



Vapormatt Leopard

Serial Number : M1257

MAINTENANCE MANUAL

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Machine built by: Vapormatt Ltd.,
Monarch Centre, Venture Way,
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Taunton,
TA2 8DE
United Kingdom

REVISION STATUS

Please update this list if new revisions are added.

Date	Revision details	Name	Signature
April 2013	Original	M. Gorczynski	
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1. SAFETY

1.1. SAFETY PRECAUTION

Operator safety:

- 1.1.1. Hand-manipulated process guns must be held securely at all times, and placed on the holding bracket immediately after use. Hand Arm Vibration (HAV) levels experienced when holding Vapormatt blast nozzles are less than the action level (EAV) of 2.5 m/s². However, if the component is held in the hand rather than the blast nozzle, then the vibration exposure is often greater; depending on the component size and shape. If the operator needs to hold the component, each situation must be individually assessed for HAV exposure. This is outside the control of Vapormatt.
- 1.1.2. Do not allow the blast stream from the process gun to come into contact with bare skin. Inspect gloves frequently for damage.
- 1.1.3. Hand – manipulated process gun must be held in hand at all times when operated.
- 1.1.4. Keep clear of the trolley door when opening and closing operation
- 1.1.5. Keep clear of the turntable, especially when loading or unloading machine because turntable can be manually rotated with the door open.
- 1.1.6. To promote hygiene in the use of rubber gloves, use a barrier cream on hands before use, or wear cotton inner gloves.
- 1.1.7. When handling chemicals, care must be taken to avoid contact with the skin, eyes or clothing - in cases of accidental contact, wash the area with copious quantities of water - if in doubt, or in the event of swallowing or contact with eyes, immediate medical advice must be sought.

Note:- APA, SGR and most other Vapormatt media are inert, and present only as dust hazard in handling. For hazards of Vapormatt chemicals see relevant product information sheets for exact details (see 6.3). A white deposit on treated components after drying usually indicates that the chemical concentration is too high.

- 1.1.8. Precautions must be taken against bacterial growth which may have occurred particularly if the machine has been out of use. Refer to HSE document L8 "Legionnaires' disease. The control of legionella bacteria in water systems. Approved Code of Practice and guidance "
- 1.1.9. When the machine or it's accessories are not in use, they must be isolated at the electrical control panel on the machine, or separate isolator for accessories. Air and water services should also be turned off to guard against unattended hoses bursting.
- 1.1.10. Read the operating instructions before use.

1.2. MAINTENANCE SAFETY:

- 1.1.1. When any repair or maintenance work whatsoever is carried out inside or outside the machine (or its accessories), the air, water and electrical supply to the machine must be turned off at the mains and the machine electrical isolator padlocked in the "Off" position. A large "Danger" notice must be displayed to prevent third party interference resulting in injury to Maintenance Fitters from moving or insecure parts and live services.
- 1.1.2. Mechanical component guards must be secure and maintained in good condition.
- 1.1.3. Door lifting mechanisms, hinges and locking devices must be frequently inspected and maintained in good condition.
- 1.1.4. Inspect machine for sharp edges which may damage hands.
- 1.1.5. Inspect abrasive, air and water delivery conduits for damage that could cause injury.
- 1.1.6. At no time should door limit switches or electrical interlocks be interfered with for Operator or Maintenance Personnel convenience.
- 1.1.7. Precautions must be taken against bacterial growth which may have occurred particularly if the machine has been out of use. Refer to HSE document L8 "Legionnaires' disease. The control of legionella bacteria in water systems. Approved Code of Practice and guidance "

2. DESCRIPTION

2.1. GENERAL DESCRIPTION

The machine is designed to process pistons using turntable's satellites, crowns and fan blades. Component will be mounted either to satellite or directly to turntable and cleaned using wrist movable gun. Cleaning process includes rinsing.

The machine contains manual workstation with folding shelf, designed for cleaning smaller components. External rinsing gun can be used for rinsing.

Blasting media

The equipment is set up to operate with glass abrasive size: SGR 50/80 mesh.

Auto Operation

- The operator use 2 hand start switch to open trolley door and to rotate turntable.
- The operator can place up to 18 pistons mounted into satellites with suitable adaptors or piston crown in the centre of turntable, smaller component must be attached using fixture supplied by customer
- different size of pistons can be used in satellites
- The operator must use 2 hand start switch to close the trolley door
- The operator selects processing type, satellites numbers and recipe
- Blast nozzles will start processing selected components according to a recipe
- Components will be rinsed according to selected recipe
- The operator then uses the two hand start switch to open trolley door and unload turntable.

Manual Workstation Operation

- The operator use 2 hand start switch to open trolley door and to rotate turntable.
- The operator must remove any pistons from turntable prior to using the manual workstation
- Shelf must be folded down
- The operator loads components on the shelf
- The operator must use 2 hand start switch to close the trolley door
- Foot switch must be used to process component (gun must be kept in hand prior to blasting)
- The operator then uses the two hand start switch to open trolley door and unload shelf.

Abrasive Slurry System

Two 50mm Vapormatt Vortex high efficiency glandless units made from polyurethane fitted with HS impellers and driven with two electric motors. 5.5kw (jet guns & slurry filtration). Pump one feeds the jet.

Pump Two feeds the abrasive elutriation tower separation system and sump agitation system. The agitation nozzles are fitted with replaceable deflector wear pads.

Provision of separate pumps for process slurry agitation / filtration and process gun feed facilitates a high level of control over the process slurry pressure and flow and hence improves slurry control and repeatability.

The slurry system has an automatic media concentration meter, for periodic slurry / solids concentration measurement.

A manually operated sight glass is provided for calibration of the electronic meter.

Electrical Control System

The machine is provided with a sophisticated control system accessed via a Mitsubishi HMI unit. All on screen instructions will be in English. The general machine electrical control system includes a Mitsubishi PLC and all other necessary contactors, MCB etc. to allow proper operation of the equipment. Electrical equipment is mounted in an IP56 enclosure positioned at the left hand side of the jet cabinet.

Trolley door

A stainless steel trolley is provided and runs from the load end, into the blast zone/ rinse zone. The door is driven by an AC motor gearbox unit, fed by an inverter speed control unit. Two sensors monitor the position of the trolley when either open or closed and one safety sensor to run pumps only when trolley door is fully closed.

Satellites

A stainless steel rotational mechanism is provided to blast and rinse up to 18 components during one blasting process. All satellites can be access by rotating turntable via 'two hand start' safety system. Different component size can be used by changing insert size. Each satellite is driven via anodized aluminum pulley and double sided belt

Satellite drive box

Fully sealed box with double sided belt system is provided to rotate one of 18 blasting components. Box will engage and disengage when selected satellite is in the blasting position.

Oscillation System

A roof mounted horizontal 'Y axis' and vertical 'Z axis' oscillation system is provided in the blast cabinet. The assembly is mounted externally to the cabinet to prevent media and water encroachment into critical bearing areas. The drive is by an AC 4 pole motor gearbox unit, fed with variable frequency alternating current from an inverter speed control unit.

Blast Gun Head

The machine will be provided with 4 Vapormatt jet guns. These are made from solid polyurethane fitted with special, high consistency boron carbide nozzles. The nozzles are on an movable gun head so jet angles can be incorporated into process recipes. Gun head include two rinse nozzles.

Recirculatory Rinse

Spray jets are positioned above the component and are supplied with water from a recirculated rinse system. This system allows the equipment to operate in a closed loop mode with the need for a permanent connection to a drain for emergency overflow purposes. This has the advantage of lowering the fresh water consumption.

Continuous Blast Slurry Filtration

The machine will remove broken down media and blasting debris with an abrasive pump fed elutriation system. The waste solids are fed to a raised level sedimentation tank where they collect, awaiting manual emptying. The water return is used to feed the rinse nozzles.

Cabinet Exhaust System

The cabinet vent must be connected to the factory extraction system. The extraction rate and vacuum level required is detailed in the specification section.

Sound Attenuation

The machine is fitted with internal sound reduction panels which reduce the level of sound emitted around the machine at 1 m distant and 1.5 m high, to lower than 80 dBA when operating at 4 Bar: noise external to the machine excluded. Vapormatt have carried out a great deal of research into noise reduction and believe that the Leopard fitted with the Vapormatt panel is the quietest in its class.

Manual work station

A stainless steel shelf is provided to blast smaller components up to 25kg max weight. To blast components manually the operator must release the shelf and unfold when trolley door open.

DECLARATION OF CONFORMITY with:-

- 1 EC MACHINERY DIRECTIVE: 2006/42/EC.
- 2 EC ELECTROMAGNETIC COMPATIBILITY DIRECTIVE: 2004/108/EC.
- 3 EC LOW VOLTAGE DIRECTIVE: 2006/95/EC applicable standards applied:-
BS EN 60204-1:2006+A1:2009: Safety of machinery - Electrical equipment of machines.
BS EN 954-1:1997: Safety of machinery - Safety related parts of control systems.
- 4 EC PRESSURE EQUIPMENT DIRECTIVE: 97/23/EC

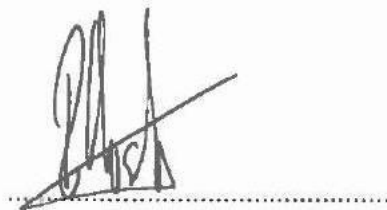
Machine manufactured by:-

**VAPORMATT LTD.,
Monarch Centre,
Venture Way,
Taunton, Somerset, TA2 8DE, UK**

Machine description:-

**Vapour blast surface treatment machine
Make and Model: Vapormatt Leopard
Serial Number: M-1257
Year of manufacture: 2013**

This machine complies with the requirements of the above directives.



Date: 12 November 2013

Signed:

R Austin, Operations Manager

Mr R. Austin has been authorised by the board of directors to sign this declaration on behalf of the company, he can be contacted at:-

Vapormatt Ltd.
Monarch Centre, Venture Way,
Taunton, Somerset
TA2 8DE
UK

2.1. TECHNICAL SPECIFICATION LEOPARD M1257

HMI and control panel

See operator manual for full HMI settings

The software for the machine remains the property of Vapormatt Ltd and may not be changed.

Services Required:

Electrical supply:-

operating voltage; 380 / 440 volts
3 phase and earth
frequency; 50Hz
load 40amps supply with isolator
The supply should be fitted with an RCDs.
Isolation switch is on electrical cabinet side

Process Air supply:-

max pressure 7 bar (100psi)
min pressure 6 bar (60psi)
max consumption 6800L/min, (240CFM)
connection 1.5" BSP
quality DIN ISO 8573-1: class 5.6.4
The pipework is marked light blue as per 92/58 EEC
Isolation valve for blast cabinet on back wall of blast cabinet

Towns Water supply:-

For machine fill, top-up
max pressure; 7 bar (100psi)
min pressure; 2 bar (30psi)
capacity 580L sump +380L filtration;
connection; 12.7mm (1/2") BSP
quality: drinking quality.
The pipework marked dark blue as per 92/58 EEC
Isolation valve for blast cabinet on back wall of blast cabinet

Drainage – pumped:-

Floor level, Ideal size 150mm, minimum 100mm. flow rate 40l/min.
(9 gpm) intermittent.

Extraction:-

432 m³/hour (7200 L/min) maximum.
Customer to supply suitable extraction.

Foundations:-

A waterproof flat and level floor is required to take a point load of 0.9 ton.

Machine weight:-

Machine weight (empty) = 4500 kg
Total machine weight (with water but no components) = 5100 kg

Networking:-

PLC is connected to HMI via Ethernet

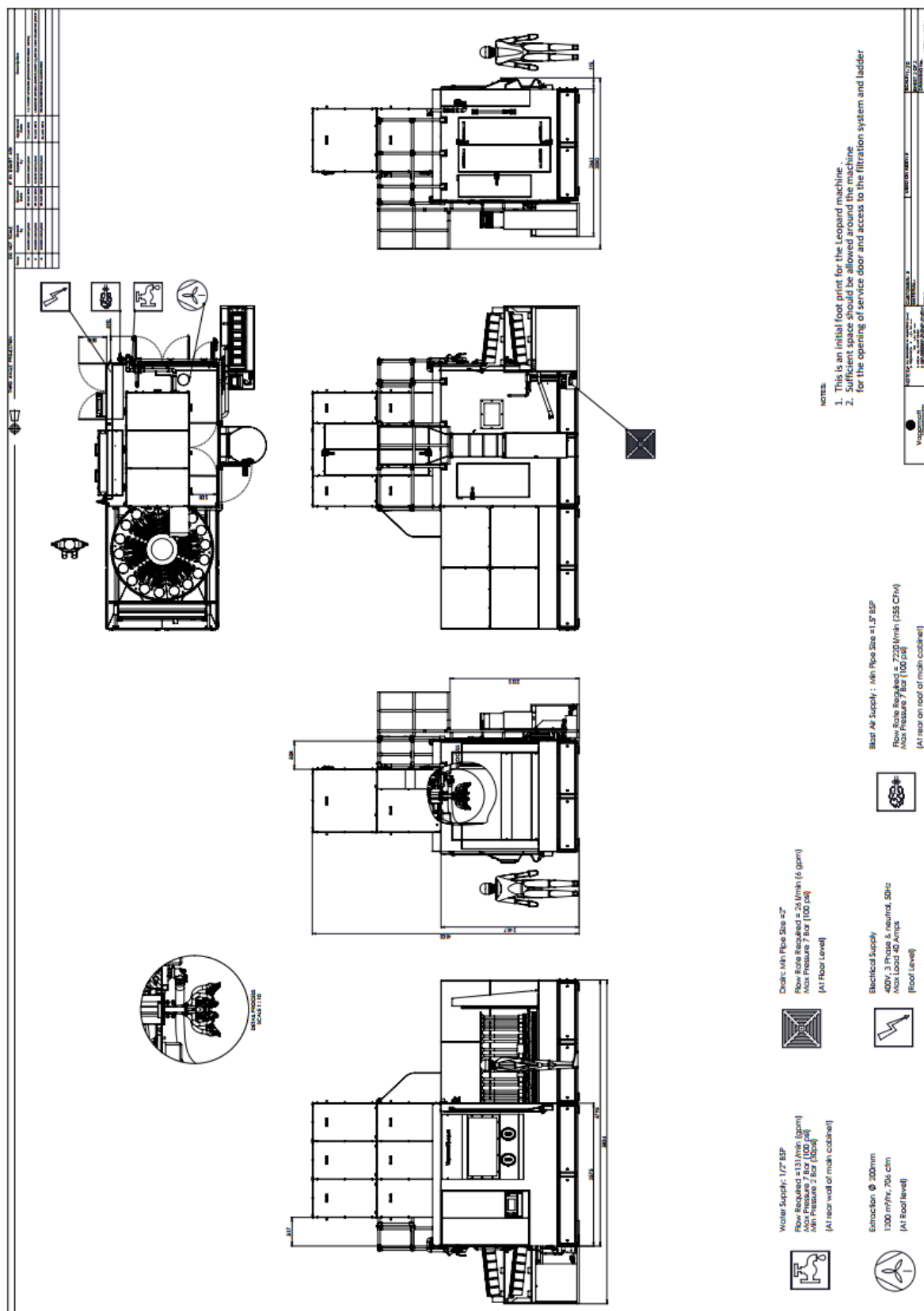
HMI: IP 192.168.1.150
PLC: IP 192.168.1.151

Specification:-

The machine will automatically wet blast pistons and valves. Any pistons larger than Ø225mm must be fixed in the centre of the turntable, valves up to 800mm long can be mounted in satellites around the turntable;

automatic blast nozzles process the parts surface when component is driven in rotation motion whilst the blast nozzles are driven in an independent vertical & horizontal motion and wrist's radial motion. Automatic rinsing is carried out using re-circulated water.

Gun angle:-	±60° from horizontal line
Vertical oscillation:-	1100mm total stroke
Horizontal oscillation:-	1530mm total stroke
Contraction:-	Welded stainless steel
Load door:-	Trolley door
Window:-	double glazed with auto rinse and wiper; double glazed with manual wash spray
Blast Guns:-	4 off manifold guns made from solid abrasive resistant polyurethane and fitted with Ø12mm boron carbide nozzle Valves:- Automatic air and water valves control the flow of these elements to the process nozzles.
Pumps:-	Two Vapormatt Vortex High Efficiency Abrasive Pumps are provided. All pumping elements are made from solid polyurethane which gives exceptional abrasion resistance. Pump One feeds four process nozzles. Pump Two feeds the abrasive filtration re-circulation and agitation systems.
Process water condition:-	An abrasive water filtration system is provided. This consists of an abrasive separation elutriation tower mounted inside the cabinet. This removes broken down abrasive of a predetermined size from the abrasive water circulation which is then directed to a cascade of settling tanks which collect the broken down abrasive. Weekly emptying is required. The cleaned liquid gravitates to storage tank. The water stored in the tank is re-circulated to the cabinet sump with a diaphragm pump through cartridge filters. The re-circulated water feed the auto rinse nozzles, the spinning nozzle, the manual rinse gun, and the window wash bars.
Mains Water:-	Main water fed system is provided for the sump top-up.
Blast Sump overflow:-	An automatic overflow valve is fitted to the blast cabinet sump. Its operation is controlled by a timer which can be adjusted to suit the falling rate of the abrasive in circulation. Liquid leaving the machine is first directed to a settling tank and then to the drain.
Electrical controls:	This is housed in a lockable cabinet with isolator positioned at the rear of the machine. Safety interlocks prevent machine operation when the doors are open.



2.2. CERTIFICATE OF RECORDED SOUND LEVEL

Date of test: 01.10.13

Machine serial number: M-1257

Site where machine was tested: Applied Automation, Plympton, UK

Test meter type:

Background noise level: < 50 dbA

Blast Guns Air Pressure: 4 bar

Test technician: Marcin Gorczynski

Test No	Location of test meter relative to machine	Height of test meter above floor (m)	Machine process status	Noise level Measure d (dbA)
1	Front (manual workstation)	1.5	Blasting – doors closed	77
2	Right Hand Side (load end)	1.5	Blasting – doors closed	75
3	Left Hand Side (pumps)	1.5	Blasting – doors closed	77
4	Rear	1.5	Blasting – doors closed	78

Signed:-

.....

3. OPERATION

3.1. CHECKING ABRASIVE CONCENTRATION

The effectiveness of a vapour blast machine is largely dependent on the quantity of abrasive media being pumped to the guns. This quantity is measured as the percentage, by volume, of abrasive media in the slurry stream. After the machine is filled with a new abrasive charge the slurry concentration will gradually decrease due to breakdown and carry-out. The breakdown rate is usually between 1 kg and 3 kg per gun per hour, dependant on :

- Media type; Glass breaks down more quickly than alumina
- Air pressure supplied to blast gun and gun range; higher air pressure and short range results in higher impact and thus higher breakdown rate.
- Material being blasted; if the blast stream is impacting a hard surface e.g. steel the breakdown rate is faster than if the target surface is more resilient e.g. plastic.

Furthermore, some media will be out of circulation as it will adhere to the internal cabinet surfaces, this is why frequent rinsing is important.

To obtain a good surface finish, the abrasive concentration within the slurry should be checked to be about 15% at the start of each cycle.

Manual checking of abrasive concentration:

By using a slurry sample valve.

Method:

Whilst the machine is blasting, take a sample from the slurry sampling valve, which is positioned at the rear of the machine below the sight glass.

This initial slurry sample can later be returned to the cabinet.

Take another 1 litre (2 pints) sample from the machine as before, but this time into a measuring cylinder (available from Vapormatt). Set the measuring cylinder on a flat surface and leave for 60 seconds, to allow the good abrasive to settle.

At the end of this period, read off the volume of solid abrasive at the bottom of the cylinder.

Repeat the complete test 3 times and take an average value of the results.

The abrasive concentration within the slurry should be checked to be between 15% and 20% (other values may be used for specific applications refer to local procedures).

Using an abrasive sight glass.

Operation:

The abrasive sight glass is fitted at the back of the machine right to the pump enclosure. To operate, start the machine. Open the valve feeding the sight glass, and allow the slurry delivery to stabilize for approx. 30 sec. **Do not leave the valve open** for extended periods, as this will cause slurry hoses to wear out VERY QUICKLY (8 hours) and the clear tube will quickly become opaque due to internal abrasion. Close the valve and turn off the machine. Wait for about 60 seconds for the good abrasive to settle to the bottom of the sight glass. The level of abrasive can now be seen, and the percentage concentration read directly off the scale. If un-scaled, then measure the distance from the top of the end cap to the underside of the return tee (A). Then measure the height of abrasive above the end cap (B).

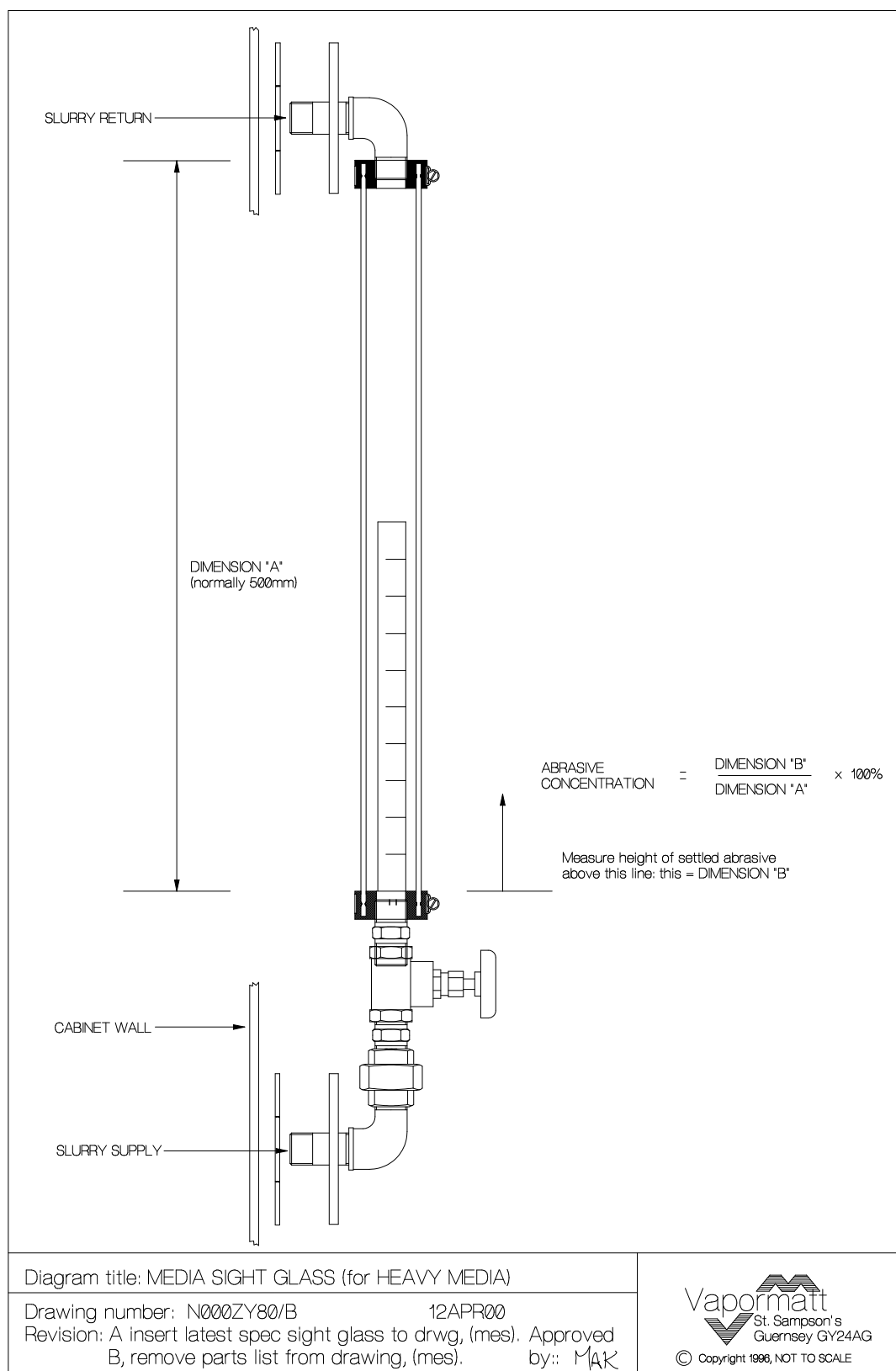
(For a sight glass with the valve at the bottom; measure the distance from the top of the valve to the underside of the elbow at the top of the sight glass (A) and the distance from the top of the valve to the top of the settled abrasive (B).

The abrasive concentration in per cent is $(B/A) \times 100$ and should be between 15% and 25%.

Maintenance:

The sight glass will gradually become opaque due to internal abrasion, and will need replacing. It is removable by undoing the unions - replacement sections are available from Vapormatt (but state length and outside diameter required). Note: Where machines are fitted with slurry enricher where slurry enrichers are fitted, and the take off point for the abrasive sight glass is plumbed in before the enricher. The actual abrasive concentration at the gun will be approximately double the reading on the sight glass.

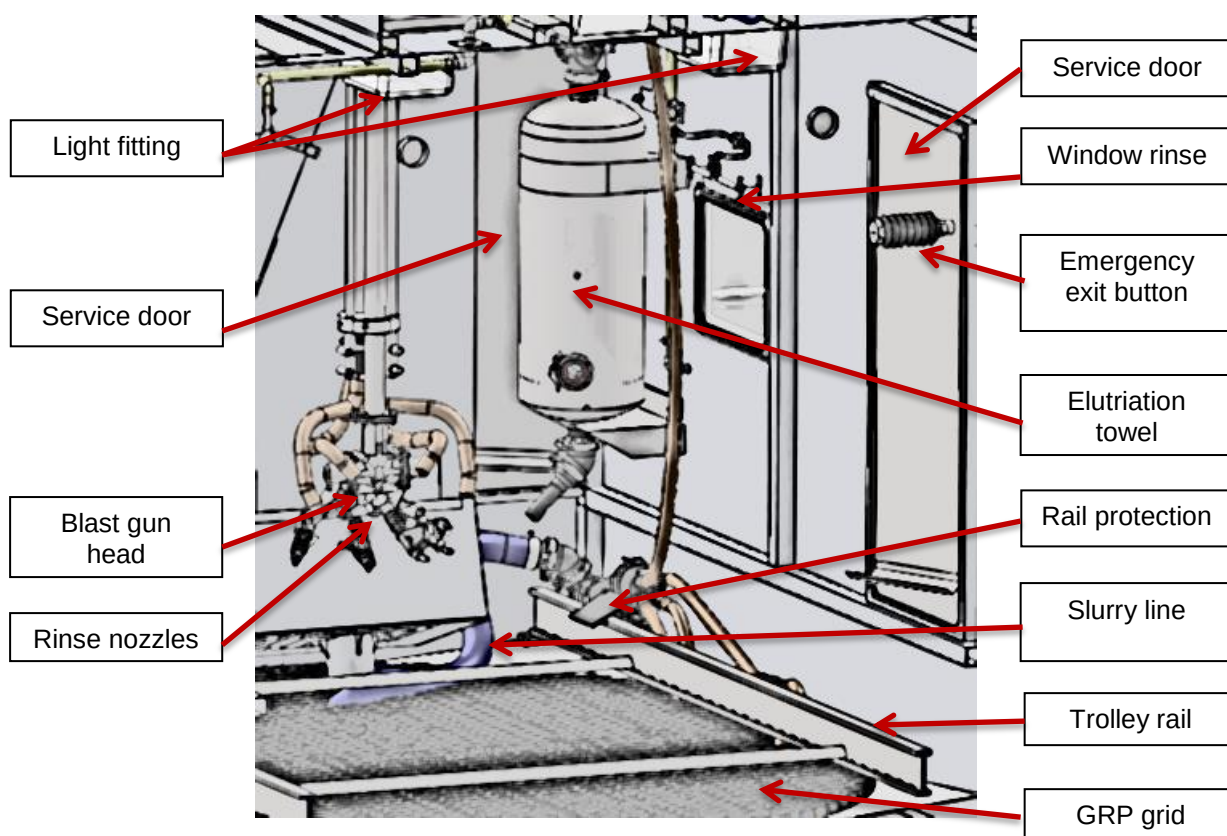
Drawing N000ZY80, Sight glass (heavy media)



3.1. BLAST ZONE

The blast zone is located above turntable when trolley door closed. Access to the Blast zone is from two of the service doors.

Figure 1. Shows the blast zone with service doors open.



Blast gun head:

4x blast guns located in the bracket attached to gearbox that is moved through the blasting process by a roof mounted oscillation system. This system is controlled by the HMI.

Rinse nozzles:

2x rinse nozzles located in the bracket that is moved through the blasting process by a roof mounted oscillation system. This system is controlled by the HMI.

Slurry line:

The slurry line is a vital part of the blasting process. The slurry line takes media from the blast sump via electrical pump and feeds the guns. (See slurry schematics for full process information)

Elutriation tower:

The elutriation tower is part of the filtration system. The unit is supplied with media via an electric pump in the sump. Media is then sorted and passed back to the sump or filtration. (See elutriation tower section for more information)

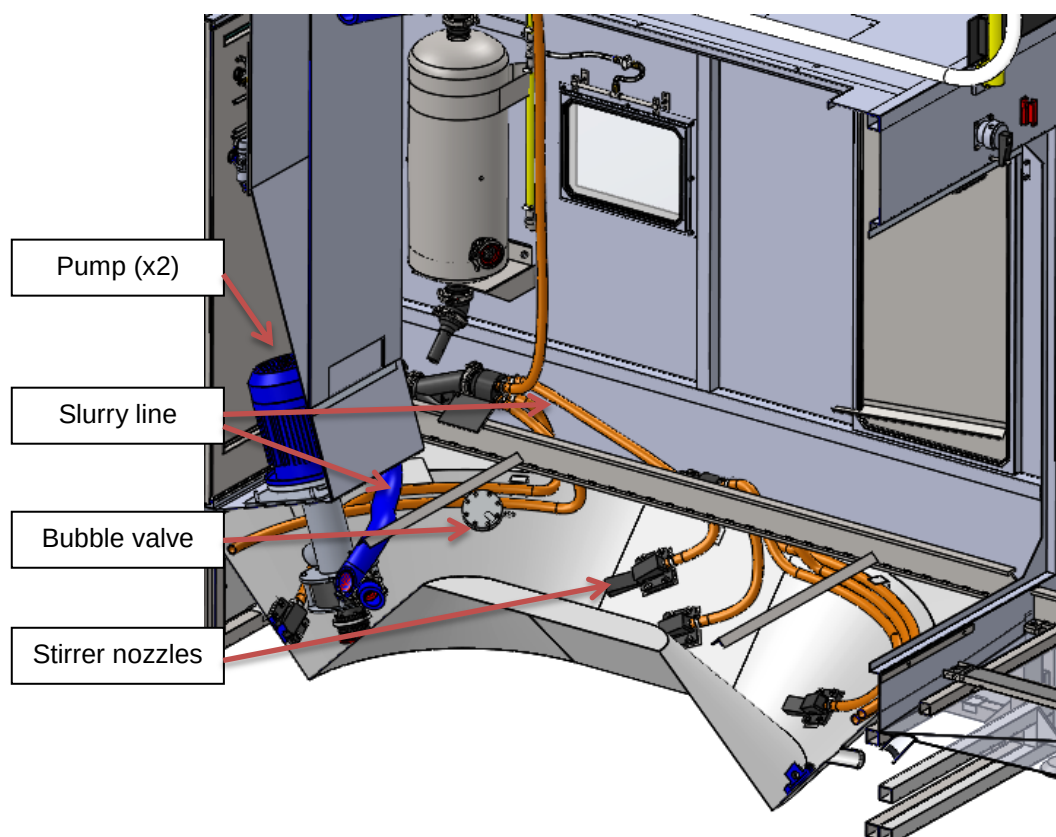
Light fitting:

The machine is fitted with four bulkhead light fittings: both of these units are IP rated. All these units are located in the blast zone.

Trolley rails:

The trolley rail guides the trolley door. These need to be cleaned down at regular intervals to avoid media build-up.

Figure 2. Blast zone sump – cross section.



Stirrer nozzles:

The deflector stirrer nozzles which are mounted in the sump of the blast cabinets play a vital role in the Vapour blast system, if the stirrer orifice should become blocked, stirring of the media in the sump will be reduced, causing a reduction in abrasive concentration in the blast stream. If slurry concentration drops abnormally, check the stirrers. They are retained in a mounting "shoe" which permits easy removal and replacement. If the deflector stirrer is removed from its locating shoe, for renewal or to remove a blockage, it must be replaced securely, if the deflector stirrer were to come free from its retaining shoe - media concentration at the gun would become erratic, and damage to the sump could occur. In the worst case the uncontrolled stirrer jet could cause the cabinet sump to be ruptured. Failure to replace badly worn deflector stirrers will lead to a reduction in blast performance, and could also result in the cabinet sump becoming ruptured. Replace the deflector stirrer if the slurry outlet port is worn to more than 12mm in diameter, or if the deflector ramp is significantly eroded.

Do not exceed the recommended abrasive charge, this may with some medias reduce the abrasive concentration in the slurry reaching the blast guns as the stirrer jet may not be powerful enough to move / mix excessive quantities of abrasive .

3.2. HORIZONTAL & VERTICAL OSCILLATION UNIT

Description:

During normal operation this unit automatically processes blasting components.
Attached gun head can move vertically and horizontally according to created recipe, manual movement is also allowed.

Oscillation error movement is $\pm 1\text{mm}$
Horizontal linear speed 0.15-0.015m/s
Total horizontal stroke – 1210mm (including overrun)
Vertical linear speed 50m/sec @ 50Hz
Total vertical stroke 1100mm (including overrun)

The horizontal process speed is continuous and can be adjusted.

Before undertaking any work on the oscillation drive system, ensure the drive motor is isolated from the power supply.

Instruction for replacing the oscillation assembly

- 3.2.1. Disconnect all hoses and energy chain from bracket
- 3.2.2. Disassemble motor, gearbox and gun angle limit switch assembly (see section 3.3.1)
- 3.2.3. Disconnect 4 bellows (1 vertical and 3 horizontal)
- 3.2.4. Disassemble blast gun manifold assembly (see figure 4)
 - Unsecure air water and slurry pipe using side bolts (see figure 4)
 - Disassemble clamp plate which hold driving shaft (see figure 4)

Note: Take special care when removing plate - **gun head assembly will drop**

- 3.2.5. Remove front oscillation enclosure wall (see figure 3.)
- 3.2.6. To remove HepcoMotion© oscillation assembly remove 24 screw and T-nuts (see figure 5.)

