

INTERNATIONAL WELDING QUALIFICATION AND CERTIFICATION SYSTEMS FOR PERSONS AND COMPANIES

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Abstract:

This paper presents the internationally harmonised systems for qualification and certification of persons and companies, developed by the European Welding Federation (EWF) and the International Institute of Welding (IIW), with the aim of providing to companies a profitable tool for fulfilling the EN/ISO Standards and Directives.

It is also described the way for assessing the Authorised National Bodies for Qualification and Certification of Persons (ANBs) and for Certification of Companies (ANBCCs) by the International Authorisation Board (IAB) of IIW.

INTRODUCTION

The development of European and International standards is having a great effect on manufacturing and fabricating companies. Many companies have achieved certification to EN ISO 9001 with respect to their quality management systems. But where significant use is made of a special process like welding, such certification is unlikely to provide the required demonstration of capability of the company to manufacture products of the required quality.

EN ISO 9001:2000 considers welding a “special process”, meaning that it must be taken into consideration much before the weld is performed. The way in which a determined welding process is applied directly affects the final characteristics of the welded product that, in the end, has to meet previously set specifications.

The effects that the application of different welding processes has on the quality of the welded joint, the environment and the prevention of working hazards must be known from the initial designing phase, since the consequences are relevant during the welding operation, as well as throughout the life of the equipment or welded product.

The importance of all this has resulted in the publication of numerous regulations defining conditions in which welding processes should be performed, so that they do not seriously affect the safety of people or environment.

The European Federation for Welding, Joining and Cutting, EWF, an organisation formed by Welding Institutes and Associations of 31 countries, has also been aware of the importance of this global welding impact and initiated in 1987 the definition of the opportune systems in such a way that the quality of the joint, as well as environment and personal safety are not negatively affected by the application of the welding processes.

On 17 July 1997, the International Institute of Welding, IIW, and EWF signed in San Francisco the first agreement of co-operation towards the development of a single international system for education and qualification of welding personnel. By use of a single syllabus for each type of training course and a central system of control of examinations, the same qualification may be awarded in any country.

In order to administer this system and to develop it still further, the IIW established the International Authorisation Board, IAB. This organisation, aimed at the effective integration of the EWF and IIW systems and its implementation in all IIW countries, publishes Guidelines and documents for training syllabuses and examinations, as well as Rules that assure the required quality during the implementation of the different schemes described in the established systems.

SYSTEM FOR EDUCATION, TRAINING AND QUALIFICATION OF PERSONNEL

The first achievement was the implementation of a harmonised training and qualification system in the field of welding technology, by publishing a EWF Guideline defining the minimum requirements for the European Welding Engineer in 1992. Today there are available 18 harmonised Guidelines for different levels and seven Special Courses, designed to provide a basic core education and training in a specific field related to welding processes, covering the whole spectrum of education and training in welding and related areas.

The education and training Guidelines and Special Courses developed up to the present are:

- I/EWE, International/European Welding Engineer *
- I/EWT, International/European Welding Technologist *
- I/EWS, International/European Welding Specialist *
- I/EWP, International/European Welding Practitioner *
- I/EWIP, International/European Welding Inspection Personnel *
- IWSD, International Welded Structures Designer *

- IW, European Welder *
- EAW, European Aluminothermic Welder
- EDW, European MMA-Diver Welder
- EPW, European Plastic Welder
- ETSS, European Thermal Spraying Specialist
- ETSP, European Thermal Spraying Practitioner
- ETS, European Thermal Sprayer
- EAE, European Adhesive Engineer
- EAS, European Adhesive Specialist
- EAB, European Adhesive Bonder
- EWS-RW, European Welding Specialist for Resistance Welding
- EWP-RW, European Welding Practitioner for Resistance Welding
- Special Course in Laser Welding (Engineer, Technologist and Specialist levels)
- Special Course for Robot Welding at the Specialist level
- Special Course for Welding Reinforcing Bars at the Specialist level
- Special Course on Weld Imperfections for Non-Destructive Personnel
- Special Course on Personnel with responsibility for Macroscopic and Microscopic Metallographic Examination
- Special Course on Personnel with responsibility for Heat Treatment of Welded Joints
- Special Course on Risk Management in Welded Fabrication.

