communications received by the closing date before issuing the final AC.

## Background

The propeller type certification process requires the applicant to prepare Instructions for Continued Airworthiness (ICA) under § 35.4. The ICA provides information for proper maintenance that ensures that propellers of that type design are airworthy. This AC addresses preparing ICA for propellers.

**Authority:** 49 U.S.C. 106(g), 40113, 44701–44702, 44704.

Issued in Burlington, Massachusetts, on December 19, 2002.

**Jay J. Pardee,**

*Manager, Engine and Propeller Directorate, Aircraft Certification Service.*

[FR Doc. 02–33127 Filed 12–31–02; 8:45 am]

**BILLING CODE 4910–13–M**

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## DEPARTMENT OF TRANSPORTATION

## Federal Aviation Administration

## Proposed Revision to Advisory Circular (AC) 25.562–1A, Dynamic Evaluation of Seat Restraint Systems and Occupant Protection on Transport Airplanes

**AGENCY:** Federal Aviation Administration, DOT.

**ACTION:** Notice of proposed revision to advisory circular.

**SUMMARY:** The Federal Aviation Administration invites public comment on a proposed revision to Advisory Circular 25.561–1A, Dynamic Evaluation of Seat Restraint Systems and Occupant Protection on Transport Airplanes. The revision provides updated guidelines for demonstrating compliance with the airworthiness standards applicable to dynamic testing of seats.

**DATES:** Comments must be received on or before April 2, 2003.

**ADDRESSES:** You should send your comments on the proposed revision to the Federal Aviation Administration, Attention: Jeff Gardin, Airframe/Cabin Safety Branch, ANM–115, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Ave. SW., Renton, WA 98055–4056. You may also submit comments electronically to: *jeff.gardlin@faa.gov.*

**FOR FURTHER INFORMATION CONTACT:** Jeff Gardlin at the above address, telephone (425) 227–2136, facsimile (425) 227–1149, or e-mail *jeff.gardlin@faa.gov.*

**SUPPLEMENTARY INFORMATION:**

### How Do I Obtain a Copy of the Proposed Advisory Circular Revision?

You may obtain an electronic copy of the draft advisory circular identified in this notice at the following Internet address: *http://www.airweb.faa.gov/DraftAC* If you do not have access to the Internet, you may request a copy by contacting Jeff Gardlin at the address or phone number listed earlier in this announcement.

### How Do I Submit Comments on the Draft Advisory Circular?

You are invited to comment on the proposed advisory material by submitting written comments, data, or views. You must identify the title of the AC and submit your comments in duplicate to the address specified above. We will consider all comments received on or before the closing date for comments before issuing the final advisory material.

### Discussion

This revision to Advisory Circular 25.562–1A provides an improved procedure for selection of test articles, as well as criteria for determining whether analysis or testing is appropriate for substantiation.

Issued in Renton, Washington, on December 20, 2002.

**Ali Bahrami,**

*Acting Manager, Transport Airplane Directorate, Aircraft Certification Service.*

[FR Doc. 02–33132 Filed 12–31–02; 8:45 am]

**BILLING CODE 4910–13–M**

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## DEPARTMENT OF TRANSPORTATION

## Federal Aviation Administration

## Proposed Revisions to Advisory Circular 25–7A, Flight Test Guide for Certification of Transport Category Airplanes

**AGENCY:** Federal Aviation Administration, DOT.

**ACTION:** Notice of proposed advisory circular revisions and request for comments.

**SUMMARY:** The Federal Aviation Administration (FAA) requests comments on proposed revisions to Advisory Circular (AC) 25–7A, ‘‘Flight Test Guide for Certification of Transport Category Airplanes.’’ The proposed revisions provide revised guidance on a means of demonstrating compliance with the new requirements of part 25 as presented in Amendment 25–108 (67 FR 70812, November 26, 2002), entitled ‘‘1-g Stall Speed as the Basis for Compliance with Part 25 of the Federal Aviation Regulations.’’ This notice provides interested persons an opportunity to comment on the proposed revisions to the AC. The guidance will be included in the next revision to AC 25–7A.

**DATES:** Comments must be received on or before March 3, 2003.

**ADDRESSES:** Send all comments on the proposed AC revisions to the Federal Aviation Administration, Attention: Don Stimson, Airplane and Flight Crew Interface Branch, ANM–111, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, WA 98055–4056. Comments may be examined at the above address between 7:30 a.m., and 4 p.m., except Federal holidays.

**FOR FURTHER INFORMATION CONTACT:** Jan Thor, Standardization Branch, ANM–113, at the above address, telephone (425) 227–2127, or facsimile (425) 227–1320.

**SUPPLEMENTARY INFORMATION:**

### Comments Invited

Interested persons are invited to comment on the proposed AC revisions by submitting such written data, views, or arguments, as they may desire. You must identify the title of the AC and submit comments in duplicate to the address specified above. The Transport Airplane Directorate will consider all comments received on or before the closing date for comments before issuing the revision to the AC. You may view the complete text of AC 25–7A on the Internet at: *http://www.faa.gov/certification/aircraft/air_index.htm,* at the link titled ‘‘Advisory Circulars,’’ or at the Regulatory and Guidance Library Web site at *http://www.airweb.faa.gov/rgl,* at the link titled ‘‘Advisory Circulars.’’

### Discussion

By Amendment 25–108 (67 FR 70812, November 26, 2002), the FAA revised the airworthiness standard for transport category airplanes to redefine the reference stall speed for transport category airplanes to a speed not less than the 1-g stall speed instead of the minimum speed obtained in a stalling maneuver. The FAA took this action to provide for a consistent, repeatable reference stall speed; ensure consistent and dependable maneuvering margins; provide for adjusted multiplying factors to maintain approximately the current requirements in areas where use of the minimum speed in the stalling maneuver has proven adequate; and harmonize the applicable regulations with those currently adopted in Change 15 to the European Joint Aviation

Requirements, JAR–25. The changes provide a higher level of safety for those cases in which the current methods result in artificially low operating speeds. To address these new requirements to part 25, the FAA is proposing to revise AC 25–7A to describe acceptable means of showing compliance with the new rules.

### Proposed Revisions to AC 25–7A

Revise paragraph 3a(3)(i) by replacing ‘‘1.4$V_{S1}$’’ with ‘‘1.3 $V_{SR1}$’’ (three occurrences).

Revise paragraph 3a(3)(ii)(B) by replacing ‘‘.12$V_{S1}$’’ with ‘‘0.11 $V_{SR1}$.’’

Revise paragraph 10b(3)(i)(B) by replacing ‘‘1.2 times $V_S$’’ with ‘‘1.13 times $V_{SR}$,’’ ‘‘$V_S$’’ with ‘‘$V_{SR}$,’’ and ‘‘stall speed’’ with ‘‘reference stall speed.’’

Revise paragraph 10b(3)(ii) by replacing ‘‘1.15 times $V_S$’’ with ‘‘1.08 times $V_{SR}$.’’

Revise paragraph 10b(4) as follows:

(4) *Section 25.107(c)—Takeoff Safety Speed* ($V_2$). $V_2$ is the calibrated airspeed that is attained at or before the airplane reaches a height of 35 ft. above the takeoff surface after an engine failure at $V_{EF}$ using an established rotation speed ($V_R$). During the takeoff speeds demonstration, $V_2$ should be continued to an altitude sufficient to assure stable conditions beyond the 35 ft. height. $V_2$ cannot be less than $V_{2MIN}$. In addition, $V_2$ cannot be less than the liftoff speed, $V_{LOF}$, as defined in § 25.107(f). In accordance with § 25.107(c), $V_2$ in terms of calibrated airspeed ‘‘* * * may not be less than $V_R$ plus the speed increment attained before reaching a height of 35 feet above the takeoff surface’’ and ‘‘that provides the maneuvering capability specified in § 25.143(g).’’ * * *

Revise Figure 14–1 by replacing ‘‘≥1.25 $V_S$’’ with ‘‘$V_{FTO}$.’’

