

European (international^b) standards for fusion welding

QUALITY REQUIREMENTS for welding^a

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|---|
| EN ISO 3834 |
| Grouping of materials |
| Welder qualification |
| WPS |
| Welding procedure qualification |
| Welding operator qualification |
| NDT-personnel |
| Welding coordination |
| Inspection & testing during welding - Measurement of preheat and interpass temp. - Recommendations for welding - Comparison of methods for avoidance of cold cracks |
| Inspection & testing after welding - NDT – General rules - Visual testing - Radiographic testing - Ultrasonic testing - Magnetic particle testing - Macro- & microscopic testing - Penetrant testing (general) |
| Post-weld heat treatment |
| Calibration/validation |

| 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 |

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| MMA |
| MIG/MAG |
| TIG |
| Electrodes etc for submerged arc |
| Fluxes for submerged arc |
| Cored wires |
| Gas welding |
| Shielding gas |

| 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 | |
| EN ISO 2560 | EN ISO 18275 | EN ISO 3580 | EN ISO 3581 | EN ISO 14172 | EN ISO 17777 | | | | |
| EN ISO 14341 | EN ISO 16834 | EN ISO 21952 | EN ISO 14343 | EN ISO 18274 | EN ISO 24373 | EN ISO 18273 | EN ISO 1071 | EN ISO 24034 | |
| EN ISO 636 | | | | | | | | | |
| EN ISO 14171 | EN ISO 26304 | EN ISO 24598 | | | | | | | |
| EN ISO 14174 | | | | | | | | | |
| EN ISO 17632 | EN ISO 18276 | EN ISO 17634 | EN ISO 17633 | EN ISO 12153 | | | | | EN ISO 1071 |
| EN ISO 20378 | | EN ISO 20378 | | | | | | | |
| EN ISO 14175 | | | | | | | | | |

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| Symbolic repr. |
| Proc. numbers |
| Terms & Def. |
| Def. weld proc. |
| Terms on joints & welds |
| Tolerances |
| Welding positions |
| Reinforcing steel |

| Other continued | |
|----------------------------------|--|
| ISO 2553 | |
| EN ISO 4063 | |
| ISO/TR 25901-parts, CEN/TR 14599 | |
| EN 14610 | |
| EN ISO 17659 | |
| EN ISO 13920 | |
| EN ISO 6947, CEN/TR 14633 | |
| EN ISO 17660 | |

| Welding consumables | |
|---|--|
| EN 13479 | |
| EN 12074 | |
| EN ISO 544 | |
| EN ISO 14344 | |
| EN 14532-1, -2 & -3 | |
| EN ISO 15792-1, -2 & -3, 6847, 14372, 8249, 3690 & ISO 2401 | |
| EN ISO 6848 | |
| EN 14700 (ISO/TR 13393) | |

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| Impact |
| Tensile long. |
| Tensile perp. |
| Tensile cruc. |
| Bend |
| Fracture |
| Hardness |
| Macroscopic |
| Hot crack |
| Cold crack |
| Delta ferrite |

| Destructive testing | |
|---------------------------------------|--|
| EN ISO 9016 | |
| EN ISO 5178 | |
| EN ISO 4136 | |
| EN ISO 9018 | |
| EN ISO 5173 | |
| EN ISO 9017 | |
| EN ISO 9015-1 & -2 | |
| EN ISO 17639, CR 12361 (ISO/TR 16060) | |
| EN ISO 17641-1, -2 & -3 | |
| EN ISO 17642-1, -2 & -3 | |
| EN ISO 17655 | |

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| Radiography |
| Ultrasonic |
| Magnetic particle |
| Penetrant |
| Visual testing (+ macro/micro etc) |

| Acceptance levels for NDT | |
|---|--|
| EN ISO 10675-1 & -2 | |
| EN ISO 11666, 15626, 22825, 23279 | |
| EN ISO 23278 | |
| EN ISO 23277 | |
| For all imperfections EN ISO 5817 etc apply | |

^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