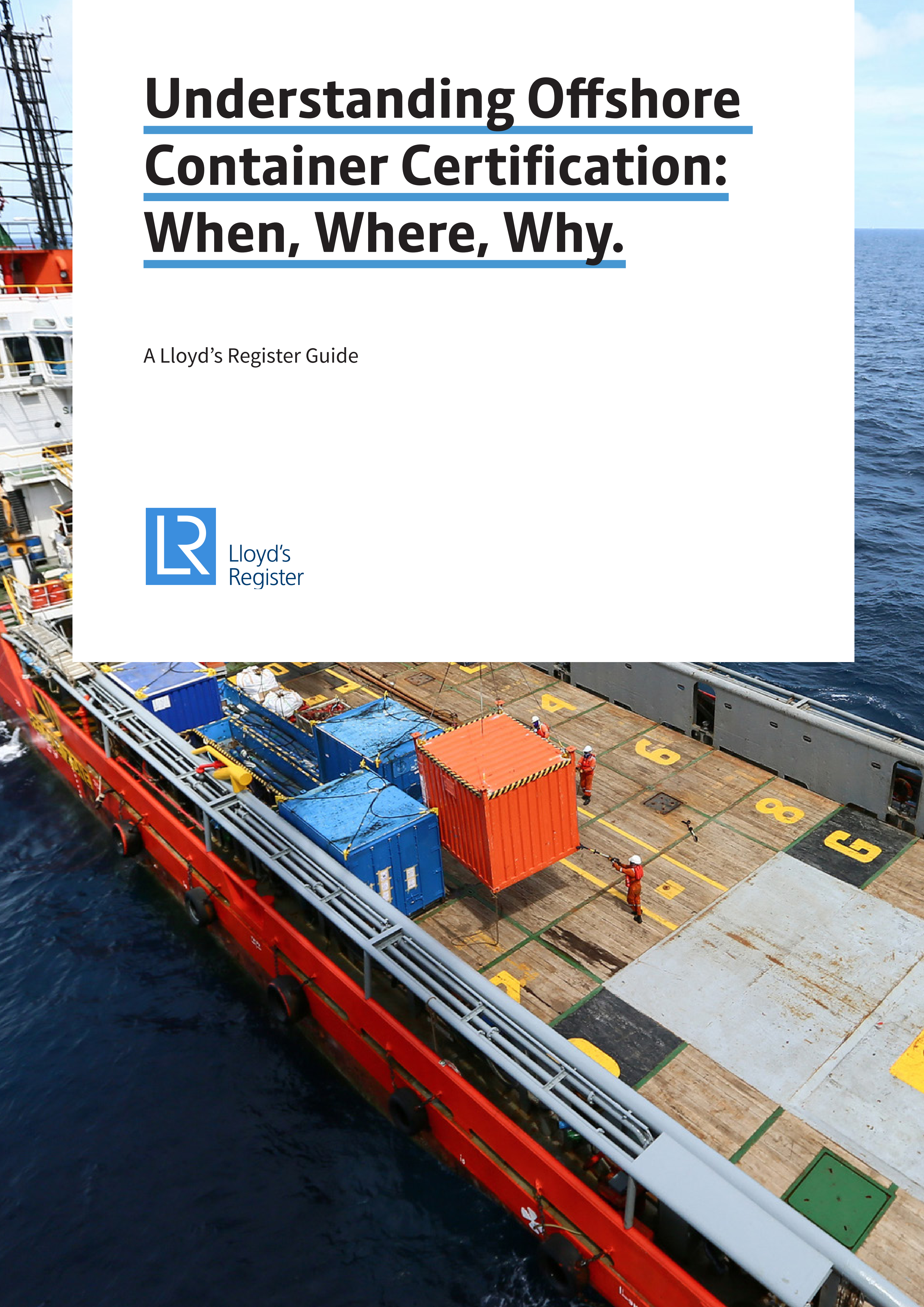


Understanding Offshore Container Certification: When, Where, Why.

A Lloyd's Register Guide

Lloyd's Register

Contents

When you work with offshore containers, it's important to understand the rules.

The when, where, and why to offshore container certification

Companies involved with building, procuring or maintaining offshore containers should have a general understanding of the standards and certifications governing their use.

From ISO-style units to custom-made skid packages, offshore containers are unique in the world of shipping containers. Alongside the growth of the offshore oil and gas industry, the use of offshore containers also continues to grow and diversify.

The goal of this guide is to educate and inform, to provide a general understanding of the background of offshore container regulations, certifications and standards in order to avoid common misconceptions. It should not be taken as a comprehensive or all-exhaustive document.

Key terms used in this guide

CSC
Convention for Safe Containers (adopted 1972). Developed by the IMO to institute uniform international safety regulations for the transport of marine freight containers.

DNV 2.7-1
A publicly available standard for certifying offshore containers produced by a privately-held company.

EN 12079
Required standard for offshore containers in CEN member States (EU plus Turkey, Macedonia, Iceland, Norway, and Switzerland); also adopted as a global standard.

IMDG
International Maritime Dangerous Goods Code. Enacted by Safety of Life at Sea (SOLAS) regulations and adopted as law by 162 governments and entities.

