Guide for Certification of

Offshore Containers

February 2020

GUIDE FOR CERTIFICATION OF

OFFSHORE CONTAINERS

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American Bureau of Shipping
Incorporated by Act of Legislature of
the State of New York 1862

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Foreword *(1 February 2020)*

IMO has issued MSC/Circ.860 Guidelines for the approval of offshore containers handled in open seas. This circular is intended to assist the competent authorities in developing the requirements for approving the offshore containers. IMO requires that all intermodal containers conform to the requirements of the International Convention for Safe Containers (CSC). The requirements of the CSC convention may not be applicable to offshore containers primarily due to non-standard designs, exposure to the marine environment for extended periods as well as the lifting of offshore containers by padeyes. EN 12079 has been published based on the MSC/Circ.860 and is currently used as an International industry standard to approve offshore containers.

Containers built to the ABS *Guide for Certification of Offshore Containers* will meet all the requirements of MSC/Circ.860, EN 12079:2006 and ISO 10855:2018. This Guide provides guidance for manufacturing facilities to build offshore containers. It also serves to assist the ABS Engineers and Surveyors in certifying offshore containers around the globe.

This Guide becomes effective on the first day of the month of publication.

Users are advised to check periodically on the ABS website www.eagle.org to verify that this version of this Guide is the most current.

We welcome your feedback. Comments or suggestions can be sent electronically by email to rsd@eagle.org.

GUIDE FOR CERTIFICATION OF

OFFSHORE CONTAINERS

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CHAPTER 1

General Information

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CHAPTER 1
General Information

SECTION 1
General

1 Scope *(1 February 2020)*

This Guide has been developed to provide requirements for the certification of offshore containers with a gross mass not exceeding 25,000 kg (55,116 lb), intended for repeated use to, from and between fixed or floating installations and ships.

These containers may not always conform to the standard design requirements of the International Convention for Safe Containers (CSC). Some features that differentiate offshore containers from the containers that are designed according to the International Convention for Safe Containers (CSC) are indicated below:

- Containers conforming to CSC convention are designed for loading and unloading in ports and in inland transport only and are not designed for being handled in the open seas. However, offshore containers are designed to be lifted onto and off offshore installations and ships, and such operations may often take place in unfavorable weather and sea conditions.
- Offshore containers are not to be lifted using spreader beams or ISO Corner fittings and are to be lifted using padeyes or lifting lugs with the designated lifting sets only.
- Offshore containers, unlike ISO containers, are not standardized with regard to sizes or gross mass.

Therefore, the intention of this Guide is to provide a standard for containers that are utilized in the offshore industry by conforming to the Guidelines issued by IMO in MSC/Circ. 860.

This Guide only applies to the transport and lifting requirements for offshore containers with respect to design, manufacturing, marking, testing and periodic inspections. This Guide does not include requirements for containers intended for intermodal transport. For this application refer to the ABS *Rules for Certification of Cargo Containers*. This Guide does not include requirements for temporary or permanent installation of offshore containers on fixed or floating offshore facilities. For these applications refer to the ABS *Guide for Portable Accommodation Modules* or the ABS Rules.

Offshore containers that are certified to the requirements of this Guide will also comply with MSC/Circ.860, EN 12079:2006 and ISO 10855:2018. Offshore Container Production Certificates issued by ABS will indicate this compliance.

Certification of existing containers may be considered on a case by case basis. Refer to A1-5 of this Guide for requirements.

2 Relationship with Other Standards, Codes and Regulations

This Guide references standards recognized by ABS which are listed in Appendix 1.

2.1 IMO-MSC/Circ.860

The International Maritime Organization (IMO), has issued guidelines for the approval of offshore containers, in circular MSC/Circ.860. This circular is intended to guide national authorities in developing approval and certification requirements for offshore containers. It recommends that new offshore containers be approved, prototype tested, and certified by duly authorized bodies.

2.2 ISO 10855:2018 *(1 February 2020)*

ISO 10855:2018 is a standard used in the offshore industry for the certification of offshore containers and associated lifting sets.

This standard consists of three parts as described below:

- EN 10855:2018, Part 1: Design, Manufacturing and Marking of Offshore Containers
- EN 10855:2018, Part 2: Manufacturing and Marking of Lifting Set
- EN 10855:2018, Part 3: Periodic Inspection, Examination and Testing

2.3 EN 12079:2006

EN 12079:2006 is a standard used in the offshore industry for the certification of offshore containers and associated lifting sets.

This standard consists of three parts as described below:

- EN 12079:2006, Part 1: Offshore Containers - Design, Manufacturing and Marking
- EN 12079:2006, Part 2: Lifting sets - Design, Manufacturing and Marking
- EN 12079:2006, Part 3: Periodic Inspection, Examination and Testing

2.4 IMDG, US DOT, RID/ADR

Offshore Containers that are intended for the carriage of dangerous cargo are required to be in compliance with the International Maritime Dangerous Goods (IMDG) Code.

Some of the offshore containers may also be required to conform to other national and international standards and regulations such as United States Department of Transport (US DOT), Regulations concerning the International Carriage of Dangerous Goods by Rail (RID) and European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), etc.

2.5 ABS Guide for Dropped Object Prevention on Offshore Units and Installations *(1 February 2020)*

The ABS Guide has been developed to provide users with specific guidance and criteria on a dropped prevention program, which corresponds to a growing industry-wide development to mitigate and eliminate the hazards imposed by dropped objects. The application of the Guide to offshore containers is optional. Offshore containers may be reviewed for compliance to the ABS Guide for the Prevention of Dropped Objects on Offshore Units and Installations at the request of the designer.

CHAPTER 1
General Information

SECTION 2
Certification Procedure

1 Certification Procedure for Offshore Containers

The certification procedure outlined below is a typical procedure which will facilitate the certification of offshore containers to this Guide. ABS may consider alternative procedures, provided they are not less effective than the requirements indicated in this Guide.

1.1 Application for Certification

An application is to be submitted by the designer or manufacturer who has legal rights to the design. The designer and manufacturer may not be the same entity and are to be indicated on the application.

The application is to be submitted with, but not limited to, the following:

i) Design drawings including but not limited to the following information:

- Dimensions
- Maximum gross mass and payload
- Scantling of members
- Material properties
- Padeye details
- Welding details
- Markings

ii) Design calculations

iii) Testing results (if applicable)

iv) Declaration for the absence of asbestos

Applications for additional units to be certified under an approved design are to include at least the application and marking drawings if the owner has changed them.

Revisions to an existing ABS approved design will require an application which is to be submitted with, but not limited to, the applicable documents indicated above. Submitted documents are to completely describe the changes.

1.2 Design Review

The documents submitted with the application will be reviewed by an ABS engineer. The engineer will evaluate the design under the requirements of this Guide and any other requested Rules, regulations or standards. Upon a successful review, an ABS review letter with test agenda, if applicable, will be returned indicating that the design meets the requirements of this Guide. The prototype test agenda is provided only after all review items are addressed.

The design is not approved until the prototype test is conducted in the presence of an ABS Surveyor in accordance with the prototype test agenda specified by ABS.

1.3 Quality Control

The manufacturing facility is to submit a quality manual to the ABS Surveyor which describes the quality system. The Surveyor will review the manual to verify aspects of the production of the container are addressed in the manual. Following a successful review of the manual, a quality audit will be performed at the manufacturing facility to verify that the system outlined in the manual is in place and functioning properly.

Upon a successful quality audit, the ABS Surveyor will issue a Factory Approval Certificate. The certificate will be valid for 5 years with annual endorsements required.

Notes:

1 A quality control document for the manufacturing facility is required to be submitted only if the facility is submitting for the first design to be manufactured at the facility.

2 Any updates to the quality control documents are to be submitted for review. The document is to be updated if a new design requiring additional quality procedures is to be produced at the facility.

1.4 Production

Upon a successful design review, prototype test and quality assessment, the manufacturing facility may begin production under the surveillance of an ABS Surveyor.

The ABS Surveyor will initially request a meeting to discuss inspection schedules, hold points and other related items. The Welding Procedure Specifications (WPS) and Welder Qualifications will be reviewed and approved by the ABS Surveyor prior to production.

Production testing is to be carried out in the presence of an ABS Surveyor or quality representative nominated by the manufacturer as indicated in the ABS approved quality document. The Surveyor is to "walk the production line" during each attendance to verify that the quality system continues to function properly.

The below documents are to be presented to the ABS Surveyor at the time of final inspection in an as-built dossier in order to support the certification of the offshore container. The documents are to include, but are not limited to the following:

i) Material certificates

ii) Material Traceability Reports (MTR) for primary structure

iii) Fabrication inspection reports

iv) Dimensional control reports

v) Nondestructive Testing (NDT) reports

vi) Production testing reports

vii) Pressure testing records

1.5 ABS Production Certificate

An ABS Production Certificate will be issued by the Surveyor following a successful review of the as-built dossier and final inspection. Additionally, the certificate will reference the ABS engineering approval letter and prototype test certificate, applicable to the container design.

1.6 Certification to Other Standards

When the application includes a request for certification to governmental requirements, international conventions, or other standards, the submittal is to include all necessary required information. These additional requirements are to be indicated in the certificate.

2 Certification procedure for the Lifting Set

The certification procedure outlined below is a typical procedure which will facilitate the certification of the lifting sets. ABS may consider alternative procedures, provided they are not less effective than the requirements indicated in this Guide.

Lifting sets are to be assembled from the various components described within this Guide. The components are to meet the requirements of this Guide and applicable standards and be presented to the manufacturer of the lifting set with supporting documentation. The lifting set will be certified in the assembled condition by the attending ABS Surveyor.

2.1 Components

Manufacturers of the following components are to submit the component for certification through the ABS Type Approval program.

- Shackles
- Chains
- Links (master links and master link assemblies, intermediate links, end links)
- Couplings

The ABS Type Approval procedure as well as the application can be found on the ABS web site, www.eagle.org. The above components are to be presented to the lifting set manufacturer with traceability to the ABS Type Approval certificate.

Other components such as wire rope, ferrules, and thimbles do not require ABS Type Approval. However, they are to be presented to the lifting set manufacturer with a 3.1 Certificate in accordance with ISO 10474 or another standard recognized by ABS.

2.2 Application for Certification

An application is to be submitted by the designer or manufacturer who has legal rights to the design of the lifting set. The designer and manufacturer may not be the same entity and are to be indicated on the application.

The application is to be submitted with, but not limited to, the following:

i) Specification of the lifting set, along with the following

- Applicable standards
- Material specification
- Dimensions of all the components
- Working Load Limit (WLL)
- Proof Load (PL)
- Breaking Load (BL)

ii) Drawings of lifting set and its components

iii) Calculations demonstrating how the lifting set components were selected, including determination of required strength

iv) Description of all the manufacturing/assembly procedures (e.g. for wire rope sling: the assembly of the sling legs with terminal, etc.)

v) Marking details on the tags

vi) Description of the test methods and procedures for all relevant prototype and production tests

vii) Type approval/3.1 certificates for the components according to 1-2/2.1

Applications for additional units to be certified under an approved design are to include at least the application and marking drawings if the owner has changed them.

Revisions to an existing ABS approved design will require an application which is to be submitted with, but not limited to, the applicable documents indicated above. Submitted documents are to completely describe the changes.

2.3 Design Review

The documents submitted with the application will be reviewed by an ABS engineer. The engineer will evaluate the design under the requirements of this Guide and any other requested Rules, regulations or standards. Upon a successful review, an ABS review letter with test agenda, if applicable, will be returned indicating that the design meets the requirements of this Guide. The prototype test agenda is only provided after all review items are addressed.

The design is not approved until the prototype test is conducted in the presence of an ABS Surveyor in accordance with the test agenda specified by ABS.

2.4 Quality Control

The manufacturing facility is to submit a quality manual to the ABS Surveyor which describes the quality system. The Surveyor will review the manual to verify aspects of the production of the lifting set are addressed in the manual. Following a successful review of the manual, a quality audit will be performed at the manufacturing facility to verify that the system outlined in the manual is in place and functioning properly.

Upon a successful quality audit, the ABS Surveyor will issue a Factory Approval Certificate. The certificate will be valid for 5 years with annual endorsements required.

Notes:

1 A quality control document for the manufacturing facility is required to be submitted only if the facility is submitting for the first design to be manufactured at the facility.

2 Any updates to the quality control documents are to be submitted for review. The document is to be updated if a new design requiring additional quality procedures is to be produced at the facility.

2.5 Production

Upon a successful design review, prototype testing and quality assessment, the manufacturing facility may begin production of lifting sets in accordance with the approved design.

Testing carried out during the production phase are to be in accordance with the relevant sling or component standards.

2.6 ABS Production Certificate

An ABS Production Certificate will be issued by the Surveyor following a successful review of the as-built dossier (which includes the ABS Type Approval or 3.1 certificates for the components of the Lifting Set) and final inspection. Additionally, the certificate will reference the ABS engineering approval letter and prototype test certificate, applicable to the lifting set design.

CHAPTER 1
General Information

SECTION 3
Definitions

1 Assembly Secured Shackle

A shackle fitted to a sling leg and secured by a seal or similar device, so as to signal unambiguously, whether or not the shackle has been exchanged.

2 Breaking Force

The maximum load at which a tensile failure occurs in the sample of wire rope being tested.

3 Corner Fitting

A corner fitting is a fixture consisting of standard apertures and faces which provide a common interface for handling and securing containers.

4 Designer

The person or legal entity that has proprietary rights to the design and its use. This may be the OEM.

5 Lifting Set

Items of integrated equipment used to connect the offshore container to the lifting appliance. This can comprise one or multi leg slings (with or without a top leg) and shackles, whether assembly secured or not.

6 Non-conformance

Non-fulfilment of a specified requirement.

7 Offshore Container

A portable unit with gross mass not exceeding 25,000 kg (55116 lb), 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.

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

8 Original Equipment Manufacturer (OEM)

The person or legal entity that has the legal or patent rights to produce the material, component, product, or system.

9 Owner

Legal owner of the offshore container or the delegated nominee of that body.

10 Permanent Equipment

Equipment that is attached to the container and which is not cargo.

Note: This may include lifting sets, refrigeration units, shelves, securing points, garbage compactors.

11 Primary Structure

Load carrying and supporting frames, load carrying panels, supporting structures for tanks, padeyes, etc.

Primary structure is divided into the following two subgroups:

11.1 Essential/Non-redundant Primary Structure *(1 February 2020)*

Main structural elements which transfer the cargo load to the crane hook (i.e., forming the "load path" from the payload to the lifting sling) include but are not limited to:

- Top and bottom side rails
- Top and bottom end rails
- Corner posts
- Padeyes
- Fork lift pockets

Other primary structure may also be considered as essential/non-redundant.

11.2 Non-essential Primary Structure

Structural elements such as floor plates, protective frame members, etc. which do not have their functional requirement as specified in 1-3/11.1 are to be categorized here. Side and roof panels (including corrugated panels), are not considered to be part of primary structure and are not be taken into account when evaluating the strength of the container.

12 Production Units

Production units are identical containers built under conditions which duplicate, insofar as is practicable, the conditions under which the prototype was built.

13 Proof Load

The specific tension applied to a sling or component in the performance of a proof test

14 Proof Test

A non-destructive tension test of the sling or components.

15 Prototype

Prototype is a representative unit of a series of identical containers built under conditions which duplicate, insofar as is practicable, the conditions under which all of the containers in the series are to be fitted.

