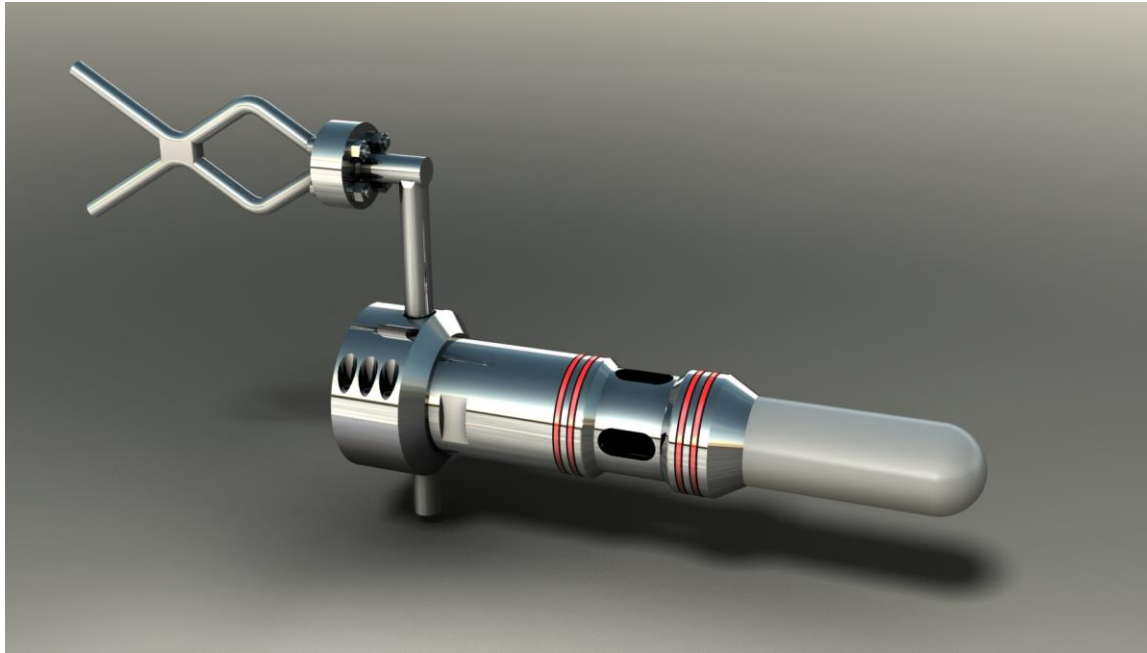


Moffat Subsea Stab Connector™



The *Moffat Subsea Stab Connector™* is a compact, light and cost-effective connector that allows a hose to be connected / disconnected subsea. The product has been in service since 1995 and has been refined and developed up until the present day as the demands of the subsea market have increased. It is now recognised by many operators as the 'best of breed' industry standard item for subsea pigging, chemical injection, gas injection, flooding and venting operations.

Design Code: API 6A (ISO 10423), API 17D/H, ASME B31.8, ASME VII DIV. 2, PD 5500 and PED
(Others available upon request)

Sizes: ¾", 1", 2", 2½", 3", 4", 6" and 8" Nominal Bore

Pressure Range: 6,000 PSI (414 BAR), 10,000 PSI (690 BAR) and 15,000 PSI (1035 BAR)

Max Water Depth: 3,000m

Material Selection: 316 St. Stl, Duplex UNS S31803, Super Duplex UNS S32760, Inconel 625, Nitronic 60 and Hiduron (Others available upon request)

Key Features

Ease Of Use - The male and female components of the stab connector are easy to assemble in service. All that is required is for the ROV to align the male with the receptacle and push. Carefully shaped low friction guides on the two components correct any inaccuracies in the alignment of the initial makeup as the connection is made.

Pressure Balanced Design - The seal arrangement of the connector is such that all pressure forces are retained in the body of the male / female components. No net force acts along the axis of the stab or on the retaining mechanism. This means that in the case of an emergency the male stab connector can be disconnected under pressure.

Rotating Handle and Collar - The male stab handle is fitted with a rotating collar. The collar allows the stab body to rotate through a full 360° independent of the handle. This allows the ROV to manipulate the male stab whilst any torsion in the hose plays out during deployment.

'J' Slot Locking Mechanism - After insertion in the female receptacle the male stab handle can be rotated 30° inside a 'J'- Slot machined into the cap of the female receptacle. This serves two purposes: 1) it shows visually that the stab is located correctly inside the female receptacle and 2) provides a physical restraint against any axial force on the hose. As the assembly is pressure balanced there are no forces on the 'J' slot locking mechanism due to pressure.

