# Use of ASME BPVC Globally

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# The International Institute of Welding

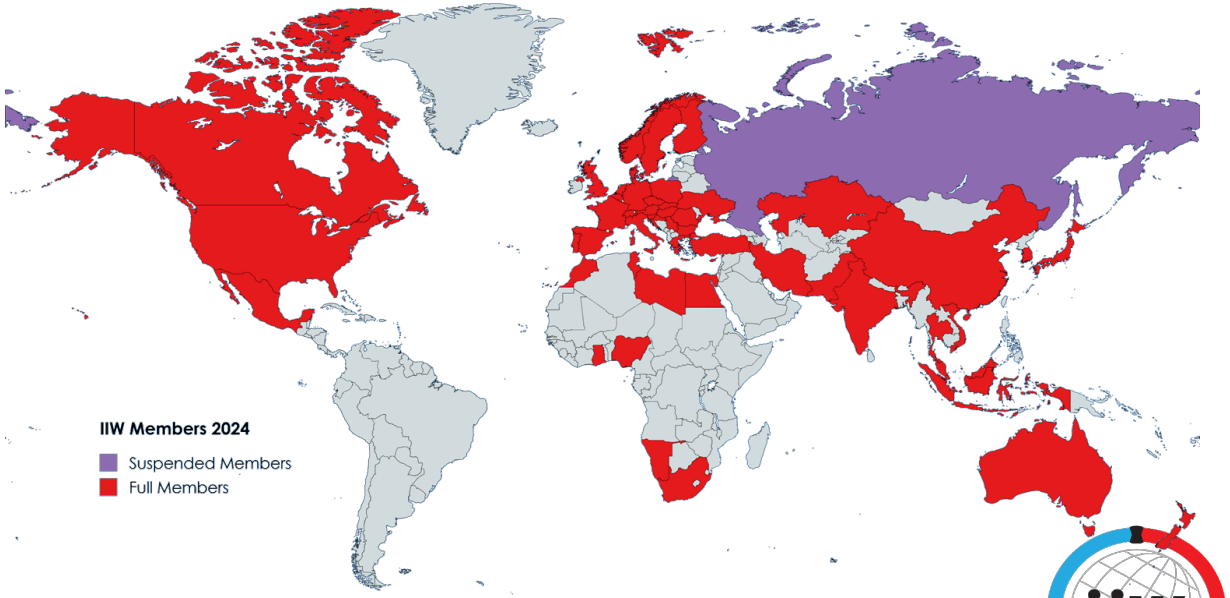
- The International Institute of Welding is an international association focused on the exchange of knowledge in the field of welding and allied technologies.
- IIW is a not-for-profit organization, and our members are the associations representing the sectors of welding and allied processes in their countries
- Currently 53 countries from all continents are represented

***Vision***

*The leading global welding community linking industry, research and education*

***Mission***

*Advance welding and joining through a worldwide network*

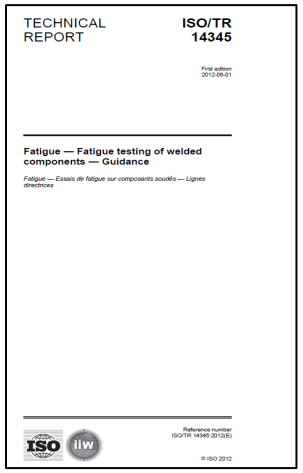


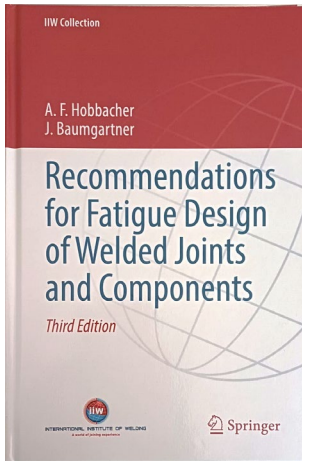
# The IIW at a glance

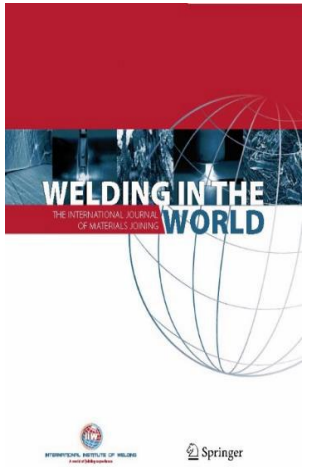
- **Researchers, industry practitioners and educators, students and young professionals** take part to our **collaborative working platform**
- **International cooperation** is achieved through annual and intermediate meetings of IIW working units and boards, **technical networking**, shared projects, events, publications and web-based communications.
- The outcomes are shared worldwide – promoting optimum use and **innovation** in joining technologies, **international standardisation**, and quality through **education, training, qualification and certification** of individuals and companies.