IMO
International Maritime Organization. The IMO publishes the IMDG code, the CSC regulations and is the holder of the SOLAS convention.

IMO MSC/Circ. 860
Guidelines for offshore container approval issued in the supplement to the IMDG code.

LRCCS
Lloyd's Register's Container Certification Scheme. It originated in 1968 as the Freight Container Certification Scheme. The Scheme covers the three main service areas of intermodal equipment. It includes CSC containers, offshore equipment and tanks for the transport of dangerous goods.

MSC
Maritime Safety Committee, the highest technical body in the IMO.

SOLAS
Mostly known as "Safety of Life at Sea," the SOLAS is an international convention or treaty adopted by 162 contracting States. It requires that flag States ensure their ships comply with minimum safety standards in construction, equipment and operation. SOLAS specifies several international codes as part of its requirements. The IMDG code is one of these.

What is an offshore container?

As defined by the International Maritime Organization, an offshore container is a portable unit, specially designed for repeated use in the transport of goods or equipment to, from or between fixed and/or floating offshore installations and ships.

The following are common types of offshore containers.

Offshore freight containers

An offshore container built for the transport of goods, which can include general cargo containers, cargo baskets, bulk containers, special containers, boxes and gas cylinder racks.

Offshore portable tanks are also included in this category. These are used to transport dangerous goods used offshore, and must also meet the International Maritime Dangerous Goods code.

Offshore service containers

Custom-built containers for a specific task that are generally temporary. Examples include labs, workshops, power plants and control stations.

Offshore waste skids

A container that holds waste. This type of container can be open or closed.

Offshore containers are also commonly called “skids” in the offshore oil and gas community, as they are often used to transport large components to drilling and production rigs. These can be as simple as frames that hold the contents. The skid, along with its contents, is sometimes referred to as a “skid package.”

Offshore containers vs. ISO containers

Offshore containers evolved from the common intermodal or ISO shipping container

"Intermodal" refers to the ability to move the container by different methods without having to unload it at each transfer (ship to rail to truck, for example).

The intermodal came into use in the 1950's and changed the world of commerce by providing a standard, low-cost method to transport goods internationally. The International Standards Organization published ISO standards for containers between 1968 and 1970, cementing the role of the shipping container in the global economy.

The IMO also studied the safety of containerization in marine transport and in 1972 the International Convention for Safe Containers (CSC) was adopted.

There are, in general, three factors that separate offshore containers from ISO containers:

Exposure to harsh environments

Offshore containers are often left exposed to open seas on the decks of supply vessels, and also loaded to platforms in harsh weather conditions, this also means that the minimum design temperature is normally specified as -20° C and the primary structure requires material of sufficient toughness for -20° C.

Loading and unloading forces

Because many offshore containers cannot be used with typical lifting equipment such as spreader beams, the methods of loading and unloading put different types of pressure on the structures of offshore containers. Offshore containers are supplied with a permanently installed sling set. Most do not have corner castings, and if they do, they are not allowed to be lifted from them.

Non-standard designs

Most offshore containers are built to fit a specific piece of equipment, and as a result do not fit into the categories of ISO containers.

Regulations vs. standards

There is some confusion in the offshore container industry when it comes to design and inspection standards for offshore containers versus what is required under international regulations.

The origins of offshore container regulations and standards lie in the Safety of Life at Sea Convention, or SOLAS treaty. SOLAS was created in 1914 as a reaction to the Titanic disaster. Thirteen countries attended the initial conference, but World War I prevented it from going into force.

International agreement and adoption of SOLAS became the first major project of the International Maritime Organization (IMO) when it first convened in 1958 as the Inter-Governmental Maritime Consultative Organization. It was then, as it is now, a specialized agency of the United Nations devoted to the safety and security of ships and the prevention of sea pollution. SOLAS went into force in 1965.

It was revised in 1974 to simplify the process for amending the treaty. The treaty also included a "tacit acceptance" procedure where amendments will be automatically entered into force unless member nations file objections.

SOLAS calls for all ships flagged by its member states to comply with minimum safety standards in construction, equipment and operation of merchant ships. Amendments have expanded its scope over the years to include provisions for nuclear ships, high-speed craft and stowage of cargo. The SOLAS convention is now held as law by 162 member States (see Annex B and Annex C). Those member states represent 99% gross tonnage of the world's merchant fleet.

SOLAS contains references to other codes that supplement the convention and are also held as law, such as the International Safety Management (ISM) code, or the International Life-Saving Appliance (LSA) code.

IMDG Code Adopted

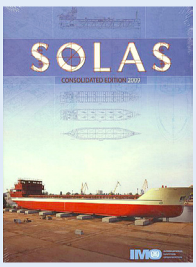
In 1960, the SOLAS Conference contained a recommendation that member governments should adopt some set of regulations around the movement of dangerous goods and hazardous materials. The IMO's Maritime Safety Committee (MSC), the highest technical committee in the IMO, took four years to develop the International Maritime Dangerous Goods (IMDG) code. It was adopted in 1965. As of January 2004, all SOLAS member States must also follow IMDG.

