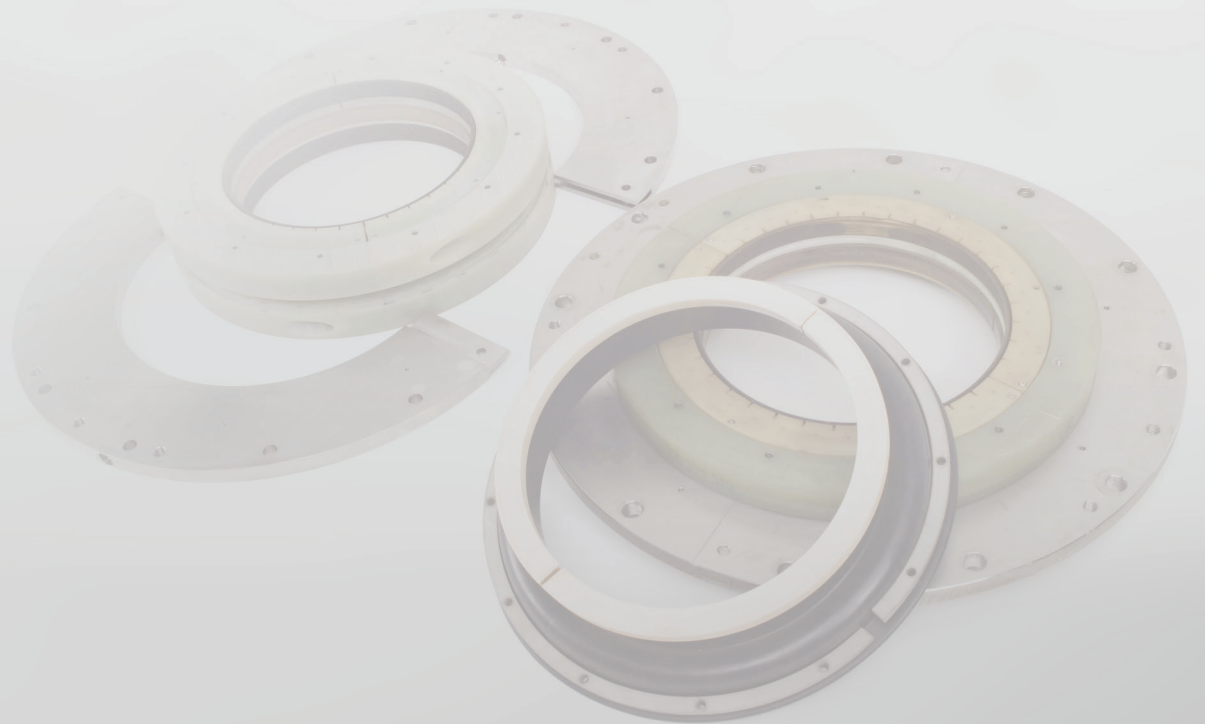




HydroActive™ Bulkhead Seals



HydroActive™ Bulkhead Seals

Technology & operational need

PRODUCT OPTIONS

ISO 9001:2008 certified, Midé Marine sells three types of bulkhead seals. All of our seals have been rigorously tested following US Naval and Class Certification guidelines.

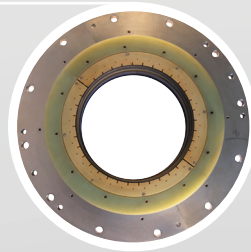
Reliant RM

The Reliant RM range of bulkhead seals are cartridge or diaphragm replacements for ships that already have bulkhead seal housings. For these ships, Reliant RM seals offer a cost effective retrofit solution, along with all of the advantages and benefits of Midé Marine HydroActive™ technology. Measurements on Reliant RM seals, installed on US Navy ships, concluded that the non-rotating seals offer superior wear performance over existing diaphragms that rotate with the shaft.



