



RINA



SGQ N° 002 A SS1 N° 001 G
SGA N° 002 D DAP N° 001 H
PRD N° 002 B PRS N° 066 C
SCR N° 003 F LAB N° 0832

Signatory of EA, IAF and ILAC
Mutual Recognition Agreements

WELDING PROCEDURE QUALIFICATION RECORD (WPQR)

N. 13VE00363PO3/A

Manufacturer **T.W.F. S.r.l. - Cervignano del Friuli (UD)**

WPQR No. **03/05**

Dated **15/07/2013**

Manufacturer's welding procedure (WPS) No. **03/05**

Dated **31/05/2013**

RANGE OF APPROVAL

Welding process	141-135	Type	141 Manual 135 Partly mechanized
Joint type	P/T and branch connections with angle over 60° BW ssnb-ssmb-bs/FW 141 P/T and branch connections with angle over 60° BW ssmb-bs/FW 135		
Single/Multiple pass	Multiple		
Parent material group(s)	8-8 (subgroup 8.1 only)	ISO/TR 15608	
Parent material thickness (mm)	Butt Joint = 3 to 11,08	Fillet Joint t₁ = 3 to 11,08	t₂ = 3 to 11,08
Throat thickness (mm)	No restriction		
Weld deposit thickness (mm)	3 to 7,08 141	1,4 to 4 135	
Outside diameter (mm)	30,15 and over		
Filler metal type	Solid rod EN ISO 14343-A: 19 12 3 LSi Solid wire EN ISO 14343-A: 19 12 3 LSi		
Shielding gas (ISO 14175)	II 141 Z 135 with max. CO₂ %= 2,2	Backing gas (ISO 14175)	II
Type of welding current	DCEN 141 ; DCEP 135	Heat input kJ/cm	No restriction (141 , 135)
Welding position	All, vertical down excluded		
Preheat min. (°C)	20	Interpass temp. Max. (°C)	150
Post weld heat treatment / Ageing	None		
Other information	-		

Welders name **Ferlat Nicola**

Stamp No. **FN**

Welding test conducted by **T.W.F. S.r.l. - Cervignano del Friuli (UD)**

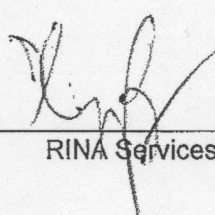
Mechanical test conducted by **METAL SERVICES MATERIALS TESTING S.r.l. Laboratory test No. R.13.645**
- Ronchi dei Legionari (GO)

At presence of RINA Surveyor **L. Mantovan**

We certify that statements in this certificate are correct and that the test welds were prepared, welded and tested in accordance with the requirements of **UNI EN ISO 15614-1: 2012 Standard**

