A310
Airplane Characteristics
For Airport Planning
AC
This revision concerns introduction of new pages and corrections of pages.

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TO: ALL HOLDERS OF A310 AIRCRAFT RECOVERY MANUAL

The revision, dated DEC 01/09 is attached and covers all the Airplane Characteristics, and the pavement data, which are identified in the highlights.

FILING INSTRUCTIONS

NOTE: Before introducing this revision make certain that previous revisions are incorporated.

- affected pages are listed on the "List of Effective Pages" and designated as follows:
  
  R = revised (to be replaced)
  D = deleted (to be removed)
  N = new (to be introduced)

- make certain that the content of the manual is in compliance with the List of Effective Pages.

- update the Record of Revisions page accordingly.

- file the Revision Transmittal Sheet separately.

- remove and destroy the pages which are affected by this revision.

REASON FOR ISSUE

The attached Highlights detail the reasons for issue.
## A310

**AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING**

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1.0 SCOPE

1.1 Purpose

1.2 Introduction
1.1.0 Purpose

The A310 AIRPLANE CHARACTERISTICS (AC) manual is issued to provide the necessary data which are needed for airport operators and airlines for the accomplishment of airport facilities planning. It provides characteristics for A310-200 and A310-300 basic versions.

This document conforms to NAS 3601.

CORRESPONDENCE

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FRANCE
1.2.0 Introduction

This manual comprises 9 chapters with a List of Effective Pages (LEP) and a Table Of Content (TOC) at the beginning of each chapter.

Chapter 1 : SCOPE

Chapter 2 : AIRPLANE DESCRIPTION

This chapter contains general dimensional and other basic aircraft data concerning the A310.

It covers:
- aircraft dimensions and ground clearances,
- passengers and cargo compartments arrangement.

Chapter 3 : AIRPLANE PERFORMANCE

This chapter indicates the aircraft performance.

It covers:
- payload range,
- takeoff and landing runway requirements,
- landing approach speed.

Chapter 4 : GROUND MANEUVERING

This chapter provides the aircraft turning capability and maneuvering characteristics on the ground.

It includes:
- turning radii and visibility from the cockpit,
- runway and taxiway turn path.

Chapter 5 : TERMINAL SERVICING

This chapter provides information for the arrangement of ground handling and servicing equipments.

It covers:
- location and connections of ground servicing equipments,
- engines starting pneumatic and preconditioned airflow requirements.
Chapter 6: OPERATING CONDITIONS

This chapter contains data and safety/environmental precautions related to engine and APU operation on the ground.

It covers:
- contour size and shape of the jet engine exhaust velocities and temperature,
- noise data.

Chapter 7: PAVEMENT DATA

This chapter contains the pavement data helpful for airport planning.

It gives:
- landing gear foot print and static load,
- charts for flexible pavements with Load Classification Number (LCN),
- charts for rigid pavements with LCN,
- Aircraft Classification Number (ACN), Pavement Classification Number (PCN), reporting system for flexible and rigid pavements.

Chapter 8: DERIVATIVE AIRPLANES

This chapter gives relevant data of possible A310 new version with the associated size change.

Chapter 9: SCALED DRAWING

This chapter contains different A310 scaled drawings.
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

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R 2.1.0 General Airplane Characteristics
R 2.1.1 General Airplane Characteristics data
2.2 General Airplane Dimensions
2.2.1 GE Engine CF6-80A3
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2.1.0 General Airplane Characteristics

The weight terms used throughout this manual are given below together with their respective definitions.

**Maximum Taxi Weight (MTW):**

Maximum weight for ground maneuver as limited by aircraft strength and airworthiness requirements. (It includes weight of run-up and taxi fuel). It is also called Maximum Ramp Weight (MRW).

**Maximum Landing Weight (MLW):**

Maximum weight for landing as limited by aircraft strength and airworthiness requirements.

**Maximum Takeoff Weight (MTOW):**

Maximum weight for takeoff as limited by aircraft strength and airworthiness requirements. (This is the maximum weight at start of the takeoff run).

**Maximum Zero Fuel Weight (MZFW):**

Maximum operational weight of the aircraft without usable fuel.

**Operational Empty Weight (OEW):**

Weight of structure, powerplant, furnishings, systems, and other items of equipment that are an integral part of a particular aircraft configuration plus the operator's items.

The operator's items are the flight and cabin crew and their baggage, unusable fuel, engine oil, emergency equipment, toilet chemical and fluids, galley structure, catering equipment, passenger seats and life vests, documents, etc.

**Maximum Payload:**

Maximum Zero Fuel Weight (MZFW) minus Operational Empty Weight (OEW).

**Maximum Seating Capacity:**

Maximum number of passengers specifically certified or anticipated for certification.

**Maximum Cargo Volume:**

Maximum usable volume available for cargo.

**Usable Fuel:**

Fuel available for aircraft propulsion.
## A310

**AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING**

### Chapter 2.1.1

#### Airplane Characteristics

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<thead>
<tr>
<th>AIRPLANE VERSION</th>
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<th>Pax and Cargo</th>
<th>A310-200</th>
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<td></td>
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<td>245 815</td>
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**GE CF6-80 Engines**

- Estimated Operational Empty Weight (OEW) 79 207 kg (174 619 lb)
- Estimated Maximum Payload 32 793 kg (71 932 lb)

**PWJT9D Engines**

- Estimated Operational Empty Weight (OEW) 79 166 kg (174 528 lb)
- Estimated Maximum Payload 32 334 kg (71 284 lb)

**Standard Seating Capacity**

- Single-class 237

**Usable Fuel Capacity**

- l 61 070
- US Gallons 16 132
- kg (d=0.785) 47 940
- lb 105 689

**Pressurized Fuselage Volume (A/C non equipped)**

- m³ 680
- ft³ 24 013

**Passenger Compartment Volume**

- m³ 454
- ft³ 16 032

**Cockpit Volume**

- m³ 12
- ft³ 424

**Usable Cargo Compartment Volume (1)**

- m³ 112.2
- ft³ 3 962

(1) Volume of Cargo Compartments:
- Fwd Cargo Compartment : 55 m³ (1 943 ft³)
- Aft Cargo Hold Compartment : 36.2 m³ (1 278 ft³)
- Bulk Cargo Compartment : 21 m³ (741 ft³)

### 2.1.1 General Airplane Characteristic Data

Model 200 and C and F
# A310

## AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

### AIRPLANE VERSION

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<td>Maximum Takeoff Weight (MTOW)</td>
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<td>Standard Seating Capacity</td>
<td>single-class</td>
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<td>Usable Fuel Capacity</td>
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<tr>
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<td>US Gallons</td>
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<td>ft³</td>
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<td>Cockpit Volume</td>
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<td>ft³</td>
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(1) Volume of Cargo Compartments: Fwd Cargo Compartment: 55 m³ (1 943 ft³)
Aft Cargo Hold Compartment: 36.2 m³ (1 278 ft³)
Bulk Cargo Compartment: 21 m³ (741 ft³)

## 2.1.1 General Airplane Characteristics Data

**Model 200**
## AIRPLANE VERSION

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<td>lb</td>
<td>kg</td>
<td>lb</td>
<td>kg</td>
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<td>kg</td>
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<td>kg</td>
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**Estimated Operational Empty Weight (OEW)**

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<td>PW4000</td>
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<td>174 528</td>
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**Estimated Maximum Payload**

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<td>PW4000</td>
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**Standard Seating Capacity**

- single-class: 243

**Usable Fuel Capacity**

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<th>US Gallons</th>
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<td>16 132</td>
<td>105 689</td>
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**Pressurized Fuselage Volume (A/C non equipped)**

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<th>m³</th>
<th>ft³</th>
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**Passenger Compartment Volume**

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**Cockpit Volume**

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**Usable Cargo Compartment Volume (1)**

<table>
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<th>m³</th>
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<td>3 962</td>
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(1) Volume of Cargo Compartments: Fwd Cargo Compartment: 55 m³ (1 943 ft³)
Aft Cargo Hold Compartment: 36.2 m³ (1 278 ft³)
Bulk Cargo Compartment: 21 m³ (741 ft³)

### 2.1.1 General Airplane Characteristics Data Model 300
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<td>Maximum Landing Weight (MLW)</td>
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<td>lb</td>
</tr>
<tr>
<td>Maximum Zero Fuel Weight (MZFW)</td>
<td>kg</td>
</tr>
<tr>
<td></td>
<td>lb</td>
</tr>
<tr>
<td>GE CF6-80 Engines</td>
<td>Estimated Operational Empty Weight (OEW)</td>
</tr>
<tr>
<td>PW JT9D Engines</td>
<td>Seventy-seven thousand three hundred and ninety-seven kilograms (170 631 lb)</td>
</tr>
<tr>
<td>PW4000 Engines</td>
<td>Seventy-nine thousand one hundred and sixty-six kilograms (174 528 lb)</td>
</tr>
<tr>
<td>GE CF6-80 Engines</td>
<td>Estimated Maximum Payload</td>
</tr>
<tr>
<td></td>
<td>lb</td>
</tr>
<tr>
<td>PW JT9D Engines</td>
<td>Estimated Maximum Payload</td>
</tr>
<tr>
<td></td>
<td>lb</td>
</tr>
<tr>
<td>PW 4000 Engines</td>
<td>Estimated Maximum Payload</td>
</tr>
<tr>
<td></td>
<td>lb</td>
</tr>
<tr>
<td>Standard Seating Capacity</td>
<td>single-class</td>
</tr>
<tr>
<td>Usable Fuel Capacity</td>
<td>US Gallons</td>
</tr>
<tr>
<td></td>
<td>kg (d=0.785)</td>
</tr>
<tr>
<td></td>
<td>lb</td>
</tr>
<tr>
<td>Pressurized Fuselage Volume (A/C non equipped)</td>
<td>metric cubes</td>
</tr>
<tr>
<td>Passenger Compartment Volume</td>
<td>metric cubes</td>
</tr>
<tr>
<td></td>
<td>ft³</td>
</tr>
<tr>
<td>Cockpit Volume</td>
<td>metric cubes</td>
</tr>
<tr>
<td></td>
<td>ft³</td>
</tr>
<tr>
<td>Usable Cargo Compartment Volume (1)</td>
<td>metric cubes</td>
</tr>
<tr>
<td></td>
<td>ft³</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Volume of Cargo Compartments: Fwd Cargo Compartment : 55 m³ (1 943 ft³)
Aft Cargo Hold Compartment : 36.2 m³ (1 278 ft³)
Bulk Cargo Compartment : 21 m³ (741 ft³)

2.1.1 General Airplane Characteristics Data
Model 300
2.2 GENERAL AIRPLANE DIMENSIONS
2.2 AIRPLANE DIMENSIONS
AIRPLANE CHARACTERISTICS

2.2 AIRPLANE DIMENSIONS

* PW JT9D : 2.718 m (107 in)
GE CF6 : 2.918 m (114 in)
PW 4000 : 2.768 m (109 in)

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2.2 AIRPLANE DIMENSIONS
2.2.1 GE ENGINE CF6-80A3
2.2 AIRPLANE DIMENSIONS
2.2.2 ENGINES JT9D-7R4
2.2 AIRPLANE DIMENSIONS
2.2.3 ENGINE CF6-80C2
2.3.0 Ground Clearances

NOTE: The distances given in the Ground Clearances charts are reference distances calculated for A/C weight and CG conditions. The conditions used in the calculations are maximum A/C weight (minimum ground clearances) and a typical A/C maintenance weight (typical ground clearances for maintenance).
A310
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

2.3 Ground Clearances
Model 200 and 200C

<table>
<thead>
<tr>
<th>MODEL C</th>
<th>OPERATING WEIGHT EMPTY CG 25 %</th>
<th>MAXIMUM RAMP WEIGHT CG 18 %</th>
<th>MAXIMUM RAMP WEIGHT CG 35 %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>m</td>
<td>ft</td>
<td>m</td>
</tr>
<tr>
<td>B</td>
<td>2.611</td>
<td>8.57</td>
<td>2.503</td>
</tr>
<tr>
<td>C</td>
<td>4.610</td>
<td>15.12</td>
<td>4.505</td>
</tr>
<tr>
<td>D</td>
<td>7.548</td>
<td>24.76</td>
<td>7.444</td>
</tr>
<tr>
<td>E</td>
<td>varies between values 0.654 m (2.14 ft) and 0.778 m (2.55 ft)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>4.573</td>
<td>15.00</td>
<td>4.481</td>
</tr>
<tr>
<td>G</td>
<td>1.958</td>
<td>6.42</td>
<td>1.877</td>
</tr>
<tr>
<td>H</td>
<td>2.720</td>
<td>8.92</td>
<td>2.640</td>
</tr>
<tr>
<td>J</td>
<td>5.392</td>
<td>17.69</td>
<td>5.226</td>
</tr>
<tr>
<td>K</td>
<td>2.751</td>
<td>9.03</td>
<td>2.676</td>
</tr>
<tr>
<td>L</td>
<td>4.845</td>
<td>15.89</td>
<td>4.775</td>
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<tr>
<td>M</td>
<td>7.301</td>
<td>23.95</td>
<td>7.246</td>
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<tr>
<td>N</td>
<td>15.947</td>
<td>52.32</td>
<td>15.896</td>
</tr>
<tr>
<td>P</td>
<td>4.70</td>
<td>15.42</td>
<td>4.53</td>
</tr>
<tr>
<td>Q</td>
<td>6.10</td>
<td>20.00</td>
<td>5.92</td>
</tr>
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</table>
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

2.3 Ground Clearances
Model 300

<table>
<thead>
<tr>
<th></th>
<th>OPERATING WEIGHT</th>
<th>MAXIMUM RAMP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EMPTY CG 25 %</td>
<td>WEIGHT CG 18 %</td>
</tr>
<tr>
<td>m</td>
<td>ft</td>
<td>m</td>
</tr>
<tr>
<td>B</td>
<td>2.623</td>
<td>8.61</td>
</tr>
<tr>
<td>D</td>
<td>7.560</td>
<td>24.80</td>
</tr>
<tr>
<td>E</td>
<td>0.667</td>
<td>2.19</td>
</tr>
<tr>
<td>F</td>
<td>4.582</td>
<td>15.03</td>
</tr>
<tr>
<td>G</td>
<td>1.942</td>
<td>6.37</td>
</tr>
<tr>
<td>H</td>
<td>2.700</td>
<td>8.86</td>
</tr>
<tr>
<td>J</td>
<td>5.378</td>
<td>17.64</td>
</tr>
<tr>
<td>K</td>
<td>2.717</td>
<td>8.91</td>
</tr>
<tr>
<td>L</td>
<td>4.802</td>
<td>15.75</td>
</tr>
<tr>
<td>M</td>
<td>7.220</td>
<td>23.69</td>
</tr>
<tr>
<td>N</td>
<td>15.867</td>
<td>52.06</td>
</tr>
<tr>
<td>P</td>
<td>4.66</td>
<td>15.29</td>
</tr>
<tr>
<td>Q</td>
<td>6.09</td>
<td>19.97</td>
</tr>
</tbody>
</table>
232 SEATS ALL TOURIST CLASS

34 in. PITCH, 8 ABREAST, 2-2/2-2
NOTE: FOR DOOR SIZES
SEE CHAPTER 2.7

243 SEATS ALL TOURIST CLASS
34 in. PITCH, 8 ABREAST, 2-2-2

ITEM | DESIGNATION
--- | ---
A | ATTENDANT SEAT
C | COAT STOWAGE
G | GALLEY
L | LAVATORY
2.4 INTERIOR ARRANGEMENT
2.4.1 PASSENGERS
2.4 INTERIOR ARRANGEMENTS
2.4.2 CARGO (12 PALLETs)
MODEL C
12 PALLETS 88 x 108 in. (2.235 x 2.743 m)

