



BULK CARRIERS

MAXIMIZING SAFETY, EFFICIENCY
AND OPERATIONAL FLEXIBILITY



**BUREAU
VERITAS**

Move Forward with Confidence



ENSURING SAFETY AT SEA FOR BULK CARRIERS

Safety and efficiency are top priorities for bulk carrier owners and charterers. Bureau Veritas helps them meet the challenge via a combination of longstanding experience, technical expertise and innovative solutions.

BULK CARRIERS ENDURE HIGHLY DEMANDING CONDITIONS WHILE IN SERVICE.

They must be built to resist loads from the sea, carried cargo and operate in the harshest North Atlantic seas. They must also withstand stress and damage as a result of cargo loading and unloading.

This makes safety the number one priority in bulk carrier design, construction and operation. Verification of structural integrity and the reliability of machinery systems play a vital role in ensuring and maintaining seaworthiness. More recently, a volatile market has focused bulk carrier owners and charterers on a key challenge: how to get the most out of their vessels? This has led to two clear trends in the past few years.

The first is a focus on energy efficiency, both to comply with regulations and to optimize operational costs. Eco-bulk carriers are becoming increasingly



HELPING OWNERS REACH COMPLIANCE AND ENERGY EFFICIENCY OBJECTIVES

Bureau Veritas is recognized for its specialist expertise in the most active segments of the newbuildings market, helping owners achieve compliance and meet their efficiency objectives.

Since July 2015, vessels over 90m long must meet the requirements of the harmonized Common Structural Rules (CSR-H) for bulk carriers. Bureau Veritas offers in-depth knowledge built on IACS working groups on CSR-H. We have strong working relationships with the leading Chinese shipyards, who value in addition our design support and expertise in Computational Fluid Dynamics (CFD), provided by our specialists. We are also a recognized leader in eco-bulk carriers, with over 100 energy-efficient vessels under construction or delivered.

We have worked with a large number of yards and designers on these projects. Our sophisticated proprietary tools enable us to evaluate and optimize the vessel's hull form, appendages and other possible energy saving devices commonly used for bulk carriers and model energy consumption and emissions.

THE AIM: TO HELP SHIP OWNERS OPTIMIZE EFFICIENCY, AND MEET EXIGENT ENVIRONMENTAL REGULATIONS AND STANDARDS.

popular as owners seek to minimize fuel consumption.

The second is a steady increase in average vessel size within each size category. This has raised the overall average bulk carrier size, even if smaller vessels under 65k dwt continue to have positive signs in the world orderbook. Orders for vessels over 100k dwt have also increased with Chinese yards maintaining their overall lead in terms of total number, tonnage, and ship value.

AN EXPERIENCED CLASSIFICATION PARTNER

Bureau Veritas is one of the leading classification societies for bulk carriers. Over 1,000 vessels (almost one in ten of the world's total) operate to Bureau Veritas class, with a further 65 in the current order book.

Shipowners trust Bureau Veritas because we make sure that vessels are built to the highest safety standards, and remain seaworthy throughout their operational life.

Our technical expertise and the ongoing support we offer to our clients make us a natural choice for owners seeking safety and reliability. We also offer convenience: our global network of experienced surveyors means owners can request an inspection anywhere in the world. For ships not classed to BV rules, we offer a range of value-added services to reduce risk and extend ship life.



WHY CHOOSE BUREAU VERITAS?

- ✓ **Protect your ship, your crew and the environment**
- ✓ **One of the leading classification societies for bulk carriers**
- ✓ **The Bureau Veritas brand: a mark of confidence**
- ✓ **Industry-leading research, knowledge and technical expertise**
- ✓ **Closely involved in the development of CSR-H**
- ✓ **Access to ship surveyors across an extensive geographical network**
- ✓ **Peace of mind: excellence in services for ships in operation**

CLASSIFICATION AND CERTIFICATION

Bureau Veritas is one of the leading classification societies for bulk carriers, reflecting our focus on safety, efficient tools and services and our involvement in developing international maritime standards.

CLASSIFICATION WITH BUREAU VERITAS PROVIDES REASSURANCE TO OWNERS AND CHARTERERS THAT THEY HAVE TAKEN THE NECESSARY STEPS TO SAFEGUARD CREW, ASSET AND CARGO, AND THAT THEIR VESSELS COMPLY WITH REGULATIONS.

We promote safety both during design and construction, and during a ship's operational life. Our pre-active services focus on verification of structural integrity, using the most advanced 3D finite element analysis software. (see page 8).



SERVICES

BULK CARRIERS

HELPING DESIGNERS MEET THE CHALLENGE OF HARMONIZED COMMON STRUCTURAL RULES

We also take into account safety risks arising from the loading and unloading of cargo at port. Cargo grabs, bulldozers and hydraulic hammers can damage plating, frames and brackets. In ports with high cargo delivery rates, an inability to pump out ballast water quickly enough may result in stress to the hull. We carry out specialist studies to tackle these issues and prevent damage to vessels. Our dedicated class notations for bulk carriers include specifications according to cargo density and loading, as well as structural analyses of cargo holds.

