

註記 / NOTES		
NO.	日期/DATE	內容/DESCRIPTION
圖名/TITLE		
銲接程序書		
WELDING PROCEDURE SPECIFICATION		
核准/APPROVED BY		
審查/CHECKED BY		
製作/DRAWN BY		
版次/VERSION	1	
圖號/DRAWING NO.	HAM-WPS	
發行日期/DATE	MAR.31.2017	

ALL OF THE WELDING CONDITIONS FOR H.NO. 銲接程序計畫書

NO 項 次	Welding procedure 銲接程序		Kind of welding 銲接方式	Test Assembly 測試組合		Positions 位置	Page 頁次
				Grade 等級	Thickness (mm) 厚度		
1	CO ₂ semi-automatic	HAM-1-01	Butt (Joint design: v-type)	KA	6 ~ 24	F	1 - 6
		HAM-1-02				V	
		HAM-1-03				H	
2	CO ₂ semi-automatic	HAM-2-01	Butt (Joint design: v-type)	DH36	6 ~ 24	F	7-12
		HAM-2-02				V	
		HAM-2-03				H	
3	Qualification test for Welding Procedure						13-15
4	Repair Procedure of the Welding defects(銲接修補方法)						16-18

PRELIMINARY WELDING PROCEDURE SPECIFICATION 銲接程序規範

Welding procedure specification No.(WPS 編號) HAM-1-01

Qualification Standard: IACS UR W28

Issued date : (發行日期) 31 Mar. 2017 Welding type(s) : Semi-Automatic

Test assembly No. HAM-01 Welding process(es) : CAW

試片編號 銲接方法

Bass Metals 母材 :

Specification type & grade 規格型式與等級 : Grade KA

Test piece Thickness : 12mm

Joint 銲口開槽 :

Butt 對接(v) fillet 填角()

Joint design 接頭設計 : V-type Gap 間隙 : 5 mm

Groove angle 開槽角度 : 45° Root 根部高度 : 1 mm

Preparation 開槽表面 : Gas Cutting or Machine

Backing 背襯材料 : Yes (v) No()

Material(type)背襯材質(型式) : Ceramic Type ACE Brand. ABH series

Filler Metal 銲材 :

Manufacturer 銲條廠商 : TIEN TAI Brand Name 品牌型號 : TWE-711

Grade 認證等級 : AWS A5.20 E71T-1C

Size of Filler metals 銲條尺寸 : 1.2 mm

Position 銲接姿勢 :

Position(s) of Butt 對接銲姿勢 : Flat

Welding Progression 走銲方向 : Up () Down ()

Position(s) of Fillet 填角銲姿勢 : N/A

Preheat 預熱 :

Preheat Temp. Min 預熱溫度(°C). N/A

Inter pass Temp. Max 層間溫度(°C) : Surfact Temp. 160°C

Post weld Heat Treatment 後熱處理 :

Temp. Range 溫度範圍 : N/A Time Range 時間範圍 : N/A

Gas :

Shielding Gas 保護氣體 : CO₂ Percent Composition(Mixtures)混合比 : 99.8%

Flow Rate 流量 : 20-25 liter / minte

Electrical Characteristics :

Current AC or DC 交或直流: DC(+) Polarity 極性 : ---

Amps. (Range)電流範圍: 190-250 Amp Volt.(Range)電壓範圍 : 22-26 V

Technique 銲接技術:

String or Weave Bead 拖銲或織動銲 : Both

Contact Tube to Work Distance 接觸管到工件距離: 12-20 mm

Multiple or Single Pass(Per Side) 多層或單層銲道: Multiple

Multiple or Single Electrodes 多極或單極銲條: Single

Travel Speed (Range) 銲接速度範圍 : Root pass 22-28 cm/min, fill pass 18-20

Peening 錘擊 Yes () No (☒)

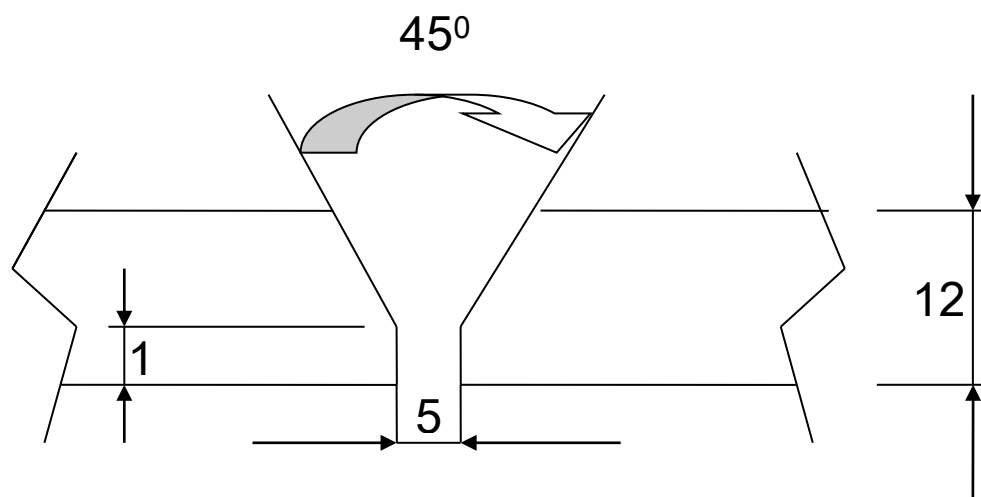
Initial & Interpass Cleaning(Brushing , Gringing , etc) : Brushing or/and Grinding

