



VORTEX
SUBSEA SOLUTIONS

GAS / LIQUID SAMPLING TOOL

HIGH PRESSURE, MANUALLY OPERATED

OPERATIONS MANUAL

VERSION 3.0 JAN 2023

VERSION	SECTION	ISSUE DATE	AUTHOR	DESCRIPTION OF UPDATE
3.0		26 Jan 2023	JG	Revised Funnel

VOR-GST-MAN:VER 3.0 VST-XX-HP

Vortex gas sample tool manual version 3.0

VORTEX INTERNATIONAL LTD

27 Parrs Road, RD, New Plymouth 4371, New Zealand
 Phone/Fax + 64 6 7538102, Mobile + 64 (0) 276 88 53 72
vortexdredge.com

Contents

1.0 INTRODUCTION

1.1	Reference documents	2
1.2	Abbreviations	2
1.3	Contacts	2

2.0 SAFETY 3

2.1	Overview	3
2.2	Risk Assessment	3
2.3	Mechanical	

3.0 TECHNICAL SPECIFICATIONS

3.1	Description	4
3.2	Schematic	5
3.3	Component particulars	6

4.0 OPERATIONAL PROCEDURES

4.1	Pre-dive checks tool visual check	7-11
4.2	Funnel & flow measurement	12
4.3	Pulling a vacuum	13
4.4	Changing bottles	14
4.5	Pre dive checks, in water operation	15-17
4.6	Post dive checks	18-19
4.7	Cleaning tool and bottles	20

5.0 MAINTENANCE & STORAGE

5.1	Standard procedures	20
5.2	Replacement procedures	20

6.0 APPENDIX AND REFERENCES

6.1	Tool dimensions and weights	21
6.2	Inventory	22
6.3	Bottle part numbers	23
Appendix III. Suppliers specifications sheets		24-28
Appendix III. Sample bottle details		29

7.0 CONTACTS 32

Introduction

The vortex High pressure Gas Sampling tool is designed to capture gas and liquid samples in a subsea environment and recover said samples to the surface in a high pressure state of no more than 1800psi (124bar) by means of an electro mechanical operated syringe to ingest sample then purge sample into a sample bottle after recovery to surface.

This tool is designed to be deployed from the surface with the bottle bled of air and a vacuum entrained in the system. Sample filling relies on the entrained vacuum and ambient water pressure filling the bottle when the main isolation valve is operated.

1.1 REFERENCE DOCUMENTS

See Appendix and references section at the end of this document for certificates and manufacturers data.

1.2 ABBREVIATIONS

PSI: Pounds per Square Inch

PPE: Personnel protective equipment

JHA: Job Hazard Analysis

VST: Vortex Sample Tool

HP: High Pressure

1.3 CONTACTS

For technical queries, comments and feedback contact Vortex Dredge: goodinjoe@gmail.com

Safety

2.1 OVERVIEW

All local HSE procedures must be followed. Use of PPE should follow guidelines outlined with handling of potential sample. For example hazardous gas samples should have PPE appropriate to mitigate dangers associated with that gas. Safety glasses should be considered minimum requirement irrespective of potential sample. Your safety is your responsibility. Think and plan ahead accordingly.

2.2 RISK ASSESSMENT

Consult with local HSE and installation operators to identify best practice steps needed for safe operations. Identify if the task been done and implement lessons learned. JHA, permitting and toolbox talks should preclude all operations.

2.3 MECHANICAL

Ensure all fittings and fasteners are secure. Check general condition of tool against images in manual for anything which may indicate potential operational issues.

REMEMBER, YOUR SAFETY IS YOUR RESPONSIBILITY. THINK AND PLAN AHEAD ACCORDINGLY. IF IN DOUBT, PLEASE ASK.

Technical Specifications

3.1 DESCRIPTION

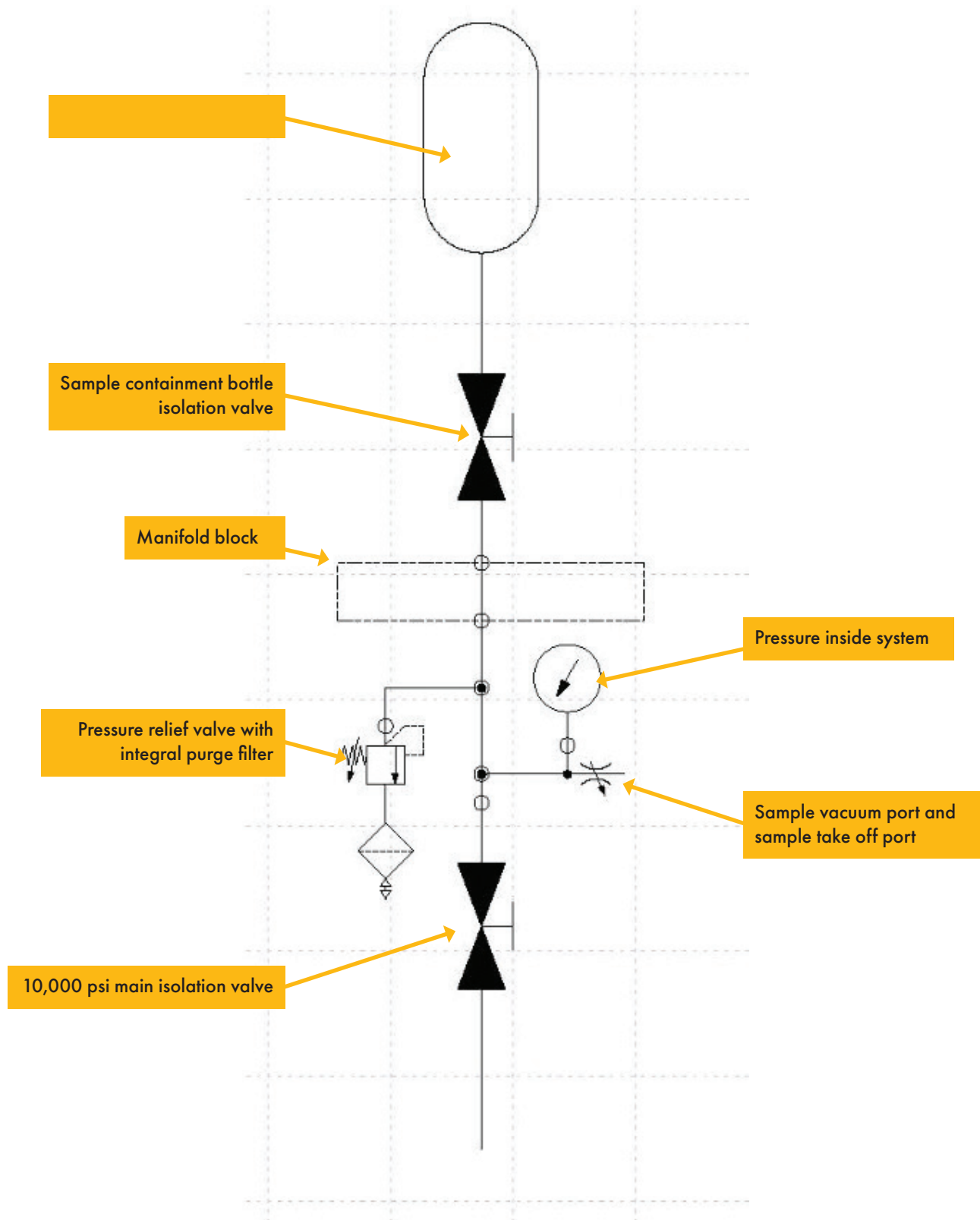
To “Suck” the sample into the syringe the operator will function the main isolation valve to open the circuit to ambient pressure and ‘draw’ the sample into the bottle.

To entrap the sample in the sample bottle the operator will function the main isolation valve closed to seal the circuit and entrap the sample in the sample bottle.



Technical Specifications

3.2 DESCRIPTION SCHEMATICS



Technical Specifications

3.3 COMPONENT PARTICULARS

- Complete tool Weight empty in air = 63 lb (29kg)
- Complete tool Weight empty in fresh water = 50 lb (23 kg)
- Containment bottle volume = 0.264 gallon (1.0 litre)
- Main relief valve setting = 1800psi (124 bar)
- Complete tool dimensions = 52 inch (1323 mm) long x 12.5 inch (318 mm) diameter
- Main relief valve working range = 0 to 6000 psi (413 bar)
- Main isolation valve rated to 6000 psi (413 bar)
- Sample bleed off valve rated to 6000 psi (413 bar)
- Pressure gauge = 0 to 3000 psi (206 bar)
- Standard funnel diameter =- 6 inch (150mm) Capacity = 780ml (0.82 quart).
- Extra funnel diameter =- 10 inch (254mm) Capacity = 6 litre (6.3 quart).
- Depth rating = 2054 mtr. 6741 foot seawater with standard 1800psi rated bottles
- Deeper rated and different sized bottles available on request.

