

DIN EN 1011-6:2006-03 (E)

Welding - Recommendation for welding of metallic materials - Part 6: Laser beam welding

Contents		Page
1	Scope	6
2	Normative references	6
3	Terms and definitions	6
4	Health and safety and protection of the environment	6
5	Quality requirements	6
6	Equipment	7
6.1	General	7
6.2	Provisions for acceptance testing	7
6.3	Provisions for maintenance and calibration	7
7	Qualification of welding personnel	7
8	Welding procedure specification	8
9	Welding procedure test	8
10	Consumables	8
10.1	Filler metals	8
10.2	Gases	8
11	Design	9
11.1	Overall design of structure or product	9
11.2	Joint design	9
11.3	Joint preparation	9
12	Laser beam welding	10
12.1	Characteristics	10
12.2	Advantages and limitations	12
12.3	Assembling and fixtures	13
12.4	Process control	13
12.5	Inspection and testing	13
12.6	Imperfections	13
Annex A (informative) Equipment		14
A.1	Description of laser process	14
A.2	Laser beam sources	15
A.3	Guiding, shaping and focusing the beam	17
A.4	Devices used to create a relative movement between the laser beam and the work piece	21
A.5	Fixtures used to hold the work piece	22
A.6	Cooling systems	22
A.7	Control systems	22
Annex B (informative) Laser beam properties		23
Annex C (informative) Information about weldability of metallic materials		25

C.1	General	25
C.2	Steels and iron alloys	25
C.3	Nickel alloys	26
C.4	Aluminium and magnesium alloys	27
C.5	Copper and its alloys	27
C.6	Refractory and reactive metals	27
C.7	Titanium and its alloys	27
C.8	Dissimilar metals	28
C.9	Non-metals	28
Annex D (informative) Information about causes of weld imperfections and prevention		29
Annex E (informative) Beam control and monitoring		31
E.1	General	31
E.2	Focus point	31
E.3	Beam alignment and pilot beam coincidence	31
E.4	Beam power	32
E.5	Beam power distribution	32
E.6	Nozzle alignment	32
E.7	Pulsed beam power data	33
E.8	Manipulators, guides etc	33
Annex F (informative) Laser beam processing		34
F.1	Laser beam cutting	34
F.2	Laser beam drilling	35
F.3	Laser beam surface treatment	36
F.4	Laser beam cladding characteristics	37
F.5	Laser beam marking and engraving	37