# IIW Technical Production

- High quality scientific papers, best practice documents, position statements and monographic videos are delivered by the worldwide recognized leading experts on different topics.
- The **IIW Knowledge center** is a global view of welding and allied processes and defines the future direction of manufacturing




- Over 30 ISO standards
- IIW Journal *Welding in the world*
  White Paper, vision documents and reports
- 145 Books Published (industrial best practices)

# IIW Scientific Commissions

| | |
|---|---|
| C-I | Additive Manufacturing, Surfacing, and Thermal Cutting |
| C-II | Arc Welding and Filler Metals |
| C-III | Resistance Welding, Solid State Welding, and Allied Joining Process |
| C-IV | Power Beam Processes |
| C-V | NDT and Quality Assurance of Welded Products |
| C-VI | Terminology |
| C-VII | Micro joining and Nanojoining |
| C-VIII | Health, Safety, and Environment |
| C-IX | Behavior of Metals Subjected to Welding |
| C-X | Structural Performances of Welded Joints - Fracture Avoidance |
| C-XI | Pressure Vessels, Boilers and Pipelines |
| C-XII | Arc Welding Processes and Production Systems |
| C-XIII | Fatigue of Welded Components and Structures |
| C-XIV | Education and Training |
| C-XV | Design, Analysis, and Fabrication of Welded Structures |
| C-XVI | Polymer Joining and Adhesive Technology |
| C-XVII | Brazing, Soldering and Diffusion Bonding |
| C-XVIII | Quality Management in Welding and Allied Processes |
| C-XIX | Physics of Welding and joining |

# IIW International System for Qualification and Certification

- Worldwide recognized diplomas
- Centralized management of examinations, in the national language
- Continuously updated guidelines
- Periodical audit of Authorized bodies for examination, certification (ANBs/ANBCCs) and Training (ATBs)
- Partnering with the International Additive Manufacturing Qualification System (IAMQS) to cover qualification of personnel in the field of Additive Manufacturing of Metals and polymers


IAMQS

# Survey on Manufacturing standards, globally?

- ISO 16528 provides limited information (framework standard)
- Often, the manufacturing standards are a requirement of **local regulations or directives** (referred to at the place of installation):
  a) Referring to National Standards and codes (e.g. USA, Canada, China)
  b) Referring to Essential Safety Requirements (e.g. PED in Europe)
  c) Referring to Standards from other Countries (e.g. Pressure Equipment in India requires ASME BPV)
- In case of **no requirement**, it's up to the Manufacturer or the main contractor (e.g. Republic of Korea)

# Survey on the use of Standards and codes

- By manufacturers of equipment (Gobally, normalised data)

| Manufacturer | ASME BPV | Other 1 | Other 2 |
|---|---|---|---|
| Manufacturer A (I) | 90% | 10% (various) | - |
| Westinghouse | 80% | 18% (EN 13445) | 2% (various) |
| Larsen&Toubro | 100% | - | - |
| Manufacturer B (JP) | 30% | 65% (Denki-Jigyohou) | 5% |

- By Country (Europe, source: Notified Bodies for CE-marked products)

| Country | EN 13445 | ASME BPV | Other |
|---|---|---|---|
| Germany | 10% | 10% | 80% (AD 2000) |
| Italy | 19% | 80% | 1% |
| Spain | 50% | 50% | - |

# Survey on ASME's certificate holders in ITALY

| Estimanted average ASME Certificate Holders EXPORT to ASME Code **mandatory** by Customers requirements. | | | **BPV Oil& GAS** Typical Sec. VIII | **BPV Miscellaneous** Typical Sec.I and IV | **BPV Nuclear** Typical Sec. III |
|---|---|---|---|---|---|
| Nord America | USA - CND | 44% | 75% | 16% | 9% |
| Middle East | Emirates Arab United - Saudi Arabia | 33% | 88% | 12% | 0% |
| North Africa | Egypt - Libya - Algeria- Tunisia | 17% | 85% | 15% | 0% |
| Far East | Indonesia- Malesia - Australia, Others | 6% | 84% | 16% | 0% |

