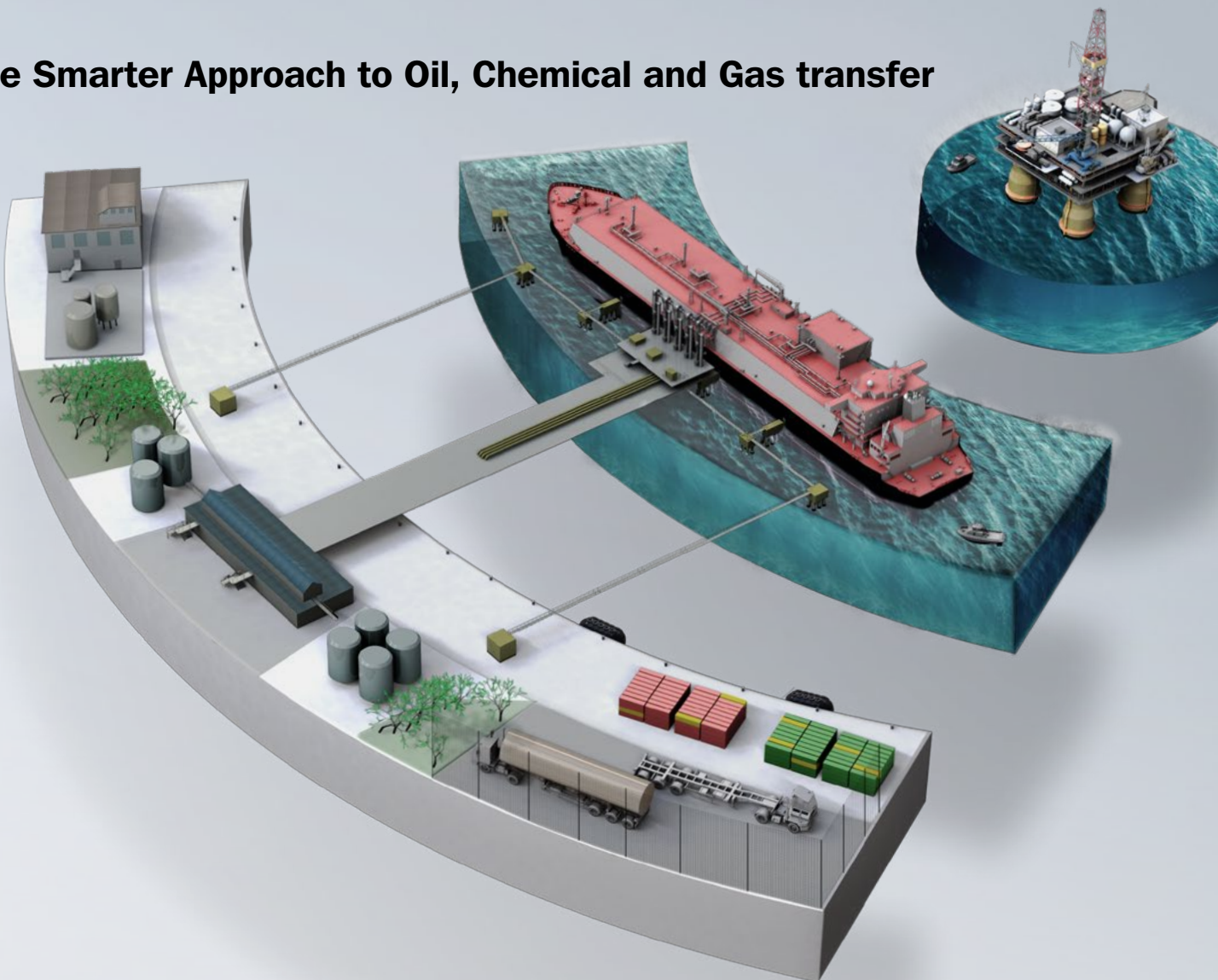


Emergency Shutdown Link

The Smarter Approach to Oil, Chemical and Gas transfer



PRODUCT OVERVIEW

The New Guidelines

The transfer of hazardous liquids in a marine environment necessitates the use of linked Emergency Shutdown (ESD) systems. This has long been the case for the transfer of Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG).

