

ICS 71.100.40

CCS G 73



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 25356-2024

Replacing GB/T 25356-2010

Airport pavement deicing/anti-icing fluid

机场道面除冰防冰液

Issued on: August 23, 2024

Implemented on: December 1, 2024

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

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1 Scope and normative references

1 The document lays down the technical requirements, the inspection, the product information and the transport and storage of airport pavement deicing/anti-icing fluid, referred to below as the deicing/anti-icing fluid. It applies where the producer declares the conformity of a product for airport pavement use, where it serves as the basis of a supply contract between producer and purchaser, and where it serves as the basis of a certification body.

2 The normative references include GB/T 2828.1 on sampling procedures for inspection by attributes, GB/T 2951.11 on common test methods for insulating and sheathing materials of cables, GB/T 6682 on water for analytical laboratory use, GB/T 7256.1-2022 on

aeronautical ground lights, the GB/T and HJ water quality methods for total chromium, copper, zinc, lead and cadmium, nitrate nitrogen, total phosphorus, sulfide, free and total chlorine, total mercury, five-day biochemical oxygen demand and chemical oxygen demand, GB/T 13266 and GB/T 13267 on acute toxicity to daphnia and to freshwater fish, GB/T 16483 on safety data sheets, GB/T 21604 on acute dermal irritation and corrosion, GB/T 23851 on snow-melting agents and GB/T 23956 on product instruction sheets, together with the ASTM methods D56, D891, D1177, E70, F483, F484, F485, F502, F519, F945, F1104, F1110 and F1111 and the SAE documents AIR6130, AS6170, AS6172, AS6211 and AMS1435.

3 The document states that there are no terms and definitions to be defined.

4 Technical requirements

4.1 The physical and chemical properties are to meet Table 1. Appearance: uniform, of consistent colour, free from surface skinning, lumps and any foreign matter unfavourable to use. Flash point: not lower than 100 °C. Specific gravity at 20 °C: the qualification test value ± 0.015 . pH value at 20 °C: the qualification test value 7.0 to 11.5, the batch value being the qualification test value ± 0.5 . Freezing point of the diluted fluid at a mass ratio of 1 to 1: lower than -14.5 °C.

4.2 Corrosivity towards aircraft metallic materials is to meet Table 2. Sandwich corrosion: the corrosion grade of the panel not greater than grade 1. Total immersion corrosion: no obvious corrosion of the panel, with a mass change not greater than 0.3 mg per square centimetre per 24 h for aluminium alloy, not greater than 0.2 for aluminium-lithium alloy, not greater than 0.2 for magnesium alloy, not greater than 0.1 for titanium alloy and not greater than 0.8 for carbon steel, and for cadmium-plated steel a panel mass change not greater than 0.3 mg per square centimetre per 24 h. Cyclic corrosion: panel mass change not greater than 0.3 mg per square centimetre, with the pH of the test fluid before and after the test reported. Hydrogen embrittlement: no brittle fracture in 150 h. Stress corrosion resistance: no cracking.

4.3 The effect on aircraft non-metallic materials is to meet Table 3. Effect on polyacrylate plastics: no cracking, staining or discoloration after 8 h under load. Effect on polycarbonate plastics: no cracking, staining or discoloration after 30 min under load. Effect on coated surfaces: no cracking, discoloration or blistering of the coated surface, and a change in coating hardness of not more than one pencil hardness grade.

4.4 The effect on airport installations is to meet Table 4. Scaling resistance of cement concrete: after 50 freeze-thaw cycles the surface scaling of the pavement concrete specimen is not to exceed grade 1. Effect on wires and cables: the change in tensile strength is not greater than 30 % and the change in elongation at break is not greater than 30 %. Effect on aeronautical ground lights: no visible damage to the appearance of the light fitting, which lights normally when energised.

4.5 The producer is to supply the environmental and safety information of the fluid, covering biodegradability through five-day biochemical oxygen demand and chemical oxygen demand; aquatic toxicity towards daphnia and freshwater fish such as zebrafish; trace pollutants, namely nitrate expressed as the nitrate ion, total phosphorus expressed as phosphorus pentoxide, sulfur, halogens and heavy metals (chromium, mercury, lead, lead and cadmium, as printed); and skin irritation.

4.6 Performance in use is to meet Table 5. Effect on unpainted surfaces: no streaks or spots on the surface. Rinsability: no residual film left on the surface after rinsing. Storage stability: no separation, sedimentation or increase in turbidity. Pavement friction loss rate: not greater than 10 %. Ice melting effect, ice undercutting effect and ice penetration effect: the test information is reported, the acceptance criteria being agreed between purchaser and supplier.

