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### **'I' ITEM NOTE**

| From:           | General Secretariat of the Council  |  |  |
|-----------------|---|--|--|
| To:             | Permanent Representatives Committee (Part 1)  |  |  |
| No. Cion doc.:  | 9638/21   |  |  |
| No. prev. doc.: | 9673/2/21 REV 2   |  |  |
| Subject:        | Draft submission by Member States and the Commission to the 104 <sup>th</sup> session of the International Maritime Organization's Maritime Safety Committee proposing a new output to regulate remote survey and audit |  |  |
|                 | <ul><li>Endorsement</li></ul>   |  |  |

# I. <u>INTRODUCTION</u>

- 1. On 8 June 2021, the <u>Commission</u> transmitted to the Council a Staff Working Document containing a draft submission to the 104th session of the Maritime Safety Committee (MSC 104) of the International Maritime Organization (IMO) proposing a new output to regulate remote survey and audit. The deadline for transmitting the draft submission to the IMO Secretariat is 2 July 2021.
- 2. The proposed new agenda item should be seen against the background of the COVID-19 pandemic, when remote inspections and audits have been exceptionally accepted instead of onboard surveys/audits. However, to date, there are no provisions or common procedures agreed at the international level for the execution of class and statutory surveys/audits by remote means, i.e. without physical attendance by surveyor(s)/auditor(s) on board the ship. The purpose of the new output would be to provide guidance in this respect.

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## II. WORK WITHIN THE COUNCIL

- 3. The draft submission was presented by the Commission to the members of the Shipping Working Party at their informal videoconference on 7 June 2021, based on an informal advance copy, and further examined at the Shipping Working Party meeting on 14 June 2021. After that last meeting, delegations were given the opportunity to make written comments, which were taken into account when preparing the final version of the text. No delegation raised objections to that final version, as set out in the Annex.
- 4. The Shipping Working Party also agreed that the Presidency would be allowed to indicate at the time of transmission that the document may be released to the public by the IMO secretariat prior to MSC 104. Finally, the working party agreed to allow interested third states and international non-governmental organisations to co-sponsor the submission.
- 5. However, there is no agreement on who should submit the draft submission. The <u>Commission</u> maintains the view that the draft submission should be made by "the European Commission on behalf of the European Union", while the <u>Member States</u> consider that it should be made by the Member States and the European Commission.
- 6. Given the urgency and importance of the matter, it was agreed at working party level to propose to transmit the submission in the name of the Member States and the European Commission, while taking good note of the position of the Commission.
- 7. Finally, the <u>Shipping Working Party</u> reiterates its request to the Commission that proposals for submissions to the IMO should be presented in such time as to allow for a proper examination of procedural and substantive issues in at least two working party meetings.

# III. CONCLUSION

8. In the light of the above, the <u>Permanent Representatives Committee</u> is invited to endorse the text of the draft submission in the annex, with a view to its transmission by the Presidency to the International Maritime Organization by 2 July 2021.

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MARITIME SAFETY COMMITTEE 104th session Agenda item 15 MSC 104/15/XX XX June 2021 Original: ENGLISH

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#### **WORK PROGRAMME**

# Proposal for regulating remote survey and audit

Submitted by Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the European Commission

#### **SUMMARY**

Executive summary: This document proposes a new output to be considered by the III

Sub-Committee and the HTW Sub-Committee on the need to provide guidance on remote survey and remote International Safety Management audit by way of either a dedicated guidance or, alternatively, amendments to the Survey Guidelines under the Harmonized System of Survey and Certification (HSSC) and guidance for the International Safety Management Code (ISM Code) as well as the development of a framework on how they

should be carried out.

Strategic Direction, if 1 and 6

applicable:

Output: Not applicable

Action to be taken: Paragraph 41

Related documents: MSC 102/22/11, MSC 102/24, SDC 7/10, SDC 7/16, Circular Letter

No.4204/Add.6, IMO Circular Letter No.4204/Add.16, Circular Letter No.4204/Add.19/Rev.3, Res.A.1140(31), Res.A.1111(30),

Res.A.1118(30).

