Guideline No.: P-08(202205)

P-08

FLEXIBLE HOSE

Issued date: 13, May, 2022

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 versions and release date : P-08(201510) October 20,2015

P-08(201705) May 9,2017

P-08(201909) September 24,2019

Main changes:

1. ISO6802:2008 is revised to ISO6802:2018;
2. According to UR P2.12.1, add restrictions on the use of flexible hose assemblies;
3. According to UR P2 12.5.2, the selection of type test samples is revised.

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1 Application

1.1 The Guidelines are applicable to metallic or non-metallic flexible hoses or flexible hose assemblies used for securing piping systems and permanent connection between mechanical components. The Guidelines may also apply to flexible hoses for temporary connection or flexible hoses or flexible hose assemblies used on portable equipment.

1.2 Flexible hose assemblies complying with the requirements of the Guidelines may be used in fuel oil, lubricating oil, hydraulic and thermal oil systems, freshwater and seawater cooling systems, compressed air system, bilge and ballast systems and grade III steam piping systems. Flexible hoses are not to be used for high pressure fuel oil injection system.

1.3 The Guidelines do not apply to the hoses intended to be used in fixed fire-extinguishing systems.

2 Normative references

(1) Annex 2, Chapter 2, PART THREE of CCS Rules for Classification of Sea-going Steel Ships (hereinafter referred to as the Rules for Steel Ships);

(2) ISO 6802-2018 Rubber and Plastic Hoses and Hose Assemblies--Hydraulic-pressure Impulse Test with Flexing;

(3) ISO 6803-2017 Rubber or Plastic Hoses and Hose Assemblies--Hydraulic-pressure Impulse Test without Flexing;

(4) ISO 10380-2012 Pipework-Corrugated Metal Hoses and Hose Assemblies;

(5) ISO 15540-2016 Ships and Marine Technology—Fire Resistance of Non-metallic Hose Assemblies and Non-metallic Compensators—Test Methods;

(6) ISO 15541-2016 Ships and Marine Technology—Fire Resistance of Non-metallic Hose Assemblies and Non-metallic Compensators—Requirements for the Test Bench;

(7) ISO 1402-2009 Rubber and Plastic Hoses and Hose Assemblies—Hydrostatic Testing;

(8) MSC/Circ.1083 Unified Interpretation on the Requirement of Shielding Means for Fuel Oil Piping

3 Terms and definitions

3.1 For the definitions of terms related to product inspection, design approval, type approval, prototype test, test specimen, unit/path inspection, final inspection, etc., refer to 3.1.2, Chapter 3, PART ONE of CCS Rules for Classification of Sea-going Steel Ships;

3.2 Flexible hose assembly: metallic or non-metallic hose/fitting combinations in which the hose ends are fitted with accessories.

Note: Flexible hose assemblies for essential services or containing either flammable or toxic media are not to exceed 1.5 m in length.

4 Drawings and documentation to be submitted

The following drawings and documentation to be submitted to CCS for review.The approval drawings and documentation shall include at least the following:

4.1 General requirements for plans and documents to be submitted to CCS for examination and approval are specified as follows:

(1) particulars of the manufacturer, including the name, address, history, production capacity, technical and inspection personnel, main products, subordinate relationship, trademark, etc.;

(2) Details of the products for approval;

(3) Main production equipment;

(4) Main test equipment;

(5) Brief production technology of the products for approval;

(6) Quality management documents;

(7) Document of entering to the register of enterprise;

(8) Qualification certificate and/or production license;

(9) Specimen of products quality certificate;

(10) Quality control scheme (where applicable);

(11) List of qualified suppliers(where applicable).

4.2 The following drawings and documentation to be submitted are to be submitted to CCS for approval:

(1) General plan;

(2) Main parts diagram (hoses, end fittings);

(3) Main properties and specifications sheet;

(4) Summary table of mechanical and chemical properties of main parts;

(5) Technical specifications for delivery acceptance, manufacturer test program, prototype test plan.

4.3 The following drawings and documentation to be submitted are to be submitted to CCS for review:

(1) Product description;

(2) Nameplate (label plate or other permanent mark);

(3) Manufacturer certificate of conformity/warranty certificate (sample);

(4) Other information to be submitted

4.4 For manufacturers applying for B type approval by CCS, the relevant basic information of the manufacturer (including manufacturer history and current situation) and description of production history, such as special verification or identification of the product, are to be submitted and associated reports and certificates may be enclosed.

4.5 For manufacturers applying for B type approval by CCS, quality control plan is to be submitted—a quality control plan for the products within the scope of approval is to be developed and submitted to CCS for approval by the manufacturers. The quality control plan is to describe the methods of quality assurance and control during the process of product manufacturing according to the technical requirements or applicable standards for the product. This quality control plan is to include a plan of inspection after approval and in particular, to reflect the inspection and test requirements specified in relevant CCS rules.

4.6 For manufacturers applying for A type approval by CCS, in addition to abovementioned documents and information, a complete set of quality management system documents covering the products within the scope of approval and complying with ISO9000 standard or equivalent standards is to be provided, among which the procedures of inspections and tests required by CCS rules are to be approved by CCS.