As well as having the primary purpose of stopping pumps and opening or closing valves automatically, visual and audible alarms should be raised by the ESD system. Evolving from the IGC code established in 1986, and the SIGTTO recommendations of 2009, new guidelines have been set out in a joint paper from the Oil Companies International Marine Forum (OCIMF) and Chemical Distribution Institute (CDI): 'Linked Ship/Shore Emergency Shutdown Systems for Oil and Chemical Transfers'.

The new guideline is a welcome step in the evolution of safety and regulations in the oil and chemical transfer arena. It is an information paper, containing some very important steps and safety measures that should be considered in project requirements.

The paper recommends that the shutdown systems on shore and ship must be interlinked so that they mutually shut down in case of emergency and that the ship and terminal ESD systems are linked via an electrical umbilical that uses industry standard 5-pin twist connectors. Minimum initiators for an ESD are a manual trip or auto trip on power fail, with optional initiators including fire detection, tank overfill, loss of containment and activation of loading arm release. As the paper recommends that systems must be linked, pendant type arrangements are not recommended.



Trelleborg, alongside other suppliers, advised OCIMF on the systems guidelines in the document.

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Emergency Shutdown Link

Trelleborg Marine Systems' Emergency Shutdown Link (ESL) system meets and exceeds the requirements of the new guidelines.

The link is critical to the transfer of hazardous liquids in a marine environment, in order to link the emergency shutdown systems of both the discharger and the receiver of the cargo, to enable controlled and mutual shutdown in emergency situations.

The system features the recommended, industry standard 5-pin twist connector. Intrinsically safe circuitry, suitable for hazardous area applications, ensures galvanic isolation between ship and shore. A test function is provided as standard for pre-transfer testing, to ensure operability.

Trelleborg's ESL is primarily aimed at LPG, oil and liquid chemical transfer operations. It supersedes and is an improvement on earlier pneumatic systems which are slower in operation and therefore less appropriate as an ESD solution.

