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SEALING SOLUTIONS FOR  
**Marine Vessels**

A large offshore oil rig is the central focus, featuring a complex network of steel towers and platforms. A flare on the left side of the rig is emitting a bright orange flame. To the right, a smaller red and white supply vessel is visible on the water. The background shows a vast blue ocean under a clear sky.

We succeed  
when you  
succeed.



# Our Vision

Evolution isn't a choice in today's business landscape; it's the only way to succeed.

Progress relies on everything moving forward, from people to machinery to production. Everything must flow.

As we engineer our way to a better world, we are breaking down barriers, making sure each process is in place, always reflecting and improving. We are experts at delivering the best sealing solutions to help our customers unlock their highest potential.

Our global community of industry-leading specialists drive our innovative production and materials to consistently raise the bar.

Whether subjected to the stresses of everyday use, specialized applications, high-temperature environments, or liquid and gas service, our products are engineered to provide reliable sealing integrity.

At Durlon, we succeed when you succeed.

**DURLON**<sup>®</sup>  
SEALING SOLUTIONS

# Sealing Solutions for the Marine Industry

The commercial marine industry is a dynamic and global sector involved in the operation, management, and transportation of goods, passengers, and resources by sea. It encompasses a wide range of activities, including shipping, fishing, offshore exploration and production, tourism and leisure, port operations, and maritime services.

This industry plays a critical role in international trade, resource exploration, and economic development, and is subject to international regulations, environmental considerations, and evolving technologies to ensure safety, sustainability, and efficiency in maritime operations.

The following are examples of commercial marine vessels and systems where gasketed connections may be used:

## **Offshore Supply Vessels (OSVs)**

Offshore Supply Vessels (OSVs) are a diverse category of vessels used in offshore oil and gas operations. They serve various roles and provide support services to offshore installations and platforms.

- Piping systems, such as those for fuel transfer, ballast water, or hydraulic systems.
- Valve assemblies for fluid control and regulation.
- Fuel-transfer pumps or firefighting pumps.

## **Drill Ships**

Drill ships are specialized vessels used for offshore drilling operations, particularly in deep water or remote locations. They are equipped with drilling equipment, including a drilling rig, derrick, and other systems necessary for drilling wells.

- Drilling system, mud-circulation systems, and other onboard piping systems.
- Drilling fluid control, circulation, and well control.

## **Floating Production Storage and Offloading (FPSO) Vessels**

FPSO vessels are floating facilities used in offshore oil and gas production. They are designed to receive, process, store, and offload hydrocarbons produced from offshore fields.

- Oil and gas processing, storage, and offloading.
- Fluid and gas control.
- Fluid transfer and processing.

## **Floating Storage and Offloading (FSO) Vessels**

FSO vessels are floating facilities used for the storage and offloading of hydrocarbons from offshore production fields. They provide storage capacity and facilitate transfer to transport vessels or onshore facilities.

- Cargo storage and offloading systems.
- Fluid-transfer and control systems.
- Ballast and associated piping systems.



### **Oil Tankers**

Oil tankers are vessels specifically designed for the transportation of oil and other liquid petroleum products. They come in various sizes and configurations to meet the diverse needs of the oil industry.

- Cargo-transfer systems, ballast systems, and other piping systems.
- Cargo handling, transfer, and control.

### **LNG Carriers**

Liquefied Natural Gas (LNG) carriers are specialized vessels designed for the transportation of LNG at cryogenic temperatures. They are crucial in the global LNG trade, facilitating the efficient and safe delivery of natural gas to various destinations.

- Cargo transfer systems, including cryogenic applications.
- LNG control, transfer, and handling.

### **Pipe-laying Vessels**

Pipe-laying vessels are specialized vessels used in offshore construction projects to lay and install subsea pipelines for the transportation of oil, gas, and other fluids. These vessels are equipped with advanced equipment and systems to handle the laying process efficiently.

- Pipeline connections and fittings during installation.
- Pipeline control, flushing, and testing.

### **Well Intervention Vessels**

Well intervention vessels are specialized vessels used in the offshore oil and gas industry to perform maintenance, repair, and enhancement operations on subsea wells. These vessels are equipped with various tools, equipment, and systems to intervene in wells and ensure their optimal performance.

- Well-control and intervention systems, including blowout preventers (BOPs) and wellhead connections.



### **Cargo Ships**

Cargo ships are used for transporting goods in bulk or containers. They have various mechanical components such as engines, pumps, valves, and piping systems.

### **Passenger Ships**

Passenger ships, including cruise ships and ferries, are designed for transporting people. They have complex mechanical systems, including engines, generators, HVAC systems, plumbing systems, and associated piping.

### **Fishing Vessels**

Fishing vessels are specialized boats used for commercial fishing activities. They have mechanical components like engines, pumps, valves, and hydraulic systems.

### **Tugboats and Towboats**

Tugboats and towboats are used for towing and manoeuvring larger vessels, barges, or floating structures. They have engines, fuel systems, cooling systems, and hydraulic systems.



### **Research Vessels**

Research vessels are equipped for scientific exploration and data collection at sea. They have various mechanical components, including engines, pumps, valves, and complex scientific equipment.

### **Dredgers**

Dredgers are vessels used for dredging operations to remove sediment and maintain waterways. They contain mechanical components like engines, pumps, valves, and hydraulic systems.

### **Yachts and Pleasure Craft**

Yachts and pleasure craft are recreational vessels used for leisure activities. They have engines, fuel systems, water systems, HVAC systems, and other mechanical components.

### **Barges**

Barges are flat-bottomed vessels used for transporting goods or materials in bulk. They may have mechanical components such as engines, pumps, valves, and piping systems.

### **Emissions Reduction**

The IMO 2020 sulfur limit, established under MARPOL Annex VI, limits the sulfur content of fuel oil used on board ships to 0.50% m/m outside designated Emission Control Areas (ECAs). Stricter sulfur limits apply within designated ECAs. The requirements are intended to reduce sulfur oxide (SOx) emissions from ships and their effects on human health and the environment.

Commercial marine vessels that are required to reduce sulfur emissions from their exhaust systems typically employ sulfur-reducing technologies, such as exhaust gas cleaning systems or scrubbers. These technologies are designed to remove sulfur oxides (SOx) from the exhaust gases emitted by the vessels. Vessel types that may use exhaust gas cleaning systems include cruise ships, ferries, container ships, bulk carriers, and tankers.

Ships may comply with applicable sulfur-emission requirements by using compliant fuel oil or, where permitted, an approved equivalent method such as an exhaust gas cleaning system (EGCS), commonly referred to as a scrubber.

Gaskets used in exhaust gas cleaning systems must be selected for the applicable temperature, pressure, chemical composition, and flange conditions. Depending on the service, suitable constructions may include flexible graphite, compressed non-asbestos materials, PTFE-based materials, and metallic or semi-metallic gaskets using corrosion-resistant alloys.



Innovative products  
**Unparalleled service**

# Durlon® Metallic & Semi-Metallic Gasketing

Durlon® metallic gaskets are manufactured from metallic materials selected to withstand demanding temperatures, pressures, and chemical environments. Available in standard and custom configurations, these rugged metal gaskets are manufactured from a variety of materials to accommodate a wide range of process applications.

Depending on the gasket design, sealing is achieved through controlled compression or deformation of the gasket and its sealing elements against the flange surfaces.

Durlon® semi-metallic gaskets combine metallic and non-metallic components and may consist of a metal core with sealing materials on both flat surfaces or a pliable core enclosed in a thin metallic casing. These gaskets are available in a wide variety of styles and sizes and can be manufactured from various metals and filler or facing materials to suit the application. Their suitability for corrosive media depends on the selection of the metal and filler or facing material.

Our computer-aided manufacturing process uses rigorous quality control programs to ensure premium quality product performance. The metallic component gives the gasket superior structural integrity, while the non-metallic element ensures superior sealing. Effective sealing requires proper gasket selection based on the joint design and operating conditions. The following elements must be considered when determining the correct gasket for the application.

## **Temperature**

Most gaskets consist of two or more components or ingredients. The overall temperature resistance of a gasket is determined through analysis of the upper and lower limits for each component. There

are two parts that need to be considered and verified when selecting the correct gasket material. The first part is to verify the metal component used to ensure the maximum temperature for the material is not exceeded. Secondly, the maximum temperature rating for the filler or facing material must be verified to ensure it is not exceeded. In most cases the filler or facing material will be the governing factor when selecting a semi-metallic gasket.

## **Chemical Compatibility**

The gasket materials must be compatible with the process media and resistant to chemical attack under the intended service conditions. Media composition and concentration, temperature, exposure time, and operating conditions should be considered when selecting both the gasket metallurgy and the filler or facing material.

