

## ADVANCES IN REGULATORY FRAMEWORK IN SHIPPING AND ITS COMPLIANCE

Commodore Syed Ariful Islam, (TAS), ndc, psc, BN (retd)

### *Abstract*

Global shipping industry carries about 90% of the world's cargo by different specialized type of ships. Therefore, shipping demands to be safe at all stages of transportation. Hence, the entire shipping industry goes through a strict regulatory regime enforced by the flag state and or through the port state control measures or by approved classification society surveyors. The recent advancement in the regulatory framework adopted by IMO especially on ship construction and the reduction of Green House Gas (GHG) emission is one of the milestone achievements for ensuring future green shipping. It is essential that all the member states follow these regulations at all phases of ships' life cycle. Non-compliances are generally detected through Port State Control Measures and in such cases, the ship may be detained by the port state. Although international rules are meant for ocean going ships in international trade, they may also be applicable for domestic shipping. This paper aims at analyzing advances in regulatory frameworks developed at IMO for compliance by the global shipping industry and then will have an overview on the constructional procedures of domestic shipping in Bangladesh along with compliance issues. In doing so, the regulatory framework adopted by IMO for the construction of ships to achieve functional requirements with safety and also to maintain green shipping has been studied through literature review and some primary and secondary data. It has been revealed that compliance of rules and regulations can lead the industry towards achieving goal based standard and green shipping. Domestic shipping industries can also be benefitted from the compliance of relevant rules and regulations in shipping and ensure the safety of ships, its personnel and the marine environment.

**Keywords:** Goal Based Construction, IMO Codes, Conventions and Compliance

### **Introduction**

International Maritime Organization (IMO) has, so far, enacted about 50 international conventions and protocols and well over 800 codes, recommendations, and guidelines relating to the safety of international shipping

and maritime environment.<sup>1</sup> All these conventions and codes are applicable to the maritime industry. Out of these, a few are directly related to the construction and safe operation of the ships in global shipping activities. While the term ‘shipping’ is used in the maritime industry, it may be defined as the transportation of cargo by ships. Global shipping industries carry about 90% of the global trade. As per UNCTAD 2019 estimate, 11 billion tons of cargo was carried by world shipping services.<sup>2</sup> In business terms, merchant shipping has a significant contribution to the development and growth of any country across the globe. Therefore, merchant shipping stands out to be one of the most compliant and regulated transport sectors in the world. As a result, the Safety of Life at Sea and the Protection of the Marine Environment become an integral part of ship design, construction, and safety. While in operation, the Maritime Labour Convention (MLC), a derivative of the International Labour Convention, is also applicable to global shipping as a whole for the safe working condition, working hours, etc. Regulations concerning shipping are inherently international and are applied globally. Uniform regulations on matters relating to ship design, Shipbuilding standards, navigational rules, and crew competence standards are vital in the shipping industry.

In order to govern safety of ships, its crew and marine environmental protection, IMO develop broad guidelines of detailed technical requirements for observance by all the member states. It also adopts new conventions or codes and amends those as per the need of the industry. National governments implement these international rules in the ships under their national flag while operating internationally. IMO requirements are enforced by the flag state through inspections of ships by its surveyors or the surveyors from the classification society.

The enforcement of maritime conventions is further widened by port state control. In complying with port state control, recognized surveyors are authorized to visit other foreign flag ships visiting the country to ensure compliance of international requirements. In case of non-conformity to international standard, port state control officials can detain foreign flag ships in their port. As such, IMO regulations are enforced on a global level.

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<sup>1</sup> International Maritime Organization (IMO), “Contribution of the International Maritime Organization (IMO) to the secretary-general’s report on oceans and the law of the sea”, 2008.

<sup>2</sup> United Nations Conference on Trade and Development (UNCTAD), “Review of Maritime Transport 2019”, 2019, Available at: [https://unctad.org/en/PublicationsLibrary/rmt2019\\_en.pdf](https://unctad.org/en/PublicationsLibrary/rmt2019_en.pdf), accessed on January 1, 2020.

With this prelude, the objective of this paper is to analyze advances in IMO's regulatory frameworks in ship construction and their operation during the life cycle of a merchant ship.

The study has covered the amendments brought by IMO for the Goal Based safety for the construction of ships and the energy efficiency required by the global merchant fleet in the coming days. It has discussed other conventions that affects the safety of the ships, its crew and the environment. While discussing international shipping and the compliance of the regulations this paper has also highlighted the compliances issues in domestic shipping in Bangladesh. However, the details of pollution and other regulatory issues affecting the operation of ports and shipping are not covered in this article.

The paper followed both primary and secondary research methodology. Combining qualitative methods of primary sources and literature review methods have also been applied. Data were extracted from both the primary and secondary sources.

## **Requirement of Regulatory Framework in Shipping**

Compliance of the regulatory framework is directly related to quality. The shipping industry being global in nature needs to observe the regulatory framework since its construction through different phases of lifecycle of a ship to ensure strict compliance regime. Different phases of ships' lifecycle include design, construction, operation and scrapping. It is a fact that, ship construction involves a wide range of complex activities. These activities are a combination of production and assembly works and heavily dependent on labour force. It is also a capital-intensive industry. Thus, while buying or ordering a product/ship, value for money is the key consideration by the owner while investing on shipping. Even, if the price of the money is high, the quality of the product will insist the customer to buy it. On the other hand, if the ship is constructed without following the international conventions, it wouldn't be permitted to operate in international water. Therefore, during the entire lifecycle of a ship, compliance of international regulations is mandatory. The following figure shows how a ship goes through different phases of its life:

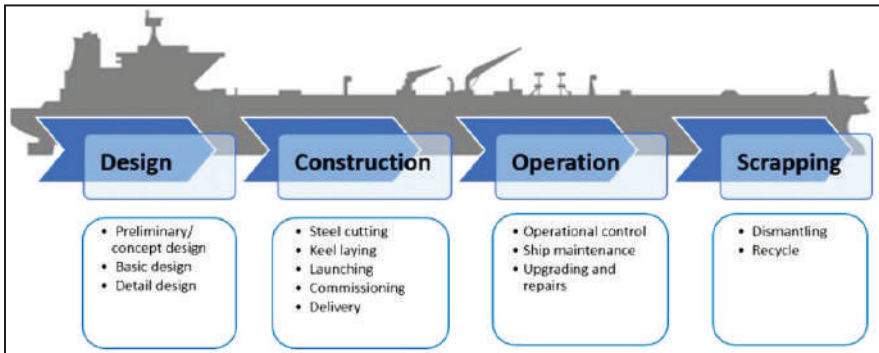


Figure 1: Ship Lifecycle and Key Milestones<sup>3</sup>

To ensure quality, in addition to relevant IMO Conventions and codes, the shipbuilding industry uses Classification Society Rules in constructing ships. These rules and codes for compliance of safety are different in different types of ships. Manning of ships for its safe operations also varies depending on the type of ship, its trade route, ships equipment regulated by a different set of regulations determined by the IMO and flag state. In the global shipping industry, four of the main conventions are known to be the four pillars of the Maritime Law and are applicable to all types of ships in the global shipping industry.<sup>4</sup> These are:

- SOLAS (Safety of Life at Sea) Convention – It covers all the safety requirements for the crew and ship.
- STCW (Standard of Training, Certification & Watch keeping) Convention – It covers all aspects of merchant marine crew competence, certification and training for those who operate the ship.
- MARPOL Conventions – International Conventions for the Prevention of Pollution from Ships. It deals with the prevention of all kinds of ship-based pollution.
- MLC Convention- Maritime Labour Convention. It deals with the seafarer’s rights, wages, of the standard of work and living conditions for the seafarers.

<sup>3</sup> J.H. Ang, Joo Hock, Cindy Goh, Alfredo Alan Flores Saldivar, and Yun Li. “Energy-efficient through-life smart design, manufacturing and operation of ships in an industry 4.0 environment”, *Energies* 10, no. 5, 2017, p. 610.

<sup>4</sup> Vaarzon-Morel, “MLC: Implementing the Fourth Pillar - Vaarzon-Morel Solicitors”, February 10, 2014, Available at: <http://vaarzonmoresolicitors.com.au/mlc-implementing-fourth-pillar/>, accessed on December 25, 2019.