Averaged results from a survey, performed on 10 key stakeholders, representing*:

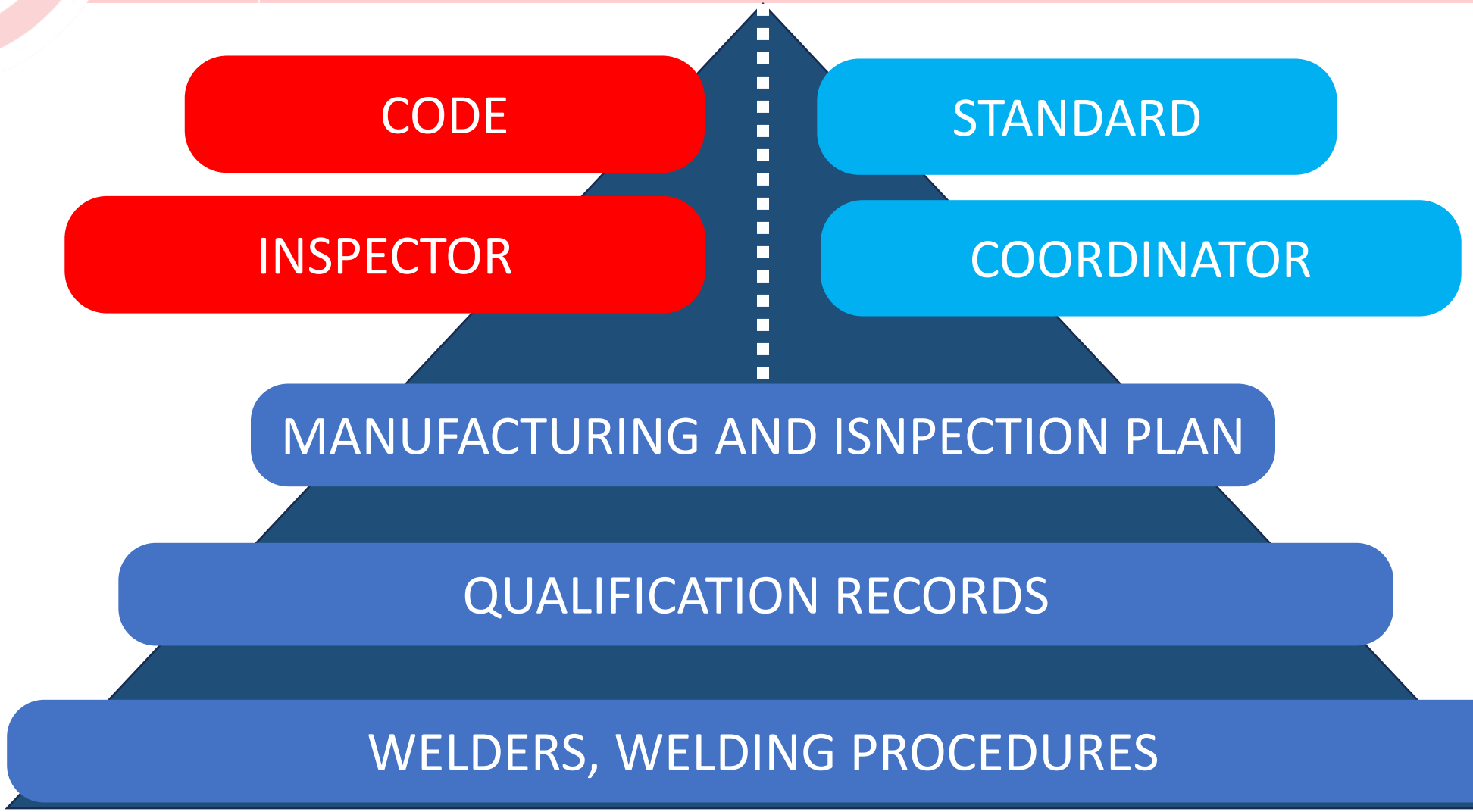
**# 3 Authorized Inspection Agencies.**

**# 3 Independent Consultants.**

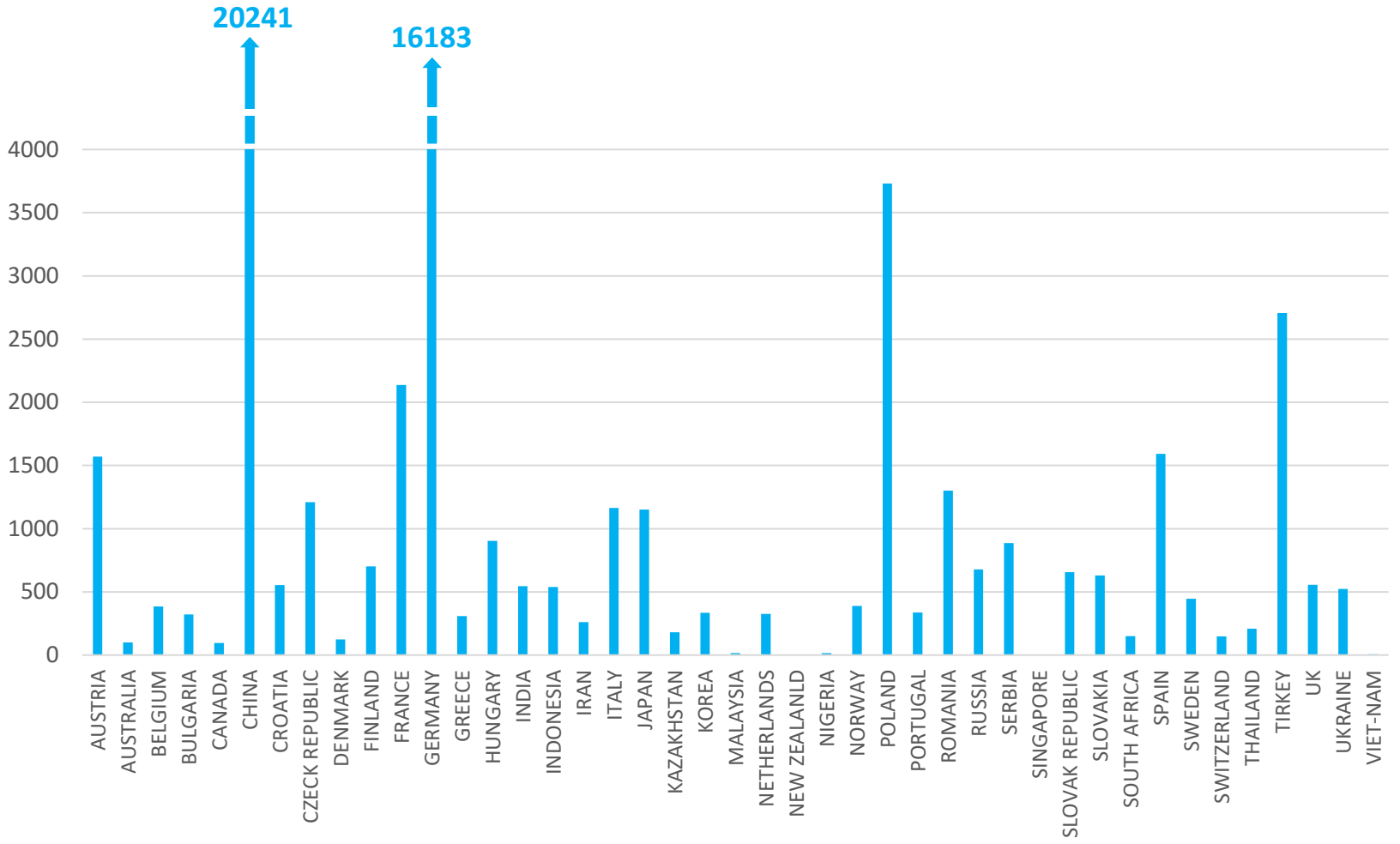
**# 4 BPV key manufacturers.**

* Source: 3HCSI

# Different philosophies in managing welding applications

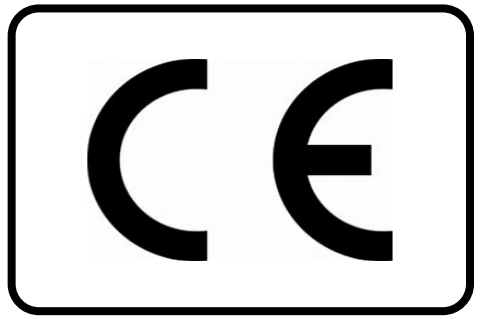


# Total IWEs by Country (2022)



# ASME BPV in Europe?

- The **Pressure Equipment Directive** (2014/68/EN, **P.E.D.**) is a European Union regulation that governs the design, manufacture, and conformity assessment of pressure equipment and assemblies with a maximum allowable pressure greater than 0.5 bar.
- Requires manufacturers to undergo conformity assessments from **Notified Bodies** to ensure compliance with the directive.
- Requires conformity to **Essential Safety Requirements (ESR)** are designed to ensure the safety of pressure equipment throughout its lifecycle.
  - **Harmonised standards** guarantee the “presumption of conformity”
  - **Other standards** may be used, provided the manufacturer demonstrates compliance with ESR



