



SUBSEA CABLE PROTECTION PRODUCTS

The Blue Ocean Projects (BOP) range of Cable Protection Products is designed to provide protection for subsea cables at **offshore wind** or **tidal energy foundations**, in **shallow water** and at **landfalls**, **boulder fields** or areas of **rocky seabed** where cable burial is impractical.

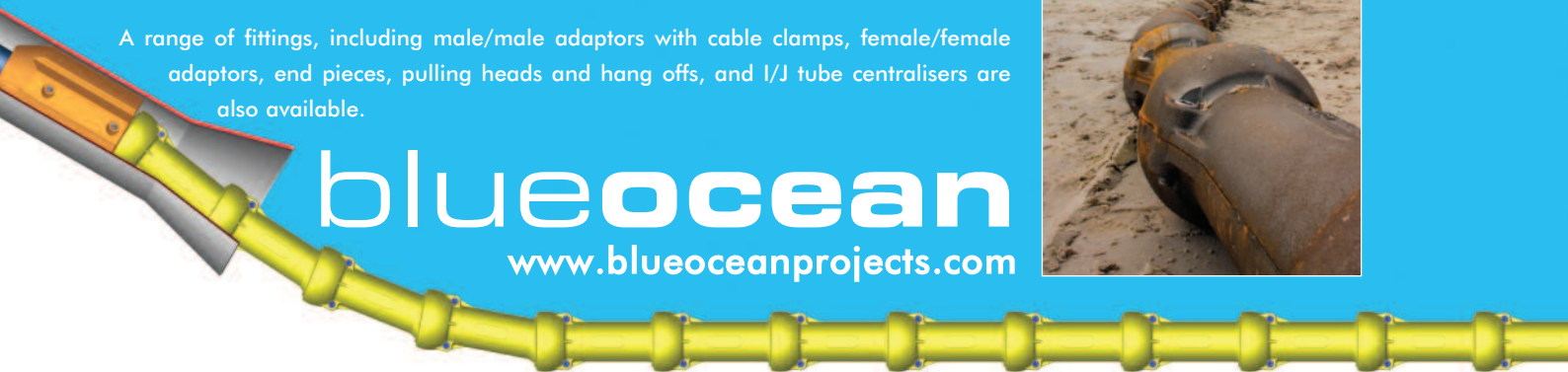
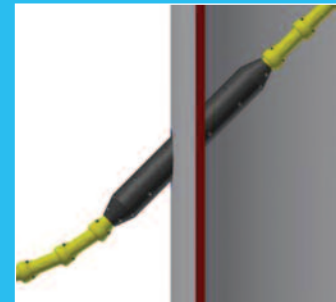
Consisting of a series of interlocking half shell modules to form a vertebrae bend restrictor around the cable, the BOP Cable Protectors are a development from conventional 'articulated pipe' (also known as 'split pipe') and are manufactured in ductile iron to provide:

- Protection against impact and abrasion
- Increased seabed stability through added weight
- Reliable and strong bend restriction to ensure that product minimum bend radius is respected
- Ease of installation and cost effective protection
- Greater articulation angle achieved at each joint than conventional split pipe, facilitating use over sheaves and chutes
- Smooth bore to facilitate longitudinal cable movement where required, for instance for cable pull-in or cable tension relief
- No sharp edges.
- All bolted assembly. Identical top and bottom castings and use of large fasteners with built in nut recesses for simplicity, speed and reliability of assembly whether onshore, on deck or subsea by divers
- Smooth outer profile for ease of pulling through apertures and structures

Manufacturing Quality & Volume Capability. Tooling is manufactured directly from 3D CAD software models for quality and precision. Castings are manufactured in a high capacity, highly automated UK foundry (with full ISO9001 quality and ISO14001 environmental certification) for quality, consistency of fitting, material traceability and dependable lead times.

A range of fittings, including male/male adaptors with cable clamps, female/female adaptors, end pieces, pulling heads and hang offs, and I/J tube centralisers are also available.