Issued at: **Genova**

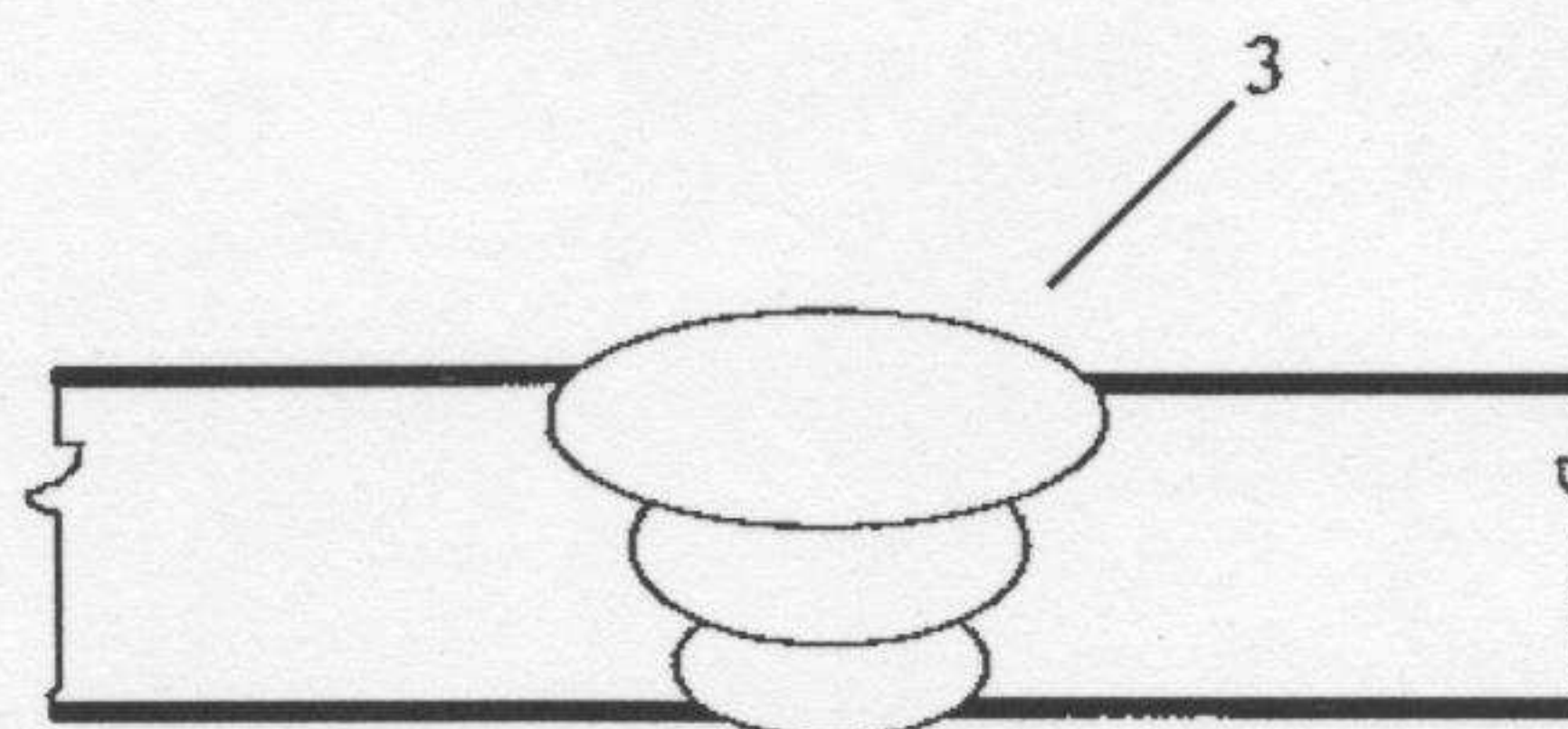
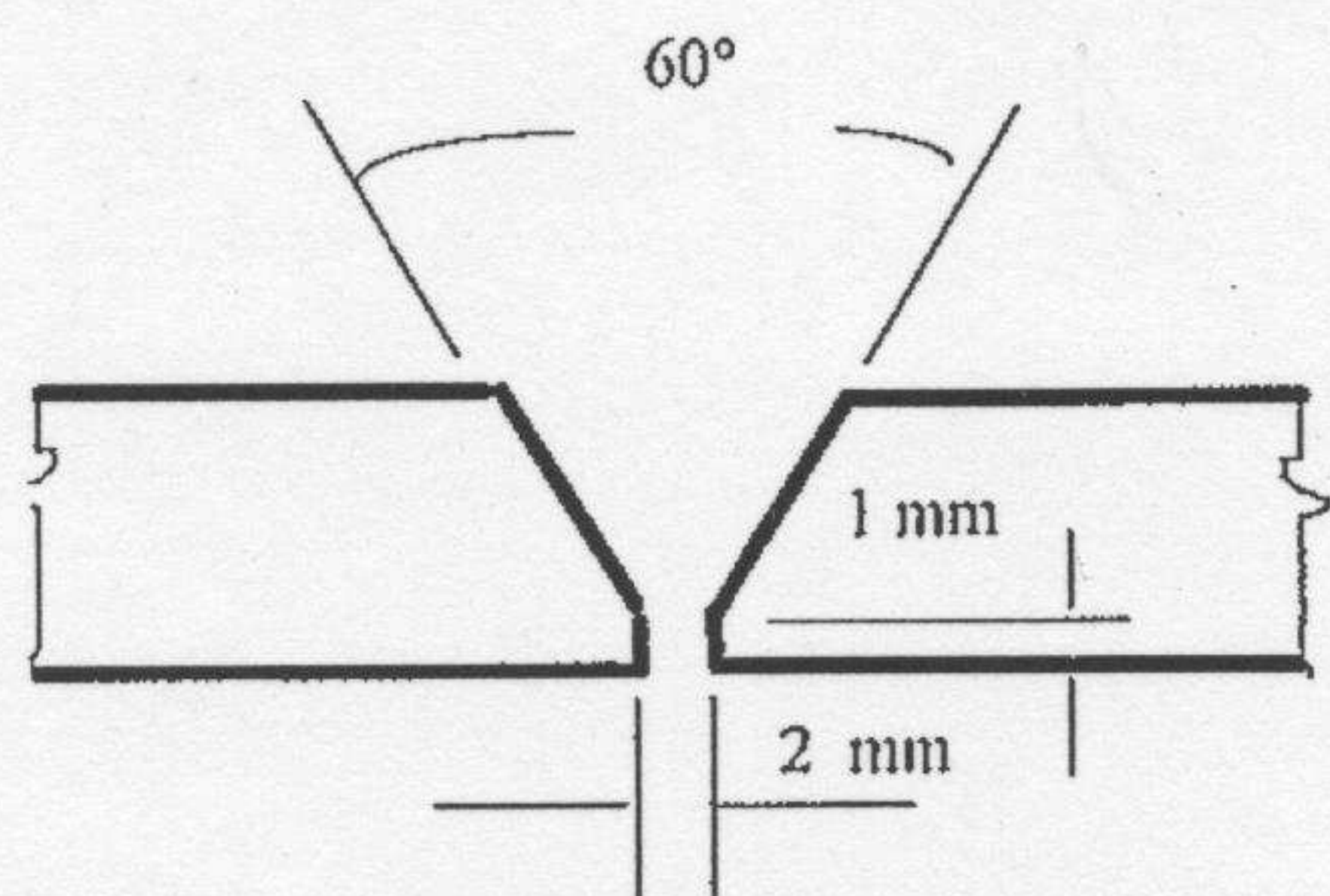
on **19 July 2013**


