

Airport Operations

A350-1000 Airport Compatibility Brochure

Issue 1, June 2014



Introduction

The present document provides basic airport compatibility data of the new Airbus A350-1000 aircraft.

All information provided in this document is for airport planning purposes only.

The A350 XWB programme is currently under development. All data and information provided herein is therefore preliminary and represents the best available knowledge at date of issue of the present document. It is given for guidance only and does not constitute a contractual commitment.

Throughout the design and development process, Airbus will issue revised editions of this document.

The latest available edition of this document can be obtained on the Airport Operations page: <http://www.airbus.com/support/maintenance-engineering/technical-data/aircraft-characteristics/> . To obtain more detailed airport compatibility data please contact the Airbus Airport Operations Department at: airport.compatibility@airbus.com

PRELIMINARY



Content

Aircraft Description

- ✓ Dimensions
- ✓ Aircraft Reference Codes
- ✓ Design Weights & Fuel Quantities
- ✓ Doors
- ✓ Standard Cabin & Cargo Arrangements

Airport Operations

- ✓ Ground Handling and Servicing
- ✓ Ground Manoeuvring
- ✓ Aircraft Pavement Loading Data

PRELIMINARY



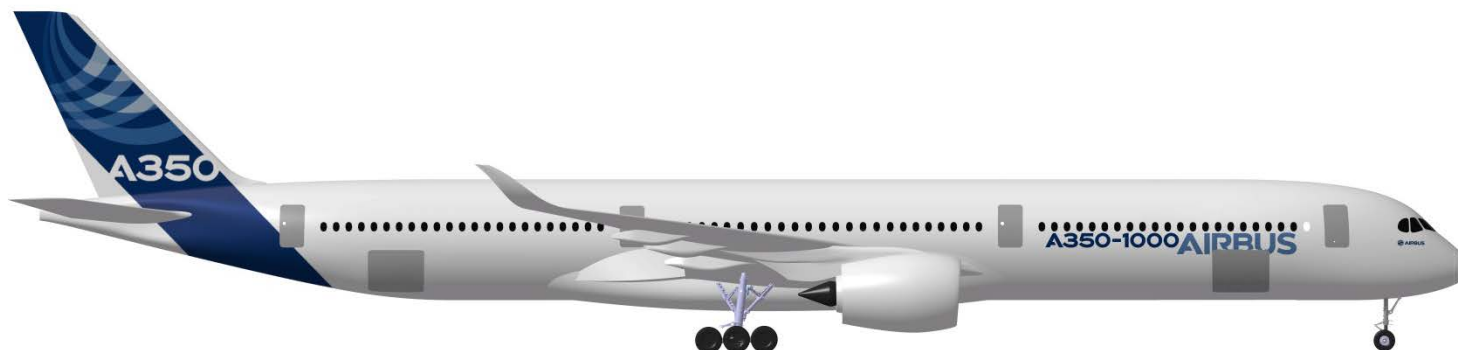
Aircraft description

- ✓ Dimensions
- ✓ Aircraft Reference Codes
- ✓ Design Weights & Fuel Quantities
- ✓ Doors
- ✓ Standard Cabin & Cargo Arrangements

PRELIMINARY



A350-1000 Aircraft Key Data

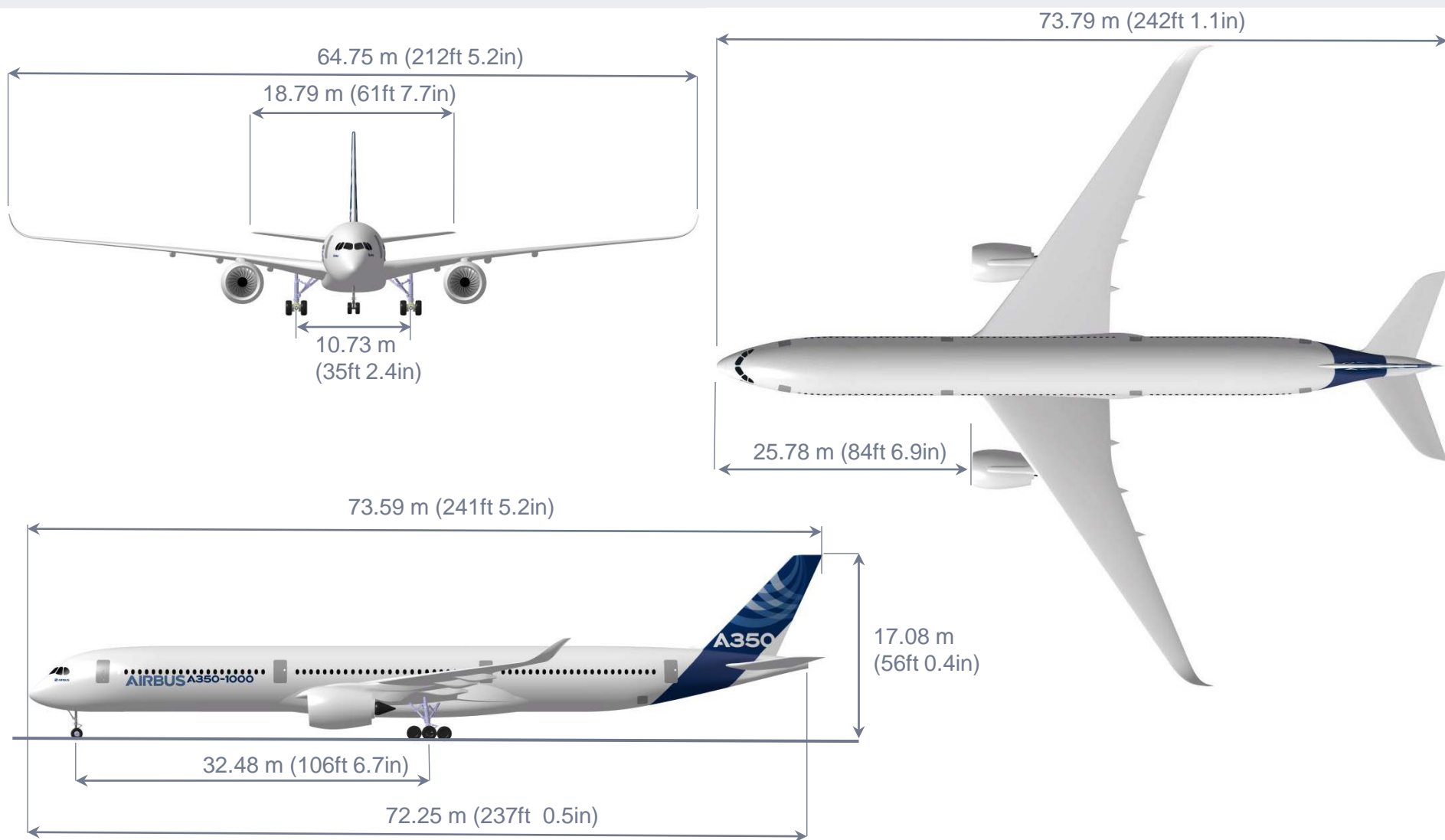


Span		64.75 m
Fuselage Length		72.25 m
Height*		17.08 m
Fuselage height	239"	6.09 m
Fuselage width (constant part)	234"	5.96 m

* Height of vertical tail plane at maximum ramp weight and aft CG

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A350-1000 General dimensions



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A350-1000 Aircraft Reference Codes

A350-1000	
ICAO Code Letter	E
FAA Design Group	V
RFF Category (ICAO)	9
ARFF Index (FAA)	E

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A350-1000 Aircraft Design Weights

A350-1000		
MTW (Maximum Taxi Weight)	[t]	308.9
MTOW (Maximum Take-Off Weight)	[t]	308
MLW (Maximum Landing Weight)	[t]	233
MZFW (Maximum Zero Fuel Weight)	[t]	220

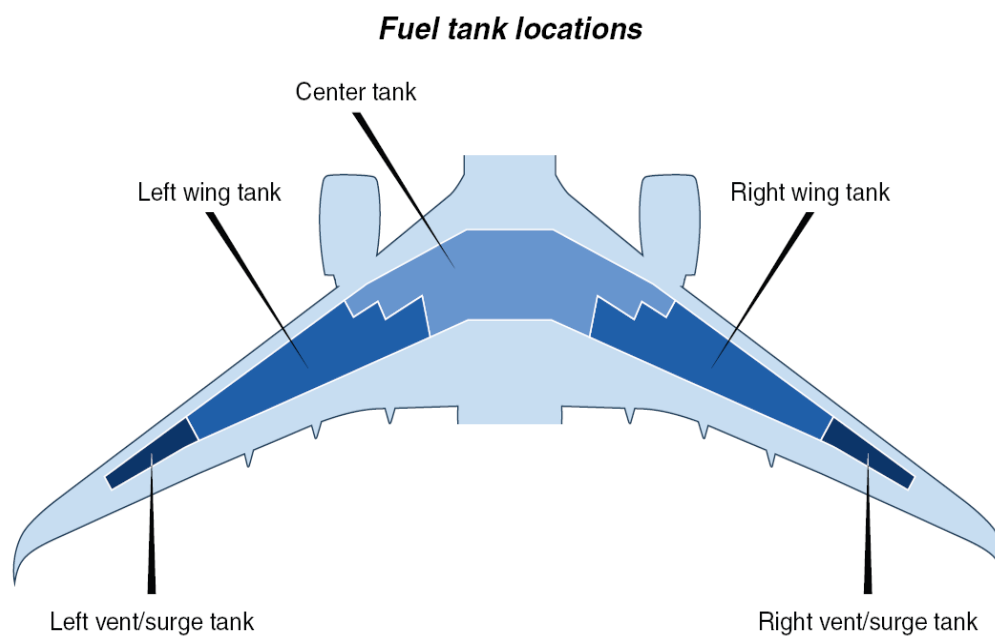
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A350-1000 Aircraft Fuel Quantities

Model	Usable Fuel Quantities
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A350-1000	156,000 l (41,211 U.S. gallons)
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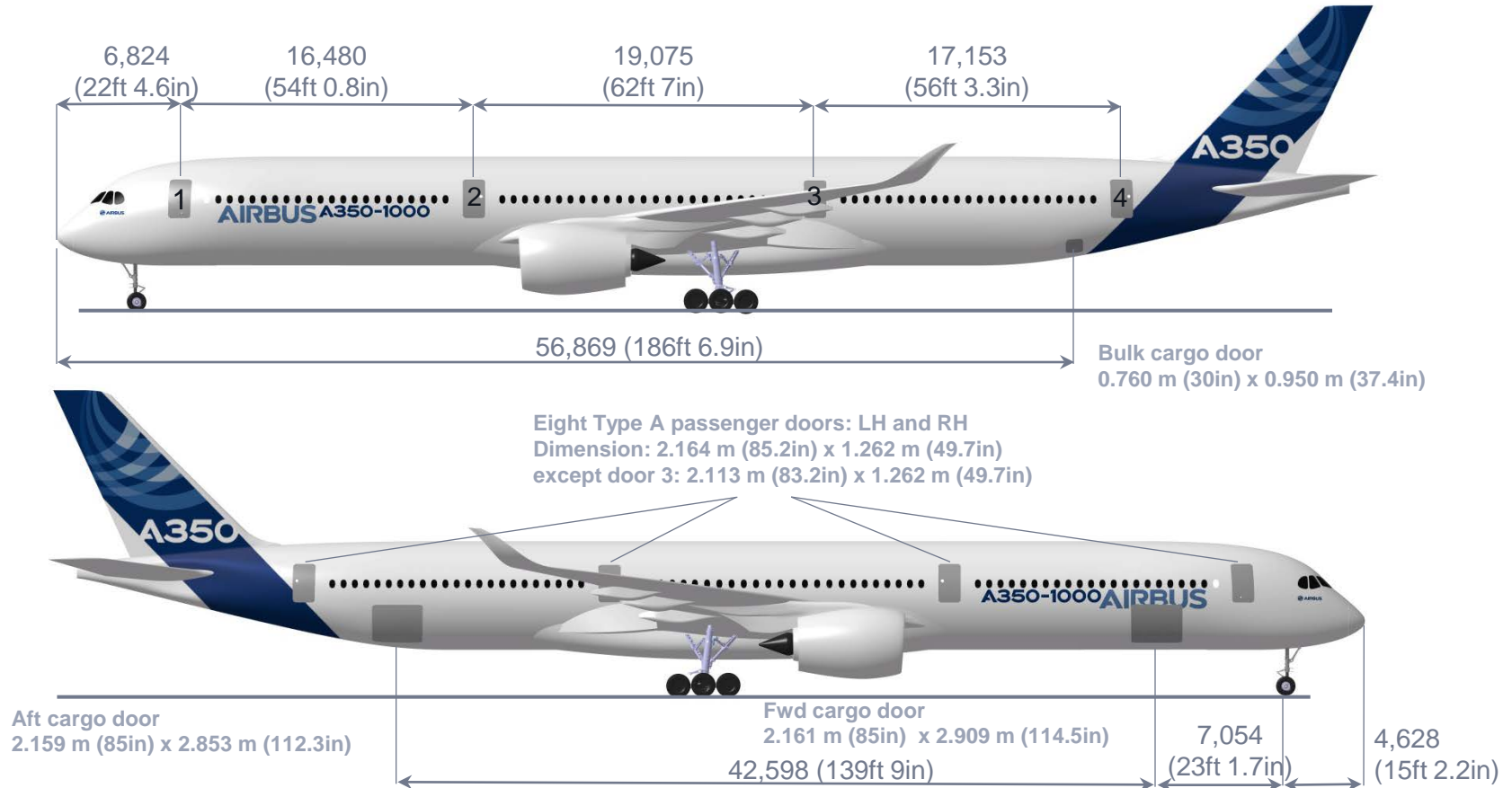


A350-1000 Door Sizes and Positions

Additional emergency exit

On the A350-1000, an optional type C exit is available between door 3 and door 4.

Its purpose is to meet emergency evacuation requirements for certain high density layout configurations



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A350-1000 Cabin and Cargo Arrangements

The following A350-1000 cabin and cargo arrangements are used as a reference for the passenger seating configurations, galley, lavatory quantities and sizes only.

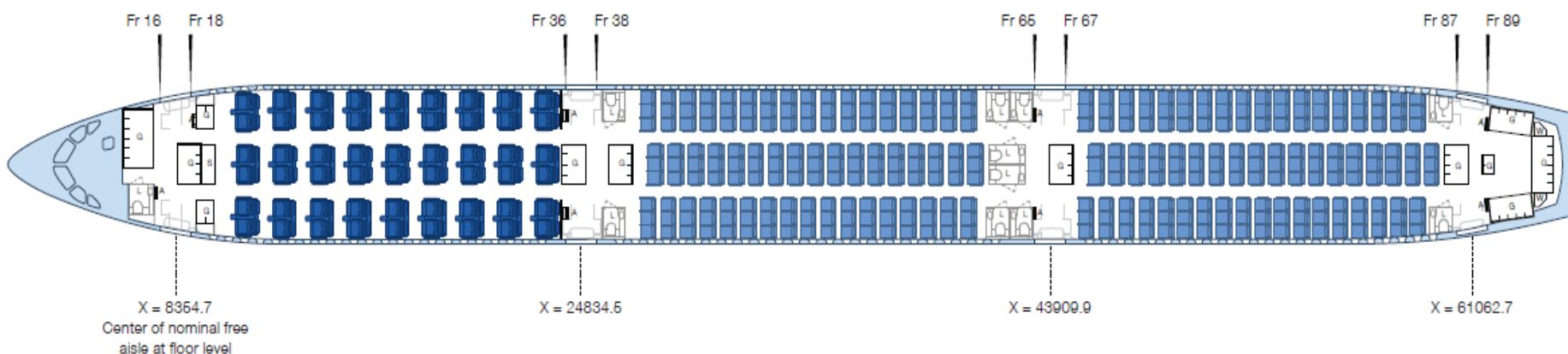
Actual cabin and cargo arrangements chosen by airlines may differ within the limits of the aircraft design and airworthiness requirements.

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A350-1000 Cabin Reference Layout

369 seats



54 B/C at 60"

- A Attendant seat
- G Galley
- L Lavatory
- S Stowage

315 Y/C at 32"

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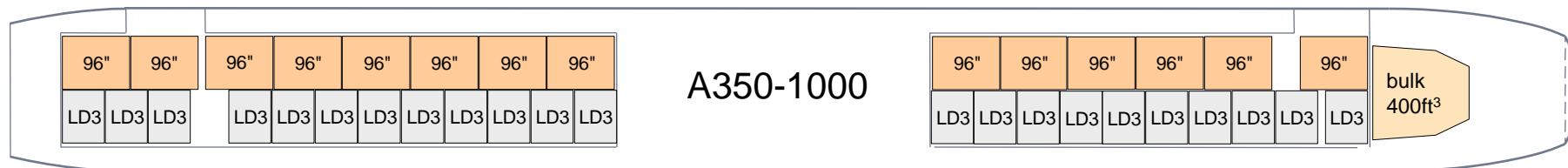
A350-1000 Cargo Hold Capacity

Forward hold

8 x 96" pallets or 24 LD3 containers

Aft hold

6 x 96" pallets or 20 LD3 containers



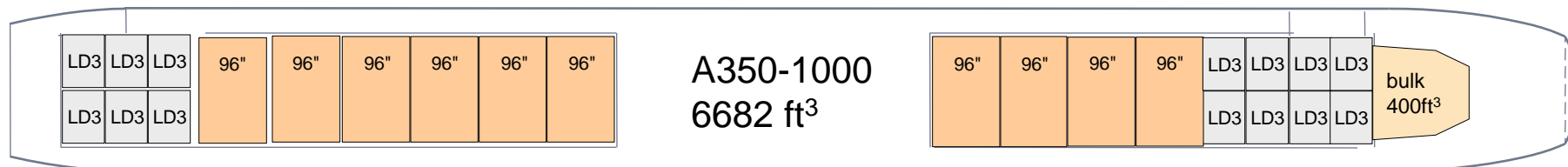
ULD capability

Forward hold

6 x 96" pallets + 6 LD3 containers

Aft hold

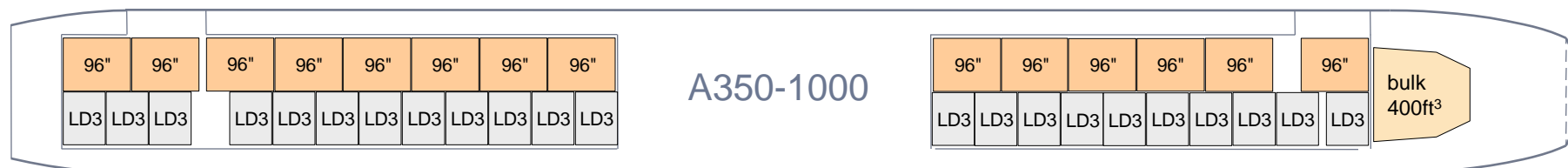
4 x 96" pallets + 8 LD3 containers



Sample loading configuration

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A350-1000 Available Cargo Volumes



Forward hold

8 pallets	-	3256 ft³
7 pallets	2 LD3	3165 ft³
6 pallets	6 LD3	3390 ft³
5 pallets	8 LD3	3299 ft³
4 pallets	12 LD3	3524 ft³
3 pallets	14 LD3	3433 ft³
2 pallets	18 LD3	3658 ft³
1 pallet	20 LD3	3567 ft³
-	24 LD3	3792 ft³

Aft hold

6 pallets	-	2442 ft³
5 pallets	4 LD3	2667 ft³
4 pallets	8 LD3	2892 ft³
3 pallets	10 LD3	2801 ft³
2 pallets	14 LD3	3026 ft³
1 pallet	16 LD3	2935 ft³
-	20 LD3	3160 ft³

Bulk hold: 400 ft³

Pallet volume: 407 ft³
Container volume: 158 ft³

PRELIMINARY



A350-1000 Airport Operations

- ✓ Ground Handling and Servicing
- ✓ Ground Manoeuvring
- ✓ Aircraft Pavement Loading Data

PRELIMINARY



Airport Operations

- ✓ **Ground Handling and Servicing**
- ✓ Ground Manoeuvring
- ✓ Aircraft Pavement Loading Data

PRELIMINARY

Ground Handling & Servicing

The A350-1000 is designed to provide safe, easy and cost effective ground handling minimizing aircraft turnaround time.

The servicing points have been designed and located in order to:

- minimize access time
- allow simultaneous access to all critical service points
- minimize the risk of damage to aircraft by ground support equipment.

In order to reduce the cost of ground handling and servicing and to optimize the operability of the aircraft, the A350-1000 is designed:

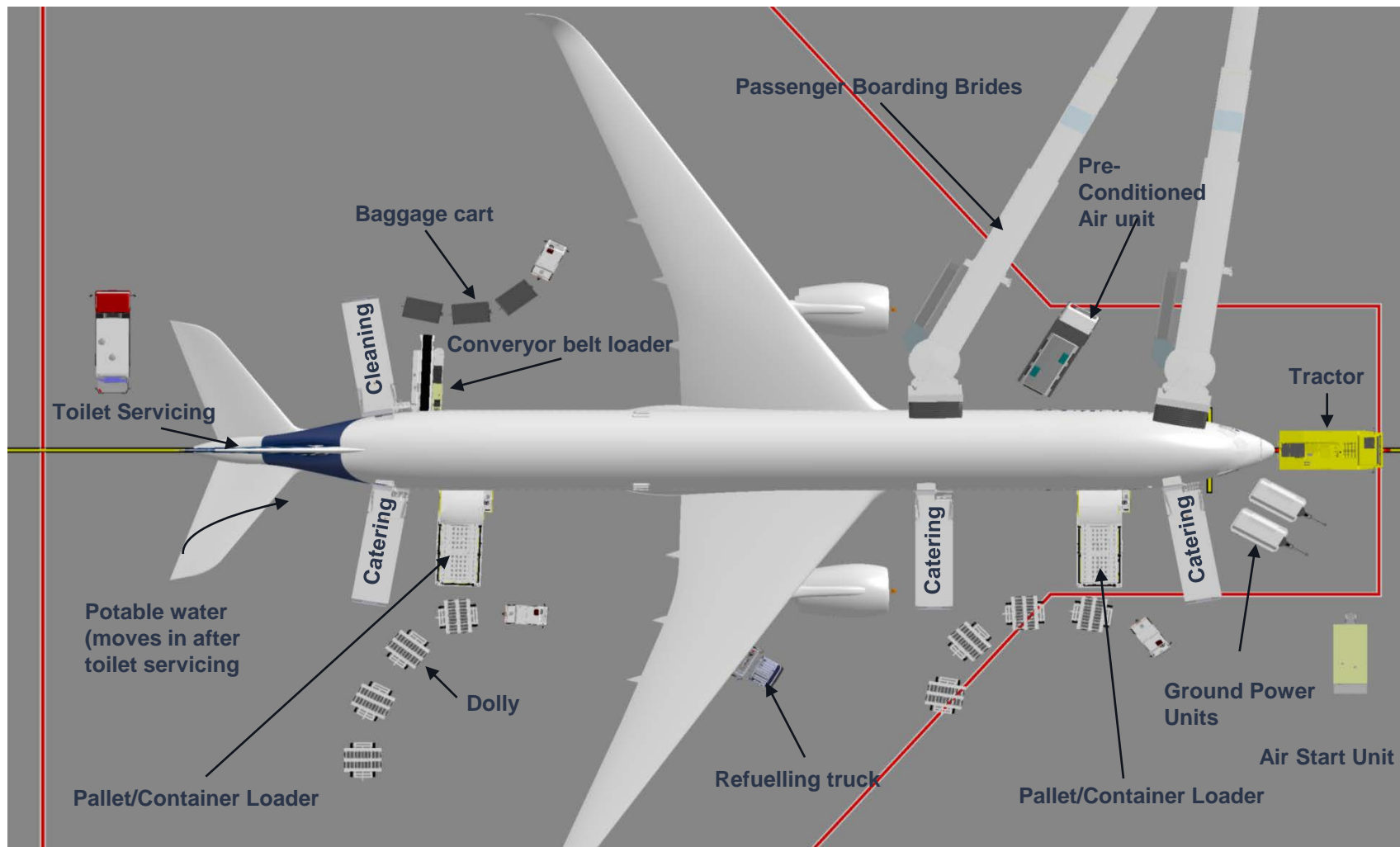
- to ensure compatibility with conventional ground handling and servicing equipment as already used at airports for similar aircraft type
- to minimize the amount of ground equipment needed for an aircraft turnaround

