

# Business Plan

## ISO/TC 44, Welding and allied processes

### Executive Summary

ISO/TC 44 produces standards for welding, by all processes, as well as allied processes. These standards include:

- terminology
- definitions
- symbolic representation of welds on drawings
- apparatus and equipment for welding
- raw materials (filler metals, gas and fluxes)
- welding processes and rules
- methods of test and control
- design of welded assemblies
- welders' qualifications
- welding procedure qualifications
- safety and health.

Electrical safety matters related to welding are under the responsibility of IEC/TC 26 and, consequently, excluded from ISO/TC 44 activities.

ISO/TC 44 is responsible for standardization concerning an industrial field which cannot be considered alone, but in close liaison with the needs expressed by other industrial fields using the techniques defined above.

ISO/TC 44 standardization work is positioned between the "upstream" technical committees work, such as base material or non-destructive testing methods and the "downstream" product technical committees work also call "user" committees.

Three types of standardization work related to welding and allied processes can be as such considered:

- welding materials and products: performance and safety;
- techniques and processes, including quality matters, which shall take in account the fundamental scientific knowledge and the state of the art in the industrial field;
- personnel and their qualifications.

# 1. Business environment of ISO/TC 44

## 1.1 Description of business environment

A significant part of all metallic finished products and structures include at least one weld. However, the material properties of finished welded joints cannot be determined solely by non-destructive testing. Ensuring the quality of welds relies, for that reason, heavily on validation, verification, documentation and control of the welding processes. Most industrialized countries have, for many years, used standards for welding as a common reference basis for formulation of requirements for inspection and testing of welded joints, qualification of welding procedures, welders and operators, and numerous other operations.

Standardization work under the scope of ISO/TC 44 is included in the following context:

- world-wide extension of requirements which necessitates the preparation of standards to be used in contracts. This world-wide extension is strengthened by the approved international agreement establishing the World Trade Organisation (WTO) which includes an Agreement on Technical Barriers to Trade;
- coordination with European standardization (CEN) which is important due to the application of the Vienna Agreement (EN ISO standards);
- coordination with the International Institute of Welding (IIW), which has been approved by the ISO Council as an international standardizing body in this field of technology.
- existence of scientific and technical character organisations gathering international specialists in the field of welding which are devoted to the analysis of technical progress and fundamental phenomena;

The need defined in the above agreement on technical barriers to trade as specified in the Code of practice for the preparation, adoption and application of standards should be also considered. Standards should be prepared or revised, adopted and applied with the view to eliminate obstacles to international trade.

## 1.2 Quantitative Indicators of the Business Environment

A study published in January 2019 by Grand View Research estimates the global welding products market size at USD 13,27 billion in 2017. The Compound Annual Growth Rate (CAGR) is expected to expand of 5,6 % from 2017 to 2025 considering the growth in the building and construction industry all over the world and the increasing demand for advanced welding technology from automotive industry.

## 1.3 Stakeholders

Are concerned by ISO/TC 44 activities:

- all international metalworking industries: offshore, pipeline, power generation, process, industrial piping, shipbuilding, heavy fabrication, structural, automotive, general steel fabrication, aerospace, electronics;
- welding equipment and consumables manufacturers;

- corresponding trade unions (in particular standards for qualification of personnel and for health and safety in welding);
- inspection authorities, third party inspection bodies and other parties ensuring the quality of welded structures and products;
- welding schools;
- customers and users buying any kind of welded product;
- national and legal bodies;
- health and safety organisations.

## 2. Benefits of ISO/TC 44 work

### 2.1 Legal factors

ISO/TC 44 develops standards to be used as references in contracts for welding requirements. Using corresponding standards facilitates the scope of welding work.

### 2.2 Economical factors

Consumables and certain interchangeable parts for equipment are standardized in order to limit the number of variants (for examples: standards for consumables, transparent curtains, hoses, hose connectors, etc.). Standards in this category promote trade, increase productivity and facilitate design and planning.

