

HLWM

Hydraulic-line downhole wet-mate connector



Rated up to 6,000 psi
[41 MPa]



Rated to 121 degC
[250 degF]

APPLICATIONS

- Retrieval of the upper completion without retrieving the lower completion
- ESP-enabled intelligent completions
- Deepwater subsea completions
- Extended-reach wells requiring dual-trip installations

BENEFITS

- Saves rig time by facilitating connections in multitrip completions with hydraulic equipment
- Protects equipment in ESP applications

FEATURES

- Concentric design
- No orientation requirement
- Pressure sleeve in stinger that allows pressure in control lines during run in hole and before initial stab
- Protective sleeve in receptacle that isolates fluid in control lines during well workovers
- Seals that can be independently tested
- Filter sub in receptacle that minimizes debris in hydraulic control line
- Operation with or without contraction joints
- Facilitation of multiple control lines

The HLWM hydraulic-line downhole wet-mate connector enables deployment of a multitrip completion that uses hydraulic equipment (e.g., flow control valves) in the lower completion. This allows a cost-effective workover of the upper completion without having to retrieve the lower completion. The HLWM connector application is not limited to downhole flow control valves only; it can be used to facilitate the installation of other types of hydraulic equipment, such as chemical injection mandrels and surface-controlled isolation valves.

Simple and robust design

The HLWM connector has a concentric design that eliminates the need for any alignment downhole when stinging into the lower completion. This is a key feature that makes the system easy and reliable to install even in highly deviated or horizontal wells. The HLWM connector consists of two subassemblies: the receptacle, which is run with the lower completion, and the stinger, which is run with the upper completion.

Ease of installation

The receptacle is made up above the lower production packer and is run to the appropriate depth using the appropriate running tool. When the packer reaches the target depth, it is set by applying pressure to the tubing at the surface. After the packer is set, the running tool is disconnected either by applying pressure to the casing annulus or by rotating the tool to the right. Once the receptacle is in place, the upper completion can be run at a later date.

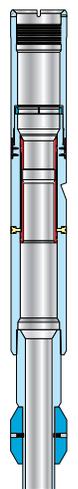
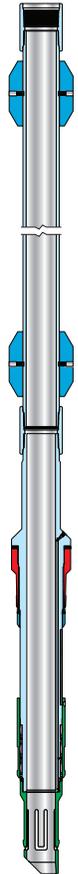
The stinger assembly is situated at the bottom of the upper completion string and latches into the receptacle without need for downhole orientation.

Workover operation

The upper completion can be retrieved by applying a straight upward pull of 20,000 lbf [88,964 N] at the stinger. As contingency, the stinger can also be disconnected by rotating to the right. When the upper completion has been disconnected, the hydraulic ports in the receptacle are covered by a protective sleeve, preserving the hydraulic integrity of the system.

Reliability and track record

More than 50 HLWM connectors have been installed worldwide with a 100% success rate. Most of these installations have been offshore with downhole hydraulic flow control valves in the lower completion and ESP in the upper completion. Several of these have been successfully worked over to replace the ESP in the upper completion without having to retrieve and rerun the lower completion. This has resulted in significant rig time and cost savings for operators.



*HLWM connector stinger —
upper completion (top)*

*HLWM connector receptacle —
lower completion (bottom)*

HLWM Connector Stinger Specifications	Two Hydraulic Lines	Four Hydraulic Lines
Active flow-wetted material	4140	4140
Yield strength of flow-wetted material, psi [kPa]	80,000 [551,580]	80,000 [551,580]
Approximate weight, lbm [kg]	497 [225]	542 [246]
External working pressure at 250 degF [121 degC], psi [kPa]	6,000 [41,368]	6,000 [41,368]
ID, in [cm]	3.750 [9.525]	3.750 [9.525]
Min. ID, in [cm]	3.745 [9.51]	3.745 [9.51]
Internal working pressure at 250 degF [121 degC], psi [kPa]	6,000 [41,368]	6,000 [41,368]
Upper thread connection: Size, in [cm]	4.500 [11.43]	4.500 [11.43]
Weight, lbm/ft [kg/m]	12.75 [18.97]	12.75 [18.97]
Type	EUE	EUE
Configuration	Box	Box
Force to connect/latch, lbf [N]	7,000 [31,137] ±15%	7,000 [31,137] ±15%
Force to disconnect/unlatch, lbf [N]	20,000 [88,964] ±15%	20,000 [88,964] ±15%
Number of control lines	Two ¼-in hydraulic	Four ¼-in hydraulic
Lower thread connection	Snap latch	Snap latch
Material/elastomers	HNBR, Aflas®	HNBR, Aflas
Max. working temperature, degF [degC]	250 [121]	250 [121]
Min. working temperature, degF [degC]	40 [4]	40 [4]
OD, in [cm]	8.369 [21.257]	8.369 [21.257]
Max. OD, in [cm]	8.374 [21.270]	8.374 [21.270]
Overall length, in [m]	134.2 [3.41]	144.1 [3.66]
Service NACE	Yes	Yes
Tensile strength at 250 degF [121 degC], lbf [N]	250,000 [1,112,055]	250,000 [1,112,055]
Pressure sleeve working pressure at 250 degF [121 degC], psi [kPa]	2,500 [17,237]	2,500 [17,237]

HLWM Connector Receptacle Specifications	Two Hydraulic Lines	Four Hydraulic Lines
Active flow-wetted material	4140	4140
Yield strength of flow-wetted material, psi [kPa]	80,000 [551,580]	80,000 [551,580]
Approximate weight, lbm [kg]	600 [272]	560 [254]
External working pressure at 250 degF [121 degC], psi [kPa]	6,000 [41,368]	6,000 [41,368]
ID, in [cm]	3.958 [10.053]	3.958 [10.053]
Min. ID, in [cm]	3.943 [10.015]	3.943 [10.015]
Internal working pressure at 250 degF [121 degC], psi [kPa]	6,000 [41,368]	6,000 [41,368]
Lower thread connection: Size, in [cm]	4.5-8RD [11.43]	4.500 [11.43]
Weight, lbm/ft [kg/m]	12.2 [18.2]	12.75 [18.97]
Type	EUE	EUE
Configuration	PIN	PIN
Max. working temperature, degF [degC]	250 [121]	250 [121]
Min. working temperature, degF [degC]	40 [4]	40 [4]
Force to connect/latch, lbf [N]	7,000 [31,137] ±15%	7,000 [31,137] ±15%
Force to disconnect/unlatch, lbf [N]	20,000 [88,964] ±15%	20,000 [88,964] ±15%
Number of control lines	Two ¼-in hydraulic	Four ¼-in hydraulic
OD, in [cm]	8.369 [21.257]	8.369 [21.257]
Max. OD, in [cm]	8.379 [21.283]	8.369 [21.257]
Overall length, in [m]	72 [1.829]	86.59 [2.199]
Service NACE	Yes	No
Tensile strength at 250 degF [121 degC], lbf [N]	250,000 [1,112,055]	250,000 [1,112,055]