



DGA Aeronautical Systems

« Fire Safety Department »

NexGen Burner
Effect of the Flame T° on the Fire Resistance & Burnthrough Time



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Scope

This presentation shows an analysis of test results performed with the NexGen Burner.

The test results presented were not performed with the aim of assessing the burner or studying the effect of various settings. But the test results show interesting points, which could be interesting to take into account to optimize the repeatability and reproducibility of the various test methods using the NexGen Burner.

The objective of the presentation is :

- ✓ **To show that the flame T° of the NexGen burner could have a significant effect on the test results.**

Test method

Tests performed

- ✓ [FAR/CS 25.856b AppF part VII \(burnthrough test\)](#) :
(NexGen Burner)
(1038°C) ($\approx 18 \text{ W/cm}^2$)



6 various fuels:

- Kerosene F34 (NATO ref. of US JP-8)
- Jet A1
- 4 other alternative fuels



Setting of the NexGen Burner

- The NexGen burner was set according to the specifications of the burnthrough test methods for the Kerosene
- The burnthrough tests were performed using the Kerosene and the other fuels without any additional adjustments
- Before each tests (for all fuels):
 - Pressures & T° (Air / Fuel) were noted and were in accordance with the specifications
 - The flame T° was checked



Test samples

Test samples :

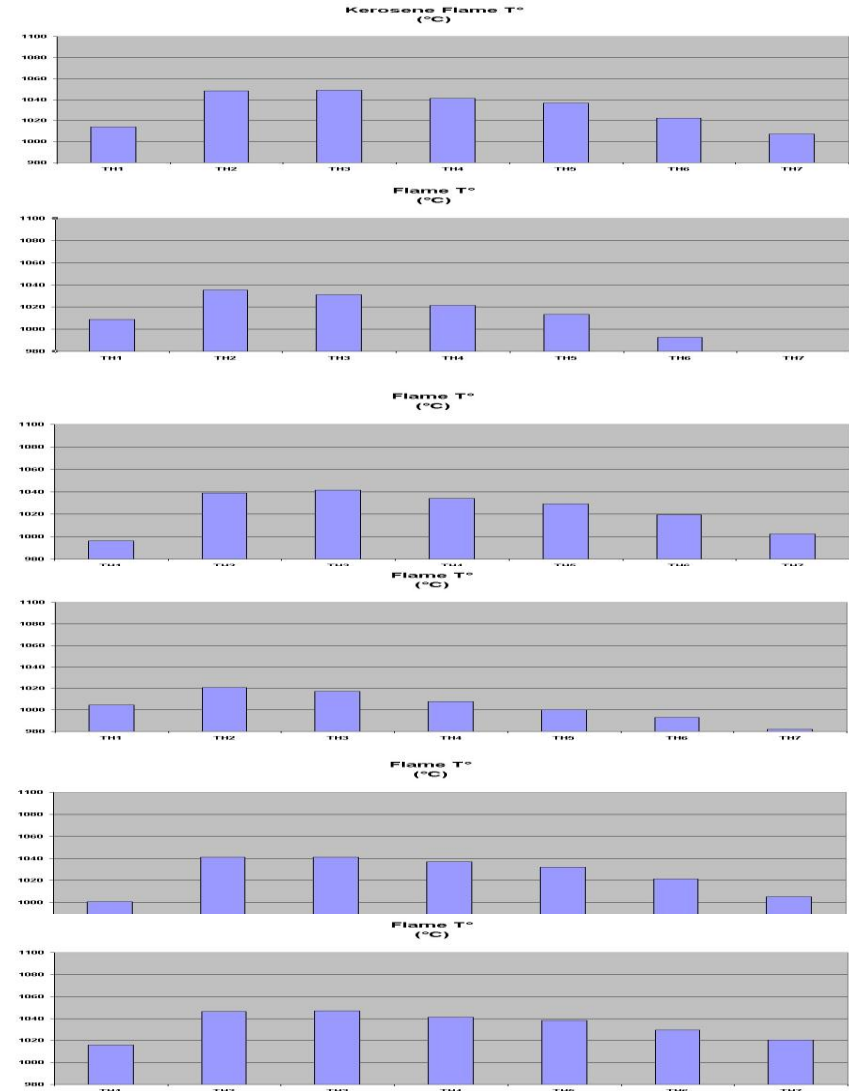
2024 aluminium plate 60 x 60 cm / 3mm thickness
(the fail criterion was the time of flame penetration)





