

A perfect couple

A revolutionary new way of loading and unloading rail and road tankers with propylene oxide (PO) and ethylene oxide (EO) has transformed what was a routine but tedious, and potentially hazardous, process. The new system, inspired by technology used in the world of Formula One motor racing, is safer, faster, cleaner and easier to use.



The conventional method of coupling PO and EO storage tanks to railcars involves a lengthy, cumbersome and hazard-ridden process of bolting together flanges.

"Operators have to wear full protective clothing with breathing apparatus, and carry the full weight of the heavy couplings while they bolt them together," explains Jan van Berkel, who is responsible for railcar loading at Shell Nederland Chemie's Moerdijk and Pernis manufacturing sites in the Netherlands.

"Working at an awkward angle compounds the problem, and increases the risk of back injuries, while this method of coupling could result in vapour emissions which are potentially both a safety and environmental hazard."

Van Berkel is a safety advisor for the Moerdijk site but also a keen follower of Formula One Grand Prix racing. It was while watching a race on TV that he and several colleagues from the plant saw the race cars being refuelled using a novel type of high-speed coupling.

The coupling used for pit-stop refuelling was an adaptation of one originally developed for the offshore oil and gas industry. Van Berkel and his team have since spent several years working with Swedish manufacturer TODO to perfect the use of a similar dry-break coupling for both PO and EO deliveries.

The specific nature of the products meant that this was no off-the-shelf replacement. In particular, gasket materials had to be found which would withstand the very low temperatures created when the tanker discharge hose was flushed with inert nitrogen to remove any traces of product before and after loading.

HSE requirement

Along with the series of trials went discussions with the various authorities to ensure that this new type of coupling would meet health, safety and environmental requirements. Now dry-break couplings are used exclusively for PO and EO loading at Moerdijk, and are increasingly finding favour with Shell Chemicals customers.

The system has a number of benefits. Where the old method of connecting and disconnecting with bolted flanges took 30 minutes, the dry-break connection can be fitted in seconds, in a single movement that also opens the valve. Disconnection is equally simple, and closes the valve automatically.

Vapour emissions have been virtually eliminated, and the cumulative time-savings in loading many railcars and road tankers has enabled the existing loading facilities to cope with a steady increase in

demand for products - and potentially saved a hefty investment in additional storage and loading equipment.

Better alternative

"Operators now wear much lighter protective clothing, and only have to carry breathing apparatus for use in emergencies," says van Berkel.

"Because the couplings are so much lighter, easier and quicker to use, our people are far less likely to suffer back injuries while loading tankers. Dry-break couplings have proved a far better alternative from every perspective."

Having proved the benefits to its own satisfaction, Shell Nederland Chemie has since shared its findings with customers.

Take-up has been enthusiastic across Europe with Bayer, Polyol, Clariant, Crompton and AKZO all moving to dry-break couplings after taking advantage of an offer of a free month's loan of the new equipment.