



JURONG SHIPYARD PTE LTD  
Regn No.: 199908265G

**WELDING PROCEDURE SPECIFICATION  
BP ANGOLA PSVM  
(21-9520)**

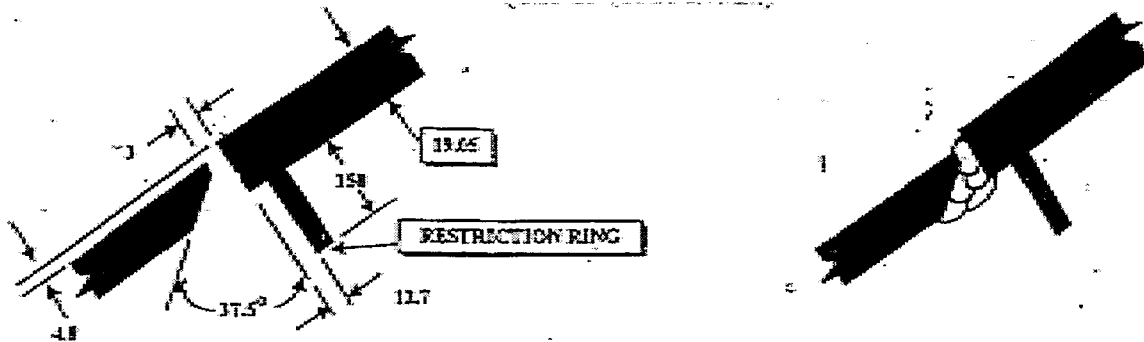
WPS : SMAW-9520-06 REV.0

PQR : 7755-04-04

DATE: 31st MARCH 2010

WELDING PROCESS : SMAW CODE : AWS D1.1  
 MANUAL / AUTO : MANUAL  
 WELDING PROGRESS : ALL POSITIONS CLIENT SPEC : N/A  
 WELDING POSITION : 6GR

**JOINT PREPARATION & WELDING SEQUENCE (UNIT IN MM)**



**BASE METAL**  
 SPECIFICATION : API 5L GR.X 52 N TO API 5L GR.X 52 N  
 MATERIAL CLASS : AWS GROUP II TO II

**TECHNIQUE**  
 CLEANING : GRINDING & BRUSHING  
 STRINGER BEAD : YES  
 WEAVE BEAD : YES (2<sup>1/2</sup> X ELECTRODE DIA)  
 BACK STRIP : NO  
 BACK GOUGING : NO  
 HEAT INPUT RANGE : MAX 1.9 KJ/mm

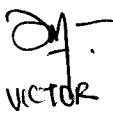


**QUALIFICATION RANGE**  
 THICKNESS : 9.1 mm & ABOVE

PIPE DIA : 219 mm  
 LINE-UP CLAMP : N/A

PASS NO	ELECTRODE			DIA (mm)	VOLTS (V)	AMPS (A)	DC/AC POL	SPEED (mm/min)
	NAME	CLASS	GROUP					
SIDE A	ROOT	LB-52 U	AWS 5.1 E-7016	3.2	20 ~ 24	90 ~ 95	AC	90 ~ 120
	HOT / FILL / CAP	LB-52 NS	AWS 5.1 E-7016G	4.0	20 ~ 24	120 ~ 230		100 ~ 130

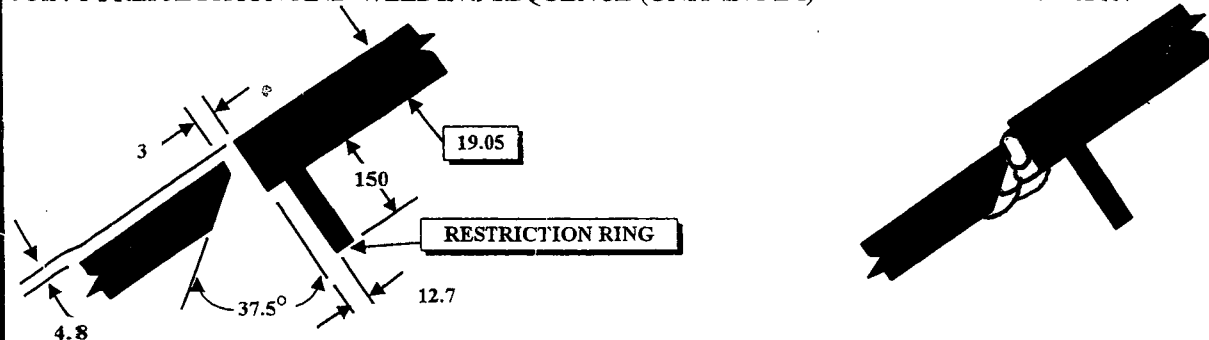
**HEAT TREATMENT**  
 PRE-HEATING : T ≤ 65 mm 65°C ; T > 65 mm 110°C  
 PRE-HEAT TYPE : HEATING TORCH / HEATING ELEMENTS  
 INTER PASS : 250°C MAX  
 P.W.H.T. : N/A  
 HOLDING TIME : N/A

**GAS**  
 SHIELDING GAS : NA  
 GAS COMPOSITION : NA  
 FLOW RATE : NA  
 BACK GAS : NA

	QA/QC SECTION	MODEC	AMERICAN BUREAU OF SHIPPING
SIGN :	 VICTOR	 Welding Engineer Date: 26/5/10	
DATE:	28/04/2010	CHARW CHARISTOU (max)	WONG E-C-030610

WELDING PROCESS : SMAW MANUAL / AUTO : MANUAL WELDING PROGRESS : ALL POSITIONS WELDING POSITION : T-Y-K	CODE : AWS D1.1 - ED. 1998 CLIENT SPEC : NA	WPS: SMAW-S061-01 PQR: SS-SMSM-GRP02-061
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**JOINT PREPARATION AND WELDING SEQUENCE (UNIT IN MM)**



Note : Refer to attached sheet 2 of 2 for sample T, Y, K joint details.

DIMENSION OF TEST PIECE: O.D : 219.1 x W.T. : 19.05 mm

No. of PASSES : 5

**BASE METAL**

SPECIFICATION : API 5L GR.X 52N MATERIAL CLASS : AWS GROUP II	TO : API 5L GR.X 52N TO : AWS GROUP II
--	---

**QUALIFIED RANGE**

THICKNESS : 9.5 and ABOVE PIPE DIA : 219 and ABOVE LINE-UP CLAMP : NA	CLEANING : GRINDING / BRUSHING STRINGER BEAD : Yes WEAVE BEAD : Yes (2 <sup>1/2</sup> x Electrode dia.) BACK GOUGE : No BACKING STRIP : No
---	--

PASS NO	ELECTRODE				AMPS.	VOLTS	AC/DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
1	LB 52U (KOBELCO)	E 7016	F4	2.6	90 ~ 95	20 ~ 24	AC	-	Manual
2 ~ 5	S - 7016 LS (HYUNDAI)	E 7016G	F4	3.2	120 ~ 130	20 ~ 24	AC	-	Manual