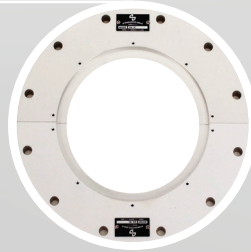
Reliant YM

Reliant YM is Midé Marine's next evolution seal design in which total system weight is reduced and maintenance is simplified. Instead of a housing, the Reliant YM series uses flat interface plates bolted to the bulkhead, on which the seal floats, to allow for large radial motions of the shaft. Reliant YM seals are installed and operating on many vessels.



Omni

Omni seals are designed for vessels that don't have the large shaft radial deflections typically required for naval ships. With fewer components, the non-floating Omni seals are significantly less expensive, and easier to install and maintain.



Patents: United States

Fluid Activated Shaft Seal
8,419,020 B2
7,828,299 B2
Bulkhead Seal
8,608,172 B2

Patents: International

Europe – 1825173
Canada – 2588676
Australia – 2005327082
Hong Kong – HK1113190
South Korea – 10-1322338

Class Certifications



HYDROACTIVE™ TECHNOLOGY

Foam with embedded hydrogel particles is the key technology that enables our HydroActive™ seals. The foam is placed inside a lip seal that is not normally in contact with the shaft. The hydrogel particles absorb water during a flooding event, and, as the particles swell, the foam pushes the lip seal into contact with the shaft - creating a water tight seal.

In summary, under normal operating conditions, no part of the seal is in contact with the shaft - allowing for unlimited shaft rotation speed without any seal wear. During a flooding event, the engaged lip seal still allows the shaft to rotate, allowing the stricken ship to reach a safe haven.

OPERATIONAL NEED

Bulkhead seals are safety components on ships. Their purpose is to stop compartment-to-compartment flooding through the shaft opening in the bulkhead. Currently most bulkhead seals on the market are based on designs that are constantly contacting or have the seal spinning with the shaft. Due to radial and axial shaft motions, shaft run out, vibrations, poor shaft/bulkhead alignment, and air differential pressures these types of seals are unreliable and expensive to maintain. High installation and maintenance costs result in unacceptable seal life-cycle costs. Midé Marine's patented non-contacting HydroActive™ bulkhead seals are not in contact with the shaft until a flooding event occurs - essentially eliminating wear.

Key HydroActive™ Features

Features & benefits

HYDROACTIVE™ BENEFITS

Reduced Total Ownership Cost

Midé Marine's line of bulkhead shaft seals have been designed using carefully chosen materials, and engineered to ensure they last the life of the vessel with little to no maintenance required. Midé Marine's HydroActive™ based designs have proven single vessel cost savings of nearly \$100,000 per seal when comparing to existing competitors' products and maintenance schedules that require costly part change outs every 3-5 years. This cost savings allows owners and operator to focus more on increasing profit, and less on maintenance and repair of safety equipment such as bulkhead seals.

Improved Safety

The non-contacting design enabled by hydrogel embedded foam actuator ensures the seal does not pre-maturely wear and works every time in an emergency.