CE marking of Pressure Equipment is compulsory in EU

# ASME BPV in Europe: harmonised standards



## European (international[b]) standards for fusion welding

| QUALITY REQUIREMENTS for welding[a] | |
|---|---|
| | EN ISO 3834 |
| Grouping of materials | |
| Welder qualification | |
| WPS | |
| Welding procedure qualification | |
| Welding operator qualification | |
| NDT-personnel | |
| Welding coordination | |
| Inspection & testing during welding<br>- Measurement of preheat and interpass temp.<br>- Recommendations for welding<br>- Comparison of methods for avoidance of cold cracks | |
| Inspection & testing after welding<br>- NDT – General rules<br>- Visual testing<br>- Radiographic testing<br>- Ultrasonic testing<br>- Magnetic particle testing<br>- Macro- & microscopic testing<br>- Penetrant testing (general) | |
| Post-weld heat treatment | |
| Calibration/validation | |
| Qual.lev. fusion welding (not beam) | |
| Quality levels for beam welding | |
| Qual.lev. laser-arc hybrid welding | |
| Quality levels for cutting | |
| Joint preparation | |
| Joint details | |
| Geometric imperfections - Definitions | |

| Arc welding | | |
|---|---|---|
| | Steel | Aluminium |
| | CEN ISO/TR 15608, 20172, 20173, 20174 | |
| | EN ISO 9606-1 | EN ISO 9606-2 |
| | EN ISO 15609-1 | |
| | EN ISO 15607, 15610, 15611, 15612, 15613 | |
| | EN ISO 15614-1 | EN ISO 15614-2 & -4 |
| | EN ISO 14732 | |
| | EN ISO 9712 | |
| | EN ISO 14731 | |
| | EN ISO 13916 | |
| | EN 1011-2 & -3 (ISO/TR 17671-2 & -3) | EN 1011-4 (ISO/TR 17671-4) |
| | CEN ISO/TR 17844 | |
| | EN ISO 17635 | |
| | EN ISO 17637 | |
| | EN ISO 17636-1 & -2 | |
| | EN ISO 17640, 10863, 13588 & 22825 | |
| | EN ISO 17638 | |
| | EN ISO 17639 | |
| | EN ISO 3452-1 | |
| | EN ISO 17663 | |
| | EN ISO 17662 | |

| Quality levels & Joint preparation | | |
|---|---|---|
| | Steel | Aluminium |
| | EN ISO 5817 | EN ISO 10042 |
| | EN ISO 13919-1 | EN ISO 13919-2 |
| | EN ISO 12932 | |
| | EN ISO 9013 | |
| | EN ISO 9692-1 & -2 | EN ISO 9692-3 |

| Other | |
|---|---|
| Pressurized comp. / Steel constr. | EN 1708-1 & -3 / -2 (ISO 'missing') |
| Fusion welding / Pressure welding | EN ISO 6520-1 / -2 |
| Thermal cuts | EN ISO 17658 |
| Designation system | CEN ISO/TS 17845 |

See continued

| Copper | Nickel | Titanium & Zirconium |
|---|---|---|
| EN ISO 9606-3 | EN ISO 9606-4 | EN ISO 9606-5 |

| Gas welding | Electron beam welding | Laser welding |
|---|---|---|
| EN ISO 15609-2 | EN ISO 15609-3 | EN ISO 15609-4 |

| Cast iron | Titanium & Zirconium | Copper |
|---|---|---|
| EN ISO 15614-3 | EN ISO 15614-5 | EN ISO 15614-6 |

| Overlay welding | Tube to tube plate | Beam welding |
|---|---|---|
| EN ISO 15614-7 | EN ISO 15614-8 | EN ISO 15614-11 |

| Clad steel | Laser | Electron beam | Cast iron |
|---|---|---|---|
| EN 1011-5 (ISO/TR 17671-5) | EN 1011-6 (ISO/TR 17671-6) | EN 1011-7 (ISO/TR 17671-7) | EN 1011-8 (ISO/TR 17671-8) |

