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MARITIME SAFETY COMMITTEE
99th session
Agenda item 20

MSC 99/20/9
13 February 2018
Original: ENGLISH

WORK PROGRAMME

Proposal for a new output concerning amendments to the Code of Safety for Diving Systems and resolution A.692(17)

Submitted by the Russian Federation, Vanuatu, IMCA and IOGP

SUMMARY

Executive summary:	The document contains a proposal for a new output concerning amendments to the Code of Safety for Diving Systems (resolution A.831(19)) and the *Guidelines and specifications for hyperbaric evacuation systems* (resolution A.692(17)). The main aim of the proposal is to enhance commercial diving safety by amending resolutions A.831(19) and A.692(17) to reflect the experience and knowledge gained by the industry since the last reviews of these instruments were conducted around 27 years ago in the case of the Guidelines and 23 years ago in the case of the Code of Safety. In addition, the proposal aims to harmonize the IMO instruments and industry guidance relevant to commercial diving systems and hyperbaric evacuation systems. The two main areas of focus for the proposed review are the application of the IMO diving instruments and evacuation arrangements for saturation divers. The proposal is expected to have minimal financial implications relative to the current Code for the shipping industry and none to the IMO budget.
Strategic direction, if applicable:	6
Output:	
Action to be taken:	Paragraph 40
Related documents:	Resolutions A.831(19) and A.692(17) and SSE 5/INF.9

Introduction

1 This document is submitted in accordance with the provisions of paragraph 4.6 of the *Organization and method of work of the Maritime Safety Committee and the Marine Environment Protection Committee and their subsidiary bodies* (MSC-MEPC.1/Circ.5), taking into account the *Application of the Strategic Plan of the Organization* (resolution A.1111(30)), to propose a new output to amend the *Code of Safety for Diving Systems* (resolution A.831(19)) and the *Guidelines and specifications for hyperbaric evacuation systems* (resolution A.692(17)).

Background

2 The Maritime Safety Committee, at its sixty-fifth session (9 to 17 May 1995), recognizing the need for a revised text, approved a draft Assembly resolution on the Code of Safety for Diving Systems following a general revision of the Code. Subsequently, the Assembly, at its nineteenth session, adopted the *Code of Safety for Diving Systems, 1995* (resolution A.831(19)) ("the Code"). By that resolution the Maritime Safety Committee was authorized to "… amend the Code as necessary in the light of further developments and experience gained from the implementation of the provisions contained therein …;".

3 The Code was developed to provide a minimum international standard for the design, construction and survey of diving systems on ships and floating structures engaged in diving operations, in order to enhance the safety of divers/personnel. Chapter 3 of the Code states that "An evacuation system should be provided having sufficient capacity to evacuate all divers under pressure, in the event of the ship having to be abandoned …".

4 *The Guidelines and specifications for hyperbaric evacuation systems* (resolution A.692(17)) ("the Guidelines") were developed with a view to promoting the safety of all divers in saturation and achieving a standard of safety for divers which corresponds, as far as is practicable, to that provided for other seagoing personnel, and which will satisfy chapter 3 of the Code. The Guidelines were adopted on 6 November 1991.

5 Since the adoption of the aforementioned resolutions, the offshore sector has made great strides in the provision and use of hyperbaric evacuation systems. New and detailed industry guidelines on hyperbaric evacuation systems have been prepared by the International Marine Contractors Association (IMCA), the International Association of Oil and Gas Producers (IOGP), and the classification societies. These are contained in the following publications:

.1 IMCA D 014 IMCA International Code of Practice for Offshore Diving Rev 2 2014;

.2 IMCA D 022 Guidance for Diving Supervisors Rev 2 August 2016;

.3 IMCA D 023 Diving Equipment Systems Inspection Guidance Note DESIGN for Surface Orientated (Air) Diving Systems Rev 1 January 2014;

.4 IMCA D 024 Diving Equipment Systems Inspection Guidance Note DESIGN for Saturation (Bell) Diving Systems Rev 2 July 2014;

.5 IMCA D 051 Hyperbaric Evacuation Systems (HES) Interface Requirements Rev 1 October 2014;

.6 IMCA D 052 Guidance on Hyperbaric Evacuation Systems May 2013;

.7 IMCA D 053 DESIGN for the Hyperbaric Reception Facility (HRF) forming part of a Hyperbaric Evacuation System (HES) April 2014;

.8 IOGP Report 411 Diving Recommended Practice June 2008;

.9 IOGP Report 468 Diving System Assurance Recommended Practice February 2016;

.10 IOGP Report 478 Performance of Saturation Diving Emergency Hyperbaric Evacuation and Recovery January 2018;

.11 ABS Rules for Building and Classing Underwater vehicles, Systems and Hyperbaric Facilities January 2018;

.12 BV NR610 Rules for the classification of diving systems February 2017;

.13 DNVGL-OS-E402 Offshore Standard for Diving Systems January 2017;

.14 DNV-RP-E403 Recommended Practice Hyperbaric Evacuation Systems October 2010;

.15 Lloyd's Register Rules and Regulations for the Construction & Classification of Submersibles and Diving Systems July 2017 (amended, January 2018);

.16 Russian Maritime Register of Shipping, Rules for the Classification and Construction of Manned Submersibles and Ships Diving Systems, 2018;

.17 DMAC 15 Medical equipment to be held at the site of an offshore operation Rev 4 December 2014; and

.18 DMAC 28 The provision of emergency care for divers in saturation Rev 2 December 2014.

Discussion

6 In all saturation diving situations, there is a risk that an unexpected or unpredictable event will threaten the integrity of the saturation system vessel or location. In spite of the best efforts of the Organization, the risks of fire, collision, or sinking remain. Diving Support Vessels (DSV) fitted with inbuilt saturation diving systems, or barges or any vessels fitted with temporary saturation diving systems, are not exempt from these risks and potential consequences for divers are severe.

7 Hyperbaric Evacuation Systems (HES) have been developed to evacuate saturation divers under pressure from a diving system in an emergency situation to a place where decompression to surface pressure can be carried out safely. It is essential that suitable hyperbaric evacuation systems are provided for saturation divers as, in the event of an emergency, they cannot be brought to surface pressure quickly. Very rapid decompression of saturation divers will almost inevitably lead to the death of the divers.

8 Modern saturation diving systems can house up to 24 divers. In the absence of a suitable HES, there is the possibility that up to 24 people could lose their lives in a single incident. Situations where there may be a need to evacuate saturation divers under pressure from a diving system under threat do not arise often. However, when they do, they are invariably very serious.

9 Saturation divers have lost their lives in the past when they were not provided with suitable means of evacuation and safe decompression from a stricken ship or other floating structure. In 1991, the **Derrick Barge (DB) 29** capsized and sank in the South China Sea during typhoon Fred. Four divers in saturation died when the barge sank. There were no means available to evacuate the divers from saturation, i.e. no suitable HES had been provided.

10 In 2005, the **MSV Samudra Suraksha** collided with the Mumbai High North platform. An immensely destructive fire ensued, which completely destroyed the platform in under two hours. The **Samudra Suraksha** also caught fire and was fully abandoned, except for the six divers who were trapped inside the saturation living chambers. The fire on board the ship made it impossible for the divers to reach the hyperbaric lifeboat. The ship was towed away from the platform and eventually the fire was brought under control. After ten hours, rescuers managed to board the stricken ship and the six divers then underwent successful emergency decompression. The **Samudra Suraksha** sank the following day.

11 In 2011, the **DSV Koosha 1** sank off the coast of Iran in the Arabian Gulf. A cement silo and other equipment reportedly broke free in stormy weather causing the ship to capsize and sink within a very short period of time. There was insufficient time to evacuate the six saturation divers in the living chambers using the HES. All six divers lost their lives.

12 In addition to the above, there have been a number of occasions when saturation divers have been readied for evacuation, but ultimately the emergency situations were brought under control and launching of the divers into the sea was not required.

13 While there are no guarantees for anyone involved in the emergency abandonment of stricken ships, the simple principle is that saturation divers should be given the same chance, as far as is practicable, as any other seagoing personnel to abandon ship safely to await rescue.

