

# Danish Fire Laboratories ApS

- Danish Fire Laboratories ApS.
- Address:  
Svalbardvej 13  
5700 Svendborg  
Denmark.
- Fire test hall size:  
20 x 20 x 14m.
- Laboratory manager:  
Henrik Abrahamsen



**A800(19) approvals are running out  
due to the MSC265(84).**

**Important date 9. May 2014.**

Evaluation of possible impacts in the designs of water mist systems due to the changes made to the disable nozzle fire test in the IMO res. A800(19) open public space fire test scenarios.

# Tests in the A800(19). Six tests.

- **Cornertests:**
- Corner
- Corner ventilated
- Corner disable
- **Open Public Space tests:**
- Under one nozzle
- Between two nozzles
- Between four nozzles

# Tests in the Res. MSC. 265(84). Five tests.

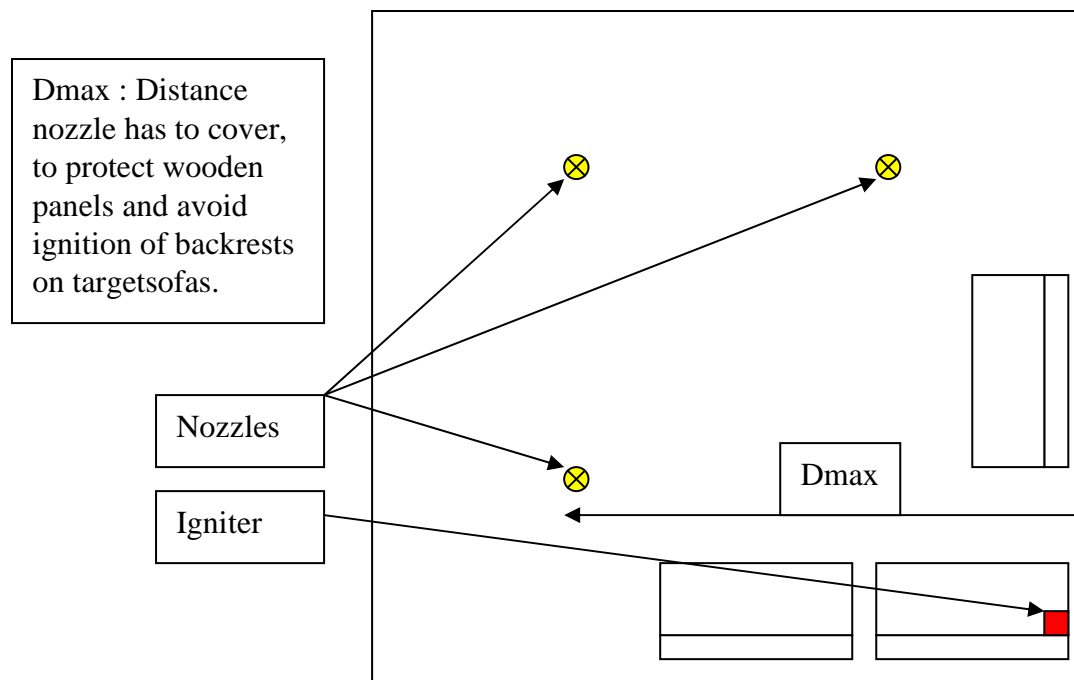
- **Cornertest:**
- Corner
- **Open Public Space:**
- Under one nozzle
- Between two nozzles
- Between four nozzles
- Open public space  
disable