16 Prototype Testing

This is the destructive and nondestructive testing of the materials and components presented for evaluation of the original design of a product. If a Surveyor's witness is required, this may not be waived under any sections of the Rules, unless it is done by a recognized third party.

17 Secondary Structure

Parts which are not considered as load carrying for the purpose of the design calculations, including the following components:

- Doors, wall and roof panels;
- Panels stiffeners and corrugations;
- Structural components used for tank protection only;
- Internal securing points.

Note: Not all container walls are corrugated.

SECTION 4
Symbols

F_s	=	resulting sling force
g	=	acceleration due to gravity
ℓ_n	=	nominal reference length (often different from actual span of a beam)
n	=	number of padeyes (for calculation purposes, n is to be either 2 or 4)
P	=	payload (i.e., the maximum permissible mass of cargo which may be transported by the container)
R	=	rating (i.e., the maximum gross mass of the container including permanent equipment and its cargo, but excluding the lifting set)
S	=	mass of the lifting set
SF	=	Safety Factor
T	=	tare mass (i.e., the mass of an empty container including any permanent equipment but excluding cargo and lifting set)
t	=	material thickness
t_{min}	=	minimum material thickness
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 degrees centigrade)
WLL_{min}	=	working load limit in tonnes (i.e., the maximum amount of mass that a lifting component is authorized to sustain in lifting service)
WLL_s	=	minimum working load limit for each shackle/sling in tonnes
y	=	deflection of structural member
β	=	angle of sling leg from vertical in degrees
σ_e	=	allowable Von Mises equivalent stress
σ_y	=	specified minimum yield stress
σ_u	=	specified minimum tensile strength at room temperature

ε = 0.2% proof stress at room temperature

ψ = dynamic factor (= 3)

Note:

1 $P = R - T$

2 The term “Safe Working Load” is never used in this Guide as it is not clearly defined for containers and for the same reason it is not used when referring to offshore containers. The term “Working Load Limit” is only used for lifting sets and not for containers.

CHAPTER 1
General Information

SECTION 5
Quality Assessment

1 General

In general, the ABS Quality Assessment will consist of a review of the Quality Manual and audit of the facility to verify manufacturing is being performed in accordance with the manual.

The quality assessment will consist of:

i) Contract or application

ii) Quality Manual review

iii) Quality Plan review

iv) Management assessment

v) Production assessment

vi) Certification

2 Quality Manual

The purpose of the Quality Manual is to describe the scope and extent of the company's quality system in a concise and brief format.

The company is to establish and maintain a quality manual that includes but is not limited to,

i) The scope of quality management system, including details of and justification for any exclusions

ii) The documented procedures established for the quality management system, or reference to them

iii) A description of the interaction between the various processes within the quality management system

The Quality Manual to be submitted to ABS for review and approval prior to requesting an initial assessment. Where a recognized certification body has approved the Quality Manual, ABS will not require the manual to be submitted to ABS for review. The Quality Manual is to be available for the ABS Surveyor to assess the performance of the quality system in place at the manufacturing facility.

3 Quality Plan *(1 February 2020)*

A typical Quality Plan is to describe methods of assuring and controlling quality during production as may be required by the product specifications and will be subject to review by ABS. In particular, the Quality Plan is to reflect specific inspections, tests, etc., required by the Rules, Guides, regulations and standards. The manufacturer is to present a representative sample of the product "type" to the Surveyor for the purpose of verifying that the "type" has been manufactured in conformance with the design documents.

Prior to the assessment, the manufacturer is to submit the Quality Plan to the Surveyor.

The plan is to include but not to be limited to the following:

- Issuance of material specification for purchasing
- Receiving inspection of materials
- Receiving inspection of finished components and parts
- Calibration certification
- Dimensional and functional checks on finished components and parts
- Edge preparation and fit-up tolerances
- Welding procedure qualifications
- Welder qualification
- Welding defect tracking
- NDT written procedures and qualification documentation
- NDT plan
- Casting and weld defect resolutions
- Assembly and fit specifications
- Subassembly inspection: alignment and dimensional checks, functional tests
- Testing of safety devices
- Hydrostatic testing plan
- Factory acceptance test plan
- Identification of dropped object prevention features (if applicable)

4 Quality Assessment

An assessment is a systematic and independent examination to determine whether quality, environmental, financial, other management activities and the related results comply with planned arrangements, and whether these arrangements are implemented effectively and suitable to achieve objectives.

i) *Management Assessment.* Evaluating the quality assurance and quality control system of the manufacturing facility in order to verify its capability to consistently meet the manufacturer's specified level of product quality and satisfy the requirements of the Rules, Guides, regulations or standards.

ii) *Production Assessment.* Evaluating the product specific manufacturing process in order to verify that the manufacture and inspections of the products are established to meet the manufacturer's specified level of quality control and, to satisfy the requirements of the Rules, Guides, regulations or standards.

Items that are periodically renewed which require verification by the ABS Surveyor is to be obtained, verified and attached to the assessment report.

4.1 Initial Assessment

The manufacturer shall submit an application to ABS requesting an initial assessment. The application are to include a copy of the manufacturer's Quality Manual which shall be reviewed by ABS prior to the initial assessment at the manufacturer's location.

The quality assurance system is more comprehensive than the manufacturing process, since it considers all of the factors that affect the process. The system includes, but is not limited to, the following:

- Design Assessment
- Quality Manual
- Quality Plan
- Control of process inputs
- Process controlling factors (e.g., competency of personnel, procedures, facilities and equipment, training, etc.)
- Process outputs
- Measurements of quality
- Process and product for continual improvement
- Control of contracted vendors, service providers, and suppliers.

4.2 Annual Assessment

The manufacturer must be able to produce records of the products continued compliance with the standard.

Calibration certificates for each piece of equipment used in the production of the container are to be collected during the annual quality assessment and retained as part of the endorsement.

4.3 Renewal Assessment

The manufacturer shall submit an application to ABS for renewal of an existing quality assessment at least 90 days prior to the expiration date of the current quality Factory Approval Certificate. Where for a practical reason the renewal process of the Factory Approval Certificate cannot be completed before the expiration date of the current certificate, a short-term extension may be considered upon application. When the certificate is renewed within 90 days of the expiration date, the new certificate shall be valid for five years from the expiration of the previous certificate.

The renewal assessment is to be no less detailed than an initial or annual assessment.

During the renewal process, the ABS Surveyor shall verify the following:

- There have been no changes to the design
- The design assessment indicates the most current Rules, Guides, regulations and standards.
- The Quality Plan remains effective to control quality during production.

4.4 Quality Assessment Report

The applicant is expected to acknowledge any comments or observations. The applicant is expected to take corrective action on all non-conformances and the conditions found. Corrective actions are to be detailed in the auditor's report.

4.4.1 Findings, Non-Conformances and Observations

i) *Finding.* A statement of fact supported by objective evidence about a process whose performance characteristics meet the definition of non-conformance or observation.

ii) *Non-Conformance.* A non-conformance is the identification of a non-fulfillment of a specified requirement.

iii) *Observation.* An observation is a statement of fact made during a system audit and substantiated by objective evidence. It may also be a statement made by the auditor referring to a situation within the Management System which, if not corrected, may lead to a nonconformity in the future. Therefore, in all subsequent audits, previous observations are to be reviewed to determine if they have become non-conformities.

Initial, annual or renewal certification is not to be credited if a non-conformance is present. Non-conformances found at initial, annual or renewal assessments must be addressed within 90 days of the audits.

4.5 Overdue Assessment

If an annual or renewal audit is not completed within 90 days after the anniversary date of the Factory Approval Certificate, all production work is to be inspected for verification of compliance with the latest Rules, Guides, regulations or standards.

5 Factory Approval Certificate

The approval of the factory is based on the assessment outlined above.

5.1 Certificate

Manufacturing facilities will be issued a Factory Approval Certificate once they are successfully audited and are found to comply with the following requirements:

i) Have undergone a satisfactory design evaluation

ii) Comply with a quality assurance standard

iii) Have manufacturing quality control that meets the applicable provisions of the Rules, product standard, or manufacturer's specification.

5.2 Validity

Each Factory Approval Certificate is valid for 5 years subject to annual endorsements. ABS reserves the right to carry out unscheduled assessments without notice.

The Factory Approval certificate is not transferable and is issued to a unique manufacturer, at a specific address, with specific ownership and a specific organization.

1 Container/Lifting Set Certification Application

Unless otherwise agreed in writing, all services rendered and certificates issued in connection with offshore container and lifting set are governed by the terms and conditions of this Section and the offshore container/lifting set certification application ("Agreement") specification. By requesting offshore container/lifting set certification, the client agrees to be bound by these terms and conditions.

2 Representations as to Certification

Certification is a representation by ABS as to the structural fitness for a particular use or service in accordance with its Rules, Guides and standards. The ABS Rules and Guides are not meant as a substitute for the independent judgment of professional designers, naval architects and marine engineers nor as a substitute for the quality control procedures of shipbuilders, container manufacturers, steel makers, suppliers, manufacturers, and sellers of marine materials, machinery or equipment. ABS, being a technical society can only act through Surveyors or others who are believed by it to be skilled and competent.

ABS represents solely to the container/lifting set manufacturer, container/lifting set Owner or client of ABS that when certifying it will use due diligence in the development of Rules, Guides and standards and in using normally applied testing standards, procedures and techniques as called for by the Rules, Guides, standards and other criteria of ABS. ABS further represents to the container/lifting set manufacturer, container/lifting set Owner or other client of ABS that its certificates and reports evidence compliance only with one or more of the Rules, Guides, standards or other criteria of ABS in accordance with the terms of such certificate or report. Under no circumstances whatsoever are these representations to be deemed to relate to any third party.

3 Suspension of Certification

Any of the following events will cause immediate suspension of the Design Assessment unless a request is submitted to ABS for a new review and audit.

i) Redesign of the product or products covered by a Design Assessment certificate

ii) Change in production methods

iii) Substantial change in management organization

iv) Substantial change in frequency or curriculum for personnel training

v) Refusing access to ABS personnel for periodic or annual audits

vi) Failure to correct a non-compliance identified during an audit or in service

vii) Failure to pay ABS fees

4 Validity

The validity, applicability and interpretation of a certificate issued under the terms of or in contemplation of ABS Container Certification are governed by the Rules, Guides and standards of ABS which shall remain the sole judge thereof. Nothing contained in a Design Assessment or Factory Approval Certificate or in any report issued in contemplation of such a Certificate shall be deemed to relieve any designer, builder, owner, manufacturer, seller, supplier, repairer, operator, insurer, or other entity of any duty to inspect or any other duty or warranty express or implied, nor create any interest, right, claim or benefit in any third party. Nothing expressed herein or in any Certificate or report issued under these Rules is intended or shall be construed to give any person, firm or corporation other than the parties hereto, any right, remedy, or claim hereunder or under any provisions herein contained; all provisions hereof are for the sole and exclusive benefit of the parties hereto.

5 Disagreement

Any disagreement regarding either the proper interpretation of the Guide or translation of the Guide from the English language edition is to be referred to ABS for resolution.

6 Limitation

ABS makes no representations beyond those contained herein and in the provisions of the Agreement regarding its reports, statements, plan review, surveys, certificates or other services. Except as otherwise specifically set out in this Agreement, neither ABS nor any of its officers, committees, directors, employees, subcontractors, or agents shall be liable for any loss, damage, or expense of whatever type or kind sustained by any person due to any act, omission or error of any nature caused by ABS, its officers, committees, directors, employees, subcontractors, or agents, or due to any inaccuracy of any nature, even if held to amount to a breach of warranty.

7 Hold Harmless

Client, or its assignee or successor in interest, agree to release ABS and all ABS officers, directors, employees, subcontractors and agents (collectively "ABS Representatives"), and to indemnify and hold harmless ABS and ABS Representatives against any and all claims, demands, lawsuits, or actions for damages, including legal fees, to persons and/or property, tangible, intangible, or otherwise which may be brought against ABS or ABS Representatives incidental to, arising out of or in connection with the Agreement, the work to be done, the services to be provided or material to be furnished under ABS certificates, except for those claims caused solely and completely by the negligence of ABS or ABS Representatives.

Any other individual, corporation, partnership, limited liability company, or other entity who in any way participates in, is engaged in connection with or is a beneficiary of, any portion of the services described herein shall also release ABS and all ABS Representatives and shall indemnify and hold ABS and all ABS Representatives harmless from and against all claims, demands, lawsuits or actions for damages, including legal fees, to persons and/or property, tangible, intangible or otherwise, which may be brought against ABS or ABS Representatives by any person or entity as a result of the services performed pursuant to this Agreement, except for those claims caused solely and completely by the negligence of ABS or ABS Representatives.

8 Arbitration

Any and all differences and disputes of whatsoever nature arising out of this Agreement shall be put to arbitration in the City of New York pursuant to the laws relating to the arbitration there in force, before a board of three persons, consisting of one arbitrator to be appointed by ABS, one by Client, and one by the two so chosen. The decision of any two of the three on any point or points shall be final. Subject to 1-6/9

until such time as the arbitrators finally close the hearings either party shall have the right by written notice served on the arbitrators and on an officer of the other party to specify further disputes or difference under this Agreement for hearing and determination. The arbitration is to be conducted in accordance with the rules of the Society of Maritime Arbitrators, Inc. in the English language. The governing law shall be the law of the State of New York, U.S.A. The arbitrators may grant any relief which they, or a majority of them, deem within the scope of the agreement of the parties, including, but not limited to, specific performance. Awards made in pursuance to this clause may include costs including a reasonable allowance for attorney's fees and judgment may be entered upon any award made hereunder in any court having jurisdiction. ABS and Client hereby mutually waive any and all claims to punitive damages in any forum.

Client shall be required to notify ABS within thirty (30) days of the commencement of any arbitration or any other legal proceeding between it and third parties which may concern ABS's work in connection with this Agreement and shall afford ABS an opportunity, at ABS's sole option, to participate in the arbitration or legal proceeding ling.

9 Time Bar to Legal Action

Any statutes of limitation notwithstanding, Client expressly agrees that its right to bring or to assert against ABS any and all claims, demands or proceedings whether in arbitration or otherwise shall be waived unless (a) notice is received by ABS within ninety (90) days after Client had notice of or should reasonably have been expected to have had notice of the basis for such claims; and (b) arbitration or legal proceedings, if any, based on such claims or demands of whatever nature are commenced within one (1) year of the date of such notice to ABS.

10 Limitation of Liability

If Client, any licensee, subcontractor or anyone claiming through, or in the name of Client relies on any information or advice given by ABS or ABS Representatives and suffers loss, damage or expense directly thereby which is proven to have been caused by the negligent act, omission or error of ABS, ABS Representatives or from any breach of any implied or express warranty of workmanlike performance in connection with the services, or from any other reason, then the combined liability of ABS or ABS Representatives to Client or any other person, corporation, partnership, business entity, sovereign, country or nation, will be limited to the greater of a) $100,000 or b) an amount equal to ten (10) times the sum actually paid for the services alleged to be deficient.

The limitation of liability may be increased up to an amount twenty-five (25) times that sum paid for services alleged to be deficient upon receipt of Client's written request at or before the time of performance of those services and upon payment by Client of an additional fee of $10 for every $1,000 increase in the aggregate limitation of liability for all services.

Neither ABS nor ABS Representatives shall in any circumstances be liable for indirect or consequential loss or damage (including, but without limitation, loss of profit, loss of contract, or loss of use) suffered by any person including Client from any failure by ABS in the performance of its obligations under this Agreement. Under no circumstances whatsoever shall any individual who may have personally caused the loss, damage or expense be held personally liable.