High Shaft Angle and Vertical Operation

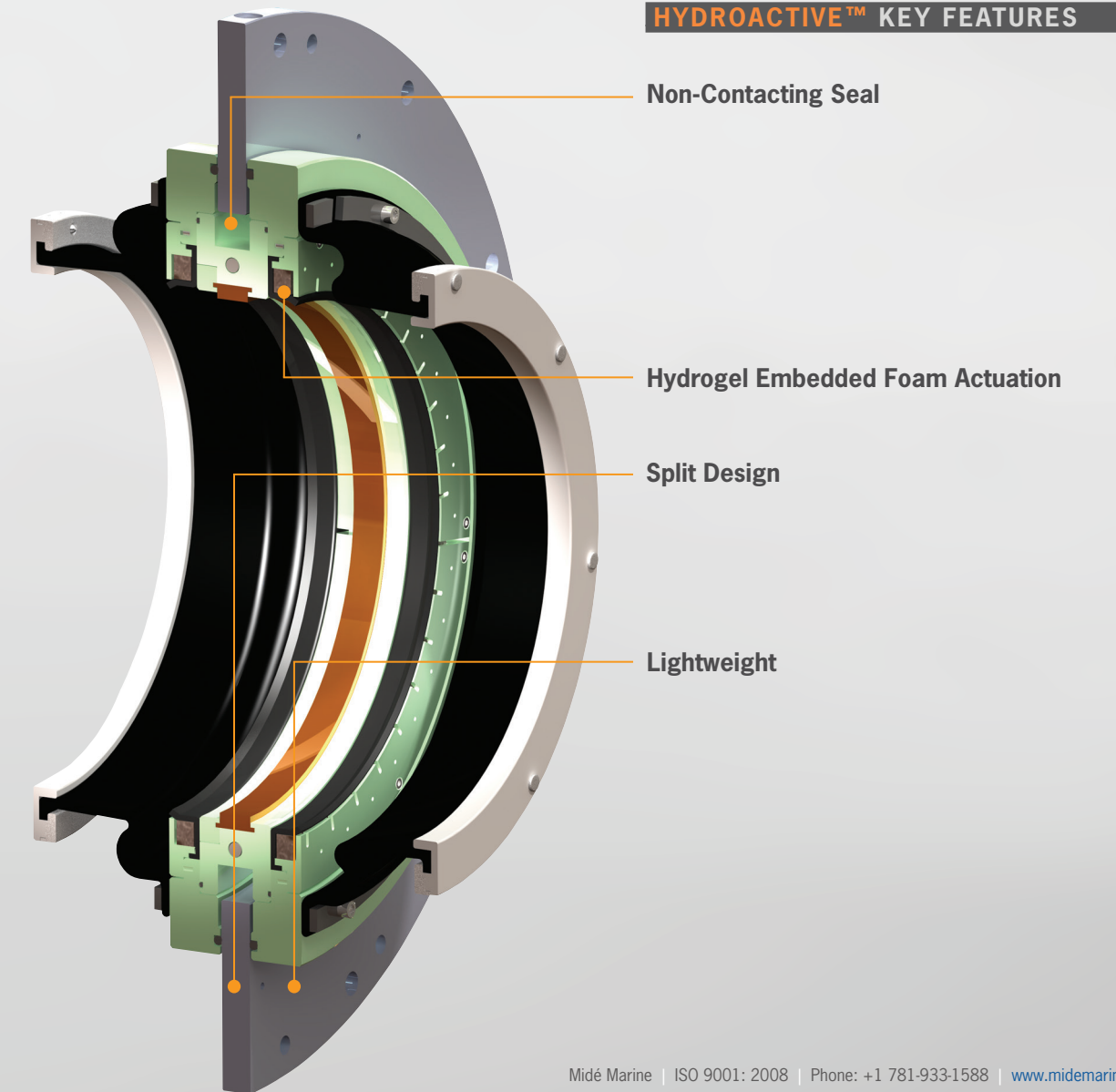
Unlike Midé Marine's non-contacting seals, conventional seals are likely to activate prematurely in vertical applications.

Silent Sealing

Self-Resettable

Easy Customization

HYDROACTIVE™ KEY FEATURES



Reliant YM & RM Series

Complete assembly & retrofit models

RELIANT KEY FEATURES & BENEFITS

Non-contacting, non-rotating floating design

Can withstand large axial and radial shaft movements Up to 50mm of radial shaft deflection and unlimited axial deflection allowed

