
**Small craft, engine-driven — Field of
vision from helm position**

Petits navires à moteur — Champ de vision depuis le poste de pilotage



Reference number
ISO 11591:2011(E)

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Foreword

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11591 was prepared by Technical Committee ISO/TC 188, *Small craft*.

This second edition cancels and replaces the first edition (ISO 11591:2000), which has been technically revised.

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Small craft, engine-driven — Field of vision from helm position

1 Scope

This International Standard specifies requirements for the field of vision from the helm position, forward and astern, in engine-driven small craft of up to 24 m length of hull.

It is not applicable to:

- tiller-steered craft (3.10) with maximum speed less than 10 knots;
- sailing craft (3.11).

NOTE Small engine driven craft can be operated in a manner and at certain speeds causing trim angles such that vision forward is temporarily obscured. This International Standard cannot assure that a craft can be operated without some temporary loss of vision from the helm position while operating at high trim angles during the transition from displacement to planing mode.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3538:1997, *Road vehicles — Safety glazing materials — Test methods for optical properties*

ISO 7000:2004, *Graphical symbols for use on equipment — Index and synopsis*

ISO 8666, *Small craft — Principal data*

ISO 11192, *Small craft — Graphical symbols*

ISO 11592, *Small craft less than 8 m length of hull — Determination of maximum propulsion power rating*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

high eye position

⟨helmsman in standing position⟩ position 1 730 mm above the surface on which the helmsman stands, 400 mm from the centre of the steering-wheel rim

See Figure 1.

3.2

high eye position

⟨helmsman in seated position⟩ position 840 mm above the intersection of the compressed seat and the seat back, 400 mm from the centre of the steering-wheel rim

See Figure 2.

3.3
low eye position
 (helmsman in standing position) position 1 480 mm above the surface on which the helmsman stands, 400 mm from the centre of the steering-wheel rim

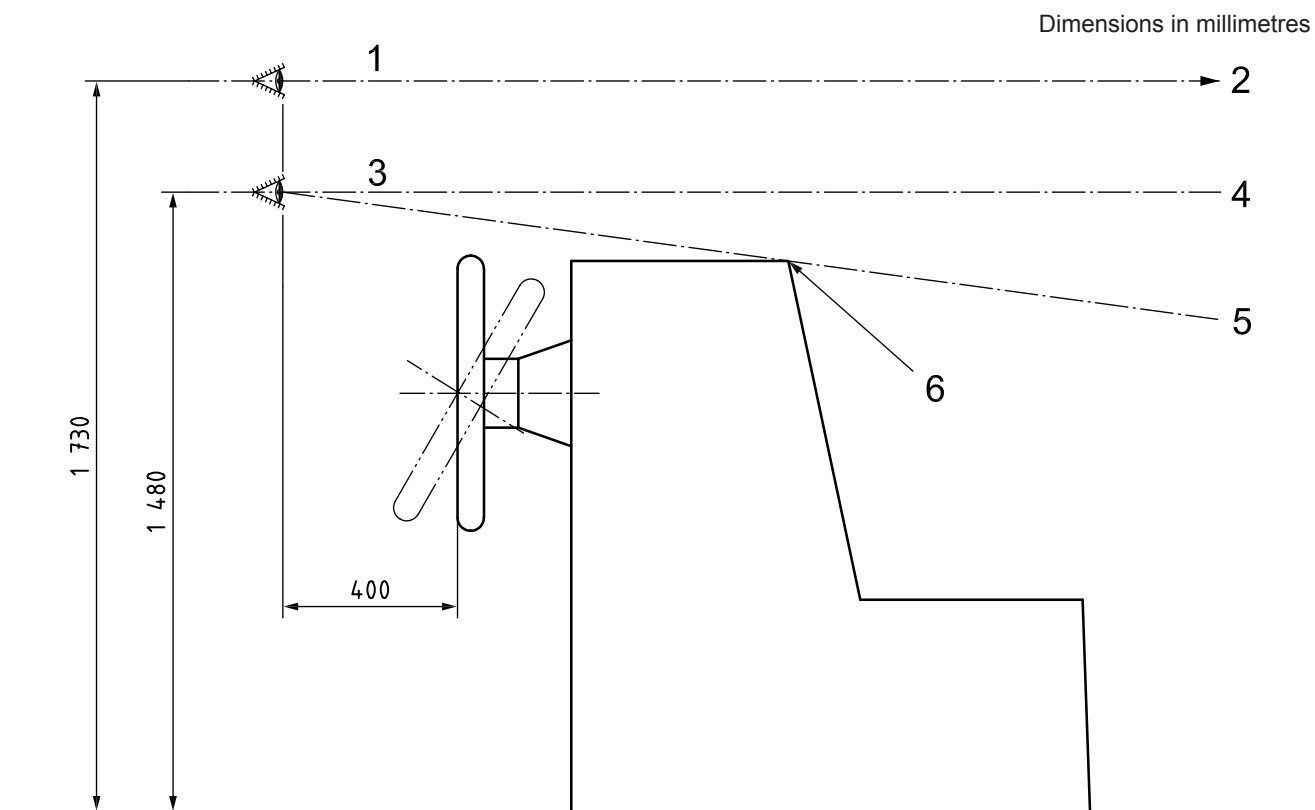
See Figure 1.

