



**CCS Rule Change Notice For:  
Lifting Appliances of Ships and Offshore  
Installations**

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## CONTENTS

### Chapter 3 CRANES, LIFTS, RAMPS AND SELF-LOADING CARGO GEARS

To add the new requirements of 3.11 self-loading cargo gears.

#### CHAPTER 1 SURVEYS AND CERTIFICATION

##### 1.1 APPLICATION

1.1.1 The Rules are applicable to the following lifting appliances used on board ships and offshore installations:

- (1) derrick rigs, including derrick cranes;
- (2) cranes;
- (3) submersible handling systems;
- (4) passenger and crew lifts;
- (5) cargo and vehicle lifts (where the certificate for lifting appliances is necessarily to be issued) and vehicle ramps (where the certificate for lifting appliances is necessarily to be issued);
- (6) self-unloading cargo gears.

##### 1.3 PLAN AND DOCUMENTS

1.3.6 The following plans and documents with respect to machinery, electrical and control systems are to be submitted for approval:

- (1) general arrangement of the control cabinet(s) and/or control station;
- (2) arrangement of power switchboard and its circuit diagrams;
- (3) diagrams of electrical circuit system indicating the specifications of equipment and cables, grade of insulation, rated current, types of various electric protections and their rated capacity and manufacturers;
- (4) short circuit current calculations for the bus-bar of the main and auxiliary switchboards and the output ends of transformers;
- (5) schematic diagrams of control circuits, interlocks and alarm system, including hydraulic, pneumatic and electric power;
- (6) details of safety devices, including securing and latching arrangement;
- (7) particulars of hydraulic rams and operating systems, if fitted.
- (8) Detailed diagrammatic plans of piping system, including the types and materials of valves and fittings for hydraulic systems; lists of size, wall thickness, maximum working pressure and material of other piping system (if fitted), as well as the type, size, pressure rating design basis and material of valves and fittings; rating of pumps is also to be included.

1.3.9 The following plans and documents of self-unloading cargo gears are to be submitted for approval:

- (1) general arrangement of self-unloading cargo gears;
- (2) all main structural plans;
- (3) materials to be used and their chemical compositions and mechanical properties;

- (4) force analysis and strength calculation of self-unloading cargo gears;  
 (5) sketch showing the arrangement, working load of the assembled gear and indicating the safe working load for each component part, position of concentrated loads, section through the conveyor boom showing the geometry of the conveyor and the volume per unit length for a range of material heights on the belt, as well as the loaded length of the boom belt, etc.

#### 1.4 CLASS NOTATIONS

1.4.1 Upon satisfactory completion of all tests and surveys of the lifting appliances for classification purposes and issue of all the appropriate test and survey certificates and the Register of Lifting Appliances and Cargo Handling Gear in accordance with the Rules, the Surveyor is to recommend the Headquarters of CCS to assign the class notation “Lifting Appliance, Cargo Handling by Conveyor System (applicable for self-unloading cargo gears)” and enter this in the Interim Classification Certificate for Hull.

#### 1.5 SURVEYS

1.5.1 General requirements

1.5.1.5 The loose gear and wire ropes, other than those having been satisfactorily examined within the last three months, are to be inspected by the responsible persons onboard the ship before each use. Ropes with broken wires are to be inspected at least once a month. A monthly inspection of the self-unloading cargo gear is to be made by vessel’s personnel designated by the Master and the record of repairs and renewals is to be maintained onboard.

#### Items and Description for Survey of Cranes, Lifts, Ramps

##### and Self-unloading Cargo Gears

Table 1.5.3.1-b

No.	Item	Cranes, lifts, ramps and <u>self-unloading cargo gears</u>
6	structure	(1) Check all bolts for tightness ensuring that where bolts have been replaced they are of the same type and quality as previously fitted. (2) Examine foundation bolts for signs of corrosion. (3) Check welds for cracks. (4) Examine structure for corrosion, removing paint and carrying out hammer tests as <del>(c)</del> <u>check jib, tower, support pedestal, gantry, ramps, rails, conveyor booms of self-unloading cargo gears, etc.</u> , for any sign of local indentation or unfairness

1.5.4 Renewal surveys

1.5.4.1 The following items of a renewal survey are to be carried out at 4-yearly intervals after the initial survey or the renewal survey:

(2) The cranes, lifts, vehicle ramps, self-unloading cargo gears together with loose gear are to be thoroughly examined in accordance with the relevant requirements of 1.5.3. The cranes, lifts, vehicle ramps and self-unloading cargo gears are to be load tested in accordance with Chapter 7. The test is to demonstrate satisfactory operation, efficiency of overload and weightload indicators, effectiveness of limit switches.