Self-centering seal

Utilizes HydroActive™ technology to engage seal

Shock & vibration qualified to military standards

Dirt excluder & emergency clamp ring Provides backup seal

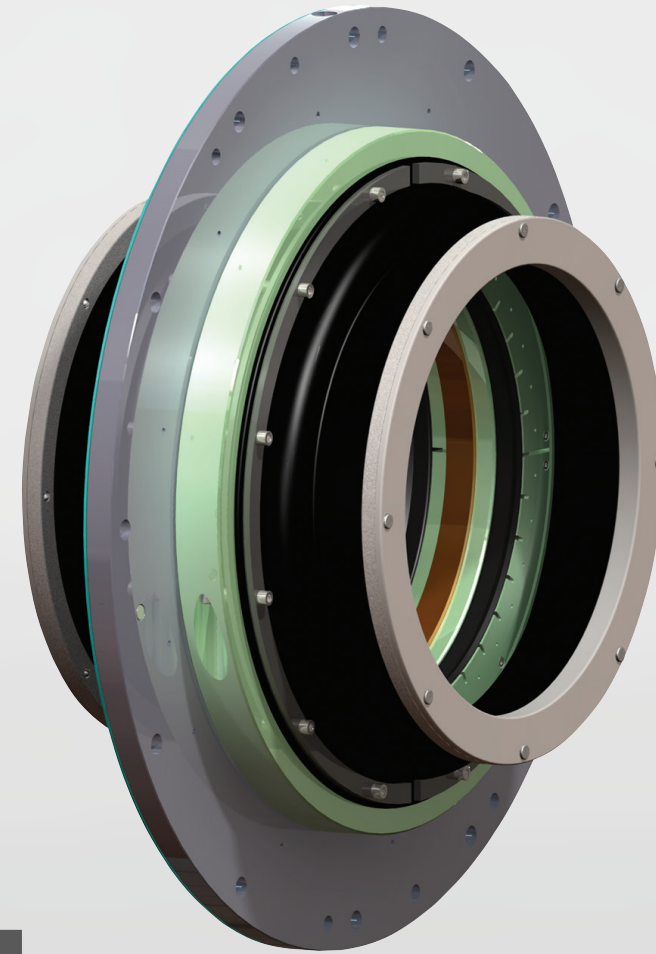
Components are lightweight & non corroding

