

Shaft Seal Handbook





About ESP

ESP offers a suite of products and services that are critical to global OEMs.

ESP has developed in-house engineering that helps design OEM components such as seals, metal castings and forgings, and also provides value-added assembly, inventory management programs and supply chain logistics. After working with customers on design, ESP then uses its qualified domestic and global factories to find the best cost manufacturer of the component. ESP can then provide any necessary subassembly or add the components to a highly automated inventory management program.

ESP continues to increase the value added to our customers' bottom line with successfully implemented engineering services, assembly services, assembly fixtures, kitting, global supplier qualification, vendor optimization and the technology to efficiently manage a process from sourcing to manufacturing plant delivery.

Worldwide Presence

ESP has a global strategy with physical locations in China, India and Taiwan. We made the decision that the best way to participate in globalization was to follow our customers around the globe.



Industries Served

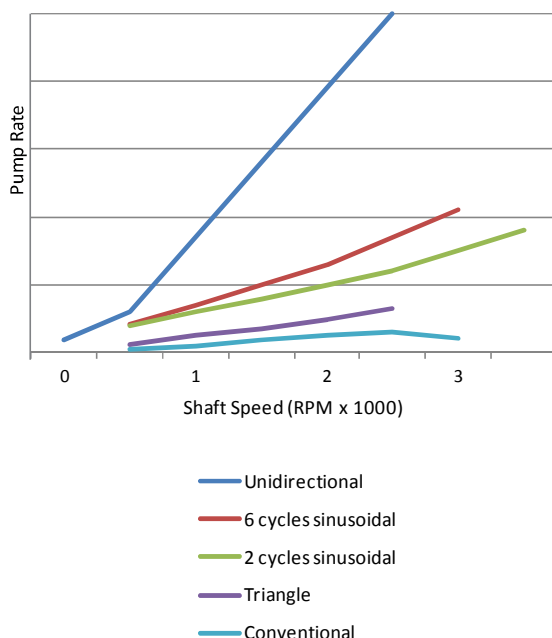
- Ag & Construction Equipment
- Fluid Power & Handling
- Power Sport Vehicles
- Powertrain Sealing Systems
- Lawn & Garden Equipment



Hydrodynamic sealing aids assist in the dynamic sealing mechanism, and increase the pumping rate back to sump. Oil that escapes past the contact width is forced back by the rotating shaft into the converging space between the rib and the lip.

The benefit of using hydrodynamic aids is the increase of underlip pressure, decrease in friction, lower running temperature and ultimately can provide longer life. In cases where there is potential for small scratches and nicks on the shaft in the contact region, aids are used to overcome the potential for dynamic leakage.

Hydrodynamic aids are available in different patterns and as both unidirectional and bidirectional. Unidirectional aids are for both clockwise or counter clockwise shaft rotation. Be aware using a clockwise unidirectional aid in a counterclockwise application will result in a large fluid leak. As the hydro-aids will act in reverse, pumping oil out of the sump.



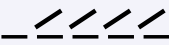
Hydrodynamics Sealing Aids.

The chart shows the different pump rates that various hydrodynamic sealing aids have.

The actual hydro aid has very specific geometry requirements. The most common issues are shown below and can be detected by installation on an acrylic shaft.