While the above-mentioned conventions directly regulate the constructions and operations, they also have significant implications on the scrapping phase of its lifecycle. In addition to the above-mentioned conventions, all other conventions and codes enacted by IMO are applicable to all the ocean-going ships during their life cycle. These are required for the safe construction and safe operation of the ships. Once these ships complete their operational life, are taken off from the trade and recycled. Ship recycling is also regulated through a different convention known as “Hong Kong Convention”. It deals with the procedural aspects of ship recycling and the handling of hazardous material. The ultimate objective is to ensure the safety of ships, its crew, and the environment from the beginning to the end of ship’s life-cycle. Ships which are not complying with the international codes and conventions are not allowed to make international voyage. In one hand, compliance of international convention is the responsibility of the flag state and on the other hand, it is also the responsibility of the port state to ensure compliance through port state control measures . Therefore, all ships must adhere to the rules and regulations made by IMO for international shipping.

### **Basic Conventions for Shipbuilding**

IMO has produced two very important conventions, one for Safety of Life at Sea and the other for the Marine Environment Protection. Both these conventions may be considered as the basic conventions for the construction of ships.

- **SOLAS (International Convention for the Safety of Life at Sea):** SOLAS convention provides criteria and provisions for the construction of new ships to ensure safety, stability and fire protection. It also addresses the carriage of dangerous cargo in solid and packaged form. Carriage of liquid cargo and condensed gases in bulk is also included in this convention. SOLAS Convention also provides guidelines and standards for the construction of ships that carry dangerous goods.

- **MARPOL (International Convention for the Prevention of Pollution from Ships):** This convention aims at preventing ship-based pollution. It, specifically, addresses the issues relating to the details concerning how ships must be constructed, making it environment friendly, and procedures for safe transportation of bulk petroleum products and other dangerous chemicals onboard.

## Advancement in Ship Construction Regulations

All oceangoing ships are constructed following the rules and regulations set by the IMO. With the advancement of maritime trade and technologies, IMO updates the regulatory framework as per the demand of the industry and also for the safety of its crew and the environment. In 2010, IMO at its Maritime Safety Committee (MSC) adopted Goal based safety standard for constructing ships which has now become standard for ship construction.<sup>6</sup> Goal-based standards

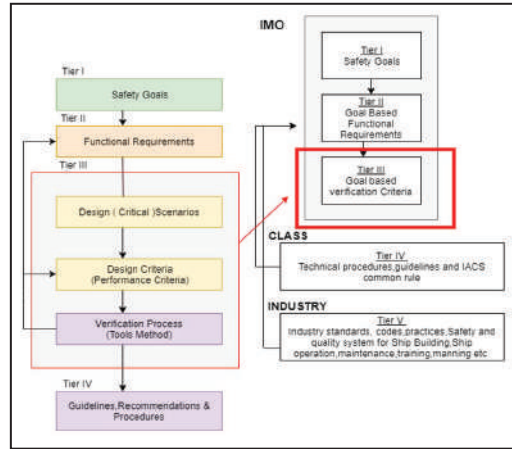


Figure 2: Goal-based Standard<sup>5</sup>

(GBS) are high level standards and procedures to be implemented through rules, regulations, standards, and guidelines for ships. In these standards, Tier I consists of goals, Tier II deals with functional requirement(s) associated with that goal, and conformity verification of standard rules/regulations to meet the goals and functional requirements. Classification societies or national administrations are required to develop rules and regulations in conformity with IMO requirements. Tier IV deals with the verified guidelines, recommendations, and procedures by independent auditors or appropriate IMO organs. In Tier V, various Industry practices, standards, codes are included in the constructional design rules and regulations of a ship. The main principles of goal-based standards/regulations are:<sup>7</sup>

- Standard of safety, security, and environment that the ships are required to comply with during their lifecycle.
- IMO, flag administration, classification societies, or recognized organizations put requirements to achieve the required level.

<sup>5</sup> Konovessis, Dimitris, Kie Hian Chua, and Dracos Vassalos. "Stability of floating offshore structures", *Ships and Offshore Structures* 9, no. 2, 2014, p.125-133.

