PRD N° 009B

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC mutual Recognition Agreements

WELDING PROCEDURE QUALIFICATION RECORD

N° QP-ITA-23-00975 Rev.0

LEVEL 2

Manufacturer's WPQR no	**03-2023**
Manufacturer	**B.M.S. s.r.l. Building And Mechanical Solution SpA**
Address	**Zona Industriale Macchiareddu 9° Strada 09010 Uta (CA) Italy**
Date of welding	**30 May 2023**
Reference standard	**UNI EN ISO 15614-1 Ed. 2019**
Code/ Standard Supplem./Client Req	**PED 2014/68/EU**
Certificate issued by / Authorized Inspector	**Mr. Giancarlo Erbì**

BUREAU VERITAS ITALIA SpA

Certifies that test pieces were prepared, welded and tested satisfactorily in accordance with the requirements of the documents indicated above.
Permanent Joining Procedure Qualification Record respect the Essential Safety Requirements stated by PED Directive Appendix 1- § 3.1.2. Test performed are equivalent to harmonized standard published in the Official journal of the European Union

EXAMINATION BODY	MANUFACTURER
Name, date and signature of authorized representant **Mr. Giancarlo Erbì** **17 Oct 2023** **Stamp**	**Name, date and signature of representant** B.M.S. S.r.l. Building And Mechanical Solutions

Revision No: *Reason of revision* :

Other identification (if necessary) : ***23.SF.5436792.783 - R53439/23/GE/ge***

Organization Name	**B.M.S. s.r.l.**			pWPS No.	**03-2023**
Mfr Procedure Qualification Record No.				Date	**30.05.2023**
Welders and/or welding operators :	**Puddu Simone 7 (Pos. PB)**				
Welding Process(es)	*A)* **136**	*B)*		*C)*	
Types (Manual, Autom., Partly Mechanized)	*A)* **Partial Mechanised**	*B)*		*C)*	

WELDING PERFORMED WITNESSED BY :

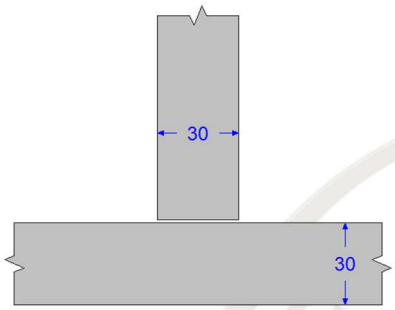
PREPARATION

Joint type	**FILLET JOINT**
Backing (only for BW)	Yes ☐ No ☒
Permanent backing Group	**N.A.**
Gouging or grinding	**N.A.**
Preparation and cleaning	**Machaning tool & brushing and degreasing**

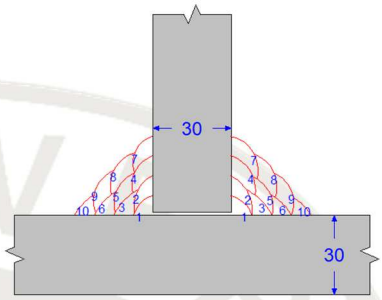
PARENT MATERIAL

Parent material grade	**S355J2+2**	**S355J2+2**
Material Standard	**EN 10025-5**	**EN 10025-5**
Group / Subgroup	**1.2**	**1.2**
Thickness (mm)	**30**	**30**
Outside diameter (mm)		

JOINT DESIGN



WELDING SEQUENCES



Note	***WELDING POSITION: PB (EN ISO 6947)***							*Note*	
Bevels	*Angle*	//	*Root gap*	//	*Root face*	//		*Tack weld*	136
Buttering information (if performed)									

FILLER METALS

	A)	*B)*
Filler Metal trade make	**VOESTALPINE BOHLER DIAMONDSPARK 46 RC**	**N.A.**
Filler Metal standard	**EN ISO 17632: T463PM211H5 AWS A5.20:E71T-1M**	**N.A.**
Filler Metal designation	**N.A.**	**N.A.**
F-No. (Only for level 1)	**N.A.**	**N.A.**
A-No. (Only for level 1)	**N.A.**	**N.A.**
Flux trade make	**N.A.**	**N.A.**
Flux designation	**N.A.**	**N.A.**
Weld Metal deposit	**N.A.**	**N.A.**
Flux batch (recrushed slag)	**N.A.**	**N.A.**
Tungsten electr. (type & Ø)	**N.A.**	**N.A.**
Other		**N.A.**