## Introduction

- 1 This document is submitted in accordance with paragraphs 4.6 and 6.12.2 of *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/Rev.2), taking into account the Application of the Strategic Plan of the Organization (resolution A.1111 (30)).
- The Sub-Committee on Ship Design and Construction, at its 7<sup>th</sup> session, discussed document SDC 7/10 (IACS) proposing amendments to the 2011 ESP Code, allowing for the use of remote inspection techniques (RITs). While the use of RITs for surveys under the 2011 ESP Code had been generally supported, SDC 7 decided that the matter required a broader consideration by the Organization, which might consider taking a holistic approach in regulating RITs, including those that might be considered under other instruments (SDC 7/16, paragraph 10.3).

The Maritime Safety Committee, at its 102<sup>nd</sup> session, when considering document MSC 102/22/11 (Republic of Korea), proposing the development of guidance on the implementation of remote surveys, recognised that such work would require detailed technical consideration by experts and should also include matters related to cases of *force majeure*. The Committee invited interested Member States and international organisations to submit a new output proposal to the Committee, in accordance with the Committees' method of work (MSC-MEPC.1/Circ.5/Rev.1) (MSC 102/24 paragraph 22.20).

## **IMO** objectives

- 4 This proposal is in line with IMO's mission statement of promoting safe, secure and environmentally sound, efficient and sustainable shipping.
- This submission is also consistent with IMO's strategic direction (SD) 1 aiming at the effective, efficient and consistent implementation and enforcement of the provisions of the IMO instruments, and with IMO's strategic direction (SD) 6 which aims to ensure that a universally adopted, effective, international regulatory framework is in place and implemented consistently, embracing and integrating new and advancing technologies, without causing unnecessary burdens.

#### Need

- During the COVID-19 pandemic, the IMO promoted a practical and pragmatic approach highlighting the importance of undertaking classification and statutory surveys and the possibility of flag State administrations granting extension of the period of validity of certificates for three months (IMO Circular Letter No.4204/Add.6).
- The IMO supported industry-developed 'Covid-19-related guidelines for ensuring a safe shipboard interface between ship and shore-based personnel' (IMO Circular Letter No.4204/Add.16) indicating that one safety control measure to reduce risk could be to conduct audits, surveys, inspections and training remotely.
- The IMO published 'Guiding principles for the provision of technical and implementation advice to flag States when considering whether to permit statutory certificate extension beyond 3 months' (IMO Circular Letter No.4204/Add.19/Rev.3) indicating a step-based approach to issuing short-term certificates or extending certificates beyond the statutory maximum in cases when the physical surveys could not be carried out.
- Several flag State administrations have accepted the remote inspection and audit *in lieu* of the onboard survey/audit, when the recognized organization (RO) has proposed that said survey/audit could be carried out remotely utilising RO specified processes. However, to date, there are no provisions or common procedures agreed at the international level for the execution of class and statutory surveys/audits by remote means, i.e. without physical attendance by surveyor(s)/auditor(s) on board the ship.
- There is an urgent need to develop specific guidance to ensure that this practice of remote survey is carried out in a harmonised way and in a manner that ensures the same level of safety as that provided by a physical onboard survey. The methodology of remote surveys and audits, be they a complete or partial substitute to physical attendance, should be properly assessed based on an international recognized method.

- At present, remote surveys and audits are predominantly used during extraordinary circumstances (such as the current pandemic or other cases like natural disasters, warfare, etc.). Availability of properly assessed remote survey methods, accepted by a flag State, would facilitate acceptance of the results of those remote surveys and audits performed under normal circumstances.
- The quality of remote surveys/audits and the level of safety on board should not be compromised and such surveys/audits should provide the same confidence as the ones performed by physically present surveyors or auditors. A discussion and determination is needed to ascertain if remote surveys of all or some survey items could be considered appropriate or that physical attendance to complete the scheduled surveys under the HSSC Guidelines would be necessary.