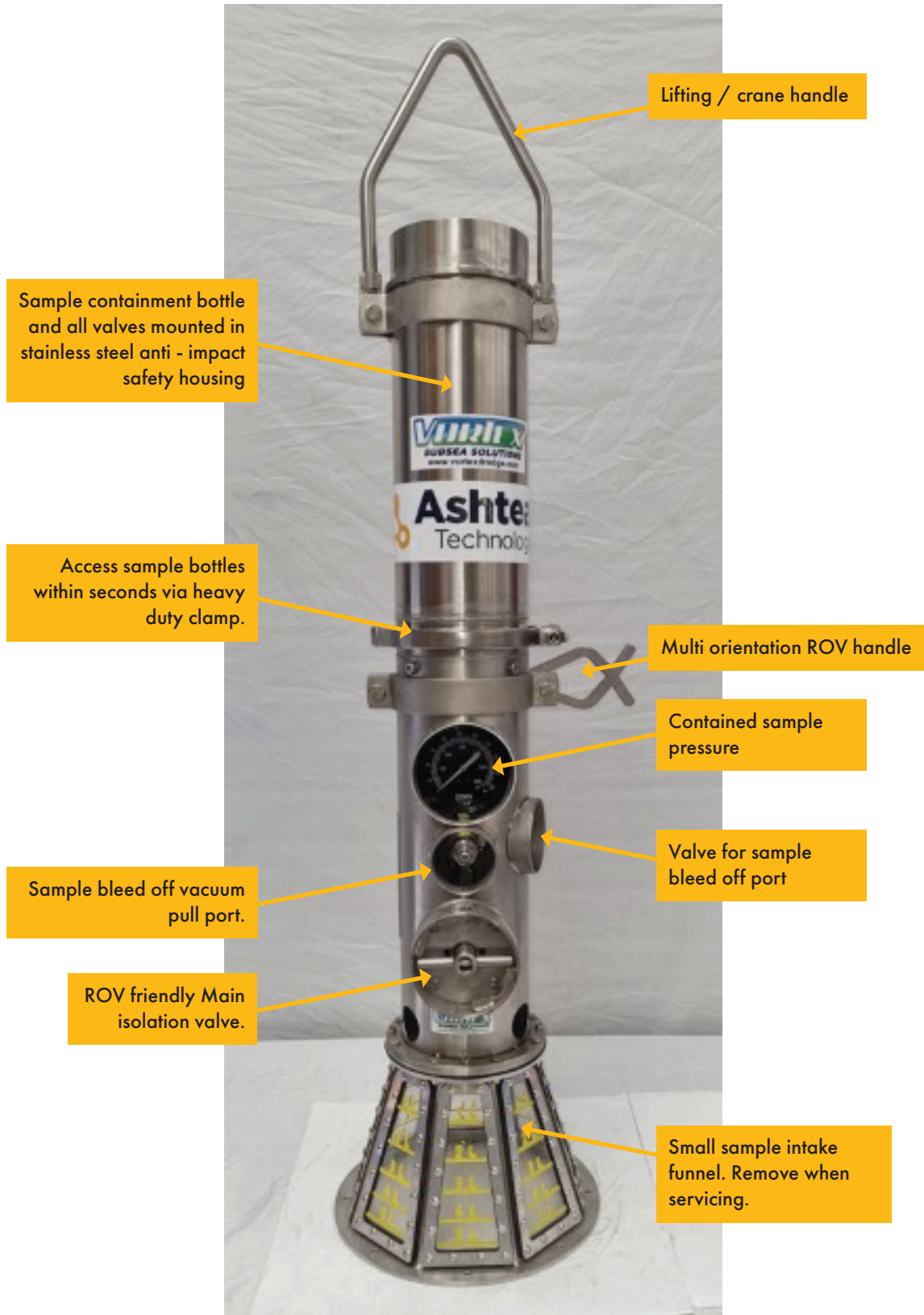
Operation Procedures

4.1 PRE DIVE CHECKS TOOL VISUAL CHECK



Operation Procedures

4.1 PRE DIVE CHECKS TOOL VISUAL CHECK



Operation Procedures

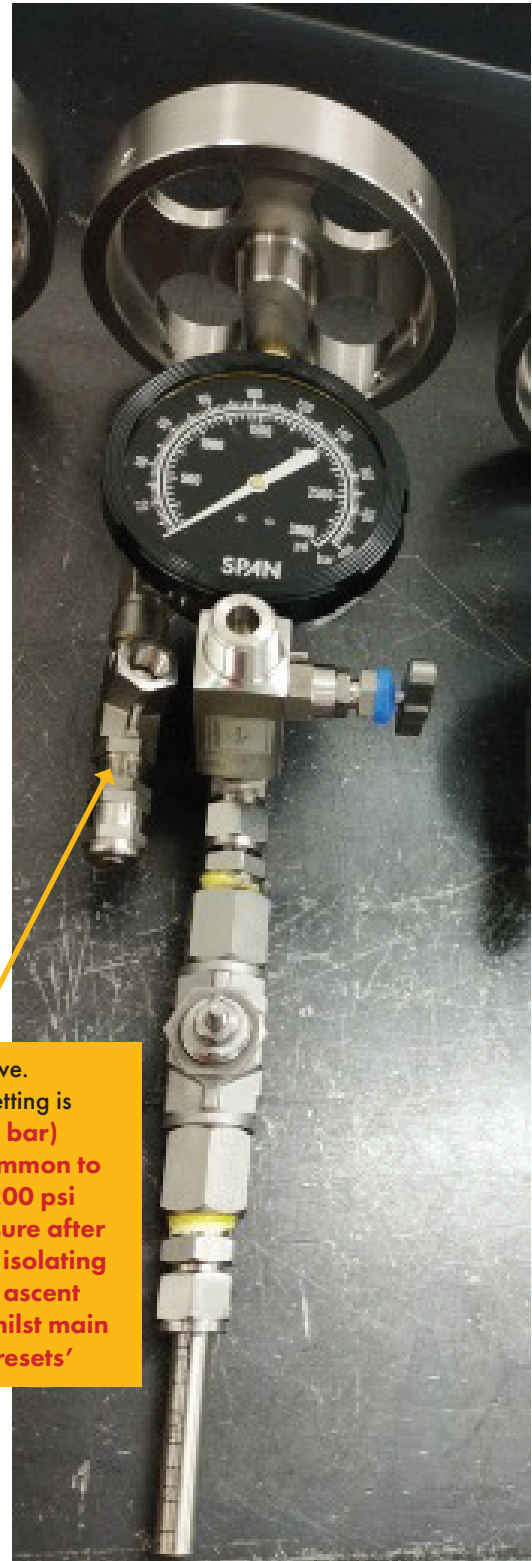
4.1 PRE DIVE CHECKS TOOL VISUAL CHECK



6,000 psi rated, ROV specific, main isolation valve and orientation when closed.



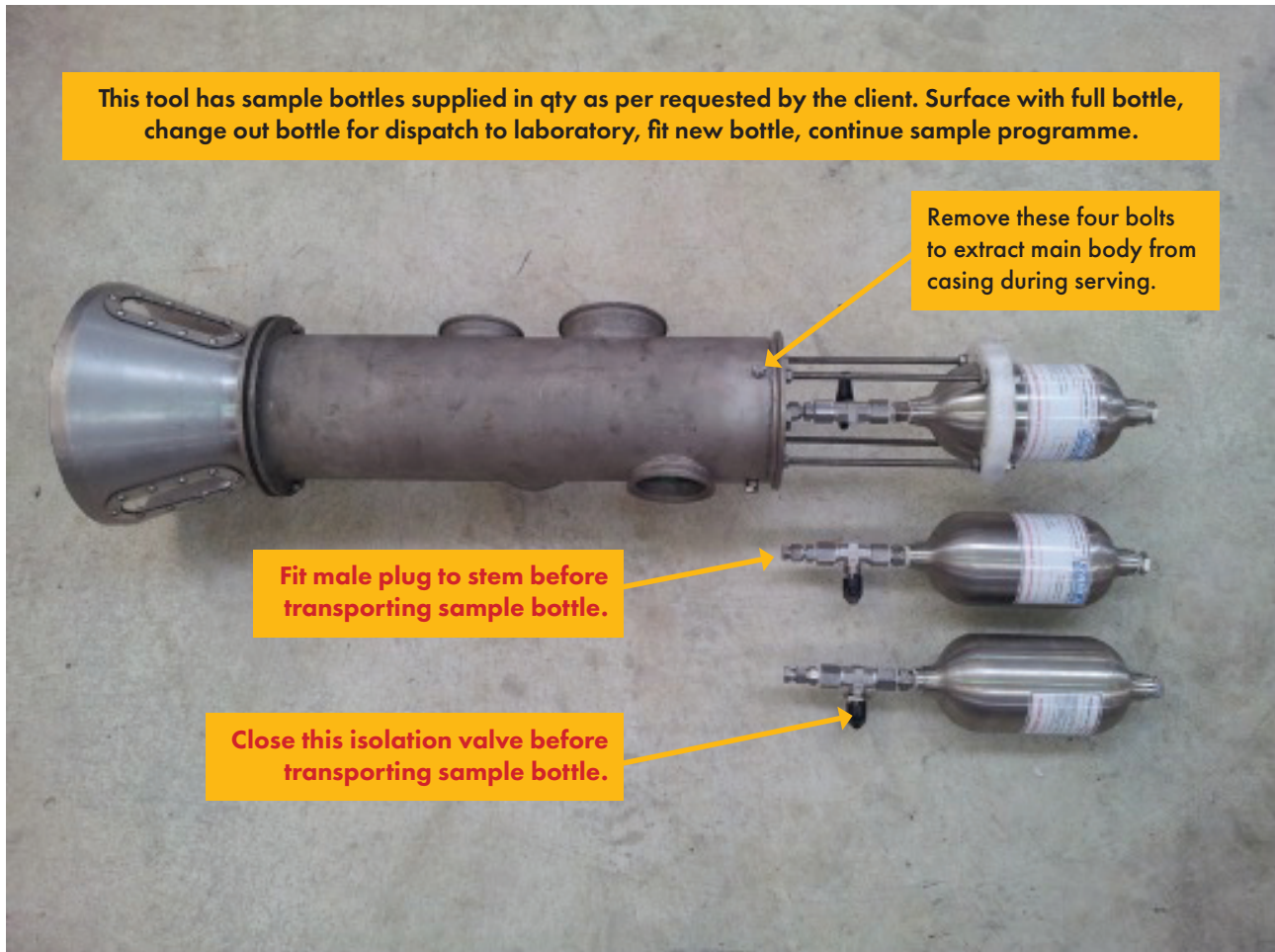
6,000psi rated, ROV specific, main isolation valve and orientation when open



