

BIT Inspection Technology

(NDT/ Welding Consultancy/ Third Party Inspection)

www.bitndtindia.com

BIT proudly informs the 3 days (24th , 25th and 26th of every month) Hands-on-Training @ BIT Inspection Technology, Chennai.

- How to prepare Proposed Welding Procedure Specification (**pWPS**),
 - Selection of consumable based on base material to be joined
 - Selection of Joint Design
 - Selection of welding process
 - Welding parameters
 - Welding technique
 - Other essential variable, supplementary variables, non-essential variables involved in the welding procedure qualification
- How to perform Welding Procedure Qualification Record (**PQR**)
- How to prepare Welding Procedure Specification (**WPS**) from existing qualified PQR
- How to prepare Welding Procedure Specification (**WPS**) from pre - qualified PQR
- How to perform welder qualification test (**WQT**)

All the above practice based on International code

- ASME IX
- AWS D1.1
- API 1104



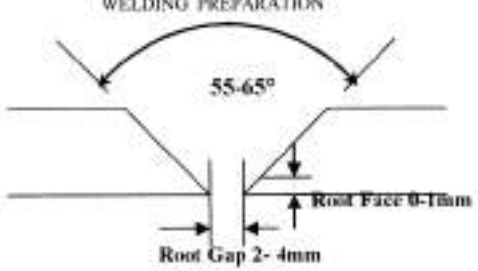
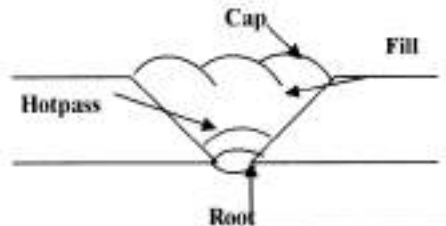
BIT Inspection Technology focus with sincerity and authentic approach in giving new dimension to NDT / Welding Inspection Training



Hand on training conducted at BIT Inspection Technology Workshop, Chennai



Sample Proposed welding Qualification Record (PWPS)

Sonamet, Lobito, Angola	WELDING PROCEDURE SPECIFICATION N° pWPS-VG-500 REV. 0 (Supported by POR -)										VG – Kizomba Satellites				
01. Scope of work 02. Design codes and spec. 03. Material grades and spec. 04. Wall thickness 05. Diameter 06. Welding process and procedure 07. Type of joint 08. Number of Passes 09. Sequence 10. Current – Polarity	Full Penetration butt welds on 25% Cr Super Duplex Pipe. ASME IX & E168-SZK-0003 UNS 32760 14.3mm 168.3mm GTAW Full Penetration single vee butt weld As per Typical Attached Sketch According to sketch DC-ve GTAW										11. Position of welding 12. Number of welders 13. Line-up clamp or tacking 14. Removal of line-up clamp 15. Cleaning 16. Preheat temperature 17. Time lapse between passes 18. Inter pass temperature 19. Welding Interruption 20. Tungsten 21. Backpurge Quality	6G, with Vertical Up Progression 1 Bridge pieces shall be from same parent material, tack welded <u>within</u> the prep and progressively removed as welding continues. N/A Power grinding and / or brushing Ambient temp, Dry only. N/A 100°C Maximum, measured by thermometer. N/A 2% Thoriated, 2.43.2mm Dia Max O2 Content – 0.05%			
WELDING PREPARATION 					WELDING SEQUENCES SKETCH Weld Cap Reinforcement – 3mm Max. <i>TYPICAL</i> 										
Welding Process	Pass N°	Consumable Type	AWS Classification	Dia (mm)	Arc Voltage (V)	Amperage (A)	Wire Speed (m/min)	Stick-out (mm)	Travel Speed (cm/min)	Max weave Width (mm)	Gas Type (Shield)	Gas Flow (liters)	**Gas Type & Flow (liters)	Direction	Heat Input (kJ/mm)
GTAW	R	Sandvik 25.10.4.1	2594	2.4	9-12	90-110	N/A	N/A	4.5-9.0	N/A	Argon 99.998%	12-15	Argon 98%, 2%N 18-20	↑ →	0.8-1.4
	HP	*	"	2.4	10-13	110-130	N/A	N/A	4.5-10	N/A	"	"	"	↑ →	0.9-1.5
	Fill	*	"	3.2	10-13	110-155	N/A	N/A	4.5-12	N/A	"	"	"	↑ →	0.9-1.5
	Fill Cap	*	"	3.2	10-13	135-155	N/A	N/A	6-10.5	N/A	"	"	"	↑ →	0.9-1.5
Notes :- 1. Back purge is Argon / Nitrogen in a 98% Argon / 2% Nitrogen Mix. 2. Back purge to remain until a minimum of 8mm weld metal is deposited. 3. Stringer beads only. Minor oscillation to ensure side wall fusion is permitted.															
For Sonamet					For Vetco Gray					For Company					