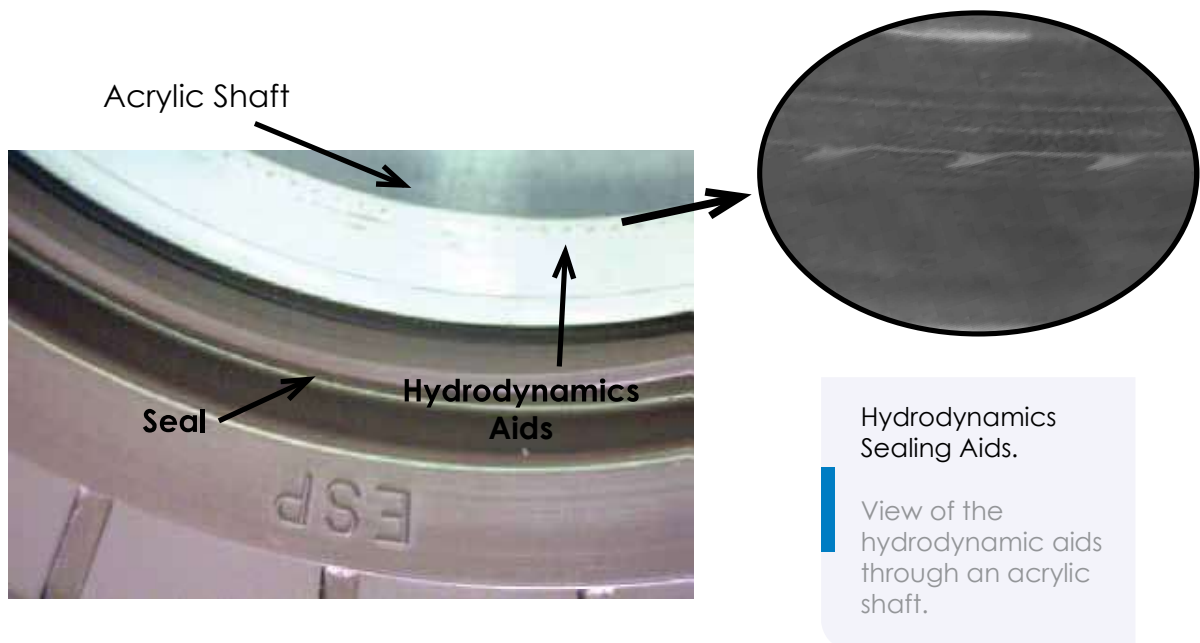
SEAL DESIGN

UNIDIRECTIONAL HELIX RIBS

No contact with primary lip		
Helix ribs too high		
Helix ribs too shallow		
Good helix ribs and contact pattern		

BI-ROTATIONAL PADS

No contact with primary lip		
Pads too high		
Pads too shallow		
Good pads and contact pattern		



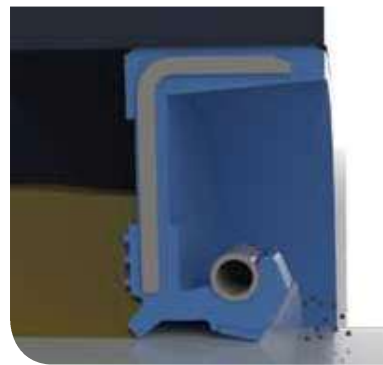
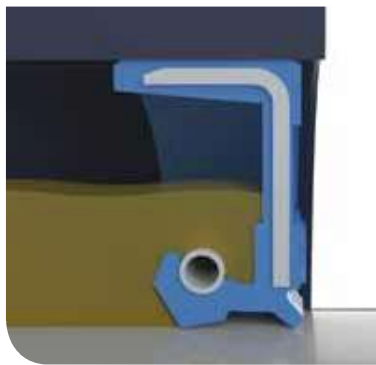
INSTALLATION DIRECTION

The installation direction determines the primary task of the seal.

It can be installed facing the air side, this is the common way to use a seal, this way the seal function is to keep the oil inside of the application.

If the function of the seal is to keep contamination out it may be installed facing the oil side. In some applications where both function are required two seals may be used, for specific applications please contact ESP International.

PROFILES



Installation direction.

The installation direction determines the primary concern of the seal, it can be to keep the oil inside or to keep the contamination out.

