find it is convenient to hold more than one option of certification. Efforts are being made to have mutual recognition of certifications; however, unless we can agree on a common set of requirements this is still a future goal.

## 2. Certification

The five steps to achieve the personnel welding certification:

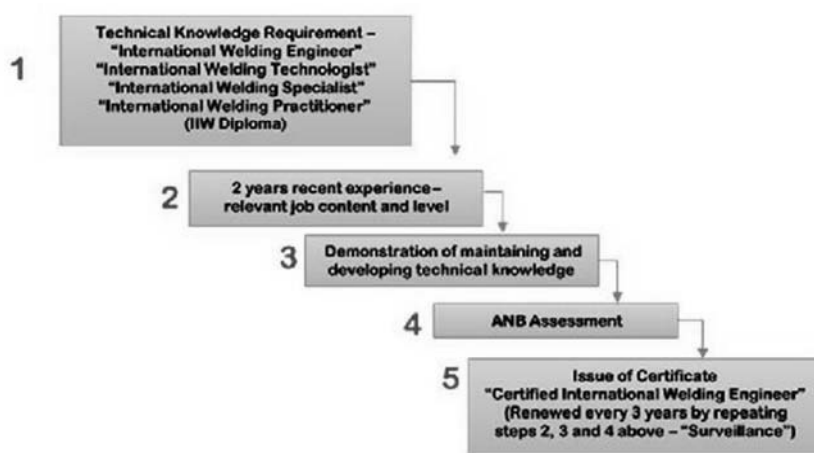


Fig.1 Welding Certification Steps – IIW  
Sl. 1. Koraci u sertifikaciji -IIW

### 2.1 Technical Knowledge Requirements

#### 2.1.1 General and Specific Knowledge Requirements EN-ISO 14731

General knowledge requirements of all welding coordination personnel (WC)

##### 1. General technical knowledge

nepoznavanje procesa. Ali u skladu sa inženjerskim početnicima, procesi širom sveta nisu jednoobrazni, pa neki odgovori na njihova pitanja ne mogu uvek biti razumljivi zbog varijacija od zemlje do zemlje. Ovaj rad je pokušaj da se ukaže na neke osnovne razlike glavnih tipova sistema i da se predlože ideje za one koji su suočeni sa nedostatkom opcija za sertifikaciju u zavarivačkom inženjeringu.

Usaglašavanje glavnih međunarodnih metoda kvalifikacije i sertifikovanja je u toku, ali još uvek postoji nekoliko razlika koje se moraju rešiti kako bi se omogućilo uzajamno priznavanje širom sveta dve glavnih opcija trećih strana.

Cilj ovog rada je da se pojednostavi razumevanje opcija sertifikacije koje se obično koriste u zavarivačkom inženjeringu. Kada bi inženjeri pitali; „Koja je potvrda najbolja?“ oni možda nisu svesni svih činjenica. U nekim slučajevima nemaju izbora koji sertifikat bi dobili, ali neke agencije mogu udovoljiti nekoliko opcija. Danas inženjeri za zavarivanje često smatraju da je prikladno da poseduju više od jedne mogućnosti sertifikacije. Ulažu se naponi na međusobnom priznavanju sertifikata; međutim, osim ako se ne možemo složiti oko zajedničkog niza zahteva, to je još uvek budući cilj.

## 2. Sertifikacija

Pet koraka za dobijanje sertifikata osoblja za zavarivanje:

### 2.1 Zahtevi tehničkog znanja

#### 2.1.1 Zahtevi opšteg i specifičnog znanja EN-ISO 14731

Opšti zahtevi za sve osoblje za koordinaciju zavarivanja (WC)

##### 1. Opšta tehnička znanja



2. Specialized technical knowledge in welding and allied process relevant to the assigned tasks, which shall be attained by a combination of theoretical knowledge, training and or experience

Specific requirements for the responsible welding coordinator (RWC)

Grouping of responsible Welding Coordinators:

a) Personnel with comprehensive technical knowledge, where full technical knowledge is required for the planning, executing, supervising and testing of all tasks and responsibilities in welding fabrication

b) Personnel with specific technical knowledge, where the level of technical knowledge needs to be sufficient for the planning, executing, supervising and testing of the tasks and responsibilities in welding fabrication within a selective or limited technical field;

c) Personnel with basic technical knowledge, where the level of technical knowledge needs to be sufficient for planning, executing, supervising and testing of tasks and responsibilities within a limited technical field, involving only simple welded constructions.

### **2.2 Recommendations for technical knowledge in welding**

The international Institute of Welding (IIW) has, on a voluntary basis, prepared recommendations for minimum requirements for education, examination and qualification of welding coordination personnel.

