# National Marine Safety Committee

Draft Regulatory Impact Statement

National Standard for Commercial Vessels

Part C Section 2 - Watertight and Weathertight Integrity

August 2010

# CONTENTS

## List of Tables

**List of Figures**

# 1. BACKGROUND

## 1.1. National Marine Safety Committee

The NMSC was formalised by an Intergovernmental Agreement (IGA) signed in November 1997 by the Prime Minister, State Premiers and the Chief Minister of the Northern Territory.

The NMSC was established as part of a strategic response to a report on national marine safety undertaken for the Australian Transport Group by Thompson Clarke. This report identified a number of deficiencies in the administration of marine safety by States and the Northern Territory. The report highlighted the lack of consistency between the jurisdictions in the application and administration of standards for commercial vessels, and the lack of marine safety data.

In June 1996 the Australian Transport Council (ATC) endorsed a Draft National Marine Safety Strategy and agreed to the formation of the NMSC to implement the strategy. Implementation commenced in April 1997 with the establishment of the NMSC consisting of an independent chair and CEOs from the Commonwealth, States and the Northern Territory Marine Safety Authorities. It is supported by a secretariat with a CEO and 14 full time professional staff.

In March 1999 a project-based approach was adopted to facilitate and implement the National Marine Safety Strategy. This approach resulted in the formation of a number of separate projects addressing various policy issues and safety standards associated with commercial vessels.

The mission of the NMSC is:

“to improve marine safety in Australia, for the benefit of the community and the maritime industry by facilitating and supporting a co-operative and coordinated approach to the efficient and effective administration of marine safety within the Australian Federation, comprised of the Commonwealth, States and Territory Governments”.

ATC first endorsed the National Marine Safety Strategy in 1998. Subsequently, the Strategy was updated to ensure continued relevance and now forms the basis for the NMSC work program. The Strategy was developed as a strategic action plan against an agreed framework of goals and objectives for marine safety administration.

The Strategy introduced requirements for marine reform, in particular:

- Common and appropriate standards and arrangements that provide for consistent legislative and operational marine safety practices in all jurisdictions.
- Safe users, incorporation of OHS concepts and practices in marine training programs, encouraging vessel operators to recognise their duty of care to employees and passengers.
- Safety programs based on relative risk and best practice measures.

## 1.2. The RIS Process

State and territory marine safety authorities assist with the development of the RIS by providing written comments on the draft RIS. Any information regarding jurisdiction specific impacts of the proposed standard, especially impacts that are additional or significantly different to the identified impacts that they would like considered for inclusion in the national RIS, are provided**.**

In June 2004, the COAG Principles and Guidelines, in regard to the minimum assessment requirements, stated that:

> "Where a Ministerial Council or standard-setting body proposes to agree to regulatory action or adopt a standard, it must first certify that the regulatory impact assessment process has been adequately completed. The assessment process does not necessarily have to be carried out by the Ministerial Council but the Council or body should provide a statement certifying that the assessment process has been adequately undertaken
>
> and that the results justify the adoption of the regulatory measure. "
>
> "Most governments have regulatory impact assessment processes in place. The completion of regulatory impact assessments by Ministerial Councils and standard-setting bodies should remove the need to duplicate this analysis."

The Office of Best Practice Regulation approve RIS for both public consultation and decision making based on compliance with COAG policies. These policies have been updated by the document "COAG Best Practice Regulation - A Guide for Ministerial Councils and National Standard Setting Bodies, October 2007."

## 1.3. USL Code and the NSCV

The USL Code has been the basis of standards for domestic vessels since the late 1970s. The current USL Code contains provisions relevant to watertight and weathertight integrity, Section 5C, 5D and 7, stability, (see Table 1 for the detailed status of each).

The USL Code was originally developed from the international requirements applicable to ships Safety of Life at Sea (SOLAS)[1] and the US Code of Federal Regulations (CFR) 46[2] requirements for domestic vessels in the USA. Since it was printed in 1979, the USL Code has been amended in 1981, 1984, 1989, 1993, 1996 and 1997. The review of Sections 5C, 5D and 7 becomes necessary in order to update the relevant requirements to address the strategic actions specified in the NMSC's Strategy. In particular, to: –

[1] International Maritime Organization International Convention for the Safety of Life at Sea (SOLAS), 1974
[2] US National Archives & Records Administration, Code of Federal Regulations 46 Shipping

- Meet technological changes in the design, construction and operation of vessels;
- Incorporate a more performance-based framework that better matches the safety requirements for the vessel to the level of risk;
- Address problems of application or interpretation of the current USL Code;
- Address safety issues that may not be adequately addressed in the current USL Code;
- Take account of public benefit when determining safety requirements;
- Provide for more flexibility; and
- Remove redundant and obsolete provisions

The USL Code largely contains prescriptive standards for the design, construction and operation of vessels. The NSCV has a performance framework for standards setting. The framework was assessed in the Regulatory Impact Statement (RIS) for Part B: General Requirements and was approved by the ATC in 2002.

## 1.4. Status of Change from USL Code to NSCV

Table 1 shows the status of the change from the USL Code to the NSCV in accordance with the agreed process of reviewing the USL Code and its replacement with the NSCV.

**Table 1 — Status of Change from USL Code to NSCV**

| Uniform Shipping Law (USL) | National Standard Commercial Vessels (NSCV) | Status |
|---|---|---|
| New | Part A Safety Obligations | Approved by ATC in 2002 |
| Section 1 | Part B General Requirements | Approved by ATC in 2002 |
| | Part C Design and Construction | |
| Section 6, Section 5 Subsection C, D & E | Section 1 Arrangement, Accommodation & Personal Safety | Development started |
| Section 5 Subsection C & D Section 7 | Section 2 Watertight & Weathertight Integrity | Development started |
| Section 5 Subsection A, B, G, H, K, L, M | Section 3 Construction | Approved by ATC in 2008 |
| Section 5 Subsection F, Section 11 | Section 4 Fire Safety | Approved by ATC in 2004 |
| Section 9, New Subsection for LPG for engines | Section 5 Engineering | Approved by ATC in 2002 |
| Section 8, Subsection A, B, C, Section 5, Subsection C | Section 6 Stability<br>Subsection A Intact Stability Criteria<br>Subsection B Buoyancy and Stability Subsection C Stability Tests | Approved by ATC in 2008<br>Approved by ATC in 2010<br>Approved by ATC in 2008 |
| Section 10, 12, 13, 16 | Section 7 Safety Equipment<br>Subsection A Safety Equipment<br>Subsection B Com Equipment<br>Subsection C Nav Equipment<br>Subsection D Anchoring Systems | Approved by ATC in 2004<br>Approved by ATC in 2008<br>Approved by ATC in 2008<br>Approved by ATC in 2008 |
| Sections 2, 3 | Part D Crew Competencies | Approved by ATC in 2002 |
| Section 15 | Part E Operational Practices | Approved by ATC in 2004 |
| | Part F Special Vessels | |
| New | Section 1 Fast Craft<br>Subsection A General Requirements<br>Subsection B Category F1<br>Subsection C Category F2<br>Subsection D Category F3 | Approved by ATC in 2002<br>Approved by ATC in 2002<br>Approved by ATC in 2007<br>Future Development |
| Section 18 | Section 2 Hire & Drive | Development completed |
| New | Section 3 Novel Vessels | Future development |
| New | Section 4 Special Purpose | Development started |

## 1.5. Overview

It is essential for safety to keep quantities of water from entering the buoyant spaces of a vessel. Watertight and weathertight integrity is the means by which measures are taken to prevent or reduce the amount of water entering buoyant spaces in the vessel. Furthermore, adequate watertight and weathertight integrity is one of the essential assumptions that underpins compliance with freeboard, stability and subdivision criteria.

Water can enter the buoyant spaces of a vessel through the numerous penetrations of the structure that arise to meet the needs for proper functioning and operation of the vessel. Examples of such openings include piping inlets and discharges, portlights, hatches, side ports, doorways, ventilators and windows.

Many of the provisions for watertight and weathertight integrity focus on ensuring appropriate design and construction so as to provide an effective barrier against the ingress of water. The provisions specify requirements for the degree of watertightness and/or weathertightness.

The effectiveness of measures to keep water out may be compromised by human error in both operation and/or maintenance. Hence, the standard contains prohibitions and defense-in-depth strategies to reduce the impact of human factors in matters of critical safety.

An example of an incident where inadequate watertight and weathertight integrity resulted in tragedy was the loss of the Malu Sara[3] with 5 lives. Among the findings, it was concluded that

- The cockpit floor was not watertight and thus compromised the vessel's reserve buoyancy provided by the single underfloor compartment (void space).
- The vessel when fully loaded did not have sufficient freeboard to prevent the flow of seawater into both the motor-well and the cockpit.
- The vessel's cockpit scuppers and motor-well freeing port were inadequately sized, poorly located and not fitted with closing devices effective in preventing the backflow of seawater into the motor-well and cockpit.
- The vessel would have exhibited unstable characteristics and ultimately capsized when the cockpit was swamped.

An illustration of the vital role that the provisions for watertight and weathertight integrity play in safety is given by the loss of the former fishing vessel Tamara[4] off the coast of Queensland on 1 Sept 2002. In this case, previously acceptable arrangements were modified.

[3] Australian Transport Safety Bureau. Loss of the DIMIA vessel Malu Sara in Torres Strait Queensland 15 October 2005

[4] Australian Transport Safety Bureau Loss of the NSW registered vessel Tamara 1 September 2002 Report No.185

> *The evidence (from statements and photographs) is that the original hatch coamings for the engine room, ice room and steering compartment on the work deck were reduced from approximately 300 mm to 75 mm in height. The bulwarks around the work deck were raised by approximately 500 mm and the freeing ports for the work deck area were modified. The skipper stated that they 'had been welded up partially'.*

Flooding of buoyant spaces, cockpits and well-decks on a vessel can have a significant negative effect on the vessel's stability characteristics by:

- Increasing the vessel's displacement / reducing the vessel's reserve buoyancy;
- Reducing the vessel's freeboard;
- Causing the vessel to trim excessively;
- Changing the location of the vertical centre of gravity;
- Giving rise to transverse heeling moments that can cause large equilibrium angles of heel and/or capsize; and
- Creating large free surface moments that reduce stability.

There is a wide variety of hazards that may lead to flooding. Hazards that are specifically addressed by the provisions in this standard include failure of skin fittings or seawater piping systems, swamping, heavy seas combined with failure of watertight and/or weathertight closing appliances; failure of means provided to rapidly drain cockpits and/or wells and premature flooding when heeled by wind, seas, passenger movements, turning forces, sail forces, tow-rope forces, heavy loads, etc.

Another hazard that can arise is premature progressive downflooding that may occur after an event not specifically dealt with by this section such as collision, grounding, stranding, structural failure, failure of fastenings or caulking, damage to the propulsion system (e.g., propeller, bearings and shaft), damage to manoeuvring system (e.g., rudder, bearing and shaft), Premature progressive downflooding may reduce the time available to save life, or otherwise mitigate consequences.

Consequences that may arise from flooding include: capsize, foundering by progressive flooding, disabling of essential or emergency systems, entrapment of persons, excessive heel and/or trim, and exposure of persons to the risks of evacuation.

## 1.6. Survey Procedures

In the absence of legislation to the contrary (subject to a separate RIS), the standards contained within the NSCV are applicable to new vessels, existing vessels being surveyed for the first time, and vessels upgrading survey (that is, exposure to higher risks if it were not for additional safety measures being applied). For most of these vessels, compliance is verified by an independent initial survey. Surveyors look at both deemed to satisfy solutions specified within the NSCV and any vessel designer/builder or operator proposed equivalent solutions.

After a vessel has been in service periodic surveys (usually once a year, every second year or when convenient due to operational considerations) are undertaken by marine authorities (except in Queensland) to ensure that the vessel is maintained and its operators address various equipment and safety issues.

Deemed-to-satisfy solutions are prescriptive solutions contained within the standard that satisfy the required outcomes. The benefit of adopting a deemed-to-satisfy solution is that there is no onus on the applicant to prove compliance with the corresponding performance standard. The convenience of this option comes at a cost in that flexibility in the solution is limited.

Equivalent solutions are solutions proposed by the applicant that achieve the required outcomes by means other than that which is deemed-to-satisfy. An equivalent solution must be “proven to satisfy” the required outcomes, either directly or by showing its performance is at least equivalent to that of the deemed-to-satisfy solution.

The benefit of using an equivalent solution is that it greatly increases the options available for achieving the required outcome, allowing for innovation and the adoption of new technology. However, in adopting an equivalent solution, the applicant must bear the cost of proving that the equivalent solution meets the applicable required outcomes.

## 1.7. Reported Commercial Vessel Incidents in Australia 2005-2009 by Incident Types

Table 2 presents the breakdown of incident types of the 3393 reported marine incidents involving commercial vessels in Australia for the period 2005-2009. Forty percent (n=1360) of all reported commercial vessel incidents were collision of some form, 15.3% (n=520) were grounding unintentional incidents and 4.2% (n=144) were due to structural failure. Reported incidents involving commercial vessels in Australia during this period has resulted in 60 fatalities and 198 serious injuries.

Watertight and weathertight integrity is likely to be a primary factor in the risks associated with sinking, swamping, capsize, loss of stability, flooding, and loss or presumed loss of the vessel (see pink shading in the Table).

Watertight and weathertight integrity may well be a secondary factor that will shape the consequences arising from collision and grounding incidents (see the yellow shading in the table).

**Table 2 — Reported Commercial Vessel Incidents in Australia 2005-2009, by Incident Types**

| Incident Types | Reported Incidents | Records in % | Fatalities | Records in % | Serious Injuries | Records in % |
|---|---|---|---|---|---|---|
| All types of Collision | 1360 | 40 | 10 | 16.6 | 26 | 13.1 |
| Grounding unintentional | 520 | 15.3 | 3 | 5 | 6 | 3 |
| Falls within vessel | 169 | 5 | 1 | 1.7 | 43 | 21.8 |
| Other onboard incident | 146 | 4.3 | 4 | 6.6 | 40 | 20.2 |
| Structural failure | 144 | 4.2 | | | | |
| Unclassified | 143 | 4.2 | 1 | 1.7 | 4 | 2 |
| Person overboard | 131 | 3.9 | 18 | 30 | 20 | 10.1 |
| Other incident caused by an operating vessel | 114 | 3.4 | 1 | 1.7 | 13 | 6.6 |
| Fire | 110 | 3.2 | 1 | 1.7 | 3 | 1.5 |
| Sinking | 108 | 3.2 | 3 | 5 | | |
| Swamping | 108 | 3.2 | 1 | 1.7 | 2 | 1 |
| Capsizing | 79 | 2.3 | 11 | 18.3 | 6 | 3 |
| Hit by propeller or vessel | 65 | 1.9 | 3 | 5 | 7 | 3.5 |
| Onboard crushing or pinching | 59 | 1.7 | 1 | 1.7 | 25 | 12.7 |
| Flooding | 49 | 1.4 | | | | |
| Diving incident | 28 | 0.8 | 2 | 3.3 | 1 | 0.5 |
| Loss or presumed loss of a vessel | 18 | 0.5 | | | | |
| Skiing incident | 16 | 0.5 | | | 2 | 1 |
| Grounding intentional | 13 | 0.4 | | | | |
| Loss of stability | 6 | 0.2 | | | | |
| Explosion | 4 | 0.1 | | | | |
| Parasailing incident | 3 | 0.1 | | | | |
| **Total** | **3393** | **100** | **60** | **100** | **198** | **100** |

Source: NMSC National Marine Incident Database

Some requirements for watertight and weathertight integrity such as door sills may impact negatively on personal safety, increasing the likelihood of falls on the vessel. Sill and coaming heights must represent a compromise between weathertight integrity and personal safety. Other provisions in the standard such as requirements to drain water on deck and strength requirements for windows reduce the chances of personnel falling overboard and/or being injured (see blue shading in the table).

The requirements for watertight and weathertight integrity of a vessel generally help reduce the likelihood and/or mitigate the consequences within the incident types highlighted. In particular, the risks of sinking and capsizing events are reduced, both of which are associated with significant levels of fatality.

Improvements in watertight and weathertight integrity have the potential to reduce the likelihood of the 79 capsizing incidents that resulted in 11 fatalities. Likewise the proposed standard may reduce the likelihood of and consequences on the 108 swamped vessels in which 3 people died. Without having detailed analysis of the exact circumstances of the 18 persons who died from falling overboard, it is reasonable to assume that one or more of them may have been exposed to the effects of seas on deck or water laying on deck.

The proportion of fatalities associated with fishing is somewhat disproportionate to the total number of fishing vessels in the commercial fleet. Table 3 shows that fatalities in fishing vessels amount to 45.8% of the total while they represent only 31.9% of the total fleet. While fatality rates in the fishing industry have been improving over the long term[5], there is still more than needs to be done to achieve parity in safety with other forms of seafaring.

**Table 3 — Proportion of fatalities in fishing vessels relative to the size of fleet Australia 2005-2009**

| Vessel Type | Fatalities | | Fleet | |
|---|---|---|---|---|
| | Number | % of total | Number | % of total |
| **Fishing** | 33 | 45.8% | 7925 | 31.9% |
| **Non-Fishing** | 39 | 54.2% | 16902 | 68.1% |
| **Total** | 72 | | 24827 | 100 |

(1) Figures presented here do not include data on vessels from Victoria
Source: NMSC National Marine Incident Database

## 1.8. Commercial Vessel Losses in Australia from 1992-2009

Table 4 gives an analysis of 120 Australian commercial vessel losses (sunk or otherwise destroyed) over the last 17 years.

The data applies to vessels that were owned in Australia at the time of loss or at some other time. Pink shows where watertight and weathertight integrity is likely to play a primary role in the risk, yellow shading shows where it is likely to play a secondary role.

The data confirms that foundering incidents (that include capsize and sinking) is the leading cause of vessel losses at 49%.

[5] Flapan, Mori. Fishing vessel safety - A new approach. Ausmarine East 2003

**Table 4 — Analysis of 120 Australian Commercial Vessel Losses from 1992 to 2009**

| Incident Consequences | Number of Vessels lost | Per cent of total vessel losses |
|---|---|---|
| Foundered | 59 | 49 |
| Wrecked | 25 | 21 |
| Burnt or Explosion | 18 | 15 |
| Collision | 10 | 8 |
| Lost or Missing (cause unknown) | 8 | 7 |
| Total | 120 | 100 |

Source: Register of Australian and New Zealand Ships and Boats compiled by Mori Flapan & NMSC Database.

At a secondary level, the requirements for watertight and weathertight work to reduce the risks collision and wrecking by reducing the consequences: i.e., limiting the extent of flooding and providing additional time to respond to hazards and protecting systems important for evacuation and thereby increasing the chances of survival. This highlights the potential benefits of improvements to the standards applicable to watertight and weathertight integrity may go beyond situations where flooding is the primary cause.

For every vessel recorded as being lost in Table 4, there will have been numerous other vessels that were subjected to similar hazards that were saved from being lost due to measures put in place to prevent or reduce the volume of water entering through openings.

## 1.9. Contributing Factors to the Occurrence of Vessel Incidents

Contributing factors relate to the circumstances or behaviour that best describe the major reason(s) for the occurrence of a marine incident. Each incident can involve one or more contributing factors, reflecting the fact that many incidents involve a chain of events with associated contributing factors.

Factors that contributed to the occurrence of incidents are classified into three broad groups namely: human, environmental and material. Within each of these there are more specific categories which provide further detail, for example, lack of maintenance which is a specific human factor.

The watertight and weathertight integrity contains measures that are largely intended to reduce the likelihood and the consequences of an incident. Results presented in Table 5 show environmental factors contributed to 27% (n=917), human factors contributed to 48% (n=1623) and material factors contributed to 16% (n=484). Nine percent (n=297) of incidents were due to factors which were unknown.

The proposed provisions for watertight and weathertight integrity act to mitigate contributing factors (i.e., environmental effects, human errors and material deficiences). For example, they provide protection against exposure to waves in both normal and abnormal conditions and when crossing bars, they help to avoid the likelihood and/or consequences of overloading, and they are essential as part of the assumptions used to establish whether a vessel has adequate stability.

