Air Pipe Automatic Closing Devices

Amended Guidance

Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use

Reason for Amendment

IACS Unified Requirement(UR) P3 specifies requirements relating to the testing of air pipe automatic closing devices fitted onto upper decks. These requirements have already been incorporated into ClassNK Rules.

Although UR P3 specifies that reverse flow tests are to be performed, a large capacity pump is required to perform such tests in the case of large air pipe heads. Since it may be impractical or difficult for such tests to be carried out in some cases, the use of Computational Fluid Dynamics (CFD) simulations has, in common practice, been considered to be an acceptable alternative to reverse flow tests.

For this reason, IACS decided to amend UR P3 to specify that CFD simulations are an acceptable alternative to reverse flow tests for air pipe automatic closing devices of 400 mm nominal diameter and above. This revision was adopted as IACS UR P3(Rev.5) in April 2021.

Accordingly, relevant requirements are amended based upon IACS UR P3(Rev.5).

Outline of Amendment

Specifies CFD simulations as an acceptable alternative to reverse flow tests for air pipe automatic closing devices.

“Guidance for the approval and type approval of materials and equipment for marine use” has been partly amended as follows:

Part 6 MACHINERY

Chapter 2 TYPE APPROVAL OF USE OF MACHINERY AND EQUIPMENT

2.4 Approval Tests

2.4.2 Details of Tests

Sub-paragraph -10(2) has been amended as follows.

10 Air pipe automatic closing devices are to be designed and tested in accordance with **(1)** and **(2)** respectively.

(1) (Omitted)

(2) Testing

((a) and (b) are omitted.)

(c) Discharge / Reverse flow tests

~~The velocity of reverse flow which makes the air flow of t~~The air pipe head ~~blocking~~ is to ~~be confirmed~~ allow the passage of air to prevent excessive vacuum developing in the tank.

i) Reverse flow test

1) A reverse flow test is to be performed. A vacuum pump or another suitable device is to be connected to the opening of the air pipe leading to the tank. The flow velocity is to be applied gradually at a constant rate until the float gets sucked and blocks the flow~~.~~; and

2) The velocity at the point of blocking is to be recorded. 80 % of the value recorded will be stated in the certificate.

ii) Alternative to the reverse flow test

1) For pipe heads of 400 mm nominal diameter and above, as an alternative to the reverse flow test, a numerical simulation test based on computational fluid dynamics (CFD), to be carried out in conjunction with limited representative testing to establish the validity of the CFD modelling and results, may be accepted;

2) CFD predictions for air pipe heads can be validated against the available actual reverse flow test results of same size and type of air pipe heads;

3) The accuracy of the CFD modelling and the major assumptions used for the calculation are to be documented;

4) Mesh convergence studies are to be carried out and documented; and

5) The requirement specified in **i)2)** above applies.