

**Welding Procedure  
Qualification Report (WPQR)**



Cert.

01-202-USA/V18-468712-1

**WELDING PROCEDURE QUALIFICATION - TEST CERTIFICATE**

**Manufacturer's Welding Procedure Reference No.** GM-SAW-1-PED      **Examiner or Test Body: Reference No:** TÜV Rheinland Industrial Solutions TUV/PQR/468712/TK1

**Manufacturer:** Spooltech Inc.

**Address:** 9325 Hwy 6 North, Houston, TX 77095

**Code/Testing Standard:** EN ISO 15614 Pt.1:2004+A2:2012 / EN ISO 5817:2007 Level B + C\*

**Date of Welding:** 31-May-2018

**RANGE OF QUALIFICATION**

**Welding Process(es):** Metal Active Gas / Submerged Arc MAG (135) / SAW (121)

**Type of joint and weld:** Multi Pass – Single, Backed or Double Side Welded.  
Pipe and Plate Full/Partial Pen. Butt Welds, T Butt, Branch Welds  $\geq 60^\circ$  and Fillet Welds.

**Parent material groups & sub group(s):** PD CEN ISO/TR 15608 Group 1 & 11  
Sub group 1.1 & 11.1

**Parent Thickness Range:** BW: 9.53 - 38.1. FW: 9.53 - 38.1mm

**Weld Metal Thickness:** BW: MAG - 3.0 to 12.7, SAW - 6.35 to 25.4

**Throat Thickness:** No Restriction

**Outside Pipe Diameter:** >500mm All Positions: >150mm in PA & PC Rotated

**Filler Metal Designation:** MAG: AWS A5.18 ER70S-6. SAW: AWS A.23 EM14K

**Filler Metal Make:** Any Supply - EN 10204 compliant (except 2.1)

**Filler Metal Size:** No limitation of filler metal size. Heat Input not to be exceeded.

**Shielding Gas / Flux:** MAG: ISO 14175: Class M21 (75% Ar, 25% CO<sub>2</sub>), SAW: 880M Neutral Flux.

**Welding Current / Polarity:** DC+ve

**Mode of Metal Transfer:** Root: Short Circuit. Hot Pass: Spray, Pulse & Globular

**Heat Input:** MAG: 0.61 - 1.61. SAW: 1.05 - 2,94 kJ/mm

**Welding Positions:** Root: PG, Balance PA, PB only

**Preheat Temperature:** 93°C minimum

**Interpass Temperature:** 260°C maximum

**Post Heating:** Not applicable

**Post Weld Heat Treatment:** Not applicable

**Other Information:** \*Level C allowed for imperfections as listed in Clause 7.5 of this standard.

**It is hereby certified that the test weld was prepared, welded and tested in accordance with the requirements of the code/testing standard indicated above.**

<u>Location:</u>	<u>Date of Issue</u>	<u>Examiner or Test Body</u>
In Works	26 <sup>th</sup> Jun 2018	TÜV Rheinland Industrial Solutions 8181 Broadmoor SE Caledonia, MI. 49316 USA

**Name, Date & Signature**  
Mr. Stephen Norris. 26<sup>th</sup> Jun 2018

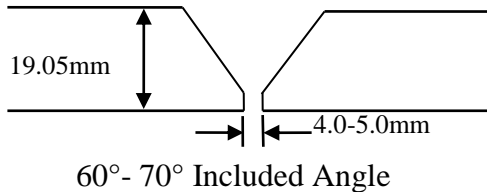
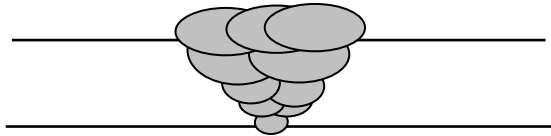
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## DETAILS OF WELD TEST

<b>Location:</b>	In Works	<b>Examiner or Test Body:</b> TÜV Rheinland I. S.
<b>WPS Reference No:</b>	GM-SAW-1-PED	<b>Method of Preparation &amp; Cleaning:</b>
<b>WPQR No:</b>	TUV/PQR/468712/TK1	Ground Prep, Grind & Wire Brush
<b>Manufacturer:</b>	Spooltech Inc.	<b>Parent Material Specification:</b>
<b>Welder's Name:</b>	Mr. Thomas Kaupert K	EN ISO 15608 Grp. 1.1&11.1 A516 Gr. 65/70
<b>Metal Transfer Mode:</b>	Root: Short Circuit. HP.: Globular	<b>Material Thickness (mm):</b> 19.05
<b>Joint Type &amp; Weld:</b>	Multi-pass butt weld	<b>Outside Pipe Diam (mm):</b> N/A
<b>Weld Preparation Details:</b>	Single Vee Groove	<b>Welding Position:</b> PG/PA

JOINT DESIGN	WELDING SEQUENCE
 <p style="text-align: center;">60° - 70° Included Angle</p>	 <p style="text-align: center;">Multi Process Multi Run MAG/SAW Butt Weld</p>

### Welding Details:

LEVEL NUMBER	PROCESS & METAL TRANSFER	SIZE of FILLER METAL	CURRENT Amps A	VOLTAGE Volts V	CURRENT & ELECTRODE POLARITY	Wire Feed M/min	TRAVEL SPEED mm/sec	HEAT INPUT kJ/mm
1	135 Dip	0.9mm	90 - 100	17 - 18	DC+ve	4.70	1.12	1.09 - 1.29
2	135 Glob.	0.9mm	125 - 140	17 - 19	DC+ve	6.35	2.10	0.81 - 1.01
3 - 4	121	3.17mm	300 - 345	28 - 29	DC+ve	5.4	6.00	1.40 - 1.67
5 - 10	121	3.17mm	360 - 400	30 - 31	DC+ve	5.4	5.88-6.00	1.80 - 2.11
11 - 13	121	3.17mm	390 - 400	31	DC+ve	5.4	6.00-7.06	1.71 - 2.07

<b>Filler Metal Classification:</b>	MAG: AWS A5.18 ER70S-6, SAW: AWS A5.23 EM14K
<b>Filler Metal Trade Name:</b>	MAG: Oxford Alloys 70S-6, SAW: Lincoln Electric EM14K
<b>Any Special Baking or Drying:</b>	N/A
<b>Gas / Flux – Shielding – Backing:</b>	MAG: ISO 14175: Class M21 (75% Ar, 25% CO <sub>2</sub> ), SAW: 880M Neutral Flux.
<b>Gas Flow – Shielding – Backing:</b>	MAG: 16 - 17 l/min. - Shielding
<b>Tungsten Electrode Type/Size:</b>	Not Applicable
<b>Detail of Back Gouging/Backing:</b>	None
<b>Preheat Temperature:</b>	93°C Ambient
<b>Interpass Temperature:</b>	260°C Maximum
<b>Post-Heating:</b>	Not Applicable
<b>Post-Weld Heat Treatment:</b>	Not Applicable
<b>Other Information:</b>	-

**Manufacturer:**

Spooltech Inc.

**Certification Body:**

TUV Rheinland Industrie Service GmbH  
Am Grauen Stein, D-51105 Köln  
PED Notified Body ID No. 0035

**Name, Date & Signature:**

Mr. Ryan Carbonara. 6.26.2018

**Name, Date & Signature:**

Mr. Stephen Norris. 6.26.2018

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## TEST RESULTS

<b>Manufacturer's Welding Procedure Reference No.</b>	GM-SAW-1-PED	<b>Examiner or Test Body:</b>	TÜV Rheinland I. S.
<b>Visual Examination:</b>	Acceptable to BS EN ISO 17637:2011 52521-81885	<b>Reference No:</b>	PQR/468712/TK1
<b>Penetrant / MPI:</b>	Acceptable to BS EN ISO 3452-1:2013/17638:2009 52521-81885	<b>Radiography:</b>	Acceptable to BS EN ISO 17637-1:2013 52521-81885
		<b>Ultrasonic:</b>	Acceptable to BS EN ISO 17640:2010 Not Applicable

**Tensile Tests:** BS EN ISO 4136:2011 --

**Temperature:** -

TYPE/No.	SIZE mm	So / mm <sup>2</sup>	Rm LOAD (KN)	Rm N/mm <sup>2</sup>	FRACTURE LOCATION	REMARKS
<b>Requirement</b>	-	-	-	<b>485</b>	-	Material ASTM A516 Gr. 65/70
Transverse 1	25.6 x 15.3	392.3	212.6	543	Weld metal	Acceptable
Transverse 2	25.6 x 15.5	398.1	214.9	540	Weld Metal	Acceptable

**Bend Tests:** BS EN ISO 5173:2010+A1:2011

**No. 4 off**

**Diameter of Former:** 4T

**Macro Examination**

TYPE/No.	BEND ANGLE	ELONGATION	RESULTS
Side 1	180°	Not Required	Acceptable
Side 2	180°	Not Required	Acceptable
Side 3	180°	Not Required	Acceptable
Side 4	180°	Not Required	Acceptable

BS EN ISO 17639:2013  
1 off Acceptable

**Micro Examination**

BS EN ISO 17639:2013  
Not Required

**Impact Tests:** BSEN ISO 9016:2011 & 148-2:2008

**No. of Sets:** 2 sets

**Type:** 2mm V

**Size:** 10 x 10\*

NOTCH LOCATION / DIRECTION	TEMP °C	VALUES				AVERAGE	REMARKS Requirement 27 J
		1	2	3			
Weld SAW	-40	254	197	127	193	Acceptable	
HAZ SAW	-40	146	175	165	162	Acceptable	
Weld GMAW*	-40	24	34	23	27	Acceptable	
HAZ GMAW*	-40	66	68	62	65	Acceptable	

**Hardness Tests:** BS EN ISO 6507-1: 2005 <380 HV

**Type/Load:** HV/10Kg

**Location of readings:** BS EN ISO 9015-1:2011. 2 Traverses: Cap 15 readings / Middle readings / Root 15 readings

**Principle Values:**  
 Parent Metal : Max: 175 / Min: 154  
 HAZ: Max: 212 / Min: 175  
 Weld Metal: Max: 191 / Min: 170

**Other Tests:** None.

**Remarks:** \* Sub size samples were used on GMAW side so the results above are based on 10 x 3.96mm sub size.

Tests carried out in accordance with the requirements of EN ISO 15614 Part 1:2004+A2:2012

Laboratory Report Reference No: 830353.00

Test results were **Acceptable**

Weld Tests were carried out in the presence of: **Mr. S. Norris**

Name, date and signature:

Mr. Stephen Norris. 6.26.2018