Sample Procedure Qualification Record (PQR)

WELD PROCEDURE QUALIFICATION RECORD

(Page 1 of 3)



COMPANY: Stolt Offshore Limited
Bucksburn House
Howes Road
Bucksburn
Aberdeen

M.E.L. REF: MPQ 50185
DATE: 7/12/2004

PQR NUMBER: SON-PQR-521
JOINT TYPE: Single Vee Butt Weld

SPECIFICATION: ASME IX & E124-SZK-0003

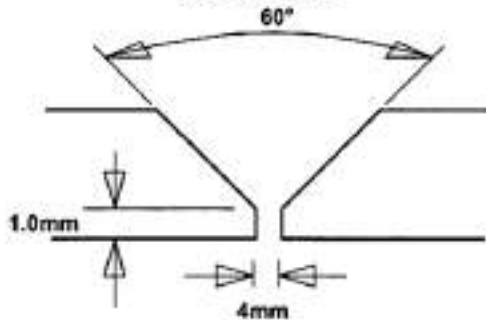
BASE METALS

SPECIFICATION: API-5L-X52	TO API-5L-X52
ASME P NUMBER: S1	TO S1
ASME GROUP NUMBER:	TO
EN GROUP NUMBER:	TO
THICKNESS(ES) (mm): 14.3	TO 14.3
DIAMETER(S)(mm): 168.3	TO 168.3

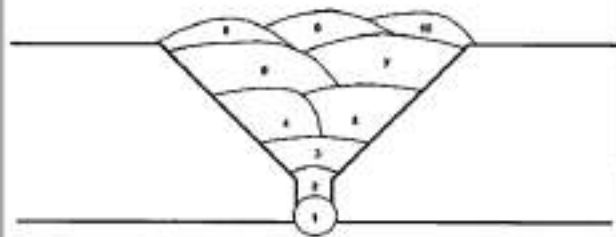
WELDING PROCESS(ES)

PROCESS 1: GTAW
PROCESS 2: SMAW

JOINT DETAILS



RUN SEQUENCE



WELDING DETAILS / TECHNIQUE

WELDING POSITION: 6G
WELD PROGRESSION: Vertical Up
STRING / WEAVE: Stringer bead
JOINT PREPERATION: Machine/Flame Cut/Grind
INTER RUN CLEANING: Wire Brush/Grind
GOUGING METHOD: N/A
LEG LENGTH (mm): N/A
THROAT THICKNESS (mm): N/A
TUNGSTEN TYPE/SIZE(mm): 2% Thoriated / 2.4

SHIELDING

	<u>SHIELDING GAS</u>	<u>BACKING GAS</u>
TYPE:	Argon	N/A
FLOW RATE (l/min):	12-15	N/A
COMPOSITION:	Argon 99.998%	N/A

PRE-HEAT

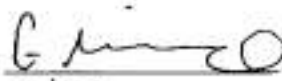
METHOD: Propane Gas Torch
MIN TEMPERATURE (°C): 100
MAX INTERPASS TEMP (°C): 250
CONTROL METHOD: Tempilstick / Digital Pyrometer