**HEAT TREATMENT**

PREHEAT TEMP : 66° C / AWS Table  
 PREHEAT TYPE : Heating Torch / H. Element  
 INTERPASS TEMP : 220° Max.  
 PWHT : NA  
 HOLDING TIME : NA

**GAS**

SHIELD GAS : NA  
 GAS COMP : NA  
 FLOW RATE : NA  
 BACK GAS : NA  
 PURGE RATE : NA

**QA/QC SECTION**

DATE : 25/5/98  
 SIGN : *[Signature]*

**SEETOH MING FYE**  
 QA/QC SECTION

**INSPECTION AUTHORITY**

PCN  
 DATE :  
 SIM KOON GAY  
 110843/SW01724  
 LEVEEN/SWI  
 TWI  
 1997

*Reviewed*  
*[Signature]*  
 29/5/98

SAMPLE JOINT DETAILS FOR T-Y-K JOINTS ( UNIT IN MM ) AS PER AWS D1.1 - ED. 98

FIG. A - TEST POSITION

VERTICAL

(GREATEST GROOVE DEPTH WITH SMALLEST GROOVE ANGLE)

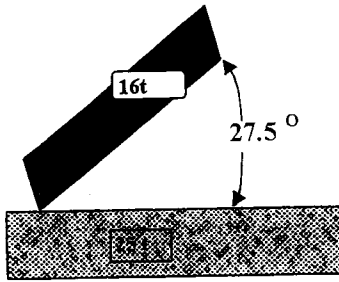


FIG. B - TEST POSITION

FLAT

(NARROWEST ROOT OPENING)

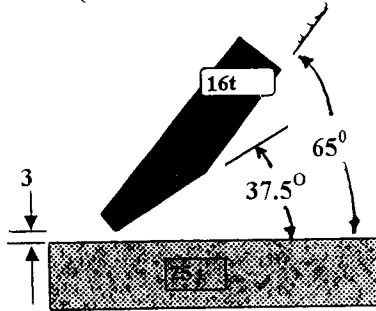


FIG. C - TEST POSITION

FLAT

(WIDEST ROOT OPENING)

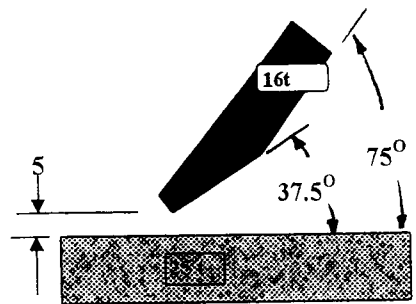


FIG. D - TEST POSITION

OVERHEAD

(NARROWEST ROOT OPENING)

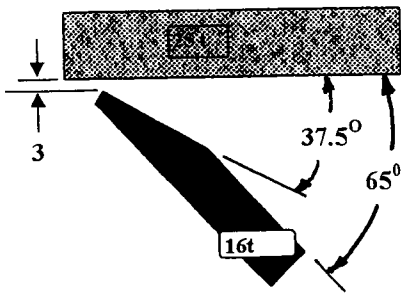
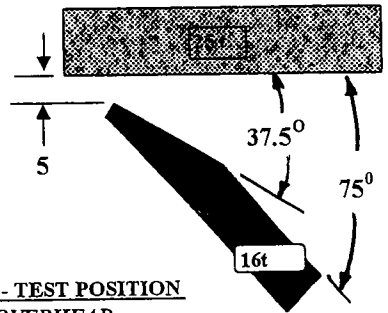


FIG. E - TEST POSITION

OVERHEAD

(WIDEST ROOT OPENING)



BASE METAL

SPECIFICATION : GR. LR EH 36 TO : GR. LR EH 36  
MATERIAL CLASS : AWS GROUP II TO : AWS GROUP II

PASS NO	ELECTRODE				AMPS.	VOLTS	AC / DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
<b>FIG. A - VERTICAL ( GREATEST GROOVE DEPTH / SMALLEST GROOVE ANGLE )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. B - FLAT ( NARROWEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. C - FLAT ( WIDEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. D - OVERHEAD ( NARROWEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. E - OVERHEAD ( WIDEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual

QA/QC SECTION

DATE :

28/5/98

SIGN :

SEETOH MING FYE  
QA/QC SECTION

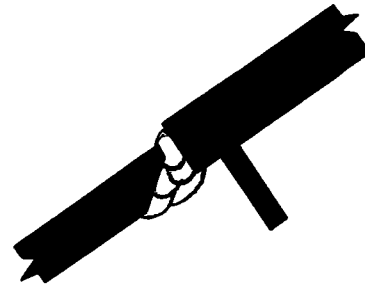
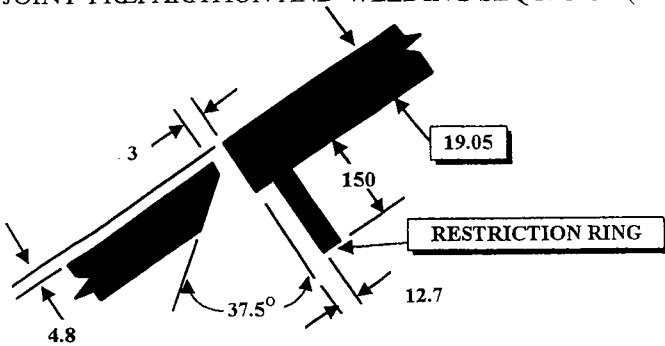
INSPECTION AUTHORITY



WELDING PROCESS : SMAW CODE : AWS D1.1 - ED. 1998  
 MANUAL / AUTO : MANUAL CLIENT SPEC : NA  
 WELDING PROGRESS : ALL POSITIONS  
 WELDING POSITION : T-Y-K  
 PQR: SS-SMSM-GRP02-061

JOINT PREPARATION AND WELDING SEQUENCE (UNIT IN MM)

WPS: SMAW-S061-01



Note : Refer to attached sheet 2 of 2 for sample T,Y, K joint details.

DIMENSION OF TEST PIECE: O.D : 219. 1 x W.T. : 19.05 mm

No. of PASSES : 5

BASE METAL

SPECIFICATION : API 5L GR.X 52N TO : API 5L GR.X 52N  
 MATERIAL CLASS : AWS GROUP II TO : AWS GROUP II

QUALIFIED RANGE

THICKNESS : 9.5 and ABOVE CLEANING : GRINDING / BRUSHING  
 PIPE DIA : 219 and ABOVE STRINGER BEAD : Yes  
 LINE-UP CLAMP : NA WEAVE BEAD : Yes (2<sup>1/2</sup> x Electrode dia.)  
 BACK GOUGE : No  
 BACKING STRIP : No

PASS NO	ELECTRODE				AMPS.	VOLTS	AC / DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
1	LB 52U (KOBELCO)	E 7016	F4	2.6	90 ~ 95	20 ~ 24	AC	-	Manual
2 ~ 5	S - 7016 LS (HYUNDAI)	E 7016G	F4	3.2	120 ~ 130	20 ~ 24	AC	-	Manual

HEAT TREATMENT

PREHEAT TEMP : 66° C / AWS Table  
 PREHEAT TYPE : Heating Torch / H. Element  
 INTERPASS TEMP : 220° Max.  
 PWHT : NA  
 HOLDING TIME : NA

