PROCEDURE QUALIFICATION RECORD (PQR)
Guild Moore & Hilder cc - Dynamic Options

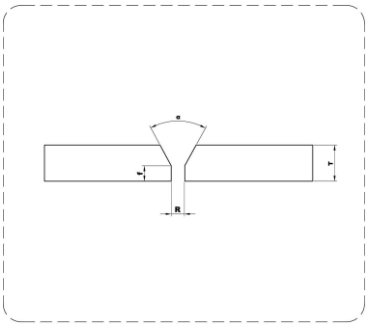
GMHcc Pressurized Systems Reg. No. CK99 22907/23

Designation PQR ASME BPVC Sec. IX - 2023; Metric; Groove; Pipe; GTAW - Manual - 6G; P 8 –8 ; 1.5 – 15.24 mm; Without PWHT; Without impacts

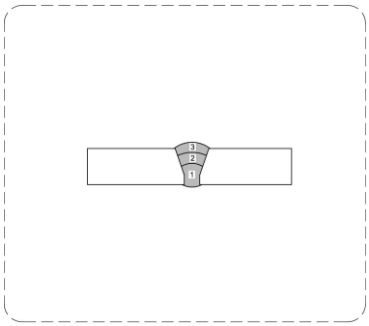
Engineering & Fabrication Vat No. 406 018 3292 CK No. 1999/031863/23

PQR Number	***PQR SA304L***	Rev/ Ver	***0***	Date	***19/02/2024***
WPS Number	***WPS SA304L***	Rev/ Ver	***0***	Date	***06/10/2023***
Code/Standard	***PQR ASME BPVC Sec. IX - 2023***	Constr. Code		Specification	

JOINT DESIGN (QW-402)



Joint Diagram



Pass Diagram

Joint Type	***Groove***
Joint Design	***Single V groove***
Surface Preparation Method	***Chemical Cleaning***
Groove Angle°	***70***
Root Face (mm)	***2***
Root Gap (mm)	***2***
Groove Radius	
Misalignment (mm)	***0.3***
Back Gouging	***No***
Backing	***Without***
Backing Type	
Edge Prep.	***Machining & Grinding***

Notes-

BASE METALS (QW-403)

Base Metals	Product Form	Specification	P#	Group #	UNS #	NPS/DN (mm)	Dia. (mm)	Schedule	Thickness (mm)
Steel & steel alloy	***Pipe***	***A/SA-312-TP304L. S30403***	***8***	***1***	***S30403***	***80***	***88.9***	***Sch 80s***	***7.62***
Steel & steel alloy	***Pipe***	***A/SA-312-TP304L. S30403***	***8***	***1***	***S30403***	***80***	***88.9***	***Sch 80S***	***7.62***
Tested	Without PWHT			Without Impact Tests			Without Hardness Tests		

WELDING DATA (QW-400)

PROCESS	***GTAW***
Type	***Manual***
Position (QW-405)	***6G***
Progression	***Up***

FILLER METALS (QW-404)

PASS	***Pass 1***	***Pass 2***	***Pass 3***
Spec. No. (SFA)	***SFA-5.9***		
AWS No. (Class)	***A5.9***		
F-Number	***6***		
A-Number	***8***		
Size, mm	***2.4***	***2.4***	***2.4***
FM Form	***Solid***		
Trade Name	***ER308L***		
Nominal Composition	***CrNi***		
Weld Metal Thk., t mm	***2.5***	***2.5***	***2.62***
Maximum Pass Thk. mm	***2.62, Maximum pass thickness less than 13 mm (1/2 in) for GTAW***		
Conformance Cert./CMTR	- -		
Consumable Insert	***Without***		

PREHEAT (QW-406)

Preheat Temperature (°C)	***16***
Interpass Temp. (°C)	***200***
Preheat Notes	

GAS (QW-408)

PASS	***Pass 1***	***Pass 2***	***Pass 3***
Shielding Gas	***99%Ar 1% CO2***	***100%Ar; 1%CO2***	***100%Ar ;1%CO2***
SG Flow Rate (l/min)	***12***	***12***	***12***
Trailing Gas	-	-	-
TG Flow Rate (l/min)	***0***	***0***	***0***
Backing Gas	***99%Ar 1% CO2***	***99%Ar 1% CO2***	***99%Ar 1% CO2***
BG Flow Rate (l/min)	***12***	***12***	***12***

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ELECTRICAL (QW-409)			
PASS	***Pass 1***	***Pass 2***	***Pass 3***
Waveform Control	***No***	***No***	***No***
Energy, J	-	-	-
Power, J/s	-	-	-
Arc time, s	-	-	-
Bead length, (mm)	-	-	-
Amps, A	***128***	***130***	***130***
Volts, V	***14***	***16***	***16***
Travel speed, (mm/min)	***30***	***35***	***35***
Heat input, (kJ/mm)	***3.5***	***3.566***	***3.566***
Current Type & Polarity	***DCEN***	***DCEN***	***DCEN***
Current pulsing DC	***No***	***No***	***No***
Tungsten size (mm)	***2.4***	***2.4***	***2.4***
Electrical notes	-		

