

Airbus A380 Wake Vortex Study – Results

This study was initiated in June 2003 with the objective of conducting investigations and gathering data to support recommendations, which would be made to the International Civil Aviation Organization (ICAO), regarding safe wake vortex separation criteria for aircraft following an A380 for various conditions of flight.

The study was led by a Steering Group, comprising Joint Aviation Authorities (JAA), EUROCONTROL, US Federal Aviation Administration (FAA), and Airbus. The detailed scientific work was conducted by a subgroup consisting of the majority of the leading international experts in this complex field. It was supported by an unprecedented programme of flight tests with innovative aspects such as back to back comparative testing of different aircraft, cruise wake encounter tests, and ground and airborne LIDAR wake measurements, totalling over 180 hours flight time.

As an interim measure, pending completion of the scientific work, temporary guidance material was recommended to ICAO in 2005, to enable ICAO Member States to safely accommodate, from an air traffic management aspect, the A380 during its worldwide developmental flights, prior to entry into operational service. This interim guidance was necessarily conservative because data collection, processing, and analysis were still ongoing at that time.

The Steering Group is now in a position to recommend more specific guidance, based on the completed flight test programme. A significant aspect of this new guidance is that it provides for a future review / revision based on further study or modifying current aircraft categories and operational experience.

The following summarizes the key elements of the guidance for ICAO Heavy, Medium, and Light aircraft categories:

- **Approach / Landing:**

A380 followed by Heavy = +2nm extra to existing ICAO separation (≈ 6 nm absolute distance)

A380 followed by Medium = +3nm* extra to existing ICAO criteria (≈ 8 nm absolute distance)

A380 followed by Light = +4nm* extra to existing ICAO separation criteria (≈ 10 nm absolute distance)

No wake constraint for the A380 as a following aircraft

* These values are subject to review and possible reduction based on further study or changes in aircraft categories and operational experience.

- **Departure following A380:**

Heavy = 2 minutes
Medium, Light = 3 minutes

Or same radar spacing as for Approach / Landing

No wake constraint for the A380 as a following aircraft

- **Vertical Spacing:**

Vertical spacing in all cases to be the same as for other aircraft

Evidence and data from encounter flight tests at cruise altitude, supported by airborne LIDAR measurements, have demonstrated that the A380 wake characteristics are equivalent to those of the B744 (chosen as the benchmark aircraft) for this phase of flight. Therefore, the current ICAO vertical separations are confirmed to be appropriate for A380 operations.

- **Horizontal spacing en-route**

En-route horizontal spacing to be the same as for other aircraft

- **Holding**

Vertical spacing to be the same as for other aircraft

Though not specifically addressed, flight tests provided no indication of impact on parallel runway operations for runways separated by more than 760 m (2500 ft). This should be monitored in operational service for verification

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JAA
EUROCONTROL
FAA
Airbus