HEAT

Preheat temperature	**≥ 20**	*° C*
Interpass temperature	**≤ 250**	*° C*
Postheat temp and time	**N.A.**	*° C*

POST WELD HEAT TREATMENT

Holding temp.	**N.A.**	*° C*
Holding time	**N.A.**	*min.*
Heating rate	**N.A.**	*°C/h*
Cooling rate	**N.A.**	*°C/h*
Other info	**N.A.**	

GAS

	A)	*B)*
Shielding gas type %	**Ar 80% - CO_2 20%**	**N.A.**
Designation (EN ISO 14175)	**M21**	**N.A.**
flow rate l/min	**10÷16**	**N.A.**
Backing gas type %	**N.A.**	**N.A.**
Designation (EN ISO 14175)	**N.A.**	**N.A.**
flow rate l/min	**N.A.**	**N.A.**
Plasma gas type %	**N.A.**	**N.A.**
Designation (EN ISO 14175)	**N.A.**	**N.A.**
flow rate l/min	**N.A.**	**N.A.**

TECHNIQUE

Weaving (max width of run)	
Oscillation amplitude	**N.A.**
Oscillat. frequ. - dwell time	**N.A.**
Single or Multiple Electr.	**Single**
Pulse welding details	**N.A.**
Dist. cont. tube/work piece	**10 ÷ 20**
Plasma welding details	**N.A.**
Torch angle °	**N.A.**
Other	

Run	*Proc*	*Transfert Mode*	*Position*	*Filler metal (mm)*	*Current (A)*		*Voltage (V)*		*Curr. Type and polar*	*Thermal efficien. K*	*Wire speed (mm/s)*	*Welding speed (mm/s)*	*Heat input (J/mm)*			*Energy or power x arc time (J)*	*Weld bead lenght (mm)*	*Arc Energy * only for Wave form controlled (J/mm)*
1	**136**	**WELDING**	**PB**	**2,4**	**255**	**270**	**28**	**30**	**DC EP**	**N.A.**	**6÷7**	**3,500**	**1,632**	**÷**	**1,851**	**N.A.**	**N.A.**	**N.A.**
2÷3	**136**	**WELDING**	**PB**	**2,4**	**255**	**270**	**28**	**30**	**DC EP**	**N.A.**	**6÷7**	**3,750**	**1,523**	**÷**	**1,728**	**N.A.**	**N.A.**	**N.A.**
4÷10	**136**	**WELDING**	**PB**	**2,4**	**255**	**270**	**28**	**30**	**DC EP**	**N.A.**	**6÷7**	**3,667**	**1,558**	**÷**	**1,767**	**N.A.**	**N.A.**	**N.A.**

NON DESTRUCTIVE TEST	Carried out by	Result	Report No
Visual test	**BUREAU VERITAS**	**Satisfactory**	**R53073_cp_23.SF.5436792.783 - WPQR 3**
Penetrant test	**Aru Manuel**		**PT_WPQR_3**
Magnetoscopic test	**N.A.**		
Radiographic test	**N.A.**		
Ultrasonic test	**N.A.**		
Other test	**N.A.**		

TRANVERSE TENSILE TEST in accordance with UNI EN ISO 4136:2012 — **Report No**

Test No	Direction	Position	Dimensions (mm) Thickness	Dimensions (mm) Width Diam.	Temp. °C	Rm (MPa) Required	Rp* (MPa) Required Info	A * (%) Required Info	Z * (%) Required Info	Fracture location	Results and remarks
Note											