* Adopted or developed by the International Institute of Welding

The subjects and teaching times for the more demanded Guidelines are:

Education module	Education time (hours)						
	I/EWE	I/EWT	I/EWS	I/EWP	I/EWIP		
					I/EWI-C (comprehensive)	I/EWI-S (standard)	I/EWI-B (basic)
Welding processes and equipment	93	76	45	22	25	13	11
Materials and their behaviour during welding	111	82	47	22	52	41	25
Construction and design	64	40	22	8	21	17	12
Fabrication, applications engineering	110	80	53	28	24	23	17
Fundamental practical skills	60	60	60	60	49	23	15
Welding inspection	---	---	---	---	97	63	40
Total	438	338	227	140	268	180	120

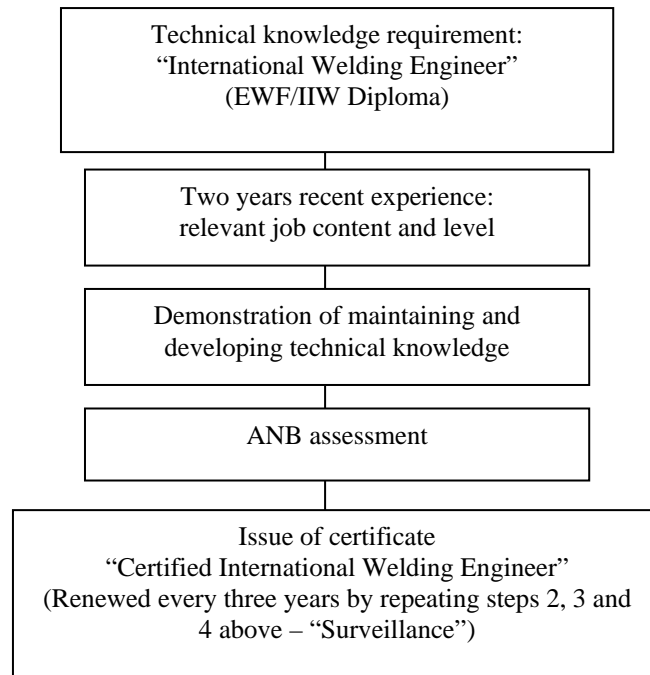
SYSTEM FOR CERTIFICATION OF PERSONNEL

Personnel certification system provides a simple means by which job capability can be assessed and recognised. It defines the profile of education, knowledge, experience and responsibility required for a range of conventional welding tasks and provides a professional assessment procedure.

Safety and profit depend on technical control of welding operations. Key staff in all welding related activities needs to have an appropriate level of competence in welding technology and its application. In addition to employing competent and tested welders, manufacturers should ensure that engineers, designers and technicians who deal with welding matters have proven relevant competence. This is increasingly becoming a contract requirement: a trend which is expected to accelerate as new European Directives and Standards for welding come into force. ISO 14731 “Welding Coordination – Tasks and Responsibilities” requires people with welding related responsibilities to be able to demonstrate that they are competent to carry out those responsibilities. This standard makes reference to IIW Qualification System as a way to demonstrate people’s technical knowledge.

Because Certification is concerned with current competence rather than historical attainment, periodic renewal is required. The system provides a convincing way of supporting companies seeking to achieve compliance with ISO 14731.

Four levels of certification are available, based on the four main Diplomas: E/IWE, E/IWT, E/IWS and E/IWP. The first three of these qualifications are deemed to satisfy the technical knowledge requirements of ISO 14731. The certification requirements are established in the document IAB- 341-08 “Rules for the implementation of IIW scheme for certification of personnel with Welding Coordination Responsibilities”, the steps considered are:



Certification and Qualification Titles

Certification Title	Welding Knowledge Qualification Required
Certified International Welding Engineer	International Welding Engineer
Certified International Welding Technologist	International Welding Technologist
Certified International Welding Specialist	International Welding Specialist
Certified International Welding Practitioner	International Welding Practitioner

SYSTEM FOR CERTIFICATION OF COMPANIES

This system includes the following three schemes:

IIW Scheme for Certification of Manufacturers of Welded Products according to ISO 3834, to determine welding quality level as stipulated in the series of standards ISO 3834 and in accordance with EN 45011 standard.

