



cargolux

Fire Containment Cover

**FCC -
Safety Assessment**

09/09/2014

- Using FCC to mitigate fire risks requires safety assessment with the involvement of Aviation Safety, Ground Ops and Flight Ops departments
- The transportation of (undeclared) Dangerous Goods poses a risk of an in-flight fire among others. At the moment Cargolux is relying on the standard fire suppression system in Class E compartments, which is based on oxygen deprivation and on Halon 3101 in Class C compartments.
 - In recent cases of in-flight cargo fires it has taken in average 17 minutes from initial notification of a fire until a catastrophic accident.
- An additional barrier to prevent a fire from spreading could be the usage of FCCs. These covers are put between the cargo and the net. It is a passive device providing a physical barrier out of which flames cannot spread out and that helps to suppress the fire through oxygen starvation and thus giving crews more time and more options to act as the fire is contained (time span depends on type of FCC and type of fire) at one pallet position, and unable to spread within the aircraft.

- FCCs will serve as a barrier in future and as such will “add safety” to the operation
- Nevertheless, there is the potential that the usage of FCCs also introduces some risks. It is understood, that all risks cannot be eliminated. Some residual risks might remain, however, these risks shall be sufficiently low to be outweighed by the benefits.
- In order to identify and understand the risks, Cargolux has performed handling tests on FCC from 3 different manufacturers. The covers were selected based on different criteria such as:
 - **AS6453 / ISO14186** standard
 - Cost
 - Weight
 - Maintenance / repair
 - Training material
 -

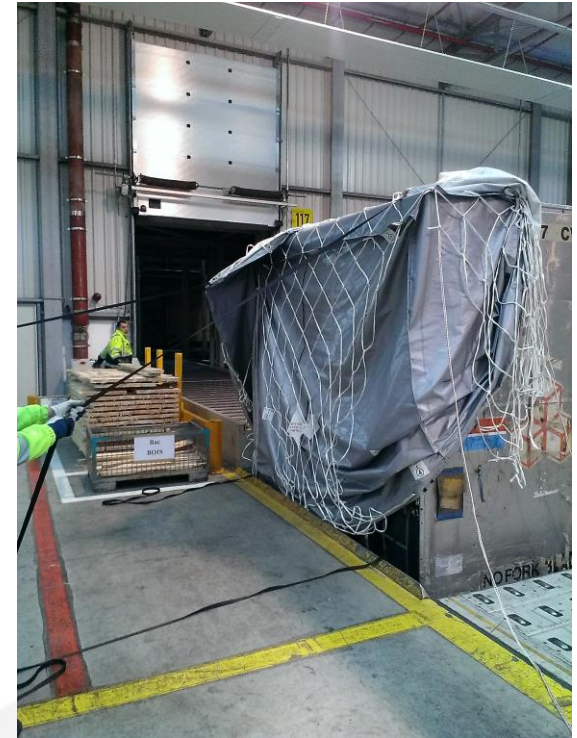
The handling was performed by 3 GHA staff (same persons) and a forklift, on a Q7 shape (AMD container).

There are **3 phases** when handling an FCC:

- Deployment & installation



- Removal of FCC



- Folding / packing of FCC



- Each of the 3 phases has important items to take care of for a smooth operation and **re-use** of the FCC
- They follow the same pattern with some differences and specifics depending on the brands, but in general the same procedure of deployment, removal and packing is applied
- For feedback purpose from the operating staff, a notation grid has been prepared. The 3 staff have rated from 1-10 the difficulty they faced with handling FCCs during the 3 phases. (1 = very difficult and 10 = very easy)
- The average time for the entire operation (deployment-removal-packing) = **25-30min**, whereas the average rating ratio = **6.88/ 10**
- Each phase of the handling enabled to identify potential issues to take care of, then incorporated in the Safety assessment.

- Incorrectly built up/used FCCs

In case the FCCs are not built up correctly, they will be less effective, but there will be no negative impact compared to a situation of a pallet without an FCC. So even in the scenario that an FCC is used incorrectly, there is no additional risk. Nevertheless all persons using the FCCs must be trained to ensure a correct positioning of the FCCs to reach the full benefit of installing the FCC.

Action: - Ensure staff who build up the pallets are adequately trained on handling FCCs
- Promote reporting of all anomalies in regard to FCCs, even if inconsequential

- Incorrectly Folded FCCs

After usage, the FCCs need to be folded. This must be done in accordance to a special procedure. In case the FCC is folded incorrectly, the worst consequence would be that during the next built up one would have the 96" side of the FCC aligned with the 125" side of the pallet. In this case one could damage the FCC when trying to pull or shift the FCC into its proper alignment and thus disable the unit.

Action: - Ensure staff who break down the pallets and fold the FCCs are adequately trained on the installation of FCCs

Different Fire Classes

There are different types of FCCs for different types of fire. In case an FCC is used for another type of fire, it might not be effective, as e.g. an FCC designed for a class A fire cannot withstand a LiBat fire. For this scenario there will be no additional risk compared to the situation of an in-flight fire without an FCC.

Delayed Fire Warnings

If a fire is contained with an FCC, the smoke/fume will be contained as well and thus the smoke/fume detectors will need longer to detect a fire and the crew will be warned later compared to a situation of a pallet without a FCC. The design of the FCC should be airtight and guarantee that smoke/fumes can escape and the time delay is as low as possible, but cannot ensure zero time delay. *“The fire containment cover assembly when properly installed onto a pallet should minimize the amount of contaminants such as smoke, fumes or noxious gases coming out of the covered pallet load.”* [Standard AS6453 - 5.2.4].

Although the alarm will be triggered later than in a normal situation (normal situation being one pallet not covered by an FCC) the advantage of an FCC covering and containing the flames will give to the crew more time to divert to the first available airport by applying all the emergency procedures.

The FAA regulation 14CFR Fire detection in 25.858 pt. a) state: *“The detection system must provide a visual indication to the flight crew **within one minute after the start of a fire**”.*

In practice this regulation is ambiguous as the possibility to detect a fire, in a situation without the use of FCCs, will be different if the fire erupts in an outside placed package (quicker) or a center placed package (delayed) on a pallet, and further if a container is used the container itself may contain the smoke and delay the detection.

Cargolux understands the regulation in the sense that the fire detection system must be able to detect the fire maximum one minute after fire is noticeable outside the transport packaging including FCC.

Ensure that flight crew has basic knowledge about FCCs, their purpose, the fact that they might delay fire detection, importance of correct application, etc..

An FCC is a passive device which provides a physical barrier which flames cannot spread out and helps to suppress the fire through oxygen starvation and thus giving crews more time and more options to act.

The hazards:

- Incorrectly built up of FCCs
- Incorrectly folded FCCs
- Different Fire Classes

These do not have a negative impact compared to the situation of an in-flight fire on a pallet without an FCC. Still, all staff handling FCCs should be trained to ensure a correct usage and thus the optimal protection.

- Delayed fire warning can be accepted as the additional loss of time is outweighed by the benefits of the FCCs by containing and suppressing a fire.

**QUESTIONS?
COMMENTS?**