

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



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SEALING SOLUTIONS FOR  
**Marine Vessels**



We Succeeded  
When you  
Succeeded.



# 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 through the stress of everyday use, or specialized applications and high-temperature environments, liquid or gas, our products deliver sustainable integrity.

At Durlon, we succeed when you succeed.

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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.

Here are some examples of various types of commercial marine vessels and the mechanical components containing gaskets:

## **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 fluid control and regulation.
- Fuel transfer pumps or fire fighting 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 system, and other piping systems onboard.
- 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 temporary storage and offloading of oil or gas from offshore production fields. They provide storage capacity and facilitate the transfer of hydrocarbons to tankers for transportation to onshore facilities.

- Same as FPSOs



### **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 connections.
- 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 sub-sea 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 sub-sea 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 preventer's (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 more.

### **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 Tow Boats**

Tugboats and tow boats 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 2020 low sulfur legislation refers to a significant regulation implemented by the International Maritime Organization (IMO), an agency of the United Nations responsible for maritime safety and environmental protection. This regulation, known as IMO 2020 or the Sulphur 2020 cap, aims to reduce sulfur oxide (SO<sub>x</sub>) emissions from ships operating worldwide.

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 (SO<sub>x</sub>) from the exhaust gases emitted by the vessels. Here are some types of commercial marine vessels that may utilize sulfur reducing exhaust systems: Cruise Ships, Ferries, Container Ships, Bulk Carriers, and Tankers.

It's important to note that the installation of sulfur reducing exhaust systems or scrubbers is dependent on the vessel owner's compliance strategy, regulatory requirements, and regional emission standards. The specific adoption of such systems may vary among vessels within these categories.

Gaskets used in sulfur reducing exhaust systems are typically made from materials that can withstand the corrosive nature of exhaust gases and liquids, as well as the high temperatures involved. Common gasket materials used in these applications include stainless steel, graphite, elastomers, and specialized high-temperature and chemical-resistant materials.



Innovative products  
**Unparalleled service**

# Durlon® Metallic & Semi-Metallic Gasketing

Durlon® metallic gaskets are manufactured from a combination of metals and designed to withstand extreme temperatures, pressures and chemical exposure. Available in standard and custom configurations, these rugged metal gaskets are made of a wide range of materials to accommodate all types of process applications.

These gaskets are designed to work by "initial line contact" or a wedging action between the flange and the gasket.

Durlon® semi-metallic gaskets include both metallic and non-metallic components, either containing a metal core with sealing materials on both flat surfaces, or a pliable core encased in a thin metallic casing. These configurations are most popular, and available in a wide variety of styles and sizes. They can typically be fabricated of any metal which is available in thin strip or sheet, and that can be welded. Therefore, they can be used against virtually any corrosive medium dependent upon the choice 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. To be able to achieve an effective seal, proper gasket selection must occur with metallic gaskets. 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 sacrificial element and will be the governing factor when selecting a semi-metallic gasket.

## **Chemical Compatibility**

The gasket must be resistant to chemical corrosion or chemical attack. The rate of corrosion is dependent on the time, temperature, and concentration of the media and must be considered when selecting both the gasket metallurgy and filler or facing material.

## **Flange Compatibility**

The flange itself must be designed so that it can apply a sufficient amount of clamping force to ensure the flange serrations are biting into, or seating the gasket. Flange materials also need to be verified against the specified metallurgy in semi-metallic gaskets. If left unverified, it is possible for galvanic type corrosion to occur due to dissimilar metals.

## **Gasket Seating Stress**

The gasket seating stress is the minimum force required to compress the gasket so that it forms an effective seal while resisting the blowout or internal pressure of the system. Seating stress must also be taken into consideration with both 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 stresses for Durlon® metallic gasketing products.

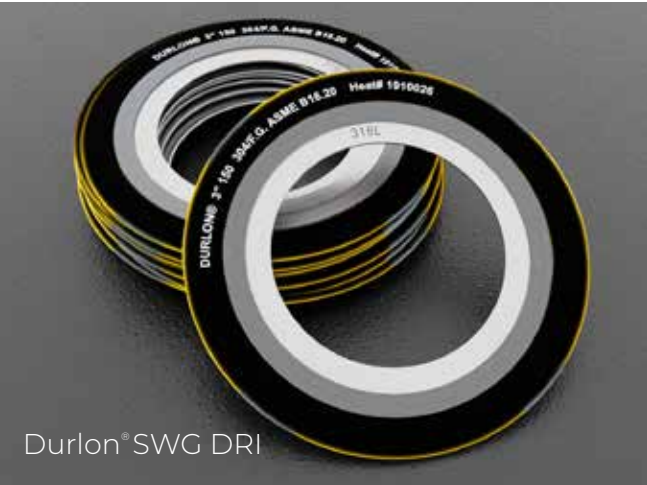
# Durlon® Product Recommendations



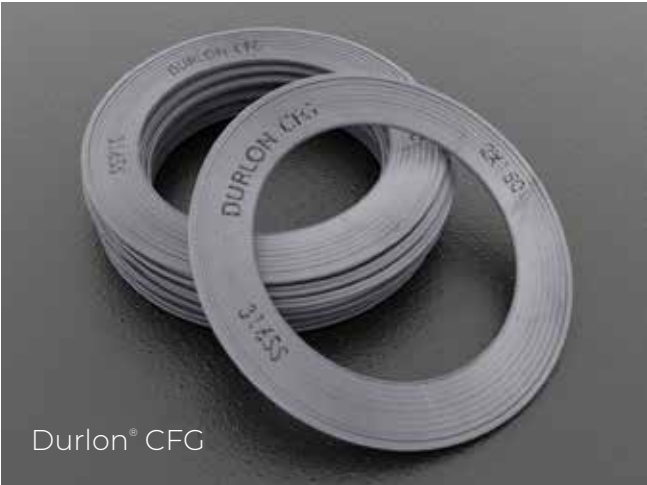
Durlon® 8500



Durlon® 9000



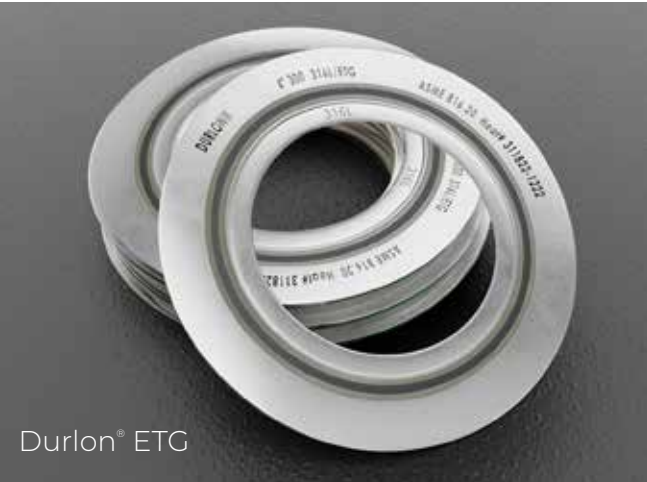
Durlon® SWG DRI



Durlon® CFC



Durlon® Durtec®



Durlon® ETG

# 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>1,000°C (1,832°F)<br>650°C (1,200°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/cc (lbs/ft³)                       | 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 2378                | 0.03 cc/min                                     | 0.01 cc/min                                       | -                   | -   | -   | -   |
| pH range, Room Temperature                    | -   | -   | -                   | -   | -   | -   |

Durlon® SWG - All Durlon® SWG's are manufactured according to ASME B16.20 standards. Quality Assurance complies with API Specifications Q1 and ISO 9001 standards. Super Inhibited Graphite meets the requirements of Shell Specification MESC SPE 85/203 and meets PVRC SCR Flexible Graphite Spec 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® - Physical Properties: dependent on facing material and metallurgy of core, data shown above is for Inconel® 625 core and HT1000® covering layers.

| Style   | Certifications  |
|---------|---|
| 8500    | California Proposition 65 and RoHS Reach Declaration compliant, API 6FB Fire Test with avg. temperature >650°C, 30 minutes, 40 bar, 1 ml (inch/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, Met requirements of 121°C (250°F) for USP for Plastic Class VI, Conforms to required 21 CFR 177.1550 for FDA, TA-luft (VDI Guideline 2440) approved material, ABS-PDA & Pamphlet 95 approved material - chlorine institute, (EC) 1935/2004 & EU (10/2011) approved material. |
| SWG     | TA-luft (VDI Guideline 2440), API Standard 6FB Fire Test- 6 inch Class 300 SWG FG   |
| CFG     | RoHS 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 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 specifications 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.

