WELDING PROCEDURE QUALIFICATION RECORD (WPQR)

LEVEL 2

N. 2017NAPO538/3 – Rev. 01

Manufacturer	**UNITEK - Angri (SA)**		
WPQR No.	**U2/2017**	Dated	**31.08.2020**
Manufacturer's welding procedure (WPS)	**U2/2017**	Dated	**29.01.2017**

RANGE OF QUALIFICATION

Welding process	**141 + 136** Type **Manual 141 - Partly mechanized 136**
Joint type	**Pipes and branch connections with angle over 60° BW ssnb-ssmb-bs/FW 141** **Pipes and branch connections with angle over 60° BW ssmb-bs/FW 136**
Single/Multiple pass	**Single 141; Single 136 (Impact properties not applied)**
Parent material group(s)	**1-1** ISO/TR 15608; ISO/TR20172; ISO/TR 20173; ISO/TR20174 with a specified minimum yield strength ≤ 275 Mpa
Parent material thickness (mm)	Butt Joint = **3 to 12.4** Fillet Joint t_1 **= 3 to 12.4** t_2 **= 3 to 12.4**
Throat thickness (mm)	**2.2 to 4.5 (141) 2.4 to 4.8 (136)**
Weld deposit thickness (mm)	**max 6 (141); max. 6.4 (136)**
Outside pipe diameter (mm)	**≥ 57,10**
Filler metal make	**N.A.** Nr. of wires for process 12: **N.A.**
Flux make	**N.A.** Flux Designation: **N.A.**
Filler metal designation	**Solid rod EN ISO 636-A W 42 4 W 3Si1** **Flux-cored wire EN ISO 17633-A : T46 2 PC 1 H5**
Shielding gas (ISO 14175)	**I1 (141)**; **M21–ArC-18 (with CO_2 ±20% relative) (136)** Backing gas (ISO 14175) **I, N, R (141)**
Type of welding current	**DCEN 141 DCEP 136** **Heat Input** Kj/cm **No Restrictions**
Welding position	**All, vertical down excluded** Transfer Mode **N.A.**
Preheat min. (°C)	**10** (if ISO/TR 17671-2 requirements are fulfilled) Interpass temp. Max. (°C) **180**
Interpass temp. Max. (°C)	**N.A.** Postheat min. (°C) **N.A.** Time (minutes) **N.A.**
Post weld heat treatment / Ageing	**N.A.** Time (minutes) **N.A.**
Other information	-
Welder's/Operator's name	**CAROTENUTO WALTER (141)** Stamp No. **CW; VC** **VITAGLIONE CATELLO (136)**
Welding test conducted by	**UNITEK - Angri (SA)**
Mechanical test conducted by	**A.Q.C. - Napoli (NA)** Laboratory test No. **18/004 (D, E, F)**
At presence of RINA Surveyor	**MARCO BUONOCORE**

We confirm that statements in this record are correct and that the test welds were prepared, welded and tested and have fulfilled the requirements in accordance with **UNI EN ISO 15614-1:2019** Standard

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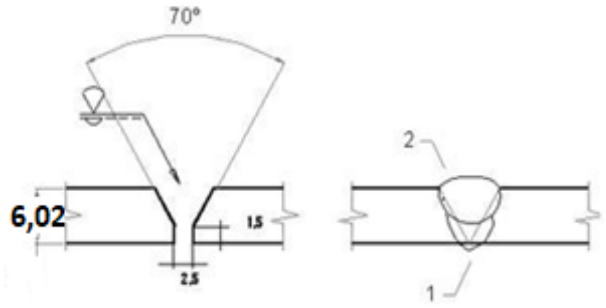
RECORD OF WELD TEST

JOINT DETAILS AND WELDING SEQUENCES PIPE TO PIPE SINGLE-V BUTT JOINT; ONE SIDE WELDING WITHOUT BACKING (141), WITH BACKING (136)									
Pass No.	Process	Filler metal diam. (mm)	Amps	Volt	Type of Current/ Polarity	Travel speed (cm/min)	Heat input (kJ/cm)	Metal Transfer mode	Other
1	**141**	**2,4**	**100**	**12**	**DCEN**	**6**	**7,2**	**N.A.**	-
2	**136**	**1,2**	**187**	**21**	**DCEP**	**20**	**9,4**	**N.A.**	-