The IMDG contains much more than guidelines for mariners. It applies to all companies and organizations connected to shipping.

The IMDG code is updated every two years, but amendments that don't affect the principles of the code can be adopted by the MSC and issued as supplemental circulars. This allows the IMO to respond to transport developments in a shorter time frame.

The IMDG code addresses the special nature of offshore containers and portable tanks handled in open seas. In Sections 12 and 13 of its introduction, the IMDG recognizes that these are different from conventional containers. However, inspections of all containers are governed by the other international treaty, the Convention for Safe Containers.

The SOLAS convention is now held as law by 162 member States. Those member states represent 99% gross tonnage of the world's merchant fleet.



INTERNATIONAL MARITIME ORGANIZATION

MSC/Circ. 860

As part of an effort to harmonize the implementation of the IMDG and CSC, the IMO developed MSC/Circ. 860. "Guidelines for the approval of containers handled in open seas."

As is the case with many regulations, MSC/Circ. 860 does not contain detailed technical requirements. Instead, it is a guideline for how "approving competent authorities" should base their approval of offshore containers.

The circular states that both design calculations and testing should be taken into account when approving an offshore container. It specifies six points to consider on the design of the containers, as well as three tests that should be done at a minimum.

To help approving authorities, it references four standards:

- EN 12079
- DNV 2.7-1
- DNV 2.7-2
- BS 7072 (now withdrawn)

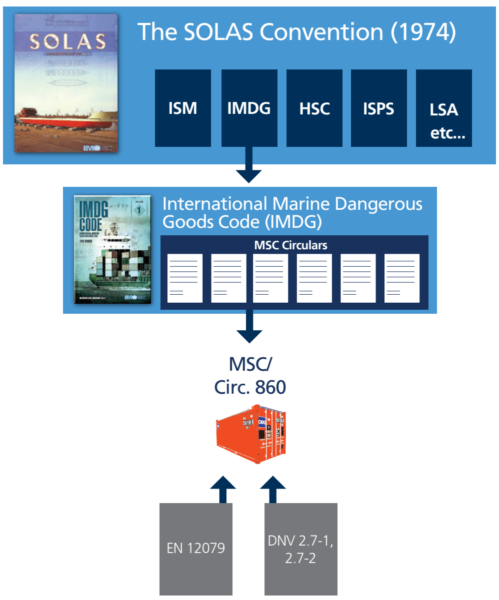
It is important to note that the circular does not mandate that approved competent authorities certify to these standards. Instead of making one standard compulsory, the circular allows all the standards to be used in the course of the approval and that they "should be consulted as appropriate." The standards are ways manufacturers can meet the regulations, but they are not regulations themselves.

ISO standard for offshore containers

Work began on an ISO standard for offshore containers in 2008. A committee comprised of industry specialists and authorised competent authorities like Lloyd's Register have worked jointly to shape the standard.

Parts one and two of the standard focus on the requirements for new containers and sling sets. A third part will address periodic inspection. The introduction for the new ISO standard stipulates that other internationally recognised standards can be used in place of the referenced ISO standard where the manufacturer and the certifying authority documents that an overall equivalent level of safety is achieved.

It is expected that ISO 10855 will be added as a supporting standard for the IMO regulation. Lloyd's Register has several representatives on the committee drafting the standard. Contact us for more information.



Regulations and supporting standards

This flowchart shows how regulations relate to standards and circulars in the world of the International Maritime Organization. SOLAS is the international treaty under which we find the regulations governing the approval of offshore containers, MSC/Circ. 860. The standards are used to help meet the stipulations of the circular, and are not not regulations in and of themselves.

Approving offshore containers

Who can approve and certify offshore containers?

As mentioned, the International Convention on the Safety of Containers governs the inspection of containers. In that international treaty, each member State names "approved competent authorities" to inspect and approve ISO containers and offshore containers.
Lloyd's Register is one of these approved competent authorities, and is one of the five specially referenced classification societies specified as a "certifying authority" or "authorised organisation" for a number of countries globally.

Lloyd's Register has been using its Container Certification Scheme (LRCCS) to certify containers of all kinds for more than 40 years. LRCCS can be used to certify individual offshore containers, or provide type approval for a production run. An individual type approval extends to one design and one manufacturing plant only, unless otherwise agreed to by LR.

For type approval and certification, there are three basic steps:
1. Appraisal and approval of the container's design
2. A survey during the manufacturing of the container
3. Testing of the prototype

What's the process for certifying an offshore container?

Design appraisal

The container's structural drawings are reviewed according to the standards referenced in IMO MSC/Circ. 860. Details of the materials and strength of the cargo containment structure, as well as the lifting and securing arrangements are appraised.

Drawings must show:

- Dimensions and load ratings
- Material specifications
- Details of welding methods and weld sizes
- Details of any other fastening methods
- Details of any special treatment for materials
- Details of sealant materials
- Details of corner fittings and closure mechanisms, together with name(s) of the manufacturer(s) of these parts
- Mandatory marking

Inspection

A qualified surveyor inspects the process to meet code requirements.