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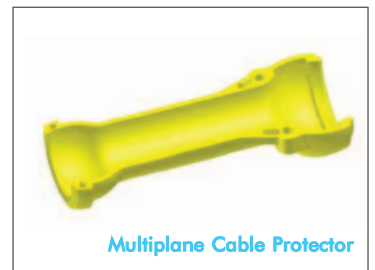


Cable Protectors

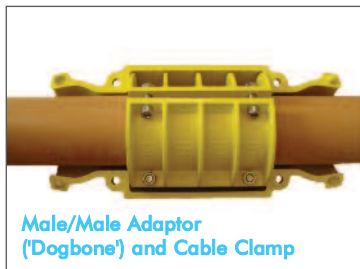
The BOP Cable Protector has a ball and socket (shoulder) joint between each interlocking module, allowing movement in any direction up to the lock out (minimum) bend radius. Normally supplied in self-coloured grade ENJ-GJS-400-15 ductile iron, with socket head cap screws and nuts as fasteners between each pair, galvanized or epoxy subsea grade paint finishes are also available. Example specifications are:

Bore Internal diameter	Pitch (effective length)	Lock out bend radius	Casting Wall thickness	Weight in air/casting	Weight in air/metre
120mm	400mm	2.0m	8.5mm	8.2kg	41kg/m
140mm	400mm	2.5m	8.5mm	10.3kg	52kg/m
160mm	400mm	2.5m	8.5mm	11.4kg	57kg/m
180mm	400mm	2.5m	8.5mm	12.7kg	64kg/m

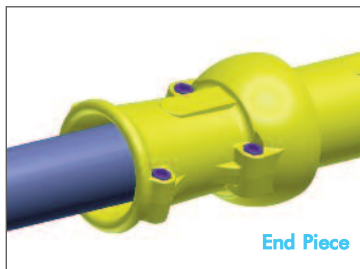
Please note: larger and smaller sizes and specifications also available, including for telecom cables and PE pipe applications, please contact us for further information



Multiplane Cable Protector



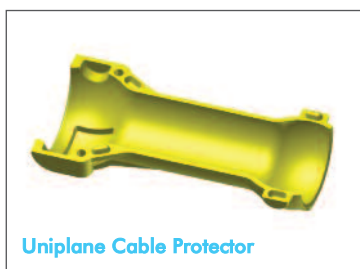
Male/Male Adaptor ('Dogbone') and Cable Clamp



End Piece



Pulling Head and Split Bowl Hang Off



Uniplane Cable Protector

Male/Male Adaptor ('Dogbone') and Cable Clamp

The male/male adaptor ('Dogbone') is designed to incorporate a cable clamp. This is typically used as the starting point for assembly. The standard cable clamp is designed as a three part clamp which provides greater tolerance of variations in cable diameter and cable 'out of roundness' than a conventional two part clamp, and also provides greater tension holding capability for a given clamping pressure.

Female/Female Adaptor

The female/female adaptor can be used as a transition adaptor with polyurethane tubular cable protectors; within 'second end' protection arrangements for array cables; and to couple runs starting from opposite directions.

End Piece

The end piece fitting has a flared internal bore to provide a mini bellmouth surface for the cable. This is the standard way of terminating a run of cable protectors to provide a smooth transition to unprotected/buried cable.

I/J tube Centraliser

The centraliser consists of a polymer outer shell mounted onto a male/male cable clamp housing, to provide a robust, non-sealing centraliser for I-tube or J-tube installations. Centralisers for use with non-sealing monopile cable entry holes are also available.

Pulling Head & 'Split Bowl' Hang Off

The pulling head can be used for deploying protector strings, for instance through a hang off flange, and then can be supported with a 'split bowl' hang off.

Uniplane Cable Protector

The Uniplane Cable Protector has a hinge (elbow) joint between each interlocking module enabling movement in one direction only up to the lock out minimum bend radius. This can be used for example to prevent unwanted cable movement or vibration from wave or current action in the horizontal plane for the section in suspension above the seabed.

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