

Fire resistance tests at SP



SP Technical Research Institute of Sweden

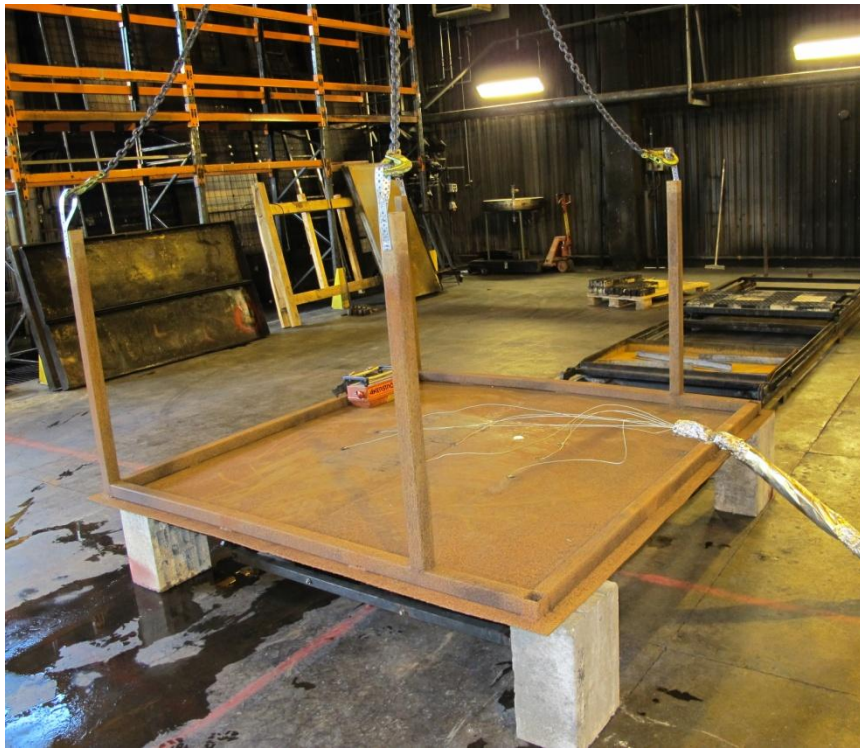
- Three sets of tests were conducted
 - Mock-up chassi, varying fuel, pre-heating time, direct exposure time and indirect exposure time. The tests were conducted to evaluate different testing procedures.
 - Temperature and Heat Release Rate depending on fuel (winter and summer 98 octane petrol and Heptane). The tests were conducted to test different fuels.
 - Temperature as a function of height above fuel. The tests were conducted in order to find a good placement for a RESS in a component test.

