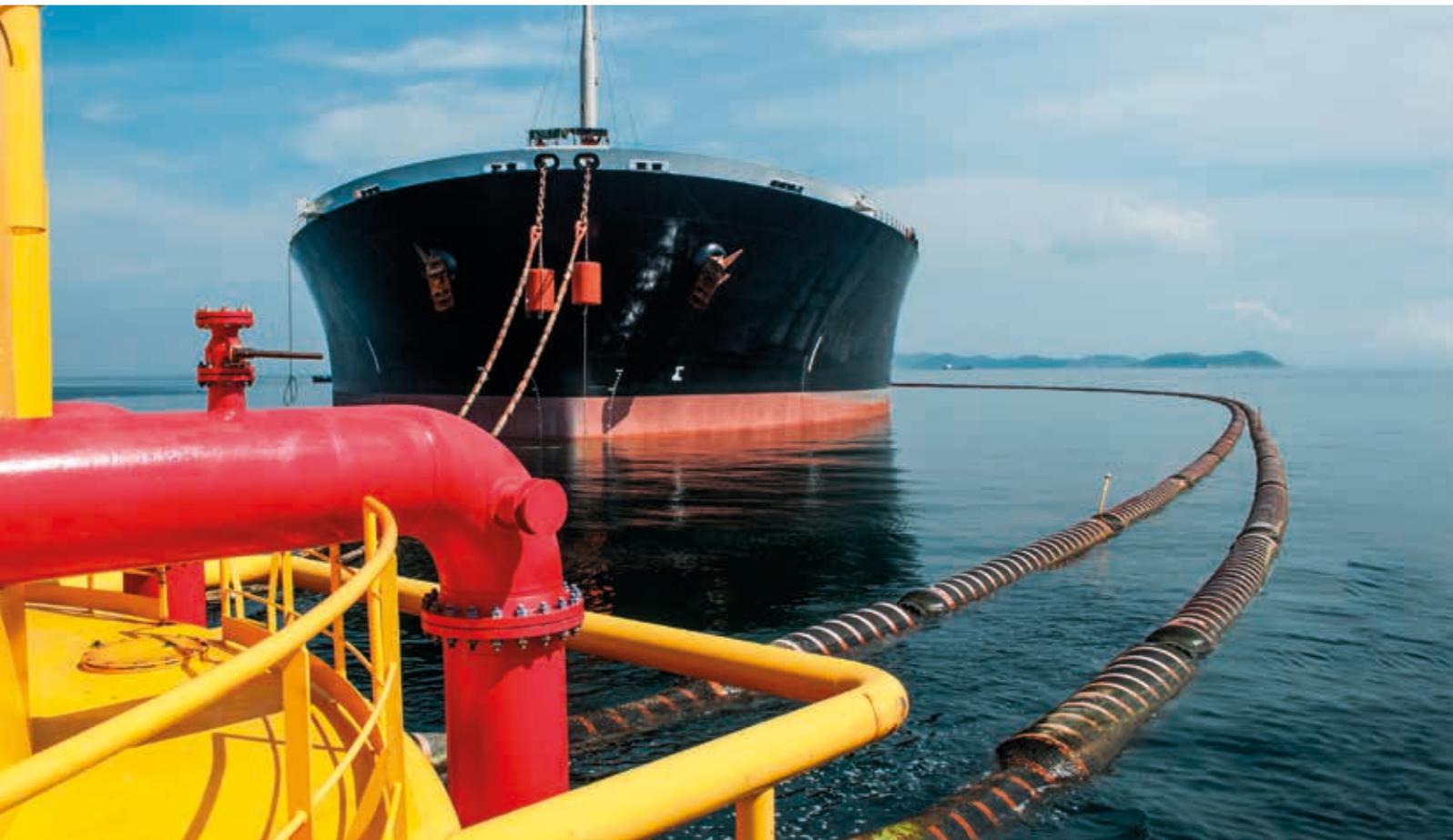




ALFAGOMMA

OIL & MARINE



// ALFAGOMMA

Alfagomma is a leading independent global manufacturer of **highly engineered fluid handling systems**, servicing multiple applications in the industrial market. The company's ever-expanding geographical footprint boasts operations spread over 5 continents, which also includes **Dunlop Hiflex**, **Hiflex**, and **Argus brands**.

OEMs, distributors and major end users consider Alfagomma the supplier of choice due to its product and service value.

Operational excellence, long-term performance, global presence and local logistic support are some of the company's strengths on which partners and clients can rely on.

Throughout the world, Alfagomma is today recognized for its **continuous new product innovation**, constant **high quality exceeding international standards** and the commitment of its personnel to provide partners and clients with the best possible service.



// QUALITY SINCE 1956

The company's mission is to do everything possible to make its customers' **production processes easier, safer and more efficient.**

The Group achieves this by providing increasingly **high quality** combined with **innovative and reliable products** that help companies of all sizes increase and realize their full potential in different industries and applications, such as: **Hydraulics, Oil & Gas, Shipbuilding & Military**, and wherever-else fluid transfers are required.

// FACTORS WHICH MAKE ALFAGOMMA UNIQUE

Opting for Alfagomma means having a **single-source partner** who develops and manufactures **integrated systems for any application.** This translates into **engineering expertise, technical support, prompt service** and **in-house production** to ensure maximum quality and safety.

Customer focused strategies, engineering, **state of the art manufacturing facilities** and a **wide range of patented products,** coupled with **long-term partnerships** and a proactive **approach to market needs** are some of the benefits customers have come to expect from the company.

ALFAGOMMA'S PRODUCT RANGE



Hydraulic Hose & Fittings



Industrial Hose & Fittings



Dogleg & Expansion Joints



Offshore products



Manipulated Tubes



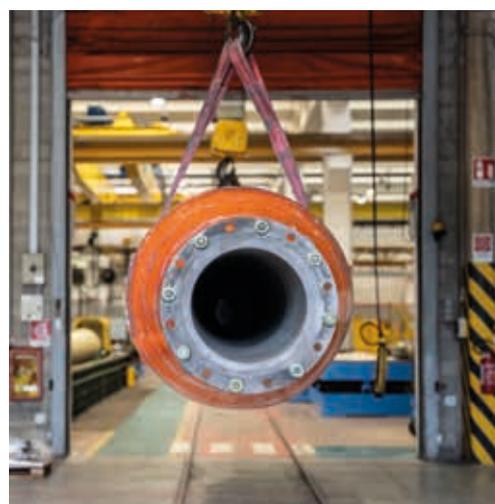
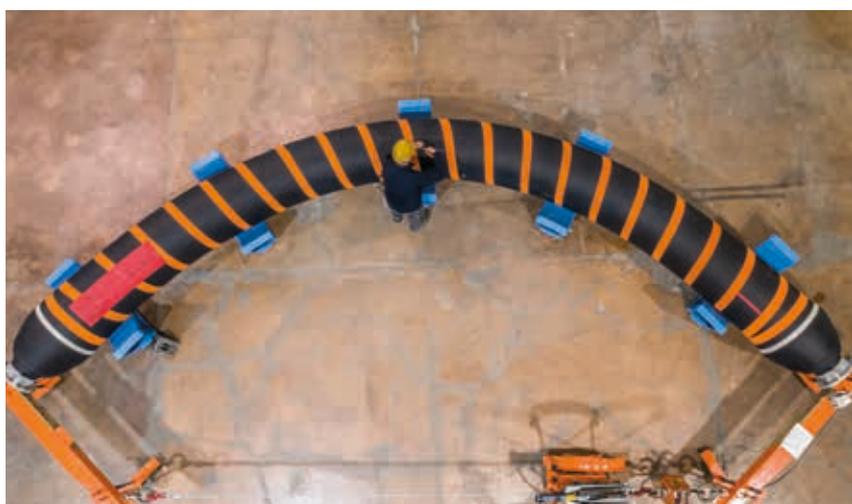
Quick Release & Multi-Couplings

// ALFAGOMMA OIL & MARINE

The **Alfagomma Oil & Marine** division specializes in the **design and manufacture** of single and double carcass marine hoses for **offloading** and **loading offshore systems**.

Driven by **reliability**, **innovation** and **commitment to quality**, Alfagomma Oil & Marine products exceed customer expectations in the oil marine operations.

The **extensive range of textile and metallic reinforced hoses** meets the needs of any application and complies with the **GMPHOM 2009**, and the most reliable stringent standards in the marine hose industry.



// ORTONA PLANT

The **Ortona plant** extends over a total surface area of 70,600 square meters - 19,000 square meters of covered space - and is about **60 kilometers** from the Group's **Research and Innovation Centre**, where new products are developed and those already in place improved thanks to **latest generation technologies**.



Ortona plant is located at East side of Italy, at 250 km from Rome, and 30 km from Pescara airport.

Alfagomma Group R&D Centre

AGI & AGH (Sant'Atto & Castelnuovo Vomano) are based at 60 km from Ortona plant.

// OUR PRODUCT

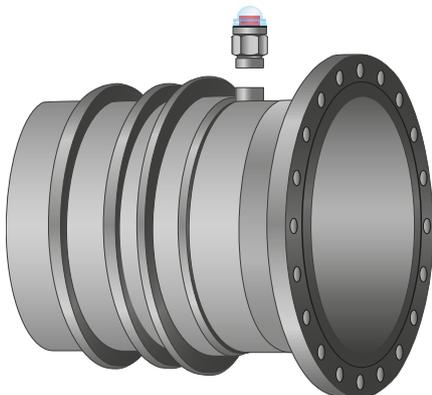
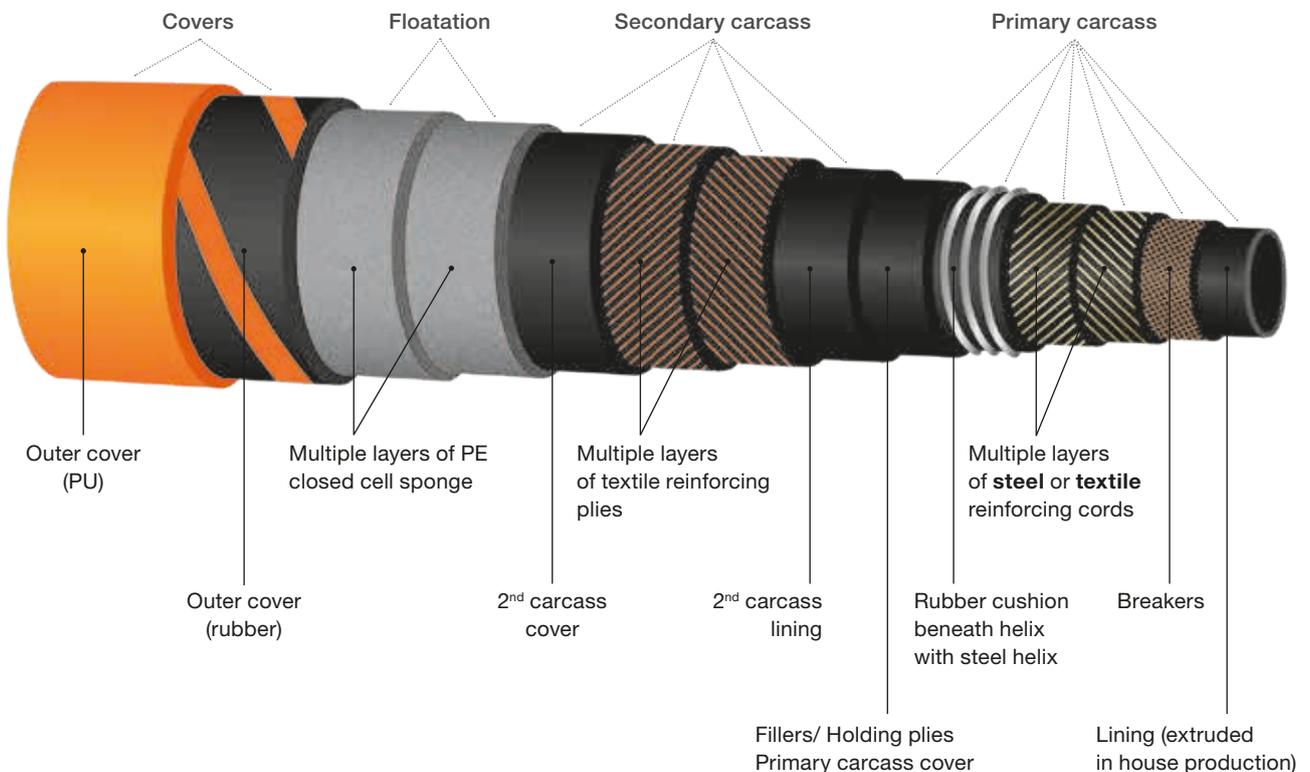
The **marine hose** is a composite structure made by **several layers** of different **rubber compounds** and **rubber-cord laminates**.

The various **layers are bonded together** during the vulcanization process **to form a single structure** for safely containing and transporting the required products.

