National Standard

for

Commercial Vessels

PART F

SPECIAL VESSELS

SECTION 1

FAST CRAFT

SUBSECTION 1C

CATEGORY F2 FAST CRAFT

Edition 1

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FOREWORD

This Subsection of the National Standard for Commercial Vessels (NSCV) was prepared as part of the review of the Uniform Shipping Laws (USL) Code. This Subsection does not replace any section of the USL Code, as standards for fast craft were not addressed by that document.

In drafting this Section, consideration was given to a number of factors including:

a) Technological developments that have occurred in the performance of vessels engaged in domestic operations in Australia.

b) The development of the IMO Code of Safety for High Speed Craft applicable to vessels engaged in international operations.

c) The integration of aspects of the HSC Code into the high speed and light craft rules of most Classification Societies.

d) The adoption of the HSC Code by Commonwealth legislation for domestic vessels engaged in interstate operations.

e) The fact that some State and Territory jurisdictions already require compliance with parts of the HSC Code by administrative means to certain domestic vessels engaged in intrastate operations.

This Subsection of the NSCV shall be read in conjunction with Part B—General Requirements of the NSCV and Part F—Special Vessels Subsection 1A: General Requirements for Fast Craft of the NSCV.

The NMSC Secretariat drafted this Subsection with the assistance of a reference group comprising representatives from industry, State and Territory marine Authorities, and the Australian Maritime Safety Authority (AMSA). A workshop on Fast Craft was hosted by the NMSC in May 2000 with the purpose of reviewing safety issues to be addressed by the standard. A risk management workshop on Category F2 Fast Craft was held on 20 September 2001.

A draft of this Subsection, along with a Regulatory Impact Statement was released for public comment on 22 February 2006. A reference group comprising industry and government stakeholders met on 29 June 2006 to review the public comments received, and make recommendations to the NMSC. The NMSC accepted the recommendations of the reference group on 1 August 2006 and the draft Subsection and RIS were revised accordingly.

NMSC approved this Subsection on 13 November 2006, with the Office of Regulation Review reporting that the final RIS was suitable on 5 September 2006. ATC endorsed this document by inter-sessional vote on 8 March 2007.

This standard was first published, as Edition 1.0 (on-line PDF) in March 2007.

Edition 1 was later subject to a correction amendment. Correction Amendment 1 to Clauses 4.6 and A3 was endorsed by NMSC on 5 October 2010 and published in October 2010.

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INTRODUCTION TO PART F SUBSECTION 1C

The requirements for conventional vessels contained in the NSCV Parts C to E and the HSC Code have been used as a basis for the standards contained in this Subsection. For many Category F2 craft, the hazards tend to be a combination of those envisaged in the HSC Code and those provided for by the conventional vessel provisions contained in the NSCV.

The application of the conventional requirements from the NSCV have been modified to take into account the differences in risk that arise for craft where one or more of the key risk parameters listed below differs from that envisaged for vessels typically covered by these standards:

a) Speed

b) Size

c) Number of passengers

d) Operational area

A key parameter matrix approach has been adopted, based on the above key parameters. The key parameter matrices are intended to allow specific requirements of the base standards to be modified so as to accommodate variations in risk levels while maintaining a level of safety no less than that those provided by the NSCV standards for conventional vessels when applied to conventional vessels.

NOTE: By means of the key parameter matrix approach, a 34.9 m fast craft carrying 300 passengers to sea is required to meet many of the provisions of the HSC Code. Likewise; a small vessel that carries 13 passengers at speeds just over the speed threshold is required to meet provisions largely similar to those for conventional craft.

CHAPTER 1 PRELIMINARY

1.1 SCOPE

This Subsection of the NSCV specifies requirements for the design, construction and operation of Category F2 fast craft that are additional to the requirements specified in Parts C to E.

It shall be read in conjunction with the following Parts of the NSCV:

a) Part B—General Requirements

b) Part C—Design and Construction

c) Part D—Crewing and Competencies

d) Part E—Operations

e) Part F Subsection 1A: General Requirements for Fast Craft.

1.2 APPLICATION

Subject to Clauses 1.3 and 1.4, this Subsection applies to Category F2 fast craft being fast craft engaged in domestic operations in Australia that are—

a) seagoing Class 1 fast craft of equivalent length (L_e) less than 35 m; or

b) sheltered waters Class 1 fast craft of all lengths.

1.3 FAST CRAFT DEFINITION TO APPLY TO EACH OPERATIONAL AREA

For the purposes of applying this Subsection, the definition of a fast craft being a craft capable of speed of 25 knots or more in the fully laden condition shall be determined separately for each operational area considering the maximum speed at the fully laden displacement applicable to that operational area.

NOTE: A craft that is capable of 26 knots carrying a given number of passengers in operational area C would fall within the definition of a fast craft notwithstanding that the craft might be only capable of 24 knots when carrying an increased number of passengers permitted for operational area E (the greater displacement in operational area E results in a lesser maximum speed). See also Clause 1.4.

1.4 SPECIFIED OPERATIONS WHERE THE SPEED DOES NOT EXCEED 25 KNOTS

The provisions of this subsection do not apply to those operations of a fast craft where, due to physical or operational limitations, the craft does not exceed 25 knots in speed. The provisions shall be read as being applicable to those operations where the actual speed of the craft is 25 knots or more.

EXAMPLE 1

The provisions would not apply to a fast craft that is capable of exceeding 25 knots but which is limited by operational controls or physical controls to a speed less than 25 knots.

EXAMPLE 2

A fast craft that operates in two different operational areas where the fully laden speed in one operational area exceeds 25 knots while the other is less than 25 knots. The provisions would only apply to the first operational area.

EXAMPLE 3

The provisions would not apply to a fast craft engaged in sheltered water service that is limited to speeds less than 25 knots on short runs where the number of passengers exceeds the number of seats.

1.5 OBJECTIVE

The objective of this Subsection is to specify standards for the design, construction and operation of Category F2 fast craft so that the overall risk to persons from a Category F2 fast craft is no greater than that from a conventional vessel under the NSCV.

NOTE: The application of the HSC Code to Category F2 craft without modification is considered inappropriate due to—

1. problems in the application of the HSC Code to small craft;
2. the sharpness in the transition of requirements as a vessel passes over the threshold speed; and
3. the exclusion in the HSC Code of vessels engaged in sheltered water operations.

1.6 DEFINITIONS

For the purposes of this Subsection of the National Standard for Commercial Vessels, the definitions in the following documents shall apply:

a) NSCV Part B

b) NSCV Part F Section 1 Subsection 1A

c) This Subsection (NSCV Part F Section 1 Subsection 1C)

Where there is any variation in the definitions—

i) between this Subsection and Part B or Part F Section 1 Subsection 1A of the NSCV, then the definitions in this Subsection shall apply; and

ii) between Part B and Part F Subsection 1A of the NSCV, then the definitions in Part F Section 1 Subsection 1A shall apply.

The following terms are defined in Part B:

accommodation space, Class 1, operational area A, operational area B, operational area C, operational area D, operational area E, control station, crew, crew accommodation, depth, domestic operations, fast craft, hazard, initial survey, length, master, maximum speed, measured length, National Regulator operational area, passenger, recognised organisation, risk, risk assessment, service category, sheltered waters, vessel.

The following terms are defined in Part F Subsection F1:

conventional vessel, craft, crew, equivalent length, HSC Code, officer, operating compartment.

air cushion vehicle—

a craft such that the whole, or a significant part, of its weight can be supported, whether at rest or in motion, by a continuously generated cushion of air dependent for its effectiveness on the proximity of the surface over which the craft operates.

datum deck—

means a watertight deck, or equivalent structure of a non-watertight deck, covered by a weathertight structure of adequate strength to maintain the weathertight integrity and fitted with weathertight closing appliances.

design waterline—

the waterline corresponding to the maximum operational weight of the craft with no lift or propulsion machinery active.

NOTE: The location of the design waterline is limited by considerations of reserve buoyancy, intact and damaged stability, and structural loading.

displacement mode—

the regime, whether at rest or in motion, where the weight of the craft is fully or predominantly supported by hydrostatic forces.

failure mode and effect analysis—

an examination of the craft's systems and equipment to determine whether any frequent or reasonably probable failure or improper operation can result in a hazardous or catastrophic effect.

light fast craft—

a fast craft capable of maximum speed equal to or exceeding—

$$V_m = 7.16\Delta^{0.1667}$$

where

V_m = maximum speed, in knots

Δ = The craft displacement corresponding to the design waterline, in tonnes

NOTE: Light fast craft are differentiated from other fast craft for the purposes of this standard to permit the application of standards for watertight and weather tight integrity and anchoring that are better suited to the characteristics of such craft.

modes of operation—

the series of operational regimes that characterise the craft's interaction with the water surface as it proceeds from stationary through to maximum speed.

non-displacement mode—

the normal operational regime of a craft when non-hydrostatic forces substantially or predominantly support the weight of the craft.

surface effect ship—

is an air-cushion vehicle whose cushion is totally or partially retained by permanently immersed hard structures.

NOTE: An SES incorporates rigid side hulls that contribute to buoyancy while underway, with flexible seals at bow and stern only.

stabilisation system—

a system intended to stabilise the main parameters of the craft's attitude: heel; trim; course; and height, and control the craft's motions: roll; pitch; yaw;

and heave. It may include rudders, foils, flaps, fans, water jets, tilting and steerable propellers, pumps, power drives that actuate stabilisation devices, sensors, logic processors, and automatic safety control.

NOTE: The term stabilisation system excludes devices not associated with the safe operation of the craft, e.g. motion reduction or ride-control systems.

transitional mode—

the regime between displacement and non-displacement modes.

1.7 ABBREVIATIONS

ACV—

air cushion vehicle

FMEA—

failure mode effect analysis

RMS

Root mean square

SES—

surface effect ship

1.8 KEY RISK PARAMETERS

The additional standards for Category F2 fast craft specified in this Subsection are largely determined by four key risk parameters of size, speed, number of persons on board and operational area. It is assumed that the magnitude of risk arising from a particular hazard associated with the operation of a fast craft is largely a function of the value of one or more of these four parameters.

Table 1 summarises the priority of key risk parameters relative to specific hazards prior to the treatment of risk by this standard. The table forms the basis for the deemed-to-satisfy requirements specified in Chapter 3.

1.9 INTERNATIONAL CODE OF SAFETY FOR HIGH-SPEED CRAFT (HSC CODE)

Where in this Subsection, a reference is made to the HSC Code, it shall be interpreted and applied in accordance with NSCV Part F Subsection 1B—Requirements for Category F1 fast craft.

NOTE: Specific clause references to the HSC Code contained within this Chapter pertain to the HSC Code 2000. The clause numbers in the HSC Code may change with subsequent amendments of the HSC Code.

1.10 REFERENCED DOCUMENTS

AUSTRALIAN STANDARDS

AS 3533.1—*Amusement rides and devices – Design and construction*

AS 3533.2—*Amusement rides and devices – Operation and maintenance*

Table 1 — Priority of key parameters affecting the risk associated with specific hazards prior to treatment

Required outcome	Priority of key parameter on risk			
	Size	Speed	Persons	Area
Operational performance		1		
Arrangement, accommodation and personal safety		1	2	2
Watertight and weathertight integrity		2		1
Construction	2	1		1
Engineering	2	2		2
Stability and subdivision	2	1	2	2
Equipment	2	1	2	
Crewing and competencies		1		
Operational requirements		1	1	

KEY:

1 = First priority parameter effecting risk

2 = Second priority parameter effecting risk

Size = size of craft in terms of length, mass or gross tonnage

Speed = maximum speed of the craft

Persons = maximum number of persons on board

Area = geographical limits; i.e. operational area A, B, C, D or E plus specific sea state or other restrictions.

CHAPTER 2 REQUIRED OUTCOMES

2.1 GENERAL

A Category F2 Fast Craft must meet the required outcomes contained in Parts C to E of this Standard, as applicable, plus those specified in Clauses 2.2 to 2.10.4 of this Chapter to the extent specified in Chapter 3 to Chapter 5 of this Subsection.

2.2 OPERATIONAL PERFORMANCE

2.2.1 Suited to intended service

The operational performance of a craft must be suited to the intended operational area so as to avoid unacceptably high levels of risk.

