

PRODUCT DATASHEET

HYDRALIGHT

8-CHANNEL, WET-MATE, OPTICAL CONNECTOR



HYDRALIGHT, bulkhead mounted plug (left), flying lead ROV receptacle (right)

DESCRIPTION

The **HYDRALIGHT** is a field proven, second generation underwater mateable, high integrity, fiber optic connector. It is an 8 channel device that facilitates underwater connection of optical fibers.

KEY FEATURES

- 2,195 units sold worldwide
- Field proven track record with over 32 million accumulated operating hours
- Mean Time Between Failure (MTBF) of better than 6.9 million hours
- Modular optical contacts up to 8 channels
- Field-proven sealing mechanisms
- Oil-filled and pressure balanced
- Optical coupling within "joined-chamber"
- Seawater compatible internals
- ROV operable interface
- Linear latch & de-latch mechanism
- **SEA CON**® Precision MKII PBOF hose interface
- 2nd-Generation optical wet-mate connector
- Average single-mode insertion-loss of better than 0.2dB (0.5dB max)
- Average single-mode back-reflection of better than -50dB over mate-cycle life (min of -40dB)
- Qualified to 7,000m (23,000 feet)
- Single-mode or multi-mode optical fiber
- Highly compatible elastomers
- Synthetic mineral oil compensation fluid
- Designed to meet the "Optical Wet-Mate Connector Specifications" for Norsk Hydro, Statoil, Elf Exploration, Total, Hess and BP
- Patented design and features

QUALITY

- **SEACON** Advanced Products, LLC operate a Quality Management System certified to ISO 9001:2008.



SEACON Advanced Products, LLC.

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CONFIGURATIONS

- Modular contacts, up to 8 optical channels
- Suitable for any type of optical fiber
- Parking Places (long-term and short-term)
- Protective caps (long-term and short-term) topside
- Plug configurations:
 - Bulkhead and flange mounted
 - Extended funnel version
 - Straight terminations
 - 90° terminations
 - Optical test connector configuration
 - Oil-fill and vent connector configuration
 - Loop back configuration
 - Fiber management configuration
 - Stab plate configuration (fixed and compliant) with direct mounted SUTA's (Subsea Umbilical Termination Unit)
- Oil-filled and pressure balanced
- Designed for use with or without cathodic protection
- ROV operable interface
- Receptacle configurations:
 - Flying lead
 - 45° **SEA CON**® Precision MKII interface
 - 90° configuration
 - Parallel **SEA CON**® Precision MKII interface
 - Optical loop-back configuration
 - Optical test connector configuration
 - Oil-fill and vent connector configuration
 - Integral dry-mate connection at spigot (**OPTI-CON**)

DESIGN RATINGS

- Design life: 25 years
- Depth Rating: Qualified to 7,000m (23,000 ft)
- Life-Cycle: Minimum 100 mate/de-mates
- Designed to meet the following Optical Wet-Mate Connector Specifications:
 - Norsk Hydro NHT-I52-00073 Rev 04H
 - Elf Exploration AO-32-2-011-LT-00-SN-005 Rev C
 - Statoil TR1233 (will be obsoleted by TR 2368)
 - Total GSESPS021
 - BP GP78-21
- Average single-mode insertion-loss of better than 0.2dB (0.5dB max)
- Average single-mode back-reflection of better than -50dB over mate-cycle life (min of -40dB)
- Maintenance-free over design life (within number of mate/demate cycles)
- Operating Temperature: -5°C to +45°C (23°F to +113°F)
- Storage Temperature: -20°C to +60°C (-4°F to +140°F)

OPERATION

- Modular ROV, fishtail, D, T, paddle, bail handle design
- Compliant handle
- Linear latch & de-latch mechanism
- Visible latch verification
- Maximum mate/de-mate speed: 0.3ms⁻¹ (12 inches per second)
- Maximum mate force: 54kg (140lb)
- Mate stroke length: 122mm (4.8 inches)
- Maximum rotational misalignment: ±10°
- Maximum angular misalignment: ±5°
- Maximum radial misalignment: ±6.4mm (0.25 inches)
- Maximum handling load: 255kg (562lb)
- Maximum ROV load: 510kg (1124lb)

MATERIALS

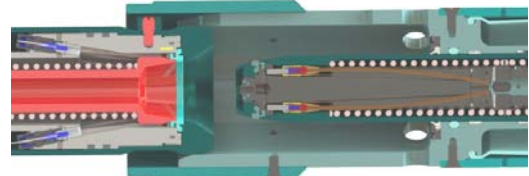
- Main seawater-wetted parts: Titanium
- Wave spring, retaining rings: Hastelloy
- Front elastomeric seals: Fluorosilicone compound
- O-rings: Fluorosilicone or Nitrile
- Pressure compensation fluid: Synthetic mineral oil
- Scraper ring: Rulon
- Internal components: All seawater-compatible