Temperature measurement

The flame T° was measured before each test



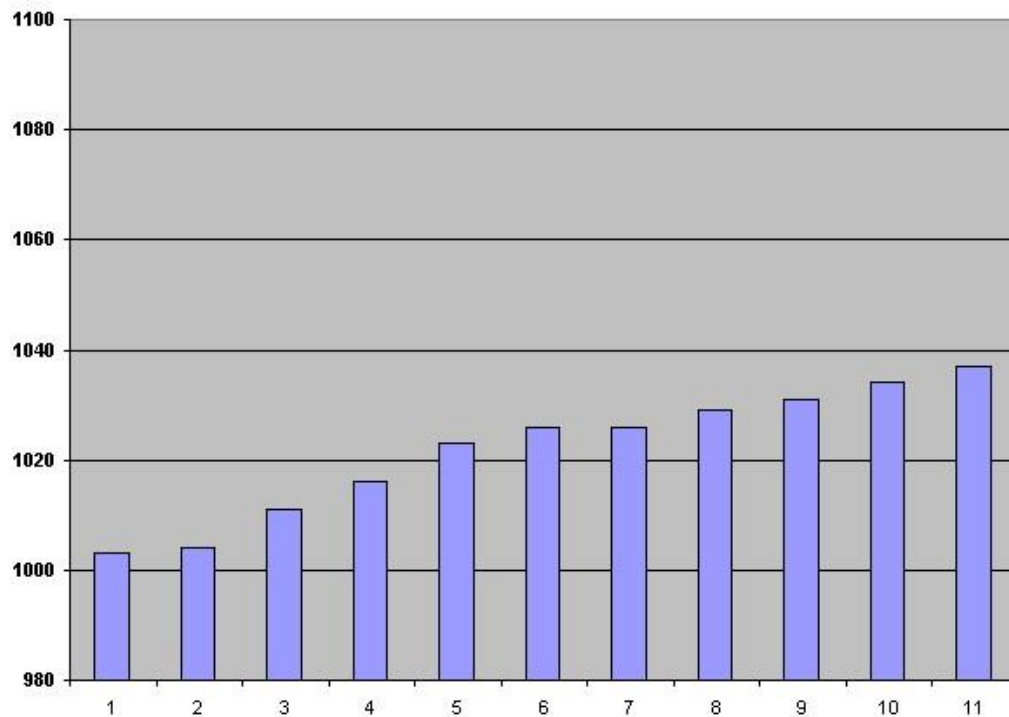


Tested T° Range

- 11 tests were performed
- The range of the average T° was from 1003°C to 1037°C



Tested T° Range (°C)





Burnthrough tests results

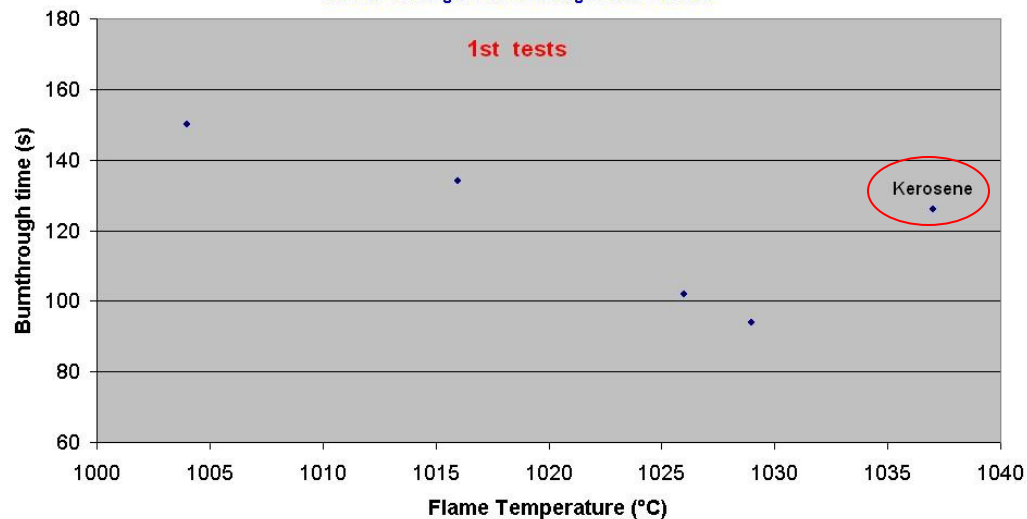
2 series of tests were performed

→ The first series of test seems to show an effect of the T° , but the kerosene test result does not confirm the trend.