Standards for gas welding equipment require world-wide comparable levels for safety and operation.

Furthermore, standards on consumables, procedures tests, qualification of welding procedures and welders, provide the basis for mutual recognition of comparable approvals or certification.

### 2.3 Technical factors

Standards may specify procedures for a work operation in order to ensure a consistent and reliable output of the operation. This is widely used for testing and inspection operations which, as a general rule, are covered by such “standard procedures”. Post weld heat treatment is also widely covered by “standard procedures”.

Welding includes several technologies, some of which are at the technological forefront, e.g. laser, micro-joining, beam welding. Standards may promote the application or indeed be a condition for the application of such methods because a standard provides a visible sign to the parties concerned that the process is “recognised”.

### 2.4 Health and safety factors

Welding is associated with specific problems in health and safety in the workplace. Standards for measurement of the concentration of fumes and gases emitted in the welder’s breathing zone, for example, are a condition for formulation or at least check of limit values. Radiographic testing of welds standards shall ensure that users are protected from radiation.

## 3. Objectives of ISO/TC 44

### 3.1 General

ISO/TC 44 is responsible for developing international standards for welding according to the following principles:

- standards shall meet global market needs;
- market prefers ISO global standards rather than national standards;
- standards shall fulfil ISO goals and the WTO agreement;
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- one scope shall be dealt with by one standard;
- standards shall be as easy as possible to use;
- standards shall contain the minimal requirements and the strictly necessary references.

Based on the principles above, ISO/TC 44 proposes the following objectives and strategic directions by developing international standards for:

- consumables and equipment;
- specification and qualification of welding procedures, welder qualification, quality requirements for welding. These standards cover arc welding of steels and aluminium and its alloys (representing the largest industrial volume) but also other welding processes such as resistance welding, stir welding and other materials such as copper, nickel and titanium;
- testing and inspection of welds: destructive and non-destructive testing;
- health and safety in welding (protective equipment, etc.).
- advanced technologies, technological guideline documents... (examples: standards for electron and laser beam welding).

### 3.2 Short terms objectives

ISO/TC 44 meets annually. These regular meetings permits to review and define the working plan of the TC. Within the 2 coming years (2019-2020), ISO/TC 44 will have to:

- improve the interpretation procedure to ensure that request for interpretation are discussed at a national level, at first;

Note: interpretations frequently deal with ISO 15614 "Specification and qualification of welding procedures for metallic materials -- Welding procedure test" and ISO 9606 "Qualification testing of welders".

- update the ISO/TC 44 website in order to facilitate the search of existing interpretation sheets (available interpretation sheets are accessible from the ISO/TC 44 website, tab "interpretation");
- reinforce the involvement of destructive testing experts: about 20 destructive testing standards are published within ISO/TC 44/SC 5 "Testing and inspection of welds" but there aren't sufficient resources available to maintain the existing standards;
- create a new sub-committee on underwater welding as this topic is currently dealt within ISO/TC 44/SC 11 "Qualification requirements for welding and allied processes personnel" to

avoid ISO/TC 44/SC 11 members voting on underwater welding projects where they do not have the expertise on the topic;

- offer its expertise to ISO/TC 61 “Plastics”, ISO/TC 269/SC 1 “Railway applications - Infrastructure” and ISO/TC 261 “Additive manufacturing” for developing standards on these topics through a liaison or the creation of a joint working group (JWG);

### 3.3 Long terms objectives

During the 5 coming years (2019 to 2024), ISO/TC 44 will have to:

- reinforce the involvement of P-members by encouraging them to attend ISO/TC 44, SCs and WGs meetings in order to have a better representativeness of countries committed in welding standards ;
- encourage P-members to provide feedback during meetings or through votes by correspondence to improve standards;

