Compressed Air Foam System
for future ARFF
CTIF Norway 2013

Kim T. Olsen
Asst. Fire Chief
Copenhagen Airport

Introduction to CAFS
Compressed Air Foam System

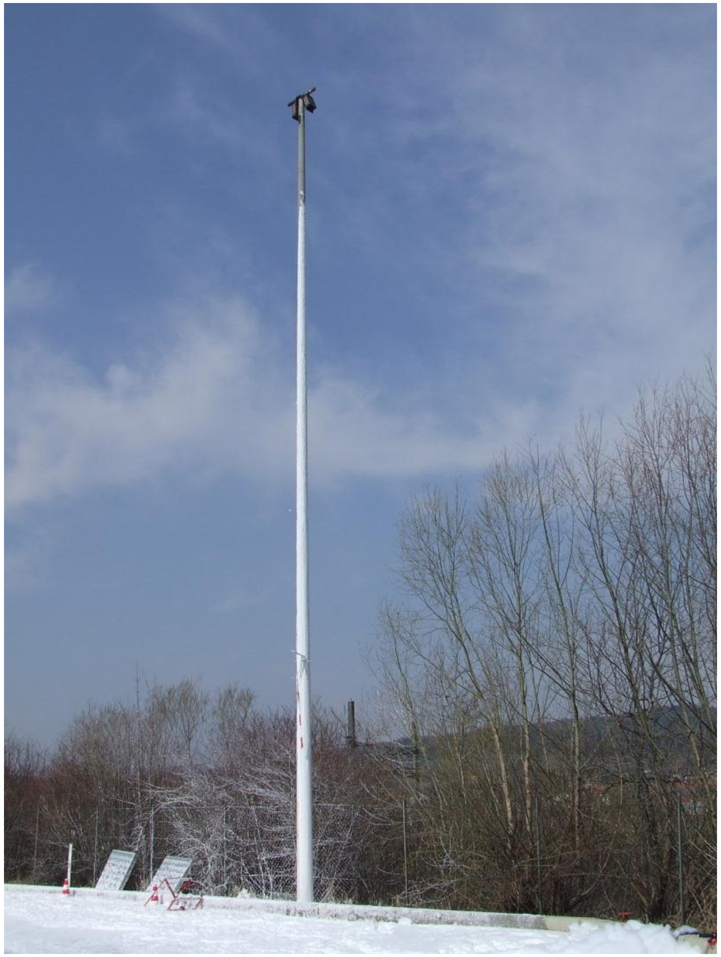
Rosenbauer
Leonding, Austria 2007

Rosenbauer Panther CA5
CAFS testing

Rosenbauer Panther CA5 CAFS testing

Wurfweitenversuche
FLASH CAFS
Rosenbauer Leonding
13.06.2006

Rosenbauer CAFS testing

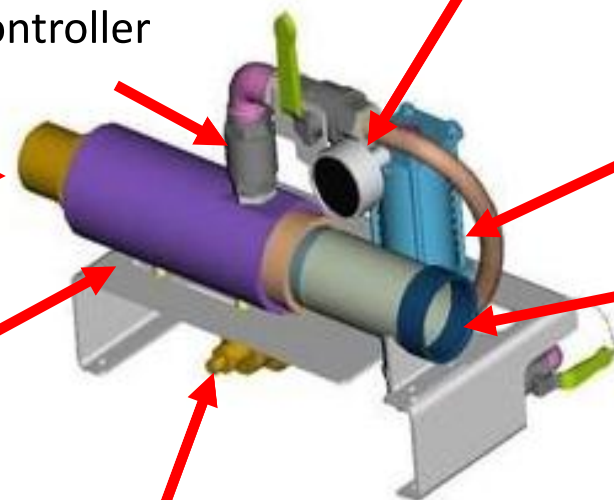


Copenhagen Airports first Rosenbauer Panther CA5

<u>CAFS on the main turret</u>

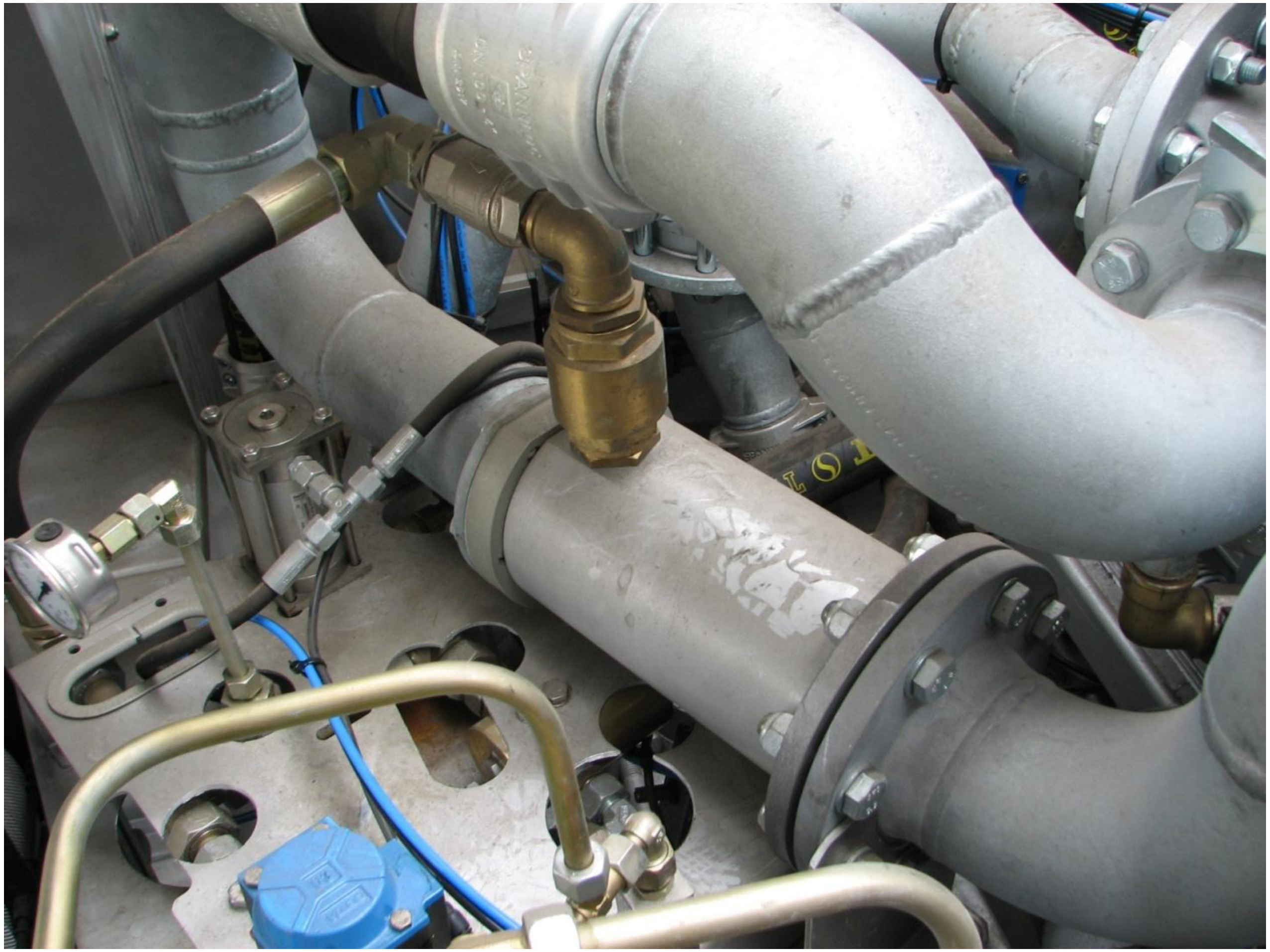
August 2007

FLASH CAFS – construction of admixing chamber



8 x 50 litter, 300 bar air bottles

Mixing chamber



Testing in Copenhagen
CAFS and new foam – Solberg ReHealing Foam

CAFS testing with Rosenbauer

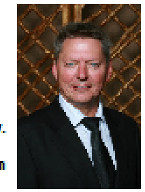
The Institution of Fire Engineers Australia, in cooperation with Fire and Rescue New South Wales

Are proud to Present

6 June 2011
Time: 0800 to16.30
Venue: Museum of Fire
1 Museum Drive (cnr. Castlereagh Rd), Penrith.

"Compressed Air Foam Systems—Experience in Aviation Fire and Rescue, Urban, and Rural Environments"

Foam Concentrate and the Environment



CAFS for ARFF