All the materials are designed to withstand the most severe operating conditions and to retain their physical characteristics over time.

ALFAGOMMA SAFEWAVE

HOSE STRUCTURE



End fittings

The function of the end fittings is to connect the hose to other hoses or manifold and to provide a system of securing the hose body section at the hose ends.

Hose structure and fitting ends are mechanically and chemically bonded during the vulcanization process.

Leak detector

For double carcass hose types, in the event that the first carcass bursts, the oil flows inside the secondary carcass and is detected by this special sensor. Different leak sensing technologies can be provided either mechanical, optical or electronic.

// FLOATING HOSES



CBM/ MBM CARGO TRANSFER SYSTEMS

A Conventional Buoy Mooring system (CBM or MBM) is typically used in relatively shallow water close to shore, whereby the tankers are mooring between a series of mooring buoys that are permanently fixed to the seabed. The number of mooring buoys within a CBM/ MBM system will depend on several factors but would typically consist of between 4 - 6 buoys and mooring lines. The cargo loading / offloading hose

string consists of multiple sections of negatively buoyant submarine hose which are connected to the subsea pipelines PLEM and left resting on the seabed between operations.

Once a tanker has berthed on the mooring, the tanker end of the hose string is lifted from the seabed and connected to the tanker manifold, at which point loading operations can commence.

Single and double carcass types available on metallic and textile designs.

Hose ID: from 6" to 24"

Rated working pressure: 15, 19, and 21 bar.

// FIRST OFF BUOY



FOB hose design with one end reinforced, for use at locations where the hose strings are attached to rigid manifolds. The function of the end reinforcing is to move the bending moment towards the more flexible mid-section of the hose.

// MAINLINE



Hose design whose construction is uniformly the same along the hose length. Mainline hoses form the majority of hoses within a typical hose string.

// TAPERED/ REDUCER



Ridux hose design with a tapered structure to facilitate attachment of MBC's and/ or Tail hoses. Typical reductions being 24/20", 20/16", 16/12".

// TAIL



Hose design whose construction is optimized in terms of flexibility, strength and weight. Tail hoses are used to connect the mainline hoses or MBC to the Tanker Rail hose.

// TANKER RAIL



Hose design with barbell shaped buoyancy jackets providing increased flexibility in the mid section. Tanker rail hoses are used to connect the hose string to the tanker manifold.

// SUBMARINE HOSES



CALM / SPM CARGO TRANSFER SYSTEMS

CALM / SPM systems are typically used in water depths less than 80 meter, but more sophisticated designs are in service in deeper waters.

The buoy is typically spread moored to the seabed using a series of mooring chains. CALM / SPM buoys include a 360° rotating turntable thereby allowing the

moored vessel to freely weathervane around the buoy whilst moored to it. A series of floating hoses are used to connect the tanker manifolds to the buoy manifolds and a series of submarine hoses used to connect the buoy manifolds to the subsea PLEM in various configurations, Chinese Lantern, Lazy S, Steep S, etc.

Single and double carcass types available on metallic and textile designs.

Hose ID: from 6" to 24"

Rated working pressure: 15, 19, and 21 bar.

// FIRST OFF BUOY



FOB hose design with one end reinforced, for use at locations where the hose strings are attached to rigid manifolds. The function of the end reinforcing is to move the bending moment towards the more flexible mid-section of the hose.

// MAINLINE WITH 7 COLLARS



Hose design whose construction is uniformly the same along the hose length. Mainline hoses form the majority of hoses within a typical hose string.

// FIRST OFF PLEM



FOP hose design with one end reinforced, for use at locations where the hose strings are attached to rigid manifolds. The function of the end reinforcing is to move the bending moment towards the more flexible mid-section of the hose.

Note: the inclusion of float location collars is possible for all submarine hose designs.

// FPSO - FLOATING HOSE TANDEM LOADING



TANDEM CARGO OFFLOADING SYSTEMS

Tandem mooring systems are commonly used to transfer cargo from storage vessels like FSO's, FSU's and FPSO's etc. to various types of shuttle tankers. The cargo offloading hose strings are permanently attached to the various storage vessels, either via fixed rigid manifolds or hose reels, from which they

are deployed to the shuttle tankers midship or bow manifolds. The specific type of loading system will dictate what type of offloading hoses can be used, which could be either floating, submarine, or catenary types, all of which are available in single or double carcass designs.