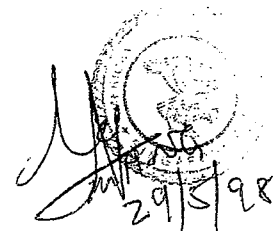
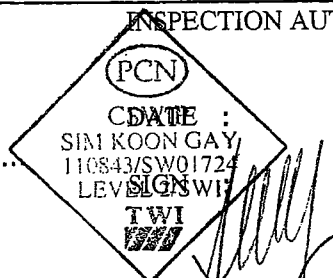
GAS

SHIELD GAS : NA  
 GAS COMP : NA  
 FLOW RATE : NA  
 BACK GAS : NA  
 PURGE RATE : NA

QA/QC SECTION

INSPECTION AUTHORITY

DATE : 25/5/98  
 SIGN : SEETOH MING FYE  
 QA/QC SECTION



SAMPLE JOINT DETAILS FOR T-Y-K JOINTS ( UNIT IN MM ) AS PER AWS D1.1 - ED. 98

FIG. A - TEST POSITION

VERTICAL  
(GREATEST GROOVE DEPTH WITH  
SMALLEST GROOVE ANGLE)

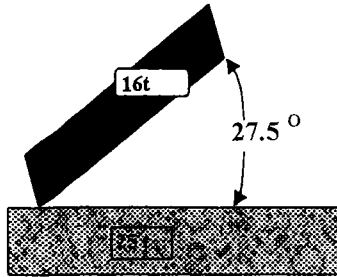


FIG. B - TEST POSITION

FLAT  
(NARROWEST ROOT OPENING)

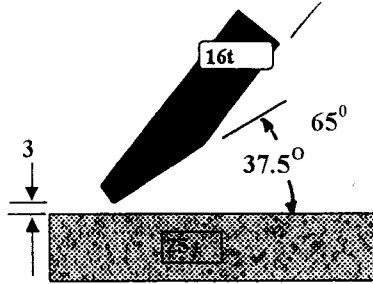


FIG. C - TEST POSITION

FLAT  
(WIDEST ROOT OPENING)

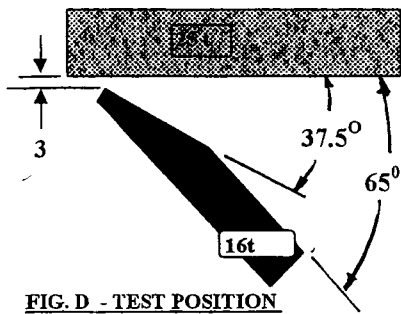
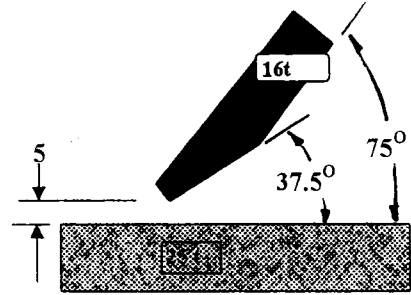


FIG. D - TEST POSITION

OVERHEAD  
(NARROWEST ROOT OPENING)

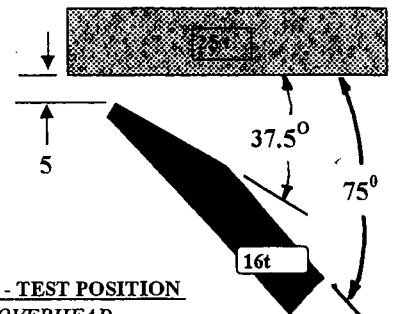


FIG. E - TEST POSITION

OVERHEAD  
(WIDEST ROOT OPENING)

BASE METAL

SPECIFICATION : GR. LR EH 36 TO : GR. LR EH 36  
MATERIAL CLASS : AWS GROUP II TO : AWS GROUP II

PASS NO	ELECTRODE				AMPS.	VOLTS	AC / DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
<b>FIG. A - VERTICAL ( GREATEST GROOVE DEPTH / SMALLEST GROOVE ANGLE )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. B - FLAT ( NARROWEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. C - FLAT ( WIDEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. D - OVERHEAD ( NARROWEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. E - OVERHEAD ( WIDEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual

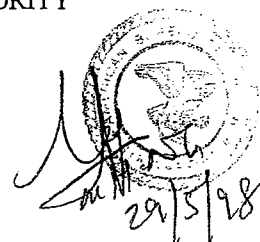
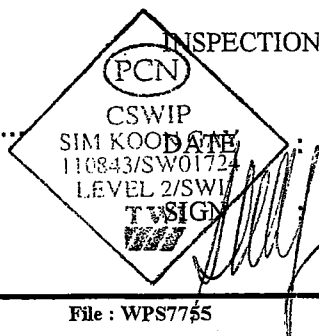
QA/QC SECTION

25/5/98

DATE :

SEETOH MING FYE  
QA / QC SECTION

SIGN :





JURONG SHIPYARD PTE LTD  
Regn No.: 199908265G

**WELDING PROCEDURE SPECIFICATION  
BP ANGOLA PSVM  
(21-9520)**

WPS : SMAW-9520-06 REV.0

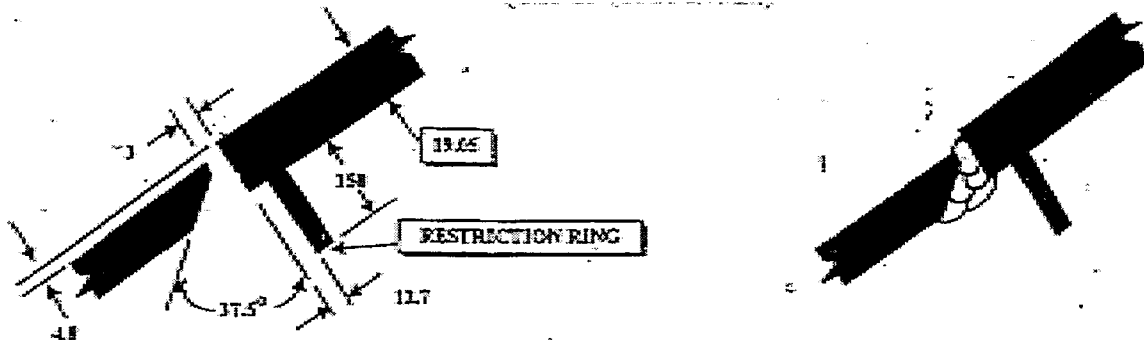
PQR : 7755-04-04

DATE: 31st MARCH 2010

WELDING PROCESS : SMAW  
MANUAL / AUTO : MANUAL  
WELDING PROGRESS : ALL POSITIONS  
WELDING POSITION : 6GR

CODE : AWS D1.1  
CLIENT SPEC : N/A

**JOINT PREPARATION & WELDING SEQUENCE (UNIT IN MM)**



**BASE METAL**  
SPECIFICATION : API 5L GR.X 52 N TO API 5L GR.X 52 N  
MATERIAL CLASS : AWS GROUP II TO II

**TECHNIQUE**  
CLEANING : GRINDING & BRUSHING  
STRINGER BEAD : YES  
WEAVE BEAD : YES (2<sup>1/2</sup> X ELECTRODE DIA)  
BACK STRIP : NO  
BACK GOUGING : NO  
HEAT INPUT RANGE : MAX 1.9 KJ/mm