TECHNIQUE (QW-410)	
Bead Type	***Stringer***
Cup/Nozzle size (mm)	***10***
Initial/Interpass Cleaning	***Wire brush***
Pass Per Side	***Multi pass***
Peening	***No***

TESTING		
Guided Bend Tests (QW-160)		
Required Tests		
Test Method	Acceptance Criteria	Test Result
2 tension tests	***QW-151.1/3/4***	***Performed and acceptable***
2 face bend & 2 root bend tests OR 4 side bend tests	***QW-161.2/3/6/7 & QW-161.1***	***Performed and acceptable***
Comments		
Test Report	23-2699-2.pdf	
Optional Tests		
Test Method	Acceptance Criteria	Test Result
Visual examination	***QW-144***	***Performed and acceptable***
Ultrasonic examination	***QW-191***	***Not performed***
Radiographic examination	***QW-191***	***Performed and acceptable***
Comments		
Test Report	14825/23/03.pdf	

TEST RESULTS

TENSION TESTS (QW-150)

Specimen No.	Width (mm)	Thickness, (mm)	Area, (mm2)	Ult. total load, (kN)	Ult. unit stress, (MPa)	Failure type & location
1	***20.04***	***7.05***	***141.28***	***87.8***	***621.5***	***Ductile - Parent Metal***
2	***20.10***	***6.99***	***140.5***	***89.3***	***635.7***	***Ductile - Parent Metal***

Comments	
Test Report	23-2699-2.pdf

Range Qualified*	
Positions	QW-2013 - Unless specifically required otherwise by the welding variables (QW-203), a qualification in any position qualifies the procedure for all positions. The welding process and electrodes must be suitable for use in the positions permitted by the WPS
Joint Type	Fillet welds are qualified when the groove weld is qualified in accordance with either Table QW-451.1 or Table QW-451.2
Thickness, T (mm)	***1.5 - 15.24***
Outside Diameter	***No limit***
Weld Metal Deposit, t (mm)	***15.24 maximum (GTAW)***
Joint Configuration	Any joint geometry approves all geometries; Check QW-250 for exceptions
Base Metal Product Form	QW 211 - The base metals may consist of either plate, pipe, or other product forms. Qualification in plate also qualifies for pipe and vice versa The dimensions of the test coupon shall be sufficient to provide the required test specimens
Base Metal P-Number	***8-8***
Filler Metal	***GTAW - F6; A8***
*Disclaimer	Please consult ASME IX 2023 edition for the range qualified values when base metals are from different P Numbers and/or of unequal thicknesses or for special joint configurations or when multiple processes are used or when impact tests are required
Note	Values shown in multiple columns under each process in these sections Filler Metals (QW-404), Gas (QW-408) and Electrical (QW-409) are for each pass, shown in the order of weld metal laid from left to right.

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CERTIFICATION					
Notes from testing:			Authorization notes:		
Welder's Name	A.Guvakuva	Welder ID 861001	- -	Stamp Number	DYNO-001
Tests Conducted by	IMP Lab		Test Report #	23-2699-2	

We certify that the statements in this record are correct and that the test welds were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code 2021 edition.

R.Hilder IPE 042/CP PV 410 PR TECH ENG 201170327	Digital signature Prepared by - Rodger Hilder 25-Feb-2024 Guild Moore & Hilder cc			Digital signature Approved by -Tristan Northing 25-Feb-2024	

Dynamic Engineering & Fabrication

Postnet Suite 196
Private Bag X10010
Edenvale
1610

Tel: 011 315 4107
e-mail: info@dynamico.co.za

APPROVED
By Renier at 9:42 am, Feb 29, 2024

ATTACHMENT

IMP LABS
CK 1996/060917/23
Tel: 011 421 9026
www.implabs.co.za | E-mail:admin@implabs.co.za
25 Moore Avenue, Benoni Ext 7

Certificate No:	**23-2699-2**	**Order No:**	PO0000328	**Date Received:**	25-Oct-2023
Customer:	UILD MOORE AND HILDER C	**Address:**		**Date Tested:**	30-Oct-2023
Attention:	R. Hilder			**Date Reported:**	31-Oct-2023
Telephone:	011 608 1575			**Ref No:**	PQR
Heat No:	N/A	**Email:**	roger.gmh@netactive.co.za		
Description:	89mm O/D x 8mm WT, butt welded stainless steel pipe		**, As Received.**		

TEST REPORT ISSUED IN ACCORDANCE WITH EN10204 3.1 — **TENSILE, IMPACT & BEND TEST**

MATERIAL SPECIFICATION:	ASME SA312/SA312M 304L	**TEST METHOD:**	ASTM E8M, ASTM E190

			TEST SPECIFICATION REQUIREMENTS:					170 min	485 min	25 min	
Sample	**Dimensions (mm) Transverse weld tensiles**		**Area (mm²)**	**Gauge Length (mm)**	**Yield Load (kN) ***	**Max Load (kN)**	**Extension (mm) ***	**Yield Stress (Mpa) ***	**UTS (Mpa)**	**% Elongation ***	**Fracture Location**
1.	7.05	20.04	141.28	50.0	40.1	87.8	22.1	284.0	621.5	44.3	P/M
2.	6.99	20.10	140.50	50.0	45.2	89.3	21.2	321.9	635.7	42.3	P/M