Main relief valve.
Vortex relief setting is **1800psi (124 bar)**
It is not uncommon to see around 200 psi drop in pressure after closing main isolating valve during ascent to surface whilst main relief valve 'resets'

Operation Procedures

4.1 PRE DIVE CHECKS TOOL VISUAL CHECK



Operation Procedures

4.1 PRE DIVE CHECKS TOOL VISUAL CHECK



REMOVE ALL PRESSURE FROM TOOL BEFORE SERVICING

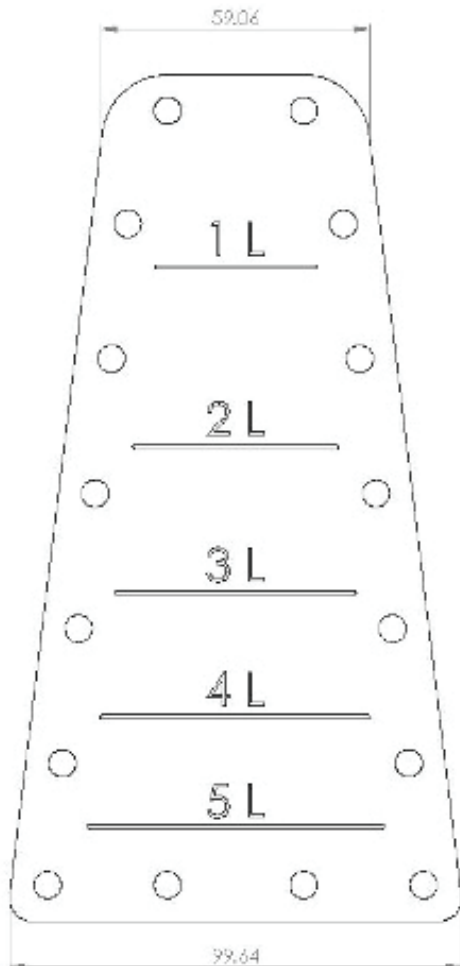
Operation Procedures

4.2 FUNNEL AND FLOW MEASUREMENT

FLOW RATE CALCULATION

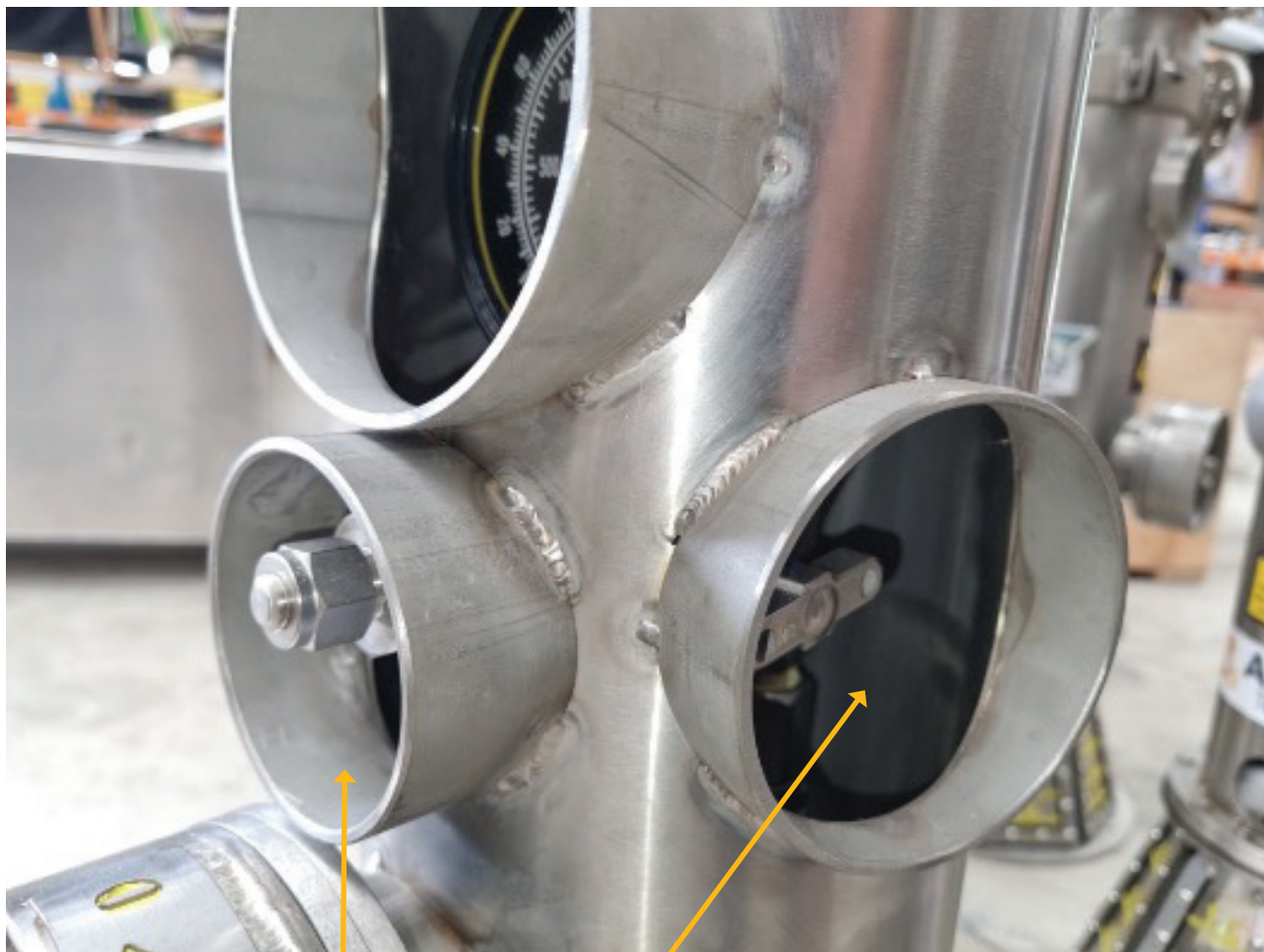
FORMULA: $Q = V / T$

**WHERE: Q = VOLUME FLOW RATE
(L/S OR L/MIN) V = VOLUME (L) T
= TIME TAKEN (S OR MIN)**



Operation Procedures

4.3 PULLING A VACUUM



Sample bleed off valve.
Connect here to draw off sample or to
pull a vacuum up to a minimum of 20
in/hg to store in sample bottle when
working in very shallow water.

Operation Procedures

4.4 CHANGING BOTTLES

Tool has two spare bottles as standard kit to enable multiple samples whilst on location.



ALWAYS

Fit male plug to fitting at end of isolation valve prior to shipping pressurized bottle to laboratory.



Simply fit spare bottle to continue sample programme.

NO DOWNTIME SENDING TOOL AWAY TO LAB.

Operation Procedures

4.5 PRE DIVE CHECKS, IN WATER OPERATION

STEP	PROCEDURE DESCRIPTION	CHECK
1	Remove top section of tool to expose sample bottle location. Fit clean containment bottle. Replace top section of tool over sample bottle.	
2	Ensure main isolation valve is CLOSED	
3	Connect vacuum pump to sample bleed valve / vacuum pull port, open this valve and draw full vacuum, note vacuum reading in dive logs then close this valve to isolate vacuum inside the circuit.	
4	Ensure sample bleed valve is closed and capped off.	
5	Containment bottle will now be isolated at sea level pressure with a vacuum until main isolation valve is opened and pressure differential equalizes between bottle and sea water ambient pressure.	
6	Check 0 to 3000 psi gauge is reading 0 and full of appropriate gauge liquid.	
7	With tool on location, invert tool to remove any residual air bubbles in the funnel, place tool with funnel facing down and place funnel over the sample location. Hold tool vertically over product until product rises and displaces water in funnel. Hold tool vertically over product until product rises and displaces water in funnel.	
8	Open Main isolation valve to 'suck' product sample into tool.	
9	Close main isolator valve.	
10	Recover tool to deck.	

... CONTINUED OVER PAGE ...

