

Guideline No.: K-03(201510)



K-03

CRUDE OIL TANK WASHING MACHINES

Issued date: October 20,2015

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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: K-03(201510) October 20, 2015

Main change: New Release

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CRUDE OIL TANK WASHING MACHINES

1 Application

1.1 This Guideline applies to the type approval and inspection of the crude oil tank washing machines for crude oil washing systems of oil tankers.

2 Normative references

2.1 The type approval and inspection of crude oil tank washing machines are to be based on the following documents:

- (1) IMO Resolution A.446(XI) revised Specifications for the Design, Operation and Control of Crude Oil Washing Systems;
- (2) IMO Resolution A.497(XII) amendments to revised Specifications for the Design, Operation and Control of Crude Oil Washing Systems (Resolution A.446(XI));
- (3) IMO Resolution A.897(21) amendments to revised Specifications for the Design, Operation and Control of Crude Oil Washing Systems (Resolution A.446(XI), as amended by Resolution A.497(XII)).

3 Definitions

3.3.1 For the purpose of this Guideline:

- (1) Fixed deck tank washing machine means a washing machine which is permanently fitted on deck.
- (2) Fixed embedded tank washing machine means a washing machine which is permanently fitted inside tank.
- (3) Portable tank washing machine means a washing machine which is not permanently fitted on deck.
- (4) Simplex nozzle means only the sole nozzle which is fitted on washing machine.
- (5) Duplex nozzles mean two nozzles which are fitted on washing machine.
- (6) Program washing machine means a washing machine which performs washing operation according to the pre-set program.
- (7) Non-program washing machine means a washing machine which performs washing operation other than the pre-set program.
- (8) Impact pressure means an impact pressure value which is caused by continuous bump from cascade on the bearing pad.
- (9) Effective range means a range by a tank washing machine when the dynamic pressure value on

bearing pad is equal to 7 kPa.

4 Plans and documents

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

- (1) main performance specifications;
- (2) a list of main parts material physicochemical performances;
- (3) general plan of crude oil tank washing machine;
- (4) drawings of nozzle body, nozzle rotor, etc.;
- (5) type test program.

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

- (1) instruction manual.

5 Type test

5.1 Selection of typical samples

A type test is to be carried out for each model of crude oil tank washing machine in the type approval.

5.2 Type test items are to include:

5.2.1 Visual examination: the washing machine is subject to visual examination in accordance with the requirements of this Guideline and the approved plans and documents after completion of assembly.

5.2.2 Operational test: to manually rotate the nozzle to check if it moves smoothly or not.

5.2.3 Hydrostatic test includes:

- (1) pressure parts of washing machine are subject to strength test with the test pressure being 1.5 times the maximum design pressure for 5 min, no leakage or other abnormal condition occurred;
- (2) washing machine is subject to tightness test with 1.25 times the maximum working pressure for 5 min after completion of assembly, no leakage or other abnormal condition occurred.

5.2.4 Operational test: confirm the operation required for the washing machine which is continuously working under 1.0 MPa working pressure according to its operational mode. For washing machines with indicators, all the operations are to be definitely displayed and be observed through viewing ports. Additionally, program washing machine is to be set with arbitrary programs for test and confirmation. The following parameters are to be measured during test:

- (1) the time necessary for each cycle of operational mode: in s;

(2) water-supply pressure, in MPa;

(3) water-supply volume, in m³/h.

5.2.5 Impact pressure test:

(1) the nozzle of washing machine to be horizontally directed at the bearing pad centre of the unit subject to impact load, the movable baffle to be placed within effective range, and impact pressure tests to be conducted in turn under the designed grades of working pressure, which is not to be less than 7 kPa. The following parameters are to be measured during test:

① water-supply pressure, in MPa;

② water-supply volume, in m³/h;

③ impact pressure of the water jet, in kPa.

The above values measured are to comply with the design requirements;

(2) the impact pressure value is to be obtained from the following formula by means of collecting the measured values when the cascade remains stable:

$$M = \frac{\int_{t_1}^{t_2} f(t) dt}{t_2 - t_1}$$

where: M – effective impact pressure, in kPa;

f(t) – curve of the measured impact pressure, in kPa;

t₁, t₂ – interval of pressure measuring.

6 Unit/batch inspection

6.1 At least 5% of crude oil tank washing machines are to be sampled for unit/batch inspection, and at least one sample of each model is to be selected.

6.2 Unit/batch inspection items are to be performed according to 5.2.1 to 5.2.4.