銲口與層間清潔方法(刷除與研磨等)

Method if back Gouging 背鏟方法: _____

Other 其他:

Sketch of welding condition (Unit : mm)



WELDING CONDITION

Flat position

Weld Layer 層次	Process 銲接方法	Filler Metal		Current		Volt 電壓範圍	Inter pass temp (Surface) 層間溫度
		Grade 認證等級	Dia(mm) 直徑	Type 交/直	Amp. 範圍		
Root Pass	CAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	190~220	22~24	---
Fill Pass	CAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	210~250	22~26	<160°C

PRELIMINARY WELDING PROCEDURE SPECIFICATION 銲接程序規範

Welding procedure specification No.(WPS 編號) HAM-1-02

Qualification Standard: IACS UR W28

Issued date : (發行日期) 31 Mar. 2017 Welding type(s) : Semi-Automatic

Test assembly No. HAM-02 Welding process(es) : CAW

試片編號 銲接方法

Bass Metals 母材 :

Specification type & grade 規格型式與等級 : Grade KA

Test piece Thickness : 12mm

Joint 銲口開槽 :

Butt 對接(v) fillet 填角()

Joint design 接頭設計 : V-type Gap 間隙 : 5 mm

Groove angle 開槽角度 : 45° Root 根部高度 : 1 mm

Preparation 開槽表面 : Gas Cutting or Machine

Backing 背襯材料 : Yes (v) No()

Material(type)背襯材質(型式) : Ceramic Type ACE Brand. ABH series

Filler Metal 銲材 :

Manufacturer 銲條廠商 : TIEN TAI Brand Name 品牌型號 : TWE-711

Grade 認證等級 : AWS A5.20 E71T-1C

Size of Filler metals 銲條尺寸 : 1.2 mm

Position 銲接姿勢 :

Position(s) of Butt 對接銲姿勢 : Vertical

Welding Progression 走銲方向 : Up () Down ()

Position(s) of Fillet 填角銲姿勢 : N/A

Preheat 預熱 :

Preheat Temp. Min 預熱溫度(°C). N/A

Inter pass Temp. Max 層間溫度(°C) : Surfact Temp. 160°C

Post weld Heat Treatment 後熱處理 :

Temp. Range 溫度範圍 : N/A Time Range 時間範圍 : N/A

Gas :

Shielding Gas 保護氣體 : CO₂ Percent Composition(Mixtures)混合比 : 99.8%

Flow Rate 流量 : 20-25 liter / minte

Electrical Characteristics :

Current AC or DC 交或直流: DC(+) Polarity 極性 : ---

Amps. (Range)電流範圍: 100-160 Amp Volt.(Range)電壓範圍 : 18-22 V

Technique 銲接技術:

String or Weave Bead 拖鋸或織動鋸 : Both

Contact Tube to Work Distance 接觸管到工件距離: 12-20 mm

Multiple or Single Pass(Per Side) 多層或單層鋸道: Multiple

Multiple or Single Electrodes 多極或單極鋸條: Single

Travel Speed (Range) 鋸接速度範圍 : Root pass 22-28 cm/min, fill pass 18-20

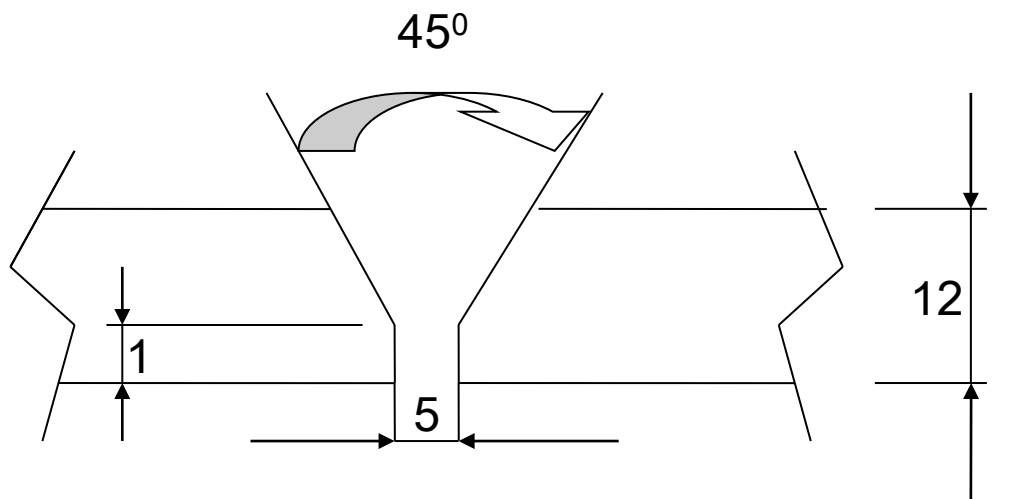
Peening 錘擊 Yes () No (☒)

