

WELDING PROCEDURE QUALIFICATION RECORD (WPQR)
LEVEL 2
 N. 20VE00912PW1/A

Manufacturer **EROS TOGNI METALCOSTRUZIONI SA - Cresciano (SVIZZERA)**

WPQR No. **01R-20** Dated **01/12/2020**

Manufacturer's welding procedure (WPS) No. **01-20** Dated **16/09/2020**

RANGE OF QUALIFICATION

Welding process(es)	135-D 135 -S/G	Type	Partly mechanized 135-D Partly mechanized 135-S/G
Joint type	Plates and Pipes and build-up BW ssnb-ssmb-bs/FW 135-D		
	Plates and Pipes and build-up BW ssmb-bs/FW 135-S/G		
Single/Multiple pass	Multiple (Impact and hardness properties applied)		
Parent material group(s)	1-1 ISO/TR 15608; ISO/TR20172; ISO/TR 20173; ISO/TR20174 with a specified minimum yield strength \leq 355 MPa		
Parent material thickness (mm)	Butt Joint = 10 to 40	Fillet Joint $t_1 =$	3 to 40 $t_2 =$ 3 to 40
Throat thickness (mm)	No restriction		
Weld deposit thickness (mm)	Max. 6 135-D	Max. 34 135-S/G	
Outside pipe diameter (mm)	Over 150 (rotated position); over 500 (fixed axis)		
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 wire EN ISO 14341-A - G46 5 M21 4Si1		
Shielding gas	82%Ar+18%CO2 (ISO 14175 M21) CO₂ max deviation\pm20%; Backing gas (ISO 14175) None and I, N1, N2, N3		
Type of welding current	DCEP (135-D); DCEP (135-S/G) Heat Input kJ/cm 5,9 to 9,8 (135-D); 5,4 to 19,4 (135-S/G)		
Welding position	PA Transfer Mode Short Arc(135-D) (1st pass); Spray, Globular (135-S/G) (other passes);		
Preheat min. (°C)	None (if ISO/TR 17671-2 requirements are fulfilled)	Interpass temp. Max. (°C)	300
Postheat min. (°C)	N.A.	Time (minutes)	N.A.
Post weld heat treatment/Ageing	None	Time (minutes)	N.A.
Other information	-		

Welder's/Operator's name **AGUSTONI PASCAL** Stamp No. **AP**

Welding test conducted by **EROS TOGNI METALCOSTRUZIONI SA**

Mechanical test conducted by **SSM S.R.L. Laboratory test No 1396/C Rev.00 20, 1397/C Rev.00 20 dated 01/12/2020; 3587/TR Rev.00 20, 3587/RE Rev.00 20, 3587/PI Rev.00 20 dated 01/12/2020; 236L-20-MA Rev.0, 236L-20-DU Rev.0 dated 01/12/2020;**

At presence of RINA Surveyor **Domenico Zema**

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

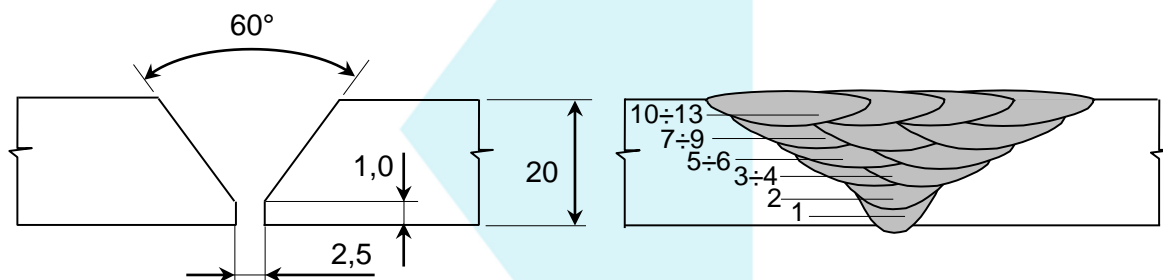
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RINA Services S.p.A.
 PED No. Bo. 0474

