Presented by

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AIRBUS

Use of Water Mist and Nitrogen for Cargo Hold Fire Protection

Results of the R&T Project FIREDETEX

Overview

FIREDETEX

- New Fire/Smoke Detection and Fire Extinguishing Systems for Aircraft Applications
- Project partly funded by the European Commission under Framework Programme 5
- Project duration: 02/2000 – 04/2003
- Consortium of 13 partners from industry, research and authorities

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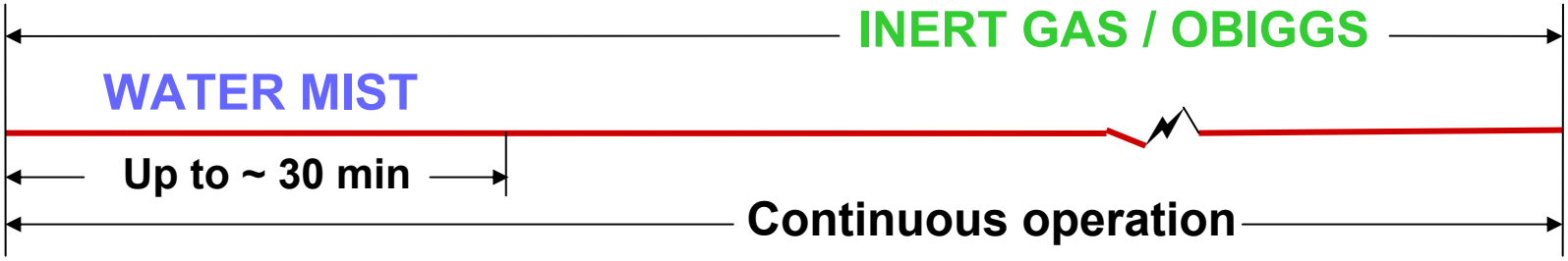
FIREDETEX - Scope

FIRE SUPPRESSION GOAL

- Environmentally friendly (non-halon) cargo compartment fire suppression system on the basis of a combination of water mist and inert gas.

APPROACH

- Concept of a 2-step suppression process
  - Fire knock down with water mist
  - Long term fire suppression with inert gas



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Fire Suppression Philosophy

COMBINATION of BENEFITS of both TECHNOLOGIES

Fire knock down with water mist

- Water mist immediately available and therefore immediately effective
- Environmentally friendly

Long term suppression with OBIGGS

- Unlimited NEA availability
- Environmentally friendly

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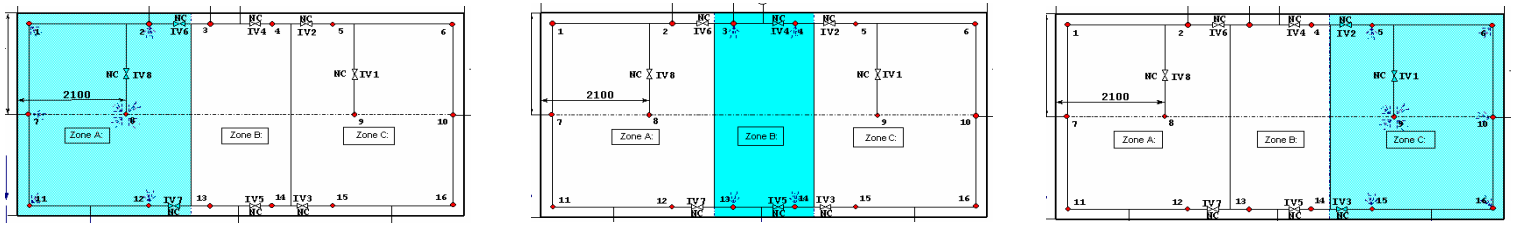
Water Mist System

LAYOUT

General

- Zonal layout of nozzles / 3 zones
- Zonal layout allows suppression within limited zones of the cargo compartment



Requirement:

- Detection system able to detect and localize hot spots

Solution:

- DTS using an Optical Fiber

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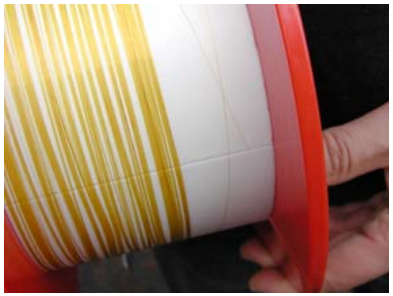
System Description

FIRE SUPPRESSION SYSTEM

Water Mist System	Inerting System	Detection System
		
Single Fluid Nozzles	Air Separation Modules - OBIGGS -	Distributed Temperature Sensor