Once in service, bulk carriers classed to BV Rules follow an enhanced survey program, in which Bureau Veritas surveys are complemented by ongoing ship safety maintenance by owners, who must follow specific guidelines.

Finally, we offer specific notations and EEDI calculations for owners seeking compliance with regional environmental regulations.

The main regulations impacting classification of bulk carriers are the harmonized Common Structural Rules (CSR-H). These replace the former CSR Bulk Carriers and CSR Tankers rules, and apply to all new bulk carriers over 90m in length. They cover key issues including standard loading conditions, fatigue, and direct strength assessment.

As a key member of working groups contributing to CSR-H, Bureau Veritas has in-depth knowledge of the rules' background and offers a fully updated set of tools to meet the new requirements. In the run-up to implementation of CSR-H, we worked with the major shipbuilders, providing swift approvals of their designs, and training on our updated Veristar Hull and MARS software.

This experience makes us well placed to advise clients around the world on CSR-H interpretation and application, and assess compliance of new bulk carrier designs.

CERTIFICATION OF CARGO LOADING

Carrying bulk cargo poses significant risks, from reduced ship stability following cargo liquefaction; fire or explosion as a result of chemical hazards; and damage to ship structures due to poor loading procedures. As such, safe carriage of solid bulk cargo is governed by the International Maritime Solid Bulk Cargoes (IMSBC) Code.

Bureau Veritas is able to assess and provide certification of procedures to assess, accept and load cargo in compliance with the Code.

Bureau Veritas has developed dedicated documentation and tools to address these challenges:

- Guidelines for the design of ships subject to bulk cargo liquefaction.
- Operational guidance for vessels that carry cargoes which may liquefy.
- Veristar Dangerous Goods & Bulk tool.

CLASSIFICATION NOTATIONS ISSUED TO BULK CARRIERS BY BUREAU VERITAS

Some of the classification notations commonly used for bulk carriers:

Class symbol and construction marks	I ✕ HULL ✕ MACH
Service notations and features:	Bulk Carrier ESP, CSR, CPS (WBT), BC-A (holds 2, 4 may be empty)
Environmental management	GREEN PASSPORT, CLEANSHIP
Other notations	✕ Veristar Hull, ✕ AUT-UMS, MON-SHAFT, BWT, INWATERSURVEY, unrestricted navigation



Visit the Bureau Veritas client portal www.veristar.com

for a full list and detail of classification notations and statutory certificates.



ENERGY EFFICIENCY AND ENVIRONMENTAL PROTECTION

Energy efficiency and environmental protection are rising up the agenda of ship owners. The reduction of CO₂, SO_x, NO_x & particulate matter emissions and the inception of emission control areas (ECAs) represent a major challenge. At the same time, ship owners and charterers are seeking to optimize energy efficiency and control operating costs. Bureau Veritas offers a range of value-added services to improve energy efficiency and environmental protection.



SHIP ENERGY EFFICIENCY ASSESSMENT TOOL (SEECAT) **SIMULATE FUEL CONSUMPTION AND PREDICT EMISSIONS**

Bureau Veritas' SEECAT tool is a ship modeling platform that simulates a ship's energy use and predicts fuel consumption. Through dedicated studies performed with SEECAT, Bureau Veritas is able to assist designers in the energy optimization of their new designs and owners to achieve the best possible performance of their ships by investigating different operational scenarios. SEECAT can also be used to predict vessels' NO_x, SO_x and CO₂ emissions, taking into account components such as scrubbers used to reduce emissions. Based on several SEECAT models, Bureau Veritas can advise owners on the best options for controlling air emissions.

LNG AS FUEL **COMPLY WITH EMISSIONS REGULATIONS**

Ships navigating in seas around the US and Europe face tough regulations on low sulphur fuels and NO_x emissions. A promising long-term solution to comply with these regulations is to use natural gas as fuel. It is clean, anticipates future legislation by reducing greenhouse gas emissions, and could be considered one of the most cost-effective solution in the long-term. Bureau Veritas offers a range of classification and advisory services specific to vessels burning LNG or other fuels.

HULL AND PROPELLER OPTIMIZATION **REDUCE ENERGY USE**

Hull hydrodynamic resistance is a major factor in a bulk carrier's energy consumption. Bureau Veritas' subsidiary uses Computational Fluid Dynamics (CFD) to calculate the performance of numerous hull forms, then identifies the optimum design based on likely operational context, including speed, trim and draft. CFD is also used to evaluate the hydrodynamic performance of propeller designs, taking into account the need to operate at both high and low speeds, and interaction with the hull.

