

DRAFT INTERNATIONAL STANDARD

ISO/DIS 19355

ISO/TC 8/SC 4

Secretariat: SAC

Voting begins on:
2015-06-30

Voting terminates on:
2015-09-30

Ships and Marine Technology — Marine cranes — Structural requirements

Navires et technologie maritime — Grues maritimes — Exigences structurelles

ICS: 47.020.40

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/51adc665-27b3-4900-a56d-63aec3ae63f7/iso-19355-2016>

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.



Reference number
ISO/DIS 19355:2015(E)

© ISO 2015

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/51adc665-27b3-4900-a56d-63aec3ae63f7/iso-19355-2016>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

	Page
Foreword	iv
1 Scope	1
1.1 Marine cranes applicable to this International Standard include the following types of cranes:.....	1
1.2 This International Standard does not apply to:.....	1
2 Normative references	1
3 Terms and definitions	2
4 General requirements	2
4.1 General.....	2
4.2 Materials.....	2
4.3 Welding.....	2
4.4 High-strength bolt connection.....	4
4.5 Cabin.....	4
4.6 Passage.....	4
5 Structural strength check	5
5.1 General.....	5
5.2 Stress.....	5
5.3 Stability allowable stress of members subjected to pressure or bending.....	6
5.4 Slenderness ratio λ	6
5.5 Overall stability check of crane jib.....	7
5.6 Local buckling stability of plate.....	7
5.7 Welding.....	7
5.8 Bolt connection.....	7

iTeh STANDARD PREVIEW
 (standards.iteh.ai)
 Full standard:
<https://standards.iteh.ai/catalog/standards/sist/19355-2015-27b3-4900-a56d-63aec3ae63f7/iso-19355-2015>

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. www.iso.org/patents

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 8, *Ships and Marine Technology*, Subcommittee SC 4, *Outfitting and Deck Machinery*.

Ships and Marine Technology — Marine cranes — Structural requirements

1 Scope

This International Standard specifies the structural requirements for marine cranes.

1.1 Marine cranes applicable to this International Standard include the following types of cranes:

Deck cranes mounted on ships for handling cargo or containers in harbour conditions; Floating cranes or grab cranes mounted on ships, barges or pontoons for operating in harbour conditions; Engine room cranes and provision cranes etc. mounted on ships (including floating docks) for handling equipment and stores in harbour conditions.

1.2 This International Standard does not apply to:

Transport, assembly, dismantling and decommissioning of cranes,
Lifting accessories, i.e. any item between the crane and the load,
Lifting operations involving more than one crane,
Hand powered cranes,
Emergency rescue operations (except training),
Shore-side cargo handling cranes,
Portable cranes on board,
Lifting appliances for lifeboats, liferafts accommodation ladders and pilot ladders.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3828, *Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols*

ISO 4306-1, *Cranes — Vocabulary — Part 1: General*

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

ISO 8566-1, *Cranes — Cabins and control stations — Part 1: General*

ISO 8566-4, *Cranes — Cabins — Part 4: Jib cranes*

ISO 19354, *Ships and marine technology — Marine cranes — General requirements*

3 Terms and definitions

For the purpose of this International Standard, the terms and definitions given in ISO 4306-1, ISO 3828 and ISO 19354 apply.

4 General requirements

The general requirements of the crane structure shall conform to ISO 19354: Ships and marine technology—Marine cranes—General requirements.

4.1 General

4.1.1 Materials, structural types and construction means shall be selected properly in the design of the metal construction of the crane to meet the strength (including fatigue strength), stability, stiffness and safety requirements of the structural elements during transportation, installation and use, as well as the requirements of protection against fire and corrosion.

4.1.2 The composition and arrangement of the metal construction of the crane shall comply with the regulations of applicable organizations, such as classification societies, and satisfy the operational requirements of the marine crane to ensure the safety and reliability.

4.1.3 Types of steel and connecting materials shall be noted in the design document of the metal construction; for vital stressed elements, mechanical properties, chemical composition and other additional guarantee items required for steel products shall also be noted. Weld forms and quality grades required shall also be noted.

4.2 Materials

4.2.1 The materials of the metal construction shall be applicable to the use and manufacture of the marine crane. The selection of steel shall take into account such factors as the importance of construction, load characteristics, stress conditions, connection modes, ambient temperatures for the operation of the crane and steel thickness. The use of hull steel plates, forgings, and castings as elements shall comply with the applicable requirements, such as the requirements of classification societies.

4.2.2 The materials shall be manufactured by the approved manufacturer, with the required material quality certificate. The materials of the main structural elements shall be of batch member designations. Various tests on materials, such as the performance test, low-temperature impact test, test on the thickness direction of steel plates, ultrasonic inspection and surface quality inspection shall also comply with the applicable requirements; the test report and certificates shall conform to the regulation.

4.3 Welding

4.3.1 The welding of the metal construction of the crane shall conform to the regulation and be approved by applicable organizations, such as classification societies. The welding process shall meet the requirements.

4.3.2 The manufacturer of the crane shall develop the specification for the welding of the metal construction, based on generally accepted standards.

4.3.3 The manufacturer shall assess the welding process in terms of steel types used for the first time, welding materials, welding methods, types of connection, welding positions, post-weld heat treatment processes, as well as combined conditions of various parameters, such as welding parameters, preheat or post-heat process.