14 When the Code of Safety for Diving Systems was first developed, it did a very good job of addressing international offshore diving system safety issues at the time. The co-sponsors are of the view that it is now imperative that the new industry guidelines should stimulate re-evaluation and revision of the IMO diving instruments, as per paragraph 3 of the Preamble to the Code. Failure to ensure that contemporary industry guidelines are fully reflected in the Code may well have adverse implications for human safety. In order to achieve its aims, and successfully protect persons who engage in offshore diving operations, the Code should be updated to ensure it reflects current industry best practice and modern safety management.

15 In addition, the revised Code should include a clear timeframe regarding the relevant implementation dates, in order to be in alignment with the structure of other IMO instruments.

IMO's objectives

16 This proposal is within the scope of IMO's objectives in that it reflects its vision statement for the period of 2018 to 2023 to "focus on the review, development and implementation of and compliance with IMO instruments in its pursuit to proactively identify, analyse and address emerging issues and support Member States in their implementation of the 2030 Agenda for Sustainable Development" (resolution A.1110(30), paragraph 2.2). The proposal also meets the expectations set out in paragraph 3 of the Preamble to the Code of Safety for Diving Systems, 1995, which recognizes "that design technology of diving systems is complex and that the Code should be re-evaluated and revised as necessary. To this end the Organization will periodically review the Code, taking into account both experience and the latest technical developments".

17 The proposal is strictly related to the scope of the Organization's mission statement, which stipulates that "the mission of the International Maritime Organization (IMO), as a United Nations specialized agency, is to promote safe, secure, environmentally sound, efficient and sustainable shipping through cooperation." (resolution A.1110(30), paragraph 1).

18 The proposal contributes to the implementation of the overarching principles of the Organization's Strategic Plan 2018 to 2023 by ensuring regulatory effectiveness (SD 6).

Need

19 Commercial diving is a high-hazard activity, which takes place in an extremely unforgiving environment that is hostile to human life. However, if diving operations are conducted by competent people in line with industry best practices and modern safety management, using suitable and sufficient plant and equipment under safe systems of work, it is an activity which can be undertaken with low risk.

20 The provision of sufficient up-to-date, high-quality and well-maintained diving plant and equipment, including diving and hyperbaric evacuation systems, is a cornerstone of diving safety. The Code and the Guidelines are important instruments to the global offshore diving industry. They provide guidance for the application of a minimum international standard for the design, construction and survey of diving systems on ships and floating structures engaged in diving operations, in order to enhance the safety of divers/personnel.

21 Since the last revisions of the Code and the Guidelines, an ongoing new build and conversion programme has steadily introduced new DSV tonnage into the market. Improvements in available technology, and operational experience gained from the first generation of dedicated diving support vessels, have considerably improved the design of equipment and processes. In particular, there has been major progress in the fields of hyperbaric evacuation and in system automation.

22 IMCA, IOGP and the classification societies have reviewed and amended their guidance and rules to keep pace with the evolution of offshore diving and hyperbaric evacuation systems over the last 27 years.

23 The substantial improvements that have been made in the design and safe operation of dive systems and hyperbaric evacuation systems since the mid-1990s are not reflected in the present iteration of the Code and the Guidelines. Accordingly, there is an urgent need to revise these instruments to ensure that IMO instruments reflect modern standards for the safety of diving systems and hyperbaric evacuation systems.

24 Specific reasons for undertaking an urgent review of the IMO diving instruments include:

.1 the Code has not been revised since 1995 and the Guidelines since 1991, leading to omissions and obsolescence in the current documents in comparison with industry guidance;

.2 certain features of diving systems now considered essential by the industry are not represented in the Code;

.3 there is a need to clarify the extent of the application of the Code to surface diving systems;

.4 new operating and control system technology is not considered in the Code;

.5 accepted processes for the evaluation of single point failure are not specifically mentioned in the Code;

.6 the description of the diving and hyperbaric evacuation systems in the Diving System Safety Certificate does not include sufficient information;

.7 the Code and the Guidelines are separate documents with overlapping aims and would benefit from being structured more effectively to meet IMO strategic objectives;

.8 some of the terminology and definitions used in current offshore diving industry guidance to describe Hyperbaric Evacuation Systems is different to, or not used by, the IMO instruments;

.9 given the special nature of hyperbaric evacuation, the ability to ensure that a place of safety is provided within a reasonable time for evacuees is challenging. While existing Search and Rescue (SAR) arrangements can provide coordination support, specialized facilities are needed to decompress the divers safely and extend life support duration beyond that provided by the HES. Current offshore diving industry guidelines refer to Life Support Packages (LSP) and Hyperbaric Rescue Facilities (HRF) as the main means to achieve these aims. How to handle these important components of Hyperbaric Evacuation Planning are not specifically considered by the IMO diving instruments;

.10 the IMO diving instruments need to include further clarifications on how to handle arrangements for transfer of the divers to a place where decompression to surface pressure can be carried out safely;

.11 the IMO instruments do not reflect important current offshore diving industry guidance against the use of a diving bell for planned hyperbaric evacuation;

.12 the preparation of written project-specific Hyperbaric Evacuation Plans is now considered to be essential good practice; however, the IMO instruments do not reflect this current industry approach; and

.13 subsea habitats are not considered in the IMO diving instruments.

Analysis of the issue

25 The proposal to re-evaluate and revise the Code and the Guidelines is a practicable, feasible and proportionate measure in light of the existence of industry guidance on best practice.

26 An initial comparison of current industry guidance against the Code and the Guidelines has identified a number of areas that will benefit from the proposed revision (see annex 3). In general, the two main areas of focus for review are the application of the instruments and evacuation arrangements for saturation divers.

27 Leading industry associations, classification societies and other stakeholders in the commercial diving industry will provide full participation in carrying out the proposed revision. The proposed revision of these IMO instruments reflects a desire to ensure that they reflect current best practice within this industry sector and that IMO maintains its status and reputation as the authoritative source of up-to-date information.

28 The Organization has authorized the Committee to undertake periodic reviews, taking into account both experience and the latest technical developments. The co-sponsors believe that the revision will not require disproportionate resources, being largely a review of industry guidance to update the IMO instruments rather than development of new instruments. In that context, the co-sponsors argue that the work is practicable, feasible and proportionate.

Analysis of implications

29 Bearing in mind existing industry guidelines, the proposal to amend the Code and the Guidelines will have minimal financial implications for the maritime industry. No additional legislative or administrative burdens are expected as a result of the proposal.

30 Application of the revised Code and Guidelines will harmonize the legal framework and industry guidance relevant to commercial diving systems and hyperbaric evacuation systems, providing clarity and consistency in the implementation of these instruments.

Benefits

31 The revisions of the Code and the Guidelines are intended to identify risks and prevent harm to divers that may arise from differences or inadequacies in the current IMO diving instruments when compared with modern industry best practices.

32 The proposed revision will contribute to the harmonization of international minimum standards for commercial dive systems and hyperbaric evacuation systems and, more specifically, provide a further stimulus to the standardization of equipment and facilities required for the successful recovery of divers from a hyperbaric environment in the event of vessel/floating structure abandonments. The proposed output will, therefore, further progress the goal of achieving a standard of safety for divers equivalent, as far as is practicable, to that provided for other seagoing personnel.

33 The revision of the Code and the Guidelines is expected to harmonize the IMO instruments with current industry best practice and achieve reinstatement of the Code as the minimum standard for diving and hyperbaric evacuation system safety. The proposed revision is also expected to enhance industry awareness of the international nature of commercial diving.

Industry standards

34 The proposed output will reflect current industry best practices as set out in IMCA and IOGP guidance. It will also reflect the contents of classification Diving System rules and standards (see paragraph 5 above).

Output

35 In full compliance with the provisions of resolution A.1111(30), the proposed output is considered in SMART terms (specific, measurable, achievable, realistic, time-bound):

.1 **specific –** the intended output is amendments to the *IMO Code of Safety for Diving Systems* (resolution A.831(19)) and the *Guidelines and Specifications for Hyperbaric Evacuation Systems* (resolution A.692 (17));

.2 **measurable** – the output can be evaluated against current industry best practice and measured against systems and guidance already in place;

.3 **achievable and realistic** – the changes proposed have already been implemented in the wider industry as a result of the DSV building activities since 2000. Therefore, the measures that will be introduced by the proposed review have in effect already been demonstrated to be achievable and realistic by the industry; and

.4 **time-bound** – the proposed output is limited by consideration of harmonization of the IMO instruments with industry guidance. Widespread acceptance of the current guidance within the industry and by Administrations, where applicable, indicates that revision may be anticipated as non-controversial. The co-sponsors, therefore, expect that the process can be completed within a biennium and potentially largely through correspondence. The co-sponsors have provided detailed proposals to SSE 5, contained in the supporting information document SSE 5/INF.9.