## 1.6 CERTIFICATION

### 1.6.2 Issue and endorsement of certificates

1.6.2.2 The certificate applies to all lifting appliances, including derrick systems, cranes, lifts, ramps, self-unloading cargo gears, etc., and is to be issued after a satisfactory survey and load test. In general, the certificate will be issued after completion of each quadrennial load test and also the test and survey of damage, repair, re-construction and re-use.

## CHAPTER 3 CRANES, LIFTS, RAMPS AND SELF-UNLOADING CARGO GEARS

### 3.11 SELF-UNLOADING CARGO GEARS

#### 3.11.1 General requirements

3.11.1.1 This Section applies to the self-unloading cargo gears installed onboard the vessels which are in a harbor or anchorage waters and do not applies to conveyors, elevators and other equipment used to transfer cargo to the conveyor boom.

3.11.1.2 The requirements of 3.2 of this Chapter also apply to the self-unloading cargo gears defined in this Section.

#### 3.11.1.3 Definitions

(1) Conveyor Boom means the structure, which supports a conveyor belt or similar device by means of which bulk cargo is discharged.

(2) Supporting Structure means the "A"-frames, elevator casings, saddles, other supporting structures, etc. to which may be attached such tackle or other device as is employed to lift, swing or otherwise position the boom defined above.

(3) Auxiliary Devices means the devices employed in luffing, slewing or otherwise positioning the boom, including actuators and their piping to the power units, winches, spreaders, etc.

(4) Loose Gear means hook, ring, shackle, link, sling, lifting beam, lifting frame or any similar article of equipment by means of which a force can be transmitted to a cargo gear and which does not form an integral part of the appliance or load.

(5) Safe Working Load of components means the maximum resultant load upon the component of self-unloading cargo gears for the design conditions assumed.

(6) Working Load of Assembled Gear means the load which each complete assembly is approved to lift excluding the weight of the gear itself (i.e., the load on the conveyor). This load is the safe working load, SWL, in kN/m, which is to appear on the Certificate of Cargo Gear Test.

(7) Live load means the minimum live load, in kN/m, to be assumed in design is to be based on the cross sectional area of a loaded belt assuming the maximum density of material to be handled.

3.11.1.4 For the operation condition, the self-unloading cargo gears are to be considered with respect to the following loads and factors:

(1) self-weight of cargo gear;

(2) live load applied on cargo gears;

(3) impact load applied on cargo gears;

(4) longitudinal forces resulting from the conveyor belt pull or other pieces of machinery;

(5) static force due to inclination of ship;

(6) wind load, to be calculated according to 3.2.12, with the wind speed in the operating condition being taken as 27m/s;

(7) ice load (if applicable).

3.11.1.5 For the stored condition, the self-unloading cargo gears are to be considered with respect to the following loads and factors:

- (1) self-weight of cargo gears;
- (2) forces due to ship's motion and static inclination;
- (3) wind load, to be calculated according to 3.2.12;
- (4) ice load, (if applicable).

### 3.11.2 Basic loads

3.11.2.1 Self-weight load,  $L_m$ , is the load imposed on the self-unloading cargo gears by the weight of the structure and machinery.

3.11.2.2 The applied load,  $L_c$ , is the live load imposed on the self-unloading cargo gears.

### 3.11.3 Working load and impact coefficient

3.11.3.1 The self-weight load and applied load of cargo gear are to be taken the effect of impact coefficient into account. For the non-cantilever section of the boom, a minimum amount of 5% of the applicable self-weight load  $L_m$  and for the cantilever section of the boom, a minimum amount of 10% of the applicable self-weight load  $L_m$  is to be assumed as a part of the working coefficient  $\phi_d$ ; and a minimum amount of 10% of the applied load  $L_c$  is to be assumed as a part of the impact coefficient  $\phi_h$ .

