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B-03 MARINE AIR RECEIVERS

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Foreword:

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

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1 Application

This Guideline applies to works approval and inspection of marine air receivers of welded construction installed on ships and offshore installations classed with CCS.

2 Normative references

2.1 CCS Rules for Classification of Sea-going Steel Ships;

2.2 CCS Rules for Materials and Welding.

3 Definitions

3.1 Relevant definitions specified in CCS Rules for Classification of Sea-going Steel Ships are applicable to this Guideline.

3.2 For the purpose of this Guideline:

(1) Design pressure means the maximum set pressure at top of air receivers, i.e. maximum permissible working pressure, taken together with related design temperature as design loading conditions.

4 Plans and documents

4.1 The following plans and documents are to be submitted to CCS for approval:

(1) Main performance specifications (including type and specifications);

(2) General assembly (including body, mountings and fittings, connections and arrangement of mountings and fittings);

(3) Drawings of main components (boiler shell, end plate, body of valve head, welded construction, safety valves and main mountings and fittings, etc.);

(4) Calculations of strength, safety valve diameter or discharge capacity of fuse plugs;

(5) List of physical and chemical properties of materials of main pressure parts;

(6) Type test program (for approval).

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

(1) List of suppliers for material and main components;

(2) Standards applicable to products;

(3) Main procedure documents such as welding procedures and heat treatment procedures;

(4) Quality assurance system documents, including quality manual, quality control procedures, and information on main production, inspection and test equipment;

(5) Product instructions, product nameplates and manufacturer's quality certificate (specimen);

(6) Other valid documents, reports and certificates showing the applicant's ability to manufacture the products and control their quality within the scope of approval.

5 Evaluation of welding procedures

5.1 The pressurized base metal and their welded joints are to be subjected to welding procedure test according to the relevant requirements of CCS Rules for Materials and Welding.

6 Technical requirements for design

6.1 Marine ambient conditions:

Marine air receivers are to operate normally with the ship having a 15 ° heel, or 22.5 ° roll, or 5 ° trim or 7.5 ° pitch (where the length of the ship exceeds 100 m, the fore-and-aft static angle of inclination may be taken as 500/*L*, where *L* is the length of the ship, in m).

6.2 The materials used in construction of marine air receivers are to comply with the relevant requirements of CCS Rules for Materials and Welding ; if any material other than the above-mentioned is to be used, the detailed information such as mechanical properties (including values of mechanical properties used in calculation of permissible stresses), chemical composition and heat treatment is to be submitted to CCS for examination.

6.3 The design pressure of marine air receivers is not to be less than the maximum working pressure. For air receivers with safety valves, the opening pressure of safety valves is not to be more than the design pressure of air receivers.

6.4 The body construction design, arrangement of mountings and fittings, strength calculations, welding procedure specification, inspection of main manufacturing processes, and completion inspection/test for marine air receivers are to comply with the requirements of CCS Rules for Classification of Sea-going Steel Ships, approved plans and related standards.

6.5 Heat treatment of air receivers is to comply with the relevant requirements in Section 4, Chapter 7, PART THREE of CCS Rules for Materials and Welding.

6.6 Calculations for component strength, bedplates and standpipes, openings and compensation, doors for manholes and sight holes of marine air receivers are to be in accordance with the relevant requirements in Section 2, Chapter 6, PART THREE of CCS Rules for Classification of Sea-going Steel Ships.

7 Type test

7.1 Selection of typical samples

7.1.1 The air receivers used in type test must be manufactured under supervision of the Surveyor according to the welding procedures and plans approved by CCS, capable of representing or covering the series of air receivers (to be selected according to design pressure, wall thickness of boiler shell, internal diameter, height, and welding procedures of air receivers) within the requested approval scope in respect of performance, characteristics and manufacturing quality. One or two air receivers are to be taken for each type.

7.1.2 Welding base metal, joint type, welding consumables, welding methods and welding positions used in welding procedure approval test are to be consistent with welding procedure specifications.

