

## **Airbus Product Safety**

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Safety Enhancement

# **Zonal Safety Analysis**

# Zonal safety Analyses (ZSA)

## Zonal Safety definition

Zonal Safety Analyses are defined in the CS25 Book 2 Appendix1.

Annex to ED Decision 2016/010/R

### CS-25 BOOK 2

(1) *Zonal Safety Analysis*. This analysis has the objective of ensuring that the equipment installations within each zone of the aeroplane are at an adequate safety standard with respect to design and installation standards, interference between systems, and maintenance errors. In those areas of the aeroplane where multiple systems and components are installed in close proximity, it should be ensured that the zonal analysis would identify any failure or malfunction which by itself is considered sustainable but which could have more serious effects when adversely affecting other adjacent systems or components.

# Definition and Background

The Zonal Safety Analysis (ZSA) is one of the safety methods used in aviation industry

ZSA is described in SAE Aerospace Recommended Practice ARP4761  
“Guidelines and methods for conducting the safety assessment process on civil airborne systems and equipment”

The ZSA evaluates the physical installation of equipment and systems in order to identify potential hazards caused by mutual influences between items installed on the aircraft as well as the influence of the operating environment on such installed items

The ZSA analysis will generally be performed by the airframe manufacturer

# Embedding of ZSA in the Safety Assessment Process

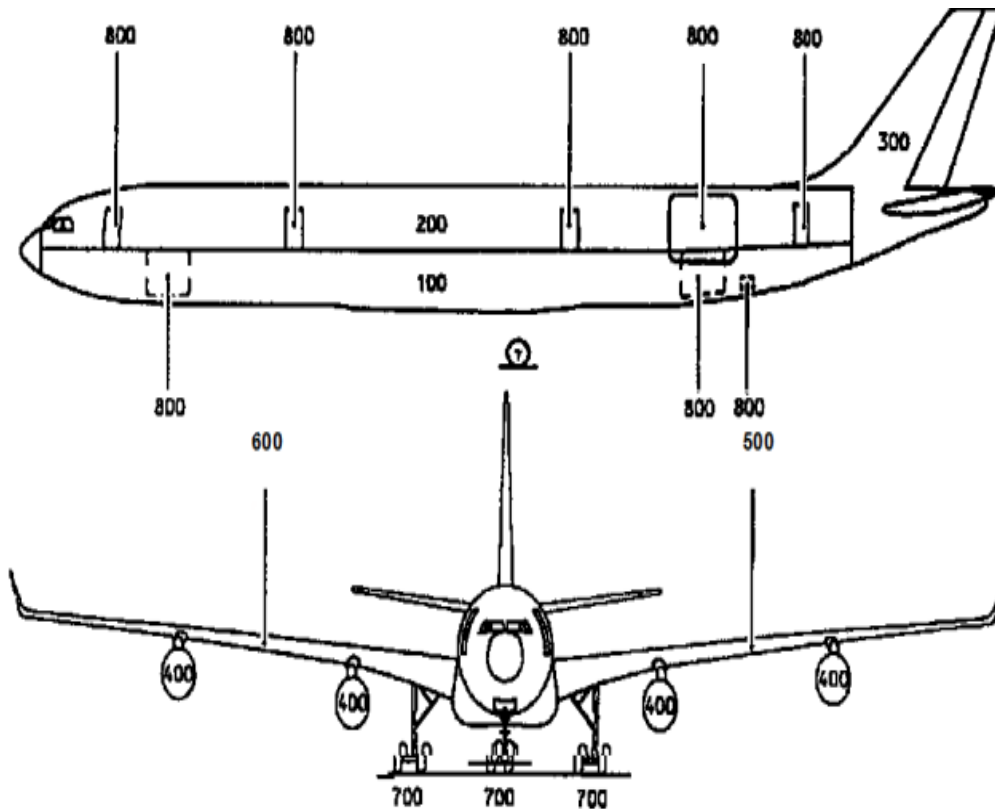
The ZSA complements the System Safety Assessments (SSA) and Aircraft Safety Assessment (ASA) processes by ensuring there are no foreseeable physical interactions between installed items, or between an item and its operating environment, capable of causing unsafe conditions

The Zonal Safety Analysis contributes to the overall Common Cause Analysis together with the Common Mode Analysis and the Particular Risk Analysis

The ZSA is intended to identify whether there are any zonal issues that could compromise intended independence e.g. zone overheat affecting multiple items simultaneously

# Partitioning of an aircraft into zones

A ZSA should be carried out for each zone of the aircraft. The partitioning of an aircraft into zones is a task that is accomplished in order to perform the ZSA



| Major Zones | Description/Boundaries   |
|-------------|--|
| 100         | Lower half of fuselage (below cabin floor) including radome to forward face of aft pressure bulkhead.  |
| 200         | Upper half of fuselage (above cabin floor) to forward face of aft pressure bulkhead.                   |
| 300         | Stabilizer and fuselage rear section from rear of aft pressure bulkhead (including rudder & elevators) |
| 400         | Power plant nacelles and pylons.   |
| 500         | Left wing.   |
| 600         | Right wing.  |
| 700         | Landing gears and landing gear doors.  |
| 800         | Passenger/crew doors, cargo compartment doors and emergency exits (pressurized doors).                 |

# Application of ZSA in design and built process

The ZSA should be performed throughout the development process of a new aircraft or when necessary, on the partial re-design of existing aircraft.

During the requirements-generation-and-validation phase, ZMCIDDC CID031(t)-2(a) aircraft, as and when it becomes

# Scope of ZSA process

The objective of the ZSA is to ensure that the design and installation of equipment and systems do not compromise aircraft safety. In order to achieve this, the ZSA process is implemented early in the development phase and considers:

- The effect of equipment and systems on other items installed within the sphere of the equipment influence;
- The effect of plausible maintenance errors relative to access and replacement of equipment and systems;
- The effects of the operating environment on equipment and systems ;
- Whether installation requirements for separation and segregation intended to ensure independence claims made in systems or aircraft safety assessments, or elsewhere are violated by zonal considerations.
- Whether aircraft-manufacturer-specified and/or general installation guidelines have been respected in the aircraft implementation
- Whether ventilation and drainage have been adequately considered and appropriate guidelines have been respected in the aircraft implementation.

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