RINA Services S.p.A.

JOINT DETAILS AND WELDING SEQUENCES

PIPE TO PIPE SINGLE -V BUTT JOINT; ONE SIDE WELDING, NO BACKING (141) ; WITH BACKING (135)

Pass No.	Process	Filler metal diam. (mm)	Filler metal classification	Amps	Volt	Travel speed (cm/min)	Heat input (kJ/cm)	Other
1	141	2,0	19 12 3 LSi	75	13	5	7,0	-
2	141	2,0	19 12 3 LSi	90	14	6	7,6	-
3	135	1,2	19 12 3 LSi	100	29	11	12,6	-



PARENT MATERIAL

Material specification **ASTM A 312**
 Type or grade **316 / 316L**
 Group(s)/Subgroup(s) No. (ISO/TR 15608) **8.1**
 Thickness (mm) **5,54**
 Diameter (mm) **60,3**
 Branch connection angle **N.A.**
 Other **-**

Throat thickness (mm) **N.A.**

WELDING CONSUMABLES

	141	135
Process	141	135
Trade name(s)	SAPIO ER 316 LSi	SAPIO ER 316 LSi
Specification	EN ISO 14343-A	EN ISO 14343-A
Classification / designation	19 12 3 LSi	19 12 3 LSi
Size (mm)	2,0	1,2
Deposited metal thickness		
Groove	3,54 mm	2 mm
Throat	-	-
Flux trade name	N.A.	N.A.
Consumable insert	None	N.A.
Other	-	-



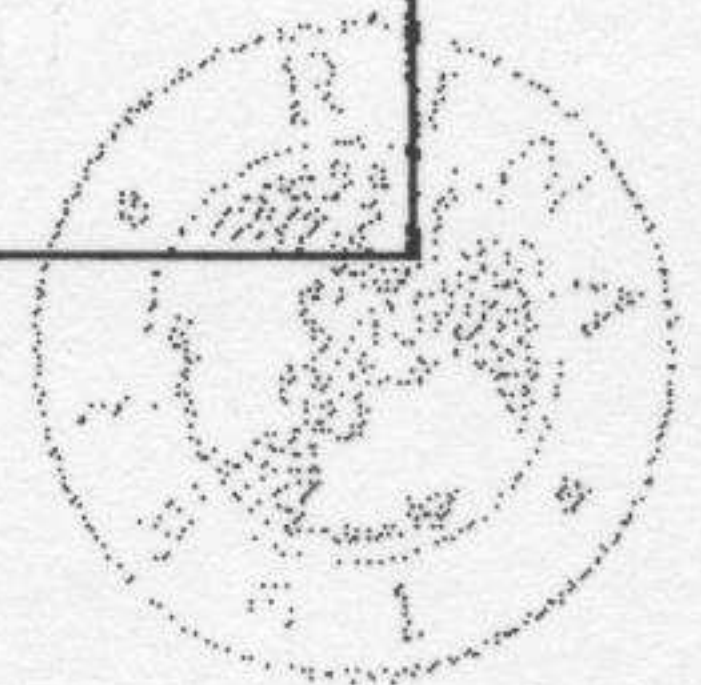
GAS			
	Gas	Mixture	Flow rate (l/min.)
Shielding	Ar 99,99%	-	9 (141)
		Ar 63% + He 35% + CO2 2%	13 (135)
Trailing	-	-	-
Backing	Ar 99,99%	-	5

