Welding Procedure Specification (WPS)
焊接工艺说明书

Qualification Codes/Standards 用于认可的法规/标准:
LR Rules for Materials , Chapter 12

Manufacturer's Name 制造商的名称:

Manufacturer's Address 制造商的地址:
Hongbei Industrial Zone,Fengcheng Town,Fengxian District,Shanghai

WPS Number and Revision: 焊接工艺说明书编号和版本:	Date: 日期:	Welding Procedure Qualification Record No 焊接工艺评定记录编号(PQR):	PQR Certificate No: 焊接工艺评定记录证书编号:
WPS 10-05	**25 May 2015**	**PQR 10-05**	**SHI 1520764/5**

Welding Process 焊接方法:
141(TIG)

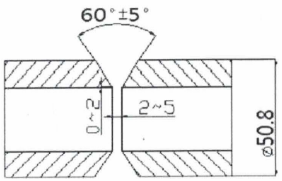
Type 焊接方式:
Manual 手工的†

Welding Technique 焊接工艺:
Multi Run 多道焊

Welding Positions 焊接位置:
H-L045

Weld Preparation Details (Sketch) 焊前坡口准备细节（简图）

Joint Design 接头型式



Welding Sequences 焊道布置

Base Material Details 母材金属的详细信息

Specification and Grade – side 1 标准和级别 – 第 1 侧:
GB/T5312-2009 410G □50.8×6.5 mm

Specification and Grade – side 2 标准和级别 – 第 2 侧:
GB/T5312-2009 410G □50.8×6.5 mm

Form 型式:	Thickness Range 厚度范围 (mm):	Pipe Outside Diameter 管子外径 (mm):
Pipe 管材† Pipe	**3~13**	**>25.4**

Consumable Details 焊接材料的详细信息

Filler Metal 填充金属:

Name 名称:	LR Grading 劳氏船级社的级别:	National Classification (if any) 国家标准级别(如果适
TIG-50(ER70S-G) **Tien Tai Electrode (Kun Shan) Co.,Ltd**	**3YM**	-

Filler Metal Sizes 填充金属的尺寸 (mm):
2.4

Flux Type and Trade Name 焊剂的形式和商品名称:
NA

Gas Composition: 气体成分:	Shielding 保护气体	**Argon**	Gas Flow Rate: 气体流量:	Shielding 保护气体	**7~15L/min**
	Backing 背部气体	-		Backing 背部气体	-

Tungsten Electrode Type & Size 钨极的形式和尺寸: **2.5**

Backing Strip Type & Size 背部衬垫的形式和尺寸: -

† Select from dropdown menu 通过下拉菜单来选择
** Delete as appropriate 删出不适用的项目*

Preheat/Heat Treatment Details 预热/焊后热处理的详细信息:

Pre Heat Temperature 预热温度°C (min 最低): –

Interpass Temperature 层间温度 °C (max 最高): **<250**

Post weld Heat Treatment and/or Ageing 焊后热处理和/或时效处理:

Method 方法:	Temperature 温度 °C:	Time 时间:
-	-	-

Heating and Cooling Rates 加热和冷却速度: -

Technique Details 技术细节:

Method of Back Gouging and Cleaning 背部刨槽和清理的方法:

Machining and grinding

String or Weave Bead 直拖焊道或摆动焊道:

Weaving 摆幅 (Maximum width of run 焊道最大宽度)

Weave Bead

-

Oscillations: 机械摆动:	Amplitude 摆幅	Frequency 频率	Dwell time 停留时间
	-	-	-

Contact tube to work distance 导电嘴到工件的距离:

-

Pulse Welding Details 脉冲焊接的细节:

Base Current 基础电流:	Base Time 基础时间:	Peak Current 峰值电流:	Peak Time 峰值时间:
-	-	-	-

Welding Details 焊接细节

Run 焊道	Process 焊接方法	Size of Filler Metal 填充金属尺寸	Current 焊接电流 A	Voltage 电弧电压 V	Type of Current/ Polarity 电流形式/极性	Wire Feed Speed 送丝速度	Travel Speed 焊接速度	Heat Input 热输入量 KJ/mm
1	**TIG**	**2.4**	**90~120**	**12~16**	**DCEN**		**50~75**	**1.1**
2	**TIG**	**2.4**	**90~120**	**12~16**	**DCEN**		**50~75**	**1.1**
3	**TIG**	**2.4**	**80~110**	**11~15**	**DCEN**		**50~70**	**1.0**
END								

Other Information 其它信息

Manufacturer:
Macfitter (ShangHai) Marine Thermal Engineering Co. , Ltd

Name: Shaoming Zhang
Date: **20 July 2015**
Signature:

Surveyor to Lloyd's Register Classification Society (China) Co., Ltd.
A subsidiary of Lloyd's Register Group Limited
Office: **Shanghai**

Name: Samuel Tan
Date: **20 July 2015**
Signature:

Lloyd's Register Classification Society (China) Co.,Ltd. Initials TCJ Shanghai Office
Lloyd's Register

1. This WPS is valid only if used by the above manufacturer.本焊接工艺说明书仅对上述的制造商有效。
2. The manufacturer is responsible for ensuring that WPS meets the technical requirements for the application. 制造商负责保证本焊接工艺说明书满足使用中相关的技术要求。

Welding Procedure Qualification Record (PQR)

Qualification: Codes/Standards
LR Rules for Materials , Chapter 12

Date of issue
20 July 2015

Office
Shanghai

p WPS* number and revision
WPS 10-05

Date of welding
12 June 2015

Test place/location shop/site
Manufacturer workshop

Manufacturer's name

Manufacturer's address
Hongbei Industrial Zone,Fengcheng Town,Fengxian District,Shanghai

Base Material, Consumable and Welding Details:

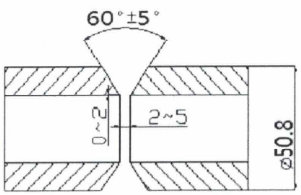
Base materials	Welding position	Welding process
GB/T5312-2009 410G □50.8×6.5 mm	**H-L045**	**TIG**
Plate/Pipe Thickness (mm):	Pipe outside diameter (mm):	
6.5	**50.8**	
Joint type	Shielding gas/flux flow rate	Gas composition
Butt Welding	**Argon / 7~15L/min**	-
Filler material	Make/type/diameter	Composition
TIG-50(ER70S-G)	**Tien Tai Electrode (Kun Shan) Co.,Ltd / 2.4**	-
Flux type		
-		

Preheat and interpass temperature (method) and control **Interpass Temperature Max. 250℃**

Postweld heat treatment temperature (method) and control -

Other information

Test joint details (sketch with dimensions) of weld preparation



Manufacturer's Preliminary Welding Procedure Specification

Test Results

Date of issue **20 July 2015**
Office **Shanghai**

Bead sequence detail (sketch to include weld metal thickness and back gouging where applicable)

Procedure Detail

Run number	Process	Size of filler material	Current A	Voltage V	AC/DC Polarity	Wire feed/travel speed	Heat input kJ/mm
1	**TIG**	**2.4**	**90~120**	**12~16**	**DCEN**	**50~75**	**1.1**
2	**TIG**	**2.4**	**90~120**	**12~16**	**DCEN**	**50~75**	**1.1**
3	**TIG**	**2.4**	**80~110**	**11~15**	**DCEN**	**50~70**	**1.0**

END

Date **20-Jul-2015**

Welder's name **Chen Haihe**

WPQ certificate number **SHI 1520764/13**

Test Results

Date of issue **20 July 2015**
Office **Shanghai**

Non-Destructive Examination (state acceptable, unacceptable, or none)

Visual	Magnetic particle	Liquid penetrant	Radiography	Ultrasonics
Acceptable	**Acceptable**	-----	**Acceptable**	-----

Destructive Tests

Test	Tensile	Yield	% Elongation	%Reduction of area	Fracture	Test Temp °C
Units	**N/mm2**					
Transverse tensile	**508,497**				**Parent Material**	**Ambient**
All-weld tensile						

Bend Tests

Orientation	Former	Angle°	Results
face	**4t**	**180**	**Acceptable**
face	**4t**	**180**	**Acceptable**
Root	**4t**	**180**	**Acceptable**
Root	**4t**	**180**	**Acceptable**
Longitudinal			

Fillet Weld Fracture (Results)

1
2
3
Macro examination
Acceptable

Impact tests

	Notch location/orientation	Temp °C	Values(J) 1	2	3	Average (J)	Remarks
Size							
Type							

Hardness Survey

Type
HV10

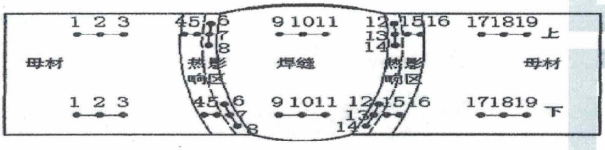
Load
98N

Hardness Range
Parent material
154,160,154,166,155,144,146,163,166,172,159,158

Weld
195,193,186,183,184,186

H.A.Z.
169,169,177,181,167,201,176,189,166,163,177,178,190,191,157,189,193,208,179,188

Location of hardness measurements (sketch)



Test Results

Date of issue **20 July 2015**
Office **Shanghai**

Additional test(s) and result(s) e.g. chemical analysis, micro examination, ferrite measurement

We certify that the foregoing statements are correct and the test welds were prepared, welded and tested in accordance with the specified Codes or Standards.

Manufacturer (signature)

Name in block capitals **SHAOMING ZHANG**

Date **20-Jul-2015**

Surveyor to Lloyd's Register Classification Society (China) Co., Ltd.

(signature) Lloyd's Register Classification Society (China) Co. Ltd. Initials TC I Shanghai Office

Name in block capitals **SAMUEL TAN**

Date **20-Jul-2015**