<sup>6</sup> IMO, "IMO Goal based standards", 2019, Available at: <https://www.imo.org/en/OurWork/Safety/Pages/Goal-BasedStandards.aspx>, accessed on March 28, 2021.

<sup>7</sup> Jason Chuah, "Research Handbook on Maritime Law and Regulation", Edward Elgar Publishing, 2019, p. 141.

- Irrespective of ship type, the requirement of design and technology should be clear, verifiable, demonstrable, implementable, and achievable.
- Sufficiently specific and not open to differing interpretations.

GBS was made mandatory for the construction of Oil Tankers and Bulk Carrier since May 2010.<sup>8</sup> Accordingly, it is now obligatory for the newly-constructed vessels of these types to comply with standards conforming to functional requirements developed and agreed by the Committee. The main objective of setting up this standard was to ensure the construction of safe and environmentally friendly ships for the global shipping industry. Hence, it is obligatory for all member states to comply with the standard by its administration or through the classification society. Although, the GBS standards are mostly followed in international shipping, the same is not given due importance while constructing ships for domestic trade. In Bangladesh the construction of ships for domestic use is regulated through ISO 1976 and the ship construction regulations 2011. These, rules do not cover all aspects of GBS.

### **Recent Regulatory Framework Affecting Shipbuilding and Operation**

With the growing demand of environment friendly shipping and also to conserve energy and the environment, series of regulations, codes, and directives are adopted/issued by IMO. These are incorporated in ship construction as well as in its operation. Therefore, these will immediately affect both the owner and the shipbuilders worldwide. To this effect, some of the important changes to ensure green shipping are well discussed matter in this industry. These are:

- Reduction of GHG from ships
- Air Pollution Control (SOX Control)
- Air Pollution Control (NOX Control)
- Ballast Water Management

### **Reduction of GHG from Ships**

It was estimated in IMO GHG Study 2014 that, international shipping emitted 796 million tonnes of CO<sub>2</sub> in 2012. It was also shown in the report that in 2012 about 2.2% of the total global anthropogenic CO<sub>2</sub> was emitted from the

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<sup>8</sup> IMO, 2019, op. cit.

shipping industry.<sup>9</sup> According to this report, it was also anticipated that due to the growth of the world maritime trade, emissions from international shipping could grow between 50% and 250% by 2050.<sup>10</sup> In order to reduce GHG emission from ships and also to enhance ships' energy efficiency, IMO has developed measures addressing all the issues of GHG emission and air pollution control. It also formulated measures to provide technical cooperation and capacity building. The overall effort of IMO in reducing GHG emission added a new Chapter in MARPOL Annex VI entitled "Regulations on energy efficiency for ships". It focuses on two broad-based mitigation measures:

- **The Energy Efficiency Design Index (EEDI):** This is formulated for the new ships to achieve minimum mandatory energy efficiency performance levels in design and construction level. This level will be stepped up over time through different phases. This measure will focus on encouraging the use of more energy-efficient equipment, engines and designing new engines for the shipping industry.

- **The Ship Energy Efficiency Management Plan (SEEMP):** It is an operational measure to improve the energy efficiency in a cost-effective manner. It, actually, focuses on the development of the Ship Energy Efficiency Plan for the old and new ships. It encourages to comply with the best practices through the observance, of monitoring and inspection. According to this measure, fuel efficiency would be ensured through trim, speed and draught optimization, weather routing, just-in-time arrival in ports, etc.

EEDI and SEEMP were enforced on 01 January 2013 for ships of 400 gross tonnage and above. For the shipping industry, these measures are considered to be the first-ever mandatory global GHG reduction regime and are being followed in the shipping industry.

## Global Sulphur Cap Policy

In consonance with Paris Declaration on United Nations Framework Convention on Climate Change, IMO is committed to reduce the Green House Gas

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<sup>9</sup> T.W. Smith, J.P. Jalkanen, B.A. Anderson, J.J. Corbett, J.Faber, S. Hanayama, E. O'keeffe, S. Parker, L. Johansson, L. Aldous and C. Raucci, "Third IMO GHG study", 2015.

