

# RI. SE

E-LASS

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Wall separating two compartments

















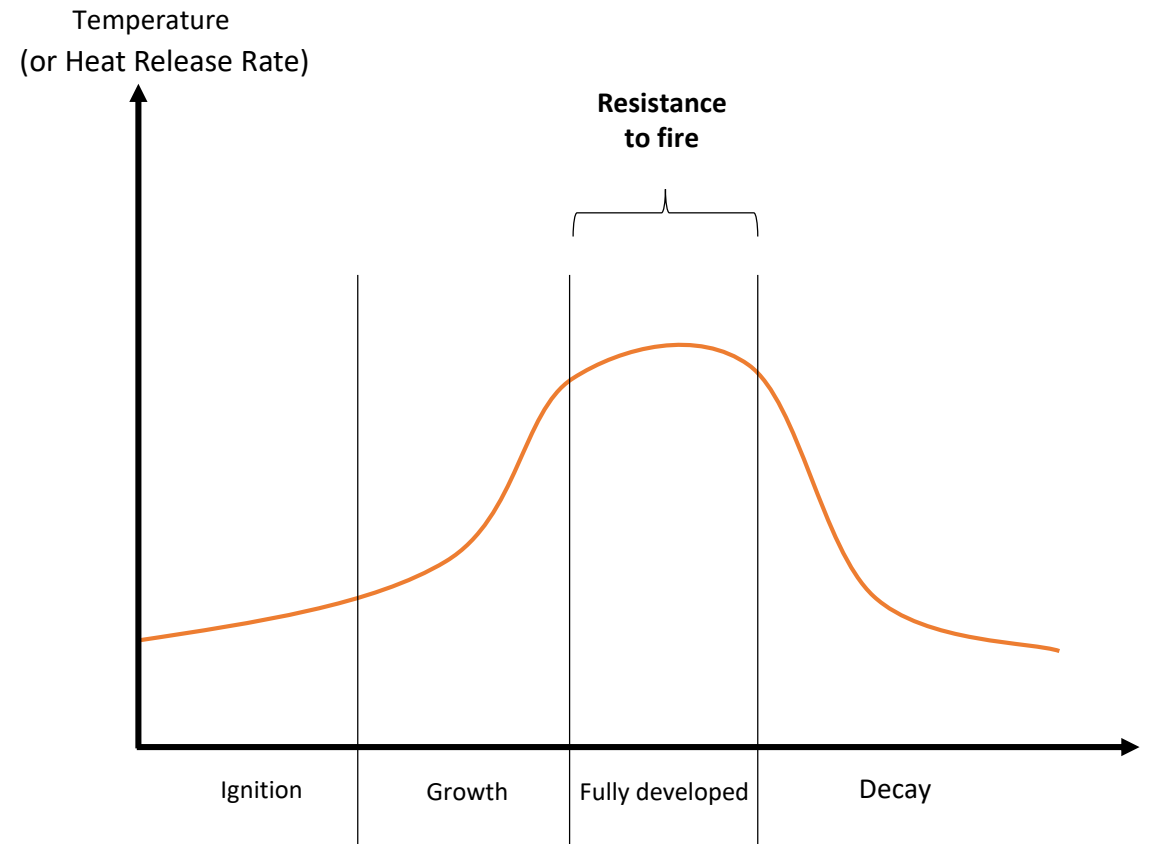


Conduction



**Reaction to fire:** a material's propensity to contribute to a fire

**Fire resistance:** a structure's ability to prevent loss of containment



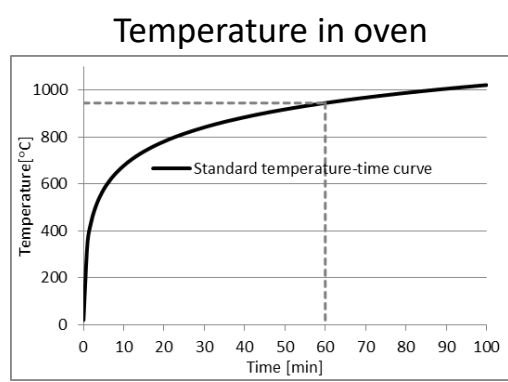


## FTP Code Part 11

Large oven



Test specimen (FRP composite)



