7.0 PAVEMENT DATA

7.1 General Information

A brief description of the pavement charts following will be helpful in their use for airport planning. Each airplane configuration is depicted with a minimum range of four loads imposed on the main landing gear to aid in interpolation between the discreet values shown. All curves for any single chart represent data at a constant tire pressure which will produce a tire deflection of 32 percent at the maximum design taxi weight shown.

Pages 180 and 181 present basic data on the landing gear footprint configuration, maximum design taxi loads, and tire sizes and pressures.

Maximum pavement loads for certain critical conditions at the tire-ground interfaces are shown on Page 182.

Pavement requirements for commercial airplanes are customarily derived from the static analysis of loads imposed on the main landing gear struts. The charts on Pages 183 through 191 are provided in order to determine these loads throughout the stability limits of the airplane at rest on the pavement. These main landing gear loads are used to enter the pavement design charts which follow, interpolating load values where necessary.

The flexible pavement design curves (Page 192) are based on procedures set forth in Instruction Report No. S-77-1, “Procedures for Development of CBR Design Curves,” dated June 1977, and as modified according to the methods described in FAA Advisory Circular 150/5320-6C, “Airport Pavement Design and Evaluation,” dated December 7, 1978. Instruction Report No. S-77-1 was prepared by the U.S. Army Corps of Engineers Waterways Experiment Station, Soils and Pavements Laboratory, Vicksburg, Mississippi. The line showing 10,000 coverages is used to calculate Aircraft Classification Number (ACN).

Rigid pavement design curves (Pages 203 through 211) have been prepared with the use of the Westergaard Equation in general accordance with the procedures outlined in the 1955 edition of “Design of Concrete Airport Pavement” published by the Portland Cement Association, 33 W. Grand Ave., Chicago 10, Illinois, but modified to the new format described in the 1968 Portland Cement Association publication, Operation Instructions “Computer Program for Concrete Airport Pavement Design” (Program PDILB) by Robert G. Packard.
The following procedure is used to develop rigid pavement design curves such as those shown on Pages 203 through 211.

1. Having established the scale for pavement thickness to the left and the scale for allowable working stress to the right, an arbitrary line is drawn representing the main landing gear maximum weight to be shown.

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

3. Additional load lines for the incremental values of weight on the main landing gear are then established on the basis of the curve for $k = 300$, already established.


On the same charts showing LCN versus equivalent single wheel load, there are load plots showing equivalent single wheel load versus pavement thickness for flexible pavements and versus radius of relative stiffness for rigid pavements.

Procedures and curves provided in the ICAO Aerodrome Manual — Part 2, Chapter 4 are used to determine equivalent single wheel loads for use in making LCN conversion of rigid pavement requirements.

Note: Pavement requirements are presented for loads, tires and tire pressures presently certified for commercial usage. All curves represent data at a constant specified tire pressure.
The ACN/PCN system as referenced in Amendment 35 to ICAO Annex 14, "Aerodromes," 7th Edition, June 1976, 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 where 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 a PCA program PDILB for rigid pavements and S-77-1 for flexible pavements to calculate ACN values. The method of pavement evaluation is left up to the airport with the results of their evaluation presented as follows:

<table>
<thead>
<tr>
<th>PCN TYPE</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>A - High</td>
<td>W - No Limit</td>
<td>T - Technical</td>
<td></td>
</tr>
<tr>
<td>F - Flexible</td>
<td>B - Medium</td>
<td>X - To 1.5 MPa</td>
<td>U - Using aircraft</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C - Low</td>
<td>(217 psi)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D - Ultra Low</td>
<td>Y - To 1.0 MPa</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(145 psi)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Z - To 0.5 MPa</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(73 psi)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Page 226 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

Page 227 shows the aircraft ACN values 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)
### MODEL DC-8