2.4.2 INTERIOR ARRANGEMENTS
MODEL C

FWD PASSENGER/CREW DOOR

GALLEY

COAT STOWAGE

LAVATORY

UPPER DECK CARGO DOOR

EMERGENCY EXIT

AFT PASSENGER/CREW DOOR

GALLEY

LAVATORY

AFT PASSENGER/CREW DOOR
2.5 PASSENGER COMPARTMENT CROSS SECTION
2.6 LOWER COMPARTMENT

2.6.2 PALLETs IN FORWARD CARGO COMPARTMENT
PERMISSIBLE CARGO HEIGHT

A = 2.222 m (7.3 ft)
B = 2.197 m (7.2 ft)
C = 2.006 m (6.5 ft)
D = 1.625 m (5.3 ft)

LOCAL FLOOR LOADS

FORWARD CARGO SECTION

CENTER CARGO SECTION

AFT CARGO SECTION

2.6.3 UPPER DECK CARGO COMPARTMENT

MODEL 200C
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7</td>
<td>Door Clearances</td>
</tr>
<tr>
<td>2.7.1</td>
<td>Forward Passenger/Crew Door</td>
</tr>
<tr>
<td>2.7.2</td>
<td>Emergency Exit</td>
</tr>
<tr>
<td>2.7.3</td>
<td>Aft Passenger/Crew Door</td>
</tr>
<tr>
<td>2.7.4</td>
<td>Forward Cargo Compartment Door</td>
</tr>
<tr>
<td>2.7.5</td>
<td>Bulk Cargo Compartment Door</td>
</tr>
<tr>
<td>2.7.6</td>
<td>Aft Cargo Compartment Door</td>
</tr>
<tr>
<td>R 2.7.7</td>
<td>Upper Deck Cargo Door</td>
</tr>
<tr>
<td>2.7.8</td>
<td>Radome Travel</td>
</tr>
<tr>
<td>2.7.9</td>
<td>Main Landing Gear Door</td>
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</tbody>
</table>
2.7 DOOR CLEARANCES
2.7.1 FORWARD PASSENGER/CREW DOOR
SECTION A.A

MINIMUM CLEARANCE BETWEEN OUTER DOOR HANDLE AND WING WHEN DOOR IS OPENED FROM OUTSIDE

MINIMUM CLEARANCE BETWEEN DOOR AND WING WHEN DOOR IS OPENED FROM INSIDE

2.7 DOOR CLEARANCES
2.7.2 EMERGENCY EXIT
2.7 DOOR CLEARANCES
2.7.3 AFT PASSENGER/CREW DOOR
2.7 DOOR CLEARANCES

2.7.4 FORWARD CARGO COMPARTMENT DOOR
2.7 DOOR CLEARANCES
2.7.5 BULK CARGO COMPARTMENT DOOR
2.7 DOOR CLEARANCES

2.7.6 AFT CARGO COMPARTMENT DOOR
2.7 DOOR CLEARANCES
2.7.7 UPPER DECK CARGO DOOR
MODEL 200C
2.7 DOOR CLEARANCES
2.7.8 RADOME TRAVEL
2.7 DOOR CLEARANCES

2.7.9 MAIN LANDING GEAR DOOR
3.0 AIRPLANE PERFORMANCE
3.1 General Information
3.2 Payload Range
3.2.1 Long Range Cruise ISA Conditions
3.3 FAR Take off Runway Length Requirements
3.3.1 ISA Conditions
3.3.2 ISA various Conditions
3.4 FAR Landing Runway Requirements
3.4.1 All Ambient Temperatures
R 3.5 Final Approach Speed
R 3.5.1 Final Approach Speed at 1.3 Vs
3.1 General Information

Section 3.2 indicates payload range information at specific altitudes recommended for long range cruise with a given fuel reserve condition.

Section 3.3 represents FAR takeoff runway length requirements at ISA and ISA + 15.3°C (59°F) for PW JT9D-7R4 engines and ISA + 18.3°C (65°F) for GE CF6-80A3 engines conditions for FAA certification.

Section 3.4 represents FAR landing runway length requirements for FAA certification.

Section 3.5 indicates Final approach speeds.

Standard day temperatures for the altitudes shown are tabulated below:

<table>
<thead>
<tr>
<th>Altitude</th>
<th>ISA Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>°F</td>
</tr>
<tr>
<td>FEET</td>
<td>METERS</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2000</td>
<td>610</td>
</tr>
<tr>
<td>4000</td>
<td>1220</td>
</tr>
<tr>
<td>6000</td>
<td>1830</td>
</tr>
<tr>
<td>8000</td>
<td>2440</td>
</tr>
</tbody>
</table>
NOTE: MAXI TAKEOFF WEIGHT
291005 lb
(132000 kg)

NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY.
THE APPROVED VALUES ARE STATED IN THE 'OPERATING
MANUALS' SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
NOTE: MAXI TAKEOFF WEIGHT
305,557 lb
(138,000 kg)

NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE OPERATING
MANUALS' SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT

3.2.2 PAYLOAD RANGE LONG RANGE CRUISE
MODEL 200 - 158.6 T

MAX STRUCTURAL PAYLOAD

237 PASSENGERS

CRUISE CONDITIONS:
ISA, L.R.C.
35000/39000 ft

INTERNATIONAL RESERVES:
EN ROUTE 10% FLIGHT TIME OVERSHOOT
200 NM (370 KM) DIVERSION
30 MINUTES HOLD AT 1500 FT
APPROACH AND LANDING

RANGE NAUTICAL MILES

RANGE KM

Chapter 3.2.1
Page 1
Sep 85
Printed in France
3.2 PAYLOAD RANGE

3.2.1 PAYLOAD RANGE LONG RANGE CRUISE
GE - CF6 - 80 A3 ENGINE
MODEL 200 - 142 T
NOTE: MAXI TAKEOFF WEIGHT
313 053 lb
(142 000 kg)

NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY.
THE APPROVED VALUES ARE STATED IN THE OPERATING
MANUALS SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.

MAX STRUCTURAL PAYLOAD

3.2.1 PAYLOAD RANGE LONG RANGE CRUISE
MODEL 200 - 142 T

PM - JT9D - 744 ENGINE

237 PASSENGERS

CRUISE CONDITIONS:
ISA; L.R.C.
35000/39000 ft

INTERNATIONAL RESERVES:
EN ROUTE 10% FLIGHT TIME
OVERSHOOT
200 NM (370 KM) DIVERSION
30 MINUTES HOLD AT 1500 ft
APPROACH AND LANDING

RANGE NAUTICAL MILES

RANGE km

Printed in France
3.2 PAYLOAD RANGE

3.2.1 PAYLOAD RANGE LONG RANGE CRUISE

ISA CONDITIONS

GE - CF6 - 80 C2 ENGINE
MODEL 300 - 153 T

Chapter 3.2.1
Page 9
Sep 85
3.2 PAYLOAD RANGE

3.2.1 PAYLOAD RANGE LONG RANGE CRUISE
ISA CONDITIONS
PW ENGINE
MODEL 300 - 157 T

Chapter 3.2.1
Page 12
Mar 93
3.2.1 PAYLOAD (1000 lb)

3.2 PAYLOAD RANGE LONG RANGE CRUISE

GE = CF6 - 80 C2 ENGINE

MAXI TAKE OFF WEIGHT
352 700 lb
(160 000 kg)

NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING
MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.

PAYLOAD (1000 lb)

Cruise Conditions:
ISA, L.R.C.
31000/35000/39000 ft

International Reserves:
EN ROUTE 10% FLIGHT TIME
OVERSHOOT

200 NM (370 km) DIVERSION
30 MINUTES HOLD AT 1500 ft
APPROACH AND LANDING

4750 NM

SUPPLEMENTARY FUEL OPTIONS

RANGE NAUTICAL MILES

RANGE km

240 PAX + 11.7 t (25,800 lb) CARGO

240 PASSENGERS + BAGGAGE

0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000

0 5 10 15 20 25 30 35
3.2 PAYLOAD RANGE

3.2.1 PAYLOAD RANGE LONG RANGE CRUISE
ISA CONDITIONS
PW ENGINE
MODEL 300 - 160 T

Chapter 3.2.1
Page 14
Mar 93

Printed in France
3.2 Pay Load Range Long Range Cruise

GE - CF6 - 80 C2 ENGINE

Model 300 - 164 T

Cruise Conditions:
ISA, L.R.C.
31000/35000/39000 ft

International Reserves:
En route 10% flight time
Overshoot
200 NM (370 km) diversion
30 minutes hold at 1500 ft
Approach and landing

Supplementary fuel options

Range nautical miles

0 1000 2000 3000 4000 5000 6000

0 2000 4000 6000

240 Passengers + Baggage

240 PAX + 11.0 t (24,200 lb) Cargo

Pay Load (1000 lb)

(1000 kg)

Maxi Take Off Weight
361 600 lb
(164 000 kg)

Note: These curves are given for information only.
The approved values are stated in the "Operating Manuals" specific to the airline operating the aircraft.
NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY. THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
3.3 FAR TAKE-OFF RUNWAY LENGTH REQUIREMENTS

3.3.1 ISA CONDITIONS

PW - JT9D - 7R4 ENGINE
MODEL 300

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NOTE: THESE CURVES ARE GIVEN FOR INFORMATION ONLY. THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT.
3.3 FAR TAKE-OFF RUNWAY LENGTH REQUIREMENTS

3.3.2 ISA + 15°C (59°F)  
GE - CF6 - 80 A3 ENGINE  
MODEL 200

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3.3 FAR TAKE-OFF RUNWAY LENGTH REQUIREMENTS
3.3.2 ISA + 15°C (59°F) CONDITIONS
GE - CF6 - 80 C2 ENGINE
MODEL 300

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Page 3
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3.4 F.A.R. LANDING RUNWAY REQUIREMENTS
3.4.1 ALL AMBIENT TEMPERATURES
GE ENGINES
MODEL 200 AND 300
3.4 FAR LANDING RUNWAY REQUIREMENTS
3.4.1 ALL AMBIENT TEMPERATURES PW ENGINES
MODEL 200 AND 300

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Page 2
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3.5 FINAL APPROACH SPEED
3.5.1 FINAL APPROACH SPEED GE AND PW ENGINES
MODEL 200 AND 300
4.0 GROUND MANEUVERING
4.1 General Information
4.2 Turning Radii, no Slip Angle
4.3 Minimum Turning Radii
4.4 Visibility from Flight Compartment in Static Position
4.5 Runway and Taxiway Turn Paths
4.5.1 More than 90° Turn Runway to Taxiway Turn
4.5.2 90° Turn-Runway to Taxiway
4.5.3 90° Turn-Taxiway to Taxiway
4.6 Runway Holding Bay (Apron)
4.1 GENERAL INFORMATION

This section provides airplane turning capability and maneuvering characteristics.

For case of presentation, this data has been determined from the theoretical limits imposed by the geometry of the aircraft, and where noted, provides for a normal allowance for tire slippage. As such, it reflects the turning capability of the aircraft in favorable operating circumstances. This data should only be used as guidelines for the method of determination of such parameters and for the maneuvering characteristics of this aircraft type.

In the ground operating mode, varying airline practices may demand that more conservative turning procedures be adopted to avoid excessive tire wear and reduce possible maintenance problems. Airline operating techniques will vary in the level of performance, over a wide range of operating circumstances throughout the world. Variations from standard aircraft operating patterns may be necessary to satisfy physical constraints within the maneuvering area, such as adverse grades, limited area or high risk of jet blast damage. For these reasons, ground maneuvering requirements should be coordinated with the using airlines prior to layout planning.
**NOTE:**
Actual operating data may be greater than values shown since tire slippage is not considered in these calculations.

4.2 TURNING RADIi NO SLIP ANGLE.
4.3 Minimum Turning Radii
A310
AIRPLANE CHARACTERISTICS

NOTE: NOT TO BE USED FOR LANDING APPROACH VISIBILITY

PILOT'S EYE POSITION

SEE CHAPTER 2.3

18 ft. 7 in. 5.78 m

25°

19.20°

PILOT'S EYE POSITION

7 ft. 10.7 in. 2.40 m

45 ft. 1.3 in. 13.75 m

21 ft. 10.6 in. 6.67 m

111°

135°

115°

135°

MAX AFT VISION
WITH HEAD ROTATED
ABOUT SPINAL COLUMN

1 ft. 9 in.
0.53 m

WITH HEAD MOVED 5 INCHES OUTBOARD

62°

42°

30°

62°

42°

30°

36°

36°

EYE REF POINT

4.4 VISIBILITY FROM FLIGHT COMPARTMENT IN STATIC POSITION

Chapter 4.4.0
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4.5 RUNWAY AND TAXIWAY TURN PATHS
4.5.1 MORE THAN 90° TURN RUNWAY TO TAXIWAY TURN

NOTE: COORDINATE WITH USING AIRLINE FOR SPECIFIC PLANNED OPERATING PROCEDURE.
NOTE: COORDINATE WITH USING AIRLINE FOR SPECIFIC PLANNED OPERATING PROCEDURE

4.5 RUNWAY AND TAXIWAY TURN PATHS
4.5.2 90° TURN RUNWAY TO TAXIWAY

Chapter 4.5.2
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NOTE: COORDINATE WITH USING AIRLINE FOR SPECIFIC PLANNED OPERATING PROCEDURE

4.5 RUNWAY AND TAXIWAY TURN PATHS
4.5.3 90° TURN—TAXIWAY TO TAXIWAY
Nose gear steering angle: -25°

Diagram showing runway holding bay (apron) with various distances marked:
- 277.2 ft. (84.5 m)
- 100 ft. (30.48 m)
- 20 ft. (6.1 m)
- 75 ft. (22.86 m)
- 150 ft. (45.72 m)

Note: Coordinate with using airline for specific planned operating procedure.

4.6 Runway holding bay (apron)
R 5.0 TERMINAL SERVICING

5.1 Airplane Servicing Arrangements – Typical

R 5.1.1 Symbols Used On Servicing Diagrams

R 5.1.2 Open Apron Free Standing – Passenger's Stairways

R 5.1.3 Open Apron Free Standing – Cargo Loading

5.2 Turnaround Station (30 Minutes)

5.2.2 Turnaround Station (45 Minutes)

5.2.3 Turnaround Station (90 Minutes)

R 5.3 Terminal Operations – En route Station

5.4 Ground Service Connections

5.4.1 Symbols Used On Ground Service Connections Diagrams

5.4.2 Ground Service Connections Layout

5.4.3 Hydraulic System

5.4.4 Electrical System

5.4.5 Oxygen System

5.4.6 Fuel System

5.4.7 Pneumatic System

5.4.8 Potable Water System

5.4.9 Oil System

5.4.10 Toilet System

5.5 Engine Starting Pneumatic Requirements

5.5.1 Ambient Temperature -40°C (-40°F)

5.5.2 Ambient Temperature +15°C (+60°F)

5.5.3 Ambient Temperature +38°C (+100°F)

5.6 Ground Pneumatic Power Requirements

5.6.1 Heating

5.6.2 Cooling

5.7 Preconditioned Airflow Requirements

5.8 Ground Towing Requirements

5.8.1 Ground Towing Requirements – Towbar Design
This section provides typical ramp layouts, showing the various GSE items in position during typical turnaround scenarios. These ramp layouts show typical arrangements only. Each operator will have its own specific requirements/regulations for the positioning and operation on the ramp. For each ramp layout, the associated typical turnaround time is given in a Chart in section 5.2.1 for the passenger aircraft.

