FINAL DRAFT
International Standard

# ISO/FDIS 10855-1

# Offshore containers and associated lifting sets —

## Part 1: Design, manufacture and marking of offshore containers

*Conteneurs pour une utilisation en mer et dispositifs de levage associés —*

*Partie 1: Conception, fabrication et marquage des conteneurs pour une utilisation en mer*

ISO/TC **67**/SC **7**

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# Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 67, *Oil and gas industries including lower carbon energy*, Subcommittee SC 7, *Offshore structures*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 12, *Oil and gas industries including lower carbon energy*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 10855-1:2018), which has been technically revised.

The main changes are as follows:

— definitions have been updated.

A list of all parts in the ISO 10855 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

# Introduction

The ISO 10855 series meets the requirements of IMO MSC/Circ.860 (1998) for the design, construction, inspection, testing and in-service examination of offshore containers and associated lifting sets which are handled in open seas.

The ISO 10855 series does not cover operational use or maintenance.

Under conditions in which offshore containers are often transported and handled, the 'normal' rate of wear and tear is high, and damage necessitating repair can occur. However, containers designed, manufactured and periodically inspected according to the ISO 10855 series have sufficient strength to withstand the normal forces encountered in offshore operations and to not suffer from complete failure even if subject to extreme loads.

# Offshore containers and associated lifting sets —

# Part 1:
# Design, manufacture and marking of offshore containers



## 1 Scope

This document specifies requirements for the design, manufacture and marking of offshore containers with a maximum gross mass not exceeding 25 000 kg, intended for repeated use to, from and between offshore installations and ships.

This document specifies only transport-related requirements.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

ISO 209, *Aluminium and aluminium alloys — Chemical composition*

ISO 1161, *Series 1 freight containers — Corner and intermediate fittings — Specifications*

ISO 1496-1, *Series 1 freight containers — Specification and testing — Part 1: General cargo containers for general purposes*

ISO 1496-3:2019, *Series 1 freight containers — Specification and testing — Part 3: Tank containers for liquids, gases and pressurized dry bulk*

ISO 1496-4:2023, *Series 1 freight containers — Specification and testing — Part 4: Non-pressurized containers for dry bulk*

ISO 3452-1, *Non-destructive testing — Penetrant testing — Part 1: General principles*

ISO 5817, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 9606-1, *Qualification testing of welders — Fusion welding — Part 1: Steels*

ISO 9606-2, *Qualification test of welders — Fusion welding — Part 2: Aluminium and aluminium alloys*

ISO 9712, *Non-destructive testing — Qualification and certification of NDT personnel*

ISO 10042, *Welding — Arc-welded joints in aluminium and its alloys — Quality levels for imperfections*

ISO 10474, *Steel and steel products — Inspection documents*

ISO 10675-1, *Non-destructive testing of welds — Acceptance levels for radiographic testing — Part 1: Steel, nickel, titanium and their alloys*

ISO 10675-2, *Non-destructive testing of welds — Acceptance levels for radiographic testing — Part 2: Aluminium and its alloys*

ISO 11666, *Non-destructive testing of welds — Ultrasonic testing — Acceptance levels*

ISO 15607, *Specification and qualification of welding procedures for metallic materials — General rules*

ISO 15609-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 1: Arc welding*

ISO 15614-1, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys*

ISO 15614-2, *Specification and qualification of welding procedures for metallic materials — Welding procedure test — Part 2: Arc welding of aluminium and its alloys*

ISO 17636-1, *Non-destructive testing of welds — Radiographic testing — Part 1: X- and gamma-ray techniques with film*

ISO 17636-2, *Non-destructive testing of welds — Radiographic testing — Part 2: X- and gamma-ray techniques with digital detectors*

ISO 17637, *Non-destructive testing of welds — Visual testing of fusion-welded joints*

ISO 17638, *Non-destructive testing of welds — Magnetic particle testing*

ISO 17640, *Non-destructive testing of welds — Ultrasonic testing — Techniques, testing levels, and assessment*

ISO 23277, *Non-destructive testing of welds — Penetrant testing — Acceptance levels*

ISO 23278, *Non-destructive testing of welds — Magnetic particle testing — Acceptance levels*

EN 10025-1, *Hot rolled products of structural steels — Part 1: General technical delivery conditions*

EN 10025-2, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 10025-3, *Hot rolled products of structural steels — Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels*

EN 10025-4, *Hot rolled products of structural steels — Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels*

EN 10088-2, *Stainless steels — Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

EN 10164, *Steel products with improved deformation properties perpendicular to the surface of the product — Technical delivery conditions*

EN 10210-1, *Hot finished structural hollow sections of non-alloy and fine grain structural steels — Part 1: Technical delivery requirements*

EN 10219-1, *Cold formed welded structural hollow sections of non-alloy and fine grain steels — Part 1: Technical delivery requirements*

EN 10250-2, *Open die steel forgings for general engineering purposes — Part 2: Non-alloy quality and special steels*

EN 10250-3, *Open die steel forgings for general engineering purposes — Part 3: Alloy special steels*

# 3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

**3.1**
**offshore container**
portable unit for repeated use in the transport of goods or equipment handled in open seas to, from and between fixed and/or floating installations and ships

EXAMPLE

— general cargo container: closed container with doors;

— cargo basket: open top container for general or special cargo;

— tank container: container for the transport of dangerous or non-dangerous fluids (other types of tanks, e.g. processing plants, storage tanks, that are empty during transport, are considered to be service equipment, and are not covered by this document);

— bulk container: container for the transport of solids in bulk;

— service container: built and equipped for a special service task, usually as a temporary installation e.g. laboratories, workshops, stores, power plants, control stations, accommodation, engine, compressor, generator;

— special container: frame or skid for the transport of special cargo e.g. garbage containers, equipment boxes, gas cylinder racks, IBC (intermediate bulk container) frame.

— offshore waste skip: open or closed offshore container used for the storage and removal of waste.

Note 1 to entry: For the purposes of this document, the maximum gross mass of offshore containers shall not exceed 25 000 kg.

Note 2 to entry: The unit incorporates permanently installed equipment for lifting and handling and can include equipment for filling, emptying, cooling, heating, etc.

Note 3 to entry: Offshore waste skips are normally constructed from flat steel plates forming the load bearing sections of the container, with bracing in the form of steel profiles (e.g. channel or hollow section) being fitted horizontally and/or vertically around sides and ends. In addition to the pad eyes for the *lifting set* (3.7), these containers can have side-mounted lugs suitable for use with the lifting equipment mounted on a skip lift vehicle.

**3.2**
**permanent equipment**
equipment that is permanently attached to the container and which is not cargo

EXAMPLE *Lifting sets* (3.7), refrigeration units, shelves, lashing points, garbage compactors.

