Flexible risers are now more common in recent years due to the increase in deep water oil and gas exploration. The flexible riser is a connection between typically a floating production system, and the subsea well or pipeline and often a means of transporting Oil & Gas. A Flexible Riser is composed of both metallic and polymer layers designed for optimal strength, weight, and flexibility under high pressures and temperature variances. The polymer sheath layer contains the process fluid and consists of certain types of polymers to form a pressure barrier that has to be resistant to chemical and mechanical degradation over time.

To maintain the integrity of the flexible riser it is important to monitor the condition of the polymer in the pressure barrier sheath. The Cosasco® Polymer Monitoring System is used for determining the potential breakdown or ageing of the polymer material under operating conditions. A number of Polymer coupons of the same material as the sheath are inserted into the flow for a certain period of time and then removed one at a time and analyzed to evaluate the condition of the pressure sheath. Based on a quantitative analysis of the coupons, an estimate of the remaining service life of the pressure sheath may be determined along with any changes to the molecular structure or chemical properties that may affect the overall strength and structural integrity of the sheath.

The Cosasco® Polymer Monitoring System consists of a polymer coupon holder and solid plug assembly installed in a standard 2” Access Fitting that would normally be located in a topside rigid pipe, downstream of the riser end connection. The assembly is also offered for use in the Cosasco 2” Hydraulic Access Fitting System. The polymer coupon assembly may be installed and retrieved under pressure using a Cosasco RSL or RBS/RBSA Retriever and Cosasco Single or Double Block and Bleed Service Valve.

### Features
- Determines Potential Breakdown and Ageing of Polymer Material Under Operating Conditions to Estimate Remaining Service Life of Pressure Sheath
- Robust Construction (Plug and Holder) for Maximum Durability and Insertion Length Under Variable Flow Conditions
- Fits in all Cosasco and Standard 2” Access Fittings
- Removable Under Pressures up to 6000 psi

### Options
- Material — SS316 or Duplex Stainless Steel
- Accommodates up to 10 or more Polymer Disc Coupons
- Disc, Dog Bone, Notched, and Bar Coupon Types Available
The coupon holder assembly is designed for maximum strength/insertion length and to reflect the process conditions the polymer sheath will be exposed to under normal production conditions over time. Depending on the type of quantitative analysis required, i.e. chemical or mechanical properties, there are four types of coupons available, including Disc, Dog Bone, Bar, and Notched.

**Disc Coupons**
Disc polymer coupons are the most common type used for determining changes in molecular weight, chemical properties and hardness of the polymer pressure sheath. Typically they are arranged in the coupon holder in quantities of 8-10, spaced, for full exposure on all sides. The number of coupons will depend on the pipe diameter and insertion length, determined by the flow conditions in the pipe. This design allows for a similar process fluid environment as would be encountered in the riser pressure sheath and carcass. Each disc has the same thickness of the polymer pressure sheath and specially cut from the original sheath material.

**Dog Bone Coupons**
Dog Bone shaped coupons are designed for analysis of both chemical and mechanical properties of the pressure sheath including torsion and tension. In addition they can also be used to measure chemical properties and hardness. The coupon holder consists of 12 to 16 pieces of pre-machined, dog bone shaped bars. This design allows for the simulation of the inner wall surface with the thin sample and provides a larger number of samples to be exposed.

**Notched Coupons**
Notched coupons are designed to simulate the thermal stress that occurs in the pressure sheath. The notch represents a machined crack that may occur in the pressure sheath due to the effects of temperature variance. A visual inspection method is used to analyze potential crack propagation.

**Bar Coupons**
Bar coupons are designed for mechanical testing. The bar coupon holder consist of 8 separate pieces with spacing in-between. They provide a fewer number of samples in comparison with the Dog Bone coupons, but provide a larger surface area and appropriate pressure sheath thickness for a variety of tests.

**Typical Flexible Pipe Composition**

- **Carcass**: (304, 316, duplex,..)
- **Polymer**: (PA11(nylon), PDVF, XLPE, PE)
- **Pressure Sheath**
- **Hoop strain armour**: (Z, T, C..)
- **Axial armour**: (2 or 4 layers)
- **Outer polymer sheath**: (PA11, PE)
- **Outer carcass/fire protection**
Polymer Coupon Type | Description | Size | Part Number
---|---|---|---
Disc Coupons | Typically 8-10, spaced, with full exposure all sides. | Typically 23mm dia x sheath thickness | Consult Factory
Dog Bone Coupons | 12-16 pieces, spaced, exposure one side. | Designed to suit holder length | Consult Factory
Bar Coupons | 8 pieces, min 1 mm clearing between sides. | Approx. 60mm x sheath thickness | Consult Factory
Notched Coupons | Notched coupon, clamped at either end | Designed to suit holder length | Consult Factory

Note: Customer will supply polymer pressure sheath material.

Access Fitting
Cosasco 2" Access fitting for coupon retrieval under pressure. Flareweld or Flanged, material to suit. See Access Fitting Datasheets for ordering information. The assembly is also offered for use in the Cosasco 2" Hydraulic Access Fitting System.

Polymer Coupon Holder Options
Dog Bone, Bar, and Notched Coupon Holders-Consult Factory.

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