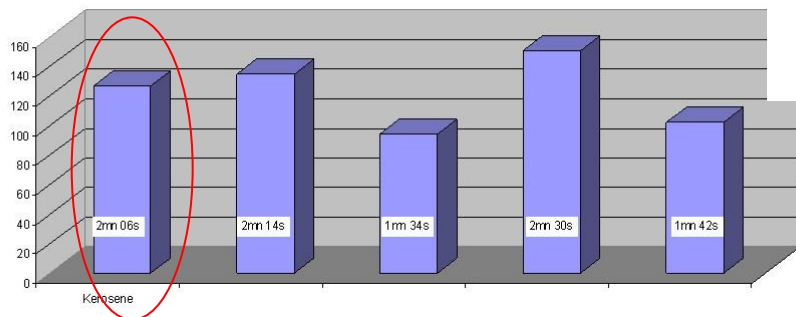
→ But, in the context of the study the test result using Kerosene was not the expected one (due to its high level of smoke/soot release in comparison with the other fuels, the kerosene test should show a lower burnthrough time)

Effect of the Flame T° on the Burnthrough Time
(NexGen Burner / Aluminium plate 3mm)

Burner settings : Burnthrough test method



Burnthrough time (s)





Burnthrough tests results

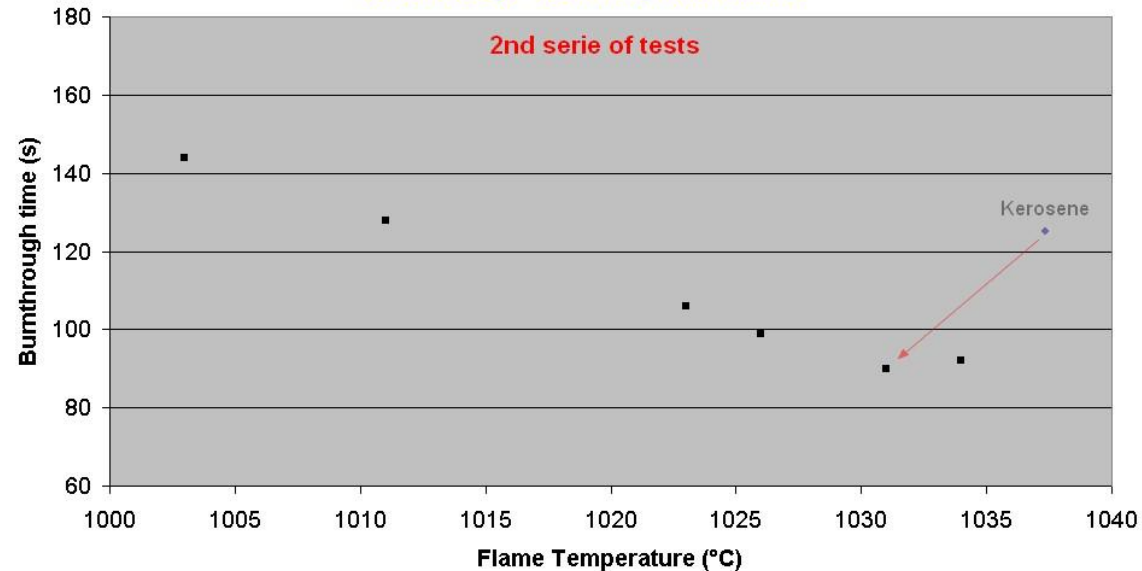
2nd series of tests :

→ The second series of tests confirms that the 1st kerosene test overestimated the burnthrough time