Initial & Interpass Cleaning(Brushing , Gringing , etc) : Brushing or/and Grinding
鋸口與層間清潔方法(刷除與研磨等)

Method if back Gouging 背鏟方法: _____

Other 其他:

Sketch of welding condition (Unit : mm)



WELDING CONDITION

Flat position

Weld Layer 層次	Process 鋸接方法	Filler Metal		Current		Volt 電壓 範圍	Inter pass temp (Surface) 層間溫度
		Grade 認證等級	Dia(mm) 直徑	Type 交/直	Amp. 範圍		
Root Pass	CAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	100~120	18~20	---
Fill Pass	CAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	130~160	20~22	<160°C

PRELIMINARY WELDING PROCEDURE SPECIFICATION 銲接程序規範

Welding procedure specification No.(WPS 編號) HAM-1-03

Qualification Standard: IACS UR W28

Issued date : (發行日期) 31 Mar. 2017 Welding type(s) : Semi-Automatic

Test assembly No. HAM-03 Welding process(es) : CAW

試片編號 銲接方法

Bass Metals 母材 :

Specification type & grade 規格型式與等級 : Grade KA

Test piece Thickness : 12mm

Joint 銲口開槽 :

Butt 對接(v) fillet 填角()

Joint design 接頭設計 : V-type Gap 間隙 : 5 mm

Groove angle 開槽角度 : 45° Root 根部高度 : 1 mm

Preparation 開槽表面 : Gas Cutting or Machine

Backing 背襯材料 : Yes (v) No()

Material(type)背襯材質(型式) : Ceramic Type ACE Brand. ABH series

Filler Metal 銲材 :

Manufacturer 銲條廠商 : TIEN TAI Brand Name 品牌型號 : TWE-711

Grade 認證等級 : AWS A5.20 E71T-1C

Size of Filler metals 銲條尺寸 : 1.2 mm

Position 銲接姿勢 :

Position(s) of Butt 對接銲姿勢 : Horizontal

Welding Progression 走銲方向 : Up () Down ()

Position(s) of Fillet 填角銲姿勢 : N/A

Preheat 預熱 :

Preheat Temp. Min 預熱溫度(°C). N/A

Inter pass Temp. Max 層間溫度(°C) : Surfact Temp. 160°C

Post weld Heat Treatment 後熱處理 :

Temp. Range 溫度範圍 : N/A Time Range 時間範圍 : N/A

Gas :

Shielding Gas 保護氣體 : CO₂ Percent Composition(Mixtures)混合比 : 99.8%

Flow Rate 流量 : 20-25 liter / minte

Electrical Characteristics :

Current AC or DC 交或直流: DC(+) Polarity 極性 : ---

Amps. (Range)電流範圍: 100-160 Amp Volt.(Range)電壓範圍 : 18-22 V

Technique 銲接技術:

String or Weave Bead 拖焊或織動焊 : Both

Contact Tube to Work Distance 接觸管到工件距離: 12-20 mm

Multiple or Single Pass(Per Side) 多層或單層焊道: Multiple

Multiple or Single Electrodes 多極或單極焊條: Single

Travel Speed (Range) 焊接速度範圍 : Root pass 22-28 cm/min, fill pass 18-20

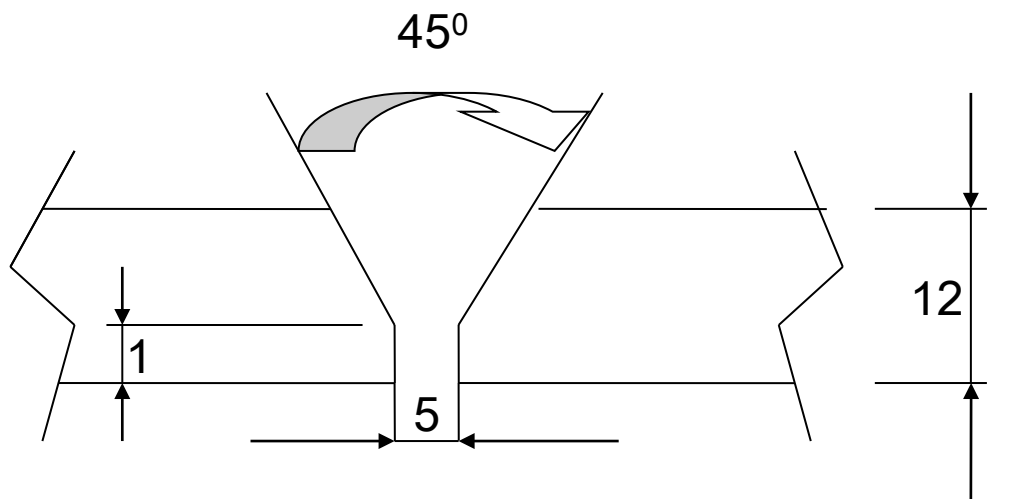
Peening 錘擊 Yes () No (☒)

Initial & Interpass Cleaning(Brushing , Grinding , etc) : Brushing or/and Grinding
焊口與層間清潔方法(刷除與研磨等)