## Performance criteria:



Temperature on unexposed side



Flame &amp; smoke integrity

Load bearing capacity for load bearing structures

Test fire resistance

Temperature  
(or Heat Release Rate)Resistance  
to fire

Ignition

Growth

Fully developed

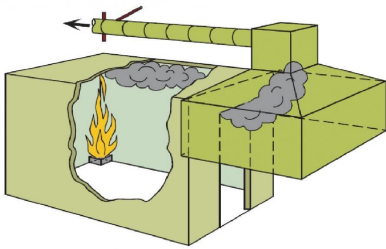
Decay

## Fire Tests of FRP Composite Ship Structures

Franz Evegren, Michael Rahm, Tommy Hertzberg (2016)

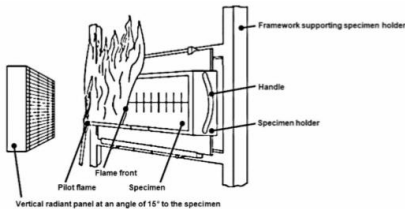
**Reaction to fire:** a material's propensity to contribute to a fire

### Room Corner Test (FTP Code Part 10)



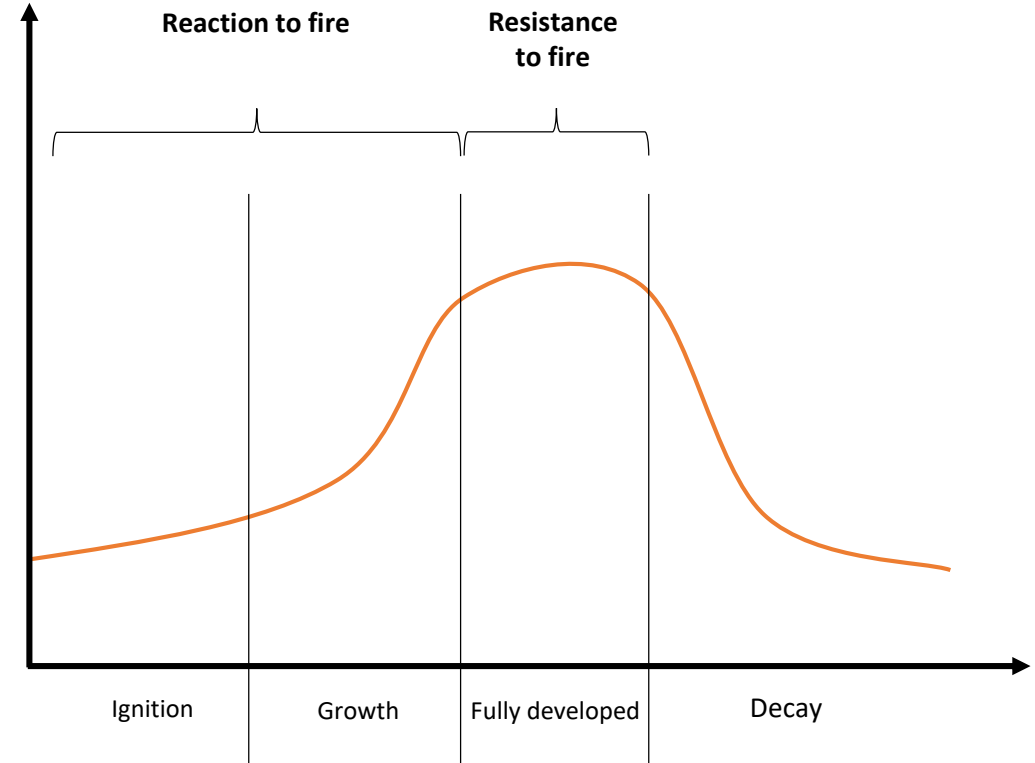
*Extremely demanding for FRP composites but ensures a high fire safety standard*