Note: Take special care when removing oscillation - **assembly will drop when no screws**

Figure 3. Oscillation enclosure – dismantle front wall & door

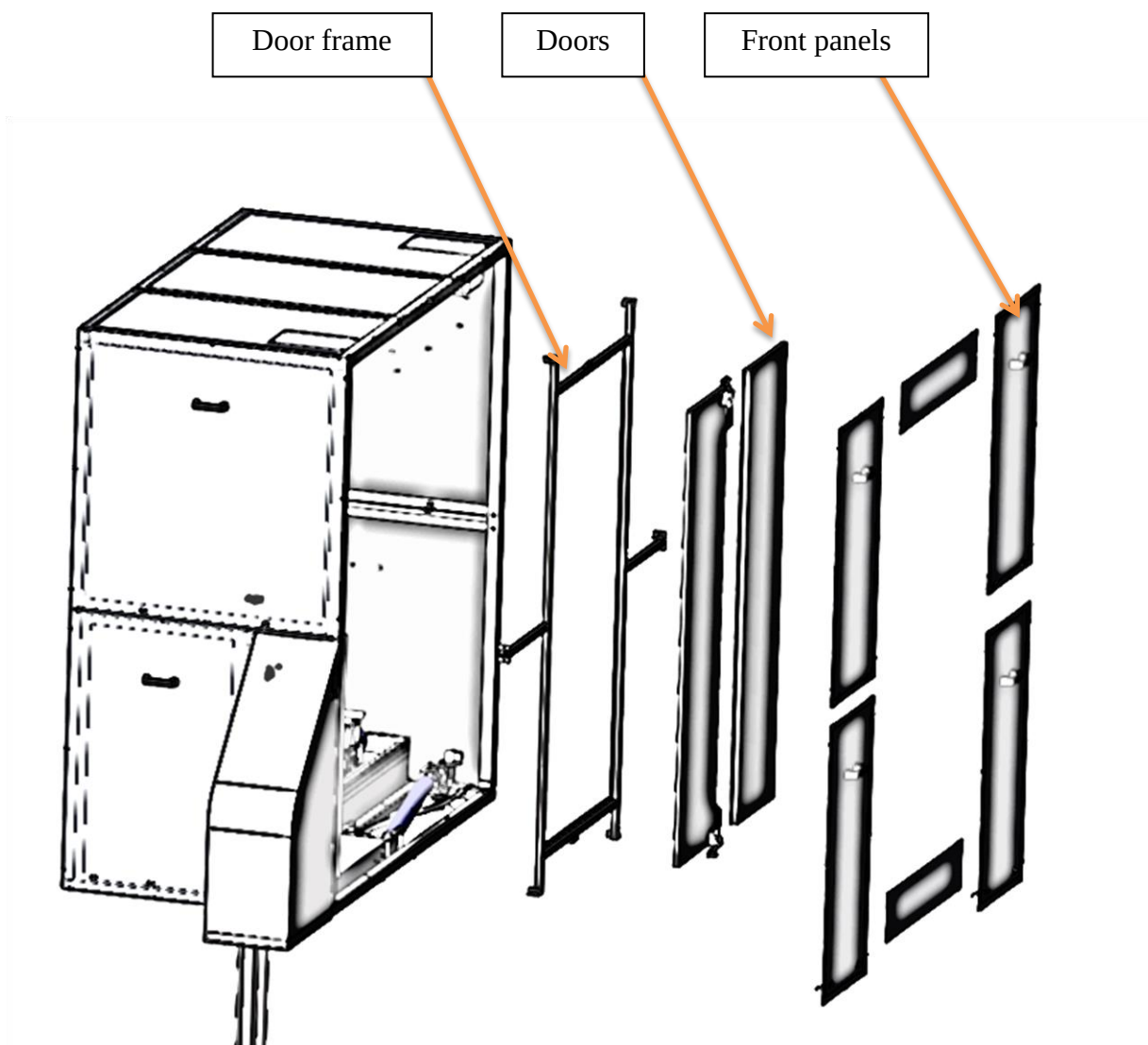


Figure 4. Gun head assembly

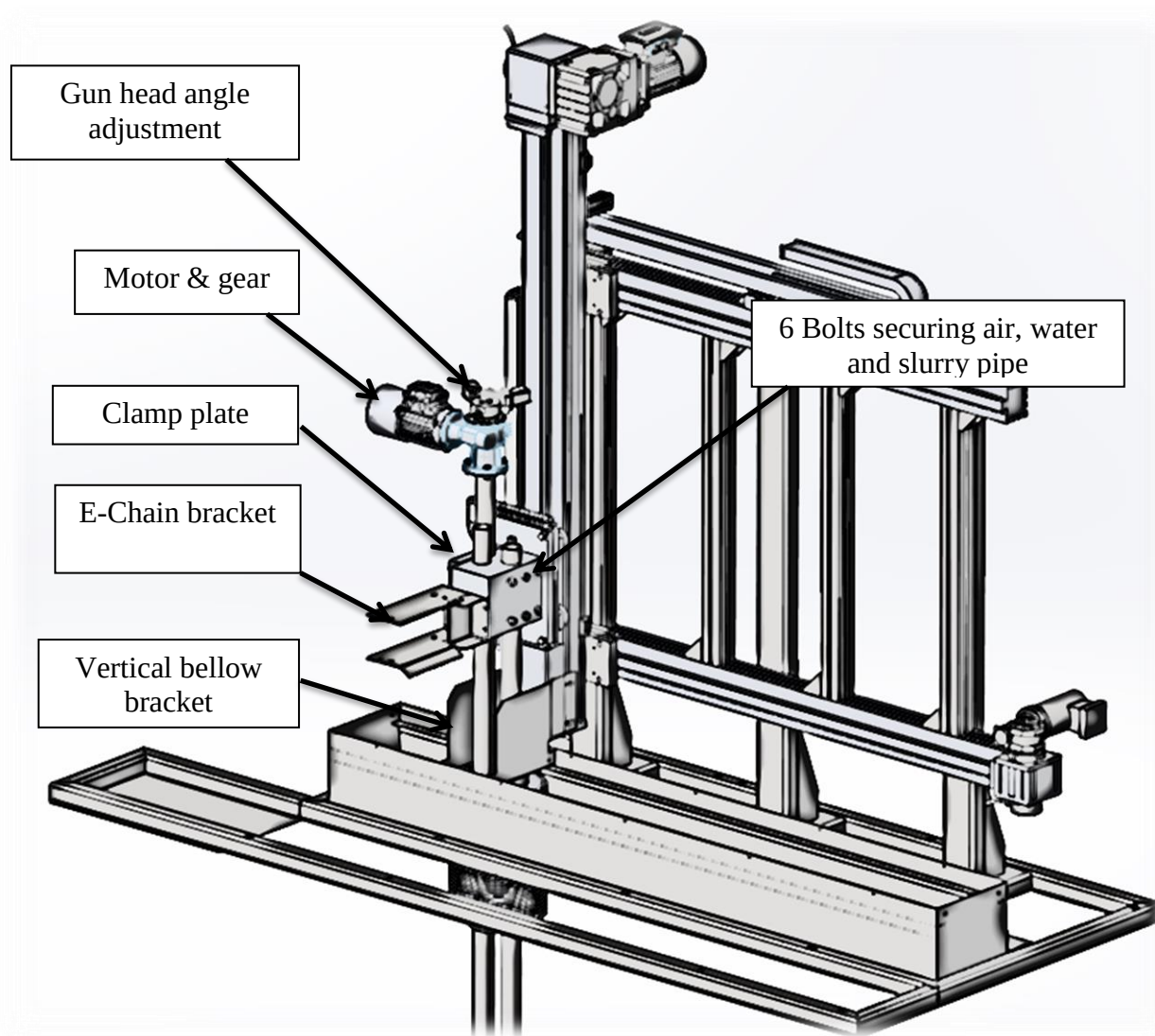
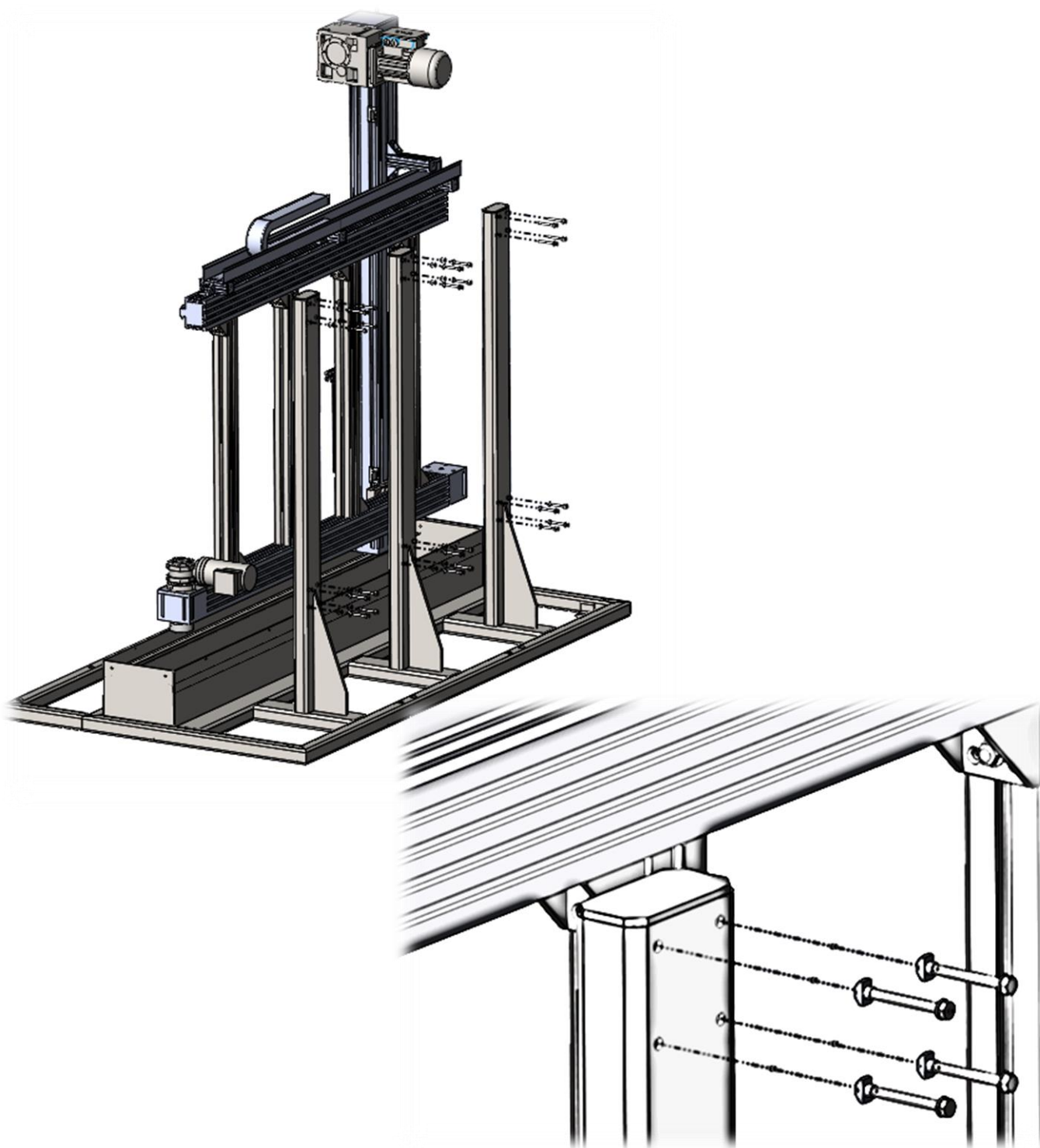


Figure 5. HepcoMotion assembly



3.3. GUN HEAD & WRIST

Wrist mechanism allow angular gun movement during automatic processing.

4 blast guns are mounted to the bracket including 2 rinsing nozzles. Gun head's total radial movement is 120°.

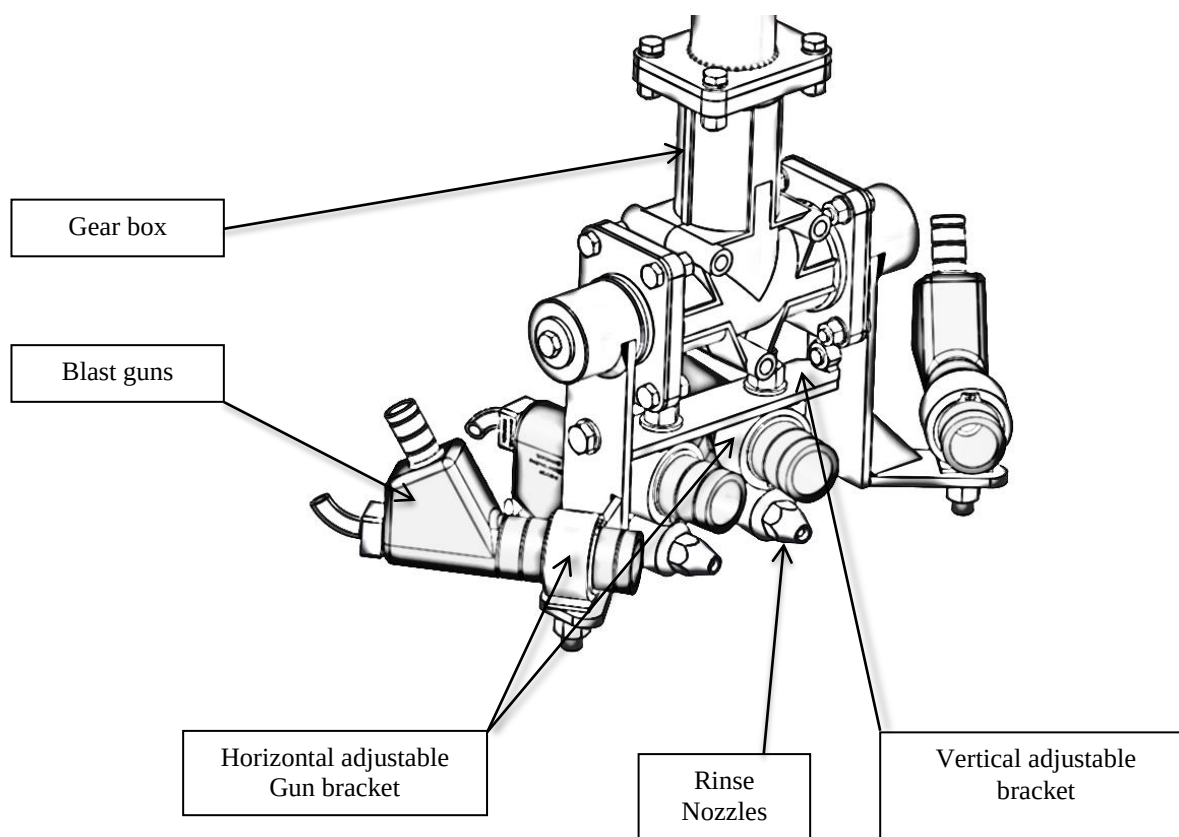
Outside two guns can be adjusted horizontally.

Inside two guns can be adjusted horizontally and vertically.

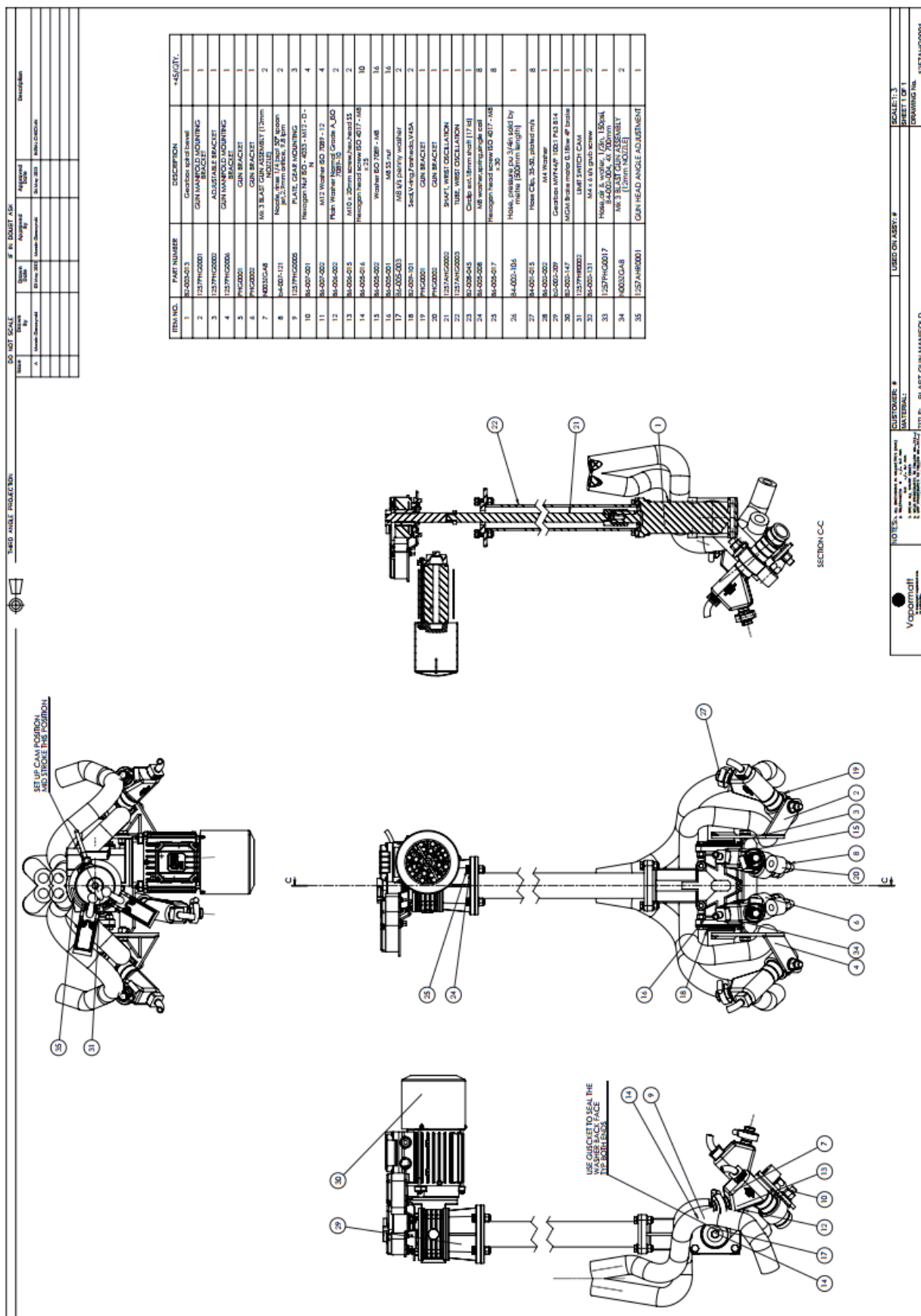
All 4 guns have to be set to achieve focus point 200mm away from guns.

Angular gun's speed can be adjusted when necessary.

Figure 6. Gun head

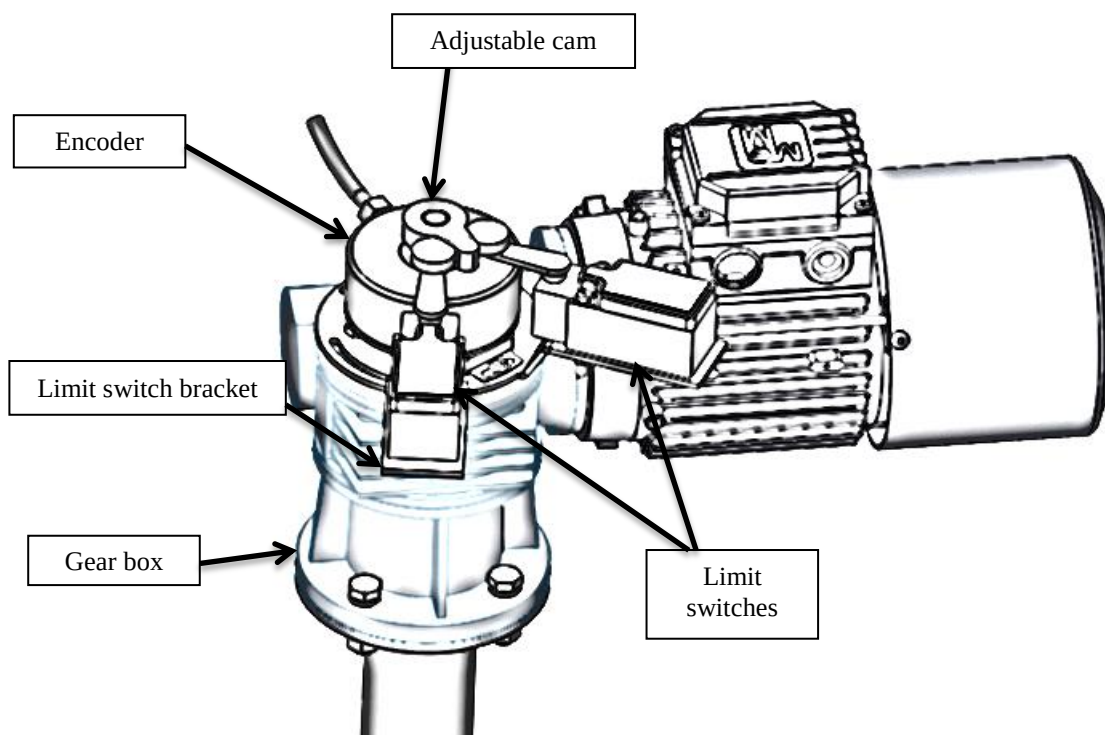


DRAWING: 1257AHG0001 BLAST GUN MANIFOLD



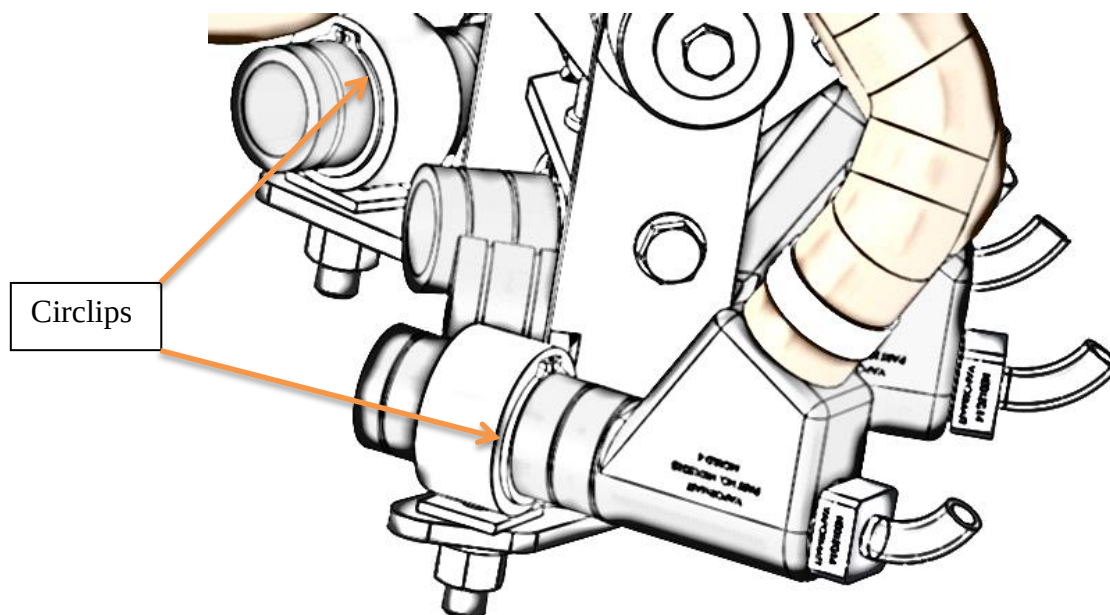
3.3.1. GUN HEAD ANGLE ADJUSTMENT

Figure 7. Gun angle adjustment



- 'Limit switch bracket' – allows to adjust and calibrate angular gun head movement
- 'adjustable cam' – allows to offset and adjust gun head movement

Figure 8. Gun head assembly



Drawing: 1257AHR0001 GUN HEAD ASSEMBLY ADJUSTMENT

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	1257PHR0001	ENCODER BRACKET	1
2	b3-015-093	LIMIT SWITCH, SIDE ROTARY	2
3	B6-002-002	M4 Washer	12
4	B6-002-069	M4 * 40mm screw slot pan.	4
5	B6-002-001	M4 Nut	4
6	B6-002-060	M4 x 6 screw, slot, pan head	2
7	B6-004-012	M6 * 10mm screw, hex. head	4
8	B3-004-212	Hengstler encoder 1024ppr HTL IP65 (part number R176TD/1024ED.4N15KF)	1
9	1257PHR0003	ENCODER BRACKET	1
10	B6-002-062	M4 x 10 screw, slot, pan head	2

THIRD ANGLE PROJECTION

DO NOT SCALE

IF IN DOUBT ASK

Issue

Drawn By

Drawn Date

Approved By

Approved Date

Description

A

March Goczyński

09 Oct 2013

March Goczyński

09 Oct 2013

INITIAL CHECK-IN

NOTES: 1. ALL DIMENSIONS IN MILLIMETRES (mm)
2. TOLERANCES: 0 +/- 0.5 mm
3. BREAK ALL SHARP EDGES
4. DIMENSIONS TO FOLLOW UNLESS OTHERWISE STATED
5. GAP PROCEDURES TO FOLLOW UNLESS OTHERWISE STATED
6. UNLESS OTHERWISE STATED 1 1

CUSTOMER: #

MATERIAL: Material <not specified>

TITLE: GUN HEAD ANGLE ADJUSTMENT

SHEET 1 OF 1

DRAWING No. 1257AHR0001

vapormatt

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Guernsey GY1 4AG

3.3.2. PROCESS GUN MAINTENANCE

Non-Return Valve Replacement

Remove air hose from pipes (oscillation enclosure). Unscrew hose connection; this connection incorporates the NRV and must be replaced as a complete unit.

Boron Carbide Nozzle Replacement

To remove the old nozzle :

- 1 Remove slurry hose at the gun and remove the air hose at the manifold end.
- 2 Remove circlip which retains the gun in its holding bracket and withdraw gun (see figure 9).
- 3 Unscrew the air hose and take care to retain the NRV ball.
- 4 The moulded air jet may then be withdrawn by pushing it out with a blunt ended drift of a diameter slightly greater than the 12 mm nozzle bore.
- 5 The nozzle may then be pushed out of the back of the gun.

To fit the new nozzle push it into the body. Lubrication with liquid detergent is helpful and a pillar drill can be used as a press. The shoulder of nozzle should fit snugly against the lip of the polyurethane gun body, and not past the retaining lip. If the nozzle is not pushed up against the lip, then slurry flow may be impaired, this will reduce blast performance.

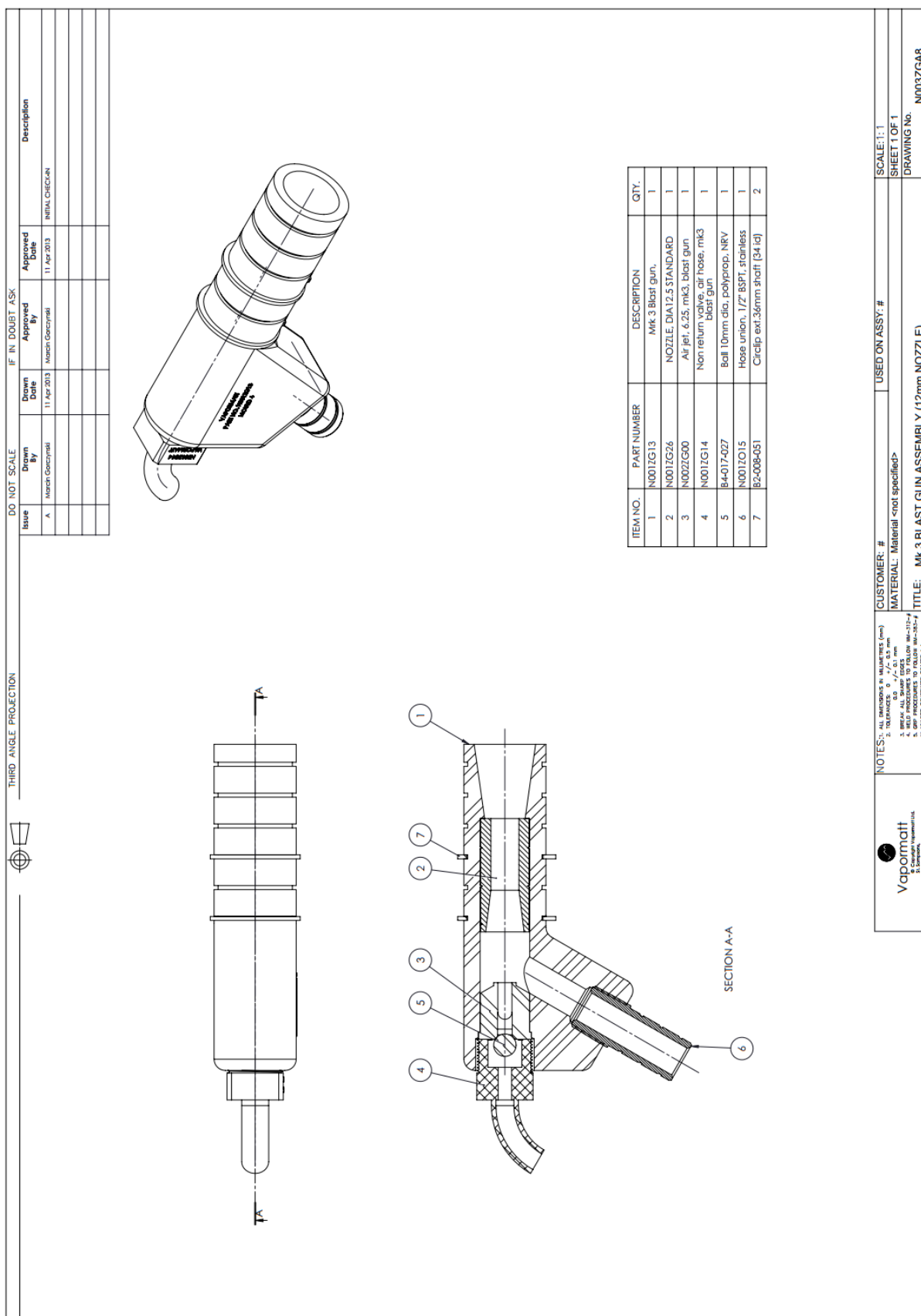
Air Jet sizes

It is important that the air jet is matched to the outlet nozzle bore. This can be achieved by fitting a replacement air jet or drilling out the smaller jet (e.g. on the MK1 gun body).

Outlet nozzle bore (mm)	Air jet bore (mm)
10	5.5
12	6
14	7

NOTE Consult section 1, Safety Precautions, before any additions, repairs or maintenance work is carried out.

Drawings: N003ZGA8 - Mk 3 BLAST GUN ASSEMBLY (12mm NOZZLE)



3.4. SUMP OVERFLOW VALVE ("Bubble valve")

Operation:

Water leaves the machine sump via a plastic diaphragm "bubble" valve. When the machine operating the diaphragm is inflated and blocks the water outlet. When the pump is turned off the valve is opened by depressurising, thus allowing excess water to drain. A timer allows a variable delay between pump stopping and valve opening - this is to allow re-usable abrasive to settle at the bottom of the sump but broken down abrasive and other fine debris remains in suspension and so is removed with the excess water.

Set-up:

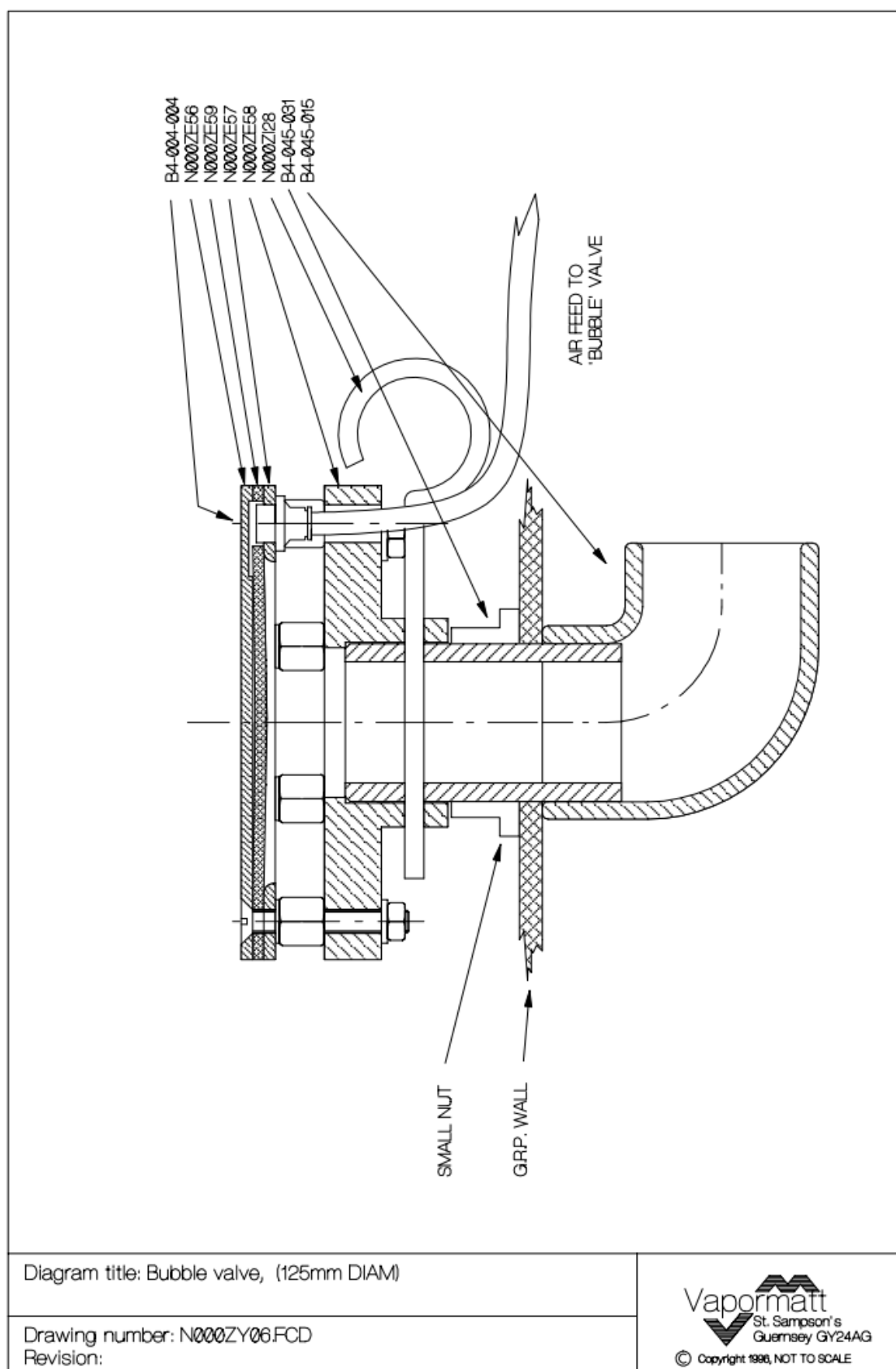
If an excess of re-usable abrasive passes through the overflow, then time delay should be increased.

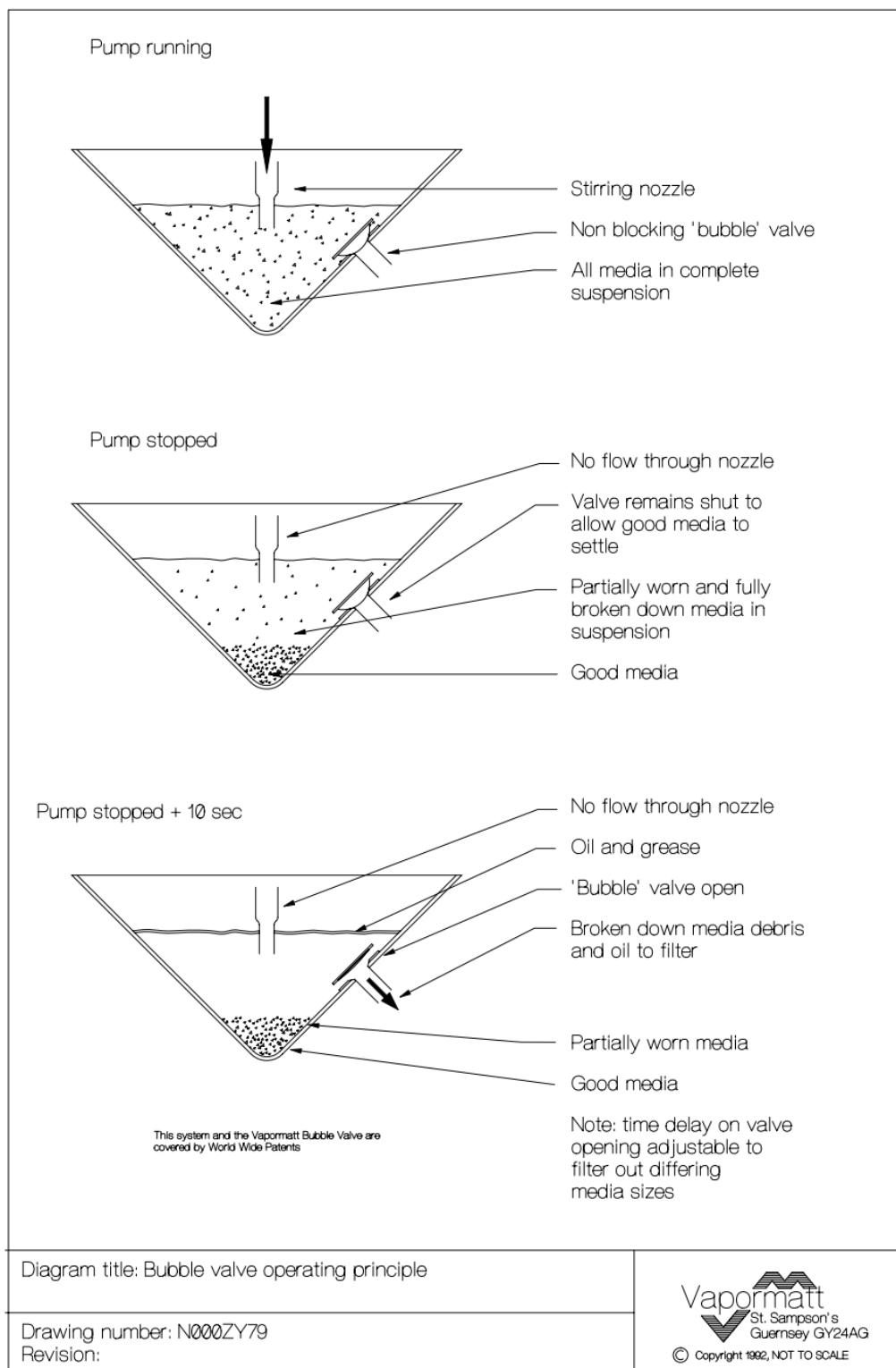
If little or no debris is being removed, the time delay should be decreased.