2.2.2 Performance characteristics forgiving of human error

The operational performance of a craft in all its modes of operation must be such that a single human error does not directly result in catastrophic consequences such as capsize, flooding and nose-diving.

2.2.3 Knowledge of performance characteristics

The operator of the craft must be provided with information about the performance characteristics and limitations of the craft through its various modes of operation to enable the operator to avoid or correct any conditions that are potentially hazardous.

2.3 ARRANGEMENT, ACCOMMODATION AND PERSONAL SAFETY

2.3.1 Operating compartment

2.3.1.1 Monitoring of hazards

The operating compartment must be located, arranged and equipped to permit the operating crew to effectively monitor all hazards associated with the craft that are within their control and which may have a significant impact on the safety of—

a) the craft itself;

b) persons on board the craft;

c) other vessels; and

d) persons that are not on board the craft but who may be adversely affected by the passage of the craft.

2.3.1.2 Protection of essential functions—operating compartment location

The operating compartment on a craft must be located to minimise the likelihood of damage or injury to operating crew members, in both normal and abnormal conditions of operation.

2.3.1.3 Human / system interface—operating compartment

The design and layout of the compartment from which the crew operate the craft must permit all operating crew members to perform their duties without reducing their ability to control the craft or without unreasonable: difficulty; fatigue; concentration; or time delay. In fulfilling this required outcome, due consideration must be given to—

a) the provision of visual and other information necessary to carry out navigation, collision avoidance and safety functions; and

b) the placement of controls, instruments and alarms essential for safe navigation, collision avoidance, communications and operation.

2.3.2 Spaces accommodating persons

2.3.2.1 Protection of persons from excessive accelerations

Spaces that accommodate persons must be designed and arranged to protect their health and safety from the risks of the accelerations or decelerations that may arise in normal and abnormal conditions of operation.

2.3.2.2 Noise levels

Noise within occupied spaces arising from machinery, propulsion systems or other sources must not exceed levels that would interfere with essential communication with other persons on board the craft or, where appropriate, remote from the craft.

2.3.3 Protection of essential functions—accelerations

Fittings and systems essential for the safe operation of the craft must be protected from accelerations arising from collision damage and the movement of cargo, stores, luggage or other masses on the craft.

2.4 WATERTIGHT AND WEATHERTIGHT INTEGRITY

2.4.1 Buoyancy

A fast craft must have buoyancy and freeboard characteristics sufficient for safety when the craft is operated in the high speed and transition modes, as well as the displacement mode or when it is stationary.

2.5 CONSTRUCTION

2.5.1 Strength, deformation and watertight integrity

The structure of a craft must be capable of withstanding the increased loads, including dynamic loads and those repeated loads that may result in fatigue failures, which may act on a craft operating at maximum speed, taking into account all operating conditions in which the craft is permitted to operate. Such loading must not result in loss of watertightness, structural failure, or excessive deformation that could interfere with the safe operation of the craft.

2.5.2 Heavy masses

Structures that support or restrain heavy masses must be capable of withstanding the loads or impacts arising from collision damage.

2.6 ENGINEERING

2.6.1 Protection of essential systems—reliability

Machinery and systems, the continued operation of which are essential to the safety of a craft, must maintain an appropriate level of reliability against failure or malfunction in normal and emergency situations.

NOTE: Redundancy and arrangements for monitoring are methods that go towards satisfying this required outcome.

2.6.2 Verification of essential systems or components

The effect of a failure or malfunctioning of handling or control devices and other essential main propulsion; and auxiliary machinery systems or components; must be determined to verify that the craft can be operated safely over the intended range of operational conditions.

2.6.3 Protection of essential systems—monitoring

Sufficient instruments and alarms must be provided to enable the operating crew to monitor the status of systems essential to the safety of the craft when operating at high speed.

2.6.4 Control in the event of a malfunction

Controls and alarms essential for safe navigation and collision avoidance, or for responding to an emergency, must be arranged so that, in the event of the failure or malfunction of an automatic or remote system, control can still be affected manually or by alternative means.

2.6.5 Stabilisation systems

Stabilisation systems and/or ride control systems, where fitted, must be arranged not to endanger the safety of persons during normal and abnormal conditions of operation or in the event of malfunction.

2.7 INTACT AND DAMAGED STABILITY AND SUBDIVISION

2.7.1 Intact stability

A craft must have stability characteristics adequate for safety when the craft is operated at high speed and during any transient mode, as well as at slow speed and when it is stationary.

NOTE: Stability also includes the characteristics of longitudinal stability

2.7.2 Stability in the event of system malfunction

Stability characteristics in the high speed and transient modes must be adequate to transfer the craft safely to the displacement mode in case of any system malfunction.

2.7.3 Stability in the event of damage

A craft must have stability characteristics in the displacement mode adequate for safety taking into account the likely increased extent of damage that would occur on a craft that is involved in a collision, grounding or contact incident when operating at high speed.

2.8 EQUIPMENT

2.8.1 Protection of essential functions—lifesaving equipment

Lifesaving equipment on a craft that operates at high speed must be located to avoid any increased likelihood that it may be damaged in the event of a collision.

2.8.2 Navigation and collision avoidance

2.8.2.1 Scope of navigation and collision avoidance equipment

Sufficient navigation and collision avoidance equipment must be provided to enable the operating crew at their normal operating station to establish and monitor the craft's position, heading, speed, course, and the presence and location of navigation or collision hazards.

2.8.2.2 Accuracy and reliability of navigation and collision avoidance equipment

Navigation and collision avoidance equipment must be capable of accurately performing its function when the craft is operating and/or manoeuvring. The reliability of navigation and collision avoidance equipment must be such as to reduce risks associated with its failure, malfunction or improper operation to within acceptable levels.

2.9 CREWING AND COMPETENCIES

2.9.1 Capacity to identify hazards and manage risk

Persons who navigate, operate, or crew a craft that operates at high speed must have the competencies needed to quickly and accurately identify, assess, and control the risks associated with high speed operation.

2.9.2 Knowledge of particular craft

Crews must have a thorough understanding of the operation and maintenance of the craft and its systems to the extent—

a) relevant to their duties; and

b) necessary to ensure prompt, effective and reliable operation at time of need.

2.10 OPERATIONAL REQUIREMENTS

2.10.1 Operational controls and procedures

The management of a craft must identify, implement and enforce the operational controls and procedures required to achieve and maintain the various safety measures for the control of risk.

2.10.2 Essential infrastructure

Infrastructure that may be essential for the safe operation of the craft (e.g.: places of refuge; communications; weather forecasts; maintenance facilities; and rescue facilities) must be identified, established and maintained.

2.10.3 Documentation for safe operation and maintenance

Information relevant to the safe operation and maintenance of a craft that operates at high speed must be documented and provided onboard the craft and elsewhere as necessary for ready reference by those persons responsible for the safe operation and maintenance of the craft.

2.10.4 Maintenance

Systems essential for the safety of a craft operating at high speed must be maintained in full working order.

CHAPTER 3 DEEMED-TO-SATISFY SOLUTIONS—DESIGN AND CONSTRUCTION

3.1 PRELIMINARY

A Category F2 Fast Craft shall be deemed-to-satisfy the design and construction required outcomes in Chapter 2 of this Subsection if it complies with the requirements of this Chapter. Alternatively the craft may comply with the requirements of NSCV Part F Subsection 1B: Category F1 Fast Craft.

3.2 PART C OF THE NSCV

Except as otherwise specified in this Chapter, Category F2 Fast Craft shall comply with the requirements for conventional vessels contained in NSCV Part C—Design and Construction.

3.3 OPERATIONAL PERFORMANCE

The initial survey of a Category F2 fast craft shall include such investigations, surveys, trials and tests to establish and record:

a) The speed, stopping and manoeuvrability characteristics of the craft in the displacement, transitional and non-displacement modes.

b) The craft's propensity to exhibit any undesirable characteristics while in motion, including those listed in Table 2.

c) Any changes in the craft's stability characteristics as it passes from the displacement mode through the transition mode to the non-displacement mode.

d) The time it takes for the craft to pass through the transition mode, both when accelerating and decelerating.

e) The performance and limits of safe use of directional control systems, any stabilisation systems (including lift systems), and any automatic pilot.

f) The performance and limits of safe use of other components or systems (such as some ride-control systems) that have been identified as being potentially critical for safety by the FMEA analysis.

NOTE: Guidance on conducting performance trials is contained in HSC Code Annex 9.

Table 2 — Typical undesirable effects

Type of craft	Effect
All craft	1. Directional instability or yawing (often coupled to roll and pitch instabilities). 2. Broaching and bow diving in following seas at speeds near to wave speed. 3. Excessive heel during turning, either outward or inward during one or more of displacement, transition or high speed modes. 4. Excessive trim during one or more of displacement, transition or high speed modes. 5. Slamming giving rise to excessive accelerations and potential structural damage. 6. Plough-in in following seas due to insufficient reserve buoyancy forward. 7. Flipping of the craft that might arise from aerodynamic lift at high speed. 8. Horizontal accelerations.
Planing monohulls	9. Bow diving owing to dynamic loss of longitudinal stability when planing which can occur in relatively calm seas. 10. Reduction in transverse stability with increasing speed. 11. Porpoising, coupled with pitch and heave oscillations that can become violent. 12. Chine tripping, occurring when the immersion of a chine generates a strong capsizing moment.
Catamarans	13. Bow diving in relatively calm seas due to dynamic loss of longitudinal stability.
ACV (air cushion vehicle)	14. Plough-in, either longitudinal or transverse, which may be a result of bow or side skirt tuck-under or sudden collapse of skirt geometry, which in extreme cases can result in capsize. 15. Instability of skirts on craft with flexible skirts under one or more operational conditions. 16. Instability of skirts that may be employed to actively control the motion of the craft.
SES[1] (surface effect ship)	17. Reduction in effective metacentric height (roll stiffness) in high speed turns compared to that on a straight course, which can result in sudden increases in heel angle and/or coupled roll and pitch oscillations. 18. Resonant rolling in beam seas, which, in extreme cases, can result in capsize.
SWATH (small waterplane area twin hull)	19. Pitch instability due to the hydrodynamic moment developed as a result of the water flow over the submerged lower hulls.
Hydrofoils	20. Dangerous attitudes or inclinations and loss of stability resulting from changes and/or adjustments to the control surfaces.

NOTES:

1 - An SES is also prone to the typical effects specified for an ACV.

3.4 ARRANGEMENT, ACCOMMODATION AND PERSONAL SAFETY

3.4.1 Operating compartment

3.4.1.1 Separation

On Category F2 fast craft that carry 50 or more passengers the following separation measures apply:

a) The operating compartment or operating position shall be separated from public spaces and not used for purposes other than navigation, communications and functions essential for the safe operation of the craft.

b) A sign is to be provided outside the operating compartment or adjacent to the operating position specifying that passengers are not to speak to the navigating crew on duty whilst the craft is operating, except in an emergency.

3.4.1.2 Field of vision

The operating compartment shall be—

a) located and arranged to enable the operating crew to gain a view all around the horizon;

b) provided with a field of vision from the navigating position in both the horizontal and vertical ranges in accordance with Table 3;

c) provided with means to keep a clear view at all times through windows essential for safe navigation and collision avoidance, regardless of weather conditions; and

d) arranged to avoid obscuring or distracting reflections on windows used for navigation and collision avoidance and other adjacent surfaces.

NOTES

1. Requirement 3.4.1.2a) could be satisfied by locating the operating compartment above other structures, the provision of bridge wings and/or (for blind spots within the aftermost 135 degree sector) the provision of closed circuit television (CCT) monitors.

2. Requirement 3.4.1.2c) could be satisfied by the provision of equipment such as windscreen wipers, windscreen washers and demisters.

3. Reflections may be reduced by—

   a) specifying console tops and instruments having surfaces that are matt or non-reflective and of dark colour; and

   b) setting windows at an angle that avoids excessive reflections.

3.4.1.3 Operating compartment layout

The arrangement of equipment and means for navigation, collision avoidance, manoeuvring, control, communication and other instruments essential for safe navigation shall be located sufficiently close together to enable the person navigating the craft to receive all necessary information and to use the equipment and controls, as required—

a) while they are seated in the normal operating position; and

b) with minimum practicable deviation from their normal line of vision.