<table>
<thead>
<tr>
<th></th>
<th>-43</th>
<th>-55</th>
<th>-55F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAXIMUM DESIGN TAXI WEIGHT</strong></td>
<td>318,000 LB 144,245 KG</td>
<td>328,000 LB 148,781 KG</td>
<td>328,000 LB 148,781 KG</td>
</tr>
<tr>
<td><strong>PERCENT OF WEIGHT ON MAIN GEAR</strong></td>
<td>SEE GRAPH 7.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NOSE TIRE SIZE</strong></td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
</tr>
<tr>
<td><strong>NOSE TIRE PRESSURE</strong></td>
<td>162 PSI 11.4 KG/CM²</td>
<td>171 PSI 12.0 KG/CM²</td>
<td>171 PSI 12.0 KG/CM²</td>
</tr>
<tr>
<td><strong>MAIN GEAR TIRE SIZE</strong></td>
<td>44 x 16 TYPE VII</td>
<td>44 x 16 TYPE VII</td>
<td>44 x 16 TYPE VII</td>
</tr>
<tr>
<td><strong>MAIN GEAR TIRE PRESSURE</strong></td>
<td>177 PSI 12.5 KG/CM²</td>
<td>186 PSI 13.1 KG/CM²</td>
<td>186 PSI 13.1 KG/CM²</td>
</tr>
<tr>
<td><strong>MAIN GEAR TIRE SPACING</strong></td>
<td><strong>&quot;D&quot; DIM.</strong></td>
<td><strong>&quot;E&quot; DIM.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>IN.</strong></td>
<td>CM</td>
<td>IN.</td>
<td>CM</td>
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<tr>
<td>30</td>
<td>76.2</td>
<td>30</td>
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<td>55</td>
<td>139.7</td>
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7.2 FOOTPRINT
MODEL DC-8-43, -55, -55F
### MODEL DC-8

<table>
<thead>
<tr>
<th></th>
<th>-61/-71</th>
<th>-61F/-71F</th>
<th>-62/-72</th>
<th>-62F/-72F</th>
<th>-63/-73</th>
<th>-63F/-73F</th>
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<tr>
<td><strong>MAXIMUM DESIGN</strong></td>
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<tr>
<td>TAXI WEIGHT</td>
<td>328,000 LB</td>
<td>331,000 LB</td>
<td>353,000 LB</td>
<td>353,000 LB</td>
<td>358,000 LB</td>
<td>358,000 LB</td>
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<tr>
<td></td>
<td>148,781 KG</td>
<td>150,142 KG</td>
<td>160,121 KG</td>
<td>160,121 KG</td>
<td>162,389 KG</td>
<td>162,389 KG</td>
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<tr>
<td><strong>PERCENT OF</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEIGHT ON</td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
</tr>
<tr>
<td>MAIN GEAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIE R SIZE</td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
<td>34 x 11 TYPE VII</td>
</tr>
<tr>
<td>TIRE PRESSURE</td>
<td>118 PSI 8.3 KG/CM²</td>
<td>119 PSI 8.4 KG/CM²</td>
<td>174 PSI 12.2 KG/CM²</td>
<td>174 PSI 12.2 KG/CM²</td>
<td>147 PSI 10.3 KG/CM²</td>
<td>147 PSI 10.3 KG/CM²</td>
</tr>
<tr>
<td></td>
<td>19 PSI</td>
<td>22 PSI</td>
<td>22 PSI</td>
<td>22 PSI</td>
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<td>22 PSI</td>
</tr>
<tr>
<td>TIRE PRESSURE</td>
<td>44 x 16 TYPE VII</td>
<td>44 x 16 TYPE VII</td>
<td>44.5 x 16.5-18 TYPE VII</td>
<td>44.5 x 16.5-18 TYPE VII</td>
<td>44.5 x 16.5-18 TYPE VII</td>
<td>44.5 x 16.5-18 TYPE VII</td>
</tr>
<tr>
<td></td>
<td>188 PSI 13.2 KG/CM²</td>
<td>190 PSI 13.4 KG/CM²</td>
<td>191 PSI 13.4 KG/CM²</td>
<td>191 PSI 13.4 KG/CM²</td>
<td>196 PSI 13.8 KG/CM²</td>
<td>196 PSI 13.8 KG/CM²</td>
</tr>
<tr>
<td>TIRE PRESSURE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIRE SPACING</td>
<td>IN.</td>
<td>CM</td>
<td>IN.</td>
<td>CM</td>
<td>IN.</td>
<td>CM</td>
</tr>
<tr>
<td>&quot;D&quot; DIM</td>
<td>30</td>
<td>76.2</td>
<td>30</td>
<td>76.2</td>
<td>32</td>
<td>81.3</td>
</tr>
<tr>
<td>&quot;E&quot; DIM</td>
<td>55</td>
<td>139.7</td>
<td>55</td>
<td>139.7</td>
<td>55</td>
<td>139.7</td>
</tr>
</tbody>
</table>