Human element

36 The proposal is in line with the goals of the Organization and based on the guidance on human element and principles specified in resolution A.947(23). The completed checklist on human element under MSC-MEPC.7/Circ.1 and resolution A.1111(30) can be found in annex 2.

Urgency

37 Relevant diving industry standards and guidance reviews have been carried out with greater frequency than IMO, leading to extensive omissions and obsolescence in the IMO instruments. There is an urgent need for the Code and the Guidelines to be revised in order to update and align them with current industry best practice, and achieve reinstatement of the Code as the minimum standard for diving and hyperbaric evacuation system safety, and to enhance global safety for diving personnel.

38 The co-sponsors have noted that more than 27 years have passed without an update to the Guidelines and 23 years in the case of the Code, rendering them not fit for current use, and, therefore, without an update, they will not provide the appropriate safety guidance for the equipment in current use.

39 Having established the exceptional circumstances above, there is specific necessity for this output to be included in the 2018-2019 biennial agenda of the Committee.

Action requested of the Committee

40 The Committee is invited to consider the above proposal and justification thereof and decide as appropriate.

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ANNEX 1

CHECKLIST FOR IDENTIFYING ADMINISTRATIVE REQUIREMENTS

This checklist should be used when preparing the analysis of implications required in submissions of proposals for inclusion of outputs. For the purpose of this analysis, the term "administrative requirements" is defined in resolution A.1043(27), i.e. administrative requirements are an obligation arising from future IMO mandatory instruments to provide or retain information or data.

Instructions:

(A) If the answer to any of the questions below is **YES**, the Member State proposing an output should provide supporting details on whether the requirements are likely to involve start-up and/or ongoing costs. The Member State should also give a brief description of the requirement and, if possible, provide recommendations for further work (e.g. would it be possible to combine the activity with an existing requirement?).

(B) If the proposal for the output does not contain such an activity, answer **NR** (Not required).

(C) For any administrative requirement, full consideration should be given to electronic means of fulfilling the requirement in order to alleviate administrative burdens.

Comment: The Code of Safety for Diving Systems and resolution A.692(17) are non-mandatory IMO instruments and so "administrative requirements" as defined in resolution A.1043(27) will not arise from the proposed output.

1 Notification and reporting?	**NR**	Yes ☐ Start-up ☐ Ongoing
Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes). Reporting similar to the work already done		
2 Record-keeping? Keeping statutory documents up to date, e.g. records of accidents, records of cargo, records of inspections, records of education	**NR**	Yes ☐ Start-up ☐ Ongoing
Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes)		
3 Publication and documentation? Producing documents for third parties, e.g. warning signs, registration displays, publication of results of testing	**NR**	Yes ☐ Start-up ☐ Ongoing
Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes)		
4 Permits or applications? Applying for and maintaining permission to operate, e.g. certificates, classification society costs	**NR**	Yes ☐ Start-up ☐ Ongoing
Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes)		
5 Other identified requirements?	**NR**	Yes ☐ Start-up ☐ Ongoing
Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes)		

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ANNEX 2

CHECKLIST FOR CONSIDERING HUMAN ELEMENT ISSUES BY IMO BODIES

<table>
<tr><td colspan="2">Instructions:

If the answer to any of the questions below is:

(A) YES, the preparing body should provide supporting details and/or recommendation for further work.
(B) NO, the preparing body should make proper justification as to why human element issues were not considered.
(C) NA (Not Applicable) the preparing body should make proper justification as to why human element issues were not considered applicable.</td></tr>
<tr><td colspan="2">Subject Being Assessed: (e.g. Resolution, Instrument, Circular being considered)

Resolution A.1087(28)</td></tr>
<tr><td colspan="2">Responsible Body: (e.g. Committee, Sub-committee, Working Group, Correspondence Group, Member State)</td></tr>
<tr><td>1 Was the human element considered during development on amendment process related to this subject?
2.1.1 of the existing Code places the human element at the centre of the design concept. This will be maintained.</td><td>☒ Yes ☐ No ☐ NA</td></tr>
<tr><td>2 Has input from seafarers or their proxies been solicited?
In this context seafarers are considered divers and operating personnel. IMCA as co-sponsor is also the operators' proxy.</td><td>☒ Yes ☐ No ☐ NA</td></tr>
<tr><td>3 Are the solutions proposed for the subject in agreement with existing instruments? (Identify instruments considered in comments section)
SOLAS II-2/D/13 cannot be met for divers using normal life-saving equipment. The proposal clarifies that the Code provides an acceptable equivalent standard for diver evacuation.</td><td>☒ Yes ☐ No ☐ NA</td></tr>
<tr><td>4 Have human element solutions been made as an alternative and/or in conjunction with technical solutions?
2.1.1 of the existing Code considers both human elements and technical solutions together as the basis for design.</td><td>☒ Yes ☐ No ☐ NA</td></tr>
<tr><td>5 Has human element guidance on the application and/or implementation of the proposed solution been provided for the following:
The proposed amendments to the IMO Diving Instruments do not introduce new human element issues relative to the current instruments.</td><td>☐ Yes ☐ No ☒ NA</td></tr>
<tr><td>• Administrations?</td><td>☐ Yes ☐ No ☒ NA</td></tr>
<tr><td>• Ship owners/managers?</td><td>☐ Yes ☐ No ☒ NA</td></tr>
<tr><td>• Seafarers?</td><td>☐ Yes ☐ No ☒ NA</td></tr>
<tr><td>• Surveyors?</td><td>☐ Yes ☐ No ☒ NA</td></tr>
</table>

6 At some point, before final adoption, has the solution been reviewed or considered by a relevant IMO body with relevant human element expertise? *The proposed amendments do not introduce new human element issues relative to the current instruments.*	☐ Yes ☐ No ☒ NA
7 Does the solution address safeguards to avoid single person errors? *This is the basis for design requirements. The new text will further clarify the language in this regard.*	☒ Yes ☐ No ☐ NA
8 Does the solution address safeguards to avoid organizational errors? *The proposed amendments do not introduce new human element issues relative to the current instruments.*	☐ Yes ☐ No ☒ NA
9 If the proposal is to be directed at seafarers, is the information in a form that can be presented to and is easily understood by the seafarer? *The proposal is not directed at seafarers. In this context seafarers are considered divers and operating personnel. IMCA as co-sponsor is also the operators' proxy.*	☐ Yes ☐ No ☒ NA
10 Have human element experts been consulted in the development of the solution? *The proposed amendments to the IMO Diving Instruments were made available to the Vice-Chair of the IOGP Human Factors Subcommittee. The proposed amendments do not introduce new human element issues relative to the current Code.*	☒ Yes ☐ No ☐ NA
11 HUMAN ELEMENT: Has the proposal been assessed against each of the factors below?	
CREWING. The number of qualified personnel required and available to safely operate, maintain, support and provide training for system. *The intention of the update aligns the Code with current best practice as such qualified personnel are already operating. Further IMCA as co-sponsor provides assistance to the industry in competence development.*	☒ Yes ☐ No ☐ NA
PERSONNEL. The necessary knowledge, skills, abilities, and experience levels that are needed to properly perform job tasks. *The proposed amendments to the Code do not increase competence requirements.*	☒ Yes ☐ No ☐ NA
TRAINING. The process and tools by which personnel acquire or improve the necessary knowledge, skills, and abilities to achieve desired job/task performance. *IMCA provides guidance and support to training. No new training requirements are envisaged based upon the update.*	☒ Yes ☐ No ☐ NA
OCCUPATIONAL HEALTH AND SAFETY. The management systems, programmes, procedures, policies, training, documentation, equipment, etc. to properly manage risks. *The update of the Code aims to clarify and better manage the risks related to hyperbaric evacuation.*	☒ Yes ☐ No ☐ NA

WORKING ENVIRONMENT. Conditions that are necessary to sustain the safety, health, and comfort of those on working board, such as noise, vibration, lighting, climate, and other factors that affect crew endurance, fatigue, alertness and morale. *No impacts on working environment are envisaged.*	☒ Yes ☐ No ☐ NA
HUMAN SURVIVABILITY. System features that reduce the risk of illness, injury, or death in a catastrophic event such as fire, explosion, spill, collision, flooding, or intentional attack. The assessment should consider desired human performance in emergency situations for detection, response, evacuation, survival and rescue and the interface with emergency procedures, systems, facilities and equipment. *The update to the Code focuses on improving coverage on this aspect and ensuring a suitable evacuation system is present*.	☒ Yes ☐ No ☐ NA
HUMAN FACTORS ENGINEERING. Human-system interface to be consistent with the physical, cognitive, and sensory abilities of the user population. *The details of this aspect are covered by class rules. Explicit requirements beyond those already covered in the Code are not envisaged to be added.*	☒ Yes ☐ No ☐ NA
Comments: (1) Justification if answers are NO or Not Applicable. (2) Recommendations for additional human element assessment needed. (3) Key risk management strategies employed. (4) Other comments. (5) Supporting documentation.	