Inspection programs include:

- Verification and testing of materials
- Welder qualification
- Acceptance of weld procedures
- Acceptance of NDE procedures
- Witness and acceptance of prototype testing
- Verification of identification and marking

Testing

Type approval of a container involves the construction and testing of a prototype built according to the approved drawings. It must also use the same materials as proposed for normal production.

Tests include:

- Four-point lift using all padeyes
- Two-point lift test using opposed
- padeyes
- A vertical impact test
- A tilt test
- Tanks for dangerous cargoes shall in addition be tested with all the requirements of the IMDG code.

A brief history of container standards

1956

- First "metal box container" shipped from Newark to Houston aboard the "Ideal-X"

1966

- Lloyd's Register publishes "Recommendations for Container Construction and Certification"

1968

- Lloyd's Register produces its Freight Container Certification Scheme (now the Lloyd's Register Container Certification Scheme or LRCCS)

1972

- IMO produces the Convention for Safe Containers (CSC)

1989

- BS 7072 is issued as a code of practice for inspection and repair of offshore containers in the UK
- "DNV Certification Note 2.7-1 Offshore Freight Containers" is released

1991

- The CEN begins work on a standard for offshore containers

1993

- IMO publishes MSC/Circ. 613: "Guidelines for the approval ofoffshore containers handled in open seas"

1995

- DNV revises the 2.7-1 certification note

1998

- IMO issues MSC./Circ. 860,"Guidelines for the approval of offshore containers handled in open seas," updating and superseding Circ. 613

1999

- CEN issues EN 12079, superseding BS 7072

2004

- Lloyd's Register Container Certification Scheme (LRCCS) is updated to formally detail design, inspection and certification requirements of intermodal equipment split into three broad categories: CSC containers, offshore containers and tanks for the transport of dangerous goods (such as portable tanks)

2006

- EN 12079 is revised to reflect current industry practices
- DNV 2.7-1 is revised and reissued as a standard

2013

- LRCCS widely revised to reflect updated legislation with technical bulletins issued to clients
- DNV offshore standards updated
- Lloyd's Register contributes to the committee for the ISO 10855 offshore standard and in the U.S. for the proposed API standard for offshore containers

Comparison of EN 12079 & DNV 2.7-1 – selected criteria

EN 12079 (2006)

Materials

(6.1) Steel: Shall be impact tested by Charpy impact (V-notch) method in accordance with EN 10045-1.
Impact test temperature given in Table 1

ble 1 — Charpy impact test temperature - Structural steel for primary structural members

Material thickness (t) in mm	Impact test temperature in °C
$t \leq 12$	$T_D + 10$
$12 < t \leq 25$	T_D
$t > 25$	$T_D - 20$

Design

(5.1.2) Stability against tipping
To prevent container from overturning (tipping) on moving deck, they shall be designed to withstand tilting of 30 degrees in any direction.

(5.1.6) Design Temperature
T_D shall not be higher than the (statistically) lowest daily mean temperature for the area where the offshore container is to operate and in no case shall be higher than -20°C

(5.2.2.1) Lifting loads
shall not exceed $\sigma e=0.85C$;
For steel: C=Re; where Re is yield stress.
For aluminum:
Base material; C=R0.2
Heat affected zone C=0.7σRm
σ=0.8 for ISO AIMg4,5Mn-HAR/AA5083-H32
σ=0.7 for all other aluminum alloys

(5.2.2.2) Lifting with lifting set
Design force on primary structure shall be calculated as 2.5Rg,
Pad eyes shall be designed for a total vertical force of 3Rg.
Resultant sling force on each pad eye is calculated as
F=3Rg/(n-1)cosv
With only one pad eye, that pad eye shall be designed for a total vertical force of 5Rg.

(5.1.1 Part-2) General requirements
In no case shall a sling be rated for an angle of the sling leg to the vertical in excess of 45 degrees

(5.2.2.3) Lifting with forklift truck
Design force on primary structure shall be calculated as 1.6(R+S)g

DNV 2.7-1 (2013)

Materials

(3) Steel: Extra high strength steel with specified yield stress above 500N/mm2 shall not be used.
Steel for primary structure shall be tested by the Charpy impact (V-notch) method according to EN 10045-1 or DNV's "Rules for Classification of ship" Pt.2 Ch.1.
Impact test temperature given in Table 3-1

Table 3-1 Impact test temperature. Structural steel for pri structural members

Material thickness, t, in mm	*Impact test temperature in*
$t \leq 12$	$T_D + 10$
$12 < t \leq 25$	T_D
$t > 25$	$T_D - 20$

Design

(4.1.2) Stability against tipping
To prevent container from overturning (tipping) on moving deck, they shall be designed to withstand 30 degrees tilting in any direction without overturning.