**Table 5 — Contributing Factors to Occurrences of Commercial Vessel Incidents in Australia 2005-2009**

| Contributing Factors | Records | Percentage to all Factors |
|---|---|---|
| Wind/sea state | 707 | 12.8 |
| Other environmental factor | 245 | 4.4 |
| Floating or submerged object | 163 | 3 |
| Tidal conditions | 124 | 2.2 |
| Restricted visibility | 117 | 2.1 |
| Environmental: Wash | 92 | 1.7 |
| Bar conditions | 44 | 0.8 |
| **Environmental Total** | **1492** | **27** |
| Error of Judgment | 732 | 13.3 |
| Other human factor | 706 | 12.8 |
| Failure to keep a proper lookout | 308 | 5.6 |
| Human: Inexperience | 296 | 5.4 |
| Human: Navigational error | 258 | 4.7 |
| Human: Excessive speed | 95 | 1.7 |
| Lack of maintenance | 81 | 1.5 |
| Human: Insecure mooring | 75 | 1.4 |
| Alcohol or Drugs | 50 | 0.9 |
| Human: Fatigue | 19 | 0.3 |
| Human: Lack of fuel | 14 | 0.3 |
| Human: Overloading | 9 | 0.2 |
| **Human Total** | **2643** | **48** |
| Other material factor | 368 | 6.7 |
| Equipment – Machinery | 308 | 5.6 |
| Equipment - Hull failure | 98 | 1.8 |
| Equipment – Electrical | 61 | 1.1 |
| Equipment – Navigation | 45 | 0.8 |
| Inadequate stability | 25 | 0.5 |
| **Material Total** | **905** | **16** |

| | | |
|---|---|---|
| Unknown factors | 484 | 9 |
| **Grand Total** | **5524** | **100** |

Source: NMSC National Marine Incident Database

# 2. STATEMENT OF THE PROBLEM

## 2.1. The Problem

ATC has set an agenda for reform of the administration of marine safety in Australia that includes revision of the Uniform Shipping Laws Code. The Marine Safety Strategy contains a number of strategic actions identified by ATC as being instrumental to achieve the outcomes sought. Among these are the following:

- Develop and promulgate standards based on recognised and approved national and international standards for the design and construction of vessels.
- Encourage the development of professional competence in vessel design, construction and survey.
- Introduce and support performance based standards as an alternative to prescriptive standards.
- Establish practices for assessing new technologies or operations in a timely manner and facilitate rapid transfer into standards.
- Incorporate OH&S principles into design and construction standards.
- Encourage vessel operators to recognise their duty of care to employees and passengers.
- Develop a forward program of broad safety initiatives that reflects relative risk, based on an assessment of an incident and other safety data.

The following is a list of specific problems that need to be addressed to fulfil the vision set by ATC for the future.

## 2.2. Out of step with modern technology and practise

The present requirements of the USL Code need to be updated to accommodate the wide variations in the design and operations of domestic vessels and changes in approach by government and industry. Advances in technology have given rise to alternative solutions. New more performance-based approaches have been developed to a level where they offer alternative means of achieving safety outcomes.

For example, the current USL Code Clauses 5C.73 and 5D.36 make no provision for window materials other than glass. The standard has difficulty accommodating arrangements that propose the use of polycarbonate or acrylic plastic materials. Likewise, there is no provision for the modern practice of gluing of windows which can reduce production costs, installation costs and weight.

## 2.3. Prescriptive rather than Performance Based

The present USL Code provisions for Watertight and Weathertight integrity are in a prescriptive technical form that does not meet the modern requirements for marine safety standards and performance which are endorsed by the ATC, industry, and marine authorities.

The preferred framework for standards requires that performance is specified in terms of required outcomes (i.e., safety outcomes), with prescriptive technical standards (deemed-to-satisfy solutions) specified to meet those required outcomes. The alternative option of equivalent solutions is also accommodated. This option appropriate where it can be shown that an alternative method will meet the required outcomes; that is, provides an equivalent safety outcome to the prescriptive standards. This ensures that innovative solutions are not stifled.

Being a prescriptive standard, the USL Code concentrates on specifying the solution without referring to the safety outcome that is to be achieved. Thus the safety outcomes intended by specific clauses are sometimes unclear and subject to different interpretations, especially when considering exemptions and equivalents. The Marine Safety Strategy requires the revision to introduce and support performance based standards as an alternative to prescriptive standards.

The performance standards framework of the NSCV was assessed in the Regulatory Impact Statement for Part B: General Requirements and approved by the ATC in 2002. Performance standards are being progressively introduced as the sections of the USL Code are replaced by the NSCV.

## 2.4. Lack of Consensus as to Requirements

The current USL Code provisions relevant to watertight and weathertight integrity are deficient as a mechanism to deliver common standards that can be recognised and accepted by all marine authorities due to inconsistencies in the way it is applied by the enabling legislation of the various jurisdictions in Australia. The differences in legislative treatment is a reflection of the issue that some of the provisions contained in the USL Code do not represent a consensus between authorities.

For example, Clause 5C.67.11 specifies characteristics for the location of freeing ports that are often not applied because they are considered too onerous. The clause implies that the freeing ports will not be immersed at angles of 15 degrees, but this is frequently not achieved.

Furthermore, lack of agreement as to the relevance and/or applicability of specific provisions within the USL Code is manifested by the fact that some authorities specify different regulatory requirements and/or apply administrative solutions such as exemptions.

An example is the provision of engine room air intakes below the gunwale in contravention with Clause 5C.70.1. This Clause specifies minimum height of ventilator coamings above the bulkhead deck, effectively precluding ventilators located below that deck.

## 2.5. Lack of Transparency and Reliance on Discretion

The lack of clarity and omissions within the standard led to inconsistencies in application. This has led to different interpretations of individual provisions.

For example, Clause 5C.73.3 states that windows on seagoing vessels should not exceed 0.6 $m^2$. The status of this provision is uncertain because of the word “should” rather than “shall” resulting in different interpretations between jurisdictions. Some limit the size, some do not considering the provision non-mandatory.

There are numerous provisions in the USL Code that rely on Authority discretion in order to achieve a workable solution. By its nature, discretion exercised by individuals on behalf of a jurisdiction tends to vary and adds an element of subjectivity, which in turn leads to difficulties in transferring a vessel from one jurisdiction to another and increases the potential for liability.

For example, there is no provision for the use of flush watertight hatch covers in Section 5C, and their application is discretionary in Clause 5D.20.2. Various jurisdictions have allowed the use of flush watertight hatch covers. However, this has led to disagreement between jurisdictions on how and when such arrangements are permissible.

## 2.6. Piecemeal Presentation of Requirements

The piecemeal presentation of requirements does not facilitate a holistic performance-based overview of risk control measures. The current USL Code contains provisions relevant to watertight and weathertight integrity in Subsection—5C Construction-Watertight Subdivision of Passenger Vessels; Subsection 5D – Construction - Watertight Subdivision of Class 2, and Class 3 Vessels, Section 7 - Load Lines, Subsection 8A—Preliminary (Stability), Subsection 8C – Stability Criteria, and Section 18 - Hire and Drive.

The presentation of requirements in separate documents without a graded risk approach inhibits a proper comprehension of the function and grading of requirements. There are subtle differences in wording for what are essentially the same requirements. For example Clause 5C.67.9 and 5C.67.12 contain provisions relevant to freeing ports in the transom; however Clause 5D.29 treats such arrangements slightly differently as there is no equivalent to Clause 5C.67.12.

## 2.7. Requirements Superseded by other Standards

During the last 25 years, there have been significant revisions to watertight and weathertight integrity standards adopted for vessels around the world. Some of the requirements in the USL Code no longer align with relevant national and international standards.

The ongoing revisions of SOLAS standards by IMO take into account the lessons learned from many vessel incidents since the original development of the USL Code. There have been a number of very significant incidents which resulted in multiple fatalities and serious injuries which were to some extent due to deficiencies in watertight and weathertight integrity. Some of the marine incidents which resulted in multi fatalities include the following ro-ro casualties:

- The Herald of Free Enterprise was a roll-on roll-off (Ro-Ro) car and passenger ferry that capsized after the vehicle deck flooded on March 6, 1987, killing 193 passengers and crew.
- The Estonia was a roll-on roll-off ferry that sank on September 28, 1994, in the Baltic Sea, claiming 852 lives. It was one of the worst maritime disasters in modern history. Again, water on the vehicle deck was an important factor.

There are no watertight and weathertight integrity standards in the USL code for ro-ro ships. The NSCV draft standard now includes provisions for access doors in these categories of vessels.

In addition, the USL Code refers to standards that have been superseded and no longer exist such as Clause D.10.3 which refers to British Standard MA24.

## 2.8. Tensions between safety provisions and function

Accommodating the technical provisions for watertight and weathertight integrity tend not to be high cost in itself. However, it frequently results in constraints on vessel design and operation that can have a significant economic impact. The best example is the limit placed on loading of a vessel by the affixing of a load line mark. This places a definite limit on the economic return that can be achieved from a vessel that earns income through maximising the quantity of cargo carried. A load line determined using the provisions specified for ocean going vessels would be inappropriate for vessels operating in sheltered waters.

To a lesser extent but in a similar manner, the need to provide coaming and sill heights on decks and freeing ports for drainage may interfere with activities undertaken on those decks. This is particularly so on the working decks of moderately sized vessels operating at sea.

On vessels that carry passengers, coamings and sills specified to meet watertight and weathertight integrity objectives may also create a tripping hazard to persons. The provisions need to find a balance between controlling the risk of flooding and controlling the risk of personal injury.

On high speed craft and, to a lesser extent on other vessels, weight is at a premium. Provisions that specify excessive thicknesses of glass can have an adverse effect on speed, stability and earning capacity.

Because of these factors, it is essential that solutions for the control of risk associated with watertight and weathertight integrity be optimised so that risks are controlled in a manner that also facilitates wider operational objectives.

## 2.9. Issues Arising from Other Standards

The NMSC Strategic Plan requires the NMSC to develop and promulgate standards based on recognised and approved national and international standards for the design, construction and operation of vessels.

These include standards for high speed craft, passenger and cargo ships, fishing vessels, Ro-Ro ships and even recreational boats.

In addition to the High Speed Craft Code 2000 that was mentioned above, there are a number of other relevant standards that provide a basis for comparison. Classification societies have now produced standards applicable to light craft that are relevant to the majority of moderate sized, domestic commercial vessels.

At the lower end of vessel size and complexity, standards are now available applicable to small non-commercial vessels that were not there previously. The ISO range of small craft standards applicable to recreational craft has potential to act as the lower benchmark applicable to simple and small commercial vessels.

## 2.10. Differences in standards applied to Fishing Vessels and Non Passenger Vessels

The current USL Code provisions for watertight and weathertight integrity contain differences in standards applying to fishing and trading vessels. For example, Class 2 (non-passenger vessels) greater than 24 metres are required to carry a Load line in accordance with Section 7 while the same vessel operating under Class 3 (Fishing) is not. Similarly, the conditions of assignment for such a vessel in Section 7 may be more onerous than the provision contained in Subsection 5D. Also, Part IV of Subsection 5D indicates that provisions that are acceptable for fishing vessels (Class 3) up to 20 m in length are only acceptable for Class 2 vessels up to 16 m. In terms of watertight and weathertight integrity, there is no obvious justification for a lesser standard being applicable to fishing vessels. Quite the contrary, Table 3 indicates that more needs to be done to improve fishing vessel safety to levels comparable to non-fishing vessels.

The safety record of fishing vessels continues to lag behind other sectors of the industry. Between 2005 and 2009, 46% of all fatalities on commercial vessels in Australia were on fishing vessels, while fishing vessels represented only 29% of the total fleet of vessels.

In particular, between 2005 and 2008, of the factors that contributed to fatalities, only fishing vessels recorded that wind and sea state were a significant factor[6]. Fishing vessels tend to continue operating in conditions that might cease operations on other

[6] National Marine Safety Committee. Commercial Vessel Incidents in Australia 2005-2008. Sydney. Nov 2009.

vessel types. People are also more likely to be on deck in those conditions. Hence, injury rates from wind and sea state factors on fishing vessels are much higher than on passenger (Class 1) or non-passenger (Class 2) vessels.

Recall that the NSCV focuses on safety outcomes rather than specific safety solutions. Any artificial distinctions between types of vessels that cannot be justified on the basis of safety outcomes undermines the very basis of the performance-based approach. Furthermore, there are increasing numbers of vessels with dual certification; i.e. Class 3 and Class 2 survey. It is unreasonable that a Class 3B crayfishing boat must upgrade safety standards to operate in Class 2C when the operations in Class 3B are hundreds of miles from a safe haven and are subject to higher risks than Class 2C.

# 3. OBJECTIVES

## 3.1. Objective of the standard

The objective of a watertight and weathertight integrity standard is to reduce the risks and consequences of vessel accidents that occur as a result of flooding of spaces by:

a) Preventing water from entering the vessel and rendering ineffective—

   i) spaces assumed intact for compliance with the relevant buoyancy and stability criteria, and

   ii) spaces that serve to provide functions essential for the safety of the vessel.

b) Minimising the likelihood that large quantities of water will lie on the exposed decks of a vessel which would otherwise lead to—

   i) a reduction in stability caused by the additional weight and free surface of water trapped on deck, and

   ii) increased likelihood of flooding through penetrations on deck.

## 3.2. Objective of the review

In addressing this problem, the NMSC aims to:

- Create an environment for persons on board a vessel that reflects current community expectations for safety.
- Reduce the risk of excessive water entering the vessel through window doors or open spaces of the vessel spaces.
- Provide a consistent and auditable benchmark for determining initial and ongoing compliance of a vessel to this standard.
- Provide a performance based framework that supports innovation through equivalence.
- Reflect advances in technology and scientific understanding;
- Provide a standard that can easily be implemented by marine authorities on a consistent basis.
- Maintain a level of compatability with the existing provisions in the USL Code so as to avoid unnecessary conflicts.
- Better take into account the particular nature and area of operations of each individual vessel.

# 4. OPTIONS FOR THE NATIONAL STANDARD

## 4.1. Overview

NSCV Part C Section 2 specifies minimum requirements for the watertight and weathertight integrity of vessels and supersedes the provisions and regulations for watertight and weathertight integrity presently contained in the USL Code. The proposed standard is the National Standard for Commercial Vessels Part C Design and Construction Section 2 Watertight and Weathertight Integrity which was prepared as part of the review of the Uniform Shipping Laws (USL) Code. The proposed standard replaces portions of Subsections 5C and 5D and the whole of Section 7 of the USL Code.

A number of options were considered in this RIS for development of the proposed standard on Watertight and Weathertight Integrity. These options were:

- Option 1 - Status Quo (USL Code Sections 5C, 5D and 7)
- Option 2 - Adopt External Standards
- Option 3 - The Proposed Standard

## 4.2. Option 1 Status Quo based on USL Code Sections 5C, 5D and 7)

The current application demands compliance with the requirements in USL Code Section 5 Construction Sub-section 5C 1993 and 1996, USL Code Section 5 Construction Sub-section 5D 1989 and USL Code Section 7 Load Lines 1989 as amended in 2006. Section 5C is Watertight sub-division of Passenger Vessels and Section 5D is Watertight sub-division of Class 2 and Class 3 Vessels. For details of the existing standard, refer to the USL Code Section 5 Construction Sub-sections C and D.

Under this option, nothing is done to effect changes to the USL Code Sections 5C, 5D and 7 which are the current requirements in place regarding watertight and weathertight integrity of commercial vessels in Australia. Adopting this option implies a continuation of the current requirements in the USL Code, with no changes to impact on safety or national consistency. The issues surrounding the continuous use of the USL Code were discussed in the chapter on the Statement of the Problem in this RIS. The Status Quo is the easiest option to be adopted as it is already in force. The continuation of this option means no changes in the existing requirements and no additional compliance costs will be incurred. However, there will be no reform of current requirements, no opportunity to encourage innovation and facilitate the optimization of designs, and continued differences in application between jurisdictions, particularly to modern vessels.

## 4.3. Option 2 - Adopt External Standards

Option 2 means Australia would adopt one or more of the various standards currently in use internationally or in other countries for their domestic usage.

The most widely used standards are the ICLL standards. However, as already mentioned, these have limited application and are not well suited to vessels less than

500GT and vessels operating in sheltered waters or in near coastal waters. Nor are they directly applicable to fishing vessels.

The International Convention on Load Lines, 1966 as amended by the Protocol of 1988, (ICLL) is applied by many countries for their domestic vessels. This Convention is already enabled in Australia for international and interstate shipping under the Commonwealth Navigation Act. The application of the ICLL is limited to non-fishing vessels 24 m and over in length and does not suit vessels with a lesser risk profile. Article 6 of the ICLL states—

> *(1). Ships when engaged on international voyages between the near neighbouring ports of two or more States may be exempted by the Administration from the provisions of the present Convention, so long as they shall remain engaged on such voyages, if the Governments of the States in which such ports are situated shall be satisfied that the sheltered nature or conditions of such voyages between such ports make it unreasonable or impracticable to apply the provisions of the present Convention to ships engaged on such voyages.*

Vessels operating in restricted offshore waters (Operational Area C) and sheltered waters (Operational Areas D and E) are vessels that would be subject to exemption. Taking into account fishing vessels which also are not covered, the ICLL is not suited without modification to 96.8% of vessels in domestic service. Many countries rely in surveyor discretion for application of ICLL to their domestic fleets. However, such an approach is contrary to the NMSC's objective of national consistency between jurisdictions. Surveyor discretion brings with it a level of subjectivity that hinders national consistency and often results in a barrier to mutual recognition.

There are other relevant national and international standards that have application to the vessels not suited to full application of ICLL. These include the IMO's High Speed Craft Code 2000 (HSC Code 2000), classification society rules produced by Lloyds Register, Det Norske Veritas and others, the Torremolinos Convention on the Safety of Fishing Vessels (SPV). Each of these standards tends to be limited in application to a relatively narrow range of vessels, for example the High Speed Craft Code. It is possible to create a framework that references a range of relevant National and International standards in a manner similar to NSCV Part C Section 3 Construction. This task could become quite complex as each standard has to be interpreted in the context of the NSCV Classes of vessels in Part B, and it is highly likely that the end result would not properly cover the field of domestic commercial vessel designs.

For example, Classification Society standards for windows on vessels specify minimum thicknesses that very greatly between the various rules. Which one is right? Furthermore, while classification society rules for windows can provide a more optimised outcome than the current USL Code provisions, unforseen issues can arise. Some of these window calculations require input that is the result of in-depth design load calculation elsewhere in the Class Rules. A switch to Class Rules would burden users who might just need to establish window requirements for a simple vessel or for replacement of a small number of windows. This is because they would need to acquire and use sophisticated Classification Society Rules.

The relevant international and national standards do not incorporate the performance-based framework that lies at the core of the NSCV. There are no clearly defined required outcomes. An attempt to cover the field by adopting a "patchwork quilt" approach applying only relevant international and national standards will result in problems with the performance outcomes because, as we have seen, some of these standards have conflicting requirements where they can overlap, creating an inconsistency in the performance-based approach. An example is the different requirement for freeing port area on fishing vessels and vessels under SOLAS. Such ambiguities can result in uncertainty as to the appropriate performance benchmark.

The details of these standards vary in their scope, application and outcomes. None is capable of being adopted as a stand-alone standard applicable to the range of commercial vessels operating domestically in Australia. However, they do provide a valuable reference to acceptable solutions for the vessels they cover.

**Question to elicit specific public comment #4:** *Public comment is sought on whether there might be an existing comprehensive standard that would provide a viable alternative the the draft standard.*

## 4.4. Option 3 - The Proposed Standard

### 4.4.1. Overview

The proposed standard draws upon the content of many of the relevant national and international standards specified in Option 2, but presented as a unified comprehensive set of requirements to regulate the watertight and weathertight integrity of the wide range of domestic commercial vessels in Australia.

The proposal adopts the ICLL requirements for watertight and weathertight integrity on domestic vessels of high risk profile where the risks are essentially similar to those of a vessel engaged in international trade.

A graded approach is proposed for vessels of lesser risk based on the ICLL regulation previously mentioned as follows—

> *(1). Ships when engaged on international voyages between the near neighbouring ports of two or more States may be exempted by the Administration from the provisions of the present Convention, so long as they shall remain engaged on such voyages, if the Governments of the States in which such ports are situated shall be satisfied that the sheltered nature or conditions of such voyages between such ports make it unreasonable or impracticable to apply the provisions of the present Convention to ships engaged on such voyages.*

Vessels operating in restricted offshore waters (Operational Area C) and sheltered waters (Operational Areas D and E) are considered to fall within the intent of this provision. This provides the basis on which a graded approach can be applied from full ICLL compliance to a much lesser level applicable to smooth waters.

The proposed standard adopts a risk-based approach to bridge the gap between the ICLL requirements for watertight and weathertight integrity applicable to full seagoing vessels and those applicable to vessels in sheltered waters. The standard applies from large vessels exceeding 100 metres down to vessels that may be sourced from recreational boat manufacturers. Particular cognisance was taken of the existing standards contained within the USL Code that already applies to a wide range of vessels and represents a considerable body of experience.

