Guideline No.G-02 (201510)

G-02

LIFTING HOOK

Issued date: 20th October, 2015

Foreword

CCS Product Inspection and Testing Guideline (hereinafter referred to as this Guideline) contains the technical requirements, inspection and testing criteria related to classification and statutory survey of marine products to be applied for CCS approval/inspection.

This Guideline frees the users to adopt other test methods and requirements which are equivalent to or are stricter than this Guideline.

This Guideline is published and updated by CCS, and is released at http://www.ccs.org.cn. Your comments or suggestions are welcomed and may be sent to our email addressed mp@ccs.org.cn.

Historical version and release date: G-03(201510) October 20, 2015

Main change: New Release

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LIFTING HOOK

1 Application

The guideline applies to the works approval and products inspection on the lifting hook made from carbon/carbon-manganese steels or alloy steels that is used on the lifting appliances on ships and offshore installations.

2 Basis for approval and inspection

2.1 *CCS Rules for Materials and Welding*

2.2 *CCS Rules for Lifting Appliances of Ships and Offshore Installations*

3 Terms and definitions

3.1 Safe working load (SWL): The max. design load borne by the lifting hook, which has been verified via tests;

4 Plans and documents

4.1 The following documents should be submitted to CCS for approval:

4.1.1 The type test program should be submitted to CCS for approval, which should specify the product name, sample model and dimension, test item, method and technical requirement, formulation basis and reference standard, test site, and criterion rule on disqualification during the test.

4.2 The following documents should be submitted to CCS for information:

4.2.1 Such documents as the factory (enterprise) profile and factory business license.

4.2.2 Product details: Including the dimension, structure, material type and heat treatment method of the lifting hook.

4.2.3 Raw material source: Including the manufacturer, variety and dimension of the raw material.

4.2.4 Main production equipment overview: List such contents as the equipment name, model, capacity, status, and main instrument calibration status of the equipment.

4.2.5 Quality management and control document: Including the organizational structure, relevant quality control point, procedure documents related to quality management, as well as responsibilities of each management department and interrelationship.

4.2.6 Process engineering document: Including such contents as the production process flow chart, internal control standard executed by the enterprise, process operation regulations, relevant process record document, and operation instructions; the process card for each phase of the typical

product manufacturing process.

4.2.7 Format of product quality certificate.

4.2.8 Testing equipment and personnel qualification.

5 Materials and components

The lifting hook is a single forged steel piece without any other part.

6 Welding procedures qualification

It is not applicable, because no repair welding is allowed for the defect on the lifting hook.

7 Design and technical requirements on products

Design plan and document of the lifting hook: Including the hook material, safety working load, proof load and applied standard, which should be submitted to CCS for information. Necessary strength calculation and description should be provided for non-standard lifting hook produced as per the plan, and the plan and technical document should be submitted to CCS for information.

8 Selection of typical samples

During approval, the product with max. dimension submitted for approval with respect to the lifting hook of each structure type made with same process should be selected for type test.

9 Type test

The lifting hook should be forged as a whole with the forging material fiber orientation consistent with the forming direction of the hook, and the blank must be cut via mechanical means. The sample should be selected and tested after final heat treatment and surface cleaning. The mechanical properties sample used in the type test should be taken at the max. dimension of the product body. For the sampling position, refer to the requirements in relevant recognized standards.

9.1 Raw material

The raw material are to be made from non-aged steel killed and fine grain treated and manufactured as per the generally acceptable standard accepted by CCS, and the factory should conduct physicochemical property re-test on each batch of raw materials. The re-test should involve at least the chemical composition and mechanical properties (tensile tests and impact tests). During works approval, the qualified raw material suppliers should be summited to CCS for information.

9.2 Material mechanical properties of the finished lifting hook

The mechanical properties of the lifting hook should meet relevant requirement of 6.3 in Chapter 6 of *CCS Rules for Lifting Appliances of Ships and Offshore Installations*. The impact test

temperature should be selected properly according to the design temperature of the lifting hook, which should meet the requirement of Table 6.3.4.4 in Chapter 6 of the CCS Rules for Lifting Appliances of Ships and Offshore Installations. The lifting hook should be subject to material test as per Sections 1 and 2 in Chapter 5 of Part One of *CCS Rules for Materials and Welding*. During the delivery inspection, the lifting hooks produced in batch can be subject to lot grouping as per 5.1.5.2 in Chapter 5 of Part One of *CCS Rules for Materials and Welding* in order to perform the material test.

9.3 Chemical composition

The chemical compositions of carbon steel and carbon manganese steel should comply with the requirement of Section 2 in Chapter 5 of Part One of *CCS Rules for Materials and Welding*; the chemical compositions of low alloy steel should meet the requirement of the standard accepted by CCS.

