7.0 PAVEMENT DATA

7.1 General Information
7.2 Footprint
7.3 Maximum Pavement Loads
7.4 Landing Gear Loading on Pavement
7.5 Flexible Pavement Requirements
7.6 Flexible Pavement Requirements, LCN Conversion
7.7 Rigid Pavement Requirements
7.8 Rigid Pavement Requirements, LCN Conversion
7.9 ACN-PCN Reporting System: Flexible and Rigid Pavements
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7.0  PAVEMENT DATA

7.1  General Information

A brief description of the following pavement charts will be helpful in their use for airport planning. Each airplane configuration is shown 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.

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-ground interfaces are shown in Section 7.3.

Pavement requirements for commercial airplanes are customarily derived from the static analysis of loads imposed on the main landing gear struts. The chart in Section 7.4 is 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 flexible pavement curves:

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 6,000 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 Aircraft Classification Number) is also placed.
Rigid pavement design curves (Section 7.7) have been prepared with the use of the Westergaard equation in general accordance with the relationships outlined in the 1955 Edition of "Design of Concrete-Airport Pavement" published by the Portland Cement Association, 33 W. Grand Ave., Chicago, Illinois, but modified to the new format described in the 1968 Portland Cement Association publication, "Computer Program for Airport Pavement Design" (Program PDILB) by Robert G. Packard.

The following procedure is used to develop the rigid pavement design curves such as that 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. 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.

All Load Classification Number (LCN) curves (Sections 7.6 and 7.8) have been plotted from data in the International Civil Aviation Organization (ICAO) Document 7290-AN/865/2, Aerodrome Manual, Part 2, "Aerodrome Physical Characteristics," 2nd Edition, 1965.

On the same charts showing LCN versus equivalent single wheel load, there are load plots for airplane Model MD-90-30 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 (Section 7.9) 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 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 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 its evaluation presented as follows:
This document has been partially revised to incorporate key information for the MD-90-30ER with a maximum ramp weight of 168,500 lbs (76,430 kgs). Due to the fact that there were only two aircraft delivered in this higher weight configuration when production of the model ceased, only limited charts in this section have been revised for the MD-90-30ER. The modified/new charts are limited to the following:

7.2   Footprint
7.3   Maximum Pavement Loads
7.4   Landing Gear Loading on Pavement
7.9.3  Aircraft Classification Number - Flexible Pavement (168,500 lbs)
7.9.4  Aircraft Classification Number - Rigid Pavement (168,500 lbs)

Contact Airport Technology for any additional data needed for this high weight model at:

Attention: Airport Technology
Telephone: 425-237-0126
Fax: 425-237-8281
Email: AirportTechnology@Boeing.com
Website: www.boeing.com/airports
### 7.2 FOOTPRINT
**MODEL MD-90-30/-30ER**

<table>
<thead>
<tr>
<th></th>
<th>MD-90-30</th>
<th>MD-90-30ER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MAXIMUM DESIGN TAXI WEIGHT</strong></td>
<td>157,000 LB (71,214 KG)</td>
<td>168,500 LB (76,430 KG)</td>
</tr>
<tr>
<td><strong>PERCENT OF WEIGHT ON MAIN GEAR</strong></td>
<td>SEE SECTION 7.4</td>
<td>SEE SECTION 7.4</td>
</tr>
<tr>
<td><strong>NOSE TIRE SIZE</strong></td>
<td>26 x 6.6 12 PR</td>
<td>26 x 6.6 12 PR</td>
</tr>
<tr>
<td><strong>NOSE TIRE PRESSURE</strong></td>
<td>160 PSI (11.3 KG/CM$^2$)</td>
<td>170 PSI (11.9 KG/CM$^2$)</td>
</tr>
<tr>
<td><strong>MAIN GEAR TIRE SIZE</strong></td>
<td>H 44.5 x 16.5 — 21 26 PR</td>
<td>H 44.5 x 16.5 — 21 26 PR</td>
</tr>
<tr>
<td><strong>MAIN GEAR TIRE PRESSURE</strong></td>
<td>190 PSI (13.4 KG/CM$^2$)</td>
<td>193 PSI (13.6 KG/CM$^2$)</td>
</tr>
</tbody>
</table>

---

[Diagram showing dimensions and tire sizes for MD-90-30 and MD-90-30ER models.]
### 7.3 MAXIMUM PAVEMENT LOADS
**MODEL MD-90-30/-30ER**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>MAXIMUM DESIGN TAXI WEIGHT</th>
<th>V&lt;sub&gt;NG&lt;/sub&gt;</th>
<th>V&lt;sub&gt;MG&lt;/sub&gt; PER STRUT (2) AFT C.G.</th>
<th>H PER STRUT (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STATIC AT MOST FORWARD C.G.</td>
<td></td>
<td>AT Steady Braking 10 FT/SEC&lt;sup&gt;2&lt;/sup&gt;</td>
<td>AT Instantaneous Braking (Coef. of Friction 0.8)</td>
</tr>
<tr>
<td></td>
<td>STATIS + BREAKING 10 FT/SEC&lt;sup&gt;2&lt;/sup&gt; DECLARATION</td>
<td></td>
<td>DECELERATION</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MAXIMUM LOAD OCCURRING AT STATIC AFT C.G.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>AT INSTANTANEOUS BRAKING (COEFF. OF FRICTION 0.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LB</td>
<td>LB</td>
<td>KG</td>
<td>LB</td>
<td>KG</td>
</tr>
<tr>
<td>MD-90-30</td>
<td>157,000</td>
<td>14,710</td>
<td>6,670</td>
<td>20,230</td>
</tr>
<tr>
<td>MD-90-30ER</td>
<td>168,500</td>
<td>15,328</td>
<td>6,952</td>
<td>21,205</td>
</tr>
</tbody>
</table>

**LEGEND:**
- V<sub>NG</sub> = MAXIMUM VERTICAL NOSEGEAR GROUND LOAD AT MOST FORWARD C.G.
- V<sub>MG</sub> = 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
7.4 Landing Gear Loading on Pavement

To obtain the airplane weight on the following pavement charts, an equivalent main landing gear weight must be determined.

In the example shown for the MD-90-30 in Section 7.4.1, for a gross weight of 105,000 lb at 96.48% weight on main gear, the equivalent weight on the main landing gear is 101,200 lb.
7.4.1 LANDING GEAR LOADING ON PAVEMENT
MODEL MD-90-30

NOTE: UNSHADED AREAS REPRESENT OPERATIONAL LIMITS

MAXIMUM DESIGN TAXI WEIGHT 157,000 LB

C.G. FOR ACN CALCULATIONS

96.48

WEIGHT ON MAIN LANDING GEAR (1,000 LB)

AIRPLANE GROSS WEIGHT (1,000 LB)

AIRPLANE GROSS WEIGHT (1,000 KG)

PERCENT MAC

-10 -5 0 5 10 15 20 25 30 35 40

PERCENT OF WEIGHT ON MAIN GEAR

OCTOBER 2002
NOTE: UNSHADED AREAS REPRESENT OPERATIONAL LIMITS

7.4.2 LANDING GEAR LOADING ON PAVEMENT
MODEL MD-90-30ER
7.5 Flexible Pavement Requirements -- U.S. Army Corps of Engineers Method (S-77-1)

The following flexible-pavement design chart presents data for 5 incremental main-gear weights at a constant main-gear tire pressure of 200 psi (14.1 kg/cm²).

In the example shown for the MD-90-30, for a CBR of 7.0, a main-gear load of 100,000 lb, and an annual departure level of 6,000, the required pavement thickness is 24.5 inches.

The line showing 10,000 coverages is used for ACN calculations (see section 7.9).

The FAA design method uses a similar procedure using total airplane weight instead of weight on main landing gear. The equivalent main gear loads for a given airplane weight can be calculated from Section 7.4.
7.5.1 FLEXIBLE PAVEMENT REQUIREMENTS
U.S. ARMY CORPS OF ENGINEERS/FAA DESIGN METHOD
MODEL MD-90-30

NOTES:
H44.5 x 16.5–21, 26 PR TIRES
TIRE PRESSURE CONSTANT AT 200 PSI (14.1 KG/CM²)
7.6 Flexible Pavement Requirements, LCN Conversion

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 shown for the MD-90-30, the flexible pavement thickness is 30 inches and the LCN is 70. For these conditions, the weight on the main landing gear is 110,000 pounds.

Note: If the resulting aircraft LCN is not more than 10 percent above the published pavement LCN, the bearing strength of the pavement can be considered sufficient for unlimited use by the airplane. The figure of 10 percent has been chosen as representing the lowest degree of variation in LCN which is significant. (Reference: ICAO Aerodrome Design Manual, Part 2, "Aerodrome Physical Characteristics," Chpt. 4, Para. 4.1.5.7v, 2nd Edition, 1965.)
7.6.1 FLEXIBLE PAVEMENT REQUIREMENTS, LCN CONVERSION
MODEL MD-90-30

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

WEIGHT ON MAIN LANDING GEAR
(SEE SECTION 7.4)

<table>
<thead>
<tr>
<th>LB</th>
<th>(KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>151,500</td>
<td>(68,720)</td>
</tr>
<tr>
<td>140,000</td>
<td>(63,500)</td>
</tr>
<tr>
<td>120,000</td>
<td>(54,400)</td>
</tr>
<tr>
<td>100,000</td>
<td>(45,400)</td>
</tr>
<tr>
<td>80,000</td>
<td>(36,300)</td>
</tr>
</tbody>
</table>

• H44.5 x 16.5-21, 26 PR TIRES
• TIRE PRESSURE CONSTRAINT AT 200 PSI

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

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAXIMUM DESIGN TAXI WEIGHT AND AFT C.G.

WEIGHT ON MAIN LANDING GEAR
(SEE SECTION 7.4)

<table>
<thead>
<tr>
<th>LB</th>
<th>(KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>151,500</td>
<td>(68,720)</td>
</tr>
<tr>
<td>140,000</td>
<td>(63,500)</td>
</tr>
<tr>
<td>120,000</td>
<td>(54,400)</td>
</tr>
<tr>
<td>100,000</td>
<td>(45,400)</td>
</tr>
<tr>
<td>80,000</td>
<td>(36,300)</td>
</tr>
</tbody>
</table>

H44.5 x 16.5-21, 26 PR TIRES
TIRE PRESSURE CONSTRAINT AT 200 PSI

EQUIVALENT SINGLE WHEEL LOAD (1,000 KG)

FLEXIBLE PAVEMENT THICKNESS

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

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAXIMUM DESIGN TAXI WEIGHT AND AFT C.G.

WEIGHT ON MAIN LANDING GEAR
(SEE SECTION 7.4)

<table>
<thead>
<tr>
<th>LB</th>
<th>(KG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>151,500</td>
<td>(68,720)</td>
</tr>
<tr>
<td>140,000</td>
<td>(63,500)</td>
</tr>
<tr>
<td>120,000</td>
<td>(54,400)</td>
</tr>
<tr>
<td>100,000</td>
<td>(45,400)</td>
</tr>
<tr>
<td>80,000</td>
<td>(36,300)</td>
</tr>
</tbody>
</table>

H44.5 x 16.5-21, 26 PR TIRES
TIRE PRESSURE CONSTRAINT AT 200 PSI

EQUIVALENT SINGLE WHEEL LOAD (1,000 KG)
7.7 Rigid Pavement Requirements, Portland Cement Association Design Method

The following rigid-pavement design chart presents data for 5 incremental main-gear weights at a constant main-gear tire pressure of 200 psi (14.1 kg/cm²).

In the example shown for the MD-90-30, for an allowable working stress of 400 psi, a main-gear load of 127,000 lb, and a subgrade strength k of 150, the required rigid-pavement thickness is 12 inches.
NOTE: THE VALUES OBTAINED BY USING THE MAX LOAD REFERENCE LINE AND ANY VALUES OF k ARE EXACT. FOR LOADS LESS THAN MAXIMUM, THE CURVES ARE EXACT FOR k = 300, BUT DEVIATE SLIGHTLY FOR OTHER VALUES OF k.

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

7.7.1 RIGID PAVEMENT REQUIREMENTS, PORTLAND CEMENT ASSOCIATION DESIGN METHOD MODEL MD-90-30
7.8  Rigid Pavement Requirements, LCN Conversion

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 shown in section 7.8.2, the rigid pavement radius of relative stiffness is 35 inches and the LCN is 70. For these conditions, the weight on the main landing gear is 115,000 pounds.

Note: If the resulting aircraft LCN is not more than 10 percent above the published pavement LCN, the bearing strength of the pavement can be considered sufficient for unlimited use by the airplane. The figure of 10 percent has been chosen as representing the lowest degree of variation in LCN which is significant. (Reference: ICAO Aerodrome Design Manual, Part 2, “Aerodrome Physical Characteristics,” Chpt. 4, Para. 4.1.5.7v, 2nd Edition, 1965.)
RADIUS OF RELATIVE STIFFNESS ($\ell'$) 
VALUES IN INCHES

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

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

<table>
<thead>
<tr>
<th>d (IN.)</th>
<th>k = 75</th>
<th>k = 100</th>
<th>k = 150</th>
<th>k = 200</th>
<th>k = 250</th>
<th>k = 300</th>
<th>k = 350</th>
<th>k = 400</th>
<th>k = 450</th>
<th>k = 500</th>
<th>k = 550</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.5</td>
<td>33.43</td>
<td>31.11</td>
<td>28.11</td>
<td>26.16</td>
<td>24.74</td>
<td>23.64</td>
<td>22.74</td>
<td>22.00</td>
<td>20.80</td>
<td>20.31</td>
<td></td>
</tr>
<tr>
<td>7.5</td>
<td>37.22</td>
<td>34.63</td>
<td>31.29</td>
<td>29.12</td>
<td>27.54</td>
<td>26.32</td>
<td>25.32</td>
<td>24.49</td>
<td>23.16</td>
<td>22.61</td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td>39.06</td>
<td>36.35</td>
<td>32.85</td>
<td>30.57</td>
<td>28.91</td>
<td>27.62</td>
<td>26.58</td>
<td>25.70</td>
<td>24.31</td>
<td>23.74</td>
<td></td>
</tr>
<tr>
<td>8.5</td>
<td>40.08</td>
<td>38.04</td>
<td>34.37</td>
<td>31.99</td>
<td>30.25</td>
<td>28.91</td>
<td>27.81</td>
<td>26.90</td>
<td>25.44</td>
<td>24.84</td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>42.67</td>
<td>39.71</td>
<td>36.88</td>
<td>33.39</td>
<td>31.58</td>
<td>30.17</td>
<td>29.03</td>
<td>28.08</td>
<td>26.55</td>
<td>25.93</td>
<td></td>
</tr>
<tr>
<td>9.5</td>
<td>44.43</td>
<td>41.35</td>
<td>37.36</td>
<td>34.77</td>
<td>32.89</td>
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<td>30.23</td>
<td>29.24</td>
<td>27.65</td>
<td>27.00</td>
<td></td>
</tr>
</tbody>
</table>

7.8.1 RADIUS OF RELATIVE STIFFNESS
(REFERENCE: PORTLAND CEMENT ASSOCIATION)
7.8.2 RIGID PAVEMENT REQUIREMENTS, LCN CONVERSION
MODEL MD-90-30

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

WEIGHT ON MAIN LANDING GEAR (SEE SECTION 7.4)

- H44.5 x 16.5-21, 26 PR TIRES
- TIRE PRESSURE CONSTRAINT AT 200 PSI

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAXIMUM DESIGN TAXI WEIGHT AND AFT C.G.

EQUIVALENT SINGLE WHEEL LOAD (1,000 LB)

EQUIVALENT SINGLE WHEEL LOAD (1,000 KG)

LOAD CLASSIFICATION NUMBER (LCN)

RADIUS OF RELATIVE STIFFNESS (L)

WEIGHT ON MAIN LANDING GEAR (LB) (KG)

151,500 (68,720)
140,000 (63,500)
120,000 (54,400)
100,000 (45,400)
80,000 (36,300)
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 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 $\mu$ on the $\ell$-value is treated in a similar manner.
EFFECT OF $E$ ON $l^\prime$-VALUES

EFFECT OF $\mu$ ON $l^\prime$-VALUES

NOTE: BOTH CURVES ON THIS PAGE ARE USED TO ADJUST THE $l^\prime$ -VALUES OF TABLE 7.8.1

7.8.4 EFFECT OF $E$ AND $\mu$ ON $l^\prime$ -VALUES
7.9 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. As an example, referring to Section 7.9.1, for an aircraft gross weight of 130,000 pounds and low subgrade strength, the ACN for flexible pavement is 39. Referring to Section 7.9.3, for the same gross weight and subgrade strength, the ACN for rigid pavement is 43.

Note: An aircraft with an ACN equal to or less than the reported PCN can operate on the pavement subject to any limitations on the tire pressure. (Reference: ICAO Annex 14, “Aerodromes,” 3rd Edition, July 1999.)

The following table provides ACN data in tabular format similar to the one used by ICAO in the "Aerodrome Design Manual Part 3, Pavements".

<table>
<thead>
<tr>
<th>AIRCRAFT TYPE</th>
<th>ALL-UP MASS/OPERATING MASS EMPTY LB (KG)</th>
<th>ON ONE MAIN GEAR LEG (%)</th>
<th>TIRE PRESSURE PSI (MPa)</th>
<th>ACN FOR RIGID PAVEMENT SUBGRADES -- MN/m^3</th>
<th>ACN FOR FLEXIBLE PAVEMENT SUBGRADES -- CBR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>HIGH 150</td>
<td>MEDIUM 80</td>
<td>LOW 40</td>
</tr>
<tr>
<td>MD-90-30</td>
<td>157,000 (71,214) 88,171 (39,994)</td>
<td>48.24</td>
<td>200 (1.4)</td>
<td>49</td>
<td>51</td>
</tr>
<tr>
<td>MD-90-30ER</td>
<td>168,500 (76,430) 89,059 (40,398)</td>
<td>46.98</td>
<td>193 (1.33)</td>
<td>51</td>
<td>53</td>
</tr>
</tbody>
</table>

Note: The table above includes the ACN for both rigid and flexible pavements, along with the tire pressure requirements for different subgrade strength categories.
7.9.1 AIRCRAFT CLASSIFICATION NUMBER -- FLEXIBLE PAVEMENT (157,000 LBS)
MODEL MD-90-30

NOTES:
• H44.5 x 16.5-21, 26 PR TIRES
• TIRE PRESSURE CONSTRAINT AT 200 PSI (14.1 KG/CM²)

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

NOTES:
• ACN WAS DETERMINED AS REFERENCED IN ICAO ANNEX 14, "AERODROMES," 3RD EDITION, JULY 1999
• TO DETERMINE MAIN-GEAR LOADING, SEE SECTION 7.4
7.9.2 AIRCRAFT CLASSIFICATION NUMBER -- FLEXIBLE PAVEMENT (168,500 LBS)
MODEL MD-90-30ER

NOTES:
- H44.5 x 16.5-21, 26 PR TIRES
- TIRE PRESSURE CONSTRAINT AT 193 PSI (13.6 KG/CM²)

AIRPLANE GROSS WEIGHT, 1,000 POUNDS

(1,000 KILOGRAMS)

NOTES:
- ACN WAS DETERMINED AS REFERENCED IN ICAO ANNEX 14, "AERODROMES," 3RD EDITION, JULY 1999
- TO DETERMINE MAIN-GEAR LOADING, SEE SECTION 7.4
- PERCENT WEIGHT ON MAIN LANDING GEAR: 93.96

SUBGRADE CLASS
- D - ULTRA LOW (CBR = 3)
- C - LOW (CBR = 6)
- B - MEDIUM (CBR = 10)
- A - HIGH (CBR = 15)
7.9.3 AIRCRAFT CLASSIFICATION NUMBER -- RIGID PAVEMENT (157,000 LBS)
MODEL MD-90-30

NOTES:
• AIRCRAFT CLASSIFICATION NUMBER (ACN)
• ACN WAS DETERMINED AS REFERENCED IN ICAO ANNEX 14, "AERODROMES," 3RD EDITION, JULY 1999
• TO DETERMINE MAIN-GEAR LOADING, SEE SECTION 7.4
• H44.5 x 16.5-21, 26 PR TIRES
• TIRE PRESSURE CONSTRAINT AT 200 PSI (14.1 KG/CM²)

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

AIRPLANE CLASSIFICATION NUMBER (ACN)
90 100 110 120 130 140 150 160
AIRPLANE GROSS WEIGHT, 1,000 POUNDS
(1,000 KILOGRAMS)
7.9.4 AIRCRAFT CLASSIFICATION NUMBER -- RIGID PAVEMENT (168,500 LBS)
MODEL MD-90-30ER