Kim Olsen has over 34 years experience in aviation safety and security. He has worked his way through the ranks at Copenhagen Airport and currently serving as the Assistant Fire Chief. He has held executive positions in both the International Aviation Fire Protection Association (IAFPA) and the Aircraft Rescue & Fire Fighting Working Group (ARFFWG). He is the Chief Instructor at the Copenhagen Airport ARFF School and provides instruction in ARFF on all Danish Incident Command courses at the Danish Emergency Services College in Tinglev. Kim is actively involved in a number of projects that are leading change and innovation in ARFF and will share his experience in dealing with the environmental issues surrounding the use of foam concentrates and will detail the tactical use of CAFS in Aircraft firefighting and rescue.

QFRS—CAFS in the Urban Environment

2 Medium Scania Pumpers were fitted with CAFS in 2009. These appliances are specifically designed to deal with the challenges of the urban environment. QFRS presenters will provide information of the process from delivery to implementation and givesome examples of incident that have proven the value of CAFS.

ACT Fire Service—CAFS in the iZone and Rural Environment

After the disastrous bush fire of 2003, the ACT FS invested in 4 Off Road CAFS vehicles. These have been in successful operation since 2005 and the ACT FS is now the most experienced user in the iZone environment in Australia. Their most experienced instructor will detail the implementation process and report on their operational experiences with CAFS.

