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16 October 2007

Subject: Revised alpha factor values for the computation of Aircraft Classification Number (ACN) on flexible pavements

Action required: a) States to note; and b) Aircraft manufacturers to revise ACN values in Table A5-1, *Aerodrome Design Manual, Part 3 — Pavements* (Doc 9157)

Sir/Madam,

1. I have the honour to inform you that the Air Navigation Commission, during the fourteenth meeting of its 175th Session held on 19 June 2007, approved Recommendation 4/3 developed by the first meeting of the Aerodromes Panel (AP/1) concerning revised alpha factor values for the computation of Aircraft Classification Number (ACN) and authorized their transmittal to States and international organizations.

2. Currently ICAO Annex 14 — *Aerodromes, Volume I — Aerodrome Design and Operations*, paragraph 2.6.4 specifies that the ACN of an aircraft shall be determined in accordance with the standard procedures associated with the Aircraft Classification Number – Pavement Classification Number (ACN-PCN) method. Guidance for determining the ACN of an aircraft can be found in *Aerodrome Design Manual, Part 3 — Pavements* (Doc 9157).

3. The alpha factor, or pavement thickness reduction factor, is used to take into account the effect of gear geometry in computing pavement design curves for flexible pavements. The original deflection-based design method overstated the damage caused by multi-wheel gears and this was later corrected by introducing the alpha factor.

4. Studies undertaken in some States had indicated that the classical pavement design theories could not correctly predict the behaviour of soils under the pavement when the design curves for dual-tandem landing gears were extrapolated for main landing gears with six wheels. Additionally, there was a lack of data points on the original alpha factor curve and any extrapolation results in a higher value

of the alpha factor, thus predicting higher stresses in the pavement, whereas the additional set of wheels were intended to distribute the load better.

5. In order to resolve the above technical anomaly, some States had decided to carry out full scale pavement tests. In the meantime, an interim alpha factor of 0.72 for six-wheels per main landing gear would be used by aircraft manufacturers, until such time the results of the tests were available.

6. Recent findings of full scale pavement tests conducted by one State had been reviewed by the Aerodromes Panel. The Commission, based on advice of the panel, agreed to the following revisions concerning the alpha factor values:

- a) change the alpha factor value for all four-wheels per main landing gear from the current 0.825 to 0.80;
- b) retain the alpha factor value for six-wheels per main landing gear at 0.72; and
- c) change the alpha factors for other main landing gears so that the ranking of the damaging effect remains consistent.

7. In light of the above, a table of revised alpha factor values is attached to this State letter. Aircraft manufacturers are requested to revise the ACN values for their respective aircraft types on various subgrade categories, currently available as guidance material in Doc 9157, Part 3, Table A5-1.

Accept, Sir/Madam, the assurances of my highest consideration.

Taïeb Chérif
Secretary General

Enclosure:

Revised alpha factor values

ATTACHMENT to State letter AN 4/20.1-EB/07/26

REVISED ALPHA FACTOR VALUES

Number of Wheels	Current Alpha Factor	Revised Alpha Factor
1	0.995	0.995
2	0.900	0.900
4	0.825	0.800
6	0.788	0.720
8	0.755	0.690
12	0.722	0.660
18	0.700	0.640
24	0.689	0.630

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