IACS

International Association of Classification Societies

1968

Annual Review 2018

Celebrating 50 years

Design and production:
carmarmedia.co.uk

Printed by:
colt-press.co.uk

Contents

Preface

Hat-trick of achievements

Jeong-kie Lee, IACS Council Chair and Chairman, and CEO of Korean Register, reflects on a busy year for strengthening quality, transparency and technical leadership of IACS

Jeong-kie Lee,
Council Chair

I am very pleased to present to you the IACS Annual Review 2018 which summarises the many and varied activities that IACS has undertaken over the past year, highlighting the scope of the organisation and the wide range of issues that the Association has handled.

Delivering on the core elements of quality, transparency and technical leadership has been key to all the IACS activities over the last twelve months. This has been demonstrated with the rolling out of the series of Recommendations on Cyber Safety; by continuing to increase IACS transparency through the information provided in IACS publications such as the Position Papers; the establishment of an Independent Quality Assessment Review Body (IQARB) to ensure the transparency of IACS' Quality System Certification Scheme (QSCS); and the successful verification of IACS Rules against the International Maritime Organization's (IMO) Goal-Based Standards requirements, to name just a few.

> **"IACS is committed to providing the industry with the appropriate tools to manage such concerns, as part of its wider mission to deliver safer, cleaner shipping"**

IACS has closely monitored the IMO's work on autonomous vessels and greenhouse gases to ensure that the Association makes meaningful contributions to both the IMO and the international maritime industry's work on these important issues which will shape the future of global shipping.

As part of IACS' ongoing commitment to continuous improvement in quality, the Association has also investigated whether further moves towards a fully-independent quality assessment review body would strengthen maritime stakeholders' confidence in IACS' QSCS and would eventually lead Member States to be more aware of the quality of the performance of their Recognized Organizations.

A proposed trial of an IQARB that will review the findings of the Accredited Certification Bodies' audits of IACS Members as well as the corresponding corrective action plans, was submitted to IMO and subsequently agreed, with the IMO Secretariat agreeing to participate in the trial.

Over the course of the year, IACS has issued a number of Position Papers on key industry topics. These papers provide valuable information regarding IACS' position on the various subjects that are of paramount importance to the global shipping industry and summarise the actions IACS has taken to help the industry better cope with the challenges.

Reaching a cyber milestone

The twelve IACS Recommendations on Cyber Safety represent a significant milestone in addressing safety concerns related to cyber issues. IACS' focus on Cyber Safety reflects the Association's recognition that cyber systems are now as much an integral part of a ship's safety as its structure and machinery. IACS is committed to providing the industry with the appropriate tools to manage such concerns, as part of its wider mission to deliver safer, cleaner, shipping.

In an era where technology and regulations are changing at an astonishing pace, IACS continues to lead the industry in meeting new challenges while maintaining its core functions of setting best practice standards applicable to all member societies and establishing a high baseline for quality operations.

As the fourth industrial revolution becomes more and more embedded in the maritime industry, new technologies, digitalisation and ideas such as autonomous ships will become the driving forces behind innovation.

Delivering on quality, transparency and technical leadership have been central tenets of IACS' activities over the past year

But IACS does not operate alone; the multi-lateral co-operative efforts of industry leaders and experts from diverse maritime stakeholders around the world combine to enhance safety measures, establish new technical standards and deliver common solutions, meeting the shared goal of casualty-free and environmentally-friendly shipping.

To that end, I look forward to continuing our strong relationships with all our maritime stakeholders including flag State Administrations, owners, and vessel operators as we work together to promote safe and secure shipping around the world.

In closing, I would like to thank all IACS Members for their commitment and support, and to particularly acknowledge the contribution of the IACS Secretariat for its dedicated and professional efforts to ensure that the Association continues to deliver the technical output required, assuring a sustainable future for the global shipping industry.

IACS' engagement with industry has never been greater

Navigating winds of change

Robert Ashdown, IACS Secretary General, discusses the evolving industry and the Association's continued relevance to global shipping

Robert Ashdown, Secretary General

Throughout 2018, IACS spoke repeatedly and publicly about the winds of change – technical, regulatory and commercial – that are sweeping across the maritime industry. The implications of these seismic changes will be profound and require not only innovative and bespoke solutions, but the adaptation of existing processes and structures to enable member-led associations such as IACS to act with the necessary speed, flexibility and agility to ensure it remains properly positioned for the longer-term.

Building on input from industry and regulators, IACS undertook extensive internal discussions in 2018 to evaluate the challenges faced and to explore new strategic responses in order to prepare and future-proof the Association. By embracing change and adapting accordingly, IACS is preparing itself to continue providing the maritime industry with the technical support expected from the world's leading classification societies.

In 2018, and as part of this exercise, IACS also took steps to ensure that its position on matters of key importance to the industry were clearly set down and widely distributed, and that these positions were grounded in the long-held IACS values of leadership, technical knowledge, quality and transparency. This was evidenced by, inter alia, the launch of 12 Cyber Recommendations; the establishment, under the auspices of IMO, of the trial of an Independent Quality Assessment Review body; the publication of a number of high-level position papers outlining IACS' stance on the 'hot topics' of the moment; and the successful maintenance of verification of Goal Based Standards at the IMO.

Each of these milestone events is described in greater detail elsewhere in this Annual Review but, collectively and individually, they reflect IACS' ongoing ambition to remain at the vanguard of new developments in the maritime sphere while continuing to provide the industry and regulators with expert, impartial advice and high-quality quality operations. The latter provision is demonstrated by enhanced Membership Criteria which applies to all existing IACS Members (as well as any new applicants) from the beginning of 2018.

This Annual Review explores some of these themes in greater depth, such as the work IACS is doing around marine autonomous surface vessels and digitalisation as well as the opportunities that new technologies offer for classification societies themselves in terms of condition monitoring and condition-based maintenance.

Meeting common goals

In this time of rapid technological change, its impact on the global regulatory regime and its practical implementation into the maritime industry, it is more important than ever that IACS engages frequently and robustly with our key stakeholders so that we can navigate through these challenges with a clear and common destination in mind. In this context, IACS' engagement with industry has never been greater and IACS continues to work towards enhancing the effectiveness of pan-industry dialogue wherever possible.

2018 also saw IACS enter its 50th year of service to the maritime community. The contributions made by this Association during the past five decades have been substantial, sustained and, most importantly, effective in delivering IACS' mission of safer, cleaner shipping. A short history section (see pages I-XIV) describes some of IACS' major achievements and particularly demonstrates the deep commitment of IACS in its support for the International Maritime Organization (IMO) in developing new regulations and in ensuring that they can be consistently and globally applied. IACS' work with the IMO continues unabated as amply demonstrated in 2018 by IACS' efforts in support of matters such as the Enhanced Programme of Inspections during Surveys of Bulk Carriers and Oil Tankers (ESP Code), the International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels (The IGF Code), the International Code for the Construction and Equipment of Ships carrying Liquefied Gases in Bulk (The IGC Code), and Goal Based Standards (GBS) maintenance audits which are further documented on page 35.

> **"It is more important than ever that IACS engages frequently and robustly with our key stakeholders so that we can navigate through these challenges with a clear and common destination in mind"**

The Annual Review again includes a 'class report' with key data on each of the IACS Members and this year, that data is placed in the context of the global fleet. Together with the infographic on the work done by IACS in 2018 and the organogram of IACS' constituent working groups, it is clear that IACS has evolved steadily over the past 50 years into an association of considerable size and scope that occupies a unique role in the maritime industry as an independent, apolitical technical standards body, committed to maritime safety, the protection of life and property, and to high environmental standards.

IACS is facing head-on the challenges posed by the fourth industrial revolution and is adapting the way it works to ensure that its internal consultation, decision-making and implementation processes are aligned with the needs of the industry and the pace dictated by technological change. This future-proofing of the Association was further complemented by the decision to relocate the IACS' permanent secretariat to more modern and flexible London offices.

The last 50 years have seen IACS successfully negotiate a myriad of changes in support of international shipping. The next 50 years will doubtless be no less challenging but through leadership and dialogue, flexibility and quality operations, IACS remains uniquely well-positioned to assist the maritime community as it evolves and adapts to the new realities imposed by rapid technological innovation and the new ways of doing business that will entail.

About IACS

Experts in ship safety

IACS works in partnership with the industry and regulators to develop, apply and maintain the relevance of the standards necessary for sound shipping
By Robert Ashdown, Secretary General

As experts in safety standards and with an unrivalled technical understanding of ships' structure and the stresses on them, IACS Member classification societies are the custodians of high standards for ships and other floating structures. Providing a forum that facilitates and encourages sharing of that in-depth technical knowledge, IACS Members support each other in their development of unified technical requirements and the production of other recommendations and guidance.

Ship classification explained

At its core, ship classification verifies the structural strength and integrity of essential parts of a ship's hull and its appendages, as well as authenticating the reliability and function of its propulsion and steering systems, and power generation, alongside other features and auxiliary systems built into the ship to maintain essential on-board services for safe operation. To achieve this, classification societies develop and apply their own Rules as well as verify compliance with international and/or national statutory regulations on behalf of flag State Administrations.

The vast majority of commercial ships are built to and surveyed for compliance with these Rules. Classification and statutory certification are, except in rare cases, inextricably linked, since classification by a society recognised by the flag State Administration is often a prerequisite for both registration of a ship with its flag State Administration and is also normally required for certification of its compliance with the International Convention on Load Lines and the International Convention for the Safety of Life at Sea.

However, a classification certificate is not a warrant of a ship's safety, fitness-for-purpose or seaworthiness. Rather, it is confirmation that the vessel – at a certain date – complied with the Rules developed and published by the society issuing the certificate.

> **"'Class cycle' involvement is a key supporting element of the purposes and objectives of IACS"**

Furthermore, classification societies are not guarantors of the safety of life or property at sea, or the seaworthiness of a vessel because although classification of a vessel is based on the understanding that it is loaded, operated and maintained in a proper manner by competent and qualified personnel, a classification society has no control over how a vessel is operated and maintained between the periodical surveys it conducts to check that a vessel remains in compliance with the relevant requirements. Proper maintenance and operation by shipowners or operators, as well as the seafarers on board, is therefore key.

Protection of life and property at sea and the protection of the environment are the responsibilities of many stakeholders. Therefore, if any defects are found that may affect class, or if any damages are sustained, the shipowner or operator is obligated to inform its classification society without delay. If the conditions for maintenance of class cannot be complied with, class may be suspended, withdrawn or revised to a different notation as deemed appropriate by the society when it becomes aware of the conditions.

Rules and requirements

To meet their objectives, classification societies must have a thorough understanding of internationally applicable statutory requirements for ships and other floating structures. Therefore, IACS has established a robust process for contributing to the development of such requirements, primarily through its role as a non-governmental organisation of the International Maritime Organization (IMO). Indeed, IACS is proud of its crucial role as technical advisor to the IMO, which allows IACS Members to have first-hand access to development of international regulatory instruments. This relationship offers IACS' 12 Member societies an unrivalled channel to share technical information with the industry and facilitates consistent implementation of the international mandatory conventions and codes as part of the statutory services societies provide on behalf of a flag State Administration when so authorised.

Each Member society has developed classification Rules over many years through extensive research and development as well as service experience, and those Rules are subject to constant refinement. In addition, Unified Requirements have been agreed by IACS Members and transposed into individual Members' Rules.

As classification societies are involved with ships through their entire life cycle, they are uniquely positioned to collate research and data throughout the design approval process, through new construction (including the certification of materials, equipment and components) and from the surveys of ships in-service which are used to drive research

Figure 1
The Class cycle

and development, as well as the improvement of classification Rules. This ‘class cycle’ involvement is a key supporting element of the purposes and objectives of IACS *(see Figure 1)*.

Key values in mind

Statutory requirements for shipping are developed at the IMO and at the International Labour Organization to address the safety and security of ships and those on board, as well as for protection of the environment. They also facilitate the efficiency of global trade by providing a level regulatory playing field that allows a compliant ship flying the flag of one State to trade internationally. In support of this, IACS develops and adopts Unified Interpretations (UIs) as necessary to assist in the global and consistent implementation of IMO regulations. IACS UIs are adopted Resolutions on matters arising from implementing IMO agreed provisions. Such IACS-adopted UIs encourage global and consistent implementation and can address matters which in the IMO agreed texts are either left to the discretion of the flag State Administration or are vaguely worded.

IACS also establishes, reviews, promotes and develops Unified Requirements (URs) in relation to the design, construction, maintenance and survey of ships on matters directly connected to or covered by specific Rule requirements and practices of classification societies. These URs are considered minimum prerequisites, but Members are free to set and publicise requirements that result in an equivalent or higher safety level compared with the IACS’ URs. IACS also assists international regulatory bodies and standards organisations to develop, implement and interpret statutory regulations and industry standards in ship design, construction and maintenance with a view to improving safety at sea and preventing marine pollution.

Regionally, IACS is also active in Brussels, where it promotes its aims to European institutions and, where appropriate, makes technical contributions to European Union regulatory developments related to shipping.

IACS further engages with individual flag State Administrations and regulatory bodies, as required.

This global reach ensures that IACS Members can be confident when it comes to certifying compliance with statutory regulations on behalf of authorising flag State Administrations.

Members are free to set and publicise requirements that result in an equivalent or higher safety level compared with IACS’ URs

IACS VALUES

IACS ascribes to the following values in its assistance to regulators, including the IMO and ILO, and industry:

1. **Leadership:** the ability to be ahead and to co-operate with regulators and industry on initiatives that can effectively promote maritime safety, protection of the environment and sustainability.
2. **Technical knowledge:** collective and individual knowledge and experience leading to the development, adoption and implementation of technical rules and requirements reflecting current practice and changing demands of society, supporting innovation and new technologies.
3. **Quality performance:** commitment of Members to define and adhere to the highest global quality standards; and
4. **Transparency:** the ability to provide advice on the implementation of regulations, interpretations or enhancements thereof, if the need is identified, so that practical solutions can be effectively developed in co-operation and with the support of other stakeholders, increasing the trust on class.

In light of the above, the breadth and depth of IACS’ work in relation to safety and the protection of the marine environment cannot be overstated. Working in partnership and applying the full depth of its expertise, IACS makes a significant contribution to the continued safe operation of the shipping industry.

Maintaining membership procedures

Robust IACS Membership Criteria reflect IACS' ongoing commitment to quality
By Robert Ashdown, Secretary General

As a technical standards-setting body, IACS has long recognised that it can only expect to receive the respect of its stakeholders if its Members maintain their professional integrity and high professional standards at all times. The IACS Membership Criteria are therefore designed to act both as a set of requirements necessary for entry into the association and as a list of obligations that all Members must meet continually if they are to remain IACS Members.

It is for this reason that IACS undertakes a three-yearly review of each Member to ensure that they remain in compliance with the Membership Criteria, imposing the same high standards upon existing Members as it does on new applicants.

IACS substantially revised its Membership Criteria in 2017 and these entered into force on January 1, 2018. Major changes included simplifying the application procedure, requiring better identification of non-compliant ships, introducing a requirement for Recognized Organization (RO) experience and enforcing a more robust Quality System Certification Scheme (QSCS) approval process. This significant revision of Volume 2 of the IACS Procedures was prompted by experience gained through applying the current procedures as well as in response to international regulatory developments, most pertinently the introduction of a new International Convention for the Safety of Life at Sea (SOLAS) regulation requiring Goal Based Standards to be applicable to bulk carriers (BCs) and oil tankers (OTs) of 150 metres or more in length whose building contracts were placed on or after July 1, 2016.

> **"IACS undertakes a three-yearly review of each Member to ensure that they remain in compliance with the Membership Criteria, imposing the same high standards upon existing Members as it does on new applicants."**

An important element of the ethos of IACS membership is that all Members should contribute to the establishment, review, promotion and development of minimum technical requirements. IACS' Common Structural Rules for OTs and BCs constitute the most comprehensive output of its technical work, but they require constant review and updating. IACS revised Membership Criteria therefore requires that Members must be technically capable of contributing to this work.

Any new member to IACS is likely to have within their classed fleet non-compliant ships, that is to say those built and/or operated outside of IACS requirements. In recognition of this fact, and to give interested parties full disclosure on the nature of the 'IACS fleet', any non-compliant ships must be publicly identifiable and, to limit this unavoidable discrepancy to the greatest extent possible, any new member must ensure that those ships fully comply with all applicable technical requirements within three years of joining. During the three-year period, all non-compliant ships will be subject to the Procedural Requirements of IACS' PR1D.

Experience in acting both as a class society and as an RO is also critical if high standards of quality operation are to be maintained. IACS therefore requires five years' experience in working as a class society, including compliance with IACS Resolutions, and five years' experience as an RO covering all elements of the primary Conventions as well experience gained within the previous 10 years demonstrating survey and design assessment capabilities.

IACS Membership Criteria also reflect the importance of each member adhering to IACS' QSCS to preserve IACS' status as an association of classification societies whose members all have stringent quality rules. Any new applicant to IACS must therefore undertake a number of associated vertical contract audits to cover a variety of areas, such as the minimum number of audits on board ship, on new constructions and reflective of the classed fleet's diversity. The audits must also be carried out by an IACS-recognised, independent Accredited Certification Body.

IACS Members maintain professional integrity and high professional standards at all times

For class societies who may aspire to membership but wish first to gain greater insight into the demands and expectations associated with participating in the association's technical work, IACS will continue to make its Technical Contributions Forum (TC Forum) open to non-IACS class societies. However, in order to participate in the TC Forum an organisation must first establish that it is a 'Classification Society' as defined in the IACS Charter and Procedures.

The IACS Membership Criteria clearly reflect the standards and attributes required of an IACS Member and assessing both new and existing Members against these criteria in a transparent, objective and justifiable manner is fundamental to the maintenance of IACS professional standards. IACS continues to welcome into membership any class society that meets its eligibility requirements.

History

IACS 1968-2018
the story so far

KITACK LIM
IMO Secretary-General

“IACS’ 50th anniversary is a remarkable achievement by any standards, but especially so for a purely technical body operating as a not-for-profit organisation in a landscape that is evolving and changing like never before.

From the perspective of both the shipping industry and the governments that regulate it through IMO, IACS is indispensable.

Given the truly global importance of shipping to sustainable development, billions of people worldwide have cause to be thankful to IACS and its members.

IACS is truly an un-sung hero – and that is something you should reflect on, and be very proud of, as you celebrate this 50th anniversary.”

The *Olympia*, the first vessel built which incorporated the Common Structural Rules

A culture of standards excellence

IACS celebrates its 50th anniversary by reflecting on its substantial achievements as well as its plans for the future

The year is 1968, the tail end of the Swinging Sixties. Apollo 8 becomes the first manned spacecraft to orbit the moon. Container trade, having been commercialised in 1956, rapidly gains momentum. And in Germany, at a meeting at the office of Germanischer Lloyd (GL) in the port city of Hamburg, the International Association of Classification Societies (IACS) is created.

But the origins of IACS date back much further. Back in 1930, before the International Maritime Organization (IMO) had even been created, the first International Convention on Load Lines was adopted, standardising load line regulations put in place by different maritime countries. The convention recommended collaboration between classification societies to secure “as much uniformity as possible in the application of the standards of strength upon which freeboard is based”.

After adoption of the convention, Italian classification society Registro Italiano Navale (RINA) held the first conference of major societies in 1939. The other society attendees – who with RINA, went on to form IACS – were American Bureau of Shipping (ABS), Bureau Veritas, Det Norske Veritas (DNV), Germanischer Lloyd (GL), Lloyd’s Register (LR) and Nippon Kaiji Kyokai (ClassNK). The conference agreed on further collaboration between the societies, and a second major class society conference took place in 1955. This event led to the establishment of working parties on specific topics and, eventually, to IACS’ formation.

When ABS, Bureau Veritas, DNV, GL, LR, ClassNK and RINA created IACS in the September of 1968, their aims were to promote high safety and pollution-prevention standards and liaise closely with the shipping sector and related organisations. Fast-forward half a century, and in 2018, IACS celebrated its 50th anniversary, marking a time not only for reflection of the industry progress it has helped to achieve since its establishment, but also a time to look ahead to a future centred on maintaining and building on those goals.

“IACS was created as the mechanism of co-operation among major classification societies and its support of and co-operation with IMO have led to tremendous contributions to the work of IMO and Maritime Governance by the UN and IMO. I witnessed how IACS has evolved through the co-operation with IMO and I have no hesitation in saying that its 50-year history and accumulated achievements have amply demonstrated that IACS can be recognised as the mechanism of maritime governance in the field of ship technology for the international shipping industry.”

KOJI SEKIMIZU
IMO Secretary-General Emeritus

The 60s, 70s and 80s

When IACS was formed in 1968, containerisation was poised to obviate many of shipping’s long-established names and identities, as well as much of the field’s general cargo technology. Diesel was triumphing over steam; the supertanker and giant bulk carrier era had arrived; and new ownership patterns marked the start of what was to become a fragmented industry. The international shipping industry was to spend many of the next thirty years fighting against excessive capacity and competition, while the steady decline of the traditional ‘company fleet’ imposed growing demands on class societies’ technical skills base.

IACS held its first IACS Council Meeting in June 1969, the same year that it was given consultative status with the Intergovernmental Maritime Consultative Organisation, IMCO (which became IMO in 1982). IACS is still the only non-governmental organisation with Observer status able to develop and apply Rules.

1969 also saw the Russian Maritime Register of Shipping become an IACS Member. A year later, the Polish Register of Shipping joined IACS too. 1972 saw the Convention on the International Regulations for Preventing Collisions at Sea, 1972 adopted. In 1973, IACS was present and contributing to the adoption of the International Convention for the Prevention of Pollution from Ships, as later modified by the Protocol of 1978 relating thereto (MARPOL 73/78). In 1973 the IMO’s Marine Environment Protection Committee was set up, and from its beginning, IACS has regularly advised the committee’s different sub-committees and working groups.

1974 proved to be a pivotal year for shipping. A completely re-written International Convention for the Safety of Life at Sea (SOLAS) was adopted – it is still the current version of SOLAS and the industry’s primary safety convention. SOLAS was also important for introducing the, “tacit acceptance,” procedure in the entry into force of new international maritime regulation. In 1976, an IACS Permanent Representative to the IMO was appointed. Important changes in tanker design and operations followed IMO’s tanker safety conference in early 1978, with new measures being incorporated in MARPOL 73/78 and subsequent annexes to it – notably those entering into force in 1983 and 1986. 1978 also saw the adoption of the STCW Convention, a key IMO Convention. That year, IACS held the first meeting of its General Policy Group in London.

By the 1980s there was growing recognition that ship safety was not good enough. IACS stepped up to target improved safety measures and in doing so regained the respect and confidence of influencers and organisations dissatisfied with the performance and transparency of class during this decade. There were notable achievements for IACS in the 1980s, starting with its first Extraordinary Council Meeting which took place at Lloyd’s Register of Shipping in London in 1980. In 1983, the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 entered into force, followed by the first set of amendments to SOLAS in 1984. In May 1988, the China Classification Society and the Korean Register of Shipping became IACS Members. That year, amendments to SOLAS and the International Convention on Load Lines introduced harmonised survey and certification procedures, evolved with considerable input from IACS. 1988 was notable for the first in a series of steps by IACS to prevent class-hopping (changing class in an attempt to avoid outstanding repairs) when it introduced its original Transfer of Class Agreement, which has been progressively revised and tightened.

Indeed, IACS has much to celebrate as it marks 50 years of its existence. It holds the position as the principal technical adviser to the IMO. It has 12 Member classification societies, with the classification design, construction and through-life compliance Rules and standards they set covering over 90% of the world’s cargo-carrying tonnage. It has a Representative to the EU as well as an Expert Group. On top of these achievements, nearly 1,000 Unified Interpretations (UIs) – which ensure a global and consistent implementation of IMO requirements – have been created since 1968.

IACS fundamentally works for safer and cleaner shipping, and since its formation, it has witnessed the adoption of countless amendments to shipping’s current main safety convention, the International Convention for the Safety of Life at Sea, as well as the adoption of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) in 1978. Numerous additional IMO Conventions related to maritime safety have been adopted since IACS was created.

Strength in numbers

Statistics from the last 50 years testify to the improvement in maritime safety during IACS’ lifetime. There has been a general safety improvement trend in the 20th Century: a rate of loss of one ship in every 100 a year in 1910 improved to around one ship in every 670 by 2010. Shipping losses have further declined by 38% over the past decade, figures show a significant improvement on the 10-year loss average and 2017’s total shipping losses constituted the second-lowest total over the last decade. Older statistics show an overall decline in the number of vessels lost from 1997 to 2011. Further, the design efficiency of ships has improved considerably since 2013.