(4.1.5) Design Temperature
T_D shall not be taken higher than the (statistically) lowest daily mean temperature for the area where the offshore container shall operate and shall not be higher than -20°C

(4.2.1) Allowable Stresses
shall not exceed $\sigma_e=0.85C$;
For steel: $C=R_e$;
For aluminum:
Base material: $C=R_{p0.2}$ but not greater than $0.7XR_m$
Weld and heat affected zone: C=yield strength in the weld and heat affected zone

(4.2.3.1) Lifting with lifting set
The design load on the primary structure shall be taken as: $F_L=2.5Rg$,
Pad eye shall be designed for a total vertical load of Fp=3Rg
Resulting sling load on each pad eye will be:
RSL=3Rg/(n-1)cosv
Container with one pad eye $F_p=5Rg$

(8.3) Design of lifting sets
In no case shall a sling be designed with an angle of the sling legs to the vertical larger than 45 degrees

(4.2.3.2) Lifting with forklift truck
Design load on the primary structure shall be taken as: $F_F=1.6(R+S)g$

(5.2.3.2) Horizontal Impact
Equivalent shall not exceeds: σ_e=C
For container post and side rails of the bottom structure 0.25Rg
For other frame members of the side structure, including top rails 0.15Rg
Max calculated deflection for corner post, bottom side rails other frame members l_n/250

(4.2.4.1) Horizontal Impact
The following values shall be used for the static equivalent to an impact load:
F_{HI}=0.25Rg corner post, side rail of the bottom structure
F_{HI}=0.15Rg for other frame members of the side structure, including the top rails
Calculated equivalent shall not exceeds: σ_e=C
Max calculated deflection y=l_n/250

(5.2.3.3) Vertical Impact
Vertical point forces 0.25Rg
Calculated deflection shall not exceed l_n/250
Equivalent stress shall not exceed σ_e=C

(4.2.4.2) Vertical Impact
Vertical point forces at center span:
F_{VI}=0.25Rg
Calculated deflection shall not exceed
y=l_n/250
Equivalent stress shall not exceed σ_e=C

(5.2.4) Internal forces on container walls
Each wall including the door shall be designed to withstand an internal force of 0.6xPxg evenly distributed over the whole surface without suffering any permanent deformation.

(4.4.8) Container walls
Each wall including the door shall be designed to withstand an internal force of F_W=0.6xPxg evenly distributed over the whole surface without suffering any permanent deformation.

(5.2.5) Minimum material thickness
External parts of corner posts and bottom rails
for R≥1000kg, t=6mm;
for R<1000kg, t=4mm
other parts of primary structure t=4mm;
Secondary structure made from metallic materials t=2mm;
For waste skips of monocoque design within an area of up to 100mm from the side edges t=6mm; for remaining parts of the side structure t=4mm

(4.2.5) Minimum material thickness
Corner posts and bottom rails forming outside of the container t≥6mm;
However, for containers with a max gross mass R<1000kg
the minimum material thickness shall be 4mm,
other parts of primary structure t≥4mm;
Secondary structure made from metallic materials t=2mm;
On waste skips of monocoque design the minimum thickness within an area of 100mm from the side edges shall be 6mm.
The remaining parts of the side and bottom structure shall be min. 4mm.

(5.3) Welding
Essential and non-redundant primary structural members shall be welded with full penetration welds.
For others primary structure, the use of fillet welds shall be justified by design appraisal (including calculations and consideration f failure mode)
Intermittent fillet welding of secondary structure is acceptable; however care shall be taken to avoid corrosion.

(4.3) Welding
All main welds between pad eyes and the primary structure shall be full penetration welds.
Essential and non-redundant primary structural members shall be welded with full penetration welds.
Fork pockets shall be connected to the bottom rails with full penetration welds but if the fork pockets pass through the bottom rail, fillet welds may be used.
For others primary structures fillet welds may be permitted after special agreement with the Society.
Secondary structures may be welded with fillet welds.
Welds between primary and secondary structures are considered to be welding of secondary structures.

(5.4.1) Floor
Containers liable to fill with water shall have suitable drainage facility

(4.4.5) Floor
Containers liable to fill with water shall have suitable drainage facility

(5.4.2) Doors and hatches
Shall be designed for same horizontal force as primary structure.
Locking devices shall be secure against opening of the doors during transport and lifting. Double doors shall have at least one such locking device on each door, locking directly to the top and bottom frame.

(4.4.8) Doors and hatches
Shall be designed for same horizontal force as primary structure.
Locking devices shall be secure against opening of the doors during transport and lifting. Double doors shall have at least one locking device on each door, locking directly to the top and bottom frame.

