Deviation E-31MAX to CS 25.901(c), 25.981(a)(3) and 25.1309(b) : Fuel Quantity Indication System (FQIS) Electrostatics threat

Applicable to B737-8 and B737-9

INTRODUCTORY NOTE:

The following Deviation 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.*"

IDENTIFICATION OF ISSUE:

During aircraft fuelling, the fuel may accumulate an electrostatic charge inside the aircraft fuel tank, due to the fuel velocity. This electrostatic charge, resulted from the fuel velocity, could create potential ignition sources into fuel tank leading to a risk of explosion.

Through the regulation, this safety risk is addressed through the requirements CS 25.901(c), CS 25.981(a)(3) and CS 25.1309(b), reminded hereafter :

CS 25.901(c)

- (c) The powerplant installation must comply with CS 25.1309, except that the effects of the following need not comply with CS 25.1309(b):

(1) Engine case burn through or rupture;

(2) Uncontained engine rotor failure; and

(3) Propeller debris release. (See AMC 25.901(c) Safety Assessment of Powerplant Installations and AMC 25-24: Sustained Engine Imbalance)

CS 25.981(a)(3)

- (a) No ignition source may be present at each point in the fuel tank or fuel tank system where catastrophic failure could occur due to ignition of fuel or vapours. This must be shown by:

(3) Demonstrating that an ignition source does not result from each single failure and from all combinations of failures not shown to be Extremely Improbable as per 25.1309.

(See AMC 25.981(a))

CS 25.1309(b)(1)

• (b) The aeroplane systems and associated components, considered separately and in relation to other systems, must be designed so that -

(1) Any catastrophic failure condition

(i) is extremely improbable; and

(ii) does not result from a single failure;

On the B737MAX, the electrostatic charges on Fuel Quantity Indication System (FQIS), tank unit and compensator Lo-Z tubes and the tank unit and compensator Hi-Z shield are safely discharged via the wiring to the ground within the Fuel Quantity Processor Unit (FQPU).

A grounding failure in one of these surfaces, being completely isolated from each other, may result in the exceedance of the minimum ignition energy (see identified through the AMC 25.981) at the component level.

Deviation E-31MAX to CS 25.901(c), 25.981(a)(3) and 25.1309(b)(1) : Fuel Quantity Indication System (FQIS) Electrostatic threat

Applicable to B737-8 and B737-9

A deviation to the requirements CS 25.901(c), CS 25.981(a)(3), and CS 25.1309(b)(1) for the Fuel Quantity Indication System (FQIS), regarding an electrostatic threat which may develop during refuelling operations, is requested for thirty-six (36) aircraft of the 737 MAX programme, distributed as follows :

- Thirty-four (34) 737-8 MAX aircraft.
- Two (2) 737-9 MAX aircraft.

This deviation is supported by the currently 12,828 Boeing airplanes (9154 Boeing 737, 1528 Boeing 747, 1050 Boeing 757, and 1096 Boeing 767) embodying this similar design, accumulating more than 555 Million flight hours. The addition of thirty-six (36) airplanes to this fleet will have no material effect on fleet safety. Moreover, this design, or similar ones, installed on Boeing fleet for more than 30 years did not lead to any refuelling related ignition events. Prior to this period, there were two (2) refueling incidents on 727 airplanes (the first was on May 3rd, 1970 and the second on December 23rd, 1970). The investigation concluded the ignition events were probably the result of sparks from fuel which had been excessively charged by the airport side filtration equipment. This led to changes in airport ground filters and airport ground refueling equipment. The hours accumulated since the last event represent many times the hours accumulated with earlier designs through 1970. The accident free fleet history since 1970 shows current Boeing FQIS system designs have sufficient protection against refueling ignition events. The 36 additional 737 MAX airplanes will be consistent with and improve upon the electrostatic ignition prevention features common to the Boeing fleet.

In addition, the 737 MAX FQIS has multiple features designed to protect the tank units and compensators from becoming isolated, consistent with similar Boeing designs.

Boeing has proven that failure modes leading to an ignition source supports safe ground fueling operations and flight. Features which minimize the in-tank electrostatic environment,

as well as limited tank flammability and the presence of higher conductivity fuel, further decrease the probability of ignition source and ignition event.