Method if back Gouging 背鏟方法: _____

Other 其他:

Sketch of welding condition (Unit : mm)



WELDING CONDITION

Flat position

Weld Layer 層次	Process 焊接方法	Filler Metal		Current		Volt 電壓 範圍	Inter pass temp (Surface) 層間溫度
		Grade 認證等級	Dia(mm) 直徑	Type 交/直	Amp. 範圍		
Root Pass	CAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	100~120	18~20	---
Fill Pass	CAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	130~160	20~22	<160°C

PRELIMINARY WELDING PROCEDURE SPECIFICATION 銲接程序規範

Welding procedure specification No.(WPS 編號) HAM-2-01

Qualification Standard: IACS UR W28

Issued date : (發行日期) 31 Mar. 2017 Welding type(s) : Semi-Automatic

Test assembly No. HAM-04 Welding process(es) : FCAW

試片編號 銲接方法

Bass Metals 母材 :

Specification type & grade 規格型式與等級 : DH36

Test piece Thickness : 12mm

Joint 銲口開槽 :

Butt 對接(v) fillet 填角()

Joint design 接頭設計 : V-type Gap 間隙 : 5 mm

Groove angle 開槽角度 : 40° Root 根部高度 : 0~1 mm

Preparation 開槽表面 : Gas Cutting or Machine

Backing 背襯材料 : Yes (v) No()

Material(type)背襯材質(型式) : Ceramic Type ACE Brand. ABH series

Filler Metal 銲材 :

Manufacturer 銲條廠商 : TIEN TAI Brand Name 品牌型號 : TWE-711

Grade 認證等級 : AWS A5.20 E71T-1C

Size of Filler metals 銲條尺寸 : 1.2 mm

Position 銲接姿勢 :

Position(s) of Butt 對接銲姿勢 : Flat

Welding Progression 走銲方向 : Up () Down ()

Position(s) of Fillet 填角銲姿勢 : N/A

Preheat 預熱 :

Preheat Temp. Min 預熱溫度(°C). N/A

Inter pass Temp. Max 層間溫度(°C) : 200°C

Post weld Heat Treatment 後熱處理 :

Temp. Range 溫度範圍 : N/A Time Range 時間範圍 : N/A

Gas :

Shielding Gas 保護氣體 : CO₂ Percent Composition(Mixtures)混合比 : 99.8%

Flow Rate 流量 : 20-25 liter / minte

Electrical Characteristics :

Current AC or DC 交或直流: DC(+) Polarity 極性 : DCEP

Amps. (Range)電流範圍: 180-260 Amp Volt.(Range)電壓範圍 : 32-38 V

Technique 銲接技術:

String or Weave Bead 拖銲或織動銲 : Both

Contact Tube to Work Distance 接觸管到工件距離: 12-20 mm

Multiple or Single Pass(Per Side) 多層或單層銲道: Multiple

Multiple or Single Electrodes 多極或單極銲條: Single

Travel Speed (Range) 銲接速度範圍 : 15~18 cm/min

Peening 錘擊 Yes () No (v)

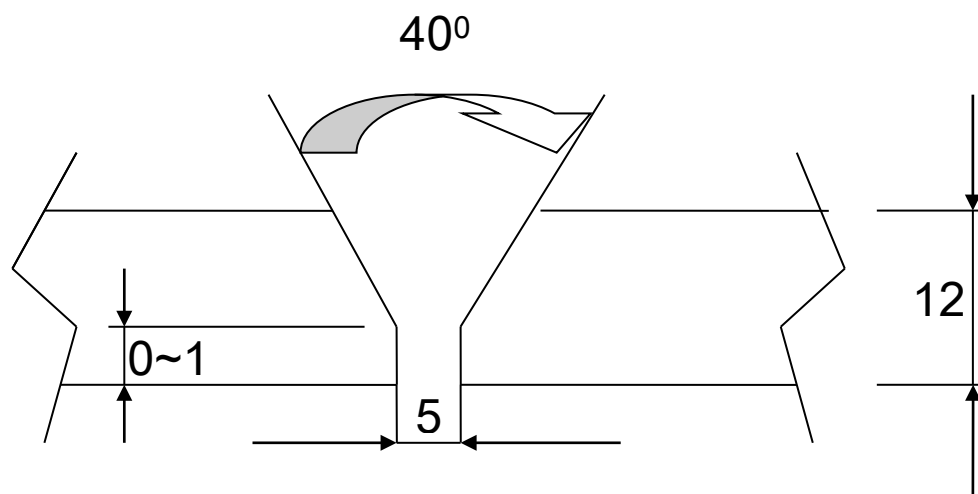
Initial & Interpass Cleaning(Brushing , Gringing , etc) : Brushing or/and Grinding

銲口與層間清潔方法(刷除與研磨等)

Method if back Gouging 背鏟方法: N/A

Other 其他:

Sketch of welding condition (Unit : mm)



WELDING CONDITION

Flat position

Weld Layer 層次	Process 銲接方法	Filler Metal		Current		Volt 電壓範圍	Inter pass temp (Surface) 層間溫度
		Grade 認證等級	Dia(mm) 直徑	Type 交/直	Amp. 範圍		
Root Pass	FCAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	180~260	32~36	---
Fill Pass	FCAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	180~260	32~36	---