This is a free event but booking is essential if you would like to take advantage of the catering.
Register on line at:
https://reg.eventarc.com/event/view/3050/compressed-air-foam-systems-experience-in-aviation-fire-and-rescue-urban-and-rural-environments-sydney
Contact: Mark Reilly 0411 186 054
mark.reilly@ife.org.au

This one day seminar will provide a rare opportunity to learn about the value of CAFS from leaders in their fields. Any organisation that is considering investing in CAFS technology will have access to essential information on all issues associated implementation. Don't miss this opportunity to learn about a technology that can greatly increase the effectiveness of fire suppression and protection in almost every context..

Why aren’t more people using CAFS?

Does it work? It´s to good to be true!

- Aspirated foam works why change?
- CAFS is often misunderstood. It´s not only for structural and class A fires.
- Change is hard: Aspirated and non aspirated foam is in ARFF fire-fighters’ DNA
- The Environmental issues!

Mix ratio	0.3%
Approx. expansion	8 : 1
Solution pressure	130 psi
Air pressure	130 psi
Solution flow	90 gpm
Air flow	90 cfm

Compressed Air Foam Systems (CAFS) Testing

CNPP, Vernon France

May 21-25 2012

UK CAA working with leading operators to carry out ICAO Compressed Air Foam System fire tests.

- The UK Civil Aviation Authority, specialist safety experts and a number of airport operators toke part in testing to determine the effectiveness of Compressed Air Foam Systems (CAFS) on aviation fires.

- The tests were carried out at the test facility of the risk-control company, CNPP, in Vernon, France in May 2012, will feed into the current ICAO and EASA work on CAFS.
- The tests were based on an 86m² fire tray with a replica fuselage in the middle of a pool of 1,500 liters of fuel. The results of the tests were captured by CNPP research staff and once collated will be made available to the wider industry.

- Simon Webb who was leading the project for the UK CAA, said: “This testing was an excellent example of the regulator, operators and manufacturers working together for the common aim of improving safety in aviation. The results of this research have delivered a key objective of the CAA Safety Plan to encourage the use of new technology in fire fighting and will direct us on the way forward with the CAFS technology.”

- The tests also found that the new generation fire fighting foams, which do not contain fluorinated products associated with the problem of environmental persistence, performed as well as the currently used film-forming foams. Thus the results identify those types of products and systems which satisfy both fire-fighting and environmental objectives.

- Industry partners in the tests included the UK Airport Operators Association, Copenhagen airport and Changi Airport Group, Singapore.

Compressed Air Foam Systems (CAFS) Testing

Aim

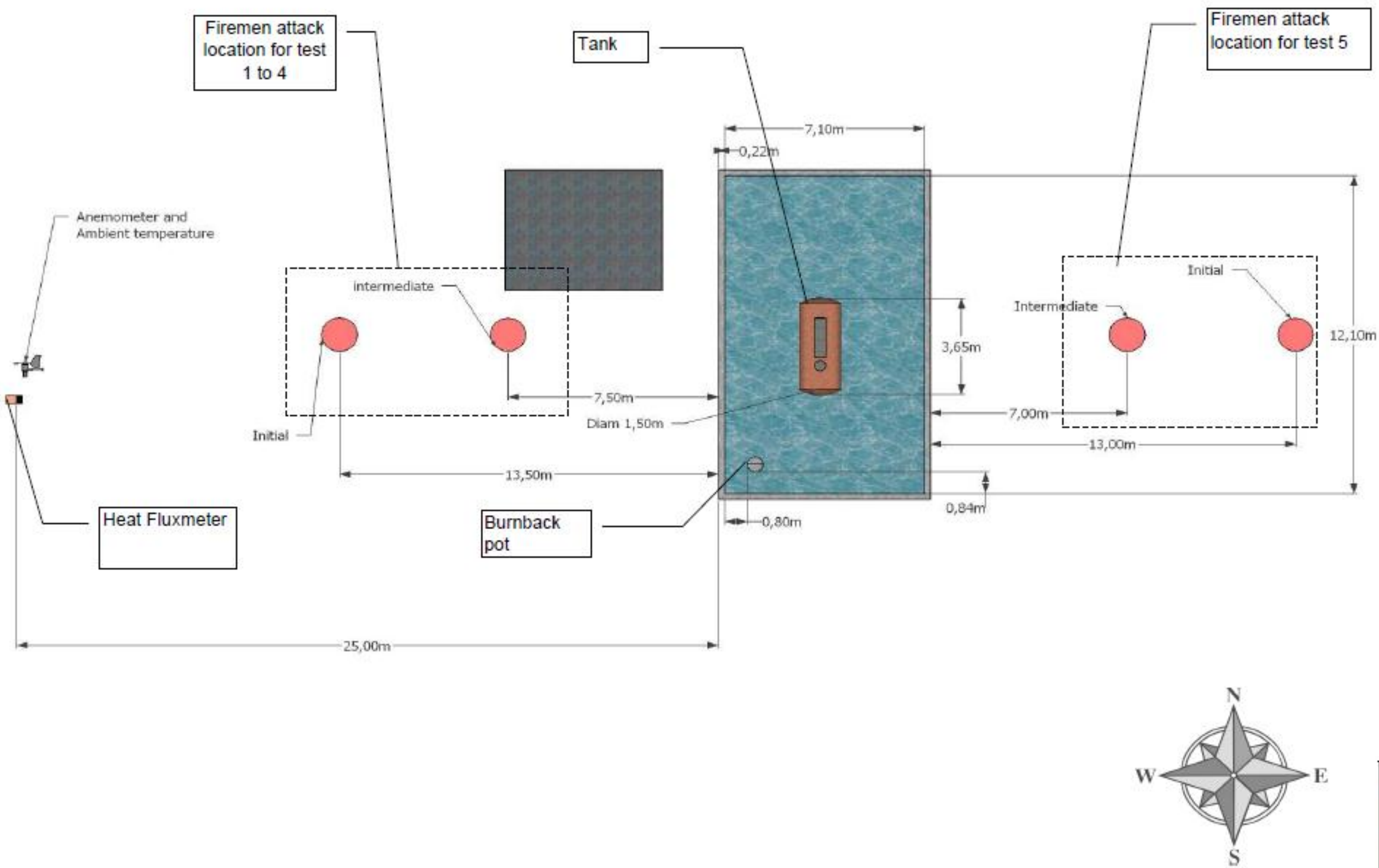
- The aim of the testing is to evaluate the use of CAFS on an aviation fire to influence future rules and recommendations (ICAO and EASA).