Scheme for Certification of Manufacturers of Welded Products according to EWF Environmental Management System, to comprehend and evaluate environmental effects of the welding process application as stipulated in EN ISO 14001 and EN 14717 standards.

Scheme for Certification of Manufacturers of Welded Products according to EWF Safety Management System, to comprehend and prevent labour accidents related to welding and its allied technologies, such as thermal cutting, thermal spraying, grinding, etc.

These schemes are applied according to rules, also harmonized, which lead to the mutual recognition of certificates issued by any of the duly authorised national organisations and that are accomplished by persons within those organisations who:

- are fully qualified in welding and its allied technologies, minimum European/International Welding Technologist,
- have three-years minimum experience in welded fabrications, as well as in quality systems,
- have added experience in the application of the most relevant national and international standards on welded constructions,
- are in continued contact with organisations in charge of elaborating rules for the fabrication, inspection and maintenance of welded constructions.

The final objective of the three schemes already mentioned is to offer, to companies using welding as an important part of their productive process, certifications that give, among other things, greater confidence to their Clients, Personnel, Stockholders and Community at large.

IIW SCHEME FOR CERTIFICATION OF MANUFACTURERS OF WELDED PRODUCTS ACCORDING TO ISO 3834

EN ISO 9001:2000 standard, in combination with EN ISO 3834 series of standards, assure that welding and its related processes are adequately controlled so that a Customer, or any other body, may have the confidence that the “special process” of welding is carried out properly and that the welded product will comply with the contract and/or application standard.

EN ISO 3834 “Quality Requirements for Welding. Fusion Welding of Metallic Materials”, has six parts whose headlines are self-explanatory:

- Part 1: Criteria for selection of the appropriate level of quality requirements,
- Part 2: Comprehensive quality requirements,
- Part 3: Standard quality requirements,
- Part 4: Elementary quality requirements,
- Part 5: Documents with which is necessary to conform to claim conformity to the quality requirements of EN ISO 3834-2, EN ISO 3834-3 or EN ISO 3834-4,
- Part 6: Guidelines on implementing EN ISO 3834-2 (EN ISO/PDTR 3834-6).

In conjunction with EN ISO 9001, Part 2 is the applicable standard with the requirements minimised to suit the range of welded constructions defined in the scope of the manufacture’s Quality Management System certification.

The applicable part of EN ISO 3834 (Part 2, 3 or 4) for independent assessment and certification of welding operations and activities (EN 45011), will depend on the nature of the welding activities required to meet the agreed specifications and will be influenced by how critical the welding operations are to the quality and fitness of the final product.

The collaboration with EA, European co-operation for Accreditation, uniquely brought together expertise in accreditation criteria and expertise in manufacturing by welding. This ensured that the special requirements of welding technology were properly accounted for, resulting in a technical set of sound accreditation criteria, which can be applied uniformly by accreditation bodies throughout Europe. Presently, the IIW Manufacturer Certification Scheme for the Management of Quality in Welding is described in the documents:

- EA-6/02, EA Guidelines on the use of EN 45011 and ISO/IEC 17021 for Certification to EN ISO 3834.
- IAB-337-08, Interpretation and implementation of ISO 3834 requirements.
- IAB-338-08, Supplement for the implementation of ISO 3834 oriented to welded products.
- IAB-339-08, Rules for ANBCCs operating the IIW Manufacturer Certification Scheme.
- IAB-340-08, ANBCCs assessment of manufacturers of welded products operating the IIW Manufacturer Certification Scheme.