### Spread of Flame (FTP Code Part 5)

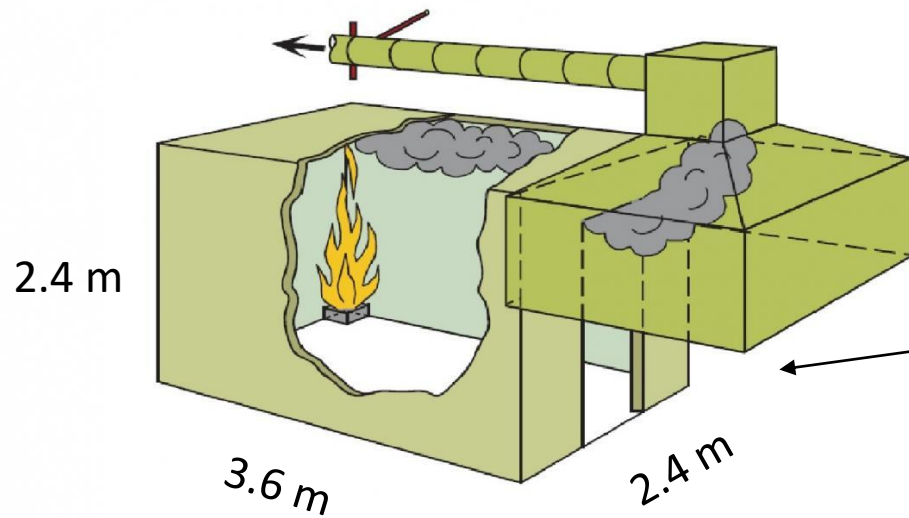


*Moderately to highly demanding for FRP composites. Unless additional safety measures are implemented, should in general only be considered for low/medium-risk spaces*

Temperature  
(or Heat Release Rate)



## Room Corner Test



Temperature  
(or Heat Release Rate)