**SEE GRAPH 7.4**

### 7.2 FOOTPRINT

MODEL DC-8-61, -61F, -62, -62F, -63, -63F, -71, -71F, -72, -72F, -73, -73F
LEGEND: $V_{NG} =$ MAXIMUM VERTICAL NOSE GEAR GROUND LOAD AT MOST FORWARD C.G.
$V_{MG} =$ MAXIMUM VERTICAL MAIN GEAR GROUND LOAD AT MOST AFT C.G.
$H =$ MAXIMUM HORIZONTAL GROUND LOAD FROM BRAKING

NOTE: ALL LOADS CALCULATED USING AIRPLANE MAXIMUM DESIGN TAXI WEIGHT

<table>
<thead>
<tr>
<th>MODEL DC-8</th>
<th>MAXIMUM DESIGN TAXI WEIGHT</th>
<th>$V_{NG}$: FORWARD C.G.</th>
<th>$V_{MG}$ PER STRUT (2), AFT C.G.</th>
<th>$H$ PER STRUT (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>STATIC</td>
<td>STEADY BRAKING*</td>
<td>STATIC</td>
</tr>
<tr>
<td></td>
<td>LB</td>
<td>LB</td>
<td>KG</td>
<td>LB</td>
</tr>
<tr>
<td>-43</td>
<td>318,000</td>
<td>32,541</td>
<td>14,761</td>
<td>50,290</td>
</tr>
<tr>
<td>-55</td>
<td>328,000</td>
<td>34,023</td>
<td>15,433</td>
<td>52,331</td>
</tr>
<tr>
<td>-55F</td>
<td>328,000</td>
<td>36,385</td>
<td>16,504</td>
<td>54,692</td>
</tr>
<tr>
<td>-61/71</td>
<td>328,000</td>
<td>27,431</td>
<td>12,443</td>
<td>41,342</td>
</tr>
<tr>
<td>-61F/-71F</td>
<td>331,000</td>
<td>25,619</td>
<td>11,621</td>
<td>39,770</td>
</tr>
<tr>
<td>-62/72</td>
<td>353,000</td>
<td>35,219</td>
<td>15,975</td>
<td>72,700</td>
</tr>
<tr>
<td>-62F/-72F</td>
<td>353,000</td>
<td>36,140</td>
<td>16,393</td>
<td>73,514</td>
</tr>
<tr>
<td>-63/73</td>
<td>358,000</td>
<td>30,448</td>
<td>13,828</td>
<td>64,535</td>
</tr>
<tr>
<td>-63F/-73F</td>
<td>358,000</td>
<td>30,659</td>
<td>13,907</td>
<td>64,723</td>
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</tbody>
</table>

*10 FT/SEC$^2$ DECELERATION

7.3 MAXIMUM PAVEMENT LOADS
MODEL DC-8-ALL SERIES
NOTE: UNSHADED AREAS REPRESENT OPERATIONAL LIMITS

7.4 LANDING GEAR LOADING ON PAVEMENT
MODEL DC-8-43
7.4 LANDING GEAR LOADING ON PAVEMENT
MODEL DC-8-55
7.4 LANDING GEAR LOADING ON PAVEMENT
MODEL DC-8-55F
NOTE: UNSHADE AREAS REPRESENT OPERATIONAL LIMITS

7.4 LANDING GEAR LOADING ON PAVEMENT
MODEL DC-8-61, -71
NOTE: UNSHADED AREAS REPRESENT OPERATIONAL LIMITS

7.4 LANDING GEAR LOADING ON PAVEMENT MODEL DC-8-61F, -71F
7.4 LANDING GEAR LOADING ON PAVEMENT
MODEL DC-8-62, -72
7.4 LANDING GEAR LOADING ON PAVEMENT
MODEL DC-8-62F, -72F
7.4 LANDING GEAR LOADING ON PAVEMENT
MODEL DC-8-63, -73
NOTE: UNSHADED AREAS REPRESENT OPERATIONAL LIMITS

7.4 LANDING GEAR LOADING ON PAVEMENT
MODEL DC-8-63F, -73F

191
7.5 FLEXIBLE PAVEMENT REQUIREMENTS — U.S. CORPS OF ENGINEERS DESIGN METHOD

MODEL DC-8
7.6 Flexible Pavement Requirements, LCN Conversion

In order to determine the airplane weight that can be accommodated on a particular flexible airport pavement, both the LCN of the pavement and the thickness (h) of the pavement must be known.