<sup>10</sup> IMO, "GHG Emissions", 2019, Available at: <https://www.imo.org/OurWork/Environment/PollutionPrevention/AirPollution/Pages/GHG-Emissions.aspx>, accessed on march 28, 2021.



Emission from Shipping Industry. Accordingly, IMO has adopted the policy of using low sulphur fuel in ships. Meaning that by January 2020, all ships making international voyage have to use fuel with less than 0.5% sulphur content.<sup>11</sup>

Accordingly, sulphur content in ship’s fuel oil has been planned to reduce under a broader time frame. In 2005, maximum allowable sulphur content in the ship’s fuel oil was determined to be within 4.5%. Subsequently, it was reduced to 3.5% by 2012 and 0.5% by 2020.<sup>13</sup> This 0.5% is known to be 0.5% Global Sulphur Cap Policy for the global shipping industry. Therefore, the world maritime industry will see a big change in the coming years.

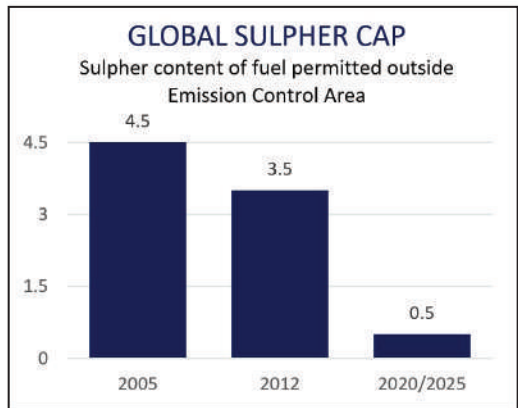


Figure 3: Global Sulphur Cap<sup>12</sup>

### Control of SOX and NOX

This is also a measure related to the reduction of GHG from the marine environment and also greening the shipping industry. To ensure compliance of EEDI and SEEMP, several measures have been taken. Among those, control of Sulphur Oxide and Nitrogen Oxide has been emphasized in the new chapter in MARPOL Annex VI. To reduce SOX as an interim measures,

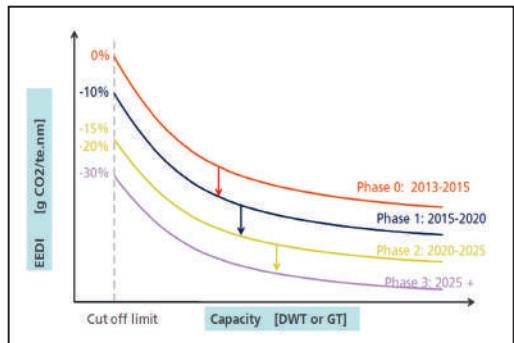


Figure 4: EEDI Concept<sup>14</sup>

<sup>11</sup> International Chamber of Shipping (ICS), “Guidance to Shipping Companies and Crews on Preparing for Compliance with the 2020 ‘Global Sulphur Cap’ for Ships’ Fuel Oil in Accordance with MARPOL Annex VI UPDATED”, 2019.

<sup>12</sup> International Chamber of Shipping (ICS), “2020 Global Sulphur Cap”, 2020, Available at: <https://www.ics-shipping.org/current-issue/2020-global-sulphur-cap/>, accessed on 15th April, 2021.

<sup>13</sup> ICS, 2019, op. cit.

<sup>14</sup> Romanas Puisa, “Uncertainty in design and operational parameters: Application of Real Options for valuation of ship design alternatives”, Human Factors in Risk-Based Ship Design Methodology, FAROS, 2015.

scrubbers are being used by many ships. Scrubbers are a diverse group of air pollution control device that can be used to remove some particulates from ships exhaust stream.

There are many variants of scrubbers being used. Also, for the reduction of NOX, many different measures are taken. Energy Efficient Design Index (EEDI) is well talked measure that would be accomplished in a wider time frame for improving energy efficiency. According to this measure, three different Tiers are discussed with time limit. The Tier I standard was defined in the 1997 protocol while Tier II/III standards were introduced by Annex VI amendments adopted in 2008, as follows:<sup>15</sup>

- **1997 Protocol (Tier I):** This protocol came into force on 19 May 2005. In anticipation of the Annex VI ratification, most marine engine manufacturers started building engines compliant with the standard set by IMO for the reduction of SOX and NOX since 2000.