Typical timer settings are:

Abrasive type/size(mesh)	Time(seconds)
SGR 50/80	10
APA 60/80	6
APA 180/220	15

Drawings: N000ZY79 Operating principle
N000ZY06 Bubble valve GA (125mm (5") DIAM)





3.5. VAPORMATT ELUTRIATION TOWER

Description:

The operating principal is to create a streamlined vertical upward flow of slurry with a velocity equal to the fall rate of the maximum size particles required at the upper (overflow) outlet; particles with a fall rate that is greater than the upward flow rate cannot reach the upper outlet; however, particles with a lower fall rate may pass to the lower (return or underflow) outlet. In other words no particles greater than the set size can reach the upper outlet although a proportion of undersize particles will flow from the return outlet.

The overflow rate can be adjusted to give the required cut point by changing the restrictor. Note the restrictor is subject to high abrasion. Normal materials will wear extremely quickly, thus the performance will alter quickly. Use only wear resistant materials for the restrictor and check it regularly.

Adjustment:

The elutriation tower integral changeable restrictor orifices define the operational characteristics. (See slurry schematic for details). These are factory installed set and should not need adjusted. However alternatives are available and the correct size is best identified empirically i.e.:

- i. If the overflow carries particles which are too coarse fit a smaller overflow restrictor
- ii. If the overflow does not carry large enough particles, fit a larger overflow restrictor; this may result in insufficient back pressure so a smaller underflow restrictor may also be required.

Maintenance:

The restrictors will wear with use, which will cause a change in elutriation tower operation, check them regularly.

Overflow restrictor: N002Z074 orifice Ø4.5 mm

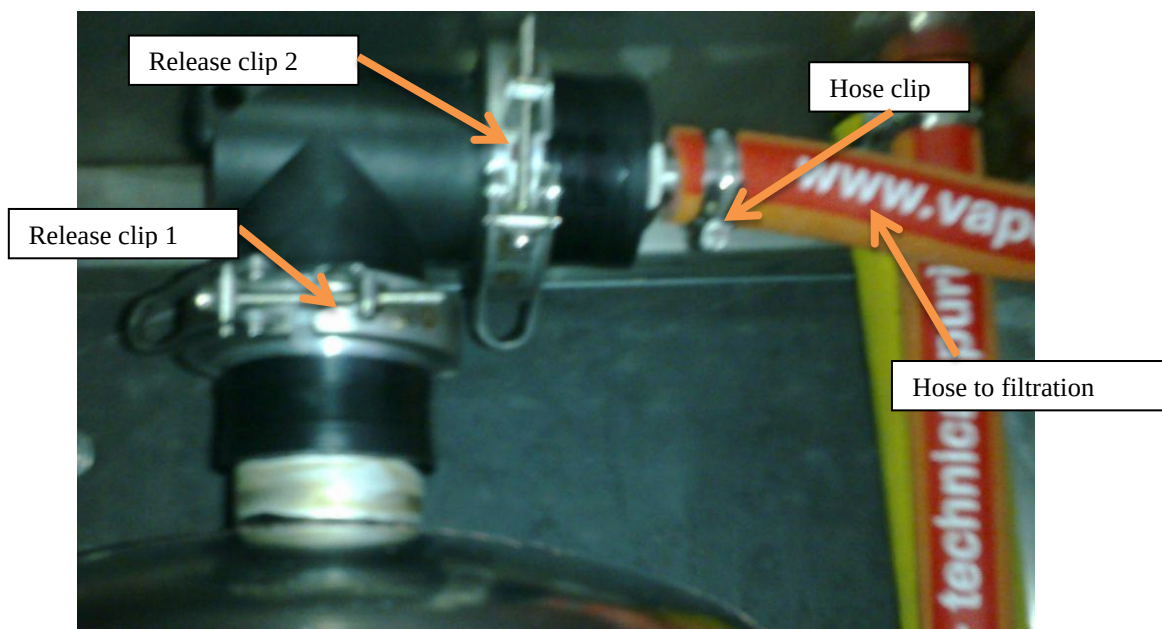
Underflow restrictor: N001ZK63, Ø8 mm

It is advised that the underflow is removed and refitted at the start of every shift/day to drain the elutriation tower. Also the underflow output should be checked regularly as its blockage will result by removing all the good abrasive from the sump. Additionally a periodic check of all parts and hoses should be done, looking for blockages or holes, and carrying out appropriate repairs or replacements.

Orifice removal

The orifice allows the media to pass through to the filtration. This is a service item and will need replacing over at certain intervals. (See preventative maintenance section) the orifice will also need to be changed if a different media is being used.

Figure 9. Orifice removal

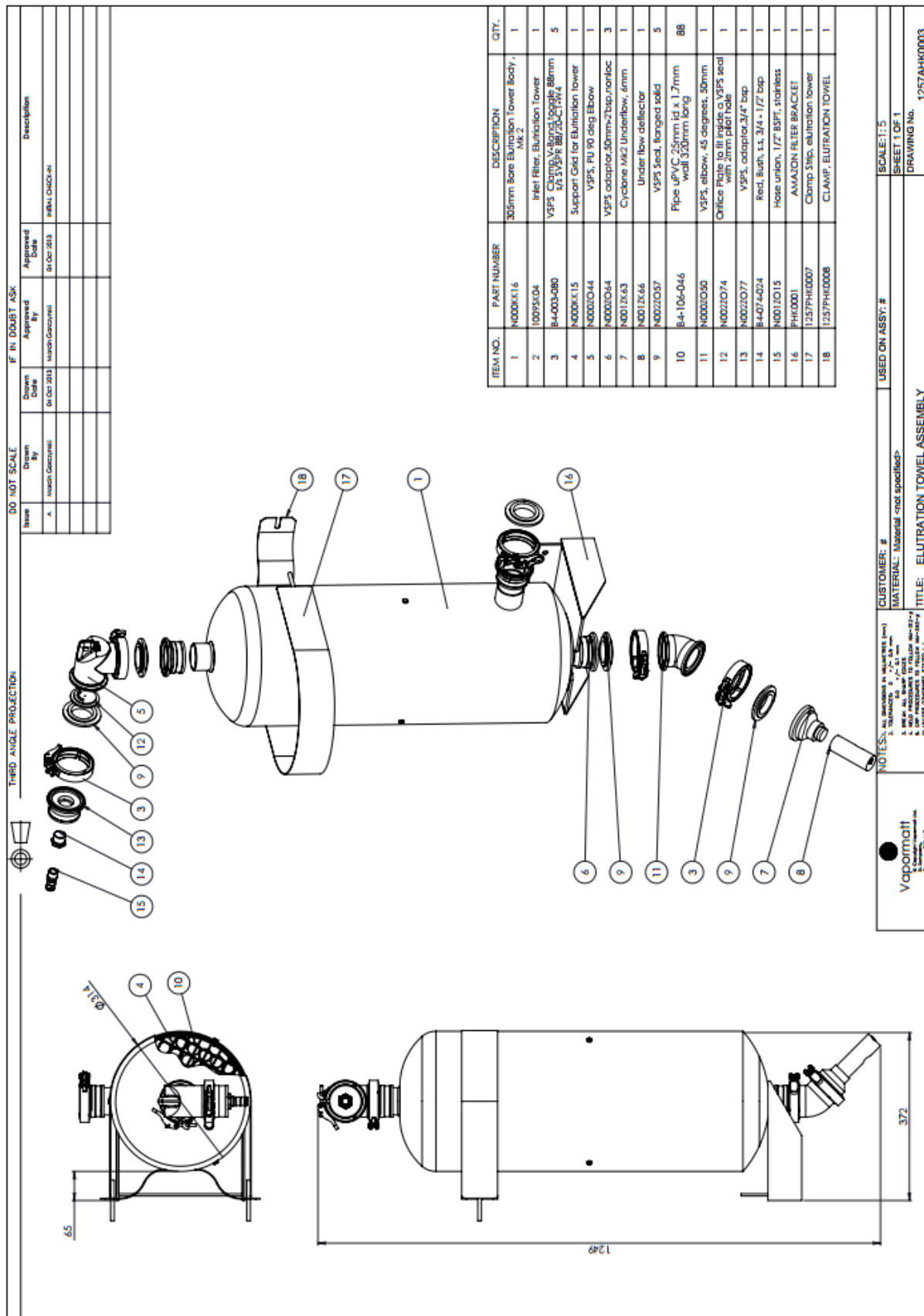


To remove the assembly to change the orifice:

1. Loosen the hose clip by unscrewing.
2. Undo release clip 1.
3. Remove assembly from top of tank and hose to filtration.
4. With assembly now removed from the top of the elutriation tower, undo release clip 2.
5. You can now access the orifice.
6. Check diameter of orifice and replace if required.
7. Re assemble unit by replacing all parts and secure with release clip 2.

Assembly can now be replaced on top of the elutriation tower securing in position and re-fitting the hose to the filtration and securing with release clip 1.

Drawings: 1257AHK0003 elutriation tower assembly



3.6. SETTLING TANK

Technical Details:

The Settling Tank is a sedimentation filter unit. It consists of a series of clear tank buckets in cascade. Each bucket being used as a weir. Machine overflows water is directed into the first bucket which overflows into the next, and so on. The last bucket overflows into the recirculation storage tank below.

Broken down abrasive and other process debris is collected in the compartments in deposits of decreasing particle size. Water leaving the unit is relatively clear.

Each bucket holds 7.5 ℓ. Total capacity is 90 ℓ approximately.

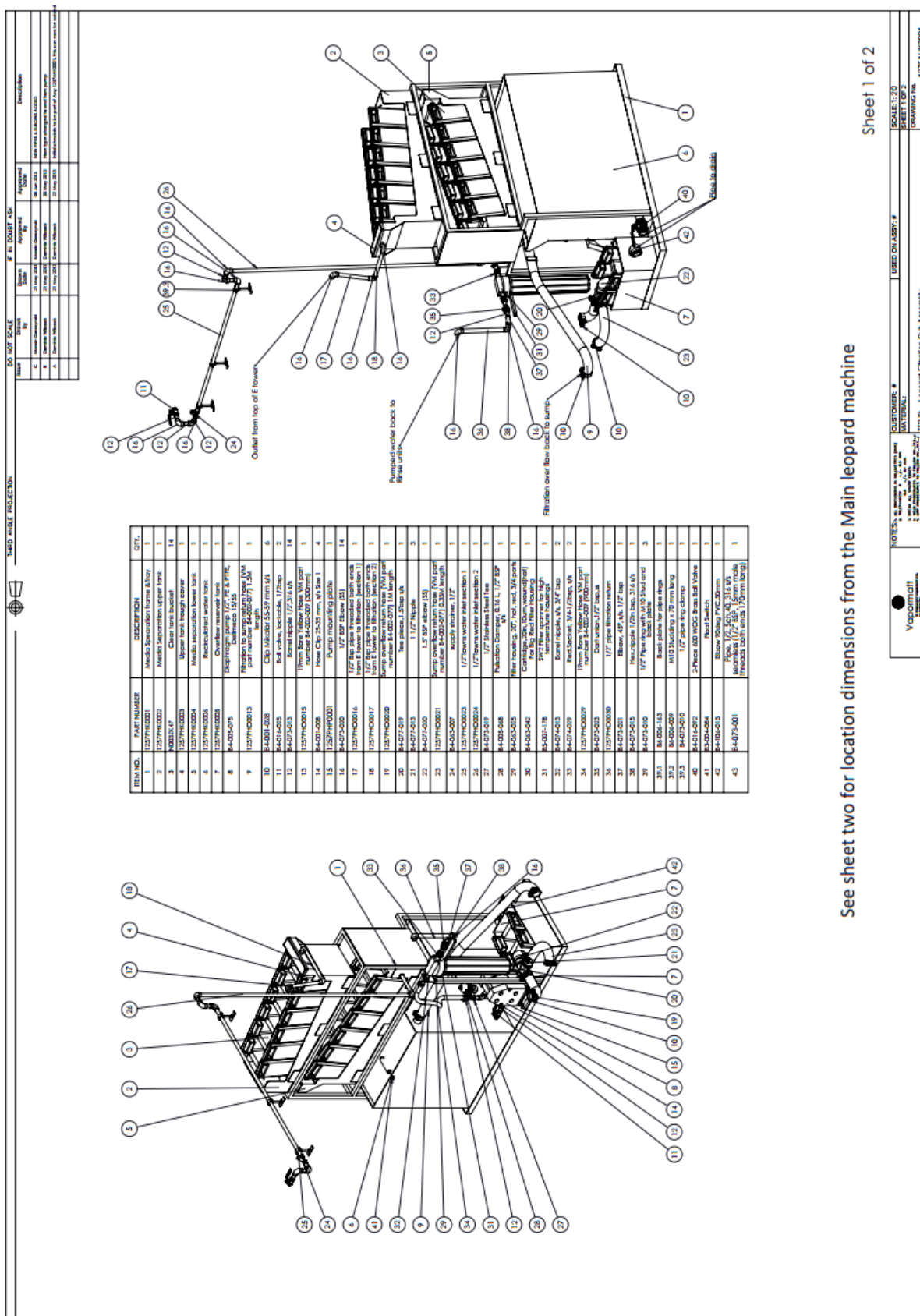
Installation Details:

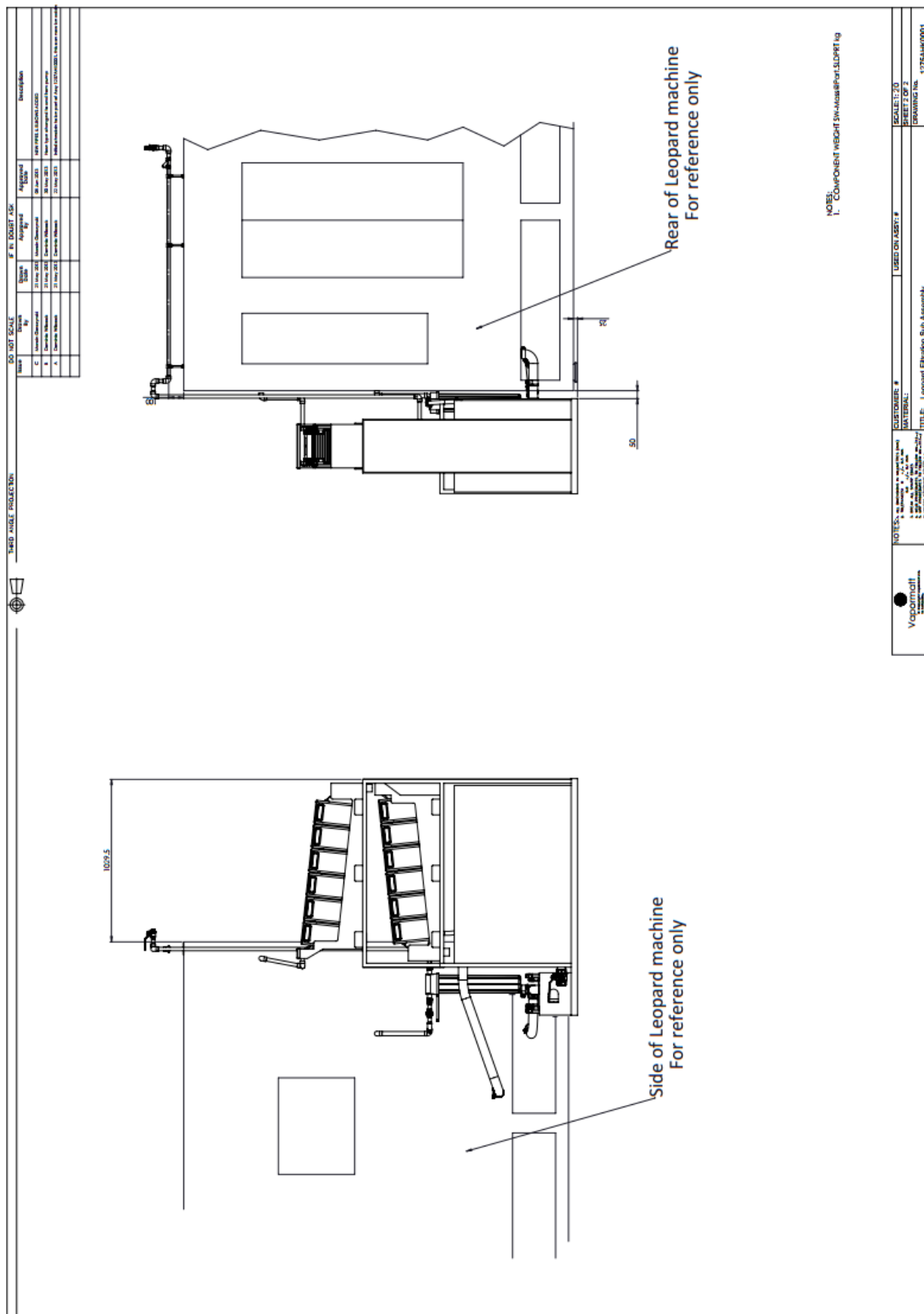
The unit must be placed with its highest compartment adjacent to the machine overflow. This gives the steepest drainpipe angle from the elutriation tower overflow into the top of the highest compartment.

Maintenance Instructions:

Every 40 hours use or weekly empty sediment/sludge. First remove the four tank baffles. Then using a liquid/solid vacuum cleaner remove the water and the sludge from the tank. Replace the baffles when the cleaning operation is complete.

Drawing: 1275AHK0001 Media separation & recirculation assembly





3.7. SLURRY SYSTEM SETTINGS

Initial set up of the slurry system requires manual loading an abrasive charge into the sump. The initial quantity of 50/80 Mesh glass abrasive required about 125kg. This will give approximately 15% concentration in the slurry.

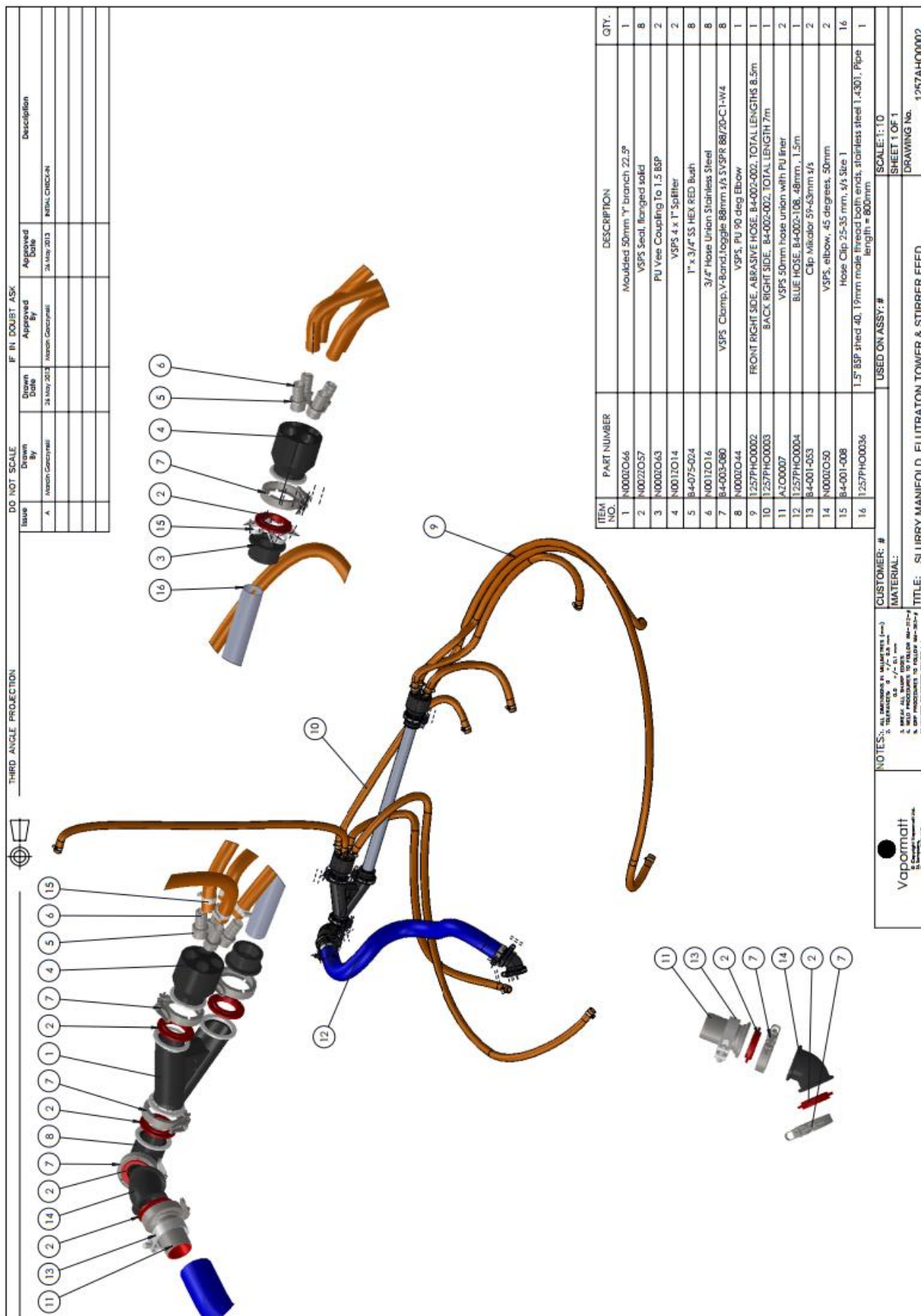
Stirrer nozzle:

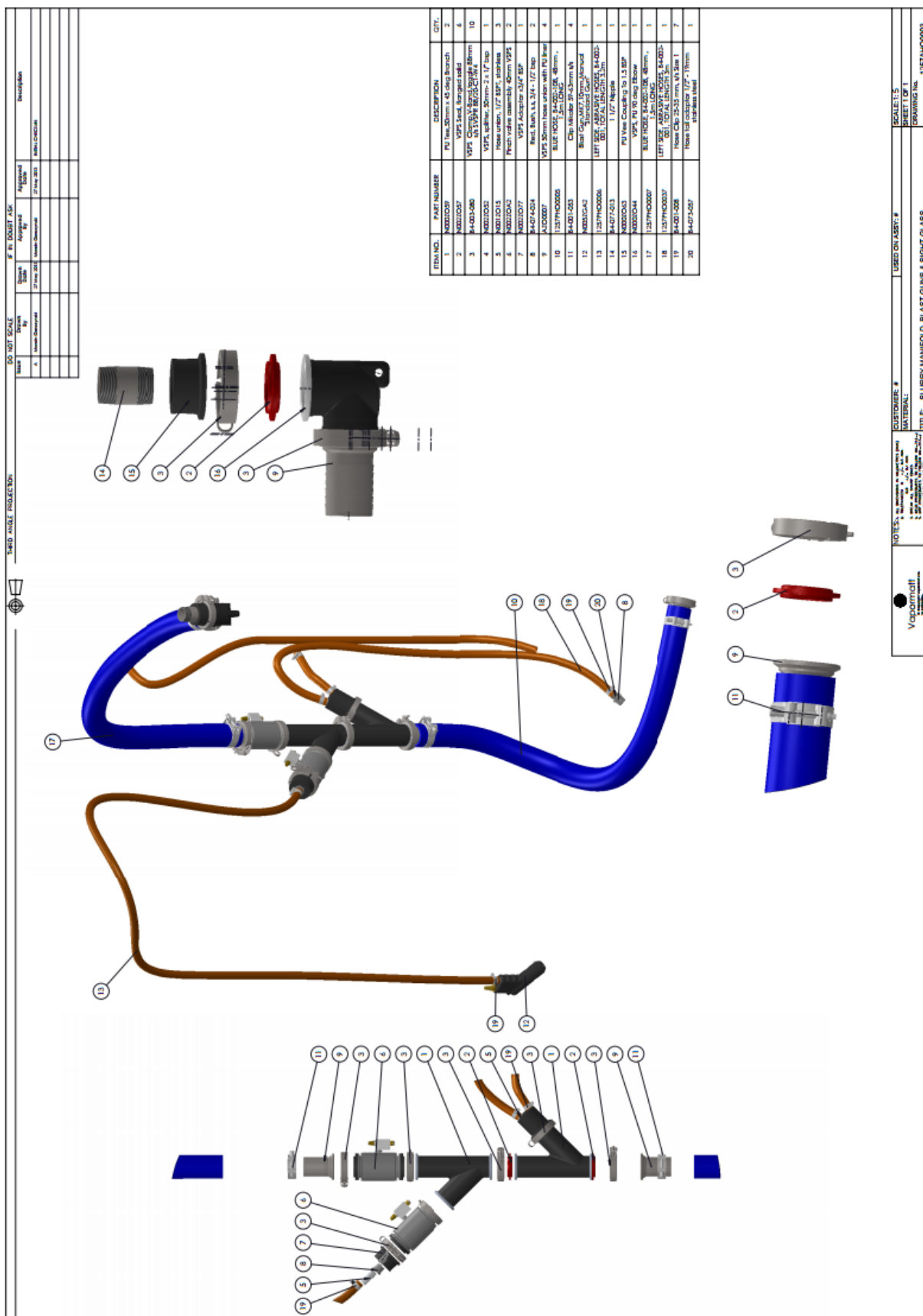
The Vapormatt "doughnut" sump (patent pending) has a number of deflector stirrer nozzles which are mounted in the sump of the blast cabinet. They play a vital role in the Vapourblast system, if a stirrer orifice should become blocked, stirring of the media in the sump will be reduced, causing a reduction, or in the worst case an almost total lack of media being picked up by the slurry pump resulting in loss of blast performance. If media concentration drops abnormally, check the stirrers. They are retained in a mounting "shoe", if a deflector stirrer is removed from its locating shoe, for renewal or to remove a blockage, it must be replaced securely, if the deflector stirrer were to come free from its retaining shoe - media concentration at the gun would become erratic, and damage to the sump could occur. In the worst case the uncontrolled stirrer jet could cause the cabinet sump to be ruptured. Failure to replace a badly worn deflector stirrer can lead to a reduction in blast performance, and could also result in the cabinet sump becoming ruptured. Replace the deflector stirrer if the slurry outlet port is worn to more than 12mm in diameter, or if the deflector ramp is significantly eroded. See the diagram 1257AHF0001 for setting up details.

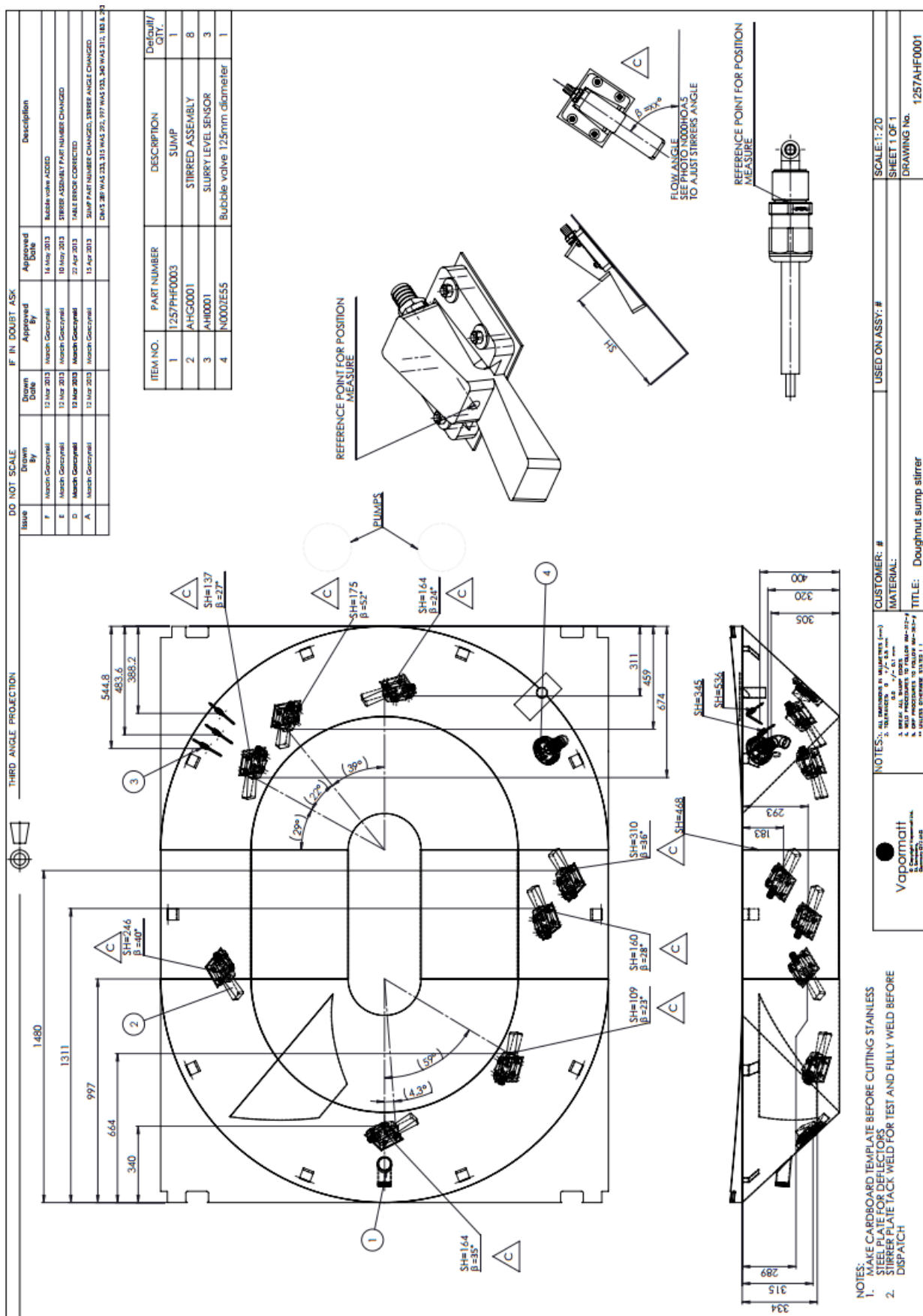
Do not exceed the recommended abrasive charge, this may with some medias reduce the abrasive concentration in the slurry reaching the blast guns as the stirrer as the stirrer jet may not be powerful enough to move / mix excessive quantities of abrasive.

Drawings: **1257AHF0001**
 1257AHO0002, 1257AHO0003

Stirrer nozzle position
Slurry tree







3.8. AIR SYSTEM SETTINGS AND ISOLATION

Isolation:

Isolation of the air circuit is achieved by closing the main air inlet valve AV1. Note that the pipework will be depressurised through the silencer exhaust fitted to the valve.

Supply:

The compressed air pipework is marked with a light blue colour as per 92/58 EEC. The following notes explain the reasons for the initial settings of the pressure regulators, and how they may be altered. Reference should be made to the air circuit diagrams in section 9. The supply air pressure to the machine must be between 5.5 and 7 bar (80 and 105 psi), with a supply capacity at least equal to the figure shown on page 1 of the air circuit diagram. Included in the air system are several moisture separators, these must be drained at regular intervals.

Blast gun acceleration adjustment:

Initial setting 4 bar (58psi)

The abrasive slurry is accelerated from the gun nozzles by compressed air. The air pressure used determines the abrasive particle velocity, and this is a major factor in determining the power of the blast stream. The pressure is set by a regulator and is shown on the associated gauge. On some machines this regulator operates a remote regulator, see appendix for specific manuals. The blast pressure required is determined empirically, Vapormatt will do test work if required. Low pressures produce less aggressive blast streams, resulting in greater polishing action. Note that at low pressure the flow from the nozzle will be erratic and there is a possibility of pumping slurry back up the air hoses, which may cause damage. High pressures produce more aggressive blast streams, resulting in faster abrasion and less polishing. Too much pressure and the component surface may be damaged. Furthermore there is a point where the air pressure becomes too high, resulting in restriction of the slurry flow and reduced aggression. This effect usually becomes apparent just above 6 bar (90 psi).

Diaphragm rinse pump air supply pressure; (initial setting 3 bar, 43 psi).

The rinse pressure required is empirical and thus may be adjusted to suit. The air supply to the diaphragm pump is usually un-lubricated. If a lubricator is fitted it should be set to 1 drip per minute, this should be reduced if the factory air supply is already oil contaminated. The oil specification is 10W). The adjustment of the diaphragm pump air supply is a balance between pressure and flow, pressure is adjusted by the supply air regulator, flow is adjusted by the ball valve (or needle valve) fitted on the pump air inlet; to balance

- Adjust the air pressure to 3 bar (43 psi) on pump air regulator.
- Fully open the flow control valve, (both ball and needle if fitted).
- Ensure pump inlet is under water, operate the pump.
- Whilst the pump is running, gradually close the needle valve until the pump is operating at about 120 strokes per minute. Ensure that the pump is pumping water continuously throughout this tuning.
- Once the needle valve is set, check that the pump starts and stops reliably then lock off the needle valve with the lock nut (if fitted).
- Experience may show that the flow rate is too low, or the pump does not start reliably; in this case open the needle valve 1/2 a turn and run again, repeat this over a period of time until acceptable performance is achieved. The pumps can be "un stalled" by toggling the air supply on/off by the flow valve or actually disconnecting and reattaching the air supply, should move the pump spool valve out of the stalled (or "neutral") position.

Slurry pinch valve drive pressure (initial setting 4.1 bar, 60 psi).

The valves which allow abrasive slurry to feed the blast guns are closed pneumatically. The pressure required to close these valves against the slurry pressure is 4.1 bar (60psi). This is factory set and should not need adjusting.

Door lock clamp, (initial setting 6.1 bar, 90 psi).

This pressure determines the power of the door clamp. It should be set so that it comfortably closes the flap and maintains the door shut at the top.

Automatic blow-off nozzles air supply pressure (initial setting 4.0 BAR, 58psi).

The blow-off pressure required is empirical and thus may be adjusted to suit.

Automatic sump overflow valve pressure (setting 1.4 BAR, 20 psi)

This pressure must NOT be altered, as any increase in air pressure could result in the bubble valve diaphragm bursting. The sump overflow valve pressure regulator is located within a separate control enclosure.

The bubble valve timer operates is set within the programme. This setting can be adjusted. See section 4.1 for further details on bubble valve principles.

Satellite drive enclosure (initial setting 1.4 BAR).

This pressure is use to pressurized satellite drive box to keep water out of the enclosure. Satellite enclosure pressure should never be switch off when machine is powered on.

Satellite drive box cylinder (initial setting 5 BAR).

This pressure is use to move satellite drive box to engage and disengage position via cylinder. The moving speed is adjusted by two needle valves on the trolley door behind the cover. Speed should set up to minimize shock when box reach the position.

3.9. WATER SYSTEM SETTINGS AND ISOLATION

Isolation:

Isolation is achieved by closing the main water supply valve V183 located on the left side of the machine. Note that this does not de-pressurise drain system. However, as there is no stored energy potential other than hose expansion, no specific means has been provided to do this.

Supply: ½ BSP

The fresh/clean water pipework is marked with a dark blue colour as per 92/58 EEC

The re-circulated water pipework is marked with a green colour as per 92/58 EEC

The fresh water supply is only used to fill and top-up the system.

The clean water supply to the machine must have a pressure between 50 and 100 psi and connected in accordance with local Water Board Regulations.

There are no pressure adjustments for the water system on the machine, although the main gate valve which isolates the machine from the main supply can be used as a crude regulator. If the water pressure within the machine is low, ensure that the gate valve is fully open before investigating low mains pressure.

Sump water level:

The correct water level in machines has an auto level control. In all cases the abrasive pump must be submerged, otherwise it will not prime.

Automatic water level control (conductive type)

The only adjustment to automatic water top up system is setting the level of water in the machine sump and overflow tank.

The water level sensor fitted is pre-set at the factory. Should the sensor need adjusting it should be performed using the following procedure:-

- Slacken the securing screw on the sensor electrode located in the sump.
- Fill the sump or tank, whose water level is being monitored, to the required level.
- Adjust the electrode until it just touches the water, monitor the neon on the sensor unit in the electrical cabinet to check that the sensor is just activating.
- The water level is now set (further levels may be set in the same way if fitted).
- Tighten the electrode securing screw.