Benefits for fabricating companies

EN ISO 3834 certification can be achieved independently (in accordance with EN 45011) or alongside EN ISO 9001 certification (in accordance with EN 45012). Obtaining EN ISO 3834 certification, in accordance with IIW harmonised system, offers companies the following benefits:

- Clear, high profile, independent verification of compliance by the world's leading authority on welding.
- Facilitate compliance with emerging European and International standards that call up EN ISO 3834 namely the EU Directives.
- Confirmation of welding and fabricating capabilities and staff competence.
- Improved client confidence leading to a reduction of external audits.
- Entry of the company's details on well-publicised international Web site register.
- Quality management and fabrication capability assessments carried out by special assessors.
- Increased national and international business potential.
- Cost savings in production.
- Certification packages to suit individual company requirements.

Registration of capability

EFW maintains a register of fabricators that have gained certification under the EN ISO 3834 welding manufacturer certification system; information contained in the register about companies and their capability is made freely available to enquirers worldwide through the EWF web page www.ewf.be. This provides an important sales benefit to certified companies.

SCHEME FOR CERTIFICATION OF MANUFACTURERS OF WELDED PRODUCTS ACCORDING TO EWF ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

Environment management is now a key issue for manufacturing companies. The international Standard EN ISO 14001 "Environmental Management System – Specification with Guidance for Use", is the key document in this area and systems that comply with this can be integrated with EN ISO 9001 Quality Management Systems.

Fabrication by welding is a complex process that cannot be limited to welding alone. Therefore, a range of activities needs to be considered and dealt with.

EFW has recognised this and has developed a series of documents on Environmental Management Systems, EMS, "best practises" for companies that use welding as a manufacturing process.

Presently, the EWF Manufacturer Certification System for the Management of Quality, Environment and Health and Safety in Welding Fabrication comprises the following documents:

- EA-6/02, EA Guidelines on the use of EN 45011 and ISO/IEC 17021 for Certification to EN ISO 3834.
- EWF-636-07, Management Schemes, Interpretation and Implementation.
- EWF-637-07, Supplement for the implementation of EN ISO 3834 oriented to Welded Products.
- EWF-638-07, Rules for ANBCCS Operating the EWF Manufacturer Certification System.
- EWF-639-07, ANBCC's Assessment of a Manufacturer of Welded Products Operating the EWF Manufacturer Certification System.

Welding Fabrication and Environment

In previous years the attention to the environment paid by the industrial world has grown higher and higher. There has not only been a series of flourishing events devoted to this matter all over the world, but some of the most important enterprises have already started asking their subcontractors to implement an environmental management system. In order to make available to companies a correct and homogeneous approach in this specific field, an international standard, EN ISO 14011 "Environmental management system-specifications with guidance for use", had been prepared with the aim to provide the needed references for the application of an effective scheme. This standard adopts the general principles of the EN ISO 9001, with the possibility to share and integrate both management systems by companies willing:

- to implement, maintain and improve an environmental management system;
- to demonstrate the fitness of their environmental politics to other private or public parties;
- to seek certification of their environmental management system by an external accredited organization.

Even if the fabrication by welding, with the manufacturing and testing processes involved, is not mentioned among the most polluting activities, a significant number of precautions are to be taken and the relevant actions enforced, as duly reported in the course of the present paper.

The EN ISO 14001, dealing with the matter as a whole, is non-oriented to solve specific environmental problems raised by welding fabrication; therefore, an interpretation of the standard itself by welding experts is needed. This is precisely what EWF has done through a special working group aimed at this purpose. Not only the different fabrication phases need to be identified and the relevant aspects and impacts defined and quantified as much as possible, but also a specific educational path for the engaged personnel must be identified and proposed. Not to double the work, all activities have been carried out taking into account what goes on in other international organisations, namely the CEN TC 121 "Welding" and the Select Committee "Environment" of IIW.

Generic Requirements for an Environmental Management System, EMS

- Preliminary Analysis of the effect on the surrounding environment, namely
 - Emissions to air
 - Releases to water
 - Waste management
 - Contamination of land
 - Use of raw materials and natural resources
 - Other local environmental and community issues
- Environmental analysis report where the actual situation is compared with:
 - Legislative and regulatory requirements
 - Advanced practise applied in the Industrial Sector of the company

- Effectiveness of the resources possibly already devoted to environmental aspects.
- Environmental management programme considering:
 - Technical activities.
 - Improvement of the relationship with the environment.
 - Review of environmental policies.