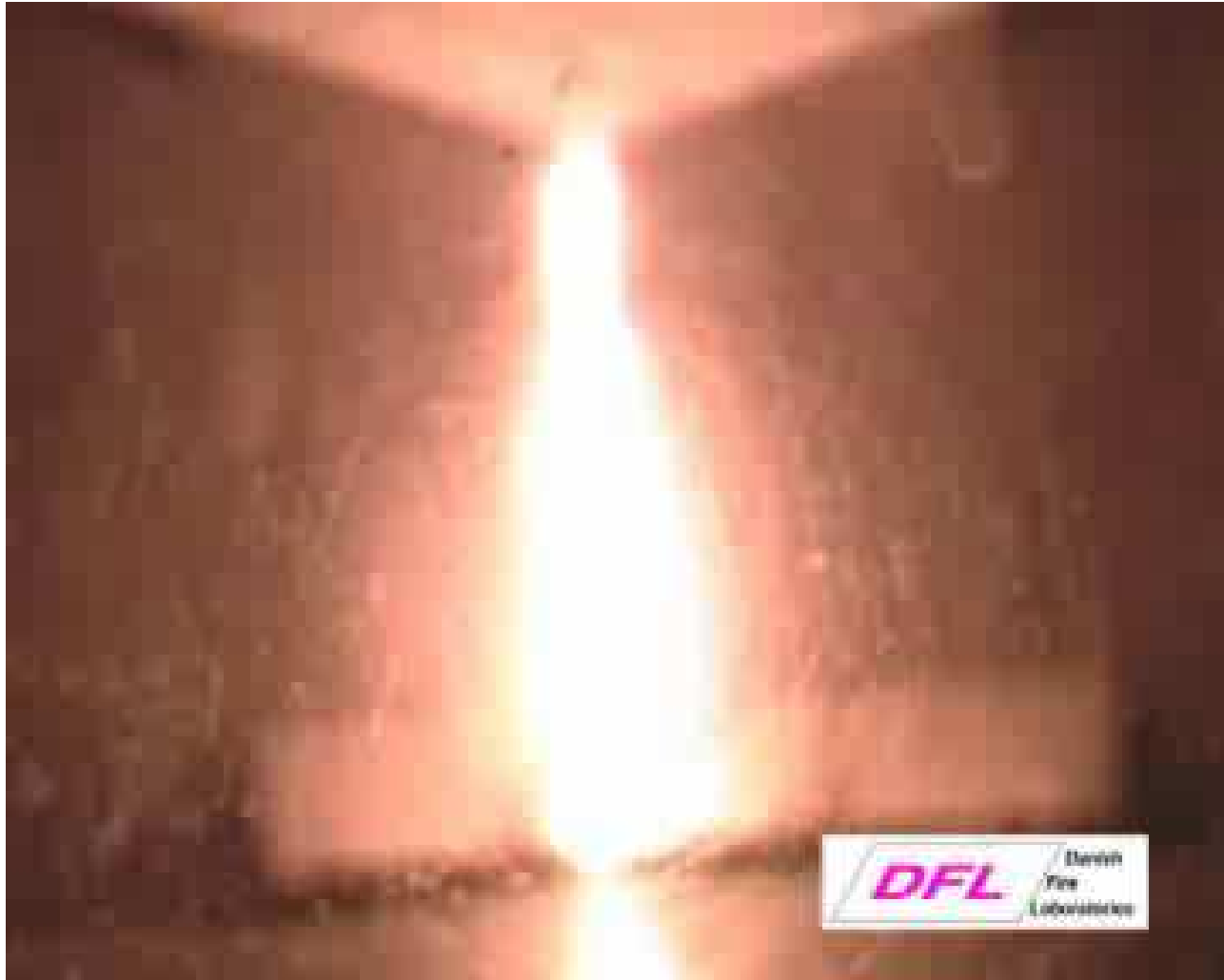
## A800(19)



- The Disable test in A800(19) was conducted in the Corner.
- 50% damage to target mattresses allowed.
- There were only three nozzles installed in the set-up.

# Drawing of disable A800(19)





## A800(19)

- Disable corner did influence in the design of nozzles. To control the firespread, nozzles were made to spray long and high to protect the wooden panels from getting out of control. If fire gets out of control it ignites the backrests of targetsofas and the test might be lost.
- Might give less coverage underneath. Or restrictions were made, like 1¼ spacing to the walls.