Table 3 — Field of vision from the navigating position

Equivalent length	Maximum speed		
	≥45 knots	**≥35 knots and <45 knots**	**≥25 knots and <35 knots**
<24 m	HSC Code	Part C Section 1	Part C Section 1
≥24 m and <35 m	HSC Code	HSC Code	Part C Section 1
≥35 m	HSC Code	HSC Code	HSC Code

KEY:

Part C Section 1— means the craft shall comply with the requirements for field of vision from the navigating position specified in this Standard for conventional vessels.

HSC Code—means the craft shall comply with the requirements for field of vision from the navigating position specified for high speed craft under the HSC Code.

3.4.1.4 Instruments

Instruments and controls essential for the safe operation of the craft shall be—

a) logically grouped according to their functions; and

b) installed to facilitate monitoring.

NOTES:

1. Instruments that share functions or that require inter-switching can result in confusion.

2. Instruments and controls may require illumination for night use and/or screening or dimming to reduce glare.

3.4.2 Design accelerations

3.4.2.1 Vertical accelerations

Superimposed vertical accelerations at any location within spaces normally occupied by passengers or crew, shall not exceed 0.3 g RMS.

NOTE: A craft designed for thrill type activities where vertical accelerations exceeding 0.3 g RMS may be encountered would be considered as a proposal for an equivalent solution. The craft and its operation should comply with AS 3533.

3.4.2.2 Horizontal operational accelerations

The design values for horizontal operational accelerations shall be appropriate for the anticipated operational characteristics of the craft in its normal operating environment. For the purposes of this standard, the magnitude of horizontal accelerations can be ascertained by observing or anticipating the typical effect on persons (see Table 14 and Annex A).

NOTE: The design values for horizontal operational accelerations would normally be a determining factor in the design and fit out of accommodation spaces. The degree to which persons are exposed to risks arising from acceleration hazards may reflect upon the limiting envelope placed on the craft's operation specified by the designer, builder and/or operator.

3.4.2.3 Collision accelerations

The design collision accelerations shall be determined in accordance with Annex B of this Subsection.

3.4.3 Limitations on the location of spaces in forward part of the craft

Spaces normally occupied by persons including public spaces, control stations (including the operating compartment) and passenger and crew accommodation spaces, as well as escape or evacuation routes shall be located abaft of the forward collision zone. These spaces shall not be located forward of a transverse plane (see Figure 1) corresponding to an area forward of the plane not less than A_{bow} as determined by:

$A_{bow} = 0.0018 A m f V_{op}$, but not to be taken greater than 0.04 A;

where

A_{bow} = the plan projected area of craft energy absorbing structure forward of the transverse plane, in metres squared (m^2)

A = total plan projected area of craft, in metres squared (m^2)

m = material factor

$= \frac{0.95}{M}$

where

M = hull material factor

= 1.3 for high tensile steel

= 1.0 for aluminium alloy

= 0.95 for mild steel

= 0.8 for fibre-reinforced plastics

NOTE: Where the materials are mixed, the material factor shall be taken as a weighted mean, weighted according to the mass of material in the area defined by A_{bow}

f = framing factor

= 0.8 for longitudinal deck and shell stiffening

= 0.9 for mixed longitudinal and transverse

= 1.0 for transverse deck and shell stiffening

V_{op} = 90% of maximum speed, in knots

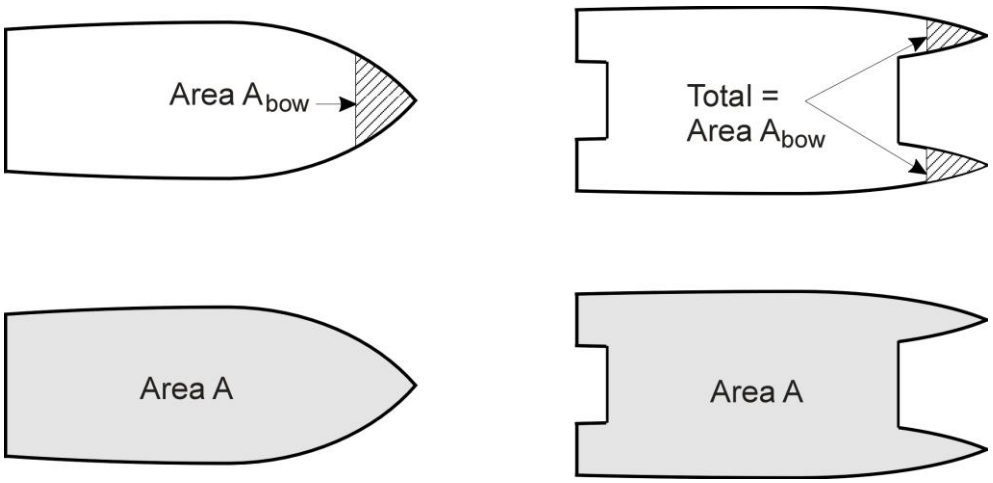

Figure 1 — Collision zones

3.4.4 Securing of items within spaces normally occupied by persons

Furniture (including seats, tables, wardrobes and lockers), items of equipment (including food preparation equipment and equipment in the operating compartment), open doors and other heavy masses that could potentially dislodge and become projectiles within spaces normally occupied by persons shall be secured against movement. The items, their attachments and the structure in proximity shall be designed to withstand the accelerations specified in Clause 3.4.2 without excessive movement or deformation that could cause injury or block escape or evacuation paths. Kiosks, bars, shops and baggage shall comply with Table 4. Seats within spaces normally occupied by persons shall comply with Table 5.

NOTE: This clause precludes the use of furniture that is unsecured.

3.4.5 Personal safety risk control measures

Spaces normally occupied by persons shall be arranged and constructed to limit the consequences arising from persons being subjected to accelerations that may occur in normal and abnormal conditions of operation including collision.

Spaces on the craft that are normally occupied by persons shall comply with Table 6.

Table 4 — Specific requirements for securing items in spaces normally occupied by persons

Item	g_{coll} less than 3	g_{coll} = 3 to 12
Kiosks, bars, shops	No limitation	Enclosed or on the after side of bulkheads.
Baggage stowage	No requirement	Baggage stowed with protection forward.

Table 5 — Requirements for the structural performance of seats within spaces normally occupied by persons

Item	g_{coll} less than 3	g_{coll} = 3 to 12
Seat design	Fixed (1)	Seats and/or sofas to be fixed (1) and either dynamically tested (2) or built integral with the structure (3)
Tables	Fixed (1)	Tables to be fixed (1) and either dynamically tested (2) or built integral with the structure (3).

KEY:

(1) Fixed means fixed when in use or when stowed (e.g. airline-type tray tables)

(2) Refer to the HSC Code Annex 10 criteria for testing and evaluation of revenue and crew seats.

(3) Refer to Clause 3.6.2.

Table 6 — Minimum required design and operational risk control measures for Category F2 fast craft

Craft characteristics	Minimum deemed to satisfy design level	Design Risk control measures for spaces normally occupied by persons	Associated operational risk control measures
Equivalent length ≥35 m or Speed <35 knots	Design Level 1	• Seats for each person on board (see Clause 3.4.6) • Ready availability of hand holds and grab rails in all spaces that persons normally occupy (see Clause 3.4.7) • Furniture, structures and fittings shall be designed and constructed without sharp edges to avoid injury.	• Advice to elderly or disabled persons to remain seated when operating • Passengers to remain seated when operating in hazardous conditions
Equivalent length <35 m and Speed ≥35 knots	Design Level 2	• As for design level 1 and • Padding of hard surfaces, including seats frames, sofas and edges of tables • Seating that is either forward or rear facing.	• As for design level 1

NOTE:

Table 6 represents the minimum required standard. A higher standard may be needed to fulfil broader safety obligations (see Part 3 of Schedule 1 to the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012*).

3.4.6 Location of seating

Seating located outside enclosed spaces shall not give rise to unacceptable risks due to wave conditions, noise, or exposure to weather.

On craft intended for operational areas A or B, seating sufficient for all persons shall be arranged in spaces that are enclosed. On craft intended for operational area C, seating sufficient for all persons shall be arranged in spaces that can be protected from the weather.

NOTES:

1. This clause does not preclude the provision of seating (additional to the minimum quantity prescribed) to be located outside enclosed spaces on craft operating to sea.
2. Seating within the minimum requirement on seagoing craft that is located outside of enclosed spaces or spaces that can be protected (as applicable) would be assessed as a proposal for an equivalent solution.

3.4.7 Grabrails and hand holds

3.4.7.1 Location

Grabrails or handholds of sufficient number and strength shall be provided to enable persons to steady themselves from the accelerations encountered during normal operation (including slamming) of the craft while—

a) seated;

b) moving about accommodation spaces;

c) moving to spaces containing equipment essential for the operation or safety of the craft; or

d) operating any equipment essential to the operation or safety of the craft.

NOTE: Seat-backs along aisles may be arranged as handholds.

3.4.7.2 Height of guardrails and bulwarks

The height of guardrails and bulwarks in way of passenger spaces shall be a minimum 1,000 mm above the deck except on craft where, during high speed operation, passengers—

a) are not permitted on open decks; or

b) are required to remain seated.

3.4.8 Noise levels

The maximum noise level in the operating compartment shall not exceed 65 dB(A) to facilitate communication within the compartment and external radio-communications.

On craft required to be fitted with a public address system under NSCV Part C Subsection 7A: Safety Equipment, the noise levels within the accommodation space shall not interfere with hearing announcements made over the public address system. To achieve this the average noise level within an accommodation space shall not exceed 75 dB(A) and the maximum noise level within the space shall not exceed 78 dB(A).

NOTE: As well as emergency use, the public address system may be required to warn persons to remain seated or comply with other instructions while the craft is operating at high speed.

3.5 WATERTIGHT AND WEATHERTIGHT INTEGRITY

3.5.1 Reserve buoyancy

The reserve buoyancy of a light fast craft, represented by the volume of the hull above the waterline up to the datum deck at the maximum operational displacement, shall not be less than that specified in Table 7.

Table 7 — Reserve buoyancy

	Operational area				
	A	B	C	D	E
Reserve buoyancy as a percentage of maximum displacement	250	200	150	50	25

3.5.2 Load line

A light fast craft complying with Clause 3.5.1 need not be assigned a load line determined by the geometric calculations in NSCV Part C Subsection 2A, nor need the craft comply with the conditions of assignment for a load line. Subject to other clauses within this subsection, a light fast craft that would otherwise be required to be provided with a loadline shall comply with the requirements for weathertight and watertight integrity specified in NSCV Part C Subsection 2B.

A light fast craft, if 24 m or more in equivalent length, shall be marked with a load line at the minimum freeboard corresponding to satisfying the relevant subdivision, scantling and stability criteria.

NOTE: Fast Craft that are not light fast craft are not required to comply with Clause 3.5.1 but are, if 24 m or more in measured length, subject to the requirements for the calculation of load line and conditions of assignment specified in NSCV Part C Subsection 2A.

3.5.3 Sills and coamings

On craft that are light fast craft that comply with Clause 3.5.1, the height above the deck of sills to doorways and coamings of hatches may be reduced from a greater height specified in NSCV Part C Subsection 2B to the height specified in Table 8.

NOTE: Access for persons in wheelchairs may be provided by moveable ramps or angled gratings.

Table 8 — Coaming and sill heights on light fast craft

Location of hatch or doorway	Minimum height of coaming or sill mm	
	First tier on the datum deck	Tiers above the first tier on the datum deck
Opening leading to machinery spaces	380	250
Opening leading to spaces considered buoyant for the purposes of stability	250	100
Operational area A, B and C opening to spaces not considered buoyant for the purposes of stability	100	0
Operational area D and E opening to spaces not considered buoyant for the purposes of stability	0	0

3.6 CONSTRUCTION

3.6.1 Applicable standards

The construction of the hull, decks and other components of a Category F2 fast craft shall be suited to the intended speed and range of operating conditions likely to be encountered during the service life of the craft. The deemed-to-satisfy solutions for the construction of Category F2 fast craft are—

a) for craft 35 m or more in equivalent length, the craft shall be designed, constructed and maintained in accordance with the rules of a recognised organisation; or

b) for craft less than 35 m in equivalent length—

   i) the standards specified in NSCV Part C Section 3 to the extent that they fall within the expressed application of that Section; or

   ii) the craft shall be designed, constructed and maintained in accordance with the rules of a recognised organisation.

