



NATIONAL COUPLING

Dummy Coupling Options

NCC has historically supplied 3 styles of dummy couplings: vented, blind and volume compensated. Over the past 3 years the second barrier of our volume compensated dummy coupling has evolved from merely “encapsulating and protecting the seal surfaces” in a captured volume of seawater to being required to hold system working pressure in the event of a leak during long term parking.

The Chevron Tahiti Project supplied in Qtr 2 2007 was the first project that now held the volume compensated dummy coupling to the API test pressure standard of 1.5 x maximum working pressure. NCC supplies the dummy volume compensated coupling in both a 10ksi WP / 15ksi TP second barrier seal trim design and a 15ksi WP / 22.5ksi TP second barrier seal trim design.

A “brief” summary of this evolution is as follows:

Vented Dummy Couplings

Vented dummy couplings such as the attached RS-8-B-59-D and AS-8-B-23-D do not have a poppet assembly and are not pressure retaining, obviously, as they have a hole drilled through them. The vent hole allows for constant communication of the sealing surfaces to seawater through a small orifice. Vented couplings do not push sea water into the hydraulic system under mating conditions as there is not a trapped volume for pressure to build up in. Vented dummy couplings only require enough force to overcome coupling seal interference and friction.

Blind Dummy Couplings

Blind dummy couplings are basically couplings with a pocket drilled in them with no poppet assembly. Blind dummies will push a small amount of sea water into the hydraulic system during coupling mating and the sealing surfaces of the coupling are only exposed to a small volume of trapped seawater. The maximum force required to mate a blind dummy coupling is equal to the male coupling sealing area times the pressure trapped between the dummy coupling and its mate. This trapped pressure should approximate the sum of the poppet cracking pressure plus the pressure sealed behind the mating coupling poppet. As the trapped pressure reaches the sum of the poppet cracking pressure and poppet sealed pressure, during coupling mating, the poppet will unseat and relieve the pressure back into the hydraulic system.

Volume Compensated Dummy Couplings

The original design intent of the volume compensated female coupling was to create an expansion chamber that would give the water a place to go when mating with a male probe under pressure. The expansion chamber also “encapsulated” the male probe within an isolated volume of seawater. The compensator allows the slug of water to be displaced without increasing the captured volume pressure in a hydraulic lock situation and eliminated seawater ingress. The piston in the compensation chamber has an o-ring barrier with two back up rings isolating the poppet and coupling sealing surfaces from the seawater and was originally only intended to serve as a low pressure barrier above the poppet crack pressure.

Pressure Retaining Volume Compensated Dummy Couplings

As use of the female volume compensated dummy coupling spread over the past two years, it was requested that the volume compensated piston assembly be designed to retain full working pressure and serve as a redundant barrier in the event that the poppet seal were to leak. These were designed to hold up to 15ksi pressure differential with the o-ring / back up ring piston design.

Pressure Retaining Volume Compensated Dummy Couplings with TP = 1.5 X WP

The Chevron Tahiti project required that the pressure retaining volume compensated dummy couplings be held to the API standard of a TP equal to 1.5 X WP on the second barrier. This was an industry first. The existing o-ring / backup ring design is limited to pressures below the 22.5ksi requirement. NCC performed the development, prototyping and testing of a new dummy coupling with a two piece piston assembly design with a captured lip seal design. RS-8 pressure retaining volume compensated dummy couplings were successfully tested and supplied to meet the API test pressure requirement of 22.5ksi TP for the current Chevron Tahiti project in accordance with the attached approved qualification procedure and FAT. These 15K pressure retaining volume compensated dummy couplings are now available for supply in the UO Series Couplings.