



## Quick disconnect coupling cuts downtime on offshore pile driving tool changes

Eaton's rugged hydraulic couplings become distributor's choice for under-pressure quick disconnect couplings

**Location:**

The Netherlands

**Challenge:**

Reduce time taken for tool changeover and minimise downtime

**Solution:**

Eaton developed a new version of steel W6000 Series thread-to-connect quick disconnect couplings that are equipped with special polyurethane (PU) valve seals

**Results:**

The customer is changing its entire stock of quick-disconnect couplings to the Eaton W6000 Series following significant customer feedback.

*"By only stocking Eaton's W6000 couplings, our customers is able to offer a reliable product that will enable their clients to disconnect hydraulic hoses with residual pressure quickly and safely."*

*Ronald Molijn, Product sales Manager  
Eaton EMEA*

An international innovative industrial service provider in the Netherlands, supplies parts to the offshore oil and gas industries, including those manufacturing or operating vibratory pile driving equipment. The ability to quickly and safely disconnect hydraulic hoses with residual pressure was a concern to the company's customers. Eaton's W6000 couplings were offered as a solution and as a result, the Dutch customer is converting its stock to this new product family

**Background**

The North Sea industries rely heavily on the use of on-shore or nearshore platforms for exploration, extraction, storage, distribution hubs and wind power. These structures are secured to the ocean floor and like conventional multistore land buildings require the use of pilings that have to be driven into the sea bed. For this purpose, sophisticated equipment is used and is often multi-purpose for both pile-driving and drilling. These capital intensive items are often available for rent to enable users to manage cash flow and outlay. Reliability, efficiency, safety and ease of use are key aspects for the equipment and downtime due to maintenance or retooling has to be minimised.

**Avoiding the need for equipment repair and reducing tool changeover time**

Initially pile driving was achieved through the use of a heavy weight which was dropped on to a hammer head via a guidance frame and then winched back up to repeat the process. Today's modern vibration pile drivers are lighter in weight and shorter in height as they consist of a hydraulically operated ram, driven by oil and/or compressed gas, operating at 1,200 to 2,400 vibrations a minute. As the pile driver is hydraulically driven rather than using gravity, piles can be driven in at an angle. Audible noise is also reduced, a benefit to the operators when being used on board a ship or floating platform. The shock impact, which can compromise the reliability of other sensitive equipment, is also lessened.

Various hammer and lifting tools are attached to the ram and operated using a lower pressure hydraulically powered clamp mechanism. Flexible hoses connect the tool to a lower pressure hydraulic power system using quick disconnect fittings for easy changeover. During the tool change, users often do not discharge the residual system pressure and, as a result, the quick-disconnect coupling seal is damaged. This occurs when



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connecting the coupling as the two valves push each other, and open the circuit. If one side is under pressure, the seal of the valve is pushed against the valve seat and in the meantime the opposite valve pushes the valve body which causes the seal to get damaged or get out of its groove. This requires a complete hose change and bleeding of the hydraulic system, which greatly extends the time for a tool change, leading to additional machine down time and lost productivity. As the hydraulic fluid is under pressure and often very hot, a risk is also posed to operator safety.

### Providing an alternative solution

Eaton developed a new version of steel W6000 Series thread-to-connect quick disconnect couplings that are equipped with special polyurethane (PU) valve seals. Featuring a proprietary profile, they contain two shut-off valves, one in each part of the coupling. Each features this new seal which is held in place by a special crimping process. The PU seals remain intact and no damage to the hose assembly occurs even when a residual pressure is present on the hose. No hydraulic fluid is lost and the hoses and couplings do not have to be replaced.

The W6000 Series with PU seals is designed for severe hydraulic applications such as construction and mining and is preferred because of its resistance to heavy mechanical loads, including rams and when there are severe pulsating loads. This coupling is also available in stainless steel which offers excellent resistance to corrosive environments, making it the coupling of choice for the offshore oil and gas industries.

Previously metal-to-metal seals were used, but these exhibit damage when connecting under pressure or valve seal extrusion due to high instantaneous flow, which can lead to leakage at low pressure. The special PU seal option on the valve can be used to replace metal-to-metal sealing to withstand harsh applications efficiently while avoiding this leakage.

The maximum residual pressure allowed during connection is between 20 and 250 bar, depending on the coupling body size.

To protect the connectors from dirt and other contaminants when tool changes are taking place, or when the vibrating pile drivers are not in use, multiple types of end caps are also available. Dirt can damage the seal elements or pollute the hydraulic fluid in the system.

### Distributor changes stock over to Eaton's quick disconnect couplings

Eaton's customer is changing its stock to Eaton W6000 quick-disconnect couplings following significant customer feedback. The harsh weather environment in the North Sea region, combined with the presence of corrosive chemicals, forces more frequent hydraulic hose changes as part of preventive maintenance procedures. There is a risk that service technicians may replace a hose, focusing on the hose material, size and pressure ratings, unaware that the coupling is not suitable for quick disconnect with residual hydraulic pressure. Initially the equipment will function without issue, but when the operator changes the tool head, the coupling seal will rupture causing additional downtime and greater expense.

By only stocking Eaton's W6000 couplings, the risk of such a mistake is dramatically reduced. The additional cost of using quick disconnect couplings is minimal, product life is enhanced and the couplings have the same, or better, chemical resistance. As the W6000 series is also suitable for use in other industries and applications, the volume of part numbers stocked is reduced, cutting inventory costs.



Reliability, efficiency, safety and ease of use are key aspects for hydraulic vibrating piling systems and downtime due to maintenance or retooling has to be minimised.



Eaton's W6000 quick disconnect coupling with PU seal provide excellent performance compared to traditional metal-to-metal sealing. They can withstand harsh applications while avoiding hydraulic fluid leakage.