11 Scope of Certification

Nothing contained in any certificate, Design Assessment, Factory Approval, or report is to be deemed to relieve any designer, builder, owner, manufacturer, seller, supplier, repairer, operator, insurer or other entity or person of any duty to inspect or any other duty or warranty, expressed or implied. Any certificate, Design Assessment, Factory Approval, or report evidences only that at the time of the review or audit the material, component, product or system, or any other item covered by a certificate, Design Assessment, Factory Approval, or report complied with one or more of the Rules, Guides, standards or other criteria of ABS, or, where there is no ABS standard, complied with the industry or manufacturer's standard specified in the Design Assessment. Any listing or certificate is issued solely for the use of ABS, its committees, its

clients or other authorized entities. Nothing contained in any listing, certificate, Design Assessment, Factory Approval, or report is to be deemed in any way a representation or statement beyond those contained herein. ABS is not an insurer or guarantor of the integrity, safety or suitability of a container or of the material, components, products, systems, equipment, machinery and other items incorporated in it. The validity, applicability and interpretation of any certificate, report, plan or document review or approval are governed by the Rules, Guides, standards or other criteria of ABS who shall remain the sole judge thereof. ABS is not responsible for the consequences arising from the use by other parties of the Rules, Guides, standards or other criteria of ABS, without review, plan approval and survey by ABS.

The term "approved" shall be interpreted to mean that the plans, reports or documents have been reviewed for compliance with one or more of the Rules, Guides, standards or other criteria acceptable to ABS.

12 Confidentiality

All plans, drawings, specifications and information given to and reports prepared by ABS in connection with performance under this Agreement shall be treated as confidential by ABS and shall not be used for any other purposes than those for which furnished without prior written consent, except as may be required by judicial order, by governmental order or regulation, by subpoena or by direction of a governmental agency with subpoena power, by the European Commission, by the flag Administration, or as necessary to enforce any of ABS's rights hereunder or to defend any claim hereunder. ABS may release specific information related to the statutory certification application and status. This information may be published on the ABS website or by other media and may include the names, dates and locations of all surveys performed by ABS, the expiration date of all statutory certificates issued by ABS, transfers, suspensions, withdrawals, cancellations and reinstatements of approval, and other related information as may be required.

13 Emblem

This Emblem is a representation that will be affixed to each offshore container that meets the criteria of this Guide and is certified by ABS

FIGURE 1
Emblem – ABS Offshore Container (ABS OC)

CHAPTER 2

Offshore Containers

CONTENTS

CHAPTER 2
Offshore Containers

SECTION 1
General

1 Scope

This Chapter specifies the requirements for the design, manufacture and marking of offshore freight, waste skip and service containers intended for repeated use to, from and between fixed or floating installations and ships.

2 Offshore Containers

An offshore container is a portable unit with gross mass not exceeding 25,000 kg (55116 lb) 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.

Offshore containers are subdivided into the following three categories:

2.1 Offshore Freight Container

Offshore freight containers are offshore containers built for the transport of goods. Examples of offshore containers are:

- *General Cargo Container.* A closed container with doors
- *Cargo Basket.* An open top container for general or special cargo
- *Tank Container.* A container for transport of dangerous or non-dangerous fluids
- Multiple Element Gas Containers (MEGCs)
- *Bulk Container.* A container for the transport of solids in bulk
- *Special Container.* A container for the transport of special cargo (e.g., garbage containers, equipment)
- Boxes, gas cylinder racks

2.2 Offshore Service Container

An offshore service container is an offshore container built and equipped for a special service task, usually as a temporary installation (e.g., laboratories, workshops, stores, power plants, control stations).

Offshore service containers on a fixed or floating offshore facilities are to be in accordance with the ABS *Guide for Portable Accommodation Modules*.

Portable accommodations are considered offshore service containers for the purpose of transit only.

2.3 Offshore Waste Skip

An offshore waste skip is an open or closed offshore container used for the storage and removal of waste.

Note: Normally constructed from flat steel plate forming the load bearing sections of the container, with bracing in the form of steel profiles (e.g., channel or hollow section) fitted horizontally and/or vertically around sides and ends. In addition to the padeyes for the lifting set, these containers may have side mounted lugs suitable for use with the lifting equipment mounted on a skip lift vehicle.

FIGURE 1
Offshore General Cargo Container

CHAPTER 2
Offshore Containers

SECTION 2
Materials and Welding

1 General

Materials made of steel are to be suitable for the intended service conditions. They are to be of good quality, free of defects and are to exhibit satisfactory formability and weldability characteristics. Materials other than steels are to be specially considered under ABS review.

2 Identification of Materials

The manufacturer is to adopt a system for the identification of finished plates, shapes, castings and forgings which will enable the material to be traced to its original heat; and the Surveyor is to be given sufficient documentation such as a Material Test Report (MTR) and a process for verifying the grade markings and traceability of the material.

3 Steels

Structural steels for the primary structure are to be carbon steel, carbon-manganese steel, carbon-manganese micro-alloyed steel or low-alloyed steel. Rolled (plates, profiles or hollow sections) or forged or extruded or cast steels are to be produced in accordance with a standard recognized by ABS. Steels in the primary structure are to be killed and fine grain treated.

Steels with yield strength (σ_y) above 500 N/mm^2 (51 kgf/mm^2, 73 ksi) are not to be used. Where required, steels for welding are to be made by open hearth, electric furnace or the basic oxygen steel process.

Stainless steels are to comply with the requirements of a standard recognized by ABS.

3.1 Toughness Requirements

Charpy V-Notch (CVN) tests are required to demonstrate that rolled or forged or extruded steels would meet the longitudinal CVN impact requirements indicated in 2-2/Table 1. CVN tests are to be carried out in accordance with ISO 148-1 or other ABS recognized standard.

TABLE 1
Charpy Impact Test – Structural Steel for Primary Structural Members

Yield Strength			*Average CVN (Longitudinal)*			*Test Temperature*	
N/mm^2	*kgf/mm^2*	*ksi*	*J*	*kgf-m*	*ft-lbs*	*Thickness ≤ 25 mm (0.98 in.)*	*Thickness > 25 mm (0.98 in.)*
235-305	24-31	34-44	27	2.8	20	T_D	20°C (36°F) below T_D
305-420	31-43	44-61	$\sigma_y/10$	$\sigma_y/1.01$	$\sigma_y/1.97$		
420-500	43-51	61-73	42	3.5	31		

Note: Steels with thickness < 6 mm (0.23 inches) do not require CVN tests.

4 Steel Casting in ISO-Corner Fittings

Refer to Appendix 4 for requirements.

5 Aluminum

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

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

Aluminum alloys used in offshore containers are to be made by rolling or extruding.

Aluminum alloys and tempers as specified in 2-2/Tables 2 and 3 may be used. Use of other alloys or tempers are to be subject to special consideration.

TABLE 2
Aluminum Alloys and Tempers for Rolled Products

Alloy		*Temper*
ISO 209-1	*AA*	*ISO/AA*
AlMg 2.5	5052	0/0 HAR/H32 HBR/H34 HCR/H36
AlMg 3	5754	0/0 HAR/H32 HBR/H34
AlMg 3.5	5154	0/0 HAR/H32 HBR/H34
AlMg 4	5086	0/0 HAR/H32 HBR/H34
AlMg 3 Mn	5454	0/0 HAR/H32 HBR/H34

Alloy		*Temper*
ISO 209-1	*AA*	*ISO/AA*
AlMg4.5 Mn	5083	0/0 HAR/H32 HBR/H34
AlSiMgMn	6082	0/0 TB/T4 TE/T5 TF/T6

Note: AA – American Aluminum Association.

TABLE 3
Aluminum Alloys and Tempers for Extruded Products

Alloy		*Temper*
ISO 209-1	*AA*	*ISO/AA*
AlSi 0.5 Mg	6063	TB/T4 TF/T6
AlSiMgMn	6082	TF/T6

Note: AA – American Aluminum Association.

6 Non-metallic Materials

Timber, plywood, fiber plastics, and other non-metallic materials are not to be used in primary structures.

Notes:

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

2 For usage of non-metallic material refer to the ABS *Guidance Notes on Review and Approval of Novel Concepts*.

7 Material Certificates

Materials used for the construction of offshore containers are to be furnished with documentation in accordance with 2-2/Table 4. All materials for primary structures are to be identifiable against the certificates.

TABLE 4
Documentation of Materials

Structure	*Documentation and Certification*		
	Inspection Certificate 3.2[1]	*Inspection Certificate 3.1*[1]	*Test Report 2.2*[2]
Padeyes	x		
Other primary structural members		x	
Secondary structural members			x

Notes:

1 Certificate issued equivalent to 3.1 & 3.2 in ISO 10474.

2 Test report is to be equivalent to 2.2 in ISO 10474.

3 ABS recognized standard equivalent to ISO 10474 can be used as an alternative.

8 Welding

Welding is to be in accordance with a standard recognized by ABS as per Appendix 1 or approved manufacturer specifications. Drawings are to indicate the code applied.

8.1 Welding Procedure

A written Welding Procedure Specification (WPS) is to be prepared in accordance with a standard recognized by ABS. The WPS and the supporting Procedure Qualification Record (PQR) are to be reviewed and accepted by the attending ABS Surveyor.

Impact tests are required as part of the welding procedure qualification. Test temperatures and test results are to comply with the requirements given in 2-2/Table 1.

Welding procedures that are not in accordance with a recognized standard are to be submitted for review and approval by ABS Materials Department.

8.2 Welding of Primary Structure

All primary structure is to be welded by full penetration welds.

Non-essential primary structure may be joined by fillet welds with the approval of ABS.

Unwelded primary structures may be accepted by special consideration.

8.3 Welding of Secondary Structure

Secondary structure is to be joined by continuous fillet welds including the welding of secondary structure to the primary structure. Intermittent fillet welds may be considered with the approval of ABS.

8.4 Welder/Welder Operator Qualification

Before proceeding with welding, the welder or the welding operator is to be qualified to the intended welding procedure. Properly documented Welder Performance Qualification Records (WPQR) conducted in accordance with a recognized welding standard (such as the ASME Boiler and Pressure Vessel Code, Section IX or AWS D1.1) and certified by a recognized body may be presented to the ABS Surveyor for acceptance as evidence of qualification. A qualified welder or welding operator is permitted to perform similar welding, provided the welding essential variables (e.g., position, with or without backing, pipe size, etc.) are within specified ranges defined by the recognized welding standard being applied.

CHAPTER 2
Offshore Containers

SECTION 3
Design

1 General *(1 February 2020)*

All offshore containers are to be designed and constructed such that they can withstand impact loads resulting from heavy seas or contact with any structure during transportation. The design is to facilitate loading and unloading operations while the vessel is operating at a maximum wave height of 6 meters (20 ft).

Suitable means are to be taken to avoid direct contact of faying surfaces of aluminum to steel.

The designer is responsible for designing the offshore container with sufficient strength to withstand the design loads/testing loads and is to include factors of safety allowing for fatigue, normal wear and tear, manufacturing fabrication techniques, and material properties.

1.1 Structural Design

Only the primary structure as a structural frame is to be considered in design calculations. Special consideration to the definition of primary structure may be given to certain types of containers (e.g., waste skip). Structural design is to be performed in accordance with 2-3/2.

Transition is to be provided for structural continuity to reduce stress concentrations.

1.2 Stability from Overturning

Offshore containers are to be designed to withstand an incline of 30° in any direction loaded at its maximum gross mass applied at its center of gravity. If the actual center of gravity is not known, the maximum gross mass is to be applied at the half height of the container.

Calculations are to be provided verifying the inclining requirement, alternatively an incline test is to be performed.

1.3 Protection for Protruding Parts

Protruding parts are to be clear from damaging other containers and lifting sets during operations.

Padeyes are to be designed in such a way that they do not protrude outside the boundaries of the container other than vertically upward, and as far as possible they are to be designed to avoid damage from other containers.

1.4 Top Protection *(1 February 2020)*

Open top containers with permanently installed fixtures or equipment and open frame containers are to be provided with top protection made from a robust material (e.g. plates, grating, GRP, tarpaulin, nets/mesh, webbing).

Top protections are not to be located lower than the lower flange of the top frame members. Fixtures for the top protection are not to cause snagging hazards.

Top protections can be rigid or flexible. Where possible, the top protection shall cover entire roof of the container; small openings may be incroprated to permit the passage of slings when pad eyes are located below the protection.

1.4.1 Rigid Top Protections *(1 February 2020)*

Rigid top protections are to have the following characteristics:

- Designed for a uniformly distributed load of 3kN distributed over an area of 600x300 mm (24x12 in).
- Non-slip surface
- Opening size not more than 1,500 mm^2 (2 in^2)

Examples of rigid top protections are gratings and plates.

1.4.2 Flexible Top Protections *(1 February 2020)*

Flexible top protections are to be designed for a central load of 0.03Rg, but not less than 1kN (2245 lbf) and not more than 3kN (674 lbf), without making contact with internal fittings or equipment.

Examples of flexible top protections are nets/mesh, webbing and tarpaulin.

Note: Nets and webbing are to have an opening size not more than (50 × 50) mm (2 x 2 in).

1.5 Intermediate Cargo Decks

When intermediate cargo decks are fitted, they are to be designed for the following load, applied uniformly distributed on the deck:

$$P_i = \alpha P g \psi$$

where

α	=	minimum of 0.5
P	=	payload
g	=	acceleration due to gravity
ψ	=	dynamic factor (= 3)

Intermediate cargo decks are to be designed for a minimum load of half of the total payload (minimum α of 0.5). Values of α other than 0.5 may be modified accordingly.

1.6 Design Temperature (T_D)

The design temperature (T_D) is not to be more than –20°C (–4°F).

When a dedicated service is specified with a lowest daily mean temperature greater than 0°C (32°F), the design temperature may be taken as no more than 0°C (32°F). This requirement on design temperature to

be 0°C (32°F) is applicable to regions of temperate climates between 36° North and 36° South and in Australian waters only. Marking requirements for containers operated in these regions is specified in 2-6/3f).

1.7 Stacking and Stacking Fittings

Offshore containers are not to be stacked during transportation on ships.

If an offshore freight or service container is intended for stacking on fixed or floating platforms, the container is to be designed for stacking and stacking height is not to exceed two levels. Empty waste skips with trapezium shaped sides may be designed for stacking at multiple levels.

The stacking guides on the top rails or on the underside of a container are to be designed to prevent lateral movement under normal operating conditions.

2 Structural Strength

The structural strength of the containers are to be verified through design calculations and tests as indicated in Chapter 2, Section 4.

2.1 Lifting with Lifting Set

2.1.1 Loads

The primary structure is to be analyzed for a total load of $2.5Rg$, considering an internal load of $(2.5R - T)g$ evenly distributed over the container floor, where:

R = rating (i.e., the maximum gross mass of the container including permanent equipment and its cargo, but excluding the lifting set)

T = tare mass (i.e., the mass of an empty container including any permanent equipment but excluding cargo and lifting set)

g = acceleration due to gravity

For tank containers, the actual distribution of the tare mass is to be used.

2.1.2 Criteria

Von Mises equivalent stress is not to exceed the allowable stress for plate elements, *se*, obtained from the following equation:

$$\sigma_e = 0.85C$$

where

C = σ_y for steel

= ε for aluminum base material

= $0.7B\sigma_u$ for aluminum heat affected zone

σ_y = specified minimum yield stress

β = 0.8 for ISO AlMg4.5Mn-HAR/AA5083-H32

= 0.7 for all other aluminum alloys and tempers

σ_u = specified minimum tensile strength at room temperature

Beam elements are to meet the requirements of a standard recognized by ABS such as AISC.