5 Technical requirements

5.1 Design and manufacture are to comply with the requirements of 1.3, Annex Chapter 2, Part Three of CCS Rules for Classification of Sea-going Steel Ships;

5.2 Installation are to comply with the requirements of 1.4, Annex Chapter 2, Part Three of CCS Rules for Classification of Sea-going Steel Ships;

5.3 The marking are to comply with the requirements of 1.6, Annex Chapter 2, Part Three of CCS Rules for Classification of Sea-going Steel Ships;

5.4 For the flanged joint, valve bonnet and any other flanged or threaded joint of the flexible hoses used in fuel oil and lubricating oil piping systems operating at an oil pressure greater than 0.18MPa, the possibility of installing splash guard is to be considered. Such joints are to be compatible with the type of connection interface for installation of steel protective guard designed according to IMO MSC /Circ.647, or may be compatible with the protective tape or other protective devices approved by CCS.

6 Materials and components

6.1 Materials and components are to comply with relevant requirements of CCS Rules.

6.2 Materials and components of flexible hose mainly include: hose, end fittings.

7 Type test

7.1 Selection of typical test specimens

7.1.1All flexible hoses or flexible hose assemblies are to be classified depending on their material and service requirements (conveyed medium, pressure and temperature) to determine the applicable standards.

7.1.2 Type tests are to be carried out for each size of hose assembly. However, for ranges with more than 3 different diameters, the type tests are to be carried out for at least:

(1) The smallest diameter;

(2) The largest diameter;

(3) Intermediate diameters selected based on the principle that type tests carried out for a hose assembly with a diameter D are considered valid only for the diameters ranging between 0.5D and 2D.

7.1.3 For hose and fitting combinations, the specimens are to be selected respectively from hose assemblies with end fittings of different materials or structures for type test.

7.1.4 For fire resistance tests the specimens shall be selected in accordance with ISO 15540:2016.

7.2 Test items

7.2.1 All flexible hoses or flexible hose assemblies are to be prototype tested in accordance with their respective applicable standards.

7.2.2 Hoses and end fittings of different service requirements and nominal diameters are to be subject to pressure, burst, impulse resistance and fire resistance tests respectively in accordance with the applicable standards.

7.2.3 All flexible hoses or flexible hose assemblies are to be burst tested to verify that they are

capable of withstanding a burst pressure not less than 4 times of the design pressure without any damage or leakage.

7.2.4 Non-metallic flexible hoses or flexible hose assemblies expected to sustain impulsive pressure and/or high vibration intensity during service are to be subject to impulse test and where they are used in any circumstance with flexing, subject to flexing test.

7.2.5 Metallic flexible hoses or flexible hose assemblies are to be subject to bend test.

7.2.6 Non-metallic flexible hoses or flexible hose assemblies, which are used for combustible medium service or used in seawater piping systems susceptible to the possibility of water invasion due to failure of such hoses/assemblies, are to be subject to fire resistance test.

7.3 Reduction or exemption of prototype test items

7.3.1 In general, all applicable test items described in 7.2 are to be carried out during the approval process. However, provided that the conditions mentioned below are satisfied, a written request for exemption from partial test items mentioned in 7.2.1 may be submitted to CCS by the manufacturer. The surveyor is to consider such request according to the manufacturer's production status, production history, service records, etc.

(1) The manufacturer applying for approval is able to provide the corresponding test reports recently issued by an authoritative testing organization (e.g. State Bureau of Quality and Technical Supervision, National Defense Technology Laboratory, etc.);

(2) The approval applicant is able to provide the corresponding test reports recently endorsed by an IACS (International Association of Classification Societies) Member.

7.4 Prototype test methods and requirements

7.4.1 The procedure of prototype test of all flexible hoses or flexible hose assemblies is to comply with the requirements of the applicable standards and submitted to CCS for review and approval.

7.4.2 Burst test of flexible hoses or flexible hose assemblies

7.4.2.1The non-metallic flexible hoses or flexible hose assemblies are to be burst tested in accordance with the requirements of ISO 1402 and no pressure holding time is required when 4 times of the design pressure is reached during the test.

7.4.2.2 The metallic flexible hoses or flexible hose assemblies are to be burst tested in accordance with the requirements of ISO 10380.

7.4.3 The non-metallic flexible hoses or flexible hose assemblies are to be impulse tested in accordance with the requirements of ISO 6803 and flexing tested in accordance with the requirements of ISO 6802.

7.4.4 The metallic flexible hoses or flexible hose assemblies are to be bending tested in accordance with the requirements of ISO 10380.

7.4.5 The non-metallic flexible hoses or flexible hose assemblies are to be fire tested in accordance with the requirements of ISO 15540 and the test bench is to comply with the requirements of ISO 15541.

8 Unit/path inspection

Unit/path inspection for manufacturers which have obtained type approval by CCS

8.1 the test regarding the following items is to be carried out in accordance with the inspection plan (relevant part in quality control plan) approved during the approval:

(1) Visual and dimensional inspection;

(2) Pressure test:

① Flexible hoses and flexible hose assemblies used in hydraulic piping systems are to be pressure tested to 1.25 times maximum design pressure; however, the test pressure does not have to exceed the design pressure plus 7 MPa;

② Flexible hoses and flexible hose assemblies other than those used in hydraulic piping systems are to be pressure tested to 1.5 times maximum working pressure, however, the test pressure is to be no less than 0.4MPa.

8.2 Above tests are to be carried out by the manufacturer piece by piece and complete test reports are to be issued and submitted to the surveyor for review.

8.3 In addition, the surveyor is to randomly select, at a percentage of 1-3% of the products of each batch/specification, at least one piece, a proportion of the products from the batch of products for re-test of abovementioned inspection and test items, and provide on-site witness when the tests are being carried out by the manufacturer.

8.4 The raw material quality certificates of the main parts are to be submitted along with each application for unit/path inspection to CCS surveyor for review.