Reaction to fire

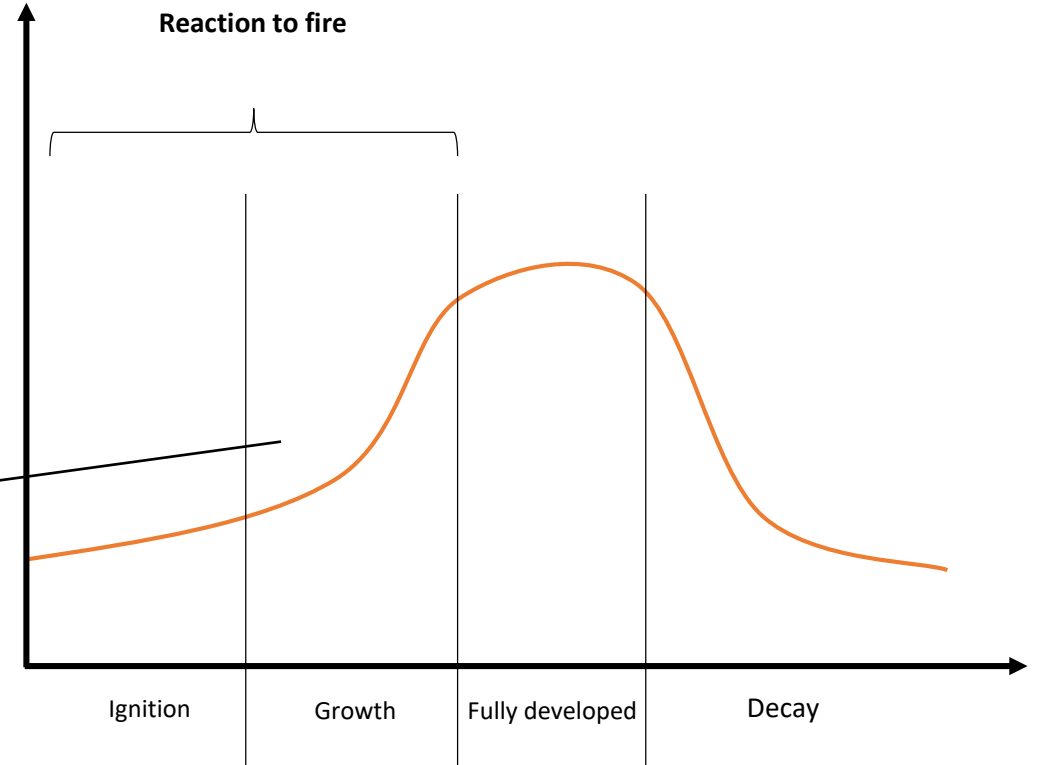
Test reaction to fire

Ignition

Growth

Fully developed

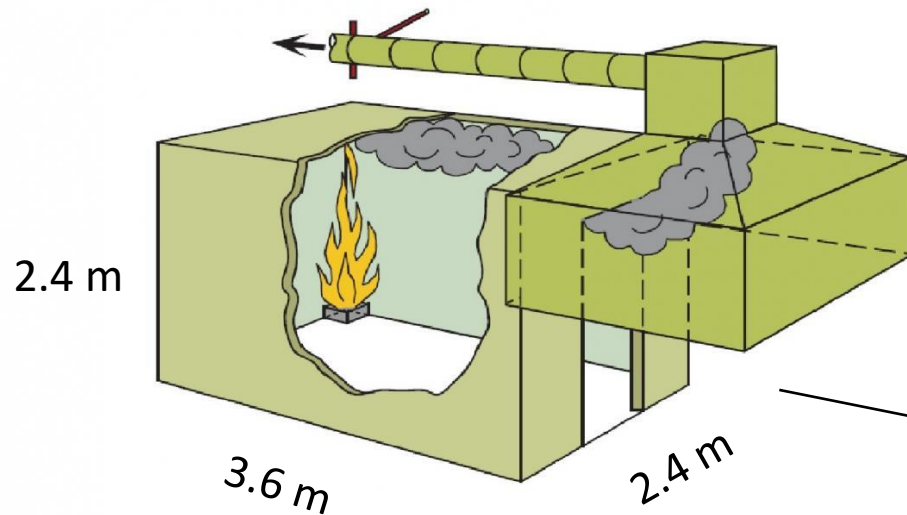
Decay



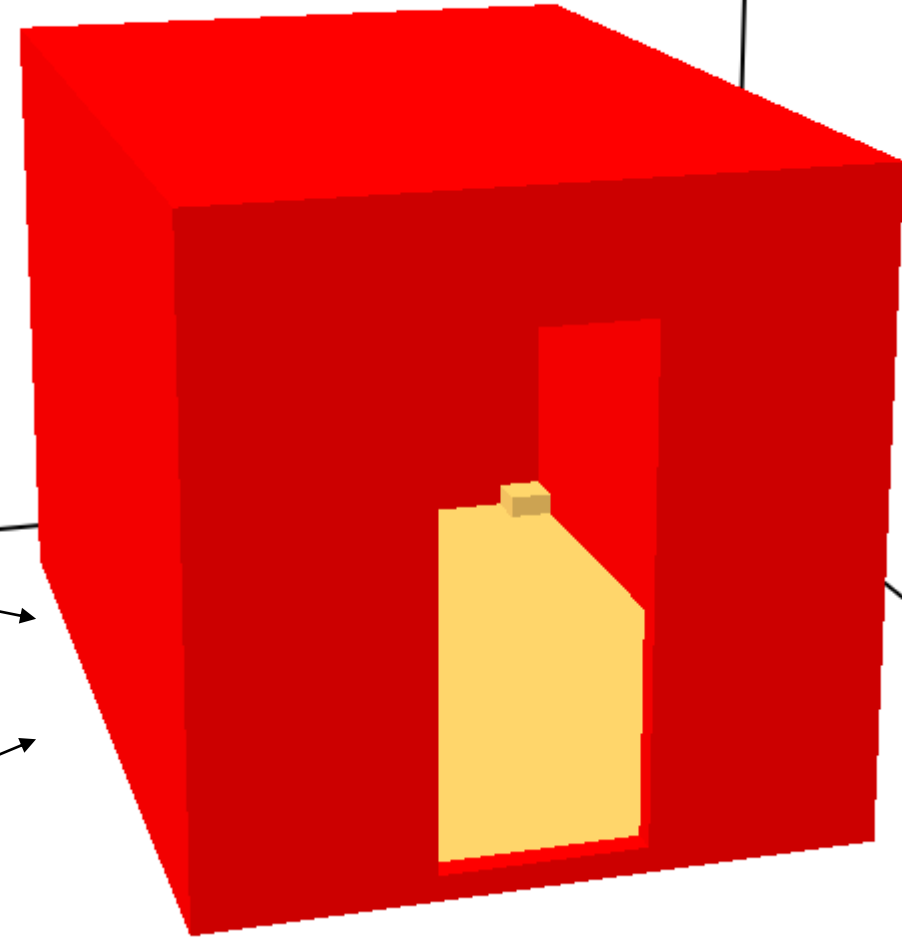


## CFD model of Room Corner Test

## Room