Single and double carcass types available on metallic and textile designs.

Hose ID: from 6" to 24"

Rated working pressure: 15, 19, and 21 bar.

// FIRST OFF FSO/ FPSO



Hose design fully reinforced, for use at locations where the hose strings are attached to rigid manifolds and subjected to high tensile loads. The function of the end reinforcing is to move the bending moment towards the more flexible mid-section of the hose.

// MAINLINE



Hose design whose construction is uniformly the same along the hose length. Mainline hoses form the majority of hoses within a typical hose string.

// TAPERED/ REDUCER



Ridux hose design with a tapered structure to facilitate attachment of MBC's and/ or Tail hoses. Typical reductions being 24/20", 20/16", 16/12".

// TAIL



Hose design whose construction is optimized in terms of flexibility, strenght and weight. Tail hose are used to connect the mainline hoses or MBC to the Tanker Rail hose.

// TANKER RAIL



Hose design with barbell shaped buoyancy jackets providing increased flexibility in the mid section. Tanker Rail hoses are used to connect the hose string to the tanker manifold.

// TURRET PURE SYSTEM



TURRET CARGO TRANSFER SYSTEMS

Turret mooring systems are typically utilised in inshore shallow waters, where the water depth is typically less than circa 40 meters and often in arctic waters where there could be pack ice.

The turret is permanently fixed to the seabed and attached to a subsea pipeline. The turret includes a fluid swivel and a 360° rotating loading arm onto which the cargo loading hoses are attached and deployed to

dedicated shuttle tankers that are equipped with Bow loading manifolds.

Once the tanker has berthed on the mooring, the hoses are deployed from the loading arm and connected to the tankers bow manifold and loading commenced.

Once loading has been completed the cargo hoses are disconnected and secured back onto to the turret in their designated parked position.

Single and double carcass types available on metallic and textile designs.

Hose ID: from 6" to 24"

Rated working pressure: 15, 19, and 21 bar.

// TANKER



Tanker hose designs with one end reinforced, for use at locations where the hose strings are attached to rigid manifolds. The function of the end reinforcing is to move the bending moment towards the more flexible mid-section of the hose.

// MAINLINE



Hose design whose construction is uniformly the same along the hose length. Mainline hoses form the majority of hoses within a typical hose string.

Note: for systems operating in Artic conditions in pack ice, the hoses can be supplied with anti-scuff outer covers consisting of additional rubber outer cover thickness and/ or PU outer covers. Hoses can be supplied c/w lifting lugs welded on the end fittings, or alternatively via individual spool pieces incorporating lifting lugs.

// SHIP TO SHIP



SHIP TO SHIP (STS) CARGO TRANSFER SYSTEM

A Ship To Ship (STS) transfer is a transfer between two vessels moored alongside each other, which is typically carried out with both vessels stationary. STS transfers can also be carried out with both vessels underway, especially in the case of military naval

vessels. STS transfers are also used for cargo lightering purposes, when a laden tanker is required to reduce its draft by offloading cargo when entering into and navigating shallow waters.

ALFAGOMMA  **SAFEWAVE**

Single carcass type available on metallic and textile designs.

Hose ID: from 6" to 12"

Rated working pressure: 15 bar.

Standard
BS EN 1765
Type 15/L

// STS HOSE



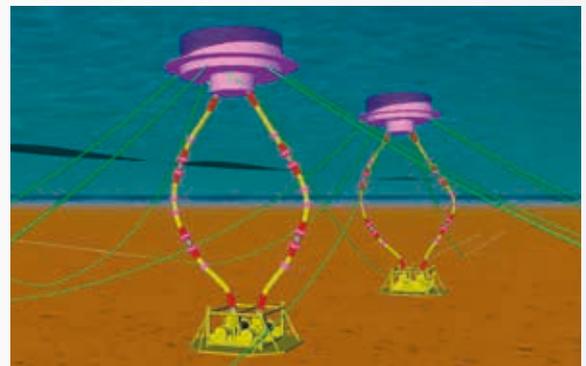
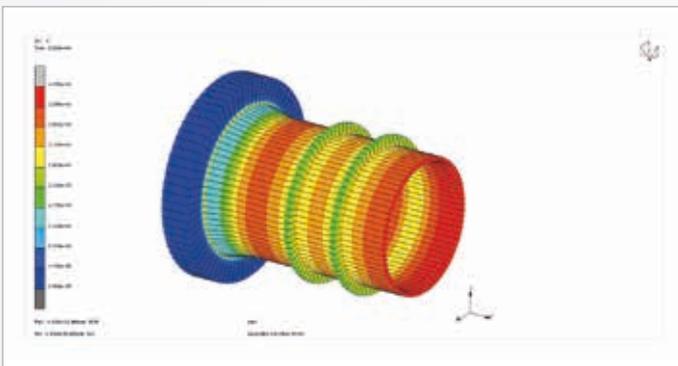
Hose design for dock service operations with increased flexibility and lower weight, suitable for discharge applications only.