BULK CARRIERS

EVALUATION OF ENERGY SAVING DEVICES (ESD) **IMPROVE PERFORMANCE**

Energy saving devices aim to improve a vessel's resistance or propulsive efficiency, thereby boosting performance. They include fins, devices to reduce stern waves, and other devices located in front of, or behind, the propeller for improving the flow in way of the propeller. Bureau Veritas is able to estimate the energy saving benefits of these devices, using CFD calculations performed by our subsidiary. We also assess device strength and attachment to the hull with state of the art calculations that tackle vibration issues common for such ESDs.

LIFE CYCLE ANALYSIS **ASSESS ENVIRONMENTAL IMPACT THROUGHOUT ASSET LIFE**

This "cradle-to-grave" approach analyzes a vessel's environmental footprint from construction through operation and dismantling. Using Bureau Veritas EIME software and databases, it evaluates the environmental impact of different ship designs and alternative types of equipment. Benefits include the ability to confirm that reductions in CO₂ are not being gained at the expense of rises in other pollutants, and that choices with a positive impact in the short term also offer long-term benefits.

VERISTAR PROJECT MANAGEMENT **SPEED UP APPROVALS**

Efficient ship design and construction depends on effective communication between numerous stakeholders. A web-based collaborative platform, Veristar Project Management enables designers, shipbuilders and, increasingly, owners, to review and exchange information. Used from design review through construction, it improves communication and speeds up approvals.

VIBRATION ANALYSIS **IMPROVE COMFORT & EXTEND ASSET LIFE**

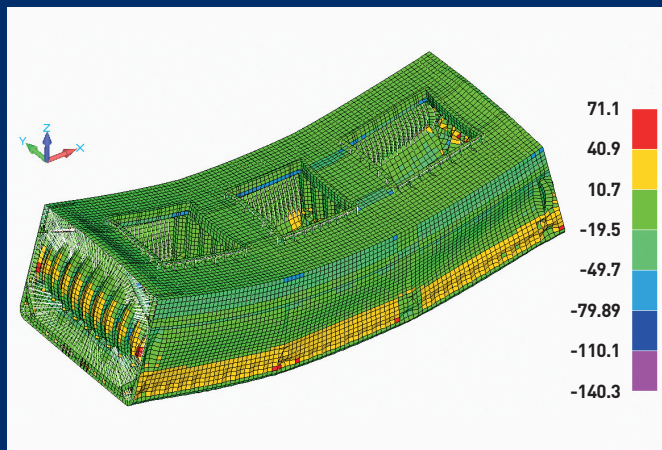
Shipboard vibration and noise can affect the safety, functionality and comfort of ships: it may lead to fatigue cracking, or even failure of machinery and equipment. To extend vessel life, Bureau Veritas recommends vibration analysis for large vessels. We carry out measurements and calculations using a 3D finite element model, and provide guidance on avoiding excessive noise and vibration.

BULK CARRIERS

STRONG TECHNICAL EXPERTISE

Our advanced tools and services support the industry as it meets the challenges of new regulations and operation in extreme climate. Our mission: to minimize risk and promote safety at sea.

SOPHISTICATED TOOLS



Bureau Veritas offers industry-leading software to support compliance with classification rules and create value for clients.

Our structural assessment tools, **Veristar Hull** and **MARS**, have been updated to meet the needs of new CSR-H rules for bulk carriers. Veristar Hull software builds a 3D finite element model of the vessel, with automatic corrosion deduction, loading conditions and criteria checking.

With MARS, Bureau Veritas checks the scantling of any transverse section and the transverse bulkheads all along the ship length, and calculate hull girder strength. It is designed to highlight fatigue issues at the earliest stage possible.

Next generation Asset Integrity Management (AIM) solution now available to reduce the CAPEX and OPEX exposure of operators. **Veristar AIM^{3D}** is conceived to be used from the design stage, through construction, and throughout the operational life-cycle, to reflect and predict the condition of any asset, or fleet of assets. The solution supports risk based inspection and condition based maintenance approaches.

NAVIGATION IN ICE

As Arctic routes open up, and with the IMO's new Polar Code expected to come into force in 2017, navigation in ice is growing in importance.

Bureau Veritas offers specific class notations (ICE CLASS, POLAR CLASS, Icebreaker 1-7, COLD) and expertise to support design, construction and operation of vessels destined for use in the Arctic. This includes our Icestar tool to assess ice loads and determine safe navigation in ice.



SERVICES FOR SHIPS IN OPERATION

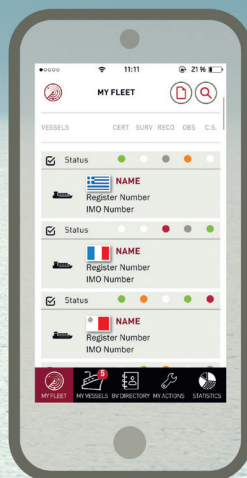
In addition to class surveys, Bureau Veritas provides a range of value-added services to support safety and performance at sea. These include training, and advice provided via our Customer Support Centers and our Technical Centers all over the world and always close to our client's needs.