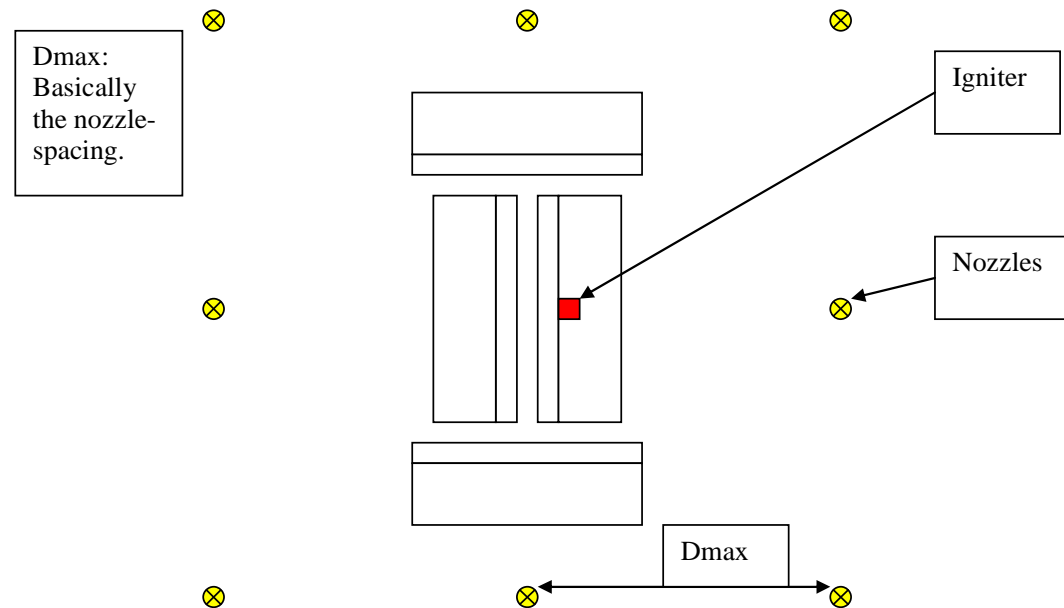


## Res. MSC. 265(84)



- The Disable test in Res. MSC. 265(84) is conducted in Open Public Space.
- 70% damage total allowed.
- In this test eight nozzles are installed.

# Drawing of disable Res.265(84)





## Res. MSC. 265(84)

- With this test, nozzles can be designed to give better coverage underneath. Basically the distance the nozzle cover has been reduced. Maybe the designer can concentrate the effort underneath and within the spacing of the nozzle. This might in the future make it possible to increase the spacing because  $D_{max}$  has been reduced.

# Sofa arrangements in disable tests

- A800(19)
- The disable arrangement has bigger distance between the sofas. This means the fire has to jump a bigger distance or burn its way along the wooden panels. Control of fire in the wooden panels is important.
- Res MSC.265(84)
- The disable arrangement sofas stand closer to each other than in the A800(19). This means you get a more concentrated fire. All of your mattresses will be at risk for catching fire before nozzles release.

## Nozzle release

- **A800(19)**
- Basically nozzles release faster because of the more rapid heat development caused by the wooden panels and the corner.
- **Res. MSC.256(84)**
- Takes longer before the nozzles release. The fire is developed much and has spread to all four backrests before nozzle activation. Most of these are lost before the nozzles release.

# Interpretation of standards.

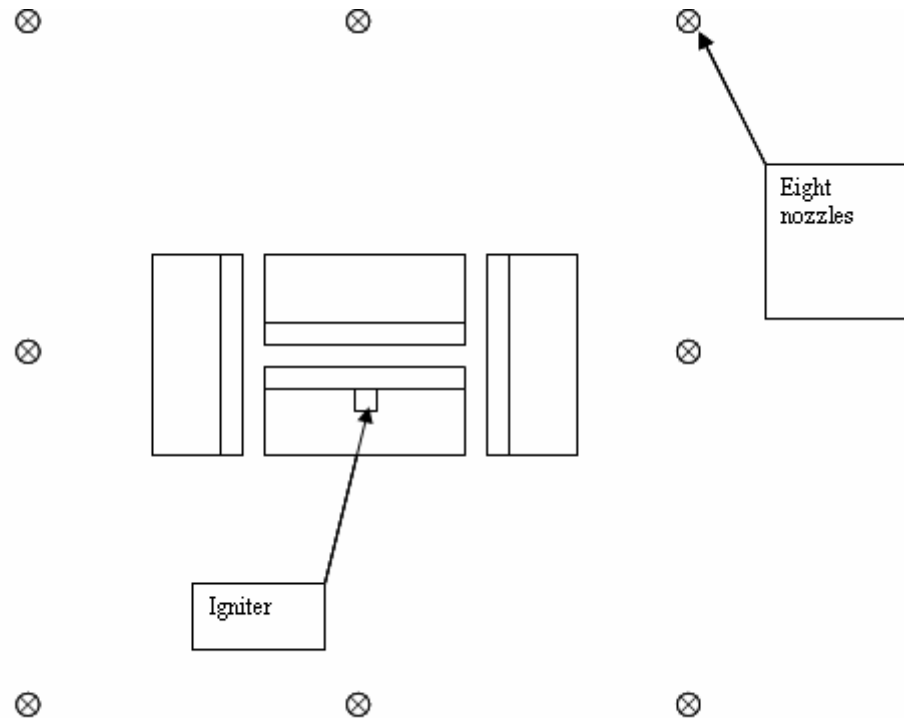
- A new standard might lead to different interpretations between manufacturer, test facilities and classification companies.
- In this case the problem was if the disable test should be performed between 8 or 4 nozzles.

