U.S. Deportment
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: WASTE WATER/POTABLE WATER DRAIN SYSTEM CERTIFICATION TESTING

Date: 3/11/85
Initiated by: ANM-110

AC No: 25.1455-1
Change:

1 PURPOSE. This advisory circular (AC) sets forth a specific method of compliance with the requirements of § 25.1455 of the Federal Aviation Regulations (FAR) pertaining to draining of fluids through drain masts when the fluids are subject to freezing. This method is designed to verify that draining fluids will not accumulate as ice in sufficient quantity to be hazardous. This AC is for guidance purposes and to set forth one method of compliance that has been found acceptable. As with all advisory circular material, it is not mandatory and does not constitute a regulation. In lieu of following this method, the applicant may elect to follow any alternate method found by the FAA to be an acceptable means of complying with the requirements of § 25.1455.

2. RELATED FAR SECTIONS. Section 25.1455. This AC discusses compliance with § 25.1455 only. This AC does not cover the drain system installation (plumbing, structure, electrical components, etc.) and the system failure effects. The installation and its failure effects should be reviewed for compliance under other sections of Part 25.

3. BACKGROUND.

a. Transport category airplanes in service today generally have several sources of freezable liquids. One source is the potable water system used to supply drinking, wash and rinse water. Another source is the waste potable water and residue from sinks, galleys, coffeemakers and floor drains that is either drained overboard through drain masts or drained into the lavatory holding tanks. The lavatory waste water system can be either a closed system using filtered waste water containing disinfectant or an open system using potable rinse water. Either type lavatory system requires periodic drain and rinse procedures, and the closed system must be recharged with water/disinfectant.

b In a properly designed system, lavatory sink drain water quantity is negligible and proper drain maintenance (see AC 120.39, Hazards of Waste Water Ice Accumlulation Separating from Aircraft in Flight, dated 10/31/80) should preclude hazardous quantities of ice being formed. Potable water which is allowed to drain out can, however, become an appreciable problem unless the drain system is designed to prevent impingement on the airplane. Either the charge lines, the waste drain lines, or the waste potable drain masts may allow seepage which can form ice. This ice represents a hazard because it may break loose and strike the airplane or fall to the ground, potentially endangering people and property on the surface. This AC describes a test procedure used to determine if excessive amounts of water, which could form a hazardous quantity of ice, will impinge on airplane surfaces.

4. TESTS. In airplanes where water is drained through drain masts from the airplane in flight, the following technique has been used to demonstrate that no excessive amount of water impinges on the fuselage:

a. The areas of the airplane expected to be in reach of drained water, including the drain mast itself, are coated with a water-soluble white compound which is allowed to dry. One product commonly used for this purpose is available under the commercial trade name "Bon Ami".

b The test solution is water containing a water-soluble, nontoxic dye. Different colors should be used to distinguish flight conditions and sources of impingement.

c. The airplane is flown in two flight conditions, one representative of holding and one representative of cruise at altitudes where freezing is not likely to occur before impingement. Airspeed, altitude and outside air temperature are recorded. An additional initial approach (descent) configuration should be tested if it is expected that a significant amount of waste liquid (coffee, beverages, etc.) may be dumped during galley cleanup activities.

d For each flight condition, allow the solution to drain from each external drain mast. This may be accomplished using lavatory sinks, or the drain system may be utilized directly if the lavatories are inconvenient or not yet installed: Approximately two to three gallons of each color should be poured at the 'most rapid rate the drain system will accommodate.

e. The colors that impinge on the white compound may become mixed and difficult to identify. It may, therefore, be necessary to conduct each test on a separate flight. Tests should be conducted in dry air because clouds or precipitation may obscure the impingement patterns.

f After the appropriate test conditions have been flown and the airplane has returned to the ground, the painted fuselage area is photographed for formal documentation. An FAA certification engineer should also assess the results, on site, as photographic evidence by itself is frequently inconclusive.

3 It is permissible to have some impingement, i.e., a light misting is acceptable in areas where no discontinuity that could contribute to ice accumulation exists. The results of the test should demonstrate that hazardous quantities of ice will not accumulate.

5 SYSTEM INSTALLATION AND FAILURE CONDITIONS. The possibility exists that drain systems will fail, burst, plug, freeze, or overflow. Heating systems that are installed to prevent freezing of fluid drain systems may also fail. The leakage of fluids, freezing of fluids, arcing, overheating of systems, etc., should be considered. These failures and possible secondary effects should be reviewed For compliance under other sections of Part 25, including §§ 25.1301 and 25.1309. See those rules and associated advisory material for guidance.

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