// RESEARCH, DEVELOPMENT & TECHNICAL INNOVATION

The **design** of Alfagomma's **marine hoses** makes use of the **best technology** in terms of **rubber compounds** and **reinforcement materials**. This, combined with company's know-how in very diversified applications, creates a **synergy of knowledge** and **skills** that lead to a **final product** that's **fully aligned with** the very latest **marine hose technology**.

Alfagomma offers two different types of marine hose designs, with **textile** or **metallic reinforcements** respectively. The identification of the optimal design depends on the specific application and customer requirements.

High modulus **polyester cords** are used which **guarantee superior flexibility** and **lightness of the structure**, while metallic design is based on **high tensile steel cords**, optimized for **fatigue resistance** and **performance retention under harsh conditions**.



Alfagomma has a dedicated team of engineers experienced in FEA, CFD, OrcaFlex, and Artificial Intelligence techniques (deep learning, data mining & genetic algorithms); thus reducing design time whilst concurrently generating **significant improvements to create the best levels of performance**.



Industrial Research Centre, Sant'Atto, Teramo (Italy).



Hydraulic Research Centre, Castelnuovo Vomano, Teramo (Italy).

// SPECIAL PRODUCTS

In addition to the GMPHOM standard products, **Alfagomma** is able to provide a wide range of **technical solutions** for any specific applications:

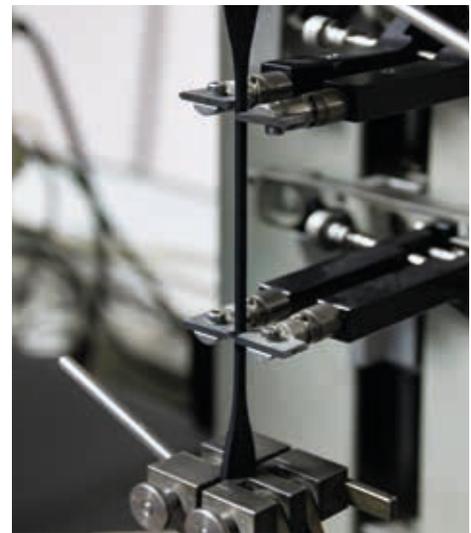
- **NBR lining** for low temperature applications (up to -50 °C).
- **HNBR lining** for transfer of crude oil with high levels of Hydrogen Sulphide (H₂S).
- **FKM lining** to transfer aggressive fluids like hydrocarbons, with up to 100% of aromatics content.
- **Special metallic reinforced** designs for high tensile loads (> 250 ton) and burst pressure (> 200 bar).
- **Polyurethane cover** with outstanding abrasion, tearing and weathering resistance.



Low temperature test chamber (-50 °C), Castelnuovo Vomano, Teramo (Italy).



Rubber compound development in Sant'Atto, Teramo (Italy).



Mechanical & Physical Lab in Sant'Atto, Teramo (Italy).



Chemical Lab in Sant'Atto, Teramo (Italy).

// EXCELLENCE IN QUALITY

Alfagomma Oil & Marine strives to deliver the **best service and product**, believing that **consistent quality** is critical to success; a tangible philosophy that runs through every aspect of the organization.

The overall workflow is subject to the **strictest control**, ensuring regulatory compliance to the **highest standards and industry best practices**.

Continuous investment in **state-of-the-art technologies**, coupled with **highly skilled teams** who are subject to comprehensive and regular training programs, translates into **outstanding manufacturing and organizational processes**; proven by having obtained international recognition, such as **ISO 9001** quality certification, **GMPHOM 2009**, **BS EN 1765**, **BS EN 1762** and **various prototype certificates** according to customers' specifications and needs.

The accreditation, from recognized institutional bodies, validates Alfagomma Oil & Marine's maturity in all areas of the organization and ensures **constant customer satisfaction** and **high reliability products**.



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