**3.3**
**primary structure**
load-carrying and supporting frames and load-carrying panels

Note 1 to entry: Primary structure is divided into two subgroups (see 3.3.1 and 3.3.2).

**3.3.1**
**essential primary structure**
structural elements which transfer the cargo load to the crane hook, forming the load path from the payload to the lifting set and is non-redundant

EXAMPLE

— top and bottom side rails;

— top and bottom end rails;

— corner posts;

— pad eyes;

— fork pockets.

**3.3.2**
**non-essential primary structure**
structural elements whose main function is not essential and can be redundant

EXAMPLE Floor plates and protective frame members.

Note 1 to entry: Side and roof panels, including corrugated panels, are not considered to be part of the *primary structure* (3.3).

**3.4**
**secondary structure**
parts which are not considered as load carrying for the purposes of the design calculations, including at least the following components:

— doors, wall and roof panels;

— panel stiffeners and corrugations;

— structural components used for tank protection only;

— internal lashing points

Note 1 to entry: Not all container walls are corrugated.

**3.5**
**prototype**
equipment item, used for type testing, considered to be representative of the product for which conformity is being assessed

Note 1 to entry: It may be either fabricated especially for type testing or selected at random from a production series.

**3.6**
**owner**
legal owner of the *offshore container* (3.1) or the delegated nominee of that body

**3.7**
**lifting set**
items of integrated lifting equipment used to connect the *offshore container* (3.1) to the lifting appliance

**3.8**
**sling**
one leg of a lifting set

**3.9**
**visual examination**
examination which uses the human eye as a detector

Note 1 to entry: For the purposes of this document, visual examination shall be in accordance with ISO 17637.

[SOURCE: ISO 9022-1:2016, 2.9.1, modified — Note 1 to entry has been added.]

**3.10**
**non-combustible material**
material that does not burn or give off flammable vapours in sufficient quantity for self-ignition when heated to 750 °C

## 4 Symbols

$m_R$ rating, i.e. the maximum gross mass of the container including permanent equipment and its cargo, in kg, but excluding the lifting set

$m_T$ tare mass, i.e. the mass of an empty container including any permanent equipment but excluding cargo and lifting set, in kg

$m_P$ payload, i.e. the maximum permissible mass of cargo which may be safely transported by the container, in kg

NOTE 1 $m_P = m_R - m_T$.

NOTE 2 $m_R$, $m_T$ and $m_P$ are expressed in kg. Where design requirements are based on the gravitational forces derived from these values, those forces are indicated thus as $m_R g$, $m_T g$ and $m_P g$, expressed in N.

$m_S$ mass of the lifting set, in kg

$T_D$ design air temperature, i.e. a minimum reference temperature used for the selection of steel grades used in offshore containers and equipment, expressed in °C

$\sigma_e$ von Mises equivalent stress, expressed in MPa or N/mm$^2$

$R_e$ specified minimum yield stress, expressed in MPa or N/mm$^2$

## 5 Design

### 5.1 General

**5.1.1** An offshore container shall be designed to allow loading and unloading from supply vessels operating offshore in a sea state with wave heights of 6 m.

NOTE Local impacts, e.g. from hitting other deck cargo or rigid parts of the ship structure, can cause extreme loads in such conditions.

**5.1.2** To prevent the containers from overturning (tipping) on a moving deck, they shall be designed to withstand tilting at 30° in any direction, without overturning when loaded at their maximum gross mass, in empty condition or any intermediate condition, and with the centre of gravity considered to be at the half height of the container. For dedicated-purpose containers (e.g. bottle racks and tank containers), the actual centre of gravity shall be used.

**5.1.3** Protruding parts on the outside of the offshore container that can snag on other containers or structures shall be avoided. Protruding parts (e.g. doors handles, hatch cleats) shall be so placed or so protected that they do not catch the lifting set.

**5.1.4** Stacking fittings and guides and other structures that protrude above the top of the container frame shall be designed and located to minimize the potential to catch on structures on the ship or on other deck cargoes during lifting operations. They shall be designed such that the risk of damage to other containers or cargoes from these is minimized. They shall also be designed such that damage to the stacking fittings does not cause damage to the pad eyes.

Particular attention should be given to avoiding the risk of catching. Protrusions such as stacking guides can catch in openings in the bulwarks of supply vessels.

Such risks can be reduced by suitable designs.

**5.1.5** If containers are designed for stacking, the corners or stacking fittings shall be sufficiently raised above the frame and roof to prevent damage to the lifting set.

NOTE Parts of the permanently attached lifting sets often hang over the side of the top frame.

**5.1.6** Containers shall be designed as structural frames (primary structure), with non-load bearing cladding where necessary (secondary structure). Only the primary structure shall be considered in the design calculations; however, on certain types of containers, with only a non-stressed cover above the bracing where the pad eyes are attached, the whole structure may be considered as a primary structure, and the design calculations may treat such a container as a monocoque construction.

EXAMPLE Waste skips with trapezium shaped sides are examples of containers with only a non-stressed cover over the bracing where the pad eyes are attached.

**5.1.7** $T_D$ shall not be higher than the (statistically) lowest daily mean temperature for the area where the offshore container is to operate and shall not be higher than −20 °C.

For containers with exposed aluminium, the danger of sparks caused by the impact of aluminium against corroded steel (the thermite reaction) shall be considered.

When preparing the specification for a service container, a rating higher than the estimated fitted out mass should be chosen. This allows for changes in the amount and mass of equipment fitted in a container during its operational life, and it can also be useful to be able to carry a certain amount of non-permanent equipment.

NOTE For containers with special features, additional regulatory design requirements can apply; see Annex A.

## 5.2 Structural strength

### 5.2.1 General

The required strength of a container shall be determined by calculation and verified by type tests, as specified in Clause 7.

### 5.2.2 Lifting loads

#### 5.2.2.1 Allowable stresses

For design loads defined in 5.2.2.2 and 5.2.2.3, the equivalent stress level, $\sigma_e$, shall not exceed the figure calculated as:

$$\sigma_e = 0{,}85C$$

where

| | | |
|---|---|---|
| for steel: | $C = R_e$ | |
| for aluminium: | base material | $C = R_{0,2}$ |
| | heat-affected zone | $C = 0{,}7\ \beta R_m$ |

where

$R_m$ is the tensile strength of aluminium;

$\beta$ is 0,8 for ISO AlMg4,5Mn-HAR/AA5083-H32;

$\beta$ is 0,7 for all other aluminium alloys and tempers.

Aluminium alloys shall be in accordance with Table 4.

#### 5.2.2.2 Lifting with lifting set

The design force on the primary structure shall be calculated as 2,5 $m_R g$ where $g$ is the acceleration due to gravity (in m/s$^2$, i.e. 9,806 65).