RECORD OF WELD TEST

JOINT DETAILS AND WELDING SEQUENCES									
SINGLE-V BUTT JOINT; ONE SIDE WELDING WITHOUT BACKING									
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	135	1,2	160	17,8	DCEP	17,5	7,8	Short Arc	-
2	135	1,2	250	28,5	DCEP	22,0	15,5	Spray Arc	-
3 to 4	135	1,2	260	29,5	DCEP	40,0	9,2	Spray Arc	-
5 to 6	135	1,2	260	29,5	DCEP	40,0	9,2	Spray Arc	-
7 to 9	135	1,2	260	29,5	DCEP	45,0	8,2	Spray Arc	-
10 to 13	135	1,2	230	26,0	DCEP	40,0	7,2	Spray Arc	-



PARENT MATERIAL	
Material specification	EN 10025-2
Type or grade	S355J2C+N
Group(s)/Subgroup(s) No. (ISO/TR 15608; ISO/TR20172; ISO/TR 20173; ISO/TR20174)	1.2
Thickness (mm)	20,0
Throat thickness (mm)	N.A.
Diameter (mm)	N.A.
Branch connection angle	N.A.
Other	-

WELDING CONSUMABLES	
Process	135
Trade name(s)	SIDERGAS S7
Specification	EN ISO 14341-A
Classification / designation	G46 5 M21 4Si1
Size (mm)	1,2
Deposited metal thickness	
Groove	20 mm
Throat	N.A.
Flux trade name	N.A.
Consumable insert	N.A.
Other	-

GAS			
	Gas	Mixture	Flow rate (l/min.)
Shielding	-	82%Ar + 18%CO2	15
Trailing	N.A.	-	-
Backing	N.A.	-	-

POSITION	
Welding position	PA
Other	-

PREHEAT		POSTWELD HEAT TREATMENT		
Preheat temperature	15°C	Temperature	None	Time N.A.
Interpass temperature	250°C	Method	N.A.	
Postheat temperature	None	Time	N.A.	Other
				-

ELECTRICAL CHARACTERISTICS			
Current	DC EP		
Ampere (range)	See table	Volts (Range)	See table
Mode of metal transfer	Short arc (1st pass); spray arc (other passes)		
Tungsten electrode size and type	N.A.		
Pulse welding details	N.A.		
Plasmawelding details	N.A.		
Waveform controlled welding machine	No		
Waveform control mode	No		
Power source	N.A.		
Welding mode	Pulse <input type="checkbox"/>	Non pulse <input checked="" type="checkbox"/>	
Other	-		

TECHNIQUE		
Travel speed (range)	See table	
String or weave bead	String and weave	Maximum width of run N.A.
Oscillation (*)	N.A.	(Amplitude/Frequency/Dwell time) N.A.
Method of groove/edge preparation	Machining/Grinding	
Interpass cleaning	Grinding/Brushing	
Method of back gouging	N.A.	
Orifice or gas cup size	16 mm	
Distance contact tube/workpiece (*)	N.A.	
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
TT1	25,00	19,30	482,50	253795	526	Out of weld
TT2	25,00	19,34	483,50	253354	524	Out of weld

BEND TEST			
Type	No.	Bend Angle	Result
SIDE TRANSVERSE	4 OFF	180°	Acceptable

IMPACT TEST					
Full size specimens 10 x 10 x 55 mm					
Spec No.	Notch location	Notch type	Test Temp. (°C)	Impact values (J)	Average (J)
VWT_{0/1,5}	WELD	ISO-V	-20	151 - 154 - 155	153,0
VHT_{1,5/1,5}	H.A.Z.	ISO-V	-20	150 - 141 - 144	145,0

HARDNESS TEST		
Location	Type/load	Maximum value
Parent metal(s)	HV10	168
H.A.Z.(s)	HV10	267
Weld metal	HV10	206

OTHER TEST

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

NON DESTRUCTIVE EXAMINATION

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

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