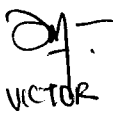


**QUALIFICATION RANGE**  
THICKNESS : 9.1 mm & ABOVE

PIPE DIA : 219 mm  
LINE-UP CLAMP : N/A

PASS NO	ELECTRODE			DIA (mm)	VOLTS (V)	AMPS (A)	DC/AC POL	SPEED (mm/min)
	NAME	CLASS	GROUP					
SIDE A	ROOT	LB-52 U	AWS 5.1 E-7016	F4	3.2	20 ~ 24	90 ~ 95	AC
	HOT / FILL / CAP	LB-52 NS	AWS 5.1 E-7016G		4.0	20 ~ 24		

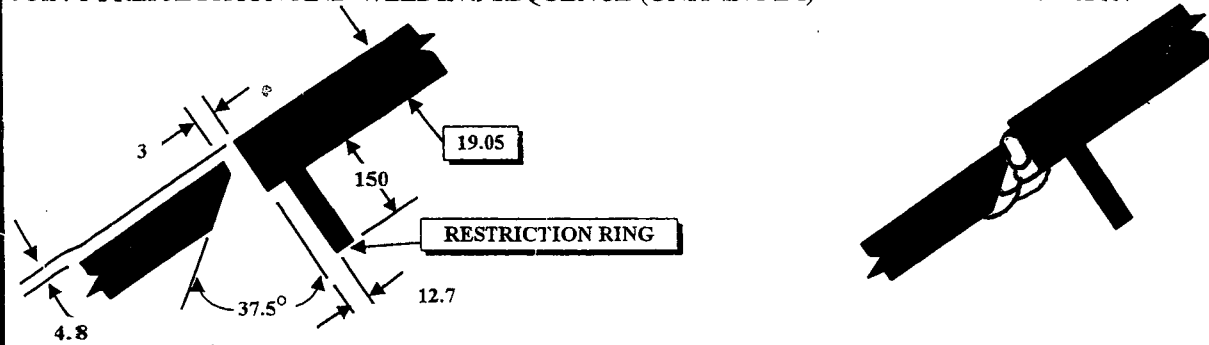
**HEAT TREATMENT**  
PRE-HEATING : T ≤ 65 mm 65°C ; T > 65 mm 110°C  
PRE-HEAT TYPE : HEATING TORCH / HEATING ELEMENTS  
INTER PASS : 250°C MAX  
P.W.H.T. : N/A  
HOLDING TIME : N/A

**GAS**  
SHIELDING GAS : NA  
GAS COMPOSITION : NA  
FLOW RATE : NA  
BACK GAS : NA

	QA/QC SECTION	MODEC	AMERICAN BUREAU OF SHIPPING
SIGN :	 VICTOR	 Welding Engineer Date: 26/5/10	
DATE:	08/04/2010	CHARW CHARISTOU (max)	WONG E-C-030610

WELDING PROCESS : SMAW MANUAL / AUTO : MANUAL WELDING PROGRESS : ALL POSITIONS WELDING POSITION : T-Y-K	CODE : AWS D1.1 - ED. 1998 CLIENT SPEC : NA	WPS: SMAW-S061-01 PQR: SS-SMSM-GRP02-061
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**JOINT PREPARATION AND WELDING SEQUENCE (UNIT IN MM)**



Note : Refer to attached sheet 2 of 2 for sample T, Y, K joint details.

**DIMENSION OF TEST PIECE:** O.D : 219.1 x W.T. : 19.05 mm

No. of PASSES : 5

**BASE METAL**

SPECIFICATION : API 5L GR.X 52N MATERIAL CLASS : AWS GROUP II	TO : API 5L GR.X 52N TO : AWS GROUP II
--	---

**QUALIFIED RANGE**

THICKNESS : 9.5 and ABOVE PIPE DIA : 219 and ABOVE LINE-UP CLAMP : NA	CLEANING : GRINDING / BRUSHING STRINGER BEAD : Yes WEAVE BEAD : Yes (2 <sup>1/2</sup> x Electrode dia.) BACK GOUGE : No BACKING STRIP : No
---	--

PASS NO	ELECTRODE				AMPS.	VOLTS	AC/DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
1	LB 52U (KOBELCO)	E 7016	F4	2.6	90 ~ 95	20 ~ 24	AC	-	Manual
2 ~ 5	S - 7016 LS (HYUNDAI)	E 7016G	F4	3.2	120 ~ 130	20 ~ 24	AC	-	Manual

**HEAT TREATMENT**

PREHEAT TEMP : 66° C / AWS Table  
 PREHEAT TYPE : Heating Torch / H. Element  
 INTERPASS TEMP : 220° Max.  
 PWHT : NA  
 HOLDING TIME : NA

**GAS**

SHIELD GAS : NA  
 GAS COMP : NA  
 FLOW RATE : NA  
 BACK GAS : NA  
 PURGE RATE : NA

**QA/QC SECTION**

DATE : 25/5/98  
 SIGN : *[Signature]*

**SEETOH MING FYE**  
 QA/QC SECTION

**INSPECTION AUTHORITY**

PCN  
 DATE :  
 SIM KOON GAY  
 110843/SW01724  
 LEVEEN/SWI  
 TWI  
 1997

*Reviewed*  
*[Signature]*  
 29/5/98

SAMPLE JOINT DETAILS FOR T-Y-K JOINTS ( UNIT IN MM ) AS PER AWS D1.1 - ED. 98

FIG. A - TEST POSITION

VERTICAL

(GREATEST GROOVE DEPTH WITH SMALLEST GROOVE ANGLE)

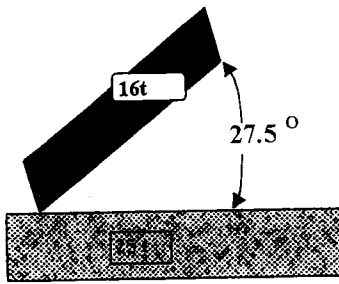


FIG. B - TEST POSITION

FLAT

(NARROWEST ROOT OPENING)

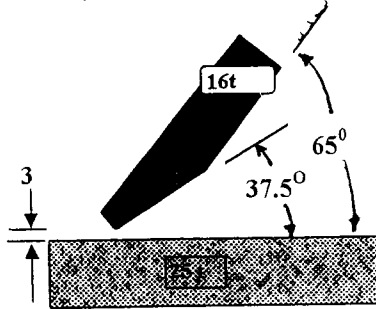


FIG. C - TEST POSITION

FLAT

(WIDEST ROOT OPENING)

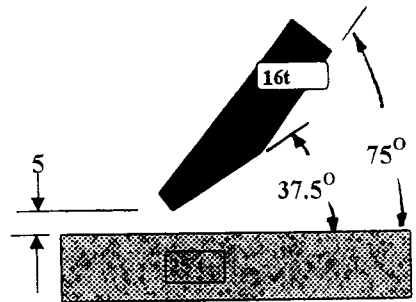


FIG. D - TEST POSITION

OVERHEAD

(NARROWEST ROOT OPENING)