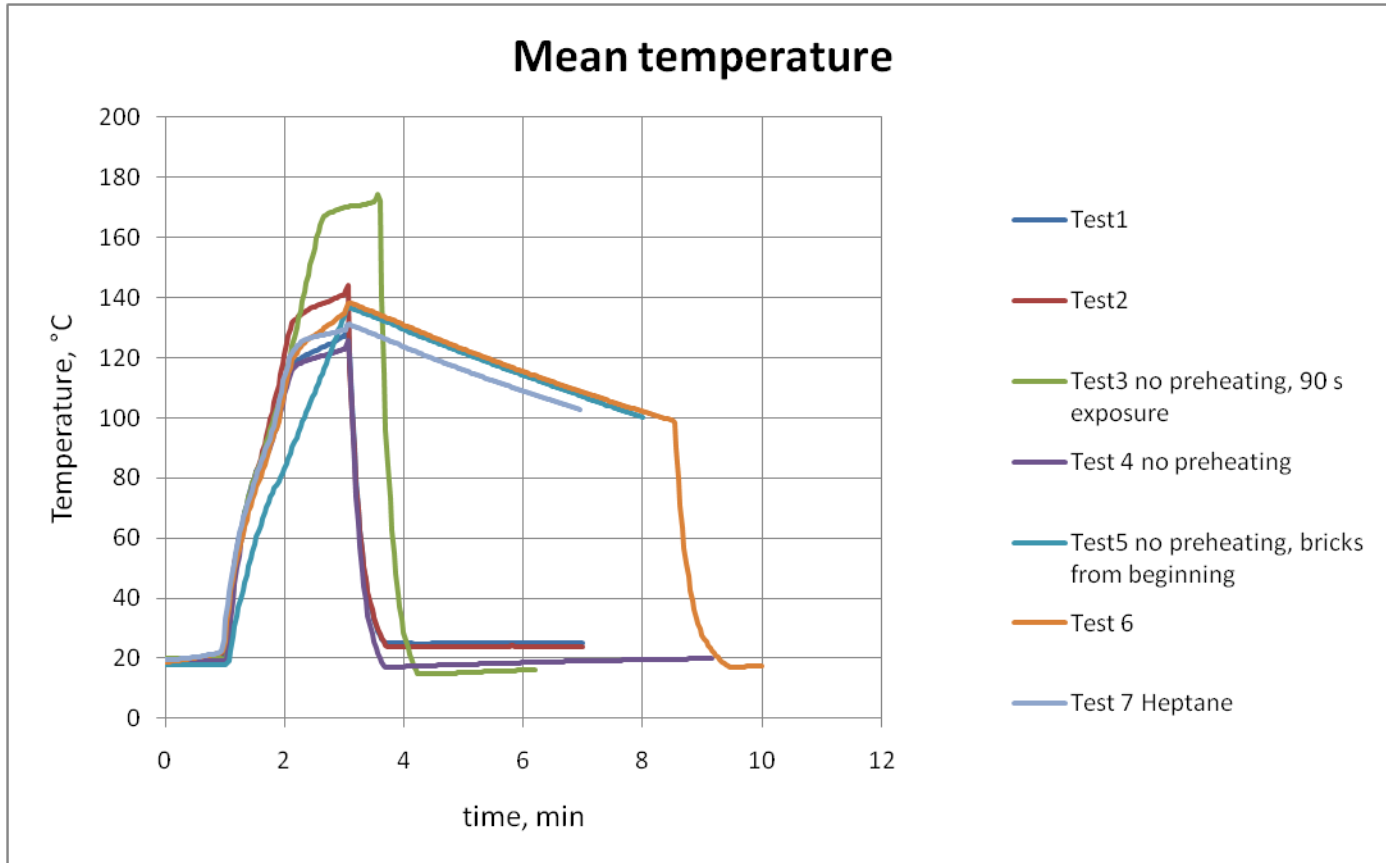
Tests with mock-up chassi

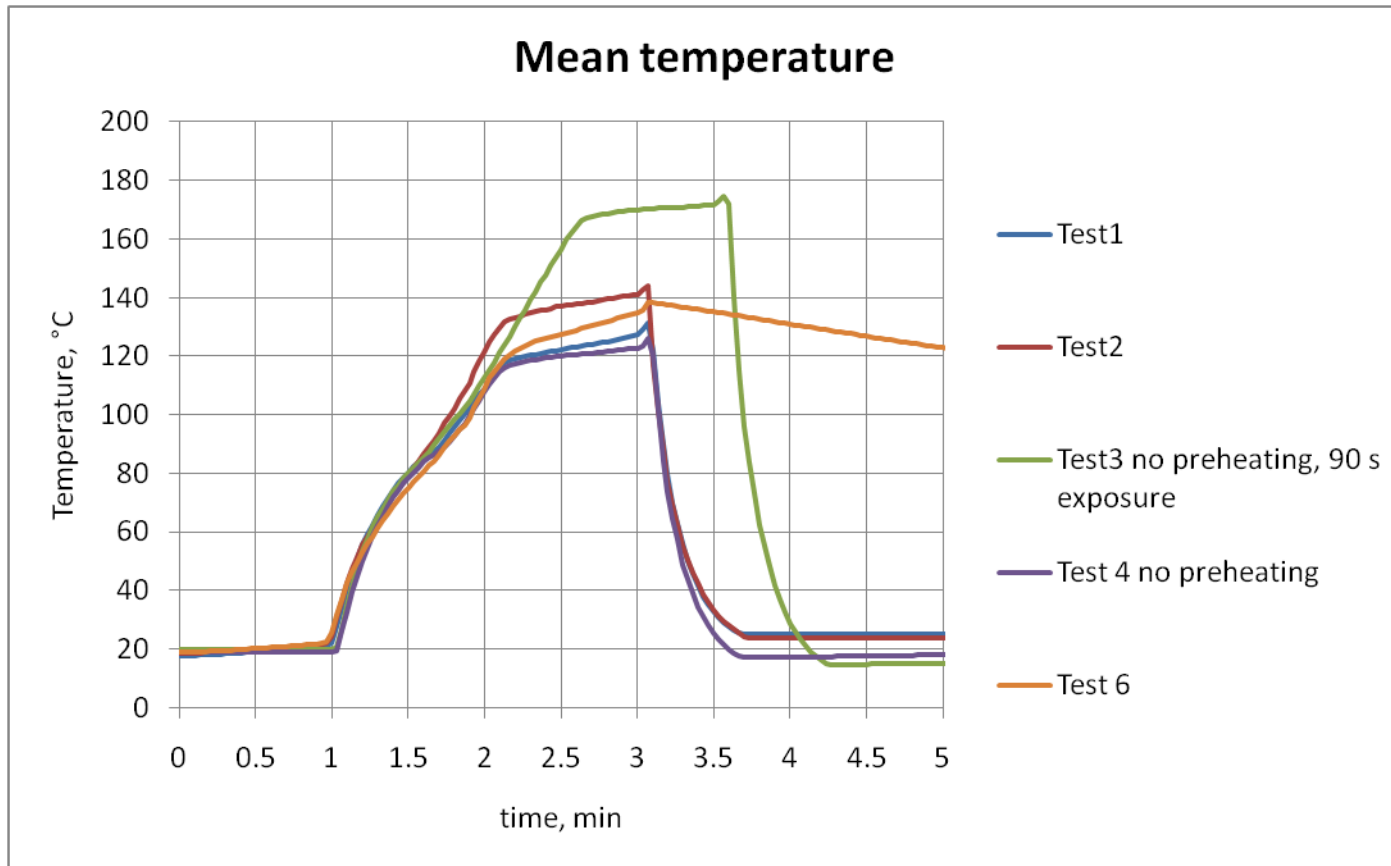
- Test 1 swedish winter petrol, normal R34 procedure
- Test 2 same as test 1
- Test 3 winter petrol, no pre-heating, 90 s direct exposure (without bricks), 60 s indirect exposure (with bricks)
- Test 4 winter petrol, no pre-heating 60 s direct exposure, 60 s indirect exposure
- Test 5 winter petrol, no pre-heating, 120s indirect exposure with bricks in place entire time, no cooling afterwards
- Test 6 repetition of test 1
- Test 7, Heptane, normal R34 procedure

Tests with mock-up chassi

- The temperature was measured at 5 places on the "chassi"
- Heat Release Rate was also measured







Conclusions test 1-7

- Preheating or not makes some difference, the influence might be larger if the fuel is not kept at RT before ignition
- There is a stochastic variation in exposure, suggest to increase direct exposure by 10 s to compensate for this and the excluded preheating
- Cooling afterwards influences the result, but is not a realistic scenario; Can be removed based on this
- Having the bricks in place from the beginning, i.e indirect exposure during entire time, results in a slower heating but the end temperature is about the same as in the normal procedure

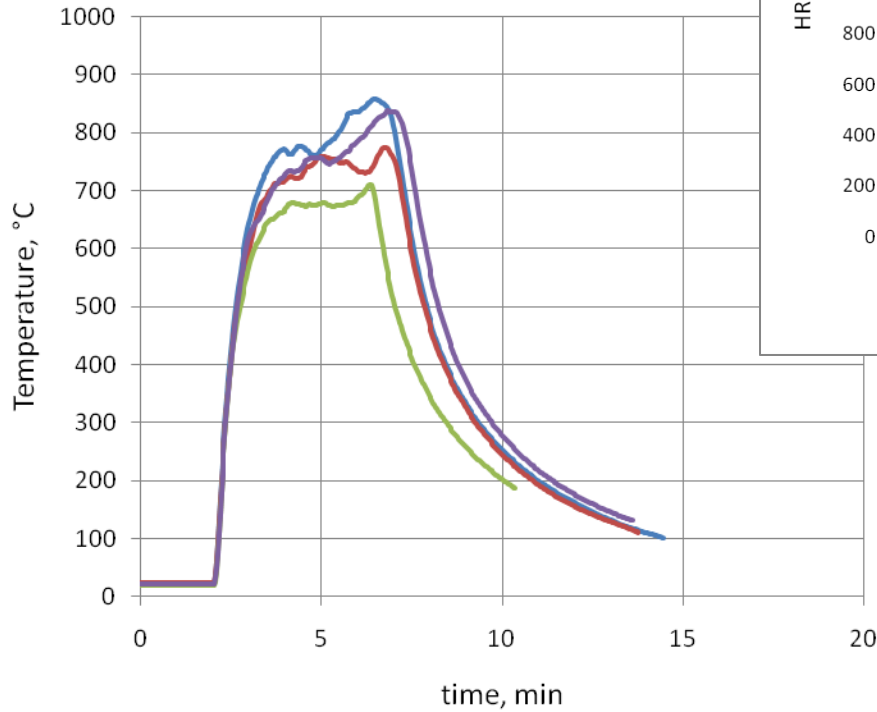
Different Fuels

- Test 8 Swedish Winter Petrol
 - Test 9 Same as test 8
 - Test 10 Heptane
 - Test 11 Swedish Summer Petrol
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- Three Plate thermometers (measures thermal impact, radiation + gas temperature) were mounted above the fuel surface
 - Heat Release Rate was measured

