Equivalent Safety Finding (ESF) on CS 25.855(b)(1) : Cargo compartment and CS 25.857(e)(2) : Cargo compartment classification at Amendment 15 for Class E Main Deck Cargo Compartment.

Applicable to Airbus A330-700L "Beluga XL"

Introductory note:

The hereby presented Equivalent Safety Finding has been classified as an important Equivalent Safety Finding and as such shall be subject to public consultation, in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) of which states:

"*2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency*."

Statement of Issue

The Airbus A330-700L "Beluga XL" will be certified as a derivative cargo aircraft of the A330-300 aeroplane for the special purpose of transporting outsized cargo items, mainly aircraft components and subassemblies between the Airbus sites of its manufacturing / production locations. These outsized cargo items are intended to be carried on dedicated TCUs (Transport Cargo Units) in the Main Deck Cargo Compartment (MDCC), which has a large volume and height and is not pressurized.

The same design principles than for the MDCC of the current Airbus A300-600ST Beluga aircraft are proposed: no liners according to CS 25.855(b)(1) and no smoke detection system as required by CS 25.857(e)(2) for Class E Cargo Compartments will be available, however the risk of hazardous fire will be precluded in the MDCC as no design features which could create a fire risk will be incorporated in this cargo compartment and by ensuring that the cargo items allowed to be carried in this compartment are of such a nature, conditioned and disposed so to avoid the risk of hazardous fire ignition which could preclude aircraft continued safe flight and landing.

The CS 25.855(b)(1) at Amendment level 15 requires that:

"(b) The following cargo or baggage compartments, as defined in CS 25.857, must have a liner that is separate from, but may be attached to, the aeroplane structure:

(1) Class B through Class E cargo or baggage compartments;"

In addition, CS 25.857(e)(2) at Amendment level 15 states that:

"(e) Class E. A Class E cargo compartment is one on aeroplanes used only for the carriage of cargo and in which –

(2) There is a separate approved smoke or fire detector system to give warning at the pilot or flight engineer station;"

Equivalent Safety Finding (ESF) D-06-700L on CS 25.855(b)(1) : Cargo compartment and CS 25.857(e)(2) : Cargo compartment classification at Amendment 15 for Class E Main Deck Cargo Compartment.

– Applicable to Airbus A330-700L–

Proposal

The smoke detection system, needed for complying with CS 25.857(e)(2), will not be installed on the main deck Class E Cargo Compartment. The risk of hazardous fire ignition is proposed to be precluded by the following set of requirements :

A. Requirements applicable to the class E main deck cargo compartment:

1) Design precautions must be taken to prevent the risk of fire in this compartment.
2) The compartment must meet the requirements of CS 25.855(d), (e), (f) and (g).
3) Cockpit voice and flight data recorder systems, windows and systems or equipment shown to be essential for aircraft continued safe flight and landing according to CS 25.1309 and which are installed within or in the vicinity of this cargo compartment must be installed and protected in accordance with CS 25.855(c)(2) requirements.
4) Any additional equipment installation to be performed in the class E main deck cargo compartment subsequent to the certification of the derivative aircraft will need to be specifically assessed under these equivalent level of safety principles concerning their contribution as a possible fire source.

B. **Requirements for the items of cargo to be carried in the main deck cargo compartment:** concerning the carriage of items transported in the class E main deck cargo compartment it shall be ensured that any fire risk is minimized and any uncontrolled fire risk is eliminated. To this effect:

1) The category of items to be carried are limited to Airbus' aircraft components and subassemblies together with their associated devices required for their transportation under the limitations addressed in this paragraph B).
2) Interface specifications and procedures for transportation of items will need to be developed by the type certificate holder to identify and describe:
    i. The kind of items to be carried.
    ii. The necessary instructions to prepare, check and load the aircraft's components and subassemblies together with their associated devices required for their transportation in the aeroplane. These instructions can be prepared and delivered as part of the instructions for continued airworthiness and manuals required by CS 25.1529.
    iii. Prior to the commencement of the flight, an acceptance checklist must be provided to the flight crew by the operator or organization responsible for the management and handling of the cargo declaring that the cargo items and the associated devices required for their transportation have been prepared, loaded in the aircraft and checked in accordance with the type certificate holder interface specifications and procedures referred in this paragraph B2. The aeroplane flight manual must contain an adequate limitation or procedure to this effect.

3) The interface specifications to be developed by the type certificate holder shall include technical principles and instructions aimed to ensure that no parts or components in the sub-assemblies to be carried may be contributing to or presenting individual risk to induce any hazardous fire ignition while carried in the main deck cargo compartment. To this effect the following aspects shall be taken into account:

i. Flammable fluids (i.e: fuel, hydraulic, oil, etc) tanks and lines shall be drained and cleaned such that they do not contain hazardous quantities of these fluids neither accumulation of flammable gases or vapours. Flammable fluid tanks and lines are adequately sealed or plugged before their transport.
ii. For payloads containing systems with a power sources/power supply potentially creating a fire risk, the system must be deactivated and the associated power source / power supply properly insulated or removed prior to transportation.

4) The interface specifications referred in this paragraph and to be developed by the type certificate holder shall be approved by their design organization. In addition:
   i. The aircraft AFM/EASA approved part of the WBM shall contain limitations regarding loading, unloading and transportation of items in the main deck cargo compartment will be performed in accordance with the type certificate holder specifications, and
   ii. The type certificate holder shall furnish a complete set of interface specifications to each known aircraft owner and provide them with any updated version.
   iii. In case additional allowed items of cargo are to be contemplated or differences from previous cargo preparation, handling and loading procedures and instructions are to be introduced, these shall be properly substantiated by the type certificate holder and finally formalized through an airworthiness approval triggering if deemed necessary by the Agency an updated AFM/WBM revision.

C. **Additional requirements applicable to other items of cargo than those specified in paragraph B:** The carriage of any other cargo item different to Airbus' aircraft components and subassemblies not covered by the type certificate holder interface specifications referred in this ESF will require a specific airworthiness design approval on a case by case basis. For this specific airworthiness design approval process:
   1) The type certificate holder interface specifications will need to be updated accordingly. The principles for these specifications as described in this ESF will need to be met taking in consideration the specificities of the new cargo item to be carried and
   2) An adequate entry/link in the AFM/WBM shall be provided for contemplating the carriage of these specific cargo items.

Safety Equivalency Demonstration:

The set of requirements described here above have been found to provide an equivalent level of safety than the CS 25.855(b)(1) and 25.857(e)(2) when applied to the "Beluga XL" A330-700L Class E Main Deck Cargo Compartment.