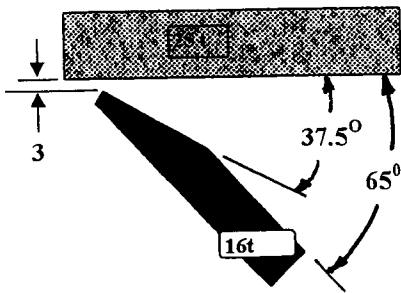
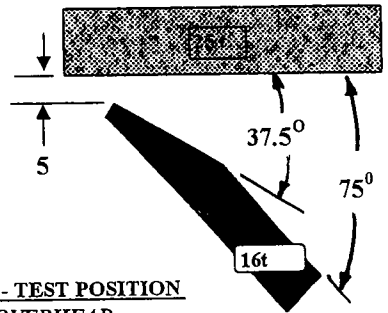


FIG. E - TEST POSITION

OVERHEAD

(WIDEST ROOT OPENING)



BASE METAL

SPECIFICATION : GR. LR EH 36 TO : GR. LR EH 36  
 MATERIAL CLASS : AWS GROUP II TO : AWS GROUP II

PASS NO	ELECTRODE				AMPS.	VOLTS	AC / DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
<b>FIG. A - VERTICAL ( GREATEST GROOVE DEPTH / SMALLEST GROOVE ANGLE )</b>									
1	LB 52U (KOBELCO)	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS (HYUNDAI)	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. B - FLAT ( NARROWEST ROOT OPENING )</b>									
1	LB 52U (KOBELCO)	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS (HYUNDAI)	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. C - FLAT ( WIDEST ROOT OPENING )</b>									
1	LB 52U (KOBELCO)	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS (HYUNDAI)	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. D - OVERHEAD ( NARROWEST ROOT OPENING )</b>									
1	LB 52U (KOBELCO)	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS (HYUNDAI)	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. E - OVERHEAD ( WIDEST ROOT OPENING )</b>									
1	LB 52U (KOBELCO)	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS (HYUNDAI)	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual

QA/QC SECTION

DATE :

28/5/98

SIGN :

SEETOH MING FYE  
 QA/QC SECTION

INSPECTION AUTHORITY



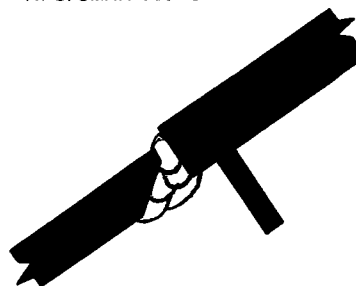
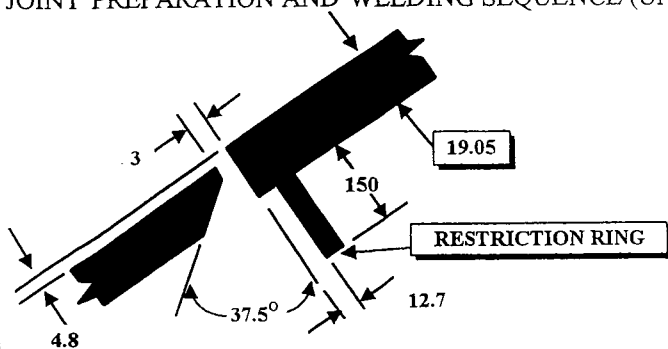
Reviewed  
 [Signature]  
 29/5/98



WELDING PROCESS : SMAW CODE : AWS D1.1 - ED. 1998  
 MANUAL / AUTO : MANUAL CLIENT SPEC : NA  
 WELDING PROGRESS : ALL POSITIONS  
 WELDING POSITION : T-Y-K  
 PQR: SS-SMSM-GRP02-061

JOINT PREPARATION AND WELDING SEQUENCE (UNIT IN MM)

WPS: SMAW-S061-01



Note : Refer to attached sheet 2 of 2 for sample T,Y, K joint details.

DIMENSION OF TEST PIECE: O.D : 219.1 x W.T. : 19.05 mm

No. of PASSES : 5

BASE METAL

SPECIFICATION : API 5L GR.X 52N TO : API 5L GR.X 52N  
 MATERIAL CLASS : AWS GROUP II TO : AWS GROUP II

QUALIFIED RANGE

THICKNESS : 9.5 and ABOVE CLEANING : GRINDING / BRUSHING  
 PIPE DIA : 219 and ABOVE STRINGER BEAD : Yes  
 LINE-UP CLAMP : NA WEAVE BEAD : Yes (2<sup>1/2</sup> x Electrode dia.)  
 BACK GOUGE : No  
 BACKING STRIP : No

PASS NO	ELECTRODE				AMPS.	VOLTS	AC / DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
1	LB 52U (KOBELCO)	E 7016	F4	2.6	90 ~ 95	20 ~ 24	AC	-	Manual
2 ~ 5	S - 7016 LS (HYUNDAI)	E 7016G	F4	3.2	120 ~ 130	20 ~ 24	AC	-	Manual

HEAT TREATMENT

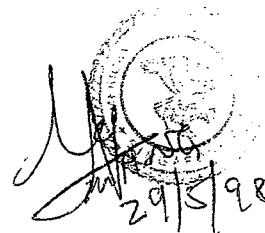
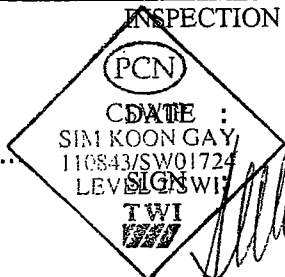
PREHEAT TEMP : 66° C / AWS Table  
 PREHEAT TYPE : Heating Torch / H. Element  
 INTERPASS TEMP : 220° Max.  
 PWHT : NA  
 HOLDING TIME : NA

GAS

SHIELD GAS : NA  
 GAS COMP : NA  
 FLOW RATE : NA  
 BACK GAS : NA  
 PURGE RATE : NA

QA/QC SECTION

DATE : 25/5/98  
 SIGN : SEETOH MING FYE  
 QA/QC SECTION



SAMPLE JOINT DETAILS FOR T-Y-K JOINTS ( UNIT IN MM ) AS PER AWS D1.1 - ED. 98

FIG. A - TEST POSITION

VERTICAL  
(GREATEST GROOVE DEPTH WITH  
SMALLEST GROOVE ANGLE)

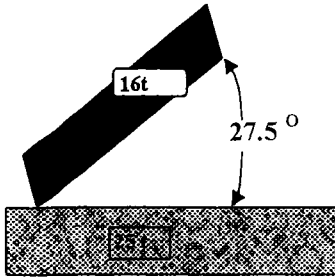


FIG. B - TEST POSITION

FLAT  
(NARROWEST ROOT OPENING)