2.2 Lifting with Forklift Truck

2.2.1 Loads *(1 February 2020)*

The primary structure is to be analyzed for a total load of $1.6(R+S)g$, considering an internal load of $[1.6(R+S)-T)]g$ evenly distributed over the container floor. Design force on the primary structure is to be calculated as $1.6(R+S)g$.

where

R , T and g are specified in 2-3/2.1.1.

Where fork pockets are intended only for handling of the empty container, the design load is to be taken as $1.6(T+S)g$. Such containers are to be marked in accordance with 2-6 Table 1.

The weight of the lifting set is to be taken into account when the strength of the fork pockets are to be calculated.

S = mass of the lifting set

2.2.2 Criteria

Von Mises equivalent stress is not to exceed the allowable stress for plate elements, σ_e, indicated in 2-3/2.1.2.

Beam elements are to meet the requirements of a standard recognized by ABS such as AISC.

2.3 Impact Loads

Impact loads are dynamic loads of very short duration.

The ability of a container unit to withstand impact loads is to be determined by calculation. Testing is to be carried out to demonstrate that the container can withstand impact loads (refer to 2-4/4).

When simplified calculations are used, each beam is to be considered separately and assumptions concerning support conditions are to be stated in the calculations.

2.3.1 Horizontal Impact

2.3.1(a) Loads.

The primary structure is to be designed to withstand a localized horizontal impact force acting at any point. This force may act in any horizontal direction on the corner post. On all other frame members in the sides, the load may be considered as acting orthogonal to the side.

The calculated (static equivalent) stress due to impact is to be combined with the lifting stresses resulting from static lifting forces (Rg).

The following loads are to be considered for the calculation of the stress due to impact:

- For corner posts and side rails of the bottom structure: –0.25Rg
- For other frame members of the side structure, including the top rails: –0.15Rg
- For horizontal impact on the tank containers for dangerous cargoes, refer to Appendix 2.

R and g are defined in 2-3/2.1.1.

2.3.1(b) Criteria.

Maximum calculated deflections at these loadings are not to exceed:

i) For corner posts and bottom side rails: $\ell_n/250$

where is the total length of the rail or post

ii) For other frame members : ℓ_n /250

where ℓ_n is the shortest edge of the wall being considered, in mm (in.).

Note: ℓ_n is a (nominal) reference length and it is often different from actual span of a beam.

For loads indicated in 2-3/2.3.1(a), the von Mises equivalent stress is not to exceed the allowable stress for plate elements σ_e, obtained from the following equation:

$$\sigma_e = C$$

where C is defined in 2-3/2.1.2.

Beam elements are to meet the requirements of a standard recognized by ABS such as AISC.

2.3.2 Vertical Impact

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 is likely on a corner. Such impact forces cannot be readily simulated by static forces. Therefore, as an alternative, the strength is to be verified through vertical impact test as described in with 2-4/4.

In addition the following applies:

2.3.2(a) Loads.

The side rails and end rails in the base are to be able to withstand vertical point forces of $0.25Rg$ at the center span.

R and g are defined in 2-3/2.1.1.

2.3.2(b) Criteria.

Calculated deflections are not to exceed (ℓ_n /250), where ℓ_n is the total length of the rail.

Von Mises equivalent stress is not to exceed the allowable stress σ_e, defined in 2-3/2.3.1(b).

Beam elements are to meet the requirements of a standard recognized by ABS such as AISC.

2.4 Padeye Design

2.4.1 Loads

Padeyes are to be designed to withstand a total vertical force of $3Rg$.

The force is to be considered as distributed uniformly between $(n - 1)$ padeyes, where the value of 'n' is not to exceed 4 and not to be less than 2.

The resulting sling force on each padeye is calculated as follows:

$$F_s = \frac{3Rg}{(n-1)\cos\beta}$$

where

β = mass of the lifting set

R and g are defined in 2-3/2.1.1.

Containers with only one padeye may be approved by ABS with special consideration. That single padeye of the container is to be designed for a total vertical force of $5Rg$.

Note: Containers without a roof may have insufficient strength and stiffness to pass the 2 point lifting test, refer to 2-4/3.3. Therefore, the open top container is to be analyzed to withstand the load occurring in the 2-point lifting test. In these calculations, the nominal yield stress of the material should not be exceeded. These calculations do not replace the prototype testing.

2.4.2 Criteria

The maximum concentrated stresses at the hole edge are not to exceed $2\sigma_y$ at design load.

2.5 Internal Forces on the Container Walls

The walls of the containers are to withstand a force of $0.6Pg$ (60% of the payload) evenly distributed over the whole surface without experiencing any permanent deformation.

3 Other Structural Requirements and Construction

3.1 Primary Structure

3.1.1 Minimum Material Thickness for Primary Structure

The following minimum material thickness (t_{min}) requirements apply:

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

- For $R \geq 1000$ kg (2205 lb) t_{min}= 6 mm (0.24 in.)
- For $R < 1000$ kg (2205 lb) t_{min}= 4 mm (0.16 in.)

ii) For all other parts of the primary structure: t_{min}= 4 mm (0.16 in.)

iii) Waste skips which are designed to utilize the external skin to support most or all of the load:

- t_{min} = 6 mm (0.24 in.), the area up to 100 mm (4.0 in.) from the side edges.
- t_{min}= 4 mm (0.16 in.), for the remaining part of the side structure.

where

R = rating (i.e., the maximum gross mass of the container including permanent equipment and its cargo, but excluding the lifting set)

t_{min} = minimum material thickness, in mm (in.)

Note: The thickness may have to be increased beyond these values to take account of special considerations such as rating, design, corrosion allowances, the need for impact tests of the material, etc.

3.1.2 Padeyes

The padeyes are to align with the sling to the center of lift, with a maximum manufacturing tolerance of ± 2.5 degrees.

The difference in the diagonal measurements between lifting point centers not to exceed 0.2% of the length of the diagonal, or 5 mm (0.2 in.), whichever is the greater.

Clearance between the shackle pin and padeye hole is not to exceed 6% of the nominal shackle pin diameter.

The tolerance between padeye thickness and inside width of shackle are not exceed 25% of the inside width of the shackle.

Padeyes are to be designed as to permit free movement of the shackle and sling termination without fouling the padeye.

Lifting points are to be positioned to minimize the risk of slings fouling against the container or its cargo during operation.

If the lifting force is transferred through the thickness of a plate, plates with specified through thickness properties in accordance with an ABS recognized standard are to be used.

3.1.3 ISO Corner Fittings

Refer to Appendix 4 for requirements.

3.2 Secondary Structure

3.2.1 Minimum material thickness

For Secondary structures made from metallic materials, the required minimum material thickness is:

$t_{min} = 2\,\text{mm}\,(0.08\,\text{in.})$

3.2.2 Floors

In the case that there is a possibility that water may collect within the container, provisions are to be provided for drainage.

3.2.3 Doors and Hatches

Doors and hatches, including hinges and securing devices, are to be designed to equivalent environmental forces as surrounding structure.

Doors are to be capable of being secured by a locking device in the closed position against the structural framing of the opening. Each of the double doors are to be secured by a locking device against the top and bottom structural framing of the opening.

All doors are to be capable to be secured in the open position.

Locking devices are to be secured in such a manner that they do not allow any disengagement during operations.

3.2.4 Internal Securing Points

Containers for general cargo are to have internal securing points that are designed to withstand a force of at least 10 kN (1 tf, 2248 lbf).

A secondary securing device is to be provided for all removal parts.

3.3 Additional Structure

3.3.1 Fork Lift Pockets

Fork lift pockets may be provided for handling containers in the loaded or unloaded condition. The fork lift pockets are to pass completely through the base structure. Forklift pockets are to have closed tops and be provided with means to prevent the container from toppling from the forks.

Fork lift pockets are to meet the following dimensional requirements:

- The minimum internal dimensions of the forklift pockets are to be 200 mm × 90 mm (8 in. × 3.5 in.).

- Forklift Pockets are be located as far apart as practicable but need not be more than 2,050 mm (81 in.) or less than 900 mm (35 in.) apart from center to center of pockets.

Notes:

1 Special requirements apply for fork pockets on tank containers and MEGCs used offshore for the carriage dangerous cargoes, (Refer to Appendix 2).

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

3 In order to compensate for strength reduction in the bottom side rails in the way of forklift pockets, additional strengthening can be placed on the top of the side girders, and it is be in line with the webs of the bottom girder. It is also required to have full penetration welds on the strengthening members and extend at least 100 mm (4 in.) outside the pocket opening at each end. These strengthening members also serve as protections against the forklift truck rupturing the side girder.

3.3.2 Tugger Points

Tugger points are the attachments to the container that facilitate handling the container without lifting. They are to be attached to the primary structure of the container only and are to be positioned as low on the structure as possible within the outer edges of the container. Tugger points are to be designed to withstand a load equal to the rating of the container.

4 Equipment

Supporting structure of equipment on offshore containers is to be designed for the following factors:

- Dynamic factor: $\psi = 3.0$
- Safety factor against breaking: $SF = 2.0$

External connections of the equipment are to be protected from damage.

Note: Certification of equipment is not covered by this Guide.

5 Coating and Corrosion Protection

Coatings, corrosion protection, paint protection and materials of offshore containers are to be suitable for environmental conditions.

All offshore container roofs are to be coated with a permanent non-slip medium.

CHAPTER 2
Offshore Containers

SECTION 4
Prototype Testing

1 Test Equipment and Calibration

1.1 Test Mass

Calibrated weights are to be used for verification of the test mass.

1.2 Calibration

Calibration of load cell and hand set are to be carried out annually in accordance with ISO 7500-1 or similar national or international standard.

Calibration of test blocks is to be carried out every 24 months to a national or international standard. Measured mass is to be marked on each block.

Calibration certificates for each piece of equipment used in the prototype test of the container are to be collected during attendance and retained as part of the prototype test report.

2 Prototype Testing

A container selected for prototype testing is to be representative of the manufacturing process to be used for production units. It is to be constructed in conformity with the approved drawings intended for subsequent production units.

Modifications to the offshore container design require engineering revaluation as per 4-5/2 and may require additional prototype testing.

Test loads are to be uniformly distributed on the container floor, otherwise test loads are to be distributed in such a way that it represents the actual load distribution in operating conditions.

For offshore containers with additional cargo decks, test loads are to be divided between the floor and the additional deck in accordance with 2-3/1.5. In the case that the additional deck is detachable, the test loads are to be placed on the floor.

3 Lifting Test

3.1 General

Lifting tests are to be carried out with lifting set placed at an angle to the vertical equal to the design angle and held for 5 minutes.

Lifting sets used for the prototype testing of the container are not to be used in service.

Lifting tests are to be carried out carefully at a gradual speed in order to avoid significant acceleration.

3.2 All-point Lifting

The container under test is to be loaded to a total mass of $2.5R$ and lifted clear off the ground. The test is to be carried out using all the padeyes and with internal load equal to $2.5R - T$.

3.2.1 Acceptance Criteria

- *During Test:* No deflections are to exceed 1/300 of the span of the member.
- *After Test*: No permanent deformations or other damages are to be observed

3.3 Two-point Lifting

The container under test, is to be loaded to a total mass of $1.5R$ and lifted clear off the ground. The test is to be carried out using only two diagonally opposite padeyes and with an internal load equal to $1.5R - T$.

3.3.1 Acceptance Criteria

- *After Test:* No permanent deformation or other damage is to be observed after testing.

3.4 Post-lifting Test Inspection and Examination of Padeye

Nondestructive examination and visual inspection as per 2-5/2.1 of the padeyes, are to be carried out after the lifting test.

4 Vertical Impact Test

4.1 General

The containers are to be loaded to their maximum permissible payload (P), and are to be dropped or lowered onto a solid floor. The floor may be covered by wooden planks not exceeding 50 mm (2 in.) in thickness.

The container is to be inclined to form an angle with the floor not less than 5 degrees but in no case is the greatest vertical distance between the highest point and lowest point of the underside of the container corners to be more than 400 mm (16 in.).

The corner with lowest rigidity is to be the impacted corner. The corner with lowest rigidity is normally at the door end for dry cargo container.

One of the following test options are required:

- *Option 1 – Drop Test*: For drop test, the container is to be suspended from a quick release hook and dropped freely for at least 50 mm (2 in.) for an initial impact of at least one (1) m/s.
- *Option 2 – Lowering Test:* For lowering test, the container is to be lowered to the floor with a minimum constant speed of 1.5 m/s.

  Whenever the container is lowered from a crane, impact speed is to be observed as there is a possibility for the suspending wire and the hook to dampen the free-fall drop speed.

ABS may consider alternative procedures for loading on testing.

4.1.1 Acceptance Criteria

- *After Test:* No major deformation or other damage is to be observed.

5 Other Tests *(1 February 2020)*

5.1 Fork lift pockets *(1 February 2020)*

Open top containers with an overall length of 6.5 meters (21 ft) or more designated to be lifted by fork lift pockets while loaded, are to be tested with a total uniform distributed gross mass of $1.6(R+S)g$ and lifted clear of the ground using the fork pockets.

Note: Fork lift pockets testing is not mandatory for other types of containers that have fork lift pockets.

5.1.1 Acceptance Criteria

- *During Test:* No deflections are to exceed 1/300 of the span of the member.
- *After Test:* No significant deformations or other damages are to be observed after the test is carried out.

5.2 Driving Ramps *(1 February 2020)*

Driving ramps when fitted in offshore containers are to be tested for an axle load of 1.25P, but need not to be more than 7,260 kg (16,006 lb), evenly distributed between two tires of a test vehicle. Each tire is to have a surface area not exceeding 142 cm^2 (22 in^2) with a nominal centre distance of 760 mm (30 in).

If the container is specially designed to transport one or more unit cargoes with a weight (UC) that would give a test axle load higher than 7,260 kg (16,006 lb), the test load is to be 2 times UC. For example, if the unit cargo weighs 6,000 kg (13228 lb), then the test load is to be 2 times 6,000 kg.

Driving ramps are to be clearly marked with the maximum allowable axle load, which shall be 0.8 times the test load.

5.3 Stability from Overturning *(1 February 2020)*

Refer to section 2-3/1.2

6 Dangerous Goods Cargo

Containers intended for the transport of dangerous goods are to be tested in accordance with the IMDG Code and other relevant Rules, regulations and standards as per Appendix 2 of this Guide.

CHAPTER 2
Offshore Containers

SECTION 5
Production

1 General

Offshore containers are to be manufactured in compliance with the ABS approval letter, approved drawings and specifications which are to be made available to the Surveyor upon his request.

The ABS Surveyor is to verify that the safety procedures are in place at the manufacturing facility and at all times the Surveyor has the right to decline work if the conditions are deemed unsafe as per ABS policy.

Offshore containers are to be produced under ABS surveillance in a manufacturing facility which has a valid ABS Factory Approval Certificate. Offshore containers produced in a facility which does not have an ABS Factory Approval Certificate requires 100% inspection.

Equipment used to manufacture Offshore Containers is to be calibrated in accordance with an ABS recognized standard. Calibration certificates are to be periodically reviewed by the Surveyor to verify the equipment continues to be in compliance with the applicable standard.

Note: ABS quality procedures require calibration certificates for each piece of equipment used in the production of the container to be collected during the annual quality assessment and retained as part of the endorsement.