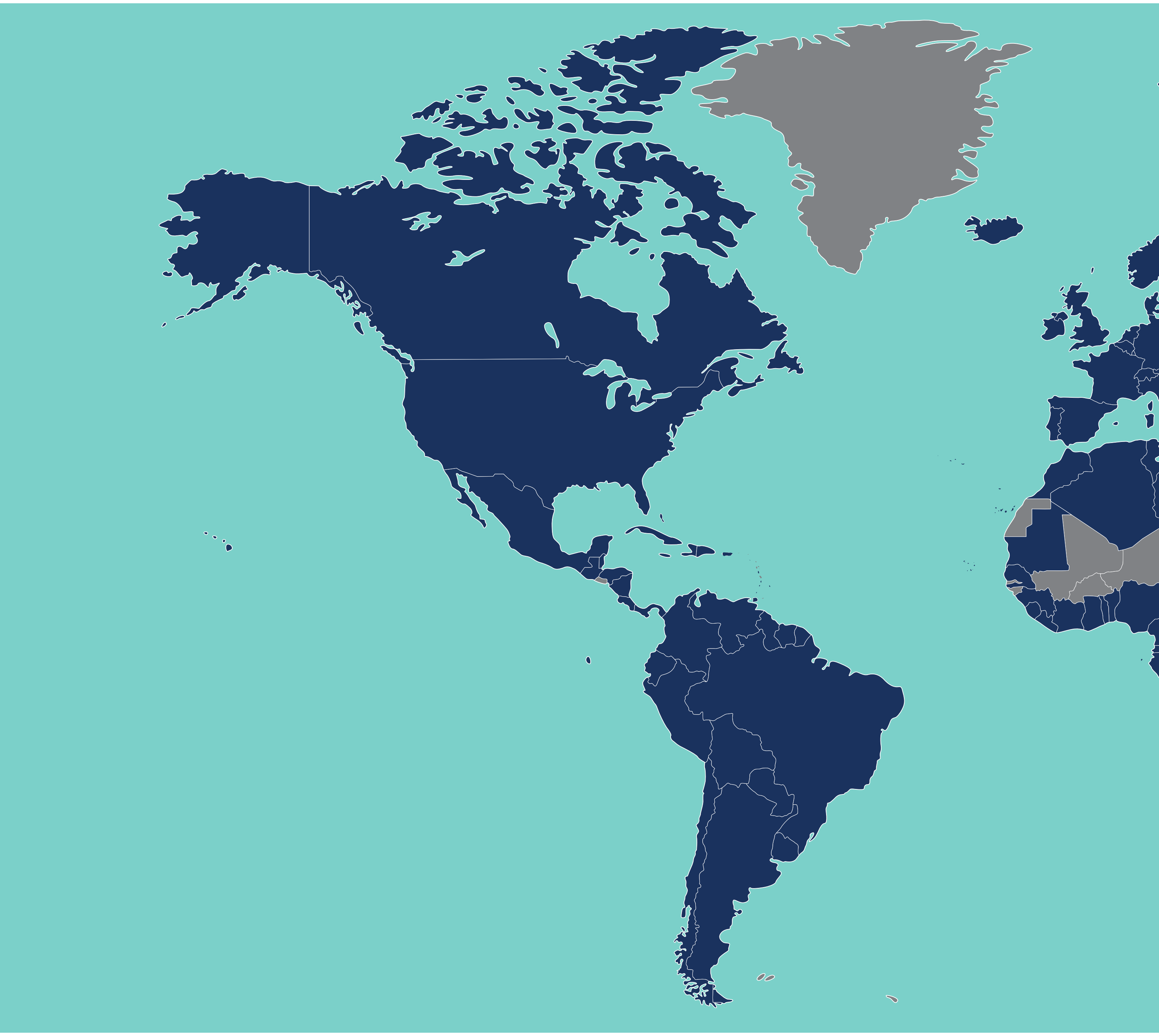
EN 12079 (2006)	DNV 2.7-1 (2013)
Design	**Design**
Locking arrangement shall be protected to prevent dislodgement by impact. Hinges shall be protected against damage from impact loads. Doors shall be secured in the open position. If weathertightness is required, the door shall be equipped with seals.	Locking arrangement shall be protected to prevent dislodgement by impact. Hinges shall be protected against damages from impact loads. Doors shall be secured in the open position. If weathertightness is required, the door shall be equipped with gaskets.
(5.4.3) Intermediate cargo decks When intermediate cargo decks are fitted they shall be designed to withstand a force of at least 0.5Pgσ uniformly distributed, Where: σ is the dynamic factor=3	(4.4.2) Intermediate cargo decks When intermediate cargo decks are fitted, they shall normally be designed for uniformly distributed load of at least: 0.5Pgσ, Where load factor: σ=3.0
(5.4.4) Internal securing points Containers for general cargo shall have internal securing points. Each shall be designed to withstand a force of at least 10kN	(4.4.10) Internal securing points Containers for general cargo shall have internal securing points Each internal lashing point shall be designed for a lashing force of least 10kN.
(5.4.5) Fork lift pockets Installed in the bottom structure and have a closed top, pass through the base and be provided with the means to prevent the container from topping from the forks. Minimum internal dimensions of forklift pockets shall be 200mm x 90mm Forklift pockets shall be located such that the container is stable during handling and driving with forklift truck. Pockets shall not be located as far as practicable but need not be more than 2050mm apart from the center of the pocket to the center of the pocket.	(4.4.6) Fork lift pockets Installed in the bottom structure with closed top, Minimum opening of the forklift pockets shall be 200mm x 90mm Forklift pockets shall be located such that the container is stable during handling and driving with forklift truck. Pockets shall be located as far as practical. Center distance shall be at least 900mm apart (where possible) but not more than 2050mm. Fork pockets shall extend across the full width of the base frame and shall pass though or be attached to the base. If attached to the underside of the base rail, detector plate shall be used. Fork pockets shall have closed tops and sides.
(5.4.7) Pad eyes Padeyes shall be aligned with the sling to the center of the lift with maximum manufacturing tolerance of +/- 2.5. Any difference in the diagonal measurements between lifting point centers shall not exceed 0.2% of the length of the diagonal, or 5mm, whichever is the greater. Diameter of holes in pad eyes shall match the shackle used, clearance between shackle pin and pad eye hole shall not exceed 6% of the nominal shackle pin diameter. However, maximum concentrated stresses at hole edges shall not exceed 2xRe at design load. Tolerance between pad eye thickness and inside width of shackle shall not exceed 25% of the inside width of the shackle Pad eyes shall be so designed as to permit free movement of the shackle and sling termination without fouling the pad eye. Pad eyes shall not protrude outside the boundary of the containers other than vertical upwards, and shall as far as possible be designed to avoid damage from the other containers. Pad eyes shall be welded to the frame with full penetration welds	(4.4.1) Pad eyes Pad eyes shall not protrude outside the boundary of the container, but may protrude above the top of the container. Padeyes shall be aligned with the sling to the center of lift with maximum manufacturing tolerance of +/- 2.5 degrees Any difference in the diagonal measurements between lifting point centers shall not exceed 0.2% of the nominal length of the diagonal, or 5mm, whichever is the greater. Diameter of holes in pad eyes shall match the shackle used, clearance between the shackle pin and pad eye hole shall not exceed 6% of the shackle pin diameter. Maximum concentrated hot spot stresses at hole edges shall not exceed 2xRe at design load. Thickness of the padeye at the hole shall not be less than 75% of the inside width of the joining shackle. Pad eyes shall be welded to the frame with full penetration welds
(7) Type Testing Test equipment and calibration Lifting test: all point lifting and 2-point lifting Post lifting inspection and examination	(4.6) Prototype Testing Test equipment and calibration Lifting test: all point lifting and 2-point lifting