PRELIMINARY WELDING PROCEDURE SPECIFICATION 銲接程序規範

Welding procedure specification no.(WPS 編號) HAM-2-02

Qualification Standard: IACS UR W28

Issued date : (發行日期) 31 Mar. 2017 Welding type(s) : Semi-Automatic

Test assembly No. HAM-05 Welding process(es) : FCAW

試片編號 銲接方法

Bass Metals 母材 :

Specification type & grade 規格型式與等級 : DH36

Test piece Thickness : 12mm

Joint 銲口開槽 :

Butt 對接(v) fillet 填角()

Joint design 接頭設計 : V-type Gap 間隙 : 5 mm

Groove angle 開槽角度 : 40° Root 根部高度 : 0~1 mm

Preparation 開槽表面 : Gas Cutting or Machine

Backing 背襯材料 : Yes (v) No()

Material(type)背襯材質(型式) : Ceramic Type ACE Brand. ABH series

Filler Metal 銲材 :

Manufacturer 銲條廠商 : TIEN TAI Brand Name 品牌型號 : TWE-711

Grade 認證等級 : AWS A5.20 E71T-1C

Size of Filler metals 銲條尺寸 : 1.2 mm

Position 銲接姿勢 :

Position(s) of Butt 對接銲姿勢 : Vertical

Welding Progression 走銲方向 : Up (v) Down ()

Position(s) of Fillet 填角銲姿勢 : N/A

Preheat 預熱 :

Preheat Temp. Min 預熱溫度(°C). N/A

Inter pass Temp. Max 層間溫度(°C) : 200°C

Post weld Heat Treatment 後熱處理 :

Temp. Range 溫度範圍 : N/A Time Range 時間範圍 : N/A

Gas :

Shielding Gas 保護氣體 : CO₂ Percent Composition(Mixtures)混合比 : 99.8%

Flow Rate 流量 : 20-25 liter / minte

Electrical Characteristics :

Current AC or DC 交或直流: DC(+) Polarity 極性 : DCEP

Amps. (Range)電流範圍: 160-180 Amp Volt.(Range)電壓範圍 : 25-30 V

Technique 銲接技術:

String or Weave Bead 拖鋸或織動鋸 : Both

Contact Tube to Work Distance 接觸管到工件距離: 12-20 mm

Multiple or Single Pass(Per Side) 多層或單層鋸道: Multiple

Multiple or Single Electrodes 多極或單極鋸條: Single

Travel Speed (Range) 鋸接速度範圍 : 7-9 cm/min

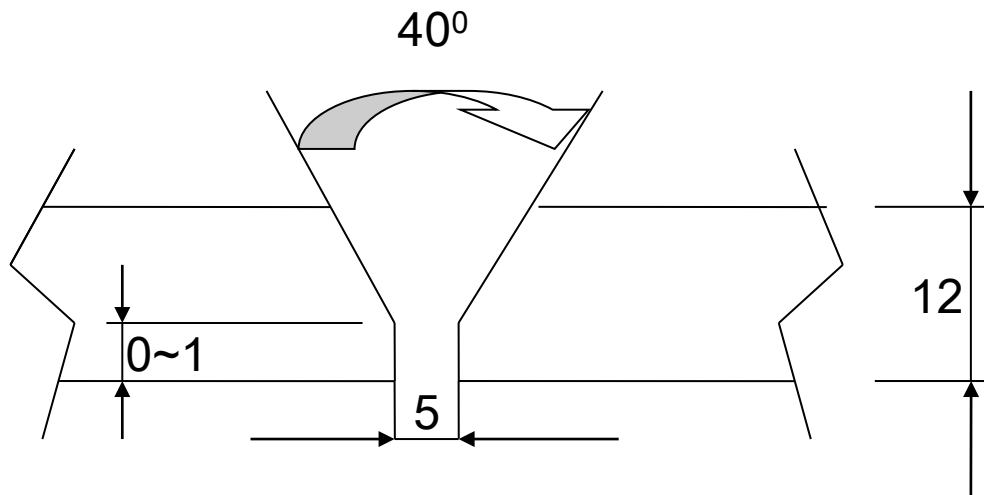
Peening 錘擊 Yes () No (v)

Initial & Interpass Cleaning(Brushing , Gringing , etc) : Brushing or/and Grinding
鋸口與層間清潔方法(刷除與研磨等)

Method if back Gouging 背鏟方法: N/A

Other 其他:

Sketch of welding condition (Unit : mm)



WELDING CONDITION

Flat position

Weld Layer 層次	Process 鋸接方法	Filler Metal		Current		Volt 電壓 範圍	Inter pass temp (Surface) 層間溫度
		Grade 認證等級	Dia(mm) 直徑	Type 交/直	Amp. 範圍		
Root Pass	FCAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	160~180	25~30	---
Fill Pass	FCAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	160~180	25~30	---

