

EFFECT OF ALTERNATIVE JET FUELS ON AIRCRAFT FIRE SAFETY

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Many ways are being evaluated to reduce the Green House Gases (GHG) emissions and the usage of Alternative Jet Fuels (AJF) (fuels not derived from petroleum with properties similar to kerosene) should increase rapidly in the near/long-term.

Currently, the qualification criteria are mainly based on fuel performances and engine compatibility (the current alternative fuels have been qualified according to the ASTM D1655 specifications / the future alternative fuels will be qualified according to the ASTM D4054).

But the assessment of the fire safety risks in presence of a post-crash fire or an inflight-fire in case of fire in fire zones (like powerplant installations) is also essential to manage the cabin safety.

The talk will present the works carried out by DGA Aeronautical Systems (ex. CEAT (Toulouse Aeronautical Test Centre)) with the support of INERIS (French Institute of Industrial Environment and Risks) in the framework of the ALFA BIRD program (Alternative Fuels and Biofuels for Aircraft Development) to assess the effect of a fuel change on the fire safety, beyond the fire and explosion safety related questions already addressed in the initial program.

The works carried out by the Fire Test Laboratory of DGA Aeronautical Systems were performed with the following objectives:

- Evaluate the effect of a fuel change on the characteristics of a post-crash fire,
- Evaluate the impact on the fire resistance level of materials and equipments,

to be able to answer to the following questions :

- Does a fuel change have an effect on the cabin and flight safety levels (post-crash or engine fire)?
- And determine if actions are necessary to keep the current performance and safety level.

The talk will present comparative characterizations and test results from 4 AJF, F34 (NATO ref. of US JP8) and JET A1, evaluated with:

- PARK Oil Burner : ISO 2685 tests (fire resistance test for materials and equipments in fire zones) on aluminium plates of 2mm,
- NexGen Oil Burner set according to the Burnthrough test method on aluminium plates of 3mm,
- 2m² pan fires,

These test results show the effect of the level of smoke release on the materials' fire behaviour.

This talk will also present the effect of the flame T° on the burnthrough time of aluminium fuselage using the NexGen Burner.