3.4
low eye position
 (helmsman in seated position) position 690 mm above the intersection of the compressed seat and the seat-back, 400 mm from the centre of the steering-wheel rim

See Figure 2.

3.5
compressed seat bottom
 surface of the centre of the helm seat at the intersection of the seat-back and seat-bottom when compressed by a 25 mm diameter spherical object under a vertical load of 100 N

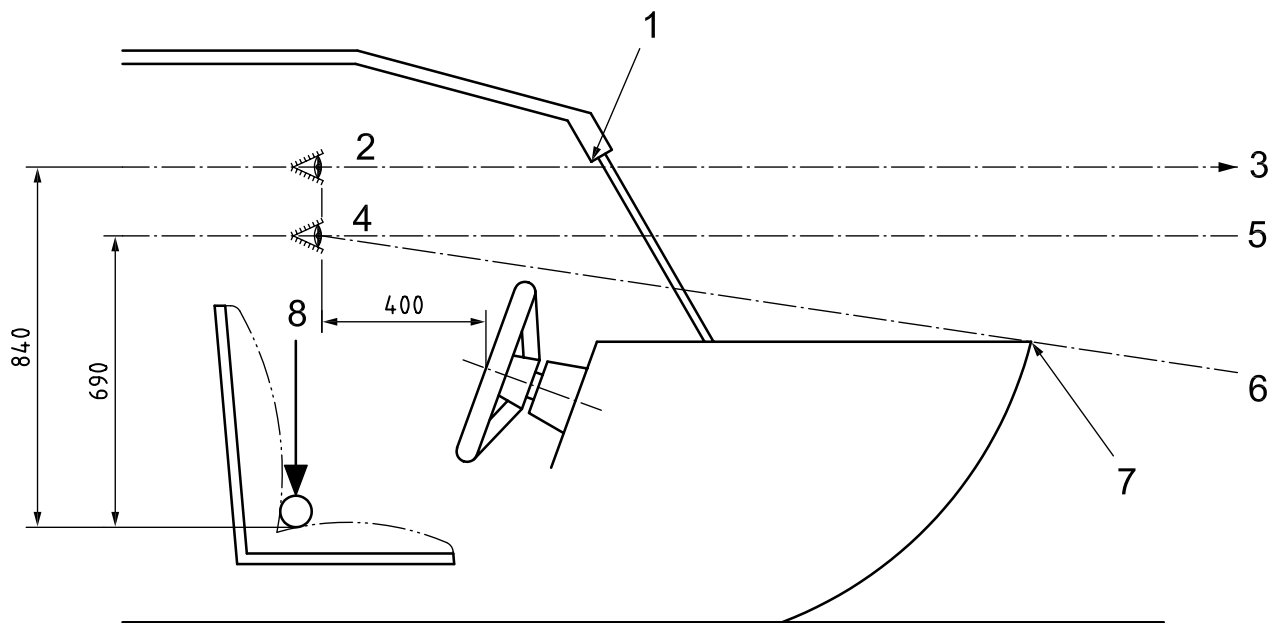
See Figure 2.