5 Inspection

5.1.1 Inspection is of three kinds: qualification inspection, quality consistency inspection and factory inspection.

5.1.2 Qualification inspection is carried out on qualification of the product or when it is made by a licensee or a subcontractor, when the raw materials, the production equipment or the process change, and when the user considers it necessary. The items, with the clause numbers of the requirement and of the inspection method, are given in Table 6. A result meeting the technical requirements of Clause 4 is a pass.

5.1.3 Quality consistency inspection applies to every deicing/anti-icing fluid, with sampling to GB/T 2828.1 and items taken from Table 6. Unless the buyer states a frequency, the frequency is fixed by the producer, but the inspection is generally to be carried out at least once every six years. A result meeting the part of Table 6 covering quality consistency inspection is a pass.

5.1.4 Factory inspection applies to every batch, a batch being the fluid produced continuously from the same batch of raw materials under the same process conditions. The items follow Table 6. Where a result fails, three further samples are drawn from the failed sample for retest, and where the retest also fails the batch is treated as non-conforming.

5.2.1 to 5.2.5 Appearance is examined visually; the flash point follows ASTM D56; the specific gravity at 20 °C follows ASTM D891; the pH at 20 °C follows ASTM E70; the freezing point is measured to ASTM D1177 on the fluid mixed at a mass ratio of 1 to 1 with grade three water to GB/T 6288, that number being the one printed in the original text.

5.2.6 Sandwich corrosion is run separately on SAE AMS4037 aluminium alloy anodised to SAE AMS2470, SAE AMS4045 aluminium alloy anodised to SAE AMS2470, SAE AMS4041 aluminium alloy, SAE AMS4049 aluminium alloy and 2060-T8E30 aluminium-lithium alloy, following ASTM F1110.

5.2.7 Total immersion corrosion is run separately on SAE AMS4037 aluminium alloy anodised to SAE AMS2470, SAE AMS4041 aluminium alloy, SAE AMS4049 aluminium alloy, SAE AMS5045 carbon steel, SAE AMS4376 magnesium alloy dichromate treated to SAE AMS2475, SAE AMS4911 titanium alloy, SAE AMS4902 titanium alloy, 2060-T8E30 aluminium-lithium alloy and SAE AMS6345 steel prepared to ASTM F1111, following ASTM F483 for a test period of 24 h.

5.2.8 Cyclic corrosion is run on SAE 4130 steel, or AISI 4130 steel, cadmium plated to ASTM F1111, following SAE AIR6130.

5.2.9 Hydrogen embrittlement is run on SAE 4340 steel prepared to ASTM F519, using specimen type 1a, 1c or 2a, following ASTM F519.

5.2.10 Stress corrosion resistance is run on SAE AMS4911 and SAE AMS4902 titanium alloys following ASTM F945.

5.2.11 and 5.2.12 The effect on polyacrylate plastics is tested on YB-DM-10 aviation stretched acrylic sheet by the stress crazing procedure of ASTM F484 at 25 °C +/-2 °C; the effect on polycarbonate plastics is tested on SAE AMS-P-83310 polycarbonate by the same ASTM F484 procedure at 25 °C +/-2 °C, with an applied tensile stress of 13.8 MPa held for 30 min +/-2 min.

5.2.13 The effect on painted surfaces is tested on SAE AMS4049 aluminium alloy prepared to ASTM F502, by the paint softening procedure of ASTM F502 at 25 °C +/-2 °C.

5.2.14 The scaling resistance of cement concrete is tested with the fluid diluted with tap water at a mass ratio of 1 to 3, following SAE AMS1435.

5.2.15 and 5.2.16 The effect on wires and cables follows GB/T 2951.11; the effect on aeronautical ground lights follows 6.2.2 of GB/T 7256.1-2022.

5.2.17 to 5.2.20 Biodegradability is covered by the five-day biochemical oxygen demand to HJ 505 and the chemical oxygen demand to HJ 828. Aquatic toxicity is covered by the acute toxicity to daphnia to GB/T 13266 and to freshwater zebrafish to GB/T 13267. Trace pollutants are covered by nitrate nitrogen to GB/T 7480, total phosphorus to GB/T 11893, sulfide to GB/T 16489, free and total chlorine to HJ 585, total chromium to GB/T 7466, total mercury to HJ 597 and lead and cadmium to GB/T 7475. Skin irritation is covered by the acute dermal irritation and corrosion test on rabbits to GB/T 21604.

5.2.21 The effect on unpainted surfaces is tested on SAE AMS4049 aluminium alloy and SAE AMS4911 titanium alloy following ASTM F485.

5.2.22 For rinsability a clean transparent glass plate of 75 mm by 200 mm, dry and free of water marks, is laid flat and covered completely with the fluid. The plate is then tilted at about 45° for 10 min +/-0.5 min and left flat at room temperature for 24 h +/-0.25 h. It is rinsed first with tap water for 5 min to 6 min, then with grade three water to GB/T 6682, and