Superior performance

Ready to integrate into military ships & boats

Retrofit solution

For Reliant RM models only

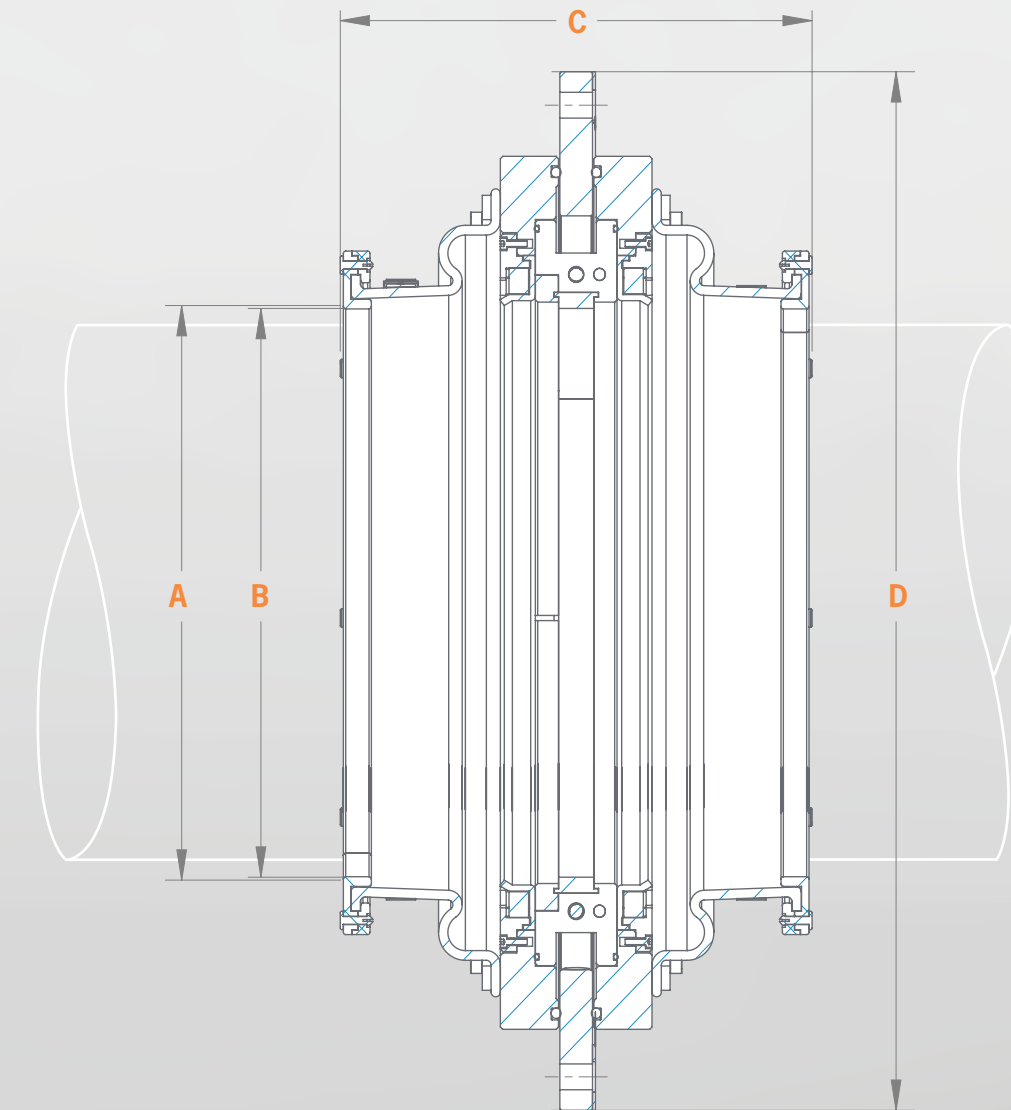


RELIANT SPECIFICATIONS

Operating Pressures	Up to 30 psi (2 bar)
Shaft Surface Speed	Dry = Unlimited. Flooded = up to 82 ft/s (25 m/s)
Surface Finish Required	63 μ-inch or better (1.6 μ-meter)
Allowable Angular Misalignment	0.5 degrees
Leak Rate	Less than 1 US Pint per minute (473 mL/min)
Shaft Deflections	Up to 50mm, 1.97" (zero to peak)
Key Features	Non-Contacting, Non-Rotating, Reusable
Approvals	NAVSEA, MIL-S-901D, MIL-STD-167-1A, ABS, DNV, BV and LR Type Approved

Standard Reliant Dimensions

Shaft diameters from 100mm - 1,000mm



Our HydroActive™ design can be engineered to meet your sealing needs. Contact Midé Marine Today!

ORDERING INFORMATION

PN: **110** - **XXX** - **20**
 Reliant YM Shaft Diameter Allowable Travel

Dimensions - all dimensions are in mm.

P/N Part Number	XXX Shaft Diameter	A Lip Seal ID	B PTFE ID	C Overall Width	D Outside Diameter
100-111-300	127.0	130.6	129.5	80.3	431.8
100-113-300	225.0	240.5	227.3	89.2	579.1
100-104-300	254.0	259.8	256.5	256.0	565.0
100-104-400	283.0	288.8	285.5	253.5	595.0
100-104-500	321.0	326.6	323.6	253.5	635.0
110-400-36-400	400.0	417.1	401.1	268.2	785.0
100-101-400	511.2	532.8	512.2	288.5	1063.6
100-103-300	760.0	795.8	765.6	299.7	1264.0