- Key**
- 1 high eye position
 - 2 to horizon
 - 3 low eye position
 - 4 required vertical range of vision
 - 5 lowest unobstructed line of vision
 - 6 point of visual obstruction

Figure 1 — Eye positions and vertical range of vision — Helmsman in standing position

Dimensions in millimetres



Key

- 1 vision obstruction
- 2 high eye position
- 3 to horizon
- 4 low eye position
- 5 required vertical range of vision
- 6 lowest unobstructed line of vision
- 7 point of visual obstruction
- 8 seat compression (see 3.5)

Figure 2 — Eye positions and vertical range of vision — Helmsman in seated position

3.6

theoretical keel

(craft without a clear intersection of bottom running surfaces at the longitudinal centreline) intersection of the lowest bottom surfaces of the craft projected horizontally to the longitudinal centreplane of the craft

See Figure 3.

3.7

level reference line

real or designated waterline of the craft determined for the operating conditions

3.8

vertical range of vision

range between the lowest unobstructed line of vision from the low eye position and the highest unobstructed line of vision from the high eye position

See Figures 1 and 2.

3.9

horizontal range of vision

range of vision through the horizontal arc formed from 112,5° on the starboard side to 90° on the port side of the craft

See Figure 4.

3.10

tiller-steered craft

craft steered from the stern position by outboard engine tiller or rudder with tiller arm directly attached

3.11

sailing craft

craft for which the primary means of propulsion is wind power, having $A_S > 0,07(m_{LDC})^{2/3}$ where A_S is the total profile area of all sails that may be set at one time when sailing close hauled, as defined in ISO 8666 and expressed in square metres

[ISO 12215-5:2008, definition 3.3]

3.12

planing mode

mode of running of a craft in the sea such that its mass is significantly supported by forces coming from dynamic lift due to speed in the water

NOTE Adapted from ISO 12215-5:2008.

3.13

planing craft

craft whose maximum speed in flat water and m_{LDC} conditions, declared by its manufacturer, is such that

$$\frac{V}{\sqrt{L_{WL}}} \geq 5$$

NOTE 1 L_{WL} is the length of the waterline, craft at rest in m_{LDC} conditions, in metres, and V is the maximum speed in calm water declared by the manufacturer, with the craft in m_{LDC} conditions, in km/h.

NOTE 2 Adapted from ISO 12215-5:2008.

3.14

displacement mode

mode of running of a craft in the sea such that its mass is mainly supported by buoyancy forces

NOTE Adapted from ISO 12215-5:2008.

3.15

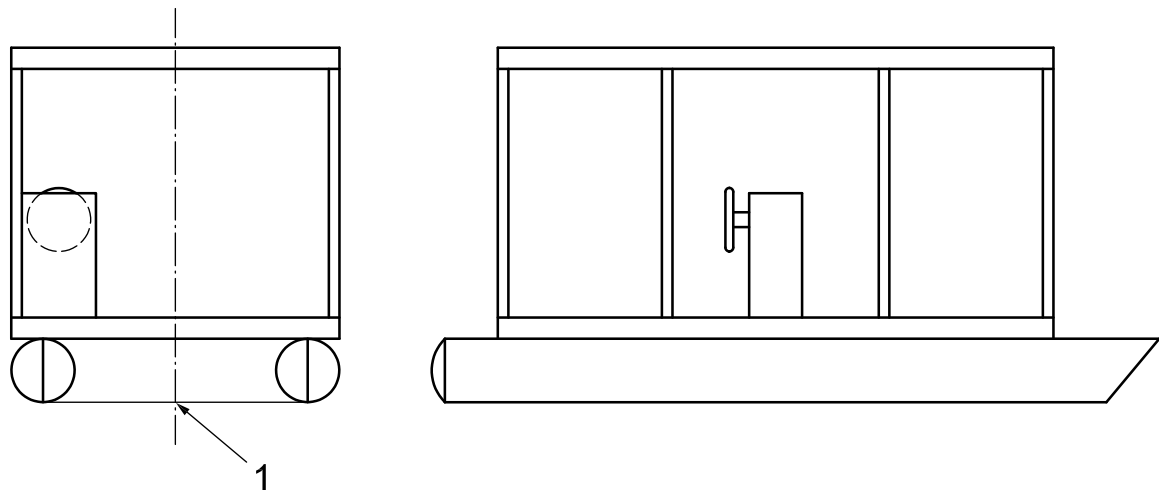
displacement craft

craft whose maximum speed in flat water and m_{LDC} conditions, declared by its manufacturer, is such that

$$\frac{V}{\sqrt{L_{WL}}} < 5$$

NOTE 1 L_{WL} and V are defined as in 3.13.