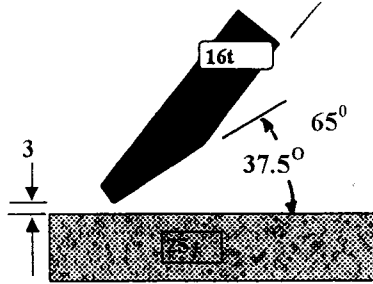


FIG. C - TEST POSITION

FLAT  
(WIDEST ROOT OPENING)

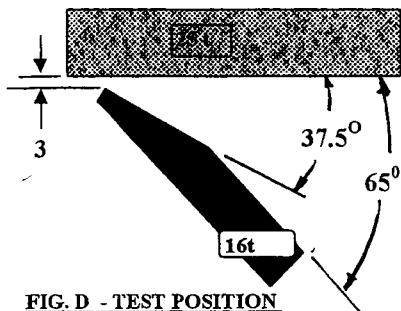
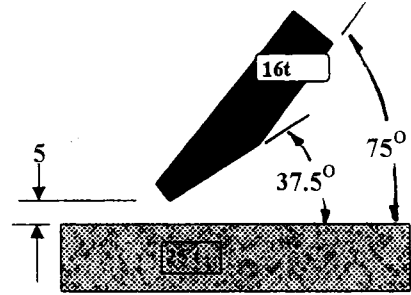


FIG. D - TEST POSITION

OVERHEAD  
(NARROWEST ROOT OPENING)

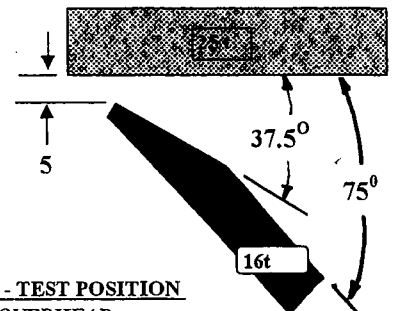


FIG. E - TEST POSITION

OVERHEAD  
(WIDEST ROOT OPENING)

BASE METAL

SPECIFICATION : GR. LR EH 36 TO : GR. LR EH 36  
MATERIAL CLASS : AWS GROUP II TO : AWS GROUP II

PASS NO	ELECTRODE				AMPS.	VOLTS	AC / DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
<b>FIG. A - VERTICAL ( GREATEST GROOVE DEPTH / SMALLEST GROOVE ANGLE )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. B - FLAT ( NARROWEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. C - FLAT ( WIDEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. D - OVERHEAD ( NARROWEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. E - OVERHEAD ( WIDEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual

QA/QC SECTION

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CSWIP  
SIM KOON DATE  
110843/SW01724  
LEVEL 2/SWI  
TVSING

29/5/98



JURONG SHIPYARD PTE LTD  
Regn No.: 199908265G

**WELDING PROCEDURE SPECIFICATION  
BP ANGOLA PSVM  
(21-9520)**

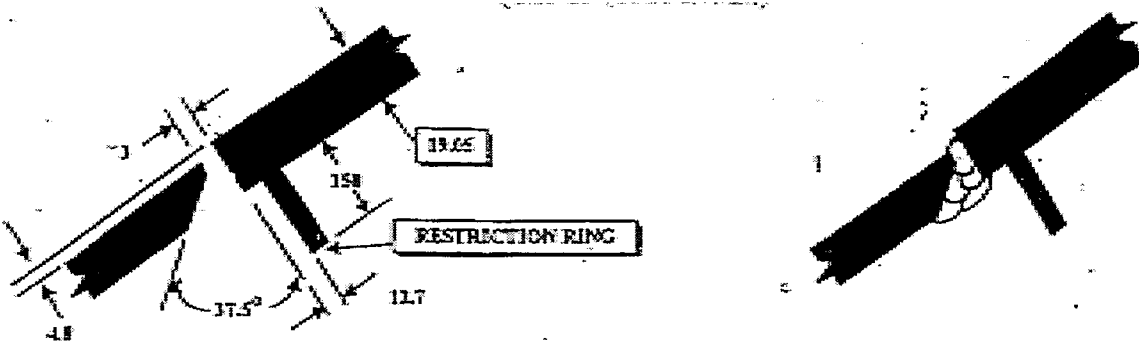
WPS : SMAW-9520-06 REV.0

PQR : 7755-04-04

DATE: 31st MARCH 2010

WELDING PROCESS	: SMAW	CODE	: AWS D1.1
MANUAL / AUTO	: MANUAL		
WELDING PROGRESS	: ALL POSITIONS	CLIENT SPEC	: N/A
WELDING POSITION	: 6GR		

**JOINT PREPARATION & WELDING SEQUENCE (UNIT IN MM)**



**BASE METAL**  
SPECIFICATION : API 5L GR.X 52 N TO API 5L GR.X 52 N  
MATERIAL CLASS : AWS GROUP II TO II

**TECHNIQUE**  
CLEANING : GRINDING & BRUSHING  
STRINGER BEAD : YES  
WEAVE BEAD : YES (2<sup>1/2</sup> X ELECTRODE DIA)  
BACK STRIP : NO  
BACK GOUGING : NO  
HEAT INPUT RANGE : MAX 1.9 KJ/mm

**QUALIFICATION RANGE**  
THICKNESS : 9.1 mm & ABOVE  
  
PIPE DIA : 219 mm  
LINE-UP CLAMP : N/A

PASS NO		ELECTRODE			DIA (mm)	VOLTS (V)	AMPS (A)	DC/AC POL	SPEED (mm/min)
		NAME	CLASS	GROUP					
SIDE A	ROOT	LB-52 U	AWS 5.1 E-7016	F4	3.2	20 ~ 24	90 ~ 95	AC	90 ~ 120
	HOT / FILL / CAP	LB-52 NS	AWS 5.1 E-7016G		4.0	20 ~ 24	120 ~ 230		100 ~ 130

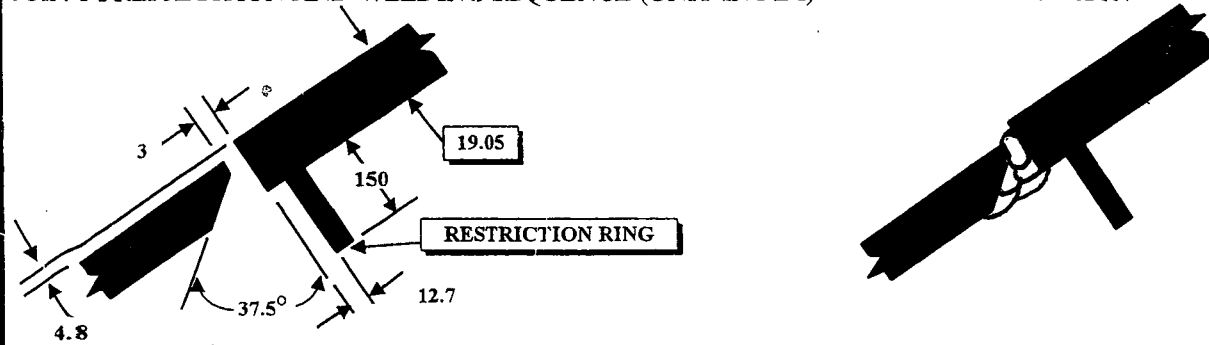
**HEAT TREATMENT**  
PRE-HEATING : T ≤ 65 mm 65°C ; T > 65 mm 110°C  
  
