

# Enhanced Time Based Separation (ETBS) & RECAT EU

## Heathrow Crew Briefing

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Time Based Separation has been in use at London Heathrow since March 2015. The next phase of the TBS evolution is to enhance the current Heathrow TBS system so it provides controllers with tool support to deliver more efficient wake separations, based on RECAT EU to runway threshold.

# What's new?



- RECAT EU is being introduced at Heathrow Airport during Spring 2018. This change alters the arrivals spacing between certain aircraft pairs using an enhancement of TBS called ETBS, and ATC will provide wake separation to runway threshold in addition to the 4DME point.
- This RECAT EU change also alters the wake turbulence separation applied on departure at Heathrow.
- Some aircraft types, based on weight, are changing wake turbulence categories, most notably the B757/B767 families & A300/A310s.

# Scope & Benefits

Enhance existing Heathrow TBS system

- More efficient wake separations based on RECAT-EU (Arrivals & Departures)
  - Separation to runway threshold supported by 'Optimised Runway Delivery' tool (ORD)
  - Concept similar to current day TBS, refinement of controller HMI (TBS Table & Indicator)
  - Anticipated landing rate increase of 0.5-1.0 movements per hour
  - Average anticipated departure rate increase of 1.0 movement per hour
  - RECAT Wake Vortex Categories are currently in use at Paris CDG
- <http://www.eurocontrol.int/articles/recat-eu>
  - <http://www.eurocontrol.int/publications/recat-eu-european-wake-turbulence-categorisation-and-separation-minima-approach-and>



# Arrivals



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# Objectives of ETBS

- Build on current TBS system i.e. resilience to moderate and strong head wind conditions on final approach.
- RECAT-EU wake separations are more efficient at the heavier end of Vortex Mix i.e. Heathrow traffic mix
- Enhance TBS tool to calculate anticipated compression inside 4DME
- Supports delivery of separation to the runway threshold, in line with CAA requirement
- Improved in service monitoring of wake separation
- Anticipated landing rate increase of 0.5-1.0 movements per hour

# RECAT EU Categories



Prevalent Heathrow Types				
SUPER	HEAVY	UPPER	MEDIUM	SMALL
A380	A330	B767	A318/9	RJ1H/85
	A340	B757	A320/1	E135-195
	A350	A300	B736-9	B732-5
	B747	A310	MD80	CRJ1-9
	B777		BCS1/3	DH8D
	B787			

Crews should communicate the correct aircraft type (**including series**) on first contact with Heathrow Director

"SUPER HEAVY"	"HEAVY"	"UPPER"	"MEDIUM"	"SMALL"	"LIGHT"
"CAT-A (J)"	"CAT-B (H)"	"CAT-C (U)"	"CAT-D (M)"	"CAT-E (S)"	"CAT-F (L)"
A388	A332	A306	A318	AT43	FA10
A124	A333	A30B	A319	AT45	FA20
(...)	A343	A310	A320	AT72	D328
	A345	B703	A321	B712	E120
	A346	B752	AN12	B732	BE40
	A359	B753	B736	B733	BE45
	B744	B762	B737	B734	H25B
	B748	B763	B738	B735	JS32
	B772	B764	B739	CL60	JS41
	B773	B783	BCS1	CRJ1	LJ35
	B77L	C135	BCS3	CRJ2	LJ60
	B77W	DC10	C130	CRJ7	SF34
	B788	DC85	IL18	CRJ9	P180
	B789	IL76	MD81	DH8D	C650
	IL96	MD11	MD82	E135	C525
	(...)	TU22	MD83	E145	C180
		TU95	MD87	E170	C152
		(...)	MD88	E175	(...)
			MD90	E190	
			T204	E195	
			TU16	F70	
			(...)	F100	
				GLF4	
				RJ85	
				RJ1H	
				(...)	

# First Call with 'Heathrow Director'



- Please note that your vortex designator on the ICAO flight plan does not change
- Consequently, your suffix of 'SUPER' or 'HEAVY' does not change
- For example, the Boeing 767 series, whilst under the upper category for RECAT EU, would still use the suffix 'HEAVY' on initial contact with the approach controller
- An example call might be:

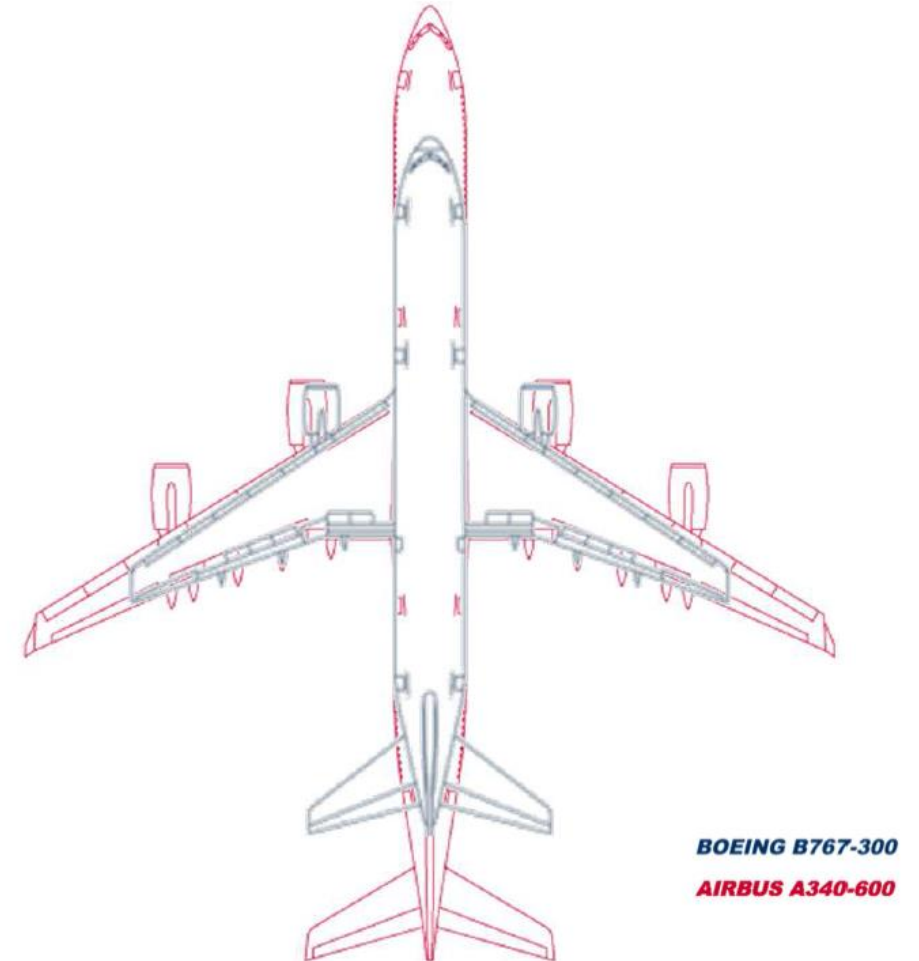
***“Heathrow Director, Delta 123 Heavy, Boeing 767-400 etc...”***



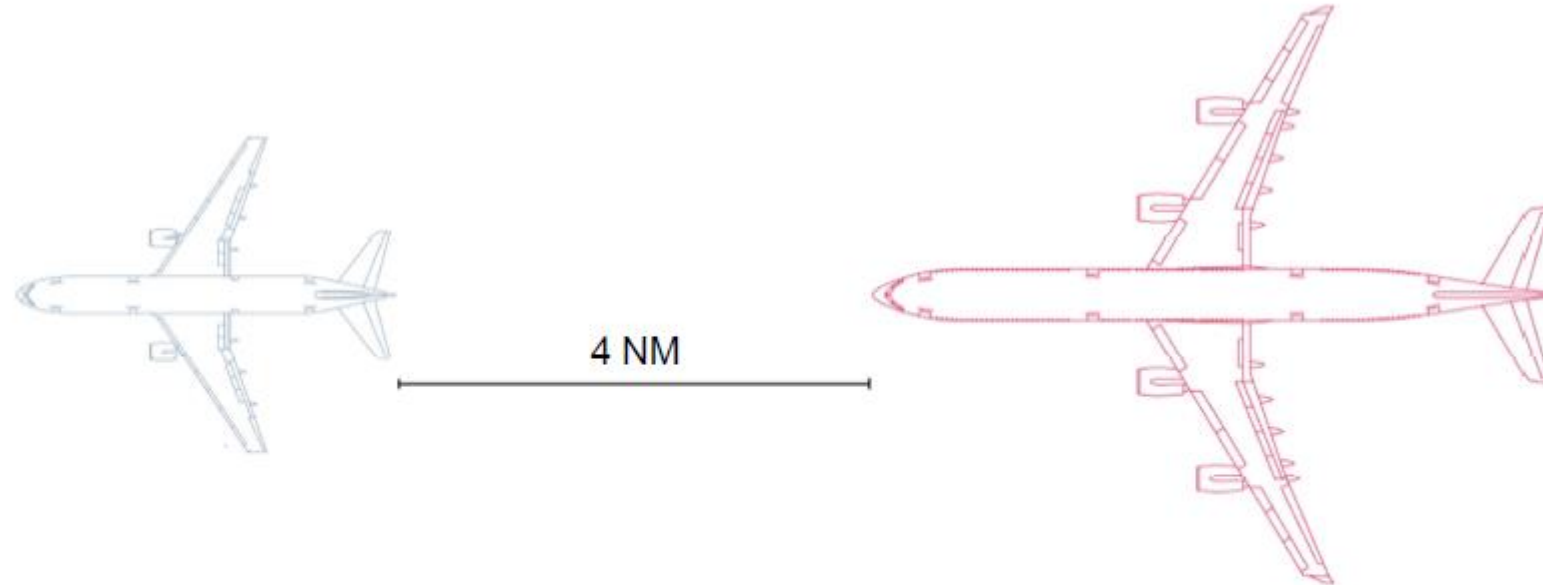
# Heavy Category

- Both A346 and B763 are in the current ICAO HEAVY category, whilst their wing spans have a difference of more than 15 metres.
- Therefore, they suffer from over-conservative separations when the B767 is the leader

**HEAVY category:**



# Current Separation



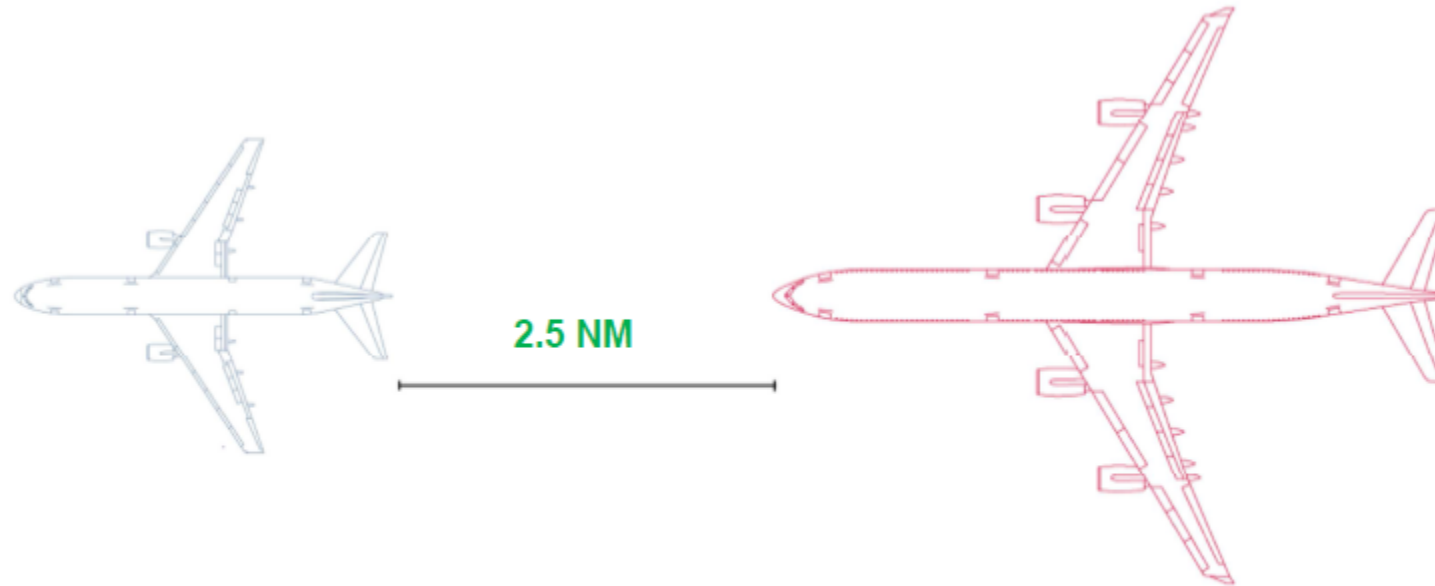
**ICAO current separations**

Safe, but over conservative.

**BOEING B767-300**

**AIRBUS A340-600**

# Future Separation



## RECAT-EU separations

It is safe too, and the separation is more efficient.

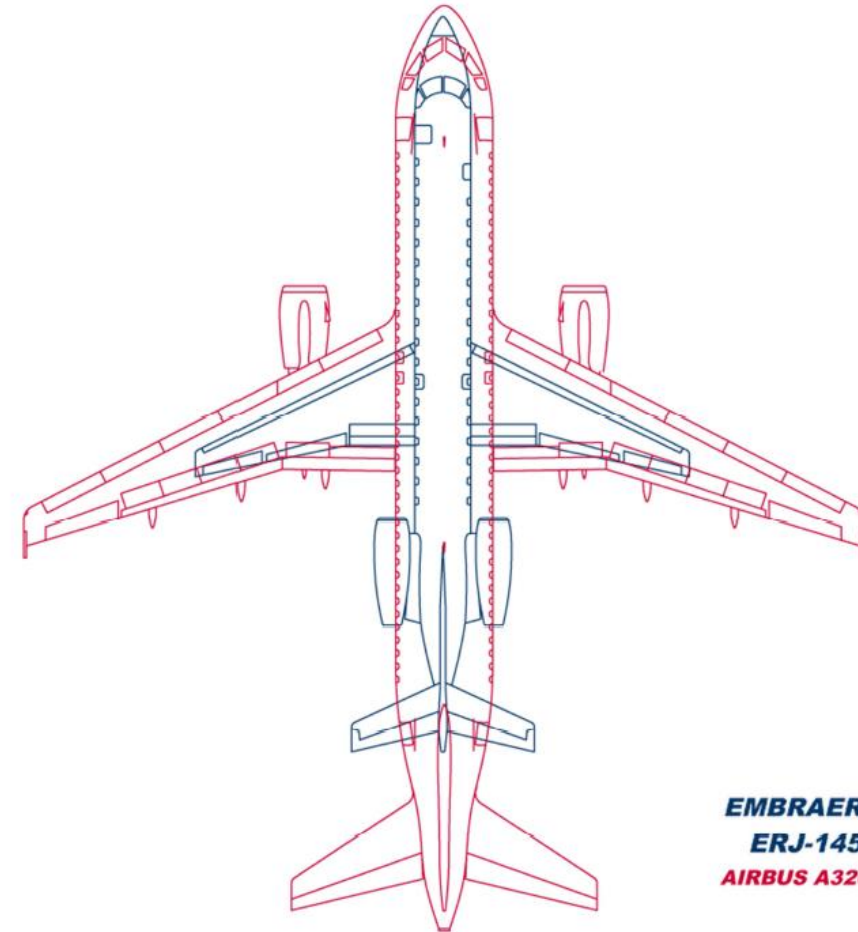
**BOEING B767-300**

**AIRBUS A340-600**

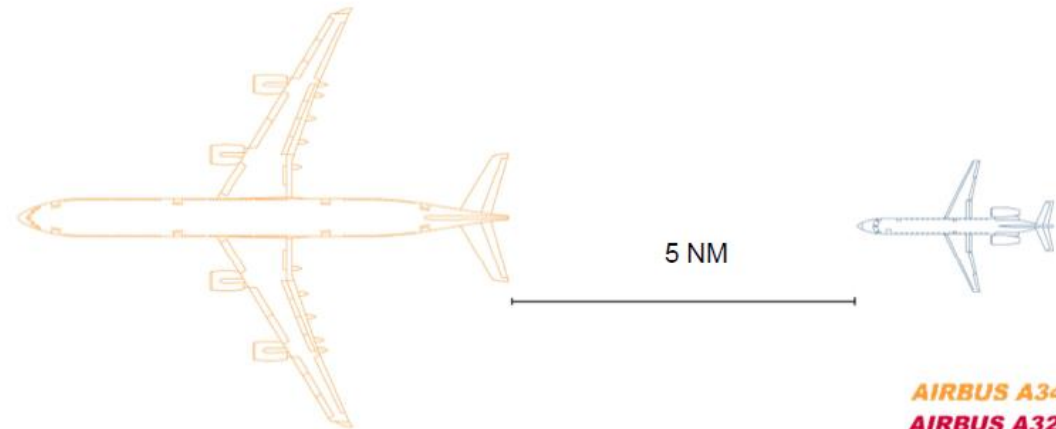
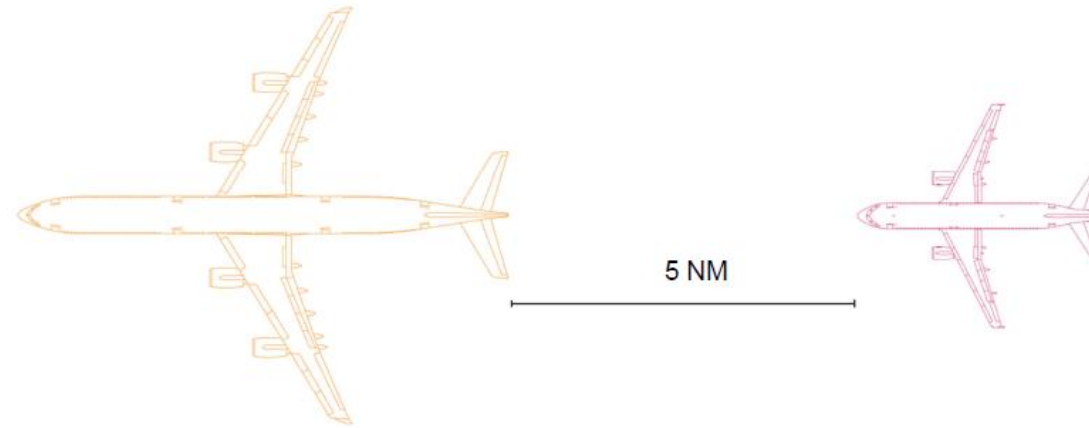
# Medium Category

- Both A320 and E145 are in the current ICAO MEDIUM category, whilst their wing spans have a difference of more than 12 metres.
- Therefore, the A320 suffers from over conservative separations when following Heavy aircraft.

**MEDIUM category:**



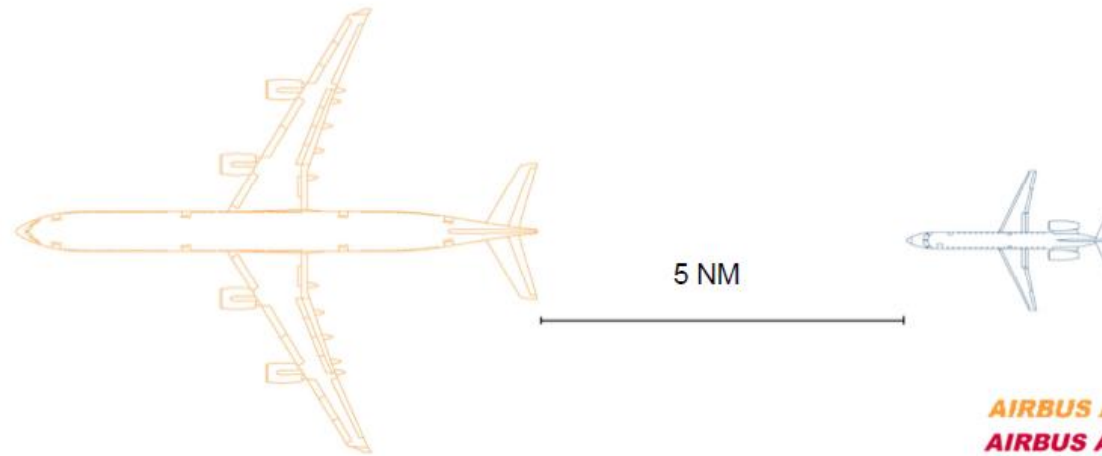
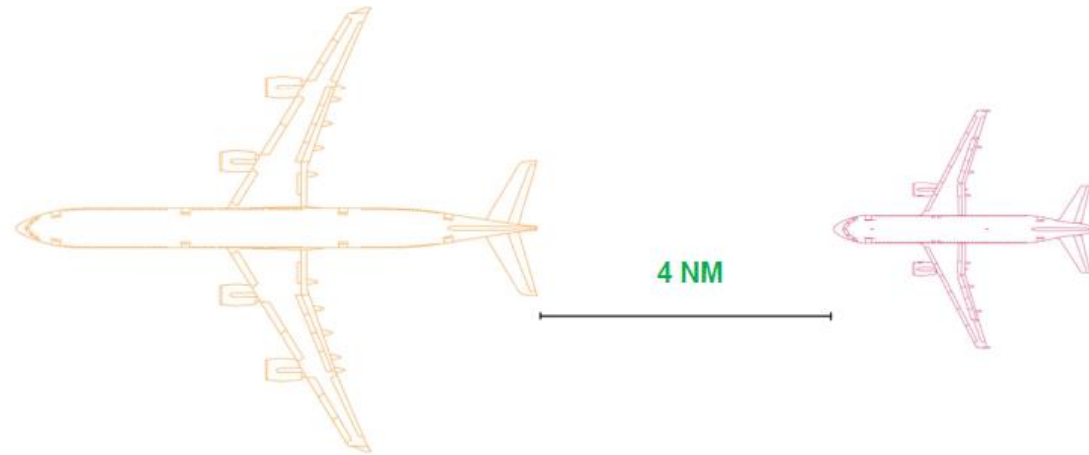
# Current Separation



**AIRBUS A340-600**  
**AIRBUS A320**  
**EMBRAER ERJ-145**

**ICAO current separations**  
Safe, but over conservative for A320.

# Future Separation



**AIRBUS A340-600**  
**AIRBUS A320**  
**EMBRAER ERJ-145**

## RECAT-EU separations

It is safe and the separation is more efficient.

# Optimised Runway Delivery (ORD)

- The ORD tool is configured with nominal airspeed profiles based on the aircraft type and wake turbulence category that have been calibrated to support delivery of the wake turbulence separation rules to the runway threshold.
- Algorithm calculates the anticipated compression between the aircraft pair from the point at which the lead aircraft crosses 4DME (5DME for A380s) and decelerates to its final landing stabilisation airspeed.
- Tool calculates anticipated compression based on wind profile inside 4DME
- Compression calculated between specific aircraft pairs
- ORD takes into account:
  - The runway surface wind conditions
  - The prevailing glideslope wind conditions.
  - The anticipated airspeed profile of the lead aircraft type from 4DME to runway threshold
  - The anticipated airspeed profile of the follower aircraft type on final approach.

# RECAT-EU 6-CAT to be applied at threshold



		Follower					
		J	H	U	M	S	L
Leader	J	4NM	4NM	5NM	5NM	6NM	8NM
	H	3.5NM	3.5NM	4NM	4NM	5NM	7NM
	U	3NM	3NM	3NM	3NM	4NM	6NM
	M	SM	SM	SM	SM	SM	5NM
	S	SM	SM	SM	SM	SM	4NM
	L	SM	SM	SM	SM	SM	3NM

- Due to Runway Occupancy Times (ROT) some pairs require extra spacing, similar to today's A380 operations
- ORD tool will automatically add this
- **IT IS IMPORTANT TO COMPLY WITH ATC SPEED INSTRUCTIONS AT ALL TIMES**



# Departures



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# RECAT-EU Departures



- European Wake Vortex Re-categorisation (RECAT-EU) is a new, much more precise categorisation of aircraft compared to ICAO, it aims at safely helping to reduce delays by redefining wake turbulence categories and their associated separation minima
- RECAT Departures will only be used where wake vortex is the primary constraint between two aircraft. The departure routing will continue to be the largest constraint for separating aircraft on departure as per today's operation

# Departure separations – seconds\*



		Follower											
		SUPER (J)		HEAVY (H)		UPPER (U)		MEDIUM (M)		SMALL (S)		LIGHT (L)	
		Current	New	Current	New	Current	New	Current	New	Current	New	Current	New
Leader	SUPER (J)			120	100	120 or 180	120	180	140	180	160	180	180
	HEAVY (H)					0 or 120		120	100	120	120	120	140
	UPPER (U)								80		100	120	120
	MEDIUM (M)											120	120
	SMALL (S)											120	100
	LIGHT (L)												

- One extra movement per hour on average (extra 17 movements per day)
- Peak hour (12:00-13:00) 1.6 extra movements
- Reduced time separations behind Airbus A380 aircraft
- Reduced time for medium following larger aircraft (55% of Heathrow traffic in A320 family)



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