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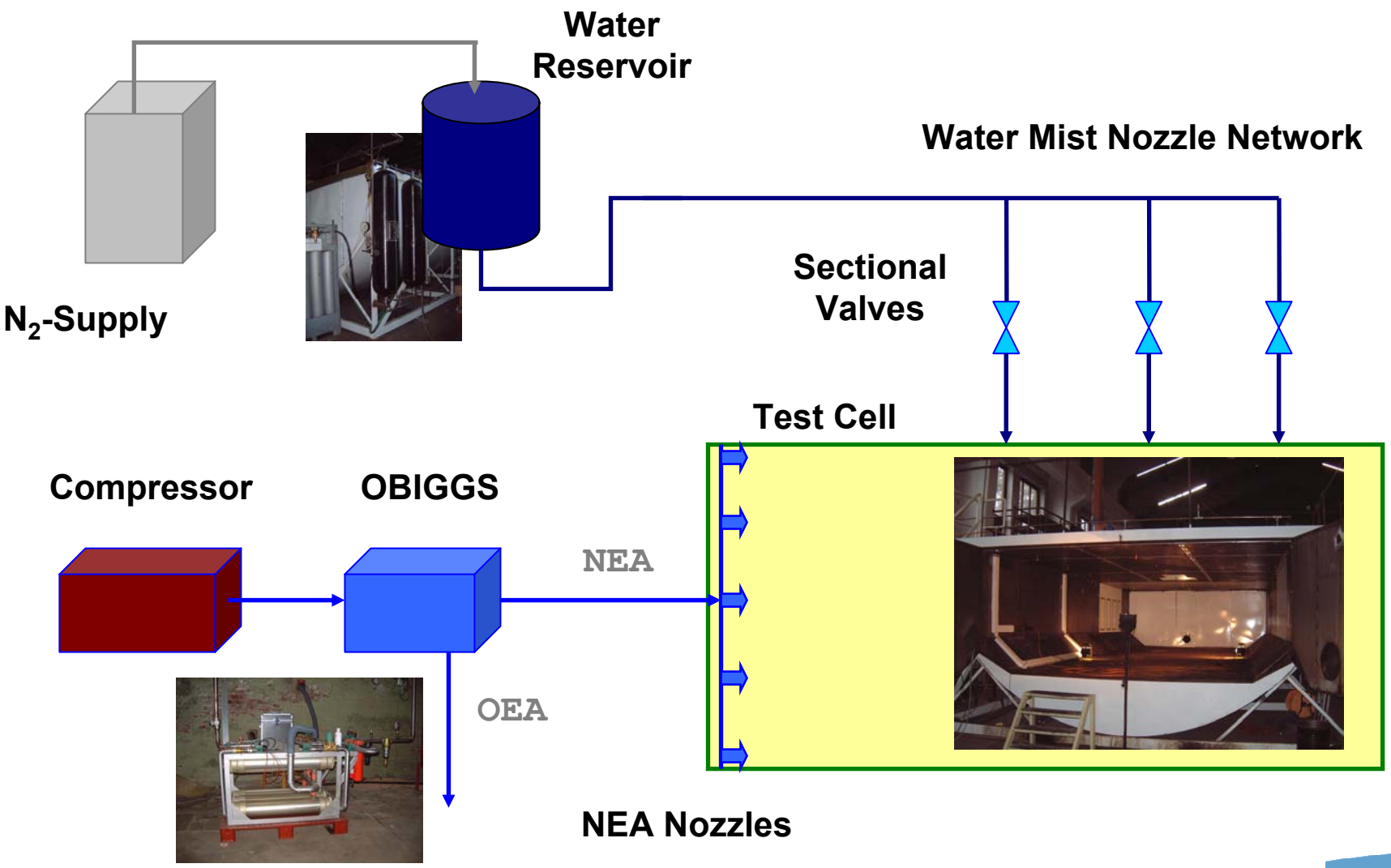
Fire Extinguishing System Schematic



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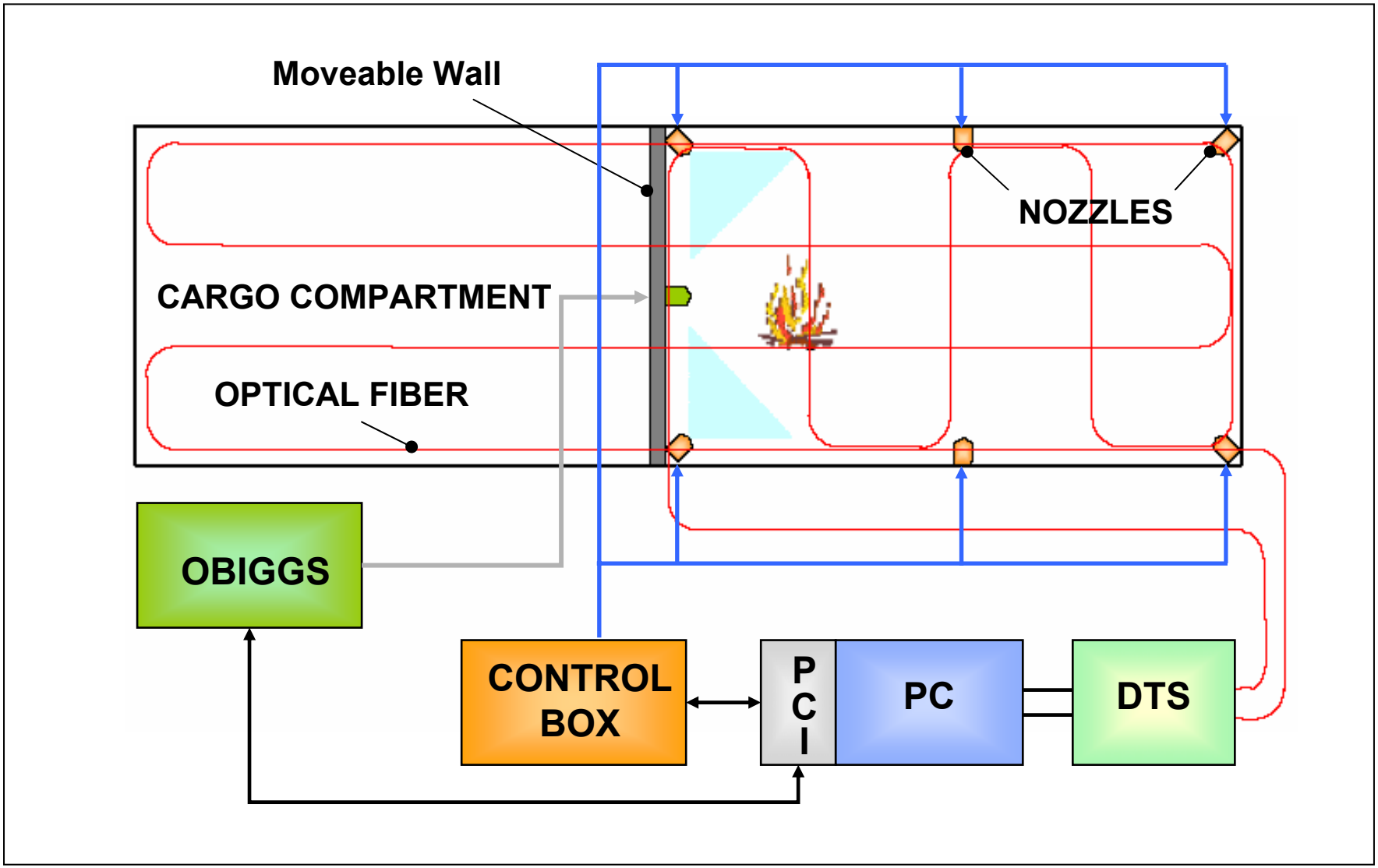
DTS Configuration



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System Components (1)