| Environment, health & safety | |
|---|---|
| Fume sampling in laboratory | EN ISO 15011-1 to -5 |
| Fume sampling in breathing zone | EN ISO 10882-1 & -2 |
| Filters | EN ISO 15012-1, -2 & -4 |
| Eye protection | EN 169, 170, 171, 175 & 379 |
| Protective clothing | EN ISO 11611, EN 12477 |
| Welding curtains | EN 1598 |
| Environm. checklist | EN 14717 |

| Other continued | |
|---|---|
| Symbolic repr. | ISO 2553 |
| Proc. numbers | EN ISO 4063 |
| Terms & Def. | ISO/TR 25901-parts, CEN/TR 14599 |
| Def. weld proc. | EN 14610 |
| Terms on joints & welds | EN ISO 17659 |
| Tolerances | EN ISO 13920 |
| Welding positions | EN ISO 6947, CEN/TR 14633 |
| Reinforcing steel | EN ISO 17660 |

| Welding consumables | |
|---|---|
| Product | EN 13479 |
| Quality req. for manufacturing | EN 12074 |
| Technical deli-very conditions | EN ISO 544 |
| Procurement | EN ISO 14344 |
| Type testing | EN 14532-1, -2 & -3 |
| Testing | EN ISO 15792-1, -2 & -3, 6847, 14372, 8249, 3690 & ISO 2401 |
| TIG electrodes | EN ISO 6848 |
| Hard facing | EN 14700 (ISO/TR 13393) |

| Destructive testing | |
|---|---|
| Impact | EN ISO 9016 |
| Tensile long. | EN ISO 5178 |
| Tensile perp. | EN ISO 4136 |
| Tensile cruc. | EN ISO 9018 |
| Bend | EN ISO 5173 |
| Fracture | EN ISO 9017 |
| Hardness | EN ISO 9015-1 & -2 |
| Macroscopic | EN ISO 17639, CR 12361 (ISO/TR 16060) |
| Hot crack | EN ISO 17641-1, -2 & -3 |
| Cold crack | EN ISO 17642-1, -2 & -3 |
| Delta ferrite | EN ISO 17655 |

| Acceptance levels for NDT | |
|---|---|
| Radiography | EN ISO 10675-1 & -2 |
| Ultrasonic | EN ISO 11666, 15626, 22825, 23279 |
| Magnetic particle | EN ISO 23278 |
| Penetrant | EN ISO 23277 |
| Visual testing (+ macro/micro etc) | For all imperfections EN ISO 5817 etc apply |

### Classification of welding consumables

| | Steel | | | | Other materials | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Non-alloy and fine grain | High strength | Creep resistant | Stainless and heat resisting | Nickel | Copper | Aluminium | Cast iron | Titanium |
| MMA | EN ISO 2560 | EN ISO 18275 | EN ISO 3580 | EN ISO 3581 | EN ISO 14172 | EN ISO 17777 | | EN ISO 1071 | EN ISO 24034 |
| MIG/MAG | EN ISO 14341 | EN ISO 16834 | EN ISO 21952 | EN ISO 14343 | EN ISO 18274 | EN ISO 24373 | EN ISO 18273 | | |
| TIG | EN ISO 636 | | | | | | | | |
| Electrodes etc for submerged arc | EN ISO 14171 | EN ISO 26304 | EN ISO 24598 | | | | | | |
| Fluxes for submerged arc | EN ISO 14174 | | | | | | | | |
| Cored wires | EN ISO 17632 | EN ISO 18276 | EN ISO 17634 | EN ISO 17633 | EN ISO 12153 | | | EN ISO 1071 | |
| Gas welding | EN ISO 20378 | | EN ISO 20378 | | | | | | |
| Shielding gas | EN ISO 14175 | | | | | | | | |

[a] References in fields with this colour are directly linked to EN ISO 3834

[b] The ISO reference in brackets is in most cases identical with or is based on corresponding EN

*"Standards do not replace education, sound judgment and good engineering practice"*, Mathias Lundin