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ANNEX 3

COMPARISON OF CURRENT INDUSTRY GUIDELINES AGAINST RESOLUTION A.831(19) AND RESOLUTION A.692(17)

Table 1: Code of Safety for Diving Systems, 1995 (resolution A.831(19) – Gap analysis

Item number	Document reference	Document wording	Comment
1	General	New text proposal	Recognizing that certain safety standards supplementing those of the 1974 SOLAS Convention are required in order to meet the means of escape requirements for divers living in deck decompression chambers under conditions of hyperbaric saturation.
2	General	New text proposal	That recovery of divers maintained in a state of hyperbaric saturation within hyperbaric evacuation units requires special consideration with respect to the units' place of safety under the International Convention on Maritime Search and Rescue, 1979.
3	Preamble, paragraph 1	New text proposal	The Code has been developed to provide an international standard of safety for diving systems of new construction, the application of which will facilitate operation of such ships and result in a level of safety for the ships and their personnel equivalent to that required by the International Convention for the Safety at Life of Sea, 1974, as amended.
4	Preamble	New text proposal	Can consideration be given to allowing the flagging of the dive system as a separate object on the mobilization certificate (to avoid flag change on mobilization)?
5	Preamble, paragraph 3	To this end the Organization will periodically review the Code, taking into account both experience and the latest technical developments.	Could the text be changed (see example) to indicate review periodicity for the Code by the Organization? To this end the Organization will undertake to review the Code with a frequency that permits it to stay aligned with current industry practices and the latest technical developments.

Item number	Document reference	Document wording	Comment
6	Preamble, paragraph 5	The Code is not intended to prohibit the use of an existing system simply because its design, construction and equipment does not conform to the requirements of this Code. Many existing diving systems have operated successfully and safely for extended periods of time and their operating history should be considered in evaluating their suitability.	In its current form it allows both exemption and equivalence. That a vessel has not yet caught on fire and sunk should not be the basis for accepting no evacuation. In practice, this point has allowed paragraph 1.4 (Exemptions) to be bypassed. Text to consider operational history may be added to paragraph 1.4.
7	Chapter 1, section 1.4	An administration may exempt any system which embodies features of a novel kind from any of the provisions of the Code, so that the research and development into such novel features is not restricted by the Code. Any such system should, however comply with safety requirements which, in the opinion of that administration, are adequate for the operation intended and are such as to ensure the overall safety of the system. The administration allowing any such exemptions should list the exemptions on the certificate.	In its current form the text in the document allows both exemption and equivalence. The fact that a vessel has not yet caught fire and sunk should not be the basis for allowing it to operate without providing hyperbaric evacuation facilities for divers living in deck decompression chambers under conditions of hyperbaric saturation. In practice, this point has allowed the intent of paragraph 1.4 (Exemptions) (chapter 1) to be bypassed. Text to consider operational history may be added to paragraph 1.4.
8	General	New text proposal	Recognizing that certain safety standards supplementing those of the 1974 SOLAS Convention are required in order to meet the means of escape requirements for divers living in deck decompression chambers under conditions of hyperbaric saturation.
9	Preamble, paragraph 6	The Code does not include requirements for diving operations or the procedures for control of diving operations.	Operational requirements are normally controlled by the applicable coastal State. Where a dive system certified in accordance with this Code operates in areas without coastal State requirements it shall be operated in accordance with recognized industry practice.

Item number	Document reference	Document wording	Comment
10	Preamble, paragraph 7	The Code has been developed for fixed systems. However any temporary diving systems which comply with the provisions of the Code may be certified in accordance with the Code.	Should the Code be expanded to cover fixed and temporary dive systems given the number of portable deck systems there are in use worldwide?
11	Preamble, paragraph 7	The Code has been developed for fixed systems. However any temporary diving systems which comply with the provisions of the Code may be certified in accordance with the Code.	Should the classification of temporary system be changed to portable/mobile/modular/surface diving system or given a definition other than the one currently used by IMO?
12	Preamble, paragraph 7	The Code has been developed for fixed systems. However any temporary diving systems which comply with the provisions of the Code may be certified in accordance with the Code.	Fixed systems could also be surface orientated (air) diving systems and surface supplied mixed gas. However, these are not covered within the Code.
13		Definitions	(Resolution A.692(17)) compression chamber means a pressure vessel for human occupancy with means of controlling the differential pressure between the inside and outside of the chamber. (Resolution A.831(19)) surface compression chamber means a pressure vessel for human occupancy with means of controlling the pressure within the chamber. (IMCA D014) DDC Deck Decompression Chamber. A pressure vessel for human occupancy which does not go under water and may be used as a living chamber during saturation diving, diver decompression or treatment of decompression illness. Also called a compression chamber, recompression chamber, deck chamber or surface compression chamber.

Item number	Document reference	Document wording	Comment
14		Definitions	(IMCA D052) Fixed. This refers to diving equipment which is installed on a vessel or installation with the intention of remaining in situ long term. It will often be built-in below decks or otherwise be installed in such a way that would make it difficult to remove. (IMCA D014) Fixed diving system. A diving system installed permanently on a vessel or fixed/floating structure. (IMO 831) Fixed system. Means a diving system installed permanently on ships or floating structures.
15		Definitions	(IMCA D014) HES Hyperbaric Evacuation System. This term covers the whole system set up to provide hyperbaric evacuation. It includes the planning, procedures, actual means of evacuation, reception facility, contingency plans, possible safe havens and anything else involved in a successful hyperbaric evacuation. (Resolution A.831(19)) Evacuation system means a system whereby divers under pressure can be safely evacuated from a ship or floating structure to a position where decompression can be carried out. (Resolution A.692(17)) HES Hyperbaric Evacuation System IMO…means the whole plant and equipment necessary for the evacuation of divers in saturation from a surface compression chamber to a place where decompression can be carried out. The main components of a hyperbaric evacuation system include the hyperbaric evacuation unit, handling system and life support system.
16		Definitions	(IMCA) HRU Hyperbaric Rescue Unit …The term used for the unit used to evacuate the divers away from the saturation system. This may be an HRC or an SPHL or some other pressure vessel. (Resolution A.692(17)) HEU Hyperbaric Evacuation Unit… means a unit whereby divers under pressure can be safely evacuated from a ship or floating structure to a place where decompression can be carried out.

Item number	**Document reference**	**Document wording**	**Comment**
17		Definitions	(IMCA D014) HRC Hyperbaric Rescue Chamber…Normally a pressure chamber adapted to act as a means of hyperbaric evacuation but not fitted inside a conventional lifeboat hull.
18		Definitions	(IMCA D014) HRF Hyperbaric Reception Facility…Normally a shore based facility which is capable of accepting a HRC or SPHL and mating it to another chamber such that the evacuated occupants can be transferred in to that chamber and safely decompressed.
19		Definitions	(IMCA D024) HRU or bell launch and recovery system (Resolution A.692(17)) Handling system… means the plant and equipment necessary for raising, lowering and transporting the hyperbaric evacuation unit from the surface to the sea or on to the support vessel as the case may be. (Resolution A.831(19)) Handling system means the plant and equipment necessary for raising lowering and transporting the diving bell between the work location and the surface compression chamber.
20		Definitions	(IMCA) LSP Life Support Package…A collection of equipment and supplies kept in a suitable location such that when the HRC or SPHL arrives at the safe haven it can carry out (or complete) decompression using the LSP components externally to maintain the environment, power, gas mixtures, heating and cooling. This system will take over from or supplement any such equipment or services already mounted on the HRU.