The content of the draft standard is illustrated by the list of Chapters:

| | |
|---|---|
| Chapter 1 | Preliminary |
| Chapter 2 | Watertight and weathertight integrity required outcomes |
| Chapter 3 | Deemed to satisfy solutions for watertight and weathertight integrity |
| Chapter 4 | Fully decked vessels and open vessels |
| Chapter 5 | Watertight integrity provisions for Zones 1 and 2 |
| Chapter 6 | Watertight and weathertight integrity provisions for Zones 3, 4, 5 and 6 |
| Chapter 7 | Tests for watertight and weathertight integrity |
| Chapter 8 | Freeboard and buoyancy at the bow |
| Chapter 9 | Freeboard mark |
| Chapter 10 | Drainage of wells and cockpits |
| Annex A | Portlight, side scuttle and window panes and window frames |

Sections 4.4.2 to 4.4.13 that follow highlight the more significant aspects of the draft standard. Other changes are listed in Annex A to this Regulatory Impact Statement.

### 4.4.2. Performance-based framework

The performance-based framework is applicable to watertight and weathertight integrity. This framework is established in Chapter 2. The required outcomes listed in the chapter establish the safety outcomes for the development and application of solutions that are equivalent to the deemed-to-satisfy solutions within the section. The proposed required outcomes are listed below:

***1. Likelihood of excessive water on deck to be controlled***

A vessel must be designed and constructed to prevent or limit the quantity of water encroaching on deck in normal and abnormal conditions arising from wave action, operational heeling moments, pitching motions and/or loading.

***2. Risk of capsize or foundering by flooding through penetrations to be controlled***

Penetrations through the effective watertight envelope must prevent or control to acceptable levels the unintentional entry of water into the buoyant volume, in both normal and abnormal conditions, that might result in the vessel capsizing or sinking.

***3. Preservation of function***

A vessel must have arrangements to prevent or control to acceptable levels the risk that systems and/or spaces necessary for the safety of the vessel could be rendered inoperative by exposure to and/or entry of water in normal or abnormal conditions.

***4. Rapid drainage of water on deck***

A vessel must have arrangements to prevent or control to acceptable levels the likelihood that in both normal and abnormal conditions, water that encroaches upon the vessel deck will be retained on the deck and in recesses.

***5. Conditions of loading to be safe***

The loading and operation of the vessel must be controlled to prevent or minimise the consequences from the uncontrolled encroachment of water in or on the vessel, in normal or abnormal conditions. Persons responsible for the safety of the vessel must have ready access to reliable and quickly assessable information needed to identify hazards, control loading and undertake any other essential actions needed to secure the vessel’s watertight and weathertight integrity.

These required outcomes have been reverse-engineered from the USL Code provisions. Providing for equivalent solutions in the new standard encourages innovation while maintaining required levels of safety. Innovation has potential to provide competitive advantage and/or reduced costs. An improved understanding of safety outcomes will facilitate verification and assessment of equivalent solutions.

### 4.4.3. Sources of Deemed to satisfy solutions for watertight and weathertight integrity

Chapter 3 establishes the overall framework for the application of deemed-to-satisfy solutions. A graded approach is used to match the specified requirements against the vessel’s level of risk. The key risk parameters used to establish relative risk are operational area and length of vessel (relative to freeboard and wave height).

The International Convention on Load Lines, 1966, as amended by the Protocol of 1988, has been used as the basis for the requirements for watertight and weathertight integrity for larger seagoing Class 1 (passenger) and Class 2 (non-passenger) vessels. ICLL forms the upper benchmark for certain higher risk vessel and has been referred to directly as the applicable standard for Class 1A, 2A, 1B and 2B vessels 25 m or more in measured length and Class 1C and 2C vessels 46.9 m or more in measured length, see Table 6. In particular, the convention's "Conditions of Assignment" in its Chapter II of Annex 1 forms the basis of this Section of the NSCV.

Clause 3.3 of the draft standard provides the interface between the international standards contained in the International Convention on Load Lines (ICLL) and the deemed-to-satisfy standards contained within the NSCV. The ICLL 1966 has been deemed appropriate for seagoing vessels by 159 signatory countries, while the ICLL Protocol 1988 has 91 signatory countries. Table 6. below establishes which domestic commercial vessels have a risk profile that is essentially similar to vessels in international trade. Those vessels are required to apply the same ICLL standards.

For completeness, approaches and/or text of other parts of the International Convention on Load Lines have been included. Other requirements have been taken from SOLAS Chapter II-1 "Construction - Structure, subdivision and stability, machinery and electrical installations" (The Safety Convention, as amended up to the adoption of IMO Resolution MSC.216 (82) as indicated in Marine Orders Part 12 Issue 2).

**Table 6 —Deemed to satisfy solutions for watertight and weathertight integrity**

| Operational Area | Class 1 Passenger and Class 2 Non-passenger | | Class 3 Fishing | |
|---|---|---|---|---|
| A,B | $L_m \geq 25$ m | ICLL and SOLAS | $L_m \geq 46.9$ m | SFV |
| | $L_m < 25$ m | NSCV | $L_m < 46.9$ m | NSCV |
| C | $L_m \geq 46.9$ m | ICLL and SOLAS | $L_m \geq 46.9$ m | SFV |
| | $L_m < 46.9$ m | NSCV | $L_m < 46.9$ m | NSCV |
| D,E | NSCV | | NSCV | |

KEY:

$L_m$ = Measured Length, in metres

ICLL = International Convention on Load Lines

NSCV = The deemed to satisfy provisions contained within Chapter 4 to Chapter of this Section

SFV = Provisions relevant to watertight and weathertight integrity contained in Torremolinos International Convention for the Safety of Fishing Vessels

SOLAS = Provisions relevant to watertight and weathertight integrity contained in IMO Convention on the Safety of Life at Sea (includes HSC Code which may be applicable to vessels that fall outside the definition of NSCV fast craft)

There is no direct equivalent to the ICLL for fishing vessels. However, the Torremolinos International Convention for the Safety of Fishing Vessels (SFV) contains provisions for watertight and weathertight integrity that are similar. Application of SFV provisions is mandatory for length 45 metres and more, and discretionary for fishing vessels less than 45 metres, The SFV length of 45 metres roughly equates to 46.9 metres measured length used in the table. For Class 3A, 3B and 3C fishing vessels of length 46.9 m or more, application of the Torremolinos International Convention for the Safety of Fishing vessels is proposed.

The IMO Conventions are amended from time to time. Unlike the USL Code that replicated the ICLL provisions, the NSCV makes direct references to the IMO standards. NSCV Part B Clause 1.6 says that any documented referenced in the NSCV should be considered as the latest revision of the document, including amendments. Hence amendments and revisions are automatically picked up where a standard is directly referenced keeping the provisions up to date.

There are very few fishing vessels of length 46.9 metres or more in Australian waters (currently only 3 in the entire fleet). Where such vessels do enter survey in the future, they would be required to meet international standards for such vessels. The SFV Convention has been adopted by 17 countries including Germany, France, Netherlands, Norway, Iceland, Spain and Sweden. The majority of new vessels of this size entering Australia would have been built in one of these countries. There should therefore be no additional cost of compliance.

It will be noted that proposed Table 6. no longer requires application of Load Line provisions for Class 1C and 2C vessels between 24 and 46.9 m length, and all Class 2D and 2E vessels of length 24 metres and more on the basis of the discretion contained within the ICLL to modify the requirements for vessels engaged in voyages where the risks are reduced.

Vessels that were previously subject to the provisions of ICLL would now be subject to the provisions of Chapters 3 to 10 of the NSCV, including the performance and risk-based provisions.

There is real potential for cost savings on certain vessels as geometric freeboard intended for full seagoing service will no longer be a determining factor for maximum deadweight on vessels operating in sheltered waters or less than full seagoing service. Safety will still be achieved by compliance with intact stability, construction, minimum bow height, watertight integrity and, where applicable, flooding criteria.

#### 4.4.4. Assignment of Zones on a vessel

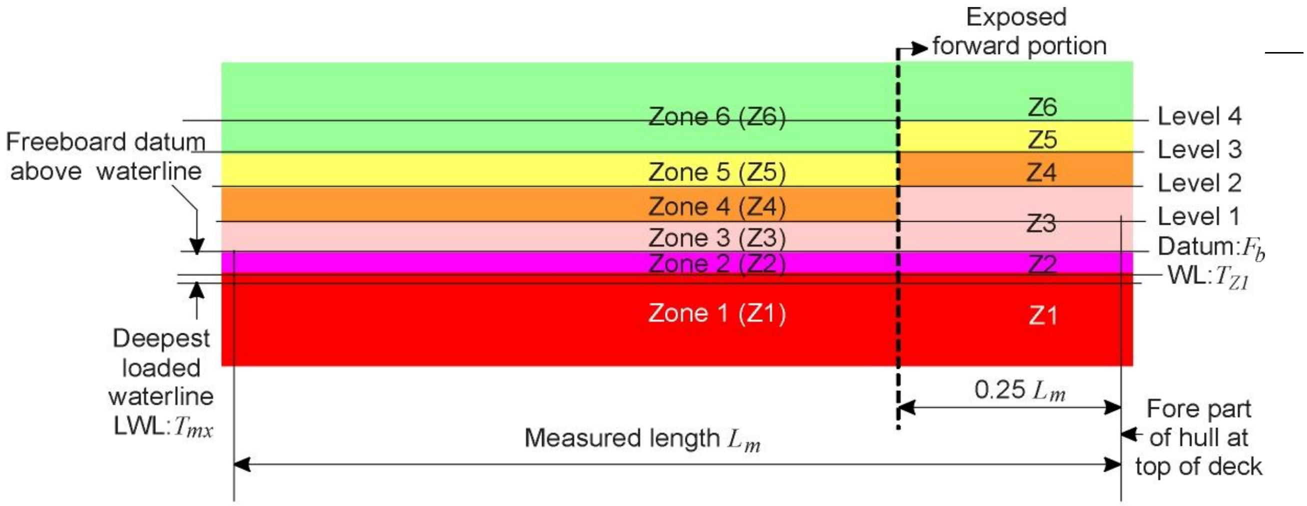
Clause 3.4 of the draft standard combines in a single performance based format the graded requirements contained in a number of standards including ICLL, Lloyds SSC Rules and the HSC Code 2000.

Table 7 and Table 8 describe in performance terms the risk characteristics of immersion risk zones. As well as setting a framework for the deemed-to-satisfy solution, Table 7 should significantly improve understanding of the performance basis of the standard. This will reduce cost, both in application of deemed-to-satisfy provisions and development and verification of equivalent solutions.

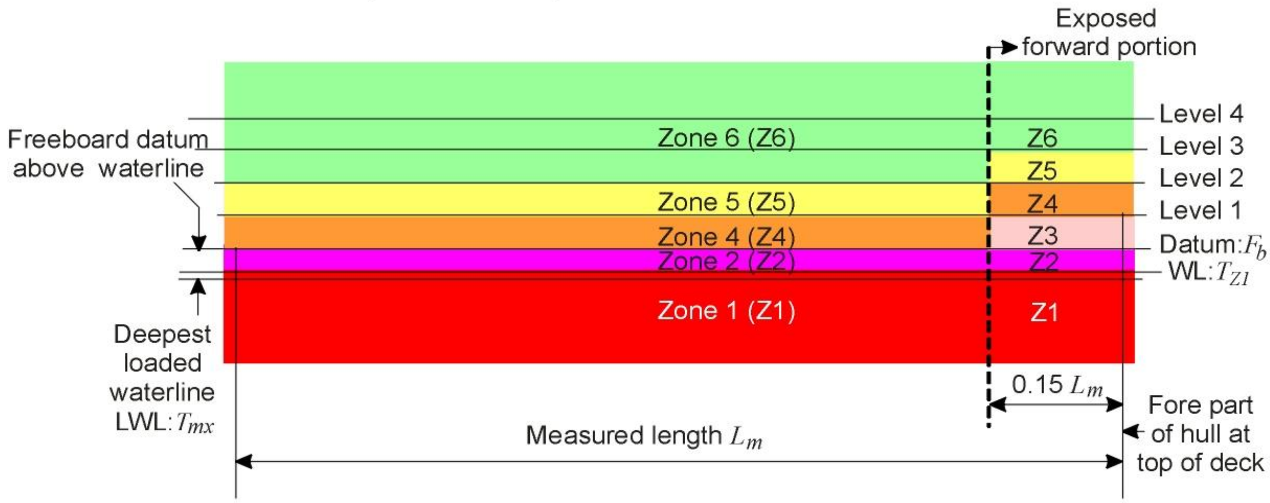
Zones are assigned to a vessel depending upon the operational area as shown in Figure 1 below. This figure contains significant reforms compared to the current USL Code. Under the current USL Code, except for load line vessels, there is no grading for weathertight decks located well above the load waterline. Even for load line vessels, there are only 2 grades for openings on decks (so-called Position 1 and Position 2). The proposal provides for 4 different weathertight grades (Zones 3 to 6). Furthermore, the proposal provides benefits to vessels having an excess of freeboard above the minimum by allowing reductions in requirements, the higher the freeboard. The proposal makes greater allowance for the different operational sea conditions across the range of operational areas. Finally the proposal has no Zone 3 applicable to smooth water vessels and only a small length of Zone 3 applicable to partially smooth water vessels, an acknowledgement that vessels engaged in sheltered waters should never be expected to have the same quantity of water on deck in normal conditions as would other vessels.

**Table 7 —Table of immersion risk zones in order of decreasing risk**

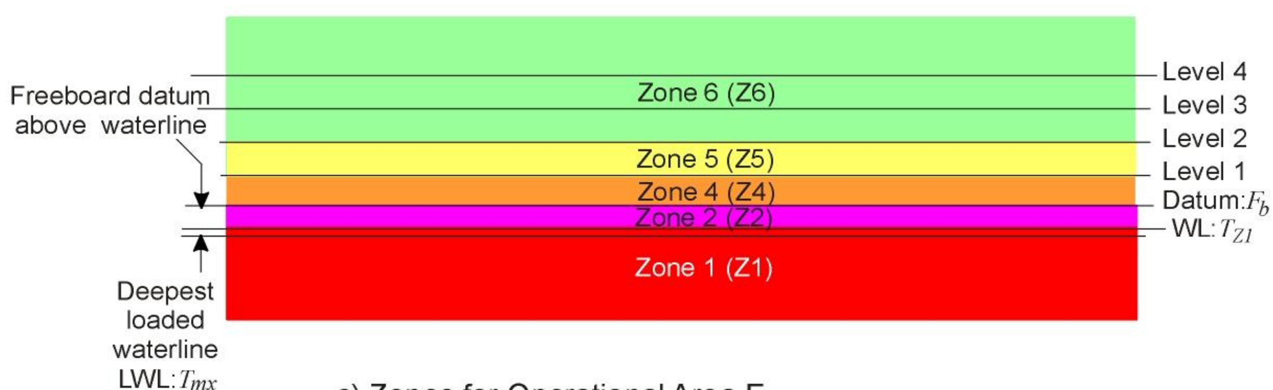
| Colour code & Zone No. | Description | Normal conditions | Abnormal conditions | Protection principles |
|---|---|---|---|---|
| **1** | Immersed hull | Extended immersion | Extended immersion | • Watertight.<br>• Robust construction<br>• Two independent means of preventing inflow.<br>• Prohibition on arrangements that are easily compromised by human error |
| 2 | Exposed hull topsides & deck | Frequent immersion | Extended immersion | • Watertight<br>• Height above load waterline relative to wave height<br>• Robust construction or backup means of preventing inflow.<br>• Controls on arrangements that are easily compromised by human error |
| 3 | Exposed<br>Equivalent to ICLL Position 1 | Transient immersion | Frequent immersion | • Weathertight<br>• Height above load waterline relative to wave height<br>• Height above adjacent deck or other horizontal surface<br>• Robust construction or backup means of preventing inflow<br>• Normally kept closed & secured |
| 4 | Partially protected<br>Equivalent to ICLL Position 2 | Infrequent immersion<br>Heavy spray<br>Quantities of water on deck | Transient immersion | • Weathertight<br>• Height above load waterline relative to wave height<br>• Height above adjacent deck or other horizontal surface<br>• Robust construction or backup means of preventing inflow. |
| 5 | Protected<br>Equivalent to Lloyds SSC Position 1 | Light spray<br>Rainwater | Heavy spray<br>Quantities of water on deck | • Weathertight<br>• Height above load waterline relative to wave height<br>• Height above adjacent deck or other horizontal surface |
| 6 | Benign<br>Equivalent to Lloyds SSC Position 2 | Rainwater | Light spray<br>Rainwater | • Weathertight<br>• Height above adjacent deck or other horizontal surface |




a) Zones for Operational Areas A, B and C




b) Zones for Operational Area D




c) Zones for Operational Area E

**Figure 1 — Determination of zones on vessels**

## Table 8 — Freeboard datum and reference levels

| Length $0.96L_m$ (m) | Reference waterline Zone 1 (WL:$T_{Z1}$) above deepest load waterline (m) | | Freeboard datum (Datum:$F_b$) above deepest load waterline (m) | | | Standard height of each reference level above the previous reference level (m) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Operational Area | | Operational Area | | | Operational Area | | | |
| | A, B, C | D, E | A, B, C | D | E | A, B | C | D | E |
| ≤ 7 | 0.10 | 0.10 | 0.20 | 0.20 | 0.20 | 0.90 | 0.90 | 0.90 | 0.90 |
| 10 | 0.12 | 0.12 | 0.26 | 0.26 | 0.25 | 0.90 | 0.90 | 0.90 | 0.90 |
| 20 | 0.21 | 0.20 | 0.46 | 0.46 | 0.43 | 1.52 | 1.22 | 1.05 | 0.90 |
| 24 | 0.24 | 0.23 | 0.55 | 0.55 | 0.50 | 1.80 | 1.35 | 1.13 | 0.90 |
| 30 | 0.30 | 0.23 | 0.63 | 0.63 | 0.50 | 1.80 | 1.35 | 1.13 | 0.90 |
| 40 | 0.40 | 0.23 | 0.79 | 0.79 | 0.50 | 1.80 | 1.35 | 1.13 | 0.90 |
| 50 | 0.50 | 0.23 | 1.00 | 1.00 | 0.50 | 1.80 | 1.35 | 1.13 | 0.90 |
| 60 | 0.60 | 0.23 | 1.24 | 1.24 | 0.50 | 1.80 | 1.35 | 1.13 | 0.90 |
| 70 | 0.70 | 0.23 | 1.51 | 1.50 | 0.50 | 1.80 | 1.35 | 1.13 | 0.90 |
| 75 | 0.75 | 0.23 | 1.66 | 1.50 | 0.50 | 1.80 | 1.35 | 1.13 | 0.90 |
| 80 | 0.80 | 0.23 | 1.82 | 1.50 | 0.50 | 1.85 | 1.39 | 1.16 | 0.90 |
| 90 | 0.90 | 0.23 | 2.61 | 1.50 | 0.50 | 1.95 | 1.46 | 1.22 | 0.90 |
| 100 | 1.00 | 0.23 | 2.53 | 1.50 | 0.50 | 2.05 | 1.54 | 1.28 | 0.90 |
| 110 | 1.10 | 0.23 | 2.94 | 1.50 | 0.50 | 2.15 | 1.61 | 1.34 | 0.90 |
| 120 | 1.20 | 0.23 | 3.37 | 1.50 | 0.50 | 2.25 | 1.69 | 1.41 | 0.90 |
| 125 | 1.25 | 0.23 | 3.54 | 1.50 | 0.50 | 2.30 | 1.73 | 1.44 | 0.90 |
| 130 (1) | 1.30 | 0.23 | 3.72 | 1.50 | 0.50 | 2.30 | 1.73 | 1.44 | 0.90 |

KEY:

(1) For lengths greater than 130 metres in Operational Areas A, B and C:

(a) The height of the reference waterline above the deepest load waterline in metres shall be determined by the formula 0.01 x $L_m$

(b) The height to the freeboard datum in millimetres shall be determined by the formula $2\times10^{-6}\left(0.96L_m\right)^4 - 0.0014\left(0.96L_m\right)^3 + 0.379\left(0.96L_m\right)^2 - 4.6496\left(0.96L_m\right) + 467.52$ where $L_m$ is the measured length, in metres.

(c) For all other columns the value remains the same as those at length 130 metres.

The location of each zone level relative to the waterline is determined by Table 8 below. For vessels in operational Area A or B, the height of each zone is greater than for vessels in operational area E with grading between of intermediate operational areas. This table is based on the values contained in the ICLL determined applying assumptions and adjustments that tend towards being conservative.

Being the key driver of standards in Chapters 4, 5, 6, 7 and 10, the Zone proposal has potential benefits that are far-reaching. It provides a means for designers to optimize the design of the vessel to better meet operational requirements while maintaining watertight and weathertight integrity safety outcomes.

**Question to elicit specific public comment #5:** *Suggestions are welcome from stakeholders on any other option which should be considered in this RIS for developing the standard on Watertight and Weathertight Integrity and its possible costs and benefits.*

### 4.4.5. Fully decked vessels and open vessels

Chapter 4 in the proposal brings together USL Code requirements that effectively limit the open arrangement of vessels including:

- The effective preclusion of open vessels in the load line calculations.
- The clause in Part B that precludes open vessels carrying passengers to sea.
- The limitation on the use of flotation materials for buoyancy to vessels up to 15 metres length in the USL Code.

