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COMMENT AND RESPONSE DOCUMENT

NPA 22C-78 - SPONSOR CAA UK

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THE PROPOSAL

The proposal of NPA 22C-78 was sponsored by CAA and was circulated as a Consultative Draft on 20 July 1999. The proposal is as follows:

Proposed NPA to Amend IEM 22.441 and IEM 22.443

Change to Rolling Moment Coefficient in the equation in both IEMs from:

In IEM 22.441:

$$M_r = 0.2\ S_t \frac{\rho_0}{2} \beta\ V^2\ b_h$$

to

$$M_r = 0.4\ S_t \frac{\rho_0}{2} \beta\ V^2\ b_v$$

In IEM 22.443:

$$M_r = 0.2\ S_t \frac{\rho_0}{2}\ V\ U\ b_h\ k$$

to

$$M_r = 0.4\ S_t \frac{\rho_0}{2}\ V\ U\ b_v\ k$$

In IEM 22.441 and 22.443 change the definition of span from:

b_h = span of horizontal tail

to

b_v = span of vertical tail, measured from the bottom of the fuselage

In IEM 22.441 and 22.443 add new line entry to define limitations in application:

This formula is only valid for vertical tail aspect ratios between 1 and 1.8 (with span and area measured from the bottom of the fuselage) and horizontal tail with no dihedral and aspect ratio 6 or less. For configurations in excess of these limits more detailed rational analysis will be required.

THE COMMENTS AND RESPONSES

Comments were received from ENAC and LBA:

1.   ENAC

1.1   ENAC comment was:

"It is understood that the current design criteria for the estimation of the top rolling moment may lead in some cases t non conservative loading conditions, however we are concerned that the proposed new formulation may lead to overly stringent design loading conditions.

As we understand the new coefficients are derived from analysis based on CFD (Computational Fluid Dynamics) methodologies; additional data should be provided concerning the reliability of these results and the robustness of the CFD codes used to obtain them.

In light of the above and considering that a more conservative and proven formulation for the top rolling moment is already available in FAR 23, unless specific issues associated to the sailplane are evidenced, we believe that, in lack of additional information, it would be more appropriate to introduce the following design criteria of FAA AC 23-9 under the applicable IEM sections of JAR 22:

$M_r = 0.3\ q\ S_H\ b_H\ \beta$

or for the lateral gust case:

$M_r = 0.3\ q\ S_H\ b_H\ \beta\ (1.2\ U/V)$

being

β = *side slip angle*
U = *equivalent gust velocity*
V = *equivalent airspeed*

1.2   CAA Response to ENAC Comment:

This NPA has been the subject of a substantial amount of research, and this work commenced from the starting point of FAA AC 23-9. The Study Group considered that to accept the ENAC proposal would be to return to the starting point of this exercise. The comment was therefore not accepted by the Study Group or the proposer.

2.   LBA

2.1   The LBA comment was:

In the formulae, the sign for horizontal tail should be written in lower case, ie: b_h, not b_H.

2.2   CAA Response to LBA Comment:

The LBA comment is consistent with the rest of the code, and was therefore accepted.

R J Hardy
UK CAA
29 Nov 99