The internal loading shall be taken as (2,5 $m_R - m_T$) $g$ evenly distributed over the container floor. For tank containers, the actual distribution of the tare mass shall be used for the calculations.

Pad eyes shall be designed for a total vertical force of 3 $m_R g$.

The force shall be considered to be evenly distributed between ($n$ – 1) pad eyes. For calculation purposes $n$ shall not exceed 4 or be less than 2.

To determine the resulting sling force on the pad eyes, the sling angle shall be considered, so that the resulting sling force on each pad eye is calculated as follows:

$$F = \frac{3\, m_R\, g}{(n-1)\cos\theta}$$

where

$F$ is the resulting sling force, in newtons (N);

$n$ is the actual number of pad eyes (for calculation purposes $n$ shall not exceed 4 and shall be not less than 2);

$\theta$ is the angle between a sling leg and the vertical, in degrees and shall be assumed to be 45° unless otherwise specified.

For containers with only one pad eye, that pad eye shall be designed for a total vertical force of 5 $m_R g$.

Containers without a roof can have insufficient strength and stiffness to pass the two-point lifting test (7.3.3). For building prototypes to pass the test, the ability of an open top container to withstand the load occurring in the two-point lifting test should be checked by a suitable calculation method. In these calculations, the nominal yield stress of the material should not be exceeded. These calculations do not replace the prototype testing.

#### 5.2.2.3 Lifting with forklift truck

The mass of the lifting set shall be considered when calculating the strength of the fork pockets. The design force on the primary structure shall be calculated as 1,6 ($m_R$+$m_S$) $g$. The internal loading shall be taken as [1,6 ($m_R$+$m_S$)–$m_T$] $g$ evenly distributed over the container floor.

Where fork pockets are intended only for handling of the empty container, the design loading shall be taken as 1,6 $(m_T+m_S)\,g$.

### 5.2.3 Impact loads

#### 5.2.3.1 General

NOTE Impact loads are dynamic loads of very short duration.

For most applications simplified static calculations as specified in 5.2.3.2 and 5.2.3.3 may be performed alongside a vertical impact test for impact on corners, in accordance with 7.4.

When simplified calculations are performed, and each beam is considered separately, any assumptions concerning support conditions shall be stated.

If it is not possible to verify the ability of a container to withstand impact loads through these simplified static calculations, detailed dynamic calculations may be performed.

#### 5.2.3.2 Horizontal impact

The main frame structure shall be dimensioned to withstand a local horizontal impact force acting at any point.

NOTE 1 This force can act in any horizontal direction on the corner post.

On all other frame members in the sides the load may be considered as acting at right angles to the side.

The calculated (static equivalent) stresses due to impact shall be combined with the lifting stresses resulting from static lifting forces $(m_R g)$.

Equivalent stresses shall not exceed $\sigma_e = C$ as defined in 5.2.2.1.

The following values shall be used for the static equivalents to an impact force:

— for container posts and side rails of the bottom structure: −0,25 $m_R g$;

— for other frame members of the side structure, including the top rails: −0,15 $m_R g$.

Maximum calculated deflections at these loadings shall not exceed $\frac{l_n}{250}$:

— for corner posts and bottom side rails: $l_n$ is the total length of the rail or post in mm;

— for other frame members: $l_n$ is the length of the shortest edge of the wall being considered.

NOTE 2 $l_n$ is a (nominal) reference length and is often different from the actual span of a beam.

#### 5.2.3.3 Vertical impact

A vertical impact test shall be carried out in accordance with 7.4. In addition, the side rails and end rails in the base shall be able to withstand vertical point forces of 0,25 $m_R g$ at the centre span.

Equivalent stresses shall not exceed $\sigma_e = C$ as defined in 5.2.2.1.

Calculated deflections shall not exceed $\frac{l_n}{250}$, where $l_n$ is the total length of the rail.

NOTE Maximum vertical impact forces are likely to occur when a container is lowered onto the deck of a heaving supply vessel. If the deck is at an angle, the first impact will be on a corner. Such impact forces cannot be readily simulated by static forces.

#### 5.2.4 Internal forces on container walls

Each container wall, including the doors, shall be designed to withstand an internal force of 0,6 *Pg* evenly distributed over the whole surface, without any permanent deformation.

#### 5.2.5 Minimum material thickness

The following minimum material thickness ($t$) requirements shall apply.

a) For external parts of corner posts and bottom rails i.e. parts forming the outside of the container:

   — for $m_R \geq 1\,000$ kg, $t = 6$ mm;

   — for $m_R < 1\,000$ kg, $t = 4$ mm.

b) For all other parts of the primary structure: $t = 4$ mm.

c) For secondary structure made from metallic materials: $t = 2$ mm.

d) For waste skips of monocoque design (see 5.1.6) within an area of up to 100 mm from the side edges: $t = 6$ mm; for the remaining parts of the side structure: $t = 4$ mm.

### 5.3 Welding

Essential primary structure shall be welded with full penetration welds. For other primary structures, the use of fillet welds shall be justified by design appraisal (including calculations and consideration of failure modes).

Intermittent fillet welding of secondary structures may be used. However, corrosion shall be avoided.

### 5.4 Additional design details

#### 5.4.1 Floor

Containers liable to fill with water, e.g. open topped, shall have a suitable drainage facility.

#### 5.4.2 Doors and hatches

Doors and hatches, including hinges and locking devices, shall be designed for at least the same horizontal forces as the 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.

Locking arrangements shall be protected to prevent dislodgement by impact.

Hinges shall be protected against damage from impact loads.

Doors shall be capable of being secured in the open position.

If weather tightness is required, the doors shall be equipped with seals.

#### 5.4.3 Intermediate cargo decks

When intermediate cargo decks are fitted, they shall be designed to withstand a force of at least 0,5 $m_P g\ \Psi$, uniformly distributed where $\Psi$ is the dynamic factor (= 3).

When intermediate cargo decks are designed to support other than half the total payload, the design requirement shall be adjusted accordingly.

### 5.4.4 Driving ramps

Offshore containers may be fitted with driving ramps. The strength of such driving ramps shall be verified by test loading. The test shall be performed with a test vehicle, with the axle load evenly distributed between two tyres. Each tyre shall have a surface area not exceeding 142 $cm^2$, with a nominal centre distance 760 mm.

The test load on the axle shall be 1,25 $m_P$, but shall not be more than 7 260 kg. If a container is specially designed to transport one or more unit cargoes with a mass that would give a higher axle load, the test load shall be two times the unit cargo mass.

Driving ramps are to be clearly marked with the maximum allowable axle load, which shall be 0,8× the test load.