## Analysis of the issue

## Remote statutory verifications and inspections

- During the pandemic, several Administrations have authorised the use of remote surveys and audits by their ROs. As indicated in MSC 102/22/11 (Republic of Korea), it appears that each RO has its own procedures to follow, and that only a few flag States explicitly allow or mention the conduct of remote surveys in their survey guidelines. Generally, there are no detailed technical instructions provided in such guidelines and the scope and procedures vary from one flag State to another. Development of specific guidance, as mentioned in paragraph 10, would help to create a level playing field on the par with the survey guidelines under the Harmonised System of Survey and Certification (HSSC) or guidelines on implementation of the ISM Code.
- In fact, a recent monitoring exercise regarding European Recognised Organisations' (EU ROs) activities, carried out by the European Maritime Safety Agency (EMSA), indicated that the ROs, when acting on behalf of the flag States or as classification societies, did not have harmonised procedures, leading to differences in approaches to the procedures for the remote classification and statutory surveys.
- Until recently, inspections, surveys or audits performed without the physical attendance of a surveyor/auditor have been mostly limited to extraordinary cases for postponement of surveys or audits or in cases where the scope did not require any substantial on-site verification. It is generally considered that the present legal framework has been developed on the underlying principle that the surveys are to be carried out with the on-board presence of the surveyors/auditors. A dedicated assessment to determine that normal survey practices with the attendance of a surveyor on-board can be replaced by remote means would be needed.
- The COVID-19 situation may catalyse a wider use of remote surveys/audits, requiring action from IMO to demonstrate that the main safety and quality elements of the present regime are upheld when such remote surveys and audits are used. Also, there is an urgent need to ensure that such practices do not constitute undue burden to shipowners and ship crew when they are implemented.

### Remote inspection techniques

- In developing the necessary guidance it is essential to define what could be considered as remote survey and distinguish it from the definition of RITs. RITs are described in IACS Rec No 42 'Guidelines for Use of Remote Inspection Techniques for surveys' and defined in IACS UR Z17 'Procedural Requirements for Service Suppliers' as a means of survey that enables examination of any part of the structure without the need for direct physical access of the surveyor. In a wider context this definition may be extended to an inspection carried out by a qualified technician of an approved service supplier (except if performed directly by the surveyor) and in the presence of the surveyor.
- The use of RIT has the potential on enhancing safety by providing the possibility of inspecting areas that otherwise would be difficult to reach. RIT can also partly replace the physical inspections in confined spaces or at height, thus reducing the risks of accidents during these inspections. The current IACS guideline for RIT is general in nature and is not sufficiently detailed to ensure consistent application. IACS member societies have individually developed detailed guidelines for implementation of RIT that fall within the general guidance of the IACS recommendation. An IMO guideline on RIT would need to be at least as detailed as those procedures used by an individual class society.
- 19 Careful consideration is needed in order to make a clear differentiation between class surveys and statutory surveys and audits. RITs may be used for both scenarios.

## Aspects to consider in remote inspections, surveys and verifications

- Remote surveys, on the other hand, are not defined in any international instrument, but by analogy to the above it could be defined as a means of survey that enables examination of a ship's hull structure, machinery component or equipment and/or gathering information and evidence of compliance with applicable requirements without the physical attendance of the surveyor. In a similar manner, remote audit is not defined. In the past, some portion of an audit could be carried out via document review in advance of an actual on site visit. However, interviewing crew members and viewing records that are maintained onboard have required the physical presence of the auditor. Some aspects of the audit such as interviews of crew may lend themselves to basic video conference technology but document viewing and sharing may not be as readily accomplished. Audits, though not surveys, typically include a walk around the vessel to view its general condition and implementation of safety management system procedures.
- In a remote survey, generally, survey items to examine the condition of the ship or equipment encompass physical inspections performed by the crew or by a qualified technician from an approved service supplier under the remote surveillance and instructions of the surveyor by two-way audio and video communication or other means of communication. The evaluation and acceptance of the condition of the survey item remains under the sole responsibility of the surveyor.
- Survey items surveyed remotely in preparation and in combination with the surveys on board may optimize the efficiency of the surveys; as an example, it may reduce the time spent reviewing records on board. It makes it also possible to get the right expertise opinion with direct information on the item inspected as it might be valuable in certain cases.