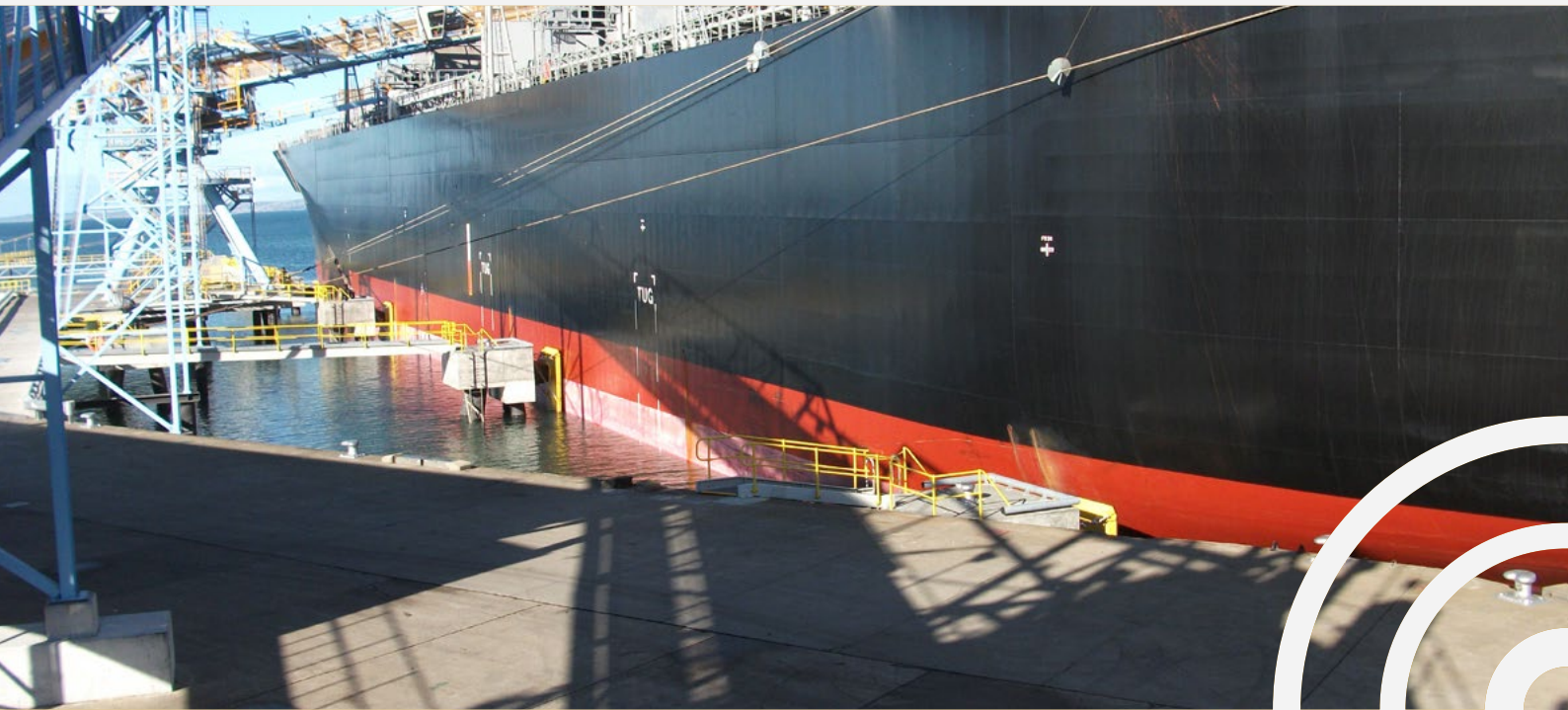
As well as meeting the new OCIMF/CDI guidelines, Trelleborg's ESL naturally meets the Recommendations and Guidelines for Linked Ship/Shore Emergency Shut-Down of Liquefied Gas Cargo Transfer, as set out by SIGTTO in 2009 and ISO 20519:2017 – Specification for Bunkering of Liquefied Natural Gas fueled vessels.

QUICK FACTS: EMERGENCY SHUT DOWN LINK

- For ship-to-ship, ship-to-shore and shore-to-ship applications
- Used in LPG, liquid chemical, oil transfer and some LNG fueling applications
- Suitable for use in SIL2 environment under IEC 61508
- Ensures galvanic isolation between ship and shore
- 'First up' indication for ESD location
- Suitable for Ex ia IIB hazardous area applications
- Meets current SIGTTO guidelines for all liquid transfers
- Meets current OCIMF / CDI guidelines for oil and chemical transfers
- Meets ISO 20519:2017: Specification for Bunkering of Liquefied Natural Gas Fueled Vessels



System Components



Trelleborg's ESL system comprises shore-side and ship-side sections. These are similar in that both possess a 'safe area' control unit, linked by fixed cable to hazardous area enclosures and control boxes. Typically, the hazardous area enclosures on both sides of the transfer are in turn interconnected by a flexible umbilical cable that allows the two sections to communicate.

The safe area control units are also connected to their respective ESD systems, to ensure the correct and safe shut down of equipment in the event of an emergency. A key feature is that the ship ESL

systems incorporate the same electronics as the shore system, thereby allowing direct ship-to-ship functionality not usually seen in other systems of this type.