Recent times have also experienced significant progress on improving shipping’s green credentials and IACS has been supportive of the IMO’s work on this front. In April 2018, the IMO adopted a strategy that sought to reduce shipping’s carbon emissions by at least half by 2050, and in October 2018 it adopted an action plan aiming to bring in new supporting measures to reduce marine plastic litter from vessels. In 2017, the International Convention for the Control and Management of Ships’ Ballast Water and Sediments, adopted to introduce global regulations to control the

Continues on page XIV

IACS 1968-2018

1968 1970 1975 1980 1985 1990 1995 2000 2005 2010 2015 2018

1968 – International Association of Classification Societies (IACS) formed

International Convention on Load Lines (CLL) enters into force

1969 – IACS holds first IACS Council Meeting

IACS given consultative status with the Intergovernmental Maritime Consultative Organisation, IMCO, which became the International Maritime Organization (IMO) in 1982

Russian Maritime Register of Shipping becomes IACS Member

1970 – Polish Register of Shipping joins IACS

1972 – Convention on the International Regulations for Preventing Collisions at Sea, 1972 adopted

1973 – International Convention for the Prevention of Pollution from Ships (MARPOL) adopted

IMCO's Marine Environment Protection Committee set up

1974 – International Convention for the Safety of Life at Sea (SOLAS) adopted

1976 – IACS Permanent Representative to the IMO appointed

1978 – Important changes in tanker design and operations follow IMCO's tanker safety conference this year, with new measures being incorporated in the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (MARPOL 73/78) and subsequent annexes

International Convention on Standards of Training, Certification and Watchkeeping for Seafarers adopted

IACS holds first meeting of General Policy Group

1980 – IACS' first Extraordinary Council Meeting takes place

1983 – MARPOL 73/78 enters into force

1984 – First set of amendments to SOLAS enter into force

1988 – China Classification Society and Korean Register of Shipping become IACS Members

Amendments to SOLAS and CLL see introduction of harmonised survey and certification procedures, evolved with considerable IACS input

First in series of IACS steps to prevent 'class-hopping', a trend in which owners switch class to class societies with lower standards

1990 – IACS decides to make big changes to meet changing sector's challenges and tackle criticism that class is excessively secretive

1991 – Intensive IACS Member investigations into dramatic bulk carrier casualty surge begin

Interim measures to improve bulk carrier safety adopted

IACS holds first Summit Meeting

Establishment of IACS Quality System Certification Scheme (QSCS)

1992 – First in series of IACS initiatives towards safer bulk carrier fleet

Double-hull or IMO-approved alternative measures adopted for new and existing tankers

IACS' Permanent Secretariat in London established

1993 – IACS' Enhanced Survey Programme for older bulk carriers and tankers introduced

IMO Assembly adopts International Safety Management (ISM) Code

1994 – International Code of Safety for High-Speed Craft adopted

IACS Council announces biggest single research effort in IACS history: an investigation into how older bulk carriers could be made safer and how greater strength and survivability margins could be realised in newbuildings

IACS involved in research after *Estonia* disaster

IACS starts giving practical help to Port State Control (PSC) authorities on ships changing class, providing databases on PSC detentions and giving training assistance – especially in the connection between IMO Conventions and Class Rules

IMO's Maritime Safety Committee (MSC) sets up panel on roll-on/roll-off (ro-ro) safety

1995 – IACS' mid-year Council Meeting agrees January 1, 1996 implementation of program of seven Marine Safety Initiatives, all focused on restricting operation of shipping failing to meet IACS' standards

Establishment of Procedural Guidelines for Members' upcoming heavy involvement in ISM Code certifications and launch of comprehensive, mandatory training initiatives for society Auditors involved

Study conducted by IACS in partnership with IMO suggests higher safety margin need

IMO Assembly adopts ro-ro and bulk carrier safety resolutions

1996 – European Council Directive makes PSC effort obligatory for Member states

New Conditions of Class unveiled requiring greater strength reserves in both existing ships and stronger new vessels from mid-1998 – as a prelude to IMO's new 12th chapter of SOLAS

1997 – IACS researches and publishes first-ever comprehensive guide to Shipbuilding and Repair Quality Standards

SOLAS amended to improve safety of new and existing bulk carriers

1998 – *Bulk Carriers – Handle with Care* published

Three most significant class-related safety developments for many years: entry into force of ISM Code for all Phase One vessels, revision to SOLAS on Recognized Organizations and IACS requirement for stronger new bulk carriers

2000 – IACS decides to discontinue Associate status

2005 – Common Structural Rules for Bulk Carriers and Double Hull Oil Tankers adopted

2006 – IACS' Associate status restored

Development of Common Structural Rules for Bulk Carriers and Double Hull Oil Tankers

2008 – European Commission (EC) competition investigation begins with raids on the head offices of Bureau Veritas, Det Norske Veritas (DNV), Germanischer Lloyd (GL), Lloyd's Register, Registro Italiano Navale and IACS' Permanent Secretariat

Revised MARPOL Annex VI, with significantly-strengthened requirements, adopted, with date of January 1, 2020 set in the regulations for entry into force of new global limit for sulphur content of ships' fuel oil of 0.5% mass by mass

2009 – EC settles its competition investigation with no findings of infringement of competition law by IACS

Commitments made regarding Criteria for IACS Membership, procedures for non-IACS classification society participation in development of IACS Resolutions (defined), availability of Resolutions and their backgrounds and establishment of Independent Appeal Board

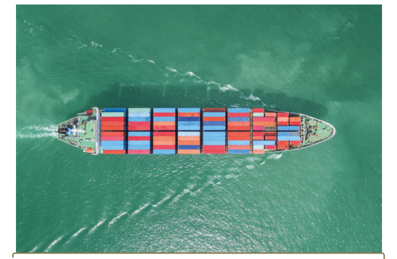
Implementation of the Transfer of Class Agreement, whereby no member will accept a ship that has not carried out improvements demanded by its previous class society

IACS QSCS amended in such a way that audits and assessment of QSCS compliance are to be carried out by an independent external Accredited Certification Body, or independent external Accredited Certification Bodies. Also modified so requirements can be applied equally by IACS Members and non-IACS class societies, including those not wanting to apply for IACS membership

New IACS Charter formally adopted

2010 – Indian Register of Shipping becomes full IACS Member and Associate category ends

With a lot of talk about improving energy efficiency, IACS warns against taking this to the extreme and advises ships not to switch to smaller engines. IACS instigator of looking at bigger picture and pushing for engines to be made more efficient



2011 – Croatian Register of Shipping and Polish Register of Shipping become IACS Members

With adoption of amendments to MARPOL Annex VI, Energy Efficiency Design Index is made mandatory for new ships while Ship Energy Efficiency Management Plan is made obligatory for all vessels

2013 – Merger of DNV and GL to form DNV GL

Adoption of Common Structural Rules for Bulk Carriers and Oil Tankers (CSR BC & OT)

2014 – IACS' Statutory Panel split into Environmental Panel and Safety Panel

GL leaves IACS

2015 – CSR BC & OT applied

2016 – 96th session of MSC approves MSC.1/Circ.1518, confirming that ships contracted under the 12 IACS Members' verified rules are deemed to meet IMO's Goal Based Standards

2017 – International Convention for the Control and Management of Ships' Ballast Water and Sediments enters into force

"It gives me great pleasure to contribute to this Review on IACS' 50th Anniversary celebrations. During my 45-year long association with IMO (12 of which as Greece's national representative and 33 as a staff member), there were plenty of interactions with the Association of which I, invariably, have fond memories.

The work of IACS lies at the epicentre of IMO's core responsibility, which, of course, is the promotion of the safety of life at sea and the protection of the maritime environment. The excellence of IACS' delivery on its agenda has always been of the highest standard. This was duly recognised by the IMO Member States when they decided unanimously to grant the Association consultative status, which, while benefiting IMO through the provision of technical support and guidance, also acts as a means for the Association itself to better its performance through becoming aware of the views, trends and developments within the wide spectrum of technical activities occasionally on the Organization's agenda.

It was because of IACS' exceptional contribution to the overall technical work of IMO, coupled with the development of unified interpretations of the Organization's statutory regulations and the formulation of technical rules that successfully reflect the aims incorporated within the various IMO conventions, that I considered IACS to be IMO's principal technical advisor.

I would do an injustice to IACS were I to attempt to list its various and many contributions to the cause of maritime safety and environmental protection lest I forgot some of them.

Its contribution, however, to the development of the SOLAS, MARPOL, Load Lines and Tonnage Measurement Conventions; the safety of ro-ro ferries and bulk carriers; the quest for robust ships and the development of Goal Based Standards for bulk carriers and tankers, to mention but a few, stand out as the Association's major achievements for which all those who go to sea in ships are grateful. I congratulate IACS on its milestone event and wish it every success in the attainment of its noble objectives for many, many years to come."

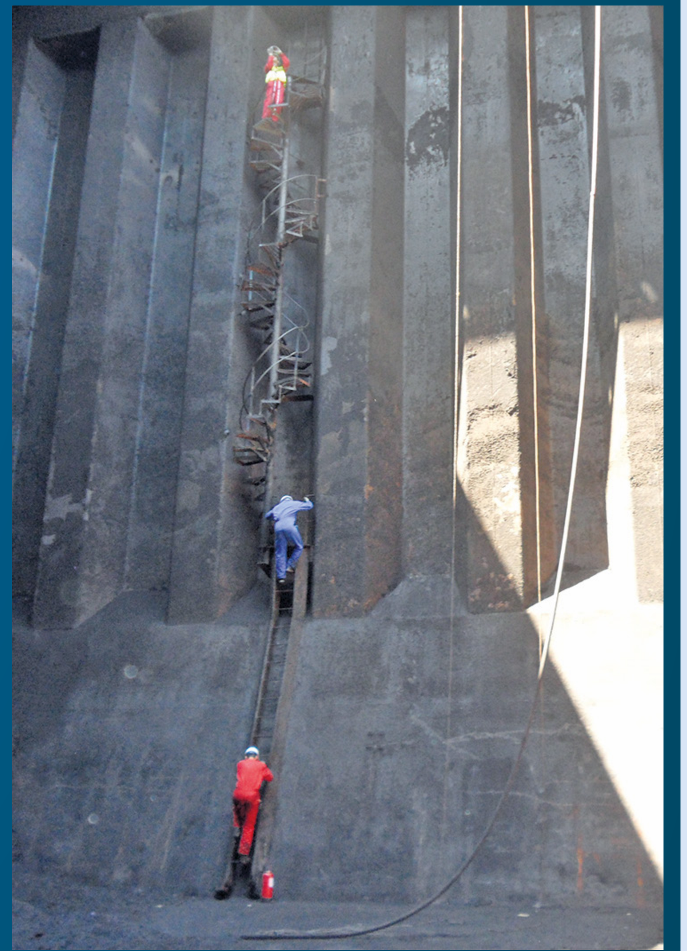
EFTHIMIOS E. MITROPOULOS KCMG
IMO Secretary-General Emeritus

The 90s

IACS began the 1990s with a seminal decision to make significant transparency changes to meet a changing sector's challenges and tackle criticism that class was excessively secretive. IACS Council proposed changes to address standards through the IACS Code of Ethics and IACS Quality System Certification Scheme (QSCS).

However, before some of these initiatives could be progressed, there was a dramatic surge in bulk carrier casualties, triggering industry alarm and the start of intensive IACS Member investigations in 1991. That year, interim measures to improve bulk carrier safety were adopted and IACS also held its first Summit Meeting. The next year, the first in a series of IACS initiatives towards a safer bulk carrier fleet (including more stringent surveys) was taken, and double-hull or IMO-approved alternative measures were adopted for new and existing tankers. IACS' Permanent Secretariat in London was also established in 1992. It quickly responded to a brief to commence more-effective communication with the industry, its critics and the media.

The 1990s saw IACS become increasingly influential over major maritime safety issues and regain confidence and respect with regard to the transparency and performance of class. In 1993, its Enhanced Survey Programme (ESP) for older bulk carriers and tankers was introduced, and was subsequently acknowledged as a major step forward in the inspection of older units and safe operation. In the following three years, the ESP was repeatedly improved, with more extensive, focused and frequent surveys in line with increasing vessel age. 1993 also saw the IMO Assembly adopt the International Safety Management (ISM) Code.



Confidence in, and respect of, class transparency and performance increased in the 1990s

In 1994, the IACS Council announced the biggest single research effort in IACS history: an investigation into how older bulk carriers could be made safer and how greater strength and survivability margins could be realised in newbuildings. Detailed cause and solution examination for older bulk carriers' vulnerability in certain scenarios explored a design, casualty and in-service experience database of over 250 ships. IACS Members were also involved in research after the sinking of the *Estonia* cruise ferry in 1994 in the Baltic Sea, with 852 lives lost. In 1994, IACS Members additionally started giving practical help to Port State Control (PSC) authorities on ships changing class, providing databases on PSC detentions and giving training assistance. 1994 was also the year the IMO's Maritime Safety Committee set up a panel on roll-on/roll-off (ro-ro) safety.

1995 marked important IACS progress in developing the association's contribution to an increasingly-elderly fleet's safety. Its mid-year Council Meeting agreed a January 1, 1996 implementation of a programme of seven Marine Safety Initiatives, all focused on restricting the operation of shipping failing to meet IACS' standards. With conformance audited through QSCS, the programme included further tightening of the Transfer of Class Agreement; greater transparency of, and simpler access to, increased class and statutory information against legitimate requests; and automatic suspension of class under given circumstances. The year also saw the establishment of Procedural Guidelines for Members' upcoming heavy involvement in ISM Code certifications and the launch of comprehensive, mandatory training initiatives for the society Auditors involved. Although there was a welcome reduction in bulk carrier casualties in 1995/96, the result of a 1995 study conducted by IACS in partnership with the IMO suggested a need for a higher safety margin. 1995 also saw the IMO Assembly adopt ro-ro and bulk carrier safety resolutions.

Mid-1996 saw a European Council Directive make PSC effort obligatory for Member states. At the end of that year, new Class Rules were unveiled requiring greater strength reserves in both existing ships and stronger new vessels from mid-1998 – as a prelude to IMO's new 12th chapter of SOLAS, dedicated to bringing in greater bulk carrier safety margins. In 1997, SOLAS was amended to improve the safety of new and existing bulk carriers. Also in 1998, IACS developed and published the first ever comprehensive guide to *Shipbuilding and Repair Quality Standards*, which was well received. Guidance on bulk cargo loading and discharge, designed to lower the inherent risks of bulk carrier damage in cargo handling, proved to be another popular publication. A version designed for convenient use by bulk terminal staff, *Bulk Carriers – Handle with Care*, was also published in 1998.

1998 also marked the 30th anniversary of IACS, which coincided with three of the most significant class-related safety developments for many years: July 1 served as the date of the entry into force of the ISM Code for all Phase One vessels, a revision to SOLAS on Recognized Organizations and IACS requirement for stronger new bulk carriers. By the end of the 20th century and as the new millennium arrived, IACS had held 40 Council Meetings.

"It gives me great pleasure to congratulate IACS on the celebration of its 50th Anniversary. During my 14 years tenure as Secretary-General of IMO, I have witnessed the excellent technical work and advice of IACS Members which has been of invaluable assistance to IMO in developing its regulatory regime. In this regard, IACS has provided representation at all IMO meetings and has willingly undertaken specific studies. These combined efforts have been pivotal in assisting IMO, particularly in improving safety of life at sea.

The fact that IACS Members are involved in the design and construction of vessels through to assuring their proper application via their valued inspection systems on board ships deserves to be applauded.

The shipping world will continue to benefit from the professionalism of IACS Members and I wish them continued success."

WILLIAM O'NEIL,
CM CMG FREng
IMO Secretary-General Emeritus

The 2000s and 2010s

For IACS, the start of the 21st century would be heavily focused on the development on Common Structural Rules.

In December 2005, the Common Structural Rules for Bulk Carriers and Common Structural Rules for Double Hull Oil Tankers were individually adopted, with an application date of April 1, 2006. This represented the culmination of three five-year projects split across the IACS Members and which involved a huge commitment in terms of resources. Indeed, the development of common structural rules is probably the most expensive project undertaken by IACS Members. Some years later, in January 2008, a European Commission (EC) competition investigation began and resulted in very heavy expenditure on legal counsel and management resources, unfortunately causing serious delays to some important IACS activities. Also in 2008, a revised MARPOL Annex VI, with significantly-strengthened requirements, was adopted, with a date of January 1, 2020 set in the regulations adopted for the applicability of a new global limit for sulphur content of ships' fuel oil of 0.5% mass by mass.

In October 2009, the EC settled its investigation with no findings of an infringement of competition law by IACS Members. Commitments were made regarding criteria for IACS membership, procedures for non-IACS classification societies' participation in the development of IACS Resolutions (defined), availability of Resolutions and their backgrounds and the establishment of an Independent Appeal Board.

By mid 2018, IACS had held 77 IACS Council Meetings and 84 General Policy Group meetings

The IACS QSCS was amended in such a way that audits and assessment of QSCS compliance were to be carried out by an independent external Accredited Certification Body or Bodies, rather than IACS's own auditors, and without any involvement of the IACS Council. QSCS was also modified so that its requirements could be applied equally by IACS Members and non-IACS class societies, including those not wanting to apply for IACS membership.

Later, in October 2009, a new IACS Charter was formally adopted and IACS closed the first decade of the new millennium with its 60th IACS Council Meeting in the UK city of London in December 2009.

In June 2010 the Indian Register of Shipping became a full IACS Member. With that, the category of Associate Members ended. Additionally in 2010, when discussions on improving energy efficiency gathered steam and proposals were made to reduce engine sizes, IACS warned industry against taking energy efficiency measures to the extreme. Instead, IACS was instrumental in pushing for engines to be made more efficient. In May 2011, the Croatian Register of Shipping became an IACS Member, and exactly a month later, so did the Polish Register of Shipping.

A month on, with the adoption of amendments to MARPOL Annex VI, the Energy Efficiency Design Index (EEDI) was made mandatory for new ships while the Ship Energy Efficiency Management Plan (SEEMP) was made obligatory for all vessels, new or not. The EEDI for new ships is an important technical measure and aims to promote using more-energy efficient (less-polluting) equipment and engines. SEEMP is an operational measure that creates a mechanism to improve a vessel's energy efficiency in a cost-effective way.

December 2013 saw the merger of DNV and GL to form DNV GL as well as the Adoption of the integrated Common Structural Rules for Bulk Carriers and Oil Tankers (CSR BC & OT). Then, on the first day of 2014, IACS' Statutory Panel was split into an Environmental Panel and a Safety Panel. In July 2015, the CSR BC & OT came into force.

In May 2016, the IMO handed down a monumental decision for IACS Members, confirming the concentrated effort that had lasted 14 years. Its Maritime Safety Committee, in its 96th session, recognised that the IACS Common Structural Rules for BC and OT met objectives and functional obligations set down by the committee of the International Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers (GBS). This recognition served as a powerful endorsement that class rules provide for the design and construction of vessels that, with proper maintenance and operation, will meet the mission of safety of life and property as well as environmental protection throughout their service life. Additionally, the International Convention for the Control and Management of Ships' Ballast Water and Sediments entered into force in 2017.

As of July 2018, IACS had held 77 IACS Council Meetings and 84 General Policy Group meetings in total. Since the year it was formed, the association has also seen 990 Unified Interpretations – IACS has continued to work with the IMO to ensure a global and consistent implementation of IMO requirements.

IACS – the numbers (2018)

2,134

Number of new-builds under Members' class collectively (delivered in a given year)

111

Number of new/revised IACS Resolutions and Recommendations

51

Number of meetings of IACS Working Groups (including SC, SGs, PTs, QC, GPG, Panels and Council)

11

Number of meetings with industry

276

Number of Accredited Certification Body's (ACBs) audits conducted by IACS Members collectively together with a number of VCAs

628*

Number of audit findings for IACS Members collectively (no distinction made between OBs and NCs); (*701 including NFs)

48

Number of submissions to IMO

20

Number of IMO meetings that IACS attended as an NGO

IACS will continue to do all it can to assure the highest possible standards of maritime safety and environmental protection

transfer of potentially-invasive species, entered into force. Looking ahead, 2020 will see the IMO put in place a sulphur limit of 0.5% for fuel oil used on vessels operating outside designated emission control areas.

Long before these developments, IACS was present and contributing to the adoption of the International Convention for the Prevention of Pollution from Ships as later modified by the Protocol of 1978 relating thereto (MARPOL 73/78), as well as the establishment of the IMO's Marine Environment Protection Committee in 1973 (IACS has regularly advised the committee's different sub-committees and working groups since it was created). Additionally, other IMO Conventions connected to preventing marine pollution have been adopted since 1968.

There is little doubt that since IACS came into existence, lives at sea have been saved and shipping has witnessed significant improvements in both safety and its environmental record. But there is always more that can be done; noting the uncertainty of the marine environment and conditions, shipping can never be too safe nor too clean, and IACS remains committed to continuous improvement. The Association's strategy and aims for 2017 to 2022, states that IACS aims to strengthen its position as a trusted regulator partner with respect to the development of regulations promoting maritime safety, environmental protection and sustainability, as well as to strengthen the trust placed in classification by other stakeholders, as the main mechanism for practical maritime sector self-regulation.

The forward-looking strategy notes the challenges faced by the organisation as they relate to those addressed in the IMO Strategic Plan for 2018 to 2023, which includes globalisation, maritime security and safety, environmental consciousness and ship efficiency, innovation and new technologies and moving emphasis onto people (such as safety culture). IACS views these challenges as chances to promote and further enhance the role of class. To address these challenges and support the IMO plan, IACS will focus on regulatory effectiveness, organisational effectiveness, global facilitation and security of international trade, implementation of the IMO's instruments, new and advancing technologies, ocean governance and climate change.

With fifty years of robust and fundamental operations to celebrate, IACS looks forward to the next 50 years and the changes they might bring. For instance, who in 1968, when IACS was formed, could have predicted the colossal impact the Internet would have on both the maritime industry and the wider world, or that technological developments would transform the way that shipping is done? Today, there are many variables to consider – be it blockchain, automation or an increasing focus on tackling climate change – that make the future of the shipping sector and IACS' role serving and leading it particularly interesting. Today and tomorrow, IACS will continue to do all it can to assure the highest possible standards of maritime safety and environmental protection. Safe ships and clean seas are our priority, and IACS wants to keep it that way.

1 https://www.researchgate.net/publication/320946469_The_impact_of_shipping_accidents_on_marine_environment_a_study_of_Turkish_seas

2 https://safety4sea.com/wp-content/uploads/2018/07/Allianz-Safety-and-Shipping-Review-2018-2018_07.pdf

3 http://awsassets.panda.org/downloads/15_years_of_shipping_accidents_a_review_for_wwf_.pdf

4 https://www.transportenvironment.org/what-we-do/shipping/shipping-and-climate-change

IACS Technical Work

Turning shipping green

New IMO environmental initiatives introduce substantial issues for the maritime industry
By Bongchan KO, IACS Environmental Panel Chair, and Carlo Aiachini, IACS Machinery Panel Chair

Recent meetings at the International Maritime Organization's (IMO) Marine Environment Protection Committee (MEPC) have focused on key environmental issues: the Energy Efficiency Design Index (EEDI), the Ship Energy Efficiency Management Plan (SEEMP), the Data Collection System (DCS), Ballast Water Management (BWM), the initial IMO strategy on the reduction of greenhouse gas (GHG) emissions and implementation of the 0.5% global sulphur limit. These developments are all part of the regulatory framework developed by the IMO to limit the environmental impact of ships. They also pose significant challenges for the maritime industry.

EEDI

The requirements of the EEDI aim to improve the energy efficiency level of new ships and will become progressively more stringent in future years compared with similar ships built from 1990 to 2000. The IMO considered an increase of the Phase 3 reduction requirements at MEPC 73, in which it was proposed to increase the requirements to 40% for container vessels starting in 2022; to retain the 30% for general cargo vessels, but starting in 2022; and to retain the current requirements and timeline (2025) for tankers, bulk carriers and all ro-ro ship categories. Various proposals were discussed for the other ship types, however the committee was not able to conclude on this matter and deferred the decision on approval of the amendments to MEPC 74 in June 2019.

Under phase 3 of the EEDI scheme, compliance will drive improved hull shapes and design methods and more efficient engines. This, however, implies that designers may have difficulty meeting the EEDI requirements without considering energy-saving technologies or reductions in service speed. Many different options have been studied either to correct the energy performance of different ship designs or to improve already optimal, or nearly-optimal, standard designs by considering phenomena usually regarded as secondary – or not yet completely understood – in the normal design process.

In any case, however, maintaining the safety of shipping remains the key priority. Because lower ship speeds may be an alternative compliance option, care must be taken not to reduce a ship's propulsion power below safe levels for navigation in adverse conditions. The reduced margins will also require the application of very strict standards for verification of compliance. IACS has supported the work undertaken to consider the impact of mandatory EEDI requirements on the minimum propulsion power that must remain available for ships to maintain manoeuvrability in adverse conditions. In addition, IACS has considered and evaluated the technical consequences (i.e., engine derating, passing through the barred speed range and shaft alignment issues) of ship machinery design resulting from EEDI implementation in order to contribute to discussions at IMO on further EEDI strengthening.

SEEMP and DCS

In October 2016, the IMO adopted the mandatory MARPOL Annex VI requirements for ships to record and report their fuel oil consumption. With this adoption, ships of 5,000 gross tonnage and above are required to collect consumption data for each type of fuel oil they use, as well as other specified data including proxies for transport work. This regulation also requires companies to update their existing SEEMP to document the methodology that will be used to collect the required data, as well as the processes that will be used to report the data to the ship's flag State Administration.

In order to assist the implementation of the DCS for fuel oil consumption of ships, at MEPC 73 IACS proposed a Unified Interpretation on issuing the confirmation of compliance for new ships, boil-off gas consumed on board ships and access to disaggregated data. IACS will continue to work closely with the IMO, industry and flag State Administrations to identify practical solutions and to review the associated IMO instruments with a view to ensuring uniform and globally-consistent implementation of accurate data gathering and verification of that data.

"Maintaining the safety of shipping will be the key priority"

BWM Convention

From the date of entry into force (September 8, 2017) of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention), ships must manage their ballast water so that aquatic organisms and pathogens are removed or rendered harmless before the ballast water is discharged into a new location.

Besides the investment required for the necessary technology, the application of the Convention to existing ships has revealed a number of practical design, installation and service issues that were not initially identified. The IMO has also recognised the concerns of the shipping industry regarding potential penalisation of shipowners and operators during implementation of the Convention due to non-compliance with the performance standard of the BWM Convention – for reasons beyond the control of a shipowner and ship's crew. Consequently, the IMO has agreed to establish an experience-building phase for the Convention through resolution MEPC.290 (71).

IACS, within the IMO framework, is committed to developing practical measures for the globally-consistent implementation of the BWM Convention during the experience-building phase which was established to encourage improvements to the Convention. IACS will also continue to consider the technical challenges for retrofit engineering and the potential safety implications (ship stability due to insufficient capacity of ballast water management systems (BWMS), fire safety of BWMS, etc.) as well as efficient survey approaches to confirm the effectiveness of BWMS on board (to be identified and addressed firstly through IMO instruments or otherwise in IACS Resolutions).

The global sulphur limit

For ships operating outside designated Emission Control Areas, the IMO has set a limit for sulphur in fuel oil used for propulsion or operation on board ships of 0.50% mass by mass from January 1, 2020. This will significantly reduce the amount of sulphur oxide emanating from ships.

The limit will, in the first instance, mean that operators must address the issue of fuel changeover and related tank and systems-cleaning, and, in the longer term, utilise new types of fuel that will be made available to the maritime market. These fuels are not

Ship owners will make more use of data in the future

The IMO-agreed sulphur limit comes into force on January 1, 2020

fully identifiable at this stage, but operators are warned that if not properly managed, the use of such fuels may cause challenges due to incompatibility with other fuels and existing systems on board that may require upgrading. In order to deal with the fuels compliant with the 2020 sulphur requirements, operators will have to become familiar with the properties associated with the new or blended fuels so that safety can be maintained.

Additionally, fuel suppliers will have to specify the fuel properties and confirm compliance with industry standards such as those specified by the International Organization for Standardization, ISO. Such properties include flashpoint, combustibility, stability, compatibility, viscosity, cat fines and lubricity. Each of these properties, if not properly addressed, can affect vessel equipment performance and reliability, which can ultimately affect the safety of personnel or the safe operation of a vessel. Additionally, equipment design and operational aspects associated with the use of new compliant fuels have to be considered and measures put into place.