NOTE 2 Adapted from ISO 12215-5:2008.

**Key**

1 theoretical keel (see 3.6)

Figure 3 — Multihull theoretical keel of a catamaran

4 General requirements

4.1 The helmsman's position shall permit the operator to have a field of vision as defined in Clause 5, when in the fully loaded ready-for-use condition (m_{LDC}) as specified in ISO 8666, during cruising, manoeuvring, docking or other extended operational modes.

4.2 All glazing through which vision from the helm station is maintained shall conform to the requirements of this International Standard and shall have at least 70 % light transmission as measured in accordance with 5.1 in ISO 3538:1997.

4.3 For craft having more than one helm station, at least one helm station shall meet the vision requirements of this International Standard. Other helm stations that do not meet the requirements of this International Standard shall display a sign at these helm stations, in clear view of the operator, with the ISO symbol for warning (in accordance with ISO 11192 or symbol 0434 of ISO 7000:2004) and at least the following information in a language appropriate to the country of operation:

WARNING — Vision from this helm station is limited. Maintain a lookout as required.

4.4 Helm locations designed to be used from either standing or sitting positions shall meet the requirements of this International Standard from at least one of the positions.

4.5 Throttle and shift controls, as intended for use by the helmsman, shall be positioned within 0,7 m of the high eye position and shall enable the maintenance of at least the low eye position by the helmsman at all throttle settings. For craft designed to be operated from both the seated and standing position, the controls shall be located to meet these requirements from at least the seated position.

4.6 The requirements for low eye position can be met by a helmsman's seat with vertical height adjustment.

4.7 Permanent and removable tops and/or other structural parts and mounted instruments in the vicinity of the helmsman shall not obstruct forward vision as required by this International Standard.

5 Field of vision — Forward

5.1 Horizontal

5.1.1 A field of vision from the eye positions at the helm shall be provided throughout a horizontal arc of 112,5° on the starboard side to 90° on the port side of the craft. For port side, starboard side or centreline helm locations, these angles of vision to port and starboard are required (see Figure 4).

5.1.2 Vision from 90° to 112,5° on the port side shall be provided without the helmsman leaving the helm or controls, i.e. without more than 0,5 m forward displacement from the eye position, or with normal movement of the helmsman's head (see Figure 4).

5.1.3 A centre field of vision shall be provided directly in front of the helmsman's eye position throughout the vertical range of vision and extending to at least 15° on either side of a line forward from the eye position to the obstructed vision distance as specified in 5.1.5. Fixed obstructions to vision within this area, such as instruments, deck hardware, horns, lights, and stanchions, shall be such that clear vision can be maintained with movement of the head from the eye positions not exceeding 35 mm in any horizontal direction for planing craft and 70 mm for displacement craft. The total angle measured from the eye position subtended by fixed objects shall not exceed 8° and the objects shall not overlap when viewed from the eye position (see Figure 4).

5.1.4 For sectors outside the arc of centre field of vision as required in 5.1.3, but within the field of vision as required in 5.1.1, fixed obstructions to vision shall be such that vision can be maintained with movement of the head from the eye positions not exceeding 100 mm in any horizontal direction. The total angle measured from the eye position subtended by fixed objects shall not exceed 30° and the objects shall not overlap when viewed from the eye position.

5.1.5 Obstructed vision distance to the water surface in the horizontal range of vision from the stem or point of visual obstruction on the craft, as determined by the level reference line (see 5.2.1), shall not exceed four times the length of hull, L_H , defined in ISO 8666, and in no case shall exceed 50 m.

5.2 Vertical

5.2.1 The vertical range of vision to the horizon and water surface shall be determined with the craft at an attitude established by the level reference line determined with the craft in the fully loaded ready-for-use condition (m_{LDC}) in accordance with ISO 8666.

For craft less than 12 m length of hull capable of speed in the planing mode operation in knots greater than seven times the square root of the length of hull, L_H , expressed in metres, as defined in ISO 8666, or 20 knots, whichever is less, the level reference line is determined with the most powerful outboard engine for which the craft is rated or the most powerful inboard engine installed by the manufacturer, and:

- a) with the hull bottom surface adjacent to the keel, or theoretical keel, in the back half-length of the craft inclined at an angle of 4° relative to the horizontal (bow raised); and
- b) with the hull bottom surface adjacent to the keel, or theoretical keel, intersecting the horizontal plane representing the water surface one-third of the length of hull from the bow (see Figure 5).