PRELIMINARY WELDING PROCEDURE SPECIFICATION 銲接程序規範

Welding procedure specification no.(WPS 編號) HAM-2-03

Qualification Standard: IACS UR W28

Issued date : (發行日期) 31 Mar. 2017 Welding type(s) : Semi-Automatic

Test assembly No. HAM-06 Welding process(es) : FCAW

試片編號 銲接方法

Bass Metals 母材 :

Specification type & grade 規格型式與等級 : DH36

Test piece Thickness : 12mm

Joint 銲口開槽 :

Butt 對接(v) fillet 填角()

Joint design 接頭設計 : V-type Gap 間隙 : 5 mm

Groove angle 開槽角度 : 40° Root 根部高度 : 0~1 mm

Preparation 開槽表面 : Gas Cutting or Machine

Backing 背襯材料 : Yes (v) No()

Material(type)背襯材質(型式) : Ceramic Type ACE Brand. ABH series

Filler Metal 銲材 :

Manufacturer 銲條廠商 : TIEN TAI Brand Name 品牌型號 : TWE-711

Grade 認證等級 : AWS A5.20 E71T-1C

Size of Filler metals 銲條尺寸 : 1.2 mm

Position 銲接姿勢 :

Position(s) of Butt 對接銲姿勢 : Horizontal

Welding Progression 走銲方向 : Up () Down ()

Position(s) of Fillet 填角銲姿勢 : N/A

Preheat 預熱 :

Preheat Temp. Min 預熱溫度(°C). N/A

Inter pass Temp. Max 層間溫度(°C) : 200°C

Post weld Heat Treatment 後熱處理 :

Temp. Range 溫度範圍 : N/A Time Range 時間範圍 : N/A

Gas :

Shielding Gas 保護氣體 : CO₂ Percent Composition(Mixtures)混合比 : 99.8%

Flow Rate 流量 : 20-25 liter / minte

Electrical Characteristics :

Current AC or DC 交或直流: DC(+) Polarity 極性 : DCEP

Amps. (Range)電流範圍: 180-230 Amp Volt.(Range)電壓範圍 : 30-34 V

Technique 銲接技術:

String or Weave Bead 拖鋸或織動鋸 : Both

Contact Tube to Work Distance 接觸管到工件距離: 12-20 mm

Multiple or Single Pass(Per Side) 多層或單層鋸道: Multiple

Multiple or Single Electrodes 多極或單極鋸條: Single

Travel Speed (Range) 鋸接速度範圍 : 16-22 cm/min

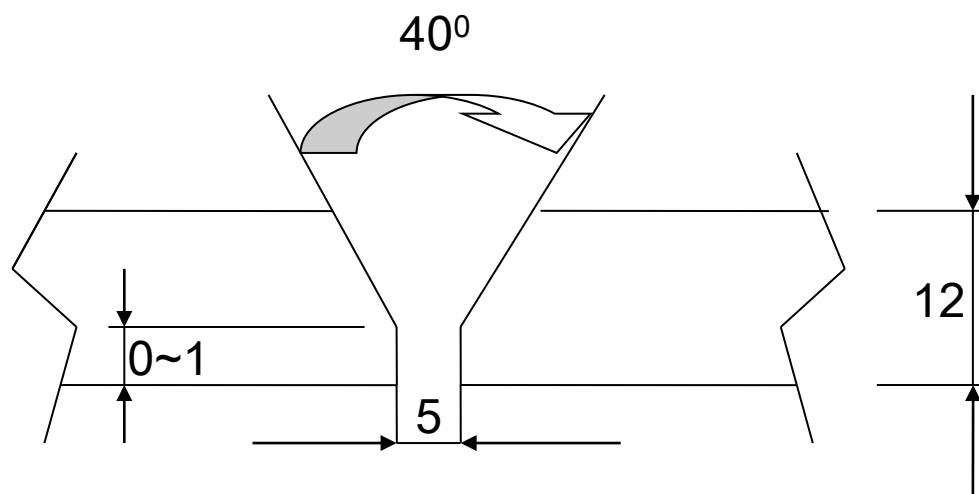
Peening 錘擊 Yes () No (☒)

Initial & Interpass Cleaning(Brushing , Gringing , etc) : Brushing or/and Grinding
鋸口與層間清潔方法(刷除與研磨等)

Method if back Gouging 背鏟方法: N/A

Other 其他:

Sketch of welding condition (Unit : mm)



WELDING CONDITION

Flat position

Weld Layer 層次	Process 鋸接 方法	Filler Metal		Current		Volt 電壓 範圍	Inter pass temp (Surface) 層間溫度
		Grade 認證等級	Dia(mm) 直徑	Type 交/直	Amp. 範圍		
Root Pass	FCAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	180~230	30~34	---
Fill Pass	FCAW	<u>AWS A5.20 E71T-1C</u>	1.2	DCEP	180~230	30~34	---

3. Qualification test for Welding Procedure

3.1 Kind of Test

The kinds of butt weld joint test and number of specimens are to be in accordance with requirements specified given in Table M.4.4 of Part M of ClassNK Rule.