Item number	Document reference	Document wording	Comment
21		Definitions	(IMCA D052) Mobile also known as Portable… This refers to diving equipment which is installed on a vessel or installation on a temporary basis, although this may be for a reasonably long period of time. It will often be situated on an open deck and is installed in such a way that would make it relatively easy to remove to a different location or vessel. It can also refer to such things as LSPs and HRFs set up onshore or at a different location but capable of being moved around. (Resolution A.831(19)) Temporary… Means a diving system installed on ships or floating structures for a period not exceeding one calendar year.
22		Definitions	PMS Planned Maintenance System…A management control system which lays out the required frequency and extent of routine maintenance required in order to keep equipment operating at peak efficiency. It normally requires detailed recording of the actions carried out.
23		Definitions	Reception Site…A place where the evacuated divers are in safe environmental conditions and transfer can be made to a decompression facility or where decompression can be carried out (or completed) in the HRC or SPHL using external life support facilities (LSP).
24		Definitions	Safe Haven…A place where the HRU can be taken initially as part of the evacuation plan. It may also be a reception site or it may be an intermediate stop on the way to a reception site.
25		Definitions	SPHL Self-propelled Hyperbaric Lifeboat…Normally a custom designed unit of a pressure vessel contained within a conventional lifeboat hull having equipment to provide suitable life support to the evacuated divers for an extended period. The unit normally has motive power and a small crew at atmospheric pressure to navigate and steer the unit as well as monitoring the divers inside the pressure vessel.
26		Definitions	Clarification required, separate Surface and Saturation noting.

Item number	Document reference	Document wording	Comment
27		Definitions	The annex to resolution A.831(19) made amendments to the original Code changing the following: 1.3.8 "Diving system" means the whole plant and equipment necessary for the conduct of diving operations using transfer under pressure techniques. to 1.3.8 "Diving system" means the whole plant and equipment necessary for the conduct of diving operations without providing guidance of applicability and this has led to significant variations of application. Note our interpretation is included in E402 along with IMO text.
28		Definitions	Class certification may identify the Current Recommended Operational Depth of the system. This should be covered by the Code. Maximum system operating depth may differ from the maximum pressure for which the system was designed to withstand due to omitted hydrotest down rating.
29	Paragraph 1.3.8	*Diving system* means the whole plant and equipment necessary for the conduct of diving operations	Clarification required, separate Surface and Saturation noting.

Item number	**Document reference**	**Document wording**	**Comment**
30	Paragraph 1.3.8	"Diving system" means the whole plant and equipment necessary for the conduct of diving operations using transfer under pressure techniques. "Diving system" means the whole plant and equipment necessary for the conduct of diving operations	The annex to resolution A.831(19) made amendments to the original Code changing: 1.3.8 "Diving system" means the whole plant and equipment necessary for the conduct of diving operations using transfer under pressure techniques. to 1.3.8 "Diving system" means the whole plant and equipment necessary for the conduct of diving operations without providing guidance of applicability and this has led to significant variations of application. Note our interpretation is included in E402 along with IMO text.
31	Definitions 1.3.16 Maximum operating depth	"Maximum operating depth" of the diving system is the depth, in metres or feet, of seawater or equivalent to the maximum pressure for which the diving system is designed to operate.	Class certification may identify the Current Recommended Operational Depth of the system. This should be covered within the Code. Maximum system operating depth may differ from the maximum pressure that the system was designed to withstand due to omitted hydrotest down rating.
32	Section 1.4	"may exempt any system built prior to this Code with a proven service history or any"	This maintains the requirement to comply with safety requirements (later in paragraph) and for exemptions to be listed on the certificate.
33	Surveys and certification, paragraph 1.6.3	Surveys and inspections should be carried out by officers of the Administration. The Administration may, however, entrust the surveys either to surveyors nominated for the purpose or to organizations recognized by it. In every case the Administration concerned should fully guarantee the completeness and efficiency of the surveys.	A checklist for the surveyor to follow could be included as part of the Code to assist and ensure the surveys are carried out and recorded correctly.
34	Section 1.6	Surveys and certification	New text proposal to cover survey after mobilization for temporary systems.

Item number	Document reference	Document wording	Comment
35	Section 1.6	Surveys and certification	New text proposals How to handle POB & CEC for vessel HES to be recorded on CEC in Additional life-saving All divers shall be considered as persons on board (POB) and provided with all required LSA in accordance with SOLAS chapter III. Unless all the divers are counted as POB, the Maritime Administration and the Owners shall agree to operational limitations that all or some of the SAT divers to be counted as extra crew outside the POB. In this context, saturation divers at a shallower depth than 7 msw (meter seawater) equivalent pressure are considered as POB. Divers in saturation at pressures equivalent to depths deeper than 7 msw shall be provided with accommodation and life-saving appliances in compliance with the Code of Safety for Diving Systems, 1995 (resolution A.831(19))." Where HLBs are employed as the means of hyperbaric escape, two escape plans are to be prepared. One for divers in saturation which in addition to considering the evacuation of divers shall also cover the use of the HLB for non-divers who must also use the HLB to evacuate.

Item number	Document reference	Document wording	Comment
36	Control, paragraph 1.7.1	Every dive system, issued with a Certificate under section 1.6, is subject, whilst under the control of an Administration other than that which has issued the certificate, to control by officers duly authorized by that Administration for verification that the Certificate is valid. Such Certificates should be accepted unless there are clear grounds for believing that the condition of the diving system or its equipment does not correspond substantially with the particulars of that Certificate. In which case, the officer carrying out the control may take such steps as will allow the system to operate on a temporary basis without undue risk to the divers and personnel on board. In the event of this control giving rise to intervention of any kind, the officer carrying out the control should inform the Administration or the consul or, in his absence the nearest diplomatic representative of the state in which the ship or floating structure is registered, in writing forthwith of all circumstances on the basis of which intervention was deemed to be necessary.	Clarify text.

Item number	Document reference	Document wording	Comment
37	General, paragraph 2.1.1	As far as reasonable and practicable, a diving system should be designed to minimize human error and constructed so that the failure of any single component (determined if necessary, by an appropriate risk assessment) should not lead to a dangerous situation.	Both NORSOK U-100 and IMCA D024 identify FMEA/FMECA as a suitable means of carrying out a systematic assessment of the diving system and its sub-systems. Furthermore OGP 411 states "Saturation systems must be supported with a current Failure Mode Effect Analysis (FMEA)". Additional text"… determined if necessary, by an appropriate risk assessment) should not lead to a dangerous situation. Failure of both static & dynamic components are to be considered."
38	General, paragraph 2.1.5	In the design of pressure vessels, including accessories such as doors, hinges, closing mechanisms and penetrators.	In this instance the pressure vessel should be called a pressure vessel for human occupation or a surface compression chamber.
39	General, paragraph 2.1.7	A diving system should include the control equipment necessary for safe performance of diving operations.	Consideration should be given to PLC and automated systems and a standard to which these should be designed and manufactured. This is a requirement of OGP Report 468 and is covered with IEC 61508 global standard.
40	Surface compression chambers, paragraph 2.2.2	Where a surface compression chamber is to be used in circumstances which a person is intended to remain under pressure for a continuous period of more than 12 hours.	Can this be designated as a saturation system? Specify a minimum chamber diameter, a bunk for each occupant and a minimum bunk size. Additional text requirements for standby chambers to be considered?
41	Paragraph 2.2.3	The living compartment and other compartments intended to be used for decompression should have a lock through which provisions, medicine and equipment may be passed into the chamber while its occupants remain under pressure.	Additional text to specify the same for an SDC in case of decompression in bell after recovery to another vessel?

