

**INTERNATIONAL MARITIME ORGANIZATION**  
4 ALBERT EMBANKMENT  
LONDON SE1 7SR

Telephone: 020 7587 3152  
Fax: 020 7587 3210



**IMO**

*E*

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## **FRAMEWORK FOR CONSIDERATION OF ERGONOMICS AND WORK ENVIRONMENT**

1 The Marine Environment Protection Committee at its fifty-third session (18 to 22 July 2005) and the Maritime Safety Committee at its eighty-first session (10 to 19 May 2006), noted that recent reports indicated that more than one out of five personal injury incidents reported were the results of slips, trips or falls.

2 The Committees agreed that significant reduction of accidents to seafarers and human error can be obtained through the consideration of ergonomics and their working environment onboard ship.

3 The Committees approved an initial framework for the consideration of ergonomics and the working environment in order to reduce the incidents of personal injuries and human errors as set out at annex.

4 Member Governments and international organizations concerned are recommended to bring this circular to the attention of all parties concerned.

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## ANNEX

### FRAMEWORK FOR IMO CONSIDERATION OF ERGONOMICS AND WORK ENVIRONMENT

#### Background

1 It is recognized that the human operator in the role as seafarer is the ship's primary protector of maritime safety and security, and the marine environment. Given the significant variations in work environment conditions (external and internal) that the seafarer is exposed to, it is imperative to ensure a safe working environment.

2 Fatigue plays a major role in reducing a seafarer's alertness and increases the chances of personal injury and human error. In the IMO Guidelines on Fatigue, it states that some ship specific factors that contribute to fatigue are: ship design, level of automation, equipment reliability, inspection and maintenance, age of vessel, and the physical comfort on board.

3 In addition, one P&I club recently reported that more than one out of five personal injury incidents reported are the result of a slip, trip or fall. Similar figures are seen in other shore side industries.

4 As a result, efforts should be made to consider guidance on the application of ergonomic solutions as a means to reduce personal injuries and the incidents or accidents brought on by human error.

#### Framework for IMO to considering ergonomics

5 As set forth in the appendix, IMO should consider five key areas for ergonomics onboard ship as it relates to reducing the incidence of personal injuries and human error in the work environment:

- .1 manual valve operation, access, location and orientation;
- .2 stairs, vertical ladders, ramps, walkways and work platforms;
- .3 inspection and maintenance considerations;
- .4 working environment; and
- .5 the application of ergonomics to design.

#### Approach for IMO to considering ergonomics

6 The following should be considered by IMO to address ergonomics and the work environment on board ship:

1. review existing IMO instruments to determine where fundamental ergonomics and work environment considerations might enhance shipboard safety and environmental protection; and
2. consider the development of guidance for IMO and the industry, as set forth at appendix, on the application of ergonomics to ships also taking into account existing IMO instruments as relevant (e.g. MSC/Circ.982).

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## APPENDIX

### KEY AREAS FOR CONSIDERATION

1. **Manual valve operation, access, location and orientation:** The ability to easily locate, access and operate valves onboard ship can have a significant impact on seafarers' ability to prevent an accident to the vessel or the environment or prevent personal injury. Consideration should be given to how ergonomic design principles can be applied in order to better access and operate manual valves onboard ship.
2. **Stairs, vertical ladders, ramps, walkways and work platforms:** As some P&I Club statistics indicate, the incidence of slips, trips and falls contribute to a significant number of injuries on board ship. Prevention of these incidents from locations such as vertical ladders, ramps, walkways and work platforms should be considered. This ergonomic consideration can be applied to new ships (i.e. design) and existing ships (e.g. non-skid materials used in critical work areas to reduce the incidents of slips).
3. **Inspection and maintenance considerations:** Accessibility, inspectability and maintainability of the ship's hull, machinery, life saving and fire fighting appliances are necessary to safety and environmental protection. Ergonomic principles should apply to inspection and maintenance that include access to critical equipment and task requirements.
4. **Working environment:** Working environment is typically comprised of five elements:
  - a. layout of spaces;
  - b. ambient environmental characteristics of human whole-body vibration;
  - c. noise;
  - d. indoor climate; and
  - e. vibration.
5. **Application of ergonomics to design:** Basic guidance on how ergonomics can be considered during the ship design stage and for changes after construction.