The Welding Procedure Specifications (WPS) and Welder Qualifications are to be reviewed and accepted by the ABS Surveyor prior to production. The Surveyor is to confirm that all WPS' are applicable to the design being manufactured and approved by ABS.

2 Primary Structure

2.1 Examination of Welds

2.1.1 General

Refer to 2-5/Table 1 for the required extent of visual examination of welds. The percentages as specified in the Table are to be applicable for the entire length of the welds.

Whenever fuel gas welding is carried out on the primary structure, ultrasonic and magnetic particle examinations are to be carried out along with radiographic examinations.

TABLE 1
Nondestructive Examination (NDE) of Structural Welds

Category of Member	*Type of Examination*			
	I Visual Examination	*II Magnetic Particle Examination(1)*	*III Ultrasonic Examination(2)*	*IV Radiographic Examination(2)*
Essential/Non-redundant primary structure	100%	100%	100% Padeyes 20% all other	10%
Non-essential primary structure	100%	20%	20%	10%
Secondary structure	100%	N/A		

Notes:

1 Dye Penetrant examination to be used where magnetic particle examination is not possible

2 Dye Penetrant examination to be used where magnetic particle examination is not possible

2.1.2 Nondestructive Examination (NDE) Methods

The NDE methods specified in 2-5/Table 2 are to be appropriate for the structural welding being inspected.

TABLE 2
Standards Relevant (NDE) Methods

Visual	*Magnetic Particle*	*Dye Penetrant*	*Ultrasonic*	*Radiography**
ISO 17637	ISO 17638	ISO 3452-1	ISO 17640	ISO 17636-1and ISO 17636-2

Note: Class B Improved radiographic techniques are to be used. Request for inspection to alternative NDE methods may be considered on case by case basis.

2.1.3 Weld Acceptance Criteria

TABLE 3
NDE Acceptance Criteria

Visual	*Magnetic Particle*	*Dye Penetrant*	*Ultrasonic*	*Radiography**
ISO 5817(1)	ISO 23278	ISO 23277	ISO 11666	ISO 10675-1(2)
Level B	Level 1	Level 1	Level 2	Level 1

Notes:

1 For aluminum ISO 10042

2 For aluminum ISO 10675-2

3 Manufacturing facilities may use an alternative standard recognized by ABS

3 Secondary Structure

The ABS Surveyor is to verify that the fabrication of secondary structure satisfies the requirements of this Guide and other defined requirements specific to the type of container. The secondary structure with regard to the intended function (cargo securing, prevention of water ingress, etc.) is to be inspected.

4 Production Testing

4.1 Lifting Test

An all-point test as described in 2-4/3.2 is to be carried out on containers that are randomly selected from the production batch. The number of containers to be tested are to be in accordance with 2-5/Table 4.

TABLE 4
Number of Containers Required for Lifting Test

Total Number in Series	*Number to be Tested**
1-5	1
6-10	2
11-20	3
21-40	4
≥ 40	10% of total

Note: * The quantity given includes the container which was prototype tested excluding the test sling used for prototype testing.

4.2 Weatherproofness Testing

If the offshore container is specified to be weatherproof, then weatherproofness tests are to be carried in accordance to ISO 1496-1 for at least 10% of the containers in a production series.

CHAPTER 2
Offshore Containers

SECTION 6
Marking and Data Plate

1 Safety Marking

TABLE 1
Safety Marking

	Closed Container	*Open and Framed Container*	*Container with Forklift Pockets(For empty handling)*	*Aluminum Containers*
Location	All around roof perimeter*	Top surface of top rail	Near to each fork pockets	All four sides
Text	N/A	N/A	"Empty lift only"	"ALUMINUM CONTAINER"
Character size (not less than)	Band 100 mm (4 in.) wide	N/A	50 mm (2 in.) high	75 mm (3 in.) high.
Color	Solid contrasting color	Solid light color or hatching in a contrasting color	N/A	N/A

Note: * In case the roof of the container is recessed below the top rail, the top surface of the top rail is to be marked at a minimum.

2 Identification Markings

Each container is to be permanently marked with the manufacturer's serial number with characters not less than 50 mm high:

2.1 Container Number

In addition to the manufacturer's serial number marking, the container number is to be displayed in contrasting colors as specified below in 2-6/Table 2:

TABLE 2
Container Number

Location	*Character Size*
All sides	75 mm (3 in.) high
Roof (if applicable)	300 mm (12 in.) high or as large as possible if restrictions with availability of space on the roof applies.

For open sided containers, the container number is to be marked in attached panels specifically to carry this number.

3 Information Marking

Each container is to be clearly marked with:

a) Maximum gross mass (kg)

b) Tare mass (kg)

c) Payload (kg)

d) Relevant electrical hazard classification and zone marking in accordance with ABS recognized standards indicated in Appendix 1/11

e) Relevant dangerous goods placarding in accordance with the IMDG Code. (Refer to *Appendix 2* for further information)

f) The text "ONLY TO BE USED IN TEMPERATE CLIMATES" displayed on the same side of the data plate, whenever the containers are operated in temperate climates as specified in 2-3/1.6

a), *b)* and *c)* are to be displayed in characters of a contrasting color not less than 50 mm (2 in.) high and *f)* is to be displayed in characters of a contrasting color not less than 75 mm (3 in.)

Notes:

1 An offshore Container carrying dangerous goods which is taken out of service is to have all dangerous goods placarding removed.

2 A matte 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.

4 Marking for Containers with Intermediate Deck

Payload of the deck is to be displayed on the inside of the container, clearly visible, with characters of contrasting colors not less than 50 mm (2 in.) high.

5 Container Data Plate

5.1 General

The container data plate is to be:

- Made of non-corrosive materials
- Attached externally to the doors, although for containers with no doors the data plate may be attached in a position that it is clear visible place at all times.
- Marked in English language with characters not less than 4 mm high (provision to include additional languages may be considered).

Note: Aluminum rivets are not allowed for the attachment of data plates.

5.2 Contents on the Data Plate *(1 February 2020)*

The data plate to be headed:

OFFSHORE CONTAINER DATA PLATE

ABS O.C: YYYY (Where YYYY indicates the latest publication year of ABS OC Guide)

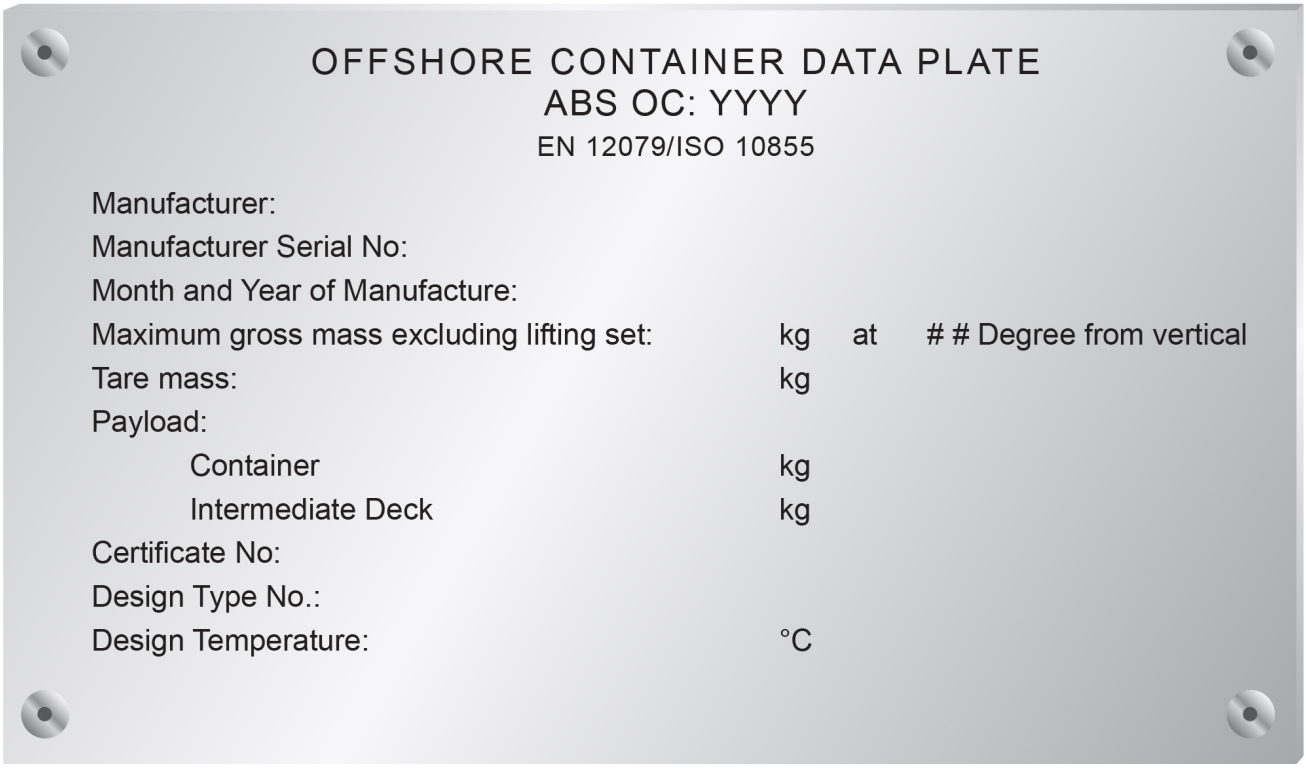
EN 12079 / ISO 10855

The plate is to indicate the following information:

- Manufacturer's Name
- Manufacturer's serial number
- Month and year of manufacture
- Maximum gross mass in kilograms excluding lifting set at the design sling angle
- Tare mass in kilograms
- Payload in kilograms and intermediate deck payload (if applicable)
- Production Certificate Number
- Design Type Number
- Design temperature

Sample format of the offshore container data plate is shown in 2-6/Figure 1.

FIGURE 1
Example of Data Plate Layout *(1 February 2020)*



CHAPTER 3
Lifting Sets

CONTENTS

CHAPTER 3
Lifting Sets

SECTION 1
General

1 Scope

The lifting set is to be used on a designated container and is to be with the container at all times. It is removed only for the purpose of maintenance or replacement. In case, there is a necessity for replacement, the new lifting set is to be manufactured to the original specification and it is also necessary to comply with the requirements of an ABS recognized standard.

Lifting set is to be assembled with components as specified in 1-2/2.1.

The Quality control procedures of the facility that is intended to manufacture the lifting set is required to comply with requirements specified in 1-5

CHAPTER 3
Lifting Sets

SECTION 2
Materials and Welding

1 General

Materials are to be suitable for the intended service conditions. The materials used for manufacturing of the lifting sets are required to comply with the requirements of an ABS recognized standard and able to resist dynamic loads.

2 Identification of Materials

The manufacturer is to adopt a system for the identification of finished plates, shapes, castings and forgings which will enable the material to be traced to its original heat; and the Surveyor is to be given sufficient documentation and means for verifying the traceability of the material.

3 Materials used in Slings and their Components

Materials used in wire ropes, chain slings, ferrules and thimbles are to be in accordance with an ABS recognized standard.

4 Toughness Requirements

Tests are required to demonstrate that steels meet the Charpy V-Notch (CVN) impact requirements in accordance with ISO 148-1 or an ABS recognized standard.

The CVN requirements are to be attained when tested at the design air temperature (T_D) with minimum average impact energy of 42 J (4.3 kgf-m, 31 ft-lb). For welded components (chains, links etc.) the test is to be sufficient to take impact test samples in the weld with the notch centered in the fusion line with minimum average impact energy of 27 J (2.8 kgf-m, 20 ft-lb). The position of the weld is to be accurately identified by etching with a suitable reagent before cutting the notches.

When standard specimens cannot be made, the required energy values are to be reduced as follows:

- 10 mm (0.39 in.)×7.5 mm (0.29 in.) : $^5/_6$ of the above value;
- 10 mm (0.39 in.)×5.0 mm (0.19 in.) : $^2/_3$ of the above value.

5 Galvanizing

Galvanizing of a component is to be carried out under the control of the manufacturer. Materials for galvanized structures are to be fabricated and designed in accordance with industry-recommended practices.

6 Material Certificates

The materials used in all components are to be supplied with an inspection certificate in accordance with ISO 10474 or similar ABS recognized standard.

7 Welding

Before undertaking the welding of any structure subject to the requirements of this Guide, a manufacturer is to prove to the satisfaction of the Surveyor that the welding consumables and the proposed process are acceptable by ABS and that welders and welding operators are duly qualified for the work intended.

CHAPTER 3
Lifting Sets

SECTION 3
Design

1 Technical Requirements

1.1 General Requirements

Slings are to be rated for a maximum angle (β) of 45 degrees.

Hinge type couplings are not allowed.

The distance between the top master link and the ground when the lifting set is hanging from the top rail is to be not more than 1.3 meters (4.3 ft).

1.2 Dimensions and Strength of Lifting Sets

The minimum working load limit (WLL_{min}) indicated in Appendix 4, includes dynamic factor which represents the dynamic amplification while lifting operations are carried out in adverse weather conditions.

Note:

For containers in the intermediate container ratings, with values greater than 2,000 kg the WLL_{min} is calculated by interpolation ($WLLmin = R$ x dynamic factor)

Selection of lifting set components such as chain, wire rope, shackles and master links are to be in accordance with an ABS recognized standard based on the calculated $WLLmin$ of the container.

Minimum working load limit for each shackle and for each sling (WLLs) are to be determined in accordance with 3-3/Table 1.

TABLE 1
Required Minimum Shackle Working Load Limit (WLL_s)

Required Minimum Shackle Working Load Limit (WLL_s)		
4 Leg Sling	2 Leg Sling	Single Leg Sling
$WLL_{min}/(3 \times \cos\beta)$	$WLL_{min}/(2 \times \cos\beta)$	WLL_{min}

Where β is the angle of the sling leg from the vertical and $WLLmin$ is the minimum WLL determined from Appendix 4.

2 Components

2.1 Wire Rope Slings

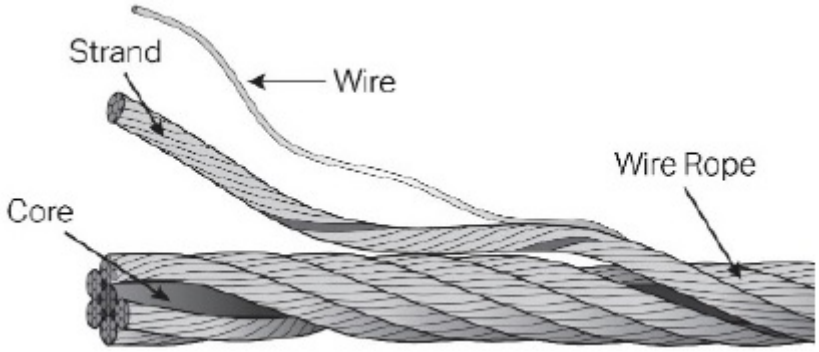
Wire rope slings are to be constructed to a standard recognized by ABS with restrictions outlined below:

i) Wire rope is to be 6-stranded and of type 6 × 19 or 6 × 36.

Note:

In wire rope with 6 × 19 construction, the first number 6 indicates the number of strands and second number 19 indicate the number of wires to make up one strand. Similarly, for wire ropes with 6 × 36 construction, indicate 6 strands and 36 wires to make a strand.