## 4. Resources to achieve ISO/TC 44 objectives

### 4.1 Coordination committee

ISO/TC 44 works closely with IIW (International level) and CEN/TC 121 “Welding” (European level) to produce high quality welding standards. In the early 1990s IIW was approved as an International Standardization Body. To ensure an efficient liaison between the 3 structures, a coordination committee between CEN/TC 121, IIW and ISO/TC 44 (ISO/TC 44 Joint Advisory Group - JAG), composed by 2 representatives of each structure was created in 1995. The main objective of ISO/TC 44 Joint Advisory Group is to avoid the duplication of welding standards, based on the following principles:

- share regularly the work program of CEN/TC 121, IIW and ISO/TC 44 in each structure;
- organize an annual meeting of ISO/TC 44 JAG to review the work program of each structure. This meeting aims to consider if projects shall be developed under Vienna Agreement (EN ISO standard) or if IIW projects shall be developed as (EN) ISO standards;

Note: the rules for developing IIW projects as (EN) ISO standards are described in the ISO/TC 44 JAG Procedure.

- appoint liaison officers in CEN/TC 121, IIW commissions and ISO/TC 44 and its sub-committees and invite them to attend meetings to improve the cooperation between the 3 structures.

Besides, to achieve its objective, ISO/TC 44:

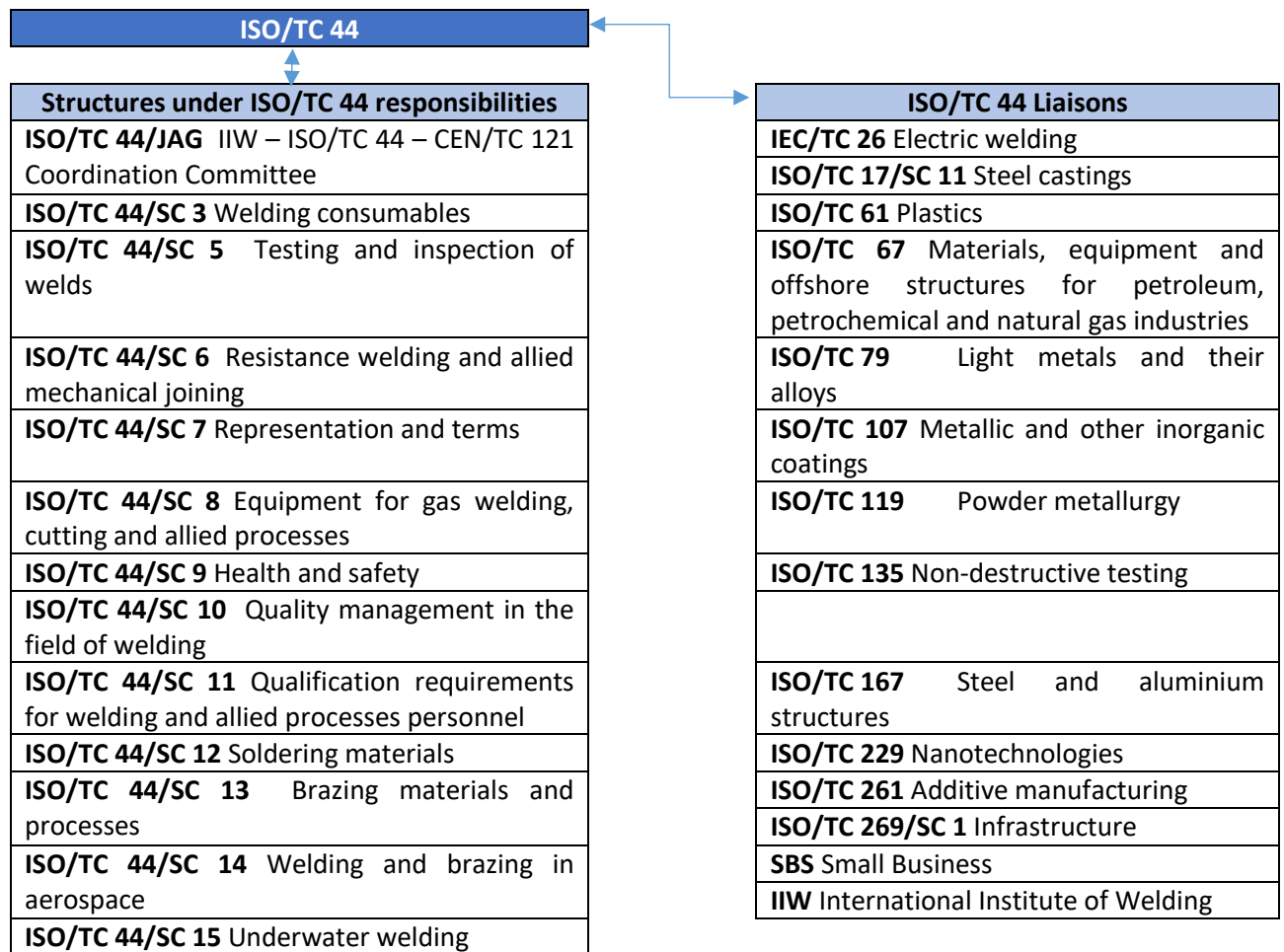
- takes profit from systematic review (large enquiries launched every 5 years after the publication of a standard) to consider if published standards still represent the state of the art. The results of these enquiries lead to the confirmation, the revision or the cancellation of a standard;
- sets-up ad-hoc groups for the improvement of the interpretation procedure and ISO/TC 44 website;
- uses the ISO/TC 44 website (public) to promote ISO/TC 44 activities and projects and, then, brings new expertise in ISO/TC 44 and its sub-committees / working groups;
- works closely with ISO to reinforce the involvement of P-members.
- delegates projects to sub-committees and their working-groups.

