

# MECHANICAL BOTTOM LOADING SKID

## Operation & Maintenance manual



# **IFC Bottom Loading Skid**

## **with mechanical counter, preset & printer**

## TABLE OF CONTENTS

1. General specification
2. Installation notes
3. Operating Instructions: Skid system
4. Recommended maintenance schedule
5. Operating instructions & troubleshooting: Electrical panel
6. Fault Finding guide

## GENERAL SPECIFICATIONS

All IFC inflow skids are:

- **ATEX compliant**
- **Suitable for zone 1 hazardous area. Suitable for operation with distillates & spirit**
- **Fully meet EN 13922 overfill prevention guidelines & current recommended practice for petroleum bottom loading**

### Standard skid specification with mechanical batch control

- Galvanised frame & carbon steel pipework sized to suit flowrate
- Acuflow positive displacement flow meter fitted with 80 mesh strainer, VR mechanical counter, pre-set counter, ticket printer & pre-set 2 stage valve linked to pump stop/start switch.
- 4in model 445 bottom loading arm
- Manual API coupler
- Tanker overfill & earth rack monitor & lead
- Vapour vessel fitted with overflow knock out switch, vapour hose & coupler
- Pressure relief system set to 7bar & linked to vapour vessel with a bottom drain valve
- Manual inlet isolation valves on each line
- All control wiring to skid mounted junction box
- IP65 Control panel (safe area)

### Standard pump specification

- ATEX certified centrifugal pump suitable for flooded suction conditions only
- ExD 3ph 415v motor direct coupled to pump.  
Standard 5.5kW, 7.5kW or 11kW hp motors dependent on flowrate required
- Pumps are sized to achieve target flow rates based on a standard discharge pressure drop of 25psi. Actual flow performance may vary due to site pipework configuration & product level in tanks.

### Optional Extras

- Fortvale semi-automatic API coupler
- ExE light bar & switch prewired to junction box
- PCV hose protection sleeves, colour coded to indicate product
- All weather operator canopy manufactured in triple clear carbonate within a mild steel frame

## INSTALLATION NOTES

Please refer to General Arrangement drawing and circuit diagram

- Unless designed otherwise the skid must be mounted on a solid flat surface with the forward edge approximately 2.4 to 2.8 metres from the centre line of the tanker.
- IFC recommend the skid is secured to a flat concrete base of at least 100mm depth using expansion bolt or similar fixings to suit mounting eyelets.
- The skid bottom loading arms are pre-balanced at the factory to an estimated balance setting only. Additional tensioning may be required once the arms have been filled with product & after several months of service. This is a simple procedure that is covered under our *loading Arm* section.
- The vapour overspill vessel terminates with a riser flange. The follow-on vent pipe must remove the vapours away from the loading area to a height of no less than 5.5 metres above grade. The vent riser is terminated with 3" vent cowl.
- Full provision has been made on the skid for pressure and thermal relief through our integrated PRV system.  
NOTE:- This will not protect up-stream pipework
- Unless otherwise designed all IFC skid electrical systems are manufactured to meet Atex zone 1 rating. Electrical cable and fittings used around the skid area must be suitable for the zone classification based on the duty & current electrical standards.
- Ensure your electrical supply is sufficient & stable enough for the skid demands. Frequent power outs & fluctuating mains can cause loading faults & errors with the equipment & may invalidate warranties.
- The IFC bottom loading skid is designed for simple operation and commissioning.

## OPERATING INSTRUCTIONS

1. Ensure all personnel wear adequate PPE when loading or operating around loading Gantry
2. Park tanker in correct loading position
3. Ensure power to the skid is present – i.e. High Level Shut-Off (HLSO) is on. (If there is no power consult the fault finding procedure)
4. Connect the combined High Level Shut off & earth monitoring (HLSO) cable and plug to your truck
5. Connect the vapour hose to the truck.
6. Connect the loading arms and enable your truck for bottom loading.