Water Mist Nozzle

- Single Fluid Design
- Full Cone Spray
- Spray Angle: 95°
- Droplet Size: 120 -140 µm
- Throughput: 4.8 l/min at 12 bar

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System Components (2)

On-Board Inert Gas Generation System

- 6 Air Separation Modules
- NEA Throughput: 180 m^3/h
- NEA Quality: 6,7 vol% O^2

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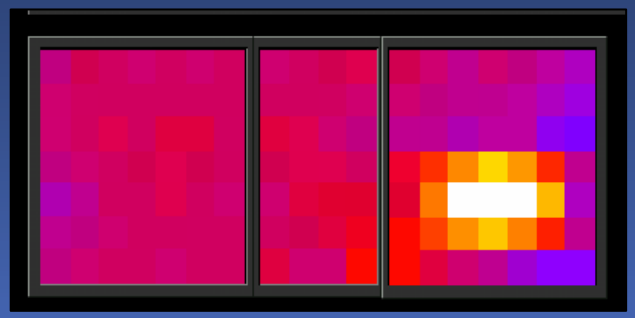
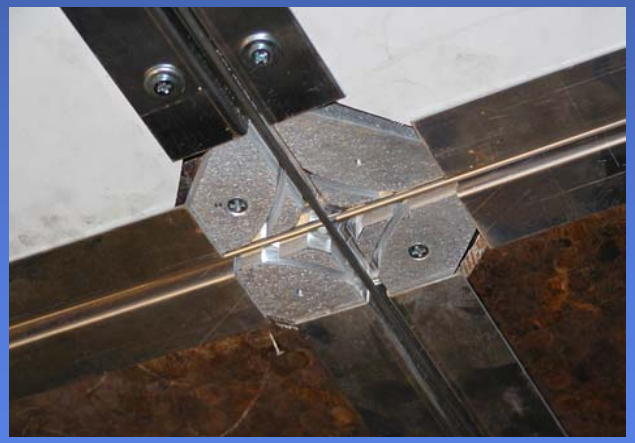
System Components (3)

Distributed Temperature Sensor





- Optical Fiber
- Temperature Profile
  - Ceiling Temperature
  - Temperature Derivative
- Fire Location

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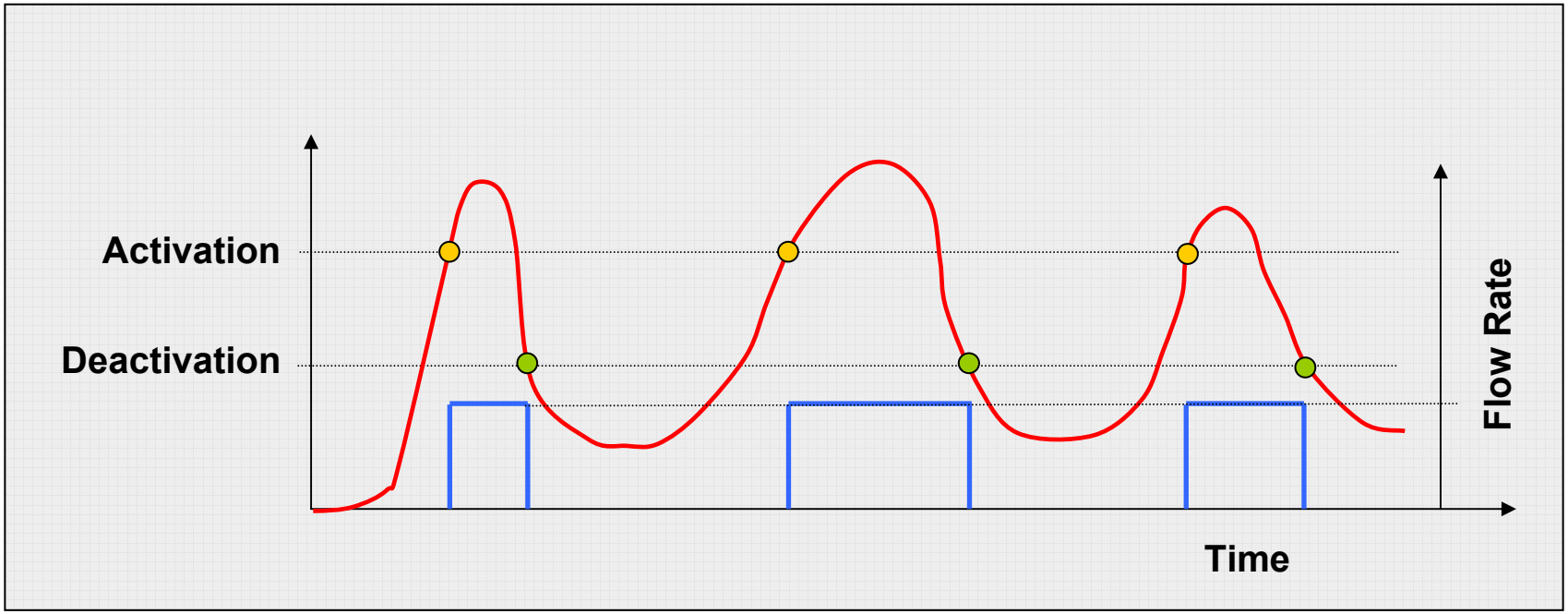
ACTIVATION – DEACTIVATION LOGIC



Activation = **High Level Signal / T1 or dT1/dt**

Deactivation = **Low Level Signal / T2 or dT2/dt**

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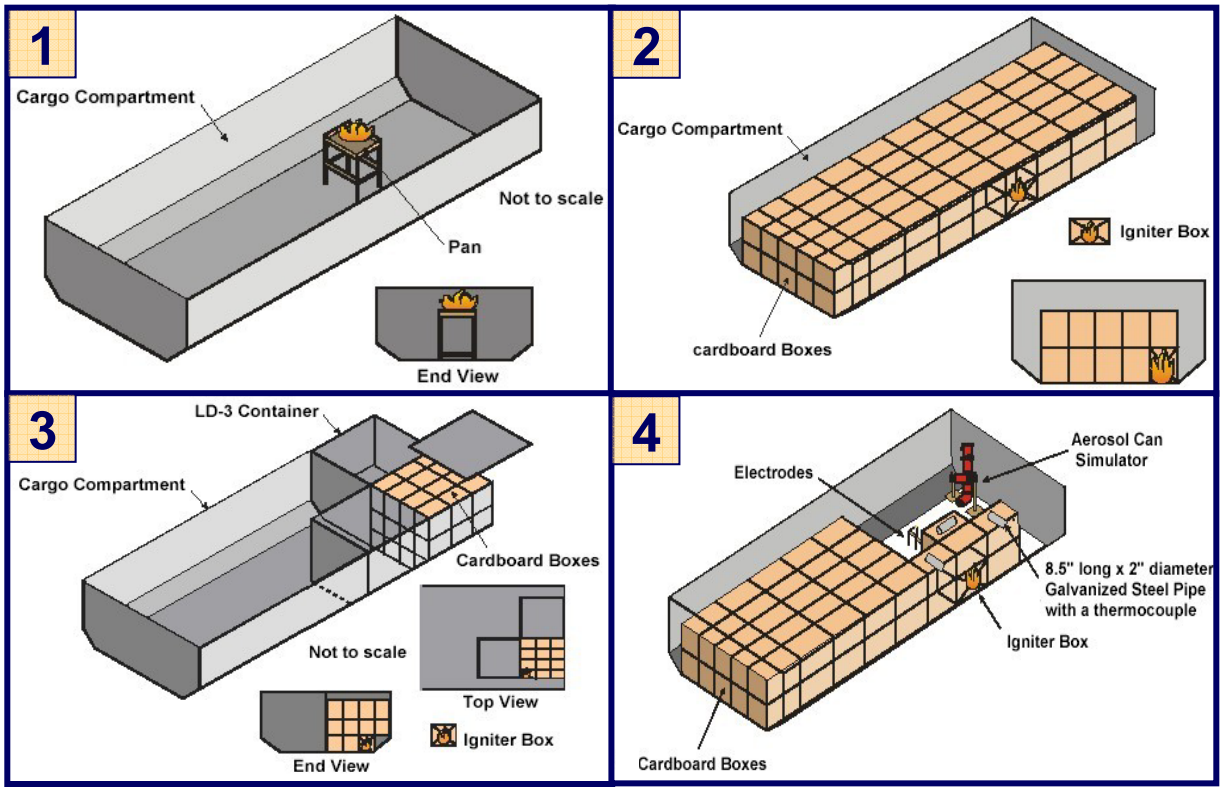
MPS Tests

FIRE SCENARIOS



1 Surface-Burning Fire

2 Bulk-Load Fire

3 Containerized Load Fire

4 Aerosol Can Explosion Test

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Test Cell

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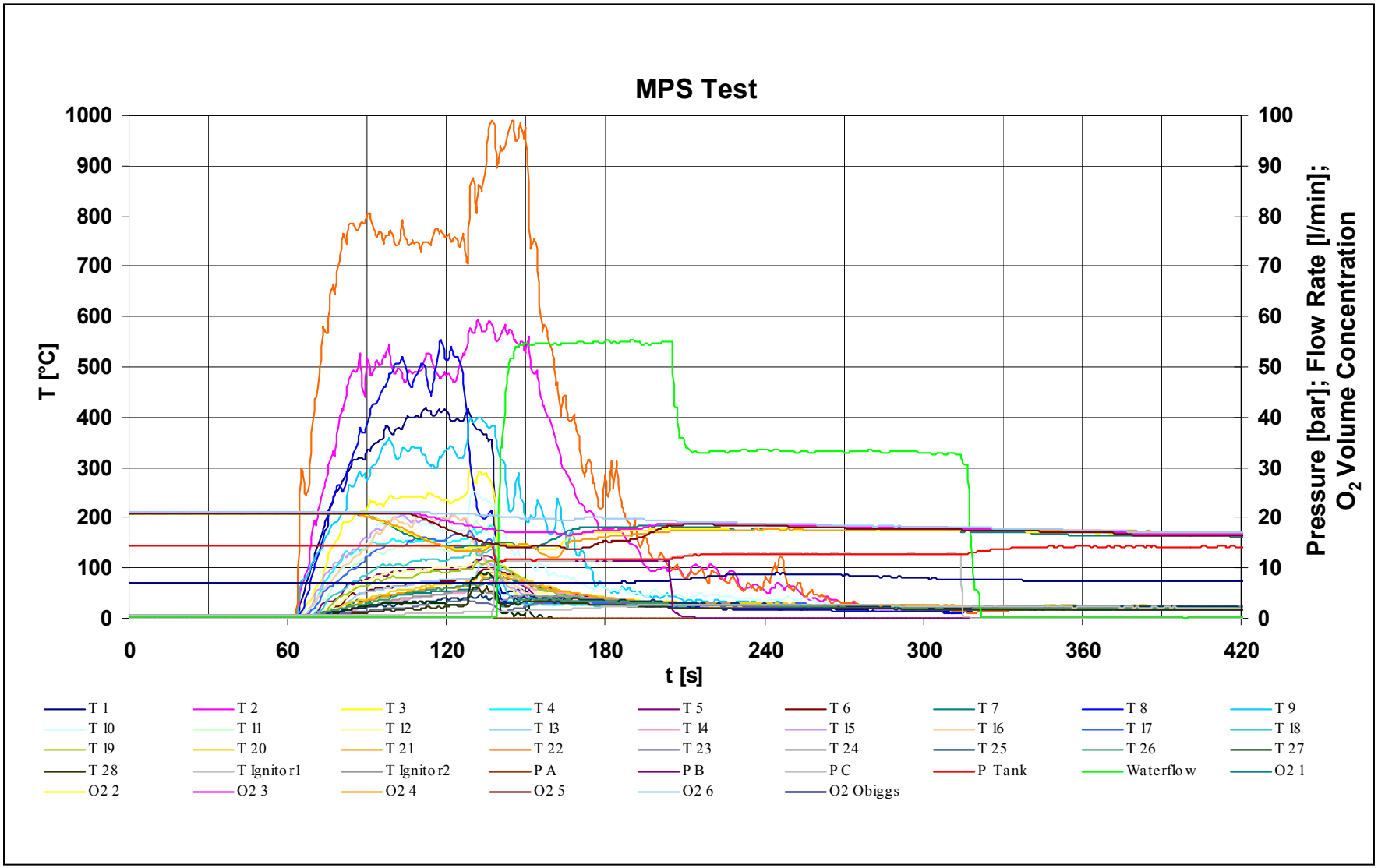
Data Recording