3.6.2 Heavy masses

Heavy masses (such as machinery, deckhouses, tanks, mast structures, vehicles, cargo, etc), their attachments or securing points, and their supporting structure in proximity shall be designed to withstand the accelerations specified in Clause 3.4.2 without excessive movement or deformation that could endanger persons or compromise watertight integrity or other systems essential to the safety of the craft after a collision or grounding.

3.6.3 Cyclic loads

Cyclic loads, including those from vibrations which can occur on the craft, shall not—

a) impair the integrity of structure during the anticipated service life of the craft;

b) hinder normal functioning of machinery and equipment; nor

c) impair the ability of the crew to carry out its duties.

3.7 ENGINEERING

3.7.1 Machinery and systems

3.7.1.1 Reliability

Where a failure of single unit of propulsion or auxiliary machinery is a hazard that could result in unacceptable risks that are over and above those of a conventional vessel, such machinery and its systems shall be designed and arranged to reduce the likelihood of failure.

NOTE: Special attention should be given to:

1. A generating set which serves as a main source of electrical power.
2. The fuel oil supply systems for engines.
3. A system that provides essential lubrication.

4. A system that provides essential cooling.
5. Any air compressor and receiver for starting or control purposes.
6. The hydraulic, pneumatic or electrical means for control in main propulsion machinery, including controllable-pitch propellers.

Additionally, where the likelihood of failure is still too frequent to reduce the risks to acceptable levels, the craft, its machinery, and systems shall be designed and arranged to reduce the consequences of failure.

NOTE: This can be done by providing redundancy or systems that are fail-safe.

3.7.1.2 Machinery protection devices

Internal combustion machinery that is essential to the safety of the craft when operating at high speed shall be protected against overspeed where there is a possibility of significant fluctuations in load during normal operation. Safety devices to prevent overspeed shall not cause complete engine shutdown without providing prior warning and the opportunity to manually abort the shutdown. Such safety devices shall be capable of being tested.

NOTE: Some engines are arranged to reduce revolutions to idle speed rather than shut down entirely, effectively preventing overspeed without causing complete shutdown

3.7.2 Directional control systems

3.7.2.1 Reliability

The systems for directional control (throttle, ahead and astern control, and steering), including any mechanical linkages, and all power or manual devices, controls and actuating systems, shall be designed and installed so that the likelihood of loss of directional control while travelling at high speed in normal operation is extremely remote.

3.7.2.2 Redundancy

The craft shall be provided with a backup directional control system where specified in Table 9. The controls for the backup directional control system shall be located in the operating compartment. The effectiveness of the backup directional control system shall be tested in the FMEA, (see Clause 3.7.5).

Craft operating in operational area D and E service that are provided with a backup directional control system need not comply with the requirement for emergency steering system specified in NSCV Part C Subsection 5A.

NOTES:

1. Backup directional control system refers to redundancy provided for the purposes of quickly regaining control of the craft in the event of a failure while travelling at speed in—
   a) the method of control between the operating compartment and steering force actuating mechanism; and
   b) the primary source of mechanical power used to actuate the steering.
2. Emergency steering refers to an alternative method of steering provided to take the craft to a place of safety in the event of a failure of the primary steering system.

3. This requirement goes further than the normal requirement of an emergency means of steering. Very high risks are associated with the loss of directional control on a craft travelling at high speed.
4. Duplication of fuel racks and the shut-down actuator fitted to an engine is not required.

Table 9 — Backup directional control system

Equivalent length criterion	Maximum speed ≥40 knots	Maximum speed <40 knots
<24 m equivalent length	Required	Not required
≥24 m equivalent length	Required	Required

3.7.3 Stabilisation systems

Stabilisation systems shall be designed so that, upon failure or malfunctioning of any one of the stabilisation devices or equipment, the craft's motion will remain within safe limits of acceleration and angle of heel.

NOTES:

1. This provision might be achieved through backup stabilisation devices or by the craft having characteristics that allow it to be safely brought into the displacement or other safe mode.
2. HSC Code Chapter 16 may be used for guidance in fulfilling this requirement.
3. For ride control systems, refer to Clause 3.7.5.

3.7.4 Alarms

In addition to any alarms in the operating compartment specified for a conventional vessel in NSCV Part C Section 5, the craft shall be provided with alarms that give warning of any impending or actual malfunctions or unsafe conditions that could render the craft out of control or would require immediate corrective action to minimise the consequences to the craft when operating at high speed.

EXAMPLES:

Total loss of normal electrical supply.

Overspeed of propulsion engines.

Failure of directional control devices.

Failure of power supply to lift, directional control or trim control devices.

Low level fuel contents.

Low level fluid reservoir, the contents of which are essential to for normal craft operation.

Failure of a system not listed above that has been identified through the FMEA to be critical for the safety of the craft.

3.7.5 Failure mode and effect analysis (FMEA)

The craft shall be subject to a failure mode and effect analysis of the following systems:

a) The directional control system.

b) Propulsion machinery systems and their associated controls.

c) Essential auxiliary systems and their associated controls.

d) Stabilisation systems (where fitted).

e) Ride control systems (where fitted).

f) Any automatic safety devices that could shut down essential machinery or systems.

The FMEA analysis shall determine that the risks associated with any likely failure of any of these items of equipment will remain within the acceptable range.

NOTES:

1. Procedures for failure mode and effect analysis are specified in HSC Code Annex 4.
2. Guidance on acceptable risk is provided in Annex C of this Subsection.
3. Engineered solutions for controlling risk are preferred over operational solutions.

3.8 STABILITY AND SUBDIVISION

3.8.1 Intact stability in the displacement mode

The intact stability of a Category F2 fast craft other than a hydrofoil when in the displacement mode shall comply with the requirements for conventional vessel specified in NSCV Part C Subsection 6A.

3.8.2 Intact stability in the non-displacement mode for semi-displacement and planing craft

In all loading conditions, the outward heel due to turning shall not exceed 8 degrees.

NOTE: Compliance with this criterion would normally be established during the trials specified in Clause 3.3.

3.8.3 Hydrofoil craft

Category F2 fast craft fitted with hydrofoils shall comply with HSC Code Clauses 2.3 to 2.5, 2.11 to 2.13 and Annex 6.

3.8.4 Intact stability in the non-displacement mode for ACV's

3.8.4.1 Passenger heeling

The total heel angle in still water due to the effect of passenger movements shall not to exceed 10 degrees. The passenger lever shall be as calculated in NSCV Part C Subsection 6A. Passenger movement need not be considered where passengers are required to be seated whenever the craft is operating in the non-displacement mode.

3.8.4.2 Wind heeling

The total heel angle in still water due to beam wind pressure as calculated in NSCV Part C Subsection 6B shall not to exceed 10 degrees.

3.8.4.3 Heeling due to turning

In all loading conditions, the outward heel due to turning shall not exceed 8 degrees.

3.8.4.4 Combined heeling

The total heel due to beam wind pressure as per Clause 3.8.4.2 and due to turning shall not exceed 12 degrees outward.

3.8.5 Damaged stability

Category F2 fast craft shall comply with the standards for subdivision specified in Table 10.

Table 10 — Damaged Stability

No of passengers	Operational area				
	A	B	C	D	E
≤36 passengers	Maximum 20% longitudinal	NSCV Subsection 6C	NSCV Subsection 6C	NSCV Subsection 6C	NSCV Subsection 6C
>36 passengers and <150 passengers	Maximum 20% longitudinal	Maximum 20% longitudinal	NSCV Subsection 6C	NSCV Subsection 6C	NSCV Subsection 6C
≥150 passengers and <450 passengers	HSC Code	Maximum 20% longitudinal	Maximum 20% longitudinal	Maximum 20% longitudinal	NSCV Subsection 6C
≥450 passengers	HSC Code	HSC Code	HSC Code	Maximum 20% longitudinal	Maximum 20% longitudinal

KEY:

Maximum 20% longitudinal—means that the craft shall comply with the HSC Code criteria for buoyancy and stability in the displacement mode following damage, but assuming a maximum required raking longitudinal extent of damage 20% of the measured length.

NSCV Subsection 6C—means that the damaged stability shall comply with the requirements for the equivalent vessel operating at conventional speeds specified by Part C Subsection 6C of the NSCV.

HSC Code—means that the craft shall comply with the HSC Code criteria for buoyancy and stability in the displacement mode following damage assuming the extent of damaged specified in the HSC Code.

3.9 EQUIPMENT

3.9.1 Location of essential equipment

Life-saving equipment, emergency power supplies and other items of equipment essential to the safety of the craft following a collision or grounding shall be located abaft the collision zone specified in Clause 3.4.3.

3.9.2 Securing of essential equipment

Life-saving equipment, emergency power supplies and other items of equipment essential to the safety of the craft following a collision or

grounding shall be secured against movement that could result in their failure to operate at time of need.

3.9.3 Quick release life buoys

Where, on a Category F2 fast craft that is carrying more than 36 passengers or that is of equivalent length greater than 24 m, the passengers or crew have access to exposed decks under normal operating conditions, at least one lifebuoy on each side of the craft shall be capable of quick release from the operating compartment and from a position at or near where it is stowed. Each such lifebuoy shall be provided with a self-igniting light and a self-activating smoke signal. The positioning and securing arrangements of the self-activating smoke signal shall be such that it cannot be released or activated solely by the accelerations produced by collisions or groundings.

3.9.4 Navigation and collision avoidance equipment

3.9.4.1 General

The user controls for all the navigation and collision avoidance equipment shall be designed to enable the operator in their normal operating position to adjust the performance of the navigation and collision avoidance equipment without reducing their ability to control the craft.

NOTE: The requirements for additional navigation and collision avoidance equipment do not lessen the obligation for the craft to be operated taking account the prevailing weather and sea conditions.

3.9.4.2 Additional items

The navigation and collision avoidance equipment specified in NSCV Part C Subsection 7C shall be increased to include the items specified in Table 11 where not already specified in NSCV Part C.

3.9.4.3 Performance and constructions standards

Items of navigation and collision avoidance equipment that form part of an integrated automatic control or information system (such as automatic pilot, automated radar plotting aid or voyage data recorder) shall be certified to meet the relevant standards for such equipment on a high speed craft issued by IMO.

NOTE: The 'wheel certificate' issued under EU Directive 96-98 provides evidence of compliance with SOLAS standards.

Other items of navigation and collision avoidance equipment shall be of a specification suited for use on a commercial high speed craft, taking into account the particular characteristics of the craft, the magnitude of its speed and its intended operation. Such equipment shall be manufactured by an established company that has, amongst its range of products, a similar item of navigation and collision avoidance equipment that meets the relevant IMO standards. The functional performance of equipment that integrates multiple navigation and collision avoidance functions shall not be less than that of equipment dedicated to a particular function.

NOTES:

1. Equipment for craft that travel at speed requires a relatively higher refresh rate to be effective, especially when the craft is changing course. Examples of key functional parameters include the scan rate of radars, the signal rate of AIS and the rate of turn capability of compasses,
2. Navigation and collision avoidance equipment available in the market for use on recreational and smaller commercial vessels does not normally comply with the relevant IMO standards. Some such equipment intended for recreational use may not have the functional characteristics or reliability appropriate for commercial applications.

Table 11 — Requirement for additional navigation and collision avoidance equipment on Category F2 fast craft (if not already specified for an equivalent conventional vessel)

Requirement	Passengers and/or equivalent length			
	W	**X**	**Y**	**Z**
	≤36 pax and <15 m with limits on operations at night and in conditions of poor visibility (C)	**Not W but ≤36 pax and <24 m**	**Not X but ≤100 pax and <35 m**	**>100 pax or ≥35 m**
Digital gyro stabilised magnetic compass (DGSMC) (A)	As per conventional	1 required (B)	V_{max} < 35 knots 1 required (B)	As per conventional
Heading digital GPS (Satellite compass) (A)	As per conventional	Alternative	V_{max} < 35 knots Alternative to DGSMC required above V_{max} ≥ 35 knots 1 required	Alternative to gyro compass
Gyro compass (A)	As per conventional	As per conventional	As per conventional	Required (B)
Speed and distance measurement	Required	Required	Required	Required
Echo-sounding device (E)	Required	Required	Required	Required
Radar installations	As per conventional	1 required	1 required	V_{max} < 30 knots 1 required V_{max} ≥ 30 knots 2 required
Automated radar plotting aid	As per conventional	As per conventional	V_{max} ≥ 35 knots Required otherwise as per conventional	Required on at least one radar
GPS	Not required	Required	Required	Required
Rate of turn indicator	As per conventional	As per conventional	As per conventional	Required if L_e ≥ 35 m; otherwise as per conventional
Automatic identification system	As per conventional	As per conventional	Required if operational area A or B and L_e ≥ 30 m, otherwise as per conventional	Required if operational area A or B and L_e ≥ 30 m Required if operational area D or E and L_e ≥ 35 m, otherwise as per conventional

Automatic pilot	As per conventional	As per conventional	Required for operational area A, B or C (D)	Required for operational area A, B or C(D)
Voyage data recorder (VDR)	As per conventional	As per conventional	As per conventional	Required if L_e ≥ 35 m, otherwise data logger
Data logger	As per conventional	V_{max} ≥ 45 knots required as per Annex D	V_{max} ≥ 35 knots required as per Annex D	If no VDR then required as per Annex D

KEY to Table 11:

Continued…

V_{max} Maximum speed in knots

As per conventional means in accordance with NSCV Section 7C.