- Remote audits are not foreseen in the International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code) and IMO Resolution A.1118(30) 'Revised guidelines on the implementation of the International Safety Management (ISM) Code by Administrations'. However, there are existing international standards for the use of remote auditing methods in land transport (ISO 19011:2018 'Guidelines for auditing management systems', IAF ID 12:2015 'Principles on Remote Assessment', IAF MD 4:2018 'IAF Mandatory document for the use of information and communication technology (ICT) for auditing / assessment purposes') that could be used, as appropriate, as a temporary solution.
- The use of remote audit methods for ISM audits would require to consider and implement such existing standards in the current practices only for those audit activities where this approach would be found adequate. While remote audits may not be able to replace in full the observations by the auditor of condition and implementation of safety management system procedures including activities on-board that are an essential part of the safety management audits on board ships, determination of the extent of their application is needed.

### Handling of remote surveys and audits under extraordinary circumstances

- It is recognized that under extraordinary circumstances such as the ones provoked by the current COVID-19 pandemic, the use of remote surveys may simply be employed to consider alternative evidence on the condition of the ship *in lieu* of completing the physical survey for the purpose of a postponement or for verification of rectification of minor deficiencies identified in previous surveys. These remote surveys/audits may be accepted on a 'case-by-case' basis, provided that an assessment is carried out. In addition, it will need to be considered whether the result of the remote survey or verification needs to be validated by a physically attended survey when necessary.
- This 'case-by-case' assessment should as a minimum address considerations such as:
- the safety performance of the safety management of the ship;
- the detailed and documented justification for the use of remote surveys/audit (e.g. extraordinary circumstances and/or *force majeure* situations such as warfare, pandemics or natural disasters that do not allow physical attendance of a surveyor on board the vessel);
- the scope of remote surveys/audits (e.g. survey planning, survey items that could be done remotely, type of ship and equipment, harmonisation of requirements between ROs, ...);
- the consultation with the flag State in case the survey/audit has been delegated to an RO (e.g. coordination of surveys and full responsibility for the outputs, ...);
- the technical requirements for the use of remote survey/audit (use of approved remote inspection techniques, audio and video communication, two-way communication, ...);
- the potential need of a validation by a physically attended survey or audit;
- the roles, responsibility, impartiality and liability of the involved parties, including personnel involved in physical inspection on board ship (e.g. tests, examinations, gathering of evidence on the condition of the ship);
- the qualifications of personnel involved in physical inspection on board ship;
- the provision of information and evidence to the surveyor/auditor (audio and video records, confidentiality of information, ...);
- the reporting requirements and records (master statement, survey report, service suppliers' report, ...);
- the transparency of information on the remote methods used and on the ship status indicating whether the surveys were carried out remotely or physically.

### Handling of remote inspections, surveys and audits under normal circumstances

- Under normal circumstances, for surveys or audits other than initial or renewal surveys/audits, consideration may be given to the use of remote survey or audit for specified items defined at IMO level, provided that the same safety level as that of on-site surveys with the physical attendance of the surveyor is ensured. Other items that may not be verified remotely should be verified by on-site surveys/audits. Additionally, the surveyor may require, if deemed necessary, to confirm the remote survey/audit results for specific items on site. The responsibility for the proper conduct of the inspections, surveys or audits, rests upon the surveyor, even if the inspection, survey or audit has been carried out remotely, as well as upon the Recognized Organization which has issued the relevant certificates.
- As a precautionary measure, initial and renewal surveys at this stage should be excluded considering the scope and the importance of these surveys before the ship is put into service and at the renewal interval, so that all survey items are inspected physically at reasonable intervals.
- However currently there is no internationally accepted way to assess or prove that remote surveys' or audits' items surveyed remotely may achieve the same safety level and confidence as that from physical attendance. Moreover, conducting remotely the surveys and audits required by the relevant IMO instruments as described in the conventions and Guidelines is not regulated, so the current legal framework will need to be considered.