PARENT MATERIAL

Material specification	**ASTM A106**		
Type or grade	**Gr.B**		
Group(s)/Subgroup(s) No. (ISO/TR 15608; ISO/TR20172; ISO/TR 20173; ISO/TR20174)	**1.1**		
Thickness (mm)	**6.2**	Throat thickness (mm)	**N.A.**
Diameter (mm)	**114.3**		
Branch connection angle	**N.A.**		
Other	-		

WELDING CONSUMABLES

Process	**141**	**136**
Trade name(s)	**CARBOROD 1A**	**AIR LIQUIDE WELDING FRANCE**
Specification	**EN ISO 636-A**	**EN 17632:A**
Classification / designation	**W 42 4 W 3Si1**	**T 46 2 PC 1 H5**
Size (mm)	**2,4**	**1.2**
Deposited metal thickness	-	-
Groove	**3 mm**	**3,2 mm**
Throat	**N.A.**	**N.A.**
Flux trade name	**N.A.**	**N.A.**
Consumable insert	**N.A.**	**N.A.**
Other	-	-

GAS

	Gas	Mixture	Flow rate (l/min.)
Shielding	-	**141 - 99,99% Ar**	**9**
	-	**136 - 80% Ar - 20% CO2**	**9**
Trailing	-	-	-
Backing	-	**141 - 99,99% Ar**	**7**

POSITION

Welding position **HL-045**

Other -

PREHEAT

Preheat temperature **10 °C**

Interpass temperature **180 °C**

Postheat temperature - Time -

POSTWELD HEAT TREATMENT

Temperature **None** Time N.A.

Method -

Other -

ELECTRICAL CHARACTERISTICS

Current **DCEN (141) ; DCEP (136)**

Ampere (range) **See table** Volts (Range) **See table**

Mode of metal transfer **N.A.**

Tungsten electrode size and type **ISO 6848: WTh20; 2,4 mm**

Pulse welding details **N.A.**

Plasmawelding details **N.A.**

Waveform controlled welding machine **N.A.** Waveform control mode **N.A.**

Power source **LINCOLN INVERTER 270SX + FRO CITOSTEEL 520**

Welding mode Pulse □ Non pulse ☑

Other -

TECHNIQUE

Travel speed (range) **See table**

String or weave bead **String** Maximum width of run -

Oscillation (*) **N.A.** (Amplitude/Frequency/Dwell time)

Method of groove/edge preparation **Machining/Grinding**

Interpass cleaning **Grinding/Brushing**

Method of back gouging **N.A.**

Orifice or gas cup size **8 mm (141) ; 18 mm (136)**

Distance contact tube/worpiece (*) **N.A.**

Multiple or single pass **Single (141) ; Single (136)**

Multiple or single electrodes **Single**

Torch angle (*) **N.A.**

Other (*) for fully mechanized/robotic only

TRANSVERSE TENSILE TEST (A.Q.C. REPORT 18/004F PAG. 1/2)						
Spec. (No.)	Width (mm)	Thickness (mm)	Area (mm^2)	Total load (N)	R_m. (N/mm^2)	Fracture location
DB-1	**11.80**	**6.13**	**72.33**	**39250**	**542**	**Ductile fracture out of weld**
DB-2	**12.17**	**6.05**	**73.62**	**40750**	**553**	**Ductile fracture out of weld**

BEND TEST (A.Q.C. REPORT 18/004F PAG. 1/2)			
Type	No.	Bend Angle	Result
FACE TRANSVERSE (TFBB)	**2 OFF**	**180°**	**Acceptable**
ROOT TRANSVERSE (TRBB)	**2 OFF**	**180°**	**Acceptable**

OTHER TEST

MACROGRAPHIC EXAMINATION	**Acceptable**
MICROGRAPHIC EXAMINATION	**Not required**

NON DESTRUCTIVE EXAMINATION

VISUAL EXAMINATION	**Acceptable**
RADIOGRAPHIC EXAMINATION	**Acceptable**
PENETRANT TEST	**Acceptable**
MAGNETIC PARTICLE	**Not required**
ULTRASONIC TEST	**Not required**

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