FIGURE 1
Construction of Wire Rope

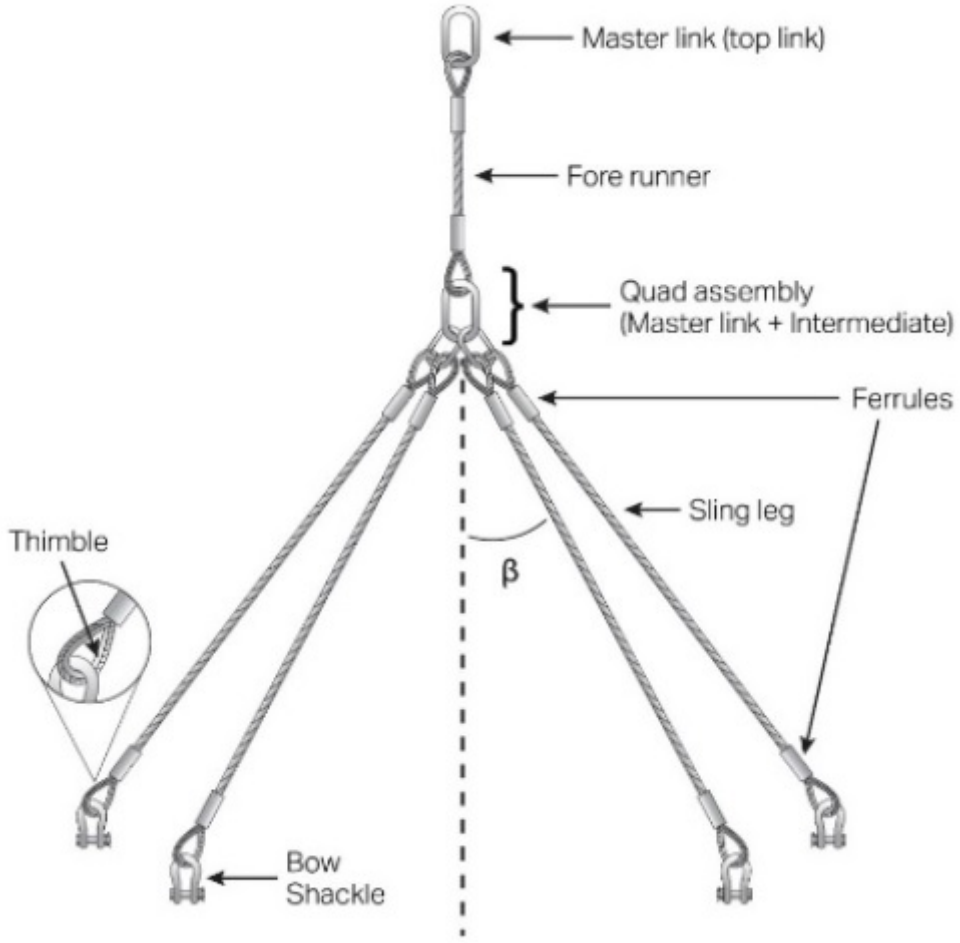


ii) The termination of wire rope is to be ferrule secured thimble.

iii) Wire ropes are to be either fiber cored or steel cored.

iv) Wire rope grade 1770/Improved Plowed Steel or 1960/Extra Improved Plowed Steel are to be used. The working load limit is to be calculated on the basis of the actual rope grade used.

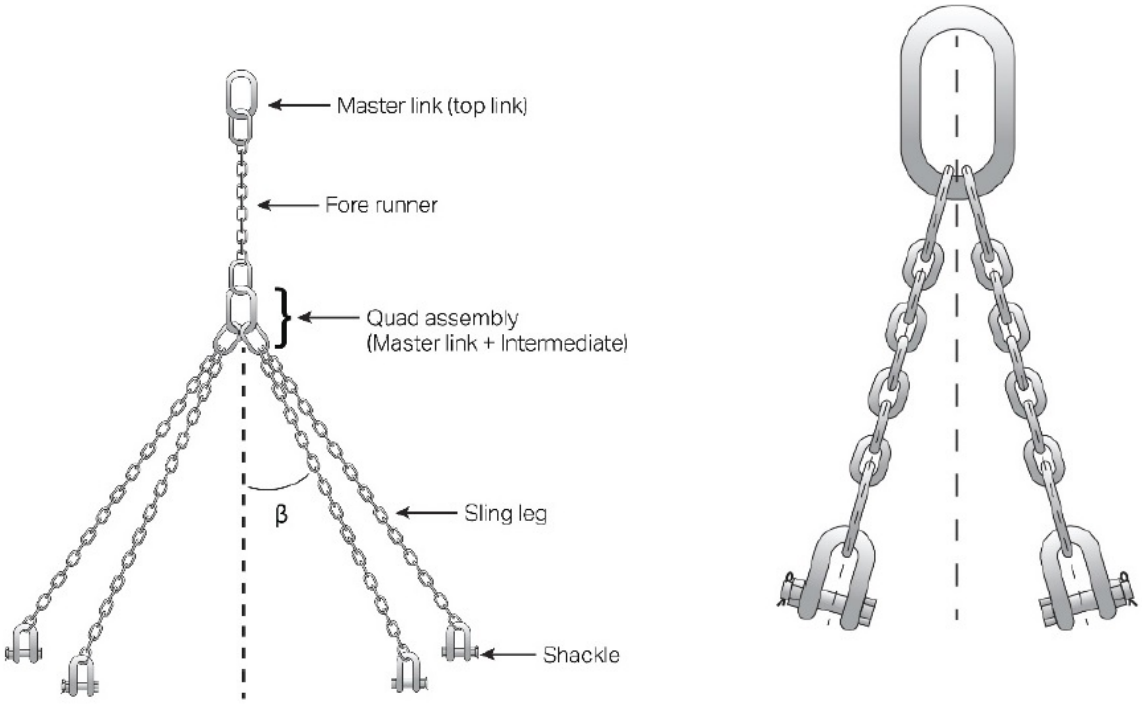
FIGURE 2
Four Legged Wire Sling with Fore Runner



2.2 Chain Slings

Chain slings are to be of Grade 8, and are to meet the requirements of the applicable ABS recognized standards. Other grades may be accepted after special consideration by ABS.

FIGURE 3
Chain Slings



Four Legged Chain Sling with Fore Runner **Two Legged Chain Sling**

2.3 Master (Top) Link

The master links are to meet the requirements of the applicable ABS recognized standard.

FIGURE 4
Master Link Assembly

2.4 Ferrules

Ferrules are to be manufactured to a standard recognized by ABS.

2.5 Thimbles

Thimbles are to be manufactured to a standard recognized by ABS.

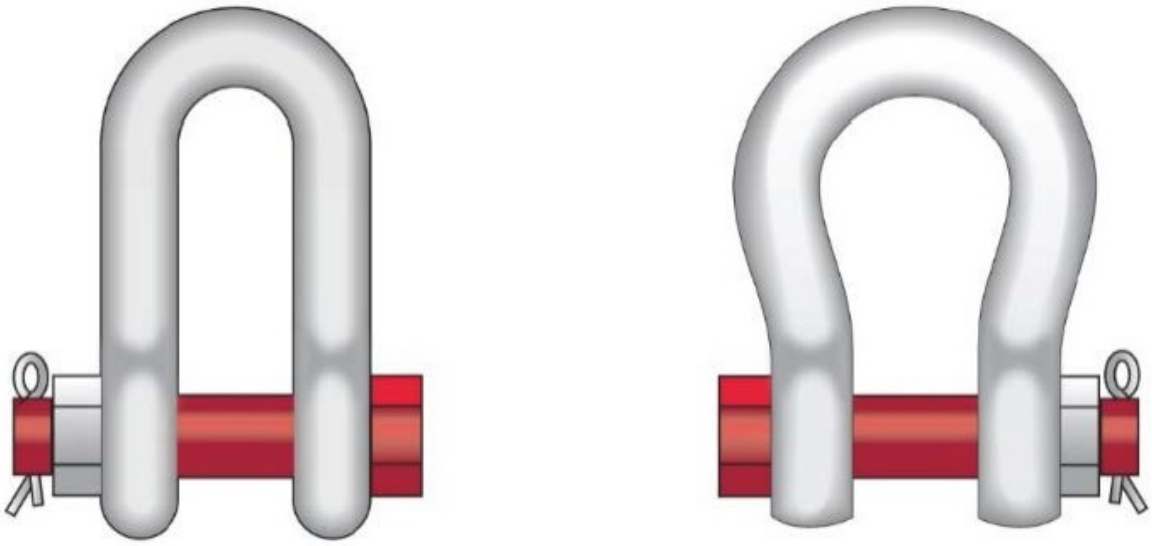
FIGURE 5
Thimble

2.6 Shackle

Shackles are to be manufactured to a standard recognized by ABS and with the additional requirement that the tolerance on the nominal diameter of the shackle pin to be –0/+3%.

Shackles are restricted to bolt type pin with hexagon head, hexagon nut, and split cotter pin only.

FIGURE 6
Shackles



CHAPTER 3
Lifting Sets

SECTION 4
Marking

1 General

Various components of the lifting sets are to be marked in accordance with standards used in the design approval of the component.

1.1 Shackles

Shackles are to be permanently marked with a unique identification whenever they are fitted to a sling as a permanent assembly. The marking is to be positioned in such a way that it is away from high tensile stress areas with characters of at least 5 mm (0.2 in.) high applied using “low stress” stamps.

1.2 Slings

A permanently marked identification tag made of metal is to be secured to the top assembly of the sling.

For chain slings, the tag is to be 8-sided, similar to 3-4/Figure 1, and for wire rope slings, the tag is to be round, similar to 3-4/Figure 2.

The tags for the slings are to be marked with the following information:

- ABS OC mark
- Unique identification number of the sling
- Number of legs
- Diameter of chain or wire rope used, including the top leg where fitted
- Working load limit (WLL) in tonnes
- Maximum angle of the sling legs from the vertical
- Mass of the lifting set (S)

1.2.1 Marking alternatives *(1 February 2020)*

As an alternative to marking slings with a tag, one of the following methods may be used for marking.

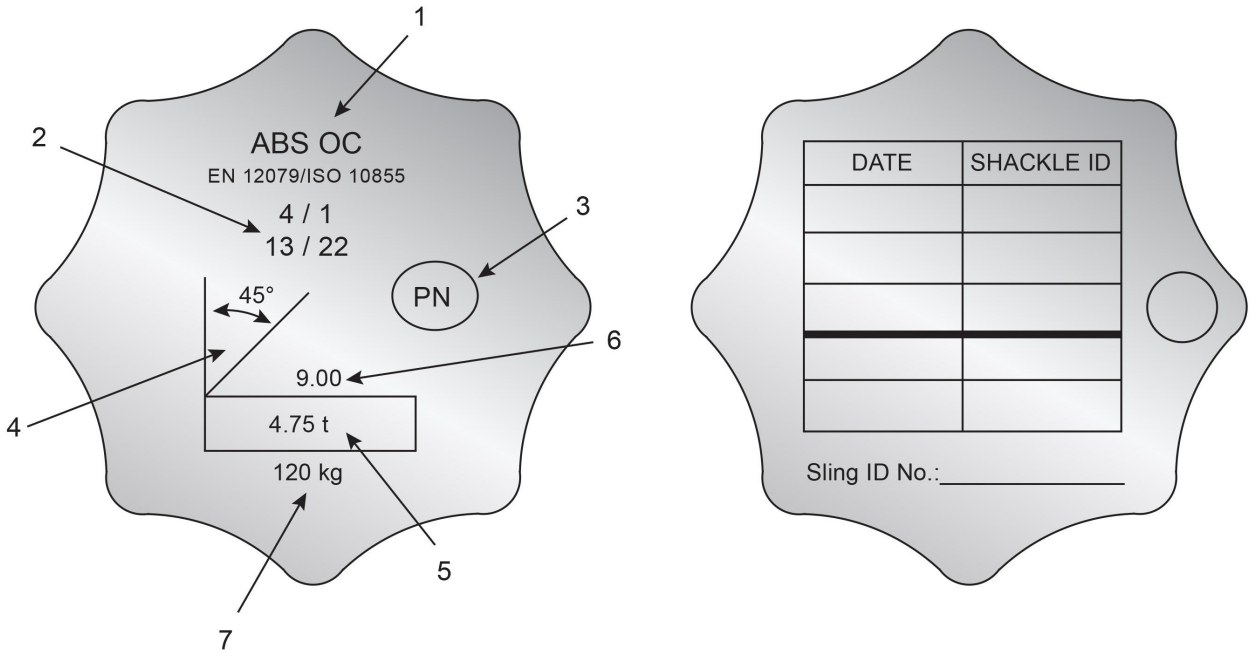
i) The marking required by 3-4/1.2 may be marked on a ferrule on wire rope slings.

ii) Slings may be marked with a small tag with only an ID number on it. All other information required by 3-4/1.2 shall be available, either electronically or by other means.

Note:

Dropped objects such as an identification tag on an offshore container lifting set can be a major health and safety issue. The risk of such accidents can be reduced or removed if one of the alternative solutions are used. However, national authorities or other stakeholders might not accept such alternative marking.

FIGURE 1
Identification Tag for Chain Sling



1) ABS OC

2) 4 Legs of 13 mm, 1 forerunner of 22 mm (example)

3) Manufacturer Mark

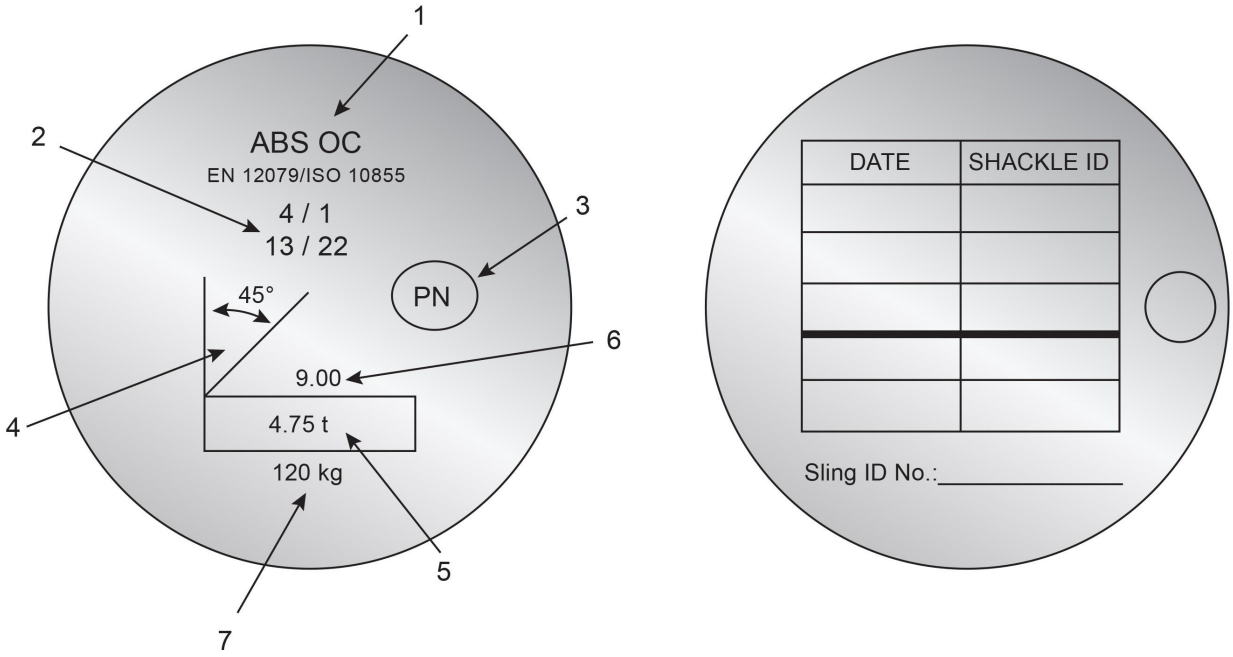
4) Sling angle

5) Shackle size

6) WLL (t)

7) Mass of the lifting set

FIGURE 2
Identification Tag for Wire Rope Sling



1) ABS OC

2) 4 Legs of 13 mm, 1 forerunner of 22 mm (example)

3) Manufacturer Mark

4) Sling angle

5) Shackle size

6) WLL (t)

7) Mass of the lifting set

CHAPTER 4

In-Service Inspections

CONTENTS

CHAPTER 4
In-Service Inspections

SECTION 1
General

1 Scope

This part of the Guide specifies requirements for the periodic inspection, examination and testing of offshore freight, waste skips, and service containers built in accordance with this Guide. Inspection requirements following damage and repair of offshore containers are included in 4-5.