Ease Of Maintenance - The assembly is incredibly robust and due to the simple minimal moving part design it requires very little maintenance. The male stab seals do occasionally need replacing. This is a simple operation and Moffat can provide spare seals and change tools to carry out the procedure.

Many Configuration Options - The *Moffat Subsea Stab Connector™* has been deployed worldwide for many different uses. As such many standard configurations are already possible; some of which are shown within this datasheet. If you require a particular adaption please contact our sales team who will be pleased to help.

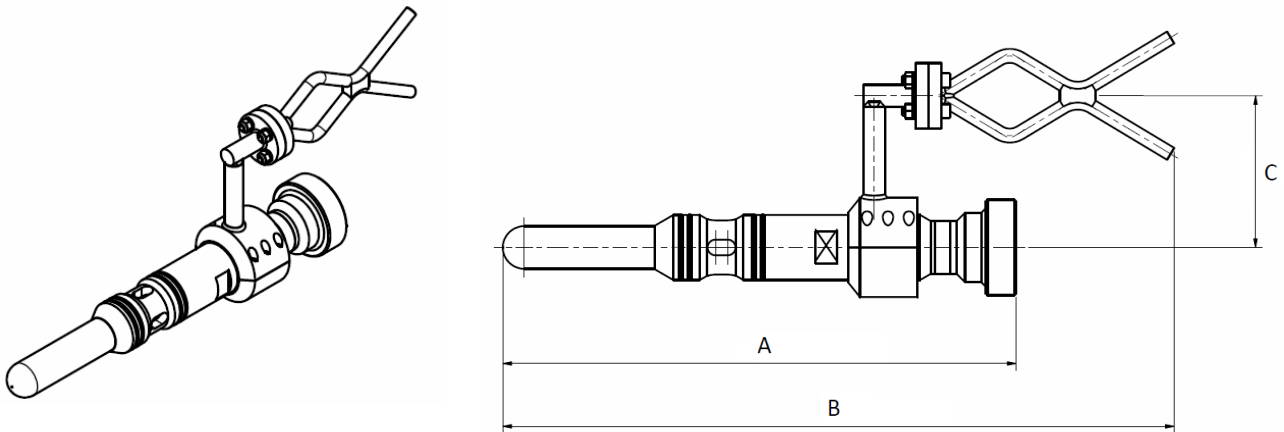
Double Sided Solution - It is sometimes not possible to predict the orientation of the female receptacle when it is subsea (e.g. during pipe-lay operations). If this is a concern and there is a possibility that the female receptacle may be inaccessible then it is necessary to use a double-sided female receptacle. This receptacle is symmetrical and allows the male stab to enter from either side.

Surplussing Valve Solution - Male stabs can be fitted with a *Moffat Surplussing Valve™*. This option is typically used to prevent hose collapse due to external sea-water pressure for deepwater operations. A surplussing valve is a check valve that seals in one direction and allows flow after a pre-determined cracking pressure in the other. This allows a hose to be deployed with an internal pressure applied to balance the external hydrostatic pressure. During operation the pressure is raised beyond the cracking pressure and the valve will open and allow flow. If the pressure drops below the cracking pressure the valve closes to protect the hose.

Forged Female Receptacle - Where welded outlet connections are not allowed by project specification it is possible to provide the female receptacle & outlet connection machined from a single forging of the chosen material. Please contact our sales department for more details.

Hydrogen Induced Stress Cracking (HISC) - When supplied in Super Duplex (UNS S32760) or Duplex (UNS S31803) parts can be supplied in accordance with DNV-RP-F112 - Recommended Practice - Design of duplex stainless steel subsea equipment exposed to cathodic protection.

Male Stab



Approximate Dimensions:

Nominal Bore	A (mm)	B (mm)	C (mm)	W (kg)
3/4"	290	595	120	6.0
1"	360	595	120	7.5
2"	590	775	175	18.0
2-1/2"	600	790	175	20.0
3"	670	830	200	28.0
4"	800	960	215	53.0
6"	915	1100	350	155.0
8"	955	1150	400	195.0

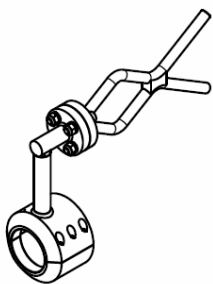
Note that the dimensions above are based on a standard male stab with a 'fish-tail' handle and female hammer-lug union inlet. Drawings and 3D Models to match your precise requirements are available via our sales department.