Revise paragraph 16b(2) by replacing ‘‘1.3$V_{S0}$’’ with ‘‘$V_{REF}$.’’

Revise paragraph 16b(3) by replacing ‘‘1.3$V_{S0}$’’ with ‘‘$V_{REF}$’’ (two occurrences).

Revise paragraph 17b(6) as follows:

(6) *Section 25.121(d) requires* that the stall speed for the configuration used to show compliance with this requirement not exceed 110 percent of the stall speed for the related landing configuration. This stall speed ratio requirement is to ensure that an adequate margin above the stall speed in the selected approach configuration is maintained during flap retraction. To achieve this stall speed ratio requirement, it is permissible to arbitrarily increase the landing flap stall speed, $V_{SR0}$, to show compliance. Of course, the landing approach speed used to comply with § 25.125(a)(2) must be based on the declared stall speed and the stall warning requirements of § 25.207 must be met at the declared stall speed. However, the § 25.203 stall characteristics requirements must still be met at the speed at which the stall is identified (as defined in § 25.201(d)). (An alternative to raising the landing flap stall speed, $V_{SRO}$, is to simply increase $V_{REF}$.)

Revise paragraph 19a(2) as follows:

(2) The minimum value of $V_{REF}$ is specified in § 25.125(a)(2) and is intended to provide an adequate margin above the stall speed to allow for likely speed variations during an approach in low turbulence. If the landing demonstrations are unable to show the acceptability of the minimum approach speed, and the tests are predicated on the use of a higher approach speed, the landing distance data presented in the AFM must be based upon the higher approach speed.

Revise paragraph 20a as follows:

a. *Explanation.* The purpose of § 25.143 is to verify that any operational maneuvers conducted within the operational envelope can be accomplished smoothly with average piloting skill and without encountering stall warning or other characteristics that might interfere with normal maneuvering, or exceeding any airplane structural limits. Control forces should not be so high that the pilot cannot safely maneuver the airplane. Also, the forces should not be so light it would take exceptional skill to maneuver the airplane without over-stressing it or losing control. The airplane response to any control input should be predictable to the pilot.

Add a new paragraph 20a(5) to read as follows:

(5) Modern wing designs can exhibit a significant reduction in maximum lift capability with increasing Mach number. The magnitude of this Mach number effect depends on the design characteristics of the particular wing. For wing designs with a large Mach number effect, the maximum bank angle that can be achieved while retaining an acceptable stall margin can be significantly reduced. Because the effect of Mach number can be significant, and because it can also vary greatly for different wing designs, the multiplying factors applied to $V_{SR}$ may be insufficient to ensure that adequate maneuvering capability exists at the minimum operating speeds. To address this issue, § 25.143(g) was added by Amendment 25–108 to require a minimum bank angle capability in a coordinated turn without encountering stall warning or any other characteristic that might interfere with normal maneuvering. The maneuvering requirements consist of the minimum bank angle capability the FAA deems adequate for the specified regimes of flight combined with a further 15 degrees of bank angle to provide a safety margin for various operational factors. These operational factors include both potential environmental conditions (*e.g.,* turbulence, wind gusts) and an allowance for piloting imprecision (*e.g.,* inadvertent overshoots).

Revise the first sentence of paragraph 20b and reformat paragraph 20b as follows:

b. *General Test Requirements.* (1) Compliance with §§ 25.143(a) through (f) is primarily a qualitative determination by the pilot during the course of the flight test program. * * *

Add a new paragraph 20b(2) to read as follows:

(2) Since § 25.143(g) involves a target speed, bank angle, and maximum value of thrust, not all flight test conditions to demonstrate compliance will necessarily result in a constant-altitude, thrust-limited turn. In cases with positive excess thrust, a climbing condition at the target bank and speed is acceptable. Alternately, if desired, the thrust may be reduced to less than the maximum allowed, so that compliance is shown with a completely stabilized, constant-altitude turn. For cases with negative excess thrust (*e.g.,* the landing configuration case), a constant-altitude slow-down maneuver at the target bank angle has been shown to be a suitable technique. With the airplane descending at $V_{REF}$ in wings-level flight on a three degree glide path, trim and throttle position is noted. The airplane is then accelerated to $V_{REF}$ + 10–20 knots in level flight. The original trim and throttle conditions are reset as the airplane is rolled into a constant-altitude slow-down turn at the target bank angle. Throttles can be manipulated between idle and the marked position to vary slow-down rate as desired. Compliance is shown when the airplane decelerates through $V_{REF}$ in the turn without encountering stall warning. Revise paragraph 20c(2) by replacing ‘‘1.3 $V_S$’’ with ‘‘1.23 $V_{SR}$.’’