For craft of 12 m length of hull or over capable of speed in the planing mode operation:

- c) at the calculated or measured planing angle of the hull bottom surface as determined with the craft operating at cruising speed, i.e. 5 knots above minimum speed in the planing mode or one-fourth of the speed difference between minimum speed in the planing mode and maximum speed, whichever is less; and
- d) with the hull bottom surface at the keel intersecting the plane of the water surface at the distance from the bow as calculated or observed and verified under operating conditions as in c) above.

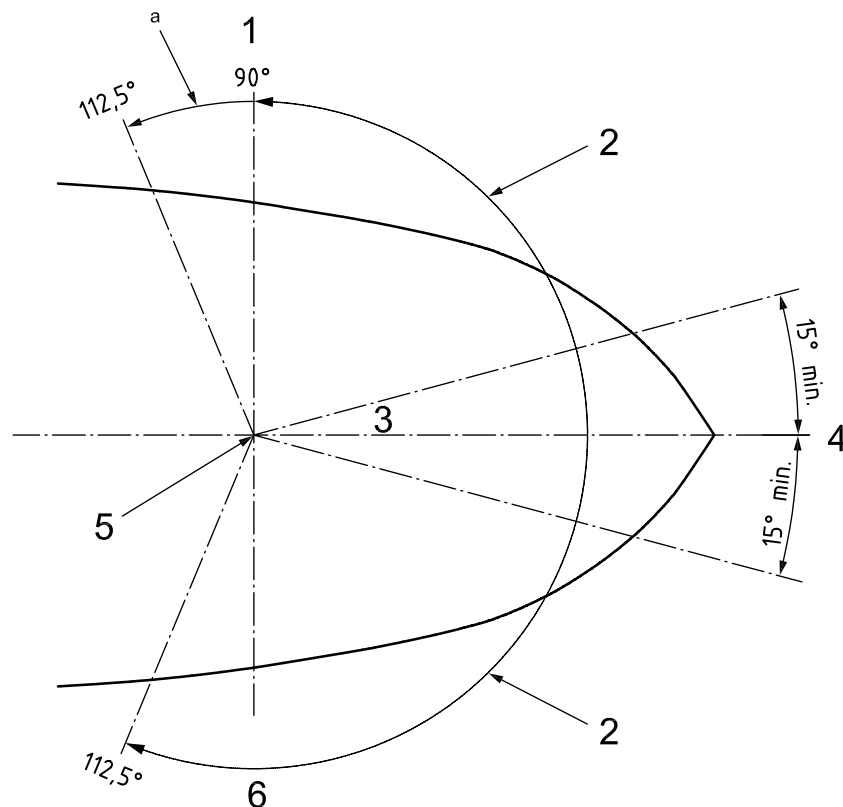
When determining the running trim angle by testing on craft equipped with transom mounted trim planes and/or propulsion unit power trim systems,

- the trim planes shall be adjusted and set at an angle not exceeding one-half of the total travel angle;
- propulsion unit trim position shall be adjusted and set with the forward centreline of the propeller shaft or water jet nozzle at an angle not exceeding 5° upward relative to the hull bottom immediately forward of the propulsion unit, and with the planing craft at a speed in the displacement mode as when manoeuvring for docking.

For craft capable of operating only at a speed in the displacement mode, the level reference line is determined with the craft at rest or at maximum speed in the displacement mode, whichever produces the greatest obstructed vision distance.

5.2.2 The minimum vertical range of vision shall extend from the horizontal with respect to the high eye position to the unobstructed line of vision from the low eye position (see Figures 1 and 2), while respecting the requirements of 5.1.5 for the horizontal arc of vision described in 5.1.1.

5.2.3 For port or starboard side helm location, the same angles of vision to port and starboard are required (see “a” in Figure 4).



Key

- 1 port
- 2 horizontal range of vision
- 3 centreline of craft
- 4 centre field of vision
- 5 eye position at helm station
- 6 starboard
- a See 5.2.3.

