FirstSubsea

Bend Stiffener Connector

First Subsea's self-aligning and self-energising, ROV-less and diverless Ballgrab® Bend Stiffener Connector (BSC) enables operators to perform faster and safer installations of flexible risers and umbilical's to platforms, FPSOs and buoys. Due to increased focus on diver safety and ease of installation of flexible risers and umbilical's in deepwater projects, we have developed two types of BSC. Type I allows risers and umbilical's to be installed in existing I tube and J tube. Type II is specifically designed for new build applications where the BSC receptacle connector is pre-installed.

Neptune BSC for a 4 Inch Umbilical

Ball and Taper

First Subsea's Ballgrab® connectors have a proven history with over 700 systems being supplied into a multitude of markets for subsea mooring, case running, pipe recovery, internal lifting, riser connections and tendon lift tools. Our class leading connectors are based on ball and taper technology, which ensures their suitability for any application involving gripping, pulling and holding connections under load.

Ball and taper connection technology, in its simplest form, is the action of balls held securely in tapers machined into the connector's mandrel. The balls are free to move up and down the taper, however when the balls grip the item to be held, they grasp it in direct proportion to the load applied.

Utilising ball and taper technology, First Subsea's Ballgrab® connectors can be used in a wide variety of scenarios.

Kitan BSC with Bend Stiffener

Features

- Bespoke design to ensure all clients requirements are met
- Direct interface with existing I-tube or with a receptacle
- No centraliser required
- Confined spaces during installation can be achieved
- No requirement for diver or ROV intervention during installation
- Large savings achieved by reduced vessel time

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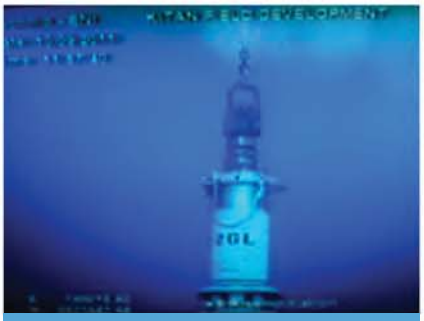
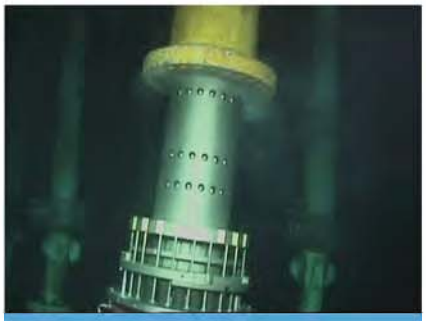
The Ballgrab® BSC is fully self latching without the need for diver intervention, hydraulics or any form of external control. To ensure client satisfaction there are two types of BSC:

	Tube	Self Aligning Pull-in	Latching and Locking Operation
Type I - Existing Installation	- Fits in existing I/J tube or bellmouth - Interfaces directly within I/J tube bore	- Pull-in using platform's winch wire - Optional hydraulic activation - Controllable and secure engagement	- No diver intervention
Type II - New Installation	- Pre-machined receptacle fitted to I/J-tube at fabrication stage	- Fully mechanical Automatic Release Clamp (ARC) with resettable pins - Option to integrate pull-in head within assembly - No shear pins	- No diver intervention - No ROV intervention



ENI Kitan - Type II BSC
16 Inch J-tube



Tahiti 2 - Type I BSC
26 Inch I-tube

Kizomba - Type II BSC
26 Inch I-tube

Automatic Release Clamp

The Automatic Release Clamp (ARC) is a fully automated method for installing flexibles to production platforms such FPSO's & Turrets.

The ARC system helps to reduce installation vessel time whilst ensuring a safe durable mechanical lock to the clients end fitting. As clients demand larger flexibles, the load capacity required for the tip clamps becomes harder to design and manufacture. The ARC system eliminates the requirement for a tip clamp during installation.

The ARC system it is capable of withstanding large installation angles and loads and also removes the need for centralisers during this process.

Key Benefits:
- Tried and tested connector
- Fully mechanical design that is controlled topside by winch operation
- Reduces installation vessel time and has no requirement for diver/ROV intervention

Bespoke BSC Test Rig

Dedicated Test Rig

The purpose-built test rig is specifically designed to demonstrate the operation and function of the complete pull-in system ahead of deployment offshore. The rig is capable of simulating a riser/umbilical weight of up to 100T and it can also evaluate the angle of connector approach with the maximum riser loads applied.

First Subsea understands the need for focus on diver safety and ease of installation of flexible risers and umbilical's. This is why First Subsea's BSC offers a safer method of installation to platforms, FPSOs and buoys, whilst reducing vessel time.

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