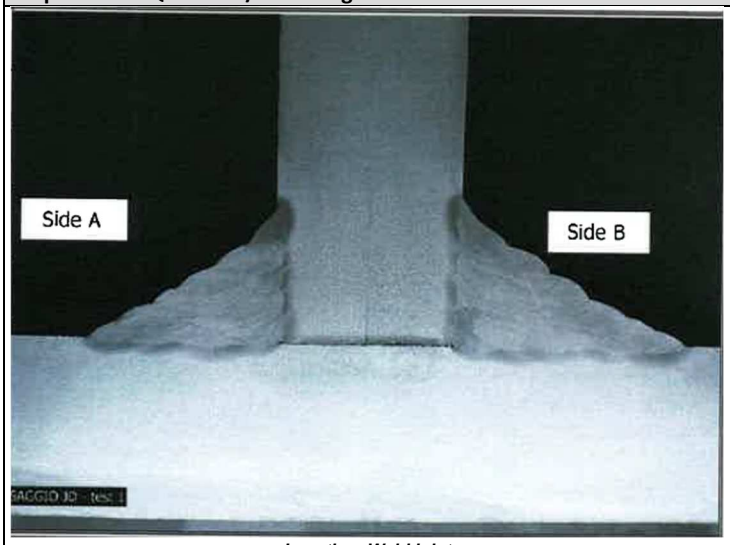
BEND TEST in accordance with UNI EN ISO 5173:2012 — **Report No**

Test No	Direction	Specimen type			Dimensions (mm)		Former diameter	Angle	Results and remarks
	Transv-Long	Face	Root	Side	Thickness	Width	(mm)	°	
Note									

IMPACT TEST in accordance with UNI EN ISO 9016:2012 — **Report No**

Test No	Direction	Position	Location	Dimens. (mm) Thk	Dimens. (mm) W	Temp °C	Values J Acceptance 27J (21(2)) I	II	III	Av.	Shear area % I	II	III	Lateral expansion I	II	III
Note																

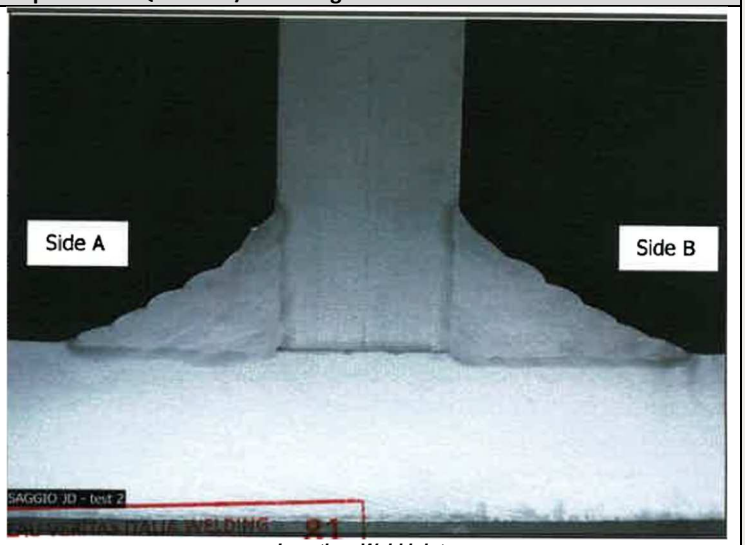
MACROSCOPIC EXAMINATION
In accordance with UNI EN ISO 17639:2013
Report No. AQC No. 23/415 C Pag.1 del 26.07.2023



Location: Weld joint
Etchant: Ferric Chloride Solution
Size of magnification : 1x

Note	***Absence of cracks, cavities, inclusions, lack of fusion/penetration*** ***Throat Thickness A: 16,6 mm; Troat Thickness B: 17,3 mm;*** ***Result: Satisfactory***

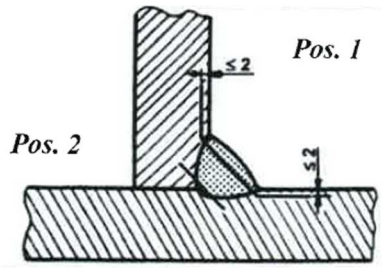
MACROSCOPIC EXAMINATION
In accordance with UNI EN ISO 17639:2013
Report No. AQC No. 23/415 C Pag.1 del 26.07.2023



Location: Weld joint
Etchant: Ferric Chloride Solution
Size of magnification : 1x

Note	***Absence of cracks, cavities, inclusions, lack of fusion/penetration*** ***Throat Thickness A: 14,8 mm; Troat Thickness B: 15,6 mm;*** ***Result: Satisfactory***

HARDNESS TEST *In accordance with UNI EN ISO 9015-1:2011*	**Report No**	AQC No. 23/415 C Pag.2 del 26.07.2023



