

Content

Tungsten inert gas welding.....	1
Arrangement of a TIG welding unit.....	2
Connection and servicing work.....	2
Basic structure of a welding power supply for tungsten inert gas welding (TIG) using direct and alternating current (DC/AC).....	3
TIG welding unit with variable welding current pattern.....	4
Striking the arc.....	5
Striking by contacting the workpiece with the electrode.....	5
Non-contact striking using high-voltage pulses (HF).....	5
Tungsten inert gas welding with direct current and alternating current.....	6
Welding with direct current.....	6
Welding with alternating current.....	6
Problems when welding with alternating current.....	7
Water-cooled torch for tungsten inert gas welding.....	8
Forming the end of the tungsten electrode.....	9
Welding with direct current (negative pole at the electrode).....	9
Welding with alternating current.....	9
Correct adjustment of current.....	9
Example nomenclature.....	10
Reference values for selecting welding current strength.....	11
Unalloyed and alloyed steel.....	11
Aluminium.....	11
Copper.....	11
Shielding gases to DIN EN ISO 14175.....	12
Consumption of shielding gas – Quantity of shielding gas – Selection of gas nozzle.....	13
Welding rods for tungsten inert gas welding of structural steel to DIN EN ISO 636.....	14
Personal safety gear.....	15
Safety precautions.....	16
Firefighting.....	17
Electric current.....	18
Safety precautions.....	18
Hazardous substances and their effects.....	19
Safety precautions.....	19
Ventilation and extraction measures.....	20
Noise.....	21
Fire prevention.....	21
Protection of other people.....	22
Welding in areas at risk of fire and explosion.....	23
Welding in confined spaces.....	24
Working with an elevated electrical risk.....	25
Welding of containers with hazardous content.....	26
Illustrations of weld joints.....	27
Reference symbol.....	28
Symbolic illustration of weld joints.....	29
Joint preparation examples depending on workpiece thickness, accessibility and welding process.....	31
Use of fillet welds in steel construction.....	32
Examples of welding joints from steel and container construction.....	33
Flame cutting.....	34
Cutting gases.....	34

Operations when flame cutting.....	34
Welder test to DIN EN 287-1:2011-11	35
Purpose	35
Sphere of application.....	35
Scope	35
Period of validity of welder test.....	35
Condition for period of validity	35
Extending the period of validity	35
Test of specialist knowledge.....	36
Testing bodies and testers.....	36
Selecting the test item/welder test.....	36
Method	36
Designation of welder test	37
Welding positions	38
What is steel?	39
Names of steel.....	40
Hardening – cause and effect.....	41
Suitability for welding of unalloyed structural steels	42
Shrinkage during welding	43
Order of magnitude of shrinkage during welding.....	44
Inherent welding stresses.....	45
Effect of inherent welding stresses.....	45
Structure of a weld joint	46
Avoiding weld imperfections	46
Summary of key weld imperfections.....	47
Tungsten inclusions – causes	48
Oxide inclusions - causes.....	48
Pore formation - causes	49
Plasma welding	50