*** FOR INFORMATION ONLY.**

Test temp. °C:		**Charpy V-Notch:**		**Notch Location:**			
IMPACT RESISTANCE:			**Energy Absorbed (Joules): WELD**	**Energy Absorbed (Joules): HAZ**	**Energy Absorbed (Joules): PM**		
Specimen 1:							
Specimen 2:							
Specimen 3:							
Specimen Average (J):						**Specification Average (J):**	

BENDS (180°):	Face	2 x face bends (32mm Ø former, 180°)= **ACCEPTABLE**			**TEST METHOD:**
	Root	2 x root bends (32mm Ø former, 180°)= **ACCEPTABLE**			ASME IX:2023
CUSTOMER:	GMH	**WELDER/I.D:**	A. Guvakuva	**PROCESS/POSITION:**	N/S
Additional information*:*					Juane benjamin Mohr Digitally signed by Juane benjamin Mohr Date: 2023.10.31 12:33:30 +02'00'
Tested By: E. Le Roux		**Witnessed By: N/A**		**Technical Signatory:**	
RESULT:	**PASS**				

IND-NDT c.c.
Vat No: 4770167569 Reg. No.1996/013860/23
NDT SERVICES
P.O.BOX 4765
Kempton Park 1620
Tel No. (011) 391-1290/1518
Fax: (011) 972-3168
Offices & Laboratories – 42 Quinine Street, Glen Marais X 1, 1620

RADIOGRAPHIC EXAMINATION REPORT

CLIENT: GMH VENDOR: GMH

ORDER No. 0000324 REPORT No: 14825/23/03 DATE: 2023/10/16

EXAMINATION LOCATION: IND-NDT LABS	JOB NR:---
COMPONENT DESCRIPTION: TEST PLATES / PIPES FOR DYNAMIC OPTIONS	
DRG NUMBER: REFER TO VENDOR DRW NO.	MATERIAL: DESCRIPTION BELOW
OD: VARIOUS	EXTENT OF EXAMINATION: 100%
BEFORE P.W.H.T. N/A	AFTER P.W.H.T. N/A

TECHNICAL DATA					SPECIFICATION DETAILS
X-RAY	KV	N/A	MA	N/A	WELDING TYPE:
GAMMA RAY	CURIES: 32ci				CODE OF MANUFACTURE: ASME IX 2023
EXPOSURE TIME: 1min 25sec					EXAMINATION PROCEDURE: IND/WI/RT-02 REV 02 2019
FFD/SFD: 89mm					ACCEPTANCE CRITERIA: ASME IX 2023
IQI: 10 fe en					
TECHNIQUE No.: DWSI					
FILM AND SCREENS: PB SCREENS 0.125					

WELD No.:	POS	SENS	DENS	WELDER	DEFECTS e/ee	DEFECTS ne	RESULTS	REMARKS
TP 11	0-10	2%	2-3	A.GUVAKUVA	e		ee	
310S	10-20	2%	2-3		e		ee	
3"	20-0	2%	2-3		e		ee	
SCH40S								
TP 12	0-10	2%	2-3	J.NKUNA	e		ee	
310S	10-20	2%	2-3		F		ee	
3"	20-0	2%	2-3		F		ee	
SCH40S								
TP 13	0-10	2%	2-3	C.RATAU	F		ee	
310S	10-20	2%	2-3	7510165853087	F		ee	
3"	20-0	2%	2-3		e		ee	
SCH40S								
TP 14	0-10	2%	2-3	C.RATAU	Aa		ee	
3"	10-20	2%	2-3	7510165853087	e		ee	
SCH40	20-0	2%	2-3		e		ee	
TP 15	0-10	2%	2-3	A.GUVAKUVA	e		ee	
304L	10-20	2%	2-3		e		ee	
3"	20-0	2%	2-3		e		ee	
SCH80								
TP 16	0-10	2%	2-3	A.GUVAKUVA	e		ee	
304L	10-20	2%	2-3		e		ee	
3"	20-0	2%	2-3		e		ee	
SCH40								

e - No Visible defects
ee - Acceptable defects
ne - Unacceptable defects
A - Gas bubbles
E - Cracks
Ea - Longitudinal Cracks
F - Undercut
B - Slag inclusions
Aa - Porosity
Ag - Worm Holes
Ba - Inclusions any shape and direction
EG - Transverse cracks
FF - Obvious film
D - Incomplete penetration
Bg - Slag lines
C - Lack of Fusion

TECHNICIAN: DA BENNIE SNT-TC-1A (LEVELII) DATE: 2023/10/16	INSP. AUTHORITY DATE: