7.0 PAVEMENT DATA

7.1 General Information

7.2 Landing Gear Footprint

7.3 Maximum Pavement Loads

7.4 Landing Gear Loading on Pavement

7.5 Flexible Pavement Requirements - U.S. Army Corps of Engineers Method S-77-1 and FAA Design Method

7.6 Flexible Pavement Requirements - LCN Conversion

7.7 Rigid Pavement Requirements - Portland Cement Association Design Method

7.8 Rigid Pavement Requirements - LCN Conversion

7.9 Rigid Pavement Requirements - FAA Design Method

7.10 ACN/PCN Reporting System - Flexible and Rigid Pavements
7.0 PAVEMENT DATA

7.1 General Information

A brief description of the pavement charts that follow will help in their use for airport planning. Each airplane configuration is depicted with a minimum range of five loads imposed on the main landing gear to aid in interpolation between the discrete values shown. All curves for any single chart represent data based on rated loads and tire pressures considered normal and acceptable by current aircraft tire manufacturer's standards. Tire pressures, where specifically designated on tables and charts, are at values obtained under loaded conditions as certificated for commercial use.

Section 7.2 presents 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-to-ground interface are shown in Section 7.3, with the tires having equal loads on the struts.

Pavement requirements for commercial airplanes are customarily derived from the static analysis of loads imposed on the main landing gear struts. The charts in Section 7.4 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 as the point of entry to the pavement design charts, interpolating load values where necessary.

The flexible pavement design curves (Section 7.5) 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 150/5320-6D, "Airport Pavement Design and Evaluation," dated July 7, 1995. 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).
The following procedure is used to develop the curves, such as shown in Section 7.5:

1. Having established the scale for pavement depth at the bottom and the scale for CBR at the top, an arbitrary line is drawn representing 5,000 annual departures.

2. Values of the aircraft gross weight are then plotted.

3. Additional annual departure lines are drawn based on the load lines of the aircraft gross weights already established.

4. An additional line representing 10,000 coverages (used to calculate the flexible pavement Aircraft Classification Number) is also placed.

All Load Classification Number (LCN) curves (Sections 7.6 and 7.8) have been developed from a computer program based on data provided in International Civil Aviation Organization (ICAO) document 9157-AN/901, Aerodrome Design Manual, Part 3, “Pavements”, Second Edition, 1983. LCN values are shown directly for parameters of weight on main landing gear, tire pressure, and radius of relative stiffness (R) for rigid pavement or pavement thickness or depth factor (h) for flexible pavement.

Rigid pavement design curves (Section 7.7) have been prepared with the Westergaard equation in general accordance with the procedures outlined in the Design of Concrete Airport Pavement (1955 edition) by Robert G. Packard, published by the Portland Cement Association, 5420 Old Orchard Road, Skokie, Illinois 60077-1083. These curves are modified to the format described in the Portland Cement Association publication XP6705-2, Computer Program for Airport Pavement Design (Program PDILB), 1968, by Robert G. Packard.
The following procedure is used to develop the rigid pavement design curves shown in Section 7.7:

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

2. Values of the subgrade modulus (k) are then plotted.

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

The rigid pavement design curves (Section 7.9) have been developed based on methods used in the FAA Advisory Circular AC 150/5320-6D July 7, 1995. The following procedure is used to develop the curves, such as shown in Section 7.9:

1. Having established the scale for pavement flexure strength on the left and temporary scale for pavement thickness on the right, an arbitrary load line is drawn representing the main landing gear maximum weight to be shown at 5,000 coverages.

2. Values of the subgrade modulus (k) are then plotted.

3. Additional load lines for the incremental values of weight are then drawn on the basis of the subgrade modulus curves already established.

4. The permanent scale for the rigid-pavement thickness is then placed. Lines for other than 5,000 coverages are established based on the aircraft pass-to-coverage ratio.
The ACN/PCN system (Section 7.10) as referenced in ICAO Annex 14, "Aerodromes," 3rd Edition, July 1999, 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 Pavement Classification Number. An aircraft having an ACN equal to or less than the PCN can operate on the pavement subject to any limitation on the tire pressure. 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 181 psi (1.25 MPa) that would have the same pavement requirements as the aircraft. Computationally, the ACN/PCN system uses the 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</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 217 psi (1.5 MPa)</td>
<td>U = Using Aircraft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C = Low</td>
<td>Y = To 145 psi (1.0 MPa)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>D = Ultra Low</td>
<td>Z = To 73 psi (0.5 MPa)</td>
<td></td>
</tr>
</tbody>
</table>

ACN values for flexible pavements are calculated for the following four subgrade categories:

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

ACN values for rigid pavements are calculated for the following four subgrade categories:

- Code A - High Strength, k = 550 pci (150 MN/m³)
- Code B - Medium Strength, k = 300 pci (80 MN/m³)
- Code C - Low Strength, k = 150 pci (40 MN/m³)
- Code D - Ultra Low Strength, k = 75 pci (20 MN/m³)
PRELIMINARY FOR -900 WITH WINGLETS

MAXIMUM DESIGN TAXI WEIGHT

<table>
<thead>
<tr>
<th></th>
<th>UNITS</th>
<th>737-700</th>
<th>737-800</th>
<th>737-900</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LB</td>
<td>133,500 THRU</td>
<td>156,000 THRU</td>
<td>164,500 THRU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>155,000</td>
<td>174,700</td>
<td>174,700</td>
</tr>
<tr>
<td></td>
<td>KG</td>
<td>60,555 THRU</td>
<td>70,760 THRU</td>
<td>74,616 THRU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>70,307</td>
<td>79,243</td>
<td>79,243</td>
</tr>
</tbody>
</table>

PERCENT OF WEIGHT ON MAIN GEAR

SEE SECTION 7.4

NOSE GEAR SIZE

IN. 27 x 7.7 - 15 12 PR 27 x 7.75 - 15 12 PR

NOSE GEAR TIRE PRESSURE

PSI 205 185 185

Kg/cm² 14.41 13.01 13.01

MAIN GEAR TIRE SIZE

IN. H43.5 x 16.0 - 21 26 PR H44.5 x 16.5 - 21 28 PR H44.5 x 16.5 - 21 28 PR

MAIN GEAR TIRE PRESSURE

PSI 197 THRU 205 204 THRU 205 204 THRU 205

Kg/cm² 13.85 THRU 14.41 14.34 THRU 14.41 14.34 THRU 14.41

OPTIONAL TIRES

MAIN GEAR TIRE SIZE

IN. H44.5 x 16.5 - 21 28PR NOT AVAILABLE NOT AVAILABLE

MAIN GEAR TIRE PRESSURE

PSI 179 THRU 205 NOT AVAILABLE NOT AVAILABLE

Kg/cm² 12.58 THRU 14.41 NOT AVAILABLE NOT AVAILABLE

7.2 LANDING GEAR FOOTPRINT

MODEL 737-700, -800, -900 (WITH WINGLETS)
\[ V_{NG} = \text{MAXIMUM VERTICAL NOSE GEAR GROUND LOAD AT MOST FORWARD CENTER OF GRAVITY} \]
\[ V_{MG} = \text{MAXIMUM VERTICAL MAIN GEAR GROUND LOAD AT MOST AFT CENTER OF GRAVITY} \]
\[ H = \text{MAXIMUM HORIZONTAL GROUND LOAD FROM BRAKING} \]

**NOTE:** ALL LOADS CALCULATED USING AIRPLANE MAXIMUM DESIGN TAXI WEIGHT

### 7.3 MAXIMUM PAVEMENT LOADS

**MODEL 737-700, -800, -900 (WITH WINGLETS)**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>UNITS</th>
<th>MAXIMUM DESIGN TAXI WEIGHT</th>
<th>V&lt;sub&gt;NG&lt;/sub&gt; STATIC AT MOST FWD C.G.</th>
<th>V&lt;sub&gt;MG&lt;/sub&gt; PER STRUT AT MAX LOAD AT STATIC AFT C.G.</th>
<th>H PER STRUT AT INSTANTANEOUS BRAKING (μ = 0.8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>737-700</td>
<td>LB</td>
<td>133,500</td>
<td>17,558</td>
<td>63,000</td>
<td>50,400</td>
</tr>
<tr>
<td></td>
<td>KG</td>
<td>60,555</td>
<td>7,964</td>
<td>28,576</td>
<td>22,861</td>
</tr>
<tr>
<td>737-700</td>
<td>LB</td>
<td>153,500</td>
<td>18,740</td>
<td>71,482</td>
<td>57,185</td>
</tr>
<tr>
<td></td>
<td>KG</td>
<td>69,627</td>
<td>8,500</td>
<td>32,424</td>
<td>25,939</td>
</tr>
<tr>
<td>737-700</td>
<td>LB</td>
<td>155,000</td>
<td>16,925</td>
<td>71,060</td>
<td>56,847</td>
</tr>
<tr>
<td></td>
<td>KG</td>
<td>70,307</td>
<td>7,677</td>
<td>32,232</td>
<td>25,785</td>
</tr>
<tr>
<td>737-800</td>
<td>LB</td>
<td>156,000</td>
<td>16,770</td>
<td>75,062</td>
<td>60,050</td>
</tr>
<tr>
<td></td>
<td>KG</td>
<td>70,760</td>
<td>7,607</td>
<td>34,048</td>
<td>27,238</td>
</tr>
<tr>
<td>737-800</td>
<td>LB</td>
<td>173,000</td>
<td>17,059</td>
<td>82,143</td>
<td>65,715</td>
</tr>
<tr>
<td></td>
<td>KG</td>
<td>78,472</td>
<td>7,738</td>
<td>37,259</td>
<td>29,808</td>
</tr>
<tr>
<td>737-800</td>
<td>LB</td>
<td>174,700</td>
<td>15,100</td>
<td>81,730</td>
<td>65,384</td>
</tr>
<tr>
<td></td>
<td>KG</td>
<td>79,243</td>
<td>6,421</td>
<td>37,078</td>
<td>29,662</td>
</tr>
<tr>
<td>737-900</td>
<td>LB</td>
<td>164,500</td>
<td>14,998</td>
<td>78,962</td>
<td>63,169</td>
</tr>
<tr>
<td></td>
<td>KG</td>
<td>74,616</td>
<td>6,803</td>
<td>35,817</td>
<td>28,653</td>
</tr>
<tr>
<td>737-900</td>
<td>LB</td>
<td>174,700</td>
<td>14,155</td>
<td>81,743</td>
<td>65,394</td>
</tr>
<tr>
<td></td>
<td>KG</td>
<td>79,243</td>
<td>6,421</td>
<td>37,078</td>
<td>29,662</td>
</tr>
</tbody>
</table>

D6-58325-5

SEPTEMBER 2003 149
7.4.1 LANDING GEAR LOADING ON PAVEMENT

MODEL 737-700 (WITH WINGLETS)

D6-58325-5

150 SEPTEMBER 2002
7.4.2 LANDING GEAR LOADING ON PAVEMENT
MODEL 737-800 (WITH WINGLETS)

D6-58325-5
7.4.3 LANDING GEAR LOADING ON PAVEMENT
MODEL 737-900 (WITH WINGLETS)
7.5 Flexible Pavement Requirements - U.S. Army Corps of Engineers Method (S-77-1) and FAA Design Method

The following flexible-pavement design chart presents the data of five incremental main-gear loads at the minimum tire pressure required at the maximum design taxi weight.

In the example shown, for a CBR of 25 and an annual departure level of 5,000, the required flexible pavement thickness for an airplane with a main gear loading of 140,000 pounds is 12.0 inches.

The line showing 10,000 coverages is used for ACN calculations (see Section 7.10).

The FAA design method uses a similar procedure using total airplane weight instead of weight on the main landing gears. The equivalent main gear loads for a given airplane weight could be calculated from Section 7.4.
7.5 FLEXIBLE PAVEMENT REQUIREMENTS - U.S. ARMY CORPS OF ENGINEERS DESIGN METHOD (S-77-1) AND FAA DESIGN METHOD

MODEL 737-700, -800, -900 (WITH WINGLETS)
7.6 Flexible Pavement Requirements - LCN Method

To determine the airplane weight that can be accommodated on a particular flexible pavement, both the Load Classification Number (LCN) of the pavement and the thickness must be known.

In the example shown on the next page, flexible pavement thickness is shown at 16.8 in. with an LCN of 45. For these conditions, the apparent maximum allowable weight permissible on the main landing gear is 100,000 lb for an airplane with 204-psi main gear tires.

Note: If the resultant aircraft LCN is not more that 10% above the published pavement LCN, the bearing strength of the pavement can be considered sufficient for unlimited use by the airplane. The figure 10% has been chosen as representing the lowest degree of variation in LCN that is significant (reference: ICAO Aerodrome Manual, Part 2, "Aerodrome Physical Characteristics," Chapter 4, Paragraph 4.1.5.7v, 2nd Edition dated 1965).
7.6 FLEXIBLE PAVEMENT REQUIREMENTS - LCN METHOD
MODEL 737-700, -800, -900 (WITH WINGLETS)

NOTES:
* TIRES - H44.5 x 16.5 - 21 28PR, TIRE PRESSURE 204 PSI (14.34 KG/SQ CM)
* EQUIVALENT SINGLE-WHEEL LOADS ARE DERIVED FROM
  ICAO AERODROME MANUAL, PART 2 PAR. 4.1.3, DATED 1965.

WEIGHT ON MAIN
LANDING GEAR
(SEE SEC 7.4)
LB  (KG)
165,950 (75,274)
140,000 (63,503)
120,000 (54,431)
100,000 (45,359)
80,000 (36,287)

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAXIMUM DESIGN TAXI WEIGHT AND AFT CG (174,700 LB)

INCHES
(1,000 POUNDS)
(1,000 KILOGRAMS)

FLEXIBLE PAVEMENT THICKNESS, h
CENTIMETERS
INCHES
LOAD CLASSIFICATION NUMBER (LCN)

PRELIMINARY FOR -900 WITH WINGLETS
7.7 Rigid Pavement Requirements - Portland Cement Association Design Method

The Portland Cement Association method of calculating rigid pavement requirements is based on the computerized version of "Design of Concrete Airport Pavement" (Portland Cement Association, 1965) as described in XP6705-2, "Computer Program for Airport Pavement Design" by Robert G. Packard, Portland Cement Association, 1968.

The following rigid pavement design chart presents the data for five incremental main gear loads at the minimum tire pressure required at the maximum design taxi weight.

In the example shown in Section 7.7.1, for an allowable working stress of 550 psi, a main gear load of 165,950 lb, and a subgrade strength (k) of 150, the required rigid pavement thickness is 11.2 in. In Section 7.7.2, for an allowable working stress of 550 psi, a main gear load of 143,000 lb, and a subgrade strength (k) of 300, the required pavement thickness is 9.5 in for an airplane with low-pressure tires.
7.7.1 RIGID PAVEMENT REQUIREMENTS - PORTLAND CEMENT ASSOCIATION DESIGN METHOD

MODEL 737-700, -800, -900 (WITH WINGLETS)
7.7.2 RIGID PAVEMENT REQUIREMENTS - PORTLAND CEMENT ASSOCIATION DESIGN METHOD

MODEL 737-700 (WITH WINGLETS) (OPTIONAL TIRES)
7.8 Rigid Pavement Requirements - LCN Conversion

To determine the airplane weight that can be accommodated on a particular rigid pavement, both the LCN of the pavement and the radius of relative stiffness (Ι) of the pavement must be known.

In the example shown in Section 7.8.2, for a rigid pavement with a radius of relative stiffness of 29 with an LCN of 55, the maximum allowable weight permissible on the main landing gear is 100,000 lb.

Note: If the resultant aircraft LCN is not more than 10% above the published pavement LCN, the bearing strength of the pavement can be considered sufficient for unlimited use by the airplane. The figure 10% has been chosen as representing the lowest degree of variation in LCN that is significant (reference: ICAO Aerodrome Manual, Part 2, "Aerodrome Physical Characteristics," Chapter 4, Paragraph 4.1.5.7v, 2nd Edition dated 1965).
RADIUS OF RELATIVE STIFFNESS ($k$)
VALUES IN INCHES

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

WHERE:  
$E$ = YOUNG’S MODULUS OF ELASTICITY $= 4 \times 10^6$ psi  
$k$ = SUBGRADE MODULUS, LB PER CU IN  
$d$ = RIGID PAVEMENT THICKNESS, IN  
$\mu$ = POISSON’S RATIO $= 0.15$

<table>
<thead>
<tr>
<th>$d$</th>
<th>$k =$</th>
<th>$k =$</th>
<th>$k =$</th>
<th>$k =$</th>
<th>$k =$</th>
<th>$k =$</th>
<th>$k =$</th>
<th>$k =$</th>
<th>$k =$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>75</td>
<td>100</td>
<td>150</td>
<td>200</td>
<td>250</td>
<td>300</td>
<td>350</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>6.5</td>
<td>33.42</td>
<td>31.10</td>
<td>28.11</td>
<td>26.16</td>
<td>24.74</td>
<td>23.63</td>
<td>22.74</td>
<td>21.99</td>
<td>20.80</td>
</tr>
<tr>
<td>7.5</td>
<td>37.21</td>
<td>34.63</td>
<td>31.29</td>
<td>29.12</td>
<td>27.54</td>
<td>26.31</td>
<td>25.32</td>
<td>24.49</td>
<td>23.16</td>
</tr>
<tr>
<td>8.0</td>
<td>39.06</td>
<td>36.35</td>
<td>32.84</td>
<td>30.56</td>
<td>28.91</td>
<td>27.62</td>
<td>26.57</td>
<td>25.70</td>
<td>24.31</td>
</tr>
<tr>
<td>8.5</td>
<td>40.87</td>
<td>38.04</td>
<td>34.37</td>
<td>31.99</td>
<td>30.25</td>
<td>28.90</td>
<td>27.81</td>
<td>26.90</td>
<td>25.44</td>
</tr>
<tr>
<td>9.0</td>
<td>42.66</td>
<td>39.70</td>
<td>35.88</td>
<td>33.39</td>
<td>31.57</td>
<td>30.17</td>
<td>29.03</td>
<td>28.07</td>
<td>26.55</td>
</tr>
<tr>
<td>9.5</td>
<td>44.43</td>
<td>41.35</td>
<td>37.36</td>
<td>34.77</td>
<td>32.88</td>
<td>31.42</td>
<td>30.23</td>
<td>29.24</td>
<td>27.65</td>
</tr>
<tr>
<td>10.0</td>
<td>46.17</td>
<td>42.97</td>
<td>38.83</td>
<td>36.13</td>
<td>34.17</td>
<td>32.65</td>
<td>31.41</td>
<td>30.38</td>
<td>28.73</td>
</tr>
<tr>
<td>10.5</td>
<td>47.89</td>
<td>44.57</td>
<td>39.47</td>
<td>37.48</td>
<td>35.44</td>
<td>33.87</td>
<td>32.58</td>
<td>31.52</td>
<td>29.81</td>
</tr>
<tr>
<td>11.0</td>
<td>49.59</td>
<td>46.15</td>
<td>41.70</td>
<td>38.81</td>
<td>36.70</td>
<td>35.07</td>
<td>33.74</td>
<td>32.63</td>
<td>30.86</td>
</tr>
<tr>
<td>11.5</td>
<td>51.27</td>
<td>47.72</td>
<td>43.12</td>
<td>40.12</td>
<td>37.95</td>
<td>36.26</td>
<td>34.89</td>
<td>33.74</td>
<td>31.91</td>
</tr>
<tr>
<td>12.0</td>
<td>52.94</td>
<td>49.26</td>
<td>44.51</td>
<td>41.43</td>
<td>39.18</td>
<td>37.43</td>
<td>36.02</td>
<td>34.83</td>
<td>32.94</td>
</tr>
<tr>
<td>12.5</td>
<td>54.58</td>
<td>50.80</td>
<td>45.90</td>
<td>42.71</td>
<td>40.40</td>
<td>38.60</td>
<td>37.14</td>
<td>35.92</td>
<td>33.97</td>
</tr>
<tr>
<td>13.0</td>
<td>56.21</td>
<td>52.31</td>
<td>47.27</td>
<td>43.99</td>
<td>41.60</td>
<td>39.75</td>
<td>38.25</td>
<td>36.99</td>
<td>34.98</td>
</tr>
<tr>
<td>13.5</td>
<td>57.83</td>
<td>53.81</td>
<td>48.63</td>
<td>45.25</td>
<td>42.80</td>
<td>40.89</td>
<td>39.34</td>
<td>38.05</td>
<td>35.99</td>
</tr>
<tr>
<td>14.0</td>
<td>59.43</td>
<td>55.30</td>
<td>49.97</td>
<td>46.50</td>
<td>43.98</td>
<td>42.02</td>
<td>40.43</td>
<td>39.10</td>
<td>36.98</td>
</tr>
<tr>
<td>14.5</td>
<td>61.01</td>
<td>56.76</td>
<td>51.30</td>
<td>47.74</td>
<td>45.15</td>
<td>43.14</td>
<td>41.51</td>
<td>40.15</td>
<td>37.97</td>
</tr>
<tr>
<td>15.0</td>
<td>62.58</td>
<td>58.24</td>
<td>52.62</td>
<td>48.97</td>
<td>46.32</td>
<td>44.25</td>
<td>42.58</td>
<td>41.18</td>
<td>38.95</td>
</tr>
<tr>
<td>15.5</td>
<td>64.14</td>
<td>59.69</td>
<td>53.93</td>
<td>50.19</td>
<td>47.47</td>
<td>45.35</td>
<td>43.64</td>
<td>42.21</td>
<td>39.92</td>
</tr>
<tr>
<td>16.0</td>
<td>65.69</td>
<td>61.13</td>
<td>55.23</td>
<td>51.40</td>
<td>48.61</td>
<td>46.45</td>
<td>44.69</td>
<td>43.22</td>
<td>40.88</td>
</tr>
<tr>
<td>16.5</td>
<td>67.22</td>
<td>62.55</td>
<td>56.52</td>
<td>52.60</td>
<td>49.75</td>
<td>47.53</td>
<td>45.73</td>
<td>44.23</td>
<td>41.83</td>
</tr>
<tr>
<td>17.0</td>
<td>68.74</td>
<td>63.97</td>
<td>57.80</td>
<td>53.79</td>
<td>50.87</td>
<td>48.61</td>
<td>46.77</td>
<td>45.23</td>
<td>42.78</td>
</tr>
<tr>
<td>17.5</td>
<td>70.25</td>
<td>65.38</td>
<td>59.07</td>
<td>54.97</td>
<td>51.99</td>
<td>49.68</td>
<td>47.80</td>
<td>46.23</td>
<td>43.72</td>
</tr>
<tr>
<td>18.0</td>
<td>71.75</td>
<td>66.77</td>
<td>60.34</td>
<td>56.15</td>
<td>53.10</td>
<td>50.74</td>
<td>48.82</td>
<td>47.22</td>
<td>44.65</td>
</tr>
<tr>
<td>19.0</td>
<td>74.72</td>
<td>69.54</td>
<td>62.83</td>
<td>58.47</td>
<td>55.30</td>
<td>52.84</td>
<td>50.84</td>
<td>49.17</td>
<td>46.50</td>
</tr>
<tr>
<td>20.0</td>
<td>77.65</td>
<td>72.26</td>
<td>65.30</td>
<td>60.77</td>
<td>57.47</td>
<td>54.91</td>
<td>52.83</td>
<td>51.10</td>
<td>48.33</td>
</tr>
<tr>
<td>21.0</td>
<td>80.55</td>
<td>74.96</td>
<td>67.73</td>
<td>63.03</td>
<td>59.61</td>
<td>56.95</td>
<td>54.80</td>
<td>53.00</td>
<td>50.13</td>
</tr>
<tr>
<td>22.0</td>
<td>83.41</td>
<td>77.62</td>
<td>70.14</td>
<td>65.27</td>
<td>61.73</td>
<td>58.98</td>
<td>56.75</td>
<td>54.88</td>
<td>51.91</td>
</tr>
<tr>
<td>23.0</td>
<td>86.23</td>
<td>80.25</td>
<td>72.51</td>
<td>67.48</td>
<td>63.82</td>
<td>60.98</td>
<td>58.67</td>
<td>56.74</td>
<td>53.67</td>
</tr>
<tr>
<td>24.0</td>
<td>89.03</td>
<td>82.85</td>
<td>74.86</td>
<td>69.67</td>
<td>65.89</td>
<td>62.95</td>
<td>60.57</td>
<td>58.58</td>
<td>55.41</td>
</tr>
<tr>
<td>25.0</td>
<td>91.80</td>
<td>85.43</td>
<td>77.19</td>
<td>71.84</td>
<td>67.94</td>
<td>64.91</td>
<td>62.46</td>
<td>60.41</td>
<td>57.13</td>
</tr>
</tbody>
</table>

7.8.1 RADIUS OF RELATIVE STIFFNESS
(REFERENCE: PORTLAND STONE CEMENT ASSOCIATION)

D6-58325-5

SEPTEMBER 2002  161
7.8.2 RIGID PAVEMENT REQUIREMENTS - LCN CONVERSION

MODEL 737-700, -800, -900 (WITH WINGLETS)
7.9 Rigid Pavement Requirements - FAA Design Method

The following rigid pavement design charts present data on five incremental main gear loads at the minimum tire pressure required at the maximum design taxi weight.

In the example shown in 7.9.1, the pavement flexural stress is shown at 700 psi, the subgrade strength is shown at $k = 300$, and the annual departure level is 3,000. For these conditions, the required rigid pavement thickness for an airplane with main gear load of 120,000 pounds is 9.9 inches. In 7.9.2, with the same pavement conditions and departure level, the required rigid pavement thickness for a 737-700 airplane with a main gear load of 115,900 pounds and optional low-pressure tires, is 8.8 inches.
7.9.1 RIGID PAVEMENT REQUIREMENTS - FAA DESIGN METHOD
MODEL 737-700, -800, -900 (WITH WINGLETS)

D6-58325-5

164 SEPTEMBER 2003
7.10 ACN/PCN Reporting System: Flexible and Rigid Pavements

To determine the ACN of an aircraft on flexible or rigid pavement, both the aircraft gross weight and the subgrade strength category must be known. In the chart in Section 7.10.1, for an aircraft with gross weight of 125,000 lb and medium subgrade strength, the flexible pavement ACN is 29. In Section 7.10.5, for the same gross weight and subgrade strength, the rigid pavement ACN is 33.5.

Note: An aircraft with an ACN equal to or less that the reported PCN can operate on that pavement subject to any limitations on the tire pressure. (Ref. Amendment 38 to ICAO Annex 14, “Aerodromes”, 8th Edition, March 1983.)

The following table provides ACN data in tabular format similar to the one used by ICAO in the “Aerodrome Design Manual Part 3, Pavements”. If the ACN for an intermediate weight between maximum taxi weight and the empty weight of the aircraft is required, Figures 7.10.1 through 7.10.12 should be consulted.

<table>
<thead>
<tr>
<th>AIRCRAFT MODEL</th>
<th>ALL-UP MASS/OPERATING MASS EMPTY LB (KG)</th>
<th>LOAD ON ONE MAIN GEAR LEG (%)</th>
<th>TIRE PRESSURE PSI (MPa)</th>
<th>ACN FOR RIGID PAVEMENT SUBGRADES – MN/m³</th>
<th>ACN FOR FLEXIBLE PAVEMENT SUBGRADES – CBR</th>
</tr>
</thead>
<tbody>
<tr>
<td>737-700</td>
<td>155,000 (70,307)</td>
<td>45.85</td>
<td>197 (1.36)</td>
<td>41 19 36 18</td>
<td>19 43 22 18</td>
</tr>
<tr>
<td></td>
<td>83,000 (37,648)</td>
<td></td>
<td></td>
<td>43 20 38 18</td>
<td>46 22 42 19</td>
</tr>
<tr>
<td>737-700 (OPTIONAL TIRES)</td>
<td>155,000 (70,307)</td>
<td>45.85</td>
<td>179 (1.23)</td>
<td>40 20 36 18</td>
<td>42 22 47 19</td>
</tr>
<tr>
<td></td>
<td>83,000 (37,648)</td>
<td></td>
<td></td>
<td>42 21 37 18</td>
<td>45 23 47 19</td>
</tr>
<tr>
<td>737-800</td>
<td>174,700 (79,243)</td>
<td>46.79</td>
<td>204 (1.41)</td>
<td>49 23 43 20</td>
<td>52 24 45 21</td>
</tr>
<tr>
<td></td>
<td>91,300 (41,413)</td>
<td></td>
<td></td>
<td>54 25 46 22</td>
<td>56 27 47 23</td>
</tr>
<tr>
<td>737-900</td>
<td>174,700 (79,243)</td>
<td>46.79</td>
<td>204 (1.41)</td>
<td>49 24 43 21</td>
<td>52 25 45 22</td>
</tr>
<tr>
<td></td>
<td>94,580 (42,901)</td>
<td></td>
<td></td>
<td>54 27 46 23</td>
<td>56 28 47 24</td>
</tr>
</tbody>
</table>

NOTE: ALL AIRPLANE MODELS WITH WINGLETS
7.10.2 AIRCRAFT CLASSIFICATION NUMBER - FLEXIBLE PAVEMENT

MODEL 737-700 (WITH WINGLETS) (OPTIONAL TIRES)

NOTES:
* TIRES - H44.5 x 16.5 - 21 2BPR
* PRESSURE - 179 PSI (12.59 KG/SQ CM)

CODE D = CBR 3 (ULTRA LOW)
CODE C = CBR 6 (LOW)
CODE B = CBR 10 (MEDIUM)
CODE A = CBR 15 (HIGH)

1. ACN WAS DETERMINED AS REFERENCED IN ICAO ANNEX 14, "AERODROMES", 3RD EDITION, JULY 1999
2. TO DETERMINE MAIN LANDING GEAR LOADING, SEE SECTION 7.4
3. PERCENT WEIGHT ON MAIN LANDING GEAR: 91.7
NOTES:

* TIRES - H44.5 x 16.5 - 21, 28PR
* PRESSURE - 204 PSI (14.34 KG/SQ CM)

CODE D - CBR 3 (ULTRA LOW)
CODE C - CBR 6 (LOW)
CODE B - CBR 10 (MEDIUM)
CODE A - CBR 15 (HIGH)
7.10.4 AIRCRAFT CLASSIFICATION NUMBER - FLEXIBLE PAVEMENT

MODEL 737-900 (WITH WINGLETS)

NOTES:
- TIRES - H44.5 x 16.5 - 21, 28PR
- PRESSURE - 704 PSI (14.34 KG/SQ CM)

2. TO DETERMINE MAIN LANDING GEAR LOADING, SEE SECTION 7.4.
3. PERCENT WEIGHT ON MAIN LANDING GEAR: 93.58
7.10.5 AIRCRAFT CLASSIFICATION NUMBER - RIGID PAVEMENT
MODEL 737-700 (WITH WINGLETS)
7.10.6 AIRCRAFT CLASSIFICATION NUMBER - RIGID PAVEMENT
MODEL 737-700 (WITH WINGLETS) (OPTIONAL TIRES)

NOTES:

1. TIRE SIZE = H44.5 x 16.5 - 21, 28PR (12.59 KG/SQ CM)
2. PRESSURE = 179 PSI
3. AIRCRAFT CLASSIFICATION NUMBER (ACN)

CODE A: K = 300 (HIGH)
CODE B: K = 300 (MEDIUM)
CODE C: K = 150 (LOW)
CODE D: K = 75 (ULTRA LOW)

ACN WAS DETERMINED AS REFERENCED IN AERODROME DATA, JULY 14, 1999.
TO DETERMINE MAIN LANDING GEAR LOADING, SEE SECTION 7.4.
PERCENT WEIGHT ON MAIN LANDING GEAR: 91.7

D6-58325-5

SEPTEMBER 2002
7.10.7 AIRCRAFT CLASSIFICATION NUMBER - RIGID PAVEMENT

MODEL 737-800 (WITH WINGLETS)

NOTES:
* TIRES - H44.5 x 16.5 - 21, 28PR
* PRESSURE - 204 PSI (14.34 KG/SQ CM)

CODE D - k = 75 (ULTRA LOW)
CODE C - k = 150 (LOW)
CODE B - k = 300 (MEDIUM)
CODE A - k = 550 (HIGH)

NOTES:
1. ACN WAS DETERMINED AS REFERENCED IN ICAO ANNEX 14, “AERODROMES”, 3RD EDITION, JULY 1999
2. TO DETERMINE MAIN LANDING GEAR LOADING, SEE SECTION 7.4.
3. PERCENT WEIGHT ON MAIN LANDING GEAR: 93.58

AIRCRAFT CLASSIFICATION NUMBER (ACN)

1,000 LB

100 110 120 130 140 150 160 170 180

1,000 KG

50 55 60 65 70 75 80

AIRCRAFT CROSS WEIGHT
7.10.8 AIRCRAFT CLASSIFICATION NUMBER - RIGID PAVEMENT

MODEL 737-900 (WITH WINGLETS)

NOTES:
* TIRES - H44.5 x 16.5 - 21, 28PR
* PRESSURE - 204 PSI (14.34 KG/SQ CM)

CODE D - k = 75 (ULTRA LOW)
CODE C - k = 150 (LOW)
CODE B - k = 300 (MEDIUM)
CODE A - k = 550 (HIGH)

1. ACN WAS DETERMINED AS REFERENCED IN ICAO ANNEX 14, "AERODROMES", 3RD EDITION, JULY 1999
2. TO DETERMINE MAIN LANDING GEAR LOADING, SEE SECTION 7.4.
3. PERCENT WEIGHT ON MAIN LANDING GEAR: 93.5%