PRE-HEAT TYPE : HEATING TORCH / HEATING ELEMENTS  
INTER PASS : 250°C MAX  
P.W.H.T. : N/A  
HOLDING TIME : N/A

**GAS**  
SHIELDING GAS : NA  
GAS COMPOSITION : NA  
FLOW RATE : NA  
BACK GAS : NA

	QA/QC SECTION	MODEC	AMERICAN BUREAU OF SHIPPING
SIGN :			
DATE:	08/04/2010	26/5/10	WONG K-C- 03 06 10

WELDING PROCESS : SMAW MANUAL / AUTO : MANUAL WELDING PROGRESS : ALL POSITIONS WELDING POSITION : T-Y-K	CODE : AWS D1.1 - ED. 1998 CLIENT SPEC : NA	WPS: SMAW-S061-01 PQR: SS-SMSM-GRP02-061
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**JOINT PREPARATION AND WELDING SEQUENCE (UNIT IN MM)**



Note : Refer to attached sheet 2 of 2 for sample T, Y, K joint details.

DIMENSION OF TEST PIECE: O.D : 219.1 x W.T. : 19.05 mm

No. of PASSES : 5

**BASE METAL**

SPECIFICATION : API 5L GR.X 52N MATERIAL CLASS : AWS GROUP II	TO : API 5L GR.X 52N TO : AWS GROUP II
--	---

**QUALIFIED RANGE**

THICKNESS : 9.5 and ABOVE PIPE DIA : 219 and ABOVE LINE-UP CLAMP : NA	CLEANING : GRINDING / BRUSHING STRINGER BEAD : Yes WEAVE BEAD : Yes (2 <sup>1/2</sup> x Electrode dia.) BACK GOUGE : No BACKING STRIP : No
---	--

PASS NO	ELECTRODE				AMPS.	VOLTS	AC / DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
1	LB 52U (KOBELCO)	E 7016	F4	2.6	90 ~ 95	20 ~ 24	AC	-	Manual
2 ~ 5	S - 7016 LS (HYUNDAI)	E 7016G	F4	3.2	120 ~ 130	20 ~ 24	AC	-	Manual

**HEAT TREATMENT**

PREHEAT TEMP : 66° C / AWS Table  
 PREHEAT TYPE : Heating Torch / H. Element  
 INTERPASS TEMP : 220° Max.  
 PWHT : NA  
 HOLDING TIME : NA

**GAS**

SHIELD GAS : NA  
 GAS COMP : NA  
 FLOW RATE : NA  
 BACK GAS : NA  
 PURGE RATE : NA

**QA/QC SECTION**

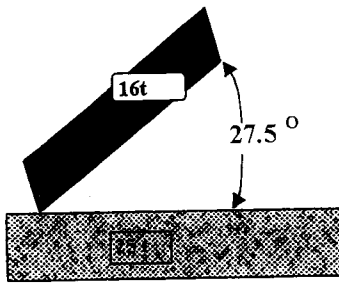
DATE : 25/5/98  
 SIGN : SEETOH MING FYE  
 QA / QC SECTION

**INSPECTION AUTHORITY**

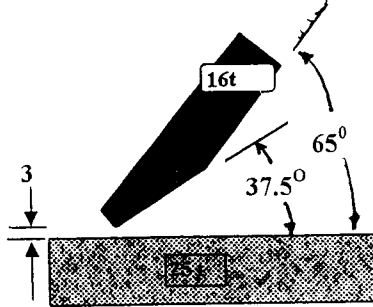
PCN  
 DATE :  
 SIM KOON GAY  
 110843/SW01724  
 LEVEEN/SWI  
 TWI  
 1997  
 Reviewed  
 29/5/98

SAMPLE JOINT DETAILS FOR T-Y-K JOINTS ( UNIT IN MM ) AS PER AWS D1.1 - ED. 98

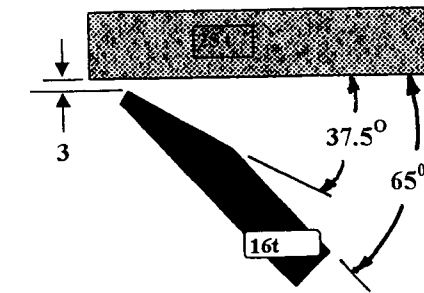
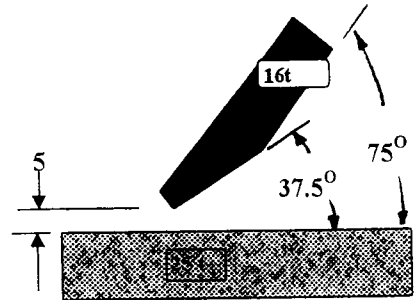
**FIG. A - TEST POSITION**  
VERTICAL  
 (GREATEST GROOVE DEPTH WITH SMALLEST GROOVE ANGLE)



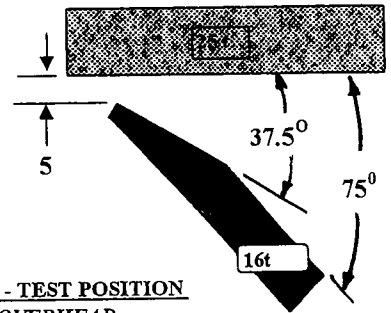
**FIG. B - TEST POSITION**  
FLAT  
 (NARROWEST ROOT OPENING)



**FIG. C - TEST POSITION**  
FLAT  
 (WIDEST ROOT OPENING)



**FIG. D - TEST POSITION**  
OVERHEAD  
 (NARROWEST ROOT OPENING)



**FIG. E - TEST POSITION**  
OVERHEAD  
 (WIDEST ROOT OPENING)

BASE METAL

SPECIFICATION : GR. LR EH 36 TO : GR. LR EH 36  
 MATERIAL CLASS : AWS GROUP II TO : AWS GROUP II

PASS NO	ELECTRODE				AMPS.	VOLTS	AC / DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
<b>FIG. A - VERTICAL ( GREATEST GROOVE DEPTH / SMALLEST GROOVE ANGLE )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. B - FLAT ( NARROWEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. C - FLAT ( WIDEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. D - OVERHEAD ( NARROWEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. E - OVERHEAD ( WIDEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2 ~ CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual

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SIGN :

SEETOH MING FYE  
 QA / QC SECTION

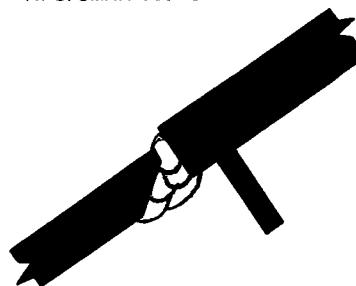
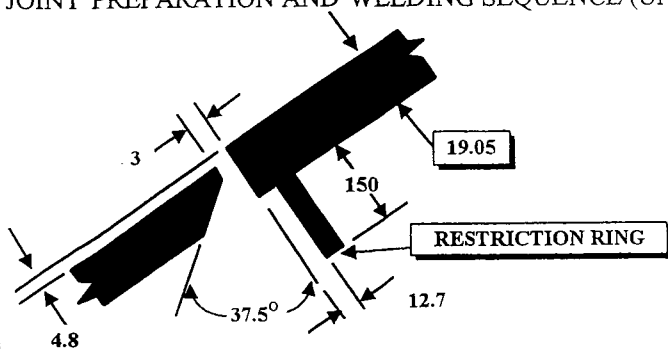
INSPECTION AUTHORITY