### 4.2 ISO/TC 44 Organisation

To achieve ISO/TC 44 objectives, it is necessary to delegate projects to sub-committees and working groups. One of the key-role of ISO/TC 44 aims to coordinate activities, projects and scopes of ISO/TC

44 sub-committees. Secondly, ISO/TC 44 shall ensure liaisons with other technical committees and relevant scientific and technical organisations.

To reach its objectives, ISO/TC 44 is organised as follows:



## 5. Factors affecting the completion and implementation of ISO/TC 44 work programme

ISO/TC 44 examines carefully each case for co-operation whether it is technically possible to establish an identical standard in both ISO/TC 44 and CEN/TC 121 or any other TC. Otherwise, the co-operation could lead to some conflict of interests. The situation is examined case by case.

Effective participation to ISO standardisation work means that countries are naturally supporting the implementation of ISO standards in their countries.

Major factors that may affect the completion of ISO/TC 44 are:

- **Essential safety requirements of European Directives and Regulation.** At the European level, most of the welding standards apply to the Simple Pressure Vessels Directive (87/440/EEC), Pressure Equipment Directive (2014/68/EU) or Construction Product Regulation (305/2011). The essential safety requirements for welding for the first two directives are general and as a consequence, the technical solutions are part of the standards themselves. For the CPR, CEN/TC 121 created a work item at the CEN level on “General delivery conditions for welding

consumables for fusion welding of metallic materials”. This solution is totally independent from ISO international standards

- **“Harmonized” standards.** ISO/TC 44 follows the development of the other sectors which could influence ISO/TC 44 work;
- **P-members participation and voting policy:** receiving abstentions through ballots by correspondence doesn't permit to gather feedback and improve standards.

## 6. Public information

For further information, several websites are publicly available:

General information on ISO/TC 44:

→ <https://committee.iso.org/home/tc44>

ISO/TC 44 organisation and ISO/TC 44 sub-committees activities:

→ <https://www.iso.org/committee/48602.html>

ISO/TC 44 and ISO/TC 44 sub-committees published standards and on-going projects:

→ <https://www.iso.org/committee/48602/x/catalogue/p/1/u/0/w/0/d/0>

ISO/TC 44 interpretation procedure and sheets

→ <https://committee.iso.org/sites/tc44/home/interpretation.html>