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Bulk-Load Fire (1)

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Bulk-Load Fire (2)

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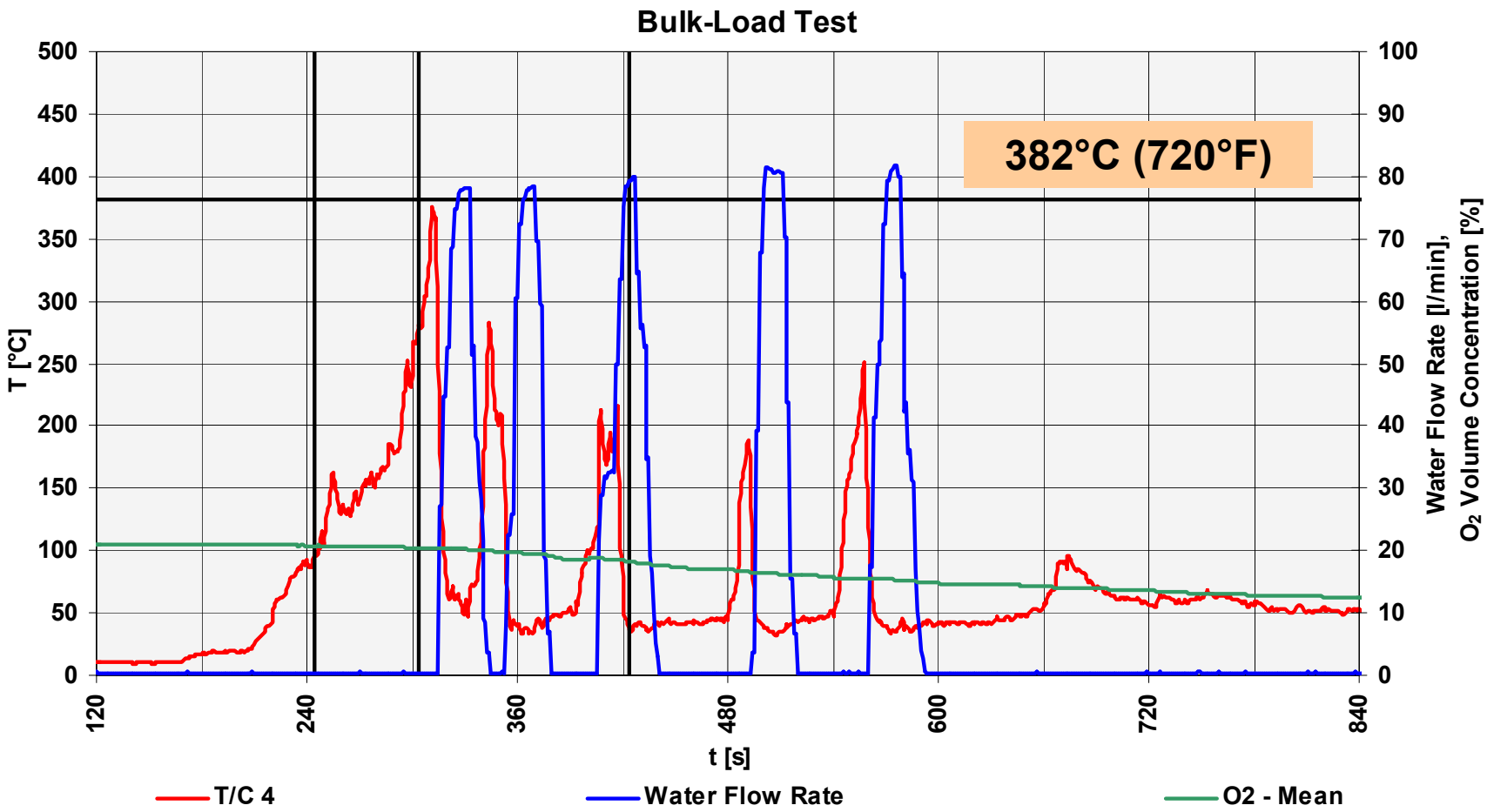
Bulk-Load Fire (3)