The major changes are the alignment with the ABP standard requiring buoyancy in vessels up to 6 metres length; and limitations on the use of open vessels at sea contained in the ISO 12217 standards including those that carry sail.

The cost of aligning with the ABP standards for open vessels less than 6 m length should not be significant given that these measures are already required for recreational craft; except that for open vessels carrying passengers that the proposal is for these to comply with level flotation when swamped. The requirement for level flotation on open vessels up to 15 metres that carry passengers is consistent with USL Code Section 10 Appendix N that specifies foam buoyancy in lieu of carrying survival craft such as liferafts. Changes to the costs of compliance with this group of vessels should therefore be minimal.

The proposed requirement for larger open vessels to be partially decked if not provided with swamped flotation is a new requirement that aligns with ISO 12217 standards for Small Craft (applicable to recreational craft in the EU). The criteria specified for partially decked vessel in ISO 12217 has been proposed for this provision. The definition in Clause 1.6 is as follows:

***partially decked vessel—***

*an open vessel that is partially protected from swamping as follows—*

*a) at least two-thirds of the horizontal projection of the sheerline area is equipped with decking, cabins, shelters or rigid covers having—*

*i) any penetrations with closing appliances complying with Chapter 6; and* *ii) drainage complying with Chapter 10.*

*b) the protected areas include—*

*i) all that within $L_m/3$ from the fore part of the hull, where $L_m$ is the measured length of the vessel; and*

*ii) the area 100 mm inboard from the point of intersection of the deck with the hull sides of the vessel.*

The impact of this new provision is likely to be relatively small as it is presented as an option. The majority of modern vessels are likely to adopt the alternative so as to avoid having to carry survival craft. Note that provisions requiring open boats to be partially decked are included in USL Code Section 18.

The specific requirement for minimum freeboard by way of a cutout in the transom for an outboard is specifically aimed at preventing small craft not suited for seagoing use from being used at sea. This was a problem highlighted by the reference group during drafting of the standard. The requirement should not affect the vast majority of vessels.

The benefits of the Zone methodology can be seen from Figures 2 and 3. Coamings and sills on the main deck of the example shown would be determined for Zone 3 for Operational Areas B and C, Zone 4 for Operational Area D and Zone 5 for Operational Area E. This means that coamings and sills on the main deck for the vessel operating in Operational Area E could be eliminated entirely. Similarly, window on the first tier abaft the exposed forward end would be designed by Zone 3 for Operational Area B, Zone 4 for Operational Area C, Zone 5 for Operational Area D and Zone 6 for Operational Area E.

#### 4.4.6. Hatchways, Doorways, Ventilators, Airpipes, Portlights and Windows

Based on the framework provided by the adoption of Zones, the proposed draft Chapter 6 contains a number of reforms that should increase flexibility of design and potentially reduce costs. These include—

a) Providing for the installation of portlights that are larger than side scuttles but which are stronger than windows in locations that previously prohibited the installation of windows.

b) Providing for reductions in coaming and sill heights on the basis of available freeboard to the relevant deck.

c) Providing an allowance for local deck erections

d) Defining two types of hatchways- large and access and providing for a reduction in coaming heights for access hatchways

e) Reducing potential trip hazards where possible

f) Providing an allowance for deck camber that encourages its incorporation in the design.

g) Providing an allowance for dorade boxes on ventilators that encourages their incorporation in the design.

Quantification of the benefits of these changes is problematic however as it is indirect and can vary greatly depending upon the nature and operation of the vessel. For example, the use of portlights larger than side scuttles can allow areas on the vessel to be utilized in new ways; for example; as a passenger lounge for sightseeing where otherwise it might have been unsuited. Likewise, flush hatchways may allow a different utilization of a deck space, while removing sills on doors may avoid trip hazards.

#### 4.4.7. Ventilators required to be left open for safety

Clause 6.12.2 in the draft contains a new provision that reflects ICLL regulations 17(3) and 19(3) that limit the minimum height of ventilators that provide air essential to the safety of the vessel. The ICLL provision has been replicated for Operational Areas A and B and significantly modified for Operational Areas C, D and E (see Columns 19 and 20 in Table Annex B). The height in the draft is specified above the freeboard datum rather than the deck so that a vessel with large freeboard will be able reduce the required height of coaming to the deck. Further significant reductions are available by the application of Dorade boxes as indicated above.

This clause has been introduced to address an issue of contention whereby some recreational motor vessels being presented for survey incorporate engineroom air intakes in the sides of the vessel below the weather deck. The proposal provides a means to accommodate such arrangements provided they lie a minimum distance above Zone 2 and are arranged to reduce the likelihood or consequences of frequent immersion in abnormal conditions. Potential exposure to immersion over longer periods is already precluded by the stability and flooding criteria in Part C Section 6.



**Figure 2 — Example of application of Zones to a vessel (1B) Photo: Mori Flapan**

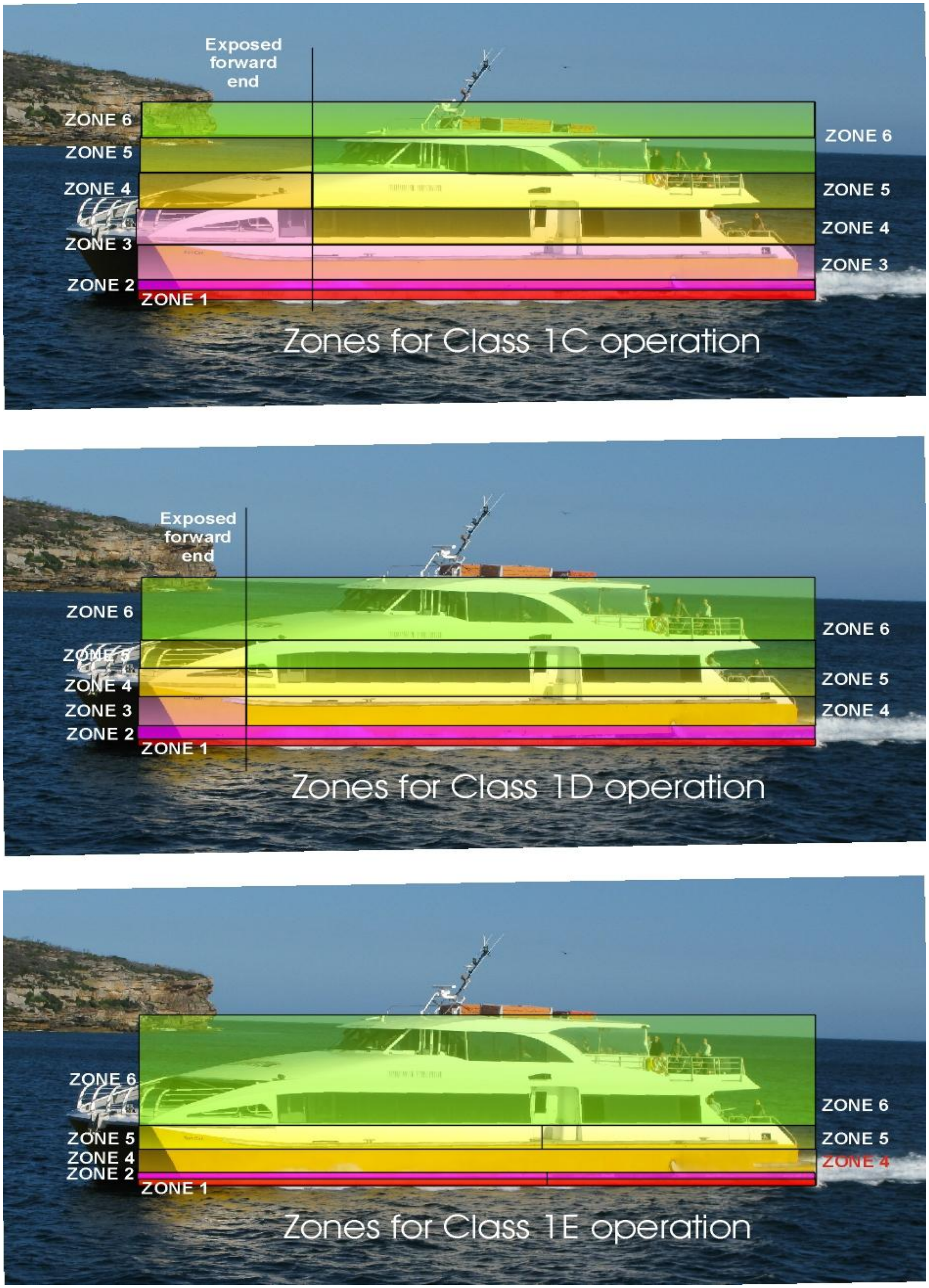



**Figure 3: Example of application of Zones to a vessel (1C, 1D, 1E)**

### 4.4.8. Storm covers for windows

Storm covers for windows are not specified in the current USL Code; however, they are included in a wide variety of relevant national and international standards including ICLL, HSC Code 2000 and Classification Society Rules. Storm covers for windows have been applied administratively by some jurisdictions over the years, unfortunately without national consistency.

Clause 6.14.2.3 of the proposal uses a minimalist approach based on classification society rules. It only applies to seagoing vessels and excludes windows of robust construction. To the limited extent to which they are applicable, the provisions do represent an increase over the current USL Code requirement based on alignment with relevant national and international standards. An average cost of a single storm cover would be about $500. The number of storm covers required is highly variable depending upon configuration of the vessel and the number of different shaped windows.

For the example shown in Figures 2 and 3, probably 5 stormcovers would be required for Class 1C operation and something like 9 stormcovers for Class 1B operation. No stormcovers are required for Class 1D or 1E.

### 4.4.9. Tests for watertight and weathertight integrity

The USL Code was silent on the need to test for watertight and/or weathertight integrity. However watertight testing was implied in USL Code clause 5A4.17. Testing is widely practiced to verify watertight integrity and to a lesser extent for weathertight integrity. Chapter 7 in the proposal incorporates test methodologies widely employed in industry. There is potential for additional cost where it may have been the practice of an individual surveyor to assume watertight or weathertight compliance without testing.

The test for watertight integrity in the proposal is based on the definition provided in USL Code clause 5A4.17. The test for weathertight integrity is based on the test applied to small craft fittings in ISO 12217 Annex D. It provides a relaxation for fittings in Zones 4, 5 and 6 that are considered to be less prone to frequent immersion. This should help reduce costs of compliance for fittings in these locations.

Alternatives to hose testing are proposed based on classification society rules. These are intended to provide alternatives which are either more cost effective or more practical in certain circumstances. They should also act to reduce cost.

Approval of portlights and windows under the USL Code (MA 24), and Classification Society rules often requires prototype testing. The proposal limits this to windows having a design pressure exceeding 38 kPa. This represents a relaxation of requirements for portlights on small vessels; addressing the reality that such portlights are rarely prototype approved. The proposal should save having to assess the acceptability of such arrangements without certification and so reduce the cost.

Notwithstanding the above measures to reduce the cost burden, the provision will likely result in an additional cost burden to ensure the quality of the safety outcome. This is necessary because other reforms in the standard that reduce coaming and sill heights will inevitably be less forgiving of defects in watertight or weathertight integrity. The cost should be considered offset by the benefits provided by these other reforms in the standard.

### 4.4.10. Freeboard and buoyancy at the bow

Chapter 8 of the draft standard reflects a similar clause contained in the USL Code for vessels subject to load lines in Section 7.

Minimum bow height at the bow is an essential factor that determines the frequency and quantity of seawater that comes over the bow and onto the deck of a seagoing vessel. It is therefore a prerequisite for good seakeeping that protects against:

a) Frequent exposure of penetrations to high heads of seawater;

b) Frequent filling of recesses to excessive quantities of seawater; and

c) Dangerous conditions for safety of crew working on deck.

As mentioned under Section 4.4.3 above, the proposal for application of ICLL now excludes Class 1C and 2C vessels of length between 25 and 46.9 m in length. For these vessels, this provision is required to achieve equivalent safety. Hence, for these vessels there is no change in cost.

The proposal also applies the provision to seagoing fishing vessels of length less than 46.9 metres on the basis that they should be no less vulnerable than the same vessel engaged in non-fishing activity. Note that SFV Chapter 3 regulation 12 requires sufficient bow height for fishing vessels over 24 metres so the application to fishing vessels is consistent with the international requirement. The majority of current seagoing fishing vessels would be expected to meet the minimum bow height requirement. However, without a specified minimum deemed-to-satisfy standard, dangerous exceptions may occur without any intervention. The nature of fishing is such that crew frequently work in exposed locations on the deck. The cost of the proposal would be expected to be more than offset on such vessels by the savings in personal injury and fatalities caused by seawater coming on board.

The dangers of inadequate bow height can even become apparent on vessels engaged in partially smooth water service, see Figure 4. A new fleet of catamaran ferries intended for the Manly service was found to have inadequate bow height after passengers were injured and damage sustained to the vessels. The ferries were subsequently withdrawn from the Manly route and transferred to smooth water operations[7], see Figure 5. (Note: There is no proposal to provide requirements for minimum bow height on partially smooth water vessels or vessels under 24 metres length in the draft standard).

[7] Mary McKillop and Susie O'Neill incidents 2001. NSW Waterways Authority. Review of Operations of Sydney Ferries. Sydney. 2001


**Figure 4 — (Top) Manly ferry in extreme partially smooth water conditions – Photo: ABC TV. (Bottom) Manly ferry showing arrangements for additional bow height – Photo: Mori Flapan**

**Figure 5 — Ferry design found to have insufficient bow height for Manly service – Mori Flapan**

### 4.4.11. Freeboard marks

The freeboard mark provides a ready measure of the point beyond which a vessel will become overloaded. The overloading of vessels raises many safety issues including stability, structural adequacy and seaworthiness. The dangers of overloading and the benefits of a ready means of reckoning by the crew were recognised by the pioneering work of Samuel Plimsoll in the 1870s that led to the so-called “Plimsoll mark” on ships.

Chapter 9 of the draft standard reflects a similar clause contained in the USL Code for vessels subject to load lines in Section 7.

As mentioned under Section 4.4.3 above, the proposal for application of ICLL now excludes Class 1C and 2C vessels of length between 25 and 46.9 m in length, and

Class 2D and 2E vessels this provision is required to achieve equivalent safety. For these vessels, this provision is required to achieve equivalent safety. Hence, for these vessels the marking required by USL Section 7 is replaced by the marking specified under NSCV Part C Section 2, so there is no increase in cost.

The proposal also applies the provision to fishing vessels of length less than 46.9 metres on the basis that they are no less vulnerable than the same vessel engaged in non-fishing activity. In many ways, it is more critical for fishermen to have a ready means of assessing safety as they are loading at sea in less than ideal conditions. The term freeboard mark has been applied rather than load line to avoid confusion with the statutory load line, immersion of which is a breach of specific provision within legislation. One of the main reasons why load lines have not been marked on fishing vessel has been that strict application of provisions for breach have been considered unreasonable to apply to fishing vessels because accurate determination of compliance is often impossible in a seaway. However, the freeboard mark provides invaluable information which will guide the user. In reality, an operator who immerses a freeboard mark would also be in breach of operating conditions contained in stability documentation (this occurs with or without the freeboard mark), and may be subject to more general penalties for breaching safety, but mere immersion alone would not of itself invoke prosecution. A system of freeboard marks is being considered for application to fishing vessels in the UK[8] (Note: This is a proposal for fishing vessels of length less than 12 metres).

#### 4.4.12. Drainage of recesses

Clause 10.6 brings together two sets of requirements with different measures of compliance. Freeing ports are specified in USL Subsections 5C/5D for non-load line vessels, and Section 7 for load-line vessels. The requirements for load line vessels are significantly greater than those for non-load line vessels, refer to the table in Annex C Examples illustrating different requirements for drainage of well decks from USL Code Sections 5C, 5D and 7 compared to proposed draft NSCV Part C Section 2, compare values in column 15 with those in column 17. The ratio of required area for the two standards varies from over 4:1 for relatively short wells to 3:2 for long wells.

The direct cost associated with a change in minimum size of drainage requirement for a new vessel is relatively small, however, the size of drainage measures can interfere with other aspects of the vessels operation such as the need for a dry deck in more benign conditions, sorting of fish, and so on.

The proposal attempts to resolve the conflict between the two USL Code standards by reverse engineering a performance-based outcome of 90% drainage of water remain behind the bulwark when the vessel is heeled to 15 degrees in 10 seconds (roughly the time before the next wave) assuming any excess water will spill over the top edge of the bulwark. The result for Area Zone 3 is shown in Column 12 of the table in Annex C. Certain vessels would gain from the proposal and certain vessels would lose.

[8] Maritime & Coastguard Agency (UK). Research Project 559 Loading Guidance for Fishing Vessels Less than 12m Registered Length Phase II Final Report May 2006

Winners include

a) Class 1C and 2C passenger vessels between 24 metres and 46.9 metres.

b) All vessels having wells on exposed decks in Zones 4, 5 or 6.

c) Class 2D and 2E vessels over 24 metres

d) Class 1D and 1E vessels over 35 metres.

For decks in Zone 3, the proposal would specify a greater area required for drainage than would be specified for the non-load line vessels under the USL Code in column 17. The effect is greater for small seagoing vessels where an increase in area up to 300% would be required. However, the proposal is still significantly lower than would be specified applying the IMO Safety of fishing vessels formula in Column 18.

Those that would find the outcome more onerous include:

e) The lower-most deck on Class 1E and 1D vessels of length less than 35 m with low freeboard.

f) The lower-most deck on Class 1 or 2 vessels less than 24 metres.

g) The lower-most deck on Class 3 Fishing vessels.

It is likely that many more vessels would find the requirement more onerous than the current USL Code criteria.

However, for seagoing vessels listed in f) and g) above, particularly fishing vessels, the benefit would be more rapid drainage of wells reducing the vessel's exposure to the effects of large quantities of water on deck. This reduces risks of capsize, excessive heel, flooding and personal injury. For fishing vessels in particular, Section 2.10 above highlights that unacceptably high levels of fatalities and injuries on fishing vessels arise because of wind and sea factors. The proposal, which better reflects minimum freeing port standards specified for fishing vessels in the SFV Convention, is expected to help reduce fishing vessel losses and injuries on board.

Further work may be required to refine this formula based on public comment, particularly the fw factor that provides for situations where the bulwarks are high relative to the width of the well reducing the effectiveness of the spillover effect.

The cost for sheltered waters vessels in e) and f) above would be somewhat mitigated by application of Clause 10.7 pertaining to the drainage of cockpits that permits vessels of measured length less than 24 metres to apply cockpit drainage criteria provided the recess does not exceed 50 percent of the length (based on the USL Code definition of a Cockpit Vessel). The performance requirement for cockpit drainage is not nearly as severe as for freeing ports.

The current USL Code is unclear as to the limits of application of cockpit drainage as compared to well deck drainage. Under the USL Code, it was generally determined that cockpit type drainage was not permitted for full width cockpits on seagoing vessels. Clause 10.7.1 of the proposal provides for limited application to seagoing vessels on the basis that free surface is limited by the allowable length of the cockpit. This will increase design options and will facilitate the adaption of certain production recreation style vessels into light commercial service (e.g. game fishing boats).

The proposed Clause 10.7.2 for calculating the drainage area for cockpits incorporates a method employed in relatively recent ISO Small Craft standards to determine the assumed quantity of water in a cockpit. A performance based criterion is suggested for determining the minimum drainage as follows: drainage of 90% of the flooded volume in 2.5 minutes for a seagoing vessel or in 3.33 minutes for a sheltered water vessel. The proposal retains the minimum 700 $mm^2/metre^2$ from the current USL provision and this appears to be the critical value for smaller vessels. For larger seagoing vessels having cockpits with comparatively lower freeboard relative to their length, the performance-based proposal becomes the critical value.

Clause 10.9.1 modifies the required range of trim and heel over which drainage arrangements shall remain effective from 5 degrees and 15 degrees respectively under the USL Code to expected range of trims and 5 degrees under the proposal. This provides a significant relaxation of requirement over the USL Code. However, the USL Code provision was rarely if ever invoked, especially on smaller well-decked vessels. The proposal attempts to provide a much more workable requirement. While in theory it represents a reduction in cost relative to the USL Code provision (allowing lesser freeboard), in reality it may increase cost as the USL Code provision was not applied due to its inapplicability to modern vessel types. With a reduced requirement, it is anticipated it will now be applied so as to actually affect the design of vessels; hence there may be additional cost where previously a vessel configuration was accepted.

The alternative was to eliminate provision 10.9.1 entirely, but the reference group declined to follow this course as there had been a number of cases of freeing ports and scuppers not being effective because of their close proximity to the waterline; and in fact these being the source of water flooding a deck causing the vessel to founder.

### 4.4.13. Window and portlight scantlings

Annex A of the draft standard contains provisions for determining minimum thicknesses of panes for portlights, side scuttles and windows, and requirements for the design of window frames.

