

ISO 15614-1:2017-06 (E)

Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys

Contents		Page
Foreword		v
Introduction		vi
1	Scope	1
2	Normative references	2
3	Terms and definitions	3
4	Preliminary welding procedure specification (pWPS)	3
5	Welding procedure test	3
6	Test piece	3
6.1	General	3
6.2	Shape and dimensions of test pieces	4
6.2.1	General	4
6.2.2	Butt joint in plate with full penetration	4
6.2.3	Butt joint in pipe with full penetration	4
6.2.4	T-joint	4
6.2.5	Branch connection	4
6.3	Welding of test pieces	4
7	Examination and testing	8
7.1	Type and extent of testing	8
7.2	Location and taking of test specimens	9
7.3	Non-destructive testing	13
7.4	Destructive testing	13
7.4.1	Transverse tensile test	13
7.4.2	Bend test	13
7.4.3	Macroscopic examination	13
7.4.4	Impact testing	14
7.4.5	Hardness testing	14
7.5	Acceptance levels	15
7.6	Re-testing	16
8	Range of qualification	16
8.1	General	16
8.2	Related to the manufacturer	16
8.3	Related to the parent material	17
8.3.1	Parent material grouping	17
8.3.2	Material thickness	19
8.3.3	Diameter of pipes and branch connections	21
8.3.4	Angle of branch connection	21
8.4	Common to all welding procedures	22
8.4.1	Welding processes	22
8.4.2	Welding positions	22
8.4.3	Type of joint/weld	23

8.4.4	Filler material, manufacturer/trade name, designation	24
8.4.5	Filler material size	24
8.4.6	Type of current	25
8.4.7	Heat input (arc energy)	25
8.4.8	Preheat temperature	25
8.4.9	Interpass temperature	25
8.4.10	Post-heating for hydrogen release	26
8.4.11	Heat-treatment	26
8.5	Specific to processes	26
8.5.1	Submerged arc welding (process 12)	26
8.5.2	Gas-shielded metal arc welding (process 13)	27
8.5.3	Gas-shielded arc welding with non-consumable electrode (process 14)	29
8.5.4	Plasma arc welding (process 15)	29
8.5.5	Oxy-acetylene welding (process 311)	29
8.5.6	Backing gas	29
9	Welding procedure qualification record (WPQR)	29
	Annex A (normative) Filler material, designation	31
	Annex B (informative) Welding procedure qualification record form (WPQR)	33
	Bibliography	38