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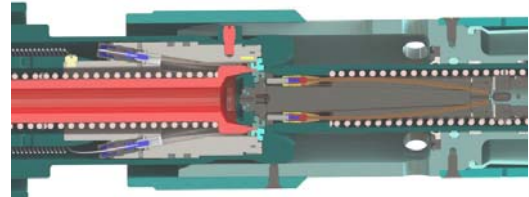
PRINCIPLE OF OPERATION

The critical fiber-to-fiber joint is made without exposure to external contamination in a harsh subsea environment. This is achieved as both ends of the optical termination are protected from seawater, sand and silt by being enclosed within separate, oil-filled and pressure compensated chambers. The sequence of operation is as follows:

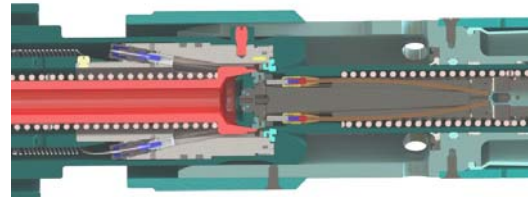
The first stage is the 'physical alignment' of the two connector halves. The receptacle is shown on the left and the plug on the right.



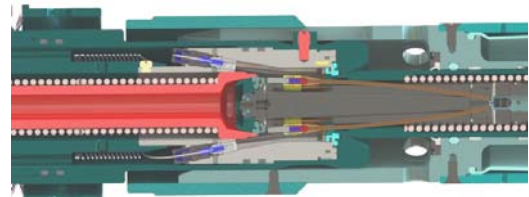
The next step is the 'front seals' of each connector half contact and engage on their respective other half.



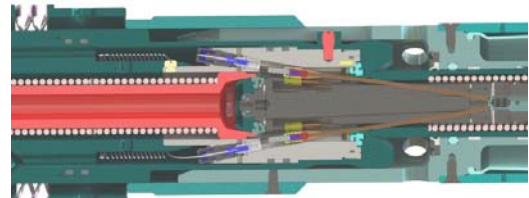
Continued mating 'squeezes out all external fluids and contaminants' as the connector halves seal against each other.



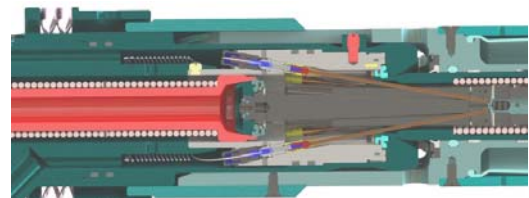
The two connector halves then open up into a single patented 'joined chamber'.



The connectors continue to move and the flexible contact guide tubes splay and align via guide-ways in their opposite half, which facilitates the coupling of the optical ferrules within the benign oil-filled environment.



The connector is fully mated.



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KEY INTERFACE INFORMATION & DOCUMENTS

- 1) Interface drawing, bulkhead plug connector, 90° termination: **SEA CON**® No.: 7740-101
- 2) Interface drawing, flying lead receptacle connector: **SEA CON**® No.: 7741-101
- 3) **HYDRALIGHT** Operation & Maintenance Manual: **SEA CON**® No.: OMM-ENG-1006
- 4) **HYDRALIGHT** Qualification Test Report Summary: **SEA CON**® No.: SC-ENG-1036, SC-ENG-1043

QUALIFICATION TESTING SUMMARY

1) Principal Connector Qualification Tests:

- Optical Tests - Optical Attenuation, Optical Back-Reflection, Cross-Talk, Optical Performance Longevity
- Mechanical Tests - Helium Leak (24 hour), Locking Device, Mating Force, Maximum Misalignment, ROV Force Test
- Environmental Stress Screening - Mechanical Shock, Vibration, Thermal Shock
- Hyperbaric Tests - Pressure (10,000psi, 690bar), Turbid Sand/Silt (Vertical, Horizontal, 40 degrees), Wet-Mating (10,000psi, 690bar), Partial Wet-Mating, Cold Seawater
- Connector/Hose header tests - Helium Testing, Nitrogen Testing, Pressure Testing (580psi, 40bar), Long-Term Testing (1,000 hour at 145psi (10bar))
- Seal Integrity Tests - Sliding Sleeves, Mate/De-Mate Speed Tests, Internal Gas Pressure and Vacuum Testing, with Simultaneous Mate/De-mating
- Oil-Loss Testing and Evaluation, Water Ingress Testing and Evaluation, Oil-Filtering, Flushing and Cleanliness
- Elastomer Compatibility
- Epoxy Bonding

2) Optical Connector Jumper Assembly Tests:

- Oscillating Jumper, Jumper Pull, Drop, Jumper Handling Simulation and Simulated Deployment

3) Optical Jumper Hose and Hose Termination Tests:

- Environmental Stress Tests - Hose Absorption/Compensation, Ozone Resistance, Ultra-Violet Resistance, Thermal Shock
- Destructive Tests - Tensile Failure, Burst Pressure, Crush Resistance, Outer Sheath Abrasion, Hose Kink

FIELD MAINTENANCE

The **HYDRALIGHT** Optical Connector Systems incorporates **SEA CON**® Precision MKII hose fittings and are able to be maintained in the field. Provision has been made in the design to simplify field maintenance of the connector, terminations and hose configurations.