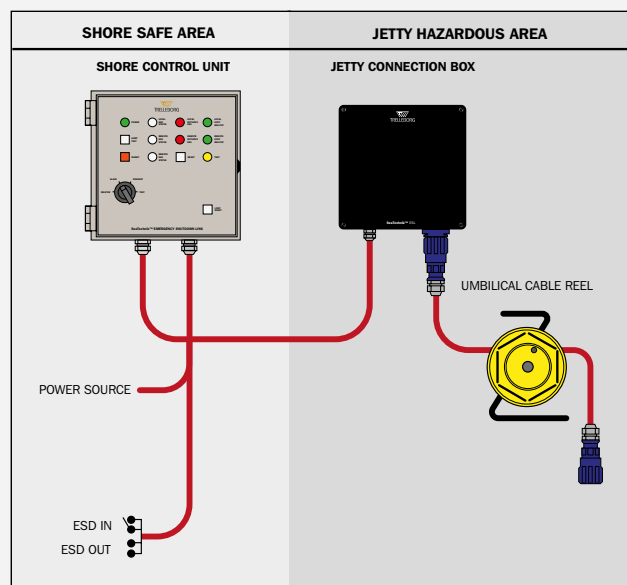
The ESL system can operate if only one side of the transfer operation is equipped with the system. In this case, a pendant unit can be connected to the jetty control unit or ship side box enabling the operator to manually initiate a shutdown if necessary. However, this solution is not recommended.

SHORE COMPONENTS

- Safe area control unit
- Jetty connection box
- Umbilical cable
- Interface for umbilical cable to connect to the ship
- Shore test unit

SHORE FEATURES

- Console and wall mount options available

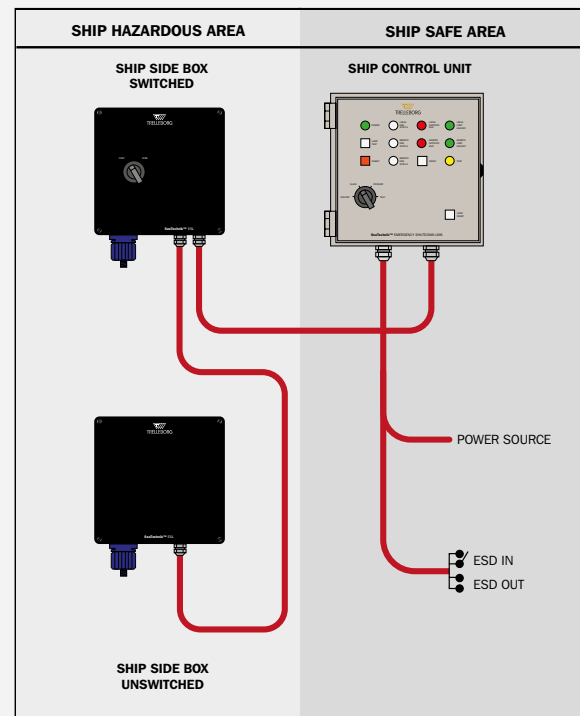


SHIP COMPONENTS

- Safe area control unit
- Ship side connection box/boxes
- Receptacle to receive umbilical cable
- Ship test unit

SHIP FEATURES

- Console and wall mount options available
- Options for midship or port and starboard configurations



ADDITIONAL COMPONENTS REQUIRED:

- Fixed cable for ship and shore
- Hardwire link to/from ESD system

Why Trelleborg?

BEST PRACTICE SOLUTIONS

In summary, Trelleborg's ESL represents a high-quality, best-in-class solution. Built on a simple design principle, it meets all relevant current industry requirements and recommendations. Indeed, Trelleborg was involved in steering the latest OCIMF and CDI document. Additionally, it gives operators increased flexibility by enabling all systems to operate in master or slave mode.

COMPATIBILITY BUILT IN

Backwards compatible with existing installed systems, the system is also compatible with Trelleborg's Universal Safety Link (USL) which is installed in many LNG applications.

FULLY SUPPORTED

While the system is designed to be user installable and tested on site, such criticality demands best in class support. Trelleborg engineers are on hand 24/7, wherever you are in the world to offer technical support whenever it's needed. Trelleborg also offers a spare parts service to keep customers operational and help to reduce downtime.

For more information on the system, visit www.trelleborg.com/marine or get in touch with Trelleborg Marine Systems.





DISCLAIMER

Trelleborg AB has made every effort to ensure that the technical specifications and product descriptions in this brochure are correct.

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