PCN  
 CSWIP.  
 DATE: SIM KOON GAY  
 110843/SW0172/  
 LSYGN2/SW1  
 TWI  
 Reviewed  
 29/5/98

WELDING PROCESS : SMAW  
MANUAL / AUTO : MANUAL  
WELDING PROGRESS : ALL POSITIONS  
WELDING POSITION : T-Y-K  
CODE : AWS D1.1 - ED. 1998  
CLIENT SPEC : NA  
PQR: SS-SMSM-GRP02-061

JOINT PREPARATION AND WELDING SEQUENCE (UNIT IN MM)

WPS: SMAW-S061-01



Note : Refer to attached sheet 2 of 2 for sample T,Y, K joint details.

DIMENSION OF TEST PIECE: O.D : 219.1 x W.T. : 19.05 mm

No. of PASSES : 5

BASE METAL

SPECIFICATION : API 5L GR.X 52N TO : API 5L GR.X 52N  
MATERIAL CLASS : AWS GROUP II TO : AWS GROUP II

QUALIFIED RANGE

THICKNESS : 9.5 and ABOVE  
PIPE DIA : 219 and ABOVE  
LINE-UP CLAMP : NA  
CLEANING : GRINDING / BRUSHING  
STRINGER BEAD : Yes  
WEAVE BEAD : Yes (2<sup>1/2</sup> x Electrode dia.)  
BACK GOUGE : No  
BACKING STRIP : No

PASS NO	ELECTRODE				AMPS.	VOLTS	AC / DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
1	LB 52U (KOBELCO)	E 7016	F4	2.6	90 ~ 95	20 ~ 24	AC	-	Manual
2 ~ 5	S - 7016 LS (HYUNDAI)	E 7016G	F4	3.2	120 ~ 130	20 ~ 24	AC	-	Manual

HEAT TREATMENT

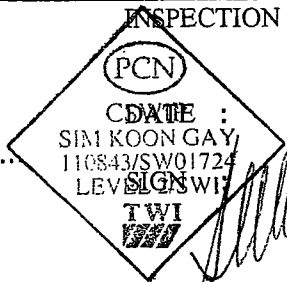
PREHEAT TEMP : 66° C / AWS Table  
PREHEAT TYPE : Heating Torch / H. Element  
INTERPASS TEMP : 220° Max.  
PWHT : NA  
HOLDING TIME : NA

GAS

SHIELD GAS : NA  
GAS COMP : NA  
FLOW RATE : NA  
BACK GAS : NA  
PURGE RATE : NA

QA/QC SECTION

DATE : 25/5/98  
SIGN : SEETOH MING FYE  
QA/QC SECTION



29/5/98

SAMPLE JOINT DETAILS FOR T-Y-K JOINTS ( UNIT IN MM ) AS PER AWS D1.1 - ED. 98

FIG. A - TEST POSITION

VERTICAL  
(GREATEST GROOVE DEPTH WITH  
SMALLEST GROOVE ANGLE)

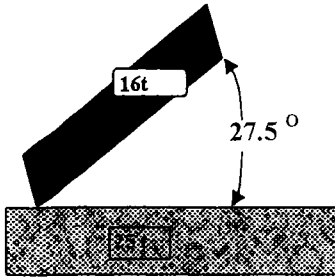


FIG. B - TEST POSITION

FLAT  
(NARROWEST ROOT OPENING)

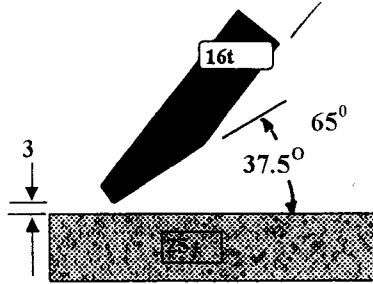


FIG. C - TEST POSITION

FLAT  
(WIDEST ROOT OPENING)

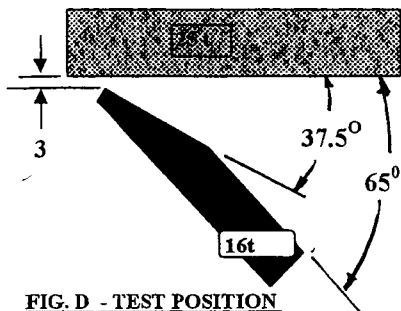
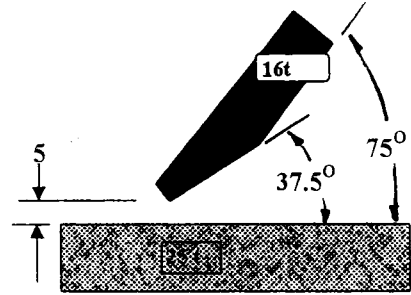


FIG. D - TEST POSITION

OVERHEAD  
(NARROWEST ROOT OPENING)

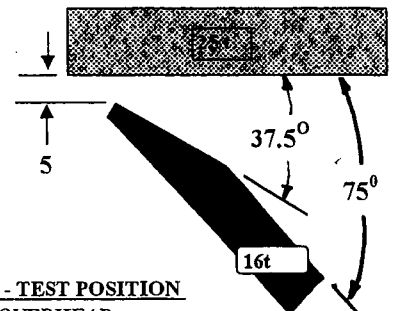


FIG. E - TEST POSITION

OVERHEAD  
(WIDEST ROOT OPENING)

BASE METAL

SPECIFICATION : GR. LR EH 36 TO : GR. LR EH 36  
MATERIAL CLASS : AWS GROUP II TO : AWS GROUP II

PASS NO	ELECTRODE				AMPS.	VOLTS	AC / DC	POL.	SPEED MM/MIN
	NAME	CLASS	GROU	DIA					
<b>FIG. A - VERTICAL ( GREATEST GROOVE DEPTH / SMALLEST GROOVE ANGLE )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. B - FLAT ( NARROWEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. C - FLAT ( WIDEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	130 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. D - OVERHEAD ( NARROWEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	2.6	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual
<b>FIG. E - OVERHEAD ( WIDEST ROOT OPENING )</b>									
1	LB 52U ( KOBELCO )	E 7016	F4	3.2	110 ~ 120	24 ~ 26	AC	-	Manual
2~CAP.	S - 7016 LS ( HYUNDAI )	E 7016G	F4	3.2	120 ~ 140	26 ~ 28	AC	-	Manual

QA/QC SECTION

25/5/98

DATE :  
SIGN : SEETOH MING FYE  
QA / QC SECTION

INSPECTION AUTHORITY

PCN

CSWIP

SIM KOON DATE

110843/SW01724

LEVEL 2/SWI

TVSIGN