Required means to be provided if not already specified as part of the requirements for conventional vessels.

(A) Applies in place of a standard magnetic compass on craft required to carry a magnetic compass under NSCV Part C Subsection 7C. The compass to be suited to the rate of turn of the craft.

(B) A heading digital GPS provides an alternative deemed-to-satisfy solution.

(C) Craft limited to speeds less than 25 knots at night or in conditions of restricted visibility.

(D) Required for craft operating at sea between ports at speeds exceeding 25 knots for more than 60 minutes.

(E) Replaces any non-electronic depth sounding device specified in NSCV Part C Subsection 7C.

3.9.4.4 Compasses

Compasses on fast craft used for navigation during normal operations and compasses that are part of an automatic integrated control or information system shall be suited to the maximum rate of turn of the craft in normal operation.

NOTE: This Clause excludes compasses provided for "take home" purposes and compasses provided for survival craft.

3.9.5 Radar reflector

If not already required under NSCV Part C Section 7, Category F2 fast craft of equivalent length less than 24 m shall be provided with an effective radar reflector or other means to enable detection by vessels navigating by radar at both 9 and 3 GHz.

3.9.6 Anchoring

Where for a conventional vessel, NSCV Part C Subsection 7D would specify more than one anchor, Category F2 fast craft in operational areas C, D or E that meet the definition of a light fast craft may be equipped with only a single anchor of weight 70 per cent that specified provided the craft has two independent means of mechanical propulsion capable of propelling the craft at 7 knots in the worst intended conditions.

3.10 PROVISION OF ESSENTIAL SAFETY INFORMATION

3.10.1 Craft operating manual

The craft shall be supplied with a craft operating manual. The craft operating manual shall contain at least the following information:

a) General description of the craft and its equipment including—

i) the rules and regulations to which the craft has been designed and built;

ii) class of service and Category F2 service notation;

iii) recognised organisation and class notation if applicable;

iv) maximum number of passengers and persons on board;

v) measured length, and the equivalent length where this differs;

vi) maximum speed; and

vii) operational areas.

b) Procedures for maintaining and checking the integrity of buoyancy compartments.

c) Details of the stability of the craft likely to be of direct practical use to the crew in an emergency.

d) Damage control procedures.

e) Description and operation of machinery systems.

f) Description and operation of auxiliary systems.

g) Description and operation of remote control and warning systems.

h) Description and operation of electrical equipment.

i) Loading procedures and limitations, including maximum operational weight, centre of gravity position and distribution of load.

j) Cargo or car securing arrangements and procedures depending on operational restrictions or damaged conditions.

k) Description and operation of fire-detection and fire-extinguishing equipment.

l) Drawings indicating the structural fire protection arrangements.

m) Description and operation of radio equipment and navigation and collision avoidance aids.

n) Description and operation of life-saving equipment.

o) Evacuation procedures and routes (to the extent determined by the craft design and equipment)

p) Information regarding the handling of the craft as determined in accordance with Clause 3.3.

q) Maximum permissible towing speeds and towing loads, where applicable.

r) Indication of emergency situations or malfunctions jeopardizing safety, required actions to be taken and any consequential restrictions on operation of the craft or its machinery.

s) The worst intended weather and sea conditions before the craft should seek shelter, and any restrictions on speed arising from structural or passenger safety considerations over the range of anticipated operating conditions.

t) Limiting values of all machinery parameters requiring compliance for safe operation.

u) Procedures for the crew to—

i) advise elderly or disabled persons to remain seated when operating; and

ii) require passengers to remain seated when operating in hazardous conditions

The operating manual shall take into account the results of any FMEA reports developed during the craft design (see Clause 3.7.5).

NOTE: The operating manual is used to prepare operating procedures for the safety management system specified under Clause 5.4 and NSCV Part E.

3.10.2 Maintenance and servicing manual

The craft shall be supplied with maintenance and servicing manual containing at least the following information:

a) Detailed, illustrated description of all craft structure, machinery installations and all installed equipment and systems required for safe operation of the craft.

b) Specifications and quantities of all replenishable fluids and of structural materials which may be required for repairs.

c) Operational limitations of machinery in terms of values of parameters, vibration and consumption of replenished fluids.

d) Limitations of wear of structure or machinery components, including lives of components requiring calendar or operating time replacement.

e) Detailed description of procedures, including any safety precautions to be taken or special equipment required, to remove and install main and auxiliary machinery, transmissions, propulsion and lift devices and flexible structure components.

f) Test procedures to be followed subsequent to replacement of machinery or system components or for malfunction diagnosis;

g) Procedure for lifting or dry-docking the craft, including any weight or attitude limitations.

h) Procedure for weighing the craft and establishing the position of longitudinal centre of gravity (LCG).

i) Where craft may be dismantled for transportation, instructions shall be provided for dismantling, transport and re-assembly.

j) A servicing schedule, included in the maintenance manual or published separately, detailing the routine servicing and maintenance operations required to maintain the operational safety of the craft and its machinery and systems.

CHAPTER 4 DEEMED TO SATISFY SOLUTIONS—CREWING AND COMPETENCIES

4.1 PRELIMINARY

A Category F2 Fast Craft shall be deemed-to-satisfy the required outcomes in Chapter 2 as they relate to crewing and competencies if the crew of the craft complies with the requirements of this Chapter. Alternatively, the crew of the craft may comply with the requirements of Subsection 1B of NSCV Part F.

NOTE: Information on Deemed-to-Satisfy solutions and their use is provided in Part B—General Requirements of the NSCV.

4.2 PART D OF THE NSCV

The crew of a Category F2 fast craft shall comply with Part D of this Standard.

4.3 FAST CRAFT COMPETENCIES

The crew of a fast craft shall have the competencies relevant to their particular duties so as to minimise the risks associated with the high-speed operation of a craft. Each crew member of a Category F2 fast craft shall possess the relevant competency level listed in Table 12 corresponding to their individual responsibility by showing they have satisfactorily achieved the training outcomes. These competencies shall equip the crew member to identify potential hazards when a vessel is travelling at high speed, recognise the potential risks and take actions where appropriate to control or minimise those risks.

Table 12 — Fast craft competencies for crew of Category F2 fast craft

Crew responsibility	Competency Level	Reference in Annex E
Well-being of persons on board a fast craft	Level 1	Table 20
Operation of a fast craft from helm position	Level 1 and Level 2	Table 20 and Table 21
Overall responsibility for navigation and collision avoidance on specified fast craft (A)	Level 1, Level 2 and Level 3	Table 20, Table 21 and Table 22

KEY:

(A) Required for a Category F2 Fast Craft that—

a) has an equivalent length 15 m or more;

b) carries more than 36 passengers; or

c) operates at night or in restricted visibility at speeds 25 knots or more.

4.4 COMPETENCIES TO BE CRAFT SPECIFIC

The competency elements listed in Table 20, Table 21 and Table 22 shall apply to the extent that the competencies are relevant to the type and operation of the particular craft being considered. The competencies shall be sufficient to safely operate the particular craft and ensure that safety systems provided on board are available and effectively deployed at time of need.

NOTE: The specific competences needed to operate a particular craft would normally be recognised by a type rating certificate issued by the owner (see Clause 5.4.2.). The type rating certificate could be valid for and individual craft or a fleet of very similar craft.

4.5 TRAINING

A Training Needs Analysis[1] shall be conducted to ascertain the competencies required for each crew position for the safe operation of the craft.

Each crew member's current competencies shall be assessed against the required competencies specified under Clauses 4.3 and 4.4 and Annex E. The training shall cover the gap between the two. The range of variables in Table 20, Table 21 and Table 22 lists the issues to be considered in developing the relevant training.

NOTE: Normally the operator would conduct the Training Needs Analysis.

4.6 ASSESSMENT METHODS

The competencies listed under Clauses 4.3 and 4.4 shall be assessed by a competent person having appropriate maritime and educational qualifications. Such persons shall include—

a) persons providing relevant training and verification in an RTO;

b) persons providing relevant training and verification holding a certificate 4 in assessment and workplace training; or

c) a delegated officer of the National Regulator.

A1 NOTE: Refer to the National Training Framework for the standards applicable to Clause 4.6 b).

1 Refer to Tovey, MD and Lawlor, DR, *Training in Australia: Design, delivery, evaluation and management* (2nd ed.), Pearson 2004.

CHAPTER 5 DEEMED TO SATISFY SOLUTIONS— OPERATIONAL REQUIREMENTS

5.1 PRELIMINARY

A Category F2 Fast Craft shall be deemed-to-satisfy the required outcomes in Chapter 2 as they relate to operational requirements if the craft complies with the requirements of this Chapter. Alternatively, the craft may comply with the requirements of Subsection 1B of NSCV Part F.

NOTE: Information on Deemed-to-Satisfy solutions and their use is provided in Part B—General Requirements of the NSCV.

5.2 PART E OF NSCV

Category F2 shall comply with the requirements of Part E of the NSCV and also the additional requirements specified under this Chapter.

5.3 SUITABILITY FOR OPERATION IN A PARTICULAR LOCALITY

A craft shall be suited to provide for acceptable safety when operating within its intended locality of operation. Where specified in Table 13, the proposed operation of a Category F2 Fast Craft within a particular locality shall be subjected to a documented risk management process that identifies hazards, assesses the risks and determines appropriate controls necessary to reduce to acceptable levels any of those risks that would otherwise be unacceptable.

Account shall be taken of the risk control measures already specified within this Standard that apply to the craft. In undertaking the risk assessment, the following matters shall be reviewed and addressed:

a) The suitability of the craft for the service intended, with regard to—

   i) the characteristics of the craft as established under Clause 3.3;

   ii) the prevailing weather, wave and wind conditions to be encountered;

   iii) the nature and proximity of navigational hazards;

   iv) the number, nature and routes of other vessels that operate on the same waters;

   v) the safety of other users of the waterway; and

   vi) the impact of the craft's operation on the local environment.

b) The availability of weather, wave and wind information that may be essential for the safe operation of the craft.

c) The availability of safe havens or shelter in the event of unfavourable weather, wave or wind conditions.

d) The competencies and work load required of the crew to safely operate and navigate the particular type of fast craft in the intended waters of operation.

e) Special arrangements required at terminals including arrangements for berthing, access and egress, fuelling, transfer of water and wastes.

f) Port or other traffic control arrangements and compliance with any existing traffic control.

g) The possible operation of the craft in restricted visibility or at night;

h) Local communication arrangements between craft, coast radio stations, base ports radio stations, emergency services and other vessels, including radio frequencies to be used.

i) The availability of readily accessible resources to undertake maintenance and servicing of the craft and its machinery on a regular basis in accordance with legislation and the manufacturers' warranties.

Table 13 — Documented risk management applied to local factors

Maximum speed	Number of passengers	
	>36	13-36
≥25 knots and <30 knots	Applies	Not applicable
≥30 knots	Applies	Applies

5.4 SAFETY MANAGEMENT SYSTEM

5.4.1 General

Category F2 Fast craft shall be provided with a safety management system that complies with Part E of the NSCV.

The safety management system shall provide for the operational controls needed to give effect to and maintain the safety outcomes envisaged by this Subsection, including the applicable minimum required operational risk control measures specified in Table 6.