Item number	Document reference	Document wording	Comment
42	Paragraph 2.2.4	Locks should be designed to prevent accidental opening under pressure and, where necessary, interlocks should be provided for this purpose.	New text proposal Interlocks are mandatory. Precautions to prevent pressurisation when locks not correctly closed is also stipulated.
43	Paragraph 2.2.5	Each pressure compartment should have viewports to allow observation of all occupants from the outside.	Update text to include provision of CCTV cameras.
44	Paragraph 2.2.6	Where the chamber is intended to be occupied for more than 12 hours toilet facilities should be provided.	New text proposal to include washing facilities/showers/sinks etc. Requirements for standby chambers to be considered.
45	Surface compression chambers, paragraph 2.2.7	The diving system should be capable of allowing the safe transfer of a person under pressure from the diving bell to the surface compression chamber (and vice versa).	New text proposal Include the requirement for isolation of power to clamping devices when bell transfer trunk under pressure. Also transfer means should have suitable interlocks fitted to prevent the diving bell being disconnected during transfer and while the transfer lock is under pressure.
46	Diving bells, section 2.3	"A diving bell should:"	Gas supply to divers not specified. Two supplies to each diver. Diver gas supplies not to interfere with each other in the event of loss.
47	Diving bells, section 2.3	"A diving bell should:"	Bell on board gas supplies for divers and bellman not specified. Separate bell on board gas supplies for divers and bellman not specified.
48	Diving bells, section 2.3	"A diving bell should:"	The Code makes no reference to allowing for the provision of a standoff frame on the bell to allow divers entry/exit if the bell is resting on the seabed.
49	Diving bells, section 2.3	"A diving bell should:"	The Code makes no reference to the provision of a medical lock on the bell which can be used to lock in medical supplies and equipment in the event of decompression in the bell.

Item number	**Document reference**	**Document wording**	**Comment**
50	Diving bells, section 2.3	"A diving bell should:"	The Code makes no reference to the provision of external lights on the bell.
51	Diving bells, section 2.3	"A diving bell should:"	The Code makes no reference to the provision of a strobe lights on the bell.
52	Diving bells, section 2.3	"A diving bell should:"	New text proposal To include the provision or possibility of ROV intervention in the event of a lost bell failure of the bell handling system.
53	Diving bells, paragraph 2.3.1.4	The diving bell should be fitted with a manifold at a suitable point close to the main lifting attachment which should include connections for the following services: ¾" NPT (female) for hot water ½" NPT (female) for breathing mix)	New text proposal Should be identified as an emergency manifold.
54	Diving bells, paragraph 2.3.1.4		New text proposal. Include communications, power, depth and gas analysis fittings as per NORSOK U-100?
55	Pipes, valves, fittings and hoses, paragraph 2.5.4	All pipe penetrations on chambers should be fitted with two shut off devices as close to the penetration as practicable. Where appropriate one device should be a non-return valve.	New text proposal Should specify valves either side of the chamber shell plate i.e. skin valves. This should be clearer such as "should be fitted with a shut off device either side of the chamber hull". Also "where appropriate" needs to be clearly defined. Flow fuses on chamber outlet pipework except analysis.

Item number	Document reference	Document wording	Comment
56	Pipes, valves, fittings and hoses, paragraph 2.5.9	Flexible hoses, except for umbilicals, should be reduced to a minimum.	Clarify. Does this refer to the number of hoses or the length of the hoses?
57	Pipes, valves, fittings and hoses, paragraph 2.5.10	Hoses for oxygen should as far as practicable, be of fire retardant construction. Oxygen systems with pressure greater than 1.72 bar must have slow opening shut off valves except pressure boundary shut off valves.	New text proposal Specify O_2 cleaning to an accepted standard. Consider rewording to "only hoses compatible with oxygen should be used and they should be kept as short as possible". Consider adding "where the oxygen or mix containing over 25% oxygen is regulated down to below 15 bar (225 psi) then quarter turn valves may be used as emergency shut off valves provided they are clearly marked as such and lightly secured in the open position during normal operations". Also consider minimizing the internal volume of components to reduce the oxygen they contain…maybe ½" maximum.
58	Breathing gas supply, storage and temperature control, paragraphs 2.6.1 and 2.6.2	Each surface compression and diving bell should be fitted with adequate equipment for supplying and maintaining the appropriate breathing mixtures to its occupants	New text proposal. CO_2 scrubbing and back up to be specified.

Item number	Document reference	Document wording	Comment
59	Breathing gas supply, storage and temperature control, paragraph 2.6.4	Oxygen bottles should be stored in a well-ventilated area.	New text proposal. Should it be specified that any gas with an oxygen percentage greater than 25% should not be stored below decks and should be protected with a deluge? Consideration for fire deluge and suppression for gas storage especially O_2 or mixes with an O_2 content of 25% and above.
60	Paragraph 2.7.7	Handling systems and mating devices should enable easy and firm connection or disconnection of a diving bell to a surface compression chamber even under conditions where the support ship or floating structure is rolling, pitching or listing to predetermined degrees.	New text proposal. Stability requirements added.
61	Paragraph 2.9.1	All materials and equipment used in connection with the diving system should be, as far as is reasonably practicable, of fire-retardant type in order to minimize the risk of fire and sources of ignition.	Additional Insulation for chambers and associated ECU systems may be fire retardant/non-toxic (2010 FTP Code and SOLAS reference).
62	Paragraph 2.9.3	Interior spaces containing diving equipment such as surface compression chambers, diving bells, gas storage, compressors and control stands should be covered with an automatic fire detection and alarm system and a suitable fixed fire-extinguishing system.	Three new required performance factors to be considered: DP II; Flooding and location of critical equipment; Minimum damaged stability criteria (lifeboats LARS).

Item number	Document reference	Document wording	Comment
63	Paragraph 2.9.6	Each compartment in a surface compression chamber should have a suitable means of extinguishing a fire in the interior which would provide rapid and efficient distribution of the extinguishing agent to any part of the chamber.	New text proposal. Each compartment in a surface compression chamber should be covered with an automatic fire detection and alarm system and a suitable water based means of extinguishing a fire in the interior which would provide rapid and efficient distribution of the extinguishing agent to any part of the chamber. Activation of this system should be available both internally and externally.
64	Electrical Systems, paragraph 2.10.13	The alternative source of electrical power should be located outside the machinery casings to ensure its functioning in the event of a fire or other casualty causing failure to the main electrical installation.	It should be ensured that if a standalone deck generator is providing the diving system alternative electrical supply then the generator should be suitable for marine conditions.
65	Control systems, paragraph 2.11.1	The diving system should be so arranged as to ensure that centralized control of the safe operation of the system can be maintained under all weather conditions.	New text proposal. Additional text should be added to clarify the separate control areas of a diving system i.e. Sat control and Dive control.
66	Control systems, paragraph 2.11.2	As a minimum facilities should be provided at the central control position to monitor the values of the following parameters for each occupied compartment.	New text proposal. Humidity and CO_2 levels should be monitored continuously in the chamber compartments.
67	Control Systems, paragraph 2.11.3	Provisions should be made within the bell for an independent means of monitoring oxygen and carbon monoxide levels.	New text proposal Consideration to the addition of text specifying the need for constant hydrocarbon monitoring inside the bell should be given.

Item number	**Document reference**	**Document wording**	**Comment**
68	Paragraph 2.12..1	The communication system should be arranged for direct two-way communication between the control stand and	New text proposal. Other control positions of equipment that may pose a risk to the Diving operation. Any back up control positions should have the same communication capability as the main station.
69	Chapter 3	Develop this chapter to include all of the overall requirements of resolution A.692(17).	New text proposal.
70	Evacuation, section 3.1	An evacuation system should be provided having sufficient capacity to evacuate all divers under pressure, in the event of the ship having to be abandoned and should be in accordance with the provision of this Code.	Information from the *Guidelines and Specifications for Hyperbaric Evacuation Systems* (resolution A.692(17)) should be included (when updated).
71	Time to evacuation		New text proposal. To date and based upon earlier vessel requirements the "target" for evacuation was based upon Cargo ship requirements (15 m) with a bit of stretch, however, IMO has done significant work regarding how to handle longer time frames for evacuation primarily with passenger vessels and the required stability and fire levels. Passenger vessels now have allowable evacuation times of up to 80 min, based upon fire safety and stability. There is no consideration of recovery speed allowable difference in split level, blow down and vent. It is our view that the approach to passenger ships could be a suitable alternative where stages are identified and tested leading to an overall evacuation time. (Note letters would be changed for a dive evacuation but it is a good graphical representation).

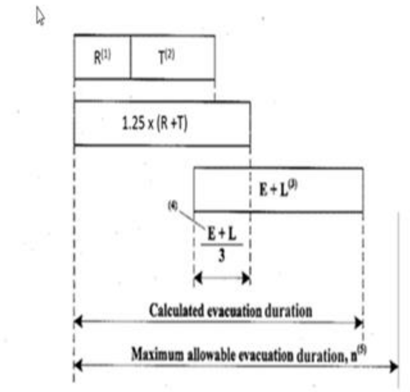
Item number	Document reference	Document wording	Comment
72	5.3 Performance standard	5.3 Performance standard (2) complies with SOLAS regulation III/21.1.3.  	Additional comment
73	Contingency plan		Additional text proposal. Current text may be improved, however, in our view the key is to what level an IMO document can capture this and the main focus should be procedural. At NB we cannot approve a contingency plan of a vessel without a job yet. Similarly in service inspections are not very suitable to follow up this topic. The approach in our view is therefore to audit perhaps via the safety management system that shelf state approval is happening. Where there is no shelf state i.e. transit voyages, then no divers should remain in saturation, or a new contingency plan is to be approved by the administration. Mating trials can be checked and certified as can LSP performance and become standardized documents in the Code.

Table 2: Guidelines and specifications for hyperbaric evacuation systems (resolution A.692(17) – Gap analysis)

Item number	Document reference	Document wording	Comment
1	Preamble		Consider moving all of the requirements of the document to chapter 3 of the Code of Safety for Diving Systems, 1995.
2	Preamble	The current extensive use of saturation diving techniques in the offshore industry during the installation, subsequent maintenance and decommissioning of subsea facilities for the recovery of hydrocarbons from the sea-bed	Additional text proposal Consider adding additional text "and renewable energy installation".
3	Preamble	Being of the opinion that hyperbaric evacuation systems are of value in certain circumstances for the rescue of divers involved in saturation diving operations where support ships may have to be abandoned.	Additional text proposal Reword to: - "being of the opinion "that hyperbaric evacuation systems are essential for the rescue of divers involved in saturation" or other wording to reflect the unconditional need for abandonment facilities for divers in saturation. Also change the wording of support ships to floating unit.
4	Hyperbaric evacuation methods	Consideration may have to be given to the provision of separate evacuation facilities for divers in saturation at significantly different depths.	New text proposal The abandonment system should be rated to the maximum depth of the dive system.
5	Preamble, Introduction	These guidelines and specifications for hyperbaric evacuation systems have been developed with a view of promoting the safety of all divers in saturation and achieving a standard of safety for divers which corresponds, so far as practicable, to that provided for other seagoing personnel, and which will satisfy chapter 3 of the Code of Safety for Diving Systems (resolution A.536(13)), as amended by resolution A.583(14)).	New text proposal Resolution A.583(14) has now been superseded by resolution A.831(19) and should be updated throughout this document.

Item number	Document reference	Document wording	Comment
6	Preamble Hyperbaric Evacuation Methods, paragraph 2.4	Transfer of the diving bell to another facility.	New text proposal Reconsideration given to the suitability of using a diving bell as a planned means of evacuating divers from a saturation system. A diving bell would not have the required duration of life support.
7	Preamble, Hyperbaric evacuation methods, paragraph 2.6	Negatively buoyant unit with inherent reserves of buoyancy, stability and life support capable of returning to the surface to await independent recovery.	New text proposal Define negatively buoyant unit for hyperbaric evacuation.
8	Contingency planning	A potentially dangerous situation can arise if a floating unit, from which saturation diving operations are being carried out, has to be abandoned with a diving team under pressure. While this hazard should be reduced by preplanning, under extreme conditions consideration may have to be given to hyperbaric evacuation of the divers. The hyperbaric evacuation arrangements should be studied prior to the commencement of the dive operation and suitable written contingency plans made. Where in the event of diver evacuation, decompression would take place in another surface compression chamber the compatibility of the mating devices should be considered.	New text proposal This paragraph needs to be modified to reflect current industry practice/guidance.
9	Contingency planning, paragraph 3.2	Once the hyperbaric evacuation unit has been launched….	New text proposal This paragraph needs to be modified or incorporated into a new paragraph that reflects current industry approach.

Item number	Document reference	Document wording	Comment
10	Contingency planning, paragraph 3.3	In preparing the contingency plans ...	New text proposal Consider inserting references to industry guidance?
11	Preamble, Training and evacuation drills	Periodic training exercises should be carried out	This paragraph should be retained.
12		Definitions	New text proposal The definitions listed need to be brought in line with current industry terms and have additional terms added.
13	Surveys	Each hyperbaric evacuation system should be subject to: An initial survey before being put into service.	New text proposal A definition in respect to portable/temporary systems needs to be added.
14	Surveys	Each hyperbaric evacuation system should be subject to: An initial survey before being put into service.	Additional text proposal A checklist for the surveyor to follow could be included as part of the Code to assist and ensure the surveys are carried out and recorded correctly.
15	Design and construction, paragraph 5.2	The hyperbaric evacuation unit should be capable of being recovered by a single point lifting arrangement ...surface swimmer	New text proposal This should be updated to reflect current industry guidance.
16	Design and construction, paragraph 5.2	In general piping penetrations, through the chamber should have isolation valves on both side.	New text proposal This is a necessary requirement.
17	Design and construction, paragraph 5.2	Materials used in the construction of hyperbaric evacuation systems should be suitable for their intended use.	New text proposal This should be updated to reflect current industry guidance.

Item number	**Document reference**	**Document wording**	**Comment**
18	Design and construction, paragraph 5.7	The hyperbaric evacuation system should be provided with the necessary control equipment to secure its safe operation and the wellbeing of the divers	New text proposal This paragraph should be updated to reflect current industry guidance.
19	Design and construction, paragraph 5.9	Hyperbaric evacuation systems should not be located in zone 0 or zone 1	New text proposal Wording should specify hyperbaric evacuation systems should be located in zone 2 only.
20	Hyperbaric evacuation units, paragraph 6.1	The hyperbaric evacuation unit is to be designed for the rescue of all divers in the diving system at the maximum operating depth. The compression chamber should provide a suitable environment and adequate facilities.	New text proposal This paragraph should be updated to reflect current industry guidance.
21	Hyperbaric evacuation units, paragraph 6.1	The hyperbaric evacuation unit is to be designed for the rescue of all divers in the diving system at the maximum operating depth. The compression chamber should provide a suitable environment and adequate facilities.	Additional text proposal Seat belts for all occupants including (where required) surface crew.
22	Hyperbaric evacuation units, paragraph 6.1	The hyperbaric evacuation unit is to be designed for the rescue of all divers in the diving system at the maximum operating depth. The compression chamber should provide a suitable environment and adequate facilities.	Text alteration proposal Delete the sentence, "where the chamber is intended to be occupied for more than 12 hours."

Item number	Document reference	Document wording	Comment
23	Hyperbaric evacuation units, paragraph 6.2	The means provided for access into the compression chamber should be such as to allow safe access to or from the surface compression chambers. Interlocks should be provided to prevent the inadvertent release of the hyperbaric evacuation unit from the surface compression chamber while the access trunking is pressurized. The mating flange should be adequately protected from damage at all times including during the launch and recovery stages.	New text proposal An interlock should always be necessary as part of the clamping arrangement and should be designed to prevent accidental opening under pressure as well as pressurisation of the lock when not fully closed. The clamp and interlock is not only there to prevent disconnection.
24	Hyperbaric evacuation units, paragraph 6.6	Where it is intended to carry out decompression of the divers after hyperbaric evacuation in another surface compression chamber, then consideration must be given to the suitability of the mating arrangements on the surface compression chamber. Where necessary a suitable adaptor and clamping arrangements should be provided.	Text alteration proposal Change the last line to " …where necessary a suitable adaptor and clamping arrangement protected from accidental opening when under pressure by an interlocking device."
25	Hyperbaric evacuation units, paragraph 6.7	A medical lock should be provided and be so designed to prevent accidental opening while the compression chamber is pressurized. Where necessary, interlock arrangements should be provided for this purpose.	New text proposal Locks should be designed to prevent accidental opening under pressure as well as pressurisation of the lock when not fully closed. An interlock is always necessary.
26	Stability and buoyancy, paragraph 7.1	Consideration should be given to the adverse effects of righting movements on the divers	Additional text The words," …and SPHL support crew" should be added.

