



ClassNK

NIPPON KAIJI KYOKAI

Certificate No. : OTH15SC02072-01

Date : 14 December 2015

CERTIFICATE for Welding Procedure, Approval

THIS IS TO CERTIFY that the undersigned Surveyor to Nippon Kaiji Kyokai did at the request of the applicant, attend the testing and examination of the product(s) described below in accordance with the applicable rules/standards and found it/them satisfactory.

Manufacturer :
Place of Manufacturer : No.68 Si Hu Rd, Fengxian District, Shanghai CHINA
Applicant : Macfitter (Shanghai) Marine Thermal Engineering Co.,ltd
Place of Inspection : SHANGHAI,CHINA
Intended for : Welding Procedure, Approval
First Date of Inspection : 20 November 2015
Final Date of Inspection : 14 December 2015
Rules/Standards Applied : THE RELEVANT REQUIREMENTS OF THE RULES OF NIPPON KAIJI KYOKAI
Total set(s) of Product : 4

Particulars

Welding Process : GTAW+SMAW
 Edge Preparation : Type "V" 60°±5°
 Type of Joint : Butt welding (One side, Without backing)
 Welding Position : Flat, Horizontal, Vertical (Up), Overhead
 Applicable Material : Q245R(GB713-2014)
 Applicable Plate Thickness : Not more than 20mm
 Welding Consumable : TIG-50 Ø2.4 (Tien Tai Electrode (Kunshan) Co., Ltd)
 CHE50 Ø3.2/4.0(Shanghai Atlantic Welding Consumables Co., Ltd)
 Welding Condition : Working procedure and control standard described in the attached welding procedure specification of WPS-01/02/03/04 are to be strictly observed.


 T. Narisawa
 Regional Manager of China



CLASS NK

Welding Procedure Specification

Certificate No. : WPS01

Date: 14 DEC 2015

Manufacturer :

上海汝信船舶工程有限公司

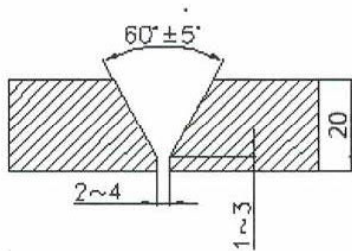
Place of Manufacturer : No. 68 Si Hu Rd, Fengxian District, Shanghai ,China

Rules/Standards Applied : The Relevant Requirements of The Rules of NIPPON KAIJI KYOKAI

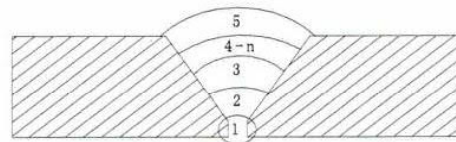
Particulars:

Base material:	GB713/2014 Q245R 20mm plate	Applicable plate thickness:	Not more than 20mm
Welding process:	GTAW+SMAW	Welding position:	Flat
Type:	Manual	Welding technique:	Multi Run
Joint type:	Butt welding	Edge preparation:	Type V (60 ± 5)° without backed
MAX. interpass TEMP:	250°C	Shielding gas/flux flow rate:	Argon/7-15L/min
Welding consumable:	TIG-50 $\Phi 2.4$ (Tien Tai Electrode(Kun Shan) Co. ,ltd)		
	CHE 50 $\Phi 3.2/4.0$ (Shanghai Atlantic Welding Consumables Co. ,ltd)		

JOINT DESIGN DETAILS :



WELDING SEQUENCE & COMPLETED WELD DIMS :



Procedure Details:

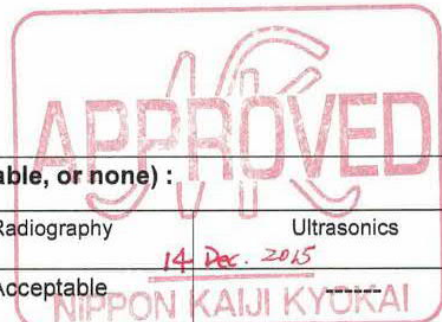
Run	Welding Process	Consumable Size(mm)	Current (A)	Voltage (V)	Current & Polarity	Wire Feed Speed (mm/min)	Travel Speed (mm/min)	Heat Input (KJ/mm)
1	GTAW	2.4	120 ~145A	19 ~22V	DCEN	185~215	50~80	2.2
2	SMAW	3.2	105 ~125 A	20~25V	DCEP	100~125	60~80	1.8
3	SMAW	4.0	130 ~160 A	22~28V	DCEP	80~115	70~100	2.1
4-n	SMAW	4.0	130 ~160A	22-28V	DCEP	80~115	70~100	2.1
5	SMAW	3.2	100 ~130 A	20~25V	DCEP	100~130	60~85	1.8
END								

Sequence of Operations:

Clean and Degrease
 Check Weld Preparation
 Make Joint Maintaining Root Gap – Visual and Dimension Inspect
 SMAW weld complete. Clean & de-slag between each run
 Visual inspection upon completion of welding

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

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



Macroscopic examinations:

Acceptable

Tensile Tests

Test	Tensile	Yield	% Elongation	%Reduction of area	Fracture	Test Temp °C
Units	N/mm ²					
Transverse tensile	466				Parent Material	Ambient
Transverse tensile	460				Parent Material	Ambient

Bend Tests

Orientation	Former	Angle °	Results
Face	4t	180	Acceptable
Face	4t	180	Acceptable
Root	4t	180	Acceptable
Root	4t	180	Acceptable

Impact Tests (3sets)

Specimen No.	Notch Location/Direction	Test Temp . (°C)	Specimen Size	Impact Values (J)				Remarks
				1	2	3	Average	
1	Welding center	0	10*10*55	140	128	148	139	
1	Fusion line	0	10*10*55	177	169	157	168	
1	Fusion line + 2 mm	0	10*10*55	163	141	157	154	

Hardness Survey :

Type: HV10

Load: 98N

Hardness Range:

Parent material : 141,141,140,124,142,145,145,144,146,147,146,150

Weld : 183,180,173,156,151,156

H.A.Z.: 147,154,182,167,163,177,174,178,160,143,146,149,156,150,166,141,148,153,154,152

Location of hardness measurements(sketch)



Additional tests and results :

The procedure and standard described in the welding procedure specification are to be in strict accordance with the specified codes or rules.

Manufacturer:

上海汝信船舶工程有限公司
Name: Rulin Li
Date: 14 December 2015

Examiner or Examining Body: CLASS NK

Name: XIN DONG

Date: 14 Dec 2015

Signature: *[Handwritten Signature]*



CLASS NK

Welding Procedure Specification

Certificate No. : WPS02

Date:14 DEC 2015

Manufacturer :

上海汝信船舶工程有限公司

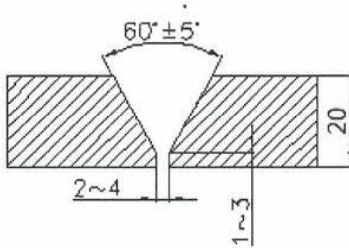
Place of Manufacturer : No. 68 Si Hu Rd, Fengxian District, Shanghai ,China

Rules/Standards Applied :The Relevant Requirements of The Rules of NIPPON KAIJI KYOKAI

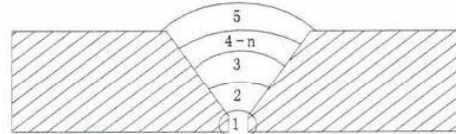
Particulars:

Base material:	GB713/2014 Q245R 20mm plate	Applicable plate thickness:	Not more than 20mm
Welding process:	GTAW+SMAW	Welding position:	Vertical Upward
Type:	Manual	Welding technique:	Multi Run
Joint type:	Butt welding	Edge preparation:	Type V (60±5) ⁰ without backed
MAX. interpass TEMP:	250°C	Shielding gas/flux flow rate:	Argon/7-15L/min
Welding consumable:	TIG-50 Φ2.4(Tien Tai Electrode(Kun Shan) Co. ,Ltd)		
	CHE 50 Φ3.2/4.0(Shanghai Atlantic Welding Consumables Co. ,Ltd)		

JOINT DESIGN DETAILS :