- **2008 Amendments (Tier II/III):** This was adopted in October 2008. This introduced new fuel quality requirements from 2010 and Tier II and III NOX emission standards for new engines and NOX requirements for Tier I pre-2000 engines (older engines).

It, thus means, at the first phase; that the reduction level is set to 10% by 2015-20 and will be tightened every five years to keep pace with the technological advancement of new energy efficiency and mitigation measures (Fig above). IMO also aspires to reduce the level further beyond 30% by 2025 and onward. Thus, the maritime industry has to use compliant fuel and compliant engines in the coming years.

## Ballast Water Management

IMO estimates that globally ships carry 3-5 billion tons of ballast water annually.<sup>16</sup> These ballast waters are generally discharged into the marine water without any plan or regulatory control causing degradation of biodiversity and

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<sup>15</sup> Dieselnet, "Emission Standards: IMO Marine Engine Regulations" , 2010 Available on: <https://www.dieselnet.com/standards/inter/imo.php>> accessed December 6, 2019.

<sup>16</sup> ClassNK, "Ballast Water Management Convention", 2019 Available on: <http://www.classnk.or.jp/hp/en/activities/statutory/ballastwater/index.html> accessed on December 25, 2019

marine pollution. “The International Convention for The Control and Management of Ships Ballast Water and Sediments, 2004” came into force with effect from 08 September 2017 with the aim to protect the marine environment from the harmful aquatic organisms in ballast water carried by ships.

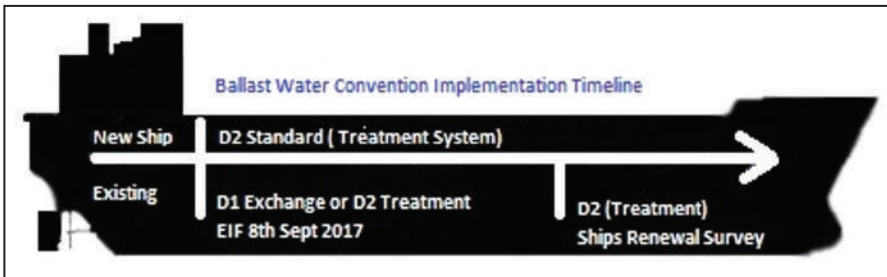


Figure 5: Ballast Water Convention Implementation Timeline<sup>17</sup>

In accordance with this Convention, all ships in international traffic need to manage their ballast water and sediments to a standard as specified by the ship-specific approved ballast water management plan. This also directs ships to carry a ballast water record and an international ballast water management certificate. New ships, constructed after the enactment of this convention (2017), must utilize ballast water treatment plant. Since the implementation of the convention is time-based, the existing ships will have the privilege of exchanging ballast water at mid-ocean, but will need to meet the ballast water treatment standard during the renewal survey. Eventually, with time, all ships will need to install an on-board ballast water treatment system.

The above diagram shows two different measures for existing and new ships. For New ships, the treatment system (D2 Standard) needs to be installed on her delivery if keel laid on or after 8 September 2017 but for existing vessels treatment system to be installed on the first International Oil Pollution Prevention (IOPP) renewal survey after 8th Sept 2017.

### Ship Building in Bangladesh for Inland Waterways

Shipbuilding for the inland waterways of Bangladesh is also regulated by a set of rules and regulations. The fundamental act of building ships for domestic water is the Inland Shipping Ordinance 1976 and the Inland Ship Construction

<sup>17</sup> ABPIMER, “Ballast Water Management Convention ratified”, 2016, Available at: <https://www.abpimer.co.uk/blog/ballast-water-management-convention-ratified/>, accessed on 15th April, 2021.

