WELDING PROCEDURE QUALIFICATION RECORD (WPQR)

LEVEL 2

N. **2017NAPO538/2**

Manufacturer **UNITEk Angri (SA)**

WPQR No. **U4/2017** Dated **29.12.2017**

Manufacturer's welding procedure (WPS) No. **U4/2017** 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)	**8-8**	ISO/TR 15608; ISO/TR20172; ISO/TR 20173; ISO/TR20174	
	Subgroup only 8.1		
Parent material thickness (mm)	Butt Joint = **3 to 17**	Fillet Joint t_1 = **3 to 17**	t_2 = **3 to 17**
Throat thickness (mm)	**2,2 to 4,5 141**	**4,1 to 8,2 136**	
Weld deposit thickness (mm)	**3 to 17 141+136** **Max. 6**	**141** **Max. 11 136**	
Outside pipe diameter (mm)	≥ **57,10**		
Filler metal make	**Solid rod Flux-cored wire**	Nr. of wires for process 12: **N.A.**	
Flux make	**N.A.**	Flux Designation: **N.A.**	
Filler metal designation	**Solid rod EN ISO 14343-A W 19 12 3L**		
	Flux-cored wire EN ISO 17633-A : T19 123 LP C/M1		
Shielding gas (ISO 14175)	**I1 141 M21 136** (with CO2 % MIN 12,0 MAX 18,0)	Backing gas (ISO 14175)	**I, N, R (141)**
Type of welding current	**DCEN 141 DCEP 136**	**Heat Input** Kj/cm	**No restriction**
Welding position	**ALL POSITIONS EXCEPT PG, Pj AND j-L045**		
	Transfer Mode **N.A.**		
Preheat min. (°C)	**10** (if ISO/TR 17671-2 requirements are fulfilled)	Interpass temp. Max. (°C)	**N.A..**
Interpass temp. Max. (°C)	**180**	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	**AVELLA FRANCO (141) ; BOCCIA FRANCESCO (136)**	Stamp No.	**AV ; BF**

Welding test conducted by **UNITEk**

Mechanical test conducted by **A.Q.C. LABORATORY** Laboratory test No. **18/004 (j , k , L)**

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: 2017** Standard

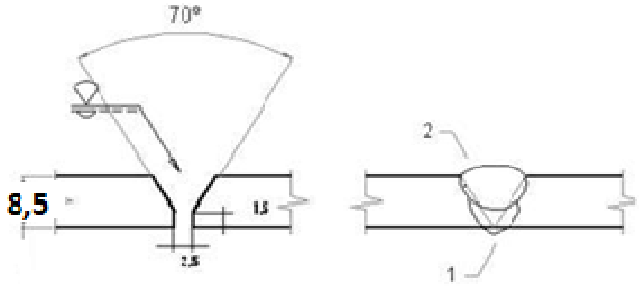
Issued at: Genova on 27/04/2018

RINA Services S.p.A.

Certificate No. 2017NAPO538/2

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**	**Spray Arc**	



PARENT MATERIAL

Material specification	**ASTM A312/A**		
Type or grade	**TP 316/316L**		
Group(s)/Subgroup(s) No. (ISO/TR 15608; ISO/TR20172; ISO/TR 20173; ISO/TR20174)	**8.1**		
Thickness (mm)	**8,5**	Throat thickness (mm)	**N.A.**
Diameter (mm)	**114,3**		
Branch connection angle	**N.A.**		
Other	-		

WELDING CONSUMABLES

Process	**141**	**136**
Trade name(s)	**SOGES S.P.A.**	**AIR LIQUIDE WELDING FRANCE**
Specification	**EN ISO 1434:A**	**EN 17633:A**
Classification / designation	**W 19 12 3L**	**T 19 12 3 LP C/M1**
Size (mm)	**2,4**	**1,2**
Deposited metal thickness	-	-
Groove	**3 mm**	**5,5 mm**
Throat	-	-
Flux trade name	**N.A.**	**N.A.**
Consumable insert	**N.A.**	**N.A.**
Other	-	-

GAS

	Gas	Mixture	Flow rate (l/min.)
Shielding (141)	**Ar 99%**		**9**
Shielding (136)		**Ar 85% +CO2 15%**	**9**
Trailing			
Backing	**Ar 99%**		**7**

POSITION

Welding position **HL-045**

Other -

PREHEAT		**POSTWELD HEAT TREATMENT**	
Preheat temperature	**10°C**	Temperature	- Time -
Interpass temperature	**180°C**	Method	-
Postheat temperature	- Time -	Other	-

ELECTRICAL CHARACTERISTICS

Current **DCEN, DCEP**

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

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

Tungsten electrode size and type **2,4 mm ; EN ISO 6848 W20**

Pulse welding details **N.A.**

Plasmawelding details **N.A.**

Waveform controlled welding machine - Waveform control mode -

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) ; 12-15 mm (136)**

Distance contact tube/worpiece (*) **3-5 mm (141) ; 12-15 mm (136)**

Multiple or single pass **MULTIPLE**

Multiple or single electrodes **SINGLE**

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

Other (*) for fully mechanized/robotic only

TRANSVERSE TENSILE TEST						
Spec. (No.)	Width (mm)	Thickness (mm)	Area (mm^2)	Total load (N)	R_m. (N/mm^2)	Fracture location
DD-1	**12,16**	**7,89**	**95,94**	**55000**	**573**	**Ductile fracture out of weld**
DD-2	**11,98**	**7,92**	**94,88**	**56250**	**592**	**Ductile fracture out of weld**

BEND TEST			
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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