NOTE These requirements only apply to ramps used for driving e.g. fork lift trucks into containers, not to smaller ramps used for e.g. hand trolleys.

### 5.4.5 Internal lashing points

Containers for general cargo shall have internal securing lashing points. Each shall be designed to withstand a force of at least 10 kN.

There should be at least 12 lashing points.

Lashing points should be foldable.

### 5.4.6 Forklift pockets

When fitted, forklift pockets shall be installed in the bottom structure and shall have a closed top, pass through the base and be provided with the means to prevent the container from toppling from the forks.

Fork pockets on tank containers for dangerous cargoes shall also conform to the special requirements specified in 5.5.3.

The bottom face of the pocket may be fully closed but openings should be provided to facilitate maintenance and to minimize the risk of loose items being retained in the pockets which can subsequently fall out during lifting operations. These openings should be dimensioned and positioned to minimize the likelihood of the fork tines penetrating or seizing in the opening, or of damaging the free edges at the cut-out.

The minimum internal dimensions of the forklift pockets shall be 200 mm × 90 mm.

Forklift pockets shall be located such that the container is stable during handling and driving with forklift truck. Container length, height, width and rating shall be taken into account.

Pockets should be located as far apart as practicable, but shall not be more than 2 050 mm apart from the centre of pocket to centre of pocket.

If a container is fitted with pockets that are only for empty handling, the container shall be marked in accordance with 9.1.

### 5.4.7 Top protection

The following types of containers shall be provided with top protection:

— all open frame containers (i.e. containers without walls and a roof);

— all open top containers with permanent internal fittings and/or equipment (i.e. where there is a risk of the crane hook or the lifting set snagging inside the container).

NOTE Other types of open top containers (e.g. cargo baskets with temporary equipment that is bolted down) can also cause snagging hazards. Such containers are not covered by the requirements in this slause; in such cases the snagging hazards can be addressed operationally.

Top protection may be fixed, hinged or removable and shall be capable of being securely fitted to the container. Top protection shall be either rigid or flexible and be made from a robust material (e.g. plates, grating, GRP, tarpaulin, nets/mesh, webbing). Grating or other rigid top protection shall have an opening size not more than 1 500 $mm^2$. Nets and webbing shall have an opening size not more than 50 mm × 50 mm.

Rigid top protection shall have a non-slip surface and be designed for a load of 3 kN uniformly distributed over an area of 600 mm × 300 mm, located anywhere on the top protection.

Flexible top protection shall be capable of supporting a central load equal to 0,03 $m_R g$. However, the design load shall not be less than 1 kN and shall not be more than 3 kN. The strength of the top protection shall be documented.

Flexible top protection should be able to support the above mass, without making contact with internal fittings or equipment.

The top protection shall be located not lower than the lower flange of the top frame members. Fixtures for the top protection shall be such that they do not cause a snagging hazard.

The top protection shall cover the entire roof of the container; small openings may be incorporated, e.g. to permit the passage of slings when pad eyes are located below the top protection.

### 5.4.8 Pad eyes

In order to prevent lateral bending moments on pad eyes, they shall be aligned with the sling to the centre of lift hook, with a maximum manufacturing tolerance of ±2,5°.

Any difference in the diagonal measurements between lifting point centres shall not exceed 0,2 % of the length of the diagonal, or 5 mm, whichever is the greater.

The 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 the hole edges shall not exceed 2 $R_e$ at the design load.

The 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 boundaries of the container other than vertically upward and shall be designed to avoid damage from other containers. See also 5.1.4. Lifting points shall be positioned on the container to preclude the risk of slings fouling against the container or its cargo during normal use.

Pad eyes shall be welded to the frame with full penetration welds. If the lifting force is transferred through the thickness of a plate, plates with specified through thickness properties in accordance with EN 10164 of quality Z25 or better shall be used. The requirements in EN 10164 apply also for plates with thickness below 15 mm.

NOTE 1 For plates of less than 15 mm an engineering justification of the material used can be undertaken based on mechanical testing, ultrasonic testing or review of chemical and mechanical properties.

Pad eyes should be slotted into the primary structure.

NOTE 2 Where corner fittings are mounted in conjunction with pad eyes, the corner fittings are not intended for lifting with slings offshore.

NOTE 3 Attention is drawn to the need for designers to be aware of the restrictions in permissible shackle types introduced in ISO 10855-2 and particularly to the preference for bow shackles with bolt type pin with hexagon head, hexagon nut and split cotter pin. As a result, it is necessary to ensure sufficient clearance surrounding the pad eye to enable the fitting and removal of this preferred type.

### 5.4.9 Corner fittings

Where corner fittings are mounted to offshore freight containers, they shall conform to ISO 1161.

Lifting offshore with shackles in these corner fittings is not permitted.

Where an offshore container does not conform to the dimensional requirements of ISO 668, corner fittings should not be fitted to the top frame.

### 5.4.10 Equipment supports and protection

Supports for equipment in open frame containers (i.e. containers without walls and a roof) with a total mass greater than or equal to 1 000 kg shall be considered primary structure and designed to withstand the maximum dynamic loading experienced during lifting and transportation offshore.

Supports for equipment with mass < 1 000 kg may normally be considered secondary structure, to be determined on a case-by-case basis. Consideration should be given to the type of the equipment, nature of the supports and the associated risks, i.e. in the event of potential failure.

Bolted connections shall include locking nuts or other suitable means to prevent loosening. Additional redundancy or the use of secondary restraining bars, around the perimeter of the unit, is recommended for open framed containers.

Protection beams, and their connections to the primary structure, shall be designed for the full mass of the equipment, or a local impact load of 0,15 $m_R g$ whichever is greater, acting horizontally and at the worst location. See also 5.2.3.2.

Design loads shall be applied at the equipment centre of gravity, to establish maximum and minimum reaction forces and moments on primary equipment supports and their connections.

For the purposes of lifting, primary equipment supports and their connections to the container shall be assessed for a vertical design load of 2,5 $m_E g$ where $m_E$ is the equipment mass in kg.

With respect to transportation, a horizontal (roll or pitch) design load of ± $m_E g$ should be considered, in combination with both maximum and minimum vertical (heave) design loads of ±0,3 $m_E g$.

Prototype testing, including the equipment supports and a dummy mass representing the equipment, may be used in lieu of the above assessment.

Retro fitting of primary equipment supports is considered a modification and requires re-certification, see ISO 10855-3.

### 5.4.11 Coating and corrosion protection

Offshore containers shall be suitable for the offshore environment by means of construction, use of suitable material and/or corrosion and paint protection.

All offshore container roofs, including those constructed from chequer plate, shall be coated with a permanent non-slip medium.

## 5.5 Tank containers

### 5.5.1 General

It is presupposed that tank containers comply with relevant design codes and requirements. They shall be suitable for offshore service.