Add a new paragraph 20f(2)(v) to read as follows:

(v) Thrust or Power Setting for Maneuver Capability Demonstrations. The effect of thrust or power on maneuver capability is normally a function of only the thrust-to-weight ratio. Therefore, for those configurations in which the weight, altitude, temperature (WAT)-limited thrust or power setting is prescribed, it is usually acceptable to use the thrust or power setting that is consistent with a WAT-limited climb gradient at the test conditions of weight, altitude, and temperature. However, if the maneuver margin to stall warning (or other characteristic that might interfere with normal maneuvering) is reduced with increasing thrust or power, the critical conditions of both thrust or power and thrust-to-weight ratio must be taken into account when demonstrating the required maneuvering capabilities. Revise paragraph 21a(1) as follows:

*Section 25.145(a)* requires that there be adequate longitudinal control to promptly pitch the airplane nose down from at or near the stall to return to the original trim speed. The intent is to ensure sufficient pitch control for a prompt recovery if inadvertently slowed to the point of stall. Although this requirement must be met with power off and at maximum continuous thrust or power, there is no intention to require stall demonstrations with thrust or power above that specified in § 25.201(a)(2). Instead of performing a full stall at maximum continuous power or thrust, compliance may be assessed by demonstrating sufficient static longitudinal stability and nose down control margin when the deceleration is ended at least one second past stall warning during a one knot per second deceleration. The static longitudinal stability during the maneuver and the nose down control power remaining at the end of the maneuver must be sufficient to assure compliance with the requirement. Revise paragraph 21b(1)(ii) as follows:

(ii) *Test procedure:* The airplane should be trimmed at the speed for each configuration as prescribed in § 25.103(b)(6). * * *

Revise paragraph 21b(2)(ii) by replacing ‘‘1.4$V_S$’’ with ‘‘1.3 $V_{SR}$’’ (two occurrences).

Revise paragraph 21b(3)(ii) by replacing ‘‘1.4$V_S$’’ with ‘‘1.3 $V_{SR}$’’ (two occurrences).

Revise paragraph 21b(4)(ii) by replacing ‘‘1.4$V_S$’’ with ‘‘1.3 $V_{SR}$’’ (two occurrences).

Revise paragraph 21b(5)(ii) by replacing ‘‘1.4$V_S$’’ with ‘‘1.3 $V_{SR}$,’’ ‘‘1.1$V_S$’’ with ‘‘$V_{SW}$,’’ and ‘‘1.7$V_S$’’ with ‘‘1.6 $V_{SR}$.’’

Revise paragraphs 21b(6)(i)(E) and 21b(6)(ii) by replacing ‘‘1.1$V_S$’’ with ‘‘1.08 $V_{SR}$’’ and ‘‘1.2$V_S$’’ with ‘‘1.13 $V_{SR}$.’’

Revise paragraph 22b(1)(i)(F) by replacing ‘‘1.4$_{VS}$’’ with ‘‘1.3 $V_{SR}$.’’

Revise paragraph 22b(2)(i)(F) by replacing ‘‘1.4$V_{S1}$’’ with ‘‘1.3 $V_{SR1}$.’’

Revise paragraph 22b(3)(ii) by replacing ‘‘1.4$V_S$’’ with ‘‘1.3 $V_{SR}$’’ and ‘‘1.4$V_{S1}$’’ with ‘‘1.3 $V_{SR1}$.’’

Revise paragraph 23b(2)(ii)(A) by replacing ‘‘1.2$V_S$’’ with ‘‘1.13 $V_{SR}$.’’

Revise paragraph 23b(2)(iii)(B) by replacing ‘‘1.1$V_S$’’ with ‘‘1.08 $V_{SR}$.’’

Revise paragraphs 27a(1), (2), and (3)(i) by replacing ‘‘1.2$V_{S1}$’’ with ‘‘1.13 $V_{SR1}$.’’

Revise paragraph 28a(1) by replacing ‘‘1.2$V_{S1}$’’ with ‘‘1.13 $V_{SR1}$.’’

Revise paragraph 29b(1)(i) as follows:

(i) To define the reference stall speeds and how they vary with weight, altitude, and airplane configuration. Revise paragraph 29b(2) as follows:

(2) *During this testing,* the angle-of-attack should be increased at least to the point where the behavior of the airplane gives the pilot a clear and distinctive indication through the inherent flight characteristics or a stall identification device (*e.g.*, stick pusher) that the airplane is stalled.

Revise paragraph 29b(3) as follows:

(3) *The airplane is considered* to be fully stalled when any one or a combination of the characteristics listed below occurs to give the pilot a clear and distinctive indication to cease any further increase in angle of attack, at which time recovery should be initiated using normal techniques.

Revise paragraph 29c(1) as follows:

(1) *Background.* (i) Since many of the regulations pertaining to performance and handling qualities specify trim speeds and other variables that are functions of stall speeds, it is desirable to accomplish the stall speed testing early in the program, so the data are available for subsequent testing. Because of this interrelationship between the stall speeds and other critical performance parameters, it is essential that accurate measurement methods be used. Most standard airplane pitot-static systems have not been found to be acceptable for stall speed determination. These tests require the use of properly calibrated instruments and usually require a separate test airspeed system, such as a trailing bomb, a trailing cone, or an acceptable nose or wing boom.

(ii) Prior to Amendment 25–108, the stall speed defined in § 25.103 was the minimum speed attained in the stalling maneuver. For many high speed swept wing transport category airplanes the resulting stall speed often occurs at a load factor normal to the flight path considerably less than one, which leads to inconsistent and unrepeatable reference stall speeds. Pilot technique can also significantly influence the rate and magnitude of any spontaneous nose down pitch occurring at the stall, thereby contributing to inconsistencies in the determination of the minimum speed obtained in the stalling maneuver. Since Part 25 defines operating speeds as multiples of the stall speed, the resulting operating speed margins to stall may not be representative of the actual lift margin available (*i.e.*, the margin to the speed at which wing lift alone can support the weight of the airplane in 1-g flight); the net result of this inadequate lift margin being inconsistent operating speed margins and maneuvering margins. To ensure that operating speed and maneuvering margins are directly related to wing lift margin, Amendment 25–108 redefined the reference stall speed as the 1-g stall speed, which is the speed at which the wing is generating maximum usable lift in a 1-g flight condition.

(iii) Since the 1-g stall speed is generally higher than the minimum speed obtained in the stalling maneuver, retaining the existing multiplying factors for determining the minimum operating speeds would have resulted in higher minimum operating speeds. However, increasing the minimum operating speeds could have imposed costs on operators because of a reduction in payload capability to comply with the regulations at the higher operating speeds. Based on the service experience of the transport airplane fleet, the costs imposed would not have been offset by a commensurate increase in safety. A survey of various swept wing transport category airplanes was conducted to come up with revised multiplying factors that would provide essentially the same operating speeds regardless of the basis used for determining the reference stall speeds. From the survey, the average load factor at the minimum speed obtained in the stalling maneuver was determined to be 0.88, which means that the minimum speed obtained in the stalling maneuver was, on average, 94 percent of the 1-g stall speed. For that reason, in Amendment 25–108 the multiplying factors applied to the reference stall speed were reduced by approximately six percent.

