

Guideline No.G-04 (201510)



G-04Pulley

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Foreword

This Guideline is a part of CCS Rules, which contains technical requirements, inspection and testing criteria related to classification and statutory survey of marine products.

This Guideline is published and updated by CCS and can be found through <http://www.ccs.org.cn>. Comments or suggestions can be sent by email to ps@ccs.org.cn.

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Contents

1 Application.....4

2 Basis for approval and inspection4

3 Terms and definitions.....4

4 Plans and documents4

5 Materials and components.....5

6 Welding procedures qualification (if any)6

7 Design and technical requirements on products.....6

8 Selection of typical samples.....6

9 Type test.....6

10 Unit/batch inspection8

Pulley

1 Application

The Guideline applies to the works approval and product inspection on the pulley used on the lifting appliances on ships and offshore installations.

2 Basis for approval and inspection

2.1 *CCS Rules for Material 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. load of the shackle, which has been designed and verified by tests. The safe working load of the single block (including the single block with lacing eyes) should be half of the load of the ring. The safe working load of the rack block should be the load of the ring.

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 specification, 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 types, basic parameters and dimensions of the pulley.

4.2.3 Source of raw materials and main parts: Including the manufacturer, variety and specification of the raw materials and main parts.

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, operation instructions, as well as 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

All key parts should be subject to the physicochemical properties test on materials, except for those materials and components purchased with CCS product certificate. During works approval, the list of qualified raw material and part suppliers should be submitted to CCS for information, and any change to the qualified suppliers should be approved by CCS. The materials of main parts should at least meet the requirement specified in the standard accepted by CCS.

5.1 Raw material

All raw materials should be provided with manufacturer's documentary evidence. The steel plate complying with the national and international standard that is used to make the marine pulley should be approved by CCS and subject to physicochemical property re-test, and the result should meet relevant requirement in Chapter 6 of CCS Rules for Lifting Appliances of Ships and Offshore Installations. The welding materials adopted should be accepted by CCS. If not, they must be approved by CCS.

5.2 Pulley wheel

For rolling pulley wheels, the manufacturer should provide relevant test evidences (for example, the material test). The cast steel pulley wheel should meet relevant requirement on cast steel in Chapter 6 of Part One of CCS Rules for Materials and Welding, and special approval should be obtained for cast iron materials (if any). The ratio of pulley wheel diameter (measured at the bottom of the cable trough) to rope diameter should not be less than the value specified in Table 5.3.4 of Chapter 5 of CCS Rules for Lifting Appliances of Ships and Offshore Installations.

5.3 Lifting hook and ring

Such components as the lifting hook and ring should meet the requirement of Chapter 6 of CCS Rules for Lifting Appliances of Ships and Offshore Installations and relevant inspection guidelines of CCS.

5.4 Axle components

The axle component should be subject to inspection according to the requirement of Chapter 6 of CCS Rules for Lifting Appliances of Ships and Offshore Installations and Chapter 5 in Part One of CCS Rules for Materials and Welding. Generally, the axle should be made of forged steel. If any axle is made of rolling round steel, the diameter should not exceed 200 mm.

5.5 Bearing

The bearing should meet the requirement of standard accepted by CCS and be provided with manufacturer's documentary evidence.

6 Welding procedures qualification (if any)

For the welding of main parts under pressure of the pulley, the manufacturer should evaluate the welding procedures of such parts and formulate welding process regulations according to relevant requirement of CCS Rules for Materials and Welding, which should be approved first by CCS before being used.

7 Design and technical requirements on products

Necessary strength calculation and description should be provided for non-standard pulley produced as per the plan according to CCS Rules for Lifting Appliances of Ships and Offshore Installations, and the plan and technical document should be submitted to CCS for approval or information.

8 Selection of typical samples

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

9 Type test

The factory should conduct type test as per CCS Rules for Lifting Appliances of Ships and Offshore Installations, CCS Rules for Materials and Welding, as well as the standard accepted by CCS and technical requirement of the plan, and the main test items and requirements are as follows:

9.1 Re-test on main parts and raw materials (chemical compositions and mechanical properties)

Main components and raw materials should be subject to the physicochemical properties test, except for those materials and components purchased with CCS product certificate. The test result should meet relevant requirement of CCS *Rules for Lifting Appliances of Ships and Offshore Installations* and *CCS Rules for Materials and Welding*, as well as the requirement of the standard accepted by CCS.

9.2 Welding inspection (if any)

Notch and type inspection should be carried out as per the plan before welding, and the weld seam should be subject to appearance check after welding. The welding record should also be reviewed. Key welding parts should be subject to nondestructive test. The type and scope of the nondestructive test vary with the importance and bearing status of the component, and the nondestructive test process should meet the requirement of the standard accepted by CCS. The welding inspection should meet relevant requirement of Section 6.5 in Chapter 6 of CCS Rules for Lifting Appliances of Ships and Offshore Installations.

9.3 Nondestructive test

Such main parts under pressure as the lifting hook and axle as well as the main welding parts under pressure (if any) should be subject to nondestructive test, and 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.

9.4 Load test of the finished product

9.4.1 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.

9.4.2 Breaking test (only for the type test, so as to verify the designed safety factor), and the test load should meet the requirement of its designed safety factor. If it is produced as per the standard accepted by CCS, the breaking test can be conducted as per the load value specified in the standard. After test, the product should be free of crack or deformation that makes it lose the bearing capacity.

9.5 Basic model and dimension inspection

The type, basic parameter and dimension of the pulley must comply with the national, international or industry standard accepted by CCS; special pulleys produced as per the plan should be subject to necessary strength calculation and description, and the plan and technical document should be submitted to CCS for information.

9.6 Visual inspection

Such rotatory parts of the pulley as the pulley wheel and lifting hook must be capable of flexible rotation in no-load status. The pulley and its components should be free of obvious deformation, crack or defect in appearance.

9.7 Test and determination

The items of type test and delivery inspection are shown in Table 9.7 below. For initial approval, all type tests should be carried out as per the test program requirement. For type test, the breaking test should be carried out based on the verification test. 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 9.7

| Test items | Type test | Delivery inspection |
|---|-----------|---------------------|
| Raw materials and main parts inspection | ☒ | ☒ |

G-04(201510) Pulley

| | | |
|---|-------------------------------------|-------------------------------------|
| Overall appearance and dimension inspection | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Verification test | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Breaking test | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Nondestructive test (if any) | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Others (if required especially by users) | <input type="checkbox"/> | <input type="checkbox"/> |

If any: Mean if 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. The CCS inspection should be applied for the pulley of the lifting appliances used on ships and offshore installations, which cannot be used until the inspection is passed.

10.2 The pulley unit/batch inspection should be carried out as per the inspection plan approved by CCS. The factory will be informed in written of the pulley inspection plan when CCS issues the works approval certificate. The inspection items are shown in Table 9.7.

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) Pulley model;
- (3) Manufacturing standard and inspection basis of the pulley;
- (4) Serial number and quantity of products;
- (5) Safety working load, proof load, and holding time of proof load;
- (6) Test date, inspection status, and signature of relevant personnel from the factory;
- (7) Type, position, inspection method, qualification level and result of the nondestructive test (if any);

10.4 Mark

- (1) It is made on the stay or pallet of the pulley;
- (2) Safety working load, kN (or T)

- (3) Test date;
- (4) Serial number;
- (5) Manufacturer mark;
- (6) CCS stamp.