



TEC SHIP TO SHORE BITUMEN UNLOADING UNIT





TEC Ship to Shore

1.0 The TEC Ship to Shore unit

TEC have designed and developed a specialised unit to fill a gap in the Bitumen market – a safe and efficient ship to shore bitumen unloading system.

The most common way of unloading a bitumen bulk carrier is via a heated ship to shore pipeline running straight into bulk storage tanks. This method is ideal for those with a large infrastructure including a terminal with port access. The need for a ship to shore unloading system is apparent when it is necessary to discharge the ship into transportable containers, either for unloading later into bulk storage or for distributing locally.

The ship to shore unloading systems being utilised today are frequently inefficient and unsafe. Long assembly/disassembly times, insufficient flow rates, problems with storing the unit when not in use, safety of the operators, difficulties in aligning the ships pump pressure with the required flow rate, stop/starting of the ships pump etc. are all examples of issues faced by companies using these units. By relying on the ships pump to regulate the flow, there is no safety mechanism in place from the operator's side for an emergency shutdown of the pump, the only option is to signal the ships pump controller.

The TEC 2 Arm Ship to Shore Unloading System has been designed and proven to be an efficient and safe alternative to these other units by delivering impressive flow rates and providing effective safety measures to prevent accidents or spillages. The design of this unit is far superior to other bitumen ship unloading systems and it is the next step forward in raising industry safety standards.

1.1 Key Concept of the TEC Ship to Shore unit

The key feature of this unit that sets it apart from other vessel unloading mediums is the pressure relieving return line and specific safety shut off systems that offer both the Ships pump operator and the ship to shore operator a greater level of control and security during the discharge.

Traditionally with a Ship to Shore transfer unit, a high level of involvement from the ships pump operator is required as they must start and shut down the pump as each container is filled to avoid over pressurisation of the lines. With this method timing is crucial and disregarding the fact that ensuring consistent loads is nearly impossible, the main fault is that it is an unsafe, inefficient and often problematic way of unloading a bulk bitumen carrier.

The TEC Ship to Shore unit establishes both a discharge and return line connection with the ship's cargo manifold. Therefore, once the ships pumps are turned on and bitumen starts being pumped to the Ship to Shore unit, the bitumen is able to pass through the internal pipework and continue through the return line back into the ship's cargo tank. The Ship to Shore unit is not a pumping system, it utilises the ships discharge pump and regulates the pressure to maintain a consistent flow.

Within the internal pipework system of the unit a pressure relief valve is fitted, which can be adjusted to accommodate the ships pumping pressure. With this valve, it is possible for the unit to self-regulate the pressure in the system and divert product to one or both of the loading arms and bypass the remaining bitumen back to the ship. If one or both arms are



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shut off due to the containers being full, the pressure relief valve will open fully, allowing an unrestricted return flow to the ship's cargo tank, avoiding any over pressurisation that could endanger the operators. Once an arm is opened again, the fall in pressure will cause the relief valve to close slightly, keeping a good consistent flow through the loading arm and more importantly a stable pressure for the ship's pump.

1.2 Self Contained Unit

The unit is designed around the frame of a standard 40' HC shipping container and can be easily packed, transported and stored as such during times when it is not in use. As it is quick to assemble/disassemble, this allows for all of the equipment to be safely stored within the container giving security to the owner should they leave it at a port.

This unit is completely self-contained and does not require any external input to function. Two of its most important features that make it this way are:

1. **33kVa Generator** – For powering the units electrical equipment such as the flow meters, lighting, power sockets, the 10 bar compressor , the electrical trace heating circuit, hi-hi level sensors etc.
2. **Atlas Compressor** – This is required to provide air pressure to open the actuated valves during operation. It is also used for blowing the discharge and return hoses, loading arms and the internal pipe system clear of any residual bitumen so that the unit can be disconnected without spillage.