NOTE:- new API couplers are often a little stiff when first entered into service. To make connecting easier offer the coupler up to the tanker unit squarely and NOT at an angle. With manual couplers ensure the outer sleeve is pulled back towards you and the handle is not partially open. When the API coupler is connected open the valve handle fully

7. Ensure the HLSO unit is showing green “*permissive*”
8. If fitted Insert a ticket in the printer slot and reset the counter to zero
9. Using the preset push buttons select the required batch amount
10. Open the meter-loading valve. This action will automatically start the pumps
11. Approximately 40 litres before the end of the batch, the flow meter control valve will slow the flow. At batch end the valve will stop the flow and switch off the pump
12. When loading is complete, disconnect equipment in the reverse order, i.e. product arms first, vapour arm next and finally the earth / HLSO

### NOTES

- A) The design of the skid allows for multi-loading simultaneously.
- B) In the event of a tanker overflow or earth fault the HLSO monitor will stop the pumps.  
**However the flow meter control valve will still be open. This MUST be closed by the operator and the electric system reset at the safe area control panel.**

**The HLSO monitor is designed as an emergency protection device only and should not be used as a form of batch control.**

## IN THE EVENT OF AN OVERFILL

**IN THE EVENT OF AN OVER FILL THE OPERATOR MUST MANUALLY CLOSE THE METER LOADING VALVE TO PREVENT CONTINUED SYPHONING OF PRODUCT THROUGH THE SKID SYSTEM**

The skid unit has a number of safety systems in place to prevent continued operation in the event of an over fill or emergency shutdown.

1. High Level Shut Off (HLSO) - If too much product is loaded into a truck compartment then the tanker high level probe will operate. This will register on the HLSO unit and automatically turn off all power to the pumps  
**Action: MANUALLY CLOSE METER LOADING VALVE & LOADING STOPS**
  
2. Vapour Pot Switch - If for any reason the High Level Probe does not work then product will pass via the trucks vapour recovery system through the vapour recovery hose into the vapour pot where there is a float switch. When operated it will automatically turn off all power to the pumps  
**Action: MANUALLY CLOSE METER LOADING VALVE & LOADING STOPS**
  
3. Emergency Stop button - The emergency stop (E-Stop) button can be pressed at any time during operation. Depending on the type of skid system this will either:-
  - a) Turn off all power to the pumps**Action: MANUALLY CLOSE METER LOADING VALVE & LOADING STOPS**

## STANDARD PROCEDURES IN THE EVENT OF AN OVERFILL

**PPE including gloves and eye protection should be worn when dealing with an overflow**

**IN THE EVENT OF AN OVER FILL THE OPERATOR MUST MANUALLY CLOSE THE METER LOADING VALVE TO PREVENT CONTINUED SYPHONING OF PRODUCT THROUGH THE SKID SYSTEM.**

1. Once pumps stop inform depot / site Manager of overflow and follow any site procedures
2. Disconnect Loading Arm from tanker

### **DO NOT DISCONNECT THE VAPOUR RECOVERY HOSE FROM THE TRUCK YET**

3. Place a fuel resistant container such as a large steel bucket under the Vapour Pot. Slowly open the drain ball valve and allow product to drain until the Vapour Pot is empty. **NOTE:- there will be a minimum of 35 litres of product in the vapour pot after an overflow**
4. Place a fuel resistant container with a minimum capacity of 20ltrs under the vapour hose coupler connection point to the tanker
5. Carefully disconnect the vapour hose from the truck & place the coupler into the container to allow the left over product in the hose to drain out into the container. **NOTE:- There will be a minimum of 17 litres of product in the vapour hose after an overflow**
6. Empty the tanker 'on board' vapour return pipe. Follow the tanker manufacturers instructions to do this.
7. Disconnect the High Level Shut Off (HLSO) & earth gantry plug
8. If Loading of other pots is to continue, reconnect the HLSO plug.
9. If the tanker probe in the overflowed pot is still wet from an overflow, the HLSO will not show the green permissive light and will not allow loading to re-commence, it will indicate the tanker pot with the wet probe.  
**In this instance the HLSO requires by-passing to allow loading to continue. Refer to HLSO operations manual for by-pass instructions or see below.**

### **HLSO BY-PASS OPERATION (only perform if operator is sure that overflow will not occur)**

10. **SCULLY** - Hold the HLSO By-pass key to the right hand side of the HLSO control box for a few seconds or until you see the red LED light flashing.
11. **LIQUIP** – Swipe the by-pass key along the front of the unit over the glass panel to reset the loading permission
12. Carry on programming/loading as normal to complete load.
13. Disconnect and Bill of Loading (BOL) will be printed as per normal.