NOTES:
• H44.5 x 16.5-21, 26 PR TIRES
• TIRE PRESSURE CONSTRAINT AT 193 PSI (13.6 KG/CM²)

NOTES:
• ACN WAS DETERMINED AS REFERENCED IN ICAO ANNEX 14, "AERODROMES," 3RD EDITION, JULY 1999
• TO DETERMINE MAIN-GEAR LOADING, SEE SECTION 7.4
• PERCENT WEIGHT ON MAIN LANDING GEAR: 93.96

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


7.9.5 Development of ACN Charts

The ACN charts for flexible and rigid pavements were developed by methods referenced in ICAO Annex 14, "Aerodromes," 3rd Edition, July 1999. The procedures used to develop these charts are also described below.

The following procedure is used to develop the flexible-pavement ACN charts such as that shown in Section 7.9.1:

1. Determine the percentage of weight on the main gear to be used below in Steps 2, 3, and 4, below. The maximum aft center-of-gravity position yields the critical loading on the critical gear (see Section 7.4). This center-of-gravity 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 side of Section 7.9.6. Use standard subgrade strengths of CBR 3, 6, 10, and 15 percent and 10,000 coverages. This chart provides the same thickness values as those of Section 7.5.1, but is presented here in a different format.

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 side of Figure 7.9.6 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 functions of aircraft gross weight, as shown in Section 7.9.1.

The following procedure is used to develop the rigid-pavement ACN charts such as that shown in Section 7.9.2:

1. Determine the percentage of weight on the main gear to be used in Steps 2, 3, and 4, below. The maximum aft center-of-gravity position yields the critical loading on the critical gear (see Section 7.4). This center-of-gravity 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 side of Section 7.9.7. Use standard subgrade strengths of \( k = 75, 150, 300, \) and 550 lb/in.\(^3\) (nominal values for \( k = 20, 40, 80, \) and 15 MN/M\(^3\) ). This chart provides the same thickness values as those of Section 7.7.1.
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 into the ACN rigid-pavement conversion chart shown on the left side of Section 7.9.7 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 2.75 MPa (400 psi). The ACN is two times the derived single-wheel load expressed in thousands of kilograms. These values of ACN were plotted as functions of aircraft gross weight, as already shown in Section 7.9.2.
ALLOWABLE WORKING STRESS (PSI)

REFERENCE THICKNESS, INCHES

NOTES:
- H44.5 x 16.5-21, 26 PR TIRES
- TIRE PRESSURE CONSTRAINT AT 200 PSI (14.1 KG/CM²)

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAX DESIGN TAXI WEIGHT AND AFT C.G.

WEIGHT ON MAIN LANDING GEAR (SEE SECTION 7.4)

151,500
140,000
120,000
100,000
80,000

(68,720)
(63,500)
(54,400)
(45,400)
(36,300)

151,500
140,000
120,000
100,000
80,000

LB
(KG)

MAXIMUM POSSIBLE MAIN GEAR LOAD AT 140,000 LB (63,500 KG)

FLEXIBLE PAVEMENT REQUIREMENTS CHART

10,000 COVERAGES S-77-1 DESIGN METHOD

AIRCRAFT CLASSIFICATION NUMBER (ACN) - FLEXIBLE PAVEMENT

MODE MD-90-30

OCTOBER 2002

MDC K9099

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7.9.7 DEVELOPMENT OF AIRCRAFT CLASSIFICATION NUMBER (ACN) - RIGID PAVEMENT
MODEL MD-90-30

NOTES:
• H44.5 x 16.5-21, 26 PR TIRES
• TIRE PRESSURE CONSTRAINT AT 200 PSI (14.1 KG/CM²)

ALLOWABLE WORKING STRESS (PSI)

REFERENCE THICKNESS, INCHES

MAXIMUM POSSIBLE MAIN GEAR LOAD AT MAX DESIGN TAXI WEIGHT AND AFT C.G.

WEIGHT ON MAIN LANDING GEAR (SEE SECTION 7.4)
LB (KG)
151,500 (68,720)
140,000 (63,500)
120,000 (54,400)
100,000 (45,400)
80,000 (36,300)

k = 75
k = 150
k = 300
k = 550