This is a deemed-to-satisfy solution offered as an alternative to using relevant Lloyds or ISO standards. The alternatives are provided to provide for flexibility. Windows, sidescuttles and portlights may be sourced from production manufacturers complying with European standards, they may be calculated using Lloyds rules and software or alternatively, without direct reference to the Part C Section 3 design loads for components sourced locally.

The proposal is based on the current USL Code but with modifications to improve application, flexibility and a more optimised outcome. The major change proposed is the replacement of a flat 6mm minimum requirement for all windows with performance criteria that considers robustness for human impact and impact by objects. This can result in reductions in glass thickness of 17% and more and is especially significant for sheltered water vessels and seagoing vessels with multiple tiers of windows. Not only does it reduce material cost, but it can also reduce weight and improve stability with potential benefits in payload.

Other reforms include the incorporation of calculations for polycarbonate and provision for glued windows. Gluing of windows can reduce material cost, installation cost and save weight.

# 5. IMPACT ANALYSIS

## 5.1. Scope of vessels impacted

The NMSC estimates that up to 1,300 commercial vessels each year in Australia may be impacted by the proposed standard, including newly constructed vessels that require survey, vessels upgrading in survey, and vessels entering survey for the first time for various reasons. These are distributed over all vessel classes and areas of operation and includes fast craft. This estimate is at the higher side and considered a maximum, based on information supplied by marine authorities of the various jurisdictions to the consultant that developed the RIS for the Construction Standard (NSCV Part C, Section 3).

## 5.2. Impacts of Option 1- Status Quo (USL Code Sections 5C and 5D)

### 5.2.1. Benefits of option 1

The major benefit of option 1 is its familiarity. The current standards have largely been reasonably effective in terms of safety outcomes, even if the administration has not been the most efficient. The ad-hoc systems to cope with the deficiencies of the current standards are already in place and a significant advantage of the option is that it avoids the need for change with the short-term disruptions that brings. However, in relative terms, the benefits to be derived from option 1 are comparatively lower than those of options 2 and 3.

### 5.2.2. Costs of Option 1

As already stated in Chapter 2 of this draft RIS, the present requirements of the USL Code have some deficiencies and if they remain as option there will be cost implications to the society in the long run. The current requirements of the USL Code do not take into account the advancements in technology and changes in approach of doing things by industry and government.

The USL Code is a prescriptive rather than performance based standard. Being a prescriptive standard, the USL Code concentrates on specifying the solution without referring to the safety outcome that is to be achieved. Thus the safety outcomes which are intended by specific clauses are sometimes unclear and subject to different interpretations by individuals, especially when considering exemptions and equivalent solutions.

The content of the USL Code does not represent a consensus between authorities. The lack of agreement as to the relevance and/or applicability of specific provisions within the USL Code is also manifested by the fact that some authorities specify different regulatory requirements and/or apply administrative solutions such as exemptions.

Furthermore, lack of clarity and omissions within the USL code standard has led to inconsistencies in its application. There are numerous provisions in the USL Code that rely on the Authority’s discretion in order to achieve a workable solution. By its nature, discretion exercised by individuals on behalf of a jurisdiction tends to vary and adds an element of subjectivity, which in turn creates difficulties in transferring a vessel from one jurisdiction to another and increases the potential for barriers to business and even liability.

The piecemeal presentation of requirements does not facilitate a holistic performance-based overview of risk control measures. The current USL Code contains provisions relevant to Part C Design and Construction Subsection 5C -Watertight Subdivision of Passenger Vessels; Subsection 5D - Construction - Watertight Subdivision of Class 2 and Class 3 Vessels and Section 7 - Load Lines.

The present requirements in the USL Code have been superseded in other standards from which the USL Code was developed. The USL Code was originally developed from the international requirements applicable to ships (SOLAS) and the US CFR 46 requirements for domestic vessels in the USA.

Over the past 25 years, there have been significant changes to watertight and weathertight integrity standards adopted for vessels around the world. These include standards for high speed craft, passenger and cargo ships, fishing vessels, Ro-Ro ships and even recreational boats in some countries. The requirements in the USL Code have not kept pace with the technological requirements of the changes effected in these international standards.

Considering the main benefits and costs of the status quo, retaining the USL Code in its existing form is not a preferred option.

## 5.3. Impacts of Option 2-Adopt External Standards

While there are a range of external standards that could be adopted, in place of the USL Code, the details of these standards vary in their scope, application and outcomes. None incorporate the performance-based framework that lies at the core of the NSCV. There are no clearly defined required outcomes.

Attempting to cover the field by adopting a “patchwork quilt” approach applying elements of the various relevant international and national standards would also result in problems with the performance outcomes because, as described in section 4, some of these standards have conflicting requirements where they can overlap, creating an inconsistency in the performance-based approach. An example is the different requirement for freeing port area on fishing vessels and vessels under SOLAS. Such ambiguities can result in uncertainty as to the appropriate performance benchmark.

None is capable of being adopted as a stand-alone standard applicable to the range of commercial vessels operating domestically in Australia. However, they do provide a valuable reference to acceptable solutions for the vessels they cover.

## 5.4. Impacts of Option 3 – The Proposed Standard

### 5.4.1. Benefits of the standard

The benefits of Option 3 are that, for no overall increase in cost, the proposal should deliver the following outcomes—

1. Improvements to safety in certain specific higher risk circumstances and
2. Increased flexibility of design choices.

As such, the proposal will provide improved safety outcomes for each safety dollar spent, without increasing the overall quantity of safety dollars.

It is impossible to quantitatively determine or make accurate estimates of the various future costs to be avoided by the marine industry, government, and all other stakeholders if all commercial vessels are compliant with the proposed standard as compared to compliant with the present USL Code and/or industry practice. The standards themselves will influence the design of vessels in the future.

To illustrate the point, Chapter 4 shows that the difference of direct cost associated with many of the reforms is likely to be minimal relative to the cost of current requirements. A ventilator coaming 600 mm high is not significantly different in cost to one that is 760 mm high. It is the indirect effect on the function and arrangement of the vessel that is more likely to change significantly. These effects will differ greatly between different vessels and different operations. The greater emphasis on performance outcomes rather than prescriptive solutions should provide designers with the opportunity to better optimise their designs for their intended functions while still maintaining required levels of safety. The flexibility incorporated into the approach should enable designers to maximise the benefits in ways that may not be immediately apparent at this stage. This is one of the objectives of incorporating a more performance-based approach into the standard.

A key benefit of incorporating a more risk-based approach is that the requirements of the standard are better matched to the specific needs of the vessels, which results in a focus of the risk control measures on the areas of highest risk.

For all these reasons, an attempt to quantify in money terms the overall costs and benefits of the proposal would be erroneous. However, the following paragraph considers the overall costs and benefits in qualitative terms

### 5.4.2. Overall cost not expected to increase

Annex D of this RIS considers the most significant of the proposed changes to the standards relative to the current USL Code. A summary comparison of expected changes in cost is shown in Table 9. It is suggested that, taken overall, increases in cost arising from the proposed changes will be more than offset by reductions in cost also provided for within the proposed changes.

**Table 9 — Qualitative comparison of expected cost reductions compared to cost additions of the NSCV standard**

| Reductions in cost | Additions to cost |
|---|---|
| R1. Class 1C and 2C vessels between 25 m and 46.9 m in measured length not being subject to full ICLL load line requirements and being able to take advantage of the NSCV performance-based deemed-to-satisfy provisions (Refer to Section 4.4.3) | C1. Open vessels will be subject to minimum requirements for being partially decked or having level flotation that better align with current recreational boat standards. (Refer to Section 4.4.5 and Notes 1, 2)<br>NOTE: The majority of vessels of this group should not be affected because they normally opt for buoyancy in lieu of carriage of survival craft. |
| R2. Assignment of zones will benefit vessels having greater than the minimum freeboards by allowing reduced requirements. (Refer to Section 4.4.4) | C2. The requirement for open vessels that proceed to sea to have a minimum freeboard. (Refer to Section 4.4.5 and Notes 1, 2) |
| R3. The Assignment of zones provides a performance-based framework that will facilitate the assessment of equivalent solutions. (Refer to Section 4.4.4) | C3. A limited number of storm covers for the exposed windows of seagoing vessels. Refer to Section 4.4.8)<br>NOTE: Often already required administratively. |
| R4. Reduced weathertight sill and coaming heights applicable to hatchways, doors, ventilators and air pipes. (Refer to Section 4.4.6) | C4. Tests for watertight and weathertight integrity specified instead of implied; but with realistic criteria and with alternatives to reduce costs. (Refer to Section 4.4.9 and Note 1) |
| R5. Increased flexibility in the placement of windows using larger-than-side-scuttle-sized portlights. (Refer to Section 4.4.6) | C5. Application of minimum bow height requirement to seagoing fishing vessels between 25 metres and 46.9 metres in length (Refer to Section 4.4.10 and Notes 1, 2) |
| R6. Reduction in trip hazards arising from hatch coamings and door sills. (Refer to Section 4.4.6) | C6. Freeboard marks required on fishing vessels of length 25 m and more in measured length. (Refer to Section 4.4.11 and Notes 1, 2) |
| R7. Means provided to accommodate designs where engine room air intakes are located in the topsides below the lowest deck. (Refer to Section 4.4.7) | C7. Potentially increased drainage area on the lower-most deck on Class 1E and 1D vessels of length less than 35 m with low freeboard, Class 1 or 2 vessels less than 24 metres with low freeboard and the lower-most deck on Class 3 Fishing vessels. (Refer to Section 4.4.12 and Note 1)<br>NOTE: Cockpit drainage area can be applied for many recesses on vessels of Operational Area D or E and smaller recesses on seagoing vessels. |

| | |
|---|---|
| R8. Potentially reduced drainage area on Class 1C and 2C passenger vessels between 24 metres and 46.9 metres; all vessels having wells on exposed decks in Zones 4, 5 or 6; Class 2D and 2E vessels over 24 metres and Class 1D and 1E vessels over 35 metres (Refer to Section 4.4.12). | C8. Preclusion of the cockpit drainage formula on vessels with relatively large recesses. Increases in cockpit drainage requirement for vessels with very deep recesses in exposed locations. (Refer to Section 4.4.12 and Note 1, 2) |
| R9. Increased application for cockpit drainage alternative; especially on vessels less than 25 m operating in sheltered waters; but also aft decks of game fishing boats and the like (Refer to Section 4.4.12). | C9. Preclusion of a vessel where drainage ineffective at specified angles of heel and/or trim. (Refer to Section 4.4.12 and Notes 1, 2) |
| R10. Reduced scantlings and increased flexibility in the requirements for windows that provide for savings in purchase cost and installation, as well as reductions in weight (Refer to Section 4.4.13). | |

NOTES:

1. See also justification for change on safety grounds given below.
2. Main effect will be to preclude a relatively small number of vessels with potentially unseaworthy characteristics.

### 5.4.3. Safety benefits

Notwithstanding the contention that the overall costs are likely to be exceeded by overall benefits, a number of the proposed changes will increase costs for specific vessels. Although analysis of these specific increases is not a prerequisite for the purposes of this RIS, it is useful to note that the cost increases should also be offset in part or in whole by improvements in safety.

For example, the measures C5 and C6 in Table 9 that increase cost result from alignment of the fishing sector with the non-passenger sector to achieve a consistent performance-based structure in the standard. These measures are likely to contribute to reducing the disproportionately high fatalities associated with the fishing sector indicated by Table 3.

Referring to the background Sections 1.7 to 1.9, a deficiency in watertight and weathertight integrity can be the primary cause of an accident. It can also be a contributing factor that breaks the chain of events that prevents an incident becoming an accident and an accident resulting in a catastrophe. Vessel accidents are rarely investigated to the depth necessary to pinpoint the exact chain of events, let alone identify quantitatively the impact of subtle changes in the factors that lead to each event. However, a qualitative approach can be taken on the basis that improvements in watertight and weathertight integrity will be a factor that can help prevent foundering or can extend the time for evacuation. Such improvements, if targeted to vessels of higher risk, have a reasonable likelihood of providing a significant if not measurable benefit. As already indicated, the fishing sector is relatively high risk.

The proposal can also be viewed another way. Currently fishing vessels operate at lower standards and have higher fatalities. It seems reasonable that one of the first measures that can be taken to remove the discrepancy in fatalities is to remove the difference in standards, all other things being equal. This principle of equal treatment for equal risk lies at the core of the performance-based approach.

Measures C1 and C2 are targeted mainly at preventing loopholes that could enable unseaworthy vessels to proceed to sea. While other factors to do with safety equipment work to preclude widespread use of vessels of this type, there is no ultimate prohibition. Most small commercial vessels of less than 7.5 metres are built to higher standards than recreational craft, but the potential still exists under current standards for commercial vessels to fall below recreational boat standards. The modification closes the gap and is justified by the same benefits as was provided by the Australian Builder's Plate.

Measures C3, C4, C7, C8 and C9 are based on relevant national and international standards, and help the NSCV to have consistent benchmarks for safety outcomes. They will all improve survivability to some extent, though the magnitude cannot be quantified.

Although not quantified and included in the analysis of overall cost impact; additional cost savings can be expected by improvements to safety arising from—

- Avoiding and/or reductions in the cost of search and rescue
- Reduced risk of fatalities
- Reduced risk of serious injuries
- Reduced property losses
- Avoiding the cost of investigating marine incidents.

**Question to elicit specific public comment #6:** *Do you believe that draft standard would likely have a positive impact on the safety of the vessels affected?*

### 5.4.4. Efficiency improvements

The draft standard contains a performance-based approach that takes into account various factors that affect the inherent risks of a vessel. As such, it is not as simple to use as the current USL requirement.

The watertight and weathertight integrity standard is expected to result in relatively lower costs in the long term because the design of the vessel will be more efficient due to the performance-based structure of the deemed-to-satisfy requirements.

The standard has flexibility that gives the designer a measure of control to choose the parameters that will allow the most appropriate deemed-to-satisfy solution. This option is expected to result in better solutions to achieve outcomes, with subsequent savings of time and money.

The new options are expected to result in increased competition between suppliers of vessels and equipment. There may be increased competition by suppliers to meet quality assurance requirements and testing certification. There may be increased competition to demonstrate that new designs and equipment comply with the new standard.

The standard will reduce the cost of application for both industry and government. Currently, there is frequent need for negotiation and the exercise of discretion to avoid having to apply the current standards where they might be considered inappropriate or technologically superseded. A revised standard that accommodates latest thinking should avoid what can be a time-consuming and frustrating process. Furthermore, it will avoid variations in the exercise of discretion that cause variations and provide barriers to mutual recognition.

**Question to elicit specific public comment #7:**

*Do you agree that the proposed standard will reduce the overall cost of applying and administering the standard?*

**Question to elicit specific public comment #8:**

*Can you give an idea of where you think the costs and benefits for administration might lie and/or what their magnitude might be?*

### *1. New options to achieve outcomes*

A benefit of the standard is expected to result from the option to use equivalent solutions where it can be shown that they meet the required outcomes or they are alternatives to the deemed-to-satisfy standards.

The standard is performance based which uses the same format as other parts of the NSCV and as outlined in the already approved Part B: General Requirements. The framework for standards requires that performance is specified in terms of required safety outcomes, with prescriptive technical standards (deemed to satisfy solutions) specified to meet those required outcomes.

### *2. Cost saving from more efficient administration*

The standard is expected to result in similar administration costs as incurred under the present USL Code.

At present there is a lack of clarity and omissions which can lead to inconsistencies and different interpretation and application of the USL Code requirements. Because of the performance-based framework and the application of zones, the rationale behind the requirements of the proposed standard will be easier to understand than those of the USL Code. So while the standard may on its face be more complex to apply, it should provide a better understanding of the key parameters of watertight and weathertight integrity that determine the level of safety. By doing this, the standard should contribute to lower costs by providing a clearer set of requirements that reduces the need for extensive interpretation by naval architects, builders and surveyors. This should reduce the frequency of error and avoid the need to rework solutions to comply. Reduced costs which are savings constitute the benefits to be derived. The new standard should also facilitate the training of design staff, ship yard staff and government marine authorities because the risk basis that lies behind the provisions is much more transparently presented.

Some sections of the USL Code are written in ways which give discretion to marine authorities that have resulted in inconsistent application. This in turn leads to difficulties in transferring a vessel from one jurisdiction to another. The draft standard has a more risk based standard that optimises the solution to the particular needs of a vessel will reduce costs in the long term because the standard will require less discretionary application, which saves time and money. Greater efficiency also is expected to result from faster training of staff at marine authorities and vessel crews because the standard will be easier to interpret and understand. These efficiencies can be measured in terms of cost savings which constitute benefits to the community.

The USL Code is deficient as a mechanism to deliver common standards that can be recognised and accepted by all marine authorities. The replacement of the USL Code by the NSCV as the common standard to be adopted by all marine authorities and jurisdictions and the reduction in the need to apply discretion will lead to more national consistency in the regulation of marine safety. The standard has a performance basis, using the same format as other parts of the NSCV and outlined in the already approved Part B: General Requirements. This will bring flexibility in the application of requirements without compromising safety and with minimal effect on regulatory consistency. Increased administrative efficiency is the benefit to be derived.

In summary, while a quantitative analysis of overall benefit in dollar terms is difficult, the objectives and required outcomes give a clear insight into the qualitative benefits of the standard. The requirements specified in the proposed standard are intended to mitigate the likelihood of flooding of buoyant spaces that might result from excessive water on deck, rapid drainage of water on deck or flooding through penetration. The intervention is intended to reduce the risks of fatalities or serious injuries occurring.

The transparent nature of the performance-based structure of the standard allows stakeholders to better appreciate and assess the performance basis of each requirement. The consensus view achieved by the consultation process provides an affirmation of the validity of each requirement to achieve the desired safety objectives.

### 5.4.5. Costs of the standard

As already indicated above, it is the basic premise of this RIS that the overall cost of measures specified by the draft standard are not expected to be greater than that under the USL Code. A qualitative assessment of relative cost of proposals compared to current requirements is shown in Annex D. The assessment indicates that taken overall, the potential cost increases arising from the new standard should be more than offset by the cost savings provided by the more risk-based approach that provides for reductions in requirement in circumstances of reduced risk. Hence, the overall impact of the standard in terms of cost on the community is expected to be minimal.

As indicated in the benefits, the additional costs arise from improvements that will add to the vessel's safety. Even if the projected cost savings in efficiency improvements were wholly negated by the additional costs, the revised standard will have succeeded by providing a means to better optimise the outcomes for each dollar spent on safety. The analysis of costs which follows helps support the contention that overall costs will not rise.

There are some instances where costs to a particular vessel may increase to a lesser or greater extent. The most important of these are highlighted in Sections 4.4.5,4.4.7, 4.4.8, 4.4.9, 4.4.10, 4.4.11 and 4.4.12. The discussion on cost highlights where additional costs where they may arise for particular vessels, to provide affected stakeholders with a better understanding of the potential impact on them.

The assessment of the costs gives more consideration to deemed-to-satisfy requirements for watertight and weathertight integrity than any options that may be accepted as an equivalent solution. The proposed standard is in essence a technical standard which gives guidance and directives on design and construction of commercial vessels in Australia.

### 5.4.6. Industry practice and cost

For that minority of situations where the proposal would mean more onerous requirements, the direct impact of the standard on costs of new vessels is expected to be minimal because changes in, say, coaming or sill heights have little bearing on fabrication cost. However, there may be indirect effects of changes such as altering the aesthetic appearance of a vessel, or changing the utility of a deck space for a given activity that may have a broader impact on the vessel. For a vessel not yet constructed, these potential impacts can normally be circumvented by changes to the design.

Decisions by vessel owners, builders, and operators regarding reduction in the risk associated with watertight and weathertight integrity are driven by an imperative to find the best balance between safety, engineering, business competition, and regulatory requirements such as applicable standards.

For existing vessels not built to current survey standards entering survey for the first time and vessels intending to upgrade survey, there is potential for significant direct and/or indirect cost. However, this is already the case with when such vessels are required to meet the current USL Code under current arrangements. There are no reasons to suggest that an existing vessel entering survey or upgrading survey under the new proposals will find the process any more onerous; and in fact, to the contrary they may well find it less onerous.