SEA CON® recommends a functional test, maintenance check and final check of the oil-fill and air-vent as part of the Subsea System pre-deployment checks or whenever the connector host-system is brought to the surface. This enables a full check and verification of the integrity of the connector system.

TRACK RECORD & RELIABILITY DATA

2,195 **HYDRALIGHT**'s have been sold worldwide. The connectors that have been installed underwater now have an accumulated operating time in excess of 32 million hours, yielding a Mean Time Between Failure (MTBF) of better than 6.9 million hours with a 99% confidence level.

All reasonable efforts have been taken to ensure that the information contained herein is accurate at the date of publication, but no representation or warranty as to the accuracy or completeness of such information is intended or to be implied by its inclusion herein. Any and all representations and warranties pertaining to the information and products referred to herein shall be set forth in **SEA CON**® standard sales order form. In addition, **SEA CON**® reserves the right to make changes to the contents hereof without notice, therefore it is suggested that at the time of inquiry, the appropriate sales office or factory be contacted directly for verification of published specifications and products availability.

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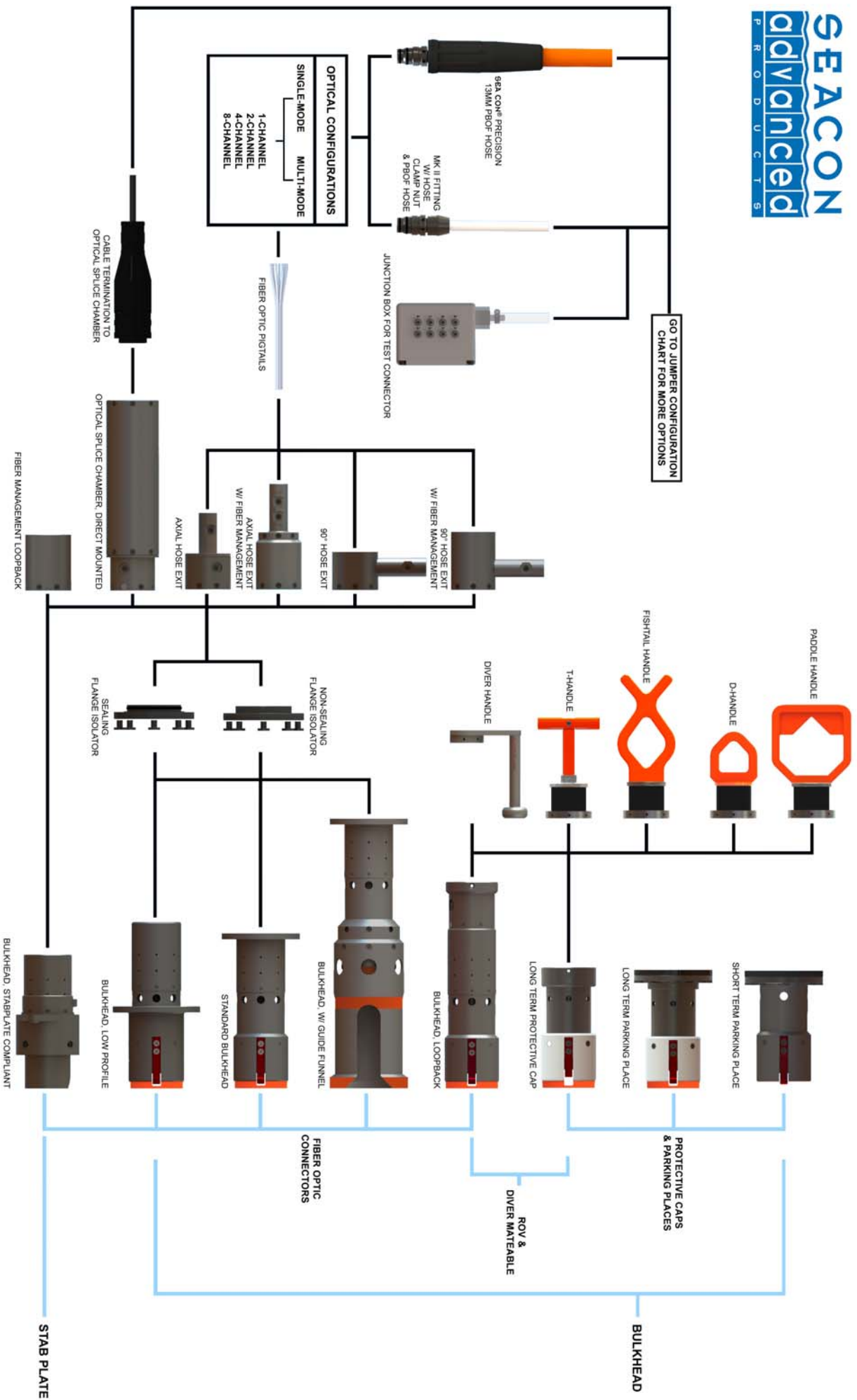
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HYDRALIGHT BULKHEAD CONFIGURATION CHART



HYDRALIGHT FLYING LEAD CONFIGURATION CHART