Figure 4 — Range of vision, horizontal

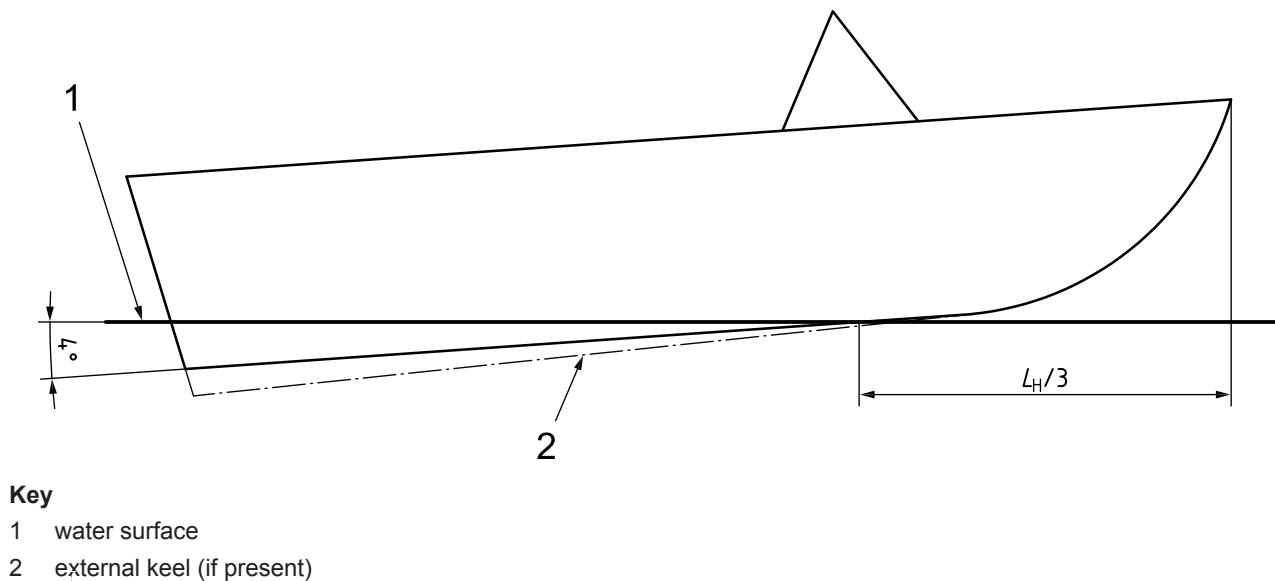


Figure 5 — Planing attitude

6 Field of horizontal vision — Astern

6.1 Craft without permanent cabin or other permanent superstructure aft of the main helm position obstructing vision astern

A field of vision astern to the horizon shall be provided throughout a horizontal arc of 135° equally divided on either side of a longitudinal axis directly astern from the helm. Vision astern shall be provided without leaving the helm or controls, i.e. not more than 0,5 m to either side from a seated position or 1 m to either side from a standing position in craft intended to be operated from a standing position.

6.2 Craft with permanent cabins or other permanent superstructure aft of the main helm position obstructing vision astern

Readily removable obstructions to vision, such as convertible or camper tops, aft and side cockpit curtains, are not considered permanent superstructures. It is assumed that during inclement weather, when these items are in place, caution in operation will be exercised and a lookout will be maintained.

Mirrors or cameras shall be provided to meet the requirements for vision astern prescribed in 6.1, without leaving the helm or controls. On craft fitted with autopilots, the helmsman can leave the helm position briefly to meet the requirements for visibility specified in 6.1.

7 Owner's manual

The following information shall be included in the owner's manual.

- a) Operator vision from the helm may be obstructed by high trim angles of the craft and other factors caused by one or more of the following variable conditions:
 - 1) propulsion unit trim angles (on craft equipped with a power trim system on the propulsion unit);
 - 2) hull trim plane angles (on craft equipped with power operated trim planes or trim tabs on the transom);
 - 3) loading and load distribution;
 - 4) speed;

- 5) rapid acceleration;
 - 6) transition from displacement to planing mode;
 - 7) sea conditions;
 - 8) rain and spray;
 - 9) darkness and fog;
 - 10) interior lights;
 - 11) position of tops and curtains;
 - 12) persons or movable gear in the operator's field of vision.
- b) The International Regulations for Preventing Collisions at Sea (COLREG) and the rules of the road require that a proper lookout be maintained at all times and observance of right of way be respected. Observance of these rules is essential.
- c) For craft with more than one helm position and not meeting the field of vision requirements, the following warning sign shall be displayed:

WARNING — Vision from this helm station is limited. Maintain a lookout as required.

- d) For craft with more than one helm position, the main helm position shall be specified.

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