Corner Test



Temperature in room? Perform CFD simulation!



**Model assumptions:**

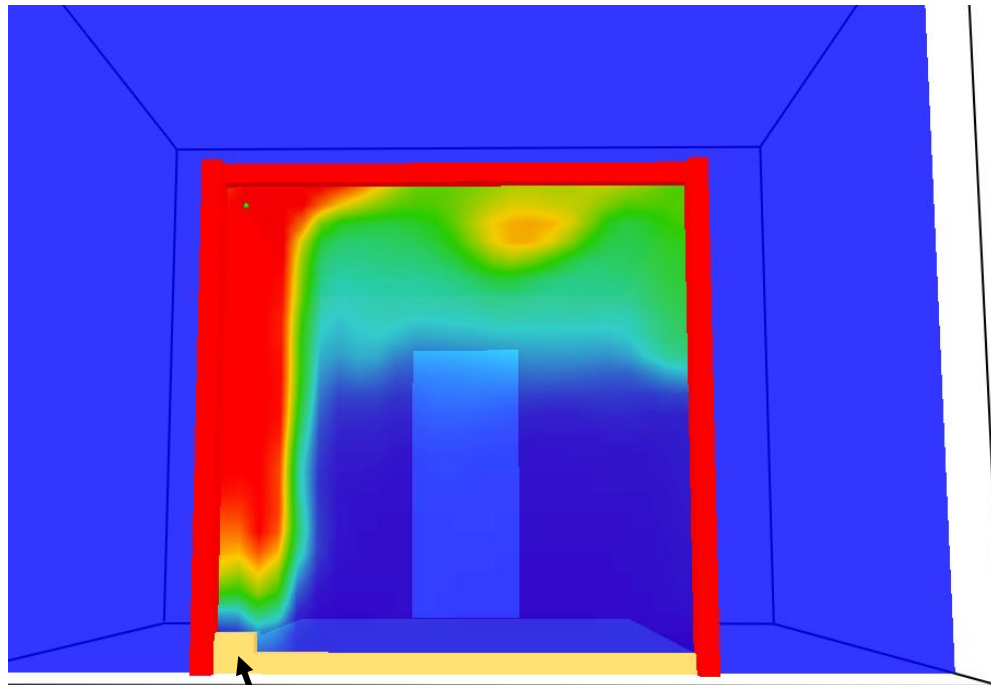
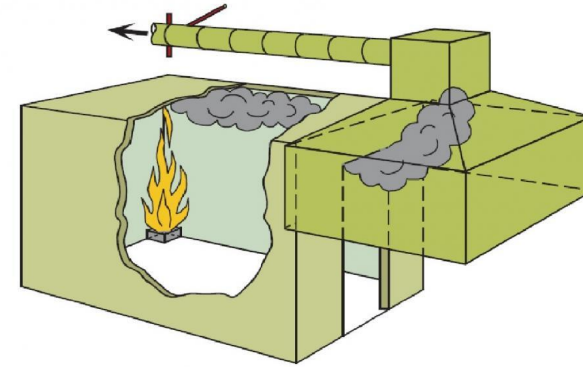
Non-combustible walls and ceiling ( $\sim 50$  mm) with low thermal conductivity.