## **Analysis of implications**

There are no additional administrative burdens for the Administrations. The checklist for identifying administrative requirements and burdens (MSC-MEPC.1/Circ.5/Rev.2) is set out in annex 1.

#### **Benefits**

- The proposed new output aims to ensure that remote surveys/audits performed under extraordinary circumstances or under normal circumstances as are contemplated in paragraphs 25 and 27, provide a satisfactory degree of assurance as the originally prescribed intent of the measures in the IMO conventions.
- 32 The proposal also intends to ensure that the confidence and credibility of the current survey/ audit regime is maintained, as the fundamental vehicle to confirm that the ships are designed, constructed, maintained and managed in compliance with the requirements of IMO conventions, codes and other instruments while safeguarding a level playing field among the flag State administrations and a high level of safety.

#### **Industry standards**

- There are no provisions or common procedures agreed for the execution of class and statutory surveys or audits by remote means, i.e. without attendance by surveyor(s)/auditor(s).
- 34 The only existing industry standards are those related to remote inspection/auditing techniques:
  - IACS Rec.42 'Guidelines for Use of Remote Inspection Techniques for surveys'
  - ISO 19011:2018 'Guidelines for auditing management systems';
  - IAF ID 12:2015 'Principles on Remote Assessment';
  - IAF MD 4:2018 'IAF Mandatory document for the use of information and communication technology (ICT) for auditing / assessment purposes'.

## Output

- The proposed output should consider which statutory survey items or audit items that could be allowed by the Administration to be performed remotely as well as under which conditions such surveys/audits should be conducted. For surveys, this output could involve development of separate guidelines or, alternatively, amendments to the Survey Guidelines under the Harmonized System of Survey and Certification (HSSC), as well as the development of guidance on how to assess remote survey methods by the flag administration. For ISM audits, the output would be additional guidance to the ISM Code in the form of a revision to A1118(30) or other guidance document appended to the ISM Code in the form of an MSC-MEPC Circular.
- The work on remote surveys should be entrusted to the Sub-Committee on Implementation of IMO Instruments (III), with the Sub-Committee on Human Element, Training and Watchkeeping (HTW) as associated organ. The work on remote ISM audits should be entrusted to the HTW Sub-Committee. Although survey and audit are distinct activities, they are complementary processes which support sustained compliance with safety and environmental standards. Coordination between the two sub-committees on this project is essential and encouraged, especially regarding the use of terminology as well the capabilities of remote technology platforms.
- Remote inspections techniques should be treated separately but complementary to this output since those techniques are relevant to ensure a proper implementation of statutory inspections and verifications carried out by or on behalf of the flag State.

#### **Human element**

The completed checklist contained in the Checklist for considering human element issues by IMO bodies (MSC-MEPC.7/Circ.1) is set out in annex 2.

#### **Urgency**

- Remote survey activities are already being conducted due to the situation created by the COVID-19 pandemic, without a harmonized framework that ensures that the safety level provided by the current survey regime is maintained. Without such safeguard, there is a risk of losing the credibility and confidence of the existing statutory regime of which surveys are a fundamental element.
- It is envisaged that this output could be completed in two sessions of the Sub-Committee, starting from the upcoming eighth session of the Sub-Committee (III 8).

### **Action requested of the Committee**

The Committee is invited to consider the information provided above and approve the proposal for a new output as set out in paragraphs 35 to 37. The III Sub-Committee and the HTW Sub-Committee should be involved in that work, as indicated in paragraph 36.

#### **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:

1. Notification and reporting?

- (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.

NR

Reporting certain events before or after the event has taken place,
e.g. notification of voyage, statistical reporting for
IMO Members.

Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes)

2. Record keeping?
Keeping statutory documents up to date, e.g. records of accidents, records of cargo, records of inspections, records of education.

Description of administrative requirement(s) and method of fulfilling it: (if the answer is yes)

The existing record keeping is anticipated to continue. The proposal to encourage facilitating reporting results from inspections carried out by non-governmental entities seeks to mitigate any additional burden on Administrations.