Our Emergency Response Service (ERS), available within 2 hours for vessels enrolled in the service, provides technical assistance 365 days per year. It brings owners and operators confidence that, in the case of an accident at sea, they can rely on a fast response and precise advice from an experienced team. ERS notation can be assigned to BV-classed vessels providing reassurance to charterers.

DIGITAL TOOLS TO MANAGE YOUR FLEET

Bureau Veritas has launched a new app to provide shipowners with fast access to fleet and vessel data and documents. My Veristar enables users to plan and visualize milestones, including current and future surveys, and get notifications on upcoming class items and class news. Shipowners can also contact Bureau Veritas experts, and request a survey, audit or class attestation. Marine professionals can also find in-depth resources, including class notations and software downloads on www.veristar.com.

My VeriSTAR



190 YEARS OF **CLIENT CONFIDENCE**

**BUREAU VERITAS IS A LEADING
CLASSIFICATION SOCIETY**
AND A TRUSTED PARTNER TO
THE SHIPPING INDUSTRY SINCE
THE EARLY 19TH CENTURY.

WHAT MAKES US DIFFERENT?
THE TECHNICAL EXPERTISE
WE OFFER AND OUR DEEP
COMMITMENT TO THE MARINE AND
OFFSHORE SECTORS.

**WE ARE OVER
2,650 EXPERTS
IN MARINE
& OFFSHORE**

We are experts in our chosen fields with a common thread: our thorough knowledge of Marine and Offshore industries. We continually develop and reinforce our expertise through training, the experience we gain by working with our clients and our engagement in leading-edge research projects.



OUR MISSION IS TO KEEP OUR CLIENTS' CREW AND ASSETS SAFE, EVERY DAY

Protecting our clients' people, ships and offshore structures from accident drives every decision and action we take.

This deep sense of purpose makes us go beyond the scope of individual projects to find new ways to anticipate and manage risk, promote health & safety, and protect the marine environment.

WE PROVIDE OUR CLIENTS WITH THE SUPPORT AND KNOWLEDGE THEY NEED

Our teams apply their knowledge and expertise every day to help our clients solve complex technical problems, meet regulatory requirements and optimize safety and performance. We develop advanced technology and tools, which we share with our clients.

WE WORK HAND-IN-HAND WITH OUR CLIENTS

Our relationships are built on years of service, transparency and trust: we work alongside our clients, providing the advice and calculations they need, and sharing our knowledge through training and technology. We work closely with the entire marine community: designers, yards, equipment manufacturers, contractors, shipowners and administrations around the world.

WE ARE CLOSE TO OUR CLIENTS, WHEREVER THEY ARE

We operate as a global network, following global standards, but able to react to our clients' needs locally. With 16 regional plan offices, five offshore technology centers, three research centers and 180 survey offices, we are always within reach. Information-sharing platforms across our network and with our clients, combined with our open, transparent way of working, mean we are set up to manage projects internationally.

WE ARE DEEPLY INVOLVED IN THE MARINE INDUSTRY

We seek to share our knowledge widely, and use our extensive work with clients, industry bodies and authorities to bring about positive change. Our people are proud of the role they play in creating long-term value for our clients, supporting innovation and helping the industry move forward safely. In return, our clients recognize and value our commitment to service and technical excellence.

A global leader in testing, inspection and certification, Bureau Veritas serves clients' needs in quality, health, safety, environmental protection and social responsibility.

For 190 years, our clients across all industries have looked to us to provide technical support, verify compliance, or obtain certification. Our network of over 1,400 offices and laboratories ensures we meet their needs, wherever they are in the world.

HISTORICAL PARTNER TO THE MARINE INDUSTRY

Bureau Veritas was founded in 1828 for the initial purpose of collecting, verifying and providing maritime insurance companies with precise and up-to-date information about the condition of ships and their equipment around the world.

OVER 1,000 ACCREDITATIONS AND AUTHORIZATIONS

Our wide range of accreditations and authorizations across a range of industry sectors prove that we operate professionally and that our reports and certifications are recognized and respected. We hold 150 delegations of authority on behalf of national maritime authorities.

EXPERTISE IN UNDERLYING INDUSTRIES

Our testing, inspection and certification services go beyond shipping. Bureau Veritas offers comprehensive testing services for the various commodities shipped by bulk carrier, from coal and ore to grain, providing us with a strong understanding of the product transported by carrier. We also provide import control and inspection services on behalf of national governments worldwide.





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Bureau Veritas - Marine & Offshore

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