The following slide shows typical ramp arrangement of the A350-1000.

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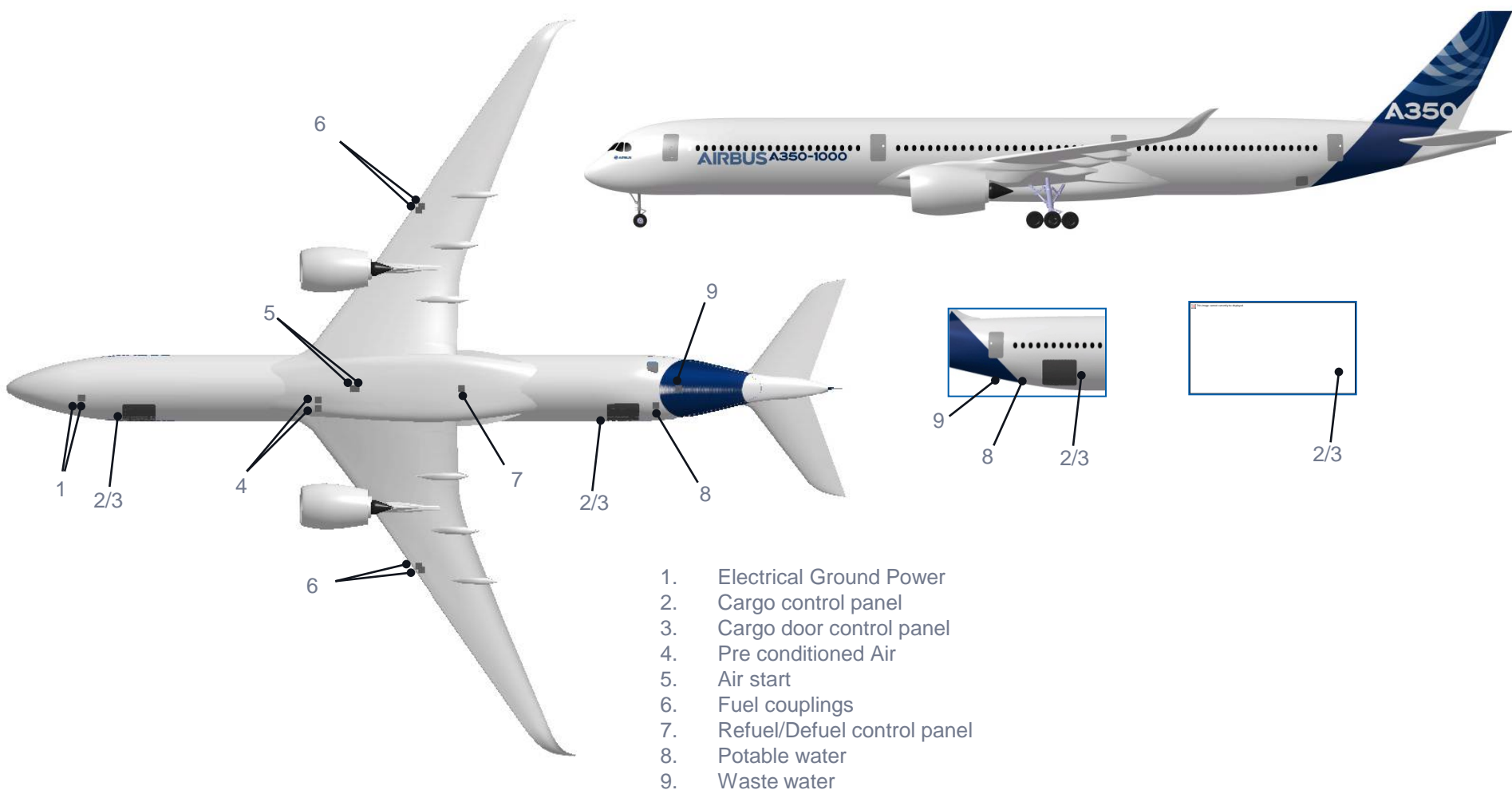
A350-1000 Ramp Layout



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A350-1000 External servicing connections and panels



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A350-1000 Ground Electrical Supply

2 connectors

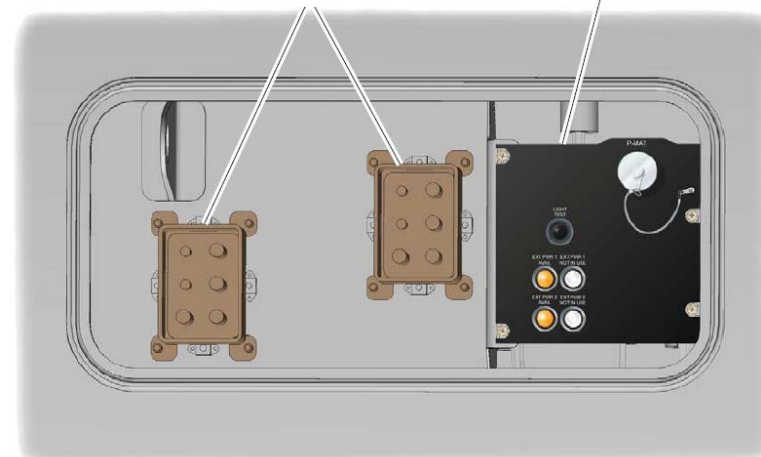
GPUs as per ISO 6858 standard (2 x 90kVA, 115VAC)

Auxiliary Power Unit (APU): 150kVA



External power receptacles

925VU



A

FWD

	Distance from nose	Distance from centreline	Height (MRW)
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GPU connector 1	6.55 m	0.89 m	2.62m
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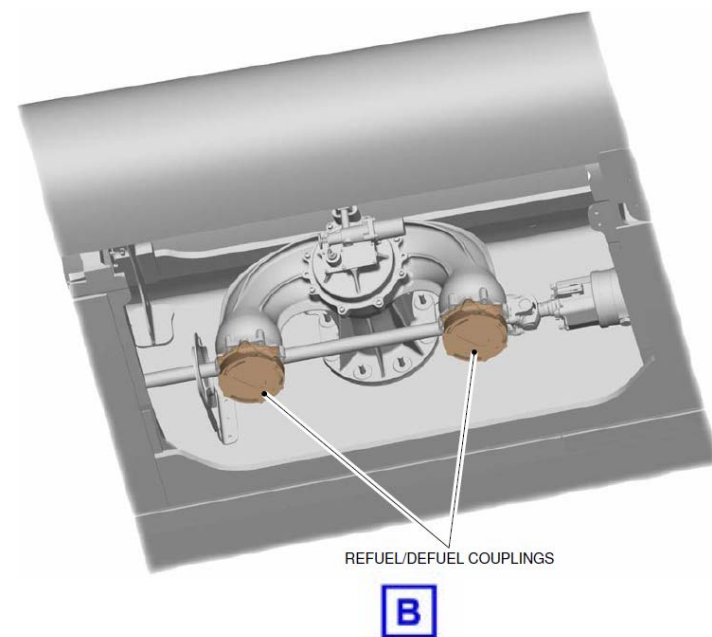
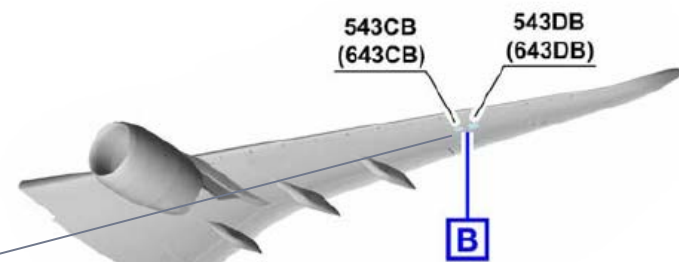
GPU connector 2	6.70 m	0.94 m	2.60 m
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A350-1000 Fuel couplings

Refuel couplings – Standard two (ISO45) 2.5" couplings in the RH wing.

Optionally 2 additional 2.5" couplings on LH side

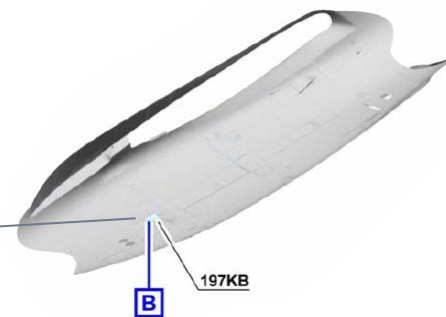


	Distance from nose	Distance from centreline	Height (MRW)
Refuel connector 1	36.49 m	15.99 m	5.51m
Refuel connector 2	36.27m	15.67 m	5.47 m

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A350-1000 Refuel/Defuel control panel

Refuelling is usually initiated from the external REFUEL panel, located in the aircraft belly fairing. However, refuelling can also be initiated from the cockpit, via the REFUEL pushbutton switch.



Distance
from nose

Distance
from
centreline

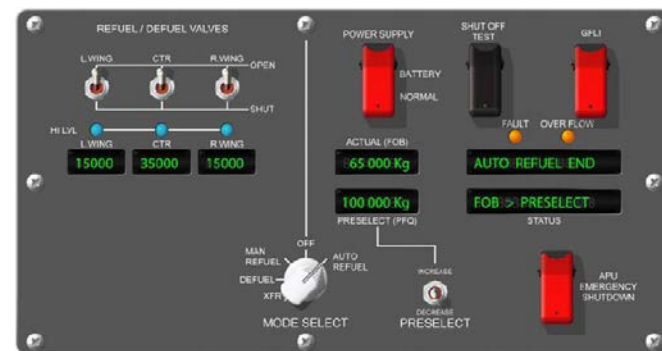
Height
(MRW)

Refuel/Defuel Control
Panel

40.11 m

0m

2.18m



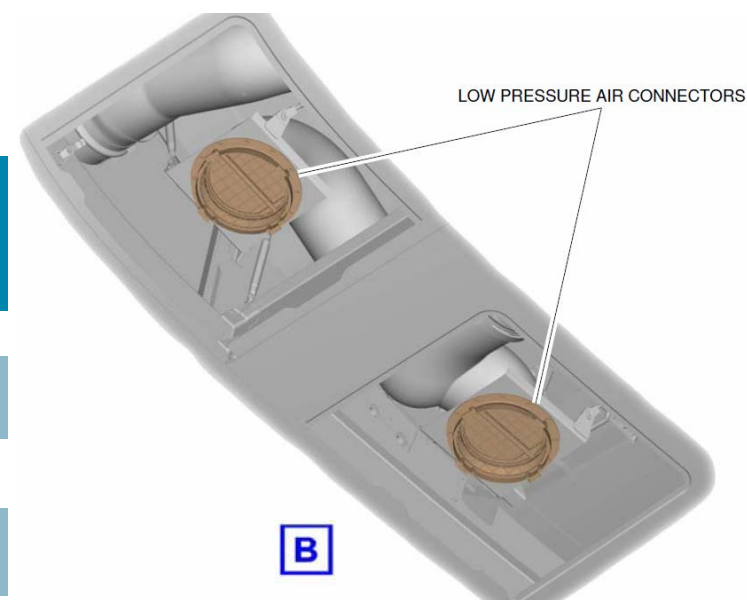
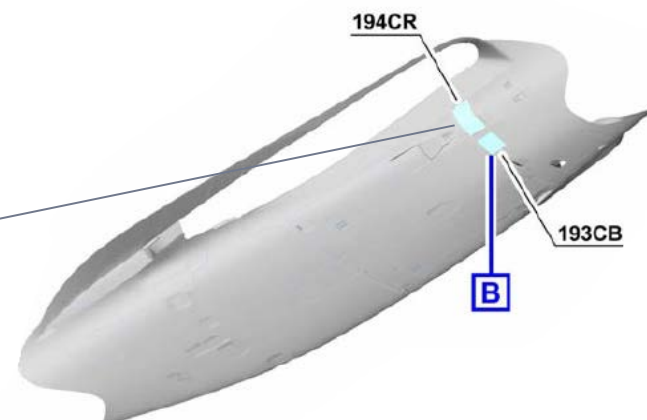
B

PRELIMINARY



A350-1000 Pre Conditioned Air

Low pressure connectors – Two standard (ISO 1034) 8” connectors



Distance
from nose

Distance
from
centreline

Height
(MRW)

PCA connector1

27.39 m

1.05 m

2.44 m

PCA connector2

27.39 m

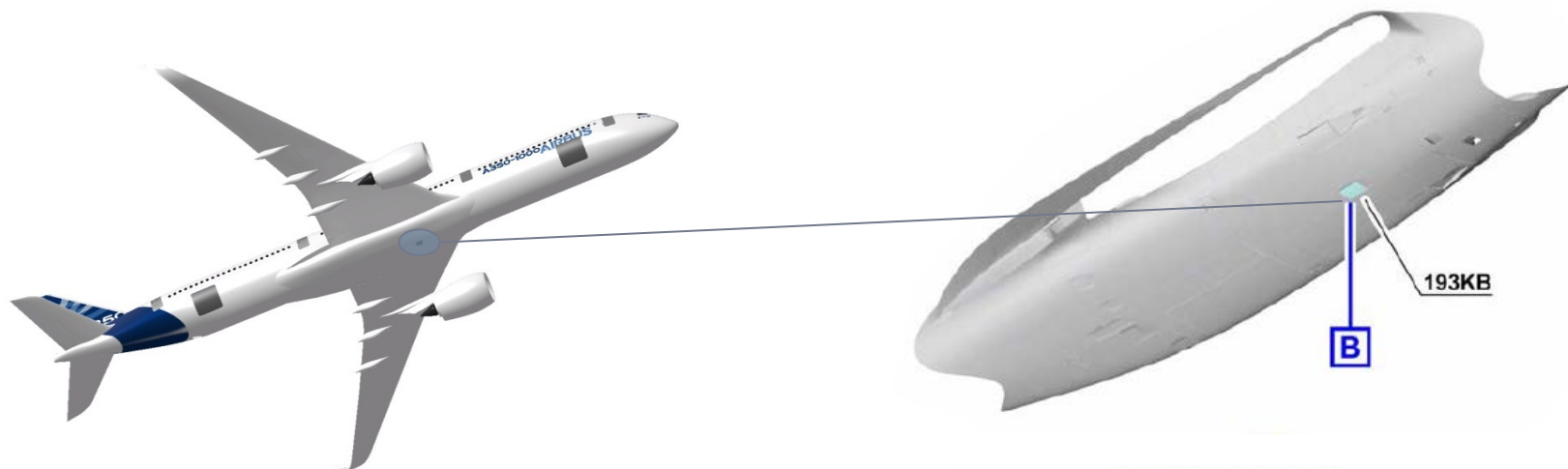
1.86 m

2.57 m

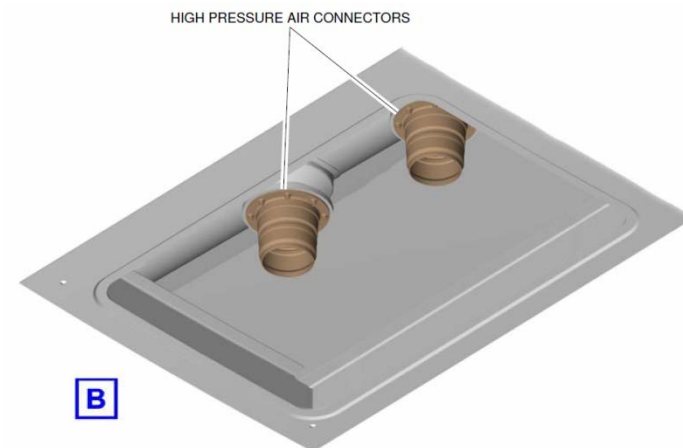
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A350-1000 Air Start Unit

High pressure connectors – Two standard (ISO 2026) 3" connectors



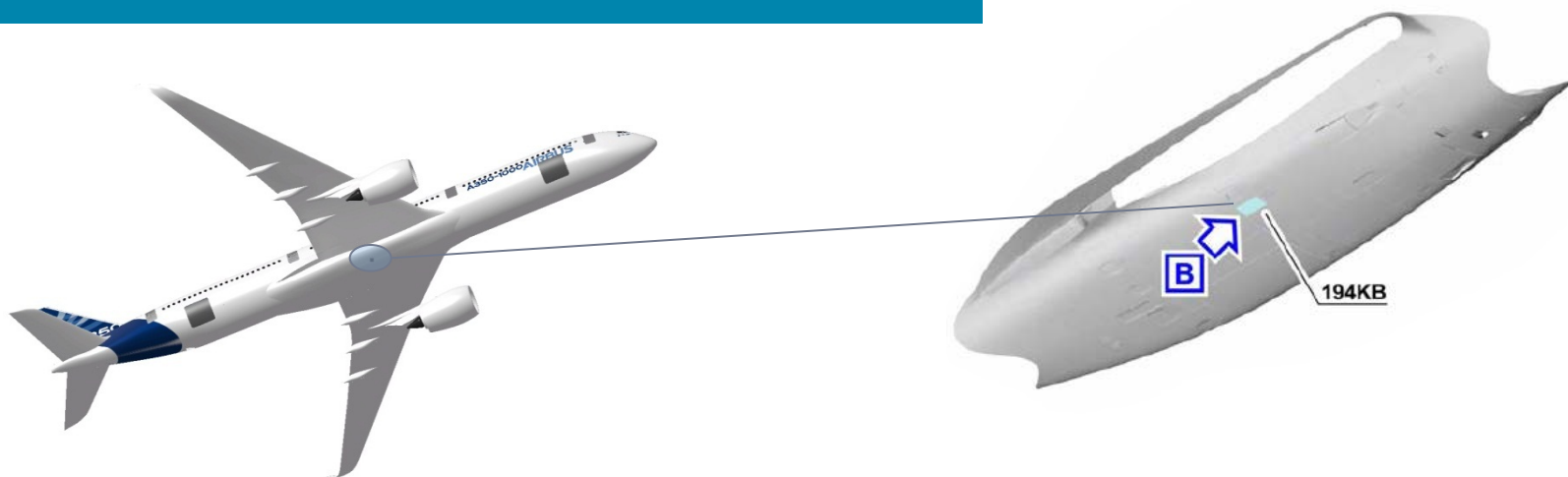
	Distance from nose	Distance from centreline	Height (MRW)
Air Start connector 1	30.77 m	0 m	2.09 m
Air Start connector 2	30.46 m	0 m	2.10 m



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A350-1000 Yellow hydraulic

Reservoir pressurization – One standard (ISO 4570) ¼" connector



Distance
from nose

Distance
from
centreline

Height
(MRW)

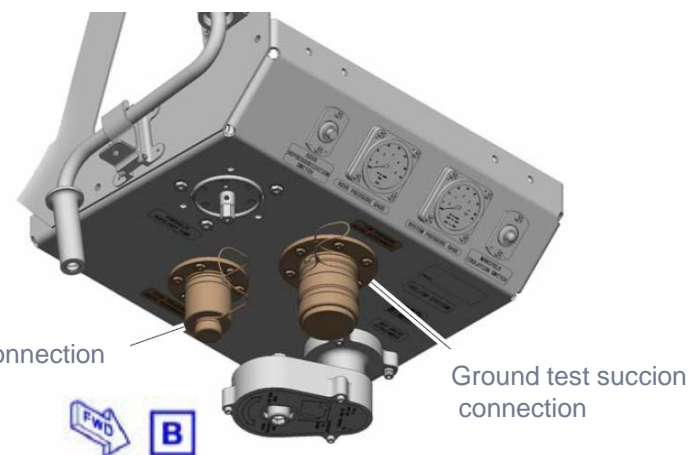
Yellow hydraulic
Connector

34.15 m

1.51 m

2.12 m

Ground test pressure connection

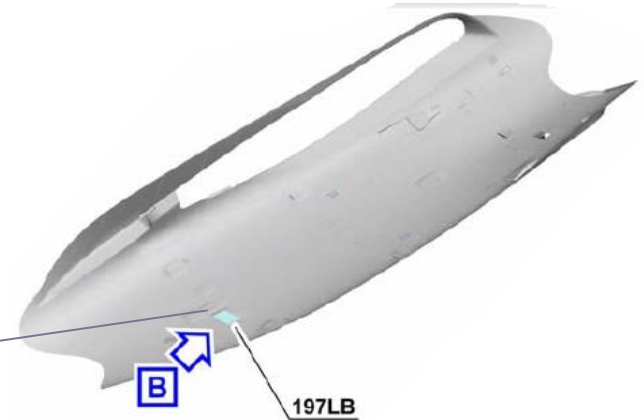


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AIRBUS

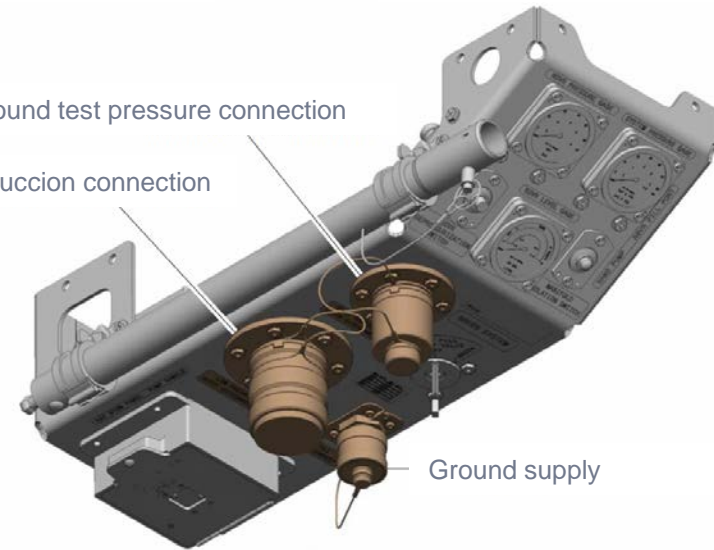
A350-1000 Green hydraulic

Reservoir pressurization – One standard (ISO 4570) ¼” connector
Centralized Reservoir filling capability (Green and Yellow)



Ground test pressure connection

Ground test suction connection

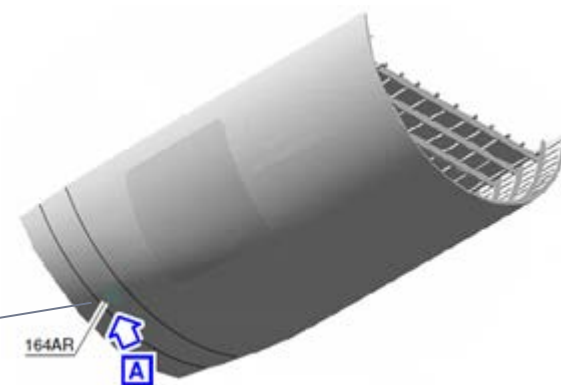


	Distance from nose	Distance from centreline	Height (MRW)
Green Hydraulic	40.18 m	-0.61m	2.24 m

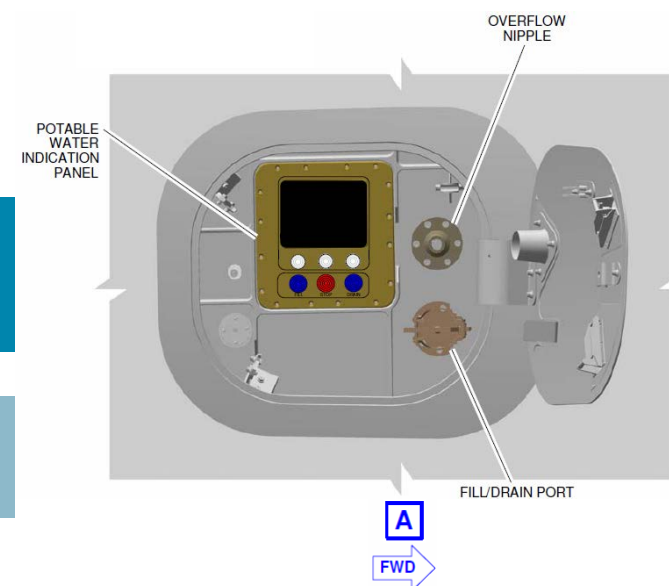
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A350-1000 Potable water

Fill & drain – One standard (ISO 17775) $\frac{3}{4}$ " connector
 Reservoir capacity – Standard 2 tanks, total 1,060 liters
 Optional: 2 tanks, total 1,500 liters



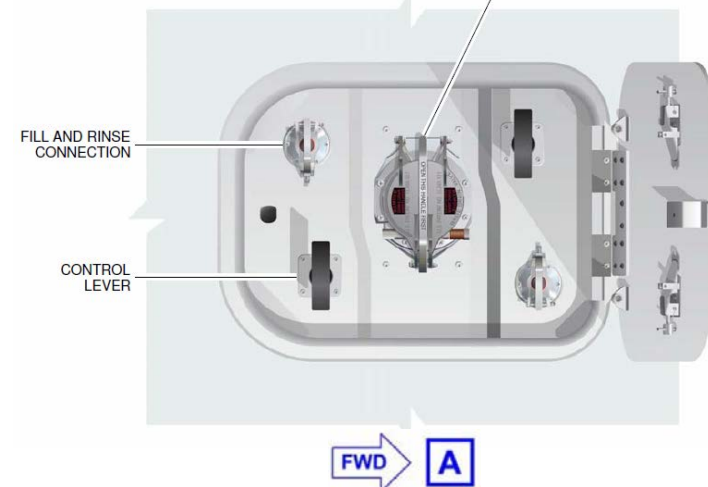
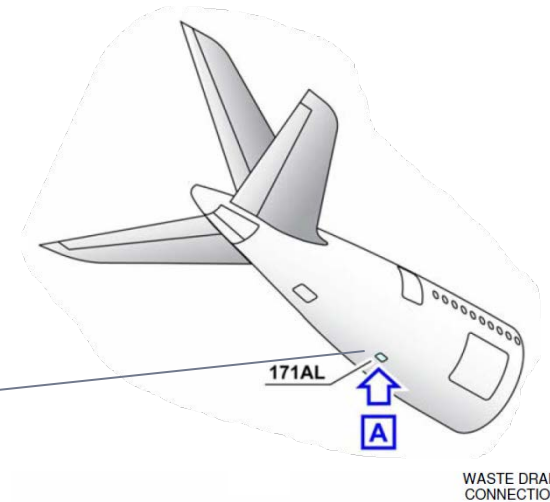
	Distance from nose	Distance from centreline	Height (MRW)
Potable water servicing panel	57.15 m	1.57 m	3.36 m



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A350-1000 Waste water

Draining – One standard (ISO 17775) 4" connector
 Flushing and filling – One standard (ISO 17775) 1" connector
 Capacity reservoir – Two tanks, total 595 liters



Distance
from nose

Distance
from
centreline

Height
(MRW)

Waste water servicing
panel

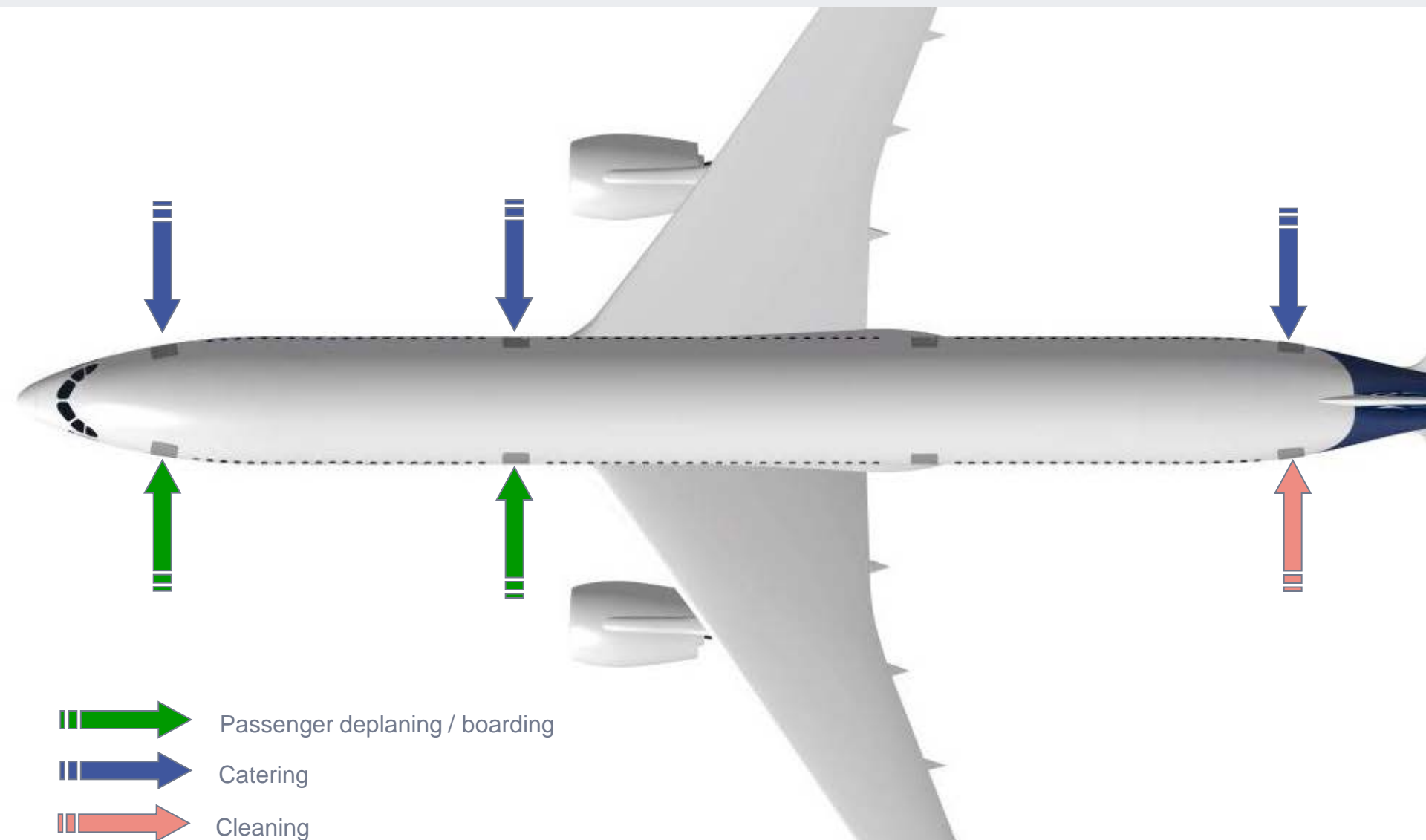
59.19 m

0 m

3.45 m

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A350-1000 Doors Servicing Functions



PRELIMINARY

A350-1000 Turnaround Time

The following slide gives indication of the Minimum Ground Times (MGT) that can be achieved with the A350-1000.

Please note, that aircraft turnaround times strongly depend on airline ground handling processes and procedures as well as specific aircraft mission and aircraft interior layout.

The presented MGT is based on Airbus experience of LR aircraft turnaround performance and on:

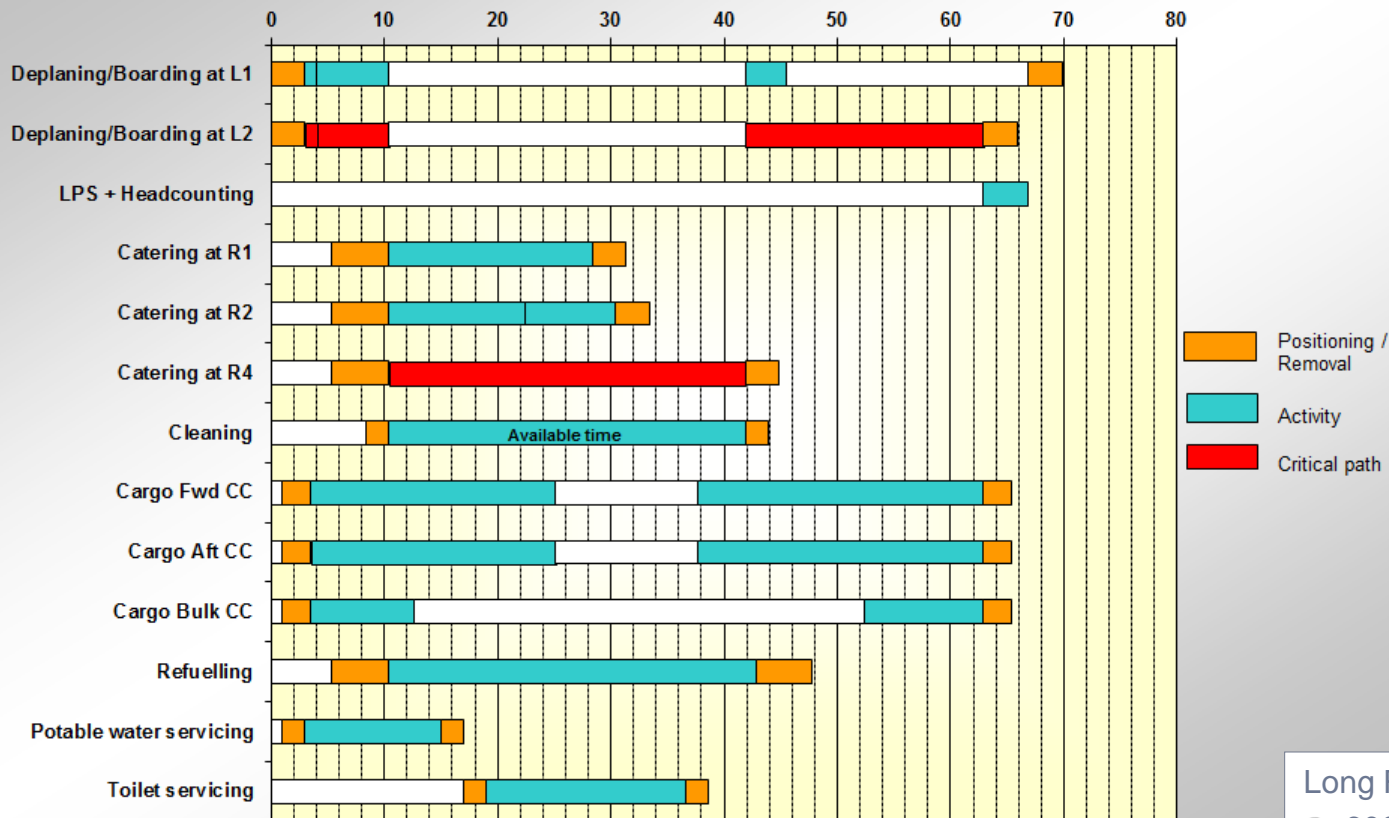
- A350-1000 reference cabin and cargo layout
- Standard Gate Servicing arrangement

PRELIMINARY



A350-1000 TRT Analysis

TRT: 70 min



TRT
70 minutes

PRELIMINARY



Ground Support Equipment needs

GSE	A350-1000
Tow bar	Specific A350 tow bar
Tow-tractor conventional	Standard LR tractor
Towbarless	A330/ A340-200 & 300 *
Ground Power	2 x 90kVA
Air Conditioning Unit	Standard Long Range unit.
Air Start Unit	Standard Long Range unit.
Catering	3 standard trucks
Refuel	1 truck/hydrant on R/H
Toilet servicing	1 standard truck
Potable water	1 standard truck
Cargo loaders	2 Lower deck loaders
Belt loader	1 standard loader

* Will be validated by tests with the A350-900

Maximum Commonality with A350-900 and Airbus Long Range aircraft

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Hydraulic bench 5000 psi : specific requirements

- (a) The hydraulic ground equipment must be able to start with aircraft hydraulic circuit not pressurized
- (b) The hydraulic ground equipment must be able to permanently operate with aircraft reservoir pressures varying between 2.0 to 5.0 bars relative (29 psig to 72.51 psig)
- (c) After ground equipment shutdown, no further fluid exchange must occur between the aircraft reservoir and the ground equipment

Currently two benches have been successfully tested and will be listed in the A350 AMM:

HYCOM HT2000-Z-E/1S-X350-Z
TESTFUCHS HGPU60-50-1S

PRELIMINARY



Airport Operations

✓ Ground Handling and Servicing

✓ **Ground Manoeuvring**

1. Minimum Turning width

2. Runway to Taxiway turn paths

2.1. 90° Turn – Cockpit over centerline technique

2.2. 90° Turn – Oversteering technique

2.3. 135° Turn – Cockpit over centerline technique

2.4. 135° Turn – Oversteering technique

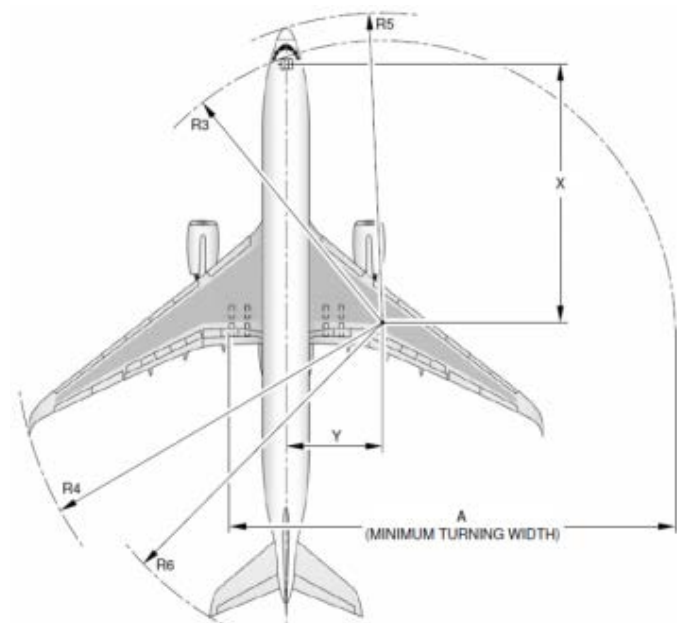
3. Minimum line-up distance corrections

✓ Aircraft Pavement Loading Data

PRELIMINARY



1. Minimum Turning width



Aircraft	Nose wheel steering angle	Minimum Turning Width*
A350-900	72°	51m
A350-1000	75°	56 m

*Turn performed with symmetric thrust and no differential braking

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2. Runway to Taxiway Turn paths

- Airports design
 - ✓ Ref.: ICAO Annex 14 and FAA AC 150/5300-13A
 - Cockpit is following the taxiway centreline (i.e. cockpit-over-centreline techniques).
 - 4.5m taxiway edge safety margin to main landing gear (MLG) path determines the width of the taxiway fillet by airport designers.
- Aircraft operations
 - Judgmental oversteering technique increases the MLG taxiway edge margin

2. Runway to Taxiway Turn paths

Taxiway design:

Formerly, FAA based this design on Airplane Design Group (ADG) for taxiway curves and intersections in order to indicate the right amount of pavement for safe maneuvering of the aircraft. It considered wingspan and tail height but not undercarriage dimensions.

However, this design criteria was revisited and decided to classify aircraft into Taxiway Design Groups (TDGs) based on overall main gear width and cockpit to main gear distance.

This new guideline is official since September 2012 and incorporated in the AC 150/5300-13A.

A350XWB falls into ADG V and TDG 6 categories.

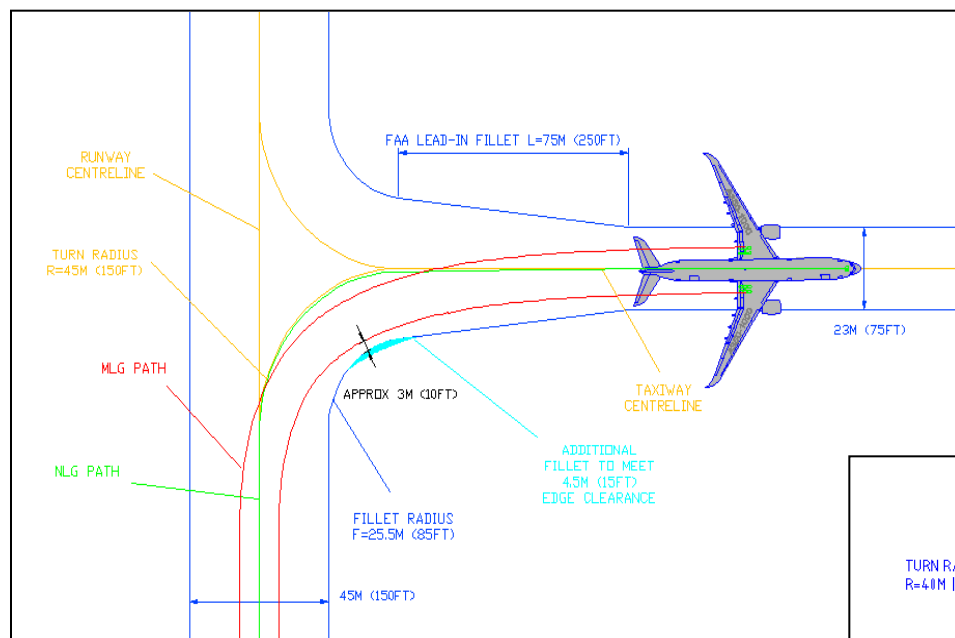
Maneuvers on both these designs are shown below.

PRELIMINARY

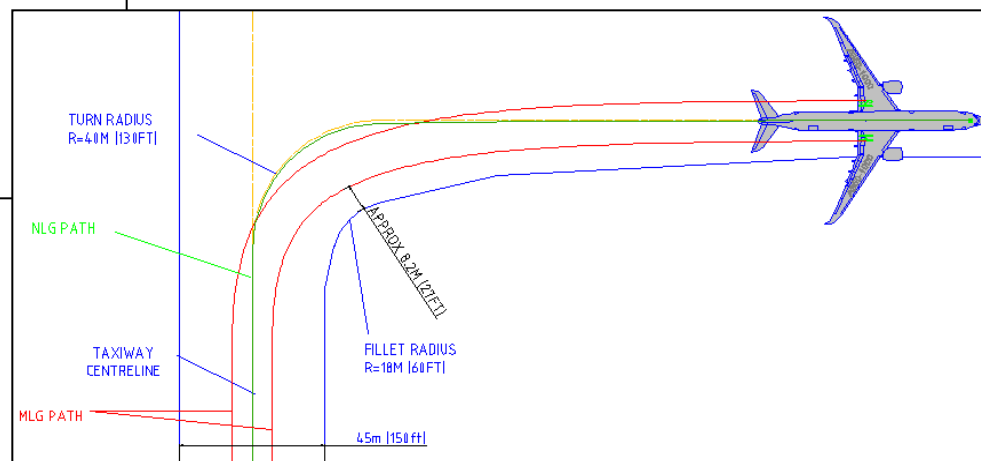


2.1) 90° Turn – Cockpit over centerline technique

A350-1000



A350-1000 – 90° turn from runway to taxiway – cockpit method for ADG V design

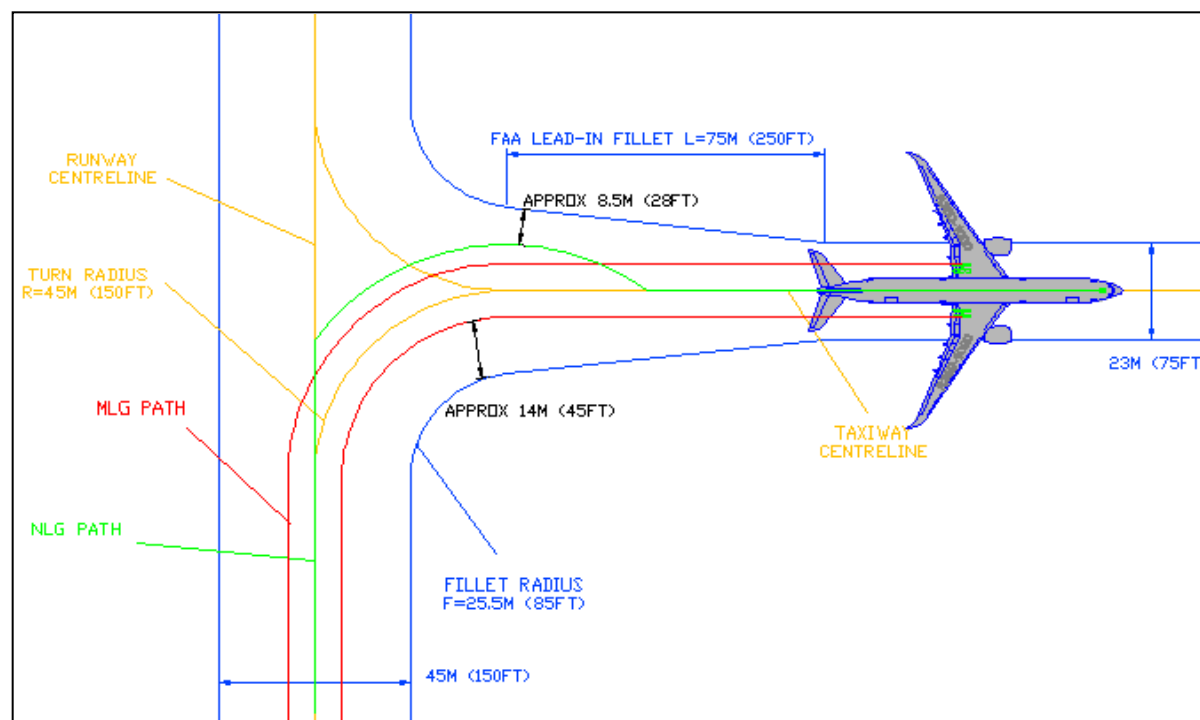


A350-1000 – 90° turn from runway to taxiway – cockpit method for TDG 6 design

PRELIMINARY

2.2) 90° Turn – Oversteering technique

A350-1000

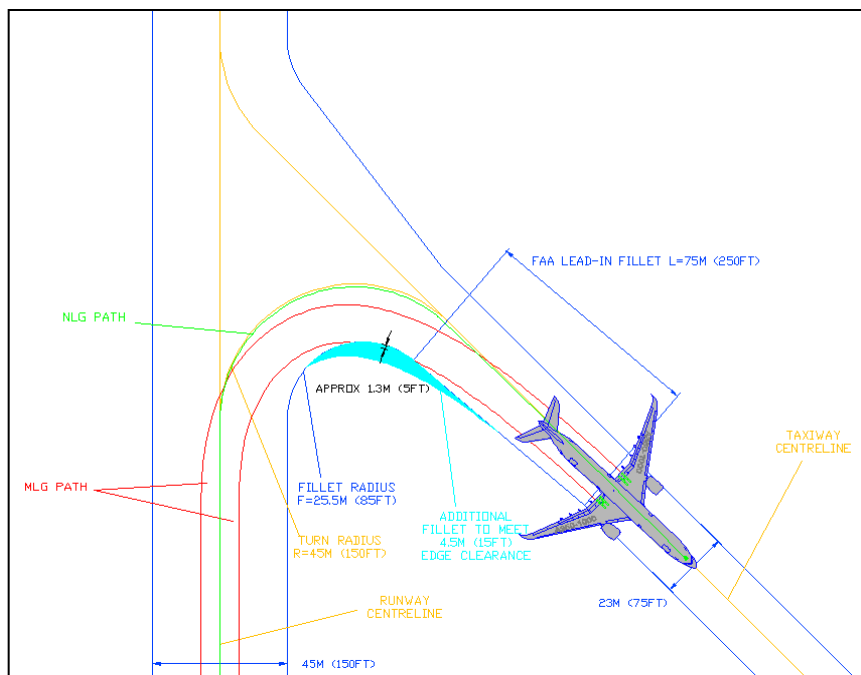


A350-1000 – 90° turn from runway to taxiway – oversteering method for ADG V design

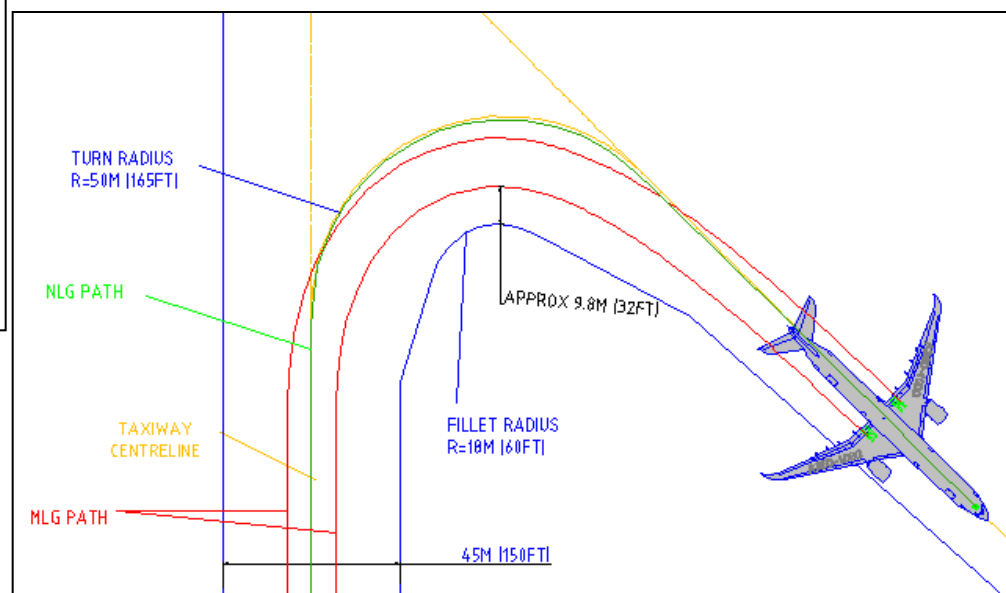
PRELIMINARY

2.3) 135° Turn – Cockpit over centerline technique

A350-1000



A350-1000 – 135° turn from runway to taxiway – cockpit method for ADG V design

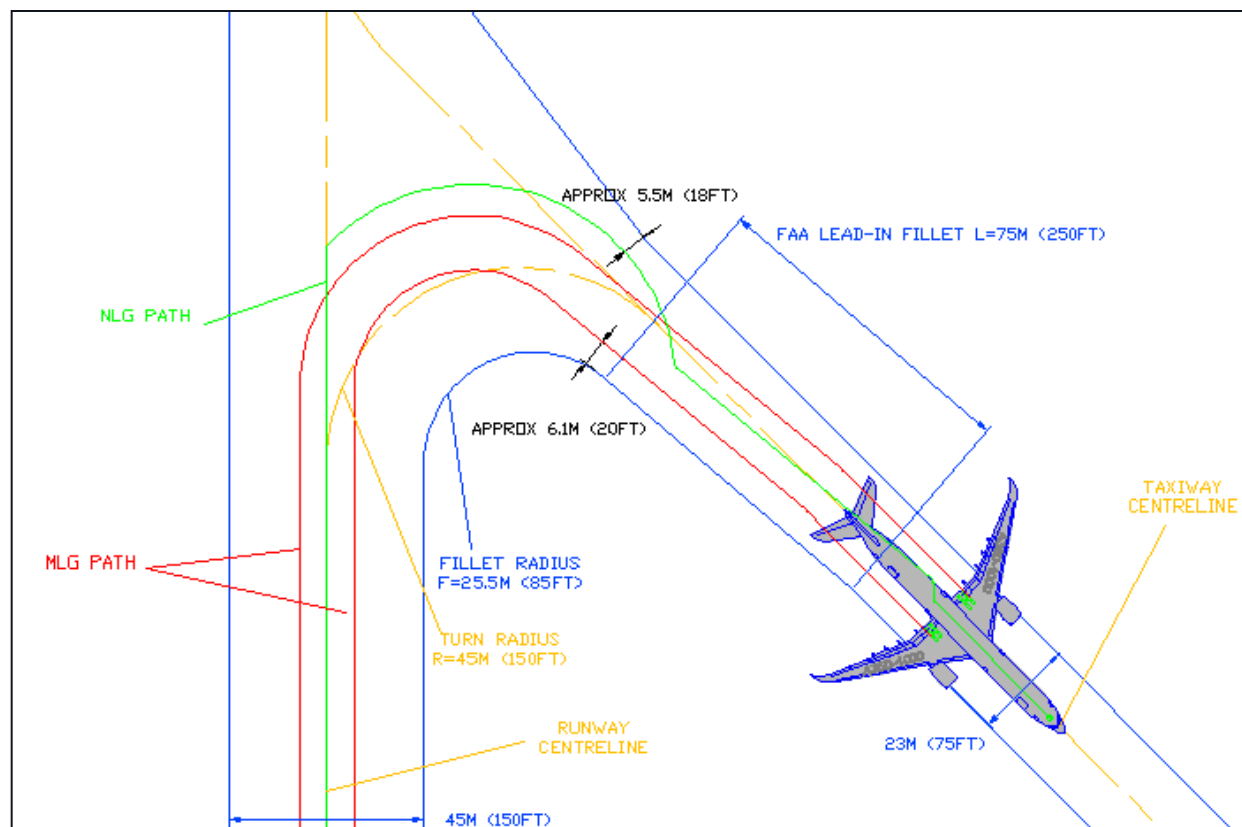


A350-1000 – 135° turn from runway to taxiway – cockpit method for TDG 6 design

PRELIMINARY

2.4) 135° Turn – Oversteering technique

A350-1000



A350-1000 – 135° turn from runway to taxiway – oversteering method for ADG V design

2. Runway to Taxiway turn paths - Assessment

On ADG V:

- Based on the cockpit-over-centerline technique, ADG V airports would have to build additional fillets to meet the recommended gear clearance of 4.5 m.
- On an ADG V airport, A350 pilots would have to use judgmental oversteering technique in order to maintain a minimum 4.5 m margin between the gear and the pavement edge.

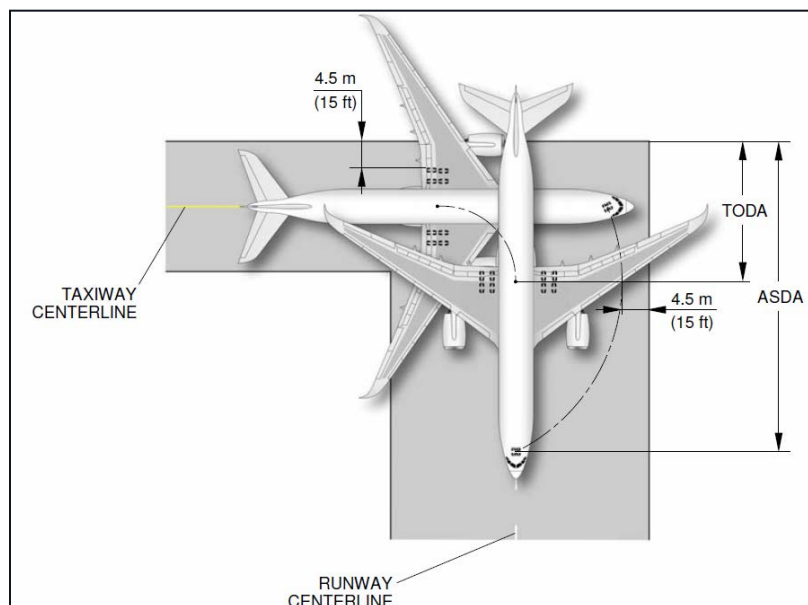
On TDG 6:

- Based on the cockpit-over-centerline technique, airports with taxiway designed as per TDG6 will accommodate A350 without the need for additional fillets.
- Maneuvers with judgmental oversteering technique are not shown above as ADG6 provides sufficient gear clearance for the turns.

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3. Minimum line-up distance corrections - 90° Turn on Runway entry

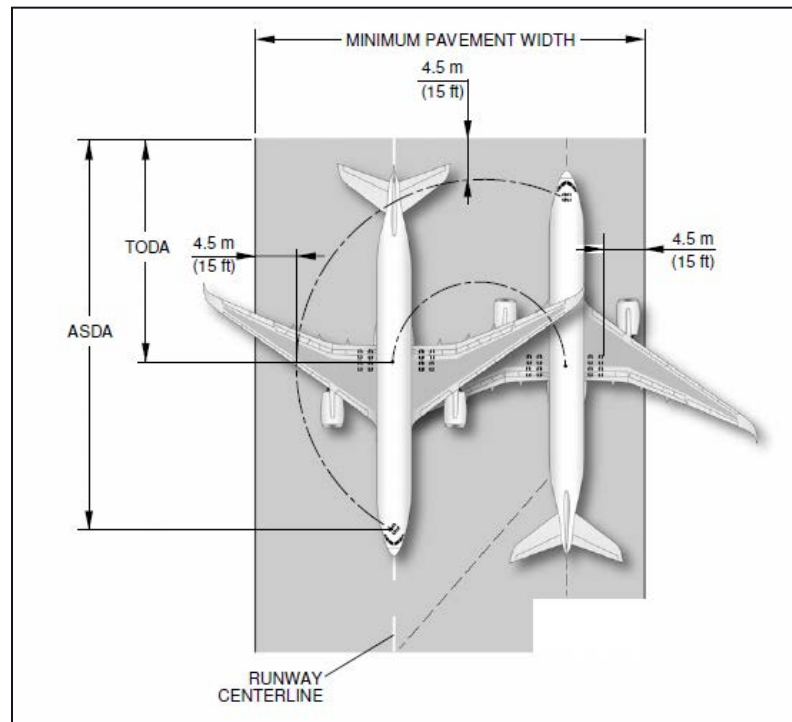


90° turn on runway entry									
Aircraft model	Max steering angle (degree)	45m wide runway				60m wide runway			
		Minimum line-up distance correction				Minimum line-up distance correction			
		On TODA		On ASDA		On TODA		On ASDA	
		feet	meters	feet	meters	feet	meters	feet	meters
A350-900	72	84	25.7	178	54.3	72	21.8	166	50.5
A350-1000	75	106	32.2	212	64.7	72	21.8	179	54.4

PRELIMINARY



3. Minimum line-up distance corrections - 180° Turn on Runway Turnpad

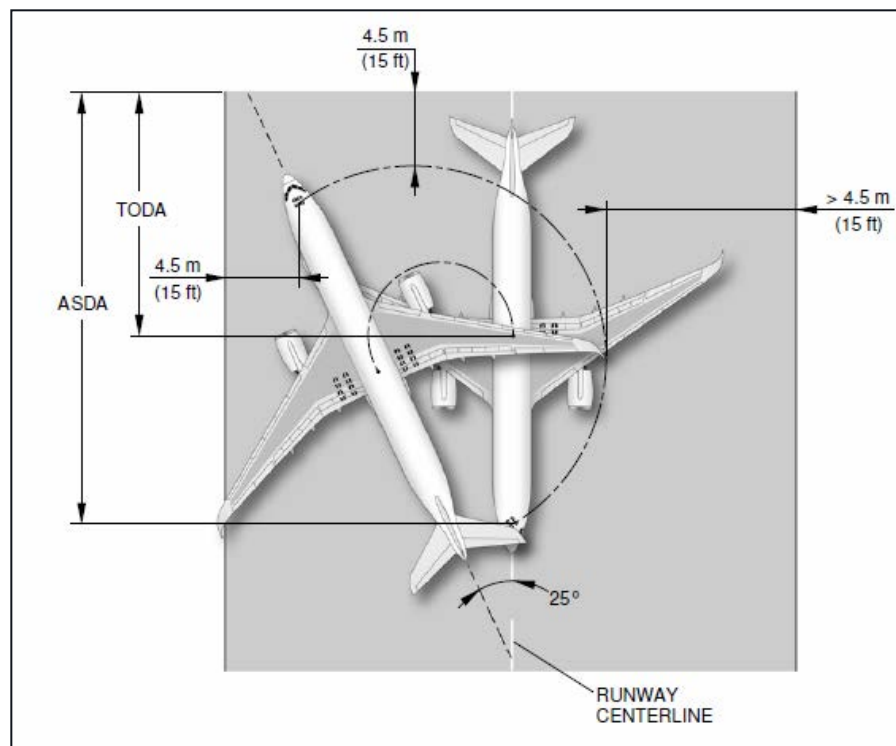


180° turn on runway turnpad									
Aircraft model	Max steering angle (degree)	45m wide runway				60m wide runway			
		Minimum line-up distance correction				Minimum line-up distance correction			
		On TODA		On ASDA		On TODA		On ASDA	
		feet	meters	feet	meters	feet	meters	feet	meters
A350-900	72	122	37.2	216	65.9	117	35.7	211	64.4
A350-1000	75	144	43.9	250	76.3	129	39.4	236	71.9

PRELIMINARY



3. Minimum line-up distance corrections - 180° Turn on Runway width



180° turn on runway width									
Aircraft model	Max steering angle (degree)	45m wide runway (Standard width)				60m wide runway			
		Minimum line-up distance correction				Minimum line-up distance correction			
		On TODA		On ASDA		On TODA		On ASDA	
		feet	meters	feet	meters	feet	meters	feet	meters
A350-900	72	Not possible				156	47.5	250	76.2
A350-1000	75					Not possible			

PRELIMINARY



Airport Operations

- ✓ Ground Handling and Servicing
- ✓ Ground Manoeuvring
- ✓ **Aircraft Pavement Loading Data**

PRELIMINARY



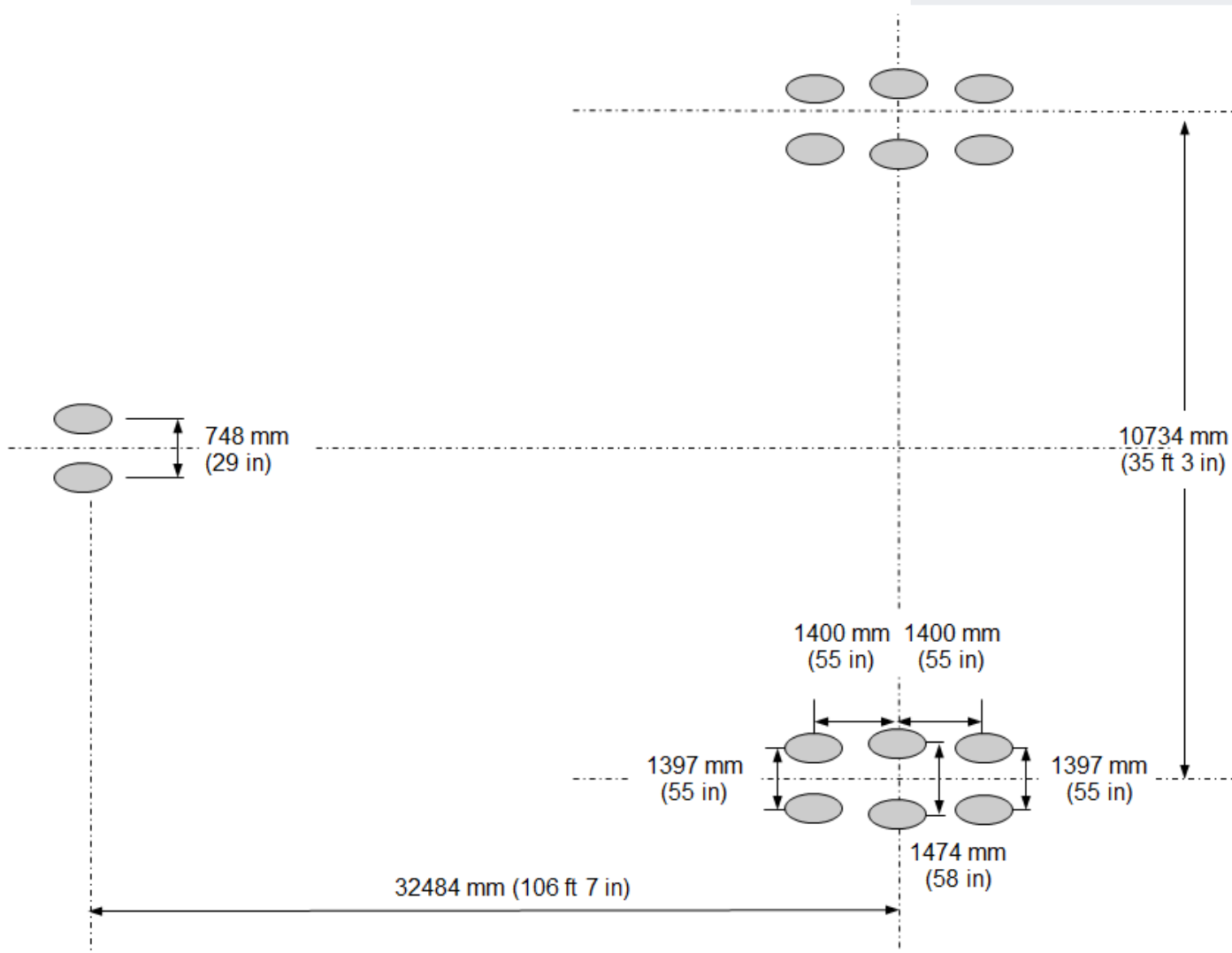
General Information

A350-1000		
MTW (Maximum Taxi Weight)	[t]	308.9
Maximum aft Center of Gravity Position	[% of MAC]	34.0
% weight on Main Landing Gear (MLG) at Max aft CG		94.22
MLG Tire size		50x20 R22
Loaded Tire Pressure	[kPa]	1500

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Landing Gear Footprint



PRELIMINARY

ACN for Flexible and Rigid Pavement

FLEXIBLE PAVEMENT ACN				Flexible pavement subgrades			
				High CBR=15	Medium CBR=10	Low CBR=6	Very low CBR=3
Aircraft	MRW (kg)	Tire Inflation Pressure (kPa)	Max aft CG position as % MAC	A	B	C	D
A350-1000	308,900	1,500	34	56	62	76	105

RIGID PAVEMENT ACN				Rigid pavement subgrades			
				High K=150 MN/m ³	Medium K=80 MN/m ³	Low K=40 MN/m ³	Very low K=20 MN/m ³
Aircraft	MRW (kg)	Tire Inflation Pressure (kPa)	Max aft CG position as % MAC	A	B	C	D
A350-1000	308,900	1,500	34	57	73	93	112

PRELIMINARY

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