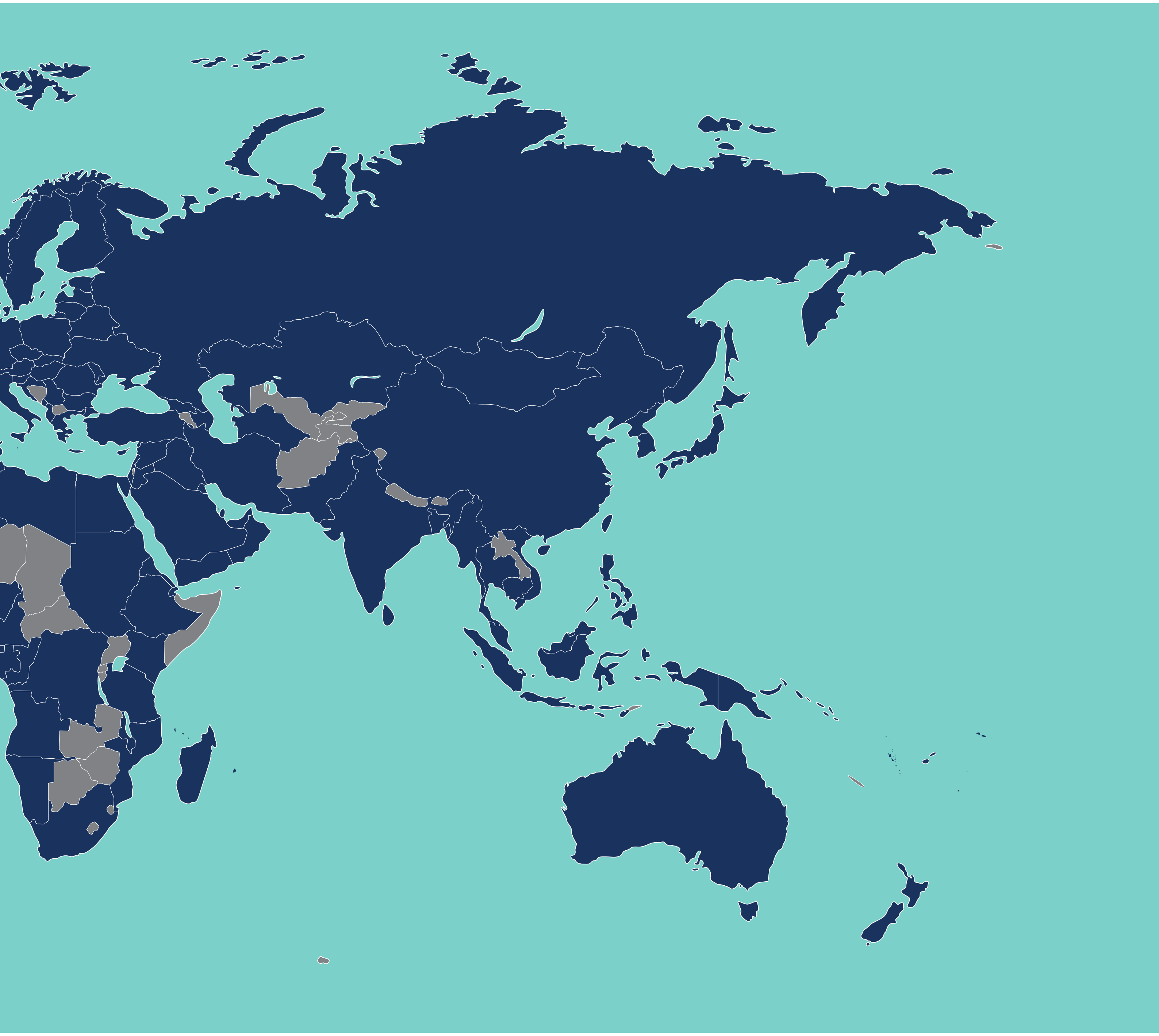
EN 12079 (2006)	DNV 2.7-1 (2013)
Design	**Design**
Vertical impact test: Drop test and Lowering test	Vertical impact test: Drop test and Lowering test
(5.4.10) Coating and corrosion protection Suitable for offshore environment by means of construction, use of suitable material and/or corrosion and paint protection	(4.4.13) Coating and corrosion protection Suitable for offshore environment by means of construction, use of suitable material and/or corrosion and paint protection
(5.2 Part 2) Dimensions and strength of lifting sets Annex A and Table 1 shall be used to calculate the minimum working load limit	(8.3.1) Dimensions and strength of lifting sets Table 8.1 and 8.2 shall be used for determination of the minimum working load limit, WLL_{min} for lifting sets.
Fabrication	**Fabrication**
(8.1) Quality Control The manufacturer shall ensure the quality of procedures and facilities by implementing a QMS at least in accordance with ISO 9001.	(5.1) Quality Control The manufacturer shall ensure the quality of procedures and facilities by implementing a QMS at least in accordance with ISO 9001. An audit of the QMS by the classification society to verify that they are qualified to manufacture containers according to the standard. Where the QMS is not fully satisfactory the scope of inspection by the classification society is adjusted accordingly.
(8.2.2) Approved Welders Welders shall be approved in accordance with EN 287-1 and EN ISO 9606-2 as appropriate to the materials being used	(5.2.1) Approved Welders Welders shall be approved by the classification society to a recognised standard, e.g. EN 287-1, EN ISO 9606-1, ISO 9606-2, ASME IX or ANSI/AWS D1.1
(8.2.3) Welding Procedures Welding procedures shall be in accordance with the relevant parts of EN ISO 15607, EN ISO 15609-1, EN ISO 15614-1, EN ISO 15614-2 as appropriate. Impact tests are required as part of the procedure qualification test. Test temperature and test results shall comply with the requirements of the standard. Where the test piece thickness exceeds 12mm four sets of impact tests shall be made (weld metal, fusion line, HAZ 2mm from fusion line, HAZ 5mm from