Omni Series

Cost effective HydroActive™ Solutions

OMNI KEY FEATURES & BENEFITS

Utilizes HydroActive™ technology to engage seal

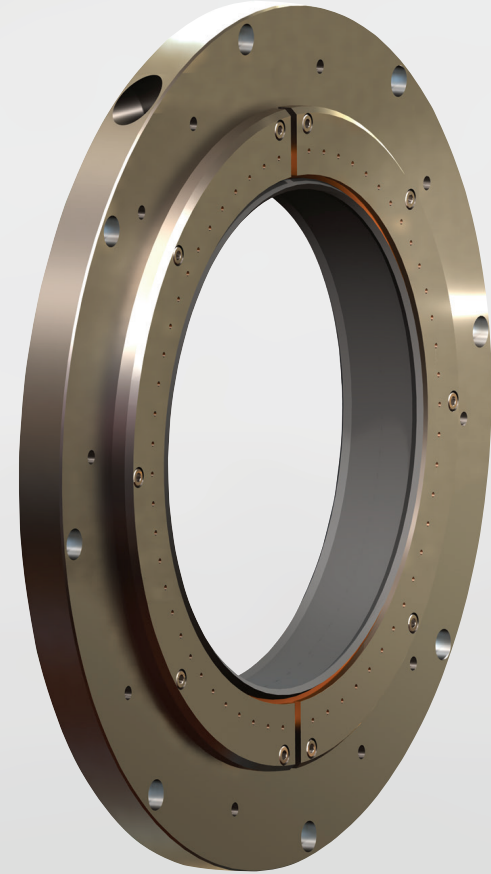
Simple non-floating static design

Can be used in applications where radial motion is less than 10mm.

Simplified shipboard installation

Lower part count

Lower procurement cost



OMNI SPECIFICATIONS

Operating Pressures	Up to 30 psi (2 bar)
Shaft Surface Speed	Dry = Unlimited. Flooded = up to 82 ft/s (25 m/s)
Surface Finish Required	63 μ-inch or better (1.6 μ-meter)
Allowable Angular Misalignment	0.5 degrees
Leak Rate	Less than 1 US Pint per minute (473 mL/min)
Shaft Deflections	Up to 10mm, 0.4" (zero to peak)
Key Features	Non-Contacting, Non-Rotating, Reusable, Cost Effective
Approvals	ABS, DNV, BV and LR Type Approved

HYDROACTIVE™ TECHNOLOGY

Military and Commercial Vessels: Omni seals have designs and sizes that meet the requirements of a wide range of military and commercial vessels.

Composite Shaft Systems: Omni seals reduce the potential for shaft damage or grooving to composite shafts, which may result from a constantly contacting seal - making them an optimal solution for use with lightweight composite shafts.

Cardan Shafts: Omni seals allow for the typical radial run out of the intermediate shaft between the universal joints of the cardan shaft - the only technically sound solution for a reliable bulkhead seal for cardan shafts.

Drawn Over Mandrel Shafting: Omni seals have been successfully tested to seal on shafts with high out of round values. Due to their non-contacting design, there is no need to machine a shaft to a desired roundness.

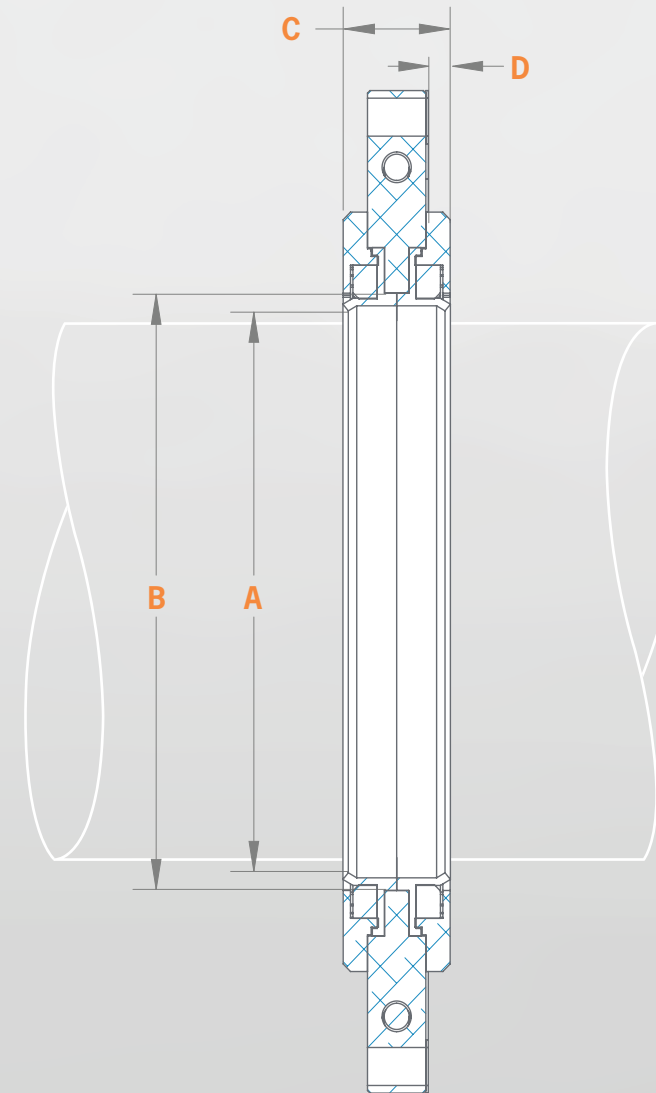
Pump Shaft Applications: Omni seals can be used to seal bulkheads around all types of rotating equipment, even pump shafts, without the risk of the equipment burning up the seal. The non-contacting design ensures that seals only contact rotating equipment when you need them - protecting them against premature failure from wear.

