OneSubsea
A Schlumberger Company

Single-Phase Wet-Mateable Connector

Diamould electrical connector model

APPLICATIONS

- Electric submersible pumps (ESPs)
- Subsea pumps for pipeline boosting and water injection
- Oil and gas separators
- Subsurface dewatering systems
- Pipeline heating systems

ADVANTAGES

- Pressure-balanced design to reduce stress across seals
- Sliding contact design that accommodates large stack-up tolerance
- Male and female electrical contacts that are protected from the environment
- Crimped cable terminations; no soldering required
- Capability of repeated subsurface mates and demates without loss of operational integrity
- Resistance to H_2S and CO_2 sour well corrosion, sand, and silt
- Capability of deployment in vertical and horizontal wells
- Coatings to prevent risk of galling
- Stab design for ESP applications; diver-mate and ROV-mate options available
- Compact, maintenance-free design

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

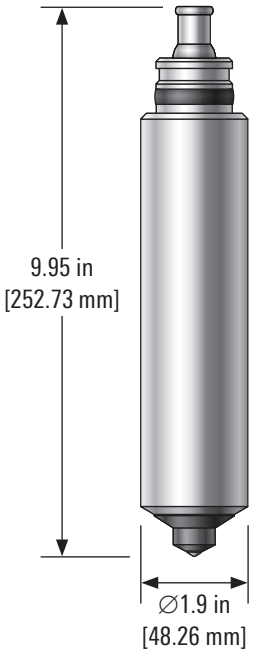
The connector electrical contacts (male pin and female socket) are housed within the connector halves to protect them from the environment, thereby preventing contact corrosion. The male contact is protected with dielectric oil, which is recirculated from one position in the connector to another as the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

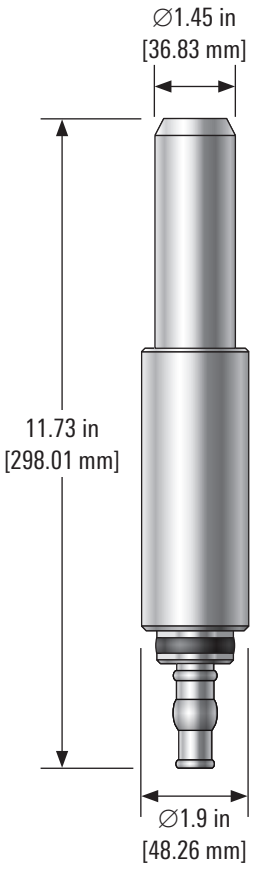
When the connector halves are mated, oil flows along the male contact pin through channels molded into the pin. The oil is then transferred through a series of drillings to a pressure-compensated reservoir inside the connector casing. When the connector halves are demated, oil is sucked back along the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

Packaging

Connector halves are individually packaged and supplied with protective caps and installation instructions.

Single-phase wet-mateable connector plug and receptacle.

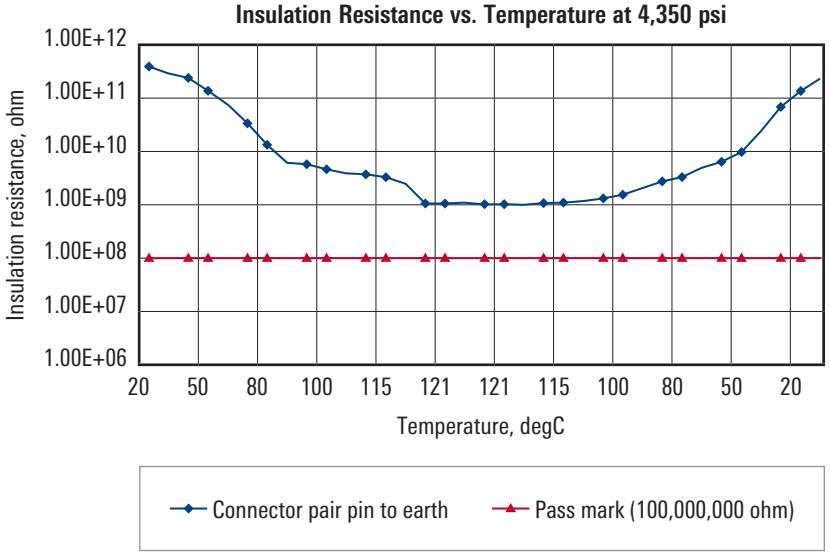




Single-Phase Wet-Mateable Connector

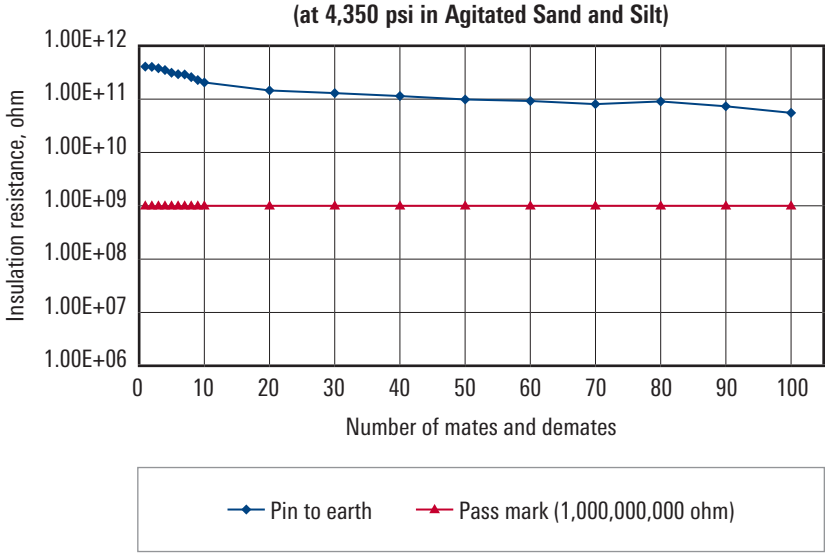
Technical Specifications	
Operating temperature, degF [degC]	32 to 250 [0 to 121]
Storage temperature, degF [degC]	–40 to 122 [–40 to 50]
Maximum operating depth, ft [m]	10,000 [3,048]
Pressure rating at 250 degF [121 degC], psi [MPa]	5,000 [34.47]
Test pressure rating, psi [MPa]	7,500 [51.71]
Design 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.

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