

TECH TIDBITS, vol. 12

Riser Connectors and Pilot-Operated Check Valves

A riser connector equipped with a pilot-operated check valve (POCV) was retrieved from the sea floor. While performing predictive unlatching pressure tests on the surface, it was noted that the initial unlatch pressure needed to release the connector was a rather high 2,500 psi. When the connector finally released, there was a distinct “bang.”

After this incident, the connector was cycled and latched at an operating pressure of 3,000 psi. The unlatch pressure was found to be 1,600 psi, which was within the acceptable maximum of 55% of the latch pressure. The connector was latched again at 1,500 psi and only needed 600 psi to unlatch, still within 55% of the latch pressure. No abnormal noises were noted while cycling the connector. A successful, charted pressure test of 3,000 psi was performed on the primary and secondary unlatch operating chamber. The connector was cycled and no further anomalies noted.

Description of Issue

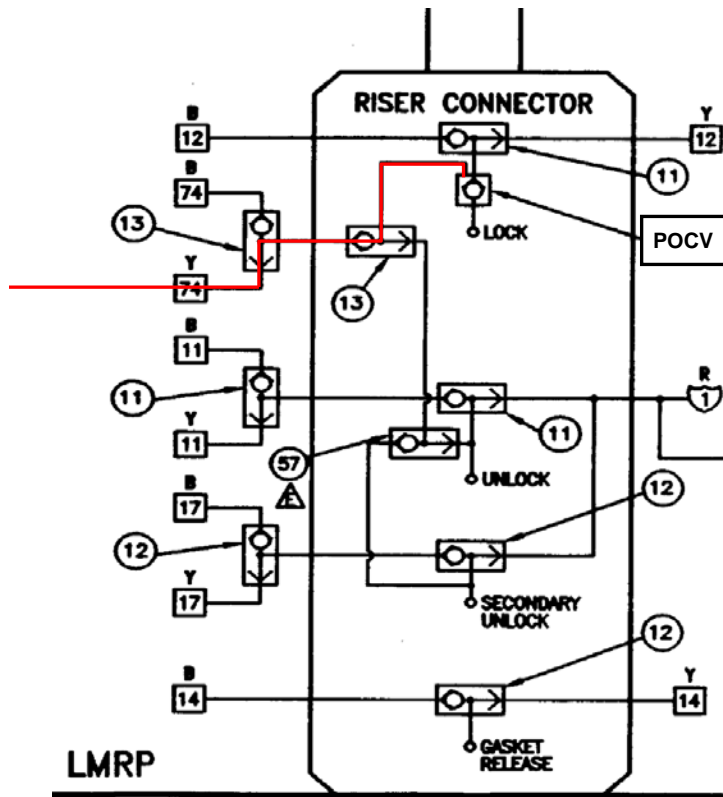
The riser connector was equipped with a Pilot Operated Check Valve, POCV, on the latch hydraulic circuit. The connector latch operating chamber was pressured to the recommended latch pressure of 1,500 psi subsea, but the hydrostatic head added additional pressure (this well had a water depth of 4,468’). With the circuit configuration being used, the POCV would not allow the hydrostatic pressure to be released while retrieving the BOP stack to the surface. By the time the connector reached the surface, the latch chamber had a combination of 1,500 psi latch pressure and approximately 2,000 psi from the former hydrostatic pressure (4,468’ x .445 psi/ft) for a total of about 3,500 psi. This pressure caused the connector to lock progressively tighter as the external hydrostatic disappeared, well exceeding the manufacturer’s recommended maximum operating pressure. As a result, much higher than normal unlatching pressure was needed to unlatch the connector while on the surface.

Fortunately, the unlatch area of the connector was greater than the latch area, so, as in most cases like this, it was possible to get it unlocked. In some cases though, this has required excessive pressure.

Solution

This situation can occur with any connector with a POCV on the latch side of the connector, and the potential latching pressure will only increase with increasing water depth. If planning to work in deep water, contractors should consider replacing or modifying the POCV circuit on the LMRP (Lower Marine Riser Package) riser connector with the manufacturer’s recommended unlatching pressure control.

Here is a solution used on at least one rig. A pilot signal was incorporated into the POCV circuit. When activated, the pilot signal is sent to hold open the POCV. This allows the connector regulator to lower the latch pressure to the correct pressure and expel excess hydrostatic pressure while retrieving the stack to surface.



Shown above is a copy of the schematic for the POCV on the riser connector. The fluid path highlighted in red indicates the pressure reduction circuit to the POCV. This pilot pressure releases the check on the valve allowing the connector regulator to reduce excess hydrostatic pressure in the latch chamber while retrieving the stack to surface.

For more information or technical questions, please contact WEST Engineering by emailing west@westengineer.com, calling 281-375-5515 or visiting our Web site at www.westengineer.com.