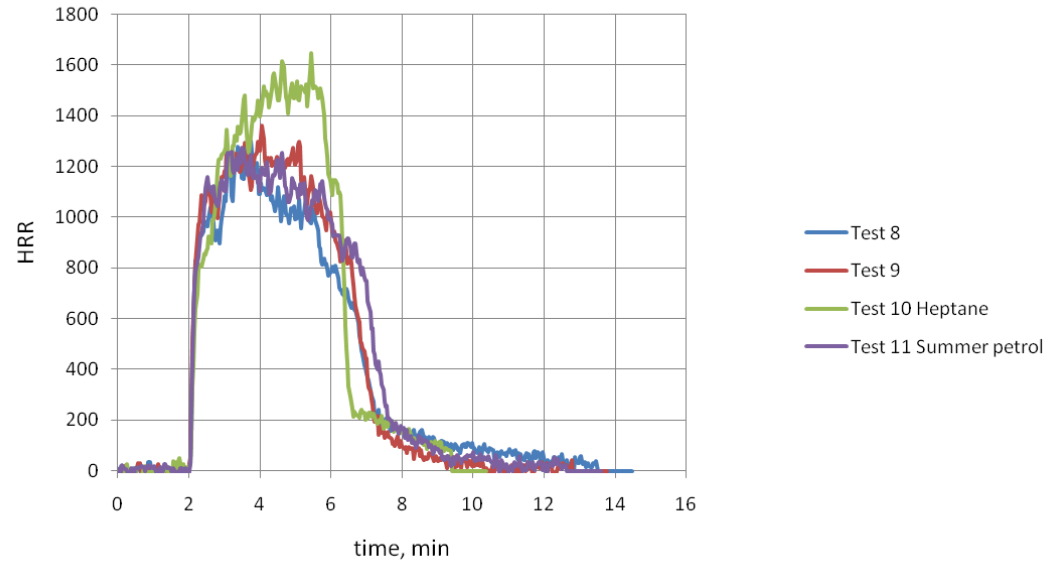


Different Fuels

Mean temperature Test8-11



HRR Test8-11



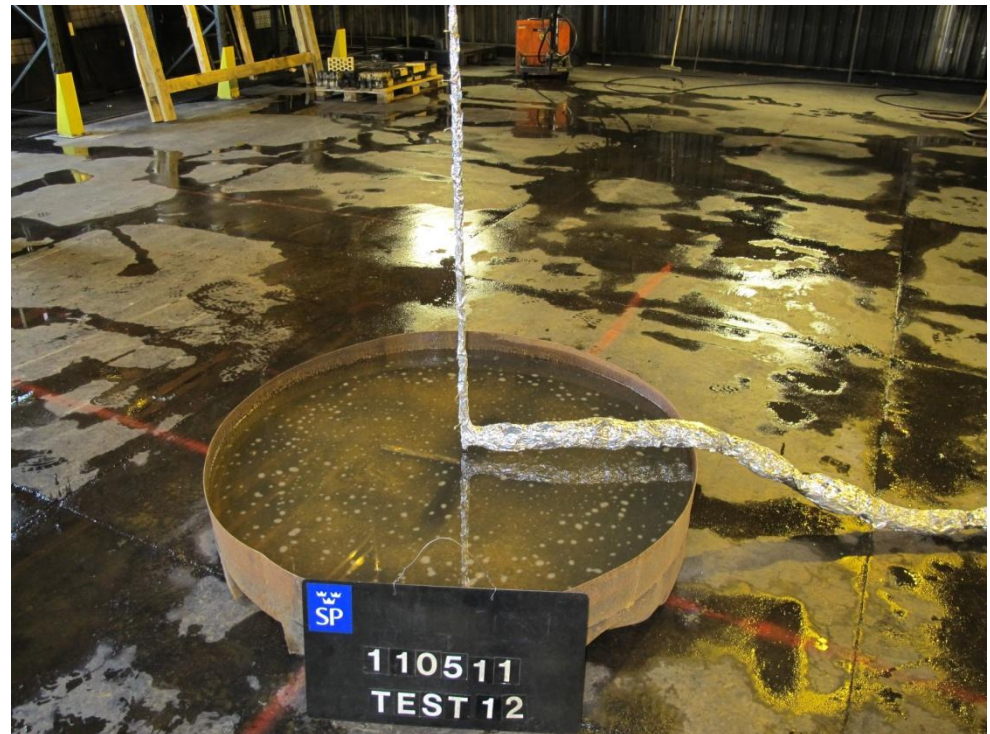
- Test 8 Mean TC 1-3
- Test 9 Mean TC 1-3
- Test 10 Heptane Mean TC1-3
- Test 11 Summer petrol Mean TC1-3