High RPM Shafts: Midé Marine's HydroActive™ seals can withstand large radial and axial shaft motions due to their non-contacting design - making them ideal for high speed shaft applications with high frequency shaft motions.

Vertical Shaft Applications: Since they are unaffected by gravity, Omni seals are ideally suited to vertical shaft applications due to their non-contacting design. Spinning seals will typically activate when aligned, or at an angle to the gravity vector - leading to premature wear and failure.

Standard Omni Dimensions

Shaft diameters from 50mm - 1,000mm



Our HydroActive™ design can be engineered to meet your sealing needs. Contact Midé Marine Today!

ORDERING INFORMATION

PN: 900 - XXX

Omni Shaft Diameter

Dimensions - all dimensions are in mm.

XXX	A	B	C	D
Shaft Diameter	Lip Seal ID	Hard Part Clearance	Overall Width	Flange Offset
50-150	XXX + 4	XXX + 20	44.0	8.4
151-1000	XXX + 6	XXX + 204	44.0	8.4

Origins

Midé Marine's HydroActive™ Seal

MIDÉ MARINE

Midé Marine (a Division of Midé Technology Corporation) is an engineering company that excels in the development of advanced engineering components and systems. After the United States Navy Destroyer USS Cole (DDG 67), was attacked in Yemen in 2000, and a compartment was flooded when a bulkhead seal failed, the United States Navy sought a better bulkhead seal design to protect its fleet and sailors.

Through a Navy small business innovative research (SBIR) award, the Navy funded Midé Marine to develop a novel approach to solving the bulkhead seal problem. The Hydro-Active™ bulkhead seal was the outcome of this multi-year development program.

Today Midé Marine offers a turn-key solution to bulkhead seal systems, with the analytical and experimental facilities to develop new designs for unique marine applications and to analyze, test and validate that the design will perform according to customer requirements. Midé Marine's quality assurance standards and procedures have been reviewed and approved by large OEM customers and Midé Marine has been assessed and approved by National Quality Assurance, U.S.A., against the provisions of: ISO 9001: 2008.

QUALIFIED SERVICE PROVIDER

Midé Marine provides unparalleled customer service and support throughout the life of its marine products.

- A professional team with an extensive repertoire of skills and expertise
- Delivering support, installation, inspection, and maintenance
- Managing complex efforts at U.S. shipyards and abroad

CONTACT INFORMATION

Midé Marine - ISO 9001:2008

200 Boston Avenue, Suite 1000
Medford, MA 02155, USA

Phone: +1 781-933-1588

Fax: +1 781-306-0619

Web: www.midemarine.com

Email: service@midemarine.com