The description in MSC 265(84) is:

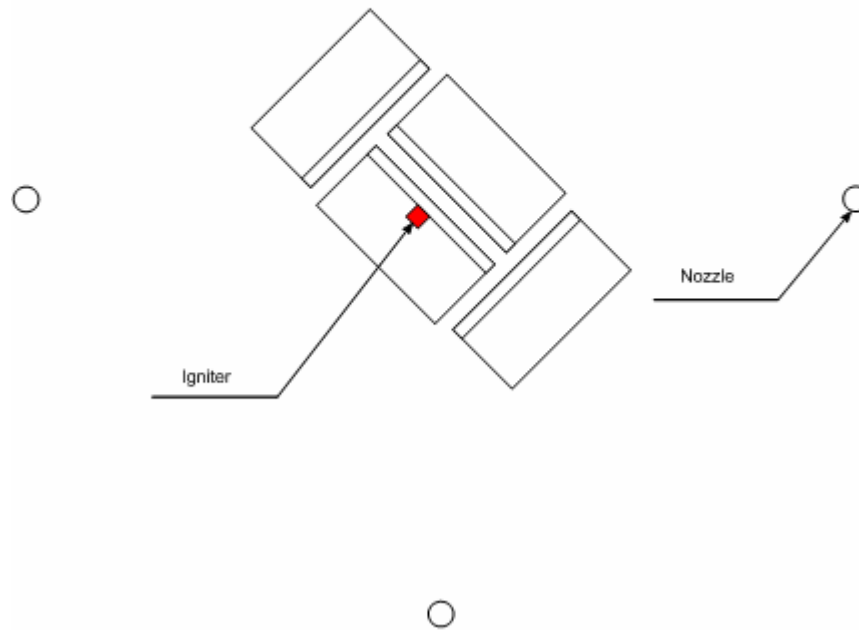
- ***The fire tests should be conducted with the ignition centered under one, between two and below four nozzles. An additional test should be conducted with the ignition centered under a disable nozzle.***



# Disable set up with 8 nozzles



# Disable set up with 4 nozzles



## Impact on the disable test due to interpretation problems.

- In this case DFL had to perform the disable test two times due to the different interpretations.
- One test with 8 nozzles and one with 4 nozzles.
- The manufacturer ended up with two different approvals with different spacings.
- To avoid these interpretation problems more drawings in the standards could be a solution.

# Comments

- These comparison tests has been conducted with the same nozzle. The nozzle were designed for the Res. A800(19) and the disable test was conducted in the corner.
- This means that the nozzle not was changed when disable was conducted accordingly to Res. MSC.265(84). Therefore the testresult might have been better if the nozzle had been designed for the Res. MSC.265(84). Basicly the nozzle might have overshoot some of the watermist in this test. In the future manufactures can optimize their nozzles to Res.MSC.265(84) disable and might perform better in the open public space tests.

# Comments

- What we also saw was that it was very important that all nozzles released at the same time. All backrests are usely lost almost before the nozzles are activated so it is important to get an all over protection of the mattresses left.
- You only have 4 tests to calculate your average from in the Res. MSC.265(84) because the ventilated cornertest has fallen out. This test usely gave a good result with minor damages. If one of the tests in open Public Space is close to 50% it gets a bit more difficult to pass the overall average requirement.

# Explosive atmosphere in test surroundings(MSC 1165)

- Accidents has occurred when test facilities has been conducting tests involving large amounts of heptane.
- Especially the Flowing Fire test present in MSC 1165 has given accidents. In this test approx. 22 l heptane/min is pumped into the facility and lighted.
- As long as the fire is burning there is no problem but the problem occurs when the test is terminated and the heptane has to be re-ignited. The heptane keeps on evaporating and an explosive environment occurs.
- This puts facilities and personnel in great danger.

# Flowing Fire MSC 1165.



# Controlled reignition of heptane

- To prevent explosions when the fire is reignited DFL has developed a procedure. We have rigged a extinguishing system with 1% foam enhancement in the bilge.
- With this we put a lid on the 4m<sup>2</sup> fire tray placed underneath the mock-up when the fire is extinguished and the test is terminated.
- This gives us opportunity to scrape a hole in the foam and reignite the heptane for a controlled fire.
- This is still a risky procedure. An even better suggestion would be to remove the Flowing Fire test.