In the example for the Model DC-8-43, the flexible pavement thickness is 30 inches, the LCN is 83, and the maximum weight permissible on the main landing gears is 250,000 pounds.
7.6 FLEXIBLE PAVEMENT REQUIREMENTS — LCN CONVERSION
MODEL DC-8-43
NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN ICAO AERODROME MANUAL, PART 2, PARA 4.1.3
44 x 16 TIRES
TIRE PRESSURE CONSTANT AT 186 PSI

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAX DESIGN TAXI WEIGHT AND AFT CG (SEC 7.4)

EQUIVALENT SINGLE WHEEL LOAD (1000 LB)

WEIGHT ON MAIN LANDING GEARS (POUNDS) (KILOS)

310,288 140,747
250,000 113,400
200,000 90,720
150,000 68,040

FLEXIBLE PAVEMENT THICKNESS (INCHES)
INCHES x 2.54 = CENTIMETERS

LOAD CLASSIFICATION NUMBER (LCN)

7.6 FLEXIBLE PAVEMENT REQUIREMENTS — LCN CONVERSION
MODEL DC-8-55
7.6 FLEXIBLE PAVEMENT REQUIREMENTS – LCN CONVERSION
MODEL DC-8-55F
7.6 FLEXIBLE PAVEMENT REQUIREMENTS — LCN CONVERSION
MODEL DC-8-61, -71
7.6 FLEXIBLE PAVEMENT REQUIREMENTS – LCN CONVERSION
MODEL DC-8-61F, -71F
7.6 FLEXIBLE PAVEMENT REQUIREMENTS — LCN CONVERSION
MODEL DC-8-62, -72
7.6 FLEXIBLE PAVEMENT REQUIREMENTS — LCN CONVERSION
MODEL DC-8-62F, -72F

NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN ICAO AERODROME MANUAL, PART 2, PARA 4.1.3
44.5 x 16.5 – 18 TIRES
TIRE PRESSURE CONSTANT AT 191 PSI

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAX DESIGN TAXI WEIGHT AND AFT CG (SEC 7.4)

<table>
<thead>
<tr>
<th>WEIGHT ON MAIN LANDING GEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(POUNDS)</td>
</tr>
<tr>
<td>335,589</td>
</tr>
<tr>
<td>250,000</td>
</tr>
<tr>
<td>200,000</td>
</tr>
<tr>
<td>150,000</td>
</tr>
</tbody>
</table>

FLEXIBLE PAVEMENT THICKNESS (INCHES)
INCHES x 2.54 = CENTIMETERS

LOAD CLASSIFICATION NUMBER (LCN)
7.6 FLEXIBLE PAVEMENT REQUIREMENTS — LCN CONVERSION
MODEL DC-8-63, -73
7.6 FLEXIBLE PAVEMENT REQUIREMENTS — LCN CONVERSION

MODEL DC-8-63F, -73F
TIRE PRESSURE CONSTANT AT 177 PSI
44 x 16 TIRES

MAXIMUM POSSIBLE MAIN GEAR LOAD
AT MAX DESIGN TAXI WEIGHT AND AFT CG
(SEC 7.4)

ALLOWABLE WORKING
STRESS

WEIGHT ON MAIN LANDING GEARS (POUNDS)

K = 500

K = 300

K = 200

K = 100

725,000 (1,342,927 KG)

260,000 (113,890 KG)

200,000 (89,720 KG)

150,000 (68,040 KG)

NOTE: THE VALUES OBTAINED BY USING THE
MAXIMUM LOAD REFERENCE LINE AND
ANY VALUE OF K ARE EXACT. FOR
LOADS LESS THAN MAXIMUM, THE CURVES
ARE EXACT FOR K = 300, BUT DEVIE
SLIGHTLY FOR OTHER VALUES OF K.

REFERENCE: "DESIGN OF CONCRETE AIRPORT PAVEMENT" AND "COMPUTER PROGRAM FOR
AIRPORT PAVEMENT DESIGN — PROGRAM PDILB," PORTLAND CEMENT ASSN.

7.7 RIGID PAVEMENT REQUIREMENTS, PORTLAND CEMENT ASSOCIATION
DESIGN METHOD

MODEL DC-8-43
7.7 RIGID PAVEMENT REQUIREMENTS, PORTLAND CEMENT ASSOCIATION DESIGN METHOD

MODEL DC-8-55

NOTE: THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUE OF K ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 300, BUT DEVIATE SLIGHTLY FOR OTHER VALUES OF K.