WELDING SEQUENCE & COMPLETED WELD DIMS :



Procedure Details:

Run	Welding Process	Consumable Size(mm)	Current (A)	Voltage (V)	Current & Polarity	Wire Feed Speed (mm/min)	Travel Speed (mm/min)	Heat Input (KJ/mm)
1	GTAW	2.4	140 ~160A	18 ~22V	DCEN	180~220	50~70	2.2
2	SMAW	3.2	100 ~120 A	20~25V	DCEP	100~130	50~70	2.0
3	SMAW	4.0	120 ~150 A	22~25V	DCEP	80~120	60~85	2.2
4-n	SMAW	4.0	120 ~150A	22-25V	DCEP	80~120	60~85	2.2
5	SMAW	3.2	100 ~130 A	20~25V	DCEP	100~130	50~75	2.0

Sequence of Operations:

Clean and Degrease
 Check Weld Preparation
 Make Joint Maintaining Root Gap – Visual and Dimension Inspect
 SMAW weld complete. Clean & de-slag between each run
 Visual inspection upon completion of welding



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

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

Macroscopic examinations:

Acceptable

CLASS NK

Welding Procedure Specification

Certificate No. : WPS03

Date: 14 DEC 2015

Manufacturer :

上海汝信船舶工程有限公司

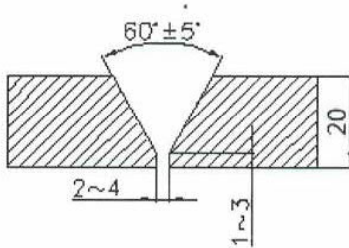
Place of Manufacturer : No. 68 Si Hu Rd, Fengxian District, Shanghai ,China

Rules/Standards Applied : The Relevant Requirements of The Rules of NIPPON KAIJI KYOKAI

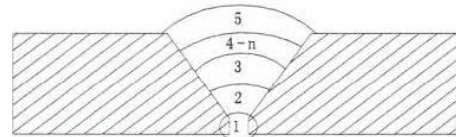
Particulars:

Base material:	GB713/2014 Q245R 20mm plate	Applicable plate thickness:	Not more than 20mm
Welding process:	GTAW+SMAW	Welding position:	Horizontal
Type:	Manual	Welding technique:	Multi Run
Joint type:	Butt welding	Edge preparation:	Type V (60±5) ⁰ without backed
MAX. interpass TEMP:	250°C	Shielding gas/flux flow rate:	Argon/7-15L/min
Welding consumable:	TIG-50 Φ2.4(Tien Tai Electrode(Kun Shan) Co. ,ltd)		
	CHE 50 Φ3.2/4.0(Shanghai Atlantic Welding Consumables Co. ,ltd)		

JOINT DESIGN DETAILS :



WELDING SEQUENCE & COMPLETED WELD DIMS :

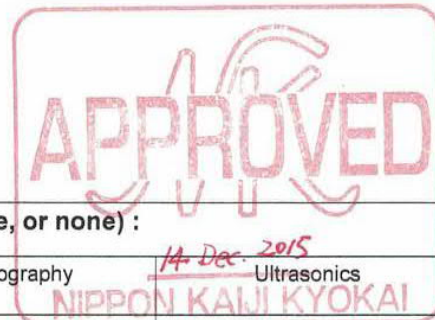


Procedure Details:

Run	Welding Process	Consumable Size(mm)	Current (A)	Voltage (V)	Current & Polarity	Wire Feed Speed (mm/min)	Travel Speed (mm/min)	Heat Input (KJ/mm)
1	GTAW	2.4	140 ~155A	18 ~22V	DCEN	180~225	50~80	2.2
2	SMAW	3.2	100 ~130 A	20~25V	DCEP	100~130	70~90	1.9
3	SMAW	4.0	130 ~150 A	22~28V	DCEP	80~120	70~90	2.2
4-n	SMAW	4.0	130 ~150A	22-28V	DCEP	80~120	70~90	2.2
5	SMAW	3.2	100 ~130 A	20~25V	DCEP	100~130	60~80	1.9

Sequence of Operations:

- Clean and Degrease
- Check Weld Preparation
- Make Joint Maintaining Root Gap – Visual and Dimension Inspect
- SMAW weld complete. Clean & de-slag between each run
- Visual inspection upon completion of welding



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

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

Macroscopic examinations:

Acceptable

Tensile Tests

Test	Tensile	Yield	% Elongation	%Reduction of area	Fracture	Test Temp °C
Units	N/mm ²					
Transverse tensile	469				Parent Material	Ambient
Transverse tensile	475				Parent Material	Ambient

Bend Tests (2Face+2Root)

Orientation	Former	Angle °	Results
Face	4t	180	Acceptable
Face	4t	180	Acceptable
Root	4t	180	Acceptable
Root	4t	180	Acceptable

Impact Tests (3sets)

Specimen No.	Notch Location/Direction	Test Temp. (°C)	Specimen Size	Impact Values (J)				Remarks
				1	2	3	Average	
3	Welding center	0	10*10*55	149	144	149	147	
3	Fusion line	0	10*10*55	182	205	197	195	
3	Fusion line + 2 mm	0	10*10*55	185	153	196	178	

Hardness Survey :

Type : HV10

Load : 98N

Hardness Range:

Parent material : 146,139,144,166,149,141,140,134,140,158,156,163

Weld : 219,242,232,135,145,132

H.A.Z. : 157,181,204,218,210,187,206,230,185,168,161,146,140,134,147,133,134,148,155,162

Location of hardness measurements(sketch)



Additional tests and results :

The procedure and standard described in the welding procedure specification are to be in strict accordance with the specified codes or rules.

Manufacturer:

上海汝信船舶工程有限公司
Name: Rulin Li
Date: 14 December 2015

Examiner or Examining Body : CLASS NK

Name: XIN DONG

Date: 14 Dec 2015

Signature:



CLASS NK

Welding Procedure Specification

Certificate No. : WPS04

Date: 14 DEC 2015

Manufacturer :

上海汝信船舶工程有限公司

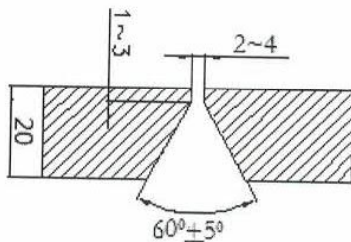
Place of Manufacturer : No. 68 Si Hu Rd, Fengxian District, Shanghai ,China

Rules/Standards Applied : The Relevant Requirements of The Rules of NIPPON KAIJI KYOKAI

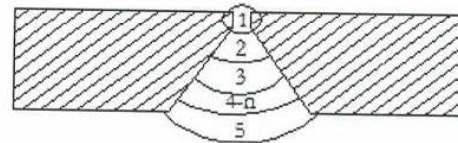
Particulars:

Base material:	GB713/2014 Q245R 20mm plate	Applicable plate thickness:	Not more than 20mm
Welding process:	GTAW+SMAW	Welding position:	Overhead
Type:	Manual	Welding technique:	Multi Run
Joint type:	Butt welding	Edge preparation:	Type V (60 ± 5)° without backed
MAX. interpass TEMP:	250°C	Shielding gas/flux flow rate:	Argon/7-15L/min
Welding consumable:	TIG-50 Φ 2.4(Tien Tai Electrode(Kun Shan) Co. ,Ltd)		
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JOINT DESIGN DETAILS :



WELDING SEQUENCE & COMPLETED WELD DIMS :



Procedure Details:

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3	SMAW	4.0	120 ~150 A	22~27V	DCEP	80~120	60~80	2.1
4-n	SMAW	4.0	120 ~150A	22-27V	DCEP	80~120	60~80	2.1
5	SMAW	3.2	100 ~130 A	20~25V	DCEP	100~130	50~70	1.9

Sequence of Operations:

Clean and Degrease
 Check Weld Preparation
 Make Joint Maintaining Root Gap – Visual and Dimension Inspect
 SMAW weld complete. Clean & de-slag between each run
 Visual inspection upon completion of welding



Non-Destructive Examination(state acceptable, unacceptable, or none) : 14 Dec. 2015

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

Macroscopic examinations:

Acceptable