The recommendations are stated in the following documents:

- International Welding Engineer (IWE), Doc. IAB-252;
- International Welding Technologist (IWT), Doc. IAB-252;
- International Welding Specialist (IWS), Doc. IAB-252.

### **3. European Welding Federation (EWF) Supplementary Education Scheme**

The European Welding Federation introduced a supplementary education scheme, EWF 652R-1-11, for minimum requirements for education, examination and qualification of welding coordination personnel to comply with EN 1090-2.

2. Specijalizovana tehnička znanja u zavarivanju i srodnim procesima relevantnim za zadate zadatke, koja će se dostići kombinacijom teorijskog znanja, obuke i ili iskustva

Specifični zahtevi za odgovornog koordinatora za zavarivanje (RWC)

Grupisanje odgovornih koordinatora za zavarivanje:

a) Osoblje sa sveobuhvatnim tehničkim znanjem, gde je potrebno potpuno tehničko znanje za planiranje, izvršenje, nadzor i ispitivanje svih kod zadataka i odgovornosti u proizvodnji zavarivanjem

b) Osoblje sa specifičnim tehničkim znanjem, gde nivo tehničkog znanja treba da bude dovoljan za planiranje, izvršavanje, nadzor i ispitivanje kod zadataka i odgovornosti u zavarivanju proizvoda u selektivnom ili ograničenom tehničkom polju;

c) Osoblje sa osnovnim tehničkim znanjem, gde nivo tehničkog znanja treba da bude dovoljno za planiranje, izvršavanje, nadzor i ispitivanje kod zadataka i odgovornosti u ograničenom tehničkom polju, uključujući samo jednostavne zavarene konstrukcije.

### **2.2 Preporuke za tehničko znanje u zavarivanju**

Međunarodni institut za zavarivanje (IIW) pripremio je preporuke za minimalne zahteve za obrazovanje, sprovođenje ispita i kvalifikaciju osoblja za koordinaciju zavarivanja.

Preporuke su navedene u sledećim dokumentima:

- Međunarodni inženjer za zavarivanje (IWE), doc. Sa IAB 252;
- Međunarodni tehnolog za zavarivanje (IWT), doc. Sa IAB 252;
- Međunarodni specijalista za zavarivanje (IWS), doc. sa IAB 252.

### **3. Šema dopunskog obrazovanja Evropske federacije za zavarivanje (EWF)**

Evropska federacija za zavarivanje uvela je šemu dopunskog obrazovanja, EWF 652R-1-11, za minimalne zahteve za obrazovanje, sprovođenje ispita i kvalifikaciju osoblja za koordinaciju zavarivanja u skladu sa EN 1090-2.



| EXC  | Steels<br>(Steel group)         | Reference standards   | Thickness (mm)      |                          |                |
|------|---------------------------------|---|---------------------|--------------------------|----------------|
|      |                                 |   | t ≤ 25 <sup>a</sup> | 25 < t ≤ 50 <sup>b</sup> | t > 50         |
| EXC2 | S235 to S355<br>(1.1, 1.2, 1.4) | EN 10025-2 EN 10025-3 EN 10025-4<br>EN 10025-5, EN 10149-2, EN 10149-3<br>EN10210-1, EN 10219-1 | B                   | S                        | C <sup>c</sup> |
|      | S420 to S700<br>(1.3, 2, 3)     | EN 10025-3 EN 10025-4 EN 10025-6<br>EN 10149-2, EN 10149-3<br>EN10210-1, EN 10219-1             | S                   | C <sup>d</sup>           | C              |
| EXC3 | S235 to S355<br>(1.1, 1.2, 1.4) | EN 10025-2 EN 10025-3 EN 10025-4<br>EN 10025-5, EN 10149-2, EN 10149-3<br>EN10210-1, EN 10219-1 | S                   | C                        | C              |
|      | S420 to S700<br>(1.3, 2, 3)     | EN 10025-3 EN 10025-4 EN 10025-6<br>EN 10149-2, EN 10149-3<br>EN10210-1, EN 10219-1             | C                   | C                        | C              |
| EXC4 | All                             | All   | C                   | C                        | C              |

