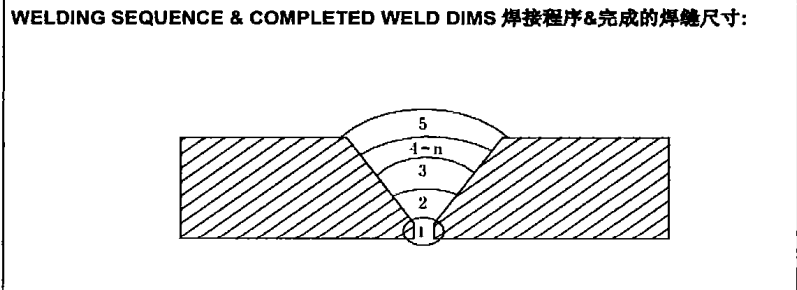
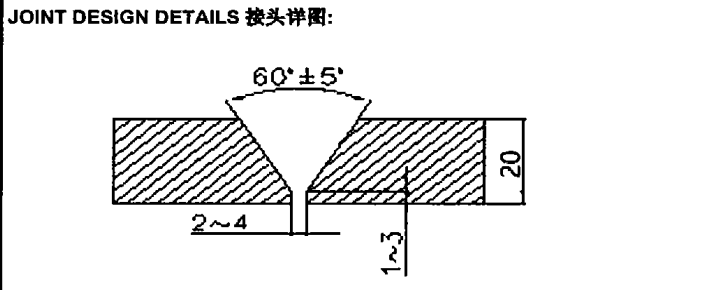


WELDING PROCEDURE SPECIFICATION 焊接工艺规程
WPS NO. 编号: 10-01 SHEET 1 OF 1

Manufacturer : MacFitter (Shanghai) Marine Thermal Engineering Co.,Ltd (上海汝信船舶工程有限公司)
Place : No. 68 Si Hu Rd, Fengxian District, Shanghai ,China

STANDARD OR SPECIFICATION 标准或技术文件: DNV.GL Rules Pt.2 Ch.4	MATERIAL SPECIFICATION 材料规格: Boiler Plate (Q245R GB713-2014)	BASE MATERIAL DIMENSIONS 母材尺寸: T=20mm THICKNESS RANGE OF APPROVAL 厚度范围: Thk 10 to 40 mm
---	--	--

WELD TYPE & METHOD 焊接类型&方法: 141 手工氩弧焊 (GTAW) +111 手工电弧焊(SMAW)	WELDING POSITION 焊接位置: 2G	SINGLE / DOUBLE SIDE WELDING 单/双面焊: Single Side
---	-------------------------------------	---



WELD PREPARATION & METHOD/S 焊前准备&方法: Machine, Grind, Clean and Degrease 机加工,打磨,清理,去油污	WELDING TECHNIQUE 焊接技术: Weave Bead / Unbacked 摆动/无衬垫	WELD SURFACE FINISH 焊缝表面的最终完成: As Welded 焊态
---	--	---

MIN. PREHEAT TEMP 最小预热温度: 5°C	MAX. INTERPASS TEMP 最大层间温度: 250°C	P.W.H.T 焊后热处理: None 无
---	---	---------------------------------

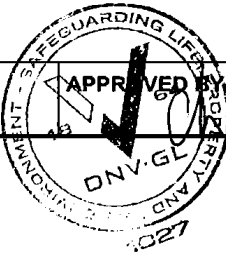
WELDING CONSUMABLES 焊接耗材: 141Wire 焊丝: TIG-50 from Tien Tai Electrode Co. ,Ltd 111Electrode 焊条: CHE50 from ATLANTIC CHINA WELDING CONSUMABLES.INC Stored and baked in accordance with the Manufacturer's instructions 贮藏与烘焙应与制造商的说明书一致	气体 GAS Shielding 保护气体: Ar(单一的 Single) 99.99% Backing 背面保护气: None 无 Trailing 尾部保护气: None 无	<table border="1"> <tr> <th>气体 Gas(es)</th> <th>流量 Flow Rate</th> </tr> <tr> <td>Ar(单一的 Single) 99.99%</td> <td>7~15 L/min</td> </tr> </table>	气体 Gas(es)	流量 Flow Rate	Ar(单一的 Single) 99.99%	7~15 L/min
气体 Gas(es)	流量 Flow Rate					
Ar(单一的 Single) 99.99%	7~15 L/min					

