

Product Sheet – PU Bend Restrictor

Introduction

Bend restrictors play a large part in the installation and operation of cables, umbilicals and flexible risers subsea. Bend restrictors are designed to mechanically restrict the flexible pipe from bending beyond its allowable MBR. Typical applications are support of a flexible pipe over free spans where there is the possibility of damaging the pipe structure because of over bending, wellhead connections, PLET connections, J-tube exits, rigid pipe crossovers and over a subsea buoy. Unlike bend stiffeners bend restrictors only provide protection once the flexible pipe has achieved a particular bend radius. Polymer bend restrictor elements are typically made from structural polyurethane. The main advantages of polymer bend restrictors over metallic ones is that they do not need any corrosion protection system and due to the low density of the polyurethane material they typically add less weight to the system.

Figure 1. PU Bend Restrictor in Service



Design

The restrictor is manufactured from a number of interlocking elements as shown below in Figure 2. These elements are manufactured in half shell form to allow the restrictor to be fitted at the fabrication yard or on board the vessel/platform as the line is being deployed. The half shell elements are bolted together to form a whole around the pipe, further elements are bolted to interlock with those already in place. The design

of the elements allows each one to move a small angular distance. When this distance is projected over the length of the restrictor the lock up radius is formed. The following parameters (typical) are needed to design a bend restrictor:

- Flexible Pipe/Umbilical OD and MBR
- Design loads/conditions (Static/Dynamic)
- Installation requirements
- Length of coverage
- Interface/Support structure
- Environmental conditions/Design Life

EXSTO can manufacture bend restrictors in both polyurethane and steel, depending on loading conditions. The restrictor is modelled in 3D CAD and FEA packages and computer based calculations are performed to ascertain its lock up radius and maximum load bearing capacity. Dunlaw Engineering can manufacture restrictors to suit bespoke specifications with the capability to perform extensive full-scale testing. Typical ranges include:

- Line OD: 30mm to 16”
- Bending Moment: 2kN to 150kN
- Weight per half: 0.5kg to 100kg
- MBR: 0.5m to 15m

If you would like to find out more about this product please contact EXSTO or visit: www.exsto.com

Figure 2. PU Bend Restrictor Schematic