Objectives

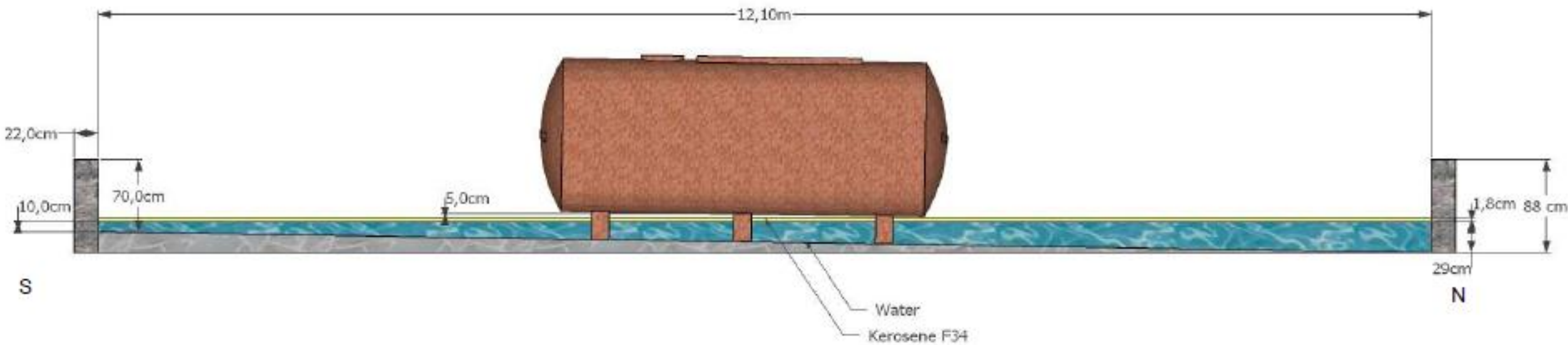
- To measure the fire fighting performance of an AFFF and FFF in an 86m^2 fire test;
- To measure the fire fighting performance of CAFS in a number of 86m^2 fire tests;

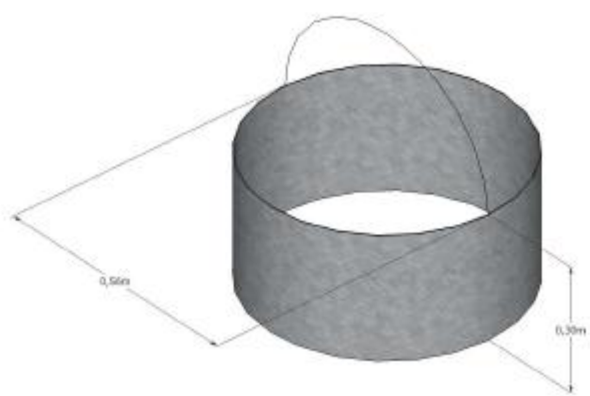
Method

- 5 tests will be carried out on an 86m2 fire containing a replica fuselage using CAFS



N.P.P. boratoire du feu	22-24/05/2012	**86 m² tests configuration**	**CAA** **PN 12 8913**





C.N.P.P. Laboratoire du feu	22-24/05/2012	**86 m² tests configuration**	**CAA** **PN 12 8913**