**Table 10 — Estimated distribution of new vessels by vessel class and vessel length assumed proportionate to the composition of the current fleet**

| Vessel Class | Vessel Lengths Grouped | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | <or =7.5m | | >7.5m-<12m | | 12m-24m | | >24m-<35m | | > or =35m+ | | Grand Total | |
| | Fleet | % | Fleet | % | Fleet | % | Fleet | % | Fleet | % | Fleet | % |
| 1A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1B | 0 | 0 | 0 | 0 | 8 | 0.6 | 1 | 0.1 | 0 | 0 | 9 | 0.7 |
| 1C | 1 | 0.1 | 7 | 0.5 | 24 | 1.8 | 3 | 0.2 | 1 | 0.1 | 36 | 2.7 |
| 1D | 2 | 0.2 | 10 | 0.8 | 23 | 1.8 | 7 | 0.5 | 1 | 0.1 | 43 | 3.4 |
| 1E | 10 | 0.8 | 24 | 1.8 | 33 | 2.5 | 8 | 0.6 | 2 | 0.2 | 78 | 5.9 |
| **Sub Total** | **13** | **1.1** | **41** | **3.1** | **88** | **6.7** | **19** | **1.4** | **4** | **0.4** | **166** | **12.7** |
| 2A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 2B | 1 | 0.1 | 2 | 0.2 | 21 | 1.6 | 8 | 0.6 | 3 | 0.2 | 36 | 2.7 |
| 2C | 106 | 8.1 | 58 | 4.5 | 37 | 2.8 | 6 | 0.5 | 2 | 0.2 | 208 | 16.1 |
| 2D | 80 | 6.1 | 29 | 2.2 | 21 | 1.6 | 3 | 0.2 | 2 | 0.2 | 135 | 10.3 |
| 2E | 194 | 14.9 | 21 | 1.6 | 18 | 1.4 | 3 | 0.2 | 2 | 0.2 | 237 | 18.3 |
| **Sub Total** | **381** | **29.2** | **110** | **8.5** | **97** | **7.4** | **20** | **1.5** | **9** | **0.8** | **617** | **47.4** |
| 3A | 0 | 0 | 0 | 0 | 1 | 0.1 | 0 | 0 | 0 | 0 | 1 | 0.1 |
| 3B | 5 | 0.4 | 9 | 0.7 | 111 | 8.5 | 8 | 0.6 | 1 | 0.1 | 132 | 10.3 |
| 3C | 67 | 5.2 | 32 | 2.5 | 43 | 3.3 | 1 | 0.1 | 0 | 0 | 143 | 11 |
| 3D | 9 | 0.7 | 15 | 1.2 | 3 | 0.2 | 0 | 0 | 0 | 0 | 28 | 2.1 |
| 3E | 56 | 4.3 | 13 | 1 | 3 | 0.2 | 0 | 0 | 0 | 0 | 72 | 5.5 |
| **Sub Total** | **137** | **10.6** | **69** | **5.4** | **161** | **12.3** | **9** | **0.7** | **1** | **0.1** | **376** | **29** |
| Class 4 | 66 | 5.1 | 35 | 2.7 | 40 | 3.1 | 0 | 0 | 0 | 0 | 141 | 10.9 |
| **Sub Total** | **66** | **5.1** | **35** | **2.7** | **40** | **3.1** | **0** | **0** | **0** | **0** | **141** | **10.9** |
| **Grand Total** | **597** | **46** | **255** | **19.7** | **386** | **29.5** | **48** | **3.6** | **14** | **1.3** | **1300** | **100** |

### 5.4.7. Vessels subject to costs

The NSCV Part B states that the NSCV applies to “The design and construction of:

- New vessels [subject to initial survey]
- Existing vessels subject to initial survey
- Existing vessels subject to upgrade in survey”.

“The NSCV may also apply to existing vessels that have been altered and existing vessels without change in survey status to the extent required by applicable legislation”. This last application is not addressed by the content of this regulatory impact statement.

In accordance with Part B, General Requirements, the analysis of the impact of the standard has been limited to just those commercial vessels subject to an initial survey or an upgrade in survey. Table 10 shows the 1300 vessels split into Vessel Classes and Vessel Lengths in proportion to the composition of the current fleet.

### 5.4.8. Vessels not subject to Chapters 4 to 9

Referring to Table 11 and 12, the deemed-to-satisfy solution for the vast majority 98.75% of new vessels entering survey would be the provisions contained within Chapter 4 to Chapter 9 of the proposed standard.

**Table 11 — Indicative Number and Per cent of New Vessels by Vessel Class and Operational Area per Year Corresponding to Deemed-to-Satisfy-Solutions of Watertight and Weathertight integrity Standard**

| Operational Area | Class 1 Passenger and Class 2 non-passenger | | | Class 3 Fishing | | |
|---|---|---|---|---|---|---|
| | **Standard** | **Num** | **%** | **Standard** | **Num** | **%** |
| A, B | Lm ≥ 25m (ICLL & SOLAS) | 13 | 1 | Lm ≥ 46.9m (SFV) | < 1 | 0.04 |
| | Lm < 25m (NSCV) | 37 | 2.8 | Lm<46.9m (NSCV) | 149 | 11.5 |
| C | Lm ≥ 46.9m (ICLL & SOLAS) | 2 | 0.2 | Lm ≥ 46.9m (SFV) | < 1 | 0.01 |
| | Lm < 46.9m (NSCV) | 274 | 21.1 | Lm < 46.9m (NSCV) | 161 | 12.4 |
| D,E | NSCV | 554 | 42.6 | NSCV | 110 | 8.4 |

NOTES: The reference to SOLAS refers to provisions relevant to watertight and weathertight integrity contained in the IMO Convention on the Safety of Life at Sea (includes HSC Code which may be applicable to vessels that fall outside the definition of NSCV fast craft), ICLL refers to the International Convention on Load Lines, NSCV refers to the deemed to satisfy provisions contained within Chapter 4 to Chapter 9 of the proposed standard and SFV refers to provisions relevant to watertight and weathertight integrity contained in Torremolinos International Convention for the Safety of Fishing Vessels.

1.2% of new Class 1 or Class 2 vessels entering survey would be subject to the full provisions of ICLL and relevant provisions of SOLAS. As these are effectively just revisions of the standards that were the basis upon which Section 7 of the USL Code was drafted, and which have already been accepted internationally, there is no significant change arising from the proposal, just alignment with the currently accepted international standard. The number of Class 3 (fishing) vessels over 46.9 m that would now be subject to the SFV is negligible at less than a vessel per year. Overall, this will result in very small cost to be incurred by the industry on the 1,300 new vessels each year in Australia.

However, should a vessel enter Australia that complies with SOLAS and ICLL or SFV requirements, such a vessel would also be recognised as meaning deemed-to-satisfy provisions contained within Chapter 4 to Chapter 9 of the proposed standard (Table 9). Similarly, these standards are regarded as alternative standards for vessels constructed in Australia and may not be impacted in any way by the proposed standard.

Very little cost is expected to be incurred on the 1.2% of the 1,300 new vessels entering survey which would be subject to the full provisions of SOLAS and ICLL or SFV (an IMO standard for fishing vessels over 24 metres in length) under the proposed standard.

**Table 12 — Summary of Indicative Number of 1,300 New Vessels by Vessel Class and Operational Area per Year Corresponding to Deemed-to-Satisfy-Solutions of the Standard**

| Standard | Class & Operational Area | Num | % |
|---|---|---|---|
| ICLL & SOLAS | Classes 1 & 2 (A, B) | 13 | 1 |
| | Classes 1 & 2 (C ) | 2 | 0.2 |
| | **ICLL & SOLAS Total** | **15** | **1.2** |
| SFV | Class 3 (A, B) | < 1 | 0.04 |
| | Class 3C | < 1 | 0.01 |
| | **SFV Total** | **<1** | **< 0.05** |
| NSCV | Classes 1 & 2 (A,B) | 37 | 2.8 |
| | Classes 1 and 2 (C) | 274 | 21.1 |
| | Class 3 (A,B) | 149 | 11.5 |
| | Class 3C | 161 | 12.4 |
| | Classes 1 & 2 (D,E) | 554 | 42.6 |
| | Class 3 (D,E) | 110 | 8.4 |
| | **NSCV Total** | **1285** | **98.8** |
| | **Grand Total** | **1300** | **100** |

5.4.9. Vessels subject to Chapters 4 to 9

Table 13 lists the major areas where individual vessels may be subject to additional costs as a result of the proposals. A number have been classified as indeterminate because they affect the way the vessel can be utilised rather than being limited to a physical change in cost of requirement.

The major potential costs arise from the watertight and weathertight testing requirements and fitting of storm covers. It is suggested that these costs will be more than offset by the benefits discussed in Sections 5.4.1 to 5.4.4..

| **Question to elicit specific public comment #9:** |
|---|
| *Suggestions are welcome from stakeholders on whether the additional cost on average per new vessel is considered reasonable high or low.* |

### 5.4.10. Design costs

The improved optimisation of design solutions arising from application of the standard comes at the cost of simplicity. The proposed standard is not as simple as the USL Code. However the USL Code, in being simple, prescribed coarse solutions that were not well adapted to the needs of industry. So, while appearing simple, added complexity frequently arose due to difficulties in application, differing views as to interpretations and requests for exemptions and equivalence with all the uncertainties these bring. Hence, design costs would be expected to reduce.

Application of the new standard would be facilitated by the development of computer design tools such as the standards assistants developed for some other NSCV standards. At a one-off cost to the jurisdictions of $10,000 to develop the “Standards Assistant”, it would facilitate accurate and rapid application of the standard to a design by both applicants and assessors. Such a tool would reduce the cost of design considerably compared to current methods.

### 5.4.11. Survey costs

The standard should not in general result in marine authority surveyors needing any more time to confirm that the design is compliant. While the standard does require more than just looking up a simple table, it will save time by providing a more optimal solution that is better suited to industry needs. One area that may well take more time is in the watertight and weathertight testing that has already been factored in Section 5.4.14. No additional testing equipment will be needed by surveyors.

The National Standard for Administration of Marine Safety (NSAMS) Section 4, Survey of Vessels, Survey Schedule which was approved by ATC in November 2009, provides detailed requirements for survey. The standard provides options for equivalent solutions that most likely will result in little need for exemptions to be granted, in greater consistency in the application of the requirements both within a jurisdiction and nationally, and greater mutual recognition. These factors are expected to result in a downward influence on survey costs in the long term.

The marine authorities are likely to incur some small costs in the course of approving equivalent solutions. These costs are most likely to be mitigated to some extent by relatively lower costs for ship builders since equivalent solutions gain mutual recognition on a national basis and the greater certainty in requirements which will help in planning.

## Table 13 — Estimated cost of specific proposals in the draft standard

| RIS Clause | Description | Nature of additional cost | Discussion | Summary |
|---|---|---|---|---|
| 4.4.5 | Fully decked vessels and open vessels | Precludes use of unseaworthy forms of open boats in circumstances of heightened risk | This potentially affects a large group of vessels. For example vessels less than 7.5 m represent 46% of the total expected number of vessels entering survey. However, in reality the majority of seagoing vessels are decked vessels. Those that are not decked normally are fitted with fixed buoyancy to avoid the need to carry survival craft; e.g., liferafts. For vessels less than 6 m length, the standard aligns with recreational boat standards. | Indeterminate |
| 4.4.7 | Ventilators required to be left open for safety | Precludes arrangements that are vulnerable to premature flooding | May preclude acceptance of some recreational boat configurations on seagoing vessels; specifically where engine room air intakes are located below the gunwale. In theory, these are not acceptable under the USL Code, however actual practise may vary. The negative cost aspects are also offset by the same provisions that may accept such arrangements for sheltered water vessels. | Indeterminate |
| 4.4.8 | Storm covers for windows | Specifies the extent to which seagoing vessels should be fitted to windows on seagoing vessels. | For the example shown in Figures 2 and 3, probably 5 stormcovers would be required for Class 1C operation and something like 9 stormcovers for Class 1B operation. No stormcovers are required for Class 1D or 1E. At about $500 per storm cover, this would equate to $2500 to $4900 respectively. The main issue for many vessels would be to find an appropriate location for stowage. Taking an average of $2000 per vessel (Class 2 and 3 vessels having generally less windows) for 279 seagoing vessels over 12 metres gives at total cost of $558,000 | $558,000 |
| 4.4.9 | Tests for watertight and weathertight integrity | The cost arises because testing for watertight and weathertight integrity is specified rather than implied. | Costs will arise from the test itself and corrective action that may arise from results. Overall additional cost can be minimised by testing at the same time as specified structural integrity tests. Assuming an extra half day average at $150 per hour amounts to $600 per vessel. The cost assuming applicable to all 703 vessels over 7.5 metres would amount to $421,000 (ignoring any current testing that is already implied). | $421,000 |
| 4.4.10 | Freeboard and buoyancy at the bow | Precludes larger designs with inadequate freeboard and buoyancy at the bow. | May impact on certain styles of fishing vessels excluding them from being surveyed for Class A or B; i.e. limiting them to Class C. The provision could affect about 10 vessels per year and is unlikely to impact on production fishing vessels because of the lower threshold of 25 m. | Indeterminate |

| RIS Clause | Description | Nature of additional cost | Discussion | Summary |
|---|---|---|---|---|
| 4.4.11 | Freeboard marks | Requires the marking of a freeboard mark on each side of the vessel to guide the operator and prevent overloading | The cost impact of the proposal would be limited to about 10 fishing vessels of length 25 metres or more per year. Assuming an average cost of affixing the freeboard marks of $2250, the projected cost of this provision would be $22,500 per annum. | $22,500 |
| 4.4.12 | Drainage of recesses | Specifies minimum drainage greater than specified in the USL Code but less than specified in IMO SFV | The direct cost of larger drainage openings is minimal in a new vessel, however, it can have indirect impacts on the vessel's operations. The application of this provision is somewhat limited by the alternative of cockpit drainage requirements for many sheltered waters vessels. The major effect would be on existing production vessels entering survey for the first time, the design and production of which would have to be altered to accommodate the new requirement. | Indeterminate |

#### 5.4.12. Cost of preparing the standard

There are costs incurred on developing the standard. These costs include the direct cost of the NMSC preparing the standard and in-kind contributions by professionals from industry groups and jurisdictions who are voluntarily involved in developing the standard. The direct costs to be incurred are the costs involved in drafting the standard, promoting the standard to engender public comment, and organising reference group meetings to discuss the submissions from the public. However, these are one-off costs which are offset by the benefits that flow from having an up-to-date performance-based standard. These costs are very small in proportion to the overall cost of each vessel and negligible when compared to the potential benefits of the proposed standard. The standard when completed will be electronically published and no significant printing cost will be associated with it.

#### 5.4.13. Transition costs

The transition costs associated with introducing the proposed standard are almost zero as many of the requirements in the standard are the same or similar as those in the present USL Code or are already being applied by industry.

Stakeholders are very knowledgeable about the present USL Code and the draft standard since they have contributed to its development over several years, including participation in the Reference Group. These stakeholders include marine authorities, vessel designers, builders and operators, equipment suppliers, and ship owners. This standard will be used primarily by vessel designers and manufacturers.

#### 5.4.14. Testing costs

While Table 13 in Section 5.4.14 includes an additional cost of $421,000 to cover testing per annum, the proposed standard should in reality result in significant less additional compliance costs that are associated with the hose, prototype and alternative to hose testing. These tests should already be conducted on domestic commercial vessels and

**Question to elicit specific public comment #10:** *Suggestions are welcome from stakeholders on any other costs that have not been identified above and which are likely to be incurred by complying with the draft Watertight and Weathertight Integrity standard.*

### 5.5. Cost benefit ratio

A major benefit to be derived from the proposed standard is that its requirements are specified to mitigate the likelihood of a vessel flooding, swamping or sinking, thereby lowering the risks of incidents, serious injuries, fatalities, vessel loss and damage. The additional benefits of the proposed standard are cost savings (avoiding the need to investigate, new options to achieve outcomes and more efficient administration). Costs for the future new fleet overall are expected to be about neutral, although some vessels may be subject to higher costs and some vessels may be subject to lower costs.

The costs and benefits of allowing future innovation are very difficult to quantify. It is also very difficult to make accurate estimates about the future in terms of vessel numbers, vessel types, number of vessel accidents, vessel accidents to be avoided, fatalities, injuries, and property damage. The future performance of the economy and future political decisions to change implementation plans in regard to retrospective application are uncertain. For example, marine incidents are expected to occur but their extent in terms of fatalities, serious injuries, vessel loss and damages are very difficult to predict.

The regulatory impact assessment gives the view that the potential benefits of the proposed standard are likely to be greater than the potential costs. This implies that the cost-benefit ratio most likely will be positive. In addition, the overall benefits of the proposed standard are expected to be greater than those of the alternatives.

## 5.6. Overall assessment of impacts

All the options were considered in terms of their potential costs and benefits and their possibility of meeting the intended objectives of the proposal.

Based on the issues discussed in this RIS and the results of the impact analysis suggest that the status quo and adopting external standards are expected to generate some benefits and meet the objectives of the proposal to some extent, but adopting external standards will have greater benefits and less associated costs and is most likely to meet the objectives of the proposal better than the status quo standard. The proposed standard is expected to generate maximum benefits, incur minimum costs and meet all the objectives of the proposal better.

**Question to elicit specific public comment #1:** *Comment is sought from Stakeholders on which option is likely to generate greatest benefits and best meet the objectives of the proposal and why?*

# 6. COMPETITION ASSESSMENT

## 6.1. COAG Principles

The COAG National Competition Principles Agreement states that regulations with significant net costs or benefits to the community should be assessed to determine that a proposal is the most effective form of government intervention to achieve a desired objective.

The impact of the standard on competition should be considered as part of an evaluation of the effectiveness of the proposal relative to the alternatives. The policy also requires that the benefits of any proposed legislation should outweigh implementation costs and that any restrictions on competition imposed by the legislation should be no more limiting than is necessary to achieve the objective.

Uniform national adoption of the standard for watertight and weathertight integrity will ensure the requirements are applied consistently and fairly to all stakeholders. This will ensure competitive neutrality between these businesses. Although these businesses will continue to incur the routine costs associated with design and construction, these ongoing costs are unlikely to be significantly higher than at present or to restrict market competition, market entry or product and service innovation.

The standard will have little effect on the overall cost structure of individual organisations involved with implementing the requirements for watertight and weathertight integrity in most situations. However, costs associated with complying with the standard will be higher for windows and openings which are located in Zones 1 and 2 of certain vessels operating in more demanding operational areas.

For the majority of vessels, costs will reduce due to deemed to satisfy solutions application, the improved performance-based focus of the requirements and the large increase in options available. The overall impact of the changes in terms of cost should be near neutral. It is highly unlikely that the requirements will be unsustainable for existing small businesses or act as a barrier for businesses planning to expand or to enter the maritime industry.

The proposed standard will bring innovation and increase competition as businesses, designers, builders and operating vessels are likely to take advantage of the much wider options contained within the deemed-to-satisfy solutions and also available via equivalent solutions. There may be increased competition to demonstrate that new designs comply with the new standard. The new options to meet the requirements are expected to result in increased competition by suppliers.

## 6.2. Small Business

The regulatory assessment guidelines for national standards require that the likely impacts on small business be identified, especially where regulatory compliance costs could have a disproportionate impact on small business.

Small business is not expected to be unfairly disadvantaged by the proposed standard because it is an improved version of the present requirements. There is improvement in safety, risks associated with incidents are lowered and small business will benefit.

It is very difficult to determine accurately the exact portion of the new commercial vessels fleet that are likely to be operated by small businesses as there is no reliable information available. However, 95.1 per cent (n=1237) of the new vessels constructed each year on average are 24 metres or less in length. Small businesses are most likely to operate most of these vessels. However, some large businesses also operate such small vessels.

About 4.9 per cent (n=63) of new vessels are greater than 24 metres in length and are more likely to be owned or operated by large organisations. These large vessels are quite expensive and are built for larger scale operations.

In terms of designing new vessels, the great majority of vessel design businesses would most likely have less than twenty employees and should be considered as small businesses. These small businesses are likely to benefit from the proposed standard, especially in terms of its performance basis and availability of equivalent solutions.

In terms of manufacturing new vessels, both small businesses and large businesses will participate. The 2 categories of businesses would both enjoy the previously identified benefits.

The proposed standard will be beneficial to small businesses because its requirements are much more likely to better meet modern technological and operational needs of the industry, and will require less interpretation and reworking in order to achieve acceptance by the marine authority. Small businesses can be disadvantaged by having a more limited network, influence, corporate knowledge and resources to effectively propose and pursue the adaption of old standards to modern vessels. An improved standard that is more applicable and transparent is likely to provide improved equity in the market place for small business at all levels: designers, builders and operators.

# 7. CONSULTATION

## 7.1. Notice to have your say

In August 2008 a NMSC "Have Your Say" notice was issued to relevant stakeholders and the public on the NMSC national database, including marine authorities, seeking comment on the Issues Paper for Watertight and weathertight integrity for commercial vessels in Australia. Copies of the Issues Paper were available from the NMSC web site or could be collected by ringing the NMSC's Secretariat.

All public comments received were referred to the Reference Group for Watertight and Weathertight Integrity for consideration in developing the draft Standard.

## 7.2. Media release for issues paper

A Media Release was issued on 4 August 2008 advising the public that the NMSC has released the Issues Paper on Watertight and Weathertight Integrity for public comment. The comment period started on the 30th July 2008 and ended on the 15 September 2008. The public was given up to mid September 2008 to provide their comments on the Issues Paper.