9.4 Metallographic inspection (structure, grain size and inclusion)

During approval, the factory should conduct metallographic inspection as per the standard accepted by CCS. The metallographic inspection should involve such contents as the metallographic structure, ferrite grain size and inclusion. For evaluation method, refer to the requirement of the standard accepted by CCS.

9.5 Heat treatment and hardness

The lifting hook should be subject to relevant heat treatment to guarantee the mechanical properties of the material, and the treatment should meet relevant requirement in Sections 1 and 2 of Chapter 5 in Part One of *CCS Rules for Materials and Welding*. Hardness test should be carried out after heat treatment, so as to determine the heating treatment effect. For hardness value, refer to the requirement of the standard accepted by CCS. The hardness test should be carried out during works approval if the technical conditions are available, or it is required by CCS or the Purchaser.

9.6 Load test of the finished product

9.6.1 The verification test should meet relevant requirement of Sections 1 and 2 in Chapter 7 of CCS Rules for Lifting Appliances of Ships and Offshore Installations.

9.6.2 Breaking test (only for the type test, so as to verify the designed safety factor), during which the product should bear the min. breaking load specified in the standard or design plan basically. After test, the lifting hook should be free of crack or deformation that makes the hook lose the bearing capacity.

9.7 Basic model and size

9.7.1 The basic structure and size of the lifting hook should comply with the national standard, international standard or other standard accepted by CCS. “C” type hooks are to be so designed as to prevent the risk of the hook from catching on the ship’s structure or other obstruction when hoisting by means of a hook shelter.

9.7.2 For lifting hook with threads, the threads should comply with recognized standards, and the fit accuracy meets the requirement of the recognized standards.

9.8 Surface inspection requirement

The finished lifting hook should feature smooth and clean surface, and be free of such partial defects affecting the strength as burr, crack, folding or overburning.

9.9 Nondestructive test

The nondestructive test process should meet the requirement of the standard accepted by CCS. The nondestructive test process rules of the product should be determined during approval. The type, sampling proportion, test method, qualification level and result of the lifting hook nondestructive test should meet the requirements specified during approval.

9.10 Test and determination

The items of type test and delivery inspection are shown in Table 9.10. If the verification test fails to meet relevant requirement, the cause should be found out. If the failure is caused by such factors rather than the product performance as the testing equipment or test method, retest can be conducted, and the product can only be determined to be qualified after all requirements are met. Otherwise, the product is not qualified.

Test item and requirement **Table 9.10**

Test items	Type test	Delivery inspection
Material test①	☒	☒
Chemical composition analysis	☒	☒
Tensile test	☒	☒
Impact test	☒	☒
Hardness test (if any)	☒	☐
Metallographic inspection		
Verification test	☒	☒
Breaking test	☒	☐
Appearance and size inspection	☒	☒
Nondestructive test	☒	☒
Others (if required especially by users)	☐	☐

①During delivery test, the factory should provide raw material quality certificate and report on raw material re-test when entering the factory. The lifting hook should be subject to material test as per batch (If the chemical composition analysis has been carried out on all items required by CCS during raw material re-test, such analysis is not required on the finished product; the chemical composition analysis on finished products is required during works approval.); “If any” means that

the technical conditions are available, or it is required by CCS or the Purchaser.

Note: ☐ ---------Not available ☒----------Available;

10 Unit/batch inspection

10.1 After obtaining CCS works approval, the factory should manufacture the product as per the approved condition, and the lifting hooks of the lifting appliances used on ships and offshore installations should be applied for CCS inspection.

10.2 The lifting hook unit/batch inspection should be carried out as per the approved inspection plan. The factory will be informed in written of the lifting hook inspection plan when CCS issues the works approval certificate. The inspection items are shown in Table 9.10.

10.3 The factory quality certificate format should be submitted to CCS for approval, including at least the following contents:

(1) Name of the Purchaser;

(2) Dimension, material type of the lifting hook;

(3) Manufacturing standard and inspection basis of the lifting hook;

(4) Serial number (or batch number if the dimension is small and inspection is to be conducted as per batch) and quantity;

(5) Safety working load, proof load, and holding time of proof load;

(6) Heat treatment method, chemical composition and mechanical properties test result;

(7) Type, sampling proportion, inspection method, qualification level and result of the nondestructive test;

(8) Test date, inspection status, and signature of relevant personnel from the factory.

10.4 Mark

(1) The mark should be marked at their broad space but not at their bends;

(2) Safety working load, kN (or T);

(3) Test date (which is not required if it is not practical at the marking position);

(4) Serial number;

(5) Mark of the manufacturer or test unit;

(6) CCS stamp.