TEST
TYPE
FLOW
SYSTEM
FOAM
1
AFFF
B
2.00
ASPIRATED
BRANCH
SAME
2
AFFF
B
200
CAFS
3
AFFF
C
140
CAFS
4
FF
B
200
ASPIRATED
CAFS
5
FF
2.00

2. TESTS SCHEDULE

Test Ref. and Type	*Date*	*Type*	*Flow*	*System*	*Foam*
Calibration tests without fire	21th May PM 22th May AM	For each combination listed below			
Fire test n°1 Calibration and protocol	22th May PM	AFFF Level B	200	Aspirated System A	Foam X
Fire test n°2 AFFF	23th May AM	AFFF Level B	200	CAFS System A	Foam X
Fire test n°3 Benchmark AFFF	23th May PM	AFFF Level B	200	Aspirated System A	Foam X
Fire test n°4 AFFF	24th May AM	AFFF Level C	140	CAFS System B	Foam Y
Fire test n°5 FF	24th May PM	FF Level B	200	CAFS System C	Foam Z

Calibrating and adjusting systems


RISQUE DE GEL
LUC

Test nr. 1
AFFF – 200 l/m - aspirated

31 HA1/Y/0911/D/BAM7168-SCHUETZ2/
4056/1719/1060/59kg/100kPa
0911/0911
4012164/1012411345
IBC COLLECTION
TICKET SERVICE
TOTAL FLUIDES
SOLANE HEPTANE - CONT
635 Kg
1117981787
694 Kg
03/10/2011
Transport
1650 kg max
KEROSENE
F34
EXTINCTION
71787-EU1

Test nr. 1
AFFF – 200 l/m - aspireret

Test nr. 1
AFFF – 200 l/m - aspirated

Test nr. 1
AFFF – 200 l/m - aspirated

Test nr. 1
AFFF – 200 l/m – aspirated
pre-burn 60 sec.

