Single-Phase Wet-Mateable Connector

The OneSubsea family of Diamould® electrical connectors includes a single-phase wet-mateable model, which provides power downhole to wireline-retrievable ESPs. Derivatives of this highly reliable and high-performance connector can be used in other medium- and high-power applications, including subsea pumps for pipeline boosting and water injection, oil and gas separators, subsurface dewatering, and pipeline heating systems.

Design
The connector electrical contacts (male pin and female socket) are housed within the connector halves to protect them from the environment, thereby preventing contact corrosion. The male contact is protected with dielectric oil, which is recirculated from one position in the connector to another as the connector halves are mated and demated. This recirculation is achieved using a sealed wiper plate and piston.

When the connector halves are mated, oil flows along the male contact pin through channels molded into the pin. The oil is then transferred through a series of drillings to a pressure-compensated reservoir inside the connector casing. When the connector halves are demated, oil is sucked back along the pin, forming a protective barrier.

Packaging
Connector halves are individually packaged and supplied with protective caps and installation instructions.
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**Technical Specifications**

- **Operating temperature, degF [degC]**: 32 to 250 [0 to 121]
- **Storage temperature, degF [degC]**: –40 to 122 [–40 to 50]
- **Maximum operating depth, ft [m]**: 10,000 [3,048]
- **Pressure rating at 250 degF [121 degC], psi [MPa]**: 5,000 [34.47]
- **Test pressure rating, psi [MPa]**: 7,500 [51.71]
- **Design life, yr**
  - Downhole: 10
  - Subsea: 25
- **Stack-up capability, in [mm]**: ±0.250 [±6.35]
- **Number of wet-mate and demate cycles**: 100
- **Maximum continuous operating voltage, V DC**: 5,000
- **Maximum continuous operating current, A**: 125 (depending on cable construction and ambient temperature)
- **Maximum test voltage at 60 s, V DC**: 22,000
- **Pulse current at 30 s, amp**: 250
- **Insulation resistance at 68 degF (20 degC), ohm**: >1.00E+10
- **Contact resistance at 5,000 V, ohm**: ≤0.0025
- **Housing**: INCONEL® alloy and stainless steel options
- **Contacts**: Gold-plated beryllium copper
- **Insulation**: Polyetheretherketone (PEEK)
- **Diaphragms**: Fluorosilicone rubber and hydrogenated nitrile butadiene rubber (HNBR)

**Insulation Resistance vs. Temperature at 4,350 psi**

*During a temperature cycle test, the insulation resistance of the connector pair never dropped below or near the acceptance level, even at the highest temperature.*

**Hydrostatic Wet-Mate and Demate Testing**

(at 4,350 psi in Agitated Sand and Silt)

*During repeated hydrostatic pressure wet mate and demate testing, insulation resistance of the connector decayed, possibly because of the small amount of dielectric oil lost. Up to the 100 mate and demate criteria, however, the resistance never dropped below the acceptance level.*