### 5.5.2 Frame

The offshore container frame shall also be designed to protect the tank and equipment from impact.

EXAMPLE Examples of equipment are valves and manholes.

### 5.5.3 Tanks for fluids

Tank design shall conform to the ISO 1496-3:2019, Clause 5.

A tank and its support shall be able to withstand lifting and impact loads. In addition, due account shall be taken of fluid surge arising from partly filled tanks.

NOTE 1 For tanks for dangerous cargoes, the requirements of the IMDG Code apply.

NOTE 2 The IMDG Code has restrictions for loaded handling of tanks over a certain length, by forklift. Information about this can be found in Chapter 4.2 and Chapter 6.7 of the IMDG Code.

### 5.5.4 Impact protection on tank containers for dangerous cargoes

On tank containers for dangerous cargoes, all parts of the tank and fittings shall be suitably protected from impact damage. In addition to the requirements of 5.2.3, the following requirements apply:

— the top of the tank and its fittings shall be protected by beams, plates or grating and no part of the tank or its fittings shall extend to within 100 mm of the top of the framework;

— it shall not be possible for any part of the lifting set to foul fittings, manhole cleats or other protrusions on the tank;

— protective beams shall be placed at or near the location where the tank shell is nearest to the outer plane of the sides; beams shall be spaced sufficiently close together to give the necessary protection;

— at the maximum calculated elastic deflection of any side member, the residual clearance between the member and any part of the tank shell or its fittings shall be at least 10 mm;

— no part of the underside of the tank shell (including sumps), the bottom valves or other fittings, shall extend below a level 150 mm above the bottom of the framework; any such part extending to within 300 mm of the bottom of the framework shall be protected by beams or plating.

Tank containers designed with direct connection between the tank and the side or top frame elements shall be subject to special consideration.

## 5.6 Containers for bulk solids

Bulk containers shall be designed in accordance with ISO 1496-3:2019, Clause 5 or ISO 1496-4:2023, Clause 5 and shall also be suitable for offshore service.

NOTE These can be either pressurized tanks or non-pressurized containers for gravity discharge.

# 6 Materials

## 6.1 Steel — General

The chemical composition, heat treatment, weldability, mechanical properties and impact energy properties shall meet the requirements specified in this clause. Extra high strength steels, with $R_e$ > 500 N/mm$^2$, shall not be used.

Materials conforming to standards other than those specified in this clause may be used provided they have properties that can be demonstrated to be equivalent.

When materials of different galvanic potential are joined together, the design shall be such that galvanic corrosion is avoided.

Welding consumables shall be of the same type as those used in the welding procedure and shall be within the limits specified in ISO 15614-1.

EXAMPLE Wire, electrodes, flux and shielding gas are examples of welding consumables.

Tensile testing shall be performed in accordance with ISO 6892-1.

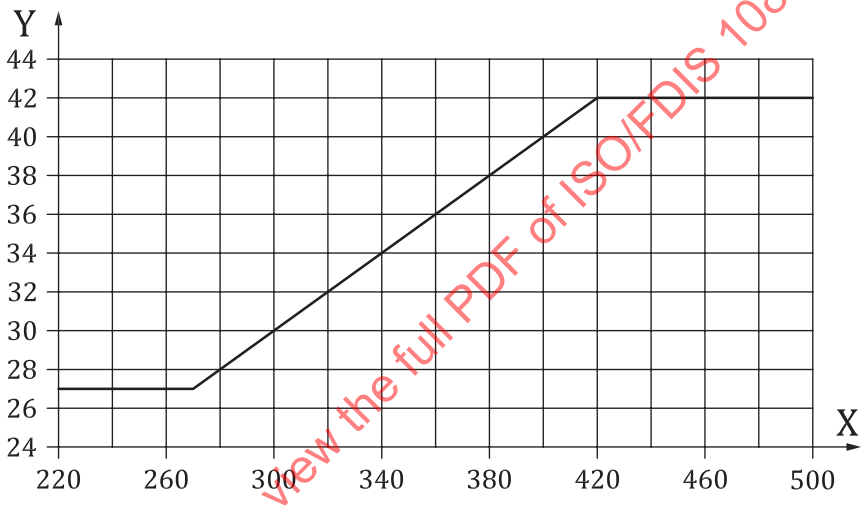
In order to avoid initiation of brittle fracture, the steels shall possess adequate fracture energy. Steels for primary structures shall be tested by the Charpy impact (V-notch) method in accordance with ISO 148-1. Test temperatures shall be as specified in Table 1.

**Table 1 — Charpy impact test temperature — Structural steel for primary structural members**

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

For normal and higher strength C-Mn steels, the test temperature shall not be taken lower than −40 °C.

The average energy absorption for base material specimens with their axis parallel to the final rolling direction shall not be less than as specified in Figure 1. For specimens with their axis transverse to the final rolling direction the value shall be two thirds of that for longitudinally orientated specimens.




**Key**

X min. specified yield stress, N/mm$^2$

Y impact energy, J

**Figure 1 — Charpy V-notch, values for steel**

## 6.2 Rolled and extruded steels in offshore container structures

### 6.2.1 General requirements

Where required, steels for welding shall be made by open hearth, electric furnace or the basic oxygen steel process. Steels in the primary structure shall be killed and fine-grain-treated. Only materials with non-ageing properties shall be used.

### 6.2.2 Groups of steels

Structural steels for the primary structure shall be carbon steel, carbon-manganese steel, carbon-manganese micro-alloyed steel or low-alloyed steel.

For hot rolled plates and profiles, material grades specified in EN 10025-1, EN 10025-2, EN 10025-3 and EN 10025-4, which conform to the requirements in 6.1 and 6.2.1, shall be used.

Hollow sections as specified in EN 10210-1 or EN 10219-1, which conform to the requirements in 6.1 and 6.2.1, shall be used.

### 6.2.3 Stainless steel

Stainless steel used in essential primary structure shall be of a minimum grade 1.4401 (Grade 316) as specified in EN 10088-2.

NOTE Some environments (e.g. tropical climates) can be particularly corrosive to stainless steel.

For containers with stainless steel, and that are intended for use in such environments, additional protective measures, such as surface protection or use of more corrosion resistant steel grades, should be considered.

### 6.2.4 Steel forgings

When required, forged carbon and carbon-manganese steels shall be used in the offshore container structure.

Such forgings shall be made from fully-killed and fine-grain treated non-ageing steel.

For chemical and mechanical properties of alloy steels, reference shall be made to EN 10250-2 and EN 10250-3. The chemical composition shall be suitable for the thickness in question. Alloy steels shall be delivered in quenched and tempered condition.

The impact test temperature shall be equal to the design air temperature, $T_D$; see Clause 4 and 5.1.

