AC Enviroseal for tidal power generation

by Chris Rowlands
Seals and Bearings
Wärtsilä Propulsion UK

Wärtsilä has adapted its established AC Enviroseal range to meet the needs of the renewable energy sector. This follows increasing investment by a number of countries into alternative methods of power generation such as solar, wave, wind and tidal power.

Underwater tidal power generation systems are typically mounted either on the seabed or float just below the surface and use one or more propellers to convert tidal flow into rotational energy and then electricity. Some machines are able to turn with the tide in order to keep the propeller positioned perpendicular to the flow.

The attributes needed for successful sealing in underwater tidal energy machines are the same as those required for a ship's sterntube system, but they do have to undergo slight adaptation for these special applications.

Zero leakage

The AC Enviroseal (Fig. 1), the sealing solution of choice for many customers, is from the Coastguard seal range, as fitted to numerous electric pods and conventional propeller shafts. Designed to ensure zero leakage of seawater inboard or bearing lubricant outboard, the AC seal combines the best features of a face seal and a lip seal.

The water face seal is manufactured in silicon carbide for resistance to abrasives whilst the oil lip seal is moulded from Wärtsilä's own proprietary Viton compound for reliable oil or grease sealing. Between the two seals is a vented air space to capture the small volumes of lubricant required by each seal.

The seals we have developed for the underwater tidal power generation units are very similar to our sterntube sealing systems, although here it's the tide that drives the propeller, not an engine or electric motor. The adapted AC Enviroseal is suitable due to the hard-wearing silicon carbide material we use as it can withstand abrasive particles and corrosion.

The CoastGuard System is a combined face-type and lip-type seal that operates on the principles of Newton's law of gravity. It was first introduced in 1977 but has since been updated and refined to meet the increasing demands of the 21st century.

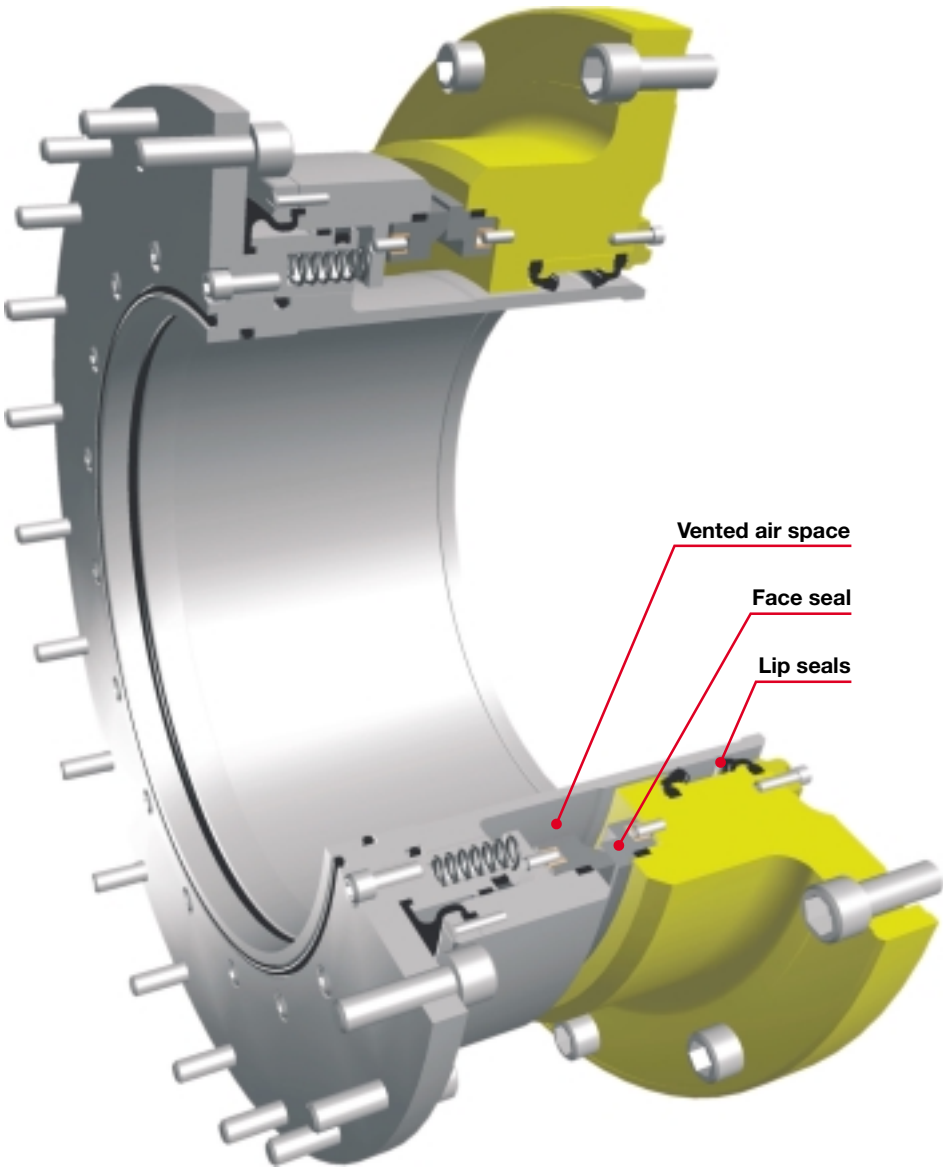

Fig. 1 – The AC Enviroseal combines the best features of a face seal and a lip seal to prevent inboard and outboard leakage.

Maintenance in situ

Both the AC and MC designs include split wearing components so that maintenance of the seals can be undertaken without removing the propeller, thereby providing a long useful service life.

The MC seal's spring system allows high axial shaft movement and vibration whilst maintaining a short fitted length. It can be fully serviced in-situ due to its split construction with either three, four or six sections, depending on seal size.

Wärtsilä's design philosophy is to always be at the cutting edge of advanced technology and developments in propeller and sterntube design, in an effort to allow extended withdrawal periods for propeller systems out to 10 years. ■