REFERENCE: "DESIGN OF CONCRETE AIRPORT PAVEMENT" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN — PROGRAM PDILB." PORTLAND CEMENT ASSN.
TIRE PRESSURE CONSTANT AT 186 PSI
44 x 16 TIRES

MAXIMUM POSSIBLE MAIN GEAR LOAD
AT MAX DESIGN TAXI WEIGHT AND AFT CG
(SEC 7.4)

NOTE: THE VALUES OBTAINED BY USING THE
MAXIMUM LOAD REFERENCE LINE AND
ANY VALUE OF K ARE EXACT. FOR
LOADS LESS THAN MAXIMUM, THE CURVES
ARE EXACT FOR K = 300, BUT DEVIATE
SLIGHTLY FOR OTHER VALUES OF K.

REFERENCE: "DESIGN OF CONCRETE AIRPORT PAVEMENT" AND "COMPUTER PROGRAM FOR
AIRPORT PAVEMENT DESIGN — PROGRAM PDILB." PORTLAND CEMENT ASSN.

7.7 RIGID PAVEMENT REQUIREMENTS, PORTLAND CEMENT ASSOCIATION
DESIGN METHOD

MODEL DC-8-55F
TIRE PRESSURE CONSTANT AT 188 PSI
44 x 16 TIRES

MAXIMUM POSSIBLE MAIN GEAR LOAD
AT MAX DESIGN TAXI WEIGHT AND AFT CG
(SEC 7.4)

NOTE: THE VALUES OBTAINED BY USING THE
MAXIMUM LOAD REFERENCE LINE AND
ANY VALUE OF K ARE EXACT. FOR
LOADS LESS THAN MAXIMUM, THE CURVES
ARE EXACT FOR K = 300, BUT DEVIATE
SLIGHTLY FOR OTHER VALUES OF K.

REFERENCE: "DESIGN OF CONCRETE AIRPORT PAVEMENT" AND "COMPUTER PROGRAM FOR
AIRPORT PAVEMENT DESIGN — PROGRAM PDILB." PORTLAND CEMENT ASSN.

7.7 RIGID PAVEMENT REQUIREMENTS, PORTLAND CEMENT ASSOCIATION
DESIGN METHOD

MODEL DC-8-61, -71
TIRE PRESSURE CONSTANT AT 190 PSI
44 x 16 TIRES

MAXIMUM POSSIBLE MAIN GEAR LOAD
AT MAX DESIGN TAXI WEIGHT AND AFT CG
(SEC 7.4)

ALLOWABLE WORKING STRESS

NOTE: THE VALUES OBTAINED BY USING THE
MAXIMUM LOAD REFERENCE LINE AND
ANY VALUE OF K ARE EXACT. FOR
LOADS LESS THAN MAXIMUM, THE CURVES
ARE EXACT FOR K = 300, BUT DEVIATE
SLIGHTLY FOR OTHER VALUES OF K.

REFERENCE: “DESIGN OF CONCRETE AIRPORT PAVEMENT” AND “COMPUTER PROGRAM FOR
AIRPORT PAVEMENT DESIGN — PROGRAM PDILB.” PORTLAND CEMENT ASSN.

7.7 RIGID PAVEMENT REQUIREMENTS, PORTLAND CEMENT ASSOCIATION
DESIGN METHOD

MODEL DC-8-61F, -71F

207
TIRE PRESSURE CONSTANT AT 191 PSI
44.5 x 16.5-18 TIRES

MAXIMUM POSSIBLE MAIN GEAR LOAD
AT MAX DESIGN TAXI WEIGHT AND AFT CG
(SEC 7.4)

NOTE: THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUE OF K ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 300, BUT DEVIATE SLIGHTLY FOR OTHER VALUES OF K.

REFERENCE: "DESIGN OF CONCRETE AIRPORT PAVEMENT" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN — PROGRAM PDILB." PORTLAND CEMENT ASSN.

7.7 RIGID PAVEMENT REQUIREMENTS, PORTLAND CEMENT ASSOCIATION DESIGN METHOD

MODEL DC-8-62, -72
TIRE PRESSURE CONSTANT AT 191 PSI
44.5 x 16.5-18 TIRES

MAXIMUM POSSIBLE MAIN GEAR LOAD
AT MAX DESIGN TAXI WEIGHT AND AFT CG
(SEC 7.4)

NOTE: THE VALUES OBTAINED BY USING THE
MAXIMUM LOAD REFERENCE LINE AND
ANY VALUE OF K ARE EXACT. FOR
LOADS LESS THAN MAXIMUM, THE CURVES
ARE EXACT FOR K = 300, BUT DEVIATE
SLIGHTLY FOR OTHER VALUES OF K.

REFERENCE: "DESIGN OF CONCRETE AIRPORT PAVEMENT" AND "COMPUTER PROGRAM FOR
AIRPORT PAVEMENT DESIGN — PROGRAM PDILB." PORTLAND CEMENT ASSN.

7.7 RIGID PAVEMENT REQUIREMENTS, PORTLAND CEMENT ASSOCIATION
DESIGN METHOD

MODEL DC-8-62F, -72F

209
TIRE PRESSURE CONSTANT AT 196 PSI
44.5 x 16.5-18 TIRES

MAXIMUM POSSIBLE MAIN GEAR LOAD
AT MAX DESIGN TAXI WEIGHT AND AFT CG
(SEC 7.4)

NOTE: THE VALUES OBTAINED BY USING THE
MAXIMUM LOAD REFERENCE LINE AND
ANY VALUE OF K ARE EXACT. FOR
LOADS LESS THAN MAXIMUM, THE CURVES
ARE EXACT FOR K = 300, BUT DEVIATE
SLIGHTLY FOR OTHER VALUES OF K.

REFERENCE: "DESIGN OF CONCRETE AIRPORT PAVEMENT" AND "COMPUTER PROGRAM FOR
AIRPORT PAVEMENT DESIGN — PROGRAM PDLB." PORTLAND CEMENT ASSN.

7.7 RIGID PAVEMENT REQUIREMENTS, PORTLAND CEMENT ASSOCIATION
DESIGN METHOD

MODEL DC-8-63, -73
NOTE: THE VALUES OBTAINED BY USING THE MAXIMUM LOAD REFERENCE LINE AND ANY VALUE OF K ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR K = 300, BUT DEVIATE SLIGHTLY FOR OTHER VALUES OF K.

REFERENCE: "DESIGN OF CONCRETE AIRPORT PAVEMENT" AND "COMPUTER PROGRAM FOR AIRPORT PAVEMENT DESIGN — PROGRAM PDBL." PORTLAND CEMENT ASSN.

7.7 RIGID PAVEMENT REQUIREMENTS, PORTLAND CEMENT ASSOCIATION DESIGN METHOD

MODEL DC-8-63F, -73F
7.8 Rigid Pavement Requirements, LCN Conversion

In order to determine the airplane weight that can be accommodated on a particular rigid airport pavement, both the LCN of the pavement and the radius of relative stiffness must be known.

In the example for the Model DC-8-43, the rigid pavement radius of relative stiffness is 54 inches, the maximum weight permissible on the main landing gear is 200,000 pounds, and the LCN is 68.

The chart of Section 7.8.1 presents $\ell$-values based on Young's Modulus (E) of 4,000,000 psi and Poisson's Ratio ($\mu$) of 0.15. For convenience in finding $\ell$-values based on other values of E and $\mu$, the curves of Section 7.8.2 are included. For example, to find an $\ell$-value based on E of 3,000,000 psi, the "E" factor of 0.931 is multiplied by the $\ell$-value found in the table of Section 7.8.1. The effect of variations of "$\mu$" on the $\ell$-value is treated in a similar manner.
**RADIUS OF RELATIVE STIFFNESS (\( \ell \))

VALUES OF \( \ell \) IN INCHES

WHERE:
- \( E \) = YOUNG'S MODULUS = \( 4 \times 10^6 \) PSI
- \( k \) = SUBGRADE MODULUS, LBF/IN.\(^3\)
- \( d \) = RIGID-PAVEMENT THICKNESS, IN.
- \( \mu \) = POISSON'S RATIO = 0.15

\[
\text{RADIUS OF RELATIVE STIFFNESS } \ell = \frac{4 \sqrt{\frac{Ed^3}{12(1-\mu^2)k}}} {k} = 24.1652 \frac{4d^3}{\sqrt{k}}
\]

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7.8.1 RADIUS OF RELATIVE STIFFNESS
(REFERENCE: PORTLAND CEMENT ASSOCIATION)
7.8.2 RIGID PAVEMENT REQUIREMENTS, LCN CONVERSION
MODEL DC-8-43
7.8.2 RIGID PAVEMENT REQUIREMENTS, LCN CONVERSION
MODEL DC-8-55
7.8.2 RIGID PAVEMENT REQUIREMENTS, LCN CONVERSION MODEL DC-8-55F
7.8.2 RIGID PAVEMENT REQUIREMENTS LCN CONVERSION
MODEL DC-8-61, -71
7.8.2 RIGID PAVEMENT REQUIREMENTS LCN CONVERSION
MODEL DC-8-61F, -71F
NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN ICAO AERODROME MANUAL, PART 2, PARA 4.1.3

LCN REQUIREMENTS ARE BASED ON CENTER OF SLAB LOADING

44.5 x 16.5 - 18 TIRES
TIRE PRESSURE CONSTANT AT 191 PSI

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAX DESIGN TAXI WEIGHT AND AFT CG (SEC 7.4)

WEIGHT ON MAIN LANDING GEARS

7.8.2 RIGID PAVEMENT REQUIREMENTS LCN CONVERSION
MODEL DC-8-62, -72
NOTE: EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN ICAO AERODROME MANUAL, PART 2, PARA 4.1.3

LCN REQUIREMENTS ARE BASED ON CENTER OF SLAB LOADING

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAX DESIGN TAXI WEIGHT AND AFT CG (SEC 7.4)

330,589 LB (152,225 KG)
250,000 LB (113,000 KG)
200,000 LB (90,720 KG)
150,000 LB (68,040 KG)

WEIGHT ON MAIN LANDING GEAR

44.5 x 16.5 - 18 TIRES
TIRE PRESSURE CONSTANT AT 191 PSI

EQUIVALENT SINGLE WHEEL LOAD (1000 LB)

RADIUS OF RELATIVE STIFFNESS INCHES (I)

LOAD CLASSIFICATION NUMBER (LCN)

7.8.2 RIGID PAVEMENT REQUIREMENTS LCN CONVERSION
MODEL DC-8-62F, -72F
7.8.2 RIGID PAVEMENT REQUIREMENTS LCN CONVERSION
MODEL DC-8-63, -73
**7.8.2 RIGID PAVEMENT REQUIREMENTS LCN CONVERSION MODEL DC-8-63F, -73F**

**NOTE:** EQUIVALENT SINGLE WHEEL LOADS ARE DERIVED BY METHODS SHOWN IN ICAO AERODROME MANUAL, PART 2, PARA 4.1.3

LCN REQUIREMENTS ARE BASED ON CENTER OF SLAB LOADING

44.5 x 16.5 TIRES TIRE PRESSURE CONSTANT AT 196 PSI

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAX DESIGN TAXI WEIGHT AND AFT CG (SEC 7.4)

WEIGHT ON MAIN LANDING GEAR

EQUIVALENT SINGLE WHEEL LOAD (1000 LB)

EQUIVALENT SINGLE WHEEL LOAD (1000 KG)

RADIUS OF RELATIVE STIFFNESS INCHES (t)

LOAD CLASSIFICATION NUMBER (LCN)
7.8.3 Radius of Relative Stiffness (Other values of E and \(\ell\))

The chart of Section 7.8.1 presents \(\ell\)-values based on Young's Modulus (E) of 4,000,000 psi and Poisson's Ratio (\(\mu\)) of 0.15. For convenience in finding \(\ell\)-values based on other values of E and \(\mu\), the curves of Section 7.8.3 are included. For example, to find an \(\ell\)-value based on an E of 3,000,000 psi, the "E" factor of 0.931 is multiplied by the \(\ell\)-value found in the table of Section 7.8.1. The effect of variations of \(\mu\) and the \(\ell\)-value is treated in a similar manner.
7.8.4 EFFECT ON RADIUS OF RELATIVE STIFFNESS
7.9 ACN-PCN Reporting System

To determine the ACN of an aircraft on flexible or rigid pavement, both the aircraft gross weight and the subgrade strength must be known. As an example, referring to Page 226, for an aircraft gross weight of 300,000 lb and low subgrade strength, the ACN for flexible pavement is 46. Referring to Page 227, for the same gross weight and subgrade strength, the ACN for rigid pavement is 45.

Note: An aircraft with an ACN equal to or less than the reported PCN can operate without restrictions on the pavement subject to any limitations on tire pressure.
7.9.1 AIRCRAFT CLASSIFICATION NUMBER — FLEXIBLE PAVEMENT
MODEL DC-8 — ALL SERIES

NOTES:
• ACN WAS DETERMINED AS REFERENCED IN AMENDMENT 35 TO ICAO ANNEX 14, "AERODROMES," 7TH EDITION, JUNE 1976.
• TO DETERMINE MAIN-GEAR LOADING, SEE SECTION 7.4
7.9.2 AIRCRAFT CLASSIFICATION NUMBER — RIGID PAVEMENT
MODEL DC-8 — ALL SERIES
7.9.3 Development of ACN Charts

The ACN charts for flexible and rigid pavements as shown on Pages 226 and 227, respectively, were developed by methods referenced in Amendment 35 to ICAO Annex 14. The procedures to develop these charts are also described below.

The following procedure is used to develop the flexible pavement ACN charts such as that shown on Page 226.

1. Determine the percent of weight on the main gear to be used in Steps 2, 3, and 4 below. It is the maximum aft c.g. position which yields the critical loading on the critical gear (see Pages 183 through 191). This c.g. position is used to determine main gear loads at all gross weights of the model being considered.

2. Establish a flexible pavement requirements chart using the S-77-1 design method such as shown on the right-hand side of Page 229. Use standard subgrade strengths of CBR 3, 5, 10, and 15 percent and 10,000 coverages. This chart provides the same thickness values as that of Page 192, but is presented here in different formats.

3. Determine reference thickness values from the pavement requirements chart of Step 2 for each standard subgrade strength and gear loading.

4. Enter the reference thickness values into the ACN Flexible Pavement Conversion Chart shown on the left-hand side of Page 229 to determine ACN. This chart was developed using the S-77-1 design method with a single tire inflated to 1.25 MPa (181 psi) pressure and 10,000 coverages. The ACN is two times the derived single wheel load expressed in thousands of kilograms. These values of ACN are then plotted as a function of aircraft gross weight such as shown on Page 226.
7.9.4 DEVELOPMENT OF AIRCRAFT CLASSIFICATION NUMBER (ACN) — FLEXIBLE PAVEMENT
The following procedure is used to develop the rigid pavement ACN charts such as that shown on Page 227.

1. Determine the percent of weight on the main gear to be used in Steps 2, 3, and 4 below. It is the maximum aft c.g. position which yields the critical loading on the critical gear (see Pages 183 through 191). This c.g. position is used to determine main gear loads at all gross weights of the model being considered.

2. Establish a rigid pavement requirements chart using the PCA computer program PDILB such as shown on the right-hand side of Page 231. Use standard subgrade strengths of $k = 75$, $150$, $300$, and $550$ pci (nominal values for $k = 20$, $40$, $80$, $150$ MN/m$^3$). This chart provides the same thickness values as that of Pages 203 through 211.

3. Determine reference thickness values from the pavement requirements chart of Step 2 for each standard subgrade strength and gear loading at 400 psi working stress (nominal value for 2.75 MPa working stress).

4. Enter the reference thickness values in the ACN Rigid Pavement Conversion Chart shown on the left-hand side of Page 231 to determine ACN. This chart was developed using the PCA computer program PDILB with a single tire inflated to 1.25 MPa (181 psi) pressure and a working stress of 400 psi. The ACN is two times the derived single wheel load expressed in thousands of kilograms. These values of ACN are then plotted as a function of aircraft gross weight such as shown on Page 227.
7.9.5 DEVELOPMENT OF AIRCRAFT CLASSIFICATION NUMBER (ACN) — RIGID PAVEMENT

NOTE:
- TIRES: 44 x 16 AND 44.5 x 16.5
- TIRE PRESSURE RANGE: 177 TO 196 PSI

ACN RIGID PAVEMENT CONVERSION CHART
REFERENCE: ICAO ANNEX 14 AMENDMENT 35

WEIGHT ON MAIN LANDING GEAR
(SEE SECTION 7.4)

MAX MAIN GEAR LOAD
AT MRW AND AFT DGE
-63, -63F, -73, -73F
-62, -62F, -72, -72F
-55, -55F
-61, -61F, -71, -71F
-43

ALLOWABLE WORKING STRESS (PSI)

RIGID PAVEMENT REQUIREMENTS CHART
PCA PROGRAM PDILB