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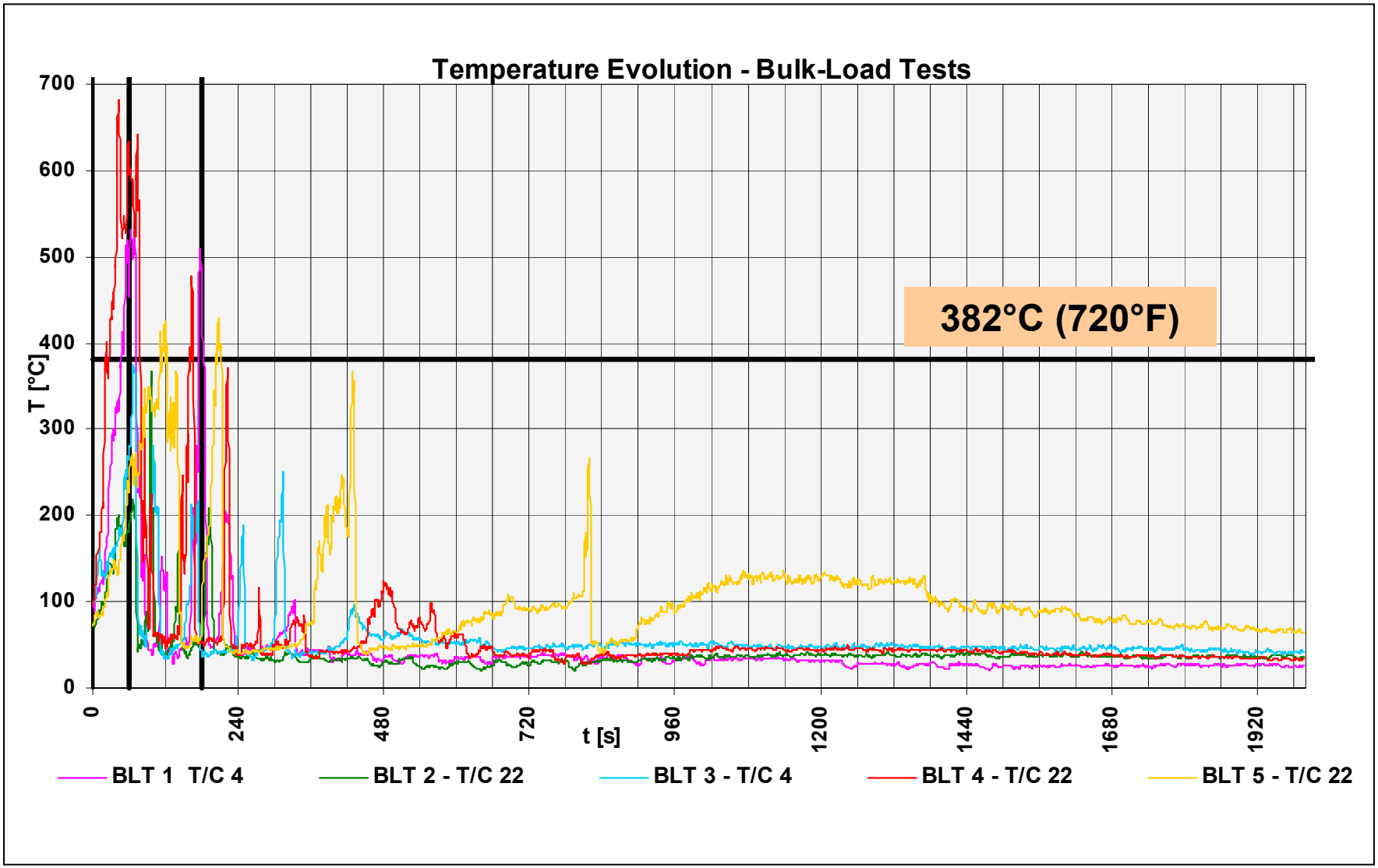
Bulk-Load Fire (4)



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Surface Burning Fire (1)

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Surface Burning Fire (2)

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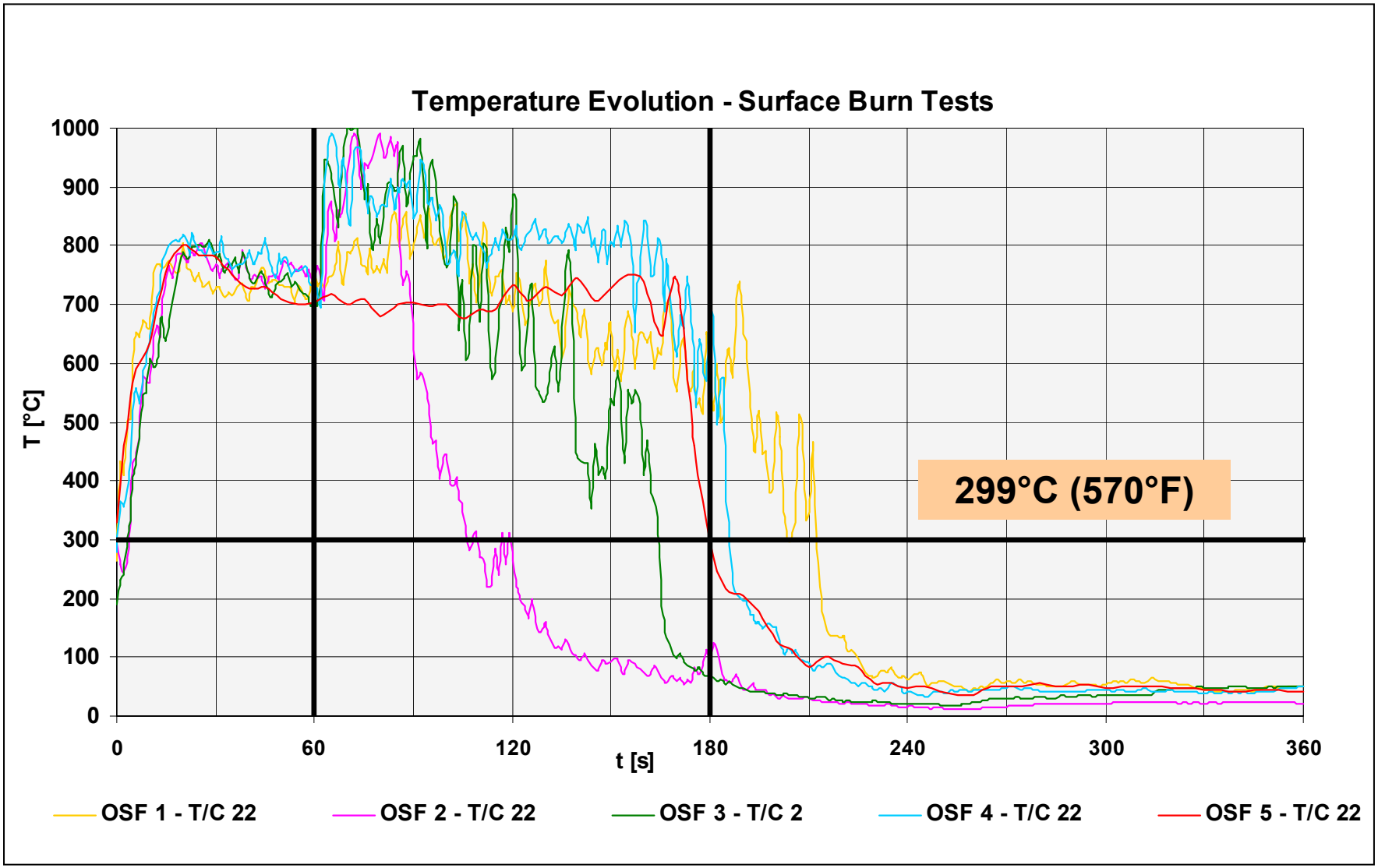
Surface Burning Fire (3)



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Containerized-Load Fire (1)

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Containerized-Load Fire (2)