### 3.11.4 Forces due to ship's motion

3.11.4.1 For the operational condition, the self-unloading cargo gear is to be designed to operate safely and efficiently at an angle of heel of the ship of  $5^\circ$  and an angle of trim of  $2^\circ$  acting simultaneously. If it is intended to operate a lift at angles greater than above, the self-unloading cargo gear is to be designed for the proposed angles and the certificate marked accordingly.

3.11.4.2 In addition to the above-mentioned operating conditions, when the self-unloading cargo gear and its locking mechanism are under stowed condition, the forces may be calculated for the combination of static and dynamic forces in accordance with the requirements as specified in 3.2.11.2.

### 3.11.5 Load combination of various loading conditions

3.11.5.1 Case 1 — for the condition of the self-unloading cargo gear operating without wind, the load combination is as following:

$$\frac{(L_m + \phi_h L_c)}{\phi_d} + L_{h1} + L_{h2}$$

Where:  $L_m$  — self-weight load of cargo gear;

\_\_\_\_\_  $L_c$  — applied load on cargo gear;

\_\_\_\_\_  $L_{h1}$  — level load due to heel of  $5^\circ$ ;

\_\_\_\_\_  $L_{h2}$  — level load due to trim of  $2^\circ$ .

3.11.5.2 Case 2 — for the condition of the self-unloading cargo gear operating with wind, and the load combination is as following:

Load combined according to 3.11.5.1 plus the most unfavourable wind load.

3.11.5.3 Case 3 — The self-unloading cargo gear is considered in the stowed condition, the combination of loads is to be considered in accordance with the requirements of 3.11.4.2.

### 3.11.6 Stowage arrangements

3.11.6.1 The foundation and supporting structure of conveyor boom for self-unloading cargo gear are to be designed to withstand the most severe combination of loads, and appropriate consideration is to be given for the selection of position of foundation of conveyor boom.

### 3.11.7 Materials

3.11.7.1 Materials used for self-unloading cargo gear are to be in compliance with the applicable requirements of CCS Rules for Materials and Welding or the standards accepted by CCS.

3.11.7.2 The selected steel grade for the construction of self-unloading cargo gear is to be considered of its tensile strength, thickness and operational environment and, in general, the Charpy V-notch test requirements for such steel grade are to comply with Tables 6.2.2.1 and 6.2.2.2.

3.11.7.3 Aluminum used in the construction of conveyor booms and associated parts is generally to be of the 5000 series of aluminum alloys for welded construction. Other alloys of aluminum will be specially considered.

### 3.11.8 Safety factors of rope

3.11.8.1 Safety factors of ropes for self-unloading cargo gear is to be as followings:

(1) 3.0 for fixed wire rope;

(2) 3.5 for running wire rope;

(3) 4.5 for chain;

(4) 5.0 for fiber rope when intended for fixed gear and vang;

(5) 7.0 for fiber rope when intended for running rigging.

### 3.11.9 Pressure vessels, cylinders, slewing gear and piping

3.11.9.1 Pressure vessels, cylinders, slewing gear, piping and electrical systems in luffing and slewing systems for self-unloading cargo gear are subject to design review and survey during installation for compliance with the requirements in this Section.

3.11.9.2 In addition to the provisions in this Section, it is to meet the relevant applicable requirements of CCS Rules for Classification of Sea-going Steel Ships. The other recognized standards or rules with the requirements not lower than CCS rules may also be accepted.

3.11.9.3 The pressure vessels are to be in compliance with the relevant requirements of Chapter 6, PART Three in CCS Rules for Classification of Sea-going Steel Ships.

3.11.9.4 The cylinders of luffing and slewing systems are to comply with the requirements of 3.2 in this Chapter.

3.11.9.5 The slewing mechanism is to be designed in accordance with the recognized standards.

3.11.9.6 Hydraulic piping systems in luffing and slewing systems are to comply with the requirements of Section 7, Chapter 4, PART Three in CCS Rules for Classification of Sea-going Steel Ships. The pumps of the system are to be provided with arrangements to prevent rotating of an inoperative pump in the opposite direction or with automatic arrangements for securing the flow through the inoperative pump.

