ANEXO A – Normas europeias e ISO utilizadas na soldadura por fusão

QUALITY REQUIREMENTS for welding[a]	EN ISO 3834

Arc welding

	Steel	Aluminium
Grouping of materials	CEN ISO/TR 15608, 20172, 20173, 20174	
Welder qualification	EN ISO 9606-1	EN ISO 9606-2
WPS	EN ISO 15609-1	
Welding procedure qualification	EN ISO 15607, 15610, 15611, 15612, 15613	
	EN ISO 15614-1	EN ISO 15614-2 & -4
Welding operator qualification	EN ISO 14732	
NDT-personnel	EN ISO 9712	
Welding coordination	EN ISO 14731	
Inspection & testing during welding - Measurement of preheat and interpass temp.	EN ISO 13916	
- Recommendations for welding	EN 1011-2 & -3 (ISO/TR 17671-2 & -3)	EN 1011-4 (ISO/TR 17671-4)
- Comparison of methods for avoidance of cold cracks	CEN ISO/TR 17844	
Inspection & testing after welding - NDT – General rules	EN ISO 17635	
- Visual testing	EN ISO 17637	
- Radiographic testing	EN ISO 17636-1 & -2	
- Ultrasonic testing	EN ISO 17640, 10863, 13588 & 22825	
- Magnetic particle testing	EN ISO 17638	
- Macro- & microscopic testing	EN ISO 17639	
- Penetrant testing (general)	EN ISO 3452-1	
Post-weld heat treatment	EN ISO 17663	
Calibration/validation	EN ISO 17662	

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)

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

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

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

Welding consumables

Product	EN 13479
Quality req. for manufacturing	EN 12074
Technical delivery 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)

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

Quality levels & Joint preparation

	Steel	Aluminium
Qual.lev. fusion welding (not beam)	EN ISO 5817	EN ISO 10042
Quality levels for beam welding	EN ISO 13919-1	EN ISO 13919-2
Quality levels for cutting	EN ISO 9013	
Joint preparation	EN ISO 9692-1 & -2	EN ISO 9692-3

Other

Joint details	Pressurized comp. / Steel constr. — EN 1708-1 & -3 / -2 (ISO 'missing')
Geometric imperfections - Definitions	Fusion welding / Pressure welding — EN ISO 6520-1 / -2
	Thermal cuts — EN ISO 17658
	Designation system — CEN ISO/TS 17845

See continued

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	
MIG/MAG	EN ISO 14341	EN ISO 16834	EN ISO 21952	EN ISO 14343	EN ISO 18274	EN ISO 24373	EN ISO 18273		EN ISO 24034
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				
Gas welding	EN 12536 (ISO 20378)		EN 12536 (ISO 20378)					EN ISO 1071	
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, January 2018