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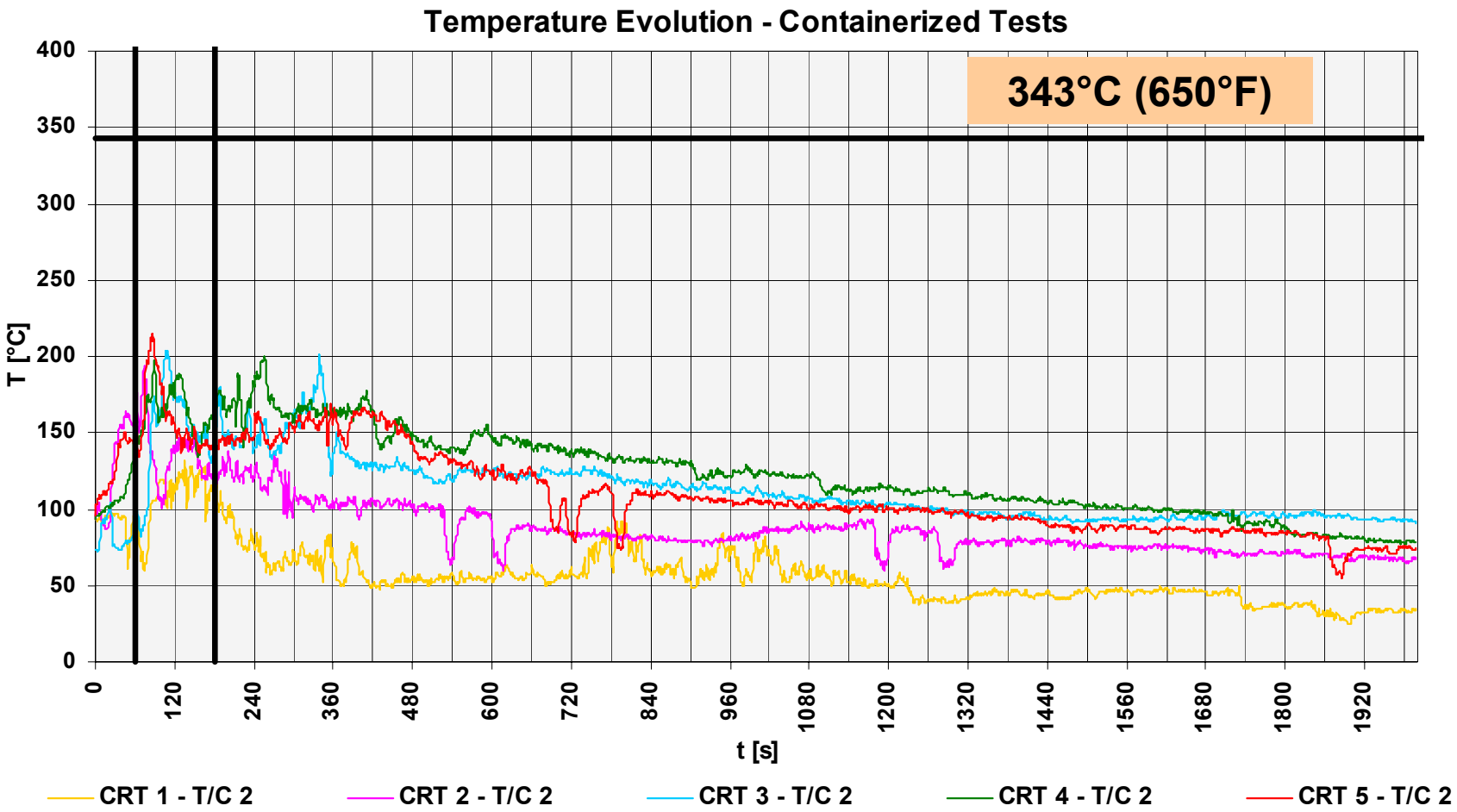
Containerized-Load Fire (3)



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Aerosol Can Explosion Test (1)

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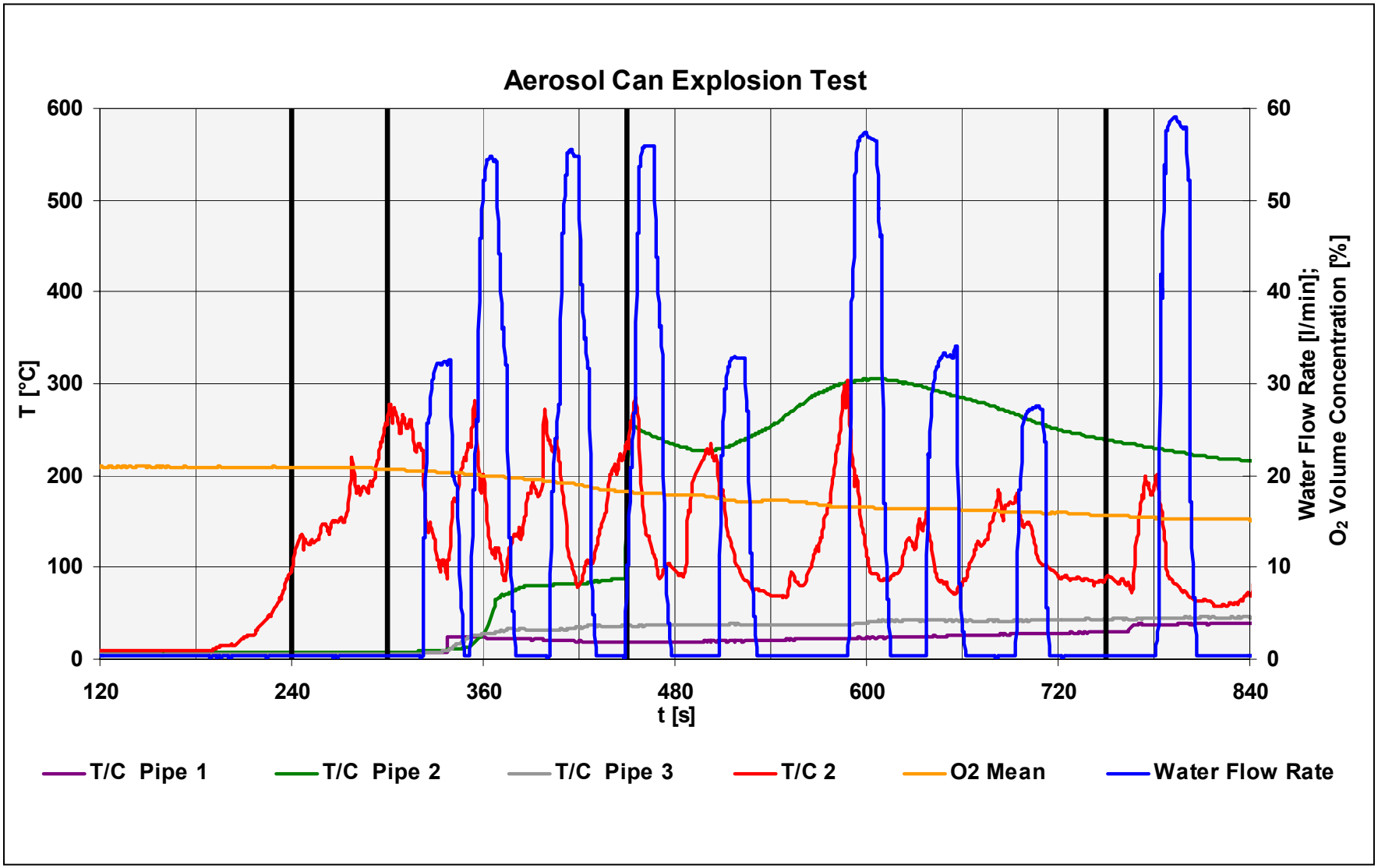
Aerosol Can Explosion Test (2)