Regulation 2011. In absence of any classification society in Bangladesh, the Panel Supervisors and the Department of Shipping remain involved with the construction process. The Panel Supervisors are graduate Naval Architect and enlisted with the Department of Shipping through selection procedures. In the domestic shipping industries, the following types of ships are constructed:<sup>18</sup>

- Cargo Ships
- Passenger Ships
- Oil Tankers
- Dredgers, House Boats
- Tug Boats
- Dumb Barges and
- Others

The lifetime of a domestic ship in Bangladesh is 30 – 40 years.<sup>19</sup> Therefore, starting from conceiving the idea of building a new ship, different regulatory requirements are also to be borne in mind for its successful completion and subsequent operational life. Shipbuilding involves a number of steps and procedures. The steps and procedures followed in Bangladesh for inland ship construction are as follows:<sup>20</sup>

- The first step for the owner is to apply for the name of his/her ship from the Department of Shipping. It is done on-line and the name clearance is given online.
- The next step is to apply for the approval of the design. While applying for design approval, the owner submits all the required design along with its stability booklet to the Department of Shipping.
- Department of Shipping, then, constitutes a Committee to check the designs. Upon checking the design, the committee recommends for its approval.

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<sup>18</sup> MR Ballast, “Ballast Water Conventions”, Available at: <https://www.mr-marinegroup.com/mr-ballast/overview-of-bwts/ballast-water-conventions>, accessed on April 15, 2021.

<sup>19</sup> Inland Shipping Ordinance 1976, Article 30.

<sup>20</sup> Wahidul Sheikh, “Problems & Prospects of Bangladesh Shipping Industry: A Comparative Overview”, 2018, Available at: <https://www.bsrmu.edu.bd/journal-bmj/assets/pdf/vol-1-issue-1/bmj-01-01-05.pdf>, accessed on December 25, 2019.

- As per the recommendation of the committee, the approval is accorded.
- On receiving the approval, the ship owner applies to the Department for Keel Laying.
- Department issues the keel- Laying Certificate along with a Task Number.
- While issuing the task number, a Panel Supervisor is engaged (Naval Architect) with each of the ship under construction. The Panel Supervisor is selected by the owner and is detailed by the Department.
- Panel Supervisor supervises the construction as per the approved design in 09 stages of the construction. He also records his remarks. Any violation/ non -compliance is reported to the Department.
- One of the surveyors from the Department also oversees the construction.
- On completion of the construction of the ship, it is launched at the water and the finishing touch is given.
- Finally, the ship is taken for trial. During such time, its inclination test is also conducted.
- Once the test- trial report is satisfactory, the owner applies to the Department for the registration of the ship.

The safety compliance in different ships are different. The manning requirements of different ships are also different. The manning of ships and the safety regulations of all kinds of Inland Shipping are determined as per the Inland Shipping Ordinance 1976 and different rules framed under this convention.

Bangladesh has about 200 shipyards/dockyards/Shipbuilders mostly located around Dhaka, Chittagong, Khulna, Barisal, and Narayanganj. They are classified in different categories depending on their capacity and other indexes. About 250 new ships are built from these industries for the domestic shipping industry.<sup>21</sup> Besides, they also construct different types of smaller vessels as per the need of the industry. Some of these industries also construct ships for the export market. Whether ships are constructed for domestic or export market, these need to maintain quality and other regulatory framework as developed by the national government and the IMO. Above all, quality determines the safety and sustainability of the industry.

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<sup>21</sup> Ibid.

## Statutory Requirement in Coastal Shipping between Bangladesh and India

To facilitate regional trade, Bangladesh and India signed Coastal Shipping Agreement in 2015. According to this agreement, Indian Standard of River Sea Vessels IV (RSV Class IV) with its equivalent ships in Bangladesh i.e. ships below 6000 DWT (Dead Weight Tonnage) constructed under classification society are allowed to ply within the coastal water of both countries as specified in the agreement between Bangladesh and India. While operating these ships, both sides agreed to accept the survey and certification approved by the respective maritime administration. As per this arrangement, vessels engaged in coastal trade are required to carry about 10 sets of documents/certificates in order to ensure the safety of the vessel, its crew and safety of the environment. It may also be mentioned that vessels operating in this route are exempted from port state control as agreed by both sides. However, since IMO is undertaking different advancement programmes in developing regulatory framework for ships above 400 GRT, all member states are required to follow the conventions as ratified by them.