<sup>a</sup> Column base plates and endplates ≤ 50mm

<sup>b</sup> Column base plates and endplates < 75mm

<sup>c</sup> For steels up to and including S275 level S is sufficient

<sup>d</sup> For steels N, NL, M and ML level S is sufficient

B: Basic technical knowledge

S: Specific technical knowledge

C: Comprehensive technical knowledge

**Tab. 1** Welding Coordination Personnel Requirements for Steels – EN 1090-2

**Tab. 1.** Zahtevi za osoblje za koordinaciju zavarivanja za čelike - EN 1090-2

| EXC  | Steels<br>(Steel group)     | Reference standards  | Thickness (mm) |             |        |
|------|-----------------------------|--|----------------|-------------|--------|
|      |                             |  | t ≤ 25         | 25 < t ≤ 50 | t > 50 |
| EXC2 | Austenitic<br>(8)           | EN 10088-2:2005, Tabel 3<br>EN 10088-3:2005, Tabel 4<br>EN 10296-2:2005, Tabel 1<br>EN 10297-2:2005, Tabel 2 | B              | S           | C      |
|      | Austenitic-ferritic<br>(10) | EN 10088-2:2005, Tabel 4<br>EN 10088-3:2005, Tabel 5<br>EN 10296-2:2005, Tabel 1<br>EN 10297-2:2005, Tabel 3 | S              | C           | C      |
| EXC3 | Austenitic<br>(8)           | EN 10088-2:2005, Tabel 3<br>EN 10088-3:2005, Tabel 4<br>EN 10296-2:2005, Tabel 1<br>EN 10297-2:2005, Tabel 2 | S              | C           | C      |
|      | Austenitic-ferritic<br>(10) | EN 10088-2:2005, Tabel 4<br>EN 10088-3:2005, Tabel 5<br>EN 10296-2:2005, Tabel 1<br>EN 10297-2:2005, Tabel 3 | C              | C           | C      |
| EXC4 | All                         | All  | C              | C           | C      |

B: Basic technical knowledge

S: Specific technical knowledge

C: Comprehensive technical knowledge

**Tab. 2** Welding Coordination Personnel Requirements for Stainless Steels – EN 1090-2

**Tab. 2.** Zahtevi za osoblje za koordinaciju zavarivanja za nerđajuće čelike - EN 1090-2

### 3. European Accreditation

EA is quite clear in EA-6/02:2013. Special attention for the audit team in evaluating the competence of the manufacturer's welding coordinators in accordance with EN ISO 14731.

- Contain persons with direct product/process/materials competence in products/process/materials being audited, and
- Contain at least one individual who is qualified and experienced in welding to a level that is sufficient to demonstrate that he/she is competent to audit the company's authorized welding coordinator in accordance with EN ISO 14731. "WELDING COORDINATION-TASKS AND RESPONSIBILITIES".

### 3. Evropska akreditacija

EA je sasvim jasan u EA-6/02: 2013. Posebna pažnja za ocjenivački tim u proceni kompetencija zavarivačkih koordinatora proizvođača u skladu sa EN ISO 14731.

- Sadrže osobe sa direktnim kompetencijama proizvod / proces / materijal u proizvodima / procesima / materijalima koji se proveravaju i
- Sadrži barem jednog pojedinca koji je kvalifikovan i iskusen u zavarivanju do nivoa koji je dovoljan da pokaže da je on / ona kompetentna za ocenjivanje ovlašćenih koordinatora za zavarivanje u preduzeću u skladu sa EN ISO 14731. „KOORDINACIJA ZAVARIVANJA- ZADACI I ODGOVORNOSTI “.



### 5. Qualification of a Welding Coordinator – EWF/IIW

The professional interview process shall involve the examination of specific contract(s) to audit compliance with the customer's specification in the following areas:

1. Selection/development of welding procedures
2. Welding sequences
3. NDT and heat treatment
4. Approval of personnel
5. Traceability
6. Quality control and acceptance
7. Sub-contracting

### 5. Kvalifikacija koordinatorazavarivanja – EWF/IIW

Proces profesionalnog razgovora uključuje ispitivanje određenog ugovora (a) za proveru poštovanja specifikacija kupca u sledećim oblastima:

1. Izbor / razvoj postupaka zavarivanja
2. Redosled zavarivanja
3. IBR i termička obrada
4. Odobrenja osoblja
5. Sledljivost
6. Kontrola kvaliteta i prihvatljivost
7. Podugovaranje

| Situation   | Additional requirement   | Activity required towards the (R)WC  |
|---|--|--|
| <b>EWF/IIW qualification is available (E/IWE, E/IWT, E/IWS)<br/>"Type 1"</b>                    | None   | Check on adequate experience and competence in the products being manufactured by means of a professional interview and examination of the Welding Coordinator's curriculum vitae.   |
| <b>EWF/IIW Personnel Certification is available (CE/IWE, CE/IWT, CE/IWS)<br/>"Type 1"</b>       | Schedule should support the scope of work allocated to the Welding Coordinator | Check on adequate experience and competence in the products being manufactured by means of a professional interview.   |
| <b>If none of the above EWF/IIW certifications or qualifications are available<br/>"Type 2"</b> | None   | Verify compliance by means of a professional interview covering knowledge, skills, experience and competence with particular emphasis on welding technology, materials and their behaviour during welding, design fundamentals of welded construction, as well as fabrication and inspection aspects (including knowledge of standards) in the |