(iv) Although the reduced multiplying factors were intended to result in roughly equivalent operating speeds, there is one class of airplanes for which a significantly lower operating speed would be obtained. Airplanes equipped with a device that abruptly pushes the nose down (*e.g.*, a stick pusher) near the angle of attack for maximum lift would be operated at speeds and angles-of-attack closer to the pusher activation point than has been experienced in operational service. For these airplanes, the minimum speed obtained in the stalling maneuver is closer to 96 to 97 percent of the 1-g stall speed. Therefore, to maintain equivalency in operating speeds for these airplanes, a supplementary margin has been established such that $V_{SR}$ must not be less than the greater of 2 knots or 2 percent above the speed at which the device activates. In addition, *see* paragraph 228 of this AC for guidance material regarding the design and function of such systems.

Revise paragraph 29c(3)(i) as follows:

(i) The airplane should be trimmed for hands-off flight at a speed 13 percent to 30 percent above the anticipated $V_{SR}$ with the engines at idle and the airplane in the configuration for which the stall speed is being determined. Then, using only the primary longitudinal control for speed reduction, a constant deceleration (entry rate) is maintained until the airplane is stalled, as defined in § 25.201(d) and paragraph 29b(3) of this AC. Following the stall, engine thrust may be used as desired to expedite the recovery.

Revise paragraph 29c(3)(ii) as follows:

(i) A sufficient number of stalls (normally four to eight) should be accomplished at each critical combination of weight, c.g., and external configuration. The intent is to obtain enough data to define the stall speed at an entry rate of 1.0 knot/second.

Revise paragraph 29c(4) as follows:

(4) *Thrust Effects on Stall Speed.* (i) Stall speeds are typically determined with the thrust levers at idle; however, it is necessary to verify by test or analysis that engine idle thrust does not result in stall speeds that are appreciably lower than would be obtained at zero thrust. Prior to Amendment 25–108, a negative thrust at the stall, which slightly increases stall speeds, was considered acceptable, but it was not required to be taken into account. With the adoption of Amendment 25–108, it became a requirement to take into account idle thrust except where that thrust level results in a significant decrease in stall speed.

(ii) To determine whether thrust effects on stall speed are significant, at least three stalls should be conducted at one flap setting, with thrust set to approximately the value required to maintain level flight at 1.5 $V_{SR}$ in the selected configuration.

(iii) These data may then be extrapolated to a zero thrust condition to determine the effect of idle thrust on stall speeds. (*See* Figure 29–1.) If the difference between idle thrust and zero thrust stall speed is 0.5 knots or less, the effect may be considered insignificant.

(iv) The effects of engine power on stall speeds for a turbopropeller airplane can be evaluated in a similar manner. Stall speed flight tests should be accomplished with engines idling and the propellers in the takeoff position. Engine torque, engine r.p.m., and estimated propeller efficiency can be used to predict the thrust associated with this configuration.

Revise paragraph 29c(5) as follows:

(5) *Data Reduction and Presentation.* The following is an example of how the data obtained during the stall speed testing may be reduced to standard conditions. Other methods may be found acceptable.

(i) Indicated airspeed from the flight test airspeed system is recorded throughout the stall, and these values are corrected to equivalent airspeed. Load factor normal to the flight path must also be recorded. Typically the load factor data would be obtained from a sufficient number of accelerometers capable of resolving the flight path load factor. At the bare minimum, one accelerometer aligned along the expected 1-g stall pitch angle may provide acceptable data.

(ii) The airplane corrected lift coefficient ($C_{LCORR}$) is calculated from the equation given below and plotted as a time history throughout the stall.

$$C_{L_{CORR}} = \frac{n_{zw}W}{qS} = \frac{295.37 n_{zw}W}{V^2 S}$$

Where:

$n_{zw}$ = airplane load factor normal to the flight path
W = airplane test weight—lbs.
q = dynamic pressure—lbs./ft.$^2$
S = reference wing area—ft.$^2$
V = knots equivalent airspeed.

(iii) The maximum lift coefficient ($C_{L_{MAX}}$) is defined as the maximum value of $C_{L_{CORR}}$ achieved during the stall test. Where the plot of $C_{L_{CORR}}$ exhibits multiple peak values, $C_{L_{MAX}}$ corresponds to the first maximum. There should also typically be a noticeable break in a plot of the load factor normal to the flight path near the point at which $C_{L_{MAX}}$ is reached. The analysis to determine $C_{L_{MAX}}$ should disregard any transient or dynamic increases in recorded load factor, such as might be generated by abrupt control inputs, that do not reflect the lift capability of the airplane. The load factor normal to the flight path should be maintained at nominally 1.0 until $C_{L_{MAX}}$ is reached. (*See* Figure 29–1.)

(iv) The $C_{L_{MAX}}$ obtained for each stall is then corrected, if necessary, from the test c.g. position to the targeted c.g. position using the equation:

$$C_{L_{MAX_{CG}}} = C_{L_{MAX}}[1 + (MAC/1_t)(CG_{std} - CG_{test})] - \Delta C_{L_T}$$

Where

MAC= Wing mean aerodynamic chord length—inches.
$1_t$ = Effective tail length, measured between the wing 25 percent MAC and the stabilizer 25 percent MAC—inches.
$CG_{std}$ = C.G. position resulting in the highest value of reference stall speed (normally the forward c.g. limit at the pertinent weight)—percent MAC/100
$CG_{test}$ = Actual test c.g. position—percent MAC 100
$\Delta C_{LT}$ = Change in $C_L$ due to engine thrust (if significant).

(v) Stall entry rate, which is defined as the slope of a straight line connecting the stall speed and an airspeed 10 percent above the stall speed, should be determined for each stall test. Because $C_{L_{MAX}}$ is relatively insensitive to stall entry rate, a rigorous investigation of entry rate effects should not be necessary. Test data should bracket a 1.0 knot/second entry rate such that the value of $C_{L_{MAX}CG}$ corresponding to an entry rate of 1.0 knot/second can be determined. This value of $C_{L_{MAX}CG}$ should be used to determine the reference stall speed defined in § 25.103(a).

(vi) For each approved configuration, a plot of $C_{L_{MAX}}$ versus weight is constructed. (*See* Figure 29–2.) An initial negative slope of this plot may be caused by several factors:

(A) A decrease in CLMAX due to increasing Mach number (which increases as the stall speed goes up with weight);

(B) The fact that $C_{LMAX}$ is proportional to the rate of change of angle of attack, whereas the data are plotted at a fixed airspeed bleed rate; and

(C) Minor adverse aeroelastic effects on the wings and high lift devices as weight (and therefore speed) increases. An inflection in the plot is typically caused by a variation in the forward c.g. limit with weight.

(vii) In the measurement of stall speeds, the lowest test altitude is usually dictated by flight test safety concerns. This test data must then be expanded to lower altitudes, and hence, lower Mach numbers to cover the operational envelope of the airplane. Since $C_{LMAX}$ increases as the Mach number is reduced, simple expansion of the flight test data could result in extrapolating to a higher $C_{LMAX}$ than tested. Expansion of $C_{LMAX}$ versus Mach number data is only permitted up to the highest $C_{LMAX}$ within the range of $W/\boldsymbol{\delta}$'s tested.

(viii) The reference stall speed is a calibrated airspeed, not less than the 1–g stall speed, and is expressed as:

$$V_{SR} \geq \frac{V_{CL_{MAX}}}{\sqrt{n_{zw}}}$$

Where:

$V_{CLMAX}$ =

$$\sqrt{295.37(W)/(C_{L_{MAX}}S)+\Delta V_C}.$$

If the stalling maneuver is limited by a device that commands an abrupt nose down pitch (*e.g.*, a stick pusher), $V_{CLMAX}$ may not be less than the speed existing at the instant the device operates.

$\Delta V_C$ = compressibility correction (*i.e.*, the difference between equivalent airspeed and calibrated airspeed).

W = airplane weight—lbs.

$C_{LMAX}$ = value of $C_{LMAX}$ corresponding to the chosen weight (see Figure 29–3).

S = reference wing area—ft $^2$.

(ix) For airplanes equipped with a device that abruptly pushes the nose down at a selected angle-of-attack (*e.g.*, a stick pusher), VSR must not be less than the greater of 2 knots or 2 percent above the speed at which the device activates.

(x) In showing compliance with § 25.103(d), in the case where a device that abruptly pushes the nose down at a selected angle of attack (*e.g.*, a stick pusher) operates after $C_{LMAX}$, the speed at which the device operates need not be corrected to 1 g. Otherwise, it would be possible for the device activation speed to be assessed as higher than VSR (or at least closer to VSR than would be obtained without correcting for load factor). Requiring the correction of the device activation speed to the 1–g condition would unnecessarily increase the stringency of § 25.103(d). Test procedures should be in accordance with paragraph 29c(3)(i) to ensure that no abnormal or unusual pilot control input is used to obtain an artificially low device activation speed.

Revise paragraph 29d(2)(v) as follows:

(v) For power-on stalls, thrust should be set to the value required to maintain level flight at a speed of 1.5 VSR at maximum landing weight with flaps in the approach position, and the landing gear retracted. The approach flap position referred to is the maximum flap deflection used to show compliance with § 25.121(d), which specifies a configuration in which the reference stall speed does not exceed 110 percent of the reference stall speed for the related landing configuration.

Revise paragraph 29d(2)(ix) as follows:

(ix) For abnormal aerodynamic configurations covered by AFM procedures, high angle-of-attack characteristics should be evaluated down to either stall warning, or to an angle-of-attack equivalent to the AFM recommended landing approach speed divided by 1.23. * * *

Revise paragraph 29d(3) as follows:

(3) *Procedures.* (i) The airplane should be trimmed for hands-off flight at a speed 13 percent to 30 percent above the reference stall speed, with the appropriate power setting and configuration. Then, using only the primary longitudinal control, establish and maintain a deceleration (entry rate) consistent with that specified in §§ 25.201(c)(1) or 25.201(c)(2), as appropriate, until the airplane is stalled. Both power and pilot selectable trim should remain constant throughout the stall and recovery (angle of attack has decreased to the point of no stall warning).

(ii) The same trim reference (for example, 1.23 VSR) should be used for both the stall speeds and characteristics testing. For all stall testing, the trim speed is based on the performance stall speeds provided in the AFM.

Revise paragraph 29f(2) as follows:

(ii) Timeliness. For one knot per second entry rate stalls, the stall warning must begin at a speed, VSW, not less than five knots or five percent CAS (whichever is greater) above the speed at which the stall is identified in accordance with § 25.201(d). For straight flight stalls, at idle thrust and with the center-of-gravity at the position specified in § 25.103(b)(5), the stall warning must begin at a speed not less than three knots or three percent (whichever is greater) above the reference stall speed. These speed margins should be in terms of the same units of measurement as VSR (*i.e.*, calibrated airspeed).

(iii) Consistency. The stall warning must be reliable and repeatable. The warning must occur with flaps and gear in all normally used positions in both straight and turning flight and must continue throughout the stall demonstration until the angle of attack is reduced to approximately that at which the stall warning was initiated. The warning may be furnished naturally through the inherent aerodynamic characteristics of the airplane, or artificially by a system designed for this purpose. If artificial stall warning is provided for any airplane configuration, it must be provided for all configurations.

Add paragraph 29f(2)(vi) as follows:

(vi) If the stall warning required by § 25.207 is provided by an artificial stall warning system (*e.g.*, a stick shaker), the effect of production tolerances on the stall warning system should be considered when evaluating the stall warning margin required by §§ 25.207(c) and (d) and the maneuver capabilities required by § 25.143(g).

(A) The stall warning margin required by §§ 25.207(c) and (d) should be available with the stall warning system set to the most critical setting expected in production. Unless another setting would provide a lesser margin, the stall warning system should be operating at its high angle of attack limit. For airplanes equipped with a device that abruptly pushes the nose down at a selected angle-of-attack (*e.g.*, a stick pusher), the stall warning margin may be evaluated with both the stall warning and stall identification (*e.g.*, stick pusher) systems at their nominal angle of attack settings unless a lesser margin can result from the various system tolerances.

(B) The maneuver capabilities required by § 25.143(g