Therefore, the conventions relating to the prevention of pollution and also regarding ballast water management will be an additional aspect that would require to be followed by these ships in future if not in practice by now. Therefore, whatever conventions and codes are developed for the global shipping, the same would also come into force in all other domestic and coastal shipping as IMO encourages member states to follow the conventions to the extent possible even for their domestic shipping. Hence, regulatory framework requirements for these vessels will have to undergo a continuous up-gradation as per the development of international rules and regulations in shipping.

### Findings

The most recent development in the IMO regulatory framework in shipping are:

- **Goal Based Standard (GBS):** It needs to be complied with the world shipping industry to ensure safe and environmentally friendly ships for global shipping industry. In the domestic shipping industry, although ships of more than 500 GRT are constructed are not complying with the international regulations.

- **Energy Efficient Shipping:** International Maritime Organization (IMO) has brought out many instructions and guidelines to encourage environmentally friendly shipping. That includes some physical preparations and a management plan. A timeframe has also been allowed by the International Maritime Organization. If the maritime industry follows IMO guidelines by 2025 level of SOX and NOX can be reduced 30% from the shipping.
- **Ballast Water Management:** All ships in international traffic need to manage their ballast water and sediments to a standard specified by the approved ballast water management plan. Port states would be responsible to check compliance. Therefore necessary preparations by the port states are needed in the coming days.
- **Compliance in Domestic Shipping:** Domestic shipping generally avoid the GBS in constructing ships for domestic industry. As these ships also contribute in the GHG emission, the broad guidelines of IMO need to be followed by all the member states to the extent possible.

## Conclusion

The shipping industry being global in nature is highly regulated and compliant with international rules and regulations. Each phase of the life cycle of shipping has to abide by different sets of conventions and codes. IMO being the apex body in this field formulates rules and regulations to maintain global standard. So far, IMO has enacted more than 50 conventions and a number of codes to regulate the global maritime industry. As the member states ratify those conventions, it becomes obligatory for them to give effect of those conventions into their respective national legislations. SOLAS and MARPOL are the two conventions that directly deal with the safety of ships, its crew, and the prevention of marine pollution. From time to time as per the requirement of the industry, these conventions were amended. IMO also sets different standards for benefit of the industry and also to contribute in the international effort of reducing GHG emission. In operational phase of the ships, STCW Conventions and MLC are instrumental to ensure the standard. These conventions were also amended from time to time as per the need of the industry. While the ship is taken out of the trade, it is sent for scrap or recycling. This phase is also regulated through different codes and conventions made by IMO. In order to ensure safety and safe handling of the materials coming out of the recycled ships, 'Hong Kong Convention' has been

enacted by IMO which is yet to come in into effect. However, ship recycling nations are committed to ratifying this convention for ensuring safety.

Since design and construction of the ship is the first step in the lifecycle of a ship, it needs to go through a strict compliance process. Classification societies, generally, take up this responsibility and remain involved till it is taken out of the trade. The goal based standard and other compliance issues have made the industry safer and greener than before. Although compared to other modes of transportation, the contribution of shipping industry in GHG emission is less, it still takes different measures to reduce it further. Sulphur cap policy, reduction of SOX and NOX to control air pollution are such measures in this effort. Technological advancement in the shipping industry and also to ensure the safety of ships, its crew and for the protection of environment, the industry demands advancement of the regulatory framework being observed in the global shipping industry. Accordingly, IMO adopts different conventions and codes to be followed by the member states engaged in the global shipping industry. It is, therefore, a possibility that with the combined effort of IMO, the member states, and the industry, the global shipping would be cleaner and greener in the future.

**About Author:** Commodore Syed Ariful Islam, ndc, psc, (retd) had a vivid career in the Navy. Thirty-six years of naval service have given him ample exposure to sea and shore services. He did his Masters in Defence Studies from Bangladesh National University and M Phil in Strategy and Development Studies from Bangladesh University of Professionals. He served as Sergeant at Arms at the National Parliament of Bangladesh and as Director General, Department of Shipping. He has several writings related to Seafarers Rights, Shipping Safety & Regulatory Issues. He was involved in the IMO guidelines' development process, including codes or conventions for the global maritime industry. He can be reached at arif563@hotmail.com.