HYDRODYNAMIC AID DESIGNS

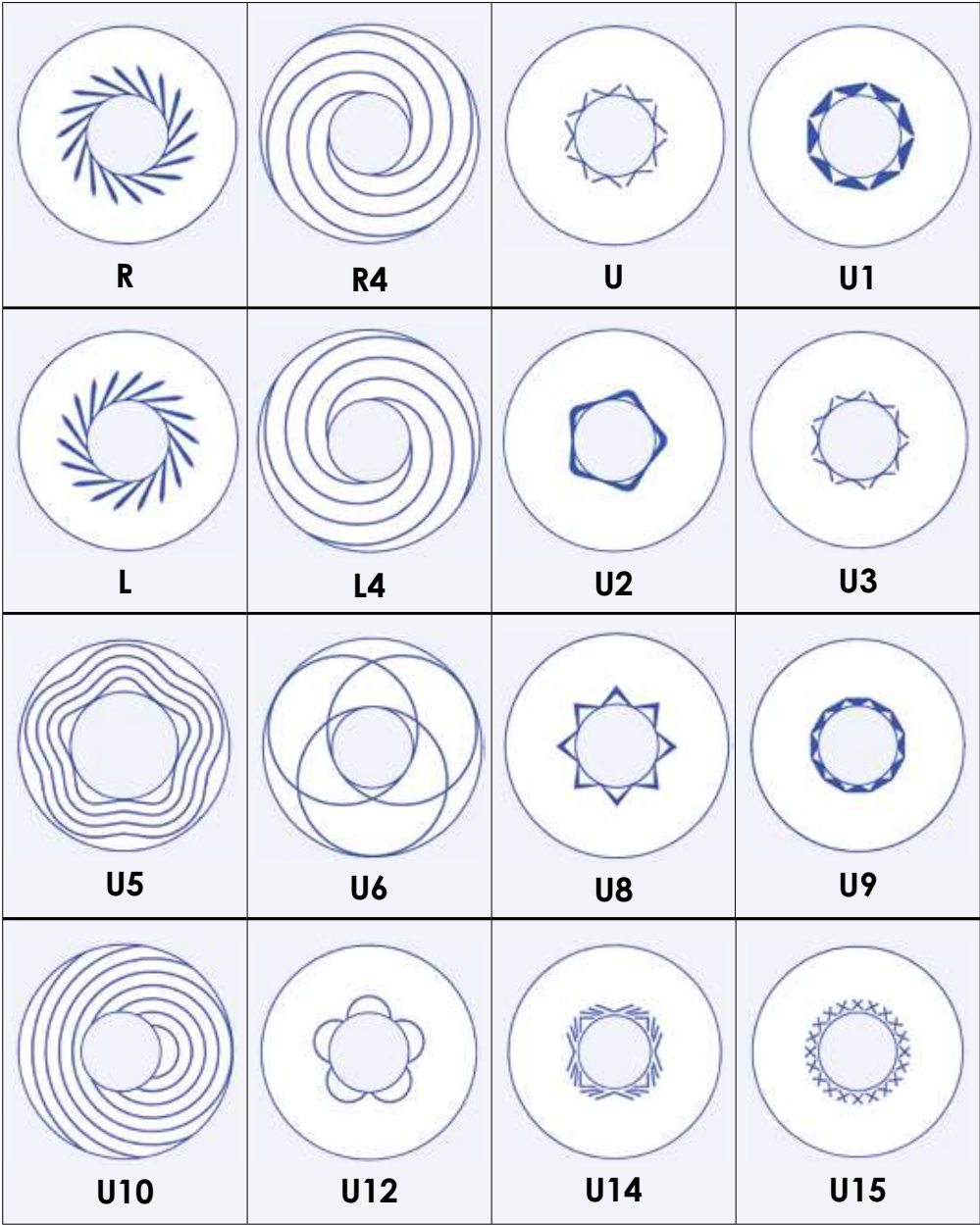
Hydrodynamic aids can provide vital sealing assistance for a given lip style. This section provides a 2-D view of the air side angle with an aid style designation. The use of a hydrodynamic aid is represented by placing an "H" in front of the radial shaft seal profile designation. If a "TC" profile utilizes a hydrodynamic aid the designation would be "HTC". More specifically, the aid style will be attached to the end of the profile designation. For a "U5" style aid, in the above example, the complete profile designation would be "HTCU5".

For example, the "L" style aid is a series of molded ribs located on the air side at an angle of 15° to 20° to the circumferential contact width.

PROFILES

PARAMETER	HYDRODYNAMIC AID
Shaft only rotates in clockwise direction	Type "R"
Shaft only rotates in counter-clockwise direction	Type "L"
Shaft rotates in both clockwise and counter-clockwise direction	Type "U"

PROFILES



For more information on hydrodynamic aids contact ESP International