- 4.3.4** The welding materials of the structural elements shall comply with the following requirements:
- (1) Types of electrodes and welding wires used for manual welding shall be adapted to the metal performance of the main body. Electrodes and welding wires shall conform to the regulations of generally accepted standards.
 - (2) Welding wires and corresponding fluxes for automatic welding or semi-automatic welding shall be adapted to the metal performance of the main body and conform to the regulations of the standards.
 - (3) The gas for gas shielded welding shall also conform to the applicable regulation.

4.3.5 For butt joints with the plate thickness difference more than 4mm, the edge of the thick plate shall be beveled: the beveling width of the butt joint subjected to the dynamic load shall be not less than four times the thickness differences of the plate; the beveling width of other butt joints shall be not less than three times the thickness differences of the plate.

4.3.6 The quality level for imperfections of arc-welded steel joints shall comply with Grades B, C and D specified in ISO 5817.

4.3.7 The welder shall pass the examination by the professional department and receive the certificate of qualification which is within the validity period; the welder with the certificate shall weld within the qualified examination items and approved range.

4.3.8 Main welds shall be traceable after welding.

4.3.9 Welding inspection

4.3.9.1 The welding inspector shall have certain qualifications, the nondestructive personnel shall have the Certification of Nondestructive Personnel issued or approved by classification societies, and the nondestructive examination shall be carried out in accordance with the type and grade of the certification.

4.3.9.2 Visual inspection shall be carried out for all welds. The weld edge shall be smoothly transitioned to the base metal; the external dimensions of the weld shall comply with the requirements of the design drawing.

4.3.9.3 For the quenched and tempered steel with the yield strength bigger than or equal to 420 N/mm², the nondestructive examination of the weld shall generally be carried out 48 h after welding. When the postweld heat treatment is carried out for the weldment, the nondestructive examination shall be carried out after heat treatment.

4.3.9.4 The type and range of the nondestructive examination depend on the importance and loading of members. For the range of the nondestructive examination, see [Table 1](#).

Table 1

Structural type	Joint type	Examination method (%)			
		Visual inspection	RT	UT	MT or penetration
Special structure	Butt	100	10~20	100	100
	Cross/T, complete penetration	100		100	100
	Cross/T, fillet /deep penetration welding	100			100

Table 1 (continued)

Structural type	Joint type	Examination method (%)			
		Visual inspection	RT	UT	MT or penetration
Main structure	Butt	100	5~10	50~80	20~50
	Cross/T, complete penetration	100		50~80	20~50
	Cross/T, fillet /deep penetration welding	100			20~50
Secondary structure	Butt	100		2~5	2~5
	Cross/T, complete penetration	100		2~5	2~5
	Cross/T, fillet /deep penetration welding	100			2~5

4.4 High-strength bolt connection

4.4.1 The high-strength connecting bolt shall be inspected according to ISO 6157-1.

4.4.2 The contact surface of elements at the high-strength bolt connection shall be treated according to the design requirements, keep dry, clean, without any flash, burr, spatter, weld flash, scale and dirt; the contact surface shall not be coated with paint, except for design requirements.

4.4.3 The high-strength bolt shall be screwed up with a torque wrench or special tool according to the requirements of the instruction for installation of lifting appliances. The tightening sequence and initial torque of connecting assemblies shall conform to the design requirements and special regulations. The torque wrench shall be calibrated and recorded on a regular basis. The screwing record shall be made for high-strength bolts.

4.5 Cabin

4.5.1 If a cabin is applied, it shall conform to ISO 8566-1 and ISO 8566-4.

4.5.2 The cabin shall be located to avoid or prevent the components of the crane, such as jibs from crash with the dropping cargo.

4.5.3 The field of vision, environment, safety protection, passage and operational conditions of the cabin shall comply with the operational requirements of the marine crane.

4.6 Passage

4.6.1 If all operating positions and positions that require frequent examination and maintenance on the crane (including sheaves and movable parts on top of the jib) are more than 2 m above the bottom footing, they shall be accessible through the inclined ladder (or stairs), platform, passage or vertical ladder. There shall be handrails or guard rails on both sides of steps, as far as practically can be achieved. There shall be safety entrances for the passage, inclined ladder (or stairs) and platform.

4.6.2 The safety of the passage means its compliance with the regulations of the applicable international organizations, such as ILO and AWWF.

5 Structural strength check

5.1 General

The check on the strength of the crane and its structure must comply with approved regulations of statics, dynamics and stress analysis.

5.2 Stress

5.2.1 The allowable stress of the structural members of the crane $[\sigma] = \frac{\tilde{\sigma}_s}{2n}$

where

σ_s yield strength of the steel

n safety factor, taken from [Table 2](#)

Table 2

Condition	1	2	3	4
Safety factor n	1.5	1.33	1.15	1.15
Note: Condition 1: the crane is in a working condition without wind; Condition 2: the crane is in a working condition with wind; Condition 3: the crane is in a non-working condition; Condition 4: the crane withstands special loads.				

5.2.2 The effective stress σ of the steel in the form of the elastic stress shall be taken from Table 3 in various stress states.

Table 3

Stress state	Tensile stress	Compressive stress	Shear stress	Bearing stress
Symbol	σ_t	σ_c	τ	$1.0\sigma_{br}$
Failure stress	$1.0\sigma_s$	$1.0\sigma_s$	$0.58\sigma_s$	$1.0\sigma_s$

5.2.3 Where the positive stress σ and the shear stress τ on a certain position of the member are rather great, the combined stress shall be calculated, the allowable stress criterion shall comply with the following requirements:

$$\sigma_e = \sqrt{\tilde{\sigma}^2 + 3\tilde{\tau}^2} \leq [\sigma]$$

where

σ_e combined stress

σ positive stress

$[\sigma]$ allowable stress