Note: The water level monitory circuit includes a 5 second delay to prevent waves and turbulence, from activating the auto interrupt.

3.10. ELECTRICAL SYSTEM ADJUSTMENTS AND ISOLATION

Isolation:

Isolation is achieved by switching off the main electrical isolator situated on the electrical control enclosure. Some components in the enclosure may maintain dangerous voltages after the switch has been operated, these have identification on them. Note that the electrical panel access doors are not usually mechanically interlocked with the switch, but access is restricted by keyed locks.

The electrical system is fully detailed on the circuit diagram (APPENDIX II). Do not make changes without authorisation from Vapormatt.

PLC programme timers & counters:

Any changes to the logic must be carefully checked for safety implications. Vapormatt can Advise

Figure 10. MCB Isolation list

FUSE LIST		
Circuit	Fuse Size	Drawing Reference
Y Axis	6A	122MCB1
Z Axis	6A	123MCB1
Gun Angle	6A	124MCB1
Turntable	6A	125MCB1
Satellite Drive	6A	126MCB1
Trolley Door	6A	127MCB1
Main RCD	63A	S0102
Slurry Pump	9-14A	120MC1
Stirrer Pump	9-14A	121MC1
Extract Fan	1-1.6A	128MC1
Sump / Immersion Heater	10A	129MCB1
Machine Lights	2A	103MCB1
Socket And Brakes	4A	103MCB2
PLC	4A	103MCB3
Turntable Brake	4A	103MCB4
24v Power Supply For Wiper	4A	103MCB5
24v Power Supply	4A	103MCB6
Water level	1A	103MCB7
24v Circuit	6A	103MCB10
HMI	4A	F0401
Safety Relay SHZ0105	4A	F0402
PLC Outputs SHZ0144	4A	F0403
PLC Inputs SHZ0141	4A	F0404
Y Axis Inverter	4A	F0405
Z Axis Inverter	4A	F0406
Gun Angle Inverter	4A	F0407
Turntable Inverter	4A	F0408
Satellite Inverter	4A	F0409
Trolley Inverter	4A	F0410
Sump Level Control	4A	F0411
Analogue Output Module	4A	F0412
Encoder Supplies	4A	F0413
Panel Cooling Fan	4A	F0414

3.11. Manual work station

Manual work station is provided to blast smaller components up to 25kg manually.

Note: Make sure there is no components either on turntable or in the satellites when using shelf

To operate manual station:

- a. Open trolley door
- b. Unfold shelf using security clamp in the left corner (see figure 11)
- c. Load components on the shelf
- d. Release manual gun from the hook (top left corner) and leave it on the shelf
- e. Close the door
- f. Open front cover
- g. Foot switch is provided to turn on /off slurry pump
- h. Hang blast gun on the hook and fold the shelf back to be able to run machine in auto mode again

Note: Auto mode is disable when shelf unfolded

Figure 11. Unfold shelf

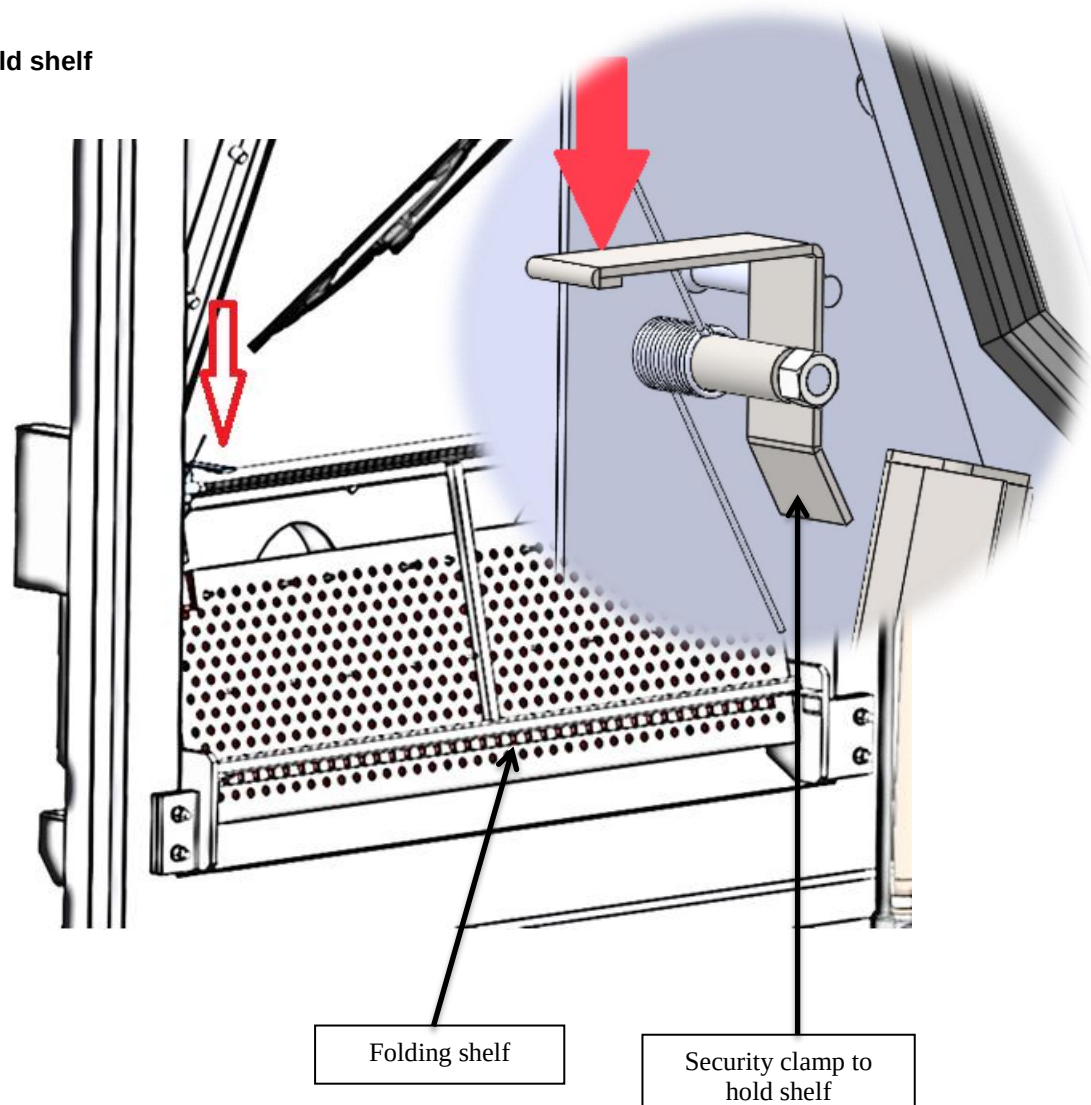
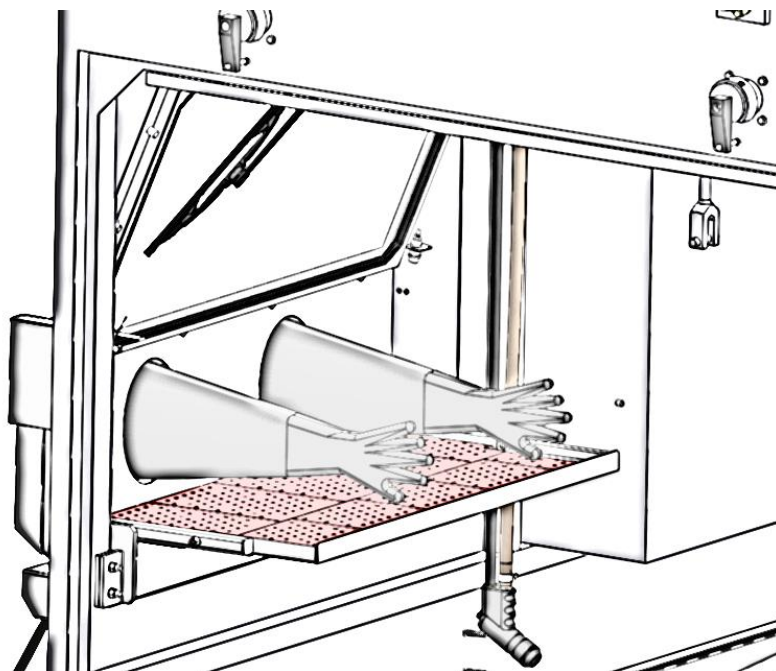


Figure 12 Shelf fully opened



3.11.1. MANUAL WORKSTATION MAINTENANCE

Glove replacement:

Unscrew hose clip, remove it together with seal band and glove. Re-fit with new glove - do not leave out the seal band.

Double glazed units:

- Disconnect machines power supply before removing instrument panel held by screws at each end.
- Remove the outer window frame.
- The glass unit can now be replaced.
- Before replacing the frame, clean and check the seals on the machine and the frame. Replace as necessary.

Wiper Blade + arm replacement:

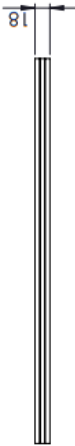
This is the same as on most cars. The arm is on a splined shaft, to remove release the spring clip and pull off.

Drawings:	N000HE01	Fitting single glazed window glass
	N000JE14	Fitting double glazed window glass
	A08-027	Wiper assembly

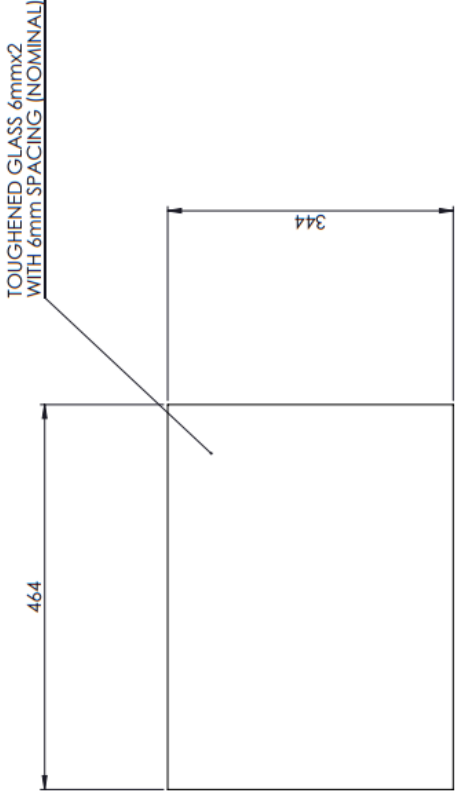
Item No.		Part Number	Drawing Ref	Description	Qty Per M/C	Supplier	Supplier Part No	Cost per Unit	Cost per M/C	Carriage	Comment
1	B2-002-172			Wiper arm 1 1/2" for heavy duty motor B2-002-172	1	B Hepworth and Company Limited	Wiper motor 24V heavy duty	175.16	175.16		
2	B5-005-048			Wiper blade 18" champion	1	B Hepworth and Company Limited	F63 Pendulum	32.31	32.31		
3	B5-005-022			Window wash bracket/enots	1	Hickley Valtone	Champion 18-339239	3.11368	3.11368		
4	B4-004-008			Window wash nozzle holder	1	Acorn Fluid Power (H16)	34-0009-04	7.11037	7.11037		
5	B4-007-028			Window wash nozzle cap nut	1	Hypro EU Limited (ex-Lurmark)	27/022470	0.63774	0.63774		
6	B4-007-029			Window wash nozzle filler	1	Hypro EU Limited (ex-Lurmark)	2510328L	0.39285	0.39285		
7	B4-007-030			Window wash nozzle	1	Hypro EU Limited (ex-Lurmark)	32504245	0.56295	0.56295		
8	B4-007-027			Adaptor 1/8" Pipe - 1/8" BSPF	1	Hypro EU Limited (ex-Lurmark)	307D110	1.56497	1.56497		
9	B4-004-007			Olives for 1/4" Enots	1	Acorn Fluid Power (H16)	M80/8/1 1/4 - 1/8	1.72146	1.72146		
10	B4-004-012			Sleeve nut 1/4" Enots	1	INTEGRALFLEX LIMITED	Olives for 1/4" Enots tube	0.20498	0.20498		
11	B4-004-013			1/4" Copper tube	1	Industrial Products and Supplies	34-0279-04	0.17139	0.17139		
12	B4-004-011				1	BSS Group Plc (H7/1363360)	338056	1.85783	1.85783		

THIRD ANGLE PROJECTION		DO NOT SCALE		IF IN DOUBT ASK		Description	
Issue	Drawn By	Drawn Date	Approved By	Approved Date			
B	Marcin Gorczynski	21 May 2013	Marcin Gorczynski	21 May 2013	NOTE ADDED		
A	Dominik Wilcock	25 Jan 2013	Dominik Wilcock	25 Jan 2013	Initial SW check-in- down from Rev B FCAD drawing		





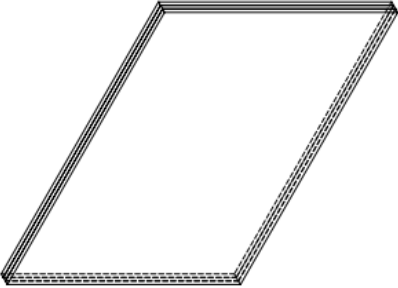
18



464

344

TOUGHENED GLASS 6mmx2
WITH 6mm SPACING (NOMINAL)



NOTES: 1. ALL DIMENSIONS IN MILLIMETRES (mm) 2. TOLERANCES: 0 +/-. 0.5 mm 3. BREAK ALL SHARP EDGES 4. WELD PROCEDURES TO FOLLOW WM-312-# 5. GRP PROCEDURES TO FOLLOW WM-353-# ** UNLESS OTHERWISE STATED !!		CUSTOMER: #	USED ON ASSY: #	SCALE: 1:5
 Vapormatt © Copyright Vapormatt Ltd. Quartermay 072 44G		MATERIAL: 18mm Sound Guard - (Info from FCAD drawing) TITLE: Sound Guard unit, Viewing window		
		SHEET 1 OF 1		
		DRAWING No. N000HE01		

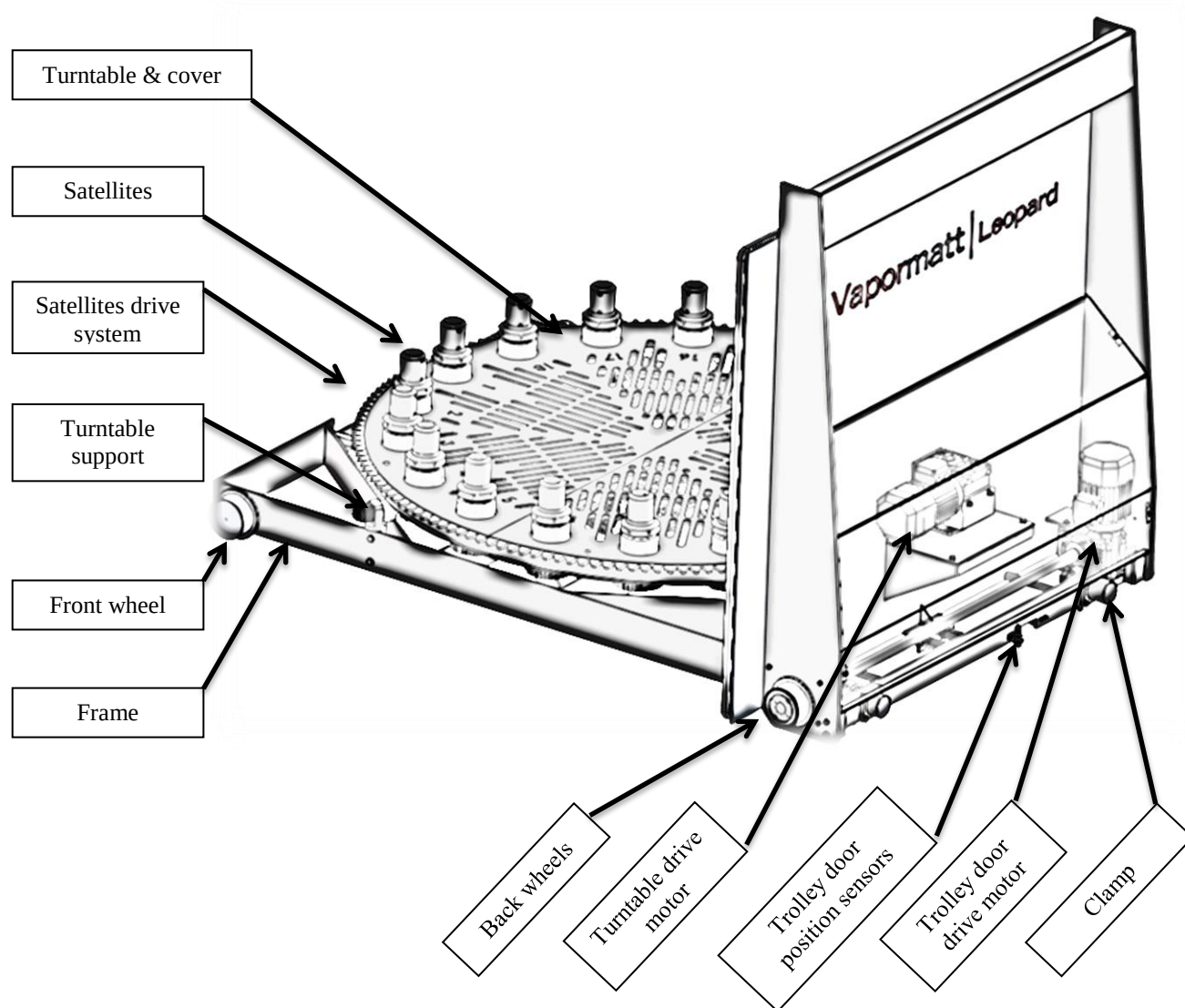
[illegible]

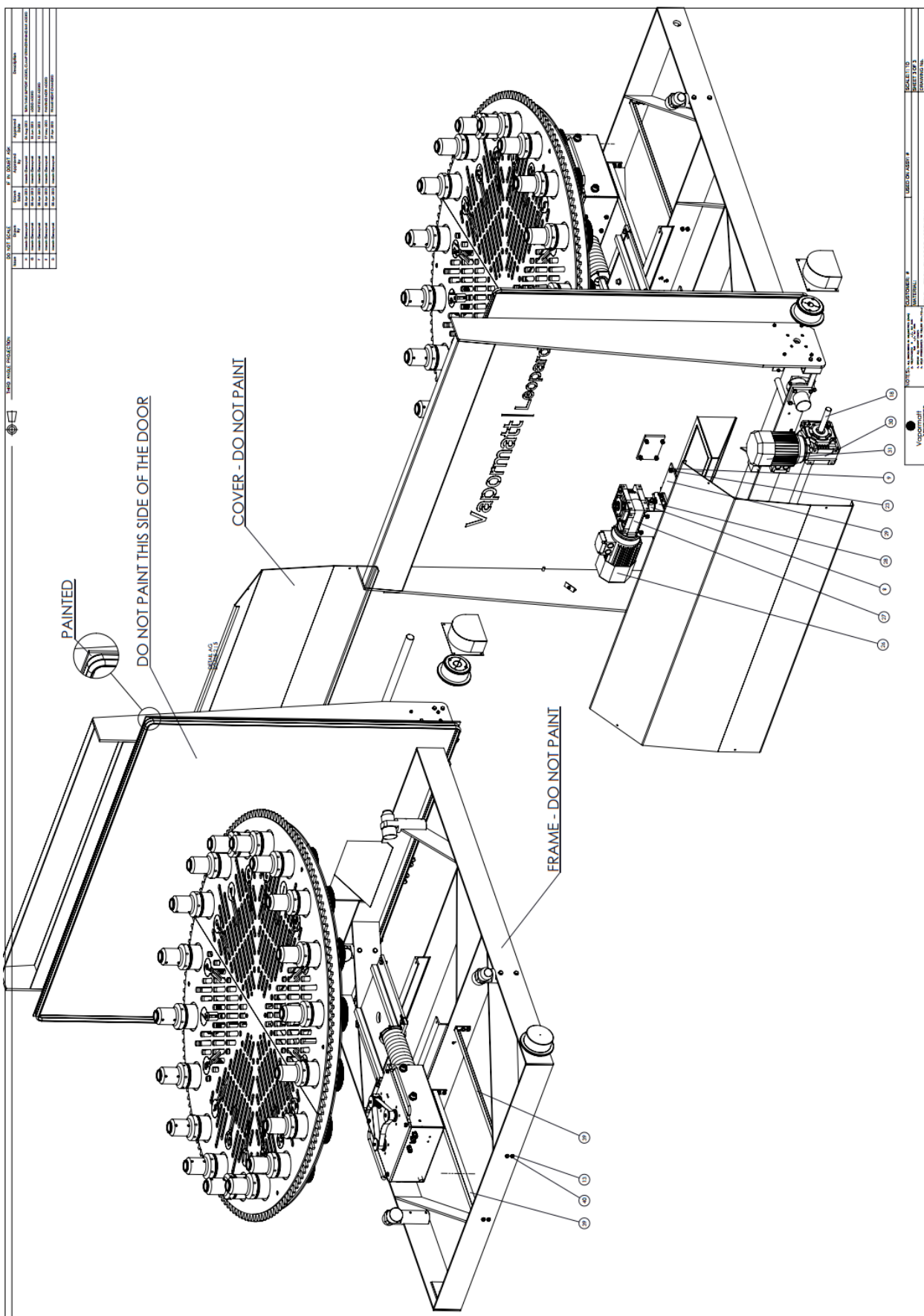
3.12. TROLLEY DOOR

The trolley door is constructed from stainless steel. This unit benefits from a set of protective covers that improve the service life of the unit. The trolley system uses two front wheel attached to load runners (section 3.12.2.) and two back wheels attached to the driven shaft (section 3.12.1) to move along the rail via and electric motor. Front wheel move along internal rail and back wheels are moving along external removable rail.

Figure 13. shows the trolley door assembly and all sub-assemblies.

Figure 13. Trolley door system





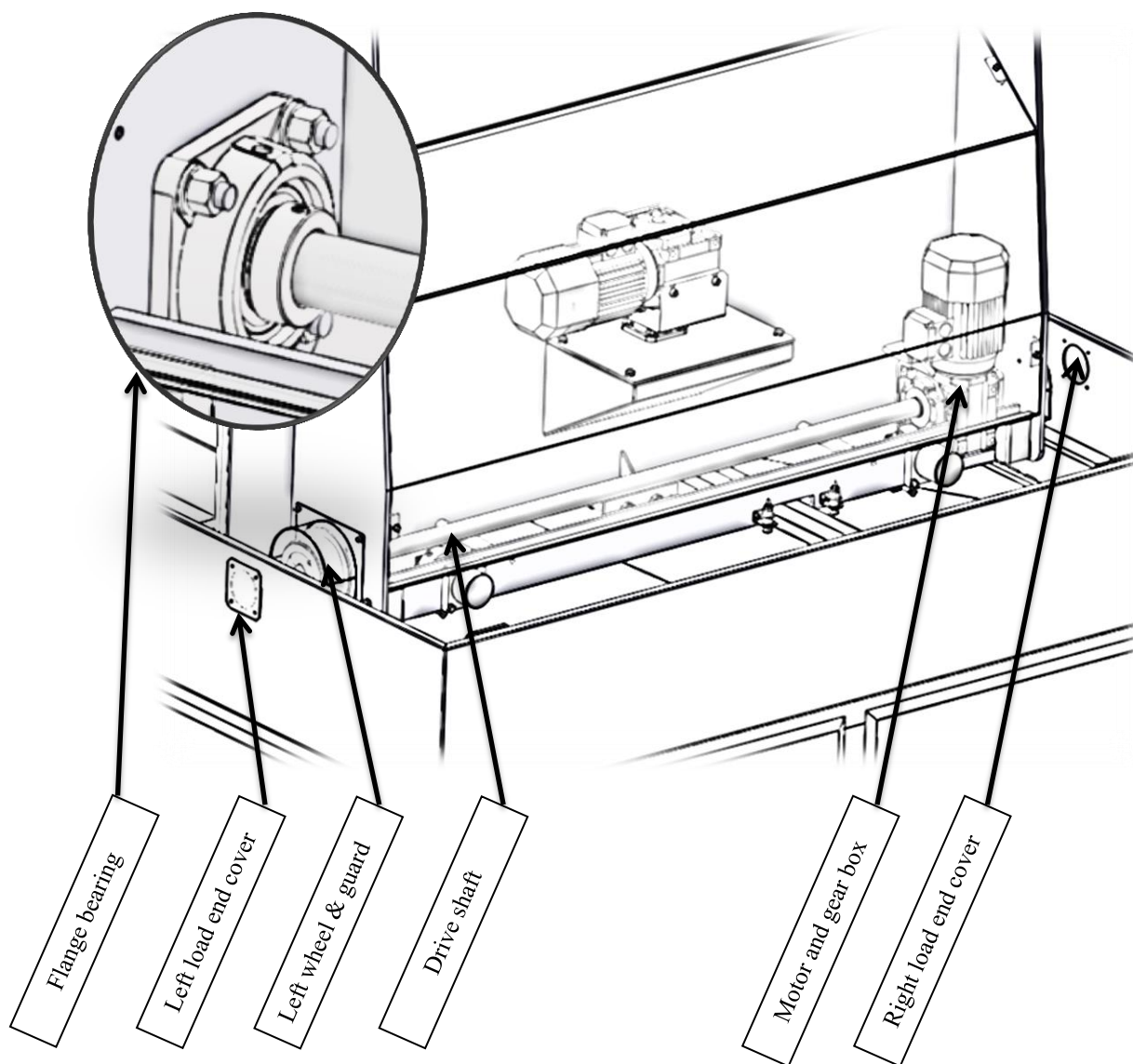
3.12.1. MAINTAINING TROLLEY DRIVE SYSTEM

Before undertaking any work on the trolley drive system, ensure the drive motor is isolated from the power supply which is located under trolley door cover.

Removing drive shaft:

- Open trolley door so it is in line with load end maintenance holes
- Lift trolley door drive end up only and secure, no load on the wheels is required
- Remove both load end covers and wheels
- Unscrew both flange bearings
- Tap the shaft from right side towards left load end maintenance hole

Figure 14. Trolley door drive system



Drawings:

- AHT0001 Wheel, trolley door, 35mm bore
- AHT0002 Wheel, trolley door, 25mm bore
- PHT0001 Shaft, trolley door drive

THIRD ANGLE PROJECTION

DO NOT SCALE

IF IN DOUBT ASK

Issue	Drawn By	Drawn Date	Approved By	Approved Date	Description
A	Marcin Gorczyński	03 Apr 2013	Marcin Gorczyński	03 Apr 2013	INITIAL CHECK-IN

SECTION A-A

3

2

3N

1

A

A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	PHT0002	WHEEL, TROLLEY DOOR	1
2	B2-004-065	Taperlock hub	1
3	B2-004-064	Taperlock bush D 25mm keyed	1

CUSTOMER: #
MATERIAL:

TITLE: WHEEL, TROLLEY DOOR, 35mm BORE

SCALE: 1: 2
SHEET 1 OF 1
DRAWING No. AHT0001

Vapormatt

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St. Leonards-on-Sea, East Sussex TN37 6AG

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES (mm)
2. TOLERANCES: 0 + / - 0.5 mm
0.0 + / - 0.1 mm
3. BREAK ALL SHARP EDGES
4. WELD PROCEDURES TO FOLLOW WA-312-#
5. COATING TO FOLLOW PR-303-#
** UNLESS OTHERWISE STATED **

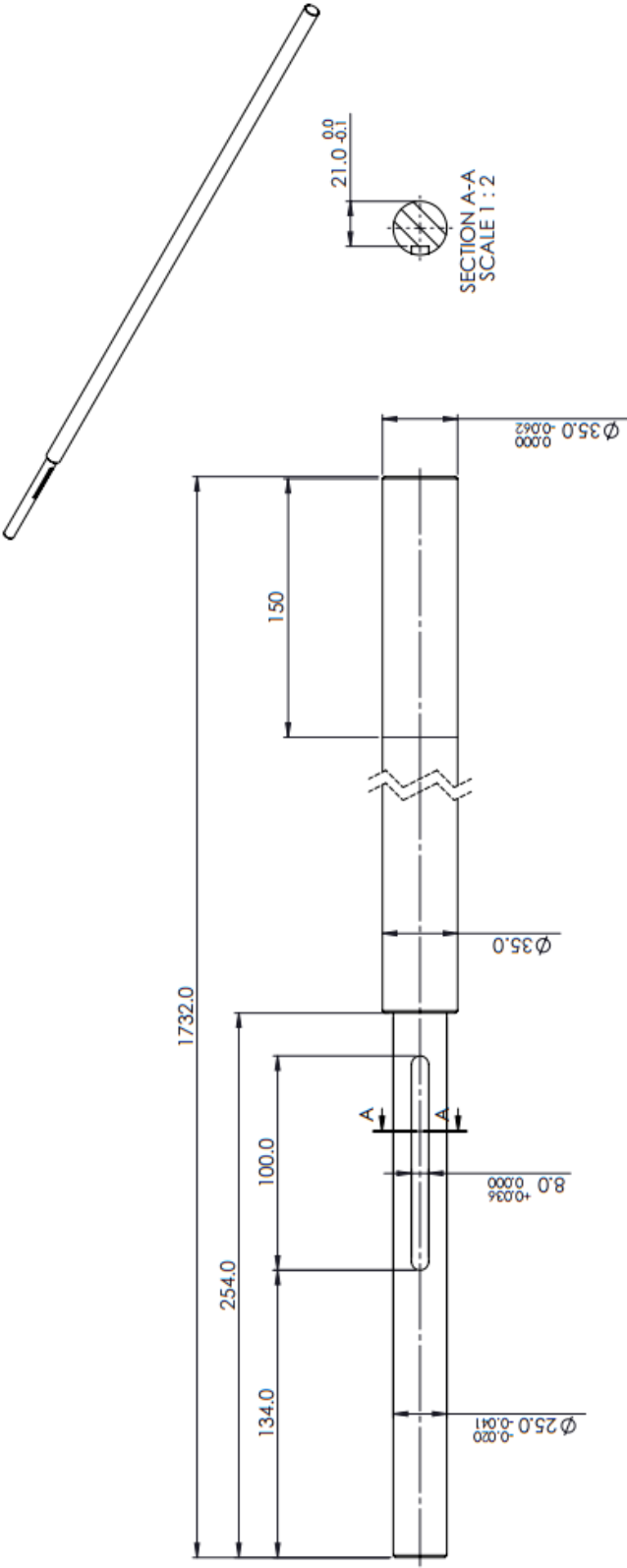
Technical drawing of a wheel assembly, showing a front view, a side view (Section A-A), and an isometric view.

Notes:

1. ALL DIMENSIONS IN MILLIMETRES (mm)
2. TOLERANCES: 0 $\pm$ 0.5 mm
3. BREAK ALL SHARP EDGES
4. WELD PROCEDURES TO FOLLOW: W-312-#
5. FINISH: 125 μ m (5 mil) RMS
6. UNLESS OTHERWISE STATED, 1:1

Table:

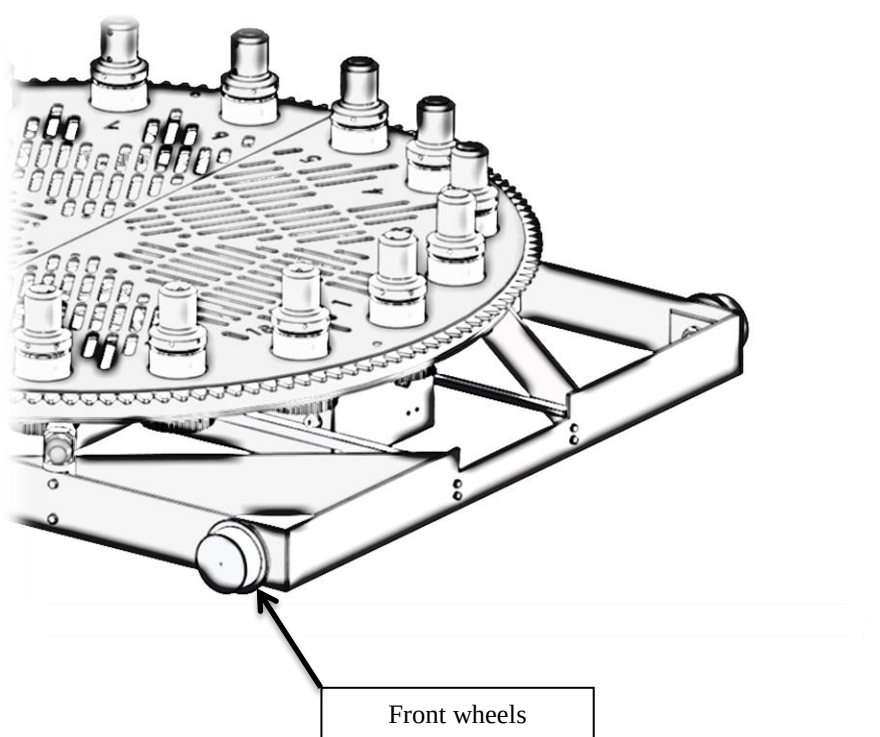
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	PHT0002	WHEEL, TROLLEY DOOR	1
2	B2-004-065	Taperlock hub	1
3	B2-004-063	Taperlock bush D 25mm keyed	1

THIRD ANGLE PROJECTION		DO NOT SCALE		IF IN DOUBT ASK		Description	
		Issue	Drawn By	Drawn Date	Approved By	Approved Date	INITIAL CHECK-IN
		A	March Goczynski	03 Apr 2013	March Goczynski	03 Apr 2013	
							
 Vapormatt 5000 Vapormatt Ltd. 51, Sarnia, Ontario Canada N7Y 4A6		NOTES: 1. ALL DIMENSIONS IN MILLIMETRES (mm) 2. TOLERANCES: ± 0.1 mm 3. BREAK ALL SHARP EDGES 4. WELD PROCEDURES TO FOLLOW MM-312-# 5. GRIP PROCEDURES TO FOLLOW MM-383-# ** UNLESS OTHERWISE STATED 1:1		CUSTOMER: # MATERIAL: AISI 316 Annealed Stainless Steel Bar (SS) TITLE: Shaft, trolley driven wheels		SCALE: 1:10 SHEET 1 OF 1 DRAWING No. PHT0001	

3.12.2. FRONT WHEEL ASSEMBLY

- Front wheel can be adjusted up and down by using spanner 40mm and rotating eccentric spacer. It can be used to level up turntable and set up correct alignment between door and cabinet to improve sealing.
- Front wheels can be adjusted left and right by changing load runner position, 1-2mm gap should be maintained between wheels flanges and rails.

Figure 15. Front wheels



Drawings:

- AHT0003 Wheel, trolley door

THIRD ANGLE PROJECTION

DO NOT SCALE

IF IN DOUBT ASK

Issue	Drawn By	Drawn Date	Approved By	Approved Date	Description
A	March Goczyński	03 Apr 2013	March Goczyński	03 Apr 2013	INITIAL CHECKIN

SECTION A-A

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	PHT0003	WHEEL, TROLLEY DOOR	1
2	Standard	Load runner, 2.5"/S/(PLR)	1
3	PHT0005	SEAL HOUSING, TROLLEY WHEEL	1
4	PHT0004	SPACER, ECCENTRIC TROLLEY	1
5	B2-009-181	Seal, V Ring, V40A	1
6	B6-003-128	Grub screw Socket	1
7	B2-007-114A	Nut, load runner	1
8	B2-007-114B	Washer, PLR 2.5"	1

NOTES: 1. ALL DIMENSIONS IN MILLIMETRES (mm)
2. TOLERANCES: 0 $\pm$ 0.5 mm
3. BREAK ALL DIMENSIONS $\pm$ 0.1 mm
4. WELD PROCEDURES TO FOLLOW WMA-312-#
5. GRP PROCEDURES TO FOLLOW WMA-313-#

CUSTOMER: #
MATERIAL:

USED ON ASSY: #

SCALE: 1:2
SHEET 1 OF 1

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TITLE: WHEEL TROLLEY DOOR

DRAWING No. AHT0003

3.12.3. TURNTABLE DRIVE SYSTEM.

Gear pinion assembly is driven by motor and gearbox via keyway. It rotate between flange bearing and gearbox bearing. Encoder is attached to the shaft for turntable movement accuracy.

