



**SUBJ:** Flammable Fluid Considerations for TKS Fluid

*This is information only. Recommendations aren't mandatory.*

## **Introduction**

This Special Airworthiness Information Bulletin (SAIB) alerts type certificate, amended type certificate, and supplemental type certificate applicants of an airworthiness concern regarding the issue of fluid flammability for TKS fluid.

At this time, this airworthiness concern is not considered an unsafe condition that would warrant an airworthiness directive action under Title 14 of the Code of Federal Regulations (14 CFR part 39).

## **Background**

In prior certifications of TKS systems on board aircraft, the issue of fluid flammability was not a concern; the fluid was simply considered to be non-flammable. However, recent testing has shown that the fluid is in fact flammable under certain conditions. As a result, the concerns of 14 CFR, part 23, § 23.853(e), § 23.863, and § 23.1365(c) should be appropriately addressed.

Per 14 CFR §23.863(b)(2), it is appropriate to consider the flammability characteristics of the specific fluid in question. In 2008, flammability testing of TKS fluid was documented by the FAA Technical Center in Report No. DOT/FAA/AR-TN08/9. The document is available at <http://www.fire.tc.faa.gov/pdf/TN08-9.pdf>. The findings of the Technical Center report are that the TKS fluid is flammable only under very specific conditions:

- Sustained surface ignition will sometimes occur if a pool of fluid is heated to approximately 150°F and an ignition source is introduced. Above approximately 150°F the ignition is self-extinguishing. However, sustained surface ignition will occur if a pool of fluid is heated to approximately 250°F and an ignition source is introduced.
- A spray mist will ignite when exposed to a flame, but is not self-sustaining when the ignition source is removed.
- A spray mist will undergo “sporadic ignitions” confined to small areas when exposed to a spark, but is not self-sustaining.
- A drip or stream directed onto a hot surface will not ignite.

In short, the fluid is only self-sustainingly flammable when allowed to both pool and heat. Further, a spray mist is only flammable in the presence of a sustained ignition source. In essence the report supports the argument that it is appropriate in certain conditions to treat the fluid as non-flammable.

## **Recommendations**

We recommend that all type certificate, amended type certificate, and supplemental type certificate applicants assess the pertinent regulations (14 CFR, part 23, §23.853(e), §23.863, and §23.1365(c)) for their TKS system and take any appropriate action. Specifically:

- 14 CFR, part 23, §23.853(e), which requires lines, tanks, and other equipment containing flammable fluids not be installed in passenger compartments unless shielded, isolated, or otherwise protected such that the fluid is not a hazard.
- 14 CFR, part 23, §23.863, which requires minimization of the probability of ignition of fluids and vapors for each area where flammable fluids or vapors could escape.
- 14 CFR, part 23, §23.1365(c), which requires main power cables be separated from TKS fluid lines or be shrouded by electrically insulated flexible conduct or equivalent, in addition to the normal cable insulation.

In summary:

- TKS anti-icing fluid requires consideration of flammability characteristics in order to determine its appropriate classification. FAA testing has revealed that the fluid must be considered as flammable under certain conditions. Specifically, TKS fluid must be considered flammable when fluid pooling may occur under conditions that may then elevate the temperature of the pool to a level that would support sustained combustion.
- TKS fluid must also be considered flammable when conditions could present a situation where a fine spray is directed onto a sustained flame source.

## **For Further Information Contact**

Leslie B. Taylor, Aerospace Engineer, FAA Small Airplane Directorate, 901 Locust Street, Room 301, Kansas City, MO 64106; phone: (816) 329-4134; email: leslie.b.taylor@faa.gov