The safety management system shall include such operational, training and maintenance manuals required for the safe operation of the craft in normal and abnormal conditions, and for maintaining the full function of safety systems on board the craft.

NOTE: This clause does not preclude the combining of manuals on simpler craft.

5.4.2 Type rating of crew

5.4.2.1 Crew to be type rated for particular craft

The safety management system shall establish a system of type rating, whereby the crew of a fast craft is provided with appropriate training and their competencies assessed prior to serving as crew on a particular craft.

5.4.2.2 Training to be craft specific

The training shall be specific to the craft and shall make direct reference to applicable parts of the craft documentation. Such documentation shall include, to the extent relevant to the particular craft:

a) The craft operating manual including—

   i) the use and operation of navigation and collision avoidance equipment; and

   ii) limitations on the craft's operation in sea conditions.

b) The route operating manual.

c) The maintenance and service manual.

d) The training manual.

e) The safety management system documentation.

f) Emergency plans.

g) Operational procedures.

h) Stability book.

5.4.2.3 Air cushion vehicles (ACVs)

The type rating of operators of ACVs shall be in accordance with Annex F.

5.4.3 Changes in operating environment

The safety management system shall provide for appropriate training and assessment of the crew before they are required to operate a craft in unfamiliar areas.

NOTE: This requirement is to ensure that they have a clear understanding of the navigational, collision and other hazards that affect the safe operation of the craft.

5.4.4 Status of systems or equipment essential for safety

The safety management system shall specify procedures that limit operation should systems or items of equipment essential for safety when operating at high speed become unserviceable before departure or during operation.

NOTE: Such procedures would normally require that the craft proceed at reduced speed. For example, a 35 m craft with more than 100 passengers that normally operates in excess of 35 knots and requires 2 radars might be restricted to less than 30 knots if one of the two radars was not serviceable and available for use.

5.4.5 Operations in conditions of restricted visibility

The safety management system shall specify procedures for actions to be taken when a fast craft is operating in conditions of restricted visibility.

5.5 ROUTE OPERATIONAL MANUAL

Craft that carry more than 36 passengers shall be provided with a route operational manual that includes at least the following information:

a) Evacuation procedures.

b) Operating limitations, including the worst intended conditions.

c) Procedures for operation of the craft within the operating limitations.

d) Elements of applicable contingency plans for primary and secondary rescue assistance in the case of foreseeable incidents, including land-based arrangements and activities for each incident.

e) Arrangements for obtaining weather information.

f) Identification of the "base port(s)".

g) Identification of the person responsible for decisions to cancel or delay voyages.

h) Identification of crew complement, functions and qualifications;

i) Restrictions on working hours of crew.

j) Safety arrangements at terminals.

k) Traffic control arrangements and limitations, as appropriate.

l) Specific route conditions or requirements relating to position fixing, operations by night and in restricted visibility, including the use of radar or other electronic aids to navigation.

m) Communication arrangements between craft, coast radio stations, base ports radio stations, emergency services and other ships, including radio frequencies to be used and watch to be kept.

ANNEX A GUIDANCE ON RELEVANT DESIGN AND OPERATIONAL RESPONSES TO HORIZONTAL OPERATING ACCELERATIONS AND COLLISION ACCELERATIONS

A1 SCOPE

This Annex provides guidance on the affects on persons of various levels of horizontal acceleration and the typical design and operational responses to control risks associated with horizontal operating accelerations and collision accelerations. Annex A is referred to under Clause 3.4.2.2 and Table 6. The Annex is informative for the purposes of this standard.

NOTE: While this Annex is informative, some of the standards it contains are mandatory within the clauses of this Subsection.

A2 OBJECTIVE

To avoid or reduce the magnitude of injuries to persons on board a fast craft that could result from accelerations encountered during normal operation or in the event of a collision.

A3 DESIGN HORIZONTAL OPERATING ACCELERATIONS

Guidance on the likely magnitude of design horizontal operational accelerations is provided in Table 14.

A1 NOTE: Table 14 has been derived from the HSC Code 2000.

Table 14 — Guidance on design horizontal operational accelerations

Typical affect on persons	Corresponding horizontal acceleration level
An elderly person will need to keep balance by holding	0.08 *g*
An average person will need to keep balance by holding A sitting person will start to keep balance by holding	0.15 *g*
Considered the acceleration level at which, without appropriate controls, the consequences will be major	0.20 *g*
The maximum that a person standing can keep balance while holding	0.25 *g*
Considered the acceleration level at which, without appropriate controls, the consequences will be hazardous	0.35 *g*
An average person will fall out of a seat unless secured by seat belts	0.45 *g*

A4 DESIGN COLLISION ACCELERATIONS

A method for estimated the magnitude of design collision accelerations is provided in Annex B.

NOTE: Annex B has been derived from the HSC Code 2000.

A5 GUIDANCE ON APPROPRIATE DESIGN AND OPERATIONAL RESPONSES

Guidance on design and operational responses corresponding to differing magnitudes of design horizontal operating acceleration and design collision acceleration is given in Table 15.

NOTE: The guidance has been derived from the HSC Code 2000.

Table 15 — Design levels and recommended design and operational responses

Design horizontal operating acceleration	Design collision acceleration	Design level	Design responses	Operational responses
<0.20 *g*	<3 g	Level 1 (A)	• Seats for each person on board. • Ready availability of hand holds and grab rails in all spaces that persons normally occupy • Furniture, structures and fittings shall be designed and constructed without sharp edges to avoid injury	• Advice to elderly or disabled persons to remain seated when operating • Passengers to remain seated when operating in hazardous conditions
0.20 g to 0.35 g	3 g to 12 g	Level 2 (B)	• As for design level 1 and • Padding of hard surfaces, including seats frames, sofas and edges of tables • Seating that is either forward or rear facing	• As for design level 1
>0.35 *g*	>12 *g*	Level 3	• As for design level 2 and • Seat belts for all persons • Sofa seating not to be used • Seating with high backs if rear facing	• As for design level 2 and • Persons to remain seated with seat belts fastened except at low speeds

KEY:

(A) Level 1 is deemed-to-satisfy for craft of equivalent length 35 m or more or speed < 35 knots (see Clause 3.4.5.).

(B) Level 2 is deemed to satisfy for craft of equivalent length less than 35 m and speed 35 knots or more, (see Clause 3.4.5.)

ANNEX B DESIGN COLLISION ACCELERATIONS

B1 SCOPE

This Annex specifies the design collision accelerations for Category F2 fast craft. Annex B is referred to under Clause 3.4.2.3, 5.4, and A4. The Annex is normative for the purposes of this standard.

B2 OBJECTIVE

The craft shall be designed to minimise the consequences that arise from collision.

B3 DESIGN SCENARIO

The craft shall be designed assuming a collision occurs with a vertical rock having maximum height of 2 m above the waterline with the craft traveling at two-thirds operating speed and at a displacement midway between lightweight and fully laden values.

B4 DEEMED-TO-SATISFY CALCULATION

The design collision accelerations shall be determined in accordance with Table 16.

Table 16 — Design accelerations as multiples of *g*

Direction	Type of craft	
	All craft except Air Cushion Vehicles (ACVs)	Air Cushion Vehicles (ACVs)
Forward direction	g_{coll}	6
After direction	2 or g_{coll} if less	3
Transverse direction	2 or g_{coll} if less	3
Vertical direction	2 or g_{coll} if less	3

KEY:

g_{coll} is the collision design acceleration expressed as a multiple of the acceleration due to gravity (9.806 m/s^2)

For craft other than ACVs, the collision design acceleration g_{coll} shall be calculated as follows:

$$g_{coll} = 1.2\left(\frac{P}{g\,\Delta}\right)$$, but not to be taken greater than 12;

where

g_{coll} = collision design acceleration, in multiples of g

g = acceleration due to gravity = 9.806 metres per second squared

Δ = craft displacement corresponding to the design waterline, in tonnes

P = load, in Newtons

= the lesser of P_1 and P_2, where—

$$P_1 = 460(M\,C_L)^{2/3}\,(E\,C_H)^{1/3}$$

$$P_2 = 9000 M\,C_L\,(C_H\,D)^{1/2}$$

where

M = hull material factor

= 1.3 for high tensile steel

= 1.0 for aluminium alloy

= 0.95 for mild steel

= 0.8 for fibre-reinforced plastics

C_L = length factor of the craft

$$= \left(\frac{165+L_m}{245}\right)\left(\frac{L_m}{80}\right)^{0.4}$$

C_H = height factor of the craft

$$= \left(\frac{80-L_m}{45}\right)$$ but not greater than 0.75 nor less than 0.3

E = kinetic energy of the craft;

$$= 0.1323\Delta_{mean}\,(V_{imp})^2$$

where, for the formulas for C_L, C_H and E

L_m = the measured length of the craft, in metres

D = depth of the craft from the underside of keel to the top of the effective hull girder, in metres

Δ_{mean} = craft displacement, being the mean of the lightweight and maximum operational weight, in tonnes

V_{imp} = estimated impact speed, in knots

= 60% of the maximum speed of the craft

For hydrofoils, the collision design acceleration g_{coll} shall be taken as the greater of either g_{coll} as calculated above, or—

$$g_{coll} = \frac{F}{g\,\Delta_{mean}}$$

where

F = failure load of bow foil assembly applied at the operational waterline, in kilo Newtons

g and Δ_{mean} = as defined above

ANNEX C EXAMPLE OF FMEA ANALYSIS WORKSHEET FOR A SMALLER FAST CRAFT

C1 SCOPE

This Annex provides guidance on the application of Failure Mode and Effect Analysis (FMEA) to Category F2 fast craft. Annex C is referred to in Clause 3.7.5. The annex is informative for the purposes of this standard.

C2 OBJECTIVE

To provide a comprehensive, systematic and documented investigation that establishes the crucial failure conditions of the craft and assesses their significance with regard to the safety of the craft, its occupants and the environment.

NOTE:

The results of an FMEA study—

1. facilitates the determination of the risk associated with the craft's operation and its acceptance by the National Regulator;
2. provides the craft operator with the data and risk control measures needed to establish a safety management system (SMS) and generate effective training, operational and maintenance programmes and documentation; and
3. provides the designers of the craft and its systems with a methodology to audit the safety of their proposed designs.

C3 PROCEDURES FOR FAILURE MODE AND EFFECT ANALYSIS

Guidance on procedures for FMEA is given in Annex 4 of the HSC Code.

C4 EXAMPLE OF FMEA APPLIED TO A FAST CRAFT

An example of an FMEA worksheet applied to a smaller water jet powered catamaran is listed in Table 17.

Table 17 — Example of FMEA applied to a smaller water jet powered catamaran in seagoing mode

No	Equipment	Function	Failure mode	Failure cause	Failure effect		Failure detection	Corrective action	Severity of failure effect	Probability of failure (if applicable)	Remarks
					Local effect	End effect					
DIRECTIONAL CONTROL SYSTEM											
1	Remote Control Central Unit	Steering Reversing and Clutch Control	Loss of steering and thrust port waterjet	Loss of primary power supply to port water jet							
2	Remote Control Central Unit	Steering Reversing and Clutch Control	Loss of backup control	Loss of backup power supply to port water jet							
3	Remote Control Central Unit	Steering Reversing and Clutch Control	Loss of steering stbd water jet	Mechanical steering feed back cable broken							
4	Remote Control Central Unit	Steering Reversing and Clutch Control	Loss of thrust stbd water jet	Mechanical bucket feed back cable broken							
5	Remote Control Central Unit	Steering Reversing and Clutch Control	Malfunction of Mode selection control	Malfunction of Mode selection control							
6	Hydraulic power pack	Provides hydraulic power for steering	Loss of hydraulic power	Pump failure/low fluid level/loss of fluid pressure							

No	Equipment	Function	Failure mode	Failure cause	Failure effect		Failure detection	Corrective action	Severity of failure effect	Probability of failure (if applicable)	Remarks
					Local effect	End effect					
ELECTRICAL SYSTEM											
1	Auto pilot	Automatic steering control	Loss of DC power	Supply cable broken							
2	Auto pilot	Automatic steering control	Loss of gyro input	Gyro signal missing							
3	Main Switchboard	Power Distribution	Loss of half switchboard	Electrical fault							
4	Main Switchboard	Power Distribution	Loss of full switchboard	Fire							
5	AC Generation	AC power supplies	Black Ship	Overloading							
6	Auto pilot	Automatic steering control	Loss of DC power	Supply cable broken							
MACHINERY											
1	Electronic Engine Control System (EECS)	Control main engine	Port engine shutdown	Low oil pressure							
2	Electronic Engine Control System (EECS)	Control main engine	Loss of one power supply to starboard engine ECS	Broken cable							
3	Electronic Engine Control System (EECS)	Control main engine	Total loss of power to starboard engine ECS	Plug inadvertently breaks contact							

ANNEX D SPECIFICATION FOR A DATA LOGGER ON A CATEGORY F2 FAST CRAFT

D1 SCOPE

This Annex specifies the requirements for a data logger for Category F2 fast craft. Annex D is referred to in Table 11. The Annex is normative for the purposes of this standard.

