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WAKE TURBULENCE RE-CATEGORISATION (RECAT)

22 SEPTEMBER 2021





Welcome Speech

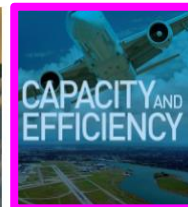
- Mr. Raphael GUILLET
Chief of the ICAO APAC Regional Sub-Office



Objectives

- To improve understanding on RECAT implementation activities:
 - development of regulations and procedures
 - operational benefits
 - operational challenges
 - lessons learnt

ICAO's Strategic Objectives





Agenda

1. Introduction to RECAT – ICAO
2. Implementation of RECAT
 - Japan
 - France
 - Republic of Korea
3. Break
4. Q&A session



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ICAO APAC Webinars 2021

Introduction to RECAT

Mr. Mior Adli Bin Mior Sallehuddin

Regional Officer, Air Traffic Management (AOM-ASM)



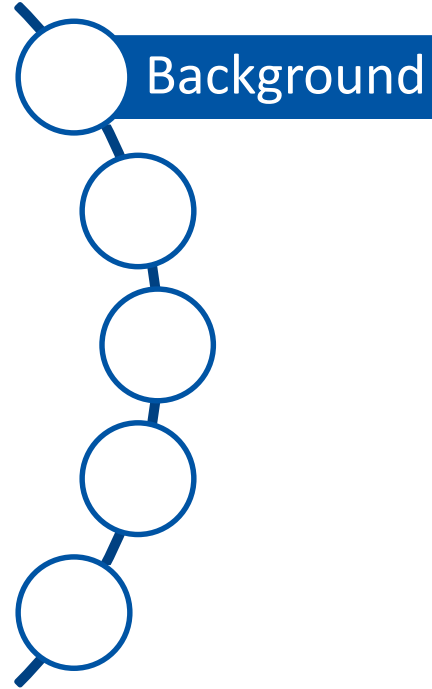


Outline

- Background
- Wake Turbulence Categories
- RECAT – Wake Turbulence Groups
- ICAO Documents
- Summary



Outline

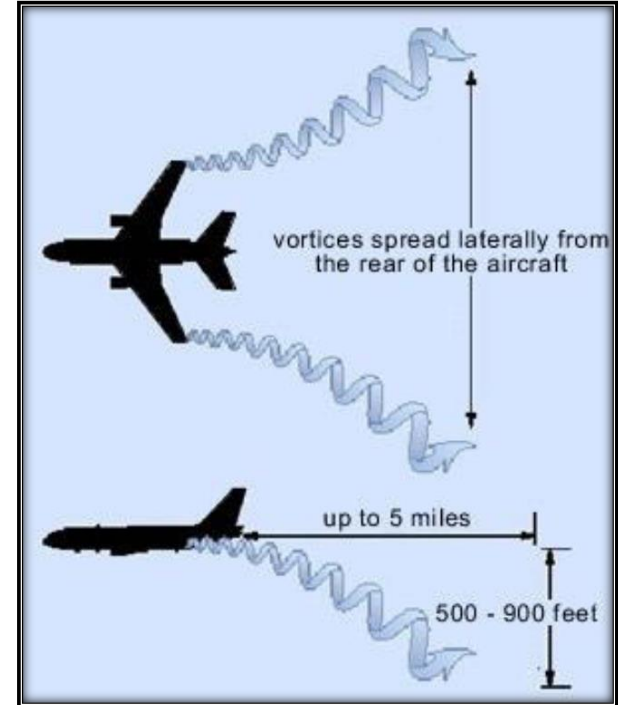


Background



Background

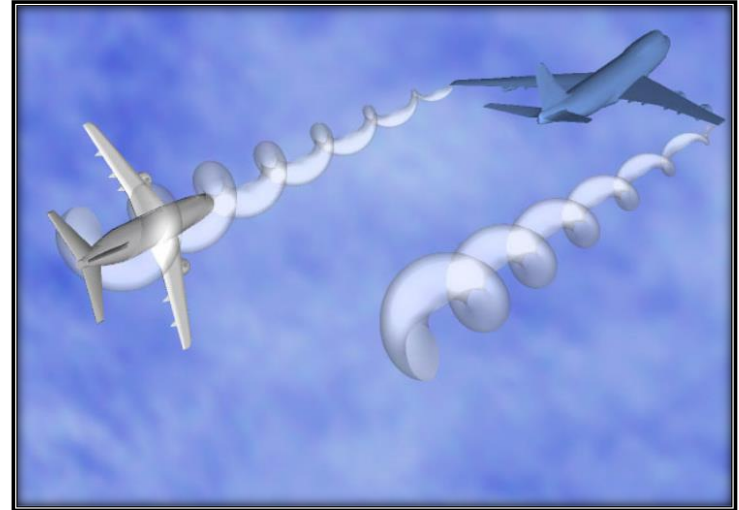
- PANS-ATM, Doc 4444:
 - wake turbulence is used to describe the effect of the rotating air masses generated behind the wing tips of aircraft, in preference to the term “wake vortex” which describes the nature of the air masses.
 - detailed characteristics of wake vortices and their effect on aircraft are contained in the Doc 9426 – *Air Traffic Services Planning Manual*, Part II, Section 5.





Background

- Wake turbulence separation minima are intended to greatly reduce the potential hazards of wake turbulence
- Basic effects of wake turbulence on a following aircraft are:
 - induced roll
 - loss of height or rate of climb
 - possible structural stress





Background

- Runway capacity and efficiency use is often directly linked with the minimum separation between aircraft
 - ATS surveillance capabilities
 - wake turbulence
- Wake turbulence separation minima applied to IFR flights is provided based in PANS-ATM (Doc 4444)
 - time-based; or
 - distance-based



Background

- The wake turbulence separation does not apply to:
 - VFR flights
 - IFR flights executing visual approach when the aircraft has reported having the preceding aircraft in sight

Note: ATC unit concerned will issue a caution of possible wake turbulence when appropriate.

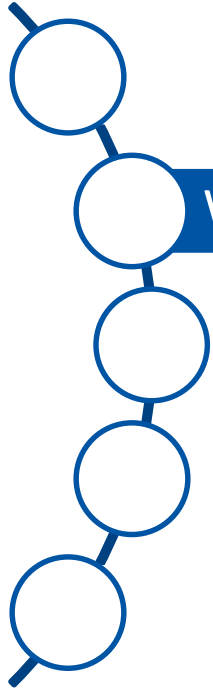


Background

- Amendment 9 to the PANS-ATM (Doc 4444) approved on 19 May 2020, for applicability on 05 November 2020
 - amendment concerning wake turbulence:
 - address A380 wake separation minima – “SUPER (J)”
 - introduction of wake turbulence groups, as an alternative means that States can choose to adopt
 - reduction of separation minima for some traffic pairs of aircraft, enabling runway throughput increase



Outline



Wake Turbulence Categories



Wake Turbulence Categories

- Four categories, according to the maximum certified take-off mass, as follows:
 - SUPER (J) — aircraft types specified as such in Doc 8643, *Aircraft Type Designators*;
 - HEAVY (H) — aircraft types of 136 000 kg or more, with the exception of aircraft types listed in Doc 8643 in the SUPER (J) category;
 - MEDIUM (M) — aircraft types less than 136 000 kg but more than 7 000 kg; and
 - LIGHT (L) — aircraft types of 7 000 kg or less.



Wake Turbulence Categories

- Distance-based wake turbulence separation minima

Previous

Aircraft category

<i>Preceding aircraft</i>	<i>Succeeding aircraft</i>	<i>Distance-based wake turbulence separation minima</i>
HEAVY	HEAVY	7.4 km (4.0 NM)
	MEDIUM	9.3 km (5.0 NM)
	LIGHT	11.1 km (6.0 NM)
MEDIUM	LIGHT	9.3 km (5.0 NM)

Current

Aircraft category

<i>Preceding aircraft</i>	<i>Succeeding aircraft</i>	<i>Distance-based wake turbulence separation minima</i>
SUPER	HEAVY	9.3 km (5.0 NM)
	MEDIUM	13.0 km (7.0 NM)
	LIGHT	14.9 km (8.0 NM)
HEAVY	HEAVY	7.4 km (4.0 NM)
	MEDIUM	9.3 km (5.0 NM)
	LIGHT	11.1 km (6.0 NM)
MEDIUM	LIGHT	9.3 km (5.0 NM)



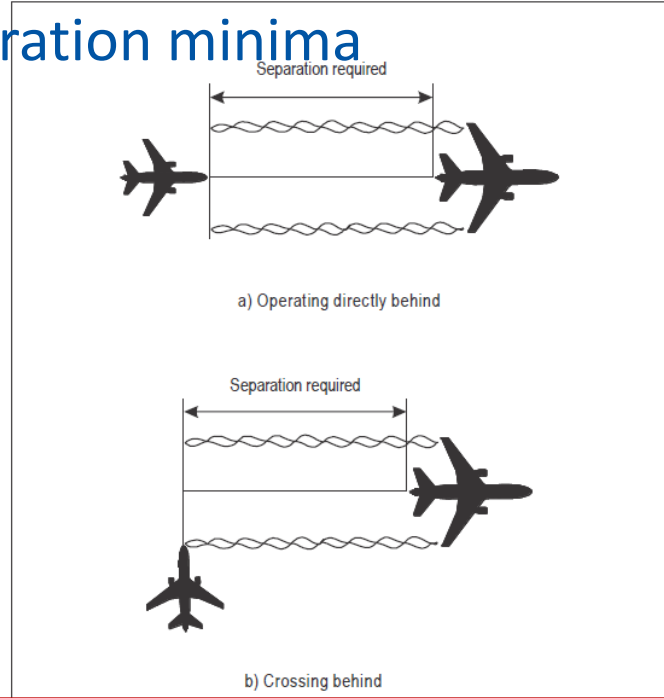
Wake Turbulence Categories

- Distance-based wake turbulence separation minima

Succeeding Aircraft

	SUPER	HEAVY	MEDIUM	LIGHT
SUPER		9.3 km (5.0 NM)	13.0 km (7.0 NM)	14.9 km (8.0 NM)
HEAVY		7.4 km (4.0 NM)	9.3 km (5.0 NM)	11.1 km (6.0 NM)
MEDIUM				9.3 km (5.0 NM)
LIGHT				

Preceding Aircraft

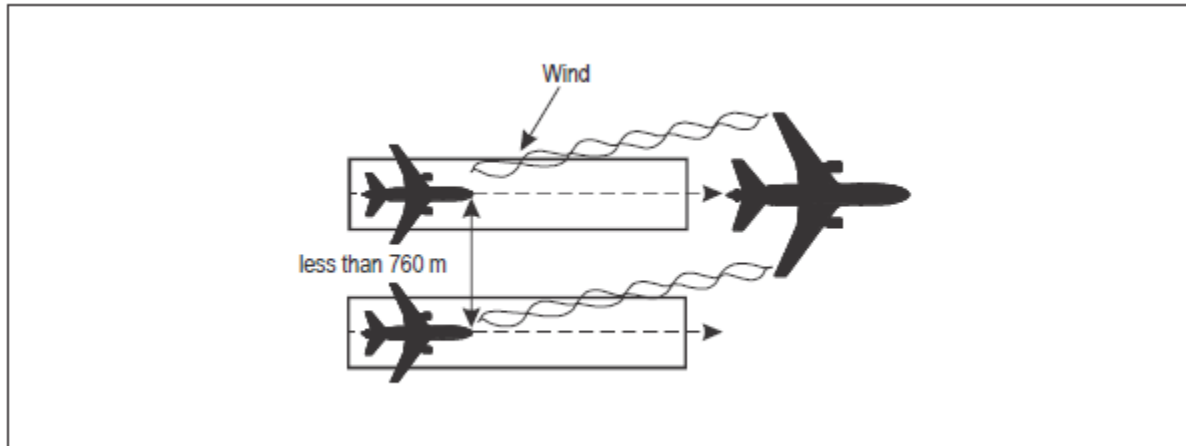


Note: when a wake turbulence restriction is not required, then separation reverts to surveillance separation minimum prescribed by the ATS authority



Wake Turbulence Categories

- Distance-based wake turbulence separation minima



Note: when a wake turbulence restriction is not required, then separation reverts to surveillance separation minimum prescribed by the ATS authority

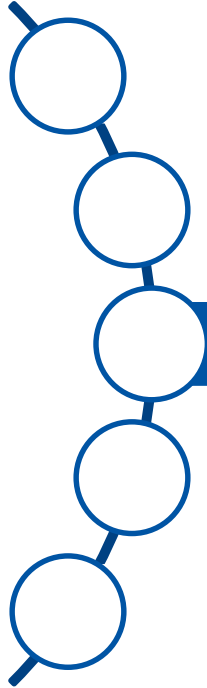


Wake Turbulence Categories

- Time-based wake turbulence longitudinal separation minima
 - PANS-ATM (Doc 4444), Chapter 5, Section 5.8



Outline



RECAT – Wake Turbulence Groups



RECAT

- What is RECAT?
 - re-categorisation of wake turbulence categories
 - based on RECAT-EU (European Wake Vortex Re-categorisation) and RECAT 1.5 (FAA Wake Turbulence Recategorization). Proposal drafted by EU and US representatives to ICAO ATMOPSP and ICAO WTSWG

ATMOPS: Air Traffic Management Operations Panel

WTSWG: Wake Turbulence Specific Working Group



RECAT

- Benefits of RECAT?
 - more precise categorisation of aircraft
 - safely increase airport capacity through the reduction of separation minima
 - reduction in fuel use and CO₂ emission
 - decrease in flight time
 - enhance safety specifically for the smallest aircraft types
 - alternative means that States can choose to adopt



RECAT

• Wake Turbulence Groups

- a) GROUP A — aircraft types of 136 000 kg or more, and a wing span less than or equal to 80 m but greater than 74.68 m;
- b) GROUP B — aircraft types of 136 000 kg or more, and a wing span less than or equal to 74.68 m but greater than 53.34 m;
- c) GROUP C — aircraft types of 136 000 kg or more, and a wing span less than or equal to 53.34 m but greater than 38.1 m;
- d) GROUP D — aircraft types less than 136 000 kg but more than 18 600 kg, and a wing span greater than 32 m;
- e) GROUP E — aircraft types less than 136 000 kg but more than 18 600 kg, and a wing span less than or equal to 32 m but greater than 27.43 m;
- f) GROUP F — aircraft types less than 136 000 kg but more than 18 600 kg, and a wing span less than or equal to 27.43 m;
- g) GROUP G — aircraft types of 18 600 kg or less (without wing span criterion).

Note 1.— Information on the wake turbulence group for each aircraft type is contained in Doc 8643, Aircraft Type Designators.

Note 2.— Guidance on the implementation of wake turbulence separation between wake turbulence groups can be found in the Manual on Implementation of Wake Turbulence Separation Minima (Doc 10122).



RECAT

- Wake Turbulence Groups

<i>Preceding aircraft group</i>	<i>Succeeding aircraft group</i>	<i>Distance-based wake turbulence separation minima</i>
A	B	7.4 km (4.0 NM)
	C	9.3 km (5.0 NM)
	D	9.3 km (5.0 NM)
	E	11.1 km (6.0 NM)
	F	11.1 km (6.0 NM)
	G	14.9 km (8.0 NM)
	B	B
C		7.4 km (4.0 NM)
D		7.4 km (4.0 NM)
E		9.3 km (5.0 NM)
F		9.3 km (5.0 NM)
G		13.0 km (7.0 NM)
C		D
	E	6.5 km (3.5 NM)
	F	6.5 km (3.5 NM)
	G	11.1 km (6.0 NM)
D	G	7.4 km (4 NM)
E	G	7.4 km (4 NM)



RECAT

Wake Turbulence Groups

SUCCEEDING

Legacy	SUPER	HEAVY		MEDIUM			LIGHT
RECAT	GROUP A	GROUP B	GROUP C	GROUP D	GROUP E	GROUP F	GROUP G
Baseline Criteria	M ≥ 136t 80m ≥ b > 74,68m	M ≥ 136t 74,68m ≥ b > 53,34m	M ≥ 136t 53,34m ≥ b > 38,1m	136t > M ≥ 18,6t 38,1m > b > 32m	100t > M ≥ 18,6t 32m ≥ b > 27,43m	100t > M ≥ 18,6t b < 27,43m	18,6t > M
Aircraft type examples	A380	A330 / B777	MD11 / B767	B757 / A320 / B737NG / BCS1	E190 / DH8D	E170 / ATR72 / CRJ1	CL30 / LIGHT
A380		7.4km (4 NM)	9.3 km (5 NM)	9.3 km (5 NM)	11.1 km (6 NM)	11.1 km (6 NM)	14.8 km (8 NM)
A124 / A330 / B777		5.6 km (3 NM)	7.4km (4 NM)	7.4km (4 NM)	9.3 km (5 NM)	9.3 km (5 NM)	13.0 km (7 NM)
MD11 / B767				5.6 km (3 NM)	6.5 km (3.5 NM)	6.5 km (3.5 NM)	11.1 km (6 NM)
B757 A320 / B737NG							7.4km (4 NM)
E190 / DH8D							7.4km (4 NM)
E170 / ATR72 / CRJ1							
CL30 / LIGHT							

PRECEDING

Wake Turbulence Categories

Aircraft category		
Preceding aircraft	Succeeding aircraft	Distance-based wake turbulence separation minima
SUPER	HEAVY	9.3 km (5.0 NM)
	MEDIUM	13.0 km (7.0 NM)
	LIGHT	14.9 km (8.0 NM)
HEAVY	HEAVY	7.4 km (4.0 NM)
	MEDIUM	9.3 km (5.0 NM)
	LIGHT	11.1 km (6.0 NM)
MEDIUM	LIGHT	9.3 km (5.0 NM)

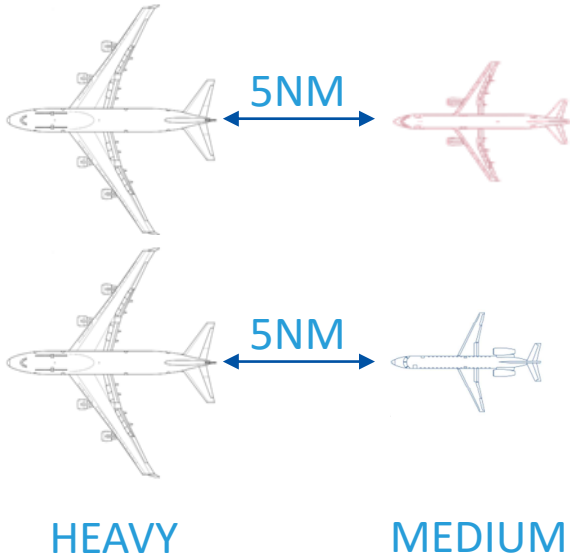
Note: when a wake turbulence restriction is not required, then separation reverts to surveillance separation minimum



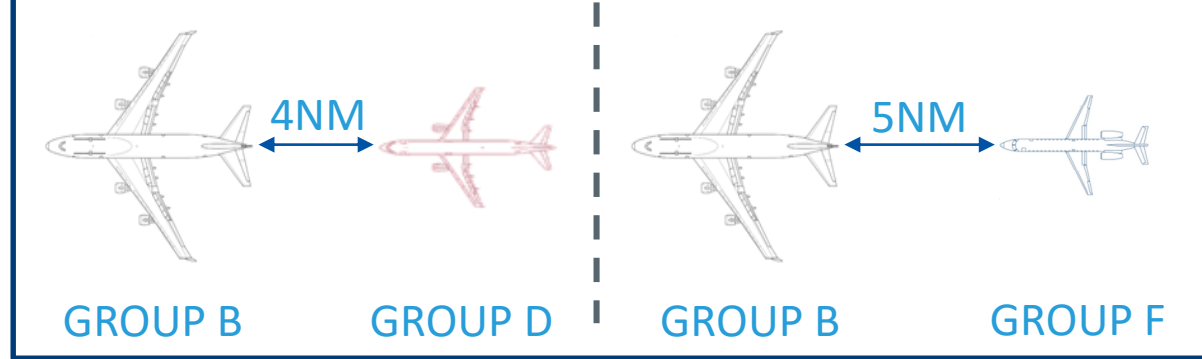
RECAT

- Increase airport capacity – reduction of separation minima

Wake Turbulence Categories



Wake Turbulence Groups

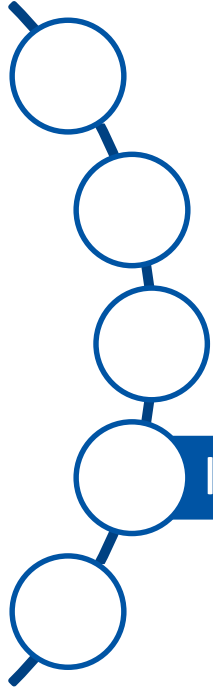


Legend:





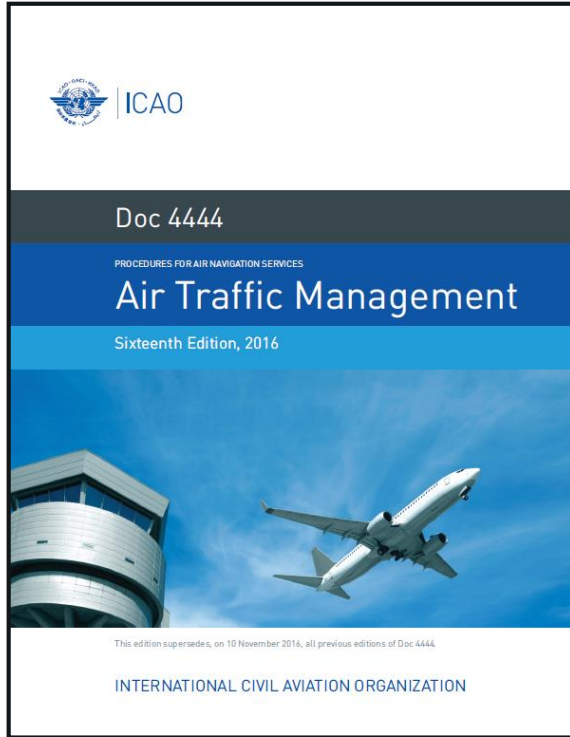
Outline



ICAO Documents



PANS-ATM (Doc 4444)

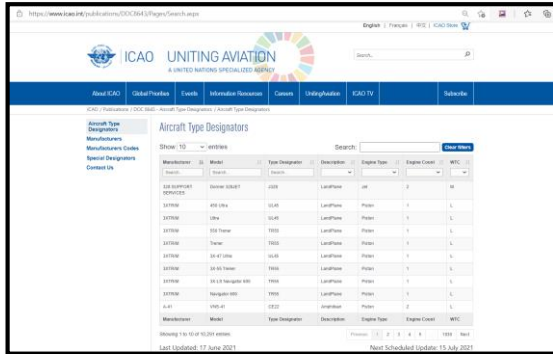


- Amendment 9 to the PANS-ATM:
 - wake turbulence categories and groups of aircraft – Chapter 4, Section 4.9
 - time-based wake turbulence longitudinal separation minima – Chapter 5, Section 5.8
 - distance-based wake turbulence separation minima – Chapter 8, Section 8.7
 - indication of super or heavy wake turbulence category – Chapter 4, Section 4.9 and Chapter 12, Section 12.3



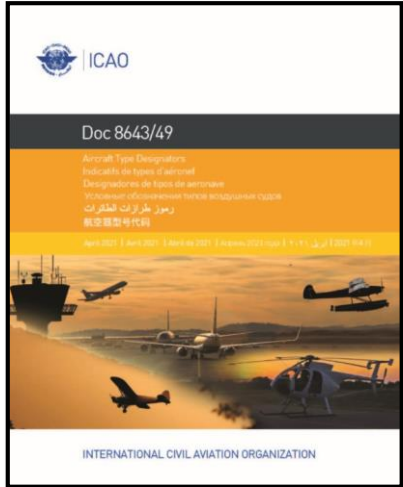
ICAO Doc 8643

- ICAO Doc 8643 – Aircraft Type Designator



Online version only contains the wake turbulence categories

The wake turbulence groups is available in the paid subscription of Doc 8643 (please visit <https://store.icao.int/> or contact sales@icao.int)



- Specific analysis for new aircraft type to be added to the database

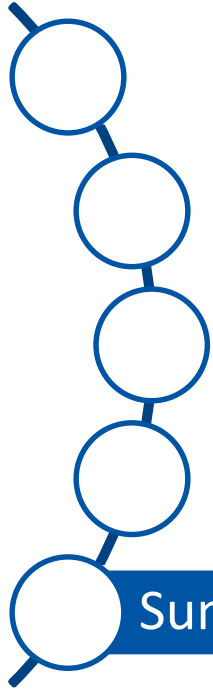


ICAO Doc 10122

- Manual on Implementation of Wake Turbulence Separation Minima (Doc 10122):
 - identification of suitable aerodromes and terminal operations
 - explanatory material about the enhanced wake turbulence separation minima
 - recommended implementation steps
- Expected to be available in **Q4 2021**



Outline



Summary



Summary

- The Wake Turbulence Categories remains available as a basis for States
 - Updated to 4-category scheme with the formal creation of the 'SUPER' ('J')
- RECAT provides alternative means of separating aircraft for wake turbulence purposes to airports looking for runway throughput benefits



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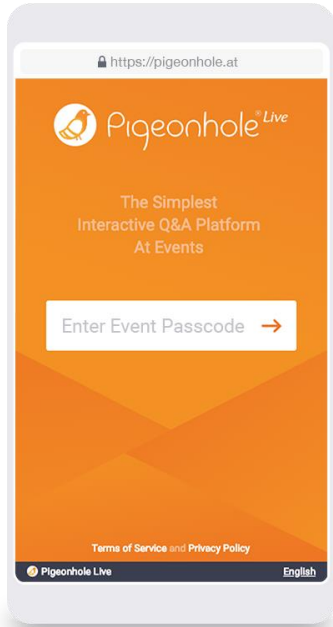
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