## **MECHANICAL SKID SYSTEM Recommended Maintenance Schedule**

### **Daily schedule:**

1. Vapour vessel – Drain daily
2. HLSO - Inspect & clean tanker plug contacts with a wire brush
3. General - visual inspection for signs of leaks
4. API Couplers - Inspect & clean all coupler contact parts

### **6 monthly schedule:**

5. **Electronic air systems only** -Remove & clean out air pressure / filter bowl
6. Flow-Meter - Remove & clean meter strainer element
7. Swivel Joints - 1 shot of grease to the loading arm & hose end swivels

### **Annual schedule:**

8. Drop & Vapour hoses - Pressure & continuity test
9. Flow-Meters - Calibrate & leak test
10. **Mechanical systems only** - Apply small amount of grease to the meter linkage and ball joint
11. Electrical - Remove knock out switch, test & lubricate float arm
12. Pressure Relief System - Remove, inspect and test pressure relief valves
13. Replace desiccant inside high level shut off monitor & batch controller if present



## Troubleshooting Guide

<b>Fault</b>	<b>Cause</b>	<b>Solution</b>
<b>No electrical power to skid</b>	Control panel isolator tripped	Press isolator button (green) on. [If applicable].
	Emergency stop or vapour switch enabled.	Release emergency button & ensure vapour pot is drained repeat above action.
<b>Overspill monitor shows (red) After connection</b>	1 or more compartments are in an overfill condition	Identify and drain off some of the excess product.
	Poor contact at the plug	Inspect the plug & vehicle socket for damage, dirt or misaligned pins.
<b>Electric panel will not reset. Buzzing / clicking noise from Panel</b>	Control valve has been left open by last operator	Press stop on preset to cancel last batch and close valve
	Pump start micro-switch is not quiet contacting	Ensure micro-switch assy. Is secure. Ensure switch is making positive contact
<b>API couplers hard to connect</b>	Worn or damaged adapter face	Replace as necessary
	Misaligned contact	Ensure the coupler is square to the adapter face
	Interlock stiff or seized	Identify and free up
<b>Arm very heavy to handle</b>	Under-tensioned or broken spring	Adjust balance or replace spring cylinder unit
<b>Pump will not start when the control valve opens</b>	Micro-switch loose or broken	Identify and repair
<b>Pump is operating but there is no flow</b>	Filter blocked or other line obstruction. Tanks empty, air in system, failed solenoid valve	Clean filter, check lines for blockage, check tank liquid levels. Contact IFC for service
<b>Control valve handle is loose and there is no flow</b>	Valve shaft shear pin or internal linkage has failed	Identify, repair or contact IFC to arrange servicing
<b>Pump is operating at very low flow</b>	Motor is wired backwards	Call in certified electrician to rewire
	Filter blockage	Identify and clean element
	Tank level low or partially closed line valves	Identify and correct

## Bottom Loading Skid Control Panel ECP1

### OPERATING PROCEDURES FOR ELECTRICAL PANEL

1. Turn on power at the door isolator
  - a. The WHITE “power on” light illuminates
  
2. Press the “System rest” button:
  - a. The GREEN “System Healthy” light illuminates

### THE SKID IS READY TO READY FOR OPERATION

### FAULT FINDING

Fault	Cause	Solution
RED “Overload Trip” light illuminates:	One of the motor circuit breakers has tripped due to excessive current draw.	Establish which motor will not run and rectify the cause.
	One of the thermistor relays has tripped due to motor overheating	
GREEN “System Healthy” light goes out:	The Panel has lost its power	Establish the cause and on regaining power follow the above “Operating Procedures”
	The Skid Emergency Stop button has been pressed	Check each button, establish the reason for it being activated and if safe to do so reset and follow the above “Operating Procedures”.
	The Panel Emergency Stop button has been pressed	
	The Vapour Pot Liquid Level Switch has activated	4) Drain the Vapour Pot and follow the above “Operating Procedures”.