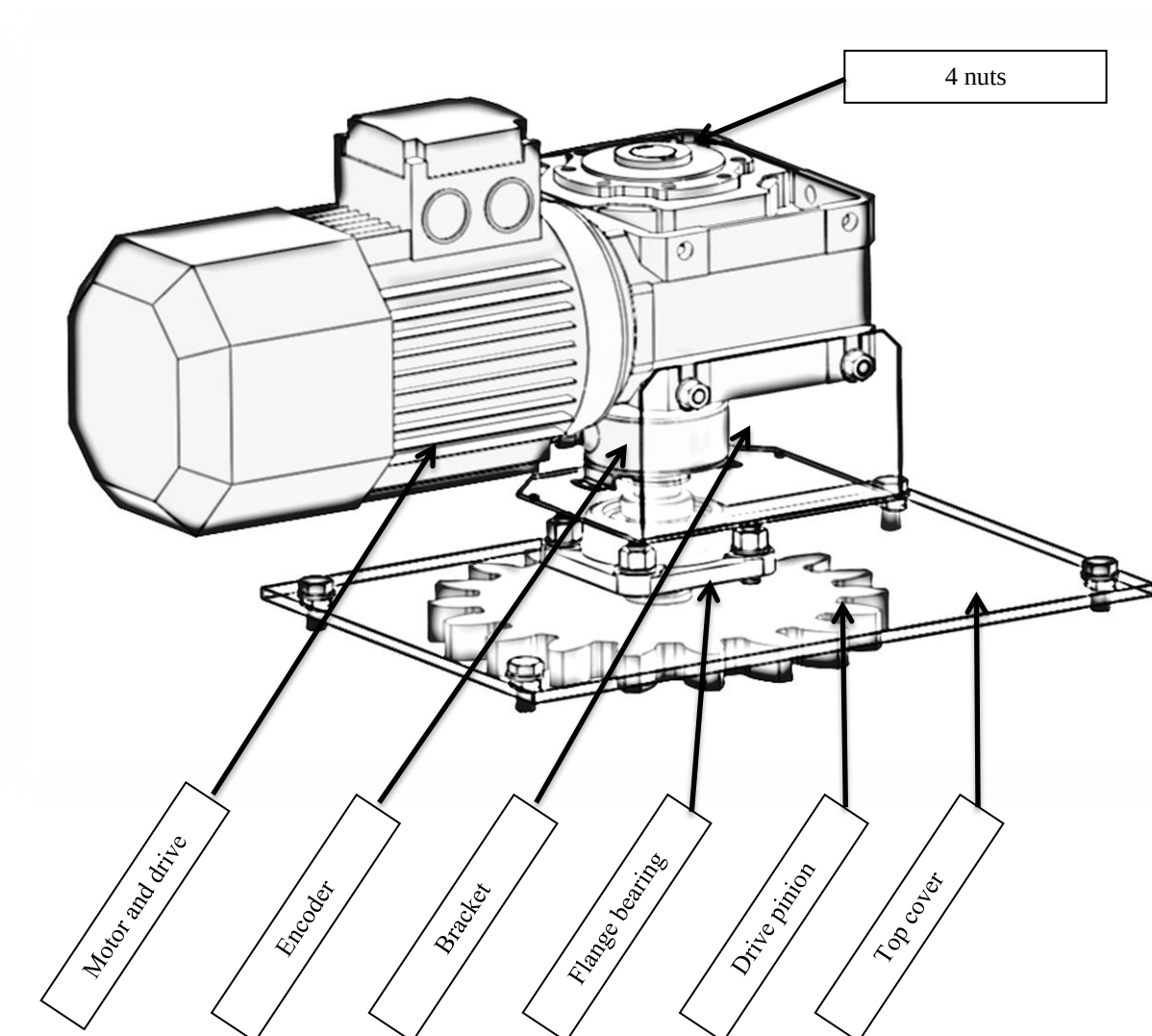
Note: Before undertaking any work , ensure the drive motor is isolated from the power supply located under trolley door cover

Remove drive assembly:

- Remove 4 nuts from the gearbox back face and 4 screws from the top cover (see figure 16.)
- Disassemble encoder's bracket

Gearbox and gear pinion assembly must be pulled off and tilted to be able to get out (gearbox can be pulled off from the shaft to help remove it from the housing)

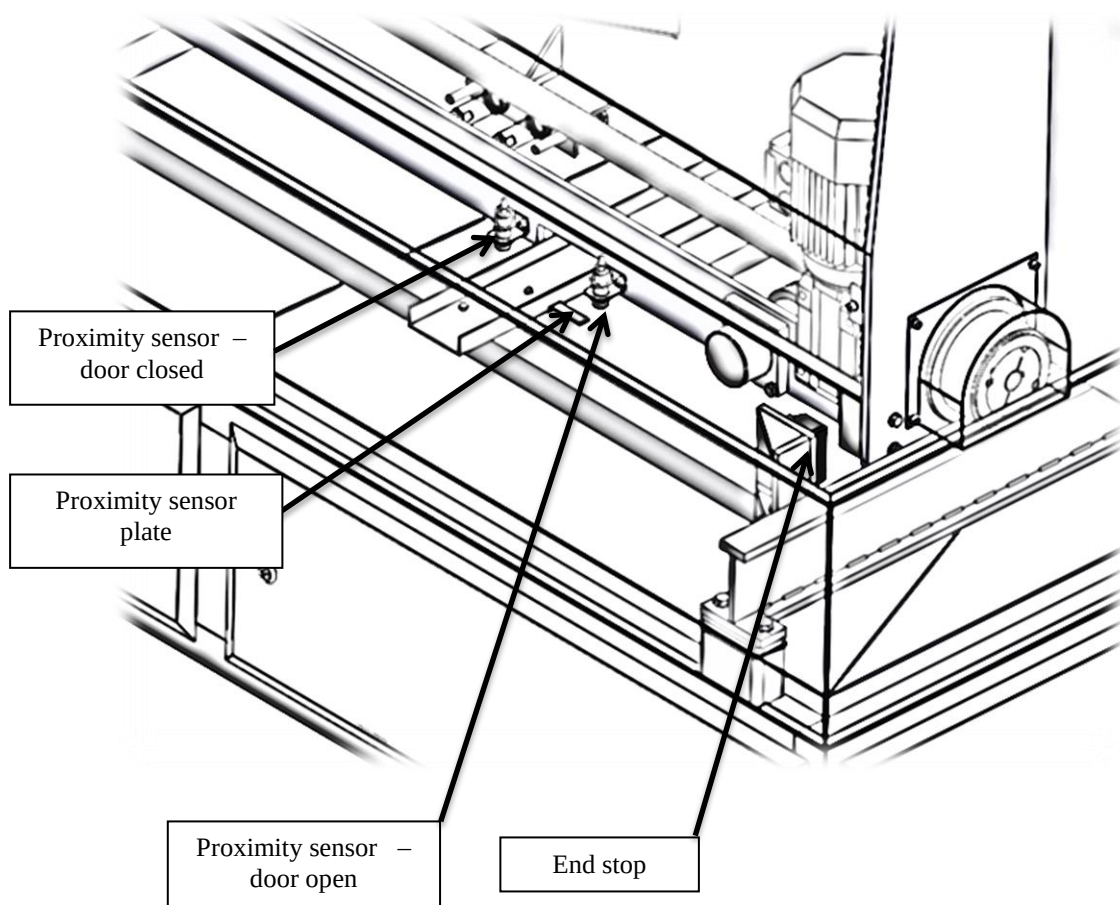
Figure 16. Turntable drive assembly



3.12.4. TROLLEY DOOR POSITION SENSOR AND END STOP

Trolley door closed and open position is controlled by two proximity switches. The door position can be adjusted by moving 'proximity sensor plate'. When door open the proximity sensor should be adjusted to avoid 'end stop' contact.

Figure 17. Trolley door positioning



3.12.5. MAINTAINING TURNTABLE.

The turntable is constructed from stainless steel and benefits from protective covers that improve the service life of the unit. The turntable is driven by gear pinion and rotate via heavy duty load runner located in the centre of the unit and it is supported by four load runners around turntable.

Turntable has the removable partition to allow better maintenance access to satellite drive box (see figure 18.)

Note: Before undertaking any work , ensure the drive motor is isolated from the power supply.

Turntable removal:

Note: Take special safety precaution when removing turntable – total turntable weight is 500kg

Turntable can be disassembled in two ways:

- Unscrewing M48 nut
- Unscrewing M10 fixing bolts allows remove turntable and plate in the same time

Note: To be able to fully remove turntable it must be tilted up to 45°

Note: Clearance between turntable gear and pinion gear must be kept as small as possible but bigger than zero

Figure 18. Turntable removable partition.

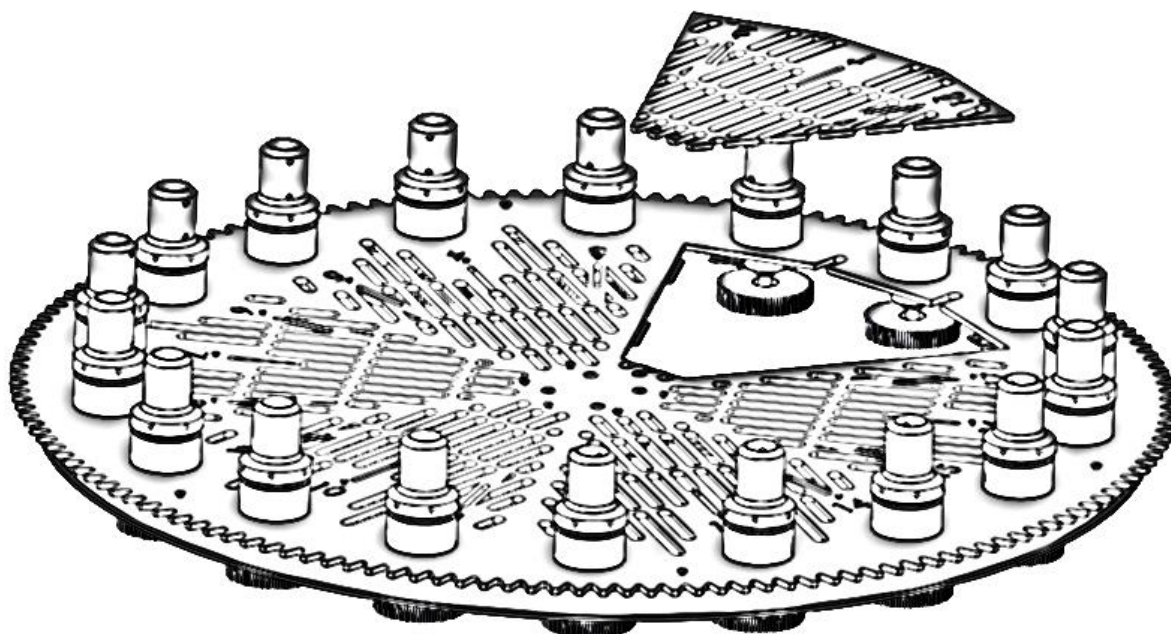
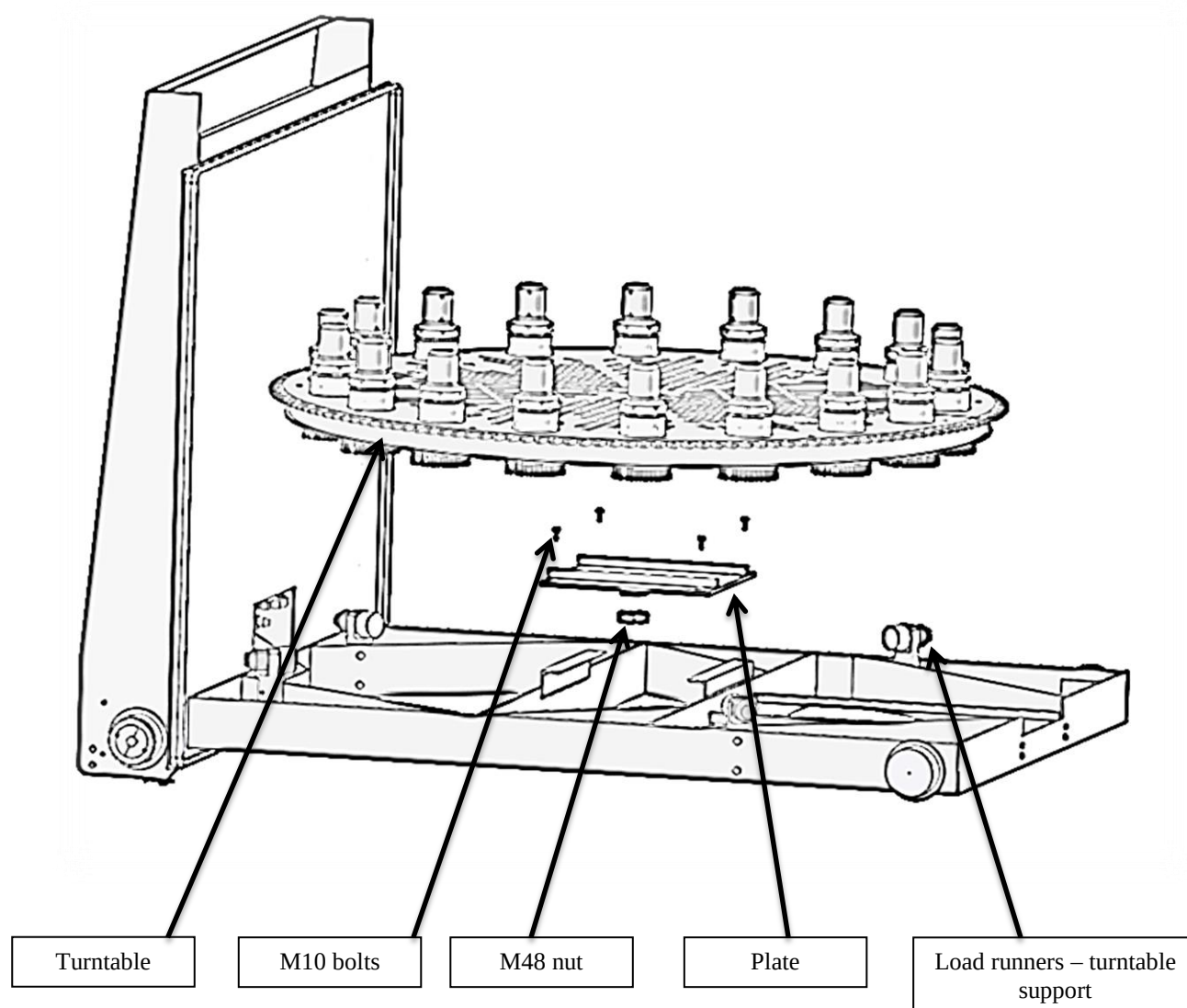


Figure 19. Removal the turntable



3.12.6. SATELLITE ASSEMBLY.

The satellite drive system is constructed from stainless steel. Top 'Adaptor' is design to suit different size insert and it can be clamped by two 'grub screws'. It is important to keep it clean before putting any insert. Satellite is driven via two different size radial bearings and seal with two 'V-ring' seals from the top and bottom side.

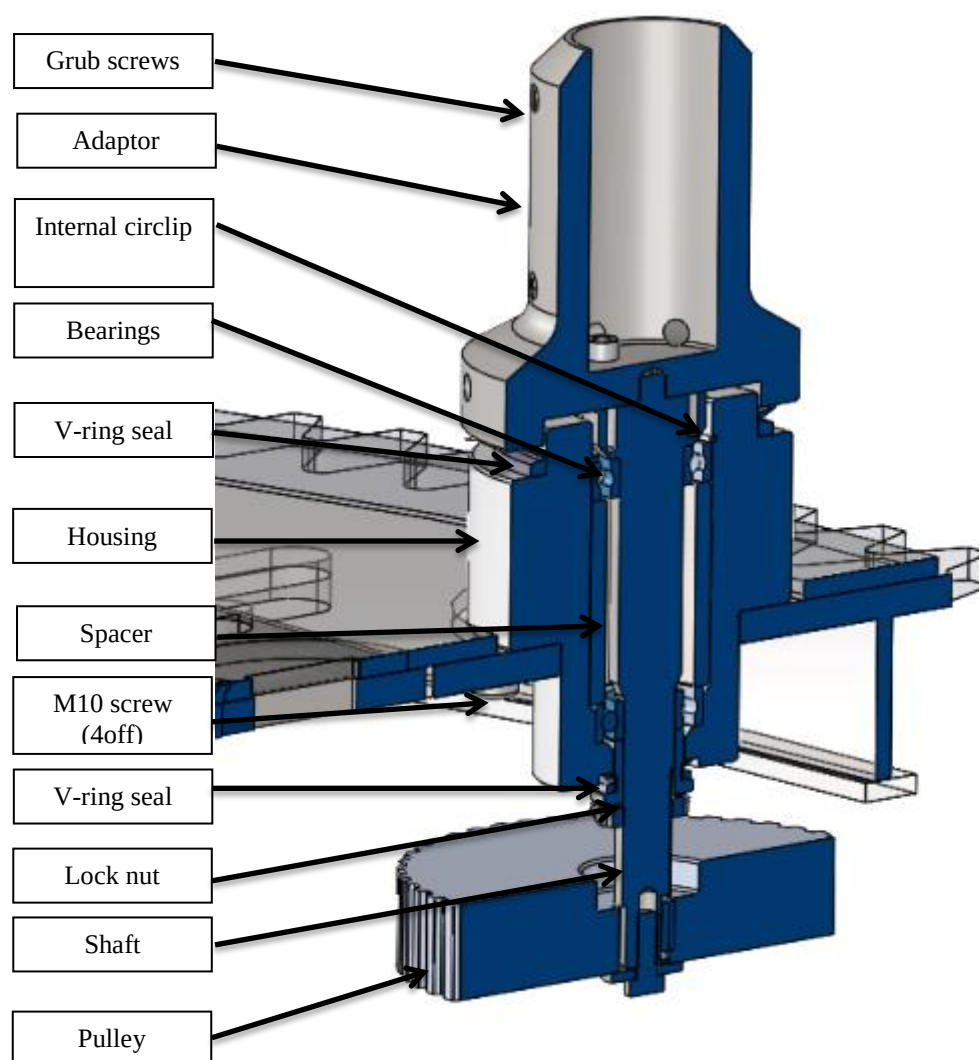
Note: maximum component diameter used in satellite holder must be smaller than 200mm

Disassembling order:

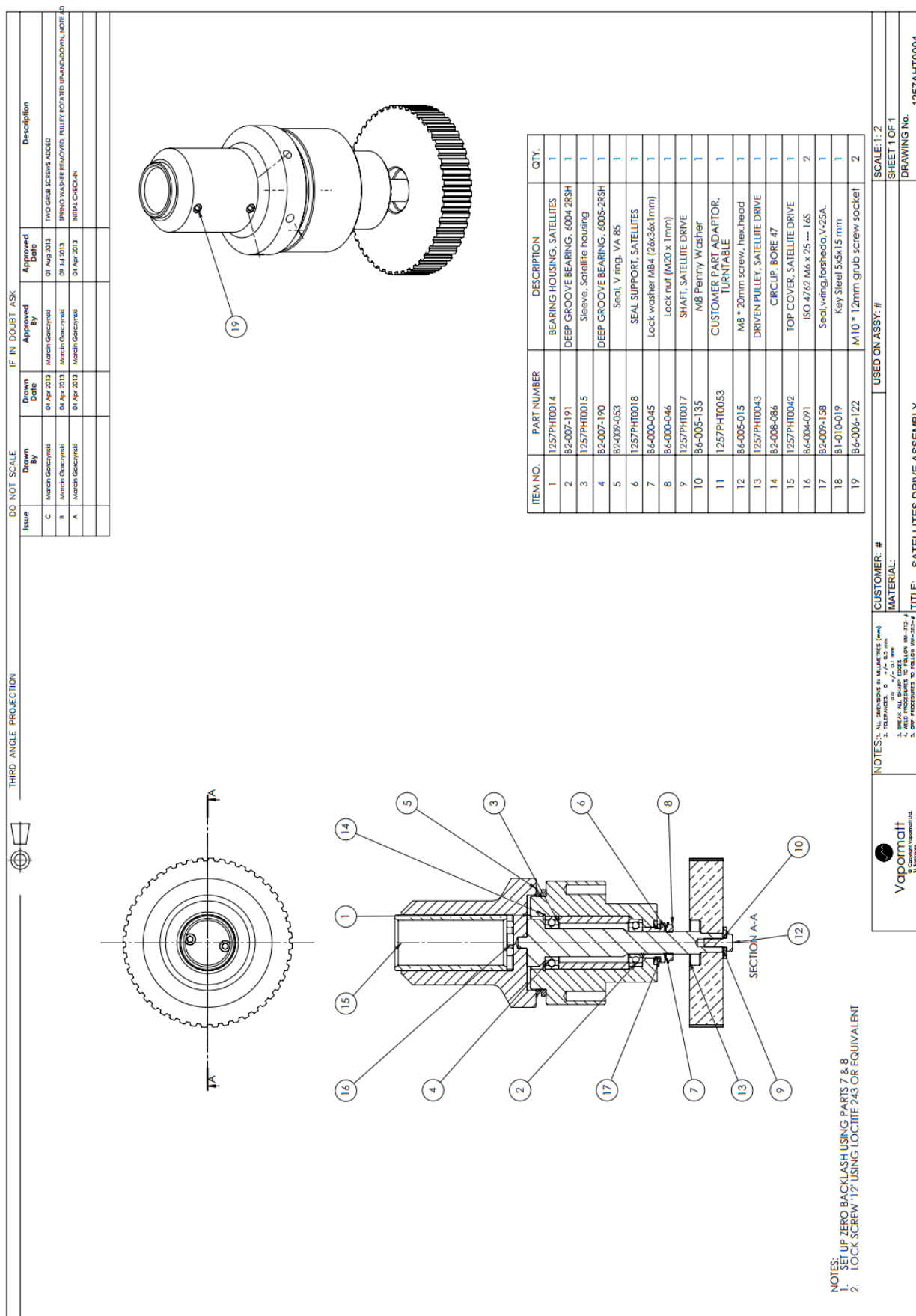
- Unscrew M8 bolt and remove aluminium pulley
- Unscrew M6 screws, located inside of the adaptor
- Unscrew M10 screws, from underneath the turntable (assembly should be easily pull off)
- Unscrew 'lock nut' and remove 'internal circlip'

Note: Shaft should be assembled to 0 backlash condition

Figure 20. Satellite cross section



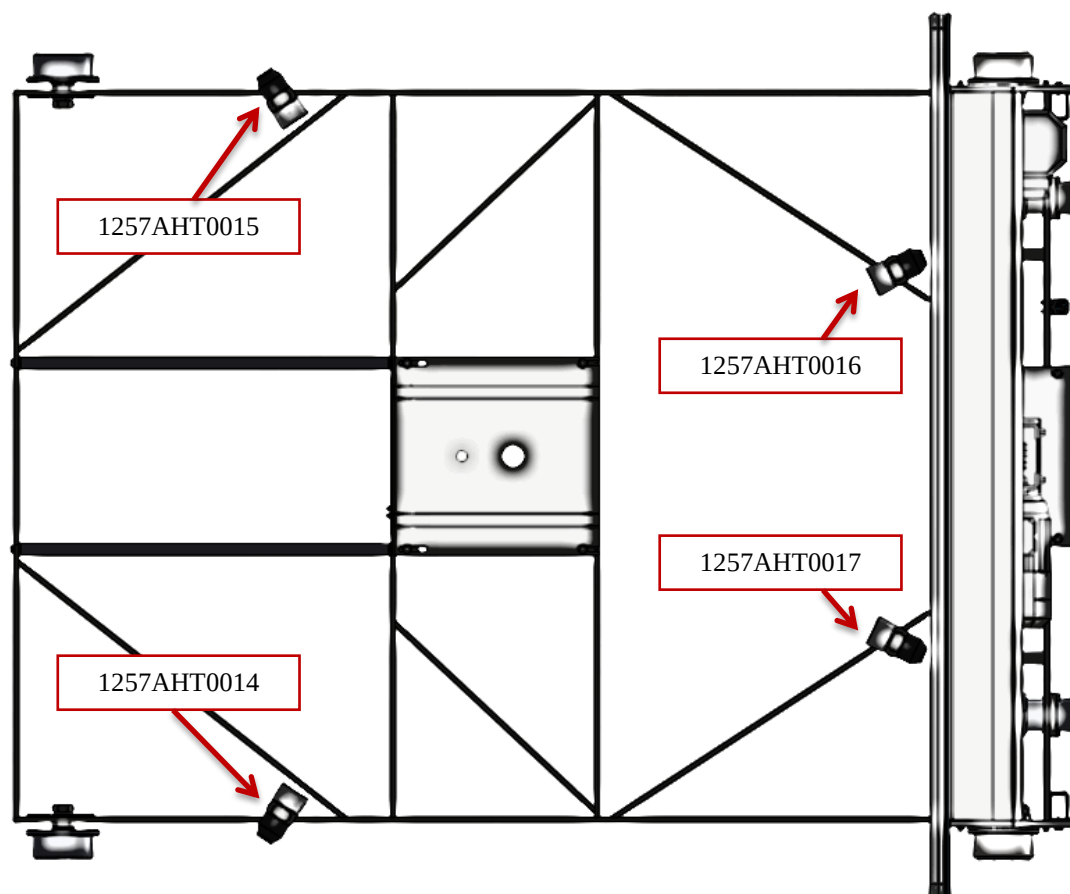
Drawing: 1257AHT0004 - Satellite drive assembly



3.12.7. TURNTABLE SUPPORT LOAD RUNNERS

The load runner's assembly is constructed from stainless steel and benefits from protective nut covers that improve the service life of the unit.
It is designed to give more stability for turntable and stop possible buckling

Figure 21. Turntable support



Drawings: All assembly drawing are identical except 'Load runner support drawing'

Assembly drawing	Load runner support drawing
1257AHT0014	1257PHT0066-1
1257AHT0015	1257PHT0066-3
1257AHT0016	1257PHT0066-2
1257AHT0017	1257PHT0066-4

THIRD ANGLE PROJECTION		DO NOT SCALE		IF IN DOUBT ASK		Description	
Issue	Drawn By	Drawn Date	Approved By	Approved Date			
A	Marcin Gorczynski	06 Aug 2013	Marcin Gorczynski	06 Aug 2013	INITIAL CHECK-IN		

ITEM NO.	PART NUMBER	DESCRIPTION	LB/QTY.
1	1257PHT0066-4	LOAD RUNNER SUPPORT	1
2	B2-007-160	Load runner 2 1/2" s/s with nut and washer	1
3	N0002T42	Nut cover, load runner, 2,5	1
4	B6-006-002	Plain Washer Normal Grade A_ISO 7089-10	2
5	B6-006-020	M10 * 45mm screw,hex.head	2

NOTE:
1. BACK LEFT SIDE SUPPORT

NOTES: 1. ALL DIMENSIONS IN MILLIMETRES (mm) 2. TOLERANCES: 0 +/ - 0.5 mm 0.0 +/ - 0.1 mm 3. BREAK ALL SHARP EDGES 4. WELD PROCEDURES TO FOLLOW: W-312-# 5. ALL DIMENSIONS ARE TO CENTER UNLESS OTHERWISE STATED !!		CUSTOMER: #	USED ON ASSY: #	SCALE: 1: 2
 Vapormatt © Copyright Vapormatt Ltd. 31, Somersdon, Gosport, Hants, PO13 9AG		TITLE: TURN TABLE SUPPORT		SHEET 1 OF 1 DRAWING No. 1257AHT0017

3.12.8. SATELLITE DRIVE BOX

The satellite drive box assembly is constructed from stainless. It drives satellites via double sided belt and 3 aluminium pulleys

Drive enclosure will engage with satellite when turntable is in the right position and disengage before it moves to another selected position. Enclosure movement is controlled by cylinder and two limit switches, cylinder shaft is protected from media by circular bellow. (see drawing below 1257AHT0008 sheet 2.)

Satellite drive enclosure has been fit with water sensor for safety precaution, alarm will appear when water detected.

Note: Drain can be use when 'flooding alarm appear' (see drawing 1257AHT0008 sheet 2.) to check the water. Further investigation should be done to eliminate any box leak.

Note: Before undertaking any work , ensure the drive motor is isolated from the power supply located under trolley door cover

Top plate removal for maintenance (see drawing 1257AHT0008 sheet 3)

- a. Set turntable is home position
- b. Remove top PU protection cover and (see figure 18. and section 3.12.5.)
- c. Remove four M8 counter sunk screw to be able to remove 'Turntable cover'
- d. Remove M5x20L fixing screws and top retaining rings
- e. Remove belt, two seals from each shaft and keyways
- f. Remove four M10 fixing hexagon bolts from top plate
- g. Top plate assembly and two shafts should be free to remove

Note: these two shaft are located in the flange bearings on the bottom of the box so it have to be pull-up about 1cm and then it can slides forward and backwards if necessary

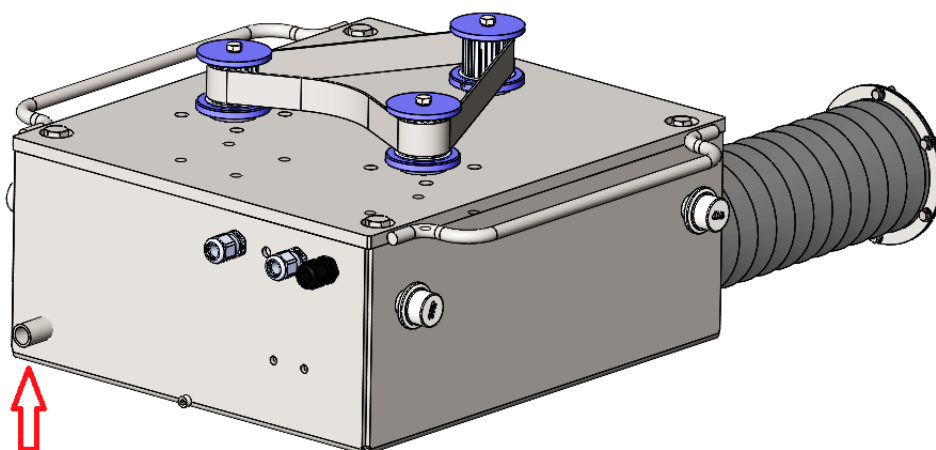
Satellite gearbox removal for maintenance

- a. (See top plate removal above)
- b. Unscrew and remove circular bellow attached to the trolley door frame
- c. Remove fixing screw from cylinder shaft bracket attached to the frame
- d. Remove cable guard and disconnect cables when required
- e. To remove enclosure, tilt and pull up (disassemble gearbox and disconnect cables if necessary)

Troubleshooting:

Problem	Solution
'Failed to engage'	a. Check pressure, min correct pressure 75psi, Tag - SV161 b. Check and adjust flow control valve, too slow speed may lead to engagement error. Valve is located on the load end, Tag AV161A & AV161B c. Reduce pressure to 0psi on SV161 and pull the enclosure back manually to check limit switch output signal (see operational manual for instruction) SV161_closed,
'Failed to disengage'	a. Check pressure, min correct pressure 75psi, Tag - SV161 b. Check and adjust flow control valve, too slow speed may lead to engagement error. Valve is located on the load end, Tag AV161A & AV161B c. Reduce pressure to 0psi on SV161 and push the enclosure forward manually to the end to check limit switch output signal (see operational manual for instruction) SV161_Open
Satellite drive 'failed to run' alarm	Check motor running condition manually (see operational manual for instruction) Output Tag ZTP141
'Satellite box flooding' alarm	Check the presence of water (see drawing 1257AHT0008 sheet 2.) Further investigation required when water detected
Broken belt	It may be a sign of broken or bad condition of one of the satellites mechanism or satellite drive box pulleys
Satellite does not rotate when engaged	Check double sided belt condition and replace if necessary

Figure 22. Non return valve location to pressurised enclosure



Drawing: 1257AHT0008 - Satellite drive enclosure (3 sheets)

1. USE FLEXIBLE TUBE TO PROTECT THE CABLES AND AIR LINE OUTSIDE OF THE BOX

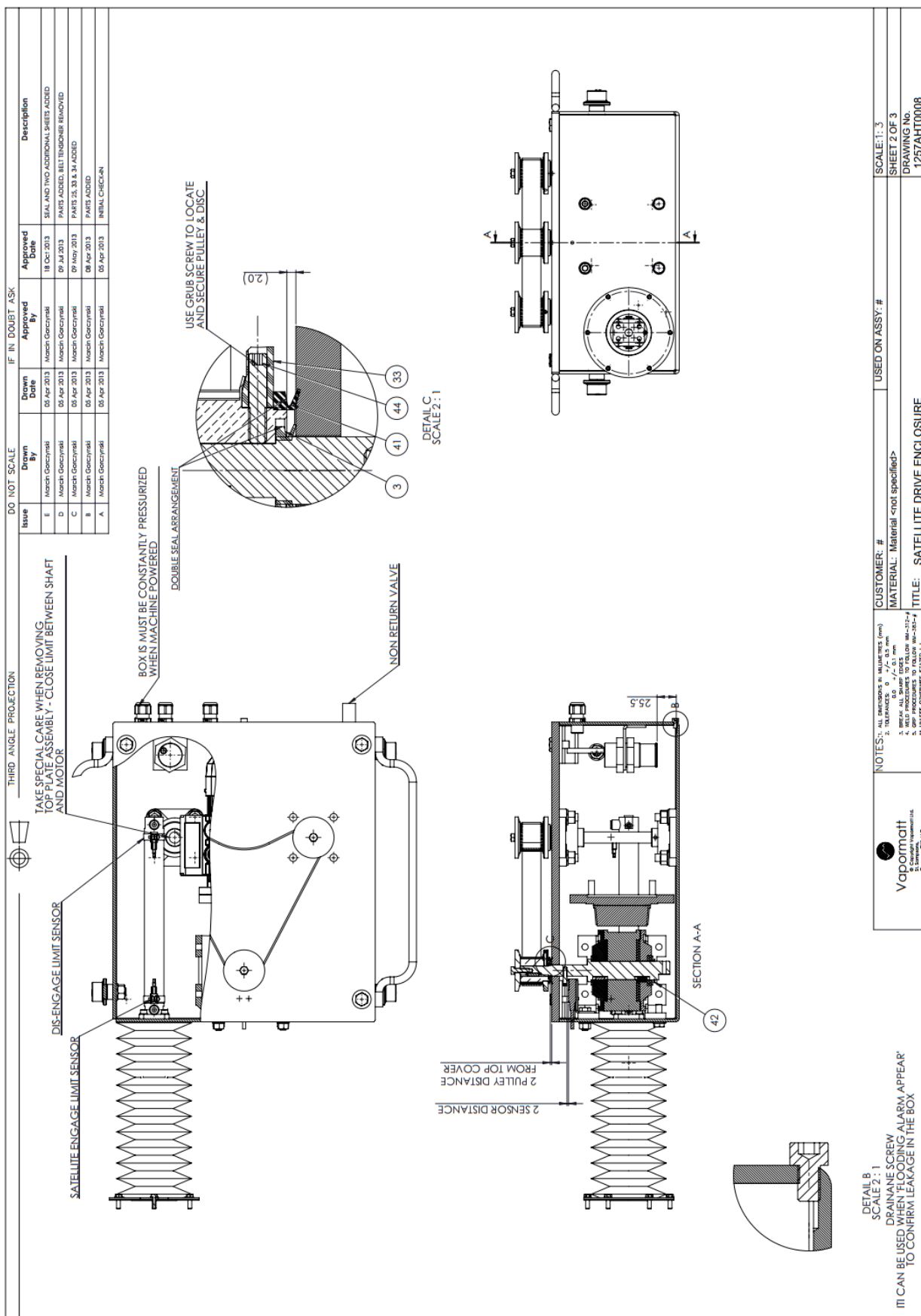
NOTES:

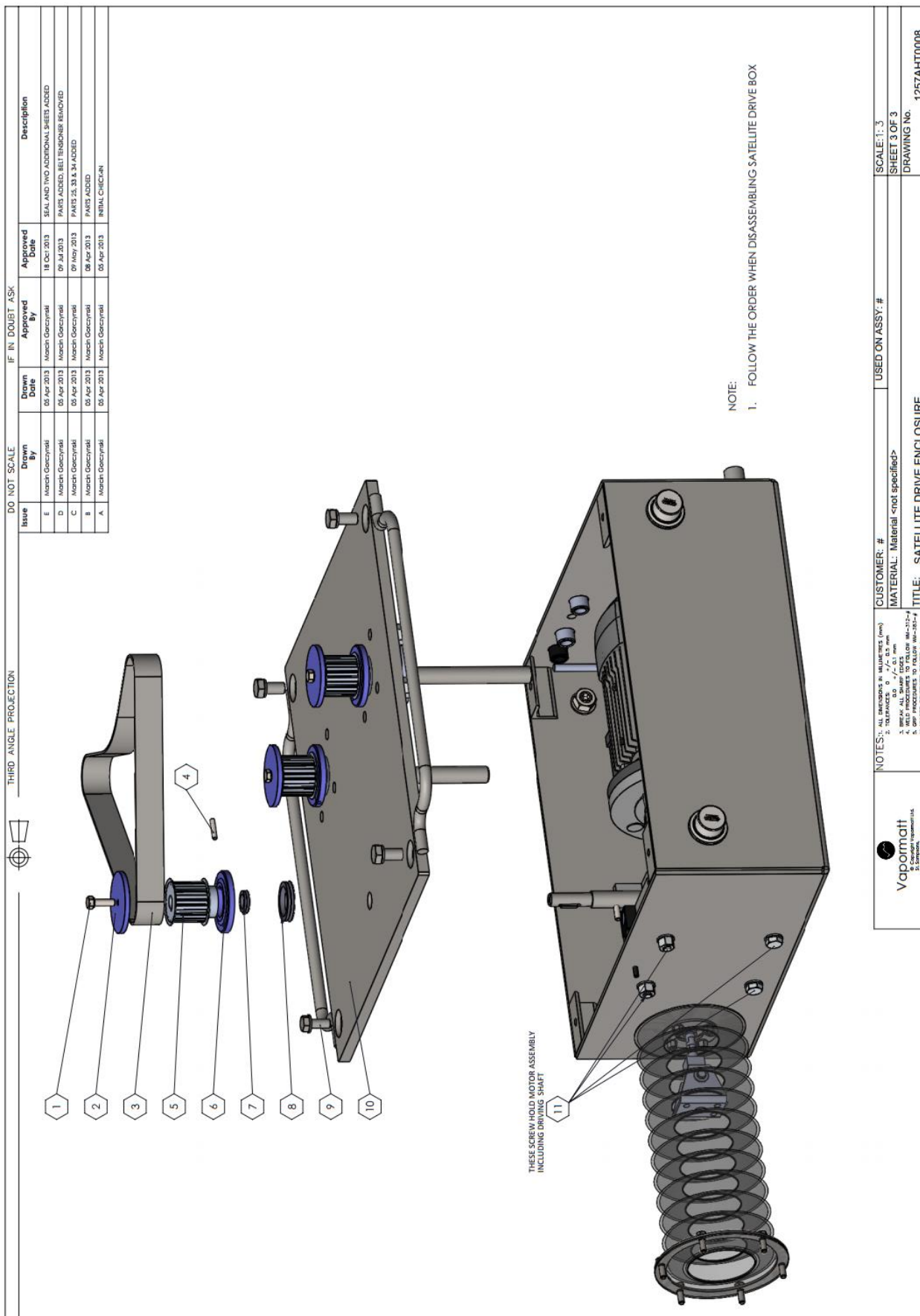
1. USE FLEXIBLE TUBE TO PROTECT THE CABLES AND AIR LINE OUTSIDE OF THE BOX

DO NOT SCALE			IF IN DOUBT ASK			THIRD ANGLE PROJECTION		
Issue	Drawn By	Drawn Date	Approved By	Approved Date	Description			
B	March Golecymall	08 Oct 2013	March Golecymall	09 Jul 2013	SEAL AND TWO ADDITIONAL SHEETS ADDED			
D	March Golecymall	08 Apr 2013	March Golecymall	09 Jul 2013	PARTS ADDED, BELT TENDONER REMOVED			
C	March Golecymall	08 Apr 2013	March Golecymall	09 May 2013	PARTS 25, 33 & 34 ADDED			
B	March Golecymall	08 Apr 2013	March Golecymall	08 Apr 2013	PARTS ADDED			
A	March Golecymall	08 Apr 2013	March Golecymall	05 Apr 2013	INITIAL CHECKIN			

ITEM NO.	PART NUMBER	DESCRIPTION	Drive in/QTY.
1	1257PH10036	BOX, SATELLITE DRIVE	1
2	82-007-189	Flange bearing, SF15	2
3	82-009-204	V14A V Ring Seal	3
4	82-002-002	Motor, 0.12kW, no brake	1
5	1257AH10009	COVER, SATELLITE DRIVE BOX	1
6	82-006-000	108:1	1
7	82-005-114	DOUBLE SIDED TIMING BELT, 25T10 - 720 X 25mm WIDE	1
8	82-007-174	Load runner 1" flanged stainless steel with nut & washer	4
9	1257PH10034	SLEEVE, LOAD RUNNER	4
10	1257PH10035	TIMING PULLEY, SATELLITE DRIVE	3
11	86-005-015	M8 * 20mm screw, hex head	1
12	86-005-002	Washer ISO 7089 - M8	11
13	86-005-016	Hexagon head screw ISO 4017 - M8 x 25	5
14	86-005-001	M8 SS nut	3
15	86-003-002	M5 5/6 flat washer	17
16	86-006-002	Plain Washer Normal Grade	8
17	86-006-001	A, ISO 7089-10	8
18	86-006-015	M10 x 20mm screw, hex head SS	3
19	1257AH10012	CYLINDER ASSEMBLY	1
20	83-004-222	PROXIMITY SWITCH	1
21	86-001-062	M3 * 10mm screw slot pan	2
22	83-009-069	Cable Gland, M16, 7-10.5mm cable	1
23	83-009-144	Cable Gland, M16, 3 - 7mm cable	2
24	84-017-013	Non-helium valve, plastic, 3/8"	1
25	86-003-001	M5 Nut	4
26	1257PH10048	CIRCULAR BELOW	1
27	1257PH10049	RETAINING RING	1
28	1257PH10050	RETAINING RING	1
29	86-003-014	M5 * 16 hex head machine screw	6
30	83-004-027	Prox.cap.PNP, NC, 30mm, n.f.f.s, M3 2	1
31	1257PH10051	BRACKET, WATER SENSOR	1
32	86-003-090	M5 x 20mm screw, socket head	4
33	1257PH10043	RETAINING DISC	3
34	1257PH10044	RETAINING DISC	3
35	86-003-015	M5 x 20 screw, hex head	3
36	1257PH10048	SENSOR BRACKET, SATELLITE BOX	1
37	1257PH10022	Shdt, scrtellies drive	1
38	81-010-016	Key Steel 8x7x12 mm	2
39	81-010-020	KEY STEEL 4X4	1
40	86-003-087	M5 x 8mm screw, socket head	1
41	82-009-2XX	Seal, V-ring, Forsheda, V27A	3
42	82-008-007	Circlip ext. 25mm shaft (24 id)	1
43	86-003-XXX	GRUB SCREW M5-25L	1
44	86-002-XXX	M4 x 20 GRUB SCREW	3

NOTES:		USED ON ASSY: #		CUSTOMER: #	
1. ALL DIMENSIONS IN MILLIMETRES (mm)		MATERIAL: Material -not specified>		SCALE: 1: 5	
2. UNLESS OTHERWISE SPECIFIED		DRAWING No.		SHEET 1 OF 3	
3. SEE ALL ALL		1257AHT0008			
4. HELD PROCEDURES TO YELLOW					
5. UNLESS OTHERWISE SPECIFIED					
6. UNLESS OTHERWISE SPECIFIED					





3.13. MK.4, 5, & 6 ABRASIVE PUMP MAINTENANCE.

After approximately 500 hours use, inspect the abrasive pump. This is done as follows:-

Note: Before undertaking any work , ensure the drive motor is isolated from the power supply.

Removing pump from machine sump:

- a. Unplug (or disconnect) the pump motor from the electrical enclosure.
- b. Remove pump to cabinet securing nuts, two at each side of the pump frame.
- c. Unlock the snap coupling feeding the sump stirring nozzle, and process gun(s) - this is positioned inside the cabinet below the sump grids.
- d. Lift pump and motor out of cabinet.

Casings, impeller and filter; removal and inspection:

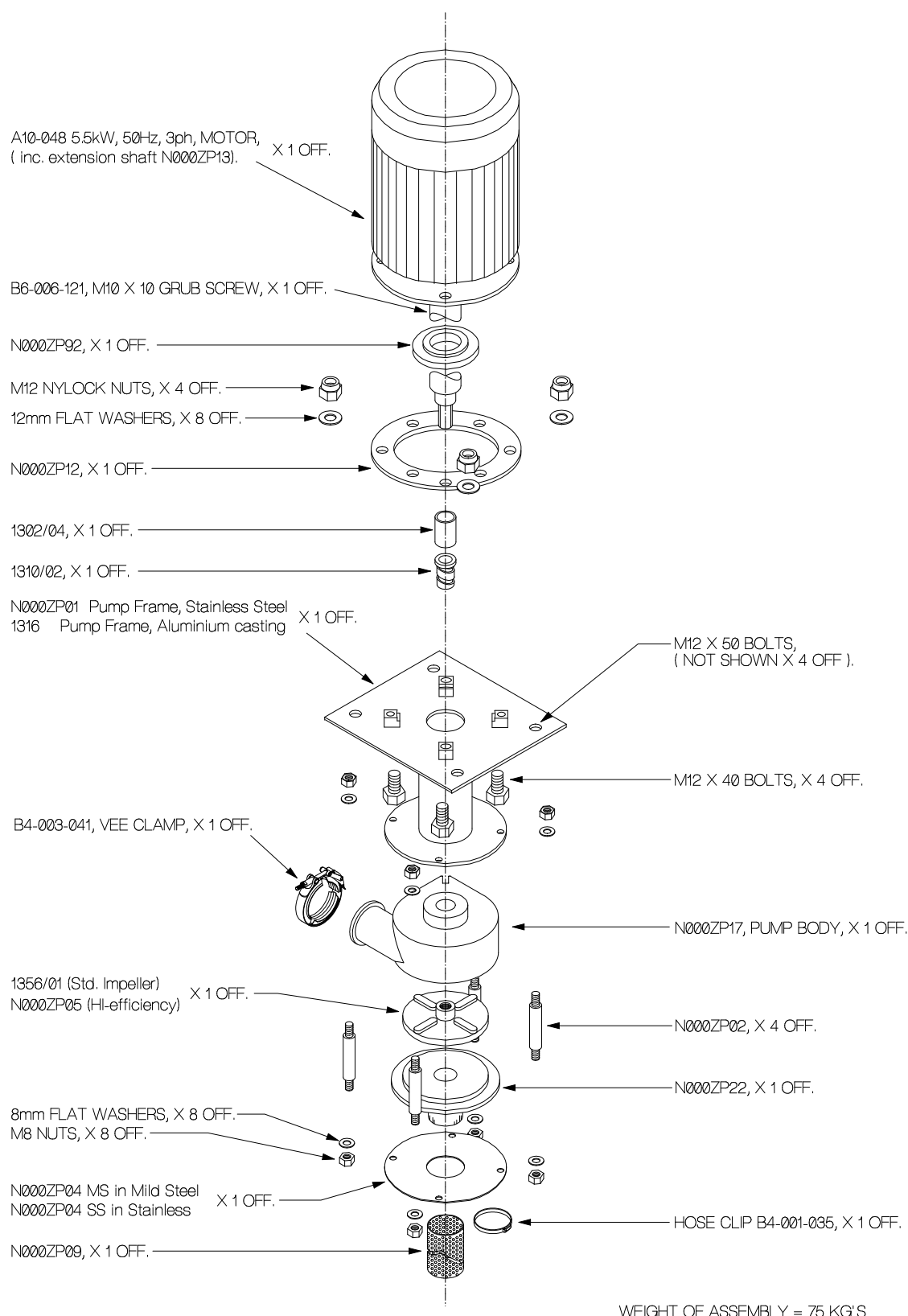
- a. Remove filter by sliding from inlet casing, check for blockage and wear.
- b. Remove the four spacer bolts that are holding the pump casings together, and separate casings.
- c. Unscrew impeller anti-clockwise, remove from casing. It will be necessary to hold the motor shaft do this, either through the gap between motor and frame or by removing the fan.
- d. Check all urethane items for wear. As a guide: 3-5 mm deep groves indicate that the particular component is nearing the end of its life.
- e. The motor can now be removed if necessary for rewinding or bearing replacement.

Re-assembly:

- a. Fit bearing thrower at top of motor shaft. Bolt motor to frame, if pump is 50mm then include spacer ring (1313/01).
- b. Stand the motor on its fan end. Fit wear sleeve and gland sleeve onto bottom of motor shaft, then fit main casing into frame.
- c. Check that both sleeves and shaft run concentrically through the casing - if not, replace casing.
- d. Grease impeller thread and screw fully on, fit inlet casing, bottom plate and tighten casing bolts to 8 ft. 1bs.
- e. By looking through outlet of pump, check that the clearance at the top and bottom of the impeller and the casing is approximately equal. If not, put shims between impeller and shaft end.
- f. Fit strainer.
- g. Check pump spins freely by hand, if not rectify binding. Fit pump into machine (without, preferably, abrasive in sump).
- h. Run pump for a second checking rotation is correct and that deceleration is smooth. Rapid deceleration indicates binding caused by incorrect clearances - rectify before use. Running pump in the wrong direction will cause the impeller to unscrew and seize. If this happens it may be possible to re-screw the impeller by reversing the motor, if this fails the pump must be stripped down and rebuilt.

Note: consult section 1 on Safety Precautions before carrying out any additions, repairs or maintenance.

Drawing: N000ZY82 Mk 6 pump assembly (50mm/5.5Kw)

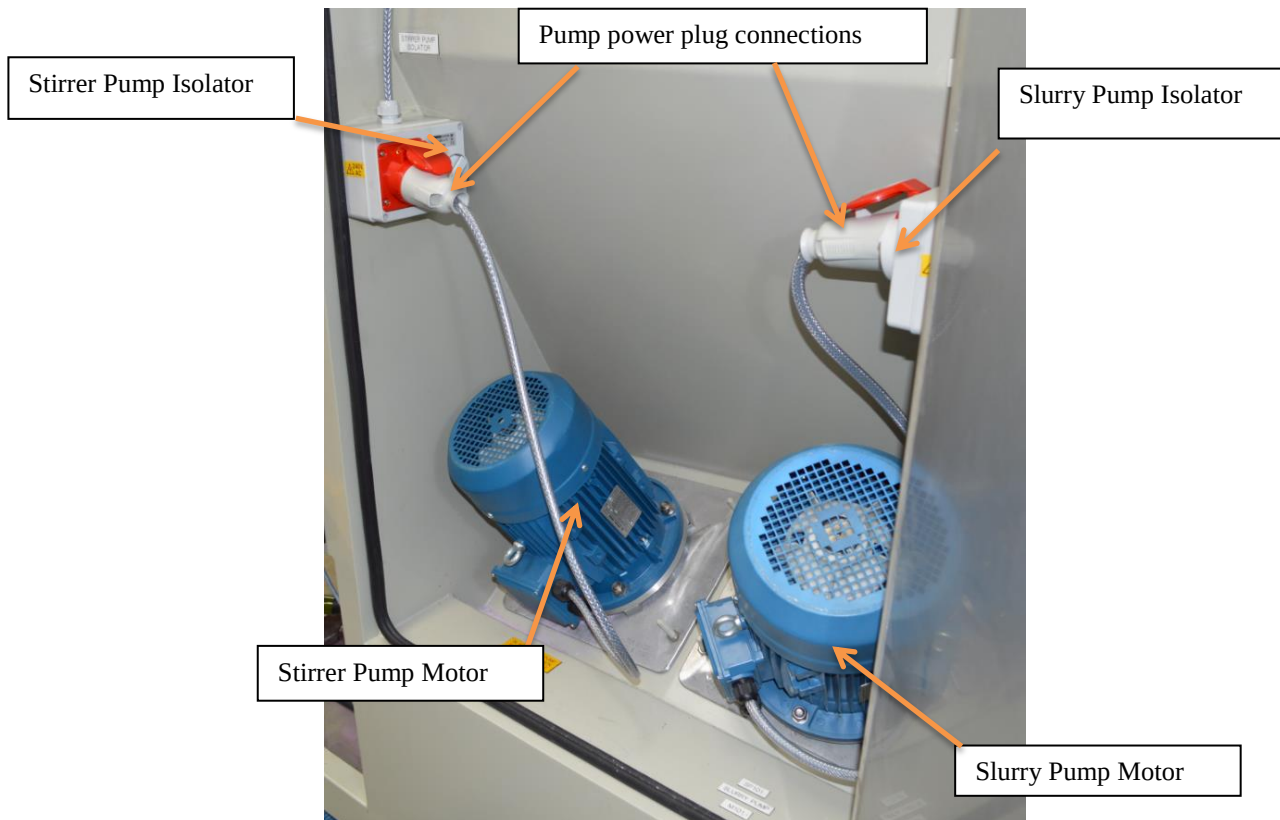


3.14. PUMP ENCLOSURE

The pump enclosure is located at the back of the main blast cabinet. The enclosure is fitted with a double door that has sound proofing built in. The door is fitted with cooling vents at the top and bottom of the door to help prevent the pumps from overheating. This door can be opened whilst the machine is running if required.

Note: Cooling vents on the door **must not be blocked** at any time as this may lead to the pump motors overheating.

Figure 23. Pump enclosure



Pump Isolators and Emergency Stop

Before undertaking any work on the pumps the power supply must be isolated using the isolation switches. And the power connection plugs should be disconnected.

The Machine is fitted with an emergency stop just outside of the of the enclosure.

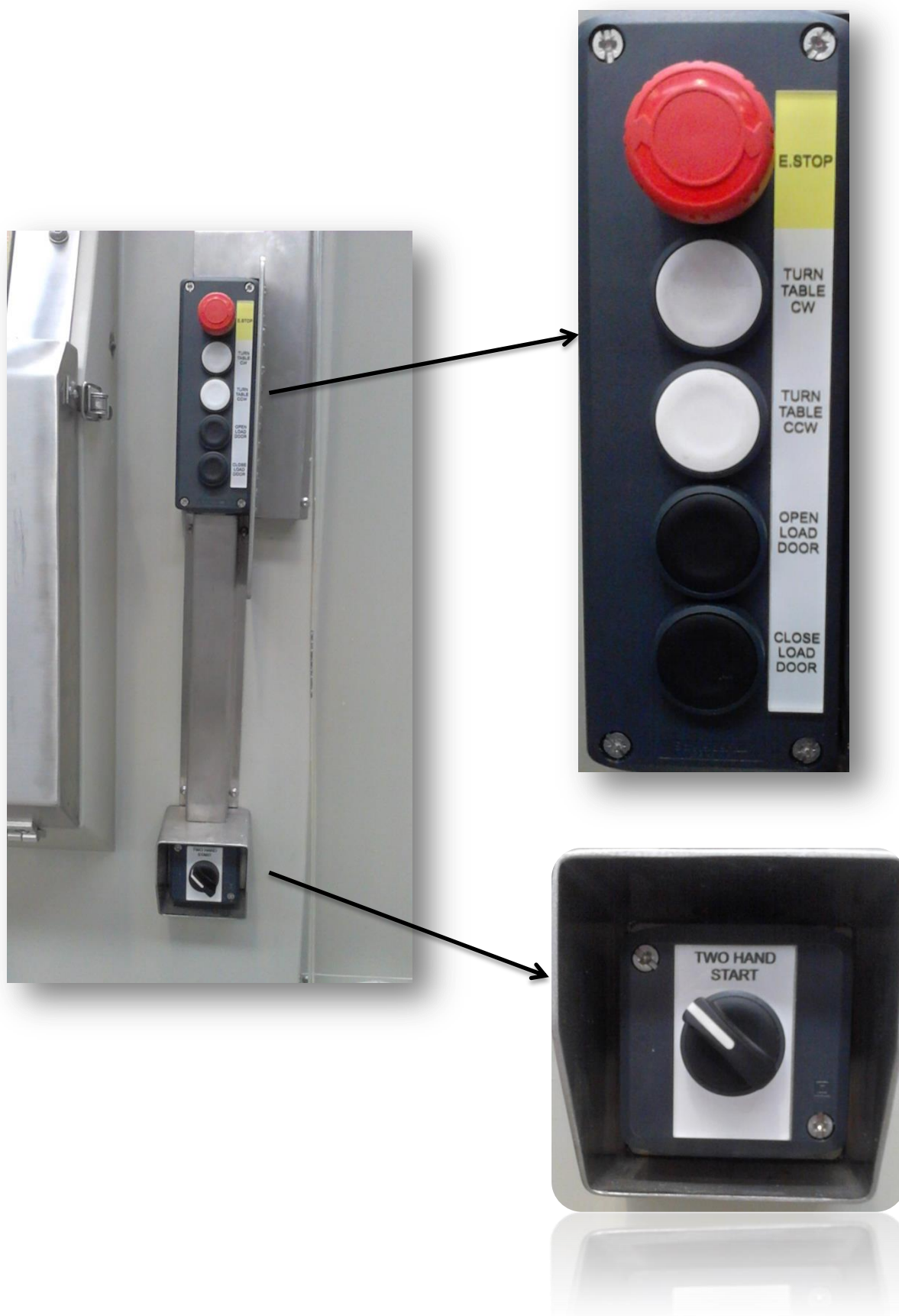
3.15. 2-HAND START

Two hand start is design for safety precautions when opening, closing and rotating turntable. The principle of the solution is to use two hands by operator when loading and unloading components.

To operate the control:

- Open the trolley door - switch 'two hand start' and press 'open load door', 3 sec timer is applied to allow to release the door clamps
- Close the trolley door - switch 'two hand start' and press 'close load door', the door start moving immediately until reach the limit switch
- Rotate the turntable - switch 'two hand start' and press 'Turn table CW/CCW, turntable start rotate immediately

Figure 24. 2-Hand start – trolley door operation



4. INSTALLATION AND INITIAL START-UP

4.1. INSTALLATION DETAILS

- 4.1.1. Check machine for damage, loose fittings and connections.
- 4.1.2. If the machine is automatic then screw the adjustable/shock absorbing feet to the machine legs before placing the machine in position.
- 4.1.3. Ensure that the floor where the machine is to be sited can support the specified load, is level and is waterproof. Place machine in position, adjacent to drain if required.
- 4.1.4. The machinery should be sited and set up in accordance with the installation plan drawings.
- 4.1.5. If load ends are supplied these should be carefully aligned with the fixing brackets, well sealed (see section 6.4) and then securely bolted onto the machine. One piece rails are then fed through the machine and screwed to the mounting plates on both machine and load end.
- 4.1.6. Fix oscillation frames, gun head, and enclosure according to section 3.2.
- 4.1.7. Remove all foreign matter from inside cabinet.
- 4.1.8. Consult section on Technical Details regarding Services required.
- 4.1.9. Connect the services as follows (refer to installation drawing):

Electrical: See circuit diagram for load, voltage etc. Unless specially ordered all machine require 3 phases, earth **AND** neutral. If the machine is not fitted with an RCD (see circuit diagram page 1) the supply **MUST** have one fitted. Connect supply onto the isolator in the electrical control cabinet, the cable entry can be drilled anywhere in the sides, to suit. **DO NOT** turn machine on - this to be done by Vapormatt Engineer.

Water: Connect 12.7mm (1/2") N.B. pipe to the 12.7mm (1/2") BSP / NPT connection on the service manifold; pipework marked dark blue as per 92/58 EEC

Air: Connect 1.5" BSP to the service manifold, the flow requirement is shown on page 1 of the air circuit diagram (section 2.1). Pipework marked light blue as per 92/58 EEC

Re-circulated pipework (return flow from filter systems to the cabinet).

Connect pipes as marked (temporary labels are attached when the machine is stripped for shipping, simply reconnect name to name), pipework marked green as per 92/58 EEC

Drain: Depending on specification this may not be necessary, check (section 2.1). and the notes at the end of this section. If it is necessary, use 100mm (4") NB pipe, preferably floor level adjacent to the machine (or if fitted, filter) overflow. A smaller pipe can be used but will be prone to blockages, 50mm (2") NB is absolute minimum. It must be capable of handling a maximum flow of 40 litres per minute, and be fitted with a grit trap.

- 4.1.10. Fill machine (and filter system, if fitted) with water, until it overflows. This can be done from the hand rinse nozzle, although automatic machines have a specific fill valve which may be automatically operated, see water circuit diagram, page 1
- 4.1.11. Regulate air pressure regulators for optimum performance of all systems. Factory pre-set values should be maintained if set. Do not exceed maximum recommended air pressures. Gauges should be red lined at maximum permissible pressures.
- 4.1.12. On Commissioning :-(To be carried out by Vapormatt Engineer).

Check phase sequence, momentarily press knee-starter button, then knee-stop button. (or if foot switch fitted press twice in quick succession) Check motor rotation clockwise, viewed from motor drive end – incorrect rotation may seize pump impeller. If this happens the pump must be dismantled, see maintenance section for details.
- 4.1.13. Place initial charge of abrasive into machine, see section 3.1.
- 4.1.14. **For safety**, isolate Services and Electrics at this point unless it is intended to operate

machine immediately following primary installation.

4.1.15. Proceed according to Operating Instructions.

4.1.16. If in doubt, contact Vapormatt Limited.

Note:

Doors, pump, air and water supply to cabinet are interlocked, and machine will not operate with door open.

Consult section on Safety Precautions before any alterations, repairs or maintenance work is carried out.

4.2. INSTALLATION CONSIDERATIONS FOR EXHAUST VENTS.

Drains:

Most vapour blast machines require drains. It is usual to use the normal factory drain. However before making a decision the drain contents should be considered with reference to local water regulations. The drain will contain:-

- process solution; this will be made up of water and any chemicals added. If the chemicals used are Vapormatt standard degreasers/inhibitors/biocides diluted to the correct strengths then this solution can be usually be put into factory drains.
- abrasive/media particles; all Vapormatt media is non-hazardous, but a build-up could block drains so grit traps should be fitted.
- particles of material from the components being processed; these will generally be non-hazardous but a risk assessment should be done.

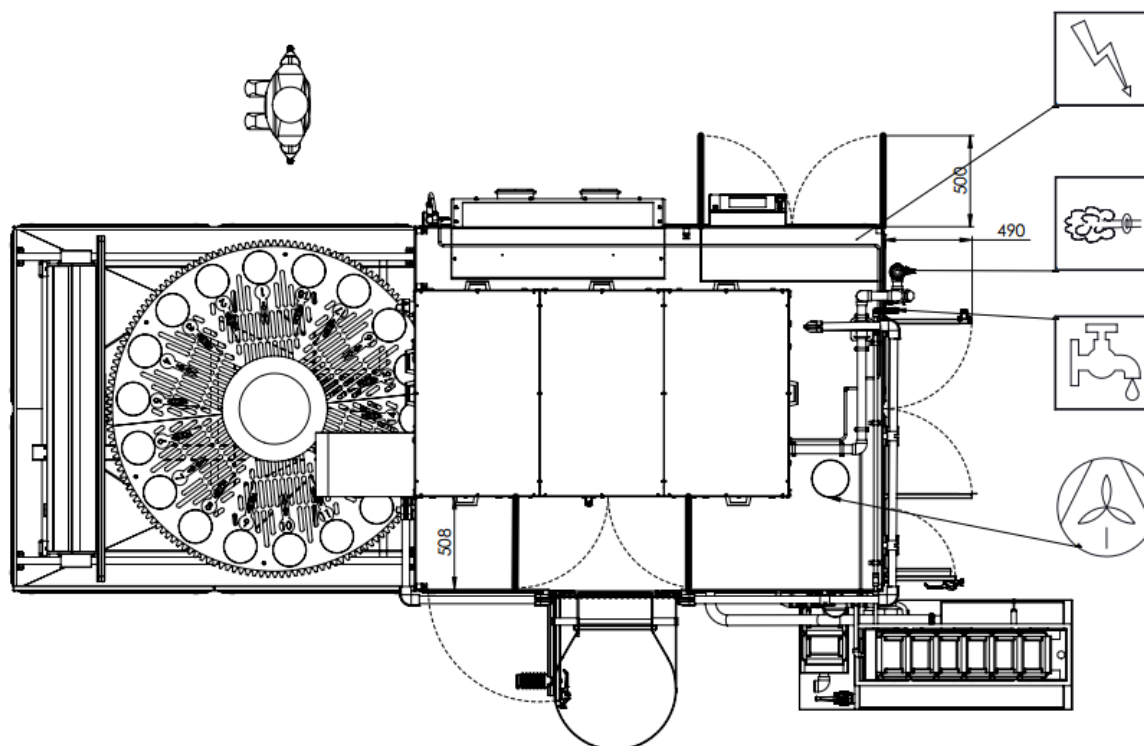
Exhaust:

During processing a quantity of moist air will constantly escape through the Exhaust vent which is situated in the roof of the machine, the volume of air that exits the exhaust vent will depend on the number of blast guns being used, Nozzle sizes, and blast air pressure. Exhaust content should be monitored to establish if the emissions could in any way pose a health hazard to operators working in the vicinity. Exhaust emissions are likely to contain the following:

- Process solution mist; this will be made up of water and any chemicals added. If the water is kept free of bacterial growth and the chemicals used are Vapormatt standard degreaser/inhibitors/biocides diluted to the correct strengths then this mist is non-hazardous
- Water vapour; non-hazardous.
- Abrasive/media particles (wet); all Vapormatt media is non-hazardous and because it is a wet process there is no dust hazard. However, wet media could be a nuisance if it falls on nearby machinery. Operators working in the vicinity should wear eye protection at all times.
- Particles of material from the components being processed (wet); these will generally be non-hazardous especially because there will not be a dust, however a risk assessment should be carried out. Some materials which when blasted could cause emissions to be hazardous are:-
 - metal castings during manufacture (see COSHH, schedule 3)
 - Asbestos (see CAWR, regulation 8)
 - Lead (see CLAW, regulation 6)

4.3. MACHINE LAYOUT

Figure 25. Drawing 1257AHA0001-C (machine layout)



4.4. LIFTING INSTRUCTIONS

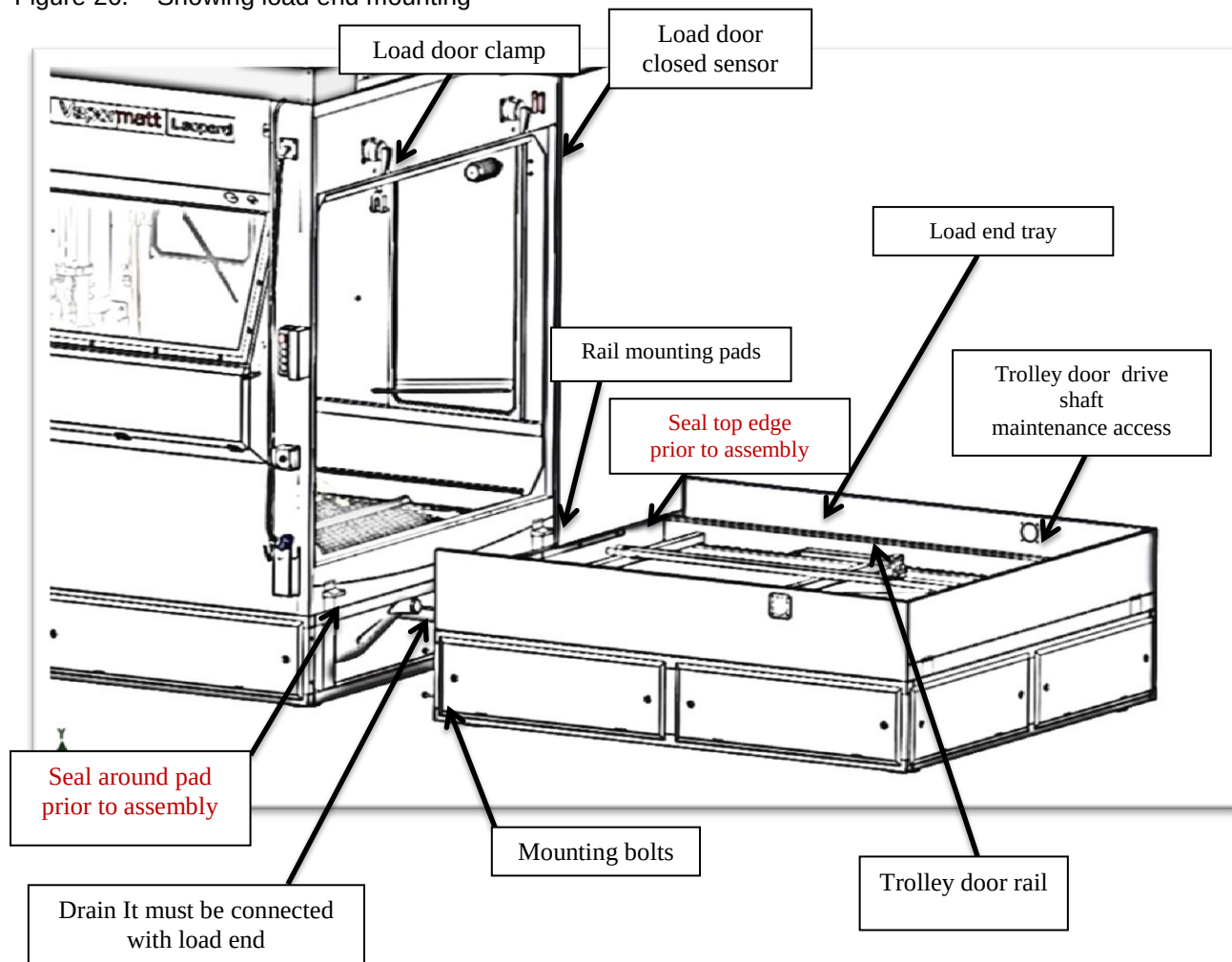
- 4.4.1. The sump, filters and settling, storage & overflow tanks must be drained.
- 4.4.2. All supplies must be disconnected: Electricity, Air, Water, Drain and exhaust.
- 4.4.3. The filters, the settling, storage & overflow tanks and the load end drip tray should be disconnected and moved separately
- 4.4.4. Although the machine can be moved a unit, it should not be lifted with the upper enclosure containing the horizontal and vertical oscillation attached to the roof. The upper enclosure should be removed and lifted separately.
- 4.4.5. Lifting slings must be passed underneath the machine, ensuring that they bear on the ends of the lowest horizontal bars. Care should be taken that the slings do not bear on any delicate components as they pass over the front and back of the machine, additional lifting slings must be added to the load end for additional support; pay specific attention to any oscillation assembly.
- 4.4.6. Alternatively, the main machine cabinet may be moved by fork lift. In this case ensure that the forks are as widely spaced as possible (at least 1.2m and that they are long enough to reach the full depth of the machine. The forks should be placed under the lowest horizontal bars; take care that the sump and drain valve are not damaged. When lifting note that the centre of gravity is **not** in the centre of the machine - it is usually nearer the pump and/or oscillation assembly.
- 4.4.7. The weight of the machine is approximately 4500 kg

4.5. LOAD END ASSEMBLY

The load end is fabricated from stainless steel and is attached to the main machine frame via four fixing bolts. This load end is stood on four adjustable feet located in each corner of the unit. The load end tray has drain which allows any excess media from the trolley door at the end of the process to pass back into the main sump of the machine.