1.3 Safety Features

The safety of both the Ship to Shore operators and the ship's crew are of paramount importance during a discharge operation. In addition to the pressure relief valve outlined above in section 1.1, the TEC Ship to Shore unit also has additional safety measures in place to safeguard those in close proximity to the unit.

The loading arm isolation valve is fully automated and is affected by 2-3 inputs:

1. 'Dead Man Switch' – the loading arm operator is in control of a switch that opens the loading arm valve when compressed. This switch must be held in order to maintain the flow of bitumen through the loading arm. Should the operator drop the switch or have an accident on top of the container causing the grip to be released, the isolation valve will shut ceasing the flow of bitumen through the loading arm.
2. Hi - Hi Level sensing Liquiphant – this unit can be attached to the loading arm via a simple bracket and lowered into the container along with the loading arm. The bracket is adjustable so that the sensor can be set at different heights, depending on the fill level required by the operator. If this sensor comes into contact with the bitumen, it will immediately shut off the loading arm isolation valve. If this unit is set at the correct level, this prevents overfilling of the container and acts as a secondary security measure to the operator observing the tank level.

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3. Optional Batch Metering System – each loading arm can be fitted with its own batch meter. The operator can input the required fill quantity into this unit and when the pre-set quantity is reached, the batch meter will automatically shut off the loading arm isolation valve ensuring consistency in filling quantities between containers.

The operator area on top of the container is also fitted with a fill quantity digital read out for each loading arm, allowing the operator to monitor how much has been discharged into the container and therefore know when the container will be full.

This offers the operator 4 levels of security to ensure that the container being loaded does not overflow and cause a safety risk.

1.4 Additional Features

The 40ft Ship to Shore unit carries 2 x 8" SS flexible bitumen hoses (one 13m in length, one 10m in length), which is enough to give one complete discharge or return line. The ship will also be carrying approximately 20m of hoses for connecting as the other line. Hose trollies are an optional extra and make the set up and shut down of the unit much faster and require less man power at the quayside.

Ramps are also provided, which are designed to allow the flexible hoses to run underneath them on the side closest to the ship, with the trucks being able to drive over them to access the loading arm for filling. This protects the hoses from damage that could cause a serious spillage.

With the 40ft unit, there is plenty of space for operators to work and for operator equipment to be stored inside the unit. The loading gantry, hoses and ramps can also be stored inside the unit during transportation.

The unit is fully trace heated and the operators are advised to begin warming up the internal pipework in advance of the discharge, to ensure that the pipework is up to temperature and that any residual bitumen left in the system becomes liquid and will not cause a 'slug' or blockage.

Both loading arms are fitted with temperature compensating coriolis mass flow meters which monitor both the flow rate and also the overall quantity unloaded through each arm. These are important for the operator to adjust the internal control valve to achieve the same consistent pressure and flow rate between both arms.



2.0 Specification

- Relocateable, fully contained system capable of off-loading a vessel using 2 loading arms simultaneously.
- Automatic Overfill Protection - Loading arms are fitted with adjustable high level overflow / shut down sensors (these are adjustable to accommodate various containers and tanker trucks)
- Return line to ship to avoid over pressurisation
- Self-powered with integrated generator
- Security railings and extending safety access stairs for operators to locate filling arms.
- Insulated Internal Pipework fitted with mono inline strainer
- Temperature controlled pipe-work using electric trace heating system.
- Endress and Hauser Flow Meters on each arm
- Compressed Air system for actuated valve control and blowback to the ship
- Actuated pressure relief valve to regulate consistent flow between both arms
- 13m and 10m lengths of quayside discharge and return hoses complete with trolley and ramp set.
- Night operation lighting.
- Fire extinguishers.

2.1 Optional Extras

- Batch controller system for loading arms
- Remote display for increased operator control
- Retractable operator area roof complete with external lighting
- Additional ships hoses
- Commissioning and Training Package

For further information on the Ship to Shore unit, please contact
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