D2 OBJECTIVE

The objective of this Annex is to specify requirements for data logging on Category F2 Fast Craft to provide information to—

a) monitor the ongoing operation of the craft to verify that it does not exceed stated design and operational limits; and

b) assist in establishing the causes of incidents so that appropriate corrective or preventative action can be taken that will avoid similar or other associated incidents in the future.

D3 DATA TYPE

The data logger shall collect data from GPS, radar images, system monitoring and craft response signals. The data need only be of the type essential to establishing the operational safety of the craft when travelling at high speed. Typical data to be recorded is listed in Table 18.

D4 DATA STORAGE

The data shall be stored in a robust storage medium. The storage medium shall be protected from exposure to the environment, access by non-authorised persons and collision accelerations, but need not be capable of withstanding submergence or exposure to fire.

Sufficient data storage shall be provided for not less than 2 hours recording of all data.

NOTE: The data logger specified for the purposes of this standard serves a similar function to a voyage data recorder (VDR). However it is not required to comply with the specific IMO standard for VDRs, especially in regard to the protection of data in the event of catastrophic incident.

D5 POWER SOURCE

The data logger shall be connected to the emergency power source so that, in the event of a power failure, the data logger shall continue to function without interruption.

Table 18 — Typical data to be recorded by data logger

Data category	Data source
Basic functions	Craft position (GPS)
	Radar image
	Heading (true or compass)
	Speed over ground
	Time
Control commands	Helm position in use
	Throttle control position
	Directional control position
	Propeller pitch control position
	Clutch control position
	Backup control mode switch position
	Stabiliser, ride control, lift control position
Mechanical response	Direction actuator position (e.g. rudder position)
	Engine speed (RPM)
	Gearbox position (ahead/astern)
	Shaft speed (RPM)
	Hydraulic pressure of essential systems
	Source of essential hydraulic pressure (main/backup)
	Power to control system (main/backup)
	Fuel rack position
	Clutch position

ANNEX E REQUIRED COMPETENCIES FOR CREW ON CATEGORY F2 FAST CRAFT

E1 SCOPE

This Annex specifies the competency standards for crew on Category F2 fast craft. Annex E is referred to under Clause 4.3 and 4.5. The Annex is normative for the purposes of this standard.

E2 OBJECTIVE

To provide the various members of the crew of a fast craft with the competencies to quickly and effectively recognise the special hazards associated with operating a craft at high speed, analyse the risks and carry out appropriate and effective actions to control those risks.

E3 COMPETENCY LEVELS

Three competency levels are defined in Table 19 for persons that are crew on a Category F2 fast craft Each competency level shall include the competency elements within the applicable tables (Table 20, Table 21 and Table 22) to the extent they are relevant to the particular type and operation of the craft.

NOTE: The competencies are not limited by the content of the tables.

Table 19 — Fast craft competency levels

Competency Level	Title	Applicable tables
Level 1	Protect the safety of persons on a fast craft	Table 20
Level 2	Safely operate a fast craft	Table 20 and Table 21
Level 3	Safely navigate a fast craft	Table 20, Table 21 and Table 22

E4 PREREQUISITES

Level 1 shall be a prerequisite of persons undertaking Level 2. Level 2 shall be a prerequisite of persons undertaking Level 3.

E5 EVIDENCE OF LEARNING

E5.1 Assessment

Assessment shall be by an accredited assessor, using a combination of practical demonstration or practical exercises and theoretical explanation as appropriate to the subject and supported by oral or written questions.

NOTE: The evidence guide listed in each competency level table provides additional information to assist in the interpretation of the competency level. The evidence guide is not prescriptive and is intended to be of assistance to the process of formal assessment.

E5.2 Context of assessment

Assessment may be in a—

a) working craft,

b) training craft,

c) simulator, or

d) approved training facility.

NOTE: The process can be a part of employment, an approved training program, or recognition of prior learning.

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Table 20 — Competency level 1: Protect the safety of persons on a fast craft

Level Descriptor 1: This level specifies the competencies required of persons nominated as crew on a Category F2 fast craft			
Competency element	**Performance Criteria**	**Range of variables (1)**	**Evidence guide**
1.1 Understand the safety system	1.1.1 Awareness of the nature of risk	➢ Hazards ➢ Analysis of risks ➢ Likelihood ➢ Consequences ➢ Control of risks ➢ Acceptable risks ➢ Unacceptable risks ➢ Qualitative analysis ➢ Quantitative analysis	Be able to identify and explain the terms in simple language
	1.1.2 Awareness of the special risks associated with a craft operating at high speed	➢ Accelerations ➢ Vertical accelerations ➢ Horizontal accelerations ➢ Energy ➢ Collision accelerations ➢ Requirement for optimised weight ➢ Less time to identify, analyse and control	Be able to identify the risks and explain the terms in simple language
	1.1.3 Awareness of documentation relevant to safety	➢ NSCV ➢ Certificate of Operation ➢ Craft Operational Manual ➢ Route Operational Manual ➢ Training Manual ➢ Maintenance and Servicing Manual ➢ Fire control and emergency plans	Be able to identify the documents and explain their high level function

Level Descriptor 1: This level specifies the competencies required of persons nominated as crew on a Category F2 fast craft			
Competency element	**Performance Criteria**	**Range of variables (1)**	**Evidence guide**
1.2 Protect the safety of persons	1.2.1 Watching for hazards	➢ Sea conditions ➢ Manoeuvring ➢ Disabled and aged persons ➢ Children ➢ Blocked exits ➢ Collisions and groundings ➢ Lookout duties	Explain the hazards that may be associated with variable and how to minimise these hazards Explain broad principles behind the use of safety equipment onboard. Demonstrate use of lifesaving and generic evacuation equipment. Explain variations of onboard equipment to generic equipment used.
	1.2.2 Limits on passenger movement	➢ Standing ➢ Seated ➢ Outside spaces ➢ Collision zones ➢ Operating compartment ➢ Vehicle spaces	Explain the hazards that may be associated with variable and how to minimise these hazards
	1.2.3 Securing of luggage and other potential projectiles	➢ Luggage ➢ Bars and shops ➢ Loose furniture	Explain the hazards that may be associated with variable and how to minimise these hazards
	1.2.4 Instructing passengers to be seated	➢ Effective communication ➢ Normal operations ➢ Emergency conditions	Provide clear effective instructions to passengers on safety features of craft
	1.2.5 Instruct passengers on the use of safety equipment	➢ Effective communication ➢ Normal operations ➢ Emergency conditions	Provide clear effective instructions to passengers on safety features of craft
1.3 Stow cargo safely	1.3.1 Cargo and Vehicle Stowage and Securing Systems	➢ Arrangement for cargo stowage ➢ Securing methods ➢ Safety issues	Carry out the functions of directing cargo and vehicle stowage and ensuring cargo is secured properly

Level Descriptor 1: This level specifies the competencies required of persons nominated as crew on a Category F2 fast craft			
Competency element	**Performance Criteria**	**Range of variables (1)**	**Evidence guide**
1.4 Reduce losses arising from a collision or grounding	1.4.1 Assessing extent of damage and damage control	➢ Passenger well-being and numbers ➢ Watertight integrity ➢ Emergency power ➢ Communications ➢ Fire risk ➢ Availability of safety equipment ➢ Directional control systems	Demonstrate knowledge of emergency procedures as they would apply to their duties
	1.4.2 Provide basic first aid to reduce consequences of injury till arrival of emergency response personnel	➢ Lacerations ➢ Broken limbs ➢ Resuscitation ➢ Movement of injured persons ➢ Contents and maintenance of first aid kit	Demonstrate selected first aid activities and explain first aid responses in the event of injuries
	1.4.3 Supervise and perform escape and assembly	➢ Clearing exits ➢ Assembly stations ➢ Emergency plan ➢ Control of persons in emergency situations	Demonstrate understanding of role of crew in the event of an emergency to facilitate escape and prepare for further actions
	1.4.4 Supervise and perform evacuation	➢ Evacuation signals and announcements ➢ Location of safety equipment ➢ Operation of safety equipment ➢ Orderly evacuation ➢ Survival techniques	Demonstrate understanding of role of crew in the event of an emergency to facilitate evacuation and facilitate survival
	1.4.5 Regaining control of a craft in emergency situations	➢ Bring the boat to a stop ➢ Anchor ➢ Secure the craft ➢ Call for assistance	Demonstrate the ability to complete the appropriate actions on a craft of the particular type

KEY:

(1) The range of variables lists the issues to be considered in developing a training program.

Table 21 — Competency level 2: Safely operate a fast craft

Level Descriptor 2: This level specifies the competencies required of persons that operate a fast craft			
Competency element	**Performance Criteria**	**Range of variables (1)**	**Evidence guide**
2.1 Understand the craft handling characteristics	2.1.1 Awareness of the modes of operation and their manifestation in various types of fast craft	➢ Modes of operation ➢ Displacement mode ➢ Non-displacement mode ➢ Transitional mode ➢ Monohulls ➢ Catamarans ➢ Hydrofoils ➢ Hovercraft and SES ➢ Risks associated with changing modes ➢ Operating manual and limits on operation	Explain the different modes of operation, how they differ between craft and the risks associated with changing mode of operation
	2.1.2 Awareness of the performance characteristics of different types of fast craft	➢ Key craft handling characteristics ➢ Differences from conventional vessels ➢ Turning ➢ Stopping ➢ Astern operation ➢ Acceleration ➢ Heeling characteristics ➢ Trim characteristics ➢ Seakeeping ➢ Typical undesirable effects of various craft ➢ Establishing performance characteristics ➢ Operating manual and limits on operation	Explain the different operational characteristics of fast craft, characteristics to be avoided and limitations on operation

Level Descriptor 2: This level specifies the competencies required of persons that operate a fast craft			
Competency element	**Performance Criteria**	**Range of variables (1)**	**Evidence guide**
	2.1.3 Awareness of manoeuvring and berthing characteristics and techniques	➢ Differences from conventional vessels ➢ Speed and handling characteristics ➢ Monohulls ➢ Multihulls ➢ Hydrofoils ➢ Hovercraft and SES ➢ High speed manoeuvring ➢ Low speed manoeuvring ➢ Establishing performance characteristics ➢ Operating manual and limits on operation	Explain the issues that arise from manoeuvring and berthing various types of fast craft
	2.1.4 Awareness of potential impact of fast craft operations on others	➢ Wake characteristics of fast craft ➢ Modes of operation ➢ Bank erosion effects ➢ Safety of small craft ➢ Persons on shoreline ➢ Silting effects ➢ Noise	Explain the wake and noise hazards that may arise from operating a fast craft incorrectly and provide methods for reducing inappropriate wake or noise effects.
2.2 Understand the craft's systems relevant to high speed.	2.2.1 Awareness of the characteristics of different types of propulsion and control systems	➢ Screws ➢ Jets ➢ Air propellers ➢ Surface piercing ➢ Rudders ➢ Azimuthing propulsion ➢ Air lift devices ➢ Hydrofoils ➢ Throttle remote controls ➢ Steering controls ➢ Backup and emergency systems ➢ Ride control systems	Explain the different types and characteristics of craft propulsion and control equipment and emergency Explain use of back-up and emergency systems