Test nr. 1
AFFF – 200 l/m - aspirated

Test nr. 1
AFFF – 200 l/m - aspirated

Test nr. 1
AFFF – 200 l/m - aspirated

Test nr. 1
AFFF – 200 l/m - aspirated

Test nr. 1
AFFF – 200 l/m - aspirated

Test nr. 1
AFFF – 200 l/m – aspirated – burnback test

Test nr. 1
AFFF – 200 l/m – aspirated – burnback test

Test nr. 2
AFFF – 200 l/m – CAFS

Test nr. 2
AFFF – 200 l/m – CAFS
pre-burn

Test nr. 2
AFFF – 200 l/m – CAFS

Test nr. 2
AFFF – 200 l/m – CAFS

Test nr. 2
AFFF – 200 l/m – CAFS

Test nr. 2
AFFF – 200 l/m – CAFS – burnback test

Test nr. 2
AFFF – 200 l/m – CAFS – burnback test

Test nr. 3
AFFF – 200 l/m – aspirated – benchmark test

Test nr. 3
AFFF – 200 l/m – aspirated – benchmark test

Test nr. 3
AFFF – 200 l/m – aspirated – benchmark test

Test nr. 3
AFFF – 200 l/m – aspirated – benchmark test

Test nr. 4
AFFF level C – 140 l/m – CAFS

Test nr. 4
AFFF level C – 140 l/m – CAFS

Test nr. 5
FFF (Fluor Free Foam) – 200 l/m – CAFS

Test nr. 5
FFF (Fluor Free Foam) – 200 l/m – CAFS

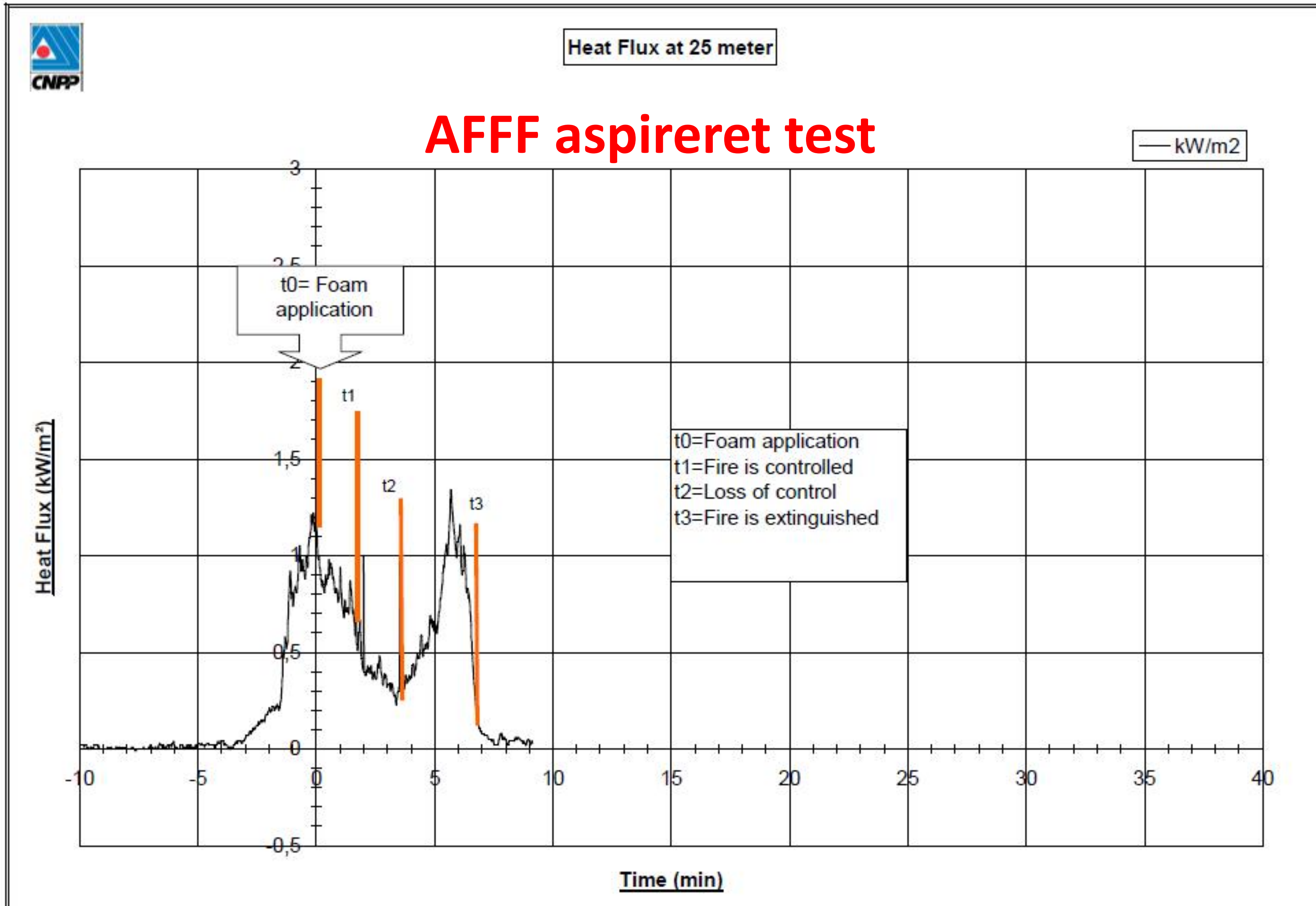
Test nr. 5
FFF (Fluor Free Foam) – 200 l/m – CAFS

Test nr. 5
FFF (Fluor Free Foam) – 200 l/m – CAFS

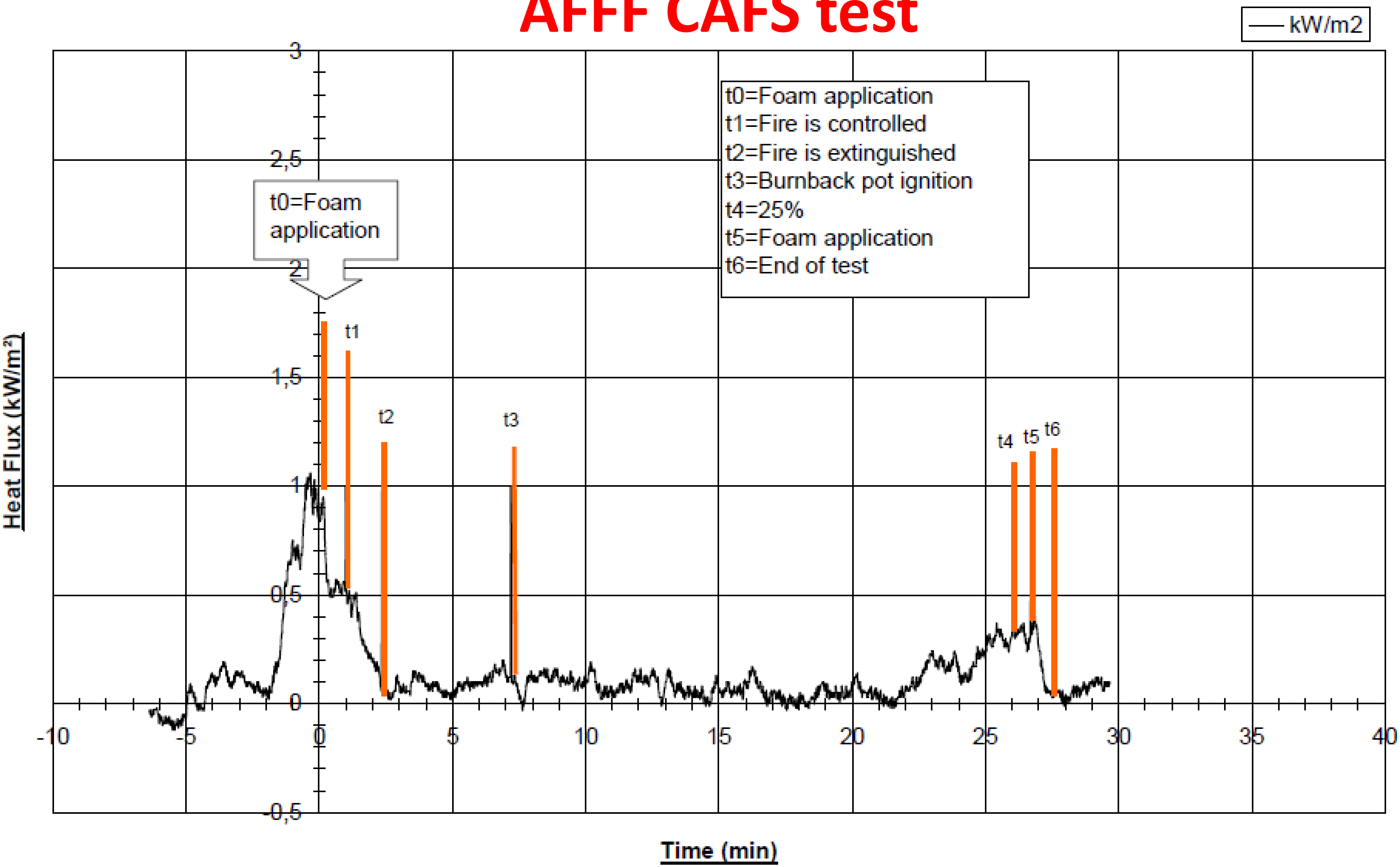
Test nr. 5
FFF (Fluor Free Foam) – 200 l/m – CAFS