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# Onboard work and habitability environments

IMO MSC-MEPC.7/Circ.3 - *Framework for consideration of ergonomics and work environment* - provides guidance on the application of ergonomic solutions as a means to reduce personal injuries or accidents brought on by human error. It suggests that, when addressing ergonomics onboard ship, there are five key areas that should be considered; following each we offer a list of sources of information to assist with the application of these solutions:

- 1. Manual valve operation, access, location and orientation**, in order to better access and operate manual valves aboard ship.
  - *Guidance Notes for the Application of Ergonomics to Marine Systems*, Section 9 - ABS (2013)
- 2. Stairs, vertical ladders, ramps, walkways and work platforms.** The application of ergonomic design principles for ladders, ramps, walkways and work platforms.
  - *Guidelines for the Design of the Means of Access for Inspection, Maintenance and Operation of Commercial Ships* - Bureau Veritas (2008)
  - *Human element recommendations for structural design of lighting, ventilation, vibration, noise, access and egress arrangements* - IACS Rec. No. 132 Section 4.6 - Access and Egress Design
  - *Guidance Notes for the Application of Ergonomics to Marine Systems*, Section 7 - ABS (2013)
- 3. Inspection and maintenance considerations**, to ensure the accessibility, inspectability and maintainability of the ship's hull, machinery, lifesaving and fire-fighting appliances.
  - *Guidance Notes for the Application of Ergonomics to Marine Systems*, Section 10 - ABS (2013)

- *A guide to managing maintenance in accordance with the requirements of the ISM Code* - IACS Rec. No. 74
- 4. Working environment**, including: the layout of spaces; the ambient environmental characteristics of human whole-body vibration; noise; indoor climate; and vibration.
    - *Code on noise levels on board ships* - IMO Resolution MSC.337(91)
    - *Ships and marine technology -- Ship's bridge layout and associated equipment -- Requirements and guidelines* - ISO 8468:2007
    - *Guidelines for engine-room layout, design and arrangement* - IMO MSC/Circ.834
    - *Guidelines on ergonomic criteria for bridge equipment and layout* - IMO MSC/Circ.982
    - *Guidelines on the application of SOLAS Regulation V/15 to INS, IBS and bridge design* - IMO SN.1/ Circ.265
    - *Human element recommendations for structural design of lighting, ventilation, vibration, noise, access and egress arrangements* - IACS Rec. No. 132
    - *Recommendation for the application of SOLAS Regulation V/15 bridge design, equipment arrangement and procedures* - IACS Rec. No.95
  - 5. The application of ergonomics to design** how ergonomics can be considered during design for changes after construction.
    - *Ergonomic principles in the design of work systems* - ISO 6385:2004
    - *Guidance Notes for the Application of Ergonomics to Marine Systems*, Appendix 2 - ABS (2013)
    - *The Human-Centred Approach - A Best Practice Guide for Ship Designers and*

*Builders* - Lloyd's Register (2013)

IMO MSC-MEPC.7/Circ.3 does not cover Habitability, but this is now adequately covered by ILO MLC 2006 (see **Alert!** Issue No. 34, January 2014 centrespread and page 8).

IMO MSC/Circ.1014 - *Guidance on fatigue mitigation and management* - recognises a number of ship design features and environmental factors that can cause fatigue, or have an effect on workload and the crew's ability to sleep.

Those who are involved in the design of ships and their systems should be familiar with Module 7 of MSC/Circ.1014.



For further information, scan the QR code.

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Membership info: [sec@nautinst.org](mailto:sec@nautinst.org)

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