→ and also clearly show an effect of the T° on the burnthrough time

Effect of the Flame T° on the Burnthrough Time
(NexGen Burner / Aluminium plate 3mm)

Burner settings : Burnthrough test method





Burnthrough tests results

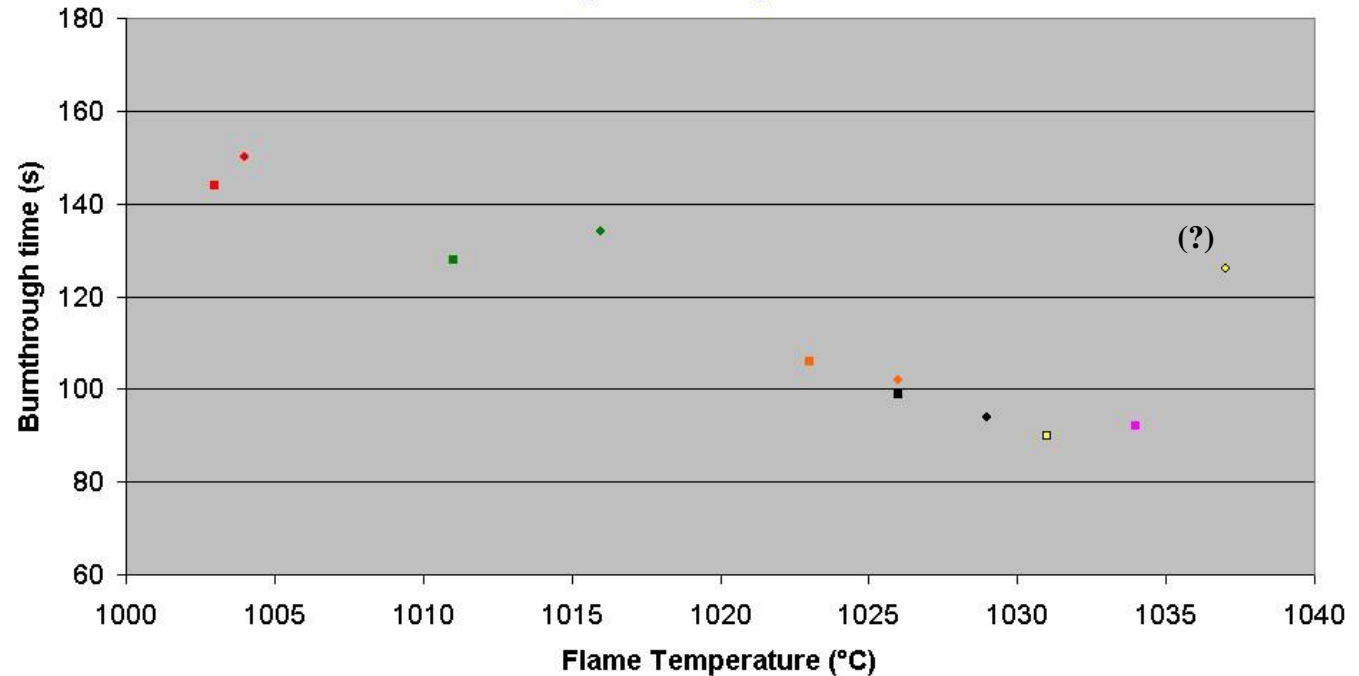
The whole of the test results clearly shows :

→ The good repeatability of the test using the NexGen Burner

→ An effect of the T° on the burnthrough time (up to 65% for a gap of T° of less than 40°C)

Effect of the Flame T° on the Burnthrough Time
(NexGen Burner / Aluminium plate 3mm)

Burner settings : Burnthrough test method



Conclusions

In the framework of these series of tests, the NexGen Burner has shown :

- a very good repeatability when the burner is set according to the burnthrough test method
- a significant effect of the flame T° on the burnthrough time

- Currently The flame T° is not a calibration parameter
 - It would be relevant to investigate this point more in detail in the framework of the various Round Robins (Burnthrough, powerplant, ...). At least, it would be interesting to note the flame T° before each test of the Round Robins

- It could be useful to specify and/or check the T° before tests and may be to reduce the range of the allowed flame T° to improve the test reproducibility (between labs)



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