Inlet Connection

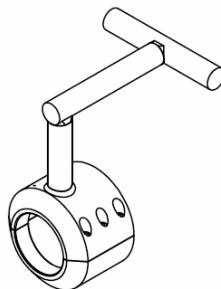
Standard hose-end connections include: Female Hammer-Lug Union (Fig. 1502, 602, 206, etc.), Flanged (API 6A or ANSI), Hub or Female Threaded (NPT, BSP or Autoclave).

Handle

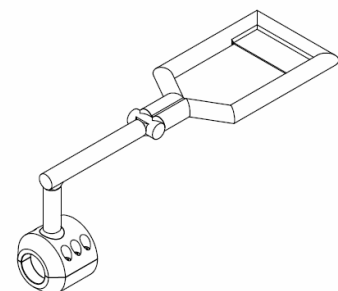
Many combinations of handle are possible, common ones are shown below. Others such as: Paddle, Goal-Post, Circular or Inline Pull are available upon request.



Fish-Tail

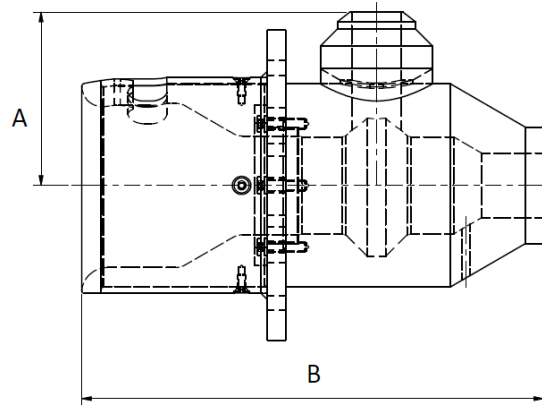
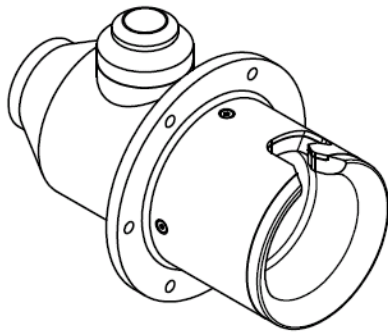


'T' - Bar



'D' - Type

Female Receptacle



Approximate Dimensions:

Nominal Bore	A (mm)	B (mm)	W (kg)
3/4"	90	230	8.0
1"	90	230	8.0
2"	135	360	29.0
2-1/2"	150	375	35.0
3"	170	425	39.0
4"	185	455	51.0
6"	360	835	340.0
8"	370	840	560.0

Outlet Connection

The standard outlet is butt-weld end to suit the nominal bore of the female receptacle. Pipe schedule can be sized to match customer requirements. In order to provide material compatibility and ease of installation the receptacle can be fabricated complete with welded 'pup' pieces to match mating pipework. Units can also be supplied with flanged outlet connection (i.e. ANSI or API).

Receptacle Mounting

Female receptacles should be supported to prevent flexing of mating pipework during stabbing operations. For this purpose female receptacles can be provided with mounting flanges. If this is not necessary (i.e. the female receptacle is supported in some other manner), the mounting flange can be omitted.

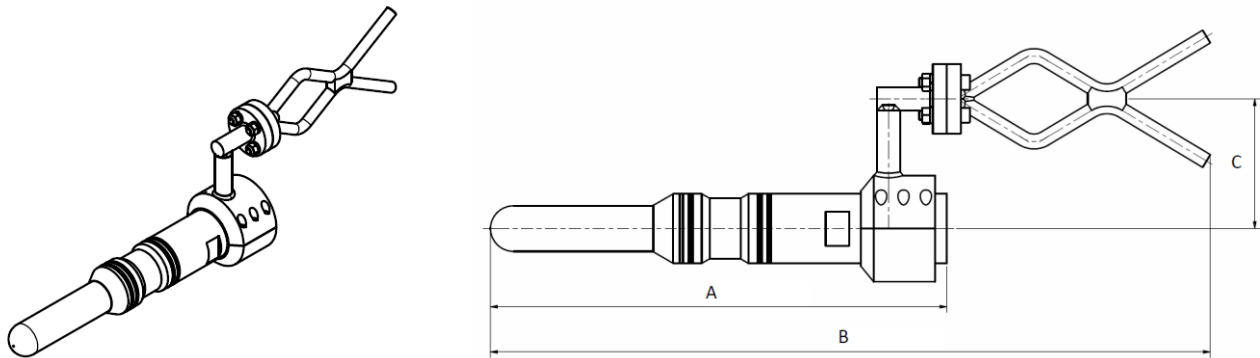
Earthing Device

In long-term installations where a blind stab is to be permanently inserted into the female receptacle it is often necessary to ensure electrical continuity to the blind so that it is protected by the cathodic protection system. In this case, it is possible to supply the female receptacle complete with a spring-loaded earthing contact point to ensure continuity.

Test Receptacle

To allow the complete hose assembly to be tested topside prior to deployment it is often necessary to use a dedicated female test receptacle. These can be supplied complete with convenient pressure tapings (i.e. NPT, BSP or Autoclave) to match up with test equipment and support feet for installation on deck.

Blind Stab (pressure retaining)



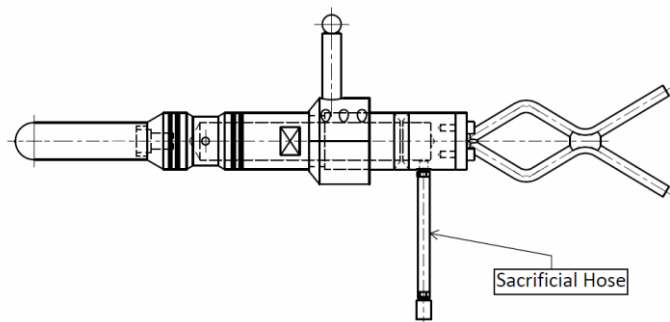
Approximate Dimensions:

Nominal Bore	A (mm)	B (mm)	C (mm)	W (kg)
3/4"	290	595	120	6.0
1"	290	595	120	6.0
2"	490	775	175	14.0
2-1/2"	500	790	175	16.0
3"	550	830	200	21.0
4"	700	960	215	38.0
6"	765	1100	350	140.0
8"	805	1150	400	175.0

Blind stabs are rated to the same working pressure as the equivalent male stab and are often used for hydrotest. They can be left in place for long-term emersion in order to protect the female receptacle and / or to act as an additional 'block' in the subsea system.

Sacrificial Pressure Relief Device

Where it is thought possible that internal pressure may build up behind the blind stab it is possible to fit a sacrificial pressure relief device to allow pressure to be dissipated without having to remove the whole stab. This device is cut by the ROV and it allows pressure from the pipework to be more safely vented. This can be provided as a hose connection (as shown) or for deepwater operation as a thin blind pipe. A range of material options are possible depending on desired length of service.

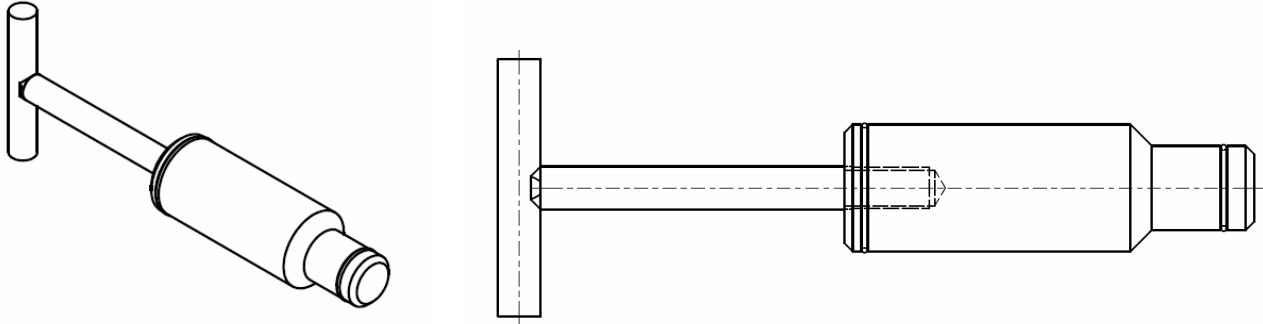


Retaining Strap

To prevent the ROV accidentally dropping the blind stab they can be supplied complete with a retaining strap that fixes the blind to the female receptacle. This strap can also be provided in conductive materials to double as an earthing path for cathodic protection.

Dummy Plug (non-pressure retaining)

A dummy plug is a simple plastic stab that fits inside the female receptacle. It can be used during deployment or during long-term emersion to provide an effective means of preventing debris and marine growth entering the female receptacle. Dummy plugs are available for all sizes of female receptacle and in a range of materials depending on the service required. As for blind stabs they can be provided with a retaining strap to prevent against accidental drop and to provide electrical continuity to the metal handle if required.



Seal Kit & Change Tool



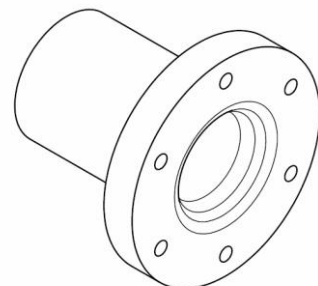
The stab assembly requires very little maintenance however the male & blind stab seals do occasionally need replacing. It is very important that this operation is carried out using the dedicated seal change tool for the stab and using procedures provided by Moffat. This ensures that the seals are installed correctly in their grooves and are sized correctly. Training for stab operators can be provided at our works.

Protection Sleeve

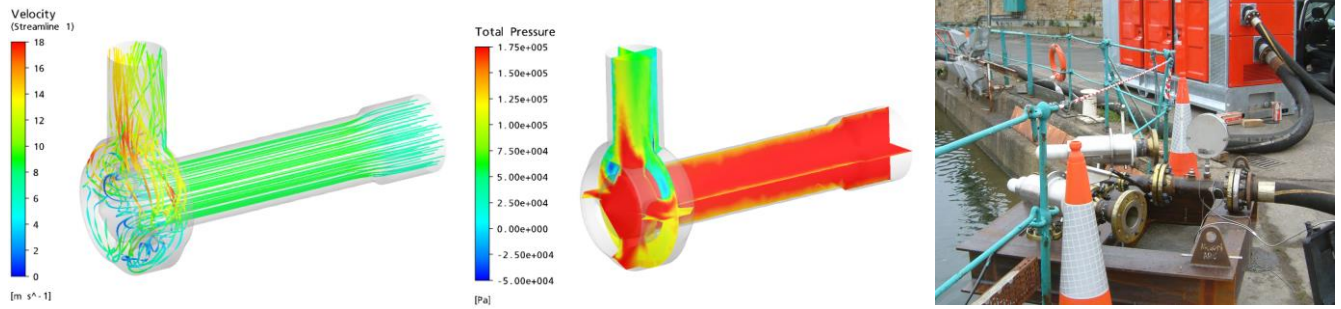
Protection sleeves can be provided to protect male / blind stab seals whilst awaiting deployment or during transit. This is a rigid plastic cover that protects the seals and helps keep them correctly sized. The sleeve should be removed prior to deployment.

Parking Receptacles

In order to assist with manipulation of stabs during operation it is often necessary to provide a place to temporarily store one stab (e.g. a blind stab) whilst another is inserted into the female receptacle. A Parking receptacle can be provided for this purpose. Parking receptacles are plastic components that match the bore of the female receptacle and are provided with a convenient mounting flange.



Flow Data



The flow rate to differential pressure (DP) curves for the various size hot stab assemblies are shown in the charts below. These curves have been derived by physical flow testing of the equipment and verified using computational fluid mechanics (CFD). The charts show the expected flow against pressure drop for sea-water. Curves for other flow media (e.g. MEG mix, Nitrogen, etc.) are available upon request.

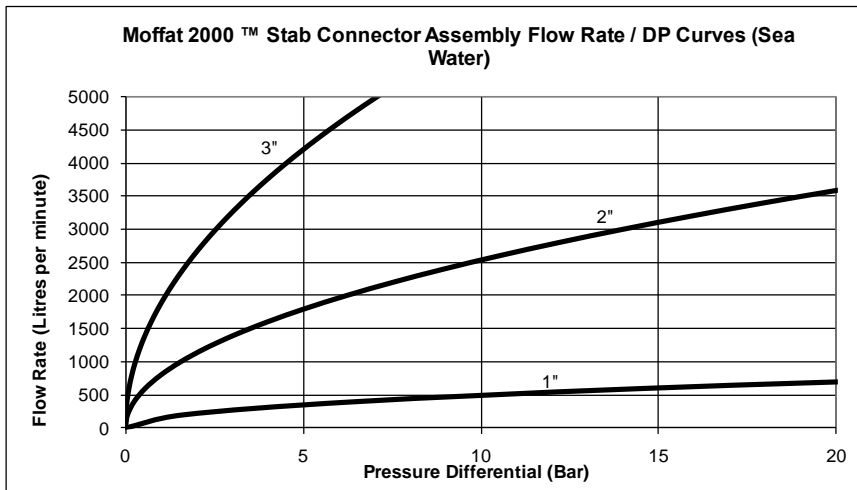


Fig. 1 - Flow rate / DP curve for 1", 2" and 3" Assembly

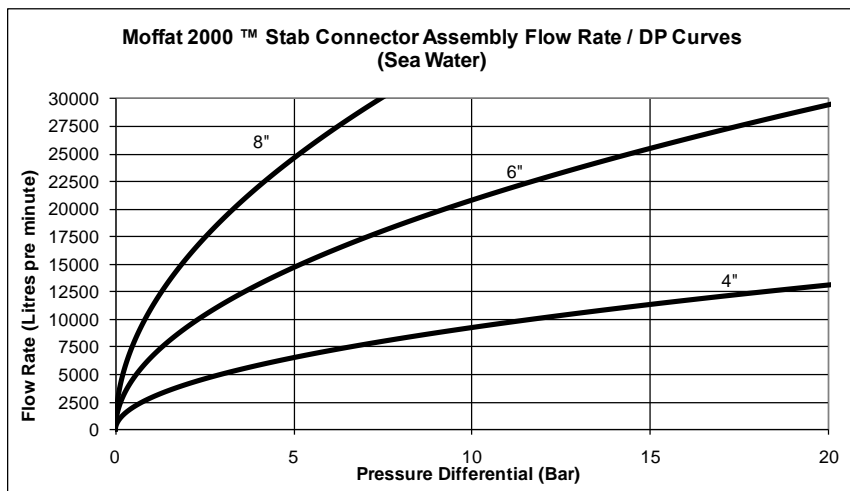


Fig. 2 - Flow rate / DP curve for 4", 6" and 8" Assembly

API 6A (ISO 10423) PR2 Verification



Folder: 53010615
Cert. No.: LVP - 10 - 615 - 1

DET NORSKE VERITAS

VERIFICATION TEST REPORT FOR:

2" MALE STAB / FEMALE RECEPTACLE CONNECTOR ASSEMBLY

Serial number: MS 5033 / FR 4327

At the request of Vaseco Ltd, Winsford & Moffat 2000 Ltd, Ashington Northumberland, the undersigned surveyor did attend the Vaseco test laboratory on various occasions in October 2010 during the running of the above test procedure to witness and verify that testing was being conducted fully in accordance with the programme as outlined in:

Moffat 2000 Ltd Document No: HOT STAB VERIFICATION PROCEDURE 8207-HVP-1 Issue 4

A further visit was undertaken in early November 2010 to conduct a final review of the completed testing record and to endorse as required.

All tests were conducted fully in accordance with the applicable sections of, Moffat 2000 Ltd Document No: HOT STAB VERIFICATION PROCEDURE 8207-HVP-1 Issue 4

FINAL TEST DOCUMENTATION

Moffat 2000 Ltd test procedure 8207-HVP-1 Issue 4 was reviewed after test completion and endorsed as required.

Winsford 2010-11-02



Gavin Maxwell
Surveyor

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Form No.: 40.91a Issue: January 2008 Page 1 of 1



Moffat, based in the North-East of England, offers design and fabrication services for a significant range of pipeline products aimed at the petrochem, process, offshore and subsea markets both in the United Kingdom and Overseas.

The company has engineering experience and expertise to provide a wide range of bespoke engineered products including: pig launchers & receivers, manifold skids, suction pile hatches (hinged or butterfly), filter separator packages and pull-in heads.

Ancillary subsea equipment associated with the above is also supplied by the company and includes: *Moffat Subsea Stab Connectors™*, *Moffat Surplussing Valves™*, subsea ball / check valves, pig retainer (lock) devices and ROV valve interfaces.

A prime component of the success of the company is the commitment to quality and health and safety. Moffat holds accreditation for quality to ISO 9001 and for Health and Safety to OHSAS 18001.

The customer base covers both end-users and EPC contractors including:

ACERGY	MCDERMOTT
AKER	OCEANEERING
BEL VALVES	ONESUBSEA
BIBBY OFFSHORE	PETROBRAS
BHP	SAIPEM
BJ SERVICES	SAPURA ACERGY
BP	SHELL EXPLORATION & PRODUCTION
CHEVRON	SUBSEA 7
DAEWOO	TECHNIP FMC
EXXON MOBIL	VECTOR INTERNATIONAL
VETCOGRAY (GE OIL AND GAS)	WEATHERFORD
HALLIBURTON	

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WEB: <https://www.f-e-t.com/subsea/hardware-tooling-and-components/tooling/#hot-stabs>

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