POSITION	
Welding position	PA
Other	-

PREHEAT		POSTWELD HEAT TREATMENT	
Preheat temperature	20 °C	Temperature	None
Interpass temperature	Max. 150 °C	Time	N.A.
Other	-	Other	-

ELECTRICAL CHARACTERISTICS			
Current	DCEN (141) ; DCEP (135)		
Ampere (range)	See table	Volts (Range)	See table
Mode of metal transfer	N.A. (141) ; Pulsed arc (135)		
Tungsten electrode size and type	2,4 mm ; EN 26848 WT 20		
Other	-		

TECHNIQUE	
Travel speed (range)	See table
String or weave bead	String
Oscillation (*)	N.A.
Method of groove/edge preparation	Machining/Grinding
Interpass cleaning	Grinding/Brushing
Method of back gouging	N.A.
Orifice or gas cup size	10 mm (141) ; 16 mm (135)
Stand off distance (*)	N.A.
Multiple or single pass	Multiple (141) ; Single (135)
Multiple or single electrodes	Single (each process)
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
1453/1	12,0	5,3	63,6	39250	617	Ductile failure out of weld
1453/2	12,0	5,4	64,8	34750	536	Ductile failure out of weld

BEND TEST		
Type	No.	Result
FACE TRANSVERSE	2 OFF	Acceptable
ROOT TRANSVERSE	2 OFF	Acceptable

OTHER TEST

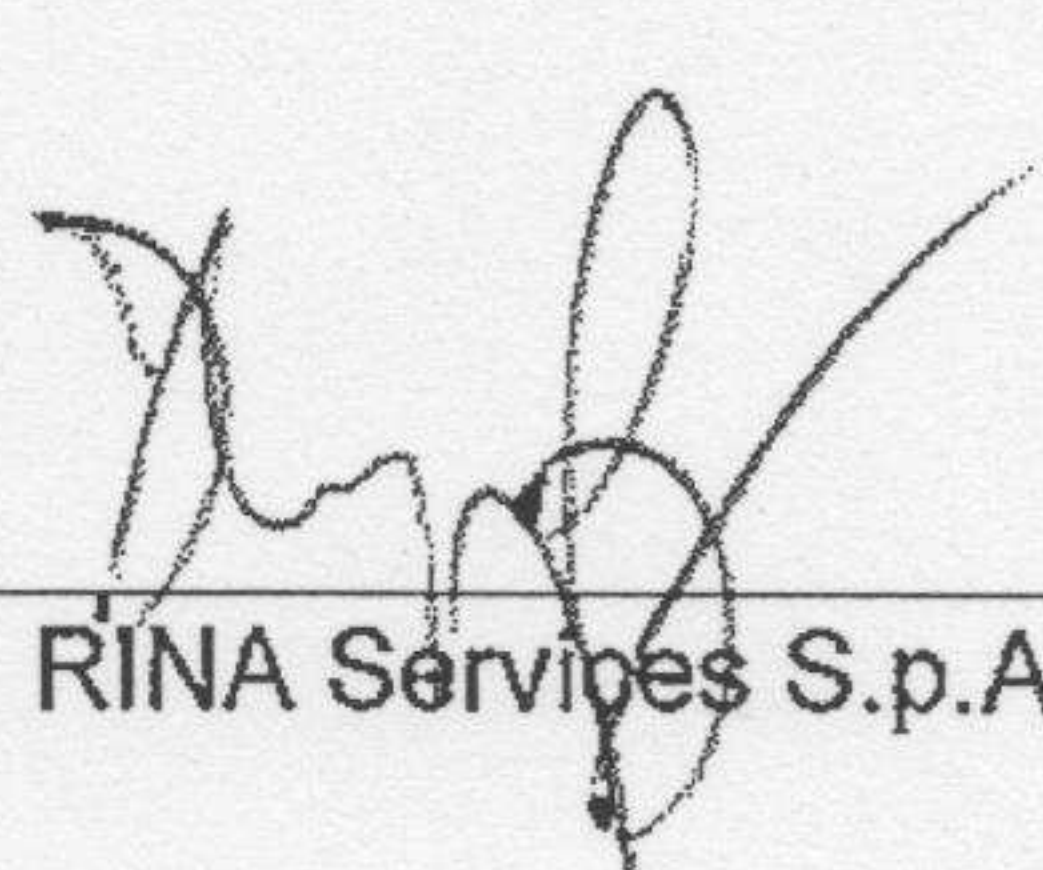
MACROGRAPHIC EXAMINATION Acceptable
MICROGRAPHIC EXAMINATION Not required

NON DESTRUCTIVE EXAMINATION

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

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