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Aerosol Can Explosion Test (3)

Please click on the following link to view the Aerosol Can Explosion Test (3) Video Clip:-

Video Clip

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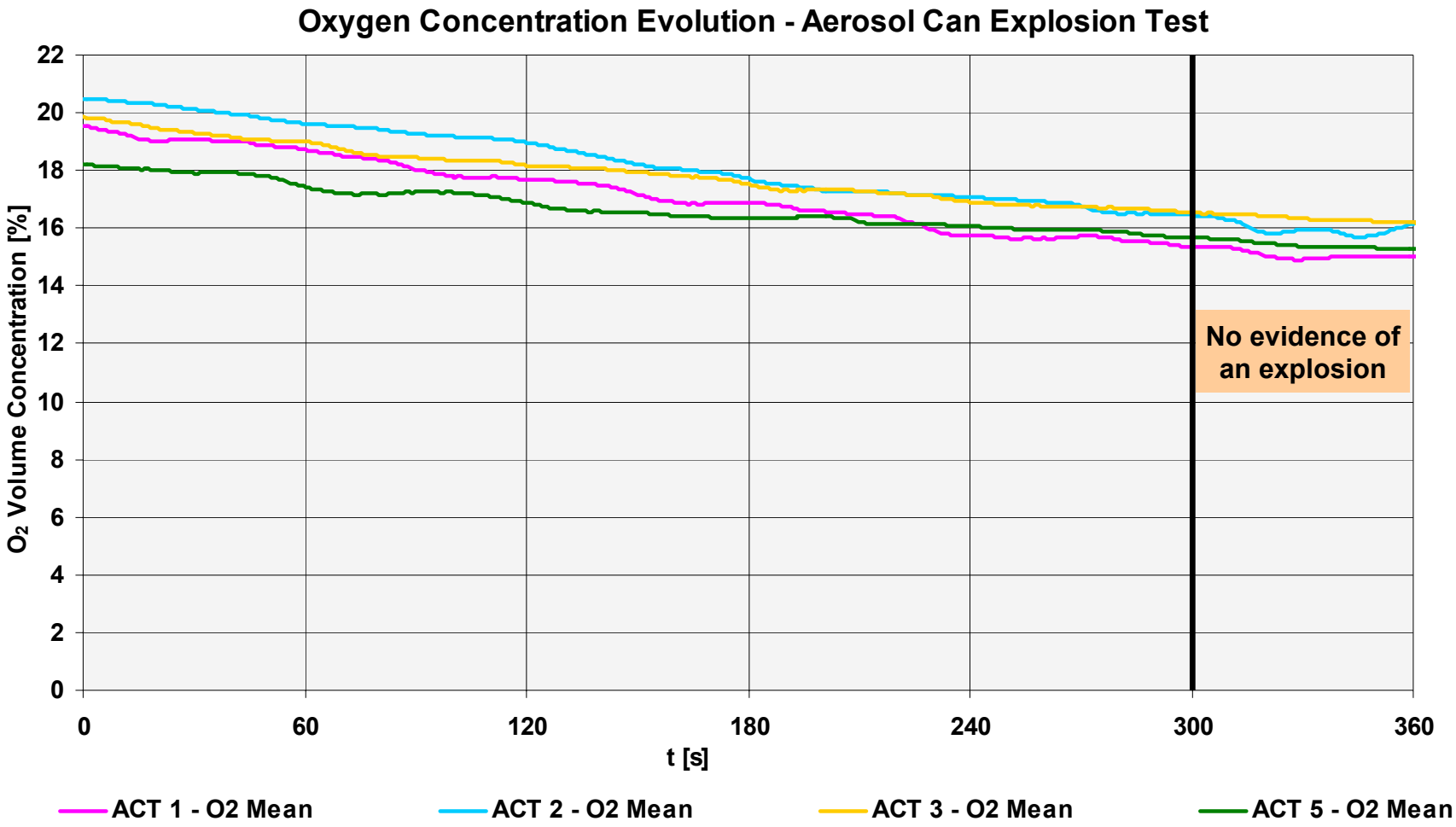
Aerosol Can Explosion Test (4)



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Test Evaluation

MPS TEST RESULTS

Test Scenario	Passed/Failed	Water Consumption
Bulk-Load	Passed	254 l
Containerized	Passed	146 l
Exploding Aerosol Can	Passed	275 l
Surface Burning	Failed Average Peak Temp. = 309°C MPS Criteria = 299°C	148 l

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Conclusion

- The combined water mist/OBIGGS system showed system functionality
- The system showed good fire knock down capabilities
- The system showed good long term fire suppression characteristics
- The investigated system concept is a possible environmental friendly alternative to halon-based fire suppression systems

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Conclusion

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