

# **OPERATING, INSTALLATION & MAINTENANCE MANUAL**

## **FOR**

### **SHEARMIX CPC MIXING STATION**

*This JISKOOT Product is designed to provide outstanding service if correctly installed, used and maintained recognising the effects of the process conditions (temperature, pressure, wax/pour point, sediment, etc.).*

*Truly representative sampling of crude oils etc., cannot be achieved by one single product in isolation. A well designed system and operating procedures as laid down in the Sampling Standards ISO 3171, API 8.2 and IP Chapter VI section 2 are mandatory.*

*Please consult Sensia for further information and assistance.*

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### GENERAL

## WARNING!

This unit is designed for use with high-pressure hydrocarbon fluids.

Ignoring this warning can result in severe personal injury or mechanical damage.

To avoid the risk of accidental release of high pressure fluids, the safety instructions of this manual must be observed and the guidelines followed.

The specifications must not be exceeded, and the unit must only be operated as described in the instruction manual.

Prior to the commissioning and installation of the unit, this manual must be examined carefully.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



### INSTALLATION

## WARNING!

The enclosure must not be operated in Zone 0 hazardous areas.

All technical data on the enclosure is to be observed.

Changes to the design and modifications to the equipment are not permitted.

The equipment shall only be operated as intended and only in undamaged and perfect condition.

This equipment must be earthed.

This equipment must **ONLY** be used in within a ventilated room

This equipment **MUST** be connected to an external vent.



### REPAIRS

## WARNING!

The Mixing Vessel on this equipment has no user-serviceable parts.

Any unauthorised attempt to repair the equipment may invalidate the warranty.

Servicing and repairs may only be undertaken by a suitably trained and competent technician.

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## **Warranty**

This product should be supplied with a warranty card. Please complete and return it to register for warranty support.

If the product has been supplied as part of a Jiskoot system or assembly, please complete the warranty card for the system.

## **1 Introduction**

The ShearMix Mixing Station is designed to mix the contents of a constant pressure sample cylinder, such as a Jiskoot CPC, containing hydrocarbon liquids under process conditions. The cylinder will not be required to have an internal mixing ball (but may have one), it can also be used with any other vendors' sample cylinder of a similar type/capacity provided it is mounted vertically, outlet downward and connected correctly. The ShearMix Mixing Station is designed to operate with sample cylinders up to 4 litres total internal volume. Mixing tests to confirm homogeneity may be performed using the ShearMix Mixing Station by taking samples from the pressure controlled sample point after sufficient mixing within the chamber.

The Mixing Station incorporates a cleaning and pre-charge system.

The Mixing Station is intended for safe area use in a continuous ventilated laboratory,

Hazardous area units may be supplied, certified for specific applications.

The ShearMix Mixing Station is designed for use with process fluids in the following conditions:

- Liquids: Hydrocarbons, from condensate to crude oils.
- Viscosity: 0.5 – 200 cSt
- Density: 0.60 – 0.95 gm/cl
- Pressure: To match rating condition for CPC (150 Bar)
- Temperature: 0 – 40°C



**ShearMix Mixing Station (Electrically operated version)**

## 2 Operating Instructions



### GENERAL

### WARNING!

This equipment is designed for use with high-pressure hydrocarbon fluids.

Ignoring this warning can result in severe personal injury or mechanical damage.

The specifications must not be exceeded, and the unit must only be operated as described in the following instructions.

Failure to operate the Mixing Station in the method and sequence described below may cause accidental release of high-pressure process fluid.

### 2.1 Preparation

A CPC constant pressure cylinder is mounted on an adjustable bracket to suit sample cylinders of different capacities, and should be positioned so as to enable the sample hose to be connected to the cylinder without excessive kinking or stretching.

The CPC is mounted with the sample connector positioned at the bottom.

It is envisaged the Mixing Station is thoroughly cleaned between sample batches to prevent potential contamination (refer to Section 3.3).

Control and operational valves are colour coded to signify process and process condition.

Traffolite or thermal printed adhesive labels positioned on the front of unit represents the position of valves and control.

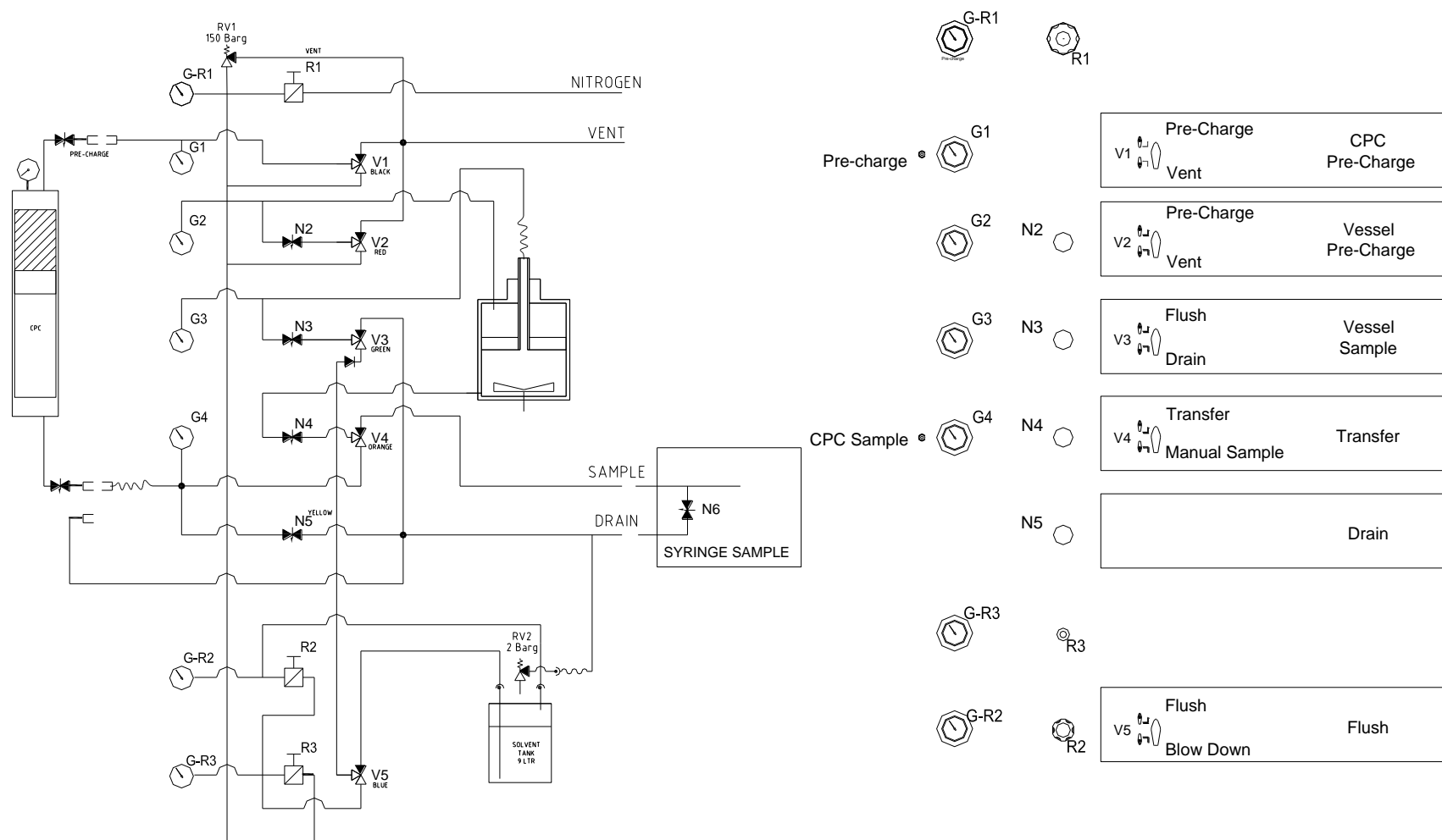
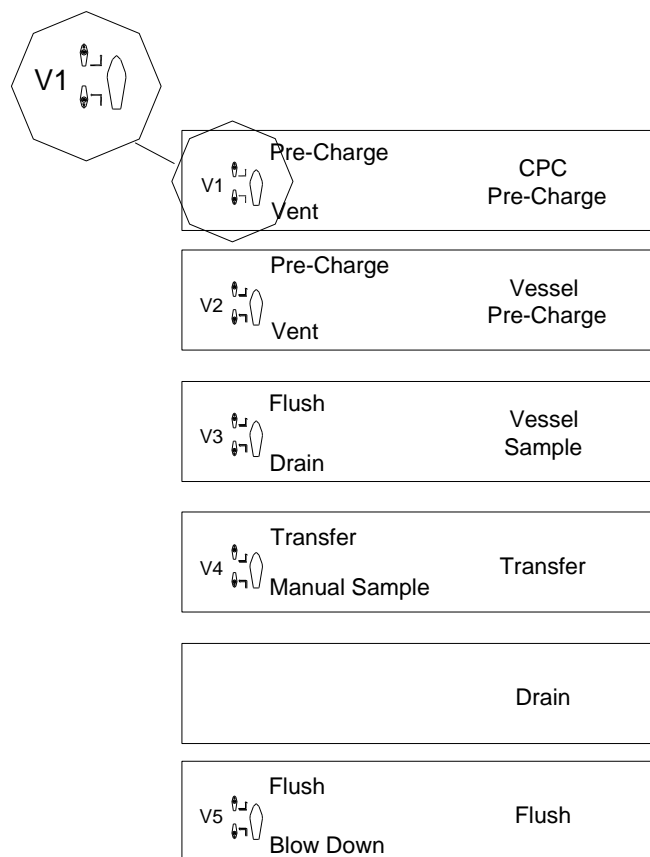


Fig. 1 – Initial valve configuration before connecting sample cylinder.

## 2.2 Connecting the Sample Cylinder

It is vital for both safety and potential sample loss, that the Mixing bench Direction Valves are set in the “Upright” vertical position, all needle valves fully “closed”, all indicators reading zero, depressurised condition before attempting to connect the Sample Cylinder.



Locate the CPC to mounting bracket and ensure the flexible hoses are connected to the pre-charge and sample connections of the CPC (Pre-charge to top).

DO NOT OPEN CPC VALVES.

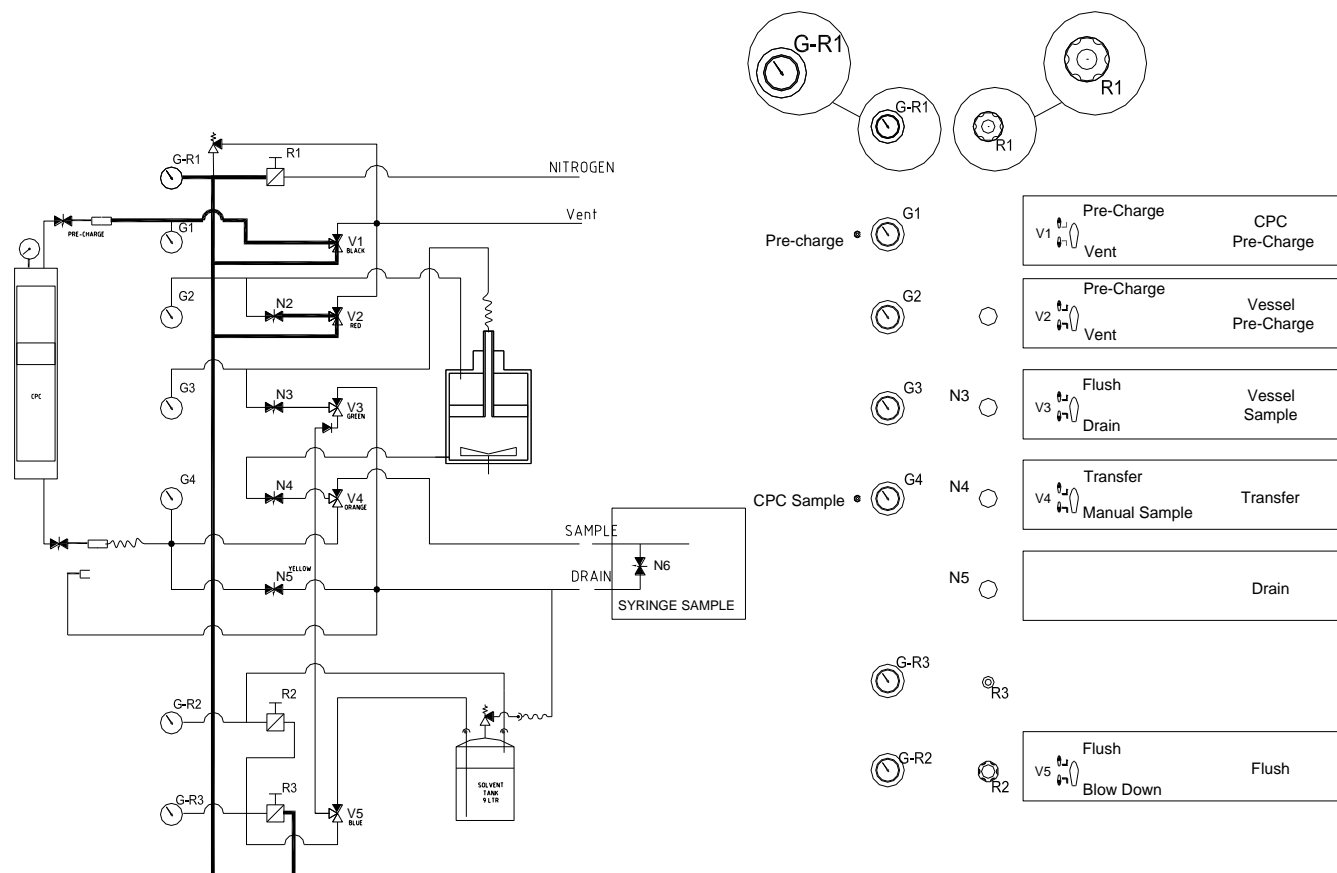


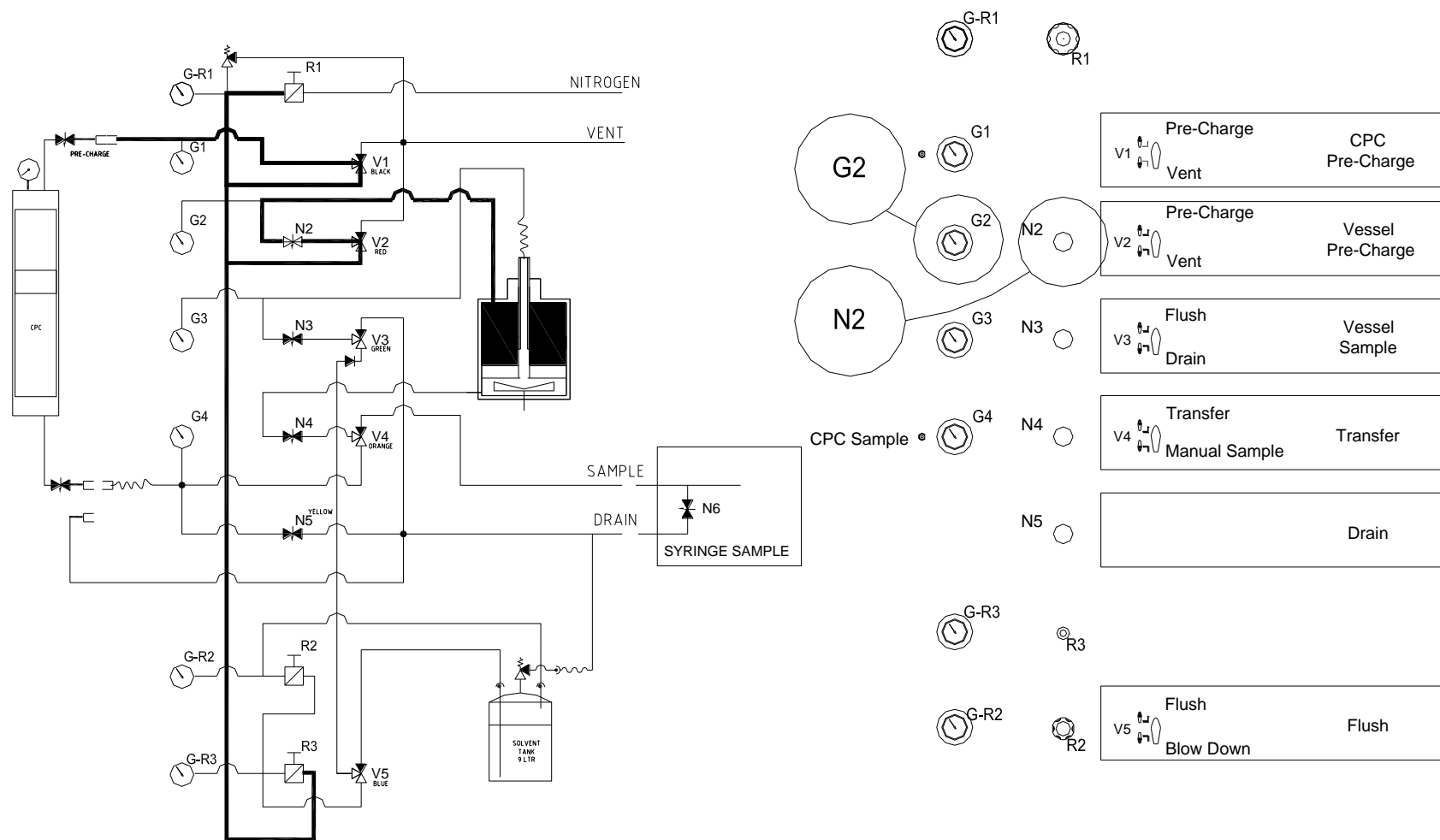
## 2.3 Stage 1 - Balancing the pressurised Sample Cylinder to the Mixing Vessel.

With the unit connected to a suitable Nitrogen supply, set the Inert Gas Regulator R1 so as to be equal to the required CPC Sample cylinder / system pressure. – **DO NOT EXCEED CPC SAMPLE PRESSURE**

If not specified set the Regulator to 150 Barg (maximum), Regulator pressure will be displayed on gauge Gr1 (Gauge – Regulator one).

Carefully, gently open the “pre-charge” isolating valve on the CPC so as to apply pressure to the CPC. Corresponding CPC pre-charge pressure will be displayed on gauge G1.





Carefully, gently open Needle Control Valve-N2(Red) applying pressure to the top of the mixing vessel forcing the piston down, minimising trapped air volume within mixing Vessel

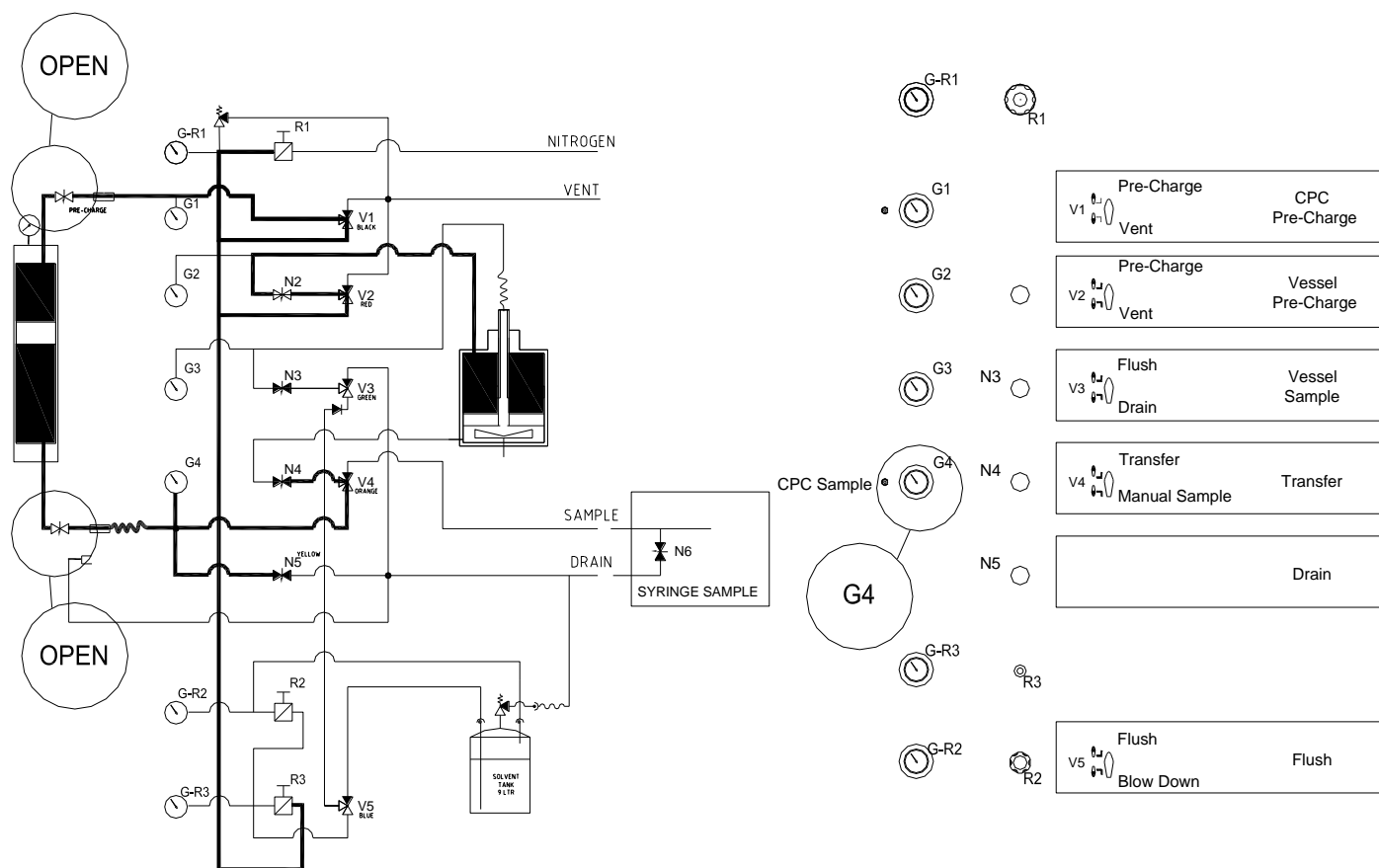
Close Needle Control Valve-N2(Red), trapping pre-charge within the top side of the Mixing Vessel.

## 2.4 Stage 2 - Purging and balancing the Mixing Vessel

PLEASE NOTE: SAMPLE CAN BE LOST COMPLETELY, UNLESS THE FOLLOWING PROCESS IS STRICTLY ADHERED TO.

Prior to "TOTAL" sample transfer, a small amount of sample will be vented to drain to ensuring air is expelled prior to mixing.

Carefully, gently open the CPC Sample isolation valve. Applying Pre-charge to the CPC sample and balancing pressure of the system indicated as G1 balanced with G4.



Carefully and very gently open Needle Control Valve-N4 (Orange), allowing sample to balancing the pressures both sides of the Mixing Vessel.

Air trapped within the mixing vessel and piping should be vented as follows:

- 1) Set Direction Valve-V3 (Green) to "Drain".
- 2) **Momentarily** rotate the Needle Control Valve-N3 (Green); until trapped air within the mixing vessel is heard venting to atmosphere. - Close Needle Control Valve-N3 (Green).
- 3) Reset Direction Valve-V3 (Green) to "Flush" (Locking Sample Vent).

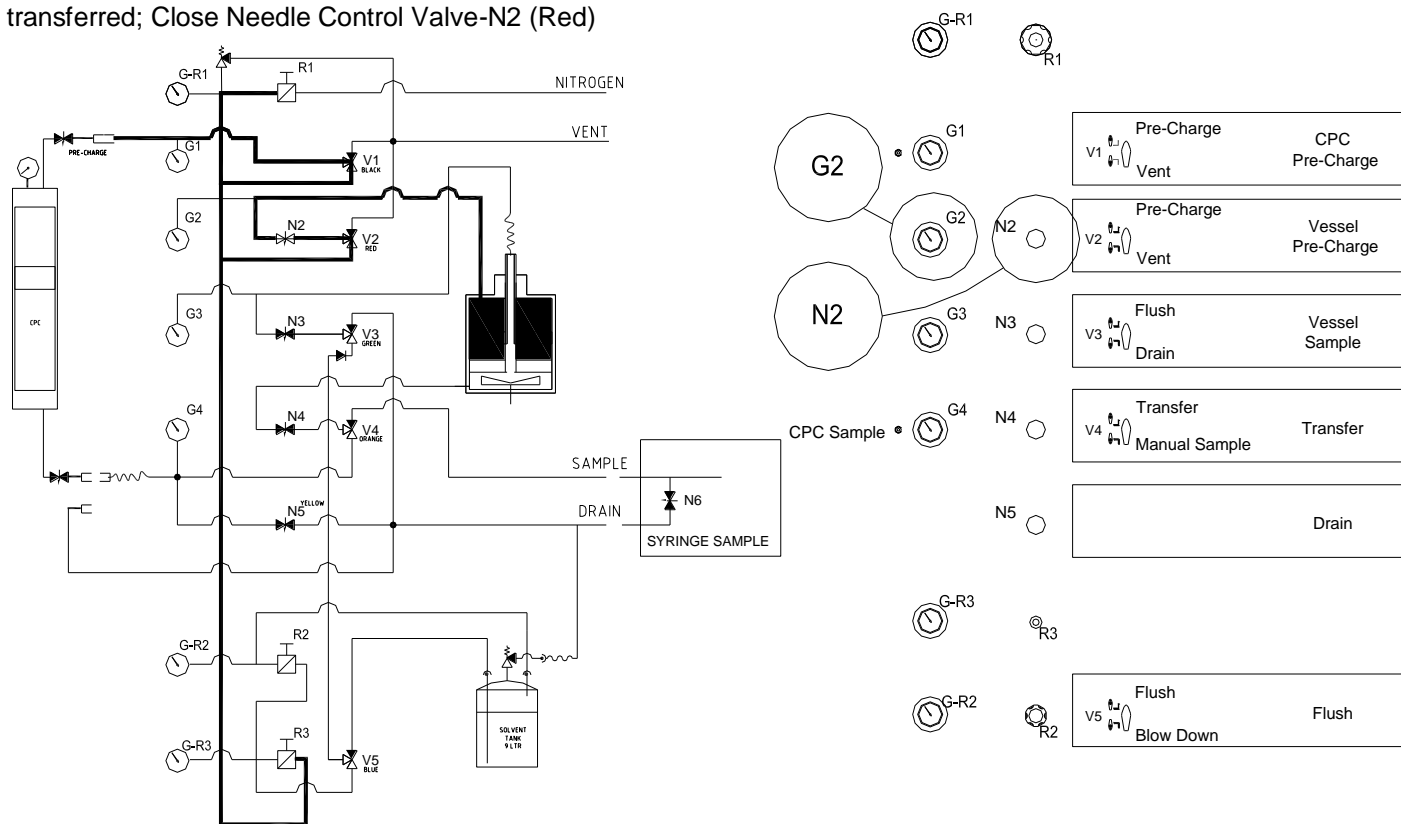
## 2.5 Stage 3 - Transfer

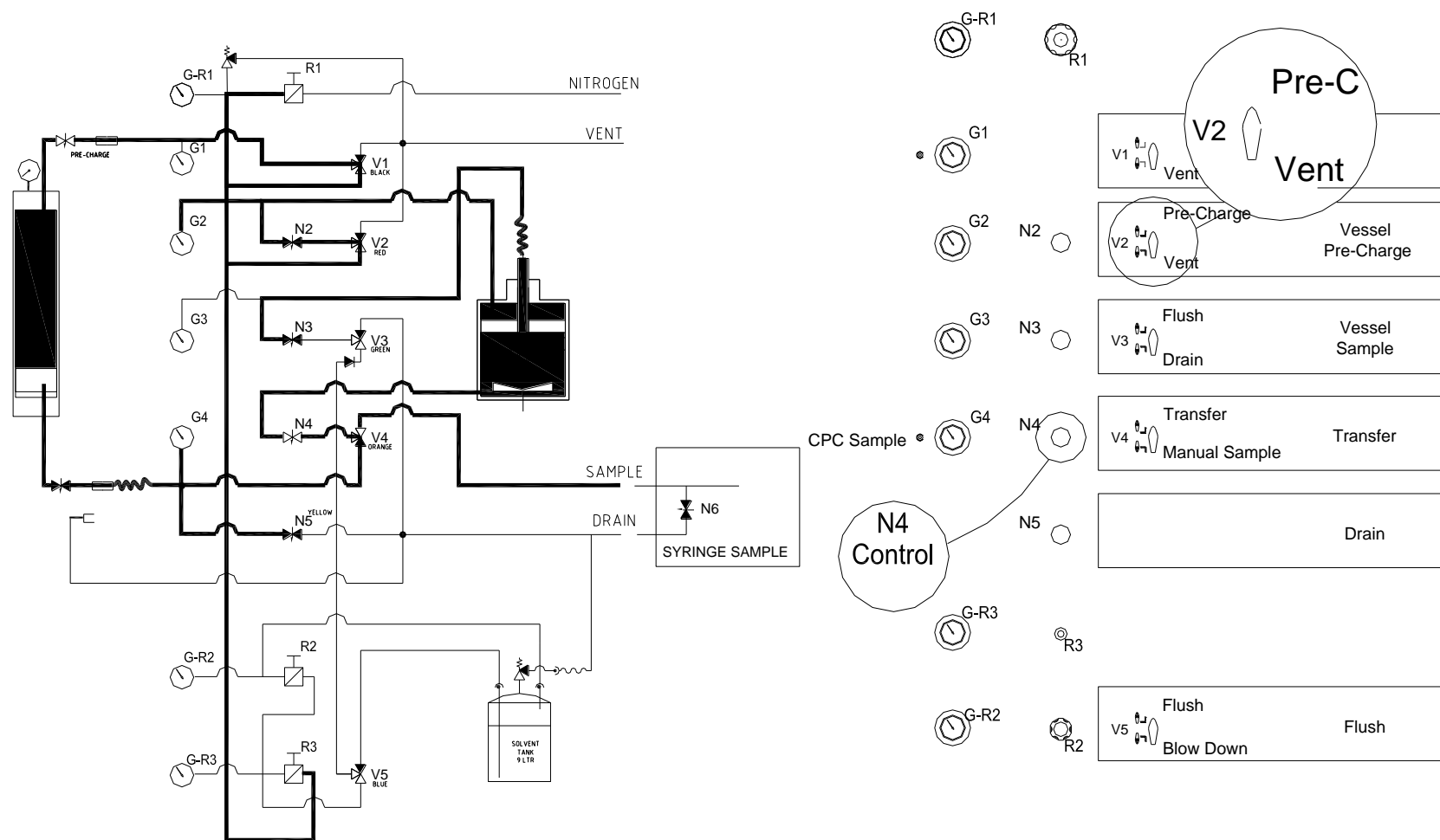
Ensure Needle Control Valve-N2 (Red) is closed; Rotate Direction Valve-V2(Red) to "Vent".

Fully open mixing vessel Needle Control Valve-N4 (Orange) The Sample will now enter the mixing vessel at a velocity momentarily controlled via Needle Control Valve-N2 (Red) and CPC sample isolation valve. As the inert pressure on the opposing Mixing Vessel decreases (indicated at gauge G2), the piston will extend, indicating transfer.

Adjust Needle Control Valve-N2 (Red) as required controlling the sample transfer via the CPC sample isolation valve. With the required sample transferred close the CPC sample isolation. – DO NOT ALLOW G2 TO DE-PRESSURISE PAST THE SAMPLE PRESSURE,.

With the sample transferred; Close Needle Control Valve-N2 (Red)





Close Mixing Vessel Needle Control Valve-N4(Orange). Locking Sample with Mixing Vessel

Rotate Direction Valve-V2(Red) to “Pre-Charge”

Carefully, gently open Needle Control Valve-N2(Red), re-applying balancing pressure to the mixing vessel so as gauges G2 and G3 indicate corresponding reading.

## 2.6 Stage 4 - Mixing

It is not recommended that the mixer is operated or started below 50% of full speed.

DO NOT OPERATE THE MIXER WITHOUT PRESSURISED SAMPLE

Select speed and start the Mixer Motor. Increase speed and run the mixer for 6 minutes at full speed (Units fitted with variable speed), although the speed of the motor and the length of time the sample will take to be thoroughly mixed will depend upon the viscosity, temperature, and composition of the sample and will be determined by experience.

The pneumatically operated version will require to be operated with an air pressure of 3.5 to 5 Barg to achieve mixing. Ensure that there is an adequate supply of Shell Tellus 37 (or equivalent) oil in the lubricator to keep the air motor lubricated during this operation (4-6 drops/minute).

**Notes: To minimise the risk of overheating, the pneumatically operated ShearMix must not be left running for more than 30 minutes or whilst unattended.**

**The pneumatic ShearMix must not be operated when there is no oil in the Mixing Vessel, as this may cause the air motor to over-speed and generate excessive heat.**

## 2.7 Stage 5 - Obtain Sample

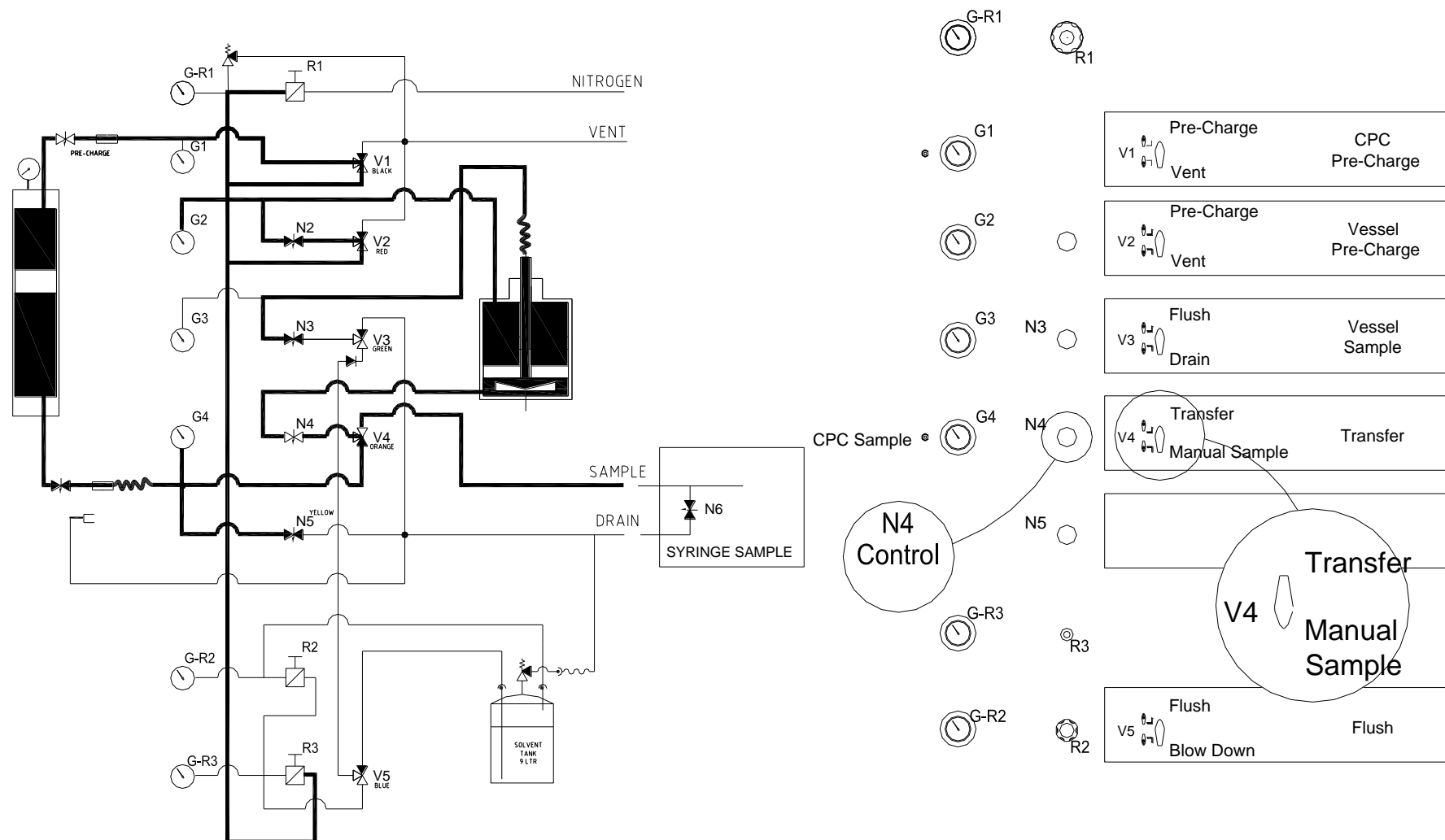


Fig. 4 – Initial valve configuration to obtain sample from Sample Point



To obtain a sample for analysis, stop the Mixer Motor, place a suitable receptacle under the sample point (Screw Syringe fitting). Rotate Direction Valve-V4 (Orange) to "Manual Sample".



Care **MUST** be taken for correct PPE and use of face mask. The sample may possibly contain highly combustible and volatile gases.

Ensure good room ventilation.

Carefully and momentarily open Needle Control Valve-N4 (Orange) to allow approximately 20ml of Non-mixed sample at a controlled flow rate to transfer into the sample container. Close Needle Control Valve-N4 (Orange)

Replace receptacle.

(See notes for Syringe).

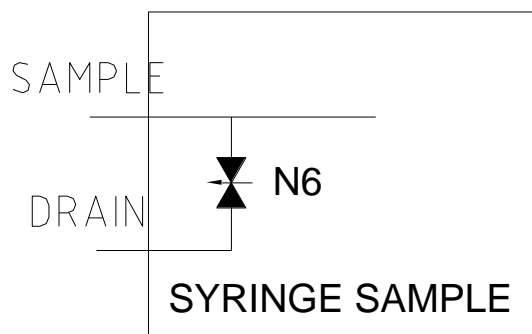
Carefully and momentarily open Control Valve-N4 (Orange) to allow mixed sample at a controlled flow rate to transfer the required quantity of sample into the sample container. Close Needle Control Valve-N4 (Orange)

The sample may now be taken for Karl Fischer analysis.

For repeat samples:

Carefully and momentarily open Control Valve-N4 (Orange) to allow mixed sample at a controlled flow rate to transfer the required quantity of sample into the sample container. Close Needle Control Valve-N4 (Orange)

## **2.8 Syringe Fitting (optional)**



For Syringe Sampling, the syringe requires bleeding to expel potential trapped air.

Ensure the Syringe is fitted correctly to sample point together with associated seals.

Set Syringe to "receive" sample.

Ensure Needle Control Valve-N6(Black) is closed (Only fitted to units with Syringe Sample)

Momentarily operate Needle Control Valve-N4(Orange), the syringe will extend as sample is forced into receptacle.

Close sample point Needle Control Valve-N4 (Orange), Open Syringe Needle Control Valve-N6 (Black), manually force the receptacle to the closed position, forcing sample to drain.

Close Syringe Needle Control Valve-N6 (Black).

Repeat I. through to III. approximately 2 -3 times to ensure toughly mixed sample is obtained and the syringe receptacle is completely purged of air.

With the Syringe receptacle extended (Charged). Pressure exerted on the sample will equal the Mixing Vessel Pre-Charge pressure indicated on Gauge G2.

“Lock” Syringe receptacle

**Momentarily** open Syringe Needle Control Valve-N6 (Black), relieving pressure to drain.

Unscrew Syringe receptacle.

## **2.9 Drain, Blow-down and Solvent Clean (Where supplied)**

### **2.10 Emptying the Mixing Vessel and CPC**

After use, the remaining sample will be forced to drain from the Mixing Vessel via operation of Needle Control Valve-N4 and Needle Control Valve-N5 (Red).

When the Mixing Vessel is empty, G4 will read zero.

**Momentarily** open Needle Control Valve-N5 (Yellow) allowing pressurised sample within the flexible CPC hose and Mixing Vessel to atmosphere (Non-pressurised drain line) Gauge G4 to read Zero.

The remaining CPC sample, if required can also be emptied to drain by opening the CPC sample isolation valve, whilst Needle Control Valve-N5 is open

Close Needle Control Valve-N5 (Yellow) and rotate Direction Valve-V4 (Orange) to “Transfer”

Open Needle Control Valve-N5 (Yellow) allowing controlled flow (Controlled from Needle Control Valve N4 (Orange) from the mixing vessel to drain. **Please note** The velocity of the sample is assisted via inert gas pressure acting on the opposite side of the mixing vessel.

CPC Sample No Longer Required  If the CPC sample is no longer required, it can be discharged to drain, via opening of the CPC sample outlet.	Keep and remove from station  Close CPC “pre-charge” needle valve (Top) and rotate Direction Valve-V1 (Black) to “Off” to de-pressurise.
When Gauge G4 reads Zero, reposition the quick connect from the CPC outlet to “Blow down connector”	
Close CPC “pre-charge” needle valve (Top) and rotate Direction Valve-V1 (Black) to “Off” to de-pressurise.	When Gauge G1 reads Zero disconnect associated hose connections.
Refer to Section 5 for using the Mixing Station to flush and clean the CPC	
Remove CPC from station.	Remove CPC from station.

Close Mixing Vessel drain Needle Control Valve-N4 (Orange) and Needle Control Valve-N5 (Yellow),

Disconnect the CPC sample flexible hose (Lower Hose) and connect to “Blow down connector”

Ensure Needle Control Valve-N2 (Red) is closed. Set Direction Valve-V2 (Red) to “Vent” and carefully release the remaining gas pressure from the top of the Mixing Vessel through Needle Control Valve-N2 (Red).

Ensure Needle Control Valve-N3 (Green) is closed. Set Direction Valve-V3 (Green) to “Drain” and carefully release any pressure from the Mixing Vessel through Needle Control Valve-N3 (Green)

With the system indicating Zero on Gauges G1, G2, G3 and G4, ensure all Needle Control Valves are closed and set all Direction valves in the "Upright" position.

### **3 Fill Mixing Vessel with solvent flush**

Preset Solvent Regulator R3 (Gr3) to 5 Barg.

Preset Solvent Regulator R2 (Gr2) to 2 to 3 Barg.

Set Direction Valve-V3 (Green) to "Flush"

Ensure Direction Valve-V5 (Blue) is set to "Flush". Solvent is allowed to enter the Mixing Vessel via Needle Control Valve-N3 (Green). **Momentarily** open Needle Control Valve-N3(Green) until the Mixing Vessel piston is seen to rise by approximately 5 – 10mm. Close Needle Control Valve N3 (Green)

Ensure Needle Control Valve-N2 (Red) is closed and Set Direction Valve-V2 (Red) to "Pre-Charge". Apply approximately 50 Barg pre-charge pressure to the top side of the Mixing Vessel (Gauge G2), via operation of Needle Control Valve-N2 (Red). Close Needle Control Valve-N2 (Red).

Run Mixer Motor for approximately 2 minutes.

Place a suitable receptacle under the sample point.

Stop Mixer Motor.

Rotate Direction Valve V4 (Orange) to "Manual Sample", **momentarily** open Needle Control Valve-N4 (Orange) Allowing solvent from the Mixing vessel to manual sample outlet. When the solvent appears to run clear.

Close Needle Control Valve-N4 (Orange)

Set Direction Valve-V4 (Orange) to "Transfer".

Momentarily open Needle Control Valve-N4 (Orange) Allowing the remaining solvent from the Mixing vessel to flow through the Blow Down pipe work.

#### **3.1 In the event of re-filling the solvent tank:**

Ensure Needle Control Valve-N2 (Red) is closed

Ensure Needle Control Valve-N3 (Green) is closed

Ensure Needle Control Valve-N4 (Orange) is closed

Reduce the Solvent Pressure via Regulator (R3) so as corresponding Gauges Gr3 and Gr2 reads Zero.

Gently remove solvent tank lid, refill to  $\frac{3}{4}$  and replace the solvent tank lid; Checking sealing.

Re-pressurise the Solvent tank via regulator R3 so as corresponding Gauge Gr2 reads 2 to 3Barg.

## 4 Blow-down the Mixing Vessel and Sample Lines

Fully open Mixer Vessel Needle Control Valve-N4 (Orange).

Set Direction Valve-V5 (Blue) to "Blow Down"

Fully open Needle Control Valve-N3 (Green) to allowing inert gas at 2 - 5 Barg, to purge any remaining solvent through Mixing Vessel to drain through the flexible blow down hose.

Close Needle Control Valve-N4 (Orange).

Place a suitable cloth over the Manual Sample or Syringe Sample outlet.

Set Direction Valve-V4 (Orange) to "Manual Sample". (If return from cleaning, depressurise system)

Momentarily open Needle Control Valve-N3 (Green) allowing inert gas at 2 - 5 Barg, to purge any solvent from the line into then cloth. Rotate Direction Valve-V4 (Orange) back and forth.

If the station will be used to clean the CPC, see Section 7.

Depressurise Regulator R1, R2 and R3, clean and fit plastic plugs in all relevant connection points.

Close Needle Control Valve-N3 (Green); set Direction Valve-N3 to "Drain"

Set Needle Control Valve-N2 (Red) to "Vent", slowly vent Mixing vessel "Pre-charge" via Needle Control Valve-N3 (Green).

When all Gauges show Zero and system is vented and de-pressurised, reset all Needle Control Valve's to the "Close" position all Direction Valve's to the upright position.

## 5 Removal of solvent tank

**Caution:** PPE must be observed when emptying and refilling the solvent tank.

Before disconnecting the tank, ensure solvent Pressure Regulator (R3) is de-pressurised as indicated on corresponding gauge Gr3 and Gr2.

Disconnect the quick connect couplings from the solvent tank and remove.

Refit the cleaned Solvent Tank to the Mixing Station and connect the two quick release couplings, adding further solvent to the tank (if required).

## 6 Using the Station to Flush and Clean the CPC

The CPC is cleaned via transferring solvent from the solvent tank, to the mixing vessel. The solvent is then flush under pressure, back and forth from the Mixing Vessel to the CPC. The solvent is flushed to drain and the process repeated to ensure cleanliness of the CPC.

Ensure the CPC is mounted, flexible hoses connection to the CPC with pre-charge to top Gauge G1 and Gauge G2 read Zero.

Ensure CPC "Pre-Charge" and "Sample isolation valves are closed.

Close all Needle Control Valves and set all Direction Valves in the "Upright" vertical position.

Set CPC Pre-charge V1 (Black) to vent and release any pre-charge gas from the CPC using The CPC isolation Valve.

Ensure adequate clean supply of solvent in the solvent tank. In the event of re-filling the solvent tank, see Section 4.1

Carefully, gently open CPC “sample” isolation valve.

Open Needle Control Valve N5 (Yellow) allowing any sample within the CPC to drain.

Ensure Needle Control Valve-N3 (Green) is closed and set Direction Valve-V3 (Green) to “Flush”

Ensure Direction Valve-V5 (Blue) set to “Flush”, solvent is allowed to enter the Mixing Vessel via Needle Control Valve-N3 (Green). Momentarily open Needle Control Valve-N3(Green) until the Mixing Vessel piston is seen to rise by approximately 50mm. Close Needle Control Valve N3 (Green).

Ensure Needle Control Valve-N2 (Red) is closed and Set Direction Valve-V2 (Red) to “Pre-Charge”. Apply approximately 50 Barg pre-charge pressure to the top side of the Mixing Vessel (Gauge G2), via operation of Needle Control Valve-N2 (Red). Close Needle Control Valve-N2 (Red). Gauge G2 will read the same as Gauge G3

## **6.1 Flush**

Ensure Direction Valve V4 (Orange) is set to “Transfer”

Fully open Needle Control Valve N4 (Orange). Solvent within the mixing Vessel will now transfer to the CPC via control of the CPC sample isolation valve and Needle Control Valve N2 (Red).

Close Needle Control Valve N2 (Red), rotate Direction Valve V1 (Black) to “Pre-charge” and pressurise the CPC using via the CPC isolation Valve.

Set Direction Valve-V2 (Red) to “Vent”. Release pre-charge pressure from the top side of the Mixing Vessel (Gauge G2), via operation of Needle Control Valve-N2 (Red). Solvent within the CPC will now transfer back to the Mixing Vessel. (Carefully apply pre-charge to the CPC isolation valve to assist the transfer)

Upon transfer of solvent; Close Needle Control Valve-N2 (Red) and CPC “pre-charge” isolation valve. Set Direction Valve-V2 (Red) to “Pre-Charge” Applying pre-charge pressure to the top side of the Mixing Vessel (Gauge G2), via operation of Needle Control Valve-N2 (Red).

Ensure CPC “pre-charge” isolation valve is closed, rotate Direction Valve V1 (Black) to “Vent” and de-pressurise the CPC using via the CPC Isolation Needle Valve. Solvent within the Mixing Vessel will now transfer to the CPC assisted via Needle Control Valve N2 (Red).

Repeat i – iv.

Upon satisfactory flushing (Possibly 3 to 4 flushes dependant upon crude consistency and viscosity) Stop flushing at stage ii, “Solvent transferred to Mixing Vessel”.

Set the Regulator R1 to 150 Barg.

Close CPC “Sample” and “Pre-Charge” isolation valves. The CPC will now indicate 150 Barg. Pre-charge with the piston ready to accept next process sample.

Close Needle Control Valve N4 (Orange), locking the solvent within the Mixing Vessel

Open Drain Needle Control Valve N5 (Yellow), releasing pressure between the CPC and the Mixing Vessel

When Gauge Reference G4 reads Zero; Disconnect the CPC sample flexible hose and connect to “Blow down connector”

Open Needle Control Valve N4 (Orange), allowing solvent to flush from the Mixing Vessel to drain.

Set Direction Valve-V2 (Red) to “Vent” and carefully release the remaining gas pressure from the top of the Mixing Vessel through Needle Control Valve-N2 (Red).

Follow Section 5 to “Blow down” the lines and clean the solvent tank.

**6.1.1 This process can be repeated until the solvent is acceptably clean**

De-pressurise regulators R1, R2 and R3 to zero to relieve gas pressure from the Mixing Vessel, via corresponding Direction and Needle control valves.

With the system de-pressurised, all gauges reading Zero; Close all needle valves and set all Direction Valves in the “Upright” vertical position.

**6.2 Inspection and preparation for next use**

Visually inspect the area around the motor and mixer for any sign of oil leaking from the seal in the Mixing Vessel. If the seal is leaking, then the Mixing Vessel may need to be returned to Jiskoot for overhaul.

## 7 **Glossary of Special Terms**

CPC Constant Pressure Cylinder – a sample container designed to maintain at the product under full process pressure.

R1 Pre-charge Regulator (Set to System Pressure - 150 Bar Maximum) – used to pressurise ShearMix Mixing System to line pressure prior to mixing sample and to pre-charge Sample Cylinders prior to use on the Sampling System.

R2 Solvent regulator (Set to 1.5 Bar) – used to displace solvent from Solvent Tank to Mixing Vessel for cleaning.

R3 Blow-down regulator R2 (Set to 2 Bar) – Used to blow any remaining residues of product/solvent from the pipelines after sampling and cleaning.

R4 Air Regulator (Set to 5 Bar) – used to control speed of Mixing Element on pneumatically operated version.

RV1 Set to open at 150 Bar. – Protects system and Sample Receivers from being over-pressurised

RV2 Set to open at 2 to 3 Bar. – Protects Solvent Tank from being over-pressurised

Three-way Valves:

V1 (Black) Either provides pre-charge pressure to the Sample Cylinder, or vents Sample Cylinder to atmosphere.

V2 (Red) Either provides pre-charge pressure to the Mixing Vessel, or vents Mixing Vessel pre-charge to atmosphere.

V3 (Green) Directs blow-down gas or solvent to the Mixing Vessel.

V4 (Orange) Directs sample from Sample Cylinder into Mixing Vessel, mixed sample fluid from the Mixing Vessel to the Sample Point for extraction by syringe or suitable container.

V5 (Blue) Directs blow-down gas or solvent to the Mixing Vessel.

Needle Control Valves:

N2 (Red) Provides control for pre-charge pressure to the Mixing Vessel, or control of venting Mixing Vessel to atmosphere.

N3 (Green) Provides control for Mixing Vessel venting.

N4 (Orange) Provides control of sample from Sample Cylinder into Mixing Vessel, and Sample Point for extraction by syringe or suitable container.

N5 (Yellow) Provides control for drain from Mixing Vessel and CPC.

Gauges

Gr Gauge regulator, Provides system pressure visualisation of setting on regulators .

G Gauge, Provides system pressure visualisation.

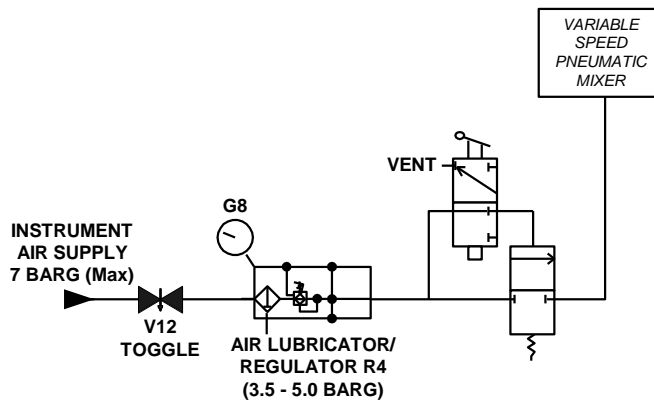
## 8 Full Functional Description

The CPC Mixing Station is designed to take a high-pressure sample of product and mix it to obtain a homogenised mix of water, oil and solids which a small sample can be taken for analysis to obtain an accurate breakdown of its composition.

The Mixing Station operates by decanting the contents of the high pressure sample cylinder into a mixing vessel, agitating the sample whilst maintaining it under process pressure to prevent the loss of light ends, and then allowing a small sample to be drawn off for analysis by Karl Fischer or other analytical processes.

The Mixing Station includes provision for maintaining the sample pressure using an inert gas supply (typically Argon or any other gas not present in the process), and for cleaning the equipment after use, to remove traces of the previous product to avoid cross-contamination.

The pneumatically operated ShearMix uses a toggle valve to start and stop the Mixer air motor via a shuttle valve. An air regulator and lubricator are provided to control the speed of the mixer and to lubricate the air motor.



Control Circuit for Air-Driven Mixer

## 9 Utilities Reference

### 9.1 Electrically operated (Safe Area) version

Electrical requirements: 115/230VAC 50/60Hz single phase, 0.75KW.

### 9.2 Pneumatically operated (Hazardous Area) version

Instrument Air Supply – 7 Barg Maximum, 5.0 Barg Minimum (500 l/m @ 5.0 Barg)



## 10 Installation Details

The electrically operated ShearMix CPC Mixing Station is intended for use in a laboratory, and is therefore designed for safe area use.

**Note:** *The electrically operated CPC Mixing Station must not be operated in a hazardous area.*

The pneumatic version of the ShearMix CPC Mixing Station is designed for use in a zone 1 T5 hazardous area.



Care **MUST** be taken for correct PPE and use of face mask. The sample may possibly contain highly combustible and volatile gases.

Ensure good room ventilation.

The Mixing Station is free standing and simply requires connecting to a suitable inert gas supply (via a regulator), the vent and drain connections require piping to suitable drains and ventilation point.

The electrically operated (Safe Area) Mixing Station requires connection to a suitable electrical supply as determined by the Purchase Order and indicated on the nameplate, while the pneumatically operated (Hazardous Area) Mixing Station requires connection to a 7 Barg (maximum) instrument air supply. Both units should be connected to the local earthing system via the supply cable or the local earth point on the framework.

The oil mister fitted to the pneumatic version will require filling with Shell Tellus 37 oil (or an equivalent grade), and will have been pre-adjusted to provide a drip rate of 4-6 drops per minute.

**Note:** *The air driven version must not be operated without the silencer fitted to the exhaust port of the motor.*

## 11 Maintenance and Troubleshooting

### 11.1 Health and Safety Precautions

Particular care must be taken when using or maintaining this equipment due to the potentially harmful effects of both the sampled product and the solvents used to clean the equipment between samples. A full assessment should be made of the risks associated with exposure and inhalation of any fumes or liquid contamination.

Care must be taken when working with this equipment to ensure that any trapped pressure can be safely released without harm to the environment, personnel or other equipment.

### 11.2 Routine Maintenance

The Mixing Station should be cleaned after each sample has been processed as described in the Instructions for use.

The pneumatic version requires the oil level of the mist unit fitted to the air regulator R4 to be topped up as and when required, and should be adjusted to a drip rate of 4-8 drops per minute.

The Mist-X Oil Eliminator/Exhaust Silencer fitted to the Air Motor on the pneumatic version of the Shearmix should be replaced annually, or when considered to be partially blocked. Periodically remove the rubber cover cap from the bottom of the silencer and drain oil into a suitable receptacle.

### **11.3 Overhaul**

The Mixing Station requires no specific maintenance other than that required after each use. The only parts which subject to wear are the Mixing Vessel seals, valve packings and regulator diaphragms, and since the equipment is only used intermittently, a long life is expected.

Faulty needle valves and changeover valves should be replaced. The O Rings in the Quick connect couplings are replaceable by carefully stripping down the coupling, and repair kits are available for the Inert Gas Regulator R3 and Back-Flush Regulator R2.

The graphite filled Teflon seal fitted to the Mixing Vessel has been selected for its ability to withstand attack from crude oil and the solvents that may be used to clean the ShearMix after each use, however in the unlikely event of seal failure, it is recommended that the Mixing Vessel is returned to Jiskoot for overhaul/refurbishment.

### **11.4 Troubleshooting**

#### **3.2 Connecting the Sample Cylinder**

If difficulty is found connecting the quick-connect coupling at the sample end, slightly open the drain valve V11 (Yellow) and try again. If the pre-charge end is difficult to connect, then try again with the changeover valve V2 (Black) open to vent and needle valve V1 (Black), slightly open. If difficulty is still experienced, and the connectors on the CPC are of the self-sealing type, the trapped pressure between the coupling and the needle valves will have to be released by removing the couplings from the CPC Isolating Valves.

## **12 COSHH**

The COSHH Safety Sheet for Tellus 37 oil (used in the oil mist unit on the Pneumatic ShearMix is attached overleaf).

Shell Tellus Oil 37

## Safety Data Sheet

# Shell Tellus Oil 37

### 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

<b>Product Code</b>	001B0668	
<b>Infosafe No.</b>	ACKQ5 GB/eng/C	
<b>Issued Date</b>	29/04/2004	
<b>Product Type/Use</b>	Hydraulic oil.	
<b>Other Names</b>	<b>Name</b>	<b>Code</b>
	Shell Tellus Oil 37	140001010639
<b>Supplier</b>	<b>Telephone Numbers</b>	
SHELL UK PRODUCTS LTD	<b>Emergency Tel.</b>	
Stanlow Manufacturing Complex	0151-350-4595	
PO Box 3	<b>Telephone/Fax Number</b>	
Ellesmere Port CH65 4HB	Tel: 0151-350-4000	
Technical Contact: Product HSE Department		
UNITED KINGDOM		

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

#### Preparation Description

Highly refined mineral oils and additives. The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

#### Dangerous Components / Constituents

Exposure limits apply to the following components: Highly refined mineral oil.

### 3. HAZARDS IDENTIFICATION

**EC Classification** Not classified as Dangerous under EC criteria.

#### Human Health Hazards

No specific hazards under normal use conditions. Prolonged or repeated exposure may give rise to dermatitis. Used oil may contain harmful impurities.

#### Safety Hazards

Not classified as flammable, but will burn.

#### Environmental Hazards

Not classified as dangerous for the environment.

### 4. FIRST AID MEASURES

#### Symptoms and Effects

Not expected to give rise to an acute hazard under normal conditions of use.

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#### Inhalation

In the unlikely event of dizziness or nausea, remove casualty to fresh air. If symptoms persist, obtain medical attention.

#### Skin

Remove contaminated clothing and wash affected skin with soap and water. If persistent irritation occurs, obtain medical attention. When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop.

#### Eye

Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

#### Ingestion

Do not induce vomiting. Wash out mouth with water and obtain medical attention.

#### Advice to Doctor

Treat symptomatically. Aspiration into the lungs may result in chemical pneumonitis. Dermatitis may result from prolonged or repeated exposure. High pressure injection injuries require prompt surgical intervention and possibly steroid therapy, to minimise tissue damage and loss of function. Because entry wounds are small and do not reflect the seriousness of the underlying damage, surgical exploration to determine the extent of involvement may be necessary. Local anaesthetics or hot soaks should be avoided because they can contribute to swelling, vasospasm and ischaemia. Prompt surgical decompression, debridement and evacuation of foreign material should be performed under general anaesthetics, and wide exploration is essential.

There may be a risk to health where low viscosity products are aspirated into the lungs following vomiting, although this is uncommon in adults. Such aspiration would cause intense local irritation and chemical pneumonitis. Children, and those in whom consciousness is impaired, will be more at risk. Emesis of lubricants is not usually necessary, unless a large amount has been ingested, or some other compound has been dissolved in the product. If this is indicated, for example, when there is rapid onset of central nervous system depression from large ingested volume - gastric lavage under controlled hospital conditions, with full protection of the airway is required. Supportive care may include oxygen, arterial blood gas monitoring, respiratory support, and, if aspiration has occurred, treatment with corticosteroids and antibiotics. Seizures should be controlled with Diazepam, or appropriate equivalent drug.

### 5. FIRE FIGHTING MEASURES

#### Specific Hazards

Combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates and gases, including carbon monoxide and unidentified organic and inorganic compounds.

#### Extinguishing Media

Foam and dry chemical powder. Carbon dioxide, sand or earth may be used for small fires only.

#### Unsuitable Extinguishing Media

Water in jet. Use of halon extinguishers should be avoided for environmental reasons.

#### Protective Equipment

Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

### 6. ACCIDENTAL RELEASE MEASURES

#### Personal Precautions

Avoid contact with skin and eyes. Wear PVC, Neoprene or nitrile rubber gloves. Wear rubber knee length safety boots and PVC Jacket and Trousers. Wear safety glasses or full face shield if splashes are likely to occur.

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## Environmental Precautions

Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers. Inform local authorities if this cannot be prevented.

## Clean-up Methods - Small Spillages

Absorb liquid with sand or earth. Sweep up and remove to a suitable, clearly marked container for disposal in accordance with local regulations.

## Clean-up Methods - Large Spillages

Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Dispose of as for small spills.

## 7. HANDLING AND STORAGE

### Handling

Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Avoid prolonged or repeated contact with skin. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Prevent spillages. Cloth, paper and other materials that are used to absorb spills present a fire hazard. Avoid their accumulation by disposing of them safely and immediately. In addition to any specific recommendations given for controls of risks to health, safety and the environment, an assessment of risks must be made to help determine controls appropriate to local circumstances. Exposure to this product should be reduced as low as reasonably practicable. Reference should be made to the Health and Safety Executive's publication 'COSHH Essentials'.

### Storage

Keep in a cool, dry, well-ventilated place. Use properly labelled and closeable containers. Avoid direct sunlight, heat sources, and strong oxidizing agents. The storage of this product may be subject to the Control of Pollution (Oil Storage) (England) Regulations. Further guidance may be obtained from the local environmental agency office.

### Storage Temperatures

0°C Minimum. 50°C Maximum.

### Recommended Materials

For containers or container linings, use mild steel or high density polyethylene.

### Unsuitable Materials

For containers or container linings, avoid PVC.

### Other Information

Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

## 8. EXPOSURE CONTROLS, PERSONAL PROTECTION

### Exposure Limits

Substance	Regulations	Exposure Duration	Exposure Limit	Units	Notes
Oil mist, mineral	EH 40 2005	TWA	5	mg/m3	
	EH 40 2005	STEL	10	mg/m3	

EH 40 2005 Health and Safety Executive. EH40; Occupational Exposure Limits.

### Exposure Controls

The use of personal protective equipment is only one aspect of an integrated approach to the Control Of Substances Hazardous to Health.

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The management of Health and Safety at Work Regulations 1992 require employers to identify and evaluate the risks to health and to implement appropriate measures to eliminate or minimise those risks. The choice of personal protective equipment is highly dependent upon local conditions, e.g. exposure to other chemical substances and micro-organisms, thermal hazards (protection from extremes of cold and heat), electrical hazards, mechanical hazards and appropriate degree of manual dexterity required to undertake an activity. Whilst the content of this section may inform the choice of personal protective equipment used, the limitations of any information which can be provided must be fully understood, e.g. personal protective equipment chosen to protect employees from occasional splashes may be entirely inadequate for activities involving partial or complete immersion. If the levels of oil mist or vapour in air are likely to exceed the occupational exposure standards then consideration should be given to the use of local exhaust ventilation to reduce personal exposure.

The choice of personal protective equipment should only be undertaken in the light of a full risk assessment by a suitably qualified competent person (e.g. a professionally qualified occupational hygienist). Effective protection is only achieved by correctly fitting and well maintained equipment and employers should ensure that appropriate training is given. All personal protective equipment should be regularly inspected and replaced if defective. Reference should be made to HSE's publication Methods for the Determination of Hazardous Substances (MDHS) 84 - Measurement of oil mist from mineral oil-based metalworking fluids. Measurement of an employee's exposure to oil vapour may be supplemented through the use of stain tubes. In the first instance, further guidance may be obtained through HSE's publication 'COSHH - a brief guide to the regulations' (INDG 136(rev1)).

### Respiratory Protection

At standard temperature and pressure, the Occupational Exposure Standard for oil vapour is unlikely to be exceeded. Care should be taken to keep exposures below applicable occupational exposure limits. If this cannot be achieved, use of a respirator fitted with an organic vapour cartridge combined with a particulate pre-filter should be considered. Half masks (EN 149) or valved half masks (EN 405) in combination with type A2 (EN 141) and P2/3 (EN 143) pre-filters may be considered.

### Hand Protection

Chemical protective gloves are made from a wide range of materials, but there is no single glove material (or combination of materials) which gives unlimited resistance to any individual or combination of substances or preparations. The extent of the breakthrough time will be affected by a combination of factors which include permeation, penetration, degradation, use pattern (full immersion, occasional contacts) and how the glove is stored when not in use.

Theoretical maximum levels of protection are seldom achieved in practice and the actual level of protection can be difficult to assess. Effective breakthrough time should be used with care and a margin of safety should be applied. HSE guidance on protective gloves recommends a 75% safety factor to be applied to any figures obtained in a laboratory test. Nitrile gloves may offer relatively long breakthrough times and slow permeation rates. Test data, e.g. breakthrough data obtained through test standard EN374-3:1994 are available from reputable equipment suppliers.

Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. A non perfumed moisturiser should be applied.

### Eye Protection

Goggles conforming to a minimum standard of EN 166 345B should be considered if there is a possibility of eye contact with the product through splashing. Higher rated eye protection must be considered for highly hazardous operations or work areas. For example, employees involved in metalworking operations such as chipping, grinding or cutting may require additional protection to avert injury from fast moving particles or broken tools.

### Body Protection

Minimise all forms of skin contact. Overalls and shoes with oil resistant soles should be worn. Launder overalls and undergarments regularly.

### Environmental Exposure Controls

Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

Colour	Light brown.
Physical State	Liquid at ambient temperature.
Odour	Characteristic mineral oil.
pH Value	Not applicable.
Vapour Pressure	Expected to be less than 0.5 Pa at 20°C.
Initial Boiling Point	Expected to be above 280°C.
Solubility in Water	Negligible.
Density	875 kg/m <sup>3</sup> at 15°C.
Flash Point	212°C. (PMCC).
Flammable Limits - Upper	10%(V/V) (typical).
Flammable Limits - Lower	1%(V/V) (typical).
Auto-ignition Temperature	Expected to be above 320°C.
Kinematic Viscosity	37 mm <sup>2</sup> /s at 40°C.
Evaporation Rate	Data not available.
Vapour Density (Air=1)	Greater than 1.
Partition co-efficient, n-octanol/water	Log Pow expected to be greater than 6.
Pour Point	-30°C.

## 10. STABILITY AND REACTIVITY

**Stability**  
Stable.

**Conditions to Avoid**  
Extremes of temperature and direct sunlight.

**Materials to Avoid**  
Strong oxidizing agents.

**Hazardous Decomposition Products**  
Hazardous decomposition products are not expected to form during normal storage.

## 11. TOXICOLOGICAL INFORMATION

**Basis for Assessment**  
Toxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the toxicology of similar products.

**Acute Toxicity - Oral**  
LD50 expected to be > 2000 mg/kg.

**Acute Toxicity - Dermal**  
LD50 expected to be > 2000 mg/kg.

**Acute Toxicity - Inhalation**  
Not considered to be an inhalation hazard under normal conditions of use.

**Eye Irritation**  
Expected to be slightly irritating.

**Skin Irritation**  
Expected to be slightly irritating.

**Respiratory Irritation**  
If mists are inhaled, slight irritation of the respiratory tract may occur.

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## Skin Sensitisation

Not expected to be a skin sensitizer.

## Carcinogenicity

Product is based on mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Other components are not known to be associated with carcinogenic effects.

## Mutagenicity

Not considered to be a mutagenic hazard.

## Reproductive Toxicity

Not considered to be toxic to reproduction.

## Other Information

Prolonged and/or repeated contact with this product can result in defatting of the skin, particularly at elevated temperatures. This can lead to irritation and possibly dermatitis, especially under conditions of poor personal hygiene. Skin contact should be minimised. High pressure injection of product into the skin may lead to local necrosis if the product is not surgically removed. Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible.

## 12. ECOLOGICAL INFORMATION

### Basis for Assessment

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

### Mobility

Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.

### Persistence / Degradability

Not expected to be readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.

### Bioaccumulation

Contains components with the potential to bioaccumulate.

### Ecotoxicity

Poorly soluble mixture. May cause physical fouling of aquatic organisms. Product is expected to be practically non-toxic to aquatic organisms, LL/EL50 >100 mg/l. (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract). Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.

### Other Adverse Effects

Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential. Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities.

## 13. DISPOSAL CONSIDERATIONS

### Waste Disposal

Recycle or dispose of in accordance with prevailing regulations, with a recognised collector or contractor. The competence of the contractor to deal satisfactorily with this type of product should be established beforehand. Do not pollute the soil, water or environment with the waste product.

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**Product Disposal**

As for waste disposal.

**Container Disposal**

Recycle or dispose of in accordance with the legislation in force with a recognised collector or contractor.

**14. TRANSPORT INFORMATION**

**Transport Information**

Not dangerous for transport under ADR/RID, IMO and IATA/CAO regulations.

**15. REGULATORY INFORMATION**

EC Symbols	None.
EC Risk Phrase	Not classified.
EC Safety Phrase	Not classified.
EINECS	All components listed or polymer exempt.
TSCA (USA)	All components in compliance.

**National Legislation**

Environmental Protection Act 1990 (as amended).  
Health and Safety at Work Act 1974  
Consumers Protection Act 1987  
Control of Pollution Act 1974  
Environmental Act 1995  
Factories Act 1961  
Carriage of Dangerous Goods by Road and Rail (Classification, Packaging and Labelling) Regulations  
Chemicals (Hazard Information and Packaging for Supply) Regulations 2002.  
Control of Substances Hazardous to Health Regulations 1994 (as amended).  
Road Traffic (Carriage of Dangerous Substances in Packages) Regulations  
Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations  
Road Traffic (Carriage of Dangerous Substances in Road Tankers in Tank Containers) Regulations  
Road Traffic (Training of Drivers of Vehicles Carrying Dangerous Goods) Regulations  
Reporting of Injuries, Diseases and Dangerous Occurrences Regulations  
Health and Safety (First Aid) Regulations 1981  
Personal Protective Equipment (EC Directive) Regulations 1992  
Personal Protective Equipment at Work Regulations 1992

**Packaging & Labelling**

Safety data sheet available for professional user on request.

**16. OTHER INFORMATION**

**Revisions Highlighted**

To assist harmonisation of sds authoring practices, a version number has been introduced.

**References**

**GUIDANCE NOTES**

UK Chemicals Regulatory Atlas, An Overview of how to guide your chemical through to regulatory compliance (DTI).  
HSG71 The storage of packaged dangerous substances.  
EH/40 Occupational Exposure Limits.  
EH/58 The Carcinogenicity of Mineral Oils.  
MS24 Health surveillance of occupational skin disease.  
HSG 53 The selection, use and maintenance of respiratory protective equipment: A practical guide.

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HSG 206 Cost and effectiveness of chemical protective gloves for the workplace: Guidance for employers and health and safety specialists.

L74 First Aid at work: Approved Code of Practice and Guidance.

HSG 136 Workplace transport safety : guidance for employers.

INDG234 (rev) Are you Involved in the Carriage of Dangerous Goods by Road or Rail

**OTHER LITERATURE**

Concawe Report 3/82 Precautionary Advice on the Handling of Used Engine Oils  
Concawe Report 86/69 Health Aspects of Worker Exposure to Oil Mists  
Concawe Report 01/97 Petroleum Products - First Aid Emergency and Medical Advice  
Concawe Report 01/53 Classification and labelling of petroleum substances according to the EU dangerous substances directive ( Concawe recommendations August 2001)  
Concawe Report 01/54 environmental classification of petroleum substances summary data and rationale  
Concawe Report 5/02 amended safety data sheet directive ( 2001/58/EC)  
Department of the Environment - Waste Management - The Duty of Care - A Code of Practice  
Concawe, Boulevard du souverain 165 B - 1160 Brussels, Belgium  
www.concawe.be

**Restrictions**

This product must not be used in applications other than recommended without first seeking the advice of the SHELL technical department.

**Technical Contact Numbers**

0151-350-4000.

**Further Information**

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It does not constitute a guarantee for any specific property of the product.

... End Of SDS ...

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## 13 Recommended Spares List

No spares are recommended, due to the intermittent use of the equipment and negligible wear on the component parts.

A spare MIST-X 25 Oil Eliminator/Exhaust Silencer should be held for the pneumatic version, as this component is required to be replaced annually.

## 14 Disclaimer

Whilst Jiskoot Limited has taken every care in the preparation of this document, it cannot accept responsibility for printing errors or omissions and does not warrant that it is correct and comprehensive in every particular. Equipment supplied should always be operated by persons with an appropriate level of skill and training.

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5	Customer comment, Caution illustrations for ventilation PPE	N.McGee	P.Whittle	26/11/07
4	Revised Panel Layout, revised P&ID illustrations, Caution illustrations	N.McGee	P.Whittle	19/11/07
3	Incorporated option for pneumatically driven mixer for hazardous area operation.	P.Whittle	M.Jiskoot	5/12/05
2	Operating Procedures revised to reflect customer feedback	P.Whittle	M.Jiskoot	21/08/05
1	Electrical requirements updated.	F.Garland	P.Whittle	10/05/05
0	First issued	P.Whittle	M.Jiskoot	21/10/05
<b>Issue</b>	<b>Revision History</b>	<b>Issued</b>	<b>Approved</b>	<b>Date</b>

## Notes

## **Notes**