**Tab. 3** Welding Coordination Personnel Qualification – EWF/IIW  
**Tab. 3.** Kvalifikacija osoblja za koordinaciju zavarivanja - EWF / IIW

This means that technical discussions must be take place between each welding coordinator and relevant auditor regarding the detailed technical scope of the welding coordinator's responsibilities and interview should take the form of a peer review and challenge process. This process will require the auditor to examine evidence of completed work done by each welding coordinator and to investigate his/her knowledge and understanding of it. The certification body shall maintain full records of the process of evaluation of the manufacturer's welding coordinators.

To znači da se moraju voditi tehničke diskusije između svakog koordinatora za zavarivanje i nadležnog proveravača u vezi s detaljnim tehničkim opsegom odgovornosti koordinatora zavarivanja a razgovor bi trebalo da bude u obliku stručnog pregleda i procesa izazova. Ovaj proces će zahtevati od proveravača da ispita dokaze o završenom radu obavljenom od strane svakog koordinatora zavarivanja i da istraži njegovo znanje i razumevanje istog. Sertifikaciono telo mora da vodi potpunu evidenciju procesa procene proizvođača koordinatora zavarivanja.



### 5.1 Professional Interview

We can see two essentially different professional interviews.

1. Type 1: Checking the actual knowledge related to the manufactured products to be covered by the welding coordinator.
2. Type 2: As specified above, but additionally covering knowledge, skill, experience and competence in the fields that is supposed to be covered by EWF/IIW qualifications and certifications.

This means:

General Knowledge and skill check for the (R)WC:

- Challenge the (R)WC by asking questions of the “what-if” type;
- Try to cover his/hers whole scope of work.

Additional knowledge and skill check for the (R)WC;

Type 1: Select a running (just delivered) contract and follow every single step as related to the (Responsible) Welding Coordinator;

Type 2: As under Type 1, but in addition select random questions out of the questions database for EWF Guideline 652 or IAB 252 and use them as guidance for the Professional Interview Type 2.

### Summary

Certification options are not always an item of choice for the RWC. Company requirements, regulatory requirements or project specifications may limit the options that are allowed.

Certification schemes such as EWF and IIW are simply the programs run by the “certifying agencies” or “certifying bodies” approved to issue certificates. Since the certificate issued by the approved body indicates the qualification requirement standard (ISO 3834 or EN-ISO 14731) it is the standard identified and not the agency or scheme issuing the certificate that is relevant to the code compliance.

### References

#### Bibliografija

- [1] ISO 14731
- [2] ISO 3834
- [3] EA-6/02
- [4] EWF 652R1-11
- [5] EN 1090-2

### 5.1 Profesionalni razgovor

Možemo videti dva suštinski različita profesionalna intervjua.

1. Tip 1: Provera stvarnog znanja u vezi sa proizvedenim proizvodima koje pokriva koordinator za zavarivanje.
2. Tip 2: Kao što je prethodno navedeno, ali dodatno pokriva znanje, veštinu, iskustvo i kompetencije u oblastima koje bi trebale biti obuhvaćene kvalifikacijama i sertifikatima EWF / IIW.

To znači:

Opšta provera znanja i veština za (R) WC:

- Izazovite (R) WC postavljajući pitanja tipa „šta ako“;
- Pokušajte da obuhvatite njegov / njen čitav opseg posla.

Dodatna provera znanja i veština za (R) WC;

Tip 1: Izaberite tekući (upravo isporučeni) ugovor i sledite svaki korak u vezi sa (odgovornim) koordinatorom za zavarivanje;

Tip 2: Kao i pod tipom 1, ali pored toga izaberite nasumična pitanja iz baze podataka za EWF smernicu 652 ili IAB 252 i koristite ih kao smernice za profesionalni intervju 2.

### Pregled

Opcije sertifikacije nisu uvek stavke po izboru za RWC. Zahtevi kompanije, regulatorni zahtevi ili specifikacije projekta mogu ograničiti opcije koje su dozvoljene.

Šeme sertifikacije kao što su EWF i IIW su jednostavno programi koje vode „sertifikacione agencije“ ili „sertifikaciona tela“ odobrena za izdavanje sertifikata. Budući da potvrda koju je izdalo odobreno telo ukazuje na zahtev standarda za kvalifikacijom (ISO 3834 ili EN-ISO 14731), identifikovan je standard, a ne agencija ili šema koja izdaje sertifikat, kao relevantan za usklađenost sa kodom.