The Media Release was released to marine industry newsletters, web sites and magazines. Coverage was gained on the Boating Oz web site. It was also published by the NMSC Safety Lines, the Australian Naval Architect and Aus Marine magazine.

There were most likely mentions of the Issues Paper in other publications and the newsletters of state and territory marine safety agencies and marine associations. The Issues Paper was not advertised in the metro press because this publicity normally happens when the subsequent draft standard is released for public comment.

## 7.3. Public comments on issues paper

The NMSC received about 93 comments from 4 organisations on the Issues paper. The comments were in large part dealing with technical details associated with watertight and weathertight integrity, vessel surveying, international standards, materials, safety system designs, and performance criteria. The organisations included:

- Marine Safety Queensland
- Australian Maritime Safety Authority
- WA Department of Planning and Infrastructure
- NMSC

## 7.4. Reference group

The NMSC set up a Reference Group to assist with the development of the standard, including consideration of the public comments received on the Issues Paper, draft Standard, and draft RIS. The Reference Group is made up of made up of people experienced in the design and operation of commercial vessels built to the USL Code, or who have experience with other standards that address watertight and weathertight integrity. The Reference Group met in Perth, Western Australia on 12 May 2009 to consider the 93 comments received from the public and make recommendations regarding preparation of the draft Standard and draft RIS.

Table 14 shows the Reference Group representatives and organisations.

**Table 14 — Reference Group Representatives and Organisations**

| Representative | Organisation |
|---|---|
| Robin Gehling | AMSA (Chairman) |
| Dion Alston | Lloyd's Register |
| Tony Armstrong | Australian Shipbuilders Association |
| Tommy Ericson | Marine Safety Queensland |
| Erik Eriksson | Marine Safety Victoria |
| John Fitzhardinge | Southerly Designs |
| Mori Flapan and Frank Jarosek | NMSC |
| George Szynaka | DPI WA - Marine Safety |
| Andrew Taylor | Southerly Designs |

## 7.5. Subsequent consultation

The first draft Standard was emailed to the members of the Reference Group on 23 March 2010 with a request that members:

1. Confirm whether they believed it to be a fair interpretation of their understanding of the outcome of the meeting.

2. Indicate whether there were any major issues that should prevent the draft being released for public comment in its current form; and

3. Comment on the content, either to make corrections or improvements, or suggestions for questions to be raised within the draft that is released for public comment for stakeholders to answer.

4. Bring up their views on some new issues suggested by the NMSC Project Manager.

A teleconference was held with the Reference Group on 12 April 2010 to consider and respond to the new suggestions made by the NMSC Secretariat Project Manager. All the issues the reference group responded to were dealing with technical details associated with watertight and weathertight integrity of a vessel, vessel surveying, class rules, international standards, materials, safety system designs, and performance criteria. The proposed standard was revised to reflect recommendations of the reference group. The names and organisations of the Reference Group Members that took part in the teleconference to discuss the issues raised by the NMSC Secretariat Project Manager are listed in Table 15.

**Table 15 — Reference Group Representatives and Organisations**

| Representative | Organisation |
| --- | --- |
| Robin Gehling | AMSA (Chairman) |
| Tommy Ericson | Marine Safety Queensland |
| Erik Eriksson | Marine Safety Victoria |
| Michael Hunn | Marine Safety Tasmania |
| David Lugg | DPI WA - Marine Safety |
| Mori Flapan and Benjamin Agbenyegah | NMSC |

The NMSC Secretariat Project Manager had additional extensive consultation while preparing the draft Standard (via phone and email) with various members of the Reference Group between April 2010 and May 2010. This process of consultation was used to resolve all issues and to revise the draft Standard so it could be released for public comment.

# 8. DRAFT CONCLUSIONS

The conclusions drawn from the draft RIS are that the proposed standard is expected to:

- Further the NMSC's objectives specified in the National Marine Safety Strategy.
- Provide a set of required outcomes consistent with the performance framework established in the NSCV Part B: General Requirements which was approved by ATC in 2002.
- Reduce system costs by employing a more flexible and efficient requirement regime that results in a more appropriate and better tailored set of requirements.
- Have a positive impact on competition because the performance-based approach supports innovative solutions provided safety is maintained.
- Have a neutral cost impact to the industry as a whole.
- Have benefits that are likely to be greater than the alternatives and best meet the objectives of the proposal.

The issues discussed in this RIS and the results of the impact analysis suggest that option 3 is likely to be the preferred option. Option 3 is preferred to the alternative. While options 1 and 2 may offer some benefits and meet the objectives of the proposal to some extent, option 3 appears to offer greater benefits and best meet the objectives of this proposal.

Furthermore, option 3 is likely to address all the deficiencies currently encountered in complying with the requirements in the USL Code. The conclusions reached by stakeholders and industry representatives at the Reference Group Meeting in Perth, through teleconference, telephone conversations and emails were all in support of the proposed standard.

**Question to elicit specific public comment #2:** *Stakeholder comment is sought on any other option which could be used as an alternative to the proposed standard, which option is preferred and why?*

# 9. IMPLEMENTATION AND REVIEW

## 9.1. Public Consultation

The NSCV draft Standard and draft RIS for Watertight and Weathertight Integrity will be subject to public consultation. The final documents will be published on the web site of the NMSC. The public and other stakeholders will be notified by various means of communications in marine publications and other media regarding the implementation of the standard.

## 9.2. Approval

The draft standard has been amended as appropriate and endorsed by the NMSC. The proposed standard will be submitted to the ATC for approval in accordance with the National Framework for Marine Safety.

## 9.3. Legislation

This RIS covers the regulatory proposal and the legal instrument which gives effect to it.

The provisions of the USL Code Subsections 5C, 5D and Section 7 are called up in legislation differently by jurisdictions. In NSW, for instance, the regulations under the Commercial Vessels Act largely duplicate Section 10 and Section 7 but omit any reference to Subsections 5C and 5D and 7. The Victorian legislation refers directly to 5C, 5D and 7 of the USL Code. Queensland currently deems the USL Code 2008 Sections which contain consolidated versions of the standards, incorporating all amendments to the Uniform Shipping Laws Code contained in amendment lists one to six as one of a number of acceptable solutions. Western Australia still refers to the 1984 edition of the USL Code, although subsequent amendments have been applied administratively.

The Watertight and Weathertight Integrity section of the NSCV may be made mandatory after amendments have been made to the present USL Code. These amendments are replacing existing USL Code sections 5C and 5D with the equivalent new parts of the NSCV. Some jurisdictions may also implement the standard through regulation or amendment to the present marine safety legislation in force. Alternatively, the Commonwealth may implement the standard via amendments to the Navigation Act.

Where the USL Code presently is applied in state and territory legislation, new vessels, vessels which undergo an initial survey, and vessels which are upgraded are supposed to comply with a combined USL/NSCV**.** This process allows the NSCV to be introduced progressively across Australia as soon as possible after the parts are approved by the ATC.

## 9.4. Review

The NMSC has committed to review the NMSC standards at five-yearly intervals.

Because of the anticipated changes in the administration of domestic commercial vessel safety, there is uncertainty as to what the exact arrangements will be available in the new environment. However, based on current arrangements, the success of the new standard would be monitored by:

1. Feedback provided by users and surveyors applying the standard through correspondence, the Commercial Vessel Survey Forum and the Aussie Commercial Vessels Forum.
2. Monitoring of exemptions and equivalent solutions through the NMSC's exemptions database.
3. The holding of Peer Advisory Network meetings to review applications for Generic Equivalent Solutions.
4. Monitoring and acting on proposals for modifications to the standard received via the jurisdictions to the NMSC secretariat.
5. Ongoing collection and analysis of incident and accident data over time.

**Question to elicit specific public comment #3:** *Stakeholders are welcome to bring out any issues which they think the draft RIS has not addressed/ fully addressed and suggestions on how best to respond to the impacts the proposed standard may have on the community.*

# Appendixes

## ANNEX A SUMMARY OF CHANGES AND THEIR IMPACTS

| | | |
|---|---|---|
| CHAPTER 1 | PRELIMINARY | The preliminary chapter is designed to facilitate use of the document by clearly defining the scope, application and objective of the subsection. It also provides information on referenced documents and definitions. The Preliminary section should reduce costs by facilitating understanding, interpretation and correct application of the standard and reducing errors. |
| CHAPTER 2 | WATERTIGHT AND WEATHERTIGHT INTEGRITY REQUIRED OUTCOMES | See Section 4.4.2 |
| CHAPTER 3 | DEEMED TO SATISFY SOLUTIONS FOR WATERTIGHT AND WEATHERTIGHT INTEGRITY | Chapter 3 establishes the overall framework for the application of deemed-to-satisfy solutions. A graded approach is used to match the specified requirements against the vessel's level of risk. The key risk parameters used to establish relative risk are operational area and length of vessel (relative to freeboard and wave height). |
| 3.3 | Source of deemed-to-satisfy solutions for buoyancy and stability after flooding | See Section 4.4.3 |
| 3.4 | Watertight and weathertight zones on a vessel | See Section 4.4.4 |
| 4.3 | Decked vessels | This clause combines 6 clauses from the USL Code. Its impact should be neutral other than reducing the potential for confusion of users. |
| 4.4 | Open vessels | See Section 4.4.5 |
| 4.4.2 and 4.4.3 | Minimum Freeboard to gunwale | See Section 4.4.5 |
| 5.5 | System inlets and discharges | This provision replaces a number of prescriptive provisions contained in the USL Code with a single performance-based tabular presentation. There should be no increase in cost associated with the application of this provision. |
| 5.6 | Windows and portlights | This clause reflects current USL Code requirements except the lower permissible level of portlights above the waterline has been altered to be consistent with that used to establish Reference Waterline Zone 1 that forms the upper boundary of Zone 1. This— |

| | | |
|---|---|---|
| | | a) reduces the requirement for sheltered water vessels of length between 35 and 50 m.<br><br>b) increases the requirement for vessels of length more than 50 m.<br><br>c) increases the requirement for sheltered water passenger vessels less than 35 m that were not subject to any minimum height. (This appears to have been an anomaly as the requirement was applicable to similar vessels not carrying passengers).<br><br>The burden is more notional than actual because a number of Class 1 and Class 2 vessels that might be unfavourably affected would in any case be subject to the ICLL convention requirements under table 1.<br><br>Similarly, for sheltered water passenger vessels less than 35 metres, the locating of a portlight less than the bare minimum height specified in Column 3 of Table 3 (e.g. less than 230 mm for vessels 24m or more) would be relatively rare and would not in any case be considered appropriate design for a deemed-to-satisfy application. |
| 5.6.2.3 | Spaces of high fire risk | The proposal limits the type of portlights used for spaces of high fire risk to ensure consistency with NSCV Part C Section 4 Fire Safety. |
| 5.6.3 | Construction | The proposal replaces the reference to portlights being in accordance with BS MA24 with ISO Standard 1751 Type A or the option of panes complying with Annex A.<br><br>The British Standard MA24 is no longer current. ISO Standard 1751 is more modern and provides an expanded range of manufactured products. Furthermore, Annex A allows for significant reductions to pane thicknesses and prototype testing based on area of operation and vessel length. |
| 5.6.4.2 | Deadlights | The USL Code contains an anomaly in that sheltered water passenger vessels less than 35 metres are not required to fit deadlights but other sheltered water vessels of that length are required to do so. The proposal finds a compromise by adopting the Lloyds inland waterways rule requirement/SSC Rule requirement that provides for a reduced number of portable deadlights. The requirements for sheltered water non-passenger vessels are effectively reduced while those for sheltered water passenger vessels are being increased. The net effect should be roughly neutral. |
| 5.7 | Ventilators and air pipes. | This clause prohibits ventilators and air pipes in Zone 2 and effectively just makes a clear statement of what was largely implied in the USL Code. |
| 5.8 | Large Ports to facilitate access for cargo or | These provisions have been updated to reflect changes to IMO conventions that arose from the loss of RoRo vessels in |

| | | |
|---|---|---|
| | personnel when in port | the late 1980s and early 1990s. In particular, controls on opening and closure and application of an inner door are proposed changes that arise from these reforms. These design features are not common on the domestic fleet, so the increased cost is unlikely to be significant (less than one vessel per year). |
| | Allowance for local deck erections | A new clause intended to give credit to arrangements that locally raise vulnerable openings above the deck. This has potential to improve flexibility and encourage seaworthy design. This can reduce costs. |
| 6.9 | System inlets and discharges | The proposal is based on provisions contained in ICLL. It clarifies requirements for Zones 3 to 6. There should be no cost associated with the proposal. |
| 6.10 | Hatchways | See Section 4.4.6 |
| 6.11 | Doorways | See Section 4.4.6 |
| 6.11.3.2 | Reduction in sill height for deck camber | This provision provides for a reduction in requirement when the designer opts to build the deck with camber. This option is intended to encourage the construction of vessels with deck camber. It increases flexibility, but there is no mandatory addition to cost. (NOTE: The inclusion of camber normally increases overall cost but can have benefits reducing the amount of water on deck) |
| 6.11.3.3 | Portable sills | This provision reflects changes to the ICLL provisions. Portable sills are not commonly used so the impact should be relatively small. |
| 6.12 | Ventilators | See Section 4.4.6 |
| | Ventilators required to be left open for safety | See Section 4.4.7 |
| 6.12.5 | Dorade boxes | See Section 4.4.6 |
| 6.13 | Air pipes | See Section 4.4.6 |
| 6.14 | Windows and portlights | See Section 4.4.6 |
| 6.14.1 | Spaces subject to damage from contents | This clause reflects and existing clause re-expressed in terms of performance. There should not be any additional cost impact |
| 6.14.2.1 | Windows—Permitted locations on the vessel | This provision reflects the current requirements. |
| 6.14.2.2 | Construction of windows | See Section 4.4.6 |
| 6.14.2.3 | Storm covers | See Section 4.4.8 |

| | | |
|---|---|---|
| 6.14.3.1 | Requirements for Portlights in specified locations | See Section 4.4.6 |
| 6.14.3.2 | Construction of portlights | See Section 4.4.6 |
| 6.14.3.3 | Deadlights for portlights | There is a proposal for portlights of robust construction where the pane is not of brittle material and is specially strengthened. Such portlights need not be provided with a deadlight. This recognizes the reality of smaller vessels such as yachts that are not provided with deadlights. The proposal increases flexibility and accommodates practical reality and so can be expected to reduce costs. |
| 6.14.3.4 | Portlights arranged to provide ventilation | These provisions are designed to maintain equivalent levels of safety against flooding when used as a ventilation opening similar to the current USL Code, but at the same time accommodating the option of larger portlights. The cost should be neutral. |
| 6.15 | Skylights | For vessels other than load-line vessels, this is a new provision. The proposal is based on ICLL Reg.23(12). The provision is intended to make acceptable arrangements that are common for clear hatch covers on yachts, etc. There may be an additional cost when applied. |
| 6.16 | Anchor cable locker, hawse pipes and spurling pipes | The draft provision is based on ICLL 22-2 with modifications for sheltered water vessels and Operational Area C. Provisions from the USL Code have also been incorporated. Many of the provisions would have already been incorporated on the majority of vessels. However, there may be some vessels that do not comply with one or more of these provisions. |
| 7.3.1 | Hose testing | See Section 4.4.9 |
| 7.3.2 | Watertight integrity | See Section 4.4.9 |
| 7.3.3 | Weathertight integrity | See Section 4.4.9 |
| 7.4 | Alternatives to hose testing | See Section 4.4.9 |
| 7.5 | Prototype testing | See Section 4.4.9 |
| 8 | Freeboard and buoyancy at the bow | See Section 4.4.10 |
| 9 | Freeboard mark | See Section 4.4.11 |
| 10.6.1 | Drainage of wells Minimum drainage area | See Section 4.4.12 |

| | | |
|---|---|---|
| 10.7.1 | Drainage of cockpits – Applicaton | See Section 4.4.12 |
| 10.7.2 | Minimum drainage area | See Section 4.4.12 |
| 10.9.1 | Design of drainage arrangements – general provisions | See Section 4.4.12 |
| A1 | Portlight, Side scuttle, and window panes and window frames | See Section 4.4.13 |
| A3 | Materials | See Section 4.4.13 |
| A4 | Pane thickness | See Section 4.4.13 |
| A5 | Glued windows | See Section 4.4.13 |

**ANNEX B: EXAMPLES ILLUSTRATING DIFFERENT REQUIREMENTS FOR COAMINGS AND SILLS FOR USL CODE Sections 5C, 5D and 7 COMPARED TO PROPOSED DRAFT NSCV PART C SECTION 2.**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air p |
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Water taxi** | **7.81** | **1D** | **Z3** | 210 | 210 | 150 | 125 | 150 | 125 | 150 | 100 | 150 | 125 | 150 | 100 | 600 | 186 | 600 | 938 | 760 |
| | | | **Z4** | 1110 | 2010 | 150 | 100 | 150 | 100 | 150 | 100 | 150 | 100 | 150 | 100 | 375 | 158 | | 469 | 450 |
| | | | **Z5** | 2010 | 2910 | 150 | 100 | 150 | 100 | 150 | 100 | 150 | 100 | 150 | 100 | 375 | 132 | | | 450 |
| | | | **Z6** | 2910 | 3810 | 150 | 100 | 150 | 0 | 150 | 0 | 150 | 0 | 150 | 0 | 375 | 125 | | | 450 |
| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air p |
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Harbour ferry** | **25.94** | **1E** | **Z4** | 500 | 500 | 150 | 100 | 150 | 100 | 150 | 100 | 150 | 100 | 150 | 100 | 600 | 100 | 600 | 450 | 760 |
| | | | **Z5** | 1400 | 1400 | 150 | 100 | 150 | 0 | 150 | 0 | 150 | 0 | 150 | 0 | 375 | 120 | 375 | 225 | 450 |
| | | | **Z6** | 2300 | 2300 | 150 | 100 | 150 | 0 | 150 | 0 | 150 | 0 | 150 | 0 | 375 | 100 | 375 | | 450 |
| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air p |
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Manly ferry** | **72.92** | **1D** | **Z3** | 1500 | 1500 | 600 | 250 | 600 | 250 | 600 | 160 | 600 | 250 | 380 | 160 | 900 | 375 | 900 | 1875 | 760 |
| | | | **Z4** | 2630 | 3760 | 450 | 190 | 450 | 160 | 450 | 160 | 380 | 160 | 380 | 160 | 760 | 315 | 760 | 1875 | 450 |
| | | | **Z5** | 3760 | 4890 | 450 | 140 | 450 | 100 | 450 | 100 | 380 | 100 | 380 | 100 | 760 | 265 | 760 | 938 | 450 |
| | | | **Z6** | 4890 | 6020 | 450 | 105 | 450 | 0 | 450 | 0 | 380 | 0 | 380 | 0 | 760 | 250 | 760 | | 450 |
| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air p |
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Whale watcher** | **31.25** | **1C** | **Z3** | 630 | 630 | 600 | 450 | 600 | 450 | 600 | 285 | 600 | 450 | 600 | 285 | 900 | 675 | 900 | 3375 | 760 |
| | | | **Z4** | 1980 | 3330 | 450 | 340 | 450 | 285 | 450 | 285 | 450 | 285 | 450 | 285 | 760 | 570 | 760 | 1688 | 450 |
| | | | **Z5** | 3330 | 4680 | 450 | 255 | 450 | 180 | 450 | 180 | 450 | 180 | 450 | 180 | 760 | 480 | 760 | | 450 |
| | | | **Z6** | 4680 | 6030 | 450 | 190 | 450 | 115 | 450 | 115 | 450 | 115 | 450 | 115 | 760 | 405 | 760 | | 450 |

| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Dive boat** | **7.29** | **2C** | **Z3** | 100 | 100 | 200 | 225 | 100 | 225 | 100 | 143 | 100 | 225 | 100 | 143 | 600 | 338 | 600 | 1688 | 760 |
| | | | **Z4** | 1000 | 1900 | 200 | 170 | 100 | 143 | 100 | 143 | 100 | 143 | 100 | 143 | 375 | 285 | | 844 | 450 |
| | | | **Z5** | 1900 | 2800 | 100 | 128 | 100 | 90 | 100 | 90 | 100 | 90 | 100 | 90 | 375 | 240 | | | 450 |
| | | | **Z6** | 2800 | 3700 | 100 | 95 | 100 | 58 | 100 | 58 | 100 | 58 | 100 | 58 | 375 | 203 | | | 450 |
| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air |
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Lighter** | **16.67** | **2E** | **Z4** | 352 | 352 | 150 | 100 | 150 | 100 | 150 | 100 | 300 | 100 | 300 | 100 | 600 | 70 | 600 | 450 | 760 |
| | | | **Z5** | 1252 | 1252 | 150 | 100 | 150 | 0 | 150 | 0 | 300 | 0 | 300 | 0 | 375 | 84 | | 225 | 450 |
| | | | **Z6** | 2152 | 2152 | 150 | 100 | 150 | 0 | 150 | 0 | 300 | 0 | 300 | 0 | 375 | 70 | | | 450 |
| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air |
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Harbour tug** | **12.50** | **2D** | **Z3** | 300 | 300 | 100 | 175 | 200 | 175 | 100 | 112 | 200 | 175 | 200 | 112 | 600 | 262 | 600 | 1313 | 760 |
| | | | **Z4** | 1232 | 2164 | 100 | 133 | 200 | 112 | 100 | 112 | 200 | 112 | 200 | 112 | 375 | 220 | | 657 | 450 |
| | | | **Z5** | 2164 | 3096 | 100 | 100 | 200 | 100 | 100 | 100 | 200 | 100 | 200 | 100 | 375 | 186 | | | 450 |
| | | | **Z6** | 3096 | 4028 | 100 | 100 | 200 | 0 | 100 | 0 | 200 | 0 | 200 | 0 | 375 | 175 | | | 450 |
| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air |
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Coastal tug** | **25.00** | **2C** | **Z3** | 550 | 550 | 600 | 450 | 600 | 450 | 600 | 285 | 600 | 450 | 600 | 285 | 900 | 675 | 900 | 3375 | 760 |
| | | | **Z4** | 2350 | 4150 | 450 | 340 | 450 | 285 | 450 | 285 | 380 | 285 | 380 | 285 | 760 | 570 | | 1688 | 450 |
| | | | **Z5** | 4150 | 5950 | 450 | 255 | 450 | 180 | 450 | 180 | 380 | 180 | 380 | 180 | 760 | 480 | | | 450 |
| | | | **Z6** | 5950 | 7750 | 450 | 190 | 450 | 115 | 450 | 115 | 380 | 115 | 380 | 115 | 760 | 405 | | | 450 |
| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air |
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Bunker barge** | **43.75** | **2C** | **Z3** | 832 | 832 | 600 | 450 | 600 | 450 | 600 | 285 | 600 | 450 | 600 | 285 | 900 | 675 | 900 | 3375 | 760 |
| | | | **Z4** | 2182 | 3532 | 450 | 340 | 450 | 285 | 450 | 285 | 380 | 285 | 380 | 285 | 760 | 570 | | 1688 | 450 |
| | | | **Z5** | 3532 | 4882 | 450 | 255 | 450 | 180 | 450 | 180 | 380 | 180 | 380 | 180 | 760 | 480 | | | 450 |
| | | | **Z6** | 4882 | 6232 | 450 | 190 | 450 | 115 | 450 | 115 | 380 | 115 | 380 | 115 | 760 | 405 | | | 450 |

| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Dredge** | **62.50** | **2D** | **Z3** | 1240 | 1240 | 600 | 250 | 600 | 250 | 600 | 160 | 600 | 250 | 600 | 160 | 900 | 375 | 900 | 1875 | 760 |
| | | | **Z4** | 2370 | 3500 | 450 | 190 | 450 | 160 | 450 | 160 | 380 | 160 | 380 | 160 | 760 | 315 | | 938 | 450 |
| | | | **Z5** | 3500 | 4630 | 450 | 140 | 450 | 100 | 450 | 100 | 380 | 100 | 380 | 100 | 760 | 265 | | | 450 |
| | | | **Z6** | 4630 | 5760 | 450 | 105 | 450 | 0 | 450 | 0 | 380 | 0 | 380 | 0 | 760 | 250 | | | 450 |
| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air |
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Inshore fishing** | **9.38** | **3D** | **Z3** | 240 | 240 | 100 | 125 | 100 | 125 | 100 | 100 | 200 | 125 | 200 | 100 | 600 | 188 | 600 | 938 | 760 |
| | | | **Z4** | 1140 | 2040 | 100 | 100 | 100 | 100 | 100 | 100 | 200 | 100 | 200 | 100 | 375 | 158 | | 469 | 450 |
| | | | **Z5** | 2040 | 2940 | 100 | 100 | 100 | 100 | 100 | 100 | 200 | 100 | 200 | 100 | 375 | 133 | | | 450 |
| | | | **Z6** | 2940 | 3840 | 100 | 100 | 100 | 0 | 100 | 0 | 200 | 0 | 200 | 0 | 375 | 125 | | | 450 |
| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air |
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Trawler** | **19.79** | **3B** | **Z3** | 448 | 448 | 300 | 420 | 300 | 420 | 300 | 266 | 300 | 420 | 300 | 266 | 600 | 630 | 600 | 3150 | 760 |
| | | | **Z4** | 1964 | 3480 | 300 | 315 | 300 | 266 | 300 | 266 | 300 | 266 | 300 | 266 | 375 | 532 | | 1575 | 450 |
| | | | **Z5** | 3480 | 4996 | 300 | 238 | 300 | 168 | 300 | 168 | 300 | 168 | 300 | 168 | 375 | 448 | | | 450 |
| | | | **Z6** | 4996 | 6512 | 300 | 179 | 300 | 105 | 300 | 105 | 300 | 105 | 300 | 105 | 375 | 378 | | | 450 |
| **Type of vessel** | **Length** | **Class** | **Zone** | Height WL to Lwr Zone | | Large hatchways | | Access hatchways es | | Access hatch not essential | | Door essential | | Door not essential | | Ventilator coaming | | Min open vent | | Air |
| | | | | Aft | Exp fwd end | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code | Prop-osal | USL Code |
| **Pearl farming** | **6.25** | **3C** | **Z3** | 200 | 200 | 200 | 225 | 200 | 225 | 100 | 143 | 200 | 225 | 200 | 143 | 600 | 338 | 600 | 1688 | 760 |
| | | | **Z4** | 1100 | 2000 | 200 | 170 | 200 | 143 | 100 | 143 | 200 | 143 | 200 | 143 | 375 | 285 | | 844 | 450 |
| | | | **Z5** | 2000 | 2900 | 200 | 143 | 200 | 90 | 100 | 90 | 200 | 90 | 200 | 90 | 375 | 240 | | | 450 |
| | | | **Z6** | 2900 | 3800 | 200 | 95 | 200 | 58 | 100 | 58 | 200 | 58 | 200 | 58 | 375 | 203 | | | 450 |

**KEY:**

- (Yellow) Proposal exceeds USL Code
- (Light blue) Proposal significantly less than USL Code
- (Orange) Proposal similar to USL Code
- (Green) Height above top of Zone 2
- (Pink) Alternative where appr dorade vent is fitted

ANNEX C: **EXAMPLES ILLUSTRATING DIFFERENT REQUIREMENTS FOR DRAINAGE OF WELL DECKS FROM USL CODE Sections 5C, 5D and 7 COMPARED TO PROPOSED DRAFT NSCV PART C SECTION 2.**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | Length of vessel | Length of well | Width of well | Height of bulwark | Operational area | Deck angle | fw | fa | fdk | lw | Area Zone 3 | Area Zone 4 | Areas Zones 5 and 6 | Load Line WD | Load line SS | USL |
| Dive boat | 6.50 | 0.98 | 2.20 | 0.60 | C | 2.0 | 1.5 | 0.75 | 1 | 0.98 | 0.036 | 0.018 | 0.009 | | | 0.012 |
| Class 2 | 6.50 | 1.63 | 2.20 | 0.60 | C | 2.0 | 1.5 | 0.75 | 1 | 1.63 | 0.059 | 0.030 | 0.015 | | | 0.020 |
| | 6.50 | 2.60 | 2.20 | 0.60 | C | 2.0 | 1.5 | 0.75 | 1 | 2.60 | 0.095 | 0.048 | 0.024 | | | 0.031 |
| | 6.50 | 3.90 | 2.20 | 0.60 | C | 2.0 | 1.5 | 0.75 | 1 | 3.90 | 0.143 | 0.071 | 0.036 | | | 0.047 |
| | 6.50 | 5.20 | 2.20 | 0.60 | C | 2.0 | 1.5 | 0.75 | 1 | 4.55 | 0.167 | 0.083 | 0.042 | | | 0.062 |
| | | | | | | | | | | | | | | | | |
| Type | Length of vessel | Length of well | Width of well | Height of bulwark | Operational area | Deck angle | fw | fa | fdk | lw | Area Zone 3 | Area Zone 4 | Areas Zones 5 and 6 | Load Line WD | Load line SS | USL |
| Tug | 25.00 | 3.75 | 6.00 | 1.00 | B | 3.0 | 1.5 | 1 | 0.85 | 3.75 | 0.335 | 0.167 | 0.084 | 0.831 | 0.416 | 0.169 |
| Class 2 | 25.00 | 6.25 | 6.00 | 1.00 | B | 3.0 | 1.5 | 1 | 0.85 | 6.25 | 0.558 | 0.279 | 0.139 | 0.919 | 0.459 | 0.281 |
| | 25.00 | 10.00 | 6.00 | 1.00 | B | 3.0 | 1.5 | 1 | 0.85 | 10.00 | 0.893 | 0.446 | 0.223 | 1.050 | 0.525 | 0.450 |
| | 25.00 | 15.00 | 6.00 | 1.00 | B | 3.0 | 1.5 | 1 | 0.85 | 15.00 | 1.339 | 0.669 | 0.335 | 1.225 | 0.613 | 0.675 |
| | 25.00 | 20.00 | 6.00 | 1.00 | B | 3.0 | 1.5 | 1 | 0.85 | 17.50 | 1.562 | 0.781 | 0.390 | 1.313 | 0.656 | 0.900 |
| | | | | | | | | | | | | | | | | |
| Type | Length of vessel | Length of well | Width of well | Height of bulwark | Operational area | Deck angle | fw | fa | fdk | lw | Area Zone 3 | Area Zone 4 | Areas Zones 5 and 6 | Load Line WD | Load line SS | USL |
| Manly Ferry | 70.00 | 10.50 | 12.00 | 1.00 | D | 2.0 | 1 | 0.5 | 1 | 10.50 | 0.368 | 0.184 | 0.092 | 1.601 | 0.801 | 0.473 |
| Class 1 | 70.00 | 17.50 | 12.00 | 1.00 | D | 2.0 | 1 | 0.5 | 1 | 17.50 | 0.613 | 0.306 | 0.153 | 1.969 | 0.984 | 0.788 |
| | 70.00 | 28.00 | 12.00 | 1.00 | D | 2.0 | 1 | 0.5 | 1 | 28.00 | 0.980 | 0.490 | 0.245 | 2.940 | 1.470 | 1.260 |
| | 70.00 | 42.00 | 12.00 | 1.00 | D | 2.0 | 1 | 0.5 | 1 | 42.00 | 1.470 | 0.735 | 0.368 | 4.410 | 2.205 | 1.890 |
| | 70.00 | 56.00 | 12.00 | 1.00 | D | 2.0 | 1 | 0.5 | 1 | 49.00 | 1.715 | 0.858 | 0.429 | 5.145 | 2.573 | 2.520 |
| | | | | | | | | | | | | | | | | |
| Type | Length of vessel | Length of well | Width of well | Height of bulwark | Operational area | Deck angle | fw | fa | fdk | lw | Area Zone 3 | Area Zone 4 | Areas Zones 5 and 6 | Load Line WD | Load line SS | USL |
| Harbour ferry | 23.90 | 3.59 | 6.00 | 1.00 | E | 2.0 | 1.5 | 0.5 | 1 | 3.59 | 0.188 | 0.094 | 0.047 | | | 0.161 |
| Class 1 | 23.90 | 5.98 | 6.00 | 1.00 | E | 2.0 | 1.5 | 0.5 | 1 | 5.98 | 0.314 | 0.157 | 0.078 | | | 0.269 |
| | 23.90 | 9.56 | 6.00 | 1.00 | E | 2.0 | 1.5 | 0.5 | 1 | 9.56 | 0.502 | 0.251 | 0.125 | | | 0.430 |
| | 23.90 | 14.34 | 6.00 | 1.00 | E | 2.0 | 1.5 | 0.5 | 1 | 14.34 | 0.753 | 0.376 | 0.188 | | | 0.645 |
| | 23.90 | 19.12 | 6.00 | 1.00 | E | 2.0 | 1.5 | 0.5 | 1 | 16.73 | 0.878 | 0.439 | 0.220 | | | 0.860 |
| Type | Length of vessel | Length of well | Width of well | Height of bulwark | Operational area | Deck angle | fw | fa | fdk | lw | Area Zone 3 | Area Zone 4 | Areas Zones 5 and 6 | Load Line WD | Load line SS | USL |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trawler | 19.00 | 2.85 | 4.50 | 0.90 | B | 3.0 | 1.5 | 1 | 0.85 | 2.85 | 0.217 | 0.109 | 0.054 | | | 0.106 |
| Class 3 | 19.00 | 4.75 | 4.50 | 0.90 | B | 3.0 | 1.5 | 1 | 0.85 | 4.75 | 0.362 | 0.181 | 0.090 | | | 0.177 |
| | 19.00 | 7.60 | 4.50 | 0.90 | B | 3.0 | 1.5 | 1 | 0.85 | 7.60 | 0.579 | 0.290 | 0.145 | | | 0.284 |
| | 19.00 | 11.40 | 4.50 | 0.90 | B | 3.0 | 1.5 | 1 | 0.85 | 11.40 | 0.869 | 0.434 | 0.217 | | | 0.426 |
| | 19.00 | 15.20 | 4.50 | 0.90 | B | 3.0 | 1.5 | 1 | 0.85 | 13.30 | 1.013 | 0.507 | 0.253 | | | 0.568 |
| Type | Length of vessel | Length of well | Width of well | Height of bulwark | Operational area | Deck angle | fw | fa | fdk | lw | Area Zone 3 | Area Zone 4 | Areas Zones 5 and 6 | Load Line WD | Load line SS | USL |
| Steber 43 | 13.11 | 1.97 | 3.74 | 0.85 | C | 2.0 | 1.5 | 0.75 | 1 | 1.97 | 0.121 | 0.061 | 0.030 | | | 0.066 |
| Class 3 | 13.11 | 3.28 | 3.74 | 0.85 | C | 2.0 | 1.5 | 0.75 | 1 | 3.28 | 0.202 | 0.101 | 0.051 | | | 0.111 |
| | 13.11 | 5.24 | 3.74 | 0.85 | C | 2.0 | 1.5 | 0.75 | 1 | 5.24 | 0.324 | 0.162 | 0.081 | | | 0.177 |
| | 13.11 | 7.86 | 3.74 | 0.85 | C | 2.0 | 1.5 | 0.75 | 1 | 7.86 | 0.485 | 0.243 | 0.121 | | | 0.266 |
| | 13.11 | 10.49 | 3.74 | 0.85 | C | 2.0 | 1.5 | 0.75 | 1 | 9.17 | 0.566 | 0.283 | 0.142 | | | 0.354 |
| Type | Length of vessel | Length of well | Width of well | Height of bulwark | Operational area | Deck angle | fw | fa | fdk | lw | Area Zone 3 | Area Zone 4 | Areas Zones 5 and 6 | Load Line WD | Load line SS | USL |
| Harbour tug | 12.00 | 1.80 | 3.80 | 0.80 | D | 2.0 | 1.5 | 0.5 | 1 | 1.80 | 0.068 | 0.034 | 0.017 | | | 0.029 |
| Class 2 | 12.00 | 3.00 | 3.80 | 0.80 | D | 2.0 | 1.5 | 0.5 | 1 | 3.00 | 0.113 | 0.056 | 0.028 | | | 0.048 |
| | 12.00 | 4.80 | 3.80 | 0.80 | D | 2.0 | 1.5 | 0.5 | 1 | 4.80 | 0.180 | 0.090 | 0.045 | | | 0.077 |
| | 12.00 | 7.20 | 3.80 | 0.80 | D | 2.0 | 1.5 | 0.5 | 1 | 7.20 | 0.270 | 0.135 | 0.068 | | | 0.115 |
| | 12.00 | 9.60 | 3.80 | 0.80 | D | 2.0 | 1.5 | 0.5 | 1 | 8.40 | 0.316 | 0.158 | 0.079 | | | 0.154 |
| | | | | | | | | | | | | | | | | |
| Type | Length of vessel | Length of well | Width of well | Height of bulwark | Operational area | Deck angle | fw | fa | fdk | lw | Area Zone 3 | Area Zone 4 | Areas Zones 5 and 6 | Load Line WD | Load line SS | USL |
| Tanker | 45.00 | 6.75 | 9.00 | 1.00 | C | 2.0 | 1 | 0.75 | 1 | 6.75 | 0.354 | 0.177 | 0.089 | | | 0.304 |
| Class 2 | 45.00 | 11.25 | 9.00 | 1.00 | C | 2.0 | 1 | 0.75 | 1 | 11.25 | 0.591 | 0.295 | 0.148 | | | 0.506 |
| | 45.00 | 18.00 | 9.00 | 1.00 | C | 2.0 | 1 | 0.75 | 1 | 18.00 | 0.945 | 0.473 | 0.236 | | | 0.810 |
| | 45.00 | 27.00 | 9.00 | 1.00 | C | 2.0 | 1 | 0.75 | 1 | 27.00 | 1.418 | 0.709 | 0.354 | | | 1.215 |
| | 45.00 | 36.00 | 9.00 | 1.00 | C | 2.0 | 1 | 0.75 | 1 | 31.50 | 1.654 | 0.827 | 0.413 | | | 1.620 |

KEY:
- Proposal lies above current USL Code and other relevant standards
- Proposal lies above USL Code non-loadline but below Safety of Fishing Vessels or Load Line where applicable
- Proposal lies below both USL Code and other relevant standards

NOTE: SFV does not include any discretionary additional area for vessels with low sheer (+ 50% on Load Line vessels)

## ANNEX D: QUALITATIVE ASSESSMENT OF RELATIVE COST OF PROPOSALS COMPARED TO CURRENT REQUIREMENTS

Key:

+ = moderate reduction in cost ++ = significant reduction in cost

- = moderate increase in cost -- = significant increase in cost

For greater detail refer to Chapter 4 and Annex A

| | | |
|---|---|---|
| CHAPTER 1 | PRELIMINARY | + |
| CHAPTER 2 | WATERTIGHT AND WEATHERTIGHT INTEGRITY REQUIRED OUTCOMES | ++ |
| CHAPTER 3 | DEEMED TO SATISFY SOLUTIONS FOR WATERTIGHT AND WEATHERTIGHT INTEGRITY | |
| 3.3 | Source of deemed-to-satisfy solutions for buoyancy and stability after flooding | ++ |
| 3.4 | Watertight and weathertight zones on a vessel | ++ |
| 4.3 | Decked vessels | |
| 4.4 | Open vessels | -- |
| 4.4.2 and 4.4.3 | Minimum Freeboard to gunwale | -- |
| 5.5 | System inlets and discharges | |
| 5.6 | Windows and portlights | - |
| 5.6.2.3 | Spaces of high fire risk | - |
| 5.6.3 | Construction | + |
| 5.6.4.2 | Deadlights | |
| 5.7 | Ventilators and air pipes. | |
| 5.8 | Large Ports to facilitate access for cargo or personnel when in port | - |
| | Allowance for local deck erections | + |
| 6.9 | System inlets and discharges | |
| 6.10 | Hatchways | ++ |
| 6.11 | Doorways | ++ |

| | | |
|---|---|---|
| 6.11.3.2 | Reduction in sill height for deck camber | + |
| 6.11.3.3 | Portable sills | - |
| 6.12 | Ventilators | ++ |
| | Ventilators required to be left open for safety | -- |
| 6.12.5 | Dorade boxes | ++ |
| 6.13 | Air pipes | + |
| 6.14 | Windows and portlights | + |
| 6.14.1 | Spaces subject to damage from contents | |
| 6.14.2.1 | Windows—Permitted locations on the vessel | |
| 6.14.2.2 | Construction of windows | + |
| 6.14.2.3 | Storm covers | - |
| 6.14.3.1 | Requirements for Portlights in specified locations | + |
| 6.14.3.2 | Construction of portlights | + |
| 6.14.3.3 | Deadlights for portlights | + |
| 6.14.3.4 | Portlights arranged to provide ventilation | |
| 6.15 | Skylights | - |
| 6.16 | Anchor cable locker, hawse pipes and spurling pipes | - |
| 7.3.1 | Hose testing | - |
| 7.3.2 | Watertight integrity | |
| 7.3.3 | Weathertight integrity | + |
| 7.4 | Alternatives to hose testing | + |
| 7.5 | Prototype testing | + |
| 8 | Freeboard and buoyancy at the bow | - |
| 9 | Freeboard mark | - |
| 10.6.1 | Drainage of wells Minimum drainage area | - |
| 10.7.1 | Drainage of cockpits – Applicaton | + |
| 10.7.2 | Minimum drainage area | + |

| | | |
|---|---|---|
| 10.9.1 | Design of drainage arrangements – general provisions | - |
| A1 | Portlight, Side scuttle, and window panes and window frames | + |
| A3 | Materials | + |
| A4 | Pane thickness | ++ |
| A5 | Glued windows | ++ |