IACS will take a role on this issue, providing requirements or guidelines for onboard systems dealing with fuels. IACS has already started moving in this direction with the publication of IACS Recommendation 151, 'Recommendation for petroleum fuel treatment systems for marine diesel engines'. However, IACS Members recognise that operational issues or those related to the chemistry of the fuel are out of IACS' remit and expertise.

GHG strategy

In April 2018, the IMO adopted an initial strategy for the reduction of GHG emissions from ships through resolution MEPC.304(72), setting out a vision to reduce GHG emissions from international shipping and phase them out as soon as possible in this century. MEPC 73 approved the follow-up programme in October 2018, which is intended to be used as a planning tool in order to meet the timelines identified in the initial IMO strategy. In the next few years, more regulatory developments are expected in order to meet the IMO intention to reduce CO_2 emissions per transport work by at least 40% by 2030, and total annual GHG emissions by at least 50% by 2050 compared with 2008.

It is expected that EEDI and SEEMP-related measures are likely to comprise the initial measures to be agreed and are expected to enter into force some time before 2023. New or innovative reduction mechanisms, including Market Based Measures, are also expected to be developed. The practical implementation, however, of any new technical and operational requirements should be considered so that they can be followed-up and uniformly implemented.

The reduction of total annual GHG emission by 50% will likely call for the widespread uptake of zero-carbon fuels, in addition to other energy-efficiency measures including improvement of the existing energy efficiency framework with a focus on EEDI and SEEMP. The expanding use of alternative fuels such as ethane, compressed natural gas and biofuel, offered as a pathway for compliance with the 2020 sulphur limit requirements, may lead to consideration of developing new property values to enable EEDI calculations.

IACS will continue to assist with the development of technically robust, implementable and effective measures for the reduction of GHG emissions from ships through constructive dialogue with IMO Member States and industry organisations.

Machinery systems and the sulphur limit

Concerns exist regarding the implementation of the IMO's 2020 sulphur limit
By Carlo Aiachini, IACS Machinery Panel Chairman

"The step change that will take place in 2020 is the largest ever"

It has been reported that international shipping currently contributes approximately 12% to global sulphur emissions. In order to reduce this percentage, tighter limits on the sulphur content in fuels are progressively being put in place.

Regulatory concern

The step change that will take place in 2020 is the largest ever, bringing the global limit for sulphur in fuel from 3.5% to 0.5% – close to the 0.1% limit currently applied within Emission Control Areas. While sufficient global availability of compliant fuel has been anticipated by the IMO, based on a CE Delft study published in July 2016, local shortcomings may be expected. Potential shortcomings raise concern over ships being forced to bunker non-compliant fuels.

The use of non-compliant fuels is currently covered by MARPOL Annex VI. However, the applicable regulation establishes that the final decision on control actions stays with the individual Port State Authority, which shall take into account all relevant circumstances and the evidence on attempts to achieve compliance.
The industry would like to have a better-defined non-compliant fuel scenario well in advance of the entry into force of the regulation. The relevant guidelines on Port State Control and the format of a Fuel Oil Non-Availability Report (FONAR) are expected to be issued by the next IMO MEPC meeting in May 2019.

Problems may also arise when sulphur-compliant fuel is available in a port, but there are doubts about its quality and operational safety (e.g., in respect of suitability and compatibility with ship equipment).
In this respect, the International Bunker Industry Association (IBIA) and International Organization for Standardization (ISO) have explained that the current SOLAS flashpoint limit of 60°C, and the existing parameters defined by ISO 8217, the fuel standard for marine fuels, will still apply to fuel blends produced to meet the 0.5% sulphur limit, as they do to today's fuels. Moreover, according to the ISO, the Publicly Available Specification PAS23263, which the ISO expects to develop and finalise prior to 2020, will provide guidance as to the application of the existing ISO 8217 standard to 0.5% sulphur fuels. On these matters, IACS is collaborating in a Joint Industry Project that is developing industry guidance to address potential safety issues related to the use of 0.5% maximum sulphur fuels.

Among the properties of fuels that raise concern, stability, acid number, flashpoint, ignition and combustion properties are addressed by the ISO standard. These should therefore not pose problems, provided that the fuel is ordered and supplied according to the correct specification. Other properties, like cold

Ship owners preparing to use lower-sulphur fuels should develop implementation plans

Potential problems with fuel quality should be anticipated when the switch is made to low-sulphur fuel on January 1, 2020

flow, cat fines content, lubricity and viscosity are to be properly accounted for when the fuel is handled on board so that the fuel treatment equipment (heaters, coolers and purifiers) is properly adjusted to achieve the required properties at machinery inlets. Some ships might require additional or replacement fuel treatment equipment to ensure safe margins.

The incompatibility issue

A special case is fuel incompatibility. Although it is not addressed by standards and cannot be confirmed by suppliers, this may come to pass when different batches of fuels are mixed together. The problem lies mainly in the fact that heavy hydrocarbons in the molecular weight range of 1,000 to 20,000 g/mol, called asphaltene, may be present in aromatic rich fuel and may become unstable and precipitate to form sludge when the fuel is mixed with a more paraffinic fuel, blocking filters and purifiers.

This matter, in the first instance, is best addressed by the segregation of different batches of fuel, as a standing strategy. Segregation, however, requires availability of a sufficient number and capacity of fuel storage tanks and a proper planning of bunker purchasing. Considering that there might be cases of ships not able to avoid mixing and that some degree of mixing different fuel oils on board cannot be avoided, procedures should be made available to mitigate the risk and consequences of destabilising a fuel. ISO is investigating stability testing methods applicable to fuel blends that will be available in the market from late 2019.

IACS has issued some Interpretations and Recommendations in this respect. These are IACS UI SC255: 'Fuel pump arrangement required for ships to maintain normal operation of propulsion machinery when operating in emission control areas and non-restricted areas'; IACS Rec.151 Part I: 'Recommendation for the treatment of fuel oil on board ships'; IACS Rec.151 Part II: 'Test procedures to confirm the ability of RMF fuel oil pumps operation with marine fuels with low viscosity'; and IACS UI SC123: 'Machinery Installations – Service Tank Arrangements'.

IACS' advice is that ship operators should prepare to use low-sulphur fuels through the development of Implementation Plans, as indicated in IMO Circular MEPC.1/Circ.878, which also addresses the fuel changeover and fuel tank and system-cleaning that is to be completed by January 1, 2020.

IACS will use its knowledge and expertise to closely collaborate with the IMO, and industry, in the development and technical implementation of regulations to ensure that all fuels used satisfy IMO requirements concerning safety. These include operational safety matters related to storage, fuel systems, filters, centrifuges and purifiers and potential malfunctions of diesel engines.

Clarifying views

Three position papers explain IACS' view on differing issues

By Bongchan Ko, IACS Environmental Panel Chair

IACS plays a key role in supporting the maritime sector on a number of fronts. Examples of recent regulatory developments range from digitalisation, cyber safety and marine autonomous surface ships to upcoming regulations such as the 2020 global sulphur cap and the International Maritime Organization's (IMO) greenhouse gas (GHG) emission-reduction strategy. IACS has set down a framework to establish clear high-level positions on these issues in a manner consistent with its five year strategic plan and aligned with its core values of quality operations, transparency, technical knowledge and leadership for industry and interested stakeholders.

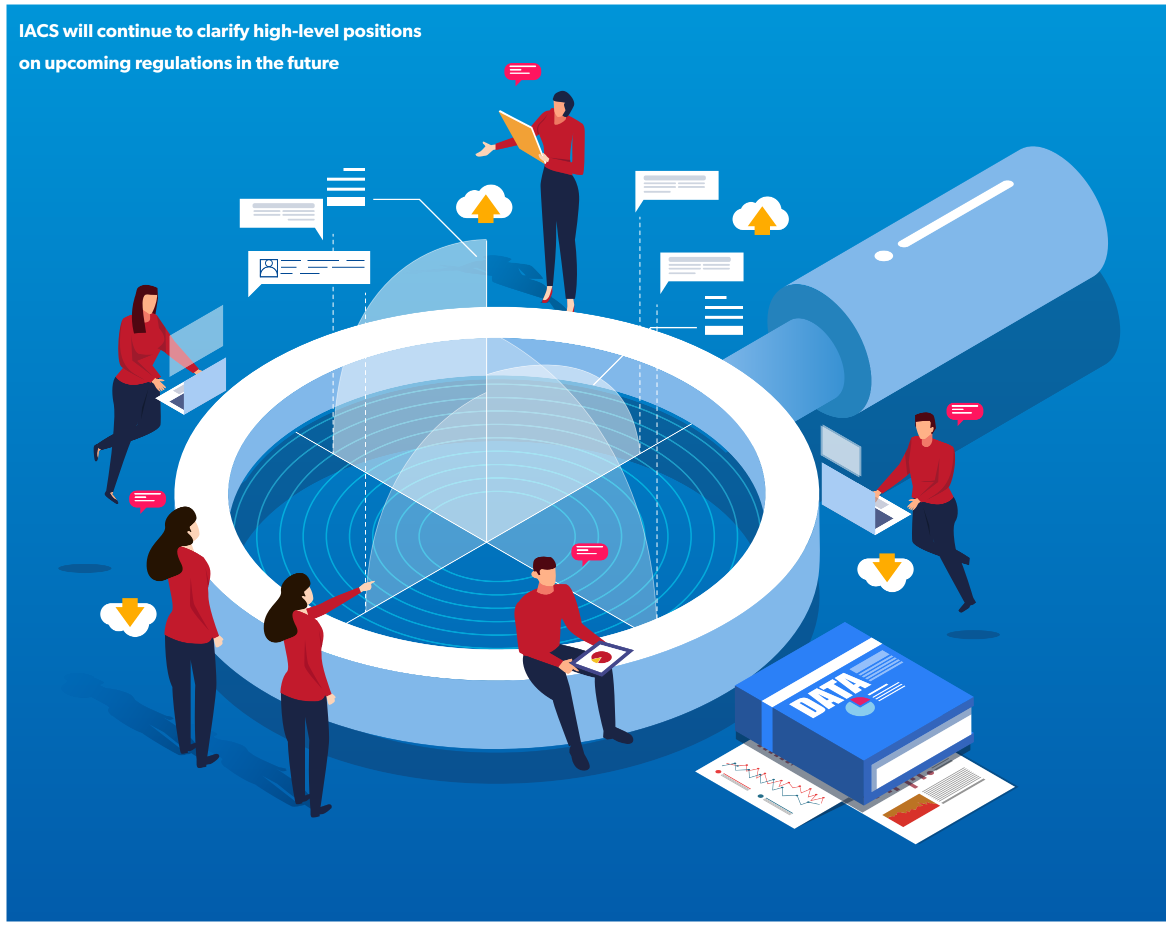
IACS Position Papers on key industry topics are issued and reviewed regularly. These papers provide background to the subject matter, explain IACS' position on the subject and provide a summary of actions taken by the Association.

Currently, three position papers have been developed, outlining IACS' viewpoint on the following topics:

Review and assessment of the Energy Efficiency Design Index to support GHG emission-reduction targets

IACS' position:

"The IMO goal-based regulations are the appropriate means to address GHG reduction measures globally, and IACS will assist in developing practical detail requirements and assist in implementation of proposed technical measures. IACS also agreed that it will bring the experience of the IACS Members related to EEDI implementation to IMO by a submission describing the technical consequences of EEDI."



IACS will continue to clarify high-level positions on upcoming regulations in the future

“IACS Position Papers on key industry topics are issued and reviewed regularly”

EU monitoring, reporting and verification (MRV) versus IMO Data Collection System (DCS)

IACS’ position:

“IACS holds the position that the scheme for the monitoring, reporting and verification (EU MRV) of GHG emissions from shipping should be technically credible and aligned as far as possible with the internationally agreed scheme. In practical terms this means that an IMO developed scheme is IACS’ preferred option.

The EU is in the process of reassessing the MRV regulation and aligning it to a yet-to-be-determined extent with the IMO fuel data collection system, as provided for in the MRV regulation itself.

IACS – working within the international IMO framework – reiterates its core principles that regulations should be technically credible and internationally agreed by the IMO. Therefore, IACS holds the view that the EU MRV system should, to the extent possible, be aligned with the IMO fuel consumption DCS.”

High-level position on fuel oil safety considerations associated with the January 2020 0.50% sulphur limit

IACS’ position:

“Design and operational aspects associated with the new compliant fuels have to be addressed before the January 2020 entry into force date of the low-sulphur requirements. Potential safety implications (stability of blended fuel oil, compatibility including new tests and metrics appropriate for future fuels, cold flow properties, acid number, flashpoint, ignition quality and cat fines) were identified during the Sub-Committee on Pollution Prevention and Response intersessional meeting (PPR Intersessional Meeting on consistent implementation of regulation 14.1.3 of MARPOL Annex VI) with actions being taken to address them. Provided the actions are appropriately addressed by January 1, 2020, we consider the information will be in place to allow the major technical challenges to be addressed.”

Cyber safety, ballast water management, digitalisation and marine autonomous surface ships will be the next topics to be covered in a series of position papers published in early 2019, providing clarity to the maritime industry as to IACS’ stance on these matters.

In line with IACS’ commitment to its core values of quality operations, transparency, technical knowledge and leadership, IACS will continue to clarify high-level positions on upcoming regulations in the future – both to elucidate the work and rationale behind the numerous IACS activities that may impact industry sectors, and to offer a better understanding of IACS positions.

For more information about the IACS Position Papers, visit www.iacs.org.uk/.

A gradual increase in the level of ship automation could deliver considerable vessel safety advantages

Credit: Rolls-Royce

Making moves towards autonomous ships

The shift to fully autonomous ships will be gradual
By Mikhail Musonov, IACS Safety Panel Chairman

The shipping industry is a highly complex and diverse industry and is no stranger to the adoption of new technology. From simple sailing ships to sophisticated, computerised and highly-automated cruise liners, the success of each particular type of ship has been founded on the balanced interaction of technology, through ship design, with seamanship, representing the human factor.

For centuries, there has been an undisputed need for a crew of professional mariners to be on board ships in order to deliver all passengers and cargoes to their destinations in a timely and safe manner, overcoming the perils of the seas.

Nevertheless, following the introduction of the first ‘periodically unattended machinery spaces’ in the 1960s and ‘one-man-bridge’ operated ships in the 1990s, the concept of unmanned ships began to be developed in the early 2000s. Greater automation of ships and wider application of computer-based systems onboard were both recognised for their ability to mitigate ‘human factor’ risks and to identify predictable failures.

Since then, all stakeholders in the maritime industry, including shipowners, shipbuilders, maritime administrations, IMO, and classification societies, have worked on building the groundwork for a future characterised by ‘smart’ or intelligent shipping.

A gradual increase in the level of ship automation – i.e. actual autonomous operation – could deliver considerable advantages for ship safety.

At the same time the development of autonomous shipping, which may eventually include Maritime Autonomous Surface Ships (MASS) with their completely new technologies, requires a high level of attention to the details and challenges involved.

Cyber security

Initially, cyber security of MASS needs to be addressed in order to mitigate (as completely as possible) the possibility of third-party intervention into the operation of autonomous ships. The regularity of cyber attacks has increased and the industry cannot discount the possibility that MASS will become a high-level target for cyber terrorists. In order to prevent such intervention there must be appropriate cyber security for these ships. It must also be noted that modern 'manned' ships are also highly computerised and may also be targeted by cyber attackers. The recent IACS developments with regard to ships' cyber security are discussed on page 33.

Intelligent systems

On the topic of intelligent systems, it should be noted that Remote Monitoring/Diagnosis (RMD), Condition Monitoring (CM) and Condition Based Maintenance (CBM) systems have become more widespread on 'manned' ships, as these processes facilitate a ship's technical maintenance and repairs. These systems will obviously be implemented on MASS as they are intrinsic to ensuring the required level of technical safety of these ships. At the same time, it's extremely likely that the development of MASS will assist in the development and improvement of all types of technical monitoring systems. The current status of development and application of IACS requirements for these systems is described on page 27.

Regulatory framework

Additionally, the legal aspects of introducing MASS into global sea trades need to be resolved. A clear and precise regulatory framework for these kinds of ships must be carefully reviewed and improved. The IMO has already started to identify the safety, security and environmental aspects of MASS operations in line with existing IMO standards, and this work could serve as a basis for future MASS safety standards. Further details on this important work and IACS' involvement in this process can be found on page 27.

Meanwhile, it is clear that the journey from crewed vessel to autonomous ship will be gradual. The steps to full autonomy begin with partial automation, before moving to full remote operation and eventually to unmanned 'crewless' vessels. This will be a step-by-step process that will see the phased implementation of various technologies.

Further, it is unrealistic to assume that fully autonomous vessels will be operating worldwide in just a few years' time. Automated and autonomous shipping technologies have been evolving for many years and will continue to develop for many years to come.

In conclusion, the shipping industry needs to be ready for the moment when MASS are trading all over the world. This will require the resolution of serious issues regarding technology, the regulatory framework, training of seafarers and onshore crews of unmanned ships, and the methods and forms of interaction between manned and unmanned ships.

Achieving this will only be possible with the collaboration of all interested parties, and co-operation must be centred on the goal of maintaining clean and safe seas.

"The steps to full autonomy will begin with partial automation, before moving to full remote operation and eventually to unmanned 'crewless' vessels"

Fully-autonomous vessels are not anticipated to be operating worldwide in the short term

MASS: a mammoth task

IACS is helping the shipping industry get to grips with MASS

By Mikhail Musonov, IACS Safety Panel Chairman

The emergence of Maritime Autonomous Surface Ships (MASS) carries the potential to significantly impact the shipping industry, as well as classification societies and IACS as a whole with respect to the development of MASS regulations. Since 2017, IACS has been keeping pace with the development of MASS, especially the development of MASS regulations, and has participated in the associated IMO working groups and correspondence groups related to MASS. In December 2018 IACS decided to take part in the initial review of Chapter II-2 of the 1974 version of the International Convention for the Safety of Life at Sea (SOLAS 1974) as the first step of the IMO's Regulatory Scoping Exercise (RSE).

The proposal for the RSE was included in the agenda of the 98th session of the IMO's Maritime Safety Committee (MSC), held in June 2017, as a new IMO output: 'Regulatory scoping exercise (RSE) for the use of Maritime Autonomous Surface Ships (MASS)'. The first work on this was initiated by the IMO at the 99th MSC session (MSC 99) in May 2018, with an aim of establishing necessary amendments to the current regulatory framework to enable safe, secure and environmentally-friendly MASS operations within existing IMO instruments. For the purpose of the RSE, the working group at MSC 99 agreed on basic terminology, four degrees of ship autonomy and a draft RSE framework. Further RSE discussion continued within the correspondence group on MASS established by MSC 99.

Four different levels

As with many other stakeholders, IACS had undertaken its own work on the development of common terminology for MASS. IACS' attempt to agree on common terminology for degrees of autonomy faced the same challenges reflected in the IMO debates. IACS decided that it was premature to propose levels of automation based on IACS' internal views only and instead agreed the following four degrees of autonomy specified by the IMO working group at MSC 99, and generally supported by the majority of the correspondence group on MASS:

1. Ship with automated processes and decision-support – Seafarers are on board to operate and control shipboard systems and functions. Some operations may be automated.

2. Remotely-controlled ship with seafarers on board – The ship is controlled and operated from another location, but seafarers are on board.

3. Remotely-controlled ship without seafarers on board – The ship is controlled and operated from another location. There are no seafarers on board.

4. Fully-autonomous ship – The operating system of the ship is able to make decisions and determine actions by itself.

The aims of the RSE are to determine how safe, secure and environmentally-sound MASS operations might be addressed in IMO instruments and to assess the degree to which the existing regulatory framework may be affected in order to address MASS operations. Noting that various IMO instruments are the purview of different IMO bodies (MSC, the Marine Environment Protection Committee, the Facilitation Committee and the Legal Committee), it was agreed that MSC start this work first to allow for smoother RSEs undertaken by other Committees. For the purpose of this RSE, 14 international conventions related to maritime safety and security were selected by MSC.

For the first step of the RSE, starting in February 2019, all selected IMO instruments will be assessed by volunteer Member States for all four degrees of autonomy in order to identify provisions in IMO instruments which, as currently drafted:

- apply to MASS and prevent MASS operations;
- apply to MASS and do not prevent MASS operations and require no actions;
- apply to MASS and do not prevent MASS operations but may need to be amended or clarified; and
- have no application to MASS operations.

Regarding the initial review of instruments, the working group at the 100th session of the MSC (MSC 100) agreed to the following principles:

- instruments should be reviewed on the level, such as regulation or rule level;
- initial review may be conducted either for a whole or part of an instrument (e.g., specific chapters) for all degrees of autonomy or for specific ones;
- priority should be given to the consideration of degrees two and three; and
- the review of mandatory instruments should be prioritised.

Further, a second step will start at the beginning of September 2019 to determine the most appropriate way of addressing MASS operations, taking account, inter alia, of the human element, technology and operational factors through:

- equivalences as provided for by the instruments or developing interpretations;
- amending existing instruments;
- developing new instruments; or
- none of the above.

The results of the RSE will be submitted in February 2020 as a report to the 102nd session of MSC. This timeline equates to a great amount of work for all RSE participants over the next 12 months. To give an understanding of the amount of work involved, considering just one regulation for all four degrees of autonomy and for four types of applicability equals 16 different combinations at just the first step. In addition, during the testing of only five regulations within the correspondence group, more than 200 pages of comments were received.

At the time of writing, 14 Member States and one non-governmental organisation (IACS) had volunteered as lead or supporting members for the initial review of various chapters of SOLAS 1974. The lead members are China (Chapter V), Finland (Chapter XI-1 and XI-2), France (Chapter II-1), Japan (Chapter II-2, Chapter VI and Chapter VII), the Netherlands (Chapter III), Norway (Chapter IX) and Turkey (Chapter IV). Supporting members are Belgium, China, Denmark, Iran, Japan, Singapore, Sweden, the Republic of Korea, the Russian Federation and IACS. In addition, the initial review of another six Conventions (the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, the International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel, 1995, the Convention on the International Regulations for Preventing Collisions at Sea, 1972, the International Convention for Safe Containers, 1972, the International Convention on Load Lines, and the International Convention on Maritime Search and Rescue) will be carried out by the Member States of Finland, France, India, Japan, the Marshall Islands, New Zealand, the Republic of Korea, the Russian Federation, Singapore, Turkey and the US.

Splitting up the categories

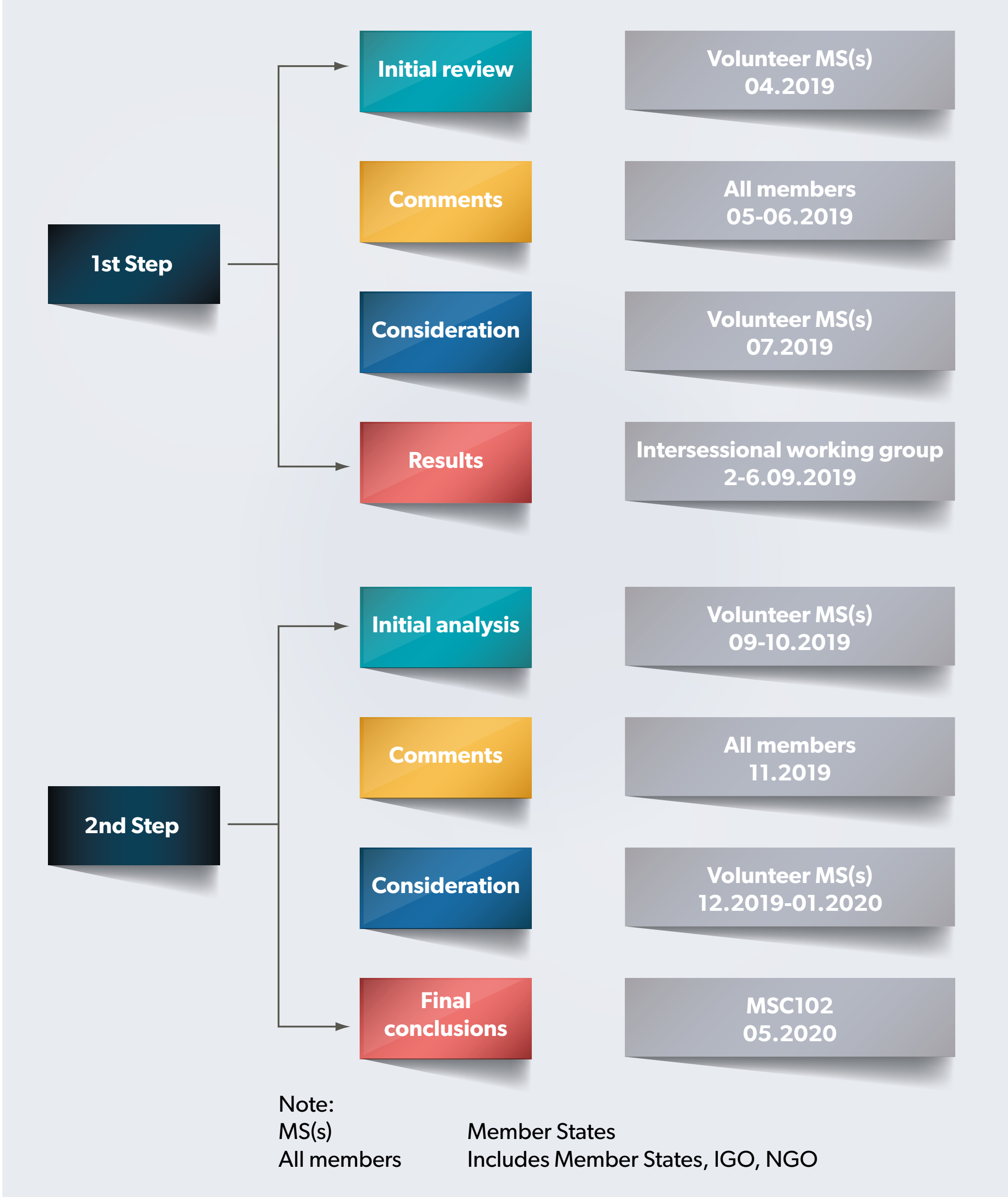
Noting the large estimated amount of work, it was proposed to MSC 100 to consider whether MASS ships of the first degree may be excluded from the RSE as these ships are actually the same as existing ships, which already have an autopilot and other computerised means of navigation, sophisticated automation and control systems. Some concerns were also expressed regarding the need to carry out an RSE for degree four – fully-autonomous ships – which might only be expected to be operational in the distant future. However, following discussion, it was agreed to conduct the RSE for all four degrees but to concentrate on degrees two and three as the types of autonomous ships most likely to be seen in the near future.