SEQUENCE OF OPERATIONS 操作程序: Clean and Degrease 清理,去油污 Check Weld Preparation 检查焊前的准备 Make Joint Maintaining Root Gap – Visual and Dimension Inspect 确保接头根部间隔 – 目视和尺寸检查 111(SMAW) weld complete. Clean & de-slag between each run 手工电弧焊每层完成后要清理焊渣 Visual inspection upon completion of welding 目视检测完成的焊缝	Tungsten Electrode Size and Type 钨极尺寸及类型: Φ2.5 mm,2% 铈钨极 Cerinted
	PULSE WELDING DETAILS 脉冲焊接详述: None 无

WELDING PARAMETERS								
Pass No. 焊道	Welding Process 焊接方法	Consumable Size(mm) 填充材料尺寸	Current (A) 电流范围	Voltage (V) 电压范围	Current & Polarity 电流极性	Wire Feed Speed ROC (mm/min) 计数器中的进丝速度	Travel Speed (mm/min) 焊接速度	Heat Input (KJ/mm) 热输入量
1	141	2.4	120~150A	16~20V	DCEN	NA	60~70	2.16
2	111	3.2	120~150A	22~26V	DCEP	NA	75~85	2.43
3	111	4.0	130~170A	23~28V	DCEP	NA	80~95	2.62
4-n	111	4.0	130~170A	23~28V	DCEP	NA	80~95	2.62
5	111	3.2	120~150A	22~26V	DCEP	NA	75~85	2.43

NOTES 注:

WRITTEN BY 编制: 李汝林 **DATE 日期:** 2016-11-22 **APPROVED BY 批准:**  **DATE 日期:** 2016-12-28



WELDING PROCEDURE QUALIFICATION RECORD

Ref:
A0352236

According to rule/standard/code: **DNV.GL Rules Part 2 Chapter 4**
 Manufacturer: **MacFitter (Shanghai) Marine Thermal Engineering Co.,Ltd** 上海汝信船舶工程有限公司
 Manufacturer address: **No. 68 Si Hu Rd, Fengxian District, Shanghai ,China**
 Place welded: **Manufacturer workshop**

Remarks/additional requirements:

General information

WPS No./Rev No:	10/01	Date of test weld:	2016-11-02
Welding process(es)	141+111	Single/double side welding	Single side
		Backing (e.g. gas):	---
Welding position:	2G	Preheating temp:	min. 5 °C

Material specification

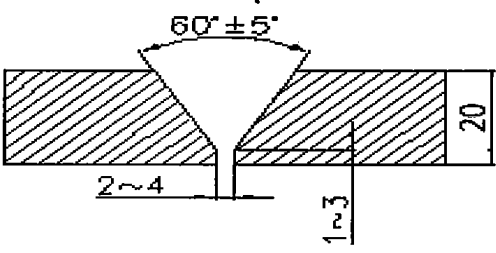
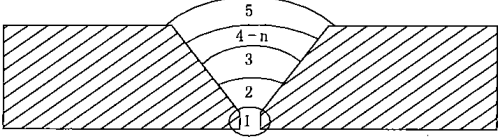
Base material 1:	GB713/2014 Q245R	Base material 2:	GB713/2014 Q245R
Delivery condition:	AR	Delivery condition:	AR
Heat No:	---	Heat No:	---
Material thickness:	20 mm	Material thickness:	20 mm
Outside diameter:	--- mm	Outside diameter:	--- mm
Additional information: (e.g. C%, C _{eq} , P _{cm})	---	Additional information: (e.g. C%, C _{eq} , P _{cm})	---

Welding consumables

No.	Filler metal		Gas	Flux		DNV GL grade
	Manufacturer	Brand name/ Designation		Manufacturer	Brand name/ Designation	
1	Tien Tai ltd	TIG-50	Argon	---	---	---
2	Atlantic ltd	CHE 50	---	---	---	---
3	---	---	---	---	---	---

Ref: A0352236

Joint preparation (sketch) and welding details

Joint design	Welding sequences
State rolling direction, if applicable	For multiple welding process qualification, the deposited weld metal thickness shall be recorded for each filler metal and process used.
	

ms

Ref: **A0352236**

Run/ layer	Welding Process	Ø filler metal (mm)	Filler metal No.	Flow rate gas (l/min)	Current (A)	Voltage (V)	Type of current/ polarity	Travel speed (mm/min)	Forehand/ backhand progression	Inter-pass temp. (°C)	Heat input (kJ/mm)
1/	141 - GTAW	2.4		7-15	120-150	16-20	DCEN	60-70	----	----	2.16
2/	111 - SMAW	3.2		---	120-150	22-26	DCEP	75-85	----	----	2.43
3/	111 - SMAW	4.0		---	130-170	23-28	DCEP	80-95	----	----	2.62
4/	111 - SMAW	4.0		---	130-170	23-28	DCEP	80-95	----	----	2.62
5/	111 - SMAW	4.0		---	130-170	23-28	DCEP	80-95	----	----	2.62
6/	111 - SMAW	3.2		---	120-150	22-26	DCEP	75-85	----	----	2.43
7/											
8/											
9/											
10/											