Level Descriptor 2: This level specifies the competencies required of persons that operate a fast craft			
Competency element	**Performance Criteria**	**Range of variables (1)**	**Evidence guide**
	2.2.2 Capacity to communicate effectively and quickly	➢ Effective communication ➢ Communications devices (radios, flares, EPIRB, walkie talkies, mobile phones, flags, horns, navigation lights) ➢ Communications alternatives ➢ Protocols ➢ Ship to Shore ➢ Ship to ship ➢ Communications in an emergency ➢ Weather communications ➢ Public address systems	Explain broad principles involved in communications systems and range of options available on board a craft Explain use of back-up and emergency systems
	2.2.3 Understanding and use of basic navigation equipment needed to for a person under supervision to steer a safe course	➢ Importance of reducing likelihood of exposure to hazards ➢ Navigation and collision avoidance devices ➢ Compasses ➢ Rate of turn issues ➢ Speed logs ➢ Depth sounders ➢ Helm indicators	Explain broad principles involved in various basic items of navigation equipment Demonstrate use of basic items of navigation equipment and any backup systems
	2.2.4 Understanding of the interrelationships between electrical, hydraulic and pneumatic systems with the safety of a craft operating at speed	➢ Failure mode and effect analysis ➢ Remote control systems ➢ Directional control systems ➢ Lift systems ➢ Stabilisation and ride control systems ➢ Navigation and collision avoidance systems ➢ Communications systems ➢ Bilge systems ➢ Backup and emergency systems	Explain broad principles of failure mode and effect analysis Explain interrelationships between essential items of craft control, navigation and other safety equipment and the electrical, hydraulic and pneumatic systems Describe types of back-up and emergency systems

Level Descriptor 2: This level specifies the competencies required of persons that operate a fast craft			
Competency element	**Performance Criteria**	**Range of variables (1)**	**Evidence guide**
	2.2.5 Operating the craft to avoid and identify damage to structures	➢ Minimal structural redundancy on fast craft ➢ Design assumptions ➢ Speed to wave height limitations ➢ Slamming loads ➢ Fatigue loading ➢ Checking for structural failure and damage	Explain the limitations that may be placed on a craft's operation for structural reasons Identify the factors that can limit operational performance and the need to operate within the design criteria of the craft Explain the need to periodic inspections to verify structural integrity
2.3 Function effectively as lookout and/or helmsman	2.3.1 Effectively identify collision hazards, assess risks and take appropriate action	➢ International regulations for the Prevention of Collisions at Sea. ➢ Giving way to other vessel ➢ Overtaking ➢ Proper lookout ➢ Sound signals, lights and shapes ➢ Responsibilities and duty of care ➢ Reduced visibility ➢ Safe speed ➢ Rules of the road	Demonstrate and understanding of the key elements of the international regulations Explain concept of operating a fast craft at a safe speed under collision regulations Demonstrate appropriate responses to various potential collision scenarios
	2.3.2 Effectively identify grounding and other navigational hazards, assess risks and take appropriate action	➢ Use of buoyage system ➢ Recognition of lights and markers ➢ Navigating in narrow channels ➢ Local traffic management schemes	Demonstrate an understanding of the key elements of the system of buoyage and traffic management Demonstrate appropriate responses to various potential grounding scenarios
	2.3.3 Function effectively as a member of the crew responsible for the safe operation of the craft	➢ Duties and responsibilities ➢ Working together ➢ Checks and balances ➢ Handover and checklists ➢ Lookout techniques at high speed	Explain the requirements for and methods used for crew on duty within the operating compartment to work as a successful team Explain roles and responsibilities of officer in charge vis-a-vie those of the crew Demonstrate appropriate handover technique

Level Descriptor 2: This level specifies the competencies required of persons that operate a fast craft			
Competency element	**Performance Criteria**	**Range of variables (1)**	**Evidence guide**
2.4 Understand the effect of loading on craft performance and safety	2.4.1 Awareness of the effect of loading on operational characteristics	➢ Stability book ➢ Importance of weight (efficiency, stability, speed, trim, performance, structural loads, damaged stability) ➢ Light condition ➢ Laden condition ➢ Distribution of weights vertically, transversely or longitudinally ➢ Heeling influences, passenger, wind, turning ➢ Loadline marking	Explain the effects of loading on stability, trim, performance and structural loads, damaged stability Explain a loading condition, the effects of distribution of weight and the effects of downflooding Provide examples of heeling influences Explain the reason for a load line
	2.4.2 Understanding of risks associated with damage and ability to apply appropriate damage control measures	➢ Extent of damage at high speeds ➢ Standards of subdivision ➢ Stability book ➢ Damage assessment ➢ Damage control measures	Explain the particular risks associated with high speed collisions and groundings Explain the different standards of subdivision Describe how damage might be assessed and appropriate damage control measures that might be taken

KEY:

(1) The range of variables lists the issues to be considered in developing a training program.

Table 22 — Competency level 3: Safely navigate a fast craft

Level Descriptor 3: This level specifies the competencies required of persons that navigate a fast craft			
Competency element	**Performance Criteria**	**Range of variables (1)**	**Evidence guide**
3.1 Utilise available aids to navigation	3.1.1 Understanding and use of navigation and collision avoidance equipment as applied to fast craft	➢ Compasses (magnetic, digital gyro stabilized magnetic, heading digital GPS, gyro) ➢ Speed logs ➢ Depth sounders ➢ Radars ➢ Radar reflectors and radar transponders ➢ Automated radar plotting ➢ AIS ➢ Rate of turn indicators ➢ Night vision equipment ➢ Automatic pilots ➢ Voyage data recorders	Demonstrate a thorough understanding of the application and operation of each item of navigation and collision avoidance equipment. Explain potential inaccuracies in navigational and collision avoidance equipment and how risks associated with these inaccuracies are to be avoided. Demonstrate the integrated use of navigation and collision avoidance equipment.
3.2 Apply navigation techniques	3.2.1 Planning a route	➢ General procedures ➢ Speed restrictions and local traffic management ➢ Assessing danger points and areas ➢ Risk reduction techniques	Demonstrate the planning of a high speed passage taking into account the impact of weather, traffic density, and techniques to manage danger points.
	3.2.2 Apply techniques that reduce risk of navigational or collision incidents at speed.	➢ Navigating in restricted visibility ➢ Use of radar at high speed ➢ Use of ARPA at high speed ➢ Use of night vision equipment ➢ Electronic charts	Demonstrate techniques for collision avoidance and navigation at high speed.
	3.2.3 Apply appropriate passage execution techniques	➢ Variations in conditions ➢ Passage execution by radar ➢ Visual passage execution ➢ Combination approaches	Demonstrate the use of radar and visual information to execute a passage through an area

Level Descriptor 3: This level specifies the competencies required of persons that navigate a fast craft			
Competency element	**Performance Criteria**	**Range of variables (1)**	**Evidence guide**
3.3 Function effectively as master or watchkeeper of a fast craft	3.3.1 Effectively identify collision hazards, assess risks and take appropriate action.	➢ Advanced interpretations of International regulations for the Prevention of Collisions at Sea ➢ Giving way to other vessel ➢ Overtaking ➢ Proper lookout ➢ Sound signals, lights and shapes ➢ Responsibilities and duty of care ➢ Safe speed ➢ Rules of the road	Explain the implications of the COLLREGS and craft handling in response to risks of collision. Demonstrate advanced knowledge of the COLLREGS
	3.3.2 Effectively identify grounding and other navigational hazards, assess risks and take appropriate action.	➢ Advanced interpretation of buoyage system ➢ Recognition of lights and markers ➢ Navigating in narrow channels ➢ Local traffic management schemes	Demonstrate a high speed passage in a restricted area, with conflicting traffic and changing weather conditions.
	3.3.3 Effective leadership of the crew of a fast craft to encourage teamwork in both operational and emergency situations.	➢ Duties and responsibilities ➢ Working together ➢ Safety management system ➢ Operating procedures ➢ Emergency planning and procedures ➢ Route planning ➢ Checks and balances ➢ Handover and checklists ➢ Lookout techniques at high speed	Explain the requirements for and methods used for crew on duty in the operating compartment to work as a successful team. Demonstrate an ability to take charge of and instruct crew to work as a team. Demonstrate how to re-organise the team to respond to changes in operations and circumstances

KEY:

(1) The range of variables lists the issues to be considered in developing a training program.

ANNEX F TRAINING STANDARDS FOR AIR CUSHION VEHICLES (ACVs)

F1 SCOPE

This Annex specifies the training standards for operators of Category F2 ACVs. Annex F is referred to under Clause 5.4.2.3. The Annex is normative for the purposes of this standard.

F2 OBJECTIVE

To provide the operator of an ACV with the competencies to safely operate the craft taking into account their unique handling characteristics compared to other fast craft; the different types of hazards they encounter and the different responses that should be undertaken to control risks.

F3 REQUIREMENTS FOR TYPE RATING TO OPERATE AN ACV

Persons who operate an ACV of less than 12 m in measured length within sheltered waters shall satisfy the type rating requirements specified in Clause F4 of this Annex.

Persons who operate an ACV of 12 or more metres in measured length and any other ACV not operating within sheltered waters shall satisfy the requirements for type rating specified in the HSC Code.

F4 ASSESSMENT FOR TYPE RATING TO OPERATE A SMALL ACV WITHIN SHELTERED WATERS

An applicant shall—

a) have achieved the competencies listed in Table 23;

b) have operational experience and training including not less than 10 hours on the type of ACV for which the type rating is required; and

c) be assessed by means of a practical test witnessed by an independent assessor.

NOTE:

1. The National Regulator may require that a Certificate of Competency be endorsed with the make and model of ACV as stated by the manufacturer.

2. Further experience and a further practical test may be required for other makes or models.

Table 23 — Competencies for type rating to operate a small ACV within sheltered waters

	Outcome	Methods for Demonstrating Competence	Standards for Evaluating Competence

	Outcome	Methods for Demonstrating Competence	Standards for Evaluating Competence
1	ACV is prepared and ready for operation	Pre-operational checks undertaken and Engine(s) are started	All pre-operational checks completed and engine(s) started in accordance with the operational manual for the type/make of ACV. Identify the factors that can limit operational performance and the need to operate within the design criteria of the craft.
2	Passenger boarding procedure	Operator instructs passengers in all boarding and emergency procedures. Issue of Hearing protection/life jackets/helmets/hair nets etc.	Operator demonstrates that he/she is aware of all marine safety precautions and OH&S for passengers.
3	Pre-departure checks complete	Passengers are considered to be seated Passengers clear of fans/propellers. Pre-start up checks. Engine(s) started	Passengers seated as instructed by operator Pre-departure checks are completed in accordance with operating manual.
4	ACV is manoeuvred safely at low speed	ACV is manoeuvred ahead at slow speed over land, stopped, turned 180^0 then returned to original starting point. ACV is moved ahead at slow speed and turned through 90^0 then another 90^0 then returned to original starting point. Engines switched off.	Operator demonstrates that he/she is able to manoeuvre the ACV at slow speed, safely and under control at all times.
5	Manoeuvring the ACV	ACV is moved from shore to water allowing for leeway. ACV is steered on a straight course allowing for leeway— a) at slow speed; and b) at full speed ACV is manoeuvred at high speed over figure-of-8 course. Changing course at high speed Rapid alteration of course through 180° at high speed returning on a reciprocal course Re-establishing on the cushion. Returning to shore (through breakers) Manoeuvring ACV up sloping ramp/beach.	ACV is manoeuvred within view of assessor /or with assessor on board. Manoeuvres completed safely with full control of the ACV at all times.
6	Dealing Practical/ Theoretical with Emergency situations	Emergency Stop Man Overboard procedures Avoiding plough in Manoeuvring at low speed off the cushion Location of fire extinguishers etc. Use of bilge pumps. Any other emergency procedure appropriate to the type/make of ACV. Failure of lift engine during a turn. Failure of main propulsion engine during a turn. Failure of steering during a turn.	Manoeuvres completed within demonstrable limits imposed by the nature of the ACV and the environment and in accordance with recommended procedures contained in the operating manual.
7	Passengers are disembarked safely	ACV proceeds up the beach safely Passengers remain seated until engine shut off Passengers assisted to disembark Lifejackets etc. returned.	ACV returns safely to shore/embarkation point, engines shut down and passengers safely disembarked

	Outcome	Methods for Demonstrating Competence	Standards for Evaluating Competence
8	The ACV is mechanically maintained for safe and reliable operation	Engineering Knowledge appropriate to the type/model of ACV	Ability to supervise routine maintenance in accordance with technical manual. Ability to undertake minor adjustments and repairs to lift and propulsion engines.