3. Publication and documentation?

Description of administrative requirement(s) and method of fulfilling it (if the answer is yes)

Producing documents for third parties, e.g. warning signs,

registration displays, publication of results of testing

4. Permits or applications?
Applying for and maintaining permission to operate, e.g. certificates, classification society costs

Description of administrative requirement(s) and method of fulfilling it:(if the answer is yes)

5. Other identified requirements?

#### ANNEX 2

#### CHECKLIST FOR CONSIDERING HUMAN ELEMENT ISSUES BY IMO BODIES

### 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.

Subject Being Assessed: (e.g. Resolution, Instrument, Circular being considered)

New unplanned output to consider when and how remote surveys could be conducted

**Responsible Body**: (e.g. Committee, Sub-committee, Working Group, Correspondence Group, Member State)

Maritime Safety Committee and the Sub-Committee on Implementation of IMO Instruments (III) with the Sub-Committee on Human Element, Training and Watchkeeping as associated organ

| 1.  | Was the human element considered during development or amendment process related to this subject?  | Yes |    |    |
|-----|--|-----|----|----|
| 2.  | Has input from seafarers or their proxies been solicited?  |     | No |    |
| 3.  | Are the solutions proposed for the subject in agreement with existing instruments? (Identify instruments considered in comments section)               | Yes |    |    |
| 4.  | Have human element solutions been made as an alternative and/or in conjunction with technical solutions?   | Yes |    |    |
| 5.  | Has human element guidance on the application and/or implementation of the proposed solution been provided for the following:                          | Yes | No | NA |
|     | <ul><li>Administrations?</li></ul>   | Yes |    |    |
|     | <ul><li>Ship owners/managers?</li></ul>  |     | No |    |
|     | <ul><li>Seafarers?</li></ul>   |     | No |    |
|     | <ul><li>Surveyors?</li></ul>   | Yes |    |    |
| 6.  | At some point, before final adoption, has the solution<br>been reviewed or considered by a relevant IMO body<br>with relevant human element expertise? | Yes |    |    |
| 7.  | Does the solution address safeguards to avoid single person errors?  | Yes |    |    |
| 8.  | Does the solution address safeguards to avoid organizational errors?   | Yes |    |    |
| 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?        |     |    | NA |
| 10. | Have human element experts been consulted in development of the solution?  | Yes |    |    |

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| 11. | HUMAN ELEMENT: Has the proposal been asse                | essed against ea | ch of the |
|-----|--|------------------|-----------|
|     | factors below?   |                  |           |
|     | CREWING. The number of qualified personnel               |                  | NA        |
|     | required and available to safely operate, maintain,      |                  |           |
|     | support, and provide training for system.                |                  |           |
|     | PERSONNEL. The necessary knowledge, skills,              |                  | NA        |
|     | abilities, and experience levels that are needed to      |                  |           |
|     | properly perform job tasks.                              |                  |           |
|     | TRAINING. The process and tools by which personnel       | Yes              |           |
|     | acquire or improve the necessary knowledge, skills,      |                  |           |
|     | and abilities to achieve desired job/task performance    |                  |           |
|     | OCCUPATIONAL HEALTH AND SAFETY. The                      | Yes              |           |
|     | management systems, programmes, procedures,              |                  |           |
|     | policies, training, documentation, equipment, etc. to    |                  |           |
|     | properly manage risks.                                   |                  |           |
|     | WORKING ENVIRONMENT. Conditions that are                 | Yes              |           |
|     | necessary to sustain the safety, health, and comfort of  |                  |           |
|     | those on working on board, such as noise, vibration,     |                  |           |
|     | lighting, climate, and other factors that affect crew    |                  |           |
|     | endurance, fatigue, alertness and morale.                | .,               |           |
|     | HUMAN SURVIVABILITY. System features that                | Yes              |           |
|     | 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.                                | \/               |           |
|     | HUMAN FACTORS ENGINEERING. Human-system                  | Yes              |           |
|     | interface to be consistent with the physical, cognitive, |                  |           |
|     | and sensory abilities of the user population.            |                  |           |