ABS requires the container to be periodically inspected, examined and tested in the presence of an ABS Surveyor in accordance with the requirements detailed in Chapter 4, Sections 2 and 3. The ABS Surveyor has the authority to request additional inspections, examinations and/or tests in order to provide confidence the container or lifting set is satisfactory for service.

Compliance with the schedule of periodic inspections, examinations and tests for offshore containers certified to this Guide is the responsibility of the Owner or Operator.

The periodic inspection, examinations or tests may be performed within one (1) month of the test date without affecting the schedule of inspection, examination and tests. Any container or lifting set which has exceed the test date is to be removed from service until the applicable tests have been satisfactorily performed to the requirements of this Guide. Containers and lifting sets which are out of test for more than six (6) months are to be tested in accordance with the test criteria at the four (4) year interval indicated in 4-2/Table 1 and 4-3/Table 1.

CHAPTER 4
In-Service Inspections

SECTION 2
Schedule of Inspections for Offshore Containers

1 Schedule of Periodic Inspection, Examination and Test – Offshore Containers

TABLE 1
Schedule of Inspection, Examination and Tests for Offshore Containers

Time or Interval (Max. Interval)	*Inspection, Examination and Tests*			
	Lifting Test	*NDE*	*Visual Inspection*	*Suffix to be Marked on Inspection Plate*
Initial Certification	Comply with all the requirements specified in Chapter 2			
12 months	N/A[(2)]	N/A[(2)]	Yes	V
48 months	N/A[(2)]	Yes	Yes	VN
Substantial repair or alteration	Yes	Yes	Yes	T

Notes:

1 ABS is the sole judge in determining which repairs or alterations require testing.

2 ABS may require other or additional inspections, examinations and or tests.

T: indicates lifting test; nondestructive examination, and visual examination; or;

V: indicates visual inspection only; or;

VN: indicates NDE and visual inspection

Nondestructive examination and visual inspection is to be carried out after the load test.

2 Lifting Test

Load tests are to be in accordance with 2-4/3.2 of this Guide.

3 Nondestructive Examination

Nondestructive examination is to be in accordance with 2-5/2.1 of this Guide.

4 Visual Inspection

The ABS Surveyor is to perform a visual inspection on the interior and exterior of an unloaded container. Means for inspection of all load bearing parts, including the under-side of the base structure, are to be provided. Access to areas around fixed equipment or other obstructions are to be provided to the satisfaction of the ABS Surveyor.

The following are to be visually inspected to verify that they are free from visible defects, excessive corrosion, distortion, mechanical damage or any other signs of distress or overload:

- Flooring
- Lashing points
- Padeyes
- Structure
- Welds

The above is not a comprhensive list and does not include all possible items.

Additionally, the following are to be visually inspected to verify that they are functioning as intended:

- Door Closures
- Drainage facilities
- Hatches
- Locking devices
- Other appendages

The above is not a comprhensive list and does not include all possible items.

CHAPTER 4
In-Service Inspections

SECTION 3
Schedule of Inspections for Lifting Sets

1 Schedule of Inspection, Examination and Tests – Lifting sets

TABLE 1
Schedule of Periodic Inspection, Examination and Testing of Lifting Sets

Time or Interval (Max. Interval)	*Applicable to:*	*Inspection, Examination and Tests*			
		Load Test	*NDE*	*Visual Inspection*	*Suffix Marked on Sling Tag*
Initial certification	Complete lifting set	Comply with all the requirements in Chapter 3			
12 months	Complete lifting set	N/A	N/A	Yes	V
48 months	Sling components and joining links excluding legs	Load test or NDE		Yes	T or VN*
	Chain sling legs	Load test or NDE		Yes	T or VN*
	Shackles	N/A	N/A	Yes	V
	Wire Rope Legs	N/A	N/A	Yes	N/A
Substantial repair or alteration	Complete lifting set	Yes	Yes	Yes	T

Note: Dependent upon whether tested or examined

T: indicates load test; nondestructive examination, and visual examination; or;

V: indicates visual inspection only; or;

VN: indicates NDE and visual inspection

Nondestructive examination and a visual inspection is to be carried out after the load test.

2 Load Test of Chain Sling Legs

A test load equal to 2 times WLL of a single leg, ±2%, is to be applied to each leg without shock. The load is to be applied for at least 2.5 minutes before measurements are taken.

3 Nondestructive Examination of Sling Components except Wire Rope Legs

Magnetic particle examination is to be undertaken as specified in 2-5/2.1.

4 Visual Inspection of the Lifting Set

The ABS Surveyor is to perform a visual inspection on the lifting set components in accordance with ABS recognized standards to verify that they are free from visible defects, excessive corrosion, distortion, mechanical damage or any other signs of deterioration or overload.

CHAPTER 4
In-Service Inspections

SECTION 4
Inspection Plates/Tags

1 Offshore Containers Inspection Plate

Containers plates are to be fitted with a plate carrying all the information specified in this Section.

The plate is to be as follows:

- Made of non-corrosive material
- Attached externally to the door in a manner to avoid unauthorized or accidental removal (for containers with no doors the data plate is to be attached in a clear visible place)
- Marked permanently in English language with characters not less than 4 mm high (additional languages may be considered)

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

1.1 Contents of the Inspection plate *(1 February 2020)*

The containers certified by ABS are to have an Inspection plate that is headed:

OFFSHORE CONTAINER INSPECTION PLATE

ABS O.C:YYYY

EN 12079 / ISO 10855

The plate is to indicate the following information:

- Owner's container number
- Owner's name
- Date of last inspection

The date of last inspection is to be the date on which the most recent inspection was carried out to the satisfaction of the ABS Surveyor.

The date of next inspection is not to be indicated on the data plate. Provision to facilitate permanent marking to record a minimum of nine inspections is to be provided.

1.2 Marking

Upon satisfactory completion of the inspection, examination and when applicable, test(s), the plate is to be permanently marked, in accordance with 4-2/Table 1, as follows:

- The date (YYYY-MM-DD) of the inspection, examination, and when applicable, test(s) together with the unique identification mark of the competent person together with either:
- Suffix T; indicating a lifting test, non-destructive examination and visual inspection; or
- Suffix VN; indicating nondestructive examination, and visual inspection; or
- Suffix V; indicating visual inspection only.

Notes:

1 For marking of the inspection plate. Further information refer to 4-4/1.1.

2 A recommended format for the plate is shown in 4-4/Figure 1.

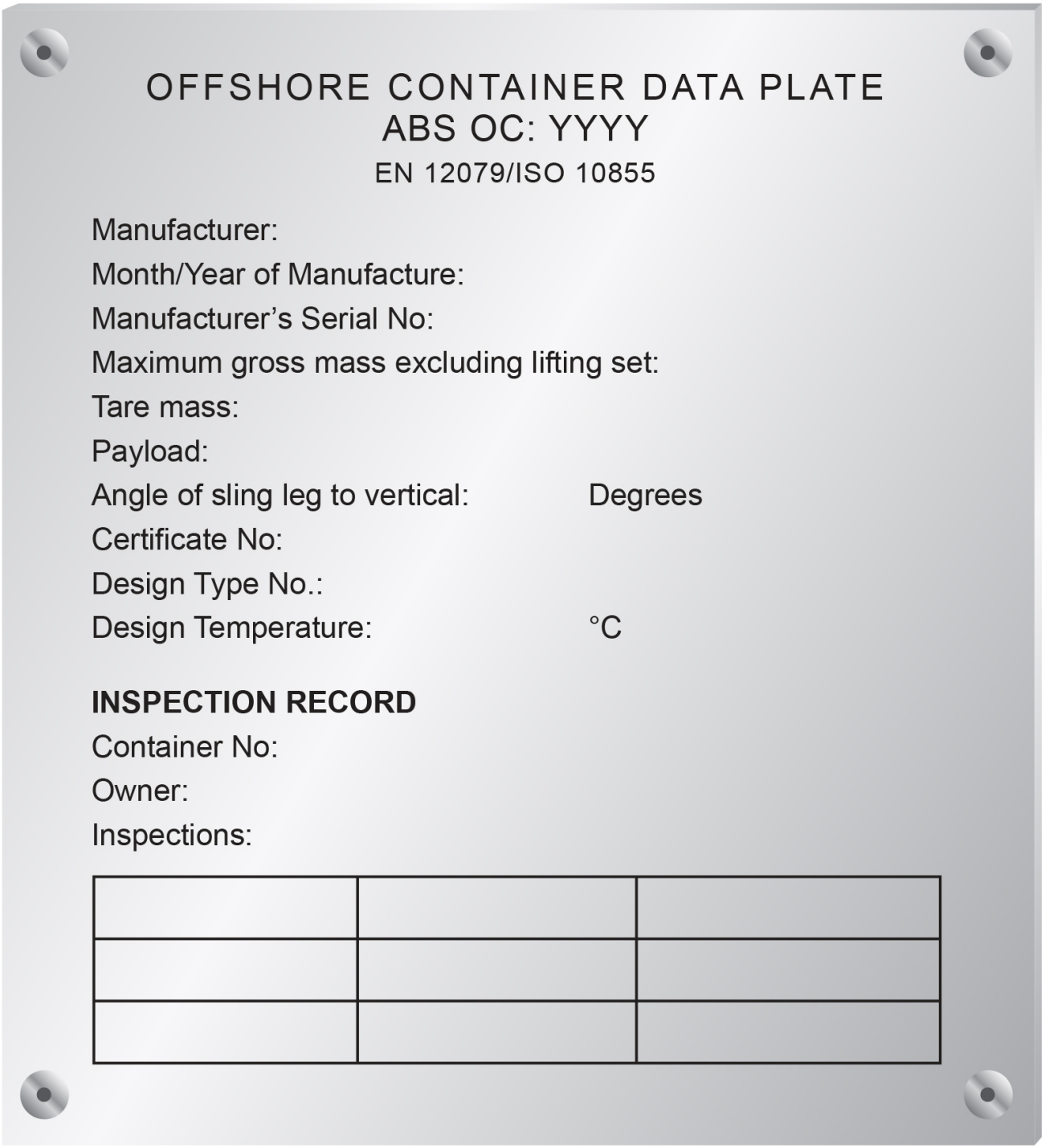
3 The information required for the inspection plate may be combined with the offshore container data plate.

FIGURE 1
Example of Inspection Plate layout

OFFSHORE CONTAINER INSPECTION PLATE ABS OC		
CONTAINER NO: OWNER: INSPECTIONS:		
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		

Inspection plate and the Data Plate can be combined into a single plating as below in 4-4/Figure 2.

FIGURE 2
Template of Combined Data Plate and Inspection Plate *(1 February 2020)*



2 Inspection Tag for Lifting Set

2.1 Marking

Upon satisfactory completion of all inspections, examinations and tests, the sling identification tag is to be attached by suitable means to prevent accidental removal and permanently marked in accordance with 4-3/Table 1 as follows:

- The date YY-MM-DD of the inspection/test, as applicable, together with the unique identification mark of the ABS together with either:
- Suffix T: indicating load test; nondestructive examination, and visual examination; or
- Suffix V: indicating visual inspection only; or
- Suffix VN: indicating NDE and visual inspection

CHAPTER 4
In-Service Inspections

SECTION 5
Repair and Modification Procedures

1 Damage and Repair Procedures

Periodic inspections are required by this Guide to determine whether damage or wear sustained during operation is extensive enough to require the container or lifting set to be repaired or replaced. Damage and wear is generally measured against the original condition. The ABS Surveyor is the sole judge with regards to certification under this Guide in determining the extent of the damage or wear and whether the container or lifting set is to be repaired.

A container or lifting set which is considered damaged to the extent that a repair is required, is to be removed from service until repairs are carried out and inspected by an ABS Surveyor. Means to transport the container or lifting set are to be arranged which does not include the utilization of the damaged components of the container or lifting set.

The repair facility is to operate under an established quality control system in accordance with the requirements of this Guide. The ABS Surveyor is to review and accept the Welding Procedure Specifications (WPS) and Welder Qualifications being used for the repair.

Repairs are to be carried out in accordance with the requirements of this Guide. The damaged or worn areas are to be repaired to their original dimensions and profiles in equivalent grades of material.

The ABS Surveyor is to review all records detailing the repair to verify that the container or lifting set has been repaired to the original condition. The container or lifting set is to be tested and inspected in the presence of an ABS Surveyor in accordance with 4-2/Table 1 or 4-3/Table 1 of this Guide.

2 Modification Procedures

Modifications or revisions to an existing design are to be submitted to ABS in accordance with Chapter 2 or Chapter 3 of this Guide.

The facility modifying the container or lifting set is to operate under an established quality control system in accordance with the requirements of this Guide. The ABS Surveyor is to review and accept the Welding Procedure Specifications (WPS) and Welder Qualifications being used for the repair.

The ABS Surveyor is to review records detailing the modification to verify if the container or lifting set has been modified in accordance with the approved drawings. The container or lifting set is to be tested, if required by the ABS approval letter, and inspected in the presence of an ABS Surveyor in accordance with Chapter 2 or Chapter 3 of this Guide.

3 Record Keeping

The Owner is to retain all records of approval and inspection for traceability of the container or lifting set during its life cycle. The records are to include, but are not limited to the following:

- Engineering approval
- Prototype testing certificate
- Production records
- Production certificate
- Records of repair
- Records of modification
- Changes in identification
- Transfer of ownership

All records supporting the certification of the container or lifting set are to be made available to the ABS Surveyor upon his request.

SECTION 1

ABS Recognized Standards

The following list consists of standards which are used in industry and are recognized by ABS. Additional standards may be recognized contingent on a review to determine whether the standard is at least equivalent to that recognized by ABS.