**REMEMBER, YOUR SAFETY IS YOUR RESPONSIBILITY.
THINK & PLAN AHEAD ACCORDINGLY. IF IN DOUBT, PLEASE ASK.**

Operation Procedures

4.5 PRE DIVE CHECKS, IN WATER OPERATION

STEP	PROCEDURE DESCRIPTION	CHECK
11	As water depth decreases during ascent, the main relief valve will limit the pressure stored in the containment bottle to a pre-set figure.	
12	Remove top section of tool to expose sample bottle location. Close bottle isolation valve. Remove, cap and label sample bottle.	
13	Depending on client requirements, the tool may need internally cleaning before next sample run. Invert tool, fill funnel with hot soapy water, open all valves and flush out circuit then flush circuit with fresh water then blow dry with air and close all valves.	
14	Fit clean containment bottle, pull and isolate vacuum in circuit, replace top section of tool over sample bottle.	
15	Continue sample program.	

Please return tool to supplier for post job maintenance.

**REMEMBER, YOUR SAFETY IS YOUR RESPONSIBILITY.
THINK & PLAN AHEAD ACCORDINGLY. IF IN DOUBT, PLEASE ASK.**

Operation Procedures

4.6 POST DIVE CHECKS

STEP	PROCEDURE DESCRIPTION	CHECK
1	Visual check all over tool looking for any damage or anything unusual.	
2	Invert tool, fill funnel with hot soapy water, open all valves and flush out circuit then flush circuit with fresh water. Connect steam cleaner to manifold block and sample bleed off valve and thoroughly clean circuit with all valves open.	
3	Blow dry with air and close all valves.	
4	Check mechanical connections on the tool are secure.	
5	Check inventory of tool.	

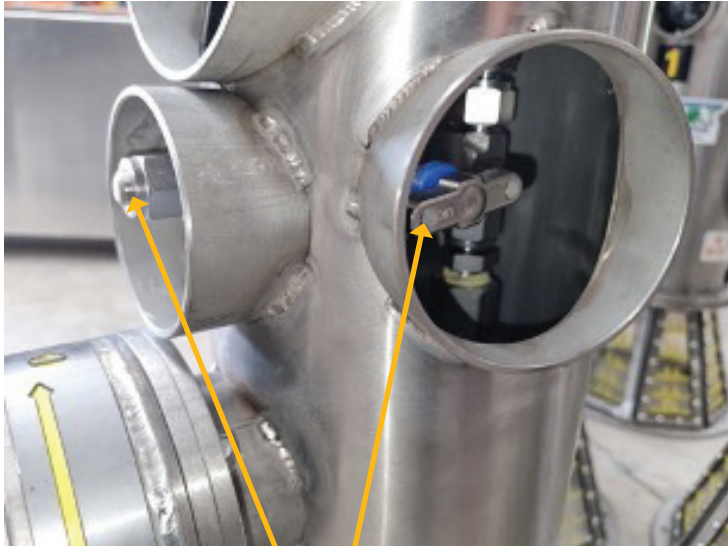
Operation Procedures

4.6 POST – DIVE CHECKS

POST DIVE COMMENTS		
Name:	Signature:	Date:

Operation Procedures

4.7 CLEANING TOOL AND BOTTLE



SAMPLE BLEED OFF VALVE

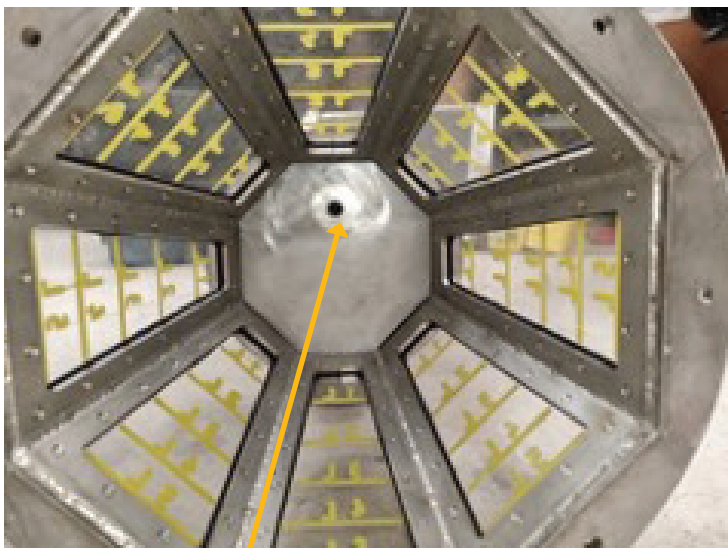
Connect here to flush manifold block through with de-greaser and steam cleaner.

MANIFOLD BLOCK



BOTTLE CONNECTION FITTING

Connect here to flush manifold block through with de-greaser and steam cleaner.



FUNNEL INLET

Open main isolation valve and enter here to flush through valve and plumbing with de-greaser and steam cleaner.

TO CLEAN TOOL

remove sample bottle, open main isolator valve, flush through these ports with hot soapy water to remove all hydrocarbons.

Roll tool full 360 degrees to flush manifold block drillings.

Flush with clean water, blow dry with air.

REMOVE ALL PRESSURE FROM TOOL BEFORE SERVICING

Maintenance & Storage

5.1 STANDARD PROCEDURES

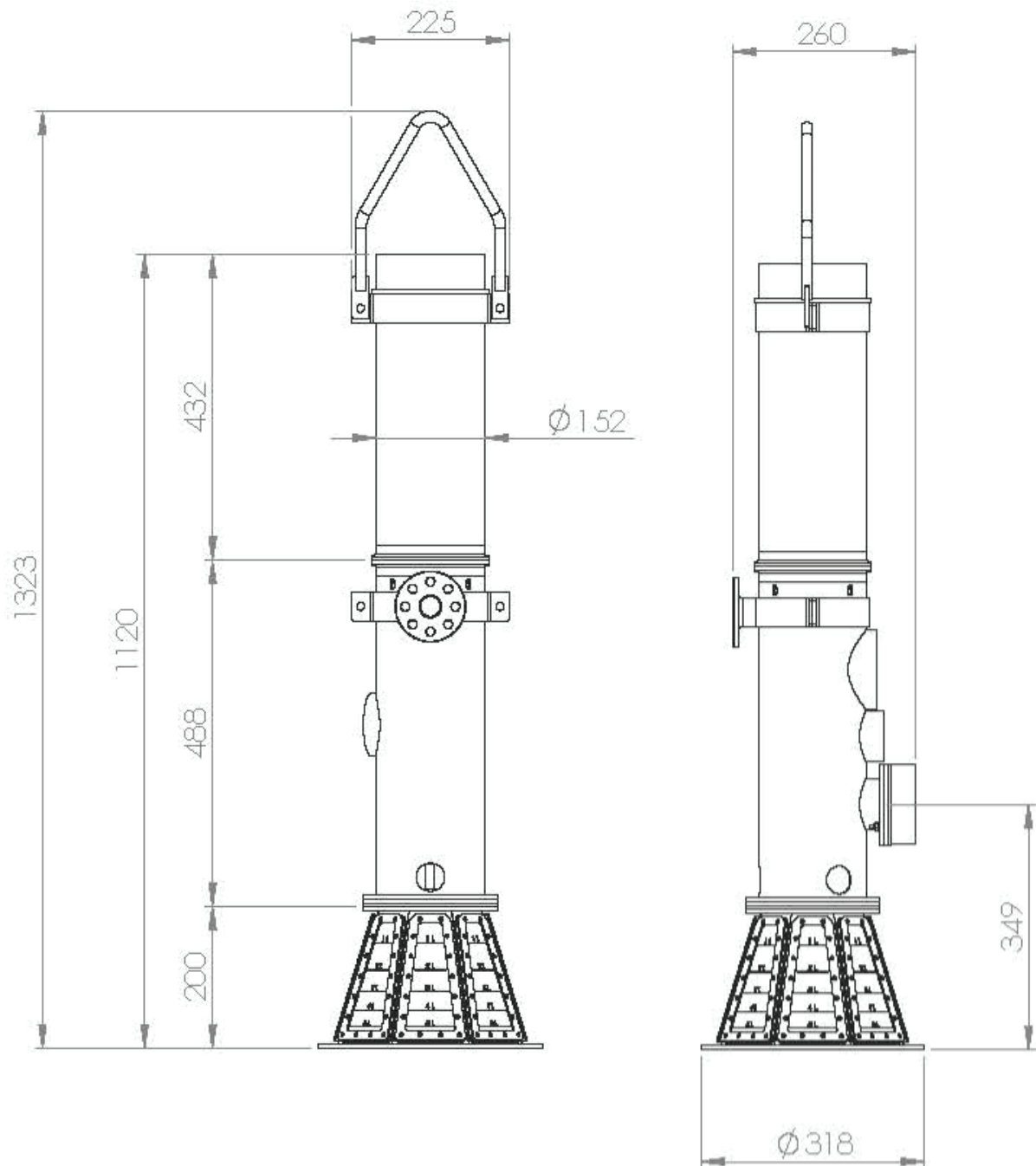
- Tool should be flushed with hot soapy water as per post dive checks.
- Allow to dry fully.
- Check operational condition of valves.
- Visual check of tool for anything which could prohibit future operation of the tool.

5.2 REPLACEMENT PROCEDURES

- Contact Ashtead Technology representatives with reports of any damaged or unserviceable items.
- **Sample bottles must be fully cleaned with records of being decontaminated and returned with records of pressure test post cleaning.**

Appendix And References

6.1 TOOL DIMENSIONS AND WEIGHTS



- Complete tool Weight empty in air = 63 lb (29kg)
- Complete tool Weight empty in fresh water = 50 lb (23 kg)
- Containment bottle volume = 0.264 gallon (1.0 litre)
- Complete tool dimensions = 52 inch (1323 mm) long x 7 inch (180 mm) diameter
- Extra funnel diameter =- 12.5 inch (318mm) Capacity = 6 litre (6.3 quart).

Appendix And References

6.2 INVENTORY

- 1 X sample tool complete.
- 1 X multi fit ROV handle.

Consumables to be replaced at clients cost:

1000cc containment bottle replacement part number: VST-HS8HDY1000

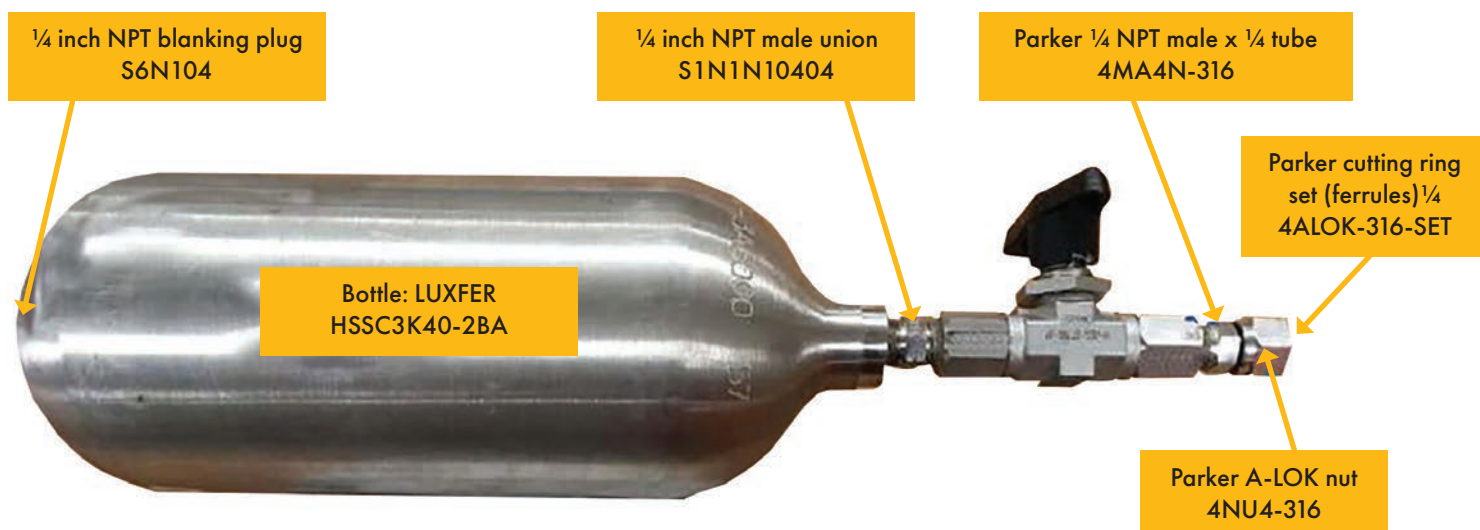
Servicing:

Please return to supplier for servicing.

If in doubt, please ask.

Appendix And References

6.3 BOTTLE PART NUMBERS

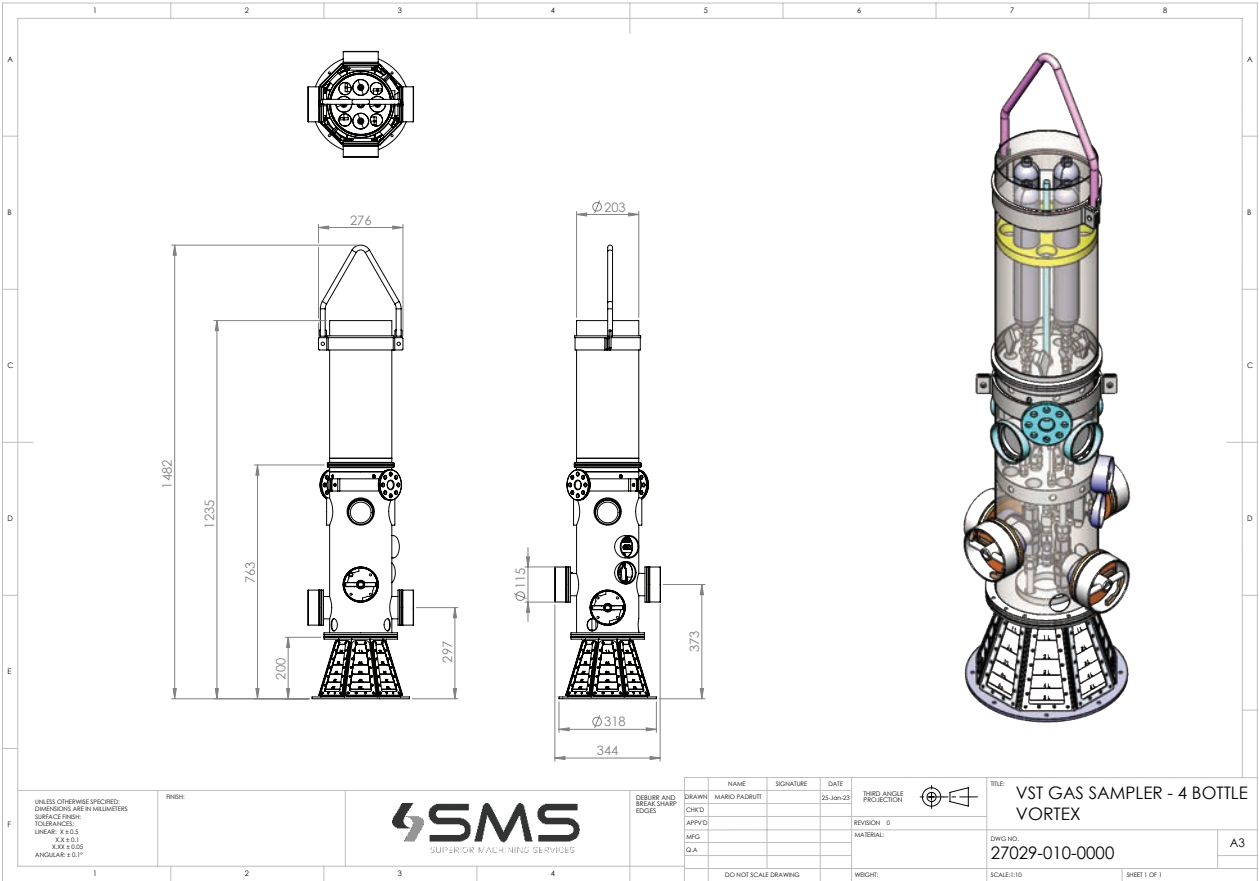
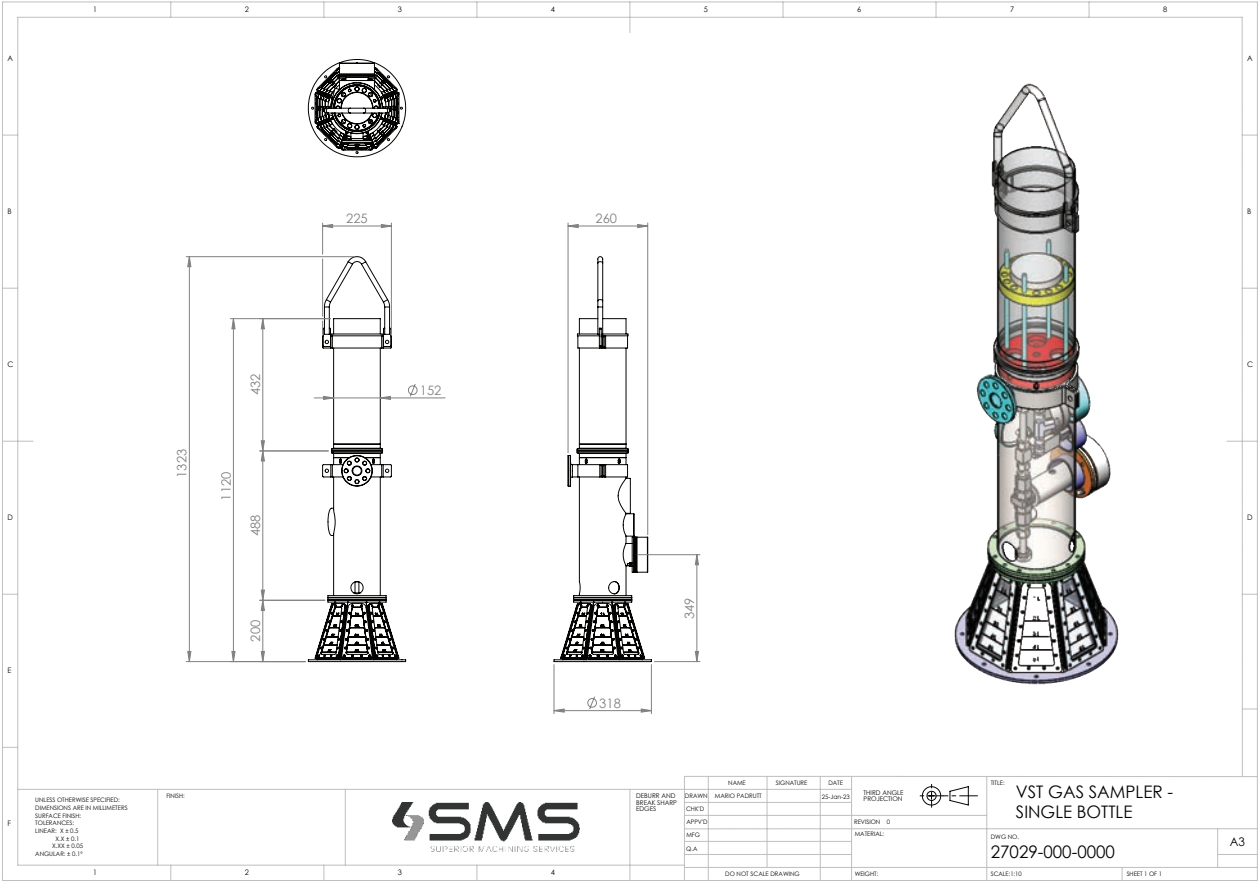


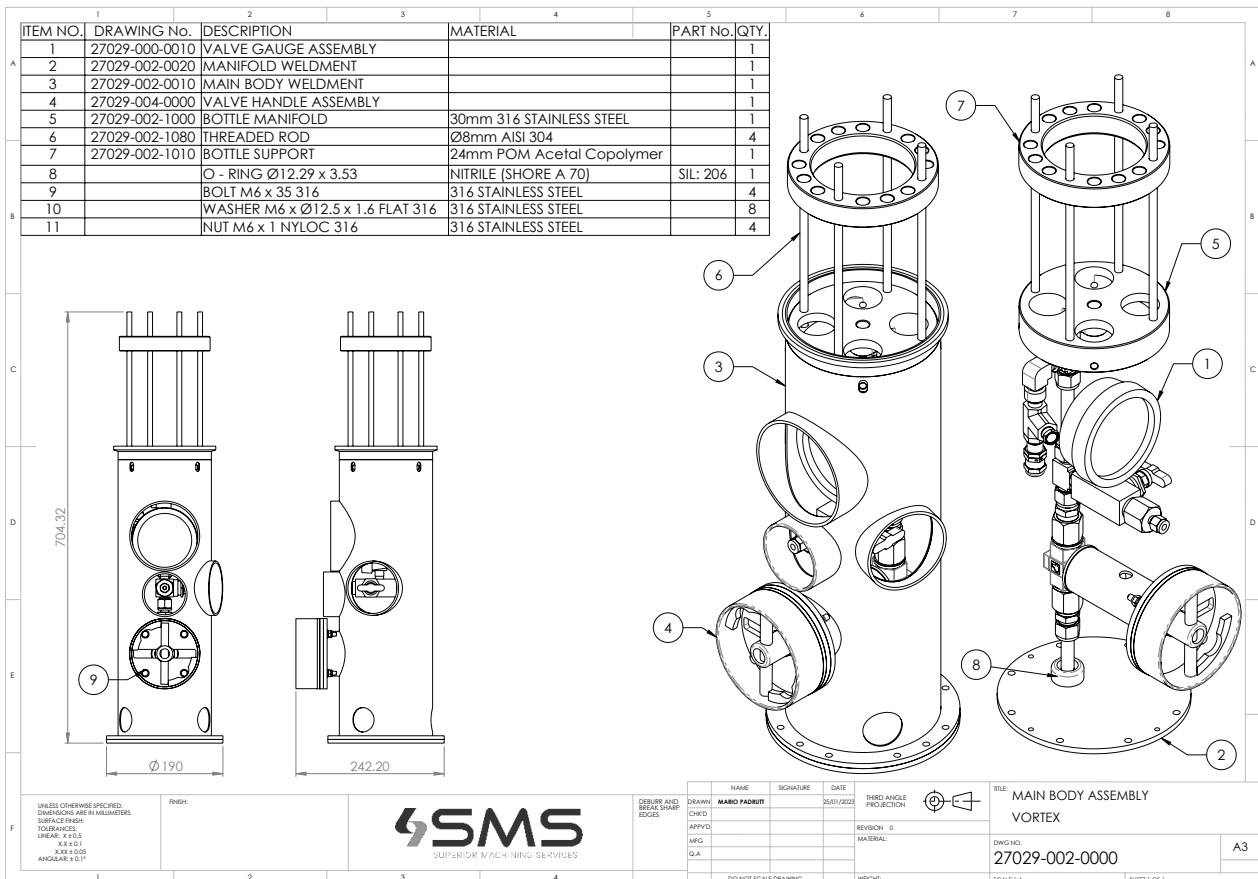
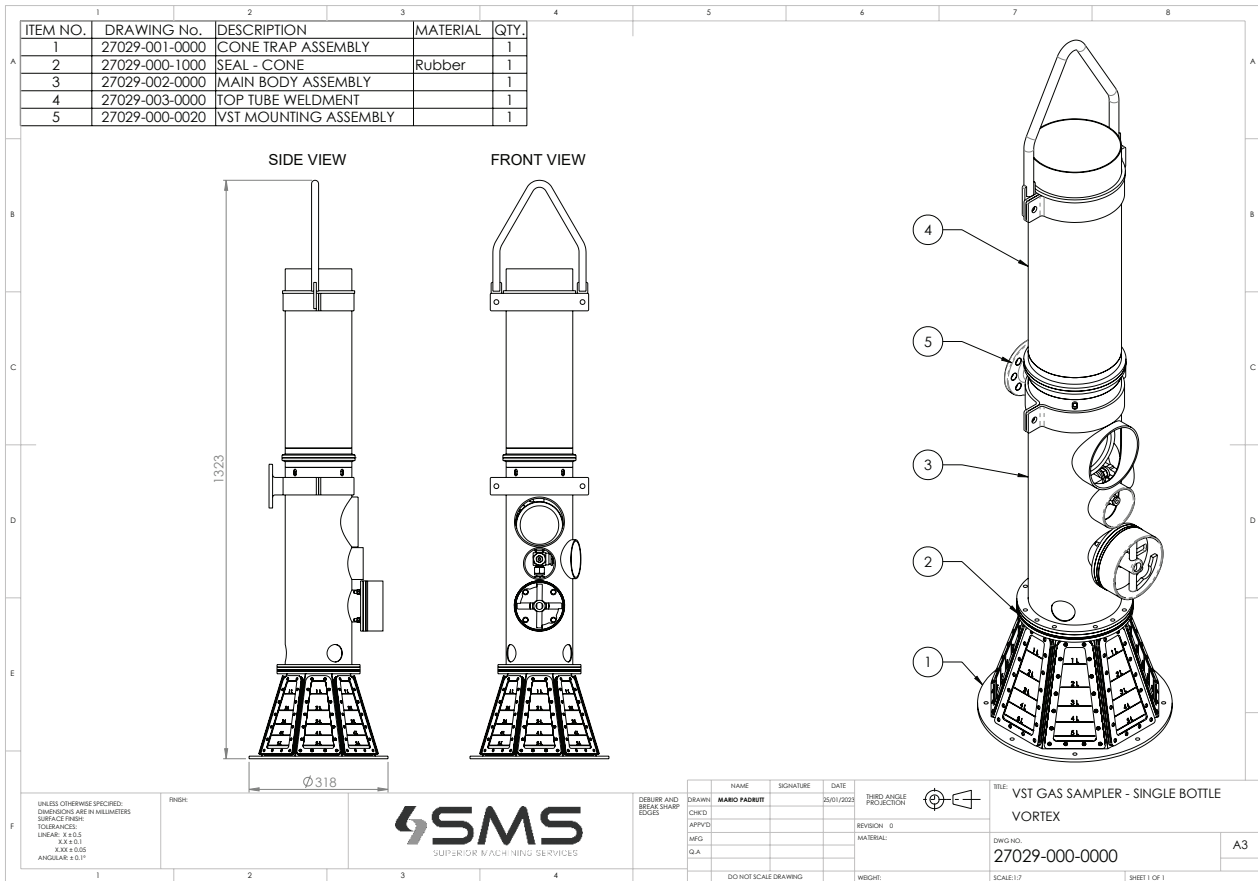
**SINGLE BOTTLE, HIGH PRESSURE
GAS SAMPLE TOOL BOTTLE AS USED.**

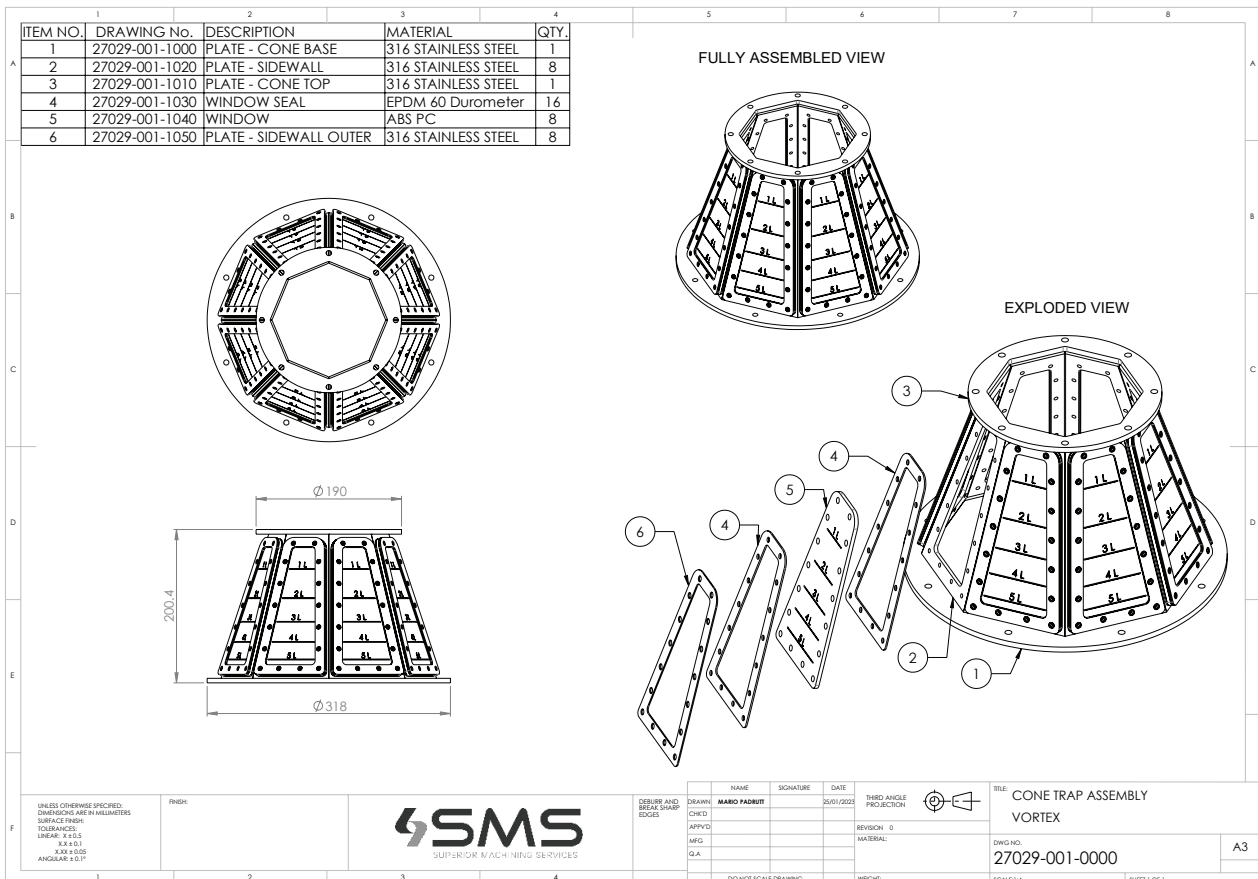
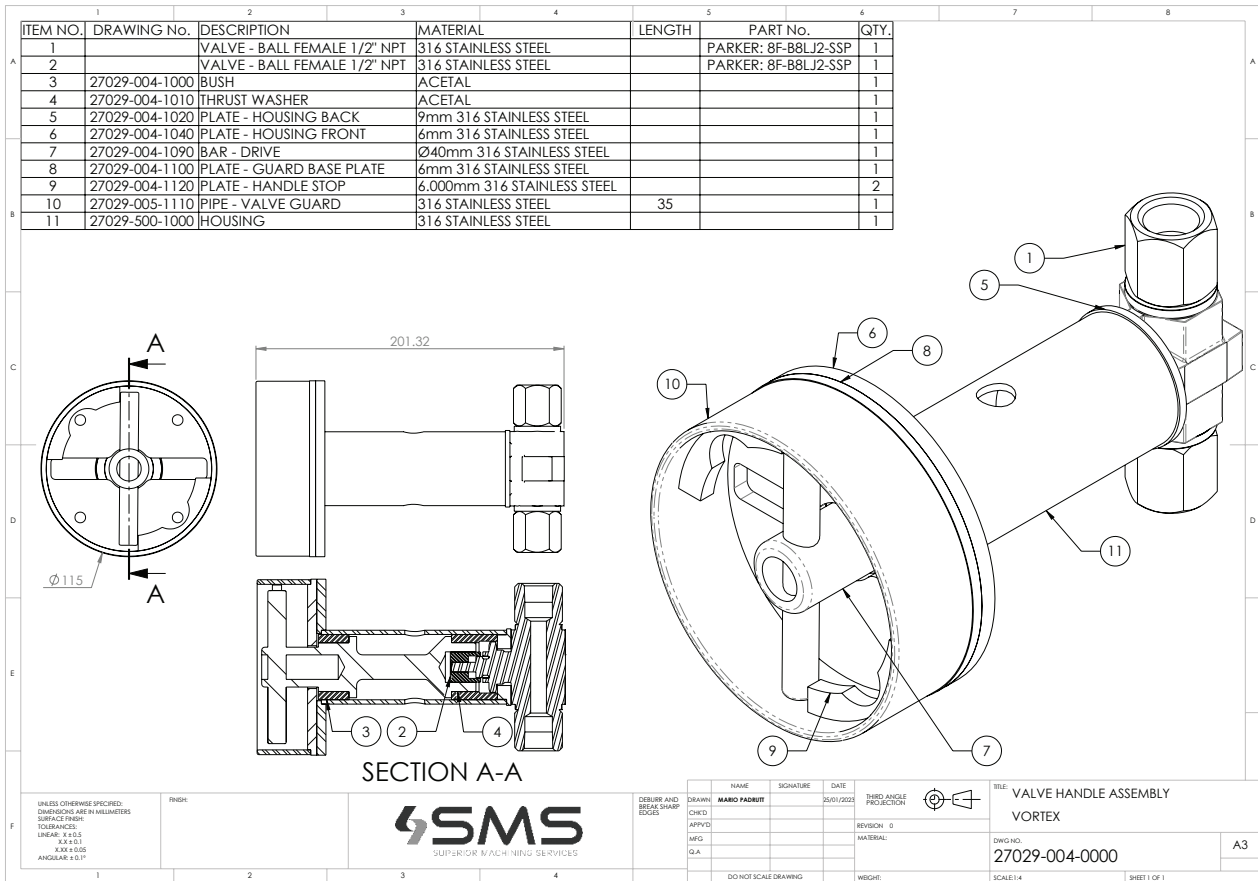


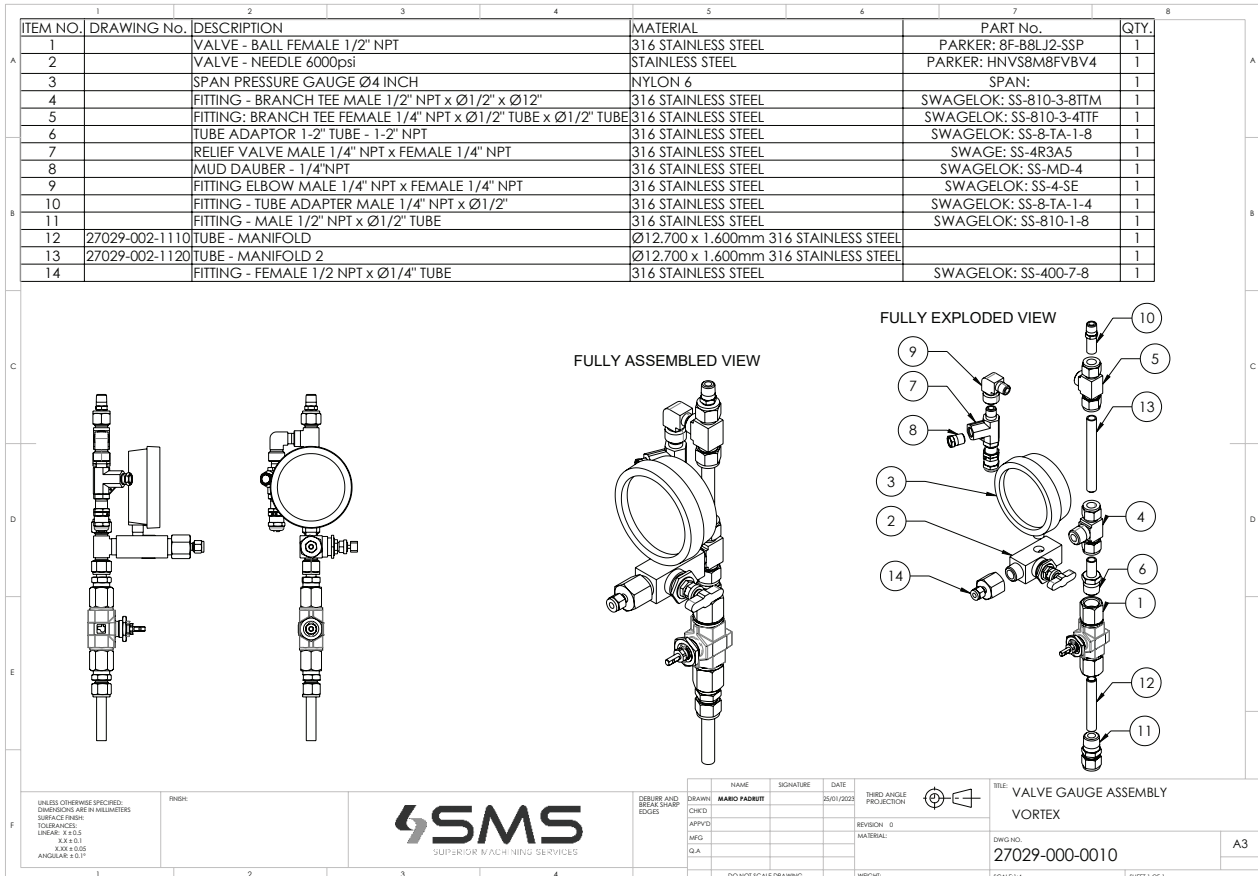
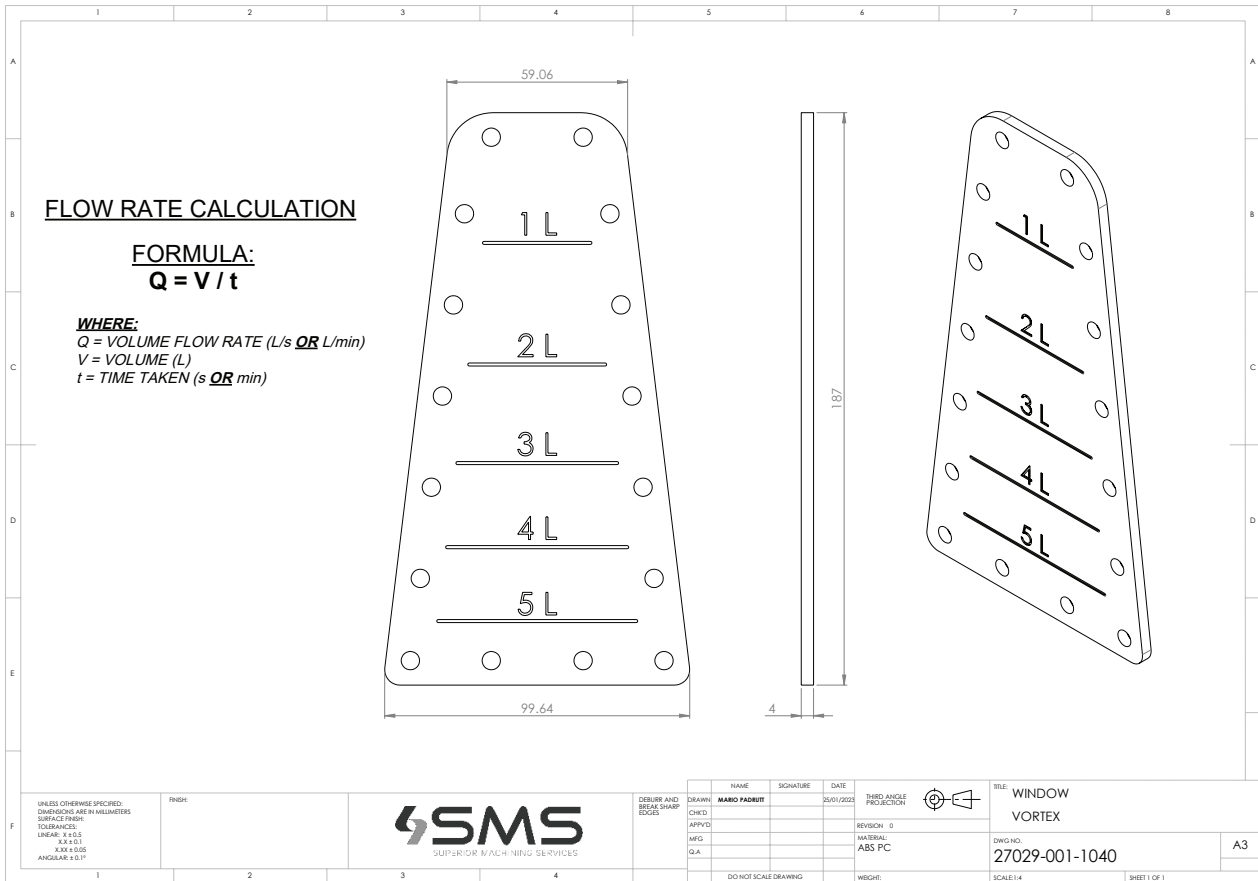
Appendix And References

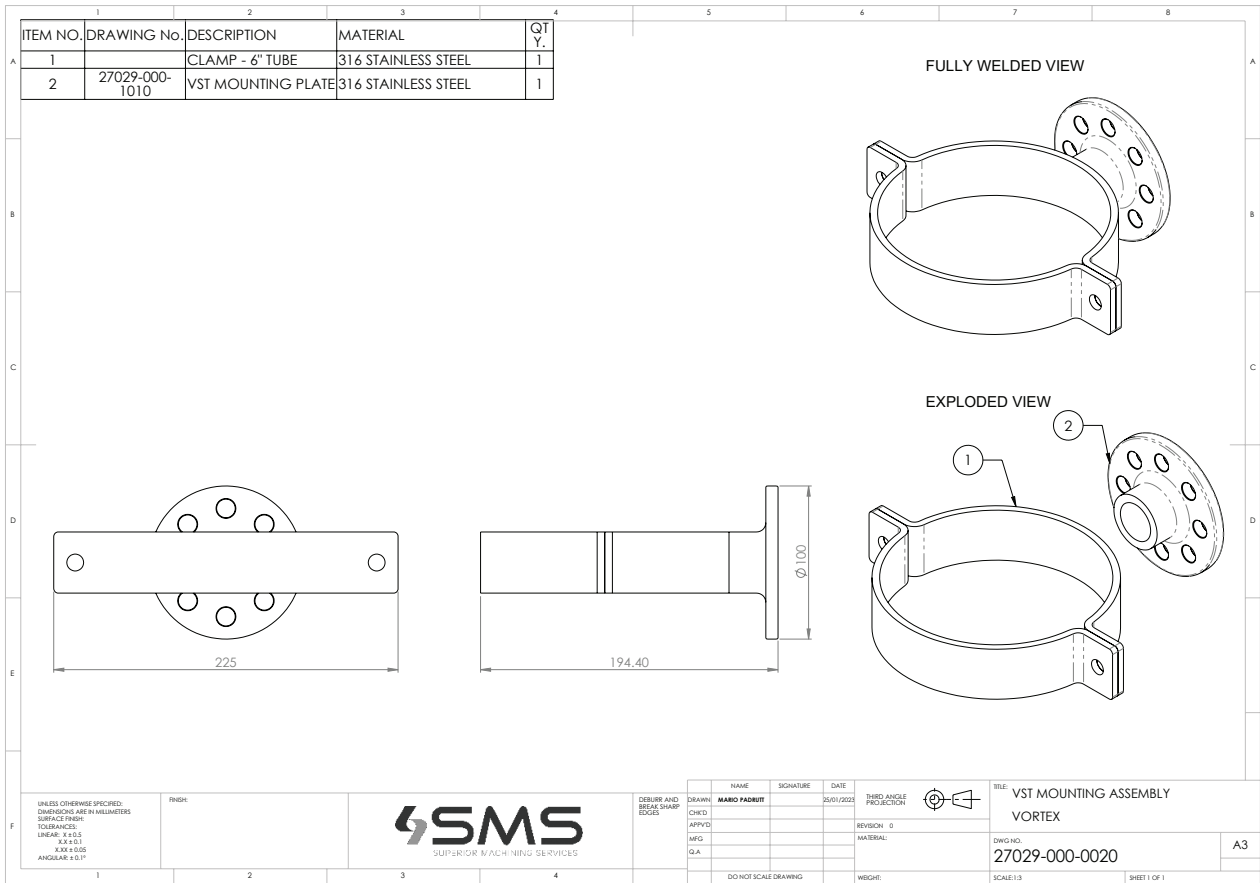
APPENDIX III - PART NUMBERS











Contacts



JOE GOODIN

MANAGING DIRECTOR

VORTEX International Ltd

27 Parrs Road, RD1, New Plymouth, New Zealand

Tel/Fax: +64 (6) 753 8102, Mobile: + 64 (0) 27 688 5372

Email: joe@vortexdredge.com

Website: vortexdredge.com



IN ASSOCIATION WITH ASHTEAD TECHNOLOGY:

ABERDEEN

Ashtead Technology Ltd

Ashtead House, Discovery Drive, Arnhall Business Park,
Westhill, Aberdeenshire AB32 6FG

Tel: +44 (0) 1224 771888,

Email: aberdeen@ashtead-technology.com

SINGAPORE

Ashtead Technology (S.E.A) Pte Ltd

Loyang Offshore Supply Base, 25 Loyang Crescent,
Block 302, Unit 02-12 TOPS Ave 3, PO Box 5157,
SINGAPORE 508988

Tel: +65 6545 9350,

Email: singapore@ashtead-technology.com

HOUSTON

Ashtead Technology Offshore Inc

19407 Park Row, Suite 170, Houston, TX 77084, U.S.A

Tel: +1 281 398 9533,

Email: houston@ashtead-technology.com

SCOPE ENGINEERING

(Ashtead Technology Agent)

Scope Engineering (WA) Pty Ltd

35 Stuart Drive, Henderson, Western Australia 6166

T: +61 8 6498 9642 F: +61 8 6498 9584,

Email: Perth@ashtead-technology.com

INNOVA AS

P.O. Box 390 Forus, 4067 Stavanger

Phone: +47 51 96 17 00

Fax: +47 51 96 17 01

Email: post@innova.no

TES SURVEY EQUIPMENT SERVICES LLC

PO Box 128256

Abu Dhabi, UAE

Tel: + 971 2 650 7710

Fax: +971 2 650 7200

Email: info@tesme.com



vortexdredge.com