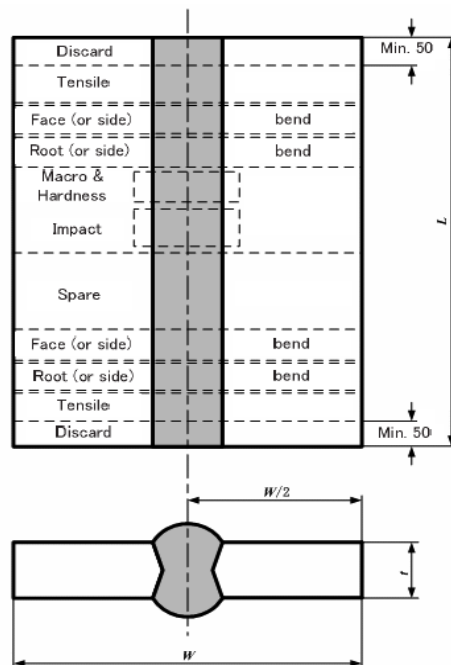
Kinds of Butt welded Joint Test for Rolled steel (Grade KA, KA36)

Kind of test	Number of specimens
Visual inspection	Whole length of welding joints
Tensile test	2
Bend test	4
Impact test (sets)	3~8
Macro-structure inspection	1
Hardness test	1
Non-destructive inspection	Whole length of welding joints

3.2 Test Assemblies

- (1) The dimension and type of test assembly are to be same as Fig. M4.1 of Part M of ClassNK Rule.
- (2) The position of notch for specimen is to be shown in Fig M4.1

Fig. M4.1 Welding Procedure Qualification Test assemblies (Unit: mm)



Notes:

- (1) In Fig.(A), width (W) and length (L) of test specimens are as follows.
Manual welding and semi-automatic welding: $W \geq 300\text{mm}$, $L \geq 350\text{mm}$
Automatic welding: $W \geq 400\text{mm}$, $L \geq 1000\text{mm}$
- (2) The root and face bends may be substituted by 4 side bends for $t \geq 12\text{mm}$.

3.3 Finished Inspection

Welded surface is to be regular and uniform and is to be free from injurious defects, such as cracks, undercuts, overlaps, etc.

3.4 Tensile Tests

Tensile tests are to be carried out in accordance with requirements of 4.2.5, Part M of ClassNK Rule. The test is to be carried out with the Table M3.2

	$a=t^{(2)}$ $W=12\ (t \leq 2)$ $W=25\ (t > 2)$ $L_c=B+60$ $R \geq 25$
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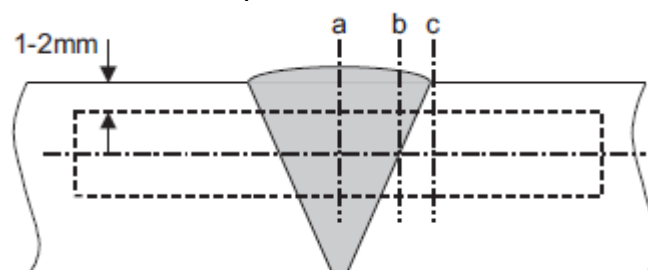
3.5 Bend Tests

Bend tests are to be carried out in accordance with requirements of 4.2.6, Part M of ClassNK Rule. Two specimens are to be taken from root bend and face band respectively.

kind	Used for	Size of specimen	Dimensions	Intended for
UB-1	Face and root bend specimen		$a = t$ $W = 30$ $L \geq 200$ $R = 1 \sim 2$	Test assemblise for butt weld test for plate:
UB-2	bend specimen		$a = 10$ $W = t^{(2)}$ $L \geq 200$ $R = 1 \sim 2$	Test assemblise for butt weld test for plate: $t \geq 12$

3.6 Impact Tests

- (1) Impact tests specimens are to be specimens to be taken form the position shown in Fig. M4.2
- (2) The testing temperature and minimum mean abosorbed energy of three specimens are to be as specified in table M.4.8



3.7 Macro-structure Inspection

- (1) Macro examination shall include about 10 mm unaffected base metal.
- (2) The transverse section of test specimens taken from the welded joint is to be etched and examined, and is to show there are no cracks, poor penetration, lack of fusion and other injurious defects.

3.8 Non-destructive Inspection

- (1) Internal inspection will be carried out by radiographic
- (2) Surface inspection will be carried out by liquid penetrant examination.

3.9 Hardness Test

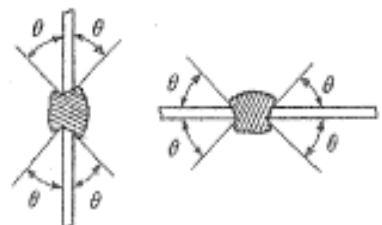
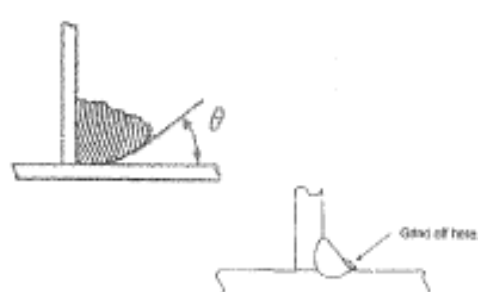
- (1) Vicker hardness is to be measured at the position shown in fig.M4.5. The kind of specimens for Vickers hardness are to be in accordance with requirements specified in Table M4.10.
- (2) The number of specimens for hardness test is to be in accordance with the requirements specified given in table M4.4