POST WELD HEAT TREATMENT

METHOD: Not applicable
TEMPERATURE CONTROL:
RATE OF RISE (°C/HR): FROM °C
SOAK TEMPERATURE (°C):
SOAK TIME (Hrs):
COOLING RATE/METHOD: DOWN TO °C

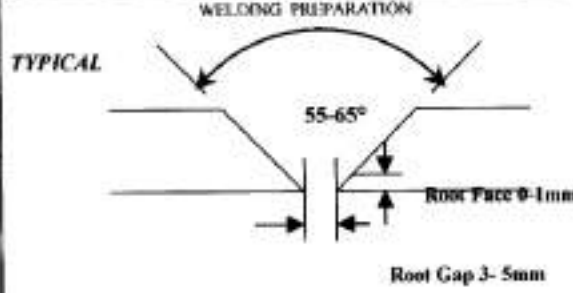
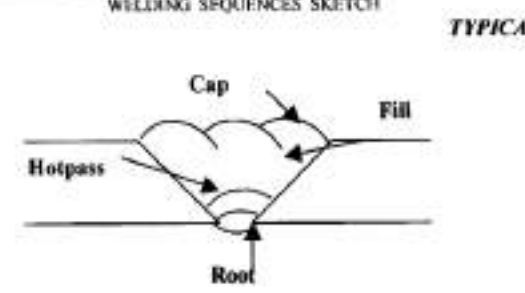
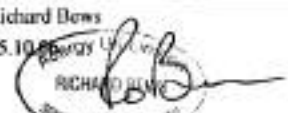

MATERIALS ENGINEERING LIMITED

CERTIFYING AUTHORITY

SIGNED: 
DATE: 15/12/2004
CB/VB: Greg Morrice / Jason Craig

SIGNED: 
DATE: 17/12/04

Sample Welding Procedure Specification (WPS)

Sonamet Lobito, Angola	WELDING PROCEDURE SPECIFICATION N° WPS-MON-500 REV. 0 (Supporting PQR : GTA-555)	Kizomba 'C' Mondo Manifolds																																																																										
01. Scope of work : 22% CR Duplex Fabrication. 02. Design codes and spec. : ASME IX 03. Material grades and spec. : UNS S31803 and equivalent Pipe & Fittings 04. Wall thickness : 10-30mm 05. Diameter : All 06. Welding process and procedure : GTAW 07. Type of joint : Full Penetration single vee butt weld 08. Number of Passes : As per Typical Attached Sketch 09. Sequence : According to sketch 10. Current - Polarity : DC-ve Root, Fill & Cap	11. Position of welding : All Positions with Vertical Up Progression 12. Number of welders : 1 or 2 13. Line-up clamp or tacking : Bridge pieces shall be from same parent material, tack welded <u>within</u> the prep and progressively removed as welding commences. 14. Removal of line-up clamp : N/A 15. Cleaning : Power grinding and / or brushing. 16. Preheat temperature : Ambient (Dry Only) Measured by Thermometer. 17. Time lapse between passes : N/A 18. Inter pass temperature : 150°C Maximum Measured by Thermometer. 19. Welding interruption : Continuous welding where possible, however a minimum one third weld volume to be deposited prior to any interruption. 20. Tungsten : 2% Thoriated & 2.4mm Dia 21. Backpurge Quality : Oxygen content prior to and during welding to be 0.05% (500ppm) Max measured by a suitable purge monitor.																																																																											
WELDING PREPARATION  <p>TYPICAL</p>	WELDING SEQUENCES SKETCH  <p>TYPICAL</p>																																																																											
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Welding Process</th> <th>Pass #</th> <th>Consumable Type</th> <th>AWS Classification</th> <th>Wire dia. (mm)</th> <th>Arc Voltage (V)</th> <th>Amperage (A)</th> <th>Wire Speed (mm/min)</th> <th>Shielding</th> <th>Torch Speed (cm/min)</th> <th>Max. weave Width (mm)</th> <th>Gas Type</th> <th>Gas Flow (l/min) (Shield)</th> <th>Gas Flow (l/min) (Purge)</th> <th>Direction</th> <th>Heat Input (kJ/mm)</th> </tr> </thead> <tbody> <tr> <td rowspan="3">GTAW</td> <td>R</td> <td>Sandvik</td> <td>25.10.8.1.</td> <td>2.4</td> <td>9 - 11</td> <td>95 - 115</td> <td>N/A</td> <td>N/A</td> <td>5.5 - 7.5</td> <td>N/A</td> <td>Argon 99.98% HP</td> <td>12-15</td> <td>16-18</td> <td>↑</td> <td>0.9 - 1.4</td> </tr> <tr> <td>HP</td> <td>"</td> <td>22.8.3.L</td> <td>2.4</td> <td>10 - 12</td> <td>120 - 130</td> <td>"</td> <td>"</td> <td>7.5 - 9.0</td> <td>N/A</td> <td>"</td> <td>"</td> <td>"</td> <td>↑</td> <td>0.9 - 1.4</td> </tr> <tr> <td>FILL/ CAP</td> <td>"</td> <td>"</td> <td>3.2</td> <td>10 - 13</td> <td>140 - 165</td> <td>"</td> <td>"</td> <td>8.0 - 13</td> <td>N/A</td> <td>"</td> <td>"</td> <td>"</td> <td>↑</td> <td>0.8 - 1.5</td> </tr> </tbody> </table>															Welding Process	Pass #	Consumable Type	AWS Classification	Wire dia. (mm)	Arc Voltage (V)	Amperage (A)	Wire Speed (mm/min)	Shielding	Torch Speed (cm/min)	Max. weave Width (mm)	Gas Type	Gas Flow (l/min) (Shield)	Gas Flow (l/min) (Purge)	Direction	Heat Input (kJ/mm)	GTAW	R	Sandvik	25.10.8.1.	2.4	9 - 11	95 - 115	N/A	N/A	5.5 - 7.5	N/A	Argon 99.98% HP	12-15	16-18	↑	0.9 - 1.4	HP	"	22.8.3.L	2.4	10 - 12	120 - 130	"	"	7.5 - 9.0	N/A	"	"	"	↑	0.9 - 1.4	FILL/ CAP	"	"	3.2	10 - 13	140 - 165	"	"	8.0 - 13	N/A	"	"	"	↑	0.8 - 1.5
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For Sonamet																																																																												
Name : Richard Bows Date : 05.10.2024 Signature : 																																																																												

Sample Welder qualification Test Record

GTAW - DUPLEX



WELDER QUALIFICATION RECORD

NAME : Viswanathan
WELDER ID NO. : 410
QUALIFICATION DATE : 29/12/04
WELDING PROCESS / TYPE : GTAW
WELDING PROCEDURE NO. : WPS 251



PARAMETERS

VARIABLE	TEST CONDITIONS	QUALIFICATION RANGE
Base Metal	ASTM A316I (P8)	P1 to P11, P34, P41 to P47
Material Thickness	25mm	Unlimited
Weld Deposit Thickness	25mm(Multipass)	Unlimited
Pipe Diameter (OD)	6"	2 7/8" to Unlimited
Welding Position	6G	All position
Progression	Uphill	Uphill
Backing	Yes - Inert gas	With inert gas backing
F. No.	N/A	N/A
AWS Class	N/A	N/A
Electrode (Single or Multiple)	Single	Single
Current (AC / DC)	DC	DC
Polarity	SP	SP
Gas Composition	98%Ar + 2%N ₂	98%Ar + 2%N ₂
Code	ASME IX	ASME IX
Other	Solid wire - Metrode Zeron 1000	Solid or Metal cored wire - Metrode Zeron 1000

INSPECTION / TESTING

NON-DESTRUCTIVE EVALUATION

VISUAL - ACCEPTABLE
RT / WF - ACCEPTABLE
Report No. & Date - 3L-10485/RT/06 / 29.12.04
Accepted by - Prasanna
Organisation - EIL

DESTRUCTIVE TESTING

SIDE BEND	N/A	TRANSVERSE TENSILE	N/A
ROOT BENDS	N/A	HARDNESS SURVEY	N/A
FACE BENDS	N/A	NICK BREAK	N/A
IMPACT TESTS	N/A	FILLET WELD BREAK TEST	N/A
MACRO SECTION	N/A	OTHERS	N/A

We certify that the statement in this record is correct and that the test welds were prepared, welded and tested in accordance with above cogniscent code.





Training Faculty

R.Baskar, AMIE (Mech),

ASNT NDT Level III (RT, UT, PT, MT,VT& ET)

PCN NDT level 3 RT,PT,MT,UT , Level 2

AWS - SCWI

CSWIP 3.2

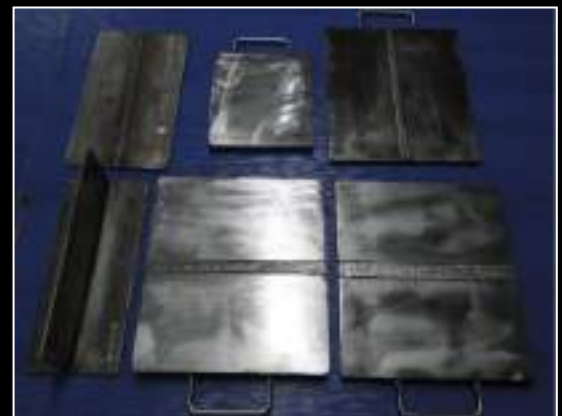
Managing Director – BIT Inspection Technology

NDT consultancy – GE Oil & Gas, Norway

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*BIT Inspection Technology focus with sincerity and authentic approach in giving **new dimension** to NDT / Welding Inspection Training*

*Now BIT Inspection Technology proudly announces that, the **weld defect specimens and Radiographic films** are developed to the customer requirement. Our specimens and radiographic reference films are used worldwide*



WHO SHOULD ATTEND?

All personnel responsible for making decisions, exercising judgments applicable to welding operations in power generation, petrochemical, oil and gas, fertilizer, shipbuilding and maintenance, structural fabrication, offshore & onshore structure fabrication, etc.....

- Engineer & Inspectors
- Quality Control Engineers & Supervisors
- Quality Assurance Engineers & Supervisor
- Technical Services Engineers & Supervisor
- Erection & Construction Engineers & Supervisor
- Fabrication Engineers & Supervisor
- Chartered Engineers
- Engineering and Welding Consultancy
- Experienced Welder
- Experienced Fabricator

Exchange experience through Case studies



Case study

"Stress Corrosion Cracks" in the "Super Duplex Stainless Steel"

Programme Sponsored by
Shri. M.V.Rajamani
 Chairman(Elect) - ISNT
 Electro - Magfield Controls & Services

Presented by
R. Baskar A.M.I.E (Mech)
 ASNT level III RT,UT,MT,PT
 CSWIP 3.2
 AWS-CWI
Vetco - Norway



PETROLVALVE CLADDING ISSUE

Presented by
R. Baskar, AME (Mech)
 ASNT NDT Level III RT,UT,PT & MT
 CSWIP 3.2
 AWS - SCWI



Ultrasound Testing on Duplex Stainless Steel

Reference Block

Calibration Block

Presented by
R. Baskar, AME (Mech)
 ASNT NDT Level III RT,UT,PT & MT
 CSWIP 3.2
 AWS - SCWI



UT on small bore (6" & 8") cladded piping weld

Presented by
R. Baskar, AME (Mech)
 ASNT NDT Level III RT,UT,PT,MT & MT
 PCN NDT Level 3 RT,PT,UT,UT
 CSWIP 3.2
 AWS - SCWI