Load end must be well sealed prior to assembly

Figure 26. Showing load end mounting



4.6. OSCILLATION ENCLOSURE

Assembling oscillation enclosure

- 4.6.1. Locate main oscillation frame and enclosure on the roof.
***** please make sure frame is properly located on the pins which are mounted directly on the roof (see figure 27.) *****
- 4.6.2. Screw in 7 x M10 screws to secure enclosure frame (mounting position on the bottom frame)
- 4.6.3. Mount gun head assembly (see section 3.3)
 - Fix and secure air water and slurry pipe using grub screws (see figure 3.3.)
 - Fix and secure driving pipe using clamp plate (figure 28 and section 3.3)

Note: Take special care when removing plate - whole gun head assembly may drop

- 4.6.4. Fix and secure vertical bellow using hose clips
- 4.6.5. Fix motor, gearbox and gun angle limit switch assembly (see section 3.3)
- 4.6.6. Connect all hoses from both sides of energy chain
- 4.6.7. Assemble horizontal bellows (see assembly drawing 1257AHL00001)

Figure 27. Oscillation frame location

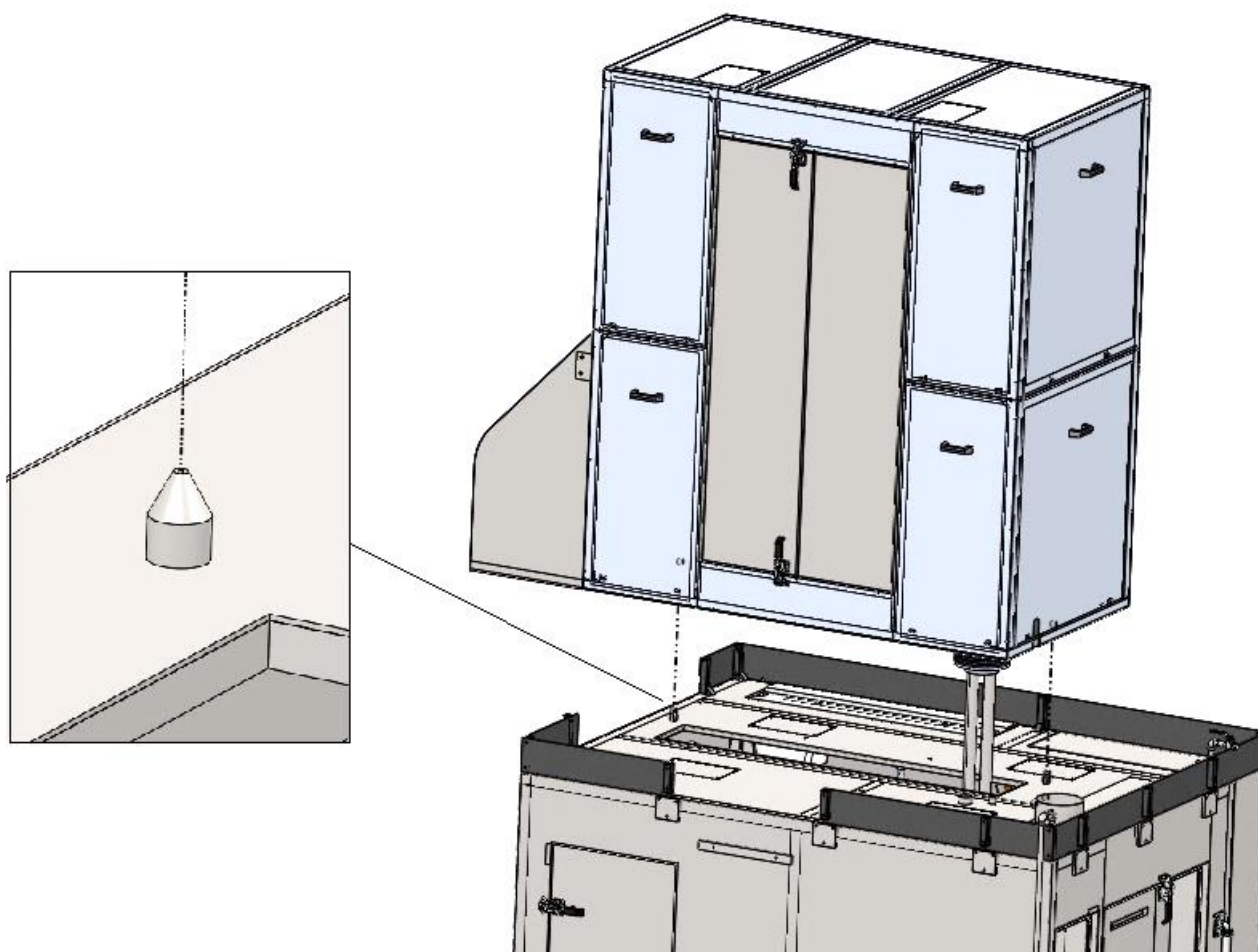
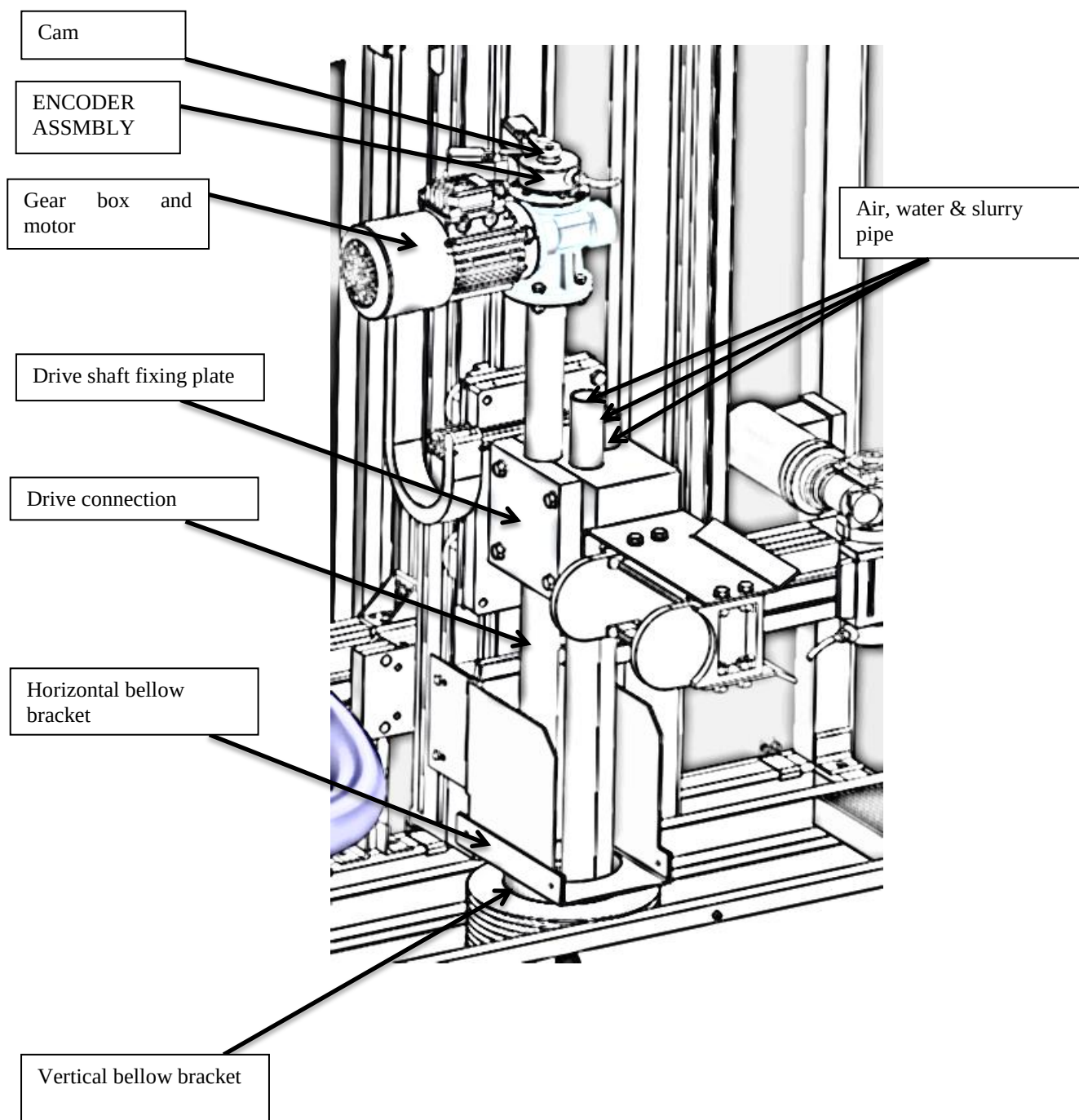
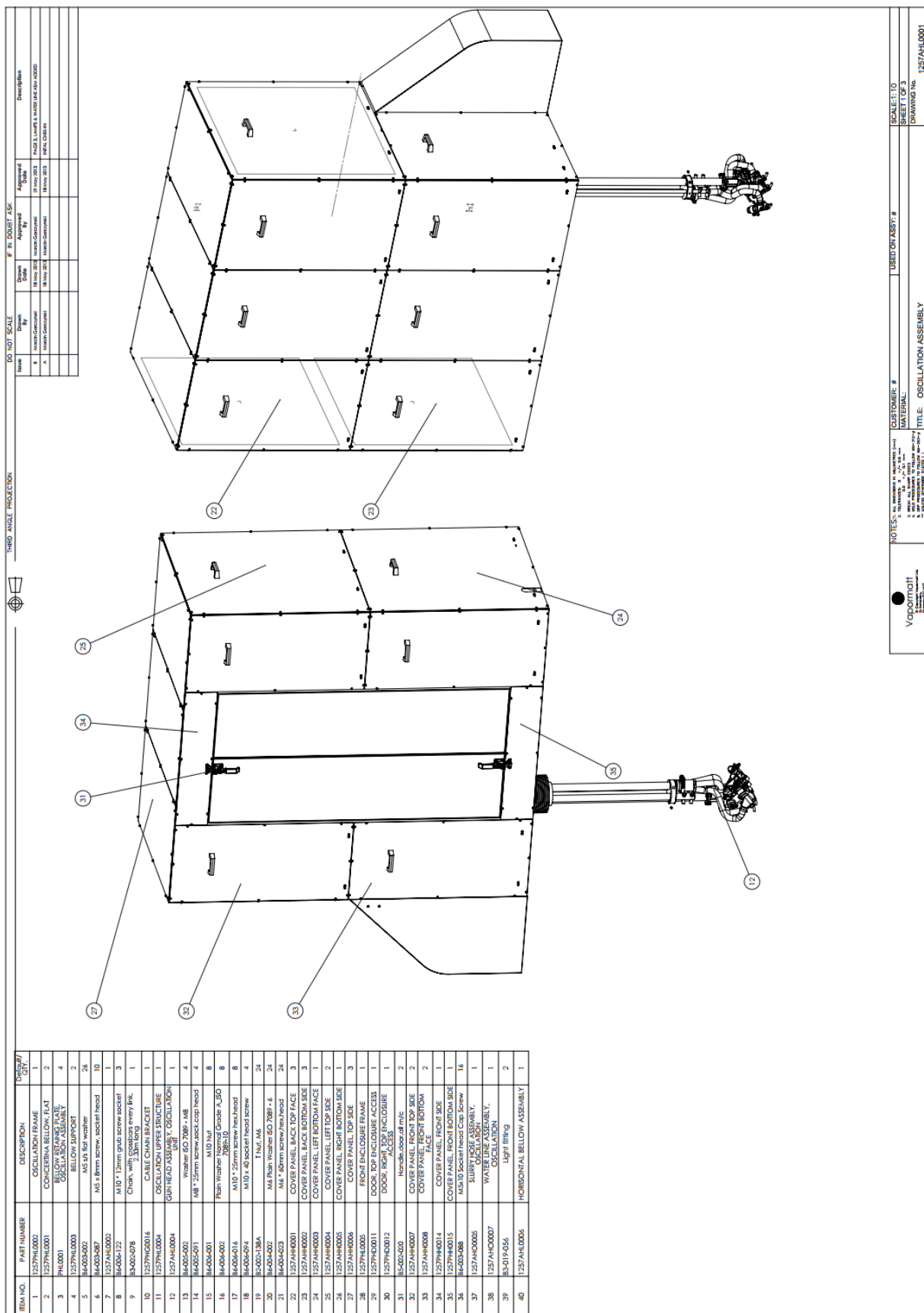


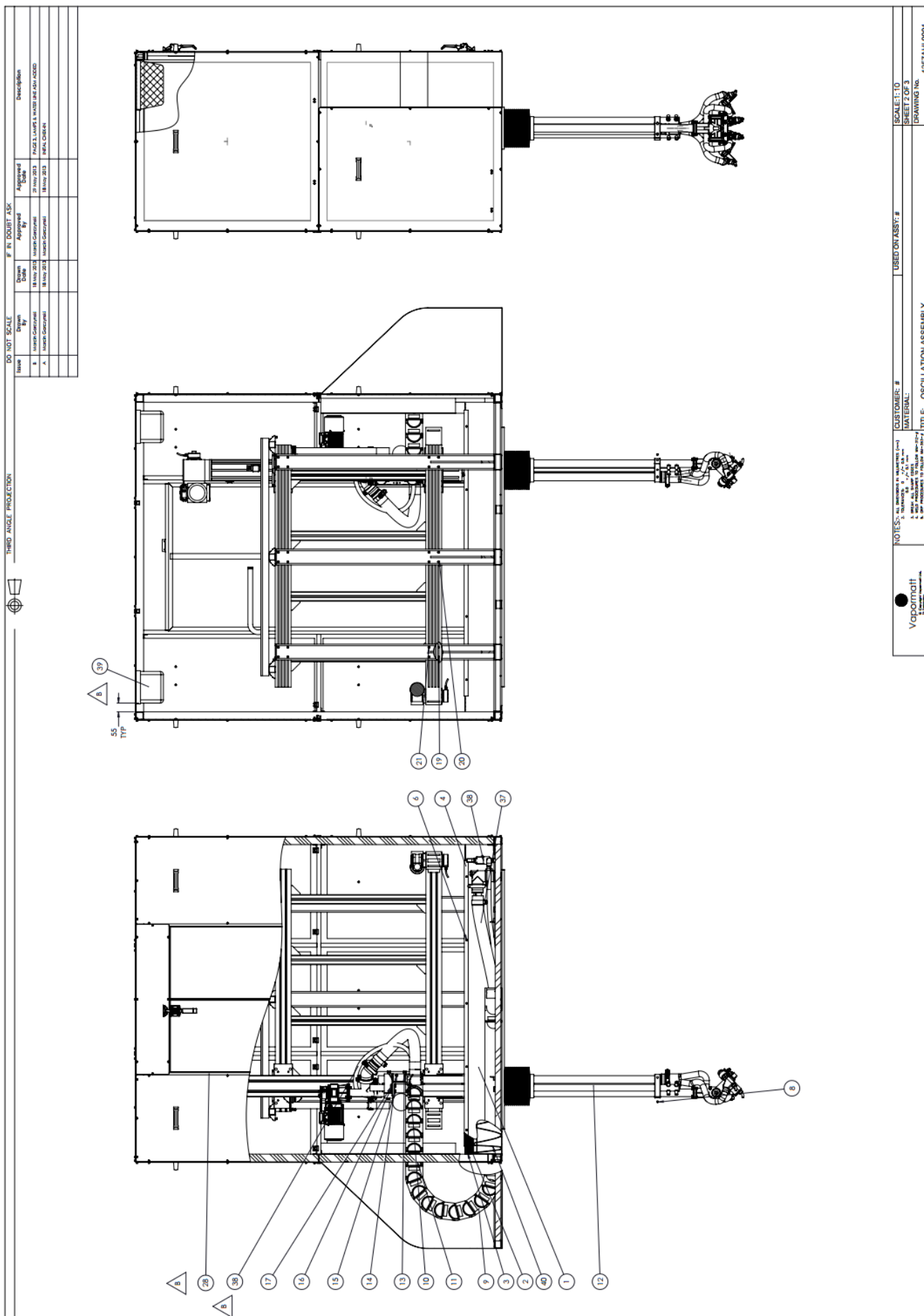
Figure 28. Oscillation brackets and pipes mounting (top enclosure)



Drawings:

- 1257AHL0001 OSCILLATION ENCLOUSER ASSEMBLY
- 1257AHR0001 GUN HEAD ASSEMBLY ADJUSTMENT (SEE SECTION 3.3.1)
- 1257AHG0001 BLAST GUN MANIFOLD (SEE SECTION 3.3.)
- 1257AHL0002 OSCILLATION ASSEMBLY FOR M1257





5. FAULT FINDING

5.1. BLAST PERFORMANCE FAULTS:

5.1.1. Little or no water flow from gun, visibility bad

- a. Air pressure too high - re-adjust air control valve (see section 3.8).
- b. Water level too low in sump (see section 3.9).
- c. Blocked pump strainer (see section 3.13).
- d. Blocked hose to process gun (see section 3.3.2.).
- e. Damaged or badly worn impeller (see section 3.13).
- f. Too much abrasive in sump (see checking abrasive concentration, section 3.1).
- g. See also pump faults, below

5.1.2. Little or no abrasive in water stream from gun.

- a. No abrasive in sump (check by feeling, see section 3.1).
- b. Partially blocked feed to process nozzle (see section 3.3.2).
- c. Blocked feed to sump stirring nozzle (see section 3.7.).
- d. Partially blocked pump strainer, this is not easily apparent yet a thin coating of fine fibres (e.g. paper) will create an effective filter and prevent abrasive getting through. Always clean very thoroughly

5.1.3. Little or no air flow from gun.

- a. Air pressure too low; re-adjust air control pressure (see section 3.8.).
- b. Blocked or failed airline (see section 3.3.2).
- c. Faulty solenoid valve (Appendix II)

5.2. OTHER FAULTS

5.2.1. Machine will not start

- a. Emergency stop buttons latched on.
- b. One of the axis's not in home position before auto start – home it manually
- c. Main supply disconnected - check mains switch(es) or R.C.D. (earth trip), Appendix II.
- d. Door open.
- e. Air supply pressure too low - check supply, check pressure switch setting (see section 3.8.).
- f. Water level in machine sump too low - check supply, check sensor operation.
- g. Control circuit fuse blown- Appendix II.

5.2.2. Slurry pump motor buzzing, but not running. Appendix II.

- a. Blown fuse.
- b. Faulty supply.
- c. Faulty overloads.
- d. Faulty connectors.
- e. Faulty drive motor

5.2.3. Slurry pump does not pump, although motor is running.

- a. Water level too low in sump
- b. Blocked pump strainer (see section 3.13).
- c. Blocked feed to process nozzle (see section 3.3.2).

5.2.4. Slurry pump working, but at much reduced pressure.

- a. Partially blocked strainer (see section 3.13).
- b. Damaged or badly worn impeller (see section 3.13).
- c. Partially blocked feed to process nozzle (see section 3.3.2).
- d. Too much abrasive in sump section 3.1
- e. Pump aerating due to:-
 - water level too low;
 - foaming caused by too much or incorrect chemical (6.0);
 - pinch valve diaphragm failure, allowing compressed air into slurry line.

5.2.5. Slurry pump protection thermal overload trips.

- a. Impellor obstructed, check for:-
 - too much abrasive in sump (Max 30%);
 - foreign objects in the pump casing, inlet or gland.
- b. Slurry flow demand too high, check for:-
 - air pressure to guns too low, supply problem or gun air hose failure.
 - slurry hose failure leakage between pump inlet and body mouldings
 - incorrect impellor fitted
 - water level too low

5.2.6. Water coming out of main pump access.

- a. Internal sump overflow valve blocked (see section 3.4).
- b. Sump overflow drain pipe blocked (see schematic in Appendix II).
- c. Excessive foaming caused by too much or incorrect chemical (see section 6.0).

5.2.7. Mist and spray leaking out of door(s), pump access or other cabinet opening. (Not vent)

- a. Mist eliminator blocked.
- b. Air hose failure.
- c. Extractor fan failure.
- d. Door seal worn.

5.2.8. Slurry coming out of gun which is turned off.

- a. Pinch valve air supply pressure too low - (see schematic in Appendix I)
- b. Faulty pinch valve diaphragm (see schematic in Appendix I).

5.2.9. Window wash inoperative or inadequate

- a. Check water supply, 3 bar (42psi) minimum is required (see section 3.9.).
- b. Blocked nozzle and/or filter.

5.2.10. Diaphragm pump will not run

- a. pump has stalled:
 - Press the reset button on the top of the pump(if fitted). Alternatively, toggling the air supply on/off by the flow valve or actually disconnecting and re-attaching the air supply, should move the pump spool valve out of the stalled (or "neutral") position.

- b. supply valve is opened too much, re-set:-The adjustment of the diaphragm pump air supply is a balance between pressure and flow, pressure is adjusted by the supply air regulator, flow is adjusted by the ball valve(or needle valve) fitted on the pump air inlet; to balance :-
- Adjust the air pressure to 3 bar on pump air regulator.
 - Fully open the flow control valve, (both ball and needle if fitted).
 - Ensure pump inlet is under water, operate the pump.
 - Whilst the pump is running, gradually close the needle valve until the pump is operating at about 120 strokes per minute. Ensure that the pump is pumping water continuously throughout this tuning.
 - Once the needle valve is set, check that the pump starts and stops reliably then lock off the needle valve with the lock nut (if fitted).
 - Experience may show that the flow rate is too low, or the pump does not start reliably; in this case open the needle valve 1/2 a turn and run again, repeat this over a period of time until acceptable performance is achieved.

Notes

Notes:

- Consult section 1, on Safety Precautions before any additions, repairs, or maintenance work is carried out.
- Other possible faults with specific warning lamps, are covered in section below

Check sequence	Secondary symptom	No. of blast guns affected	Possible cause	Check
1	pump aerating	All	water level too low, causing slurry pump aeration	water should cover pump casing
2	pulsating blast stream	All	supply compressor low threshold set too close to process pressure	monitor inlet air pressure gauge: it should have a steady reading above the value of process air pressure
3	pulsating blast stream	All	process air pressure too low; cannot overcome slurry pressure	check process air pressure gauge during processing: should be above 4 Bar
4	Little or no water in blast stream ,visibility bad.	one or more	slurry feed hose kinked (maybe only during oscillation cycle)	monitor hoses for a complete a process cycle
5	Little or no water in blast stream ,visibility bad.	All	process air pressure too high, so excessive air flow cutting slurry flow off	check process air pressure gauge during processing: should be below 5.5 Bar
7	little or no air flow in blast stream	one or more	air feed hose kinked (maybe only during oscillation cycle)	monitor hoses for a complete a process cycle
8	various	a complete bank	process air pressure regulator faulty	check process air pressure gauge during processing: should have a steady reading
9	little or no air flow in blast stream	a complete bank	process air supply solenoid valve faulty	check process air pressure gauge during processing: should have a steady reading of correct pressure (as set when static)

Inconsistent blasting remedies

Check sequence	Secondary symptom	No. of blast guns affected	Possible cause	Check
10	various	One	faulty process gun	visually check for internal abnormalities (flash, wear, moulding voids)
11	Little of no water in blast stream ,visibility bad.	One	boron nozzle not fully forward in gun body	visually check each gun
12	little or no air flow in blast stream	All	main air supply pipe work or filter blocked	check process air pressure gauge during processing: should have a steady reading of correct pressure (as set when static)
13	Little of no water in blast stream ,visibility bad.	All	slurry pump rotation incorrect	watch motor fan as pump is switched off; it should rotate clockwise
14	Little of no water in blast stream ,visibility bad.	All	slurry pump motor not operating, blasting by venturi only	check motor fan is operating
15	various	all	air supply compressor faulty	check process air pressure gauge during processing: should have a steady reading of correct pressure (as set when static)
16	Little or no abrasive in blast stream	All	pump feeds swapped: stirrer slurry pump feeding guns and vice versa	check the guns are supplied from the pump with the lowest intake
17	little or no air flow in blast stream	one or more	process air line to gun(s) blocked or failed	
18	Little or no abrasive in blast stream	all	stirrer nozzle not in correct position	check nozzle is located in it's holder
19	Little or no abrasive in blast stream	all	excessive abrasive in sump so stirring not effective	feel in the sump, abrasive should not be above stirrer nozzle
20	Little or no abrasive in blast stream	all	insufficient abrasive in sump	feel in the sump, abrasive should be at least 100mm deep
22	pulsating blast stream	all	foreign body in sump obstructing stirrer nozzle /slurry pump inlet, may be only when running (e.g. flap of rubber)	feel in sump
23	Little of no water in blast stream ,visibility bad.	one or more	slurry feed hose blocked (one gun inoperative?)	check all guns operating in similar fashion
24	Little of no water in blast stream ,visibility bad.	one	gun air jet worn out, so excessive air supply cutting slurry flow off	check all gun air jets
26	Little or no abrasive in blast stream	all	stirrer nozzle blocked	remove nozzle from holder and check

Check sequence	Secondary symptom	No. of blast guns affected	Possible cause	Check
27	Little or no abrasive in blast stream	all	stirrer nozzle feed hose blocked	remove nozzle(s) from holder and check feed hose
29	Little or no abrasive in blast stream	all	slurry pump strainer partially blocked (e.g. fibers) causing abrasive to be filtered out of flow	remove strainer and clean
30	pump aerating	all	incorrect strainer fitted to gun supply slurry pump, inlet too high, so abrasive not being sucked in or pump aerating	if two different strainers fitted, check the gun supply pump is fitted with the less open strainer (lower intake)
31	Little of no water in blast stream ,visibility bad.	all	blocked pump strainer, preventing correct slurry flow	remove strainer and clean
32	Little or no abrasive in blast stream	one or more	partially blocked slurry feed to process nozzle	
33	Little of no water in blast stream ,visibility bad.	all	slurry pump impellor damaged or badly worn	remove pump. disassemble and check impellor
	Pump races to achieve pressure		gun blast "drilling" into sump water and causing slurry pump aeration	
34	various	all	slurry pump impellor incorrect type	remove pump. disassemble and check impellor
35	Pump pressure low	all	Pinch valve diaphragm failure, allowing compressed air into slurry line.	Operate each pinch valve in manual mode and check for air leakage.

6. CONSUMABLES TECHNICAL DATA

6.1. MEDIA SELECTION CHART

<u>Code</u>	<u>Usual Sizes</u>	<u>Characteristics and application</u>
S.G.R.	20 to 325 mesh	A round particle blasting media manufactured from soda lime glass. It is suitable for general cleaning, low level peening, cosmetic burnish finishing, and where little or no dimensional change can be tolerated to the workpiece.
S.G.R.S.	20 to 70 mesh	A round particle blast cleaning and peening media manufactured from special quality, stress relieved soda lime glass. This product is mainly used for the peening and surface cleaning of precision components.
C.B.R.	20 to 70 mesh	A round particle blast cleaning and peening media manufactured from crystalline zirconia. It has an extremely tough particle structure and will retain its spherical shape after prolonged use. It is more dense than soda lime glass giving higher peening levels and increased life.
S.S.R.	100 to 300 mesh	A round particle blast cleaning media manufactured from 304L stainless steel. It has an extremely tough particle structure and retains its spherical shape after prolonged use. It has been developed primarily for use in wet blast machines and is an ideal media for cleaning stainless steel and the decontamination of nuclear components.
S.A.R.	10 to 70 mesh	An extremely durable alumina based abrasive with a tough particle structure that retains sharpness on breakdown, will outlast reclaimed abrasives many times. Ideally suitable for general purpose non-critical blasting applications.
A.P.A.	36 to 400 mesh	A fast cutting abrasive with a particle structure that is a sharp but less friable than white alumina. The materials characteristics fall between the white and brown aluminas; and is suitable for all blasting applications where speed and durability are required.

<u>Code</u>	<u>Usual Sizes</u>	<u>Characteristics and application</u>
A.W.A.	54 to 600 mesh	An extremely fast cutting abrasive with a sharp friable structure that retains its sharpness on breakdown. It is ideally suited where abrading rather than peening is paramount.
A.B.A.	10 to 600 mesh	A fast cutting abrasive with a less friable particle structure than white alumina. This is a general purpose blasting media suitable for hard materials, but tends to become mulled after prolonged use on soft substrates.
S.C.A. (B)	8 to 1000 mesh	An extremely fast cutting abrasive with a sharp friable blocky particle structure which retains its sharpness on b for blasting applications it is ideal when abrading rather than peening is pre-eminent.
P.A.P.	20 to 80 mesh	A soft artificial blast cleaning media manufactured from virgin cellulose filled, urea or melamine resin. The product has a blocky shape and is ideally suitable for the stripping of paints without damage to substrates.
V.A.A.	30 to 200 mesh	A natural product manufactured from either; Almond, Cocoa or Citrus stones. The materials can be used in dry or wet blast systems, for the removal of surface debris such as paint and carbon deposits. Their particular advantage over all other process media is that if they are accidentally left in a mechanism, they will cause minimum damage.

Note: With any abrasive Vapormatting always has the attributes of being dust free and not requiring previous degreasing. Vapormatt have full test facilities where we can investigate the best abrasive for any application.

VAPORMATT CHEMICAL SELECTION

This list is intended to help with selection, see technical data or application data sheets for full details.

V-CLEAN PLUS (10L Plastic Drums, part Number B1-089-029B)

V CLEAN PLUS is designed as a one component additive for all wet blast equipment incorporating an emulsifying degreaser, corrosion inhibitor and antifoam agent. Additionally it's presence in process water reduces bacterial growth.

V-CLEAN ANTIFOAM (1 litre bottles, part number B1-089-031)

V CLEAN ANTI-FOAM is a concentrated ready to use water based anti-foam liquid.

RUSTOP 2 (5 litre bottles, Part number B1-089-032)

V Clean Rust Stop is a concentrated liquid rust preventative.

HYDRASAFE 2 (5 litre bottle, part number B1-089-033)

V Clean Hydro Safe is a concentrated liquid biocide.

V Clean Hydro Safe is a concentrated liquid bactericide that can be added to regular water or water with V Clean / V Clean Plus. It should be used when there is a risk of bacterial growth in process water e.g. when a reservoir of water is left standing for long periods of time or when the water is contaminated with organic material.

Water from a public supply is usually treated to give a level of free chlorine of about 1 to 2 mg/l. This is sufficient to inhibit bacterial growth. However, the free chlorine will dissipate with time so Hydrasafe 2 should be used where there is little or no input of fresh water to the machine, such as when a recirculated rinse system is fitted.

Hydrasafe 2 may also be used for disinfectant purposes when cleaning out a vapour blast machine, in this case the. See maintenance section.

6.2. ABRASIVE TECHNICAL DATA

Vapormatt Pink fused alumina (APA)

Application : Impact Finishing

Description : Vapormatt APA is a high-purity aluminium oxide. It is produced in a batch process by fusing chemically pure alumina in an electric arc furnace, with the addition of approximately 0.22% chromium oxide. Due to chromium oxide content, PINK Fused Alumina is less friable than WHITE Fused Alumina.

Typical Chemical Analysis:

Al O	99.30%
Cr O	0.22%
SiO	0.02%
FeO	0.04%
CaO	0.01%
MgO	0.01%
NaO	0.26%

Grading: To FEPA and ANSI standards.

Mesh Sizes Available:

36	Mesh
46	Mesh
60	Mesh
60/80	Mesh
90/100	Mesh
100/120	Mesh
180/220	Mesh
(Other sizes available on request)	

Health and Safety

Pink Aluminous Oxide is non-toxic and non-hazardous. (no free silica present)

Nuisance dust only - refer to the current Guidance Note from the Health & Safety Executive.

Note: HSE Guidance Note EH40/85 Specifies Exposure limits as 5mg/m respirable dust and 10mg/m total dust.

Warning: Face masks must be worn when exposed to dust in excess of the above limits.

All technical information is typical but does not imply any warranty.

Vapormatt white fused alumina (APA)

Application: Impact finishing, lapping, dip and stucco coats for investment casting moulds.

Description: White Bauxilite (White Fused Alumina) is manufactured in an electric arc furnace by the fusion of a controlled quality pure grade of calcined alumina.

Typical Chemical Analysis:

Al O	99.50%
SiO	0.03%
Fe O	0.05%
TiO	Trace
CaO	0.04%
NaO	0.32%
K O	0.01%

Grading: To FEPA, ANSI and MOD Standards.

Mesh Sizes Available:

54	Mesh
60	Mesh
100	Mesh
180/220	Mesh
220/240	Mesh
600	Mesh
(Other sizes available on request)	

Health and Safety:

White Aluminous Oxide Is non-toxic and non-hazardous. (no free silica present)

Note: Nuisance dust only - refer to the current Guidance Note from the Health & Safety HSE Guidance Note EH40/85 Specifies Exposure limits as 5mg/m respirable dust and 10mg/m total dust.

Warning: Face masks must be worn when exposed to dust in excess of the above limits.

All technical information is typical but does not imply any warranty.

Vapormatt Brown fused alumina

Application: Impact Finishing

Description: Vapormatt Brown Fused Alumina is made in an electric arc furnace by the fusion and reduction of calcined Bauxite which is an impure form of hydrated alumina.

Typical Chemical Analysis:

Al ₂ O ₃	95.2%
TiO ₂	3.10%
SiO ₂	1.10%
FeO	0.20%
CaO	0.05%
MgO	0.35%

Grading: To FEPA, ANSI and ROLLS ROYCE SPECIFICATIONS (CSS 12).

Mesh Sizes Available:

46	Mesh
60	Mesh
60/80	Mesh
120/220	Mesh
150	Mesh
280/500	Mesh
(Other sizes available on request).	

Health and Safety:

Brown Aluminous Oxide is non-toxic and non hazardous (no free silica present)

Nuisance dust only - refer to the current Guidance Note from the Health & Safety Executive.

Note: HSE Guidance Note EH40/85 Specifies Exposure limits as 5mg/m respirable dust and 10mg/m total dust.

Warning: Face masks must be worn when exposed to dust in excess of the above limits.

All technical information is typical but does not imply any warranty.

Vapormatt Hydrabead glass beads (SGR)

Application: Peening, Impact finishing.

Description: Vapormatt Hydrabead Glass Beads are made from top quality plate glass Soda Lime Composition. All are of a regular shape and in this form they are tempered to resist fracture and equalise internal stresses to give long life. They will withstand moisture, dilute acids, alkalis and resist surface etching when exposed to atmospheric conditions.

Typical Chemical Analysis:

Irregular Shapes	Not more than 15% Max.
Sharp Angular Particles	Not more than 1% Max.
Surface Scoring & Scratching	Not more than 2% Max.
Foreign Matter	Not more than 0.5% Max.
Iron particles	Not more than 1% Max.
Density	Less than 2.99
Coefficient of Expansion	(0 - 300 C) -85 x 10
Softening Point	730 C
Rockwell Hardness	C Scale - 47 HRC
Knoop 100g Load	515 kg/mm

Grading: To ASTM, SNECMA or ROLLS ROYCE SPECIFICATIONS (CSS 8)

Mesh Sizes Available:

20/40	Mesh
40/60	Mesh
50/80	Mesh
60/100	Mesh
70/140	Mesh
100/120	Mesh
140/270	Mesh
170/325	Mesh
30/140	Mesh
(Other sizes available on request).	

Health and Safety:

Glass Beads are non-toxic and non-hazardous. (no free silica present)

Nuisance dust only - refer to the current Guidance Note from the Health & Safety Executive.

Note: HSE Guidance Note EH40/85 Specifies Exposure limits as 5mg/m respirable dust and 10mg/m total dust.

Warning: Face masks must be worn when exposed to dust in excess of the above limits.

All technical information is typical but does not imply any warranty.

Vapormatt Alumatt alumina (SAR)

Application: For general use in metal cleaning and surface preparation for a broad range of pressure or suction blasting applications.

Description: Vapormatt S.A.R. is a superior quality blasting media specially developed to satisfy all technical and economical requirements in the metal finish industries.

Typical Chemical Analysis:

Alumina (Corrundum)	80%
Mullite	10%
Complex iron, titanates & silicates	10%

Grading: ANSI Specifications.

Mesh Sizes Available:

40	Mesh
40/70	Mesh
(Other sizes available on request)	

Health and Safety:

Alumatt is non-toxic and non-hazardous. (no free silica present)

Nuisance dust only - refer to the current Guidance Note from the Health & Safety Executive.

Note: SE Guidance Note EH40/85 Specifies Exposure limits as 5mg/m respirable dust and 10mg/m total dust.

Warning: Face masks must be worn when exposed to dust in excess of the above limits.

All technical information is typical but does not imply any warranty.

Vapormatt plastic media (PAP)

Application: Impact Finishing.

Description: Vapormatt Plastic Media is manufactured from a polymerised multi-coloured resin. Ideally suited for removal of all types of painted surfaces without damaging substances.

Typical Specification Analysis:

Hardness	3.5(MOH Scale)
Specific Gravity	1.50 (gms/cc)
Bulk Density	58-60 (lbs/cuft)
Operational temperature	0-300 ° C
Chemical Nature	Inert

Grading: Gleared to the Aerospace Industry.

Mesh Sizes Available:

20/30	Mesh
30/40	Mesh
60/100	Mesh
(Other sizes available on request)	

Health and Safety:

Plastic Media is non-toxic and non-hazardous. (no free silica present)

Nuisance dust only - refer to the current Guidance Note from the Health & Safety Executive.

Note: HSE Guidance Note EH40/85 Specifies Exposure limits as 5mg/m respirable dust and 10mg/m total dust.

Warning: Face masks must be worn when exposed to dust in excess of the above limits.

All technical information is typical but does not imply any warranty.

Vapormatt Ceramic beads (CBR)

Application: Preening, Surface Finishing, De-burring.

Description: Around particle blast cleaning and peening bead, made from crystalline Zirconia and closely bonded inside a silica glassy phase. This produces impact resistance and hardness which gives long life. These beads are environmentally friendly, as they produce virtually no dust. Can be used as a substitute for Glass Beads.