Further information

Name of welder/operator:	He, Mengqi	Baking of electrodes:	---
PWHT (Temperature/Time):	--- °C/ --- Hr(s)	Heating/Cooling rate:	---

Other (e.g. weaving, groove preparation, gouging, grinding):

TEST RESULTS**Non-destructive testing**

Test Method	Results	Test report No.	Test Method	Results	Test report No.
Visual inspection:	Acceptable	---	Radiographic test:	Acceptable	RT-20161107-1 (RT-1-1/RT-1-2)
Ultrasonic test:	---	---	Magnetic particle test:	Acceptable	MT-20161107-1 (MT-1)
Dye penetrant test:	---	---			

Destructive testing

Tensile test		Test report No:	QL11-070 (PAGE 1)
Specified YS min:	235 N/mm²	Specified TS min:	400 N/mm²

No.	Dimension	Area (mm ²)	Test load Fr (N)	YS (N/mm ²)	Break load Fm (N)	TS (N/mm ²)	Elongation (%)	R.A. (%)	Location/Character of fracture
1#	---	---	---	---	---	474	---	---	Base material
1#	---	---	---	---	---	475	---	---	Base material

Bend test		Test report No:	QL11-070 (PAGE 1)
Specified degree:	180 °	Mandrel diameter:	80 mm

Type	Dimension (W x T)	Result	Type	Dimension (W x T)	Result
Side bend	---	In order	Side bend	---	In order
Side bend	---	In order	Side bend	---	In order

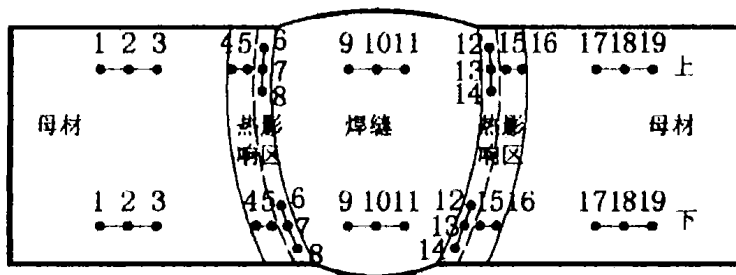
Notched bar impact test		Test report No:	QL11-070 (PAGE 1)
Test temperature:	0 °C	Minimum requirement:	34 J

Notch location	Result 1 (J)	Result 2 (J)	Result 3 (J)	Average (J)
Weld metal	210	171	210	197
Fusion line	224	242	244	237
Fusion line + 2 mm	198	233	231	221
Fusion line + 5 mm				
Fusion line + 10 mm				
Weld metal (Root)				

Ref: **A0352236**

Hardness tests HV 10	Test report No:	QL11-080 (PAGE 1)
-----------------------------	-----------------	--------------------------

Sketch



来样编号	位置	类型	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	上	HV10	134	143	138	155	161	164	175	165	193	191	177	203	185	165	162	154	148	152	146
	下		148	143	147	157	147	173	150	155	156	164	164	148	150	156	161	163	146	147	145

检测依据: GB/T 2654-2008
DNV-GL

Points		1	2	3	4	5	6
WM	A	193	191	177			
WM	B	156	164	164			
HAZ	A	155	161	175	185	162	154
HAZ	B	157	147	150	150	161	163
BM	A	134	143	138	148	152	146
BM	B	148	143	147	146	147	145

Test Method	Results	Test report No.	Test Method	Results	Test report No.
Macro photo	In order	QJ11-009	Fracture Test	---	---
Micro photo	---	---			

This is to certify:

That the statements in this record are correct and the welds were prepared, welded, heat treated and tested in accordance with the specified rule/code/standard and/or purchaser's specification.

Survey station:

DNV GL Shanghai

Place: **Shanghai** Date: **2016-12-28**

for **MacFitter (Shanghai) Marine Thermal Engineering Co.,Ltd** 上海汝信船舶工程有限公司

Li Rulin
Manager

for **DNV GL**
Shao You Chang
Shao You Chang
Surveyor