With this in mind, there has been consideration of an alternative option proposed by several IMO Members and discussed at MSC 99, in a correspondence group, and at MSC 100. The proposal is for the development of a new, dedicated instrument for two degrees of unmanned autonomous ships, one for degree three – remotely-controlled ships without seafarers on board, and another for degree four – fully-autonomous ships.

This idea is rooted in the following:

- The results of an IMO pilot test on the framework and methodology for the RSE clearly demonstrated that a huge number of existing IMO instruments will need to be amended, since the existing regulations of IMO instruments envisage the presence of seafarers on board a ship. Whereas for the two degrees of unmanned MASS (degree three and degree four), functions or operations need not necessarily be performed by seafarers on board.

A flow chart and timeline of the 1st and 2nd steps of regulatory scoping exercise are as follows:



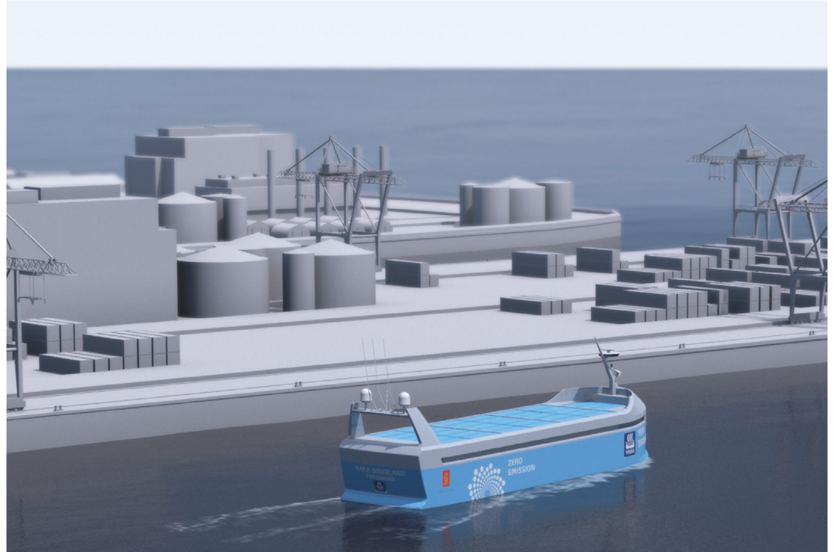
- These categories of unmanned MASS constitute significant changes in many different aspects of ship design and operation.
- Searching through and evaluating provisions from such a considerable volume of conventions with a view to creating amendments addressing unmanned MASS would be extremely time-consuming.

Consequently, a dedicated instrument for unmanned MASS, perhaps in the form of a new mandatory code under SOLAS 1974, could be developed. A policy decision such as this would significantly reduce the work required for the RSE for all the IMO bodies that will carry the RSE out for MASS.

IACS is of the view that a dedicated IMO instrument for the two degrees of unmanned MASS might be developed based on a risk-based analysis and following the Goal Based Standards methodology instead of a detailed identification of each paragraph of existing IMO instruments that needs amendment.

Development of a dedicated IMO instrument for unmanned MASS may:

- significantly reduce the workload and time required to reach the point of revising the existing regulations through the RSE;
- more easily introduce new technologies and approaches without being constrained by the boundaries that exist within the existing IMO instruments;



“IACS agrees with the four degrees of autonomy specified by the IMO working group at MSC 99”

- retain the existing IMO instruments exclusively for manned vessels instead of complicating the application; and
- enable ease of reference to requirements in a single instrument.

Additionally, the RSE for related specific regulations can be carried out simultaneously with the development of dedicated IMO instruments.

During discussions, it was also suggested that even if the first two degrees of autonomy (degree one: ships with automated processes and degree two: decision-support and remotely-controlled vessels with seafarers on board) might be accommodated via amendments to the existing instruments, it would be preferable to fit all the autonomy concepts into the proposed new instrument. However, this interesting solution does not seem practical in view of quite an urgent need to address the first two degrees which could definitely be accomplished much more quickly through the amendment of the existing instruments, as necessary.

Progress made

As of early 2019, the decision to develop a dedicated instrument for the two unmanned MASS degrees had been postponed until after the completion of the RSE. However, it is IACS' view that it will take time to develop an entirely new set of regulations and to realise ships with these degrees of autonomy. A first step may be considered through the development of 'Interim Guidelines for Maritime Autonomous Surface Ships Trials'. There were two independent proposals for such guidelines submitted to MSC 100, and both proposals were supported and considered by the working group.

The following principles for the development of these guidelines have been agreed by MSC:

- Guidelines should be developed as a single document addressing Administrations, the industry and other relevant stakeholders.
- Guidelines should be generic.
- Guidelines should be not too technical or prescriptive.
- Guidelines should be goal-based, describing functions and goals to be achieved.
- Guidelines should ensure the safe, secure and environmentally-sound operation of MASS.
- Guidelines should provide that MASS trials are to be in line with mandatory instruments.
- Guidelines should provide that a scope should be specified for each trial to be conducted (e.g., mooring, navigation, new equipment, etc.).

It is expected that new technologies applicable to autonomous ships will develop fast, making it quite difficult to prescribe all the detailed technical requirements at a high regulatory level. Thus, a goal-based approach with regards to development of this dedicated instrument makes practical sense, maintaining a clear message at its core: autonomous ships must have safety requirements which are higher than, or equal to, those of a standard ship.

Advancing with new digitalisation techniques

IACS has established new standards relating to Condition Monitoring (CM) and Condition-Based Maintenance (CBM) schemes

By Yuwei Cui, IACS Survey Panel Chairman

Advancements in technology, such as high-sensitivity sensors and modern electronic data-processing, allow for predictive maintenance, and have prompted many machinery manufacturers to offer their clients Condition Monitoring (CM) and Condition-Based Maintenance (CBM) schemes. The aim of these schemes is to enhance the maintainability, safety and performance of machinery systems, coupled with reduced energy consumption through data analysis. As per ISO 13372:2012, CM is defined as the acquisition and processing of information and data that indicate the state of a machine over time. A machine state deteriorates if faults or failures occur. CBM is defined as maintenance performed as governed by CM programmes.

Machinery manufacturers link the following benefits to the application of CM and CBM schemes to machinery systems:

- a better overview of actual equipment conditions;
- improved availability of equipment, achieved through reduction or elimination of unnecessary dismantling;
- a reduction of the hazards introduced by intrusive maintenance; and
- improved flexibility of planned maintenance.

Requirement for consistency

These new technologies have implications for the survey regime and influence the scope and/or frequency of class survey. Consequently, IACS realised there was a need to provide the industry with uniform rules and standards for defining the possible fields of application and to set criteria for these new techniques.

IACS' Survey Panel was tasked with adapting existing, and developing new, IACS Unified Requirements (URs) on Remote Monitoring/Diagnosis (RMD) and Condition-Based Inspecting/Maintenance to allow for the use of such technologies in the survey process as an additional source of information. In some cases, these technologies can be used to replace verifications that require dismantling of components to a rigid time schedule. A project team consisting of specialists selected by the Survey Panel created a newly-developed UR, IACS UR Z27 'Condition Monitoring and Condition Based Maintenance', together with revisions to the relevant existing IACS Resolutions and Recommendations (IACS UR Z18 'Survey of machinery', IACS UR Z20 'Planned maintenance scheme (PMS) for machinery' and IACS Rec 74 'A guide to managing maintenance in accordance with the requirements of the ISM Code') – to cover the approval of CM and CBM schemes intended to be applied to machinery components.

CBM is a set of maintenance actions based on real-time or near-real-time assessment of equipment condition obtained from embedded sensors, tests and measurements taken by portable equipment. From a classification society's perspective, the RMD comprises similar principles of monitoring.

Aside from CBM and RMD, other systems exist that monitor based on acquisition and processing of data information indicating the state of a machine over time. With emerging technologies such as radio-frequency identification, sensors, microelectromechanical systems, wireless telecommunication, supervisory control and data acquisition, and product embedded information devices, such systems are expected to become popular for gathering and monitoring the status of machinery components and systems. More generally, the CBM scheme can be viewed as a method to reduce the uncertainty of maintenance activities. It comprises various CM/condition diagnosis technologies and techniques, such as lubricant/fuel examination regarding wear particle content, bearing temperature examination using infrared thermography and motor current signature analysis.

Digitalisation is transforming ship maintenance and monitoring

UR in depth

The newly adopted IACS UR Z27 is to be uniformly implemented by IACS class societies for machinery survey schemes approved on or after 1 January 2020. IACS UR Z27 provides requirements for software, onboard working, documentation, personnel, approval and survey for application of the CM/CBM schemes, and survey/audit for maintaining it, where the CM results are used to influence the scope and/or frequency of class surveys. An owner may request application of the CM/CBM scheme to components and systems covered by Continuous Machinery Survey. IACS UR Z27 can only be applied to vessels operating on the basis of an approved Planned Maintenance Scheme for Machinery.

The CM/CBM scheme is designed to provide an equivalent or greater degree of confidence in the condition of the machinery compared with traditional survey techniques. Where an approved condition monitoring system is fitted, credit for survey may be based on acceptable condition monitoring results. The condition monitoring results are to be reviewed during the annual survey.

The CM/CBM scheme may be applied to any individual machinery item or system. Any item not covered by the scheme will be surveyed and credited in accordance with the requirements of IACS UR Z18 and/or IACS UR Z20.

> **"New technologies have implications for the survey regime and influence the scope and/or frequency of class survey"**

Squaring up to cyber

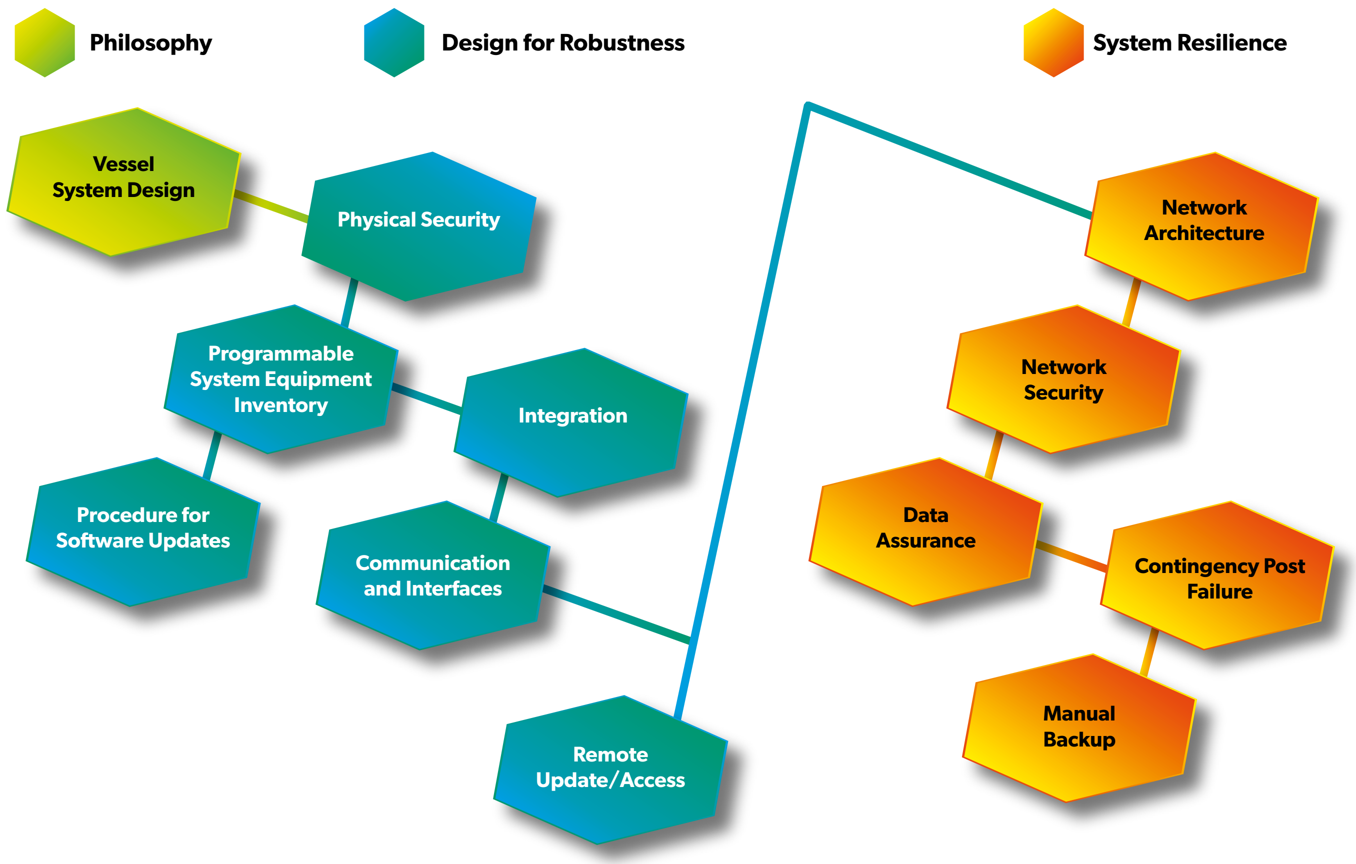
IACS has published 12 new Recommendations focused on the theme of cyber security
By George Reilly, Cyber Systems Panel Chairman

IACS delivered on its first external cyber-related output when 12 Recommendations were posted on the IACS website.

The 12 Recommendations are:

- Vessels' system design (IACS Rec.160).
- Physical security of onboard computer-based systems (IACS Rec. 158).
- Inventory list of computer-based systems (IACS Rec. 161).
- Integration (IACS Rec. 162).
- Communications and interfaces (IACS Rec. 164).
- Recommended procedures for software maintenance of computer-based systems on board (IACS Rec. 153).
- Remote update/access (IACS Rec. 163).
- Network architecture (IACS Rec. 156).
- Network security of onboard computer-based systems (IACS Rec. 159).
- Data assurance (IACS Rec. 157).
- Contingency plan for onboard computer-based systems (IACS Rec. 155).
- Recommendation concerning manual/local control capabilities for software-dependent machinery systems (IACS Rec. 154).

The subjects addressed by the Recommend-ations are more familiar to the industry now than they were when first selected. A great deal of popular discussion involves cyber security, but from a maritime safety perspective, threats such as hacking or computer viruses are just two of many unfortunate incidents that can



"The protection provided, whether preventative or reactive, needs to serve the same goal"

pose a threat to safety. IACS has used the term 'cyber incident' in its Recommendations to support the position that the source or means of initiation of an event is less important than its consequences and that the protection provided, whether preventative or reactive, needs to serve the same goal. This approach, or a best practice, moves away from a more restricted cyber security mindset typically associated with Information Technology (IT) systems and helps to emphasise Operational Technology which has a direct influence over the ship systems required for safe operation.

It is also recognised that existing IACS requirements already have a strong legacy in safety as related to ships' systems but have limited material that considers cyber security threats. Consequently, in deciding upon the first 12 topics, priority was given to addressing this weakness and introducing topics to support cyber security. This is the logic behind including procedures for software updates, programmable system inventory, data assurance and remote update or access in the first 12 Recommendations.

New vessel focus

IACS' work in cyber has prioritised new ships to support an industry preference of having one clearly identifiable date after which all newly-built vessels could be assumed to have been delivered with systems, equipment, functionality and documentation to aid their operations in a manner supporting the management of cyber risk. Once the industry is familiar with the basics of the approach and allocation of responsibilities being applicable to new ships, it should be easier to assess existing vessels against that benchmark.

With the 12 IACS Recommendations now available on the IACS website, there will be an ongoing dialogue with industry stakeholders with regard to applying their principles. This will have particular significance with respect to consistent and robust implementation to achieve the stated goals, while retaining scope for innovation, identification and co-ordination of industry responsibilities. There will also be work to consolidate the 12 IACS Recommendations into one document.

As for subsequent steps, many aspects of existing class requirements will have to be revisited to consider their continued effectiveness when functions are implemented through software. Examples are systems that could readily be considered independent now having unintended ways of interacting, and IACS requirements concerning type approval (e.g., E10) will be expected to have a cyber-resilient equivalent.

On the horizon, remote control and autonomy of ships are challenges in their own right, but they also pose an additional challenge to current cyber safety methods where manual control and crew numbers or competence have been assumed. Even without these challenges, it should be noted that the amount of equipment on board that is not linked to a computer or a network connection is already very small. These developments may lead to the need for support facilities ashore.

Whatever the challenges of the future, it is clear that the whole industry needs to remain aware of the goals and be open to high levels of collaboration that will be needed to keep abreast of them.

Making goals clear

GBS and CSR help to ensure the safety of vessels in the world's fleet

By Philippe Baumans, Chairman of IACS Hull Panel

In May 2010, the International Convention for the Safety of Life at Sea (SOLAS) was amended to apply a new concept: Goal Based Standards (GBS) for ship-construction, applicable to oil tankers and bulk carriers of 150 metres in length and above. This amendment resulted in the adoption, on May 20, 2010, of three important resolutions by the IMO's Maritime Safety Committee (MSC): MSC.287(87) – adoption of the international GBS for bulk carriers and oil tankers; MSC.290(87) – adoption of amendments to SOLAS, 1974, as amended; and MSC.296(87) – adoption of the guidelines for verification of conformity with GBS for bulk carriers and oil tankers.

Previously, in 2002, the GBS concept was initially introduced to the IMO, suggesting that the development of ship construction standards would permit innovation in design and ensure that ships should remain safe for their entire economic life if properly maintained. The International Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers (GBS Standards) describe the goals and establish the functional requirements that the rules for design and construction should conform to, as defined in SOLAS regulations II-1/2.28 and II-1/3-10. Additionally, GBS established that the rules shall be verified as conforming to the goals and functional requirements.

The GBS consist of five tiers as shown in *Figure 2*:

Tier I – Goals

The Tier I goals are defined in SOLAS regulation II-1/3-10 as follows: "Ships shall be designed and constructed for a specified design life to be safe and environmentally-friendly, when properly operated and maintained under the specified operating and environmental conditions, in intact and specified damage conditions throughout their life."

Tier II – Functional requirements

Fifteen functional requirements are expressed in four categories (design, construction,

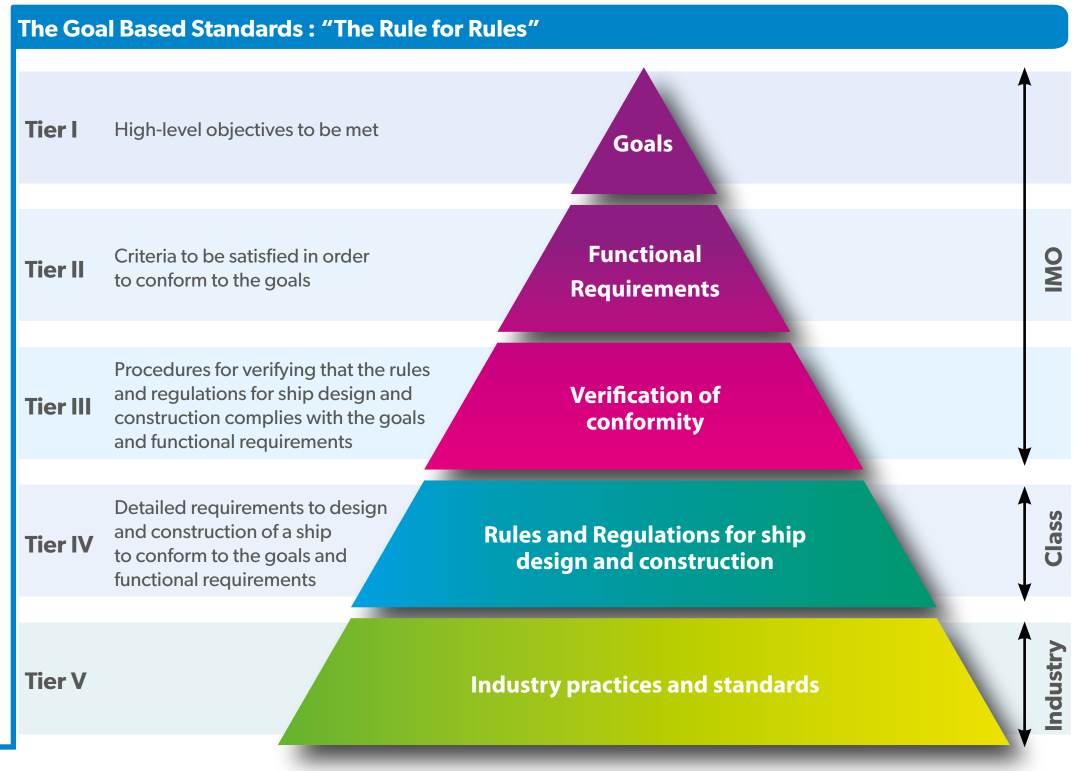


Figure 2

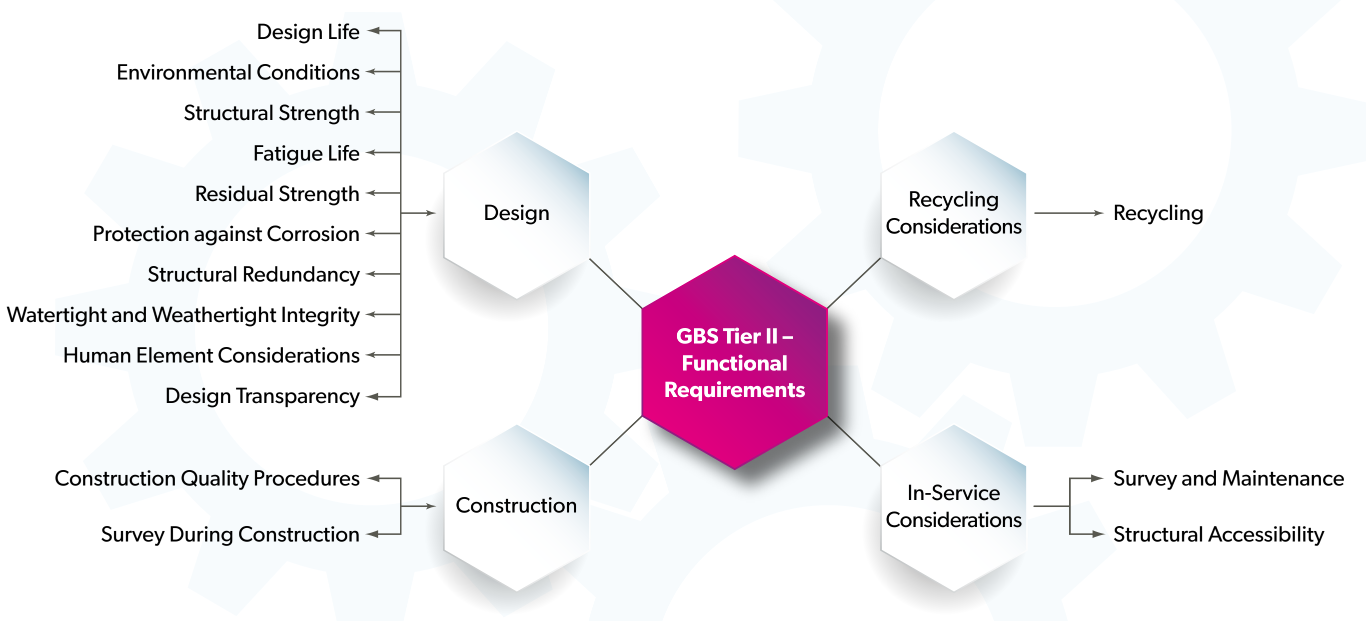


Figure 3

in-service considerations and recycling considerations), themselves sub-divided into sub-categories as shown in *Figure 3*:

Tier III – Verification of conformity

The rules for the design and construction of bulk carriers and oil tankers are to be verified as conforming to Tier I – goals – and Tier II – functional requirements – based on the guidelines developed by IMO. It means that the above-mentioned rules have been compared to the GBS using guidelines providing procedures on how to carry out such verification, so as to ensure uniformity of the verification process. As mentioned above, those guidelines have been adopted by the IMO Resolution MSC.296(87).

The guidelines are made up of two main parts. Part A details the procedures to be followed for verifying that the ship design and construction rules conform to the GBS. This part distinguishes the verification for an initial rule submission and the maintenance of verification for rule changes. Part B provides detailed documentation requirements and evaluation criteria to use for verifying the conformity of the rules to GBS.

Tier IV – Rules and regulations for ship design and construction

Tier IV consists of rules that could be made by national Administrations, but more usually developed by Recognized Organizations. These rules provide requirements for the design and constructions of oil tankers and bulk carriers within the GBS scope of application. This Tier is the main core business of IACS.

Tier V – Industry practices and standards

Tier V represents the industry standards and codes of practices covering subjects such as quality systems for shipbuilding, ship operation, maintenance, training, manning, etc. which may be referred to in the rules mentioned in Tier IV.

IACS CSR

In April 2006, the IACS Common Structural Rules for Double Hull Oil Tankers (CSR-OT) and Common Structural Rules for Bulk Carriers (CSR-BC) entered into force. These two Rules were developed independently.

In order to remove inconsistencies, IACS decided to harmonise these Rules in a single set of Rules, known as the Common Structural Rules for Bulk Carriers and Oil Tankers (CSR BC & OT). These harmonised Rules cover the hull requirements for both bulk carriers over 90 metres in length and oil tankers of 150 metres in length and above. The CSR BC & OT entered into force on July 1, 2015, superseding the existing CSR-BC and CSR-OT.

During the development of these harmonised structural rules, GBS functional requirements were considered and IACS developed the CSR self-assessment of GBS compliance before its submission to IMO.

> **“The development of ship construction standards permit innovation in design and ensure that ships should remain safe for their entire economic life if properly maintained”**

IACS, in order to conform to the GBS requirements, submitted the CSR rules in 2015 for initial verification. Further to the audit findings in May 2016, IACS provided a corrective action plan for rectifying what was discovered. The IMO Maritime Safety Committee (MSC) concluded in 2017 that the rectification of the findings had been duly accomplished and that the whole process of the initial verification audit had been successfully completed. In other words, the CSR BC & OT were found to be in compliance with the goals and functional requirements of the GBS.