Repair Procedure of the Welding defects (銲接缺失修補方法)

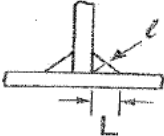
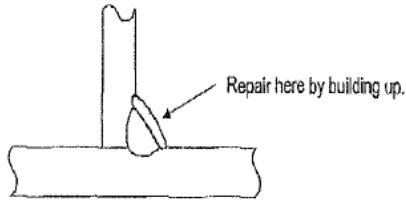
1) Under Cutting 過熔低陷

Item 項目	Tolerance 容許誤差	Repair Procedure 補修方法
1. butt welds 對接銲	1. For main structures within 0.6L (skin plate, longitudinal members and principal transverse supporting members.) max. depth: 0.5mm (LENGTH NO MORE THAN 90mm) 1. 0.6L內之主結構(如船殼板、縱向構材及主要橫向加強材)最大深度：0.5mm(長度不大於90mm) 2. For other members max. depth: 0.8mm 2. 其它構件最大深度：0.8mm	when the undercut exceeds the tolerance limits the undercut shall be filled up by welding. Using electrodes of small diameter. 當過熔低陷超過誤差允許值時，以電銲填補下陷處，並使用較細之銲條 However, the filled up welding shall not be ground off. 填補銲道不可磨除
2. fillet welds 填腳銲	Max. depth: 0.8mm 最大深度：0.8mm 	Same as above butt welds. 如上述對接銲

2) Over Lap in Welding 堆疊銲接

Item 項目	Tolerance 容許誤差	Repair Procedure 補修方法
1. butt welds 對接銲	$\theta \geq 120^\circ$ 	in case where θ is less than 120°, it shall be repaired by grinding or welding to make $\theta \geq 120^\circ$ 當θ 小於120°時，以研磨或電銲修補使θ 大於等於120°
2. fillet welds 填腳銲	$\theta \geq 90^\circ$ 	in case where θ is less than 90°, it shall be repaired by grinding or welding to make $\theta \geq 90^\circ$ 當θ 小於90°時，以研磨或電銲修補使θ 大於90°

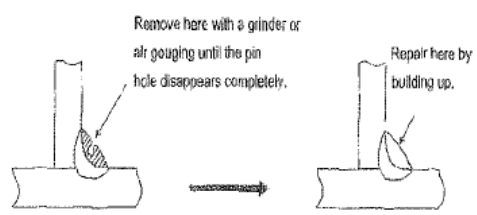
3) Welding Leg Length 電銲腳長

Item 項目	Tolerance 容許誤差	Repair Procedure 補修方法
Leg Length 腳長 	L : leg length t : throat thickness $L \geq 0.9 * (\text{specified leg length})$ $t \geq 0.9 * (\text{specified throat length})$ L : 腳長 t : 喉深 $L \geq 0.9 * (\text{標準腳長})$ $t \geq 0.9 * (\text{標準喉深})$	In case where “L”或”t” is less than tolerance limits , weld up over it. “L”或”t”小於誤差值時以電銲補足 

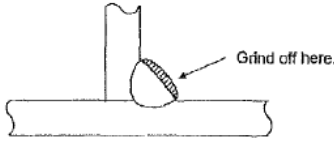
4) short bead 短銲道

Item 項目	Tolerance 容許誤差	Repair Procedure 補修方法
Mild steel 軟鋼	≥ 30	In case short bead is made erroneously , it shall removed by grinding and rewelded. 如果短銲道造成缺陷，須模除後重銲
TMCP type AH DH	≥ 10	

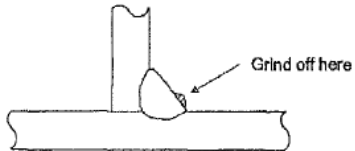
5) Crater 銲坑

Item 項目	Tolerance 容許誤差	Repair Procedure 補修方法
Crater 銲坑	where found exceeding the criteria shall all be repaired. 任何標準外之處，全部重新整修	the repair method of the concave in the center of the crater shall follow the as mentions above 凹坑中心孔將依照圖示研磨或以半圓鑿清除並補強銲接 

6) Reinforcement 補強

Item 項目	Tolerance 容許誤差	Repair Procedure 補修方法
Reinforcement 補強	where found exceeding the criteria shall all be repaired. 任何標準外之處，全部重新整修	the repairing method shall be as shown below. 修補方法如圖示 

7) Overhang 突出物

Item 項目	Tolerance 容許誤差	Repair Procedure 補修方法
Overhang 突出物	overhang shall all be repaired. 如有突出物均應清除	overhang shall be ground as shown below not damage the base metal by grinding. 修補方法如圖示， 研磨時不能損壞金屬本質 

8) Crack 裂縫

Item 項目	Tolerance 容許誤差	Repair Procedure 補修方法
裂縫	crack shall all be repaired 如有裂縫均應修補	the repairing method shall be as shown below. 修補方法如圖示 