### 6.2.5 Steel castings in corner fittings

The tensile strength of corner fittings (see 5.4.9) made from cast steel shall be not less than 480 N/mm$^2$; the yield strength shall be not less than 275 N/mm$^2$.

The chemical composition shall be in accordance with that set out in Table 2; mechanical properties shall be in accordance with Table 3.

**Table 2 — Chemical composition (ladle analysis)[a]**

| Chemical composition % | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| C max. | Mn | Si max. | P max. | S max. | Cr max. | Ni max. | Cu max. | Mo max. | $Al_{sol}$[b] min. | Cr+Ni+Cu+Mo max. |
| 0,20 | 0,90 to 1,50 | 0,50 | 0,035 | 0,035 | 0,25 | 0,30 | 0,20 | 0,08 | 0,015 | 0,70 |

[a] The carbon equivalent shall not exceed 0,45 %.

[b] Aluminium may be replaced partly or totally by other fine graining elements as stated in the approved specifications.

**Table 3 — Mechanical properties**

| Mechanical properties | | | | |
|---|---|---|---|---|
| **Yield strength** | **Tensile strength** | **Elongation** | **Reduction of area** | **Impact energy** |
| $R_{oH}$<br>N/mm$^2$<br>min | $R_m$<br>N/mm$^2$ | $A_5$<br>%<br>min | $Z$<br>%<br>min | $KV$[a]<br>J<br>min at –20 °C[b] |
| 220 | 430 to 600 | 25 | 40 | 27 |

[a] Average value on 3 ISO V-notch impact specimens in accordance with ISO 148-1. One individual value may be below the average value but shall not be lower than 70 % of the average.

[b] For design temperatures lower than –20 °C, these corner fittings shall be tested for the lower design temperature.

## 6.3 Aluminium

The chemical composition, heat treatment, weldability and mechanical properties shall be suitable for the purpose.

When materials of different galvanic potential are joined together, the design shall be such that galvanic corrosion is avoided.

Aluminium alloys used in offshore containers shall be made by rolling or extruding. Aluminium alloys and tempers specified in Tables 4 and 5 shall be used. Use of other alloys or tempers shall be subject to special consideration.

**Table 4 — Aluminium alloys and tempers for rolled products**

| Alloy | | Temper |
|---|---|---|
| **ISO 209** | **AA** | **ISO/AA** |
| AlMg 2,5 | 5052 | 0/0<br>HAR/H32<br>HBR/H34<br>HCR/H36 |
| AlMg 3 | 5754 | 0/0<br>HAR/H32<br>HBR/H34 |
| AlMg 3,5 | 5154 | 0/0<br>HAR/H32<br>HBR/H34 |
| AlMg 4 | 5086 | 0/0<br>HAR/H32<br>HBR/H34 |
| AlMg 3 Mn | 5454 | 0/0<br>HAR/H32<br>HBR/H34 |
| AlMg 4,5 Mn | 5083 | 0/0<br>HAR/H32<br>HBR/H34 |
| AlSiMgMn | 6082 | 0/0<br>TB/T4<br>TE/T5<br>TF/T6 |
| NOTE AA stands for American Aluminium Association.<br>These references are included as users can encounter these references in practice. | | |

**Table 5 — Aluminium alloys and tempers for extruded products**

| Alloy | | Temper |
|---|---|---|
| **ISO 209** | **AA** | **ISO/AA** |
| AlSi 0,5 Mg | 6063 | TB/T4<br>TF/T6 |
| AlSiMgMn | 6082 | TF/T6 |
| NOTE AA stands for American Aluminium Association.<br>These references are included as users can encounter these references in practice. | | |

### 6.4 Non-metallic materials

Timber, plywood, fibre reinforced plastics and other non-metallic materials shall not be used in primary structures. No materials other than non-combustible materials shall be used except where a special property is required that cannot be obtained by using non-combustible material.

Consideration should be given to strength, durability, suitability, and possible hazards caused by use of these materials.

### 6.5 Material documents

Materials used for the construction of offshore containers shall be furnished with documentation in accordance with Table 6. All materials for primary structures shall be identifiable against the documents.

**Table 6 — Documentation of materials**

| Structure | Documentation in accordance with ISO 10474 | | |
|---|---|---|---|
| | Inspection certificate 3.2 | Inspection certificate 3.1 | Test report 2.2 |
| Corner fittings | X | | |
| Pad eyes | X | | |
| Other primary structural members | | X | |
| Secondary structural members | | | X |

## 7 Type testing

### 7.1 General

For any change of design, specification of material and method of manufacture beyond normal manufacturing tolerances, which can lead to a modification of the mechanical properties defined in this document, the relevant type tests shall be carried out on the modified container.

NOTE Type tests demonstrate that offshore containers conforming to the requirements of this document possess the mechanical properties specified. The purpose of these tests is to prove the design, material and method of manufacture.

A container selected for type testing shall be representative of the production units and not a hand-built pre-production development container. It shall be built in conformity with plans and data and using tooling comparable to those planned for subsequent production.

The tests specified in 7.3 and 7.4 shall be carried out for all offshore container types and shall be considered as design requirements.

Type testing shall not replace design review. Non-destructive examination (NDE) in accordance with 8.2.3.2 shall be performed after testing.

The test masses or test load should normally be evenly distributed inside the container. If it is not possible to place all the test mass inside the container, the remaining mass shall be placed outside or under the container, provided that this gives a loading on the structure similar to the distribution of the container loading in operating condition.

If the container has an additional cargo deck, the test mass or test load shall be evenly divided between the floor and the additional deck; see 5.4.3. If the additional deck is removable, the test shall be performed with the test mass or test load divided between the additional deck and the floor, as well as with the whole test mass or test load, on the floor.

For containers with special features where additional design requirements apply, suitable tests should be made to verify that those requirements are met.

## 7.2 Test equipment and calibration

### 7.2.1 Test mass or test load

The test mass (or test load) shall be verified using calibrated weights or a calibrated load cell and handset.

EXAMPLE Examples of appropriate means of application of test mass or test load are:

— calibrated test blocks;

— water bags;

— sand bags;

— free weights;

— a suitable test rig.

### 7.2.2 Calibration

If a load cell and handset is used it shall be calibrated annually, in accordance with ISO 7500-1, to an accuracy of ±2 %.

If a load cell is overloaded or receives a shock load (e.g. from being dropped), the load cell and handset should be re-calibrated before further use.

Where used, test blocks shall be calibrated, as a minimum, every second year. The measured mass, in kilograms, of each block shall be legibly and durably marked on each block.

Care should be taken in the storage of calibrated concrete blocks to prevent the absorption of water having an influence on the actual block mass.

## 7.3 Lifting test

### 7.3.1 General

The container shall be lifted by a lifting set with an angle to the vertical equal to the design angle. The container shall be clear of the ground throughout the test.

Where the lifting set intended for use with the container is used for the lifting test, care should be taken to ensure that no overloading, deformation, or distortion is induced in the lifting set. Should the lifting set that is normally fitted to the container be used for the lifting test, it should be visually examined after the load test.

The container shall be lifted in such a way that no significant acceleration forces occur. It shall be held for 5 min before measurements are taken.

### 7.3.2 All-point lifting

The container shall be loaded to give a total mass of 2,5 $m_R$ and lifted clear of the ground, using all the pad eyes.

This total mass may be obtained by putting in an internal test mass of (2,5 $m_R$) – $m_T$.

No deflections during testing shall be greater than 1/300 of the span of the member. The offshore container shall show no permanent deformation or other damage after testing.

### 7.3.3 Two-point lifting

An offshore container fitted with four pad eyes shall also be lifted from only two pad eyes, situated diagonally opposite each other, with a total mass of 1,5 $m_R$. If the container structure is not symmetrical, this test shall be carried out with each pair of pad eyes.

The offshore container shall show no permanent deformation or other damage after testing.

#### 7.3.4 Post-lifting test inspection and examination

On completion of the lifting test, a non-destructive examination and visual examination of the pad-eyes shall be performed.

### 7.4 Vertical impact test

The container, with its internal test mass corresponding to payload $m_P$, shall be either lowered or dropped on to a workshop floor of concrete or other rigid structure.

This floor may be covered with a sheathing of wooden planks with a thickness not exceeding 50 mm.

If the container is lowered from a crane, the suspending wire and hook can dampen the impact compared to a free-fall drop test. Therefore, the impact speed should be greater if a lowering test is used.

In both cases, the container shall be so inclined that each of the bottom side and end rails connected to the lowest corner forms an angle of not less than 5° with the floor.

The greatest height difference between the highest and lowest point of the underside of the container corners shall not be more than 400 mm.

The corner to be impacted shall be the one with the lowest rigidity.

NOTE 1 On closed dry cargo containers this is normally at the door end.

No significant permanent damage shall occur.

NOTE 2 Cracks in welds and minor deformations can be repaired.

One of the following procedures shall be performed.

a) Drop test

   An internal load equal to the payload ($m_P$) shall be safely secured; the container shall be inclined as described above.

   The container shall be suspended from a quick release hook. When released, the container shall drop freely for at least 50 mm to give it a speed at initial impact of at least 1 m/s.

b) Lowering test

   An internal load equal to the payload ($m_P$) shall be safely secured and the container shall be inclined as described above.

   The container shall be lowered to the floor at a constant speed of not less than 1,5 m/s.

**WARNING — These tests can cause considerable tremors in the building.**

### 7.5 Other tests

**7.5.1** Open top containers with an overall length of 6,5 m or more, with fork pockets designed for loaded lifting shall be loaded to a total uniformly distributed gross mass of 1,6 ($m_R$ + $m_S$) $g$ and lifted clear of the ground using the fork pockets. No deflections during testing shall be greater than 1/300 of the span of the member. The offshore container shall show no permanent deformation or other damage after testing.

NOTE Tests specified in IMDG Code are applicable for tanks for dangerous cargoes.

**7.5.2** For testing of driving ramps, see 5.4.4.

# 8 Production

## 8.1 General

Production shall be performed in accordance with approved drawings, specifications and procedures.

Production documents conforming to this document shall be prepared and approved before production starts.

The manufacturer should ensure the quality of the procedures and facilities used through operation of a quality management system such as ISO 9001.

## 8.2 Primary structure

### 8.2.1 General

During production it shall be possible to identify the materials used for the primary structure and link them with the corresponding documentation. If the marking is not visible on the finished product, a log shall be kept of the components to identify and ensure traceability of the materials used in the primary structure.

### 8.2.2 Approved welders

Welders shall be approved in accordance with ISO 9606-1 and ISO 9606-2, as appropriate to the materials being used. Alternatively, welders may be approved to the ASME Boiler and Pressure Vessel Code, Section IX or to AWS D1.1 Welding procedures.

Qualified welding procedures shall be used for the welding carried out on the primary structure.

Preliminary welding procedure specifications shall form the basis for the preparation of welding procedure tests.

Welding procedure specifications, welding procedure tests and approval of welding procedures shall be performed in accordance with ISO 15607, ISO 15609-1, ISO 15614-1 or ISO 15614-2 as appropriate and the requirements in the following paragraph.

Impact tests are required as part of the welding procedure tests. Test temperatures and test results shall conform to the requirements specified in 6.1 including Table 1. For $t$ > 12 mm four sets of impact tests shall be performed: one set in the weld metal, one set at the fusion line, one set in the heat affected zone (HAZ) 2 mm away from fusion line and one set 5 mm away from fusion line.

### 8.2.3 Examination of welds

#### 8.2.3.1 General

Welds shall be subject to a visual examination as specified in Table 7.

The percentages specified in Table 7 shall apply to the total length of weld for the type of structural assembly in question.

Welds between essential and non-essential primary structure shall be examined as for non-essential primary structure.

When fuel gas welding is applied, ultrasonic and magnetic particle examination are required in addition to radiographic examination.

**Table 7 — Non-destructive examination (NDE) of structural welds**

| Category of member | Type of examination | | | |
|---|---|---|---|---|
| | I<br>Visual examination | II<br>Magnetic particle examination[a] | III<br>Ultrasonic examination[b] | IV<br>Radiographic examination[b] |
| Essential primary structure | 100 % | 100 % | 100 % pad eyes<br>20 % all other | 10 % |
| Non-essential primary structure | 100 % | 20 % | 20 % | 10 % |
| Secondary structure | 100 % | | | |
| [a] Dye penetrant examination shall be used where magnetic particle examination is not possible. | | | | |
| [b] Ultrasonic and radiographic examinations shall be performed depending on material thickness and possibility. | | | | |

### 8.2.3.2 Non-destructive examination (NDE) methods

NDE methods in accordance with Table 8 shall be chosen with due regard to the conditions influencing the sensitivity of the methods. Structural welds shall be examined as specified in columns I to IV in Table 7 with those in columns III or IV being employed if they are relevant.