Update available at www.svets.se/overview

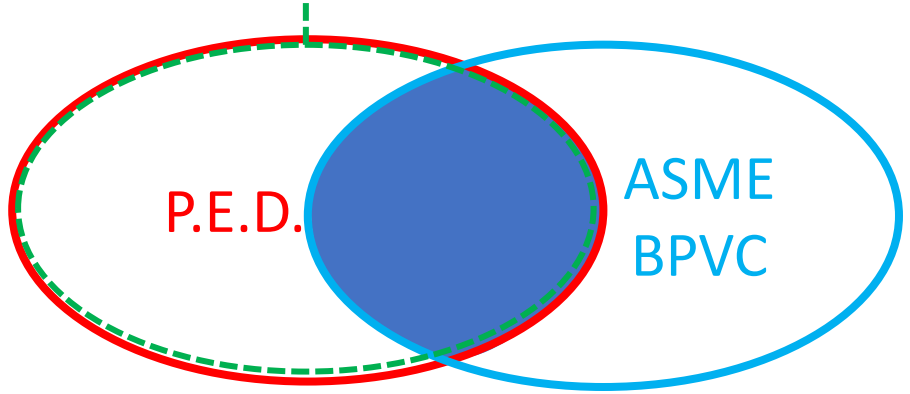
Mathias Lundin, Swedish Welding Commission, May 2024

# ASME BPV in Europe – Specific requirements

- The ASME BPV Code requirements are not recognized:
  - There is no market for the “ASME Stamp”.
  - The ASME BPVC can still be used under the conformity assessment rules of Europe
- Examples of ESR applicable to ASME BPVC users:
  - Chemical composition of Base Materials
  - Hot temperature properties of materials
  - Impact Testing
  - Period of validity of Welders’ Qualifications
  - Issuance of PQRs and WPQs
- This may result in severe restrictions on applications, nevertheless….