1 Materials

ISO 6892-1	Metallic materials – Tensile testing – Part 1: Method of test at room temperature
ISO 148-1	Metallic materials – Charpy impact test – Part 1: Test method
ISO 10474	Steel and steel products- Inspection documents
EN 10204	Metallic products-Types of inspection documents
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 thermo mechanical rolled weldable fine grain structural steels
EN 10210-1	Hot finished structural hollow sections of non-alloy and fine grain structural steels. Technical delivery requirements
EN 10219-1	Cold formed welded structural sections of non-alloy and fine grain steels. Technical delivery requirements
EN 10088-2	Stainless Steels – Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes
ASTM A240/240 M	Standard specification for chromium and chromium – nickel stainless steel plate, sheet, and strip for pressure vessels and for general applications
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
ISO 209-1	Aluminium and Aluminium Alloys – Chemical Composition

2 Quality Control for Manufacturing Facilities

ISO 9001	Quality Management Systems – Requirements

3 ISO Corner Fittings

ISO 1161	Series 1 freight containers – Corner fittings – Specification
ISO 668	Series 1 freight containers – Classification, dimensions and ratings

4 Padeyes

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

5 Welding

EN 9606-1	Qualification test of welders. Fusion welding. Steels
EN ISO 9606-2	Qualification test of welders. Fusion welding-Part 2: Aluminium and Aluminium alloys
ASME	ASME Boiler and Pressure Vessel Code, Section IX
AWS D1.1	Structural welding code – Steel
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 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
EN ISO 15613	Specification and qualification of welding procedures for metallic materials – based on pre-production welding test

6 Calibration

EN ISO 7500-1	Metallic materials. Verification of static uniaxial testing machines. Tension/ compression testing machines. Verification and calibration of the force – measuring system

7 Nondestructive Testing

ISO 17637	Non-destructive testing of welds. Visual testing of fusion –welded joints
ISO 17638	Non-destructive testing of welds. Magnetic particle testing
EN ISO 3452-1	Non-destructive testing. Penetrant testing-Part 1: General Principals
ISO 17640	Non-destructive testing of welds. Ultrasonic testing- techniques, testing levels and assessment
EN ISO 17636-1	Non-destructive testing of welds. Radiographic testing. X- and gamma- ray technique with film
EN ISO 17636-2	Non-destructive testing of welds. Radiographic testing. X- and gamma- ray technique with digital detectors
ISO 23278	Non-destructive testing of welds. Magnetic particle testing of welds-Acceptance levels
ISO 23277	Non-destructive examination of welds. Penetrant testing of welds. Acceptance levels
EN ISO 17643	Non-destructive testing of welds. Eddy current testing of welds by complex – plane analysis
EN ISO11666	Non-destructive testing of welds. Ultrasonic testing – Acceptance levels
EN ISO 5817	Welding. Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded). Quality levels for imperfections

ISO 10675-1	Non-destructive testing of welds. Acceptance levels for radiographic testing. Steel, nickel, titanium and their alloys
ISO 10042	Arc-welded joints in aluminum and its alloys – Quality levels for imperfections
ISO 10675-2	Non-destructive testing of welds. Acceptance levels for radiographic testing. aluminum and its alloys
EN ISO 3834-2	Quality requirements for fusion welding of metallic materials – Part 2: Comprehensive Quality Requirements
ISO 9712	Non-destructive testing. Qualification and certification of NDT personnel

8 Weatherproofness Testing

ISO 1496-1	Series 1 freight containers – Specification and testing – Part 1: General Cargo containers for general purposes

9 Tank Containers

ISO 1496-3	Series 1 freight containers – Specification and testing. Tank containers for liquids, gases and pressurized dry bulk

10 Containers for Bulk Solids

ISO 1496-3	Series 1 freight containers – Specification and testing. Tank containers for liquids, gases and pressurized dry bulk
ISO 1496-4	Series 1 freight container. Specification and testing. Non-pressurized containers for dry bulk

11 Hazardous Areas

ATEX Directive	Equipment intended for use in Potentially Explosive Atmospheres
IECEx	International Electrotechnical Commission for use in Explosive atmospheres

12 Analysis – Beam Elements

Manual of Steel Construction, AISC, 9th Edition

13 Standards for Lifting Set and their components

ASME B30.9	Slings – Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings
ASME B30.26	Rigging Hardware – Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings
ISO 898-1	Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screw and studs with specified property classes – coarse thread and fine pitch thread
API Spec. 9A	Specification for Wire Rope
EN 12385-4	Steel wire ropes. Safety. Stranded ropes for general lifting applications
EN 13411-3	Terminations for steel wire ropes. Safety. Ferrules and ferrule – securing
EN 13411-1	Terminations for steel wire ropes. Safety. Thimbles for steel wire rope slings
EN 818-4	Short link chain for lifting purposes – Safety – Part 4 – Chain slings – Grade 8

EN 818-6	Short link chain for lifting purposes. Safety. Chain slings. Specification for information for use and maintenance to be provided by the manufacturer
EN 1677-1	Components for slings. Safety. Forged steel components, Grade 8
EN 13414-1	Steel wire rope slings. Safety. Slings for general lifting service
EN 13414-2	Steel wire rope slings. Safety. Specification for information for use and maintenance to be provided by the manufacturer
ABNT NBR 13545	Lifting purposes – Shackles (Brazilian Standard)
ISO 2415	Forged shackles for general lifting purposes – Dee shackles and bow shackles
EN 13889	Forged steel shackles for general lifting purposes. Dee shackles and bow shackles Grade 6. Safety

SECTION 2

Certification Requirements for Offshore Tank Containers/Portable Tanks and MEGC

1 Tank Containers for Dangerous Goods

All tank containers intended for marine transport of dangerous goods are to be certified to the International Maritime Dangerous Goods Code (the IMDG Code). Tank containers built after January 1st 2003 must be built and certified in accordance to the requirements for UN Type tanks (Ch. 6.7 in the IMDG Code). Tank containers built before that date may be in accordance with chapter 13 of the older IMDG code (i.e. up to amendment 29 of that code) Tank containers that are certified according to these requirements are also allowed for road and rail transport.

1.1 Tank Containers – General

In addition to complying with other relevant design codes and requirements, tank containers are to be suitable for offshore service.

1.2 Frame

Tank container frames are to be designed to protect the tank/elements and the equipment.

1.3 Tanks for Fluids

Tanks design are to conform to the relevant sections of ISO 1496-3.

Tanks for dangerous cargoes are to fulfil the requirements of the IMDG Code, and are to be designed according to recognized standards such as ISO 1496-3 or to ABS recognized standards. A tank and its support are to be able to withstand lifting and impact loads. In addition due account is to be taken of fluid surge arising from partly filled tanks.

Note: The IMDG Code has restrictions for loaded handling of tanks over a certain length, by forklift. Reference should be made to Chapters 4.2 and 6.7 of the IMDG Code.

1.4 Impact Protection on Tank Containers for Dangerous Cargoes

All parts of the tank containers are to be protected from impact damage and in addition to the requirements of 2-3/2.3 of the Guide, the following requirements apply:

i) Protective covers or housings are to be provided to minimize the risk of damage to the tank containers top and its fittings due to impact.

ii) A clearance of at least 100 mm (4 in.) is to be provided between external fittings and the top of the container.

iii) Measures are to be taken to prevent any part of the lifting set from fouling the fittings, manholes, cleats or other protrusions on the tank

iv) Protective beams are to be provided to give necessary protection to the tank shell when the same is nearest to the outer plane of the sides.

v) The residual clearance of at least 10 mm (0.4 in.) is to be provided between the member and any part of the tank shell or its fittings at the maximum calculated elastic deflection of any side member.

vi) The underside of the tank shell (including sumps) and bottom valves or other fittings, are to extend below a level 150 mm (6 in.) above the bottom of the framework (the underside of the side or end rails). Any such part extending below 300 mm (12 in.) above the bottom of the framework, is to be protected by beams or plating.

Special considerations are to be given to tank containers with direct connections between the tank and the framework.

1.5 Periodic Inspections for Tank Containers

Offshore tank containers that are certified for dangerous goods according to IMDG code are subject to 5 year periodic inspections and tests, and to intermediate 2.5 year periodic inspections and tests.

1.6 Multiple Element Gas Containers (MEGCs)

Multiple Element Gas Containers are multimodal assemblies of pressure receptacles or elements that are interconnected by a manifold for filling and discharge which are assembled within an ISO framework and include service equipment necessary for the transport of gases. Additional information on this type of container can be found in the latest edition of ABS *Rules for Certification of Cargo Containers*.

SECTION 3

Determination of Working Load Limit of the (WLL_{min}) Lifting Set

Container Rating (R) kg	*Dynamic Factor/ Enhancement Factor*	*Minimum Required Working Load Limit of the Lifting Set* (WLL_{min}) *tonnes*
500	---	7.00
1000	---	7.00
1500	---	7.00
2000	3.500	7.00
2500	2.880	7.20
3000	2.600	7.80
3500	2.403	8.41
4000	2.207	8.83
4500	2.067	9.30
5000	1.960	9.80
5500	1.873	10.30
6000	1.766	10.60
6500	1.733	11.26
7000	1.700	11.90
7500	1.666	12.50
8000	1.633	13.07
8500	1.600	13.6
9000	1.567	14.1
9500	1.534	14.57
10000	1.501	15.01
10500	1.479	15.53
11000	1.457	16.02
11500	1.435	16.5
12000	1.413	16.95
12500	1.391	17.38

13000	1.368	17.79
13500	1.346	18.18
14000	1.324	18.54
14500	1.302	18.88
15000	1.28	19.20
15500	1.267	19.64
16000	1.254	20.06
16500	1.24	20.47
17000	1.227	20.86
17500	1.214	21.24
18000	1.201	21.61
18500	1.188	21.97
19000	1.174	22.31
19500	1.161	22.64
20000	1.148	22.96
20500	1.143	23.44
21000	1.139	23.92
21500	1.135	24.39
22000	1.13	24.86
22500	1.126	25.33
23000	1.121	25.79
23500	1.117	25.25
24000	1.112	26.7
24500	1.108	27.15
25000	1.104	27.59

SECTION 4

Container Corner Castings

1 General

Container corner castings are required to be certified in accordance with the requirements prescribed in this Appendix. The certification procedure is indicated in Chapter 1, Section 2. Corner fittings are to conform to the requirements of ISO 1161.

Lifting offshore containers with shackles in corner fittings is not acceptable.

Corner fittings of unique design for special purpose containers will also be considered for certification provided the strength requirements are not less than those specified by ISO Standard 1161.

Corner castings are to be produced under ABS Surveyor witness in a manufacturing facility which has a valid ABS Factory Approval Certificate (refer to 1-5/5). Corner castings produced in a facility which does not have an ABS Factory Approval Certificate will require a certification by heat treatment lot specified in Section 14 of the ABS *Rules for Certification of Cargo Containers*.

ABS may accept certification of ISO Corner Fittings by other IACS Societies under special considerations provided that all the data and supporting document are submitted for review.

Corner fittings are not allowed to carry out lifting operations on offshore containers.

2 Process of Manufacture

The steel is to be made by the open-hearth, electric furnace, or basic oxygen process. Other processes of manufacture will be specially considered.

3 Heat Treatment

All castings are to be either fully annealed, normalized, or normalized and tempered.

4 Material Specifications

Corner castings are to be made of carbon steel according to the chemical and mechanical properties listed in A4/4.2 and A4/5.3 of this Guide. Other material specifications submitted for certification of corner castings will be specially considered.

4.1 Chemical Analysis

An analysis of each heat of steel is to be made by the manufacturer to determine the percentages of the elements specified below. The chemical analysis is to be made from a sample taken during the pouring of the heat. If drillings are used from a finished casting, they are to be taken not less than 6 mm (0.24 in.) beneath the surface. The chemical composition thus determined is to conform to the requirements

prescribed in Appendix 4, Table 1 of this Guide. Chemical analysis certificates are to be provided to the Surveyor.

4.2 Chemical Requirements

TABLE 1
Chemical Composition (%)

Carbon (max.)	*Manganese* (max.)	*Silicon* (max.)	*Sulfur* (max.)	*Phosphorous* (max.)	*Aluminum*[(1)] *(min.)*
0.20	1.20	0.50	0.035	0.035	0.015

Notes:

1 Aluminum may be partly or totally by other fine graining elements as stated in the approved specifications.

2 The manganese may exceed 1.20% provided that the carbon content plus one-sixth of the manganese content does not exceed 0.45%.

3 Residual elements are not to exceed 0.80 %

4 Residual elements individual % maximum (Cu = 0.30, Cr = 0.30, Ni = 0.40, Mo = 0.15).

5 Tension Test

One tension test is to be performed on a specimen from each heat treatment lot. The tension test is to be performed in accordance with the American Society for Testing and Materials (ASTM) Standard A 370 – Mechanical Testing of Steel Products, or equivalent. The mechanical properties thus determined are to conform to the requirements specified below in A4/5.3 of this Guide.

5.1 Tensile Test Specimen

Test bars are to be poured in special blocks, similar to those shown in ASTM A 370, from the same heat as the casting represented, and are to be heat treated in production furnaces to the same procedure as the castings they represent. Alternatively, test coupons may be cut from the heat treated castings or cast integrally. Test specimens are to be machined to the form and dimensions shown in ASTM A 370. If any specimen is machined improperly or if flaws are revealed by machining or during testing, the specimen may be discarded and another substituted from the same heat treatment lot.

5.2 Retests

If the results of the mechanical tests do not conform to the requirements specified, heat-treated castings may be reheat-treated and retested, but not more than twice.

5.3 Tensile Properties

- Minimum yield strength — 240 N/mm^2 (24.5 kgf/mm^2, 34809 psi)
- Tensile strength — 450 to 600 N/mm^2 (46 to 61.2 kgf/ mm^2, 65267 to 87022 psi)
- Minimum elongation in 50 mm (2 in.) — 25%
- Minimum reduction in area — 40%

5.4 Charpy Impact Test

Charpy impact test properties are to be determined on each heat from a set of three Charpy V-notch specimens made from a test coupon in accordance with ASTM A370, and tested at a test temperature of –20°C (–4°F). The acceptance requirements are to be the value of energy absorbed. The minimum average

absorbed energy value of three specimens is to be 27 Joules (20 ft lbs), and one individual value may be below the average value but shall not be lower than 70% of the average.

6 Inspections

6.1 Dimensional Inspection

Each casting is to be inspected by the manufacturer to insure compliance with the dimensional requirements defined in ISO 1161. Satisfactory records of such inspection are to be available to the Surveyor.

6.2 Visual Inspection

Each casting is to be inspected by the manufacturer for general appearance and surface defects. The castings are to be free from defects. Satisfactory records of such inspections are to be available to the Surveyor.

6.3 Internal Discontinuities Examination

One casting from each 400 (50 sets) are to be examined by the manufacturer for internal discontinuities using either radiographic or ultrasonic methods.

6.3.1 Radiographic Examination

Castings are to be examined for internal discontinuities by means of X-ray or gamma rays. The procedure is to be in accordance with ASTM Recommended Practice E 94 and Method E 142. The types and degrees of discontinuities considered are to be judged by ASTM Reference Radiograph E 446. Basis for acceptance is to be as follows:

Nature of Defects	*Radiographic Acceptance Criteria*
Blow holes	Level 4
Inclusions	Level 4
Shrinkholes category CA, AB, CC or CD	Level 3
Cracks	None
Quench cracks	None

6.3.2 Ultrasonic Inspection

Castings are to be examined for internal discontinuities by means of ultrasonic inspection. The inspection procedure is to be in accordance with ASTM Specification A 609. Methods of testing and basis of acceptance are to be agreed upon.

7 Marking

Each corner casting will be identified with the foundry identification mark and ABS to signify compliance with the Rules.

SECTION 5

Existing Offshore Containers *(15 December 2017)*

1 General

Existing containers that have not previously been certified by ABS according to the provisions of this Guide may be considered for certification. Contact the ABS Corporate Container Certification group for complete details.

The certification procedure will include general compliance with this guide and as agreed by ABS. The certification procedure will include a technical design review, inspection and testing of the existing design prior to issuance of the applicable certification.

This certification process may be applied on a case by case basis for the purpose of bringing existing containers into the ABS in-service inspection program per Chapter 4 of this Guide.

2 Marking and Date Plate

Container markings and date plates are to be in accordance with Chapter 2, Section 6 of this Guide.

3 Emblem

This Emblem is a representation that will be affixed to each existing offshore container that meets the criteria contained in this document and is approved by ABS: