Low-Profile Vertical Tree Instrumentation
Electrical Feedthrough System

The low-profile vertical tree EFS in the portfolio of Diamould® electrical connectors has been developed to address specific applications where real estate is limited, providing a unique nonorientated solution for vertical tree applications.

Based on patented and field-proven wet-mateable technology and cable termination methods, the low-profile vertical tree EFS provides all the functionality expected from an industry standard plus differentiating features that improve reliability and long-term performance.

**Protected male pins and dielectric-filled wipers**
Male pins are protected in dielectric-filled wipers, increasing the electric tracking distance to earth as well as improving integrity and reliability. This feature provides mechanical and corrosion protection to the demated male contact pin.

**Crimp termination technology**
Unique and reliable crimp and latch boot technology provides a clean, repeatable means of cable termination, eliminating the requirement for soldered terminations and potential quality issues.

**Electron-beam-welded pressure barrier**
When used for long-term sealing, O-rings are subject to compression set and decompression damage. Electrical pressure barriers are configured with an electron beam weld for well integrity, eliminating the need for O-rings and elastomers as a long-term seal solution in critical wellhead applications.

**High-temperature tubing hanger connectivity**
The dry-mate connection system at the bottom of the tubing hanger feedthrough is developed and qualified for 350-degF operation scenarios with high-temperature production flow.

**APPLICATIONS**
Electrical feedthrough for subsea vertical trees

**ADVANTAGES**
- Low-profile design ideal for use with hardware with <1-in outside diameter
- Protected male pin for corrosion protection when demated
- Electron-beam-welded electrical pressure barriers that eliminate requirement for O-rings
- Crimp termination technology that eliminates soldering
- Lower tubing hanger connections rated to 350 degF (177 degC)
- Design based on proven vertical electrical feedthrough system (EFS) technology used in more than 1,000 installed subsea trees
- Barriers qualified to API Spec 6A Product Specification Level (PSL) 3G
Low-Profile Vertical Tree Instrumentation Electrical Feedthrough System

Specifications

Temperature range, degF [degC]
- Operating
  - Tubing hanger wet-mateable electrical connector and bonnet assembly: 0 to 310 [–18 to 155]
  - Tubing hanger wet-mateable electrical connector: 0 to 350 [–18 to 177]
- Storage: −40 to 122 [–40 to 50]

Maximum operating pressure, psi [MPa]
- Wet-mate electrical connector: 10,000 [69]
- Dry-mate electrical connector: 15,000 [103]

Number of mating cycles: 100

Design life, yr: 30

Overall connector diameter, in [mm]: <1.0 [25.4]

Mating speed (minimum to maximum), in/s [mm/s]: 0.12 to 31.50 [3 to 800]

Axial stackup, in [mm]: ±0.15 [3.81]

Radial offset, in [mm]: ±0.10 [2.54]

Angular misalignment, °: ±1.0

Electrical

Voltage rating, V DC: 1,000

Insulation resistance at 68 degF [20 degC], Gohm: >500

Materials

Connector housing: Super duplex stainless steel and INCONEL 625

Contacts: Gold-plated Colsibro copper alloy

Insulation: Polyetheretherketone (PEEK-HT)

Sealing systems: Bespoke fluoroelastomer and perfluoroelastomer compounds (NORSOK M710)

Qualification Compliance

Intelligent Well Interface Standardization Recommended Practice (IWIS RP) A2

ISO 13628-4 (API Spec 17D)

ISO 10423 (API Spec 6A)

Customer-specific specifications