### Symbols Used On Servicing Diagrams

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<tbody>
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<td>AS</td>
<td>AIR STARTING UNIT</td>
</tr>
<tr>
<td>BL</td>
<td>BULK LOADER</td>
</tr>
<tr>
<td>D</td>
<td>DOLLY</td>
</tr>
<tr>
<td>F</td>
<td>FUEL TANKER</td>
</tr>
<tr>
<td>GC</td>
<td>GROUND AIR PRECONDITIONING UNIT</td>
</tr>
<tr>
<td>GL</td>
<td>GROUND LOADER</td>
</tr>
<tr>
<td>GPU</td>
<td>ELECTRICAL GROUND POWER UNIT</td>
</tr>
<tr>
<td>GS</td>
<td>GALLEY SERVICE TRUCK</td>
</tr>
<tr>
<td>P</td>
<td>PASSENGER LOADING BRIDGE</td>
</tr>
<tr>
<td>ST</td>
<td>STAIRWAY</td>
</tr>
<tr>
<td>T</td>
<td>TRANSPORTER</td>
</tr>
<tr>
<td>TS</td>
<td>TOILET SERVICE TRUCK</td>
</tr>
<tr>
<td>UL</td>
<td>UPPERDECK LOADER</td>
</tr>
<tr>
<td>W</td>
<td>WATER SERVICE TRUSK</td>
</tr>
</tbody>
</table>
Airplane Servicing Arrangements - Typical
Open Apron Free Standing - Passenger's Stairways
Model 200 and 300
Airplane Servicing Arrangements - Typical
Open Apron Free Standing - Passenger's Loading Bridge
Model 200 and 300
Airplane Servicing Arrangements — Typical
Open Apron Free Standing — Cargo Loading
Model 200 C
5.2.1 TERMINAL OPERATIONS
Model 200 and 300

5.2.1.1 TURNAROUND STATION 30 MINUTES

Passenger Activity
- Position/Remove Bridge/Stairs
- Open/Close door
- Pax Disembark/Embark
- Clean
- Catering

Lower Deck Activity
- Open/Close FWD cargo door
- Position/Remove Loaders
  FWD CC Offload/Load
- Open/Close AFT cargo door
- Position/Remove Loaders
  AFT CC Offload/Load
- Position/Remove conveyor
- Open/Close bulk door
  Bulk Offload/Load

Servicing Activity
- Potable water
- Waste water / Lavatory
- Position/Remove Fuel Truck/Hydrant
- Refuel

237 pax off • average of 22 per min = 10.75 mins
237 pax on • average of 18 per min = 13 mins

4 x LD3 + 1 x 88 x 125" pallet off

6 x LD3 off / 6 x LD3 on

2000kg off / 2000kg on

400l = 2 mins + connect/disconnect = 6.5 mins
530l = 3.5 mins + connect, flush, disinfect
   /disconnect = 7.5 mins

Time in minutes
0 5 10 15 20 25 30 35 40 45

Thus 30 minutes turn round not realistic
5.2 TERMINAL OPERATIONS
5.2.2 TURNAROUND STATION 45 MINUTES
MODEL 200 AND 300
### 5.2.3 TURNAROUND STATION 90 MINUTES

#### MODEL 200 AND 300

**Passenger Activity**
- Position/Remove Bridge/Stairs
- Open/Closed door
- Pax Disembark/Embark
- Clean
- Catering

**Lower Deck Activity**
- Open/Closed FWD cargo door
- Position/Remove Loaders
- FWD CC Offload/Load
- Open/Closed AFT cargo door
- Position/Remove Loaders
- AFT CC Offload/Load
- Position/Remove conveyor
- Open/Closed bulk door
- Bulk Offload/Load

**Servicing Activity**
- 400l + connect/disconnect = 6.5 mins Potable water
- 530l + connect, flush, disinfect /disconnect = 7.5 mins Waste water / Lavatory
- Position/Remove Fuel Truck/Hydrant
- Refuel No allowance for ACT

---

237 pax off @ 22/min = 10.75 mins
237 pax on @ 18/min = 13 mins

4 x LD3 + 1 x B6 "x 125" pallet off
8 x LD3 on
6 x LD3 off
6 x LD3 on
2000kg off
2000kg on
5.3 Terminal Operations – En Route Station

This section provides a chart showing typical activities for home-base turnaround. This data is provided to show the general scope and type of activities involved in ramp operations during the turnaround of an aircraft. Varying Airline practices and operating circumstances may result in different sequences and different time intervals to do the activities shown.

**Estimated Time-Minutes**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position Stairways</td>
<td>0</td>
</tr>
<tr>
<td>Opening Doors and Position Loaders</td>
<td>5</td>
</tr>
<tr>
<td>Baggage and Cargo Movement</td>
<td>10</td>
</tr>
<tr>
<td>Clean Cabin</td>
<td>15</td>
</tr>
<tr>
<td>Service Toilet and Water Replenishment</td>
<td>20</td>
</tr>
<tr>
<td>Service Galley</td>
<td>25</td>
</tr>
<tr>
<td>Refuel</td>
<td>30</td>
</tr>
<tr>
<td>Walk Around Check</td>
<td></td>
</tr>
<tr>
<td>Remove Loaders and Close Cargo Doors</td>
<td></td>
</tr>
<tr>
<td>Remove Stairways</td>
<td></td>
</tr>
<tr>
<td>Start Engines</td>
<td></td>
</tr>
<tr>
<td>Disconnections</td>
<td></td>
</tr>
</tbody>
</table>

**All Freight Containerized**
- 21 Standard M size ULDS on MD
- 4 Standard M size ULDS in FWD LDCC
- 10 Standard K size ULDS in AFT LDCC

**100% Unloading/Loading**

**APU Running**

**Note:** If the aircraft is fitted with ACT's the refueling time will be longer (up to 65 min with 2 ACT installed)

Terminal Operations – En Route Station
Model A310
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>POTABLE WATER FILLING AND DISCHARGING</td>
</tr>
<tr>
<td>A1</td>
<td>POTABLE WATER DRAINING</td>
</tr>
<tr>
<td>D</td>
<td>ENGINE AND IDG OIL FILLING</td>
</tr>
<tr>
<td>E</td>
<td>LAVATORY SERVICING, FORWARD AND AFT</td>
</tr>
<tr>
<td>F</td>
<td>ELECTRICAL GROUND POWER</td>
</tr>
<tr>
<td>G</td>
<td>PRECONDITIONING - LP</td>
</tr>
<tr>
<td>H</td>
<td>GRAVITY FILLING</td>
</tr>
<tr>
<td>J</td>
<td>HYDRAULIC</td>
</tr>
<tr>
<td>L</td>
<td>PRESSURE REFUELING</td>
</tr>
<tr>
<td>M</td>
<td>ENGINE STARTING/HP</td>
</tr>
</tbody>
</table>

5.4 GROUND SERVICE CONNECTIONS
5.4.1 SYMBOLS USED ON GROUND SERVICE CONNECTIONS DIAGRAMS
5.4 GROUND SERVICE CONNECTIONS
5.4.2 GROUND SERVICE CONNECTIONS LAYOUT
MODEL 300 (ENGINE GE CF6 80 C2)
5.4 GROUND SERVICE CONNECTIONS
5.4.2 GROUND SERVICE CONNECTIONS LAYOUT
MODEL 300 (ENGINE PW 4000)

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Page 4
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Printed in France
## A310 AIRPLANE CHARACTERISTICS

### HYDRAULIC SYSTEM

<table>
<thead>
<tr>
<th>AFT OF NOSE</th>
<th>FROM AIRPLANE CENTERLINE</th>
<th>MEAN HEIGHT FROM GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>RH SIDE</td>
<td>LH SIDE</td>
<td></td>
</tr>
<tr>
<td>DISTANCE</td>
<td>(ft - in.)</td>
<td></td>
</tr>
</tbody>
</table>

### A. Tank pressurization:
- One 1/4 in. self sealing connection common to the 3 tanks

<table>
<thead>
<tr>
<th>DISTANCE</th>
<th>(ft - in.)</th>
<th>MEAN HEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.22</td>
<td>3.95</td>
<td>3.50</td>
</tr>
<tr>
<td>(66-4)</td>
<td>(12-11)</td>
<td>(11-6)</td>
</tr>
</tbody>
</table>

### B. Accumulator charging:
- One MS28889 - 1 connection for both YELLOW system accumulators
- One MS28889 - 1 connection for YELLOW system braking accumulator and GREEN system accumulator
- One MS28889 - 1 connection for BLUE system accumulator

<table>
<thead>
<tr>
<th>DISTANCE</th>
<th>(ft - in.)</th>
<th>MEAN HEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.36</td>
<td>1.88</td>
<td>2.84</td>
</tr>
<tr>
<td>(76-8)</td>
<td>(6-2)</td>
<td>(9-4)</td>
</tr>
<tr>
<td>23.36</td>
<td>1.55</td>
<td>2.84</td>
</tr>
<tr>
<td>(76-8)</td>
<td>(5-1)</td>
<td>(9-4)</td>
</tr>
<tr>
<td>19.98</td>
<td>3.20</td>
<td>3.65</td>
</tr>
<tr>
<td>(65-7)</td>
<td>(10-6)</td>
<td>(12-0)</td>
</tr>
</tbody>
</table>

### C. Tank filling:
- One 1/4 in. self sealing connection common to the 3 tanks

<table>
<thead>
<tr>
<th>DISTANCE</th>
<th>(ft - in.)</th>
<th>MEAN HEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.73</td>
<td>2.10</td>
<td>2.94</td>
</tr>
<tr>
<td>(74-7)</td>
<td>(6-11)</td>
<td>(9-8)</td>
</tr>
</tbody>
</table>

### D. Tank overflow:
- One 3/8 in. self sealing connections (one per tank)
  - YELLOW
  - GREEN
  - BLUE

<table>
<thead>
<tr>
<th>DISTANCE</th>
<th>(ft - in.)</th>
<th>MEAN HEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.22</td>
<td>3.95</td>
<td>3.50</td>
</tr>
<tr>
<td>(66-4)</td>
<td>(12-11)</td>
<td>(11-6)</td>
</tr>
<tr>
<td>22.73</td>
<td>2.10</td>
<td>2.94</td>
</tr>
<tr>
<td>(74-7)</td>
<td>(6-11)</td>
<td>(9-8)</td>
</tr>
<tr>
<td>20.22</td>
<td>3.95</td>
<td>3.50</td>
</tr>
<tr>
<td>(66-4)</td>
<td>(12-11)</td>
<td>(11-6)</td>
</tr>
</tbody>
</table>

### E. Ground test
- Three 1 in. self sealing connections and three 1 - 1/2 in. self sealing connections (one pair per system)
  - GREEN
  - YELLOW
  - BLUE

<table>
<thead>
<tr>
<th>DISTANCE</th>
<th>(ft - in.)</th>
<th>MEAN HEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.22</td>
<td>3.95</td>
<td>3.50</td>
</tr>
<tr>
<td>(66-4)</td>
<td>(12-11)</td>
<td>(11-6)</td>
</tr>
<tr>
<td>22.73</td>
<td>2.10</td>
<td>2.94</td>
</tr>
<tr>
<td>(74-7)</td>
<td>(6-11)</td>
<td>(9-8)</td>
</tr>
<tr>
<td>20.22</td>
<td>3.95</td>
<td>3.50</td>
</tr>
<tr>
<td>(66-4)</td>
<td>(12-11)</td>
<td>(11-6)</td>
</tr>
</tbody>
</table>

---

5.4 GROUND SERVICE CONNECTIONS
5.4.3 HYDRAULIC SYSTEM

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AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

ELECTRICAL SYSTEM

One standard 6 pin connector
ISO R 461 specification

Supply:
115/200 Volt, 3-Phase, 400 Hz
Power required: 90 KVA

R Electrical Connectors for Servicing

R Note: For mating connectors contact HUBBEL (FSCM 7H582)

<table>
<thead>
<tr>
<th>Distance (ft - in.)</th>
<th>Meters</th>
<th>Mean Height From Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aft of Nose</td>
<td>7.28</td>
<td>2.00</td>
</tr>
<tr>
<td>(23-11)</td>
<td></td>
<td>(6-7)</td>
</tr>
<tr>
<td>Airplane Centerline</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.4 GROUND SERVICE CONNECTIONS
5.4.4 ELECTRICAL SYSTEM
OXYGEN SYSTEM

NOTE: Internal charging connection provided.

<table>
<thead>
<tr>
<th>DISTANCE (ft - in.)</th>
<th>MEAN HEIGHT FROM GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFT OF NOSE</td>
<td>FROM AIRPLANE CENTERLINE</td>
</tr>
<tr>
<td></td>
<td>RH SIDE</td>
</tr>
<tr>
<td>7.81 (25-8)</td>
<td>2.50 (8-2)</td>
</tr>
</tbody>
</table>

One service connection (external charging) 3/8 in. UNF x 24 TPI as Option.

5.4 GROUND SERVICE CONNECTIONS
5.4.5 OXYGEN SYSTEM
### FUEL SYSTEM

<table>
<thead>
<tr>
<th>DISTANCE (ft - in.)</th>
<th>Meters</th>
<th>MEAN HEIGHT FROM GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFT OF NOSE</td>
<td>FROM AIRPLANE CENTERLINE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RH SIDE</td>
<td>LH SIDE</td>
</tr>
<tr>
<td>Two standard 2½ in. connections - ISO R45 Specification (LH SIDE : OPTION)</td>
<td>20.50 (67-3)</td>
<td>10.50 (34-7)</td>
</tr>
<tr>
<td>Two service connections (gravity feed)</td>
<td>21.50 (70-6)</td>
<td>11.00 (36-0)</td>
</tr>
<tr>
<td>Two service connections (gravity feed)</td>
<td>26.00 (85-4)</td>
<td>19.00 (62-4)</td>
</tr>
</tbody>
</table>

**Flow Rate:**
1475 l/mn (325 Imp. gal/mn) (390 U.S. gal/mn) per connection

**Maximum Pressure:**
50 psig (3.45 bars)
PNEUMATIC SYSTEM

<table>
<thead>
<tr>
<th>DISTANCE FROM AIRPLANE CENTERLINE</th>
<th>MEAN HEIGHT FROM GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFT OF NOSE</td>
<td>RH SIDE</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>16.45 (54-0)</td>
<td></td>
</tr>
<tr>
<td>16.99 (55-9)</td>
<td></td>
</tr>
<tr>
<td>15.23 (50-0)</td>
<td>0.82 (2-8)</td>
</tr>
</tbody>
</table>

Two standard 3 in. ISO TC20 connections for engine starting and cabin air conditioning.

One standard 8 in. connection (MS33562) for pre-conditioned air.

5.4 GROUND SERVICE CONNECTIONS
5.4.7 PNEUMATIC SYSTEM
POTABLE WATER SYSTEM

<table>
<thead>
<tr>
<th>DISTANCE (ft - in.)</th>
<th>Meters</th>
<th>MEAN HEIGHT FROM GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFT OF NOSE FROM AIRPLANE CENTERLINE</td>
<td>RH SIDE</td>
<td>LH SIDE</td>
</tr>
<tr>
<td>15.50 (50-10)</td>
<td>1.13 (3-9)</td>
<td>2.48 (8-2)</td>
</tr>
<tr>
<td>15.50 (50-10)</td>
<td>1.13 (3-9)</td>
<td>2.48 (8-2)</td>
</tr>
<tr>
<td>24.25 (79-7)</td>
<td>1.20 (4-0)</td>
<td>2.20 (7-3)</td>
</tr>
</tbody>
</table>

One service panel comprising:
- One standard 3/4 in. quick release filling connection
- One 3/4 in. standard overflow and discharge connection
- One ground pressurization connection

Our standard 3/4 in. quick release filling connection and overflow connection

One draining connection with back-up mechanical control

R Usable capacity: 2 tanks
R - 200 liters (44 Imp.gal) (53 US gal) each

Fill rate:
- Flow: 91 l/mn (20 Imp.gal/mn) (24 US gal/mn)
R - Pressure: 50 psig (3.45 bar)

5.4 Ground Service Connections
5.4.8 Potable Water System
OIL SYSTEM

<table>
<thead>
<tr>
<th>DISTANCE FROM AIRPLANE CENTERLINE</th>
<th>MEAN HEIGHT FROM GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFT OF NOSE</td>
<td>RH SIDE</td>
</tr>
<tr>
<td>A. Engine oil replenishment:</td>
<td>17.11</td>
</tr>
<tr>
<td>One gravity filling cap and one pressure filling connection per engine</td>
<td>(56-2)</td>
</tr>
</tbody>
</table>

R Delivery pressure required: 25 psig (1.72 bar)

Tank capacity:
- Full level: 6 US GAL (22.71 liters)
- Usable: 3 US GAL 4.5 US GAL (17.03 liters)

B. IDG oil replenishment:
One pressure filling connection per engine and one gravity filling port

R Delivery pressure required: 25 psig (1.72 bar)

Tank capacity: 2.12 US GAL (8.04 liters)
OIL SYSTEM

### Engine oil replenishment:
One gravity filling cap and one pressure filling connection per engine

<table>
<thead>
<tr>
<th>DISTANCE (Meters)</th>
<th>MEAN HEIGHT FROM GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AFT OF NOSE</strong></td>
<td><strong>FROM AIRPLANE CENTERLINE</strong></td>
</tr>
<tr>
<td></td>
<td>RH SIDE</td>
</tr>
<tr>
<td>18.01</td>
<td>8.80</td>
</tr>
<tr>
<td>(59-1)</td>
<td>(28.11)</td>
</tr>
</tbody>
</table>

R Delivery pressure required: 25 psig (1.72 bar)

Tank capacity:
- Full level: 7.7 US GAL (29.15 liters)
- Usable: 4.25 US GAL (16.08 liters)

### IDG oil replenishment:
One pressure filling connection per engine and one gravity filling port

<table>
<thead>
<tr>
<th>DISTANCE (Meters)</th>
<th>MEAN HEIGHT FROM GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AFT OF NOSE</strong></td>
<td><strong>FROM AIRPLANE CENTERLINE</strong></td>
</tr>
<tr>
<td></td>
<td>RH SIDE</td>
</tr>
<tr>
<td>16.55</td>
<td>9.00</td>
</tr>
<tr>
<td>(54-4)</td>
<td>(29.6)</td>
</tr>
</tbody>
</table>

R Delivery pressure required: 25 psig (1.72 bar)

Tank capacity: 1.2 US GAL (4.54 liters)
A310
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

OIL SYSTEM

<table>
<thead>
<tr>
<th>DISTANCE (ft - in.)</th>
<th>MEAN HEIGHT FROM GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFT OF NOSE</td>
<td>FROM AIRPLANE CENTERLINE</td>
</tr>
<tr>
<td></td>
<td>RH SIDE</td>
</tr>
<tr>
<td>Engine oil replenishment:</td>
<td>17.11</td>
</tr>
<tr>
<td>One gravity filling cap and one pressure filling connection per engine</td>
<td>(56-2)</td>
</tr>
<tr>
<td></td>
<td>7.00</td>
</tr>
<tr>
<td></td>
<td>(22-11)</td>
</tr>
</tbody>
</table>

R Delivery pressure required: 25 psig (1.72 bar)

Tank capacity:
- Full level: 6.7 US GAL (25.36 liters)
- Usable: 3.2 US GAL (12.11 liters)

B. IDG oil replenishment:
One pressure filling connection per engine and one gravity filling port

<table>
<thead>
<tr>
<th>DISTANCE (ft - in.)</th>
<th>MEAN HEIGHT FROM GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDG oil replenishment:</td>
<td>16.55</td>
</tr>
<tr>
<td>One pressure filling connection per engine and one gravity filling port</td>
<td>(54-4)</td>
</tr>
<tr>
<td></td>
<td>6.80</td>
</tr>
<tr>
<td></td>
<td>(22-4)</td>
</tr>
</tbody>
</table>

R Delivery pressure required: 25 psig (1.72 bar)

Tank capacity: 2.12 US GAL (8.04 liters)

5.4 GROUND SERVICE CONNECTIONS
5.4.9 ENGINE AND IDG OIL SYSTEM
MODEL 300 (GE CF6-80C2 Engine)
TOILET SYSTEM

<table>
<thead>
<tr>
<th>AFT OF NOSE</th>
<th>FROM AIRPLANE CENTERLINE</th>
<th>MEAN HEIGHT FROM GROUND</th>
</tr>
</thead>
<tbody>
<tr>
<td>RH SIDE</td>
<td>LH SIDE</td>
<td></td>
</tr>
<tr>
<td>4.40</td>
<td>1.71</td>
<td>3.28</td>
</tr>
<tr>
<td>(14-5)</td>
<td>(5-7)</td>
<td>(10-9)</td>
</tr>
<tr>
<td>36.03</td>
<td>0.64</td>
<td>4.26</td>
</tr>
<tr>
<td>(118-0)</td>
<td>(2-1)</td>
<td>(13-10)</td>
</tr>
</tbody>
</table>

Service panel comprising:
One standard 4 in. drain connection and two 1 in. flushing connections
One 1 in. flushing connection

R Capacity 2 tanks:
R - Waste : 265 liters (58.2 Imp.gal) (70 US gal) each
R - Chemical fluid : 9.5 liters (2.1 Imp.gal) (2.5 US gal)

5.4 Ground Service Connections
5.4.10 Toilet System
5.5 ENGINE STARTING PNEUMATIC REQUIREMENTS
5.5.1 AMBIENT TEMPERATURE - 40°C (-40°F)
GE CF6 80A3 ENGINE

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5.5 ENGINE STARTING PNEUMATIC REQUIREMENTS
5.5.1 AMBIENT TEMPERATURE: -40°C (-40°F)
PW JT9D 7R4 AND PW 4000 ENGINE
5.5 ENGINE STARTING PNEUMATIC REQUIREMENTS
5.5.1 AMBIENT TEMPERATURE: -40°C (-40°F)
GE-CF6-80C2 ENGINE

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AIR SUPPLY TEMPERATURE AT FUSELAGE CONNECTION

0 TO 8000 FT, ALT
TEMP AMBIENT : ISA + 15°C (+ 60°F)

5.5 ENGINE STARTING PNEUMATIC REQUIREMENTS
5.5.2 AMBIENT TEMPERATURE + 15°C (+ 60°F)

GE CF6 80A3 ENGINE
5.5 ENGINE STARTING PNEUMATIC REQUIREMENTS
5.5.2 AMBIENT TEMPERATURE : +15°C (+60°F)
PW JT9D 7R4 AND PW4000 ENGINE
5.5 ENGINE STARTING PNEUMATIC REQUIREMENTS
5.5.2 AMBIENT TEMPERATURE: +15°C (+60°F)
GE-CF6-80C2 ENGINE

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5.5 ENGINE STARTING PNEUMATIC REQUIREMENTS

5.5.3 AMBIENT TEMPERATURE: +40°C (+104°F)
PW JT9D 7R4 AND PW4000 ENGINE
5.5 ENGINE STARTING PNEUMATIC REQUIREMENTS
5.5.3 AMBIENT TEMPERATURE: +38°C (+100°F)
GE-9F6-80C2 ENGINE

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Printed in France
5.6.1 HEATING

INITIAL CABIN TEMPERATURE AT 23°C (73.4°F)
TEMPERATURE AT GROUND CONNECTION: 7°C (44.6°F)
EMPTY CABIN
LIGHTING: OFF
RECIRCULATION: OFF

TIME TO HEAT CABIN TO 21°C (69.8°F) ON GROUND

CABIN AIRFLOW
lb/s  kg/s
5.5  2.5
4.5  2.0
3.5  1.5
2.5  1.0
1.5  0.5
1.0  0.25

500  750  1000  1250  1500  1750  2000  2500  3000  3500

TIME (min)
INITIAL CABIN TEMPERATURE AT 30°C (86°F)
TEMPERATURE AT GROUND CONNECTION 1.6°C (34.9°F)
45% RELATIVE HUMIDITY
EMPTY CABIN
SUN : 3 900 W
RECIRCULATION : OFF

CABIN AIRFLOW

0 250 500 750 1000 1250 1500
TIME (s)

0 5 10 15 20 25
TIME (min)

TIME TO COOL CABIN TO 27°C (80.6°F) ON GROUND

5.6 GROUND PNEUMATIC POWER REQUIREMENTS
5.6.2 COOLING

lb/s kg/s
5.7 Preconditioned Airflow Requirements

- Curve 1: Cabin at 24°C (75.2°F) - 237 Passengers and 7 Cabin Attendants. No galley load. Bright day solar load = 3900 W. Electrical load = 0. Recirculation: ON.
- Curve 2: Cabin at 27°C (80.6°F). All other conditions same as in 1. Recirculation: ON.
- Curves 3-6: Cabin at 24°C (75.2°F). No passenger of cabin attendants. No other heat load.

O.A.T.: Outside Ambient Temperature
5-8 Ground Towing Requirements

This section provides information on aircraft Towing.

The A310 is designed with means for conventional towing or towbarless towing. Information on towbar less towing can be found in SIL 09-002 and chapter 9 of the Aircraft Maintenance Manual.

1. Ground Towing

   It is possible to tow or push the aircraft, at maximum ramp weight with engines at zero or up to idle thrust, using a towbar attached to the nose gear leg. Two towbar fittings are installed, one at the front of the leg and one at the back.

   The body gears have attachment points for towing or debogging (for details refer to chapter 7 of the Aircraft Recovery Manual).

A. The first part of this section shows the chart to determine the draw bar pull and tow tractor mass requirements as function of the following physical characteristics:

   - Aircraft weight
   - Slope
   - Number of engines at idle

   The chart is based on the A310 engine type with the biggest idle thrust.
   The chart is therefore valid for all A310 models.

B. The second part of this section supplies guidelines for the towbar.

   NOTE : Information on aircraft towing procedures and corresponding aircraft limitations are given in chapter 9 of the Aircraft Maintenance Manual.
NOTE: UNUSUAL BREAKAWAY CONDITIONS NOT REFLECTED. ESTIMATED FOR RUBBER TIRED TOW VEHICLES. COEFFICIENTS OF FRICTION (μ) APPROXIMATE.

IN EXAMPLE A: THE GRAPH REPRESENTS AN A310 AIRPLANE WEIGHING 132900 kg (293000 lb) BEING PUSHED REARWARD ON WET CONCRETE UP A 2% SLOPE, WITH ENGINES IDLING.

SUCH CONDITIONS REQUIRE A 11000 daN (24700 lbf) DRAWBAR PULL AND A MINIMUM 19000 daN (42700 lbf) LOAD ON THE TRACTION WHEELS.

IN EXAMPLE B: THE GRAPH REPRESENTS AN A310 AIRPLANE WEIGHING 132900 kg (293000 lb) BEING PULLED FORWARD ON WET CONCRETE UP A 2% SLOPE, WITH ENGINES STOPPED.

SUCH CONDITIONS REQUIRE A 9000 daN (20200 lbf) DRAWBAR PULL AND A MINIMUM 15000 daN (33700 lbf) LOAD ON THE TRACTION WHEELS.
2. Towbar design guidelines

The aircraft towbar shall respect the following norms:

- SAE AS 1614, "Main Line Aircraft Tow Bar Attach Fitting Interface",
- SAE ARP1915 Revision C, "Aircraft Tow Bar",
- ISO 8267-1, "Aircraft - Tow bar attachment fitting - Interface requirements - Part 1: Main line aircraft",
- ISO 9667, "Aircraft ground support equipment - Tow bars"
- IATA Airport Handling Manual AHM 958, "Functional Specification for an Aircraft Towbar"

A conventional type tow bar is required which should be equipped with a damping system to protect the nose gear against jerks and with towing shear pins:
- A traction shear pin calibrated at 14670 daN (33000 lbf),
- A torsion pin calibrated at 1750 m.daN (12907 lbf.in).

The towing head is designed according to SAE/AS 1614 (issue C) cat. II.

There is a variety of shear pin arrangements and the values of the shear pins depend on them. We hereafter show two arrangements classically used on towbars.
Ground Towing Requirements
Typical Tow Bar Configuration 1
Ground Towing Requirements
Typical Tow Bar Configuration 2
Ground Towing Requirements
Nose Gear Towing Fittings

<table>
<thead>
<tr>
<th>OPERATING WEIGHT EMPTY</th>
<th>MAXIMUM RAMP WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG 25%</td>
<td>CG 16%</td>
</tr>
<tr>
<td>mm</td>
<td>in.</td>
</tr>
<tr>
<td>A 591</td>
<td>23.27</td>
</tr>
<tr>
<td>B 465</td>
<td>18.35</td>
</tr>
</tbody>
</table>

NOTE: DIMENSIONS IN THE TABLE ABOVE ARE APPROXIMATE AND WILL VARY TIRE TYPE AND CONDITIONS
6.0 OPERATING CONDITIONS
6.1 Jet Engine Exhaust Velocities and Temperatures
  6.1.1 Exhaust Velocity Contours – Breakaway Power
  6.1.2 Exhaust Temperature Contours – Breakaway Power
  6.1.3 Exhaust Velocity Contours – Take-off Power
  6.1.4 Exhaust Temperature Contours – Take-off Power
  6.1.5 Exhaust Velocity Contours – Idle Power
  6.1.6 Exhaust Temperature Contours – Idle Power
6.2 Airport and Community Noise
  6.2.1 Noise Data
6.3 Danger Areas of the Engines
  6.3.1 Danger Areas of the Engines – Ground Idle
  6.3.2 Danger Areas of the Engines – Take-off
  6.3.3 Danger Areas of the Engines – Acoustic Protection Areas

R - Definition of Breakaway Power
R Breakaway Power means the minimum power necessary for the aircraft to be able
R to start moving.
ALL VELOCITY VALUES ARE STATUTE MILES PER HOUR.

NOTE: GROUND IDLE POWER - SEA LEVEL STATIC, ZERO WIND,
STANDARD DAY, ZERO RAMP GRADIENT ENGINE TYPE.

8200 POUNDS OF THRUST

CONVERSION FACTOR
1 MPH = 1.6 KM PER HOUR
6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.1 EXHAUST VELOCITY CONTOURS BREAK AWAY POWER
(GE CF6-8C2 ENGINE) MODEL

Chapter 6.1.1
Page 3
Oct 87

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8200 LBS (36, 47 kN) CORRECTED GROSS THRUST

CORRECTED VELOCITY ~ KNOTS (knots/hr)

RADIAL DISTANCE FROM CENTERLINE ~ FEET (m)

VELOCITY RADIAL VARIATIONS
61 FEET (18.59) AFT OF FAN
NOZZLE EXIT

6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.1 EXHAUST VELOCITY CONTOURS BREAK AWAY POWER
(GE CF6-80C2 ENGINE) MODEL 300
(Sheet 2 of 3)

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Page 4
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Printed in France
8200 LBS (36.47 kN) CORRECTED GROSS THRUST

CORRECTED VELOCITY ~ KNOTS (knots/hr)

RADIAL DISTANCE FROM CENTERLINE ~ FEET (m)

VELOCITY RADIAL VARIATIONS 161 FEET
(49.07 m) AFT OF FAN NOZZLE EXIT

CORRECTED VELOCITY ~ KNOTS (km/hr)

RADIAL DISTANCE FROM CENTERLINE ~ FEET (m)

VELOCITY RADIAL VARIATIONS 200 FEET
(60.96 m) AFT OF FAN NOZZLE EXIT

6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.1 EXHAUST VELOCITY CONTOURS BREAK AWAY POWER
(GE CF6-80C2 ENGINE) MODEL 300
(Sheet 3 of 3)

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6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.1 EXHAUST VELOCITY CONTOURS BREAKAWAY
1.04 EPR (PW 4000 ENGINE)

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Page 6
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ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT

NOTE: BREAKAWAY POWER = SEA LEVEL STATIC, ZERO WIND STANDARD DAY, ZERO RAMP GRADIENT ENGINE TYPE.

8700 POUNDS OF THRUST

CONVERSION FACTOR

$$C^0 = \frac{(F^\circ - 32)}{1.8}$$
ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT.
NOTE: BREAKAWAY POWER - SEA LEVEL STATIC, ZERO WIND
STANDARD DAY, ZERO RAMP GRADIENT ENGINE TYPE.
7700 POUNDS OF THRUST

CONVERSION FACTOR
TEMP. F° TO C°
\( C° = \frac{(F° - 32)}{1.8} \)
6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.2 EXHAUST TEMPERATURE CONTOURS BREAK AWAY POWER
(GE CF6-80C2 ENGINE)
MODEL 300

Chapter 6.1.2
Page 3
Oct 87

Printed in France
6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES

6.1.2 EXHAUST TEMPERATURE CONTOURS BREAKAWAY

1.04 EPR (PW 4000 ENGINE)
6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES

6.1.3 EXHAUST VELOCITY CONTOURS-TAKEOFF POWER
(GE CF6 80A3 ENGINE)
MODEL 200
ALL VELOCITY VALUES ARE IN STATUTE MILES PER HOUR.

NOTE: TAKEOFF POWER -sea level static, zero wind
STANDARD DAY, zero ramp gradient engine type.
45 520 pounds of thrust

6.1.3 EXHAUST VELOCITIES AND TEMPERATURES - TAKEOFF POWER

CONVERSION FACTOR
1 MPH = 1.6 KM PER HOUR
6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.3 EXHAUST VELOCITY CONTOURS—TAKE-OFF POWER
(GE CF6-80C2 ENGINE)
MODEL 300

Chapter 6.1.3
Page 3
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6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.3 EXHAUST VELOCITY CONTOURS—TAKE-OFF
(PW 4000 ENGINE)
ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT

NOTE: BREAKAWAY POWER - SEAL LEVEL STATIC, ZERO WIND,
STANDARD DAY, ZERO RAMP GRADIENT ENGINE TYPE.

50 000 POUNDS OF THRUST

CONVERSION FACTOR

TEMP: °F TO °C

°C = \left(\frac{°F - 32}{1.8}\right)
ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT

NOTE: TAKEOFF POWER, SEA LEVEL STATIC, ZERO WIND
STANDARD DAY ZERO RAMP GRADIENT ENGINE TYPE.

45 520 POUNDS OF THRUST

CONVERSION FACTOR
TEMP. °F TO °C

°C = \frac{(°F - 32)}{1.8}
6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.4 EXHAUST TEMPERATURE CONTOURS—TAKE-OFF POWER
(GE CF6-80C2 ENGINE)
MODEL 300

Printed in France
6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.4 EXHAUST TEMPERATURE CONTOURS—TAKE-OFF
(PW 4000 ENGINE)
ALL VELOCITY VALUES ARE STATUTE MILES PER HOUR.

NOTE: GROUND IDLE POWER - SEA LEVEL STATIC, ZERO WIND,
STANDARD DAY, ZERO RAMP GRADIENT ENGINE TYPE.

CONVERSION FACTOR
1 MPH = 1.6 KM PER HOUR
ALL VELOCITY VALUES ARE IN STATUTE MILES PER HOUR.

NOTE: GROUND IDLE POWER, SEA LEVEL STATIC, ZERO WIND
STANDARD DAY, ZERO RAMP GRADIENT ENGINE TYPE.

CONVERSION FACTOR
1 MPH = 1.6 KM PER HOUR

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6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.5 EXHAUST VELOCITY CONTOURS-IDLE POWER
(GE CF6-80C2 ENGINE)

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6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.5 EXHAUST VELOCITY CONTOURS-IDLE
(PW 4000 ENGINE)
ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT

NOTE: BREAKAWAY POWER - SEA LEVEL STATIC, ZERO WIND,
STANDARD DAY, ZERO RAMP GRADIENT ENGINE TYPE.
ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT

NOTE: GROUND IDLE POWER - SEA LEVEL STATIC, ZERO WIND,
STANDARD DAY, ZERO RAMP GRADIENT ENGINE TYPE.

6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES

FEET

AFT END OF AIRCRAFT

METERS

PLAN

CONVERSION FACTOR
TEMP. F° TO C°

°C = \left(\frac{F° - 32}{1.8}\right)

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A310
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

CORRECTED TOTAL TEMPERATURE
RADIAL VARIATIONS 61 FEET (18.59 m)
AFT OF THE FAN NOZZLE EXIT

RADIAL DISTANCE FROM CENTERLINE ~ FEET (m)

TEMPERATURE ~ °R (°K)

VERTICAL DISTANCE FROM CENTERLINE ~ FEET (m)

DISTANCE AFT OF FAN NOZZLE EXIT ~ FEET (m)

PLUME CORRECTED TOTAL TEMPERATURE PROFILE FOR MINIMUM IDLE POWER SETTING

6.1 JET ENGINE EXHAUST VELOCITIES AND TEMPERATURES
6.1.6 EXHAUST TEMPERATURE CONTOURS-IDLE POWER
(GE CF6-80C2 ENGINE)
MODEL 300

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Printed in France
NOTE: ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT.
GROUND IDLE POWER—SEA LEVEL STATIC, ZERO WIND,
STANDARD DAY, ZERO RAMP GRADIENT ENGINE TYPE.
6.2 AIRPORT AND COMMUNITY NOISE

Table 6.2.1 provides data concerning engine maintenance run-up noise to permit evaluation of possible attenuation requirements.
### Estimated Provisional Values

<table>
<thead>
<tr>
<th>Octave Band Center Frequency</th>
<th>Octave Band SPL, dB (20 J Ph)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45° to Exhaust</td>
</tr>
<tr>
<td>63 Hz</td>
<td>103.1</td>
</tr>
<tr>
<td>125 Hz</td>
<td>109.2</td>
</tr>
<tr>
<td>250 Hz</td>
<td>106.1</td>
</tr>
<tr>
<td>500 Hz</td>
<td>103.5</td>
</tr>
<tr>
<td>1000 Hz</td>
<td>99.2</td>
</tr>
<tr>
<td>2000 Hz</td>
<td>96.3</td>
</tr>
<tr>
<td>4000 Hz</td>
<td>92.8</td>
</tr>
<tr>
<td>8000 Hz</td>
<td>90.2</td>
</tr>
</tbody>
</table>

**Ground Static**

**Takeoff Power**

100 Meters Radius

45° Levels are average of 40° and 50° Levels

---

6.2 AIRPORT AND COMMUNITY NOISE

6.2.1 NOISE DATA

Model 200 (GE CF6 80A3 ENGINE)
### Estimated Provisional Values

<table>
<thead>
<tr>
<th>Octave Band Center Frequency</th>
<th>Octave Band SPL, dB (20 µPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45° To Exhaust</td>
</tr>
<tr>
<td>63 Hz</td>
<td>101.3</td>
</tr>
<tr>
<td>125 Hz</td>
<td>99.5</td>
</tr>
<tr>
<td>250 Hz</td>
<td>103.9</td>
</tr>
<tr>
<td>500 Hz</td>
<td>98.6</td>
</tr>
<tr>
<td>1000 Hz</td>
<td>94.1</td>
</tr>
<tr>
<td>2000 Hz</td>
<td>92.3</td>
</tr>
<tr>
<td>4000 Hz</td>
<td>92.0</td>
</tr>
<tr>
<td>8000 Hz</td>
<td>91.2</td>
</tr>
</tbody>
</table>

**Ground Static**

**Takeoff Power**

100 Meters Radius

45° Levels are average of 40° and 50° Levels

---

6.2.2 AIRPORT AND COMMUNITY NOISE
6.2.1 NOISE DATA
MODEL 200 (PW JT9D - 7R4 ENGINE)
ESTIMATED PROVISIONAL VALUES

<table>
<thead>
<tr>
<th>OCTAVE BAND CENTER FREQUENCY</th>
<th>OCTAVE BAND SPL dB (20 μ Pa)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45° TO EXHAUST</td>
</tr>
<tr>
<td>63 Hz</td>
<td>108.2</td>
</tr>
<tr>
<td>125 Hz</td>
<td>109.4</td>
</tr>
<tr>
<td>250 Hz</td>
<td>107.2</td>
</tr>
<tr>
<td>500 Hz</td>
<td>103.4</td>
</tr>
<tr>
<td>1000 Hz</td>
<td>100.0</td>
</tr>
<tr>
<td>2000 Hz</td>
<td>98.7</td>
</tr>
<tr>
<td>4000 Hz</td>
<td>96.2</td>
</tr>
<tr>
<td>8000 Hz</td>
<td>97.9</td>
</tr>
</tbody>
</table>

GROUND STATIC
TAKE OFF POWER
100 METERS RADIUS
45° LEVELS AVERAGE OF 40° AND 50° LEVELS

6.2 AIRPORT AND COMMUNITY NOISE
6.2.1 NOISE DATA
MODEL 300 (PW 4000 SERIE ENGINE)
### A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

**ESTIMATED PROVISIONAL VALUES**

<table>
<thead>
<tr>
<th>OCTAVE BAND CENTER FREQUENCY</th>
<th>OCTAVE BAND SPL, dB (20 μPA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>45° TO EXHAUST</td>
</tr>
<tr>
<td>63 Hz</td>
<td>107.9</td>
</tr>
<tr>
<td>125 Hz</td>
<td>108.7</td>
</tr>
<tr>
<td>250 Hz</td>
<td>106.4</td>
</tr>
<tr>
<td>500 Hz</td>
<td>102.5</td>
</tr>
<tr>
<td>1000 Hz</td>
<td>98.5</td>
</tr>
<tr>
<td>2000 Hz</td>
<td>90.6</td>
</tr>
<tr>
<td>4000 Hz</td>
<td>95.2</td>
</tr>
<tr>
<td>8000 Hz</td>
<td>91.6</td>
</tr>
</tbody>
</table>

GROUND STATIC
TAKEOFF POWER
100 METERS RADIUS
ISA + 10° C AND 70° HR
SEA LEVEL

---

6.2 AIRPORT AND COMMUNITY NOISE
6.2.1 NOISE DATA
MODEL 300 (GE CF6-80C2 SERIE ENGINE)

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6.3 DANGER AREAS OF THE ENGINES
6.3.1 DANGER AREAS OF THE ENGINES
GROUND IDLE (GE CF6 80 ENGINE)
6.3 DANGER AREAS OF THE ENGINES
6.3.1 DANGER AREAS OF THE ENGINES
GROUND IDLE (JT9D-7R4 ENGINE)
6.3 DANGER AREAS OF THE ENGINES
6.3.1 DANGER AREAS OF THE ENGINES
GROUND IDLE
(PW 4000 ENGINE)
6.3 DANGER AREAS OF THE ENGINES
6.3.2 DANGER AREAS OF THE ENGINES (TAKEOFF)
(GE CF6-80 ENGINE)
6.3 DANGER AREAS OF THE ENGINES
6.3.2 DANGER AREAS OF THE ENGINES (TAKEOFF) (JT9D-7R4 ENGINE)

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6.3 DANGER AREAS OF THE ENGINES
6.3.2 DANGER AREAS OF THE ENGINES TAKE-OFF (PW 4000 ENGINE)

INLET SUCTION DANGER AREA TAKE-OFF THRUST

L-A1139

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6.3 DANGER AREAS OF THE ENGINES
6.3.3 ACOUSTIC PROTECTION AREAS
(PW ENGINES)
### 6.3.3 ACOUSTIC PROTECTION AREAS

#### (GE CF6-80 ENGINE)

<table>
<thead>
<tr>
<th>Power Setting</th>
<th>Radius X (m) (ft.)</th>
<th>Radius Y (m) (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Idle</td>
<td>23 (75 ft.)</td>
<td>30 (100 ft.)</td>
</tr>
<tr>
<td>Break Away</td>
<td>30 (100 ft.)</td>
<td>46 (150 ft.)</td>
</tr>
<tr>
<td>Take-Off</td>
<td>30 (100 ft.)</td>
<td>61 (200 ft.)</td>
</tr>
</tbody>
</table>

**Note:** Based on uninstalled engine.
A310
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

APU - Exhaust Gas temperature & Velocity
DECAY - APU

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7.0 PAVEMENT DATA

7.1 General Information
7.2 Landing Gear Footprint
7.3 Maximum Pavement Loads
7.4 LG Loading on Pavement
    7.4.1 LG Loading on Pavement
7.5 Flexible Pavement Requirements U.S. Army
    7.5.1 Flexible Pavement Requirements
7.6 Flexible Pavement Requirements LCN
    7.6.1 Flexible Pavement Requirements LCN
7.7 Rigid Pavement Requirements PCA
    7.7.1 Rigid Pavement Requirements PCA
7.8 Rigid Pavement Requirements LCN
    7.8.1 Radius of Relative Stiffness – Inches
    7.8.2 Rigid Pavement Requirements LCN
    7.8.3 Radius of Relative Stiffness – Other values
    7.8.4 Radius of Relative Stiffness – Other values
7.9 ACN–PCN Reporting System
    7.9.1 ACN Number Flexible Pavement
    7.9.2 ACN Number Rigid Pavement
7.1 General Information

1. General Information

-A310-200 Models - A310-300 Models

A brief description of the pavement charts that follow will help in airport planning.

To aid in the interpolation between the discrete values shown, each airplane configuration is shown with a minimum range of five loads on the main landing gear.

All curves on the charts represent data at a constant specified tire pressure with:

- the airplane loaded to the maximum ramp weight.
- the CG at its maximum permissible aft position.

Pavement requirements for commercial airplanes are derived from the static analysis of loads imposed on the main landing gear struts.

Section 7.2, presents basic data on the landing gear footprint configuration, maximum ramp weights and tire sizes and pressures.

Section 7.3, shows maximum vertical and horizontal pavement loads for certain critical conditions at the tire–ground interfaces.

Section 7.4.1 contains charts to find these loads throughout the stability limits of the airplane at rest on the pavement.

These main landing gear loads are used as the point of entry to the pavement design charts which follow, interpolating load values where necessary.

Section 7.5.1 uses procedures in Instruction Report No. S-77-1 "Procedures for Development of CBR Design Curves", dated June 1977 to show flexible pavement design curves.

The report was prepared by the U.S. Army Corps Engineers Waterways Experiment Station, Soils and Pavement Laboratory, Vicksburg, Mississippi.

Section 7.5.1 & 7.9.1 uses the new load repetition factor according to the ICAO letter Reference AN 4/20.1-EB/07/26.
The line showing 10,000 coverages is used to calculate Aircraft Classification Number (ACN).

2. Flexible Pavement

The procedure that follows is used to develop flexible pavement design curves such as shown in Section 7.5.1.

A. With the scale for pavement thickness at the bottom and the scale for CBR at the top, an arbitrary line is drawn representing 10,000 coverages.

B. Incremental values of the weight on the main landing gear are then plotted.

C. Annual departure line are drawn based on the load lines of the weight on the main landing gear that is shown on the graph.

Section 7.7.1 gives the rigid pavement design curves that have been prepared with the use of the Westergaard Equation. This is in general accordance with the procedures outlined in the Portland Cement Association publications, "Design of Concrete Airport Pavement", 1973 and "Computer Program for Airport Pavement Design", (Program PDILB), 1967 both by Robert G. Packard.

3. Rigid Pavement

The procedure that follows is used to develop rigid pavement design curves such as those shown in Section 7.7.1.

A. With the scale for pavement thickness on the left and the scale for allowable working stress on the right, an arbitrary line load line is drawn. This represents the main landing gear maximum weight to be shown.

B. All values of the subgrade modulus (k values) are then plotted.

C. Additional load lines for the incremental values of weight on the main landing gear are drawn on the basis of the curve for $k = 80 \text{ MN/m}^2$ already shown on the graph.

All Load Classification Number (LCN) curves shown in Section 7.6.1 and Section 7.8.2 have been developed from a computer program based on data provided in Internation Civil Aviation Organisation (ICAO) document 7920-AN/865/2, Aerodrome Manual, Part 2, "Aerodrome Physical Characteristics", Second Edition, 1965.
The flexible pavement charts in Section 7.6.1 show LCN against equivalent single wheel load, and equivalent single wheel load against pavement thickness.

The rigid pavement charts in Section 7.8.2 show LCN against equivalent single wheel load, and equivalent single wheel load against radius of relative stiffness.


The ACN/PCN system provides a standardized international airplane/pavement rating system replacing the various S, T, TT, LCN, AUW, ISWL, etc., rating systems used throughout the world.

ACN is the Aircraft Classification Number and PCN is the corresponding Pavement Classification Number.

An aircraft having an ACN equal to or less than the PCN can operate without restriction on the pavement.

Numerically the ACN is two times the derived single wheel load expressed in thousands of kilograms.

The derived single wheel load is defined as the load on a single tire inflated to 1.25 Mpa (181 psi) that would have the same pavement requirements as the aircraft.

Computationally the ACN/PCN system uses PCA program PDILB for rigid pavements and S-77-1 for flexible pavements to calculate ACN values. The Airport Authority must decide on the method of pavement analysis and the results of their evaluation shown as follows:

<table>
<thead>
<tr>
<th>PCN</th>
<th>PAVEMENT TYPE</th>
<th>SUBGRADE CATEGORY</th>
<th>TIRE PRESSURE CATEGORY</th>
<th>EVALUATION METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>R - Rigid</td>
<td>F - Flexible</td>
<td>A - High</td>
<td>W - No Limit</td>
<td>T - Technical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B - Medium</td>
<td>X - To 1.5 Mpa (217 psi)</td>
<td>U - Using Aircraft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C - Low</td>
<td>Y - To 1 Mpa (145 psi)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D - Ultra Low</td>
<td>Z - To 0.5 Mpa (73 psi)</td>
<td></td>
</tr>
</tbody>
</table>
Section 7.9.1 shows the aircraft ACN values for flexible pavements.

The four subgrade categories are:

A  High Strength  CBR 15
B  Medium Strength CBR 10
C  Low Strength   CBR  6
D  Ultra Low Strength  CBR  3

Section 7.9.2 shows the aircraft ACN for rigid pavements.

The four subgrade categories are:

A  High Strength  Subgrade k = 150 MN/m³ (550 pci)
B  Medium Strength Subgrade k =  80 MN/m³ (300 pci)
C  Low Strength   Subgrade k =  40 MN/m³ (150 pci)
D  Ultra Low Strength Subgrade k =  20 MN/m³ (75 pci)
## A310

**AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING**

<table>
<thead>
<tr>
<th>MAXIMUM RAMP WEIGHT</th>
<th>132,900 kg (293,000 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCENTAGE OF WEIGHT ON MAIN GEAR GROUP</td>
<td>See Section 7.4-1 MRW 132,900 kg</td>
</tr>
<tr>
<td>NOSE GEAR TIRE SIZE</td>
<td>40 x 14 -16 or 40 x 14 R16</td>
</tr>
<tr>
<td>NOSE GEAR TIRE PRESSURE</td>
<td>10 bar (145 psi)</td>
</tr>
<tr>
<td>WING GEAR TIRE SIZE</td>
<td>46 x 16 - 20 or 46 x 17 R20</td>
</tr>
<tr>
<td>WING GEAR TIRE PRESSURE</td>
<td>12.3 bar (178 psi)</td>
</tr>
</tbody>
</table>

---

**NOTE:** Dimensions in millimeters (feet and inches in brackets).

---

**Landing Gear Footprint**

A310-200 Models - MRW 132,900 kg
### A310

**AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING**

<table>
<thead>
<tr>
<th>MAXIMUM RAMP WEIGHT</th>
<th>139 500 kg (307 550 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCENTAGE OF WEIGHT ON MAIN GEAR GROUP</td>
<td>See Section 7-4-1 MRW 139 500 kg</td>
</tr>
<tr>
<td>NOSE GEAR TIRE SIZE</td>
<td>40 x 14 -16 or 40 x 14 R16</td>
</tr>
<tr>
<td>NOSE GEAR TIRE PRESSURE</td>
<td>10.3 bar (149 psi)</td>
</tr>
<tr>
<td>WING GEAR TIRE SIZE</td>
<td>46 x 16 - 20 or 46 x 17 R20</td>
</tr>
<tr>
<td>WING GEAR TIRE PRESSURE</td>
<td>10.8 bar (157 psi)</td>
</tr>
</tbody>
</table>

**Landing Gear Footprint**

**A310-200 Models - MRW 139 500 kg**

---

**NOTE:** DIMENSIONS IN MILLIMETERS (FEET AND INCHES IN BRACKETS).
## A310

**A310**

**AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING**

### Table: Landing Gear Footprint

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAXIMUM RAMP WEIGHT</strong></td>
<td>142 900 kg (315 050 lb)</td>
</tr>
<tr>
<td><strong>PERCENTAGE OF WEIGHT ON MAIN GEAR GROUP</strong></td>
<td>See Section 7-4-1 MRW 142 900 kg</td>
</tr>
<tr>
<td><strong>NOSE GEAR TIRE SIZE</strong></td>
<td>40 x 14.16 or 40 x 14 R16</td>
</tr>
<tr>
<td><strong>NOSE GEAR TIRE PRESSURE</strong></td>
<td>11 bar (160 psi)</td>
</tr>
<tr>
<td><strong>WING GEAR TIRE SIZE</strong></td>
<td>46 x 16 - 20 or 46 x 17 R20</td>
</tr>
<tr>
<td><strong>WING GEAR TIRE PRESSURE</strong></td>
<td>13.3 bar (193 psi)</td>
</tr>
</tbody>
</table>

### Diagram: Landing Gear Footprint

- **Dimensions in Millimeters**
  - 15,220 mm (49 ft 11.2 in)
  - 9,600 mm (31 ft 6 in)
  - 625 mm (24.8 in)
  - 927 mm (36.5 in)
  - 1,397 mm (55 in)

**NOTE:** DIMENSIONS IN MILLIMETERS (FEET AND INCHES IN BRACKETS).
### A310

#### AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAXIMUM RAMP WEIGHT</strong></td>
<td>139 500 kg (307 550 lb)</td>
</tr>
<tr>
<td><strong>PERCENTAGE OF WEIGHT ON MAIN GEAR GROUP</strong></td>
<td>See Section 7.4.1 MRW 139 500 kg</td>
</tr>
<tr>
<td><strong>NOSE GEAR TIRE SIZE</strong></td>
<td>40 x 14.16 or 40 x 14 R16</td>
</tr>
<tr>
<td><strong>NOSE GEAR TIRE PRESSURE</strong></td>
<td>11.3 bar (164 psi)</td>
</tr>
<tr>
<td><strong>WING GEAR TIRE SIZE</strong></td>
<td>46 x 16 - 20 or 46 x 17 R20</td>
</tr>
<tr>
<td><strong>WING GEAR TIRE PRESSURE</strong></td>
<td>13.2 bar (191 psi)</td>
</tr>
</tbody>
</table>

**NOTE:** DIMENSIONS IN MILLIMETERS (FEET AND INCHES IN BRACKETS).

**Landing Gear Footprint**
A310-300 Models - MRW 139 500 kg
## A310

### AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

<table>
<thead>
<tr>
<th>MAXIMUM RAMP WEIGHT</th>
<th>150 900 kg (332 675 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCENTAGE OF WEIGHT ON MAIN GEAR GROUP</td>
<td>See Section 7-4-1 MRW 150 900 kg</td>
</tr>
<tr>
<td>NOSE GEAR TIRE SIZE</td>
<td>40 x 14-16 or 40 x 14 R16</td>
</tr>
<tr>
<td>NOSE GEAR TIRE PRESSURE</td>
<td>11.3 bar (164 psi)</td>
</tr>
<tr>
<td>WING GEAR TIRE SIZE</td>
<td>46 x 16 - 20 or 46 x 17 R20</td>
</tr>
<tr>
<td>WING GEAR TIRE PRESSURE</td>
<td>14.3 bar (207 psi)</td>
</tr>
</tbody>
</table>

**NOTE:** DIMENSIONS IN MILLIMETERS (FEET AND INCHES IN BRACKETS).

**Landing Gear Footprint**

A310-300 Models – MRW 150 900 kg
### A310

**AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING**

| MAXIMUM RAMP WEIGHT       | 153 900 kg  
|----------------------------| (339 300 lb) |
| PERCENTAGE OF WEIGHT      | See Section 7-4-1 MRW 153 900 kg |
| ON MAIN GEAR GROUP        |                                   |
| NOSE GEAR TIRE SIZE       | 40 x 14-16 or 40 x 14 R16         |
| NOSE GEAR TIRE PRESSURE   | 11.3 bar (164 psi)                |
| WING GEAR TIRE SIZE       | 46 x 16 - 20 or 46 x 17 R20       |
| WING GEAR TIRE PRESSURE   | 14.6 bar (212 psi)  
|                            | 12 bar (174 psi)                  |

**NOTE:** DIMENSIONS IN MILLIMETERS  
(FEET AND INCHES IN BRACKETS).

Landing Gear Footprint  
A310-300 Models - MRW 153 900 kg
### A310

**AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING**

| MAXIMUM RAMP WEIGHT                  | 157 900 kg  
<table>
<thead>
<tr>
<th></th>
<th>(348 100 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCENTAGE OF WEIGHT ON MAIN GEAR GROUP</td>
<td>See Section 7-4-1 MRW 157 900 kg</td>
</tr>
</tbody>
</table>
| NOSE GEAR TIRE SIZE                 | 40 x 14 -16 or 40 x 14 R16  
|                                     | 40 x 14 R16  
|                                     | P/N M11701  |
| NOSE GEAR TIRE PRESSURE             | 11.3 bar (164 psi)  
|                                     | 12.3 bar (178 psi)  |
| WING GEAR TIRE SIZE                | 46 x 16 - 20 or 46 x 17 R20  
|                                     | 49 x 17 - 20 |
| WING GEAR TIRE PRESSURE            | 14.8 bar (215 psi)  
|                                     | 12.4 bar (180 psi)  |

**Landing Gear Footprint**

A310-300 Models – MRW 157 900 kg

---

**NOTE:** DIMENSIONS IN MILLIMETERS (FEET AND INCHES IN BRACKETS).
# A310

## AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

<table>
<thead>
<tr>
<th>MAXIMUM RAMP WEIGHT</th>
<th>160,900 kg (354,725 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCENTAGE OF WEIGHT ON MAIN GEAR GROUP</td>
<td>See Section 7-4-1 MRW 160,900 kg</td>
</tr>
<tr>
<td>NOSE GEAR TIRE SIZE</td>
<td>40 x 14 -16 or 40 x 14 R16</td>
</tr>
<tr>
<td>NOSE GEAR TIRE PRESSURE</td>
<td>11.3 bar (164 psi)</td>
</tr>
<tr>
<td>WING GEAR TIRE SIZE</td>
<td>49 x 17 - 20</td>
</tr>
<tr>
<td>WING GEAR TIRE PRESSURE</td>
<td>12.6 bar (183 psi)</td>
</tr>
</tbody>
</table>

**NOTE:** DIMENSIONS IN MILLIMETERS (FEET AND INCHES IN BRACKETS).

---

**Landing Gear Footprint**

A310-300 Models - MRW 160 900 kg
### A310 Characteristics for Airport Planning

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Ramp Weight</td>
<td>164,900 kg (363,550 lb)</td>
</tr>
<tr>
<td>Percentage of Weight on Main Gear Group</td>
<td>See Section 7-4-1 MRW 164,900 kg</td>
</tr>
<tr>
<td>Nose Gear Tire Size</td>
<td>40 x 14-16 or 40 x 14 R16</td>
</tr>
<tr>
<td>Nose Gear Tire Pressure</td>
<td>11.3 bar (164 psi)</td>
</tr>
<tr>
<td>Wing Gear Tire Size</td>
<td>49 x 17 - 20</td>
</tr>
<tr>
<td>Wing Gear Tire Pressure</td>
<td>12.9 bar (187 psi)</td>
</tr>
</tbody>
</table>

**Diagram:**

- **Dimensions in Millimeters**
  - 15,220 mm (49 ft 11.2 in)
  - 6,250 mm (24.6 in)
  - 9,600 mm (31 ft 6 in)
  - 927 mm (36.5 in)
  - 1,397 mm (55 in)

**Note:** Dimensions in millimeters (feet and inches in brackets).

**Landing Gear Footprint**

A310-300 Models - MRW 164,900 kg
### Maximum Pavement Loads

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MAXIMUM RAMP WEIGHT</th>
<th>STATIC LOAD AT MOST FWD C.G. (1)</th>
<th>STATIC BRAKING @ 10 ft/sec DECELERATION</th>
<th>STATIC LOAD AT MAX AFT C.G. (2)</th>
<th>STEADY BRAKING @ 10 ft/sec DECELERATION</th>
<th>AT INSTANTANEOUS BRAKING COEFFICIENT = 0.8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb</td>
<td>kg</td>
<td>lb</td>
<td>kg</td>
<td>lb</td>
<td>kg</td>
</tr>
<tr>
<td>-200</td>
<td>293 000</td>
<td>132 900</td>
<td>38 700</td>
<td>17 560</td>
<td>63 400</td>
<td>28 760</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>307 550</td>
<td>139 500</td>
<td>40 625</td>
<td>18 430</td>
<td>66 550</td>
<td>30 180</td>
</tr>
<tr>
<td>-200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>315 050</td>
<td>142 900</td>
<td>41 625</td>
<td>18 880</td>
<td>68 175</td>
<td>30 920</td>
</tr>
</tbody>
</table>

### Notes:
- **V (NG)**: MAXIMUM VERTICAL NOSE GEAR GROUND LOAD AT MOST FORWARD CG
- **V (MG)**: MAXIMUM VERTICAL MAIN GEAR GROUND LOAD AT MOST AFT CG
- **H**: MAXIMUM HORIZONTAL GROUND LOAD FROM BRAKING

(1) MRW = 132 900 kg, FWD CG = 18% MAC AT A/C WEIGHT = 132 900 kg
MRW = 139 500 kg, FWD CG = 18% MAC AT A/C WEIGHT = 139 500 kg
MRW = 142 900 kg, FWD CG = 18% MAC AT A/C WEIGHT = 142 900 kg

(2) MRW = 132 900 kg, AFT CG = 35% MAC AT A/C WEIGHT = 132 900 kg
MRW = 139 500 kg, AFT CG = 35% MAC AT A/C WEIGHT = 139 500 kg
MRW = 142 900 kg, AFT CG = 35% MAC AT A/C WEIGHT = 142 900 kg

**NOTE:** ALL LOADS CALCULATED USING AIRPLANE MAXIMUM RAMP WEIGHT

### Diagram

The diagram illustrates the force applied on the pavement by the aircraft in different directions, showing the forces acting at the nose gear (V (NG)) and main gear (V (MG)).
### Maximum Pavement Loads

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum Ramp Weight</th>
<th>Static Load at Most FWD C.G. (1)</th>
<th>Static Braking @ 10 ft/s² Deceleration</th>
<th>Static Load at Max Aft C.G. (2)</th>
<th>Steady Braking @ 10 ft/s² Deceleration</th>
<th>At Instantaneous Braking Coefficient = 0.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>-300</td>
<td>307 550</td>
<td>40 625</td>
<td>66 550</td>
<td>144 775</td>
<td>47 800</td>
<td>115 800</td>
</tr>
<tr>
<td></td>
<td>139 500</td>
<td>18 430</td>
<td>30 180</td>
<td>65 660</td>
<td>21 680</td>
<td>52 530</td>
</tr>
<tr>
<td>-300</td>
<td>332 675</td>
<td>43 950</td>
<td>71 975</td>
<td>157 100</td>
<td>51 700</td>
<td>125 675</td>
</tr>
<tr>
<td></td>
<td>150 900</td>
<td>19 940</td>
<td>32 650</td>
<td>71 260</td>
<td>23 450</td>
<td>57 010</td>
</tr>
<tr>
<td>-300</td>
<td>339 300</td>
<td>44 825</td>
<td>73 425</td>
<td>160 225</td>
<td>52 725</td>
<td>128 175</td>
</tr>
<tr>
<td></td>
<td>153 900</td>
<td>20 330</td>
<td>33 300</td>
<td>72 680</td>
<td>23 920</td>
<td>58 140</td>
</tr>
</tbody>
</table>

**V (NG) Maximum Vertical Nose Gear Ground Load at Most Forward CG**

**V (MG) Maximum Vertical Main Gear Ground Load at Most Aft CG**

**H Maximum Horizontal Ground Load from Braking**

1. MRW = 139 500 kg  FWD CG = 18% MAC AT A/C WEIGHT = 139 500 kg
   MRW = 150 900 kg  FWD CG = 18% MAC AT A/C WEIGHT = 150 900 kg
   MRW = 153 900 kg  FWD CG = 18% MAC AT A/C WEIGHT = 153 900 kg

2. MRW = 139 500 kg  AFT CG = 37.2% MAC AT A/C WEIGHT = 139 500 kg
   MRW = 150 900 kg  AFT CG = 38% MAC AT A/C WEIGHT = 150 900 kg
   MRW = 153 900 kg  AFT CG = 38% MAC AT A/C WEIGHT = 153 900 kg

**NOTE:** ALL LOADS CALCULATED USING AIRPLANE MAXIMUM RAMP WEIGHT
### Maximum Pavement Loads

<table>
<thead>
<tr>
<th>Model</th>
<th>Static Load at Most Nose Gear C.G.</th>
<th>Static Load at Most Main Gear C.G.</th>
<th>Maximum Ramp Weight</th>
<th>V (NG) Maximum Vertical Nose Gear Ground Load at Most Forward C.G.</th>
<th>V (NG) Maximum Vertical Main Gear Ground Load at Most Aft C.G.</th>
<th>Maximum Horizontal Ground Load from Braking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lb</td>
<td>kg</td>
<td>lb</td>
<td>kg</td>
<td>kg</td>
<td>lb</td>
</tr>
<tr>
<td>-300</td>
<td>348 100</td>
<td>157 900</td>
<td>34 170</td>
<td>164 400</td>
<td>74 570</td>
<td>24 540</td>
</tr>
<tr>
<td>-300</td>
<td>354 725</td>
<td>160 900</td>
<td>45 725</td>
<td>167 525</td>
<td>75 840</td>
<td>25 125</td>
</tr>
<tr>
<td>-300</td>
<td>363 550</td>
<td>164 900</td>
<td>45 725</td>
<td>171 675</td>
<td>77 670</td>
<td>25 650</td>
</tr>
</tbody>
</table>

Note: All loads calculated using airplane maximum ramp weight.
7.4 Landing Gear Loading on Pavement

-A310-200 Models

In the typical example shown in Section 7.4.1 with MRW 132 900 kg.

The Gross Aircraft Weight is 110 000 kg (242 500 lb) and the percentage of weight on the Main Gear is 93.3 %.

For these conditions the total weight on the Main Gear Group is 102 603 kg (226 250 lb).

-A310-300 Models

In the typical example shown in Section 7.4.1 with MRW 139 500 kg.

The Gross Aircraft Weight is 125 000 kg (275 575 lb) and the percentage of weight on the Main Gear is 94.14 %.

For these conditions the total weight on the Main Gear Group is 117 680 kg (259 425 lb).
Landing Gear Loading on Pavement
A310-200 Models – MRW 132 900 kg
Landing Gear Loading on Pavement
A310-200 Models - MRW 139 500 kg
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

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Landing Gear Loading on Pavement
A310-200 Models - MRW 139 500 kg
Landing Gear Loading on Pavement
A310-200 Models - MRW 142 900 kg
Landing Gear Loading on Pavement
A310-300 Models - MRW 139 500 kg
Landing Gear Loading on Pavement
A310-300 Models - MRW 150 900 kg
Landing Gear Loading on Pavement
A310-300 Models - MRW 153 900 kg
Landing Gear Loading on Pavement
A310-300 Models - MRW 153 900 kg
Landing Gear Loading on Pavement
A310-300 Models - MRW 157 900 kg
Landing Gear Loading on Pavement
A310-300 Models - MRW 160 900 kg

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Landing Gear Loading on Pavement
A310-300 Models - MRW 164 900 kg

MTOW = 164 000 kg
MLW = 124 000 kg
MZFW = 114 000 kg
CG FOR ACN CALCULATIONS

WEIGHT ON MAIN LANDING GEAR - x 1 000 kg
AIRCRAFT GROSS WEIGHT - x 1 000 kg

PERCENTAGE OF WEIGHT ON MAIN GEAR
PERCENTAGE MAC
7.5 Flexible Pavement Requirements – US Army Corps of Engineers Design Method

To find a Flexible Pavement Thickness, the Subgrade Strength (CBR), the Annual Departure Level and the weight on one Main Landing must be known.

-A310-200 Models

In the typical example shown in Section 7.5.1 with MRW 132 900 kg for:
- a CBR value of 10
- an Annual Departure level of 3000
- and the load on one Wing Landing Gear of 40 000 kg (88 175 lb)
- the required Flexible Pavement Thickness is 34 cm (13.5 inches).

The line showing 10 000 Coverages is used to calculate Aircraft Classification Number (ACN).

-A310-300 Models

In the typical example shown in Section 7.5.1 with MRW 139 500 kg for:
- a CBR value of 10
- an Annual Departure level of 3000
- and the load on one Wing Landing Gear of 40 000 kg (88 175 lb)
- the required Flexible Pavement Thickness is 34 cm (13.5 inches).

The line showing 10 000 Coverages is used to calculate Aircraft Classification Number (ACN).
Flexible Pavement Requirements
A310-200 Models – MRW 132 900 kg

Flexible Pavement Thickness

46 x 16 - 20 TIRES
TIRE PRESSURE CONSTANT AT 12.3 BAR (178 PSI)
Flexible Pavement Requirements
A310-200 Models – MRW 132 900 kg
Flexible Pavement Requirements
A310-200 Models - MRW 139 500 kg

Flexible Pavement Thickness
46 x 16 - 20 TIRES
TIRE PRESSURE CONSTANT AT 13 BAR (189 PSI)
Flexible Pavement Requirements
A310-200 Models - MRW 139 500 kg
Flexible Pavement Requirements
A310-200 Models - MRW 142 900 kg
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

Flexible Pavement Requirements
A310-200 Models - MRW 142 900 kg

Flexible Pavement Thickness
49 x 17 - 20 TIRES
TIRE PRESSURE CONSTANT AT 11 BAR (160 PSI)
Flexible Pavement Requirements
A310-300 Models - MRW 139 500 kg
Flexible Pavement Requirements
A310-300 Models - MRW 139 500 kg

FLEXIBLE PAVEMENT THICKNESS

49 x 17 - 20 TIRES
TIRE PRESSURE CONSTANT AT 11 BAR (160 PSI)
Flexible Pavement Requirements
A310–300 Models – MRW 150 900 kg
Flexible Pavement Requirements
A310-300 Models – MRW 153 900 kg
Flexible Pavement Requirements
A310-300 Models - MRW 153 900 kg

FLEXIBLE PAVEMENT THICKNESS

49 x 17 - 20 TIRES
TIRE PRESSURE CONSTANT AT 12 BAR (174 PSI)
Flexible Pavement Requirements
A310-300 Models - MRW 157 900 kg
Flexible Pavement Requirements
A310-300 Models - MRW 157 900 kg

FLEXIBLE PAVEMENT THICKNESS

49 x 17 - 20 TIRES
TIRE PRESSURE CONSTANT AT 12.4 BAR (180 PSI)
Flexible Pavement Requirements
A310-300 Models – MRW 160 900 kg
Flexible Pavement Requirements
A310-300 Models - MRW 164 900 kg
7.6 Flexible Pavement Requirements – LCN Conversion

To find the airplane weight that a Flexible Pavement can support, the LCN of the pavement and the thickness \( h \) must be known.

- A310-200 Models

In the example shown in Section 7.6.1 with MRW 132 900 kg.

The thickness \( h \) is shown at 762 mm (30 in.) with an LCN of 81.

For these conditions the weight on one Main Landing Gear is 60 000 kg (132 275 lb).

- A310-300 Models

In the example shown in Section 7.6.1 with MRW 139 500 kg.

The thickness \( h \) is shown at 762 mm (30 in.) with an LCN of 84.

For these conditions the weight on one Main Landing Gear is 60 000 kg (132 275 lb).
Flexible Pavement Requirements LCN

A310-200 Models - MRW 132, 900 kg

Maximum Possible Main Gear Load at Maximum Ramp Weight and Aft CG

46 x 16 - 20 Tires
Tire Pressure Constant at 12.3 BAR (178 PSI)

Weight on One Main Landing Gear
- 62,000 kg (136,675 lb)
- 60,000 kg (132,275 lb)
- 50,000 kg (110,225 lb)
- 40,000 kg (88,175 lb)
- 30,000 kg (66,150 lb)

Equivalent Single Wheel Load (1000 lb)

Flexible Pavement Thickness [Inches]

Equivalent Single Wheel Load (1000 kg)

Load Classification Number (LCN)

Flexible Pavement Requirements LCN
A310-200 Models – MRW 132 900 kg

FLEXIBLE PAVEMENT THICKNESS (mm)

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAXIMUM RAMP WEIGHT AND AFT CG

WEIGHT ON ONE MAIN LANDING GEAR
- 62 000 kg (136 675 lb)
- 60 000 kg (132 275 lb)
- 50 000 kg (110 225 lb)
- 40 000 kg (88 175 lb)
- 30 000 kg (66 150 lb)

49 x 17 - 20 TIRES
TIRE PRESSURE CONSTANT AT 10.2 BAR (148 PSI)

Flexible Pavement Requirements LCN
A310-200 Models - MRW 139 500 kg
Flexible Pavement Requirements LCN
A310-200 Models - MRW 139 500 kg
Flexible Pavement Requirements LCN
A310-200 Models – MRW 142 900 kg

NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN
Flexible Pavement Requirements LCN

A310-300 Models - MRW 139 500 kg

FLEXIBLE PAVEMENT THICKNESS (mm)

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAXIMUM RAMP WEIGHT AND AFT CG

WEIGHT ON ONE MAIN LANDING GEAR

65 660 kg (144 775 lb)

60 000 kg (132 275 lb)

50 000 kg (110 225 lb)

40 000 kg (88 175 lb)

30 000 kg (66 150 lb)

49 x 17 - 20 TIRES
TIRE PRESSURE CONSTANT AT 11 BAR (160 PSI)

EQUIVALENT SINGLE WHEEL LOAD (1 000 lb)

EQUIVALENT SINGLE WHEEL LOAD (1 000 lb)

Flexible Pavement Requirements LCN
A310-300 Models - MRW 153900 kg
Flexible Pavement Requirements LCN
A310-300 Models - MRW 153 900 kg
Flexible Pavement Requirements LCN
A310-300 Models - MRW 157 900 kg
Flexible Pavement Requirements

A310-300 Models – MRW 157 900 kg

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAXIMUM RAMP WEIGHT AND AFT CG

WEIGHT ON ONE MAIN LANDING GEAR
74 570 kg (164 400 lb)
70 000 kg (154 325 lb)
60 000 kg (132 275 lb)
50 000 kg (110 225 lb)
40 000 kg (88 175 lb)

Flexible Pavement Requirements LCN
A310-300 Models - MRW 164 900 kg
7.7 Rigid Pavement Requirements – Portland Cement Association Design Method

To determine a Rigid Pavement Thickness, the Subgrade Modulus (k), the allowable working stress and the weight on one Main Landing Gear must be known.

- A310-200 Models

In the typical example shown in Section 7.7.1 with MRW 132 900 kg for:

- a k value of 150 MN/m$^3$ (K = 550 lbF/in$^3$)
- an allowable working stress of 28 kg/cm$^2$ (400 lb/in$^2$)
- the Load on one Wing Landing Gear of 50 000 kg (110 225 lb)
the required Rigid Pavement Thickness is 21.5 cm (8.51 inches).

- A310-300 Models

In the typical example shown in Section 7.7.1 with MRW 139 500 kg for:

- a k value of 150 MN/m$^3$ (K = 550 lbF/in$^3$)
- an allowable working stress of 28 kg/cm$^2$ (400 lb/in$^2$)
- the Load on one Wing Landing Gear of 50 000 kg (110 225 lb)
the required Rigid Pavement Thickness is 21.7 cm (8.51 inches).
**Rigid Pavement Requirements**

_A310-200 Models - MRW 132 900 kg_

**NOTE:**

- THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUES FOR K ARE EXACT.
- FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 80 MN/m³ BUT DEVIATE SLIGHTLY FOR ANY OTHER VALUES OF K.

**REFERENCE:**

- "DESIGN OF CONCRETE AIRPORT PAVEMENTS" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN - PROGRAM PDILB" PORTLAND CEMENT ASSOCIATION.
Rigid Pavement Requirements
A310-200 Models - MRW 132 900 kg

NOTE:
THE VALUES OBTAINED BY USING
THE MAXIMUM LOAD REFERENCE
LINE AND ANY VALUES FOR K ARE
EXACT.
FOR LOADS LESS THAN MAXIMUM,
THE CURVES ARE EXACT FOR K =
80 MN/m² BUT DEVIATE SLIGHTLY
FOR ANY OTHER VALUES OF K.

REFERENCE:
"DESIGN OF CONCRETE AIRPORT
PAVEMENTS' AND 'COMPUTER
PROGRAM FOR AIRPORT
PAVEMENT DESIGN - PROGRAM
PDILB' PORTLAND CEMENT
ASSOCIATION.
Rigid Pavement Requirements
A310-200 Models - MRW 139 500 kg

NOTE: THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUES FOR K ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 80 MN/m³ BUT DEVIATE SLIGHTLY FOR ANY OTHER VALUES OF K.

REFERENCE: "DESIGN OF CONCRETE AIRPORT PAVEMENTS" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN - PROGRAM PDILB" PORTLAND CEMENT ASSOCIATION.
Rigid Pavement Requirements
A310-200 Models - MRW 139 500 kg

NOTE: THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUES FOR K ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 80 MN/m³ BUT DEVIATE SLIGHTLY FOR ANY OTHER VALUES OF K.

REFERENCE: "DESIGN OF CONCRETE AIRPORT PAVEMENTS" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN - PROGRAM PDILB" PORTLAND CEMENT ASSOCIATION.
Rigid Pavement Requirements
A310-200 Models - MRW 142 900 kg
Rigid Pavement Requirements
A310-200 Models - MRW 142 900 kg

NOTE:
THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUES FOR K ARE
EXACT.
FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 80 MN/m² BUT DEVIATE SLIGHTLY FOR ANY OTHER VALUES OF K.

REFERENCE:
"DESIGN OF CONCRETE AIRPORT PAVEMENTS" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN - PROGRAM PDILB PORTLAND CEMENT ASSOCIATION.
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

Rigid Pavement Requirements
A310-300 Models - MRW 139 500 kg

NOTE: THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUES FOR K ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 80 MN/m² BUT DEVIATE SLIGHTLY FOR ANY OTHER VALUES OF K.

REFERENCE: "DESIGN OF CONCRETE AIRPORT PAVEMENTS" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN - PROGRAM PDILB: PORTLAND CEMENT ASSOCIATION.

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Page 7
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Rigid Pavement Requirements
A310-300 Models - MRW 139 500 kg

NOTE: The values obtained by using the maximum load reference line and any values for K are exact. For loads less than maximum, the curves are exact for K = 80 MN/m² but deviate slightly for any other values of K.


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Rigid Pavement Requirements
A310-300 Models – MRW 150 900 kg

Note: The values obtained by using the maximum load reference line and any values for K are exact.

For loads less than maximum, the curves are exact for K = 80 MN/m² but deviate slightly for any other values of K.

Reference:
Rigid Pavement Requirements
A310–300 Models - MRW 150 900 kg

NOTE:
THE VALUES OBTAINED BY USING
THE MAXIMUM LOAD REFERENCE
LINE AND ANY VALUES FOR K ARE
EXACT.
FOR LOADS LESS THAN MAXIMUM,
THE CURVES ARE EXACT FOR K =
80 MN/m³ BUT DEVIATE SLIGHTLY
FOR ANY OTHER VALUES OF K.

REFERENCE:
"DESIGN OF CONCRETE AIRPORT
PAVEMENTS" AND "COMPUTER
PROGRAM FOR AIRPORT
PAVEMENT DESIGN - PROGRAM
PDILB" PORTLAND CEMENT
ASSOCIATION.
Rigid Pavement Requirements
A310-300 Models - MRW 153 900 kg

The values obtained by using the maximum load reference line and any values for K are exact. For loads less than maximum, the curves are exact for K = 80 MN/m² but deviate slightly for any other values of K.

Reference:
"Design of Concrete Airport Pavements" and "Computer Program for Airport Pavement Design - Program PDILB" - Portland Cement Association.
Rigid Pavement Requirements
A310-300 Models - MRW 153 900 kg

NOTE:  THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUES FOR K ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 80 MN/m³ BUT DEVIATE SLIGHTLY FOR ANY OTHER VALUES OF K.

REFERENCE:  "DESIGN OF CONCRETE AIRPORT PAVEMENTS' AND 'COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN - PROGRAM PDILB' PORTLAND CEMENT ASSOCIATION."
Rigid Pavement Requirements
A310-300 Models - MRW 157 900 kg

NOTE: THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUES FOR K ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 80 MN/m² BUT DEVIATE SLIGHTLY FOR ANY OTHER VALUES OF K.

REFERENCE:
"DESIGN OF CONCRETE AIRPORT PAVEMENTS" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN - PROGRAM PDILB" PORTLAND CEMENT ASSOCIATION.
A310
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

Rigid Pavement Requirements
A310-300 Models - MRW 157 900 kg

NOTE: THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUES FOR K ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 80 MN/m^3 BUT DEViate SLIGHTLY FOR ANY OTHER VALUES OF K.

REFERENCE:
"DESIGN OF CONCRETE AIRPORT PAVEMENTS' AND 'COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN - PROGRAM PDILB' PORTLAND CEMENT ASSOCIATION."
A310
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

Rigid Pavement Requirements
A310-300 Models - MRW 160 900 kg

NOTE: THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUES FOR K ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 80 MN/m³ BUT DEVIATE SLIGHTLY FOR ANY OTHER VALUES OF K.

REFERENCE:
"DESIGN OF CONCRETE AIRPORT PAVEMENTS' AND 'COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN - PROGRAM PDILB' PORTLAND CEMENT ASSOCIATION.

49 x 17 - 20 TIRES
TIRE PRESSURE CONSTANT AT 12.6 BAR (183 PSI)

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAXIMUM RAMP WEIGHT AND AFT CG

WEIGHT ON ONE MAIN LANDING GEAR
75 880 kg (167 525 lb)
70 000 kg (154 325 lb)
60 000 kg (132 275 lb)
50 000 kg (110 225 lb)
40 000 kg (88 175 lb)
Rigid Pavement Requirements
A310–300 Models – MRW 164 900 kg

NOTE:
THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUES FOR K ARE EXACT.
FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 80 MN/m² BUT DEVIATE SLIGHTLY FOR ANY OTHER VALUES OF K.

REFERENCE:
"DESIGN OF CONCRETE AIRPORT PAVEMENTS" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN - PROGRAM PDILB" PORTLAND CEMENT ASSOCIATION.
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

7.8 Rigid Pavement Requirements – LCN Conversion

To determine the airplane weight that a Rigid Pavement can support, the LCN of the pavement and the Radius of Relative Stiffness (L) must be known.

- A310-200 Models

In the typical example shown in Section 7.8.2 with MRW 132 900 kg.

The Radius of Relative Stiffness is shown at 1270 mm (50 in.) with an LCN of 93.

For these conditions the weight on one Main Landing Gear is 60 000 kg (132 275 lb).

- A310-300 Models

In the typical example shown in Section 7.8.2 with MRW 139 500 kg.

The Radius of Relative Stiffness is shown at 1270 mm (50 in.) with an LCN of 93.

For these conditions the weight on one Main Landing Gear is 60 000 kg (132 275 lb).
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

RADIUS OF RELATIVE STIFFNESS (L)
VALUES IN INCHES

\[ L = \frac{4Ed^3}{12(1-\mu^2)k} = 24.1652 \frac{4d^3}{k} \]

WHERE
- \( E = \) Young’s Modulus = 4 x 10^6 psi
- \( k = \) Subgrade Modulus, lbf/in²
- \( d = \) Rigid Pavement Thickness, inches
- \( \mu = \) Poisson’s Ratio = 0.15

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Radius of relative stiffness
(Reference: Portland Ciment Association)
Rigid Pavement Requirements LCN

A310-200 Models - MRW 132 900 kg

RADIUS OF RELATIVE STIFFNESS (mm)

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAXIMUM RAMP WEIGHT AND AFT CG

WEIGHT ON ONE MAIN LANDING GEAR:
- 62 000 kg (136 675 lb)
- 60 000 kg (132 275 lb)
- 50 000 kg (110 225 lb)
- 40 000 kg (88 175 lb)
- 30 000 kg (66 150 lb)

NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN ICAO AERODROME MANUAL PART 2 PAR 4.1.3 Second Edition 1965.
NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN ICAO AERODROME MANUAL PART 2 PAR 4.1.3 Second Edition 1965.
Rigid Pavement Requirements LCN
A310-200 Models - MRW 139 500 kg

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Rigid Pavement Requirements LCN
A310-200 Models – MRW 142 900 kg
NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN ICAO AERODROME MANUAL PART 2 PAR 4.1.3 Second Edition 1965.
Rigid Pavement Requirements LCN
A310-300 Models - MRW 139 500 kg
Rigid Pavement Requirements LCN
A310-300 Models - MRW 139 500 kg
Rigid Pavement Requirements LCN
A310-300 Models - MRW 150 900 kg
NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN
Rigid Pavement Requirements - MRW 153,900 kg

A310-300 Models - MRW 153,900 kg

NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN ICAO AERODROME MANUAL PART 2 PAR 4.1.3 Second Edition 1965.
Rigid Pavement Requirements LCN
A310-300 Models - MRW 157 900 kg
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Rigid Pavement Requirements LCN
A310-300 Models – MRW 157 900 kg

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A310-300 Models - MRW 160 900 kg
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Rigid Pavement Requirements LCN
A310-300 Models - MRW 164 900 kg
7.8.3 Radius of Relative Stiffness (Other values of E and μ)

- A310-200 Models - A310-300 Models

The table "Radius of Relative Stiffness" of Chapter 7.8.1 presents \( L \) values based on Young's Modulus (E) of 4 000 000 psi and Poisson's Ratio (μ) of 0.15.

To find \( L \) values based on other values of E and μ,
See Section 7.8.4 "Radius of Relative Stiffness".

For example, to find a \( L \) value based on an E of 3 000 000 psi, the "E" factor of 0.931 is multiplied by the \( L \) value found in the table "Radius of Relative Stiffness" of Section 7.8.1. "Radius of Relative Stiffness".

The effect of variations of μ on the \( L \) value is treated in a similar manner.
**Chapter 7.8.4**

**Page 1**

**Radius of relative stiffness**

(Effect E and \( \mu \) on "\( L \)" values)

**NOTE:** BOTH CURVES ON THIS PAGE ARE USED TO ADJUST THE \( L \) VALUES OF "RADIUS OF RELATIVE STIFFNESS" IN SECTION 7-8-1.
7.9 ACN/PCN Reporting System
- A310-200 Models

To find the ACN of an aircraft on flexible or rigid pavement, the aircraft gross weight and the subgrade strength must be known.

In the example shown in Section 7.9.1 with MRW 132 900 kg.

For an Aircraft Gross Weight of 110 000 kg (242 500 lb) and low subgrade strength (code B), the ACN for the flexible pavement is 29.

In the example shown in Section 7.9.2 with MRW 132 900 kg.

For an Aircraft Gross Weight 110 000 kg (242 500 lb) and low subgrade strength (code B), the ACN for the rigid pavement is 30.

NOTE: An aircraft with an ACN equal to or less than the reported PCN can operate on that pavement, subject to any limitation on the tire pressure.
7.9 ACN/PCN Reporting System

- A310-300 Models

To find the ACN of an aircraft on flexible or rigid pavement, the aircraft gross weight and the subgrade strength must be known.

In the example shown in Section 7.9.1 with MRW 135 900 kg.

For an Aircraft Gross Weight of 110 000 kg (242 500 lb) and low subgrade strength (code B), the ACN for the flexible pavement is 29.

In the example shown in Section 7.9.2 with MRW 139 500 kg.

For an Aircraft Gross Weight 110 000 kg (242 500 lb) and low subgrade strength (code B), the ACN for the rigid pavement is 30.

NOTE: An aircraft with an ACN equal to or less than the reported PCN can operate on that pavement, subject to any limitation on the tire pressure.
Aircraft Classification Number - Flexible Pavement
A310-200 Models - MRW 132 900 kg
Aircraft Classification Number - Flexible Pavement
A310-200 Models - MRW 139 500 kg
Aircraft Classification Number - Flexible Pavement
A310-200 Models - MRW 139 500 kg
Aircraft Classification Number – Flexible Pavement
A310-200 Models – MRW 142 900 kg

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Aircraft Classification Number - Flexible Pavement
A310-300 Models - MRW 139 500 kg
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

Aircraft Classification Number - Flexible Pavement
A310-300 Models - MRW 139 500 kg
Aircraft Classification Number - Flexible Pavement
A310-300 Models - MRW 150 900 kg

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Aircraft Classification Number - Flexible Pavement
A310-300 Models - MRW 150 900 kg

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Aircraft Classification Number – Flexible Pavement
A310-300 Models – MRW 153 900 kg
Aircraft Classification Number - Flexible Pavement
A310-300 Models - MRW 153 900 kg

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Aircraft Classification Number – Flexible Pavement
A310-300 Models – MRW 157 900 kg
49 x 17 - 20 TIRES
TIRE PRESSURE CONSTANT AT 12.4 BAR (180 PSI)

ACN WAS DETERMINED AS REFERENCED IN
ICAO AERODROME DESIGN MANUAL PART 3
CG USED FOR ACN CALCULATIONS: 38% MAC
See Section 7-4-1 MRW 157 900 kg.

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

Aircraft Classification Number – Flexible Pavement
A310-300 Models – MRW 157 900 kg
Aircraft Classification Number – Flexible Pavement
A310-300 Models – MRW 160 900 kg
Aircraft Classification Number – Rigid Pavement
A310-200 Models – MRW 132 900 kg

ACN was determined as referenced in Chapter 1, Second Edition 1983.
See Section 7.4.1 MRW 132 900 kg.
Aircraft Classification Number – Rigid Pavement
A310-200 Models – MRW 132 900 kg
A310
AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

Aircraft Classification Number – Rigid Pavement
A310-200 Models – MRW 139 500 kg

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Aircraft Classification Number – Rigid Pavement
A310-200 Models – MRW 142 900 kg
Aircraft Classification Number – Rigid Pavement
A310-200 Models – MRW 142 900 kg
Aircraft Classification Number – Rigid Pavement
A310-300 Models – MRW 139 500 kg

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Aircraft Classification Number – Rigid Pavement
A310-300 Models – MRW 139 500 kg
A310–300 Models – MRW 150 900 kg

Aircraft Classification Number – Rigid Pavement

ACN WAS DETERMINED AS REFERENCED IN
ICAO AERODROME DESIGN MANUAL PART 3

CG USED FOR ACN CALCULATIONS: 38% MAC
See Section 7-4-1 MRW 150 900 kg.

180 200 220 240 260 280 300 320 340

46 x 16 - 20 TIRES
TIRE PRESSURE CONSTANT AT 14.3 BAR (207 PSI)

70 60 50 40 30 20 10

120 140 160

AIRCRAFT GROSS WEIGHT

AIRCRAFT CLASSIFICATION NUMBER (ACN)

SUBGRADE STRENGTH
D - K = 20 MN/m² (ULTRA LOW)
C - K = 40 MN/m² (LOW)
B - K = 80 MN/m² (MEDIUM)
A - K = 150 MN/m² (HIGH)
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

Aircraft Classification Number - Rigid Pavement
A310-300 Models - MRW 150 900 kg
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

Aircraft Classification Number - Rigid Pavement
A310-300 Models - MRW 153,900 kg
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

Aircraft Classification Number – Rigid Pavement
A310-300 Models – MRW 153 900 kg

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Aircraft Classification Number - Rigid Pavement
A310-300 Models - MRW 157 900 kg
A310–300 Models – MRW 157 900 kg

Aircraft Classification Number – Rigid Pavement

ACN WAS DETERMINED AS REFERENCED IN
ICAO AERODROME DESIGN MANUAL PART 3
CG USED FOR ACN CALCULATIONS: 38% MAC
See Section 7-4-1 MRW 157 900 kg.
Aircraft Classification Number – Rigid Pavement
A310-300 Models – MRW 160 900 kg
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

Aircraft Classification Number – Rigid Pavement
A310-300 Models – MRW 164 900 kg

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AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

R 8.0 DERIVATIVE AIRPLANES
R 8.1.0 Possible Future A310 Derivative Airplane
8.1.0 Possible Future A310 Derivative Airplane

R  No derivative versions of the "A310" are currently planned.
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

R 9.0 SCALED DRAWINGS

R 9.1.1 A310 Scaled Drawing 1 in. = 500 ft.

R 9.2.1 A310 Scaled Drawing 1 cm. = 500 cm.
A310

AIRPLANE CHARACTERISTICS FOR AIRPORT PLANNING

LEGEND:

A  AIR CONDITIONING
B  BULK CARGO COMPT DOOR
C  CARGO COMPT (CONTAINER) DOOR
E  ELECTRICAL
F  FUEL (2 CONNECTIONS)
H O (FIL)  POTABLE WATER - FILLING AND DISCHARGING
H O (DRAI)  POTABLE WATER - DRAINING
L  LAVATORY
MLG  MAIN LANDING GEAR
NG  NOSE GEAR
P  PNEUMATIC (2 CONNECTIONS)
X  PASSENGER/CREW DOOR

NOTE: WHEN PRINTING THIS DRAWING, SURE TO ADJUST FOR PROPER SCALING

9.1 Scaled Drawing – 1 in. = 500 ft.
9.1 Scaled Drawing — 1 in. = 500 ft.

NOTE: WHEN PRINTING THIS DRAWING, SURE TO ADJUST FOR PROPER SCALING
9.2 Scaled Drawing - 1 cm. = 500 cm.

NOTE: WHEN PRINTING THIS DRAWING, SURE TO ADJUST FOR PROPER SCALING
NOTE: WHEN PRINTING THIS DRAWING, SURE TO ADJUST FOR PROPER SCALING

9.2 Scaled Drawing – 1 cm. = 500 cm.