3.11.9.7 The passage of hydraulic pipes for self-unloading cargo gear through cargo holds and tanks is to be limited to only that which is necessary for operational purposes. Pipes installed

within cargo holds and tanks are to be protected from mechanical damage. System connection to other hydraulic systems is subject to special consideration. Failure in any one part of the self-unloading hydraulic system is not to cause the failure of other parts of the self-unloading cargo gear or of other vessel's systems.

3.11.9.8 The hydraulic piping system test is to comply with the requirements of Section 7, Chapter 2, PART THREE in CCS Rules for Classification of Sea-going Steel Ships.

## **CHAPTER 4 MACHINERY, ELECTRICAL INSTALLATIONS AND CONTROL ENGINEERING SYSTEMS**

### **4.1 GENERAL PROVISIONS**

#### 4.1.1 General requirements

4.1.1.1 This Chapter applies to the machinery, electrical installations and control engineering systems for the following lifting appliances:

- (1) derrick rigs and derrick cranes;
- (2) cranes;
- (3) cargo, vehicle lifts and ramps;
- (4) passenger and crew lifts;
- (5) self-unloading cargo gears.

#### 4.3.5 Self-unloading cargo gears

4.3.5.1 If machineries, electrical power sources, control and safety devices and wirings are installed in locations where a flammable atmosphere is expected to exist (as may occur in spaces for coal or grain), it is to be in compliance with the relevant requirements of Section 18, Chapter 2, PART FOUR of CCS Rules for Classification of Sea-going Steel Ships.

Where essential for operation purposes, engines may be installed in hazardous areas as mentioned in 4.3.5.1 and such installation will be subject to special consideration. In all instances, exhaust outlets are to be outside of all hazardous areas and air intakes are to be not less than 3 m from hazardous areas.

4.3.5.2 Fail-safe arrangements and safety devices are to be provided on the luffing and slewing equipment. A system is considered fail-safe if a component failure or loss of power supply will result in a controlled securing of the equipment or control of movement so as not to endanger personnel.

4.3.5.3 Controls are to be provided for the safe operation of the self-unloading cargo gear. These controls are to be clearly marked to show their functions. Energizing the power unit at a location other than cargo control station is not to set the gear in motion.

Where remote controls are provided for the cargo gear operation, these are also to be arranged for local operation. Control systems and monitoring systems are also to be arranged for local operation. Control systems and monitoring systems are to be independent of any other systems.

4.3.5.4 As appropriate, monitoring is to indicate system operating status (operating or not operating), availability of power, overload alarm, air pressure, electrical power or current, motor running and motor overload and brake mechanism engagement.

4.3.5.5 Remote shutdowns are to be provided outside of the power unit space so that they may be

stopped in the event of fire or other emergency.

## **CHAPTER 7 TESTING**

### **7.4 TESTING OF LIFTING APPLIANCES**

#### 7.4.5 Testing of self-unloading cargo gears

7.4.5.1 Before the cargo gear is placed in service, it is to be tested to a load equal to 1.25 times SWL (1.1 times SWL for renewal survey) of the assembled gear. The boom is to be positioned during the test to both the minimum operating angle and to an angle equal to the maximum operating angle or 10 degrees above the horizontal, whichever is less.

7.4.5.2 The boom is to be luffed and slewed from side-to-side without load to the limits shown on the approved plans and the leads of all cables are to be observed to ensure lack of interference with any structure. The conveying system is to be demonstrated under load.

7.4.5.3 Power for operation of the luffing and slewing equipment during the test is to be taken through the vessel's cables. Shore power may be used when supplied through the main switchboard.

7.4.5.4 The operation of all brakes and fail-safe devices are to be demonstrated under simulated loss of power conditions to the satisfaction of the surveyor.

7.4.5.5 After testing, the self-unloading cargo gear is to be thoroughly examined for deformation and other defects.