Typical Specification:

ZrO ₂	68%
SiO ₂	31%
Other (Al ₂ O ₃ , Fe ₂ O ₃ , TiO ₂)	1%
True relative density	3.85
Bead relative density	3.76
Bulk density	2.30 kg/l
Micron-hardness (Vickers)	75 to 95 GPa
Rockwell hardness	62 to 65 HRC (equivalent)

Grading: To PRATT & WHITNEY, AMS & SAE SPECIFICATIONS

Mesh Sizes Available:

150	Mesh
210	Mesh
300	Mesh
(Other sizes available on request)	

Health and Safety:

Ceramic Beads are non-toxic and non-hazardous. (no free silica present)

Nuisance dust only - refer to the current Guidance Note from the Health & Safety Executive.

Note: SE Guidance Note EH40/85 Specifies Exposure limits as 5mg/m respirable dust and 10mg/m total dust.

Warning: Face masks must be worn when exposed to dust in excess of the above limits.

All technical information is typical but does not imply any warranty.

Vapormatt silicone carbide, black

Application: Impact Finishing, Lapping

Description: Vapormatt Silicon Carbide

Typical Chemical Analysis:

	SiC	98.0%	Minimum
	SiO	0.8%	Maximum
Free	Si	0.6%	Maximum
Free	C	0.2%	Maximum
	FE O	0.15%	Maximum
	MI	0.03%	Maximum

Grading: To FEPA Standards.

Mesh Sizes Available:

220 Mesh (Other sizes available on request)

Health and Safety:

Silicon Carbide is non-toxic, does not irritate eyes or skin.
Does not contain quartz and are not fibrogenic.

Nuisance dust only - refer to the current Guidance Note from the Health & Safety Executive.

Note: SE Guidance Note EH40/85 Specifies Exposure limits as 5mg/m respirable dust and 10mg/m total dust.

Warning: Face masks must be worn when exposed to dust in excess of the above limits.

All technical information is typical but does not imply any warranty.

6.3. CHEMICAL TECHNICAL DATA

SAFETY DATA

Safety of use of any of these products is covered on separate "safety data sheets" copies are supplied with the product and copies are also freely available on request.

V-CLEAN PLUS

V CLEAN PLUS is a concentrated alkaline emulsifying degreasing liquid. It is suitable for cleaning ferrous and non-ferrous metals, including plastics and painted surfaces, it is bio-degradable and can be used at various dilution strengths. Water temperature up to 50 °C will improve cleaning action and help with component dry off. It has a green colour to enable identification of treated water

V-Clean Plus contains an anti foam agent, however, some applications may require additional V-Clean anti-foam additive, particularly if the cleaning solution is relatively cold or a higher than normal concentration is being used.

V-Clean Plus also contains a corrosion inhibitor which gives protection to ferrous surfaces for up to 5 days in workshop conditions. Rustop 2 can be added to give greater protection.

Note: If cleaned part has to be painted, to get maximum adhesion wash with warm water.

Supply quantity

10L Plastic Drums, part Number B1-089-029B

Dosage rates:

1:20 dilution rate (5%) is normally adequate for spray type cleaning equipment.

Vapormatt machine sump and standard re-circulated filter volumes are shown below, together with the quantity of V-Clean Plus required for 5% concentration.

<u>Machine size</u>	<u>Sump capacity (l)</u>	<u>charge (l)</u>
Vapormate incl. MB filter	65	3.25
Lynx	90	4.5
Cougar	100	5
Lion	100	5
Profelis incl. MB filter	480	24

1:10 dilution rate (10%) for immersion type cleaning equipment ("Bupi cleaners" etc.)

CLEAN ANTI-FOAM

V CLEAN ANTI-FOAM is a concentrated ready to use water based anti-foam liquid, it can be added to either V CLEAN RTU or V CLEAN PLUS.

Supply quantity

1 litre bottles, part number B1-089-031

Dosage rates:

If unacceptable foam occurs in the cleaning liquid during processing we recommend that addition of approx. 0.1litre (100ml) of V-Clean anti foam to 100 litres of cleaning liquid (0.1%), double this to 0.2% if foam persists.

V-Clean anti foam can be added to V-Clean or V-Clean Plus containers before use, so it can be dosed concurrently. In this case add between 0.5l (for 0.1% concentration) and 1.0 litres (for 0.2% concentration) to each 25 litre drum. Mix well before use.

Vapormatt machine sump and standard re-circulated filter volumes are shown below, together with the quantity of V-Clean Anti foam required for 0.1% concentration.

<u>Machine size</u>	<u>Sump capacity (l)</u>	<u>charge (ml)</u>	
Vapormate incl. MBF	65	100	
Lynx	90	100	
Cougar	100	100	
Lion	100	100	
Profelis	480	480	
incl.			MB filter

RUSTOP 2

V Clean Rust Stop is a concentrated liquid rust preventative, that can be added to regular water or water with V Clean / V Clean Plus. The product to be used to reduce oxidization on cleaned ferrous material for up to 5 days.

Note: If cleaned part has to be painted to get maximum adhesion wash with warm water.

Supply quantity

25 litre bottles, Part number B1-089-032

Dosage rates:

0.1 litres (100ml) to 10 litres of process liquid

Vapormatt machine sump and standard re-circulated filter volumes are shown below, together with the quantity required for 1% concentration.

<u>Machine size</u>	<u>Sump capacity (l)</u>	<u>charge (l)</u>	
Vapormate incl. MB filter	65	0.65	
Lynx	90	0.9	
Cougar	100	1	
Lion	100	1	
Profelis	480	4.8	
incl.			MB filter

HYDRASAFE 2

V Clean HydraSafe is a concentrated liquid bactericide that can be added to regular water or water with V Clean / V Clean Plus. It should be used when there is a risk of bacterial growth in process water e.g. when a reservoir of water is left standing for long periods of time or when the water is contaminated with organic material.

Water from a public supply is usually treated to give a level of free chlorine of about 1 to 2 mg/l. This is sufficient to inhibit bacterial growth. However, the free chlorine will dissipate with time so Hydrosafe 2 should be used where there is little or no input of fresh water to the machine, such as when a recirculated rinse system is fitted.

HydraSafe 2 may also be used for disinfectant purposes when cleaning out a vapour blast machine, in this case the (See Vapormatt machine manual section 7.04 for further details).

Supply quantity

5 litre bottle, part number B1-089-033

Dosage rates:

0.1litre (100ml) of HydraSafe 2 to 100 litres of cleaning liquid (0.1%).

HydraSafe 2 can be added to V-Clean or V-Clean Plus containers before use, so it can be dosed concurrently. In this case add 0.5l (for 0.1% concentration) to each 25 litre drum. Mix well before use.

Vapormatt machine sump and standard re-circulated filter volumes are shown below, together with the quantity required for 0.1% concentration.

<u>Machine size</u>	<u>Sump capacity (l)</u>	<u>charge (ml)</u>
Vapormate incl. MB filter	65	65
Lynx	90	90
Cougar	100	100
Lion	100	100
Profelis incl. MB filter	480	480

7. MAINTENANCE SCHEDULE

Preventative maintenance system

The machine has a preventative maintenance schedule built into the HMI. Alarms will show when maintenance is due on any of the monitored items. Note that the maintenance times are based on the hours the specific component runs for, not machine run time. When the maintenance is completed the next service due hours box must be updated by entering the time of the next alarm. The total hours run box should be left unaltered; unless the item is replaced when the total hours should be reset to zero.

There are some items that are not on the preventative maintenance list and require regular maintenance.

EQUIPMENT	Period	Unit	Alternative Period	Alternative Unit	Notes
Blast station elutriation tower	50	Hours	n/a	n/a	empty, check overflow orifice
Clear tanks	50	Hours	n/a	n/a	empty
Rinse tank	50	Hours	n/a	n/a	Empty, check for debris, clean out as necessary
Blast gun hoses	200	Hours	n/a	n/a	inspect for wear
Blast Guns	500	Hours	n/a	n/a	inspect for wear
Pinch Valve	500	Hours	20,000	Pinches	check liner
Blast abrasive check valve (density meter supply)	500	Hours	20,000	Pinches	check liner
Sump Blast valve	1,000	Hours	100,000	Pinches	check operation
Rinse Pump	1,000	Hours	n/a	n/a	check operation, diaphragm and NRVs
Oscillation Y axis	2,000	Hours	n/a	n/a	lubricate at 2000hrs, end of life expected 8000 hours
Oscillation Z axis	2,000	Hours	n/a	n/a	lubricate at 2000hrs, end of life expected 8000 hours
Blast Abrasive Pump	2,000	Hours	n/a	n/a	dismantle
Blast Stirrer Pump & nozzle	2,000	Hours	n/a	n/a	dismantle
Blast 1 sump	3,000	Hours	n/a	n/a	empty and inspect for wear including the stirrer nozzles
Turntable & Trolley drive system	5,000	Hours	n/a	n/a	check condition & operation
Turntable supports	4	Hours	n/a	n/a	

The environment in all blasting equipment is very harsh. Whilst Vapormatt take care to use the most suitable wear resistant materials in the machine construction, components in contact with abrasive slurry will exhibit high wear rates, this is especially true when the component is not intended to be in contact with slurry but becomes subject to it due to the wearing out of other items e.g. hoses. For this reason it is most important to follow a regular inspection and maintenance programme. The programme set out below is based on average conditions and should be amended to suit individual operational conditions in the light of experience.

It should also be noted that use of abrasive media can be quite high (usually between 0.5 & 2 kg per gun per hour). Whilst it is important to add abrasive to maintain slurry concentration and hence performance, it must be appreciated that an equal quantity of broken down abrasive must be removed from the filter system, the frequency of removal being dependant on the capacity of the filter system. This sludge removal is also a vital part of the maintenance procedure. Sludge from Vapormatt abrasives can be disposed of in land fill, provided that the components being processed are neither coated with toxic material nor toxic in themselves.

This schedule includes air system maintenance in accordance with U.K. Health and Safety Executive recommendations.

Every 40 hours or weekly:

Every 500 hours or 3 months:

- Remove all aluminium pulleys and inspect sealing area (See section XXX a-f)
- Check working condition for two rotating shafts, it should rotate smoothly and with no large backlash
- Remove drain screw and check if there is no water coming out
- Check bellow condition

Every 8 hours:

- Check abrasive concentration in sump - this should be approximately 10 to 15% volume
- Check flow from rinse nozzle and elutriation tower
- Wash down inside surfaces on machine, remove debris from grids.
- The air system should be checked for leaks and repairs carried out as necessary.
- Check the elutriation tower for blockages (section 3.5.)

Every 40 hours or weekly:

- As 8 hours.
- Check abrasive and air hoses, and their fastenings. Air hoses will wear due to abrasion on the outside. Abrasive hoses wear quickest from the inside; feel for thin areas on the outside of bends, (orange and blue hoses). If a slurry leak is found, check the cabinet and components in the vicinity for any consequential damage.
- Check sediment levels in the re-circulation storage tank (Section 3.6.) and/or settling tank.
- Check condition of process gun nozzles - replace as necessary. Wear is apparent by the outlet diameter being more than 2mm oversize (usual new nozzle size is 12mm). Excessive wear has occurred if the outlet is non-circular (oval or misshapen).
- Check condition of non-return valve in process guns
- Drain pneumatic filter/separator bowls
- Check condition and position of sump stirring nozzles - replace as necessary (section 3.7.).

- Check pump inlet strainers for blockages
- Check air pressure regulators to ensure that they have not been tampered with and that the correct pressure is maintained.
- Check for vibration of air extractor if applied, clean inside as necessary.
- Check for general condition of internal oscillation bellows and associated items on this module, to ensure adequate protection of moving and sliding components from media infiltration. At this time check tightness of allied nuts and bolts etc. to ensure continuing positional accuracy and thus process repeatability.
- Check that the satellite drive box is pressurised, air should be constantly coming out from the enclosure through the non-return valve (See figure 3.12.8).
-

Every 1 month

Every 500 hours or 3 months:

- As 40 hours
- Check condition of viewing windows - renew as necessary.
- Remove abrasive. Drain sump and slurry filter systems, clean and disinfect. Refill with clean fresh water, replace abrasive.
- Check the general status of the oscillation driving belts. This is mounted on the top of the blast cabinet inside the protective enclosure.
- Check for lateral movement on the oscillation beam, this should be minimal as no adjustment should be necessary for the life of the mechanism but will identify excessive wear, or failure, of a bearing or other component.
- Check for damage to cabinet or its rubber linings & PU covers; particularly:
 - i. opposite all blast guns.
 - ii. underneath the elutriation tower.
- Check bubble valve diaphragm. The valve can be found for inspection and maintenance by pulling out the retaining pin and lifting off (See section 3.4.). A twisting action may be required as the valve often sticks to the overflow pipe. The air supply line need only be renewed to ease diaphragm replacement. When replacing the valve ensure the retaining pin is pushed fully home.
- Check satellites running condition (See section 3.12.6.) Rotate each unit and check followings:
 - a. V-ring seals condition and replace if necessary
 - b. backlash condition - unit should rotate smoothly and without rocking
 - Check bearings and seals when hard to rotate
 - Adjust lock nut when backlash identified
- Check turntable support load runners (See section 3.12.7.) Rotate turntable using two hand switches and check visually load runners condition **Note: when no load runner rotation noticed (turntable sliding) – load runner must be replaced**

Every 1000 hours or 6 months:

- As 500 hours.
- Generally check all mechanical and electrical drives - adjust and replace as necessary.
- Air and water supply stop valves should be checked. Check that access to the valve has been maintained, that the handle is in position, that it will shut off the supply and that it will open fully and operate freely.
- Re-lubricate the oscillation carriage. These should be removed approx. every 500 Km of travel (400,000 strokes), cleaned and re-packed with Festo grease LUB-RN2.
- Remove pump unit from cabinet, check strainer, impeller and casing for wear, replace parts as necessary (section 3.14.).
- Air and water supply stop valves should be checked. Check that access to the valve has been maintained, that the handle is in position, that it will shut off the supply and that it will open fully and operate freely.

Precautions:

Before any pressurised components are dismantled they should be effectively isolated from all pressure sources and completely vented to atmosphere. Precautions should also be taken to guard against the possibility of injury through sudden release of trapped springs.

7.1. DRAINING AND REFILLING SUMP

Every 500 hours or 3 months the machine sump should be completely drained, cleaned and refilled. Draining the water is done by use of the vacuum system on the filtration. Use the "wander hose" from the vacuum to draw off water. The abrasive is left in the sump: this is removed by wet and dry vacuum cleaner or shovel.

Alternatively, the abrasive can be removed before draining the water. Place a container (e.g 45 gallon drum).

Cleaning:

The most effective method of cleaning is as follows:-

1. refill the second rinse tank with water only (see note 1 below), add a strong non foaming detergent and suitable disinfectant (chlorinate with Vapormatt "Hydrasafe" to give a level of at least 15ppm free residual chlorine; 10ml Hydrasafe liquid per 100ltr water, if the water being used is initially chlorine free). It is best to add the cleaning agents to any filtration systems separately to speed up dispersal.
2. Use the filtered rinse water wash-down hose to spray the inside of the machine with the disinfected water. Refill the rinse tank with a water/disinfectant mix as necessary.
3. Use brush or scraper to clean all areas that are subject to sludge build-up. Such areas will be primarily the filter system and the "tide line". Take precautions not to create or breath any mist.
4. Fill the sump and all tanks with a water/disinfectant mix. Check that the free chlorine level is still at least 15ppm, if not add further doses accordingly. Maintain this level of chlorine for four hours (overnight ?).
5. Drain the solution away.

Refilling:

Refill with fresh water (if the water being used is initially chlorine free chlorinate with Vapormatt "Hydrasafe" to give a level of 2 - 4ppm free chlorine; 2ml Hydrasafe liquid per 100ltr water, or a suitable quantity of alternative biocide if the supply is not already treated). Adjust the abrasive charge as necessary.

APPENDIX I. Process & instrumentation diagram (P&ID)

Drawing	Issue	Description
1257SHZ0001	K	P&ID

APPENDIX II. Control circuit diagrams (Air , water, electrical)

Drawing	Issue	Description
1257SHZ0002	G	Control Air Distribution Schematic
1257SHZ0003	D	Control Air Distribution Schematic

Drawing	Issue	Description
1257SHZ0101	A	415Vac Distribution-1
1257SHZ0102	A	415Vac Distribution-2
1257SHZ0103	A	240Vac Distribution
1257SHZ0104	B	24Vdc Distribution
1257SHZ0105	B	Safety Relay
1257SHZ0106	A	Safety Circuit
1257SHZ0110	A	Sump Level Control
1257SHZ0111	A	Machine Lighting
1257SHZ0120	A	Abrasive Pump
1257SHZ0121	A	Stirrer Pump
1257SHZ0122	A	Y Axis Motor
1257SHZ0123	A	Z Axis Motor
1257SHZ0124	A	Gun Angle Motor
1257SHZ0125	A	Turntable Motor
1257SHZ0126	A	Satellite Motor
1257SHZ0127	A	Trolley Motor
1257SHZ0128	A	Extract Fan Motor
1257SHZ0129	A	Sump Heater
1257SHZ0140	A	PLC Layout
1257SHZ0141	B	Digital Inputs X0-X47
1257SHZ0142	C	Extension Card Digital Inputs X50-X67
1257SHZ0143	B	High Speed Counter Inputs
1257SHZ0144	B	Digital Outputs Y0-Y27
1257SHZ0145	B	Digital Outputs Y30-Y47
1257SHZ0146	B	Analogue Outputs

APPENDIX III. Configuration file

See M1257- Config Rev A

APPENDIX IV. Tag list

	Tag	Description
	PI&D	
1	AF201	Bubble pinch air supply - filter
2	AF202	Blow off nozzle - filter
3	AF203	Manifold base air supply - filter
4	AF204	Door lock air - filter
5	AF205	Satellite box cylinder - filter
6	AF306	Diaphragm pump - filter
7	AF307	Satellite drive enclosure - filter
8	AG153	Pressure gauge
9	AG201	Bubble pinch air supply - gauge
10	AG202	Blow off nozzle - gauge
11	AG203	Manifold base air supply - gauge
12	AG204	Door lock air - gauge
13	AG205	Satellite box cylinder - gauge
14	AG306	Diaphragm pump - gauge
15	AG307	Satellite drive enclosure - gauge
16	AP158	Unregulated air supply to A_P converter
17	AR153	Regulator
18	AR201	Bubble pinch air supply - regulator
19	AR202	Blow off nozzle - regulator
20	AR203	Manifold base air supply - regulator
21	AR204	Door lock air - regulator
22	AR205	Satellite box cylinder - regulator
23	AR306	Diaphragm pump - regulator
24	AR307	Satellite drive enclosure - regulator
25	AV161A	Flow control valve for satellite drive box cylinder
26	AV161B	Flow control valve for satellite drive box cylinder
27	AV163	Non return valve satellite drive box
28	AV202	Blow off nozzle
29	BN1	Manual blast gun
30	BN2	Auto blast gun
31	BN3	Auto blast gun
32	BN4	Auto blast gun
33	BN5	Auto blast gun
34	BN6	Auto blast gun
35	BN7	Auto blast gun
36	BN8	Auto blast gun
37	BN9	Auto blast gun
38	DP109	Diaphragm PUMP
39	DV200	Dump valve
40	ET185	Elutriation tower

	Tag	Description
	PI&D	
41	F109	WATER FILTER
42	F156	Filter
43	F162	WORKSTATION WINDOW FILTER
44	F182	Air filter
45	hv14	Trigger operated rinse nozzle - valve
46	HV188	viewing window valve
47	NR187	Non return valve
48	NV206	Needle valve for Diaphragm pump
49	P101	Slurry pump
50	P102	Stirrer pump
51	PS120	Air control manifold
52	RN10	Gun head rinse nozzle
53	RN11	Gun head rinse nozzle
54	RN15	Workstation window wash nozzle
55	RN16	viewing window rinse bar
56	RN17	Trolley rail wash nozzle
57	RN18	Trolley rail wash nozzle
58	SN1	Stirrer nozzle
59	SN2	Stirrer nozzle
60	SN3	Stirrer nozzle
61	SN4	Stirrer nozzle
62	SN5	Stirrer nozzle
63	SN6	Stirrer nozzle
64	SN7	Stirrer nozzle
65	SN8	Stirrer nozzle
66	SV109	Valve for Diaphragm pump
67	SV150	SMC manifold block base 3A, valve - auto pinch valve
68	SV152	SMC manifold block base 3B, valve - manual pinch valve
69	SV155	SMC block - Bubble Air valve
70	SV160	SMC manifold block valve, base 1 for door locks
71	SV161	SMC manifold block, base 2- satellite drive box cylinder
72	SV162	SMC manifold block, base 2- satellite drive box cylinder
73	SV163	SMC manifold block, spare
74	V150	Pinch valve
75	V151	Auto air blast - valve
76	V152	Pinch valve
77	V153	Manual blast air - valve
78	V154	gun head water rinse valve
79	V155	Bubble valve
80	V156	Water valve - top up

	Tag	Description
	PI&D	
81	V158	Remote air regulator
82	V160A	Door locks - top
83	V160A	Door locks - top
84	V160A	Door locks - bottom
85	V160A	Door locks - bottom
86	V161	Satellite drive box cylinder
87	V162	WORKSTATION WINDOW WATER VALVE
88	V163	RAIL WASH WATER VALVE
89	V181	Main air valve
90	V183	Lockable isolation valve
91	V184	sight glass valve
92	Switches	
93	LS121_HH	water level high/High
94	LS121_LL	water level low/Low
95	LS121_H	water level High
96	VS122	Extraction Vacuum Switch
97	TS123	Sump Heater At Temp
98	TSH123	Sump Heater Over Temp
99	ZTP131	Y axis Front Limit
100	ZTP132	Y axis Back Limit
101	ZTP133	Y axis Home
102	ZTP134	Z axis Top Limit
103	ZTP135	Z axis Bottom limit
104	ZTP136	Z axis home
105	ZTP137	Gun Angle Clockwise limit
106	ZTP138	Gun Angle Counter Clockwise limit
107	ZTP139	Gun Angle Home
108	ZTP140	Turntable rotation switch/home
109	ZTP141	Satellite Turntable rotation switch
110	ZTP142	Trolley Fully In Switch
111	ZTP143	Trolley Fully Out Switch
112	ZTP144	Door Closed Switch
113	High Speed Counter	
114	ZTE103_A	Y axis Encoder Pulse A
115	ZTE103_B	Y axis Encoder Pulse B
116	ZTE104_A	Z axis Encoder Pulse A
117	ZTE104_B	Z axis Encoder Pulse B
118	ZTE105_A	Gun Angle Encoder Pulse A
119	ZTE105_B	Gun Angle Encoder Pulse B
120	ZTE106_A	Turntable Encoder Pulse A
121	ZTE106_B	Turntable Encoder Pulse B

	Tag	Description
	PI&D	
122	Digital Outputs	
123	M101_RN	slurry pump run
124	M102_RN	stirrer pump run
125	M103_FWD	Y axis in
126	M103_REV	Y axis out
127	M104_FWD	Z axis up
128	M104_REV	Z axis down
129	M105_CW	Gun angle Clockwise
130	M105_CCW	Gun angle Counter Clockwise
131	M106_CW	Turntable Clockwise
132	M106_CCW	Turntable Counter Clockwise
133	M107_RN	Satellite Turntable run
134	M108_FWD	Trolley in
135	M108_REV	Trolley Out
136	M109_RN	Extract Fan Run
137	M110_RN	Window Wash Run
138	H123_ON	Sump Heater On
139	V150_CL	Auto slurry valve close
140	V151_OP	auto blast air valve Open
141	V152_CL	Manual slurry valve close
142	V153_OP	manual blast air valve Open
143	V154_OP	Rinse Valve Open
144	V155_CL	Bubble Valve Close
145	V156_OP	machine sump fill valve Open
146	V157_OP	Window Wash Water Valve Open
147	SV160_OP	Lock trolley door
148	SV160_CL	Unlock trolley door
149	Analogue Outputs	
150	M107_HZ	Satellite Turntable speed
151	M106_HZ	Turntable speed
152	MV158_POS	blast air pressure

APPENDIX V. Assembly drawing list

Drawing	Description
1257AHA0001	Main machine assembly
1257AHD0001	WORKSTATION COVER
1257AHD0002	LINING ASSEMBLY
1257AHE0001	Handrail
1257AHE0002	WORKSTATION COVER ASSEMBLY
1257AHF0001	Sump assembly
1257AHF0002	Cabinet assembly
1257AHF0003	LOAD END ASSEMBLY
1257AHF0004	KICK BOARD ASSEMBLY
1257AHG0001	BLAST GUN MANIFOLD
1257AHG0002	SHAFT, WRIST OSCILLATION
1257AHG0003	TUBE, WRIST OSCILLATION
1257AHH0001	COVER PANEL, BACK TOP FACE
1257AHH0002	COVER PANEL, BACK BOTTOM SIDE
1257AHH0003	COVER PANEL, LEFT BOTTOM FACE
1257AHH0004	COVER PANEL, LEFT TOP SIDE
1257AHH0005	COVER PANEL, RIGHT BOTTOM
1257AHH0006	COVER PANEL, TOP SIDE
1257AHH0007	COVER PANEL, FRONT TOP SIDE
1257AHH0008	COVER PANEL, FRONT BOTTOM FACE
1257AHI0001	WORKSTATION SHELF ASSEMBLY
1257AHI0002	MEDIA DEFLECTOR, ELUTRATION TOWER
1257AHI0003	SHELF SUBASSEMBLY
1257AHI0004	SHELF SUBASSEMBLY
1275AHK0001	Leopard Filtration Sub Assembly
1257AHL0001	OSCILLATION ASSEMBLY
1257AHL0002	VER & HOR OSCILLATION UNIT
1257AHL0004	GUN HEAD ASSEMBLY, OSCILLATION UNIT
1257AHO0002	SLURRY MANIFOLD, ELUTRATON
1257AHO0003	SLURRY MANIFOLD, BLAST GUNS & SIGHT GLASS
1257AHO0004	AIR CIRUITS
1257AHO0005	SLURRY HOSE ASSEMBLY, OSCILLATION
1257AHO0006	INTERNAL RINSE PIPE WORK
1257AHO0007	WATER LINE ASSEMBLY, OSCILLATION
1257AHT0001	TROLLEY DOOR ASSEMBLY
1257AHT0003	TURNTABLE ASSEMBLY
1257AHT0004	SATELLITES DRIVE ASSEMBLY
1257AHT0007	FRONT PANEL, TROLLEY DOOR
1257AHT0008	SATELLITE DRIVE ENCLOSURE
1257AHT0009	COVER, SATELLITE DRIVE BOX
1257AHT0012	CYLINDER ASSEMBLY
1257AHT0014	TURN TABLE SUPPORT
1257AHT0015	TURN TABLE SUPPORT
1257AHT0016	TURN TABLE SUPPORT

Drawing	Description
1257AHT0017	TURN TABLE SUPPORT
1257AHU0001	Logo
N000HPA1	Strainer, pump inlet stirring
A08-027	WIPER ASSEMBLY
N000ZE91	Sight glass,Mk2,SS,heavy media
N000HDA1	Escape handle
1257AHK0003	Elutriation Tower Assembly
AHE0001	LADDER ASSEMBLY
AHF0001	SIDE INFILL ASSEMBLY PANEL
AHF0002	BACK & FRONT INFILL ASSEMBLY PANEL
AHF0003	LOADEND SIDE INFILL PANEL
AHG0001	STIRRED ASSEMBLY
AHH0001	Grid assembly
AHI0001	SLURRY LEVEL SENSOR
AHN0001	HMI ASSEMBLY
AHT0001	WHELL, TROLLEY DOOR, 35mm BORE
AHT0002	Wheel, Turntable, 25mm bore
AHT0003	WHEEL, TROLLEY DOOR
AHT0006	TROLLEY SPLASH BACK 2210x1760
AHT0007	DRIVE GEAR ASSEMBLY, TURNTABLE DRIVE

APPENDIX VI. MANUALS OF 3RD PARTY EQUIPMENT FITTED

(these are supplied on the Data CD only)

Machine mounted:

- Lamps, Thorlux PX11921J
- E/P regulator ITV series (ITV 2050-312-L3 Q pl)
- Parker Solenoid valve 2/2 way pilot operated (manual 430312)
- Mounting instruction for KG10 switch
- Omron limit switch D4N
- MGM electric motor Series BA
- MGM electric motor Series BM
- Dellmeco diaphragm pumps DM 25/315 AEE
- Omron proximity switch TL-W
- Hengstler encoder RI76 TD
- Pepperl fuchs Floating Switch LFL
- SMC Digital pressure switch ZSE30A(F)ISE30A
- Honeywell limit switch

Electrical enclosure:

- Mitsubishi Electric FX2n-1HC Function block (JY992D65401E)
- Mitsubishi Electric Inverter FR-E700
- Omron, switching power supply S8VS
- Mitsubishi JY997D16001K
- Transistorized inverter FR-ABR-(H) 0.4K to 22K
- Mitsubishi Electric GOT1000 GT15

- Eaton Isolation switch
- Schneider Electric XCS DMC /DMP/ DMR Coded magnetic switches (W9 163408501 A55 08)
- Pilz PN0Z safety relay
- Mitsubishi Electric FX3u-4AD-ADP Programmable Controllers (JY997D13091H)
- Mitsubishi Electric FX3u Master Module FX3u-64DP-M
- Mitsubishi Electric FX3u-CNV-BD (JY997D13601D)
- Mitsubishi Electric FX3u Ethernet FX3u-ENET

APPENDIX VII. RECOMMENDED SPARE PARTS LIST, MACHINE M-1257

This list itemises most parts used on the machine that are considered to be subject to wear and therefore need periodic replacement. It also includes items which are more prone to accidental damage and whose failure would render the machine inoperative. The list is not a complete list of parts used - refer to the assembly drawings for this information. The quantities shown are the recommended to hold in stock, this is not necessarily the total used on the machine.

Adjacent items marked with an asterisk are alternatives to each other, choice depends on customer preference

Normal delivery for items shown as 'ex-stock' will be within 2 working weeks of receipt of order. However Vapormatt Ltd. have a 'PRIORITY' - MACHINE DOWN ! ordering facility wherein we can offer manufacture and/or dispatch of urgent items within "12 working hours" of receipt of order in our Guernsey Manufacturing Plant. Goods would be dispatched by a reputable overnight carriers. Note: in this case there would be a 100% surcharge on each item, in addition to this any carrier charges would be invoiced on separately at cost.

If for any reason, e.g. unavailability of raw materials etc. we were unable to complete the order within the 12 working hours Vapormatt Ltd. will advise the customer of the delay and an estimated dispatch date, and the surcharge will not apply.

Adjacent items marked with an asterisk are alternatives to each other, choice depends on customer preference.

Instigation of this 'PRIORITY' service relies on orders being placed on:-Vapormatt Ltd. Tel: +44 (0)1823 257 976
Fax No.+44 (0)1823 336 446

RECOMMENDED SPARES LIST			
	Description	VM part number	Qty. required
1	Stirrer	N000ZP61	4
2	Dove Tail Mounting	N000ZP68	4
3	3/4" Hose Union	N001ZO16	10
4	Water Level Sensor	AHI0001	1
5	12mm Air Hose	B4-154-002	1 Roll
6	Complete Bubble Valve	N000ZE55	1
7	Diaphragm, f125mm b/valve, EPDM	N000ZE59	1
8	Window & Door Seal	B2 009 001	15m
9	Foam strip, s/adh,25w*3mm,	B2-009-061	1 Roll
10	Gloves	B5 001 022	2 Pairs
11	Glove Ring	B5 001 003	2 Pairs
12	Hose Clip 210mm - 240mm	B4 001 033	4

RECOMMENDED SPARES LIST			
13	Wiper Arm 16"	B2 002 172	1
14	Wiper Blade 18"	B5 005 022	1
15	Complete Sight Glass	N000ZE91	1
16	1/2" 90 s/s Elbow	B4 073 043	5
17	Dart Union s/s 1/2"	B4 073 023	2
18	Saunders Valve 1/2"	B4 016 015	1
19	Hose Clip 35-50mm	B4 001 015	1 Box
20	VSPS Adaptor 50MM-1.5"	N000ZO63	5
21	VSPS Seal	N002ZO57	20
22	VSPS 90 Elbow	N000ZO44	5
23	VSPS Adaptor 3/4"	N002ZO77	5
24	8mm Cyclone Underflow	N001ZK96	2
25	Underflow Deflector	N001ZK66	2
26	Orifice Plate	N002ZO74	5
27	VSPS Clamp	B4 003 080	20
28	Hose Clip 35-45mm	B4 001 007	1 Box
29	Hose Clip 60-80mm	B4 001 035	1 Box
30	Turntable Cover	1257PHT0031	1
31	Turntable Cover	1257PHT0047	1
32	MK3 Blast Gun Assembly [12mm Nozzle]	N003ZGA8	2
33	MK3 Gun Body	N001ZG13	2
34	12mm Nozzle	N001ZG26	4
35	Air Jet	N002ZG00	2
36	Non Return Air Line	N001ZG26	4
37	Non Return Ball	B4 017 027	10
38	1/2" Hose Union	N001Z015	10
39	Cir clip	B2 008 040	8
40	Rinse Nozzle	B4 007 021	2
41	1/2" Air & Water Hose	B4 002 004	5m
42	VSPS Splitter 4 x 1/2"	N002ZO54	3
43	Hose Silicon Reinforced 51mm 3.8 M	B4 002 113	2
44	VSPS Elbow 45	N000ZO50	5
45	1 1/2" Nipple	B4-077-013	5
46	Mikalor Clip 59-63mm	B4-001-053	5
47	1 1/2" PU Barrel Nipple	P200011	5
48	Air Hose 19mm Bore	B4-002-009	10m
49	Hose Clip 25-35mm	B4-001-008	1 Box
50	VSPS Y Branch	N000ZO66	5
51	VSPS 4 x 1" Splitter	N001ZO14	5
52	VSPS Tee Branch	N000ZO59	5
53	VSPS 2 x 1/2" Splitter	N002ZO52	5

RECOMMENDED SPARES LIST			
54	Pinch Valve Assembly	N002Z0A2	1
55	Pinch Valve Liner	N002ZO71	2
56	Pinch Valve Body	N002ZO73	1
57	VSPS Half Seal	N002ZO76	5
58	VSPS ¾ Adaptor	N002ZO77	5
59	MK 7 Blast Gun Assembly	N005ZGA2	1
60	MK 7 Gun Body	N002ZG14	1
61	5.5mm Air Jet For MK 7 Gun	N002ZG14	1
62	10mm Nozzle	N000ZG14	2
63	½ 19MM Hose Tail	B4-073-057	5
64	Strainer Slurry Pump	N000HPA1	1
65	Strainer Stirrer Pump	N000HP02	1
66	Complete Pump	A10 057	1
67	Cartridge Filter	B4-063-042	2
68	Rubber Drab	B1-021-006	1 Roll
69	Impeller	1356/01	2
70	Pump Body	N000ZP17	2
71	Pump Top	N000ZP22	2
72	Pump Spacer Bolts	N000ZP02	8
73	19mm Abrasive Hose (green)	B4-002-106	3m
74	25mm Abrasive Hose	B4-002-002	1 Roll
75	Trolley wheel rinse nozzles	B4-007-040	2
76	Satellite box belt	B2-005-114	2
77	V seals for satellite box	B2-009-204	3
78	Limit switch for K axis	B3-015-093	1
79	Limit switch for oscillation	Hepco DLS5-V3-SWAM	1

EXTRA SPARES LIST		
Description	VM part number	Qty. required
Window	N000JE14	1
Turntable Bearing	B2 007 156	1
Satellite	1257AHT0004	2
CONCERTINA BELLOW, GUN	1257PHL0006	1
K Axis Gear box	B2 003 013	1
Turntable Load Runners	B2-007-156	4
Hand Spray Gun	B4-007-050	1
Trolley Wheel Assembly	PHT0002	2
Turntable Motor & Gear box	B2-002-152/B2-002-208	1
Trolley Motor & Gear box	B2-002-151/B2-002-153	1
Pneumatic Door locks L/R	B5-010-022 / B5-010-021	2
Inverter Drive	B3-050-052	1
ITV Valve	B3-004-109	1
SMC Valve Block	B4-008-183	1
Diaphragm Pump	B4-005-075	1
Horizontal Bellows	1257PHL0001	1
SMC Rinse Valve	B4-008-178	1
Oscillation Unit	1257AHL0002	1
K Axis Motor an gearbox	B2-002-147 / B2-002-209 (Hepco Motion)	1
Z Axis Motor and gear box	SDS056-22 / SW40 63 71 (Hepco Motion)	1
Y Axis Motor and Gear box	GKS04-3M-VAR-063C12-B	1
Horizontal Bellows	1257AHL0006	1

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