Competence in developing and implementing an EMS is important, particularly when special processes like welding are involved. The related personnel must be competent to provide adequate response to the completeness of the environmental analysis, the fitness of the environmental practice (if one exists) and the fitness of the environmental programme designed. The same competence is required to the auditors involved in assessing the compliance of an EMS according to EN ISO 14001.

SCHEME FOR CERTIFICATION OF MANUFACTURERS OF WELDED PRODUCTS ACCORDING TO EWF SAFETY MANAGEMENT SYSTEM (SMS)

This certification system is still in prototype phase. Until EN standards regarding this matter are published, this system will be considered as “Good Practise” not submitted to a certification process.

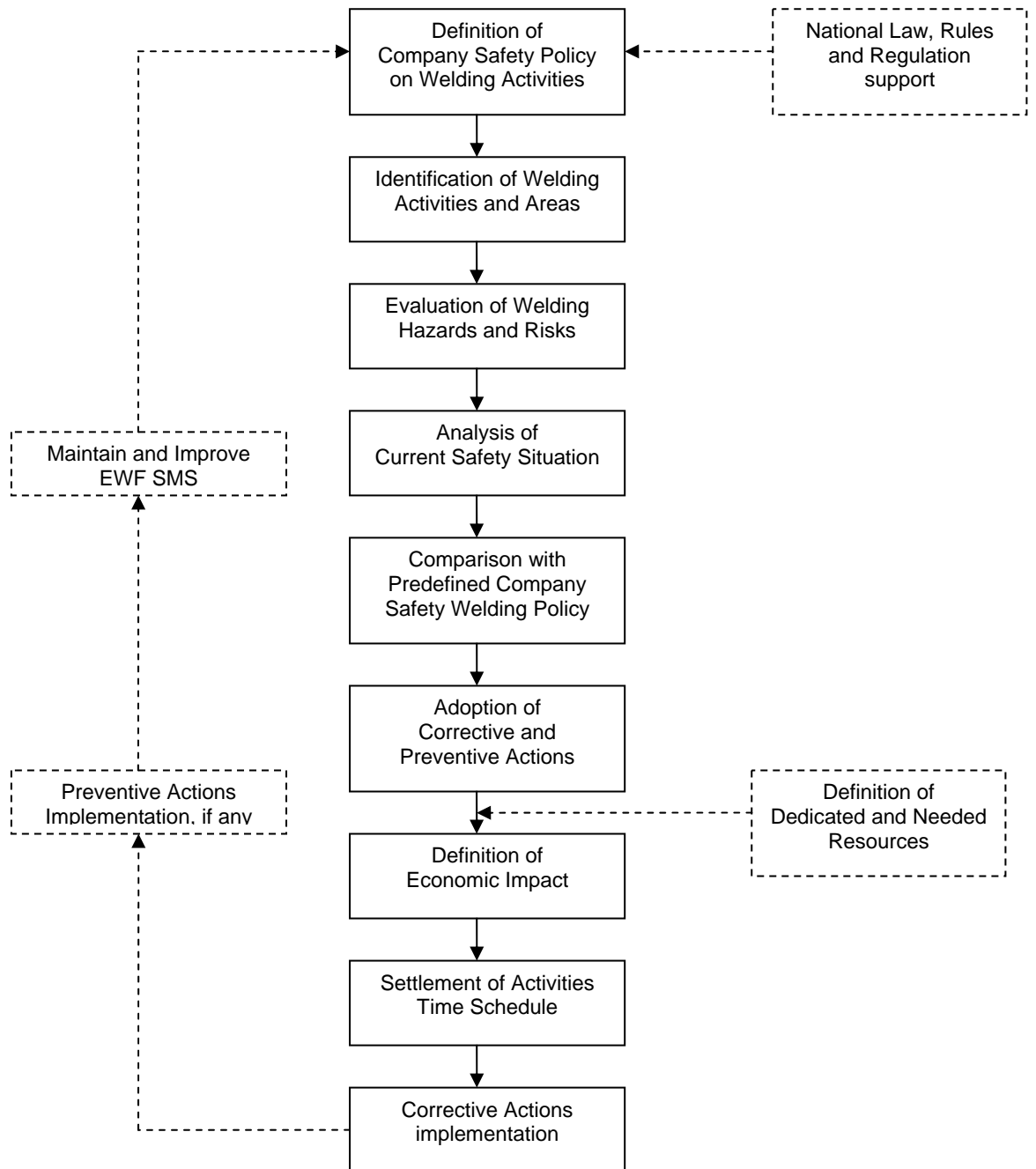
It is planned that the definition of EWF Safety Management System, SMS, should include, at least:

- Basic terms and definitions regarding safety
- Identification of safety indicators
- Analysis of hazards and risks
- Planning preventive and/or corrective actions to be taken by the Manufacturer to meet safety requirements
- Related economic evaluation
- Approach to the continuous improvement of safety in the welding production process.

The SMS will be designed, realised and presented to the Manufacturer of Welded Product in such a way that he may choose one of the following possibilities:

- A stand-alone scheme.
- A complementary part of the IIW ISO 3834 scheme.
- A complementary part of the EWF EMS scheme.
- A complementary part of the IIW ISO 3834 and EWF EMS scheme.

The implementation of EWF SMS should take into consideration the steps indicated in the following flow diagram:



IMPLEMENTATION OF THE INTERNATIONAL HARMONISED SYSTEMS

The uniform application of previously described qualification and certification systems is guaranteed by appointing one organisation in each country to act on behalf of IIW/EWF. These organisations, assessed and monitored against specific rules, are known as **Authorised National Bodies for Qualification and Certification of Persons (ANBs)** or **Authorised National Bodies for Certification of Companies (ANBCCs)**, being responsible for ensuring that the international standards of qualification and certification are maintained. The objective is that the Qualified Person, or Certified Company, will have demonstrated that they have achieved an identified minimum level of capability for a specific scope of activity, irrespective of the country in which they have been qualified and/or certified.

It is the role of the ANBs to act in its own country for IIW/EWF in respect to personnel qualification, including:

- The approval of ATBs (Training Centres) for the conduct of courses in accordance with IIW/EWF Guidelines,
- To conduct the examinations,
- The qualification and certification of personnel and the recording of relevant information.

Presently the following 37 countries participate in this system and have the corresponding ANB: Australia, Austria, Belgium, Brazil, Bulgaria, Canada, P.R. of China, Croatia, Czech Republic, Denmark, Finland, France, Germany, Hungary, India, Italy, Iran, Japan, Netherlands, Nigeria, Norway, Poland, Portugal, Romania, Russia, Serbia, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Ukraine, United Kingdom and United States. Another five countries, Egypt, Greece, Indonesia, South Korea and Turkey, have applied to become ANBs.

The personnel certification system is becoming more popular every day and has been implemented in the following eleven countries: Australia, Belgium, Croatia, Czech Republic, France, Germany, Italy, Poland, Romania, Slovakia and United Kingdom.

The role of ANBCCs is to act on behalf of IIW/EWF in respect to company certification, including the conduct of company assessment (either directly or through Participating Assessment Bodies), the qualification of ANBCC Assessors, the issuing of the certificate and the recording of all relevant information during the certification process.

At present, the following countries have an ANBCC:

- In accordance with IIW ISO 3834 Scheme: Australia, Austria, Croatia, Czech Republic, France, Germany, Hungary, Italy, Iran, Netherlands, Poland, Romania, Slovakia, Slovenia, South Africa, Spain, Ukraine and United Kingdom.
- In accordance with EWF EMS: Hungary, Italy and Romania.
- In accordance with EWF SMS: Hungary and Italy.

Additional and updated information can be obtained from your national ANB/ANBCC or visiting www.ewf.be or www.iiw-iis.org Web sites.