Hardness type	HV10 – Position PB														
Point	B.M. 1			H.A.Z.			W.M.			H.A.Z.			B.M. 2		
Line 1	124	130	125	175	173	167	231	249	234	171	171	170	117	122	120
Line 2	145	146	148	184	181	177	211	240	251	178	176	182	124	122	127

Note	Maximum measured value : 251 HV10

OTHER TESTS	***Report No***

CERTIFICATE ATTACHMENT	
1. Range of qualification (Level 2)	***2. pWPS WPQR 3***
3. Filler metal certificate ACERLOR MITTAL no. 20542377 Batch No. 399529	***4. Visual Welding report: Bureau Veritas No. R53073_cp_23.SF.5436792.783 – WPQR 3 at 30.05.2023***
5. Penetrant test report: Aru Manuel PT_WPQR_3 del at 31.05.2023	***6. Laboratory test report: AQC 23/415 C at 26.07.2023***

NOTE - OBSERVATION

RANGE OF QUALIFICATION

LEVEL 2

General for all process								
Welding process(es)	**136**							
Degree of mechanization	**Partly Mechanised**							
Type of joint and weld	**FW: P&T**							
Parent material group(s) and sub group(s) included permanent backing material	**Group 1.2** **Test piece materials in groups 1 and 11 qualify the equal or lower specified minimum yield strength steels**							
Parent Material Thickness (mm) without impact	**BW**		to		with		to	
Parent Material Thickness (mm) with impact	**BW**		to		with		to	
Parent Material Thickness (mm)	**FW**	≥ 5	To		with		to	
Parent Material Thickness (mm)	**Branch**		To		With		to	
Deposited weld Metal Thk (mm) each process :	**N.A.**							
Throat Thickness (mm) :	**no restriction**							
Outside Pipe Diameter (mm) :	**outside diameter is >500 mm or when the outside diameter is >150 mm welded in the PC, in PF rotated position or in PA rotated position.**							
Single run / Multi run :	**Multi run**							
Angle of branch connection	**N.A.**							
Filler Material	**Equivalent mechanical properties, same type of covering core or flux, same nominal composition and the same or lower hydrogen content**							
Filler Material Size	**No restriction if heat input is respected. No limitation if hardness not required**							
Type of Welding Current	**136 Direct Current (DC EP)**							
Heat Input (ISO/TR 18491)	Same used in procedure test	**- 25 % when hardness requirements apply**						
Welding Positions :	**All positions, except for PG / PJ and J-L045**							
Preheat Temperature **:**	**> 20°C**							
Interpass Temperature **:**	**< 250°C**							
Post-Heating for hydrogen release :	The temperature and duration of post-heating for hydrogen release shall not be reduced. Post-heating shall not be omitted, but may be added.							
Post-Weld Heat Treatment	Yes ☐ No ☒ Addition or deletion not permitted							
Post-Weld Heat Treatment temp.	**N.A.**							
Other informations								
Process 12								
Number of electrodes	**N.A.**							
Flux make and designation (if impact required at < -20°C)	**N.A.**							
Flux re-crushed slag if used	**N.A.**							
Processes 111								
FM trade name: (if impact required at < -20°C)	**N.A.**							
Processes 114								
FM trade name : (if impact required at < -20°C)	**N.A.**							
Processes 13								
Shielding Gas:	**ISO 14175:2008 - M21**							
Content of CO2	**20% ± 0,36%**							
Wire system (Single or multiple)	**Single**							
Mode of Metal Transfer :	**SPRAY ARC**							
Power source	☐Waveform controlled ☐ Pulsed mode (without waveform controlled) ☒Without pulsed and waveform							
136 and 132 Filler Material trade name: (impact required at < -20°C)	Same							
Process 14								
Shielding Gas:	**N.A.**							
Content of He	**N.A.**							
Filler metal used	**N.A.**							
Process 15								
Plasma gas composition	**N.A.**							
Shielding gas composition	**N.A.**							
Filler metal used	**N.A.**							
Joint preparation (if inpact test required)	**N.A.**							
Process 311								
Filler metal used	**N.A.**							
Backing Gas								
Backing gas	**N.A.**							
Backing gas main group (ISO 14175)	**N.A.**							
Change backing gas (material groups 7 and 10)	**N.A.**							
Deletion if production are made with mb > 5 mm	**N.A.**							