The CSR BC & OT have been modified since their first issue in 2015 and rule changes have been made every year to deliver improvements. The latest rule changes were submitted in March 2018 regarding a GBS maintenance verification audit.

The IACS portion of the submission corresponds to a common package for all the 12 Members of IACS. IACS Members also have to submit individual packages – made up of the Members' own rules, instructions, procedures, etc. – if those have been modified compared with the package already conforming to the GBS. As requested for the maintenance verification audit, IACS submitted to IMO its self-assessment regarding GBS compliance and documents, including an explanation of why the changes were considered necessary; the extent to which the changes address the issues under consideration; an explanation of the way the rules were formulated or drafted; an indication of any impact on, and/or contribution to, safety, security or environmental protection; and an indication of any impact on net and gross scantlings.

The IMO audit was conducted in accordance with the current *Guidelines for verification of conformity with goal-based ship construction standards for bulk carriers and oil tankers*, adopted by resolution MSC.296(87). The audit was carried out in May 2018 on 10% of the rule changes selected by the auditors, with the corresponding report provided to the 100th meeting of the MSC. The IMO audit team recommended that MSC confirms that the IACS-submitted and audited rules conform to the ship construction GBS, provided that the additional findings are rectified.

The GBS Standards establish functional requirements

Deciphering the ESP Code

IACS has been working to ensure that the 2011 ESP Code makes clear what is non-optional
By Yuwei Cui, IACS Survey Panel Chairman

The adoption of the International Code on the Enhanced Programme of Inspections During Surveys of Bulk Carriers and Oil Tankers, 2011 (ESP Code) as a mandatory instrument of IMO by Resolution A.1049(27) is broadly recognised as a milestone. The Code replaces the ESP Guidelines adopted by Resolution A.744(18) as amended, which is acknowledged for its great contribution to the promotion of the safety of oil tankers and bulk carriers over the years. IACS is deeply involved in fundamental work that takes place annually to keep the Code continuously updated and is working towards alignment of the contents of the Code and the IACS Unified Requirements, or URs (IACS UR Z10s, excluding IACS UR Z10.3). These have already been implemented and applied to bulk carriers and oil tankers classed with IACS Members.

To ensure unified understanding and facilitate global consistency in the implementation and practical application of the ESP Code, a co-operation project was initiated between IACS and the IMO to align the Code with the most recently updated versions of IACS UR Z10s. The most important task was identifying all mandatory requirements and amending the tables and forms based on the practical experience IACS has gained so far.

Underlining the obligatory

IACS and the IMO soon realised that the non-mandatory language in the Code's text inherited from the previous ESP Guidelines needs to be further revised to clearly identify all mandatory requirements. Additionally, the tables and forms annexed to the various parts of the ESP Code require further improvement so that they can be more easily applied during surveys. To that end, IACS submitted to the IMO a series of co-sponsored papers proposing amendments to the ESP Code with a view to preparing a draft consolidated version that is aligned with IACS' UR Z10s. The intention is that this draft is adopted as the 2019 consolidated version of the ESP Code at the 31st session of the IMO Assembly, to be held from November 25 to December 5, 2019.

"MSC concurred with the view that the mandatory language should be used in the ESP Code"

The IACS proposed draft version of the ESP Code included the following amendments to the 2011 ESP Code:

- inserting a Preamble to introduce the function and scope of the ESP Code;
- making amendments throughout the text of the Code with the aim of using mandatory language;
- incorporating all the footnotes containing substantive text into the Preamble or the main body contents of the Code;
- revising footnote identifying references in order to avoid the unnecessary burden of updating the contents of the ESP Code when inserting or removing footnotes in the future;
- introducing substantive hull survey requirements for ships subject to IACS Common Structural Rules (CSR) and IMO Goal Based Standards regime, including the acceptance criteria for both general corrosion and pitting, edge and grooving corrosions of structures, the thickness measurement tables for CSR ships, and the annexes to the Condition Evaluation Reports for the CSR ships, etc.;
- inserting new annexes of 'Procedural requirements for thickness measurements' for oil tankers;
- inserting new requirements for Ship Construction Files and Coating Technical Files; and
- amendments for addressing a number of term inconsistencies, such as 'cargo length area' and 'cargo area', etc.

Rules on inspections have benefitted from amendments from IACS Members

The MSC standpoint

During the 100th session of the Maritime Safety Committee (MSC), held December 3 to 7, 2018, the Committee concurred with the view that the mandatory language should be used in the ESP Code and decided to move forward with the amendments to the ESP Code in two stages:

1. Adopt the amendments to the 2011 ESP Code at the 101st MSC session.
2. Adopt the 2019 consolidated version of the ESP Code at the 31st IMO Assembly based on the draft consolidated ESP Code proposed by IACS.

The draft amendments to Chapter XI-1 of the International Convention for the Safety of Life at Sea to make mandatory the consolidated version of the Code are expected to be adopted at the 102nd session of MSC (in spring 2020). The expected entry-into-force date is January 1, 2022.

Quality & Safety

QSCS is the gold standard for classification societies

A question of quality

IACS' innovation is consistent when it comes to its QSCS
By Peter Williams, IACS Quality Secretary

It has always been recognised that the best way of improving safety at sea is by developing international regulations that are followed by all shipping nations. These are not my words – they constitute the opening sentence of a *'Brief History of the IMO'*.

The IMO celebrated its 70th anniversary in 2018. It is noteworthy that such an illustrious and respected organisation as the IMO has 'improve implementation' as the first of its current seven 'strategic directions'. On further reflection, however, continually striving to ensure that implementation of agreed international regulations is as effective as it can be is a key reason why the IMO enjoys a reputation for promoting safe, secure, environmentally-sound, efficient and sustainable shipping — and why our industry continually delivers enhanced standards in practice.

Scheme explored

For any organisation or individual, complacency and a sense of self-satisfaction with procedures and working practices will stifle innovation, progress and improvement. However, to critically assess and question one's own performance requires both courage and humility in equal measure. The best and most successful organisations never stand still: they are practically in a perpetual state of change, actively looking for ways to improve and innovate. They are always alert and responsive to the needs of their stakeholders and customers (or 'interested parties' in Quality speak), who rely on either the product they manufacture or the service they provide. This is the essence of what an effective Quality Management System (QMS) does, but a QMS comes with the added benefit of having external auditors take an impartial, objective and detailed look at those procedures and working practices.

IACS can trace its roots back to 1939, when the seven major classification societies of that time held a conference aiming at cooperation and as much uniformity as possible in the application of the standards of strength upon which freeboard is based. This was a requirement of the 1930 International Convention on Load Lines. The initiative led to the founding of IACS, 50 years ago, on September 11, 1968 – and since then its membership has gradually increased to the current 12 members.

IACS Members provide services to the best of their abilities, and IACS membership is recognised as providing an assurance, to all interested parties, of integrity and the maintenance of high professional standards.

This IACS mantra has never changed, and the establishment of IACS' Quality System Certification Scheme (QSCS) in the early 1990s cemented the ethos of quality within the membership. The professional and testing audits of IACS Members, conducted by the Accredited Certification Bodies (ACBs), continually scrutinise and challenge the procedures and working practices of Members impartially, objectively and without fear or favour. As a consequence, IACS believes QSCS to be the gold standard in the maritime industry for classification societies. It has been compared favourably with other highly-respected sector schemes, such as those within the automotive and aerospace fields.

The high standards of IACS Members, and the positive contribution they make individually and collectively to enhancing and promoting high levels of safety, pollution prevention and security standards in shipping is widely recognised. QSCS plays an important role in that, but the scheme has not been without its critics, who particularly cite its lack of independence. To address that, ten years ago the IACS Council took the decision to allow members freedom of choice to contract with ACBs. Since 2010 ACBs have been the sole audit and certifying bodies of IACS Members against the requirements of IACS QSCS.

This has brought a new approach to the audits. After some initial concerns, the move has proved to be a valuable and important one in enhancing the scheme's integrity. Certification confirming compliance with the IACS QSCS is now issued exclusively by the ACBs, evidenced by an ISO 9001:2015 QMS certificate and a Statement of Compliance (SOC) with respect to QSCS. The SOC is countersigned by the IACS Quality Secretary upon satisfactory review of documented information demonstrating all the required audits have been completed in accordance with the requirements of QSCS. Whether or not to issue QSCS certification – to an IACS Member or a classification society seeking IACS membership – is entirely and exclusively at the discretion of the ACB. IACS has no involvement.

Looking ahead

During 2018, there have been various discussions with key industry stakeholders, not least the IACS Advisory Committee, which is comprised of senior industry figures that have a vested interest in the integrity and effectiveness of IACS QSCS. They have explored possible ways to further develop the scheme to make it a true industry scheme that flag State Administrations and the wider maritime industry can have greater confidence in. To that end, the paper *'Trial for an independent assessment of the IACS Quality System Certification Scheme (QSCS)'* (MSC 100/19/8) was submitted to the IMO Maritime Safety Committee, co-sponsored by the Liberian, Marshall Islands and New Zealand administrations. There was unanimous support in plenary for the proposed paper's recommendation to conduct a trial of an International Quality Assessment Review Body (IQARB), under the aegis of the IMO, which would review the findings of the ACBs' audits of IACS Members as well as any corresponding corrective action plans. The MSC Chair summarised interventions noting a broad agreement from MSC 100 that the IMO Secretariat should "actively participate in this trial".

It is intended the establishment of the IQARB, which would be governed by its own self-developed protocol, will demonstrate the true independence of the scheme and make the process wholly transparent so that flag State Administrations and other interested parties can have well-placed faith in the efficacy of IACS Member audits.

"The best and most successful organisations never stand still"

Competence Building

A culture of continuous improvement

Day after day, IACS works to ensure that the reputation of excellence it has earned over the years is maintained

By Łukasz Korzeniewicz, IACS Quality Committee Chair

IACS and its Members rely on their reputations. The good name of both can only be maintained through continuous enhancement of their professionalism and competence. The important question is how should this competence be maintained? Competence in the case of IACS Members means integrity and knowledge, but it also means ensuring safety at work for those involved in the maritime industry, as well as maintaining the independence of organisations and employees while duties are carried out.

IACS Members build competence on several levels and have introduced a holistic approach to competence building. Individual employees build competence through their training in offices, branches and their organisations. Additionally, classification societies, within their core mission of safer ships and cleaner seas, work with external parties such as the International Maritime Organization, the International Labour Organization, flag States, shipowners and other institutions on wider competence building throughout the maritime and shipping industry.

Grassroots engagement

IACS Members wishing to provide the highest level of service need to employ professional staff. This presents several challenges, one example being a high entry threshold for technical staff. However, once an individual becomes a classification society staff member, they can count on a lifelong, exciting career within multicultural and international organisations.

It is only when an employee identifies strongly with their employer's goals that a classification society can be sure its mission will be implemented. A highly-skilled, professional employee is essential for classification societies so training, seminars, studies, practices and the latest teaching and tutoring methods are utilised at all career levels. This demands a relatively high level of funding but this finance is treated by IACS Members as an investment in their development.

> **"With each day that passes the competence of IACS and its Members improves"**

As mentioned above, competence building is essential for IACS Members at all levels. At middle and senior management level, classification societies implement tutoring, mentoring and monitoring programmes, with the best approaches selected and shared within the organisation. At all levels, employees and managers are encouraged to take an active role in the development of Rules and quality management systems.

Additionally, listening to employees is one of the core development methods for IACS Members whose knowledge is built through listening to all parties involved in the maritime industry. This allows classification societies to actively participate in the development of new technologies and surveillance methods. On top of this, IACS Members co-operate closely with universities, where the latest technologies are developed, and this co-operation is extended to ship designers, shipbuilders and shipowners.

Sharing experience is another method used by IACS Members to enhance competence. Prior to their release, IACS Members' Rules are subjected to a long and broad consultation process. Recognising that classification societies rely on the knowledge and professionalism of external parties, IACS issues invitations to Flag States, regulators, universities and representatives from the shipping industry who are all invited to comment on classification society amendments and improvements to Rules.

The whole picture

The role of IACS as a platform for the exchange of knowledge, experience and competence should also not be forgotten. IACS Members, through their work within the Association, contribute to maritime safety and regulation through technical support, compliance verification and research and development. All these aspects are covered and strengthened by the widely recognised gold standard of the Quality System Certification Scheme (QSCS). IACS Members invite Accredited Certification Body (ACB) auditors to perform independent audits of their processes and quality management systems. ACBs use highly qualified professional auditors with extremely good knowledge of quality standards, IACS and its Members, the application of IACS Resolutions, IACS Members' Rules and international regulations.

In order to achieve this level of competence, IACS and ACBs have to accept each other's obligations and restrictions. Each year, IACS provides professional training to the ACB auditors on the latest changes to its Regulations and the QSCS. Additionally, IACS End User Workshops have become a professional forum of experience exchange between IACS, IACS Members, ACBs, Flag States and regulators.

IACS Members have introduced a holistic approach to competence building

All of this means that IACS has achieved a synergy effect. With each day that passes the competence of IACS and its Members improves, which ultimately results in safer ships and cleaner seas.

International and Inter-Industry Relations

Interdependence of IACS and the IMO

The important relationship between IACS and the IMO continues to flourish
By Paul Sadler, IACS Accredited Representative to IMO

In 2018, the IMO celebrated the 70th anniversary of the adoption of the IMO Convention and the 100th session of the Maritime Safety Committee (MSC 100), which IMO recognises as "the highest technical body of the Organization". As IACS celebrates its 50th anniversary, it is timely to take stock of the relationship between IACS and the IMO.

In the IACS Charter, it is stated that in terms of the purposes and aims, IACS "assists international regulatory bodies and standard organisations to develop, implement and interpret statutory regulations and industry standards in ship design, construction and maintenance, with a view to improving safety at sea and the prevention of marine pollution". The primary such international regulatory body is the IMO. Since it was first granted consultative status as a Non-Governmental Organization (NGO) in 1969, IACS has maintained a focus on delivering upon its aim to provide quality contributions, eventually leading to its recognised role as the IMO's principal technical advisor.

> **"IACS has maintained a focus on delivering upon its role as the Organization's principal technical advisor"**

Special relationship

IACS has an Accredited Representative who is supported by dedicated colleagues in its Permanent Secretariat, as well as representatives from the IACS Members who are world-leading technical experts in the matters under consideration at the IMO. IACS submits papers to, and actively participates in, all the meetings of the IMO's technical bodies. These experts not only contribute technical input to the development of new, and amendments to existing, IMO requirements, they also provide a unique degree of insight and feedback on the implementation of the IMO-agreed regulatory framework. This is because IACS Members are not only classification societies, they also act as Recognized Organizations (ROs). In this latter capacity, they act on behalf of IMO Member States to which they are authorised to verify compliance with IMO's statutory regulations and requirements on ships that fly the flag of those countries. The 48 papers that IACS submitted to IMO meetings in 2018 again demonstrates the unparalleled contribution of IACS, as an NGO, to the work of the IMO.

In addition to IACS' extensive technical contributions mentioned above, as further recognition of the shared common goals and objectives regarding safe, secure and environmentally-sound shipping, the Secretariat of the IMO and IACS have in place a Memorandum of Agreement. This agreement is a living document that is reviewed on an annual basis by the IACS Council to confirm its continued relevance and usefulness, and that it is delivering tangible results. At its meeting in December 2018, the Council agreed that work in three focus areas should be taken forward in 2019, those being:

- further consideration of cyber safety within the framework of IMO's MSC-FAL.1/Circ.3 on Guidelines on Maritime Cyber Risk Management;
- development of the methodology of the data analysis step, i.e., Phase 2 of the collection and reporting of ship fuel oil consumption data (MARPOL Annex VI regulation 22A); and
- improvements to the relevant modules of the IMO's Global Integrated Shipping Information System that will facilitate the analysis of accident data to be used in the development of risk-based input to the IMO's decision-making processes.

Progress in these areas will deliver a further strengthening of the bond between IACS Members, in their capacities as ROs, and the IMO Member States on whose behalf they act, for the benefit of the membership of both the IMO and IACS. By virtue of the technical expertise and experience of its Members, IACS is therefore unique in the support that it offers the IMO.

Important issues that IACS will be addressing

There are now a number of technical issues related to improving the efficiency of, or reducing the emissions from, international shipping on which policy decisions have been taken, or will be taken in 2019, that now need to be implemented. These include:

- the date of implementation and reduction amounts for Phase 3 of the requirements relating to the Energy Efficiency Design Index of ships;
- the adoption of the Initial IMO Strategy on reduction of GHG emissions from ships (IMO resolution MEPC.304(72);
- reducing the limit for sulphur in fuel oil used on board ships operating outside designated emission control areas to 0.5% m/m (mass by mass), unless an alternative means to meet this sulphur limit requirement is provided by the fitting of exhaust gas cleaning systems (scrubbers); and
- the development of further measures to enhance the safety of ships relating to the use of fuel oil.

In recognising its role as the IMO's principal technical advisor, IACS is actively considering its contribution to the safe, efficient and effective implementation of the above initiatives.

At MSC 100 in December 2018, it was confirmed that the rules, including the latest modifications, of all IACS Members continue to conform with the goals and functional requirements prescribed in the IMO's Goal Based Standards (GBS) for bulk carriers and oil tankers framework. In addition, the committee adopted 'Revised guidelines for verification of conformity with goal-based ship construction standards for bulk carriers and oil tankers'. In effect, these guidelines provide the work instructions for conducting the initial and periodic maintenance of audits of the rules that are submitted for verification. With these decisions from MSC 100, it is considered that, 16 years after the GBS concept was first brought to the attention of the IMO Council, the GBS framework for bulk carriers and oil tankers has reached a 'steady state'.

In recognition of the evolutionary nature of classification society rules to take account of technological advances, research and development and feedback from ships in service, IACS and its Members will continue to submit, for verification by the IMO, updates to their rules relevant to the construction of bulk carriers and oil tankers.

A continuing connection

The well-established relationship between the IMO and IACS cannot be doubted. Importantly, this interdependence is continuously evolving, deepening and becoming more important to both IACS and the IMO.

Tripartite and other industry meetings

Tectonic shifts in technology, regulation and markets make IACS and industry dialogue increasingly necessary and valuable
By Robert Ashdown, Secretary General

In a world where the pace of change continues to accelerate, strengthening and deepening the dialogue between IACS and its industry partners is essential if a common understanding of the emerging technical and regulatory landscape is to emerge. IACS therefore continued to strengthen its engagement programme with industry in 2018, most notably by supplementing the regular technical and policy level meetings with the publication of a series of high-level position papers on the topics of greatest concern to the industry. The three initial papers focused on Greenhouse Gas Emissions and the 2020 Sulphur Limit, with other papers in the pipeline related to Ballast Water, Cyber, Digitalisation and Marine Autonomous Surface Ships.

These high-level position papers work to a common format that explains the background of the issue, IACS' policy position, the work IACS has undertaken to date and ongoing actions that IACS is working on. By clearly elucidating IACS' position in these areas, the intention is to delineate with clarity where IACS' scope for action lies (noting the apolitical, non-commercial nature of the Association) in delivering its mandate to focus on safety and environmental improvement. The position papers will be subject to ongoing review in order to take into consideration the latest technological and regulatory developments.

Outreach ongoing

In parallel, of course, IACS continues its regular outreach programme with its industry association partners, with new emphasis on the Joint Working Group/Cyber Systems (see article on page 33); a commitment to participating in a further Joint Working Group, led by the International Association of Independent Tanker Owners, on anchoring equipment; and, for the first time, intersessional work being undertaken by IACS and the International Union of Marine Insurance (IUMI) on fire risks due to leakage from low-pressure fuel pipes. IACS' commitment to deeper, technical engagement with the insurance industry was also evidenced by specific briefings given to the Lloyd's Market Association's Joint Hull Committee on cyber safety and by IACS' participation in IUMI's annual conference in South Africa. Additionally, IACS has opened a closer dialogue with the Marine Accident Investigators' International Forum with a view to ascertaining whether IACS can assist the body in better promulgating its findings to the International Maritime Organization (IMO), and so to industry, in order that any lessons learned are distributed as widely and as quickly as possible.

Continued dialogue between IACS and its industry partners is vital

IACS continued to strengthen its engagement programme with industry in 2018

In addition to these new areas of activity, IACS continues to work with industry to strengthen the value of the annual Tripartite meeting of shipowners, shipbuilders and classification societies. Tripartite 2018, held in Seoul, delivered a full programme of technical discussions along with an agreement to establish Tripartite as an informal think tank for the industry, as well as looking to share experiences of the installation, testing and operation of Ballast Water Management Systems and to obtain data with a view to better understanding the technical challenges posed by the IMO's GHG reduction strategy.

> **"Strengthening and deepening the dialogue between IACS and its industry partners is essential if a common understanding of the emerging technical and regulatory landscape is to emerge"**

Meanwhile, IACS continues to recognise the significant added value of having industry comment, at an early stage, on the draft rule changes proposed for the upcoming year and to giving industry's views due consideration before launching the package of rule changes that will be proposed for the forthcoming year. In this context, IACS continues to evolve its External Advisory Group (EAG), whose purpose is to provide a forum to offer input on the maintenance process of Common Structural Rules (CSR), with ongoing advice from experts in modern tanker and bulk carrier structural design, construction and operation.

The experts, selected based on their experience and background in design, construction and/or operation of tankers and/or bulk carriers, make significant contributions to the future maintenance of the CSR. Members of the EAG act in their individual capacities, relying on their own experience and expertise. It was agreed in 2018 to better balance representation by expanding the number of shipbuilder representatives.

Cyber Systems Joint Working Group progress

2018 saw IACS' JWG/CS make robust progress on important maritime issues
By George Reilly, Cyber Systems Panel Chairman

The Joint Working Group on Cyber Systems (JWG/CS) continued its work in 2018 with discussions on recent developments and experiences related to cyber-enabled systems within the maritime industry. Previous work on an appropriate risk model continued, with consideration being given to its use together with a goal-based approach, in further developing the IACS Recommendations. Areas explored included how the model could be consistently calibrated and effectively implemented, how it would address the needs of all users and how responsibilities would be identified and exercised through a vessel's construction and maintained throughout its life.

Progress has been made on cyber-enabled systems

An important function of the JWG/CS work is to review the planned output of IACS with respect to cyber-enabled systems. The Group had a limited window of opportunity to review the draft Recommendations before they were published, yet considerable useful feedback was received. Items that could readily be incorporated were adopted directly into the Recommendations. Meanwhile, other, more substantive suggestions were retained until after the Recommendations' first publication, in order for them to be addressed during the integration into a consolidated document.

Detailed responses to all comments were tabulated and shared in 2018 in order to track the developments during the integration phase. The visibility of the Recommendations on the IACS website (Rec 153 to 164) also provided an opportunity for those outside of the JWG/CS attendees to see the first version of the documents and follow changes as they develop.

IACS is grateful that the JWG/CS members continue to be committed to supporting IACS' work in developing practical criteria associated with the introduction into the industry of ever-expanding digital implementations and solutions. Even maintaining current safety levels will challenge industry stakeholders as the levels of system integration and interdependence increase to unprecedented levels. Due to the many different perspectives and expectations and the fluidity of digital change, full industry equilibrium and stability will continue to be a challenge for the foreseeable future.

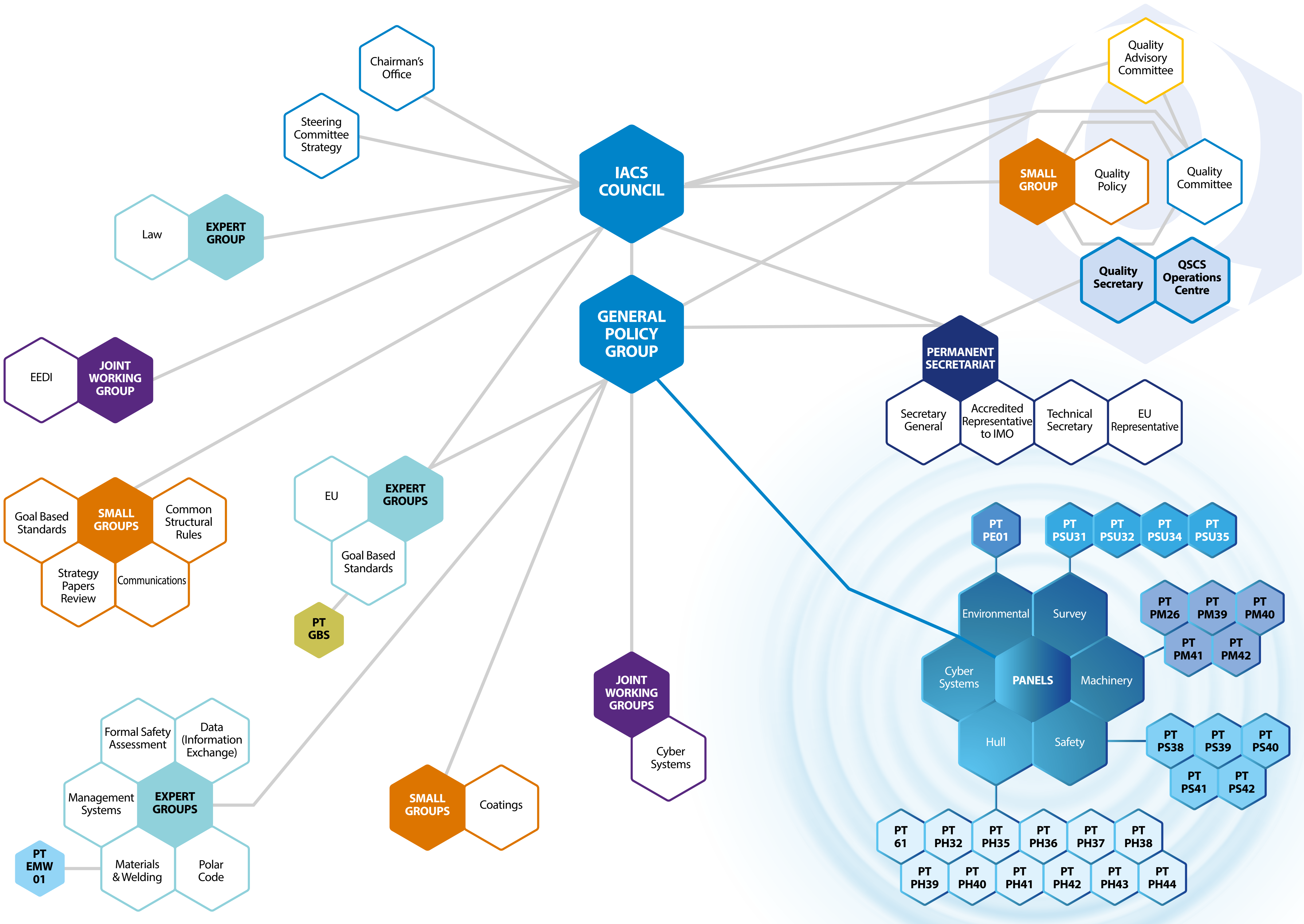
In light of this, the JWG/CS provides the best possible vehicle for maintaining common understanding, where objectives, discussions and conclusions can be shared and consistently distributed.

Lessons were learned from the NotPetya cyber attack on Maersk

IACS Organisation 2018

IACS Organisation 2018

IACS deals with multiple tasks to advance the goal of safer and cleaner shipping.



Project teams in detail

EG-Goal Based Standards – 1 Project team

PT GBS	GBS Maintenance

EG-Materials & Welding – 1 Project team

PT EMW01	NDT Techniques

Environmental Panel – 1 Project team

PT PE01	Revision of PR 38

Survey Panel – 4 Project teams

PT PSU31	ESP Code
PT PSU32	Survey of BHD penetrations
PT PSU34	Effect of new technologies
PT PSU35	IGC Code Loading & Discharging

Machinery Panel – 5 Project teams

PT PM26	IGF development
PT PM39	Polar code issues for icebreakers
PT PM40	Barred speed range investigations
PT PM41	Shaft alignment investigations
PT PM42	Retrofitting issues for BWM

Safety Panel – 5 Project teams

PT PS38	IGC Code interpretations
PT PS39	Cargo lashing
PT PS40	Maintenance of IACS Rec.110
PT PS41	BTWS fire safety protection
PT PS42	UR F44 to include chemical tankers

Hull Panel – 12 Project teams

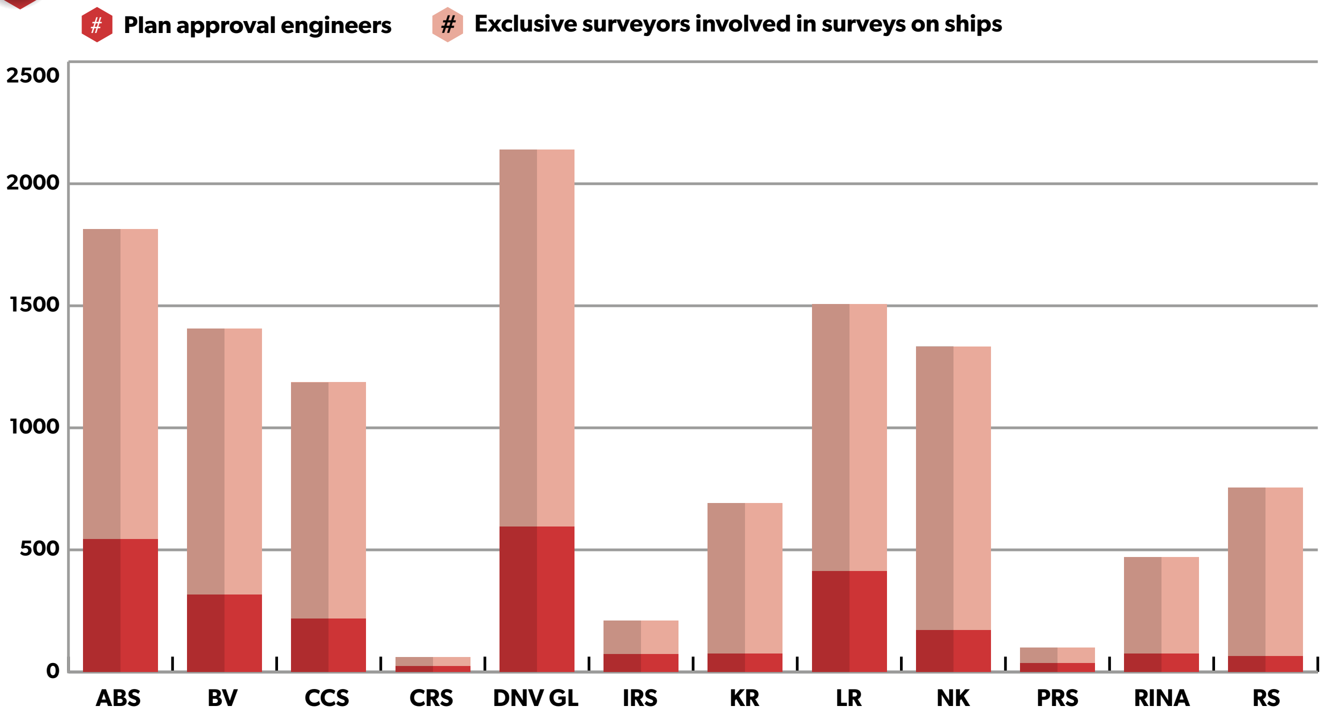
PT 61	Polar Code issues
PT PH32	CSR Maintenance Team
PT PH35	GBS issues on loads
PT PH36	GBS issues on Safety factors
PT PH37	GBS issues on fatigue
PT PH38	Whipping on Containerships
PT PH39	BC cargo hols coatings
PT PH40	Wave data investigations
PT PH41	GBS issues on Human elements
PT PH42	Recommendation 132
PT PH43	Buckling requirements
PT PH44	Fatigue Assessment

IACS Class Report 2018

IACS Class Report Data 2018

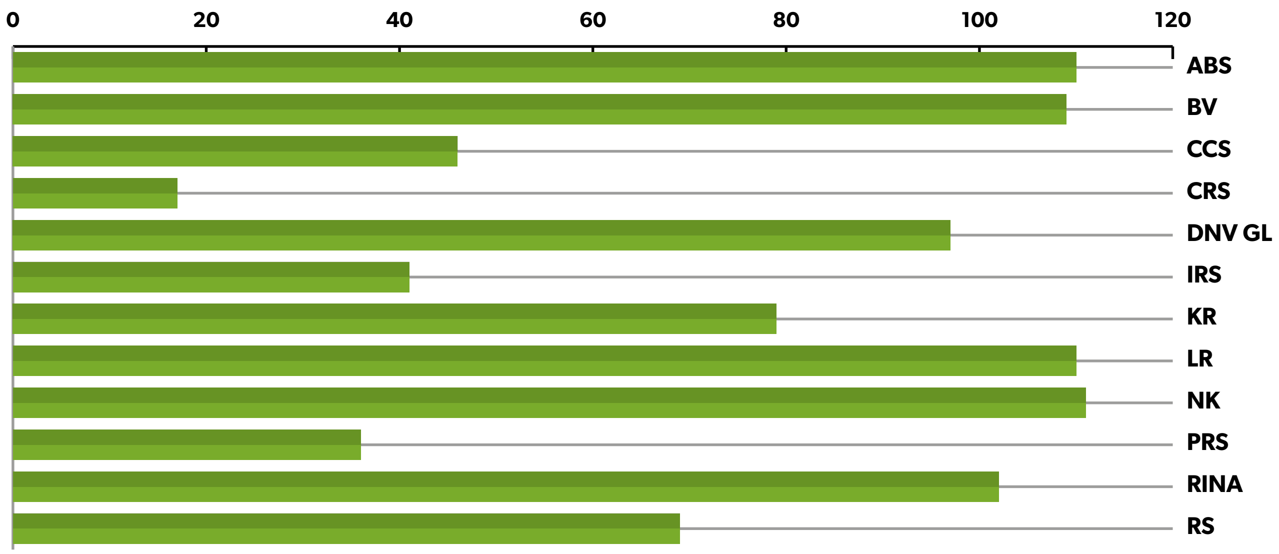
Classed fleet figures include ocean going self-propelled ships of 100 GT and over, excluding fishing vessels, military vessels and pleasure craft, with dual classed ships counted at 100%.

Number of surveyors*



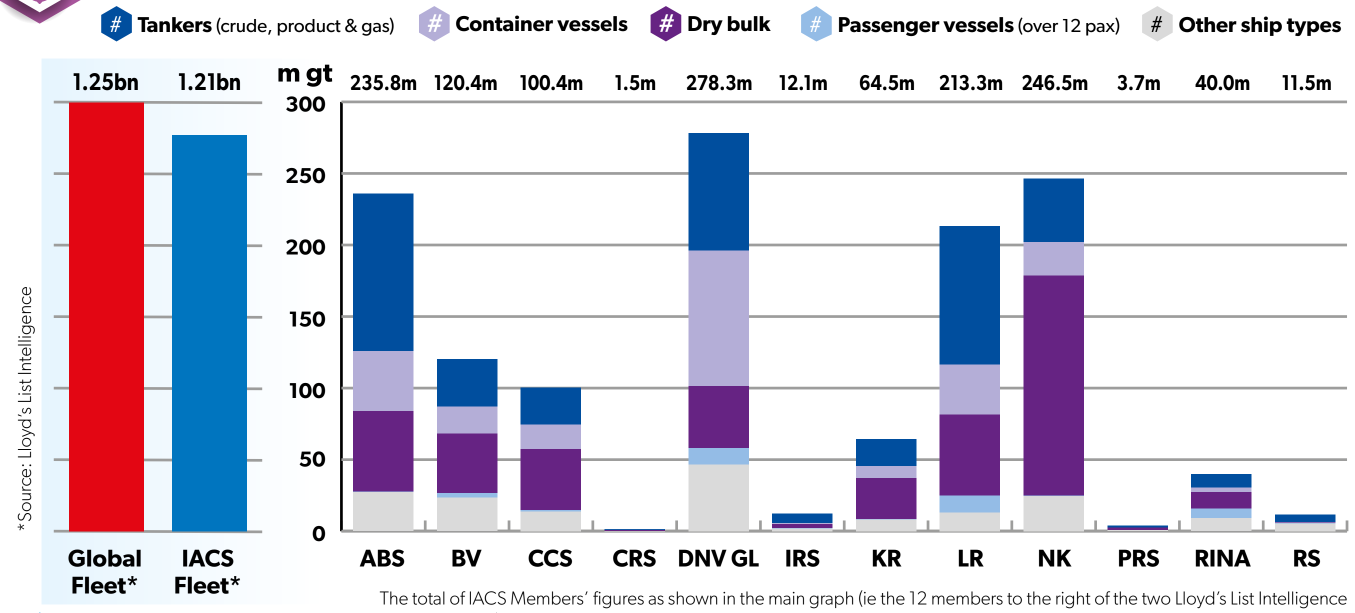
*Combined total number of surveyors, consisting of **the number of exclusive plan approval engineers** (RO Code A1.1.2 Plan approval staff are the personnel authorised to carry out design assessment and to conclude whether compliance has been achieved), and **the number of exclusive surveyors involved in surveys on ships** (RO Code A1.1.1 Survey staff are the personnel authorised to carry out surveys (in operation and under construction), and to conclude whether or not compliance has been achieved.)

Number of recognising flag authorities*



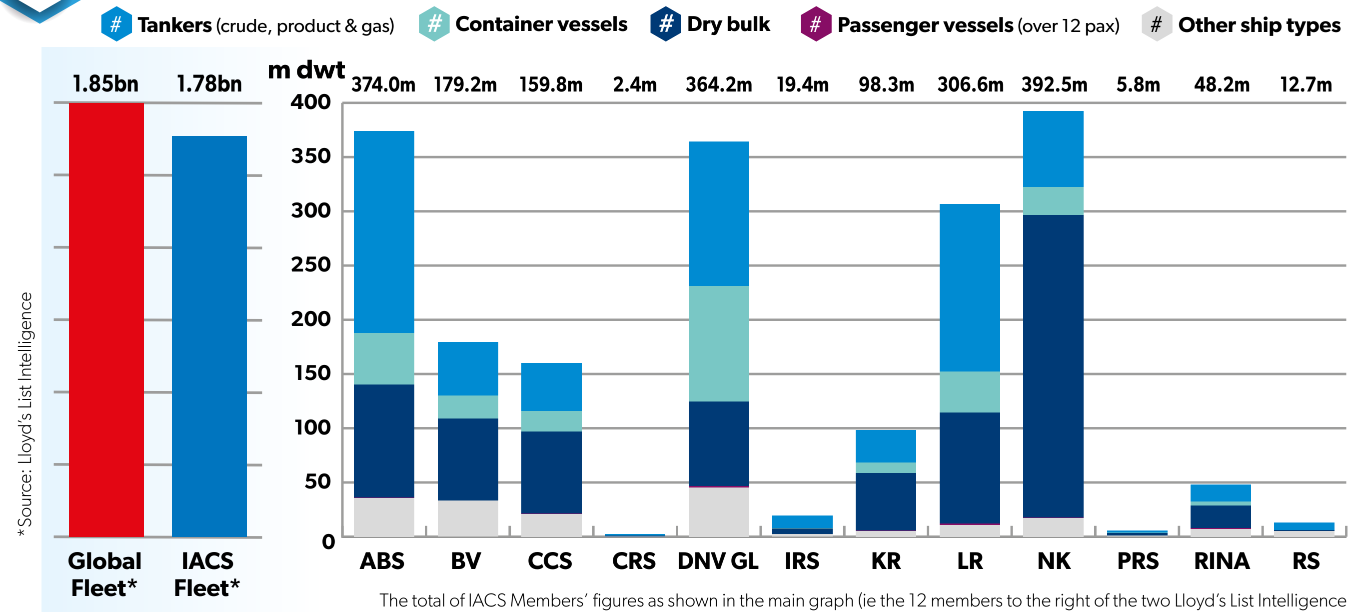
*Number of recognising flag authorities means number of RO agreements with Flags, with general or standing authorization to act on their behalf for any statutory certificate.

Total gross tonnage by type



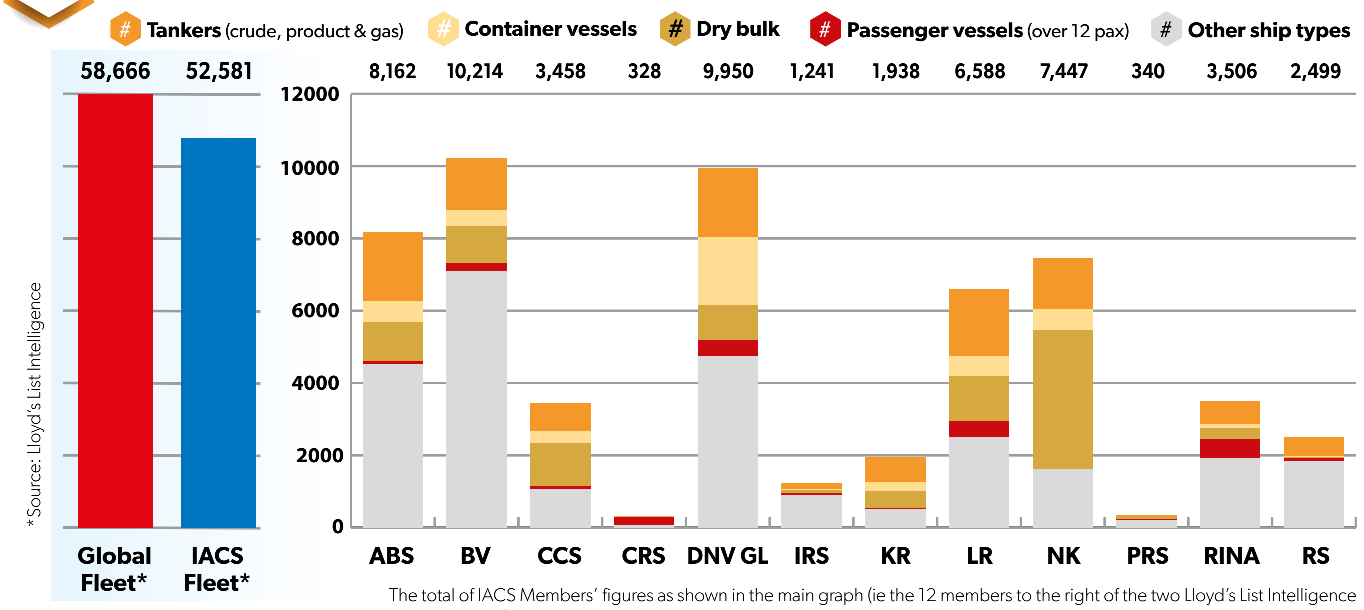
The total of IACS Members' figures as shown in the main graph (ie the 12 members to the right of the two Lloyd's List Intelligence columns) is in excess of the Lloyd's List Intelligence global figure as each IACS member counts dual classed ships at 100%.

Total deadweight by type



The total of IACS Members' figures as shown in the main graph (ie the 12 members to the right of the two Lloyd's List Intelligence columns) is in excess of the Lloyd's List Intelligence global figure as each IACS member counts dual classed ships at 100%.

Total number of vessels by type



The total of IACS Members' figures as shown in the main graph (ie the 12 members to the right of the two Lloyd's List Intelligence columns) is in excess of the Lloyd's List Intelligence global figure as each IACS member counts dual classed ships at 100%.

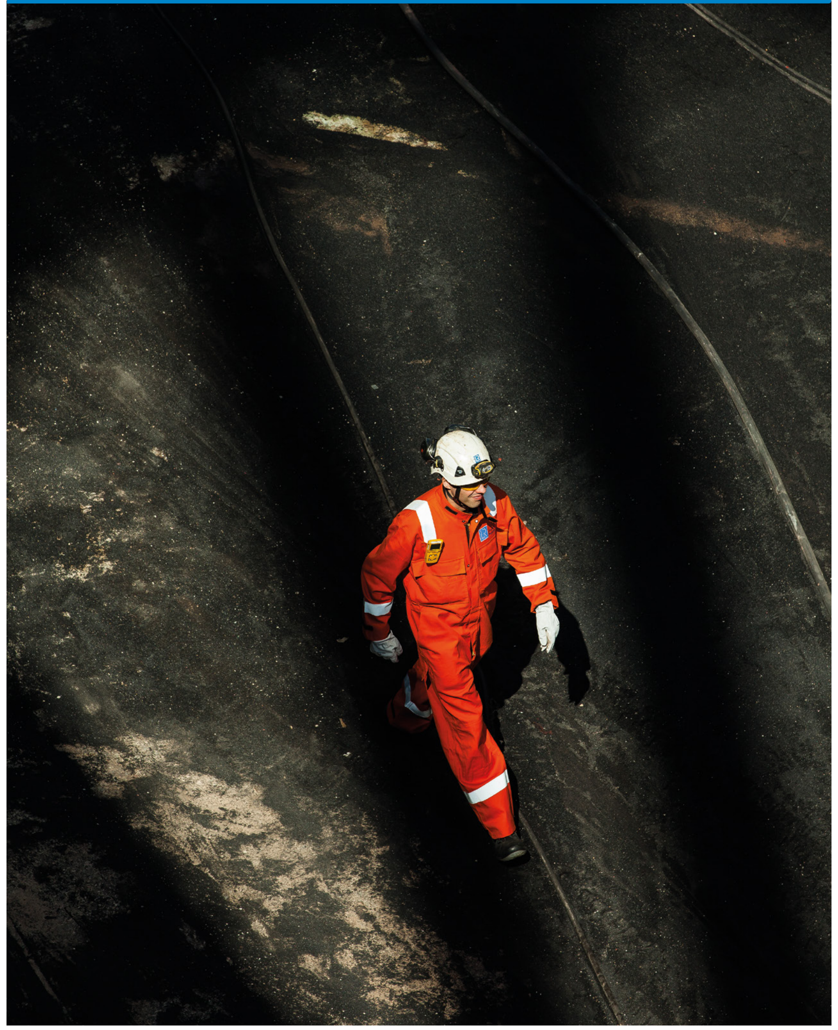

IACS
Publications

Enabling new technologies and ways of working

IACS resolutions cover a range of class, regulatory and operational matters of relevance across the industry

The development and continuous review of IACS Resolutions and Recommendations is an essential part of the Association's work. Keeping this large body of material up-to-date is vital to maintain its ongoing relevance while the production of new Resolutions in response to technical, regulatory or operational advances demonstrates IACS' technical leadership and responsiveness. The selection below represents only a small sample of the work undertaken in 2018 and highlights IACS' activity across the maritime sphere. A list of all IACS Resolutions amended or developed in 2018 can be found in the Appendix I which starts on page 78.

Developing and continuously reviewing Resolutions and Recommendations is vital



Cyber systems

IACS has published 12 recommendations on cyber safety with the aim of enabling the delivery of cyber-resilient ships whose resilience can be maintained throughout their working lives. These eagerly anticipated recommendations are the result of a long-term initiative from IACS that has benefited considerably from cross industry input and support.

IACS initially addressed the subject of software quality with the publication of UR E22 in 2006. Recognising the huge increase in the use of onboard cyber-systems since that time, IACS developed this series of Recommendations with a view to reflecting the resilience requirements for a ship with many more interdependencies. As a result, the IACS Recommendations address the need for:

- A more complete understanding of the interplay between a ship's systems.
- Protection from events beyond software errors.
- An appropriate response and ultimately recovery, in the event that protection fails.
- A means of detection is required in order that the appropriate response can be put in place.

Brief explanation for 3 out of the 12 recommendations:

Rec 153

Rec 153 suggests minimum requirements as well as procedures for maintenance and update of software on board ships. The 'Procedure for Software Updates' is relevant to all computer systems including radio and navigation equipment installed on board the ship.

Rec 159

Rec 159 provides a minimum set of recommended measures for the resilience of networks and networked systems onboard against cyber-related risks, vulnerabilities and threats, including awareness of operators about cyber security threats and procedures to prevent and react to cyber incidents.

Rec 164

This publication provides recommendations for control over communication paths and connections to onboard Information Technology (IT) and Operation Technology (OT) systems. It provides guidance for existing ships that provide connections to computer-based services and systems ashore, and to new construction ships with integrated systems provided by the builder or integrator.

The technical contents of these 12 publications will be reformatted to simplify the application of the Recommendations.

Other cyber-related publications in 2018 included Rec 154, Rec 155, Rec 156, Rec 157, Rec 158, Rec 160, Rec 161, Rec 162 and Rec 163.

Utilisation of new technologies within the survey regime

New technologies on survey regime include CBM (Condition Based Monitoring and inspection methods, and RMD (Remote Monitoring and Diagnosis). IACS has reviewed and updated its survey requirements to meet the demands of the latest technological advancement.

These latest revisions provide the industry with uniform rules and standards for relevant new technologies. IACS is also working closely with the IMO to update relevant IMO instruments (e.g. the ESP Code).

UR Z10.3

The requirements apply to all self-propelled chemical tankers with integral tanks i.e. vessels with an IMO certificate of fitness for the carriage of dangerous chemicals in bulk. The UR was revised considering new technologies on Remote Inspections (RIT). This revision also introduced new provisions into the ESP Code and relevant UR Z10s.

Rec 74

Rec 74 provides guidance regarding managing maintenance in accordance with the requirements of ISM Code. Rev.2 of this publication is issued considering the new technologies on CBM and inspection methods. Also, CBM is included in the checklist of Principal Maintenance System Management Controls.

UR Z17

UR Z17 sets minimum requirements for approval and certification of service suppliers and is applicable to both initial and renewal audits. The UR was revised considering new technologies on Remote Inspections (RIT). This revision also provided clarity by specifying the applicability to mobile offshore drilling units (MODU).

Other publications revised in 2018 due to implications of new technologies included UR Z3, UR Z7, UR Z7.1, UR Z7.2, UR Z10.1, UR Z10.2, UR Z10.4, UR Z10.5 and UR Z15.

Safety of surveyors

All IACS Members are fully committed to the health and safety of their surveyors. By way of reinforcing this commitment, IACS Member Societies have signed the IACS Joint Statement on Safety of Surveyors (http://www.iacs.org.uk/media/4440/iacs-joint-safety-statement.pdf). The Statement contains seven safety objectives which represent a minimum safety standard that IACS Members expect when working at third-party sites. IACS has published new and revised publications for enhancing the safety of surveyors.

PR 37

PR 37 contains the minimum requirements that societies shall prescribe to help keep surveyors safe when conducting confined space entry. In this revision, Para 2.8 was aligned with the table in Chapter 19 of the IGC Code.

Rec 72

Rec 72 gives guidelines for confined space safe working practice. Work in confined and enclosed space has a greater likelihood of causing fatalities, severe injuries and illness than any other type of shipyard work or work

IACS new and revised documents 2018

done onboard ships. This Recommendation is revised to align with IACS PR 37, with the main texts being re-structured as Part One, and the guidelines annexed to this Recommendation being restructured as Part Two.

Interpretations of the new IGC Code

The Maritime Safety Committee (MSC) of the IMO adopted resolutions MSC.370(93) and MSC Res.391(95) to amend the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code). To enable the global and consistent implementation of this important IMO Code, IACS has developed and revised various Unified Interpretations for the revised IGC Code, Recommendations for inspection/survey plans of these ships, and Unified Requirements for common surveys related to them.

UI GC22

UI GC22 provides the interpretation for 11.3 of the revised IGC Code MSC.370(93) related to water spray system design. Clarifications are provided for the definition of two tank groups in the deck area, interconnections of spray and fire systems, capacity of fire pumps serving the water spray system and protection of exposed survival crafts with the water spray.

UI GC27

UI GC27 provides interpretation of 13.2.2 of the revised IGC Code (MSC 370(93)). The Phrase ‘can be maintained’ means that any part of the level gauge other than passive parts can be overhauled while the cargo tank is in service, where passive parts are those parts assumed not subject to failures under normal service conditions.

Rec 114

Rec 114 provides guidelines on the operational testing, inspection and documentation of emergency shut down valves (ESD) for liquefied gas carriers. The revision was introduced to align the Recommendation with the revised IGC Code (MSC.370 (93)).

Other publications related to the IGC Code in 2018 included UI GC2, UI GC9, UI GC10, UI GC23, UI GC24, UI GC25, UIGC26 and UI GC28.

Definitions

UR

Unified Requirements are adopted Resolutions on matters directly connected to or covered by specific Rule requirements and practices of classification societies, and the general philosophy on which the rules and practices of classification societies are established.

Subject to ratification by the governing body of each IACS Member, Unified Requirements should be seen as minimum requirements to be incorporated in the Rules and practices of Members within one year of approval by the IACS General Policy Group.

While each Member remains free to set more stringent requirements, the existence of a UR does not oblige a Member to issue respective Rules if it chooses not to have Rules for the type of ship or marine structure concerned.

CSR

The IACS Council adopted the **Common Structural Rules** for Double Hull Oil Tankers (CSR-OT) and Common Structural Rules for Bulk Carriers (CSR-BC) on December 14, 2005, for implementation on April 1, 2006, on the basis that these Rules were founded on sound technical grounds, and achieved the goal of more robust and safer ships.

These two sets of Rules were developed independently, and in order to remove variations and achieve consistency, IACS decided to harmonise these Rules to create a single set of Rules – *“Common Structural Rules for Bulk Carriers and Oil Tankers”* (CSR BC & OT). This comprised two parts: Part One gave requirements common to both bulk carriers and double hull oil tankers and Part Two provided additional specialised requirements specific to either bulk carriers or double hull oil tankers.

PR

Procedural Requirements are adopted Resolutions on matters of procedures to be incorporated in the practices and procedures of IACS Members within the periods agreed by the IACS General Policy Group.

UI

Unified Interpretations are adopted Resolutions on matters arising from implementing the requirements of IMO Conventions or Recommendations. The Resolutions can involve uniform interpretations of Convention Regulations or IMO Regulations on matters that are unclear.

Interpretations are circulated to the flag State Administrations concerned or sent to IMO for information. They are also designed to aid the development of regulations that are clear, unambiguous and can be easily applied by IACS Members to ships whose flag State Administrations have not issued definite instructions on the interpretation of the IMO regulations concerned, amid statutory certification on behalf of those flag Administrations.

Recommendations

IACS produces **Recommendations** and guidelines related to adopted Resolutions that not only deal with matters of class but also offer some advice to the marine industry.

Major Events

2018

1 January 2018

New Membership Criteria

As part of its ongoing commitment to high-quality operations, new IACS Membership Criteria enter into force, applicable to both existing Members and new applicants.

January, Brussels

EU Commissioner's Reception

IACS attends Commissioner Violeta Bulc's reception to mark the passing of the EU Year of Maritime and explore synergies with other transport modes as part of the 2018 Multimodality Year to further progress our work for a more competitive, efficient, safe and environmentally sustainable maritime transport sector.

March, Stamford, USA

CMA Annual Conference

IACS Chairman outlines the initiatives taken at the International Association of Classification Societies (IACS) that are changing the organisation.

March, Hamburg

IUMI Spring Conference

As part of IACS' ongoing support for marine insurance, IACS Chairman gives keynote speech to the IUMI Spring Conference.

January, Vladivostok

ACB Refresher Training

Annual refresher training for certifying bodies takes place; new focus areas described and feedback gathered.

March, London

IMO 70th Anniversary

IMO marks seventy years to the day since the treaty establishing the United Nations International Maritime Organization (IMO) was adopted. Her Majesty Queen Elizabeth II marked the occasion at IMO Headquarters in London on Tuesday March 6.

April, London

Launch of Annual Review

Chairman of IACS pinpoints three key themes of the Association's strategy for the future: commitment to quality, modernisation and transparency, as widely reflected in IACS' work and future vision.

April, London

IMO GHG Reduction Strategy

IMO adopts its initial strategy on reductions of Greenhouse Gas emissions with huge long-term implications for international shipping.

May, London

IACS/Industry Technical Meetings

IACS hosts its annual meetings with insurers, owners and builders to discuss in-depth the key technical challenges facing the industry.

May, London

IMO High-Level Forum

IMO High-Level Forum 'IMO 70: Our Heritage – Better Shipping for a Better Future' highlights IACS' ongoing and unparalleled support of the IMO and the support given to the IMO's programme of events to celebrate the 70th Anniversary of the adoption of the IMO Convention.

June, London

Seatrade Awards

IACS was honoured and delighted to receive Seatrade's Industry Anniversary Award in recognition of 50 years' dedicated service to safety, the environment, and support of the IMO.

August, Brussels

EU DG CONNECT

IACS Secretary General and Cyber Panel Chair meet with the Director of DG CONNECT to brief the Commission on IACS' extensive work on cyber safety.

September

IACS Publishes 12 Cyber Recommendations

IACS publishes the initial nine recommendations on cyber safety which resulted from extensive collaboration across industry and provide much needed guidance on how to develop and maintain the cyber integrity of vessels. The remaining three are published later in the year.

September, South Africa

IUMI Annual Conference

IACS Secretary General participates in the IUMI Annual Conference and builds links with new IUMI President, Richard Turner.

October, Seoul

Tripartite

With the shipping industry on the verge of major changes requiring strong collaboration between ship builders, ship owners and classification societies, IACS again made a strong contribution to Tripartite discussions on Human-Centred Design, CO_2, Sulphur, BWMS and the pre-eminence of ship safety.

November, London

End User Workshop

IACS hosted its 10th End User Workshop, which was the key opportunity for interested parties to have tangible and meaningful influence on the evolution of IACS QSCS, ensuring the Scheme continues to be relevant and up-to-date and meets the needs of all interested parties and stakeholders.

November, Singapore

MAIIF Annual Meeting

IACS deepens its engagement with the Marine Accident Investigators' International Forum by speaking at their Annual Meeting on how best to share safety information.

December, London

IMO Agrees to IQARB Trial

IMO's MSC 100 agreed to the establishment of an Independent Quality Assessment Review Body which marks another significant step towards strengthening the independence of the oversight of IACS QSCS and maintaining its reputation as the Gold Standard for Class Societies.

December, Brussels

IACS EU Reception

IACS hosts a reception for the many EU Representatives and industry stakeholders that work with IACS on European issues that impact international shipping.

December, London

IACS 50th Anniversary Dinner

IACS hosts a 50th Anniversary dinner for its industry partners. Guest of honour, IMO Secretary General, Kitack Lim, delivered a speech in which he praised IACS' steadfast commitment and support of the IMO over the past five decades and highlighted the importance of IACS, and classification, in helping industry and regulators rise to the challenges of the future.


IACS
Members

IACS Members

IACS consists of 12 member societies, details of which are listed below. Chairmanship of IACS is on a rotational basis with each member society taking a turn.

The current chairmanship is as follows:

Chair of Council	Mr. Jeong-kie Lee	KR
Vice-Chair (incoming Chair)	Mr. Arun Sharma	Indian Register of Shipping
Vice-Chair (immediate past-Chair)	Mr. Knut Ørbeck-Nilssen	DNV GL

ABS
American Bureau of Shipping
www.eagle.org

BV
Bureau Veritas
www.veristar.com

KR
Korean Register of Shipping
www.krs.co.kr

LR
Lloyd's Register
www.lr.org

CCS
China Classification Society
www.ccs.org.cn/ccswzen/

CRS
Croatian Register of Shipping
www.crs.hr

NK
Nippon Kaiji Kyokai
www.classnk.or.jp

PRS
Polish Register of Shipping
www.prs.pl

DNV GL
www.dnvgl.com

IRS
Indian Register of Shipping
www.irclass.org

RINA
RINA Services S.p.A.
www.rina.org

RS
Russian Maritime Register of Shipping
www.rs-class.org/en/

Appendices

Appendix I Summaries of the IACS Resolutions published in 2018

Summary of New/Revisions to IACS Unified Requirements published in 2018

New **Revised** **Corrigenda** **Deleted/Withdrawn**

Index	Resolution no.	Revision	Adoption	Title	Implemention Date
1	UR Z10.1	Rev.23	Jan 2018	Hull surveys of oil tankers	01 Jan 2019
2	UR Z10.2	Rev.35	Jan 2018	Hull surveys of bulk carriers	01 Jan 2019
3	UR Z10.3	Rev.18	Jan 2018	Hull surveys of chemical tankers	01 Jan 2019
4	UR Z10.4	Rev.15	Jan 2018	Hull surveys of double hull oil tankers	01 Jan 2019
5	UR Z10.5	Rev.18	Jan 2018	Hull surveys of double skin bulk carriers	01 Jan 2019
6	UR Z17	Rev.13	Jan 2018	Procedural requirements for service suppliers	01 Jan 2019
7	UR Z3	Rev.7	Jan 2018	Periodical survey of the outside of the ship's bottom and related items	01 Jan 2019
8	UR Z7	Rev.26	Jan 2018	Hull classification surveys	01 Jan 2019
9	UR Z7.1	Rev.14	Jan 2018	Hull surveys for general dry cargo ships	01 Jan 2019
10	UR Z7.2	Rev.7	Jan 2018	Hull surveys for liquefied gas carriers	01 Jan 2019
11	UR S21A	Corr.1	Feb 2018	Evaluation of scantlings of hatch covers and hatch coamings and closing arrangements of cargo holds of ships	-
12	UR W17	Rev.5	Mar 2018	Approval of consumables for welding normal and higher strength hull structural steels	01 Jul 2019
13	UR W23	Rev.2	Apr 2018	Approval of welding consumables for high strength steels for welded structures	01 Jul 2019
14	UR S10	Rev.5	May 2018	Rudders, sole pieces and rudder horns	01 Jul 2019
15	UR G1	Corr.1	May 2018	Cargo containment of gas tankers	-
16	UR Z15	Rev.2	Jun 2018	Hull, structure, equipment and machinery surveys of mobile offshore drilling units	01 Jul 2019
17	UR W13	Rev.6	Jun 2018	Thickness tolerances of steel plates and wide flats	01 Jul 2019
18	UR E11	Corr.1	Jun 2018	Unified requirements for systems with voltages above 1 kV up to 15 kV	-
19	UR E13	Corr.1	Jun 2018	Test requirements for rotating machines	-
20	UR M76	Rev.1	Jun 2018	Location of fuel tanks in cargo area on oil and chemical tankers	01 Jul 2019
21	UR S6	Rev.9	Jul 2018	Use of steel grades for various hull members – ships of 90 m in length and above	01 Jul 2019
22	UR Z27	New	Jul 2018	Condition Monitoring and Condition Based Maintenance	01 Jan 2020
23	UR Z18	Rev.8	Jul 2018	Survey of machinery	01 Jul 2019
24	UR Z20	Rev.1	Jul 2018	Planned Maintenance Scheme (PMS) for machinery	01 Jul 2019
25	UR M78	New	Jul 2018	Safety of internal combustion engines supplied with low pressure gas	01 Jul 2019
26	UR M51	Corr.1	Sep 2018	Factory acceptance test and shipboard trials of I.C. engines	-
27	UR Z10.2	Rev.33 Corr.1	Sep 2018	Hull surveys of bulk carriers	-
28	UR Z10.2	Rev.34 Corr.1	Sep 2018	Hull surveys of bulk carriers	-
29	UR Z10.2	Rev.35 Corr.1	Sep 2018	Hull surveys of bulk carriers	-
30	UR P2.13	New	Oct 2018	Installation	01 Jan 2020
31	UR P2.7.4	Rev.9	Oct 2018	Mechanical joints	01 Jan 2020
32	UR E10	Rev.7	Oct 2018	Test specification for type approval	01 Jan 2020
33	UR Z7	Rev.27	Oct 2018	Hull classification surveys	01 Jan 2020
34	UR M79	New	Oct 2018	Towing winch emergency release systems	01 Jan 2020
35	UR M3	Rev.6	Nov 2018	Speed governor and overspeed protective device	01 Jan 2020
36	UR D3	Rev.6	Nov 2018	General design parameters	01 Jan 2020
37	UR E24	Rev.1	Dec 2018	Harmonic distortion for ship electrical distribution system including harmonic filters	01 Jan 2020
38	UR M36	Rev.6	Dec 2018	Alarms and safeguards for auxiliary reciprocating internal combustion engines driving generators in unattended machinery spaces	01 Jan 2020
39	UR M46	Rev.2	Dec 2018	Ambient conditions – inclinations	01 Jan 2020
40	UR D10	Deleted	Dec 2018	Electrical installations	-
41	UR G2	Rev.2	Dec 2018	Liquefied gas cargo tanks and process pressure vessels	01 Jan 2020
42	UR P4	Rev.5	Dec 2018	Production and application of plastic piping systems on ships	01 Jan 2020

Summary of New/Revisions to IACS Unified Requirements published in 2018

1. UR Z10.1 (Rev.23 Jan 2018)

The requirements apply to all self-propelled oil tankers other than double hull oil tankers, as defined in 1.1.1 of UR Z 10.4. A series of items of UR Z10s were amended in accordance with the ESP Code. This revision also introduced new provisions into the ESP Code and relevant UR Z10s.

2. UR Z10.2 (Rev.35 Jan 2018)

The requirements apply to all self-propelled bulk carriers other than double skin bulk carriers as defined in 1.1.1 of UR Z10.5. A series of items of UR Z10s were amended in accordance with the ESP Code. This revision also introduced new provisions into the ESP Code and relevant UR Z10s.

3. UR Z10.3 (Rev.18 Jan 2018)

The requirements apply to all self-propelled chemical tankers with integral tanks i.e. vessels with IMO certificate of fitness for the carriage of dangerous chemicals in bulk. The UR was revised considering new technologies on Remote Inspections (RIT). A series of items of UR Z10s were amended in accordance with the ESP Code. This revision also introduced new provisions into the ESP Code and relevant UR Z10s.

4. UR Z10.4 (Rev.15 Jan 2018)

The requirements apply to all self-propelled double hull oil tankers. A series of items of UR Z10s were amended in accordance with the ESP Code. This revision also introduced new provisions into the ESP Code and relevant UR Z10s.

5. UR Z10.5 (Rev.18 Jan 2018)

The requirements apply to all self-propelled double skin bulk carriers. A series of items of UR Z10s were amended in accordance with the ESP Code. This revision also introduced new provisions into the ESP Code and relevant UR Z10s.

6. UR Z17 (Rev.13 Jan 2018)

UR Z17 sets minimum requirements for approval and certification of service suppliers and is applicable to both initial and renewal audits. The UR was revised considering new technologies on Remote Inspections (RIT). This revision also provided clarity by specifying the applicability to mobile offshore drilling units (MODU).

7. UR Z3 (Rev.7 Jan 2018)

The requirements apply to periodical survey of the outside of the ship's bottom and related Items. UR Z3 is revised considering the use of Remotely Operated Vehicles (ROVs) and to propose a possible list of service suppliers that need to be certified.

8. UR Z7 (Rev.26 Jan 2018)

The requirements apply to all self-propelled vessels. This revision introduced criteria for the steel renewal and criteria for the survey of the downflooding ducts and ventilation ducts which are integrated into the ship's structures. The UR was also revised considering new technologies on Remote Inspections (RIT).

9. UR Z7.1 (Rev.14 Jan 2018)

The requirements apply to hull surveys for general dry cargo ships. The UR was revised considering new technologies on Remote Inspections (RIT).

10. UR Z7.2 (Rev.7 Jan 2018)

The requirements apply to all self-propelled ships carrying liquefied gases in bulk. The UR was revised considering new technologies on Remote Inspections (RIT).

11. UR S21A (Corr.1 Feb 2018)

The requirements apply to all ships except bulk carriers, ore carriers and combination carriers, as defined in UR Z11, and are for all cargo hatch covers and coamings on exposed decks. The corrigendum has modified the wording from "Plastic materials on steel" to "lower friction materials" in table 9.

12. UR W17 (Rev.5 Mar 2018)

The requirements give the conditions of approval and inspection of welding consumables used for hull structural steel according to UR W11. The revision aligned UR W17 with UR W16 and introduced new grade of 5Y40 consumable.

13. UR W23 (Rev.2 Apr 2018)

The requirements supplement UR W17 and give the conditions of approval and inspection of welding consumables used for high strength steels for welded structures according to UR W16. The revision aligned UR W23 with UR W16.

14. UR S10 (Rev.5 May 2018)

UR S10 applies to ordinary profile rudders, and to some enhanced profile rudders with special arrangements for increasing the rudder force. This revision improved the requirements for dimensions of the gudgeon and the cone coupling push-up length. This revision also corrected inconsistences and clarified requirements identified in the text of Rev.4 and Annexes.

15. UR G1 (Corr.1 May 2018)

UR G1 provides general principles which are applied by classification societies for approval and survey of the relevant items of liquefied gas tankers for classification purposes. The text for G1.2. was corrected as "…. P0 may be increased to a higher value but not less than 0.07 N/mm2 (0.7 bar)."

16. UR Z15 (Rev.2 Jun 2018)

The requirements apply to all Mobile Offshore Drilling Units after their construction for surveys of the hull, structure, equipment, and machinery subject to classification. The UR was revised considering new technologies on Remote Inspections (RIT).

17. UR W13 (Rev.6 Jun 2018)

The requirements apply to the tolerance on thickness of steel plates and wide flats. This UR was revised to apply the same criteria regardless of thickness for tolerance on nominal thickness, structural steel plates as per UR W11 and high strength steel plates for welded structure as per UR W16. Further minor changes were introduced.

18. UR E11 (Corr.1 Jun 2018)

The requirements apply to A.C. three-phase systems with nominal voltage exceeding 1kV – the nominal voltage is the voltage between phases. This corrigendum updated the international standards referred to in UR E11.

19. UR E13 (Corr.1 Jun 2018)

UR E13 provides test requirements for rotating machines and states that tests are to be carried out according to IEC 60092-301. This corrigendum updated the international standards that are referred to in UR E13.

20. UR M76 (Rev.1 Jun 2018)

UR M76 provides the guidance on the location of fuel tanks in cargo area on oil and chemical tankers. This revision clarified the types of liquid cargoes to which this UR applies.

21. UR S6 (Rev.9 Jul 2018)

UR S6 provides the requirement for use of steel grades for various hull members on ships of 90 m in length and above. This UR does not apply to CSR bulk carriers and oil tankers. This revision updated Table 8 – Cargo tank boundaries, updated Table 9 to include -11/-15ºC degrees and -16/-25ºC and added a new paragraph to address cold cargo.

22. UR Z27 (New Jul 2018)

IACS developed this new unified requirement for the approved Condition Monitoring and Condition Based Maintenance schemes applying to machinery components and systems where condition monitoring results are used to influence the scope and/or frequency of class survey, including the requirements of software, onboard working, documentation, personnel, approval and survey for applying the scheme, and survey/audit for maintenance of the scheme.

Summary of New/Revisions to IACS Unified Requirements published in 2018

23. UR Z18 (Rev.8 Jul 2018)

UR Z18 deals with the periodical surveys of machinery. It stipulates the requirements for special surveys, annual surveys and continuous surveys. This UR was revised to include the Planned Maintenance Scheme and Condition Monitoring/Condition Based Maintenance.

24. UR Z20 (Rev.1 Jul 2018)

UR Z20 requirements apply to an approved Planned Maintenance Scheme for Machinery (PMS) as an alternative to the Continuous Machinery Survey (CMS). This UR was revised considering the new technologies on Remote Monitoring/Diagnosis (RMD) and Condition Based Inspecting/Maintenance (CBM).

25. UR M78 (New Jul 2018)

UR M78 provides a common approach for design and testing of trunk piston type diesel engines supplied with low pressure natural gas as fuel. Engines can be either dual fuel engines or gas fuel only engines.

26. UR M51 (Corr.1 Sep 2018)

UR M51 provides requirements on factory acceptance tests and shipboard trials of I.C. engines. In this corrigendum, reference to UR M51.3.3.2 in UR M51.3.3.4 was changed to UR M51.3.3.3 because the operational profile of the engines driving generators for auxiliary purposes was evaluated to be more similar to that of the engines driving generators for electric propulsions (UR M51.3.3.3).

27-29 UR Z10.2 (Rev.33, 34, 35 Corr.1 Sep 2018)

The requirements apply to all self-propelled bulk carriers other than double skin bulk carriers as defined in 1.1.1 of UR Z10.5. These corrigenda were issued for aligning the figures in UR Z10s with the ESP Code.

30. UR P2.13 (New Oct 2018)

UR P2.13 adds a requirement that seawater supply pipes located in cargo holds are to be protected from mechanical damage where necessary.

31. UR P2.7.4 (Rev.9 Oct 2018)

UR P2.7.4 is applicable to pipe unions, compression couplings, slip-on joints. This revision introduced a picture for typical compression type mechanical joints and clarified applicability of limitation in use of slip on joints.

32. UR E10 (Rev.7 Oct 2018)

UR E10 is applicable to electrical, electronic and programmable equipment intended for control, monitoring, alarm and protection systems for use in ships. This revision increased the frequency range for electromagnetic emissions up to 6 GHz. This revision also stipulated the application a quasi-peak detection and average detection to test radiated emissions for below and above 1 GHz, respectively.

33. UR Z7 (Rev.27 Oct 2018)

The requirements apply to all self-propelled vessels. UR Z7 is revised to clarify the applicability of FP and AP tanks in table 1, and modified item 4 of table 1 as “Internals in forepeak and afterpeak ballast tanks”.

34. UR M79 (New Oct 2018)

UR M79 defines minimum safety standards for winch emergency release systems provided on towing winches that are used in the handling of ships within close quarters, ports or terminals.

35. UR M3 (Rev.6 Nov 2018)

UR M3 provides requirements for speed governor and overspeed protective devices. This revision included newer requirements for testing generator sets i.e. testing engine and alternator together, including the coupling.

36. UR D3 (Rev.6 Nov 2018)

UR D3 provides general design parameters applicable to mobile offshore drilling units contracted for construction on and after 1 January 2013. This revision corrected a typographical error in the shear stress formulation and simplified the UR text by removing paragraph D3.9.2.2.

37. UR E24 (Rev.1 Dec 2018)

The requirements apply to ships where harmonic filters are installed on the main busbars of electrical distribution system, other than those installed for single application frequency drives such as pump motors. This revision clarified the scope of application of UR E24.

38. UR M36 (Rev.6 Dec 2018)

UR M36 provides requirements for alarms and safeguards for auxiliary reciprocating internal combustion engines driving generators in unattended machinery spaces. This UR was revised to align requirements of UR M36 with requirements of UR M10.8 regarding the use of engine bearing temperature monitors or equivalent devices instead of oil mist detection arrangements to protect the engine crankcases.

39. UR M46 (Rev.2 Dec 2018)

UR M46 specifies the ambient conditions for the layout, selection and arrangement of all shipboard machinery, equipment and appliances to ensure proper operation. In this revision, the reference to inclination angles was removed for switch gear, electrical and electronic appliances to avoid a possible conflict with requirements in UR E10.

40. UR D10 (Deleted Dec 2018)

UR D10 was deleted as most of the sections of the UR are addressed directly in the 2009 MODU Code.

41. UR G2 (Rev.2 Dec 2018)

UR G2 provides general principles which are applied by classification societies for approval and survey of the relevant items of liquefied gas tankers for classification purpose. This revision included requirements from the new IGC Code (MSC 370(93).

42. UR P4 (Rev.5 Dec 2018)

The requirements are applicable to piping systems on ships, including pipe joints and fittings, made predominantly of material other than metal. This revision aligned UR P4 with IMO Res. A.753(18) as amended by Res. MSC. 313(88) and MSC.399(95).

Summary of New/Revisions to IACS Procedural Requirements published in 2018

New Revised Corrigenda Deleted/Withdrawn

Index	Resolution no.	Revision	Adoption	Title	Implemention Date
1	PR28	Rev.2	Jan 2018	Procedure for Change of Flag	01 Jan 2019
2	PR21	Rev.2	Mar 2018	Procedural Requirement for Statutory Surveys by Exclusive Surveyors	01 Jan 2019
3	PR9	Rev.3	Apr 2018	Procedural Requirements for ISM Code Certification	01 Jul 2018
4	PR37	Rev.2	Dec 2018	Procedural Requirement for Confined Space Safe Entry	01 Jul 2019
5	PR39	New	Dec 2018	Procedure for Fleet Quality Monitoring	01 Jan 2019
6	PR40	New	Dec 2018	Procedural Requirements for MLC, 2006 Certification	01 Jan 2019

1. PR28 (Rev.2 Jan 2018):

The purpose of this Procedural Requirement is to lay down common procedures and minimum statutory survey requirements for societies in case of change of flag. The title of the PR is only changed in this revision.

2. PR21 (Rev.2 Mar 2018):

PR21 stipulates that for ships subject to mandatory IMO instruments, such as, but not limited to, SOLAS, MARPOL and/or Load Line conventions, all statutory surveys are to be carried out by exclusive surveyors as defined in PR5. This revision was triggered by GPG in order to consider the use of exclusive surveyors of class and exclusive surveyors of other ROs on survey regimes.

3. PR9 (Rev.3 April 2018):

PR9 reflects, as applicable, IMO Resolution A.1118(30) 'Revised guidelines on the implementation of the International Safety management (ISM) Code by administrations' and IMO Resolution A.741(18) 'International Safety Management (ISM) Code' as amended. This PR was revised to update the references, update the requirements based on operational experience and harmonisation of ship certification scenarios for ISM, ISPS and MLC.

4. PR37 (Rev.2 Dec 2018):

PR37 contains the minimum requirements that societies shall prescribe to help keep surveyors safe when conducting confined space entry. In this revision, Para 2.8 was aligned with the table in Chapter 19 of the IGC Code.

5. PR39 (New Dec 2018):

PR39 establishes the procedural requirements for the identification and follow-up of vessels not being satisfactorily maintained between surveys due to lack of maintenance. The obligations of this Procedure apply to classification societies which are subject to verification of compliance with QSCS.

6. PR40 (New Dec 2018):

PR40 establishes procedural requirements for the planning, preparation, conduct, reporting and follow-up of MLC inspections and for the issuance of the corresponding Maritime Labour Certificate (MLC) and Declaration of Maritime Labour Compliance (DMLC).