Test nr. 5
FFF (Fluor Free Foam) – 200 l/m – CAFS

AFFF aspireret test

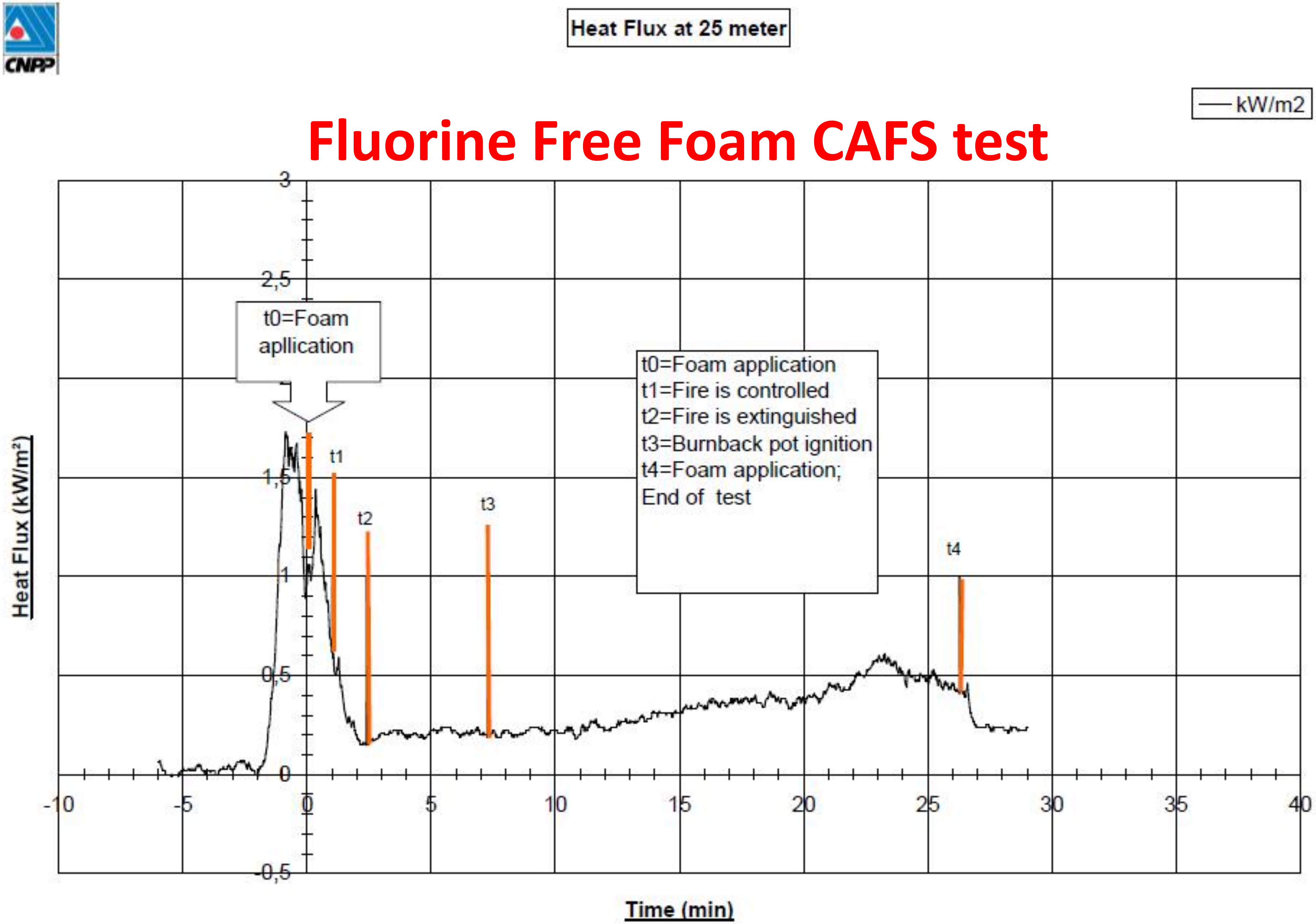


AFFF CAFS test



C.N.P.P. Laboratoire du feu	23/05/2012 Test 2	CAFS System A Foam X	CAA PN 12 8913