fusion line)	(5.2.2) Welding Procedures Welding procedures shall be in accordance with the relevant parts of EN ISO 15607, EN ISO 15609-1, EN ISO 15614-1, EN ISO 15614-2 or other recognised standards (e.g. ANSI/AWS D1.1). Impact tests are required as part of the procedure qualification test. Test temperature and test results shall comply with the requirements of the standard. Where the test piece thickness exceeds 12mm four sets of impact tests shall be made (weld metal, fusion line, HAZ 2mm from fusion line, HAZ 5mm from fusion line)
(8.2.4) Examination of Welds Welds shall be subject to visual inspection as specified in Table 7 (requires all welds to be 100% visually inspected).	(5.2.3) Inspection of Welds Welds shall be subject to visual inspection and NDE. All welds shall be 100% visually inspected unless otherwise agreed in an MSA.
(8.2.4.2) NDE Methods Table 8 and Table 9 specify EN reference standards, (8.2.4.4) NDE Operators NDE Operators shall be qualified to a minimum of Level 2 of EN 473.	(5.2.4) NDE Procedures and NDE Operators Table 5-2 and Table 5-3 specify EN ISO reference standards, ‘other recognised standards’ can be used though, and ‘the stipulated acceptance criteria may in certain cases be modified or made more severe’ at the discretion of the classification society. NDE Operators shall be qualified to a minimum of Level 2 of EN ISO 9712 or an equivalent standard.

ANNEX B

Where is IMO MSC/Circ. 860 in force?

More than 160 countries have signed the Safety of Life at Sea Convention of 1974, putting MSC/Circ. 860 in force in the countries in blue.





ANNEX B

List of contracting states to SOLAS (1974)

Albania
Algeria
Angola
Antigua & Barbuda
Argentina
Australia
Austria
Azerbaijan
Bahamas
Bahrain
Bangladesh
Barbados
Belarus
Belgium
Belize
Benin
Bolivia
Brazil
Brunei Darussalam
Bulgaria
Cambodia
Cameroon
Canada
Cape Verde
Chile
China
Colombia
Comoros
Congo
Cook Islands
Costa Rica
Cote d'Ivoire
Croatia
Cuba
Cyprus
Czech Republic
Dem. People's Rep. Korea
Dem. Rep. of the Congo
Denmark
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Lloyd's Register
Global Headquarters
71 Fenchurch Street
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