**ASME STAMP is not recognized for CE marking**

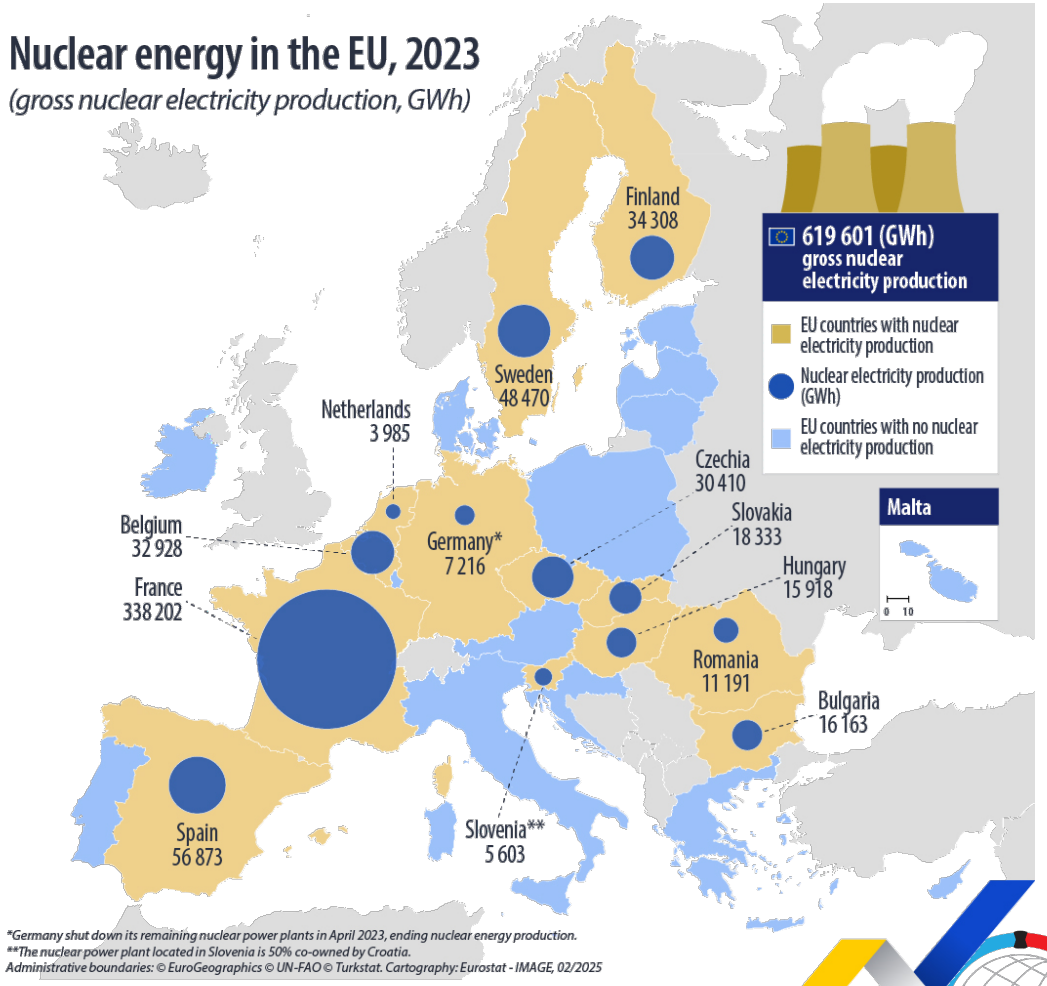
Harmonised Standards with ZA Annexes




**REQUIREMENTS FOR BPVC USERS**

# ASME BPV in Europe – the nucelar sector

- PED is NOT applicable for "*items specifically designed for nuclear use, failure of which may cause an emission of radioactivity*" (Article 1, item h), i.e Nuclear Power Plants (the **Nuclear Island**)
- Plant owners may consider using **ASME BPVC III in EU**, but without setting the requirement of the ASME Certification Mark



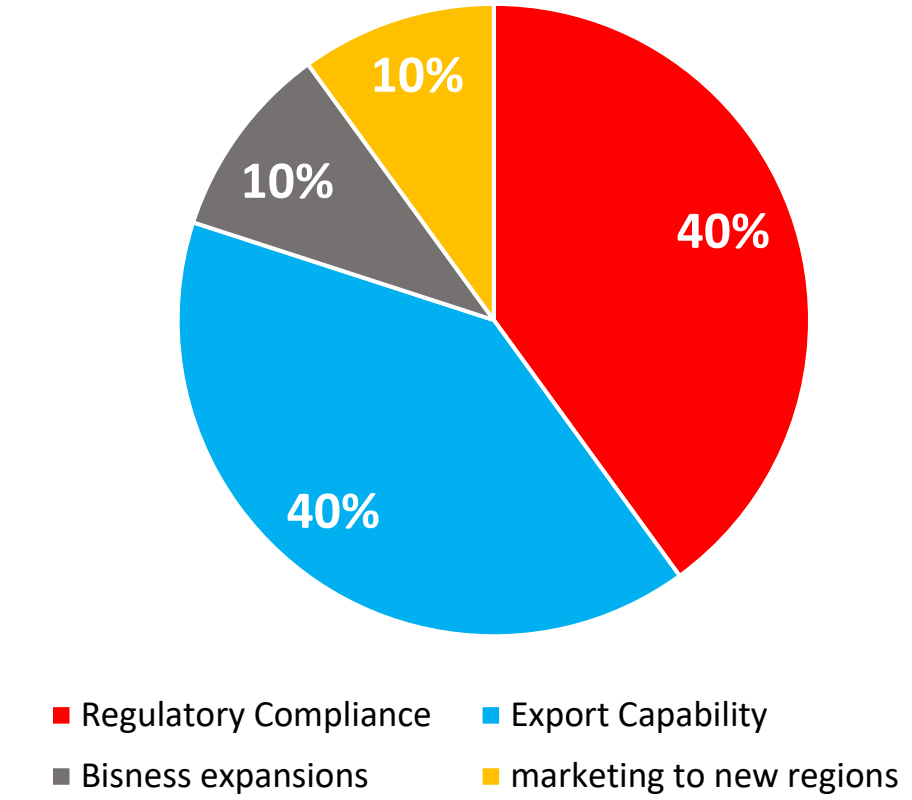
# ISO/CEN: a different approach in the development of standards

- **Proposal Stage/Systematic review**: A need for a new standard or a revision (5 Years) is identified, and a proposal is submitted.
- **Preparatory Stage**: A working group of experts is formed to prepare a working draft of the standard. This group includes representatives from different countries and industries, each through their national Standardization Body.
- **Committee Stage**: The working draft is shared with the relevant ISO technical committee for review and comment. (multiple rounds of discussion).
- **Enquiry Stage**: The draft standard is released as a Draft International Standard (DIS) and is circulated to all ISO member bodies for voting and comments.
- **Approval Stage**: Based on comments received, the Final Draft International Standard (FDIS) is submitted for a final vote by ISO member bodies.
- **Publication Stage**: If the FDIS is approved, it is published as an official ISO International Standard.

# Why is it so widely used?

- History (since 1914)
- Easy Access?
- Coverage
- Update
- **Imposed by regulations, specifications or standard requirements**
- … and possible technical abuses

**Main Drivers for ASME certificate in Italy***




* Source: 3HCS

# Acknowledgements (sources)