Item number	Document reference	Document wording	Comment
27	Stability and buoyancy, paragraph 7.3	Hyperbaric evacuation units designed to float should have sufficient reserves of buoyancy to enable the necessary rescue crew and equipment to be carried.	Additional text Clarification required in respect of SPHLs and HRCs?
28	Stability and buoyancy, paragraph 7.4	Where hyperbaric evacuation units are designed to be placed aboard a rescue vessel attachment points should be provided on the unit to enable it to be secured on the deck.	Additional text Clarification required in respect of SPHLs and HRCs?
29	Stability and buoyancy, paragraph 7.4	Hyperbaric evacuation units on ships required to be provided with fire protected lifeboats should be provided with a similar degree of protection.	New text proposal This paragraph should stipulate fire protection as mandatory.
30	Life-support system, paragraph 8.1	Means should be provided to maintain all the occupants in thermal balance and in a safe and breathable atmosphere for all environmental conditions envisaged…	Additional text Clarification required to distinguish between the achievable control of these parameters for an HRC and an SPHL.
31	Life-support system, paragraph 8.1	Means should be provided to maintain all the occupants in thermal balance and in a safe and breathable atmosphere for all environmental conditions envisaged…the effects of hypothermia should be considered	Additional text proposal And the effects of hyperthermia.
32	Life-support system, paragraph 8.1	However in no such case should the duration of the units autonomous life support endurance be less than 72 hours.	Consideration of the use or meaning of autonomy in this paragraph.

Item number	Document reference	Document wording	Comment
33	Life-support system, paragraph 8.2	The persons operating the chamber whether within or outside it should be provided with adequate controls to provide life support. As far as practicable, the controls should be capable of operation without the person who operates them having to remove his/her seat belt.	Consideration given to the achievability of this requirement in respect of seat belts.
34	Life-support system, paragraph 8.4	Adequate equipment should be provided and be suitably situated to maintain oxygen and carbon dioxide levels and thermal balance within acceptable limits while the life support equipment is operating.	How does this apply to HRCs?
35	Life-support system, paragraph 8.6	Where it is intended that divers are to be decompressed within the hyperbaric evacuation unit ...	This paragraph needs to be re written with the intent of the content made clear.
36	Life Support System, paragraph 8.7	An adequate supply of food and water should be provided…	Definition of adequate required. Is it in accordance with SOLAS?
37	Life-support system, paragraph 8.8	A breathing system should be provided with a sufficient number of masks ...	Additional text proposal This paragraph should stipulate one mask per occupant plus a spare. Surface crew breathing system and masks should also be specified.
38	Life-support system, paragraph 8.9	Provisions should be made external to the hyperbaric evacuation unit, and in a readily accessible place, for the connection of emergency hot or cold water and breathing therapeutic mixture. The dimensions of the connections provided should be as follows: ¾" NPT (female) for hot water ½" NPT (female) for breathing mix)	New text proposal An emergency services supply manifold in accordance with industry guidance should be provided.

Item number	Document reference	Document wording	Comment
39	Life-support system, paragraph 8.11	First aid equipment, sea sickness bags…	New text proposal References to DMAC requirement for medical equipment to be added to text.
40	Fire protection and extinction, paragraph 9.1	A fire-extinguishing system should be provided ...	New text proposal. It is only possible for a portable, hand held fire-extinguisher to be used onboard HRCs and SPHLs. The text should reflect this.
41	Fire protection and extinction, paragraph 9.3	In hyperbaric evacuation units that are designed to float and may be used to transport divers through fires, consideration should be given, where practicable, to providing an external water spray system for cooling purposes.	New text proposal It should be recognized that only SPHL type evacuation units can fulfil this possibility. Text should make the provision of external hull cooling spray systems mandatory.
42	Electrical arrangements, paragraph 10.2	Power supplies required for the operation of life support systems and other essential services should be sufficient for the life support duration. The battery charging arrangements should be designed to prevent overcharging under normal or fault conditions. The battery storage compartment should be provided with means to prevent over pressurisation and any gas released vented to a safe place.	New text proposal. This paragraph should specify time for life support duration. Battery charging arrangement statement should be aligned with current industry guidance.
43	Launch and recovery of hyperbaric evacuation units	Where appropriate	Removal of text The term where appropriate should be removed.

Item number	Document reference	Document wording	Comment
44	Launch and recovery of hyperbaric evacuation units, paragraph 11.1	Means should be provided for the safe and timely evacuation and recovery of the unit and due consideration should be given to the environmental and operating conditions and the dynamic snatch and impact loadings that may be encountered	Consideration should be given to rewording the statement in respect of recovery of an evacuation unit.
45	Launch and recovery of hyperbaric evacuation units, paragraph 11.1	Means should be provided for the safe and timely evacuation and recovery of the unit and due consideration should be given to the environmental and operating conditions and the dynamic snatch and impact loadings that may be encountered. Where the primary means of launching depends on the ships main power supply, then a second and independent launching arrangement should be provided.	Consideration should be given to referencing SOLAS for the fulfilment of the provision of a secondary, independent launching arrangement.
46	Launch and recovery of hyperbaric evacuation units, paragraph 11.2	If the power to the handling system fails, brakes should be engaged automatically. The brake should be provided with manual means of release.	Consideration should be given to referencing SOLAS for the fulfilment of this provision.
47	Launch and recovery of hyperbaric evacuation units, paragraph 11.3	The launching arrangements provided should be designed to ensure easy connection or disconnection of the hyperbaric evacuation unit from the surface compression chamber and for the transportation and removal of the unit from the ship under the same conditions of trim and list as those of the ships other survival craft.	Consideration should be given to referencing SOLAS for the fulfilment of this provision and in the classification of an SPHL as a survival craft.

Item number	Document reference	Document wording	Comment
48	Launch and recovery of hyperbaric evacuation units, paragraph 11.3	The launching arrangements provided should be designed to ensure easy connection or disconnection of the hyperbaric evacuation unit from the surface compression chamber and for the transportation and removal of the unit from the ship under the same conditions of trim and list as those of the ships other survival craft.	New text proposal. The addition of text relating to the interlocking of davit power supplies while the access trunking from the chamber system to the SPHL chamber is under pressure to prevent accidental operation of davit winches/arms.
49	Launch and recovery of hyperbaric evacuation units, paragraph 11.4	Where a power-actuated system is used for the connection or disconnection of the evacuation unit and the surface compression chamber, then a manual or stored power means of connection or disconnection should also be provided.	Consideration should be given to referencing SOLAS for the fulfilment of this provision.
50	Launch and recovery of hyperbaric evacuation units, paragraph 11.5	The means provided for release of the falls or lift wire after the unit is afloat should provide for easy disconnection, particular attention being given to units not provided with an attendant crew.	Consideration given to aligning text with SOLAS chapter 3, page 1 which references onload release systems?

Item number	Document reference	Document wording	Comment
51	Launch and recovery of hyperbaric evacuation units, paragraph 11.6	Where the hyperbaric evacuation unit is designed to be recovered from the sea, or from a ship in a seaway, consideration should be given to the mode of recovery. Adequate equipment to enable a safe recovery of the unit should be provided on the unit. Permanently marked clear instructions should be provided adjacent to the lifting equipment as to the correct method for recovery, including the total weight of the hyperbaric evacuation unit. Consideration should be given to the effect which any entrained water and any bilge water may have on the total weight to be lifted by the recovery vessel. Consideration should also be given to any means that can be provided for the absorption of the dynamic snatch loads imposed during the recovery of the hyperbaric evacuation unit from the sea.	Consideration given to the text in terms of its applicability in practice and relevance to current industry guidelines.
52	12.1 Communications and location systems, paragraph 12.1	If breathing mixtures containing helium or hydrogen are used	Proposed text removal Consideration should be given to the reference to the use of hydrogen mixtures.
53	Communications and location systems, paragraph 12.4	Hyperbaric units designed to be placed on the seabed to await independent recovery should be provided with an acoustic transponder.	Clarification required in the text to identify this particular type of unit and if it refers to welding habitats.

Item number	Document reference	Document wording	Comment
54	Marking and information to be provided on hyperbaric evacuation units, paragraph 13.3.	Where applicable the following instructions and equipment should be clearly visible and be kept readily available while the unit is afloat.	Text removal Remove the reference to Telex numbers from Point 6.