**Table 8 — Standards relevant to NDE methods**

| Visual | Magnetic particle | Dye penetrant | Ultrasonic | Radiography |
|---|---|---|---|---|
| ISO 17637 | ISO 17638 | ISO 3452-1 | ISO 17640 | ISO 17636-1[a]<br>and<br>ISO 17636-2[a] |
| [a] Class B improved radiographic techniques shall be used. | | | | |

### 8.2.3.3 Weld acceptance criteria

**Table 9 — NDE acceptance criteria**

| Visual | Magnetic particle | Dye penetrant | Ultrasonic | Radiography |
|---|---|---|---|---|
| ISO 5817[a] | ISO 23278 | ISO 23277 | ISO 11666 | ISO 10675-1[b] |
| Level B | Level 1 | Level 1 | Level 2 | Level 1 |
| [a] For aluminium ISO 10042. | | | | |
| [b] For aluminium ISO 10675-2. | | | | |

### 8.2.3.4 Non-destructive examination (NDE) operators

NDE operators shall be qualified, in accordance with ISO 9712, to a minimum of level 2.

The welds shall be examined in accordance with Table 7; reports describing weld quality, containing the following information as a minimum, shall be supplied:

— number of repairs carried out to meet the specified acceptance standard;

— NDE methods and procedures used;

— NDE-parameters necessary for a proper assessment;

— confirmation of acceptance or rejection.

## 8.3 Secondary structure

The secondary structure shall be fabricated to prevent cargo from falling out of the offshore container and, if required, prevent water from entering.

Welds between primary and secondary structures shall be performed as for secondary structures and shall be examined as such.

The welding procedure used for the secondary structure shall be in accordance with ISO 15607, ISO 15609-1, ISO 15614-1 or ISO 15614-2 as appropriate.

## 8.4 Production testing

### 8.4.1 Lifting test

During the production of a batch of offshore containers, some, selected at random, shall be tested in accordance with the all-point lifting test specified in 7.3.2 and shall conform to all specified requirements.

The number of containers to be tested shall be agreed in advance and is dependent on the total number in the production series. The minimum number of containers to be tested, which shall include the container which was type tested, shall be in accordance with Table 10.

**Table 10 — Number of containers required for lifting test**

| Total number in series | Number to be tested[a] |
|---|---|
| 1 to 5 | 1 |
| 6 to 10 | 2 |
| 11 to 20 | 3 |
| 21 to 40 | 4 |
| >40 | 10 % |

[a] The quantity given includes the container which was type tested.

### 8.4.2 Weather proofness testing

If a type of offshore container is specified to be weatherproof, the following weather proofness tests shall be performed.

For the prototype and 10 % of the containers in a production series, the test shall be performed in accordance with the weather proofness test specified in ISO 1496-1.

For the remaining containers, the water test may be replaced by a simple light test, the instructions for which are as follows:

— enter the container, close the doors and allow sufficient time to become accustomed to the darkness (at least 3 min);

— while a light is directed at all external surfaces, examine the interior of the container for light penetration;

— no light penetration shall be observable with the naked eye or with normally corrected vision.

Appropriate provision should be made to ensure that there is no risk to the health and safety of the inspector.

## 8.5 Failure of production containers

If any container fails to conform to either the weld acceptance criteria in Table 9 or the lifting test requirements (see 7.3.1 and 8.4.1) the manufacturer shall identify the cause of failure and rectify all affected containers. The rectified containers shall then be re-inspected and/or re-tested.

# 9 Marking

## 9.1 Safety marking

The tops of closed containers and the top rails of open and framed containers shall be marked as follows:

— closed containers shall be marked with a band of solid contrasting colour not less than 100 mm wide round the roof perimeter; if the roof of the container is recessed below the top perimeter rail, at least the top surface of the top rail shall be marked;

— open and framed containers shall be marked on the top surface of the top rails with either hatching in a contrasting colour or a solid light colour.

Where a container is fitted with fork pockets designed for handling the container only when empty (e.g. on some tanks and long baskets), then the words "Empty lift only" shall be clearly displayed near each set of fork pockets in characters not less than 50 mm high.

Aluminium containers shall be specially marked to warn of the danger of sparking (see 5.1). "ALUMINIUM CONTAINER" shall be marked on all four sides in letters at least 75 mm high.

## 9.2 Identification markings

Each container shall have the manufacturer's serial number welded on in characters at least 50 mm high. In addition, each container shall be marked with a unique container number, issued by the owner, as a prime identifier for use as the common cross-reference on all in-service certification and shipping documentation.

The container number shall be prominently and indelibly displayed on all sides of the container (as viewed from ground level) in characters of a contrasting colour, not less than 75 mm high.

NOTE For open-sided containers it is sometimes necessary to attach panels specifically to carry the container number.

If a container has a roof, the container number shall be displayed on the roof, in characters 300 mm high or more. Where character size is restricted by the available space they should be as large as practicable. The marking shall be carried out in such a way as to avoid incorrect interpretation, e.g. by underlining. Where applicable, the lower edge of the marking shall be positioned near the side of the container in which the door is located.

In exceptional circumstances the owner may change the container number and re-mark the container accordingly. In this case the inspection plate should be replaced (see Clause 10) and the statement of conformity revised (see Clause 11).

## 9.3 Information markings

Each container shall be clearly marked with:

a) maximum gross mass (in kg);

b) tare mass (in kg);

c) payload (in kg).

The items in a), b) and c) shall be displayed in characters of a contrasting colour not less than 50 mm high.

A matt black panel of appropriate size may be provided for the application of temporary information. It is recommended that this panel be located on a door, where fitted. Other information, e.g. destination, may be added if desired.

### 9.4 Other markings

If the container is fitted with an intermediate deck the payload of the deck shall be displayed on the inside of the container in a position where it is clearly visible at all times, in characters of a contrasting colour not less than 50 mm high.

The user of the container may add additional information marking such as owner's name. To avoid misinterpretation additional marking should be kept to a minimum.

## 10 Container data plate

### 10.1 General

Containers shall be fitted with a plate carrying the information specified in 10.2

The plate shall be made of corrosion resistant material securely attached externally in a manner designed to avoid unauthorized or accidental removal. The plate shall be fitted to a door, or, on containers with no doors, in a prominent position.

Aluminium rivets have been found to be unsuitable as a fixing method in the offshore environment and shall not be used.

The information on the plate shall be in the English language.

Provision for an additional language may be made.

The text shall be permanently and legibly marked on the plates in characters not less than 4 mm high.

### 10.2 Contents of data plate

The plate shall be headed:

"OFFSHORE CONTAINER DATA PLATE — ISO 10855-1"

The plate shall contain the following information:

— manufacturer's serial number;

— month and year of manufacture;

— month and year of modification;

— maximum gross mass in kilograms, excluding lifting set mass, at the design sling angle;

— tare mass in kilograms;

— payload in kilograms and intermediate deck payload (if applicable);

— certificate of conformity reference;

— design temperature;

— identification of body issuing the statement of conformity.

The format in Figure 2 should be followed.

The data plate may be combined with the inspection plate by including the additional information specified in ISO 10855-3:—, Clause 5.