Summary of New/Revisions to IACS Unified Interpretations published in 2018

New Revised Corrigenda Deleted/Withdrawn

Index	Resolution no.	Revision	Adoption	Title	Implemention Date
1	UI SC94	Corr.1	Jan 2018	Mechanical, hydraulic and electrical independency of steering gear control systems	-
2	UI GC22	New	Apr 2018	Water spray system	01 Jul 2019
3	UI COLREG5	New	May 2018	Interpretation of COLREG 1972 Annex I Sections 9(a)(i) and 10(a)(i)	01 Jul 2019
4	UI GC18	Rev.1 Withdrawn	Jun 2018	Test for cargo tank's high level alarm (on ships built on or after 1 July 2016)	-
5	UI GF1	Rev.1 Withdrawn	Jun 2018	Test for gas fuel tank's high level alarm	-
6	UI MPC51	Rev.1 Withdrawn	Jun 2018	Resolution 2 of the 1997 MARPOL Conference Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines	-
7	UI SC284	New	Jun 2018	Automatic shutdown of the inert gas system and its component parts	01 Jul 2019
8	UI SC285	New	Jun 2018	Operational status of valves to cargo tanks	01 Jul 2019
9	UI SC286	New	Jun 2018	Operational status of the inert gas system	01 Jul 2019
10	UI SC287	New	Jun 2018	Low pressure audible alarm system	01 Jul 2019
11	UI SC89	Rev.4	Jun 2018	Ventilation of cargo spaces	01 Jan 2019
12	UI GC23	New	Jul 2018	Cargo tank structure heating arrangement power supply	01 Jul 2019
13	UI GC24	New	Jul 2018	Fire test for emergency shutdown valves	01 Jul 2019
14	UI GC25	New	Jul 2018	Cargo piping insulation	01 Jul 2019
15	UI GF13	New	Jul 2018	Fire protection of spaces containing equipment for fuel preparation	01 Jul 2019
16	UI GF14	New	Jul 2018	Hazardous area classification of fuel storage hold spaces	01 Jul 2019
17	UI GF15	New	Jul 2018	Alarms for loss of ventilation capacity	01 Jul 2019
18	UI MPC88	Deleted	Aug 2018	Annex IV of MARPOL 73/78 Regulation 9.1.1 Regulation 9 Sewage systems	-
19	UI MPC92	Deleted	Aug 2018	Tonnage to be used when applying MARPOL Annex VI Regulation 5 Surveys and Inspections	-
20	UI MPC 102	Deleted	Aug 2018	Surveys and certification relating to the Ship Energy Efficiency Management Plan (SEEMP)	-
21	UI MPC127	Deleted	Aug 2018	Annex I of MARPOL 73/78 Regulation 14.7	-
22	UI MPC12	Rev.3	Aug 2018	Annex VI of MARPOL 73/78 Regulation 1	01 Jan 2020
23	UI MPC14	Rev.2	Aug 2018	Annex VI of MARPOL 73/78 Regulation 1/Regulation 5.2	01 Jan 2020
24	UI MPC98	Rev.1	Aug 2018	'Time of the replacement or addition' for the applicable tier standard for the supplement to the IAPP Certificate	01 Jan 2020
25	UI SC156	Rev.1	Oct 2018	Doors in watertight bulkheads of cargo ships and passenger ships	01 Jan 2020

Summary of New/Revisions to IACS Unified Interpretations published in 2018

Index	Resolution no.	Revision	Adoption	Title	Implemention Date
26	UI GC26	New	Oct 2018	Type testing requirements for valves	01 Jan 2020
27	UI SC123	Rev.4	Nov 2018	Machinery installations – service tank arrangements	01 Jan 2020
28	UI SC288	New	Dec 2018	Carriage of dangerous goods – required air changes	01 Jan 2020
29	UI SC289	New	Dec 2018	Separation arrangements between inert gas piping and cargo tanks	01 Jan 2020
30	UI SC290	New	Dec 2018	Emergency source of electrical power on gas carriers and chemical tankers	01 Jan 2020
31	UI MODU3	New	Dec 2018	Selective disconnection or shutdown and equipment operable after an emergency shutdown	01 Jan 2020
32	UI GC10	Rev.1	Dec 2018	Reliquefaction plant of motor-driven LNG carriers	-
33	UI GC2	Rev.1	Dec 2018	Interpretation of the second sentence of paragraph 13.2.1	-
34	UI GC27	New	Dec 2018	Interpretation of paragraph 13.2.2	01 Jan 2020
35	UI GC28	New	Dec 2018	Guidance for sizing pressure relief systems for interbarrier spaces	01 Jan 2020
36	UI GC9	Rev.1	Dec 2018	Guidance for sizing pressure relief systems for interbarrier spaces	-
37	UI GF16	New	Dec 2018	Liquefied gas fuel tank loading limit higher than calculated using the reference temperature	01 Jan 2020
38	UI GF17	New	Dec 2018	Other rooms with high fire risk	01 Jan 2020

1. UI SC94 (Corr.1 Jan 2018)

UI SC94 applies to steering gear control systems, as defined in SOLAS regulation II-1, 3/1, for the main and auxiliary steering gear, operable from the navigation bridge. Corrigenda is issued to correct Example 2 in the publication.

2. UI GC22 (New Apr 2018)

UI GC22 provides the interpretation for 11.3 of the revised IGC Code MSC.370(93) related to water spray system design. Clarifications are provided for the definition of two tank groups in deck area, interconnections of spray and fire system, capacity of fire pumps serving water spray system and protection of exposed survival crafts with the water spray.

3. UI COLREG5 (New May 2018)

UI COLREG5 provides a clarification on the possible blockage of hull structures to the horizontal plane and the vertical sector of side lights as respectively required by COLREG Annex 1 9(a)(i) and 10(a)(i). This UI is intended to bring an earlier application of the provisions of MSC.1/Circ.1577.

4-6. UI GC18, GF1 & MPC51 (Rev.1 Withdrawn Jun 2018)

Revision 1 of these publications was withdrawn and the original versions were re-instated.

7. UI SC284 (New Jun 2018)

UI SC284 provides interpretation of the term "Automatic shutdown" in Chapter 15.2.2.2.2 of the FSS Code.

8. UI SC285 (New Jun 2018)

UI SC285 provides interpretation of the term "Unambiguous information regarding the operational status of such valves" (i.e. stop valves in branch piping leading from the inert gas main to cargo tanks) in Chapter 15.2.2.3.2.2 of the FSS Code.

9. UI SC286 (New Jun 2018)

UI SC286 provides interpretation of the term "operational status" in Chapter 15.2.2.4.1 of the FSS Code.

10. UI SC287 (New Jun 2018)

UI SC287 provides interpretation of the term "independent alarm system" in Chapter 15.2.2.4.5 of the FSS Code.

11. UI SC89 (Rev.4 Jun 2018)

UI SC89 provides interpretation for SOLAS Reg. II-2/19.3.4, Section 1.7 & 3.5.4 IMSC Code. This revision contains consequential modifications coming from the amendments of IMSBC Code, i.e., Resolutions MSC.354(92) and MSC.426(98). However, the essence of its interpretation has not changed.

12. UI GC23 (New Jul 2018)

UI GC23 provides interpretation of the requirement in paragraph 4.19.1.6 of the IGC Code.

13. UI GC24 (New Jul 2018)

UI GC24 provides interpretation of the requirements for emergency shutdown valves as mentioned in paragraph 5.13.1.1.4 of the IGC Code.

14. UI GC25 (New Jul 2018)

UI GC25 provides interpretation of the phrase "a thermal insulation system as required to minimise heat leak into the cargo during transfer operations" and the phrase "cargo piping systems shall be provided with a thermal insulation system as required ... to protect personnel from direct contact with cold surfaces" in paragraph 5.12.3.1 of the IGC Code.

15. UI GF13 (New Jul 2018)

UI GF13 interpretation of the sentence "Any space containing equipment for fuel preparation such as pumps, compressors, heat exchangers, vaporisers and pressure vessels shall be regarded as a machinery space of category A for fire protection purposes" in Chapter 11.3.1 of the IGC Code.

16. UI GF14 (New Jul 2018)

UI GF14 provides interpretation regarding acceptable means of monitoring "required ventilation capacity" in section 12.5.2.1 and footnote 23, Part A-1 of the IGF Code.

17. UI GF15 (New Jul 2018)

UI GF15 provides interpretation for the classification of hazardous area zones for fuel storage hold spaces in section 15.10.1, Part A-1 of the IGF Code.

18 -21. UI MPC88, MPC92, MPC102 & MPC127 (Deleted Aug 2018)

22. UI MPC12 (Rev.3 Aug 2018)

UI MPC12 provides interpretation for the term "all ships" in the regulation. Revision of this UI is introduced for consistency with current text of Reg 1 of MARPOL Annex VI as amended by Res. MEPC.278(70).

Summary of New/Revisions to IACS Unified Interpretations published in 2018

23. UI MPC14 (Rev.2 Aug 2018)

UI MPC14 provides interpretation regarding the criteria for ship & engine certification in the context of MARPOL Annex VI. The UI was revised considering IMO Res. MEPC.278(70).

24. UI MPC98 (Rev.1 Aug 2018)

UI MPC98 provides interpretation regarding a common date to be used for determining the applicable Tier standard for engines that are added or non-identical engines that are replaced onboard a ship. The UI was revised considering IMO resolution MEPC.258(67) and MEPC.286(71).

25. UI SC156 (Rev.1 Oct 2018)

IACS UI SC156 pertains to doors located in the way of the internal watertight subdivision boundaries and the external watertight boundaries necessary to ensure compliance with the relevant subdivision and damage stability regulations. Rev.1 provides consequential modifications coming from the amendments to SOLAS regulations including MSC.421(98) and MSC.429(98).

26. UI GC26 (New Oct 2018)

UI GC26 provides interpretation of the wording “shall be certified to a recognised standard” in Chapter 5.13.1.1.2 of the IGC Code.

27. UI SC123 (Rev.4 Nov 2018)

UI SC123 provides interpretation of the requirements for service tank arrangements in Regulation SOLAS II– 1/26.11. The UI is revised taking into consideration newbuilds and retrofitted vessels trading in ECA zones using low sulphur and residual grade fuels.

28. UI SC288 (New Dec 2018)

UI SC288 provides interpretation of SOLAS Reg. II-2/19.3.4.1 and Reg. II-2/19.3.5.4 in order to clarify the required air change when transporting dangerous goods of classes 2, 3, 6.1 and 8 in closed freight containers and when the bilge pump is located directly inside a container cargo space.

29. UI SC289 (New Dec 2018)

UI SC289 provides interpretation of FSS Code Chapter 15.2.2.3.2.3.3 regarding separation arrangements between inert gas piping and cargo tanks of tankers.

30. UI SC290 (New Dec 2018)

UI SC290 provides interpretation of SOLAS Chapter II-1, Regulation 43.6 (as amended) to highlight the need to also apply the revised IGC Code (MSC.370 (93)) section 2.7.2.2.

31. UI MODU3 (New Dec 2018)

UI MODU3 provides interpretation of 2009 MODU Code (as amended), Chapter 6, paragraphs 6.5.1 and 6.5.5 for emergency shutdown (ESD) systems arranged with multiple levels of ESD.

32. UI GC10 (Rev.1 Dec 2018)

UI GC10 provides interpretation concerning controlling the cargo pressure/temperature in paragraph 7.2.1 of the IGC Code (MSC.5(48)) as amended except Resolution MSC.370(93). Rev.1 stated that this UI is applicable for ships constructed on or after 1 July 1986 but before 1 July 2016.

33. UI GC2 (Rev.1 Dec 2018)

UI GC2 provides interpretation for the second sentence of paragraph 13.2.1 of the IGC Code (MSC.5(48)) as amended except Resolution MSC.370(93). Rev.1 stated that this UI is applicable for ships constructed on or after 1 July 1986 but before 1 July 2016.

34. UI GC27 (New Dec 2018)

UI GC27 provides interpretation of 13.2.2 of the revised IGC Code (MSC.370(93)), where the phrase “can be maintained” means that any part of the level gauge other than passive parts can be overhauled while the cargo tank is in service, where passive parts are those parts assumed not subject to failures under normal service conditions.

35. UI GC28 (New Dec 2018)

UI GC28 provides interpretation concerning sizing of the pressure relieving devices for interbarrier spaces of the second sentence of paragraph 8.1 of the IGC Code (MSC.370(93)).

36. UI GC9 (Rev.1 Dec 2018)

UI GC9 provides interpretation concerning sizing of the pressure relieving devices for interbarrier spaces of the second sentence of paragraph 8.1 of the IGC Code (MSC.5(48)) as amended except Resolution MSC.370(93)). Rev.1 stated that this UI is applicable for ships constructed on or after 1 July 1986 but before 1 July 2016.

37. UI GF16 (New Dec 2018)

UI GC16 provides interpretation for “loading limit” in Section 6.8.2, Part A of the IGF Code.

38. UI GF17 (New Dec 2018)

UI GC17 provides interpretation for “other rooms with high fire risk” in Section 11.3.3, Part A of the IGF Code.

Summary of New/Revisions to IACS Recommendations published in 2018

New **Revised** **Corrigenda** **Deleted/Withdrawn**

Index	Resolution no.	Revision	Adoption	Title	Implemention Date
1	Rec 152	New	Apr 2018	Survival craft launching stations. Guidance for applying the requirements of 11.3.1 of the IGC Code (on ships constructed on or after 1 July 2016)	-
2	Rec 67	Rev.1	Jun 2018	Test and installation of busbar trunking systems	-
3	Rec 86	Rev.1	Jun 2018	Applicable standards for UR P4.7 'Requirements for Type Approval of Plastic Pipes'	-
4	Rec 111	Rev.1	Jun 2018	Passenger ships – Guidelines for preparation of hull structural surveys	-
5	Rec 12	Deleted	Jul 2018	Guidelines for surface finish of hot rolled steel plates and wide flats	-
6	Rec 46	Rev.1	Jul 2018	Guidance and information on bulk cargo loading and discharging to reduce the likelihood of over-stressing the hull structure	-
7	Rec 74	Rev.2	Aug 2018	A guide to managing maintenance in accordance with the requirements of the ISM code	-
8	Rec 121	Rev.1	Aug 2018	Uniform application of MARPOL Annex I, Revised Regulation 12	-
9	Rec 153	New	Sep 2018	Recommended procedures for software maintenance of shipboard equipment and systems	-
10	Rec 154	New	Sep 2018	Recommendation concerning manual/local control capabilities for software dependent machinery systems	-
11	Rec 155	New	Sep 2018	Contingency plan for onboard computer-based systems	-
12	Rec 156	New	Sep 2018	Network architecture	-
13	Rec 157	New	Sep 2018	Data assurance	-
14	Rec 159	New	Sep 2018	Network security of onboard computer-based systems	-
15	Rec 161	New	Sep 2018	Inventory list of computer-based systems	-
16	Rec 162	New	Sep 2018	Integration	-
17	Rec 163	New	Sep 2018	Remote update/Access	-
18	Rec 158	New	Oct 2018	Physical security of onboard computer-based system	-
19	Rec 82	Rev.1	Oct 2018	Surveyors' glossary hull terms & hull survey terms	-
20	Rec 165	New	Nov 2018	Recommendation for assessing alternative methods used in the hull structural design of ships subject to the Common Structural Rules for Bulk Carriers and Oil Tankers (CSR-BC&OT)	-
21	Rec 160	New	Nov 2018	Vessel system design	-
22	Rec 164	New	Nov 2018	Communication and interfaces	-

Index	Resolution no.	Revision	Adoption	Title	Implementation Date
23	Rec 72	Rev.3	Dec 2018	Confined space safe practice	-
24	Rec 114	Rev.1	Dec 2018	Recommendation for operational testing, inspection and documentation of emergency shutdown valves for liquefied gas carriers	-
25	Rec 85	Rev.1	Dec 2018	Recommendations on Voyage Data Recorder	-

1. Rec 152 (New Apr 2018)

Rec 152 is an outcome of discussion about water spray protection of the exposed survival crafts and muster stations introduced by 11.3.1.7 of revised IGC Code (Resolution MSC.370(93)).

2. Rec 67 (Rev.1 Jun 2018)

Rec 67 is for the testing and installation of busbar trunking systems arranged outside of switchboards for supplying section and/or distribution boards or consumers, instead of cables. In this revision, the referred international standards in the recommendation are updated.

3. Rec 86 (Rev.1 Jun 2018)

Rec 86 stipulates the applicable Standards for UR P4.7 'Requirements for Type Approval of Plastic Pipes'. In this revision, the referred international standards in the recommendation are updated.

4. Rec 111 (Rev.1 Jun 2018)

Rec 111 provides guidelines for preparation of hull structural surveys on passenger ships, with focus on areas with accessibility problems. In this revision, the reference to UR Z22 in paragraph 3.6 was deleted.

5. Rec 12 (Deleted Jul 2018)

Content of Rec 12 was included in UR W11 and hence it was deleted.

6. Rec 46 (Rev.1 Jul 2018)

Rec 46 provides guidance and information on bulk cargo loading and discharging to reduce the likelihood of over-stressing the hull structure. This recommendation was updated for the use of masters, ship's officers, ship owners, operators, etc., reflecting the changes introduced in IACS resolutions and IMO instruments, which encompass Common Structural Rules and BWM Convention.

7. Rec 74 (Rev.2 Aug 2018)

Rec 74 provides guidance regarding managing maintenance in accordance with the requirements of ISM Code. Rev.2 of this publication is issued considering the new technologies on Condition Based Inspecting/Maintenance (CBM). Also, CBM is included in the checklist of Principal Maintenance System Management Controls.

8. Rec 121 (Rev.1 Aug 2018)

Rec 121 enables uniform application of MARPOL Annex I, Revised Regulation 12. This revision has been issued to align with the current text of Regulation 12 of MARPOL Annex I as amended by MEPC.266(68).

Summary of New/Revisions to IACS Recommendations published in 2018

9. Rec 153 (New Sep 2018)

Rec 153 suggests minimum requirements as well as procedures for maintenance and update of software on board ships. The Procedure for Software Updates is relevant to all computer systems including radio and navigation equipment installed on board ship.

10. Rec 154 (New Sep 2018)

Rec 154 proposes how requirements in SOLAS concerning local control of machinery can be applied on machinery installations that depend on computer-based systems.

11. Rec 155 (New Sep 2018)

Rec 155 stipulates the need for policies and procedures to be applied in case of the failure or malfunction of onboard computer-based systems which could lead to dangerous situations with respect to human safety, safety of the vessel and/or threat to the environment.

12. Rec 156 (New Sep 2018)

Rec 156 was developed to provide broad guidelines on shipboard network architecture. The recommendation broadly covers various aspects from design to installation phases which should be addressed by the system integrator and yard.

13. Rec 157 (New Sep 2018)

The purpose of this recommendation is to supplement the UR E22 with regards to digital data assurance of Category I, II and III computer-based systems on board, ship-to-ship and ship-to-shore systems.

14. Rec 159 (New Sep 2018)

Rec 159 provides a minimum set of recommended measures for the resilience of networks and networked systems onboard against cyber-related risks, vulnerabilities and threats, including awareness of operators about cyber security threats and procedures to prevent and react to cyber incidents.

15. Rec 161 (New Sep 2018)

Rec 161 contains recommended information to be included in an inventory list for computer-based systems and recommendations for updating the list.

16. Rec 162 (New Sep 2018)

Rec 162 is intended for vessels with interconnected Category II or III systems or where the interconnection of systems includes at least one Category II or III system. UR E22 should be applied for each system individually and Category I systems that are interconnected to each other.

17. Rec 163 (New Sep 2018)

Rec 163 provides a minimum set for recommendations/procedures for remote connection to systems on shore and remote maintenance, including clear procedures and protective measures, which include mechanisms for validating updates prior to preceding and reverting to earlier revisions in the case of corruption.

18. Rec 158 (New Oct 2018)

Rec 158 suggests the recommended measures for onboard computer-based systems to prevent unauthorised physical access, misuse of removable devices and theft of the systems.

19. Rec 82 (Rev.1 Oct 2018)

Rec 82 is intended as a guide to improve the standardisation of survey reporting. The Glossary also includes definitions of common hull survey terms that are applicable for surveys of hull structures and reporting. This revision aligns the descriptions of the forepeak and afterpeak tanks as per UR Z7 Table 1.

20. Rec 165 (New Nov 2018)

Rec 165 provides clarifications on the scope and documentation to trace for assessing alternative methods used for the hull structural design appraisal of CSR ships when there is not full and direct compliance to CSR-BC&OT due to innovative designs that are not capable of being directly evaluated with the existing Rules and/or IACS resolutions.

21. Rec 160 (New Nov 2018)

Rec 160 provides broad guidelines on vessel system design. The recommendation broadly covers various aspects from design to installation phases, which should be addressed by the system integrator and shipyard.

22. Rec 164 (New Nov 2018)

Rec 164 provides recommendations for control over communication paths and connections to onboard Information Technology (IT) and Operation Technology (OT) systems. It provides guidance on communication paths and onboard IT/OT systems for existing ships that provide connections to computer-based services and systems ashore, and to new construction ships with integrated systems provided by the builder or integrator.

23. Rec 72 (Rev.3 Dec 2018)

Rec 72 gives guidelines for confined space safe working practice. Work in confined and enclosed space has a greater likelihood of causing fatalities, severe injuries and illness than any other type of shipyard work or work done onboard ships. This Recommendation is revised to align with IACS PR 37, with the main texts being re-structured as Part One, and the guidelines annexed to this Recommendation being restructured as Part Two.

24. Rec 114 (Rev.1 Dec 2018)

Rec 114 provides guidelines on the operational testing, inspection and documentation of emergency shut down valves (ESD) for liquefied gas carriers. The revision was introduced to align the Recommendation with the revised IGC Code (MSC.370(93)).

25. Rec 85 (Rev.1 Dec 2018)

Rec 85 is applicable to Voyage Data Recorders (VDR) required by SOLAS Chapter V, Reg. 20. The revision was introduced to align the Recommendation with revised IGC Code (MSC.370(93)) as well as with updated IMO Resolutions (such as MSC.333(90) and A.1021(26)).

Appendix II Summaries of IACS Members Class Report Data 2018

ABS	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**235,854,062**	**8,162**	**374,054,943**	**1,815**	543	1,272	**110**
Tankers (crude, product & gas)	110,055,125	1,897	186,316,199				
Container vessels	41,983,472	584	47,602,666				
Dry bulk	56,218,323	1,089	104,226,070				
Passenger vessels (over 12 pax)	398,875	56	305,021				
Other ship types	27,198,267	4,536	35,604,987				

BV	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**120,446,264**	**10,214**	**179,213,345**	**1,406**	316	1,090	**109**
Tankers (crude, product & gas)	33,488,739	1,439	48,994,397				
Container vessels	18,671,634	441	21,192,203				
Dry bulk	41,675,503	1,021	75,475,098				
Passenger vessels (over 12 pax)	3,245,335	213	404,973				
Other ship types	23,365,053	7,100	33,146,674				

CCS	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**100,369,035**	**3,458**	**159,858,789**	**1,188**	218	970	**46**
Tankers (crude, product & gas)	25,754,185	796	44,032,935				
Container vessels	17,329,990	318	19,022,602				
Dry bulk	42,387,941	1,179	75,631,678				
Passenger vessels (over 12 pax)	1,230,000	109	336,588				
Other ship types	13,666,919	1,056	20,834,986				

CRS	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**1,539,672**	**328**	**2,363,718**	**60**	24	36	**17**
Tankers (crude, product & gas)	668,838	23	1,183,483				
Container vessels	-	-	-				
Dry bulk	650,079	23	1,102,252				
Passenger vessels (over 12 pax)	175,842	220	35,436				
Other ship types	44,913	62	42,547				

DNV GL	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**278,282,123**	**9,950**	**364,208,459**	**2,140**	596	1,544	**97**
Tankers (crude, product & gas)	82,273,190	1,901	133,119,320				
Container vessels	94,674,094	1,886	106,580,329				
Dry bulk	43,161,340	967	77,959,008				
Passenger vessels (over 12 pax)	11,465,597	464	1,193,082				
Other ship types	46,707,902	4,732	45,356,720				

IRS	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**12,158,320**	**1,241**	**19,400,760**	**210**	73	137	**41**
Tankers (crude, product & gas)	6,642,502	169	11,287,502				
Container vessels	576,628	25	744,673				
Dry bulk	2,819,184	103	5,034,228				
Passenger vessels (over 12 pax)	125,045	52	35,966				
Other ship types	1,994,961	892	2,298,391				

KR	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**64,476,261**	**1,938**	**98,257,055**	**691**	74	617	**79**
Tankers (crude, product & gas)	18,997,912	681	29,903,545				
Container vessels	8,287,637	248	9,613,727				
Dry bulk	28,601,808	471	53,385,384				
Passenger vessels (over 12 pax)	303,671	22	87,563				
Other ship types	8,285,233	516	5,266,836				

LR	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**213,305,769**	**6,588**	**306,622,042**	**1,506**	412	1,094	**110**
Tankers (crude, product & gas)	97,076,364	1,842	154,181,094				
Container vessels	34,759,928	557	38,079,954				
Dry bulk	56,643,577	1,237	102,184,562				
Passenger vessels (over 12 pax)	11,732,503	449	1,502,748				
Other ship types	13,093,397	2,503	10,673,684				

NK	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**246,554,976**	**7,447**	**392,511,429**	**1,333**	171	1,162	**111**
Tankers (crude, product & gas)	44,625,550	1,396	70,254,573				
Container vessels	23,233,767	596	25,557,638				
Dry bulk	154,025,315	3,842	279,298,776				
Passenger vessels (over 12 pax)	131,131	8	25,027				
Other ship types	24,539,213	1,605	17,375,415				

PRS	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**3,738,071**	**340**	**5,776,627**	**100**	36	64	**36**
Tankers (crude, product & gas)	1,209,432	29	2,221,731				
Container vessels	38,641	2	47,229				
Dry bulk	1,551,060	66	2,606,691				
Passenger vessels (over 12 pax)	271,084	41	58,714				
Other ship types	667,854	202	842,262				

RINA	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**40,015,091**	**3,506**	**48,164,510**	**470**	75	395	**102**
Tankers (crude, product & gas)	9,619,610	630	16,115,919				
Container vessels	3,101,652	110	3,296,436				
Dry bulk	11,398,021	314	20,663,858				
Passenger vessels (over 12 pax)	6,880,604	532	1,145,652				
Other ship types	9,015,204	1,920	6,942,645				

RS	Gross Tonnes	No of vessels	Deadweight	Total no. of Surveyors	Plan approval engineers	Exclusive ship surveyors	Number of recognising flag authorities
Total Size of classed fleet	**11,497,356**	**2,499**	**12,709,845**	**755**	65	690	**69**
Tankers (crude, product & gas)	5,324,265	530	6,498,658				
Container vessels	158,814	14	194,588				
Dry bulk	512,565	24	848,573				
Passenger vessels (over 12 pax)	122,668	94	28,968				
Other ship types	5,379,044	1,836	5,139,058				

Classed fleet figures include ocean going self-propelled ships of 100 GT and over, excluding fishing vessels, military vessels and pleasure craft, with dual classed ships counted at 100%.

Number of surveyors includes combined total number of surveyors, consisting of the number of exclusive plan approval engineers (RO Code A1.1.2 Plan approval staff are the personnel authorised to carry out design assessment and to conclude whether compliance has been achieved), and the number of exclusive surveyors involved in surveys of ships (RO Code A1.1.1 Survey staff are the personnel authorised to carry out surveys (in operation and under construction), and to conclude whether or not compliance has been achieved.)

Number of recognising flag authorities means number of RO agreements with Flags, with general or standing authorisation to act on their behalf for any statutory certificate.

IACS

International Association of Classification Societies

IACS Limited
Permanent Secretariat
4 Matthew Parker Street
London SW1H 9NP
United Kingdom

www.iacs.org.uk