Fluorine Free Foam CAFS test



C.N.P.P. **Laboratoire du feu**	24/05/2012 Test 5	**CAFS System C Foam Z**	**CAA** **PN 12 8913**

4.2.2 Fire test 2 – AFFF Level B – CAFS System A Foam X

- ***Sequence of events***
- T0 – 2 min 08 s Start of pool fire ignition
- T0 – 1 min Fire had spread over the whole basin surface

- **T0 Foam application**
- T0 + 54 s **Start of fire control**
- *T0 + 1 min 45 s* 90% control
- *T0 + 2 min 03 s* 99% control
- T0 + **2 min 21 s = T0'** **Fire is fully extinguished**

- T0' + 5 min 10 s = T0'' Burnback pot ignition with propane burner
- T0'' + 55 s Burnback pot ignited. Removal of propane burner
- T0'' + 8 min 53 s Start of ignition of fuel around the pot (small flames)
- T0'' + 13 min 00 s Flames around the pot are more stable and tends to develop toward the SW corner
- *T0'' + 14 min 54 s* 5% burnback
- T0'' + 16 min 02 s Start of fuel reignition under the simulated fuselage
- *T0'' +* ***18 min 30 s*** **25% burnback**
- T0'' + 19 min 00 s Extinguishing of remaining fire

4.2.5 Fire test 5 – FFF level B – CAFS system C Foam Z

- ***Sequence of events***
- T0 - 2 min 18 s Start of pool fire ignition
- T0 - 1min Fire had spread over the whole basin surface

- **T0 Foam application**
- T0 + 1min 01 s **Start of fire control**
- T0 + 1 min 55 s 90 % control
- T0 + 2 min 11 s 99 % control
- T0 + **2 min 24 s = T0'** **Fire is fully extinguished**

- T0' + 5 min 04 s = T0'' Burnback pot ignition with propane burner
- T0'' + 13 s Burnback pot ignited. Removal of propane burner
- T0'' + 3 min 57 s Start of ignition of fuel around the pot (small flames)
- T0'' + 15 min 30 s 10 % burnback
- T0'' + **18 min 58 s** **20 % burnback**
- T0'' + 19 min 00 s Extinguishing of remaining fire , End of test

Fluorine Free Foam CAFS test

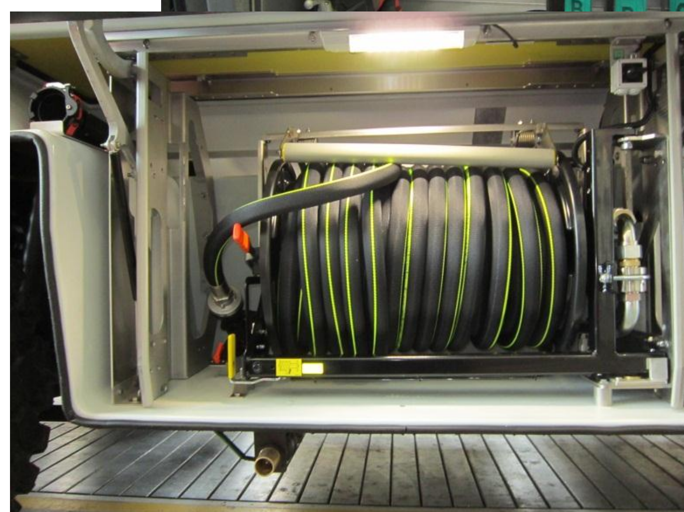
Conclusion

- The ICAO/UK CAA tests at CNPP showed that CAFS has advantages in extinguishing fires compared to aspirated foam – approximately 40% more efficient in the knock down.
- Tests pointed out other very important factors like environmental influences, tactic etc. has a high impact on the extinguishing time and therefore also on the quantity of extinguishing agent being used.
- Tests also showed that Level C foam had almost the same extinguishing time and quantity of extinguishing agent as the Level B foam.
- CAFS with Fluorine Free foam or AFFF foam is very efficient.
- Burnback tests in all tests – aspirated, CAFS, FFF and AFFF all pasted the test with excellent results.

New CA5 CAFS Rosenbauer Panther in Copenhagen


COPENHAGEN AIRPORT
3


Achtung HOCHDRUCK !
Attention HIGH PRESSURE !
B
B
C
C




THANK YOU