7.1.3 For marine air receivers used in type test, acceptance of raw materials, main manufacturing processes, inspections and tests, and transfer of relevant marks are to be carried out under supervision of the Surveyor on site. The results are to comply with the requirements of CCS Rules for Classification of Sea-going Steel Ships and approved plans.

7.2 Type test items and requirements

7.2.1 Raw material inspection:

Steel plates, steel pipes and welding consumables used in construction of marine air receivers are to be furnished with products certificates issued by CCS or equivalent documents, and their types, grades and specifications are to be consistent with approved plans. The steel plates and steel pipes not having CCS products certificates are to be manufactured at manufacturers accepted by CCS and subject to CCS inspection.

7.2.2 Visual examination and dimension examination:

(1) visual examination: Misalignment, edge bevel and weld size of butt welds (width and reinforced dimensions of welds) are to be measured, and the results are to comply with the requirements of CCS Rules for Materials and Welding and approved plans. Visually examined boiler shell and end plate are to be free from cracks, scabs and other defects impairing the performance of the products;

(2) dimension examination: Main dimensions such as overall length, overall height, diameter and out-of-roundness of boiler shell are to comply with the requirements of CCS Rules for Classification of Sea-going Steel Ships and approved plans.

7.2.3 Non-destructive testing

Welds and test plates are to be subjected to non-destructive testing and the results are to comply with the relevant requirements in Section 5, Chapter 7, PART THREE of CCS Rules for Materials and Welding.

7.2.4 Test of welded test plates (air receivers with grade III may be exempted from the test):

The relevant requirements in Section 2, Chapter 7, PART THREE of CCS Rules for Materials and Welding are to be complied with.

7.2.5 Hydraulic test

The body and standpipe of air receiver are to be subjected to hydraulic test after completion of assembly. The test pressure is to comply with the relevant requirements in Section 5, Chapter 6,

PART THREE of CCS Rules for Classification of Sea-going Steel Ships.

7.2.6 Tightness test

The tightness test of air receiver body can be carried out only after satisfactory hydraulic test and completion of assembly of mountings and fittings. The test pressure is to be working pressure, and the test medium may be air, nitrogen or any other inert gas. The pressure is to be maintained for at least 5 min and no leakage is allowed. If the gastightness test is not practical, the hydraulic test may be accepted in lieu of the gastightness test and the test pressure is to be 1.25 times the design pressure. Test methods and acceptance criteria are the same as those for the hydraulic test.

7.2.7 Fuse plug test (if any)

Two fuse plugs are to be taken for each specification and subjected to the extrusion resistance test and the test for determination of actuation temperature of fuse plugs. The compressed air is to be applied on the side where the test sample contacts the medium inside the air receiver at the design pressure and temperature of 50 – 60℃ for 2 h. Then the other side is to be examined and no leakage or visible extruded fusible alloy is allowed. After satisfactory results are obtained, the test for determination of actuation temperature of fuse plugs is to be carried out. In general, the actuation temperature of fuse plugs is 100℃.

7.2.8 Safety valve test (if any)

The test is to cover opening pressure, return pressure, gastightness. The opening pressure is to be more than working pressure and less than design pressure, the return pressure to be not less than 0.85 times the working pressure, and the gastightness test pressure is to be working pressure. No leakage is allowed. The discharge of the safety valve is to be such that the pressure inside the air receiver will not exceed 110% of the design pressure when the outlet valve is closed.

8 Unit/batch inspection

8.1 Unit/batch inspection for issuing marine products certificates is to be carried out after CCS works approval, unless special consideration is given. Each marine air receiver is to be subjected to unit/batch inspection. Where air receivers are not approved, the unit/batch inspection is to be carried out according to type test requirements.

8.2 The unit/batch inspection after approval by CCS is to be carried out according to the approved

inspection plan, including the following test items:

(1) raw material inspection or retesting;

(2) visual examination and dimension examination;

(3) welding inspection: Inspection prior to welding, welding inspection and visual examination of welds;

(4) non-destructive testing;

(5) test of mechanical properties of welded test plates (if applicable);

(6) hydraulic test;

(7) tightness test;

(8) safety valve test;

(9) other tests (if applicable).