**Result:**

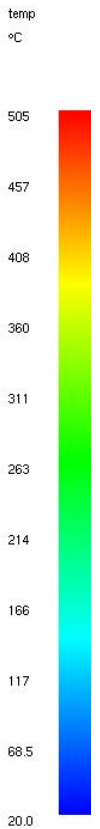
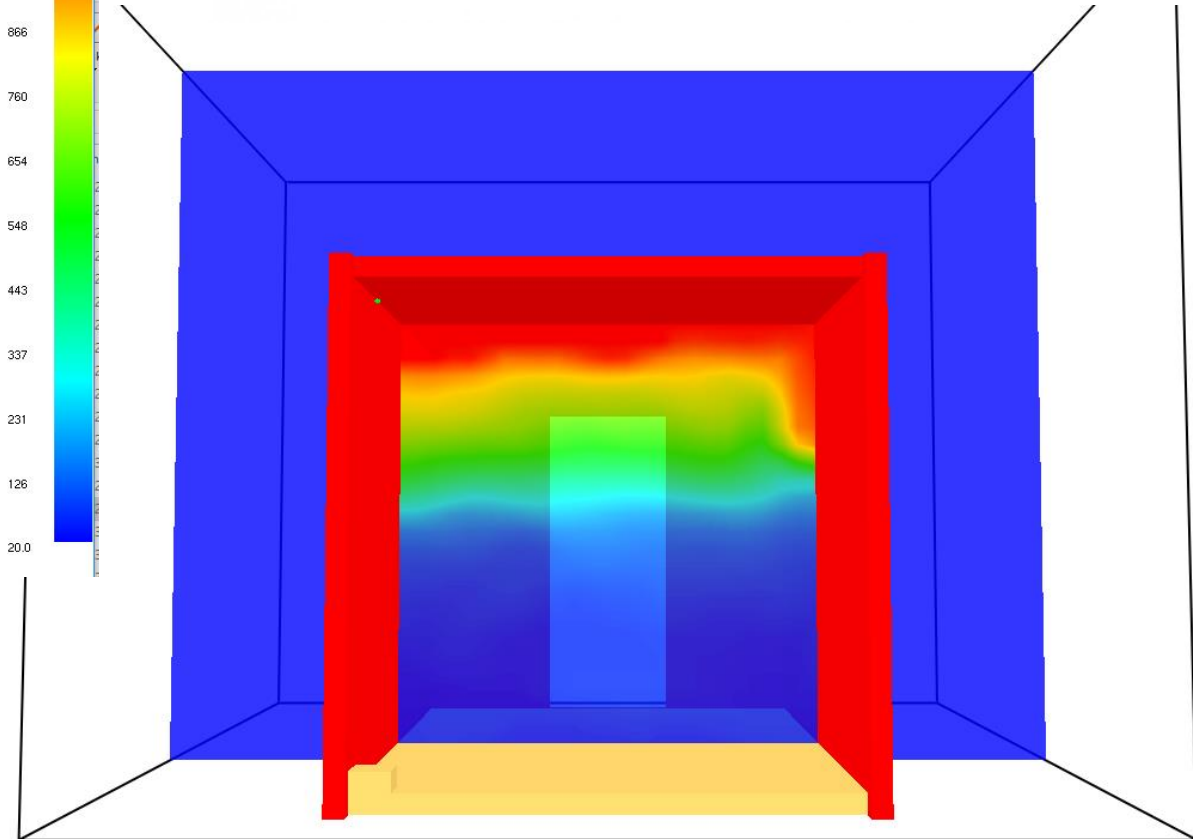
Temperature above the burner  $\sim 1100$  °C.

Temperature right below the ceiling in the middle of the room  $\sim 500$  °C.

Combustible materials (FRP composites) will increase the temperature even further, making it even more challenging to pass (vicious cycle)!



Burner



Thank you for your attention!