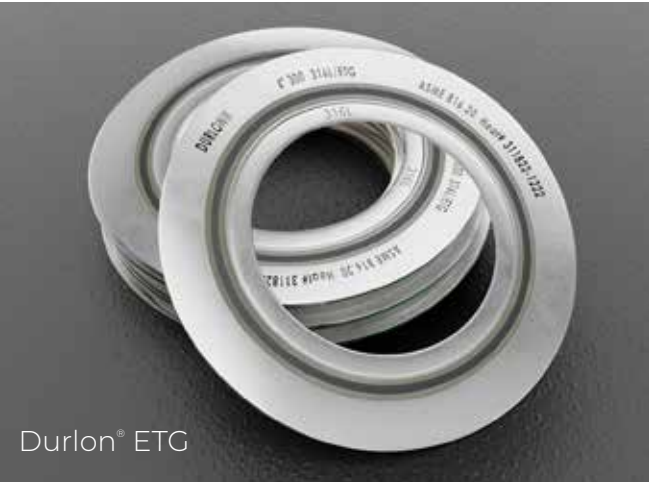
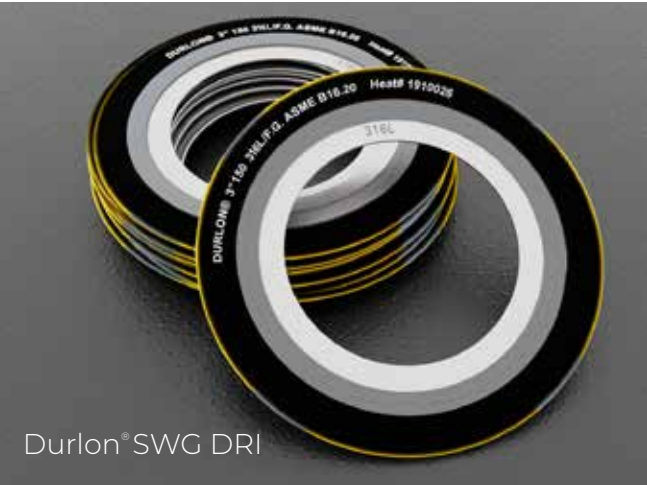
## **Flange Compatibility**

The flange must provide sufficient clamping force and an appropriate surface finish for the selected gasket design. Flange materials should also be evaluated for compatibility with the metallurgy used in semi-metallic gaskets. Where dissimilar metals are present, the potential for galvanic corrosion should be considered.

## **Gasket Seating Stress**

Gasket seating stress is the compressive stress applied to the gasket during assembly to achieve the required level of seating and sealing. Seating stress must also be considered in relation to the gasket type and flange surface finish. The minimum and maximum seating stresses are product-specific and recommended by the manufacturer. The table below shows the recommended minimum and maximum seating stresses for Durlon® metallic gasketing products.

# Durlon® Product Recommendations



# Physical Properties & Certifications

| Physical Properties                              | 8500                                            | 9000                                              | SWG                 | CFG                                                   | Durtec®                                           | ETG                                       |
|--------------------------------------------------|-------------------------------------------------|---------------------------------------------------|---------------------|-------------------------------------------------------|---------------------------------------------------|-------------------------------------------|
| Composition                                      | Aramid-Inorganic NBR                            | Inorganic Filler / Pure PTFE Resins               | Spiral Wound Gasket | Corrugated Flexible Graphite                          | Specially Engineered Metal Core Technology        | Extreme Temperature Gasket                |
| Color                                            | Green                                           | Blue                                              | Style: DRI          | -                                                     | -                                                 | SWG / Durtec® / Kammprofile               |
| Temperature:<br>Min<br>Max<br>Continuous, Max    | -40°C (-40°F)<br>371°C (700°F)<br>287°C (548°F) | -212°C (-350°F)<br>271°C (520°F)<br>260°C (500°F) | -                   | -200°C (-328°F)<br>650°C (1,200°F)<br>550°C (1,022°F) | -200°C (-328°F)<br>450°C (842°F)<br>400°C (752°F) | > 650°C (1,200°F) up to 1,000°C (1,832°F) |
| Pressure, max, bar (psi)                         | 103 (1,500)                                     | 103 (1,500)                                       | -                   | 207 (3,000)                                           | 430.9 (6,250)                                     | -                                         |
| Density, g/cm <sup>3</sup> (lb/ft <sup>3</sup> ) | 1.7 (106)                                       | 2.2 (138)                                         | -                   | -                                                     | -                                                 | -                                         |
| Compressibility, %                               | 8-16                                            | 8-16                                              | -                   | -                                                     | -                                                 | -                                         |
| Recovery, %                                      | 50                                              | 40                                                | -                   | -                                                     | -                                                 | -                                         |
| Creep Relaxation, %                              | 20                                              | 30                                                | -                   | -                                                     | -                                                 | -                                         |
| Tensile Strength, MPa (psi)                      | 13.8 (2,000)                                    | 13.8 (2,000)                                      | -                   | -                                                     | -                                                 | -                                         |
| Nitrogen Sealability ASTM F2378                  | 0.03 mL/min                                     | 0.01 mL/min                                       | -                   | -                                                     | -                                                 | -                                         |
| pH range, Room Temperature                       | -                                               | -                                                 | -                   | -                                                     | -                                                 | -                                         |