→ Keep commercial fuel

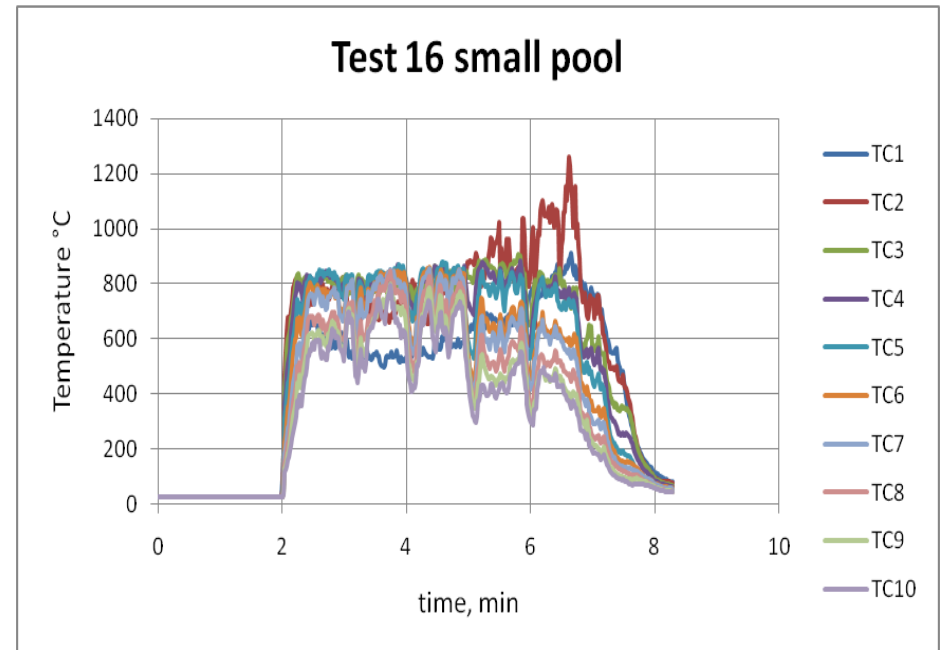
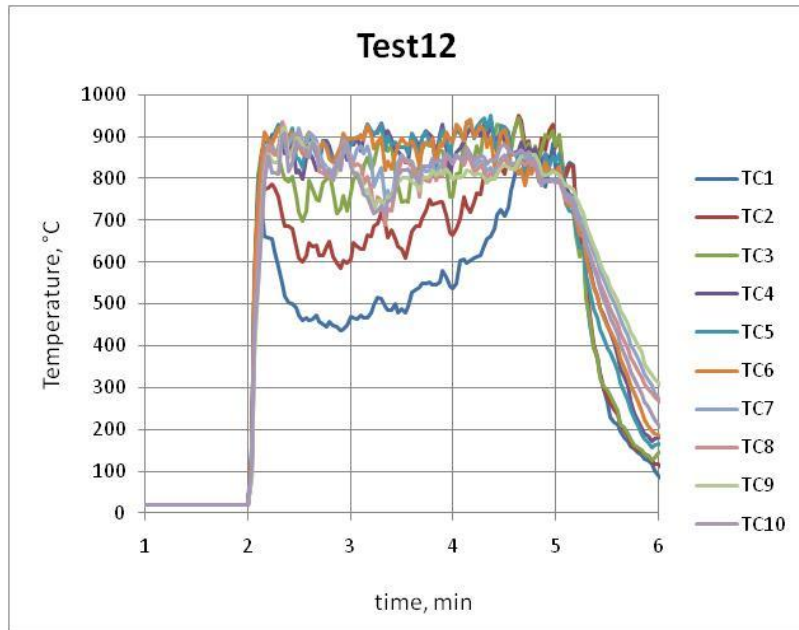
Component test

- Test 12 pool 1.17 m diameter (1.1 m²) winter petrol
- Test 13 pool 1.48 m diameter (1.7 m²) winter petrol
- Test 14 pool 1.67 m diameter (2.2 m²) winter petrol

- Temperature measured every 10 cm above pool
- Heat Release Rate measured



Component test



About the same temperature above 50 cm.