Durlon® SWG - All Durlon® SWG's are manufactured in accordance with ASME B16.20. Quality Assurance complies with API Specification Q1 and ISO 9001 standards. Super-inhibited graphite meets the requirements of Shell Specification MESC SPE 85/203 and meets PVRC SCR Flexible Graphite Specification for FG 600 material.

Durlon® ETG adds an inner and outer protection boundary in the form of a mica-phyllsilicate based sealing material - Durlon® HT1000® : consists of phlogopite mica paper impregnated with an inorganic binder at less than half the binder amount found in a typical vermiculite-phyllsilicate filled product. This lower binder content allows for superior weight retention and results in ultimate extreme temperature sealing performance.

Durlon® Durtec® - Actual performance and service life are dependent upon material selection, operating conditions and environmental factors.

| Style   | Certifications                                                                                                                                                                                                                                                                                    |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8500    | California Proposition 65 and RoHS and REACH Declaration compliant, API 6FB Fire Test with avg. temperature >650°C, 30 minutes, 40 bar, 1 mL/(in·min) max allowable leakage, Conforms to the FDA requirements of 21 CFR 177.2600, ABS Tier2 - PDA Issued.                                         |
| 9000    | Passed API 6FA, 3rd Edition Fire Test, Meets USP Plastic Class VI requirements at 121°C (250°F), Conforms to FDA 21 CFR 177.1550, TA-Luft (VDI Guideline 2440) approved material, ABS-PDA approved and listed in Chlorine Institute Pamphlet 95, (EC) 1935/2004 & EU (10/2011) approved material. |
| SWG     | TA-Luft (VDI Guideline 2440), Tested to 6FB Fire Test- 6 inch Class 300 SWG FG.                                                                                                                                                                                                                   |
| CFG     | RoHS and REACH Declaration compliant, API 6FB Fire Test.                                                                                                                                                                                                                                          |
| Durtec® | Passed modified API 607 fire test and meets the requirements of Shell Specification MESC SPE 85/203 & PVRC SCR Flexible Graphite Specification for FG 600 material, RoHS and REACH Declaration.                                                                                                   |
| ETG     | API 6FB, Fourth Edition 2019, Type 1 (Onshore Test), API 6FB, Fourth Edition 2019, Type 2 (Offshore Test), API 607, 4th Edition Fire Test with Exxon modifications.                                                                                                                               |

**Note:** ASTM properties are based on 1/16" sheet thickness, except ASTM F38 which is based on 1/32" sheet thickness. This is a general guide only and should not be the sole means of accepting or rejecting this material. The data listed here falls within the normal range of product properties, but should not be used to establish specification limits nor used alone as the basis of design. For applications above Class 300, contact our technical department.

**Warning:** Durlon® gasket materials should never be recommended when both temperature and pressure are at the maximum listed. Properties and applications stated are typical. No applications should be undertaken by anyone without independent study and evaluation for suitability. Never use more than one gasket in one flange joint and never reuse a gasket. Improper use or gasket selection could cause property damage and/or serious injury. Data reported is a compilation of field testing, field service reports and/or in-house testing. While the utmost care has gone into publishing the information contained herein, we assume no responsibility for errors. Specifications and information contained within are subject to change without notice. This edition cancels and obsoletes all previous editions.



The core of the Durlon® brand is to provide fluid sealing solutions that make sense, both financially and strategically. We accomplish this through process-oriented design, sector-specific knowledge, and extensive testing. Our goal is to ensure performance and safety while operating under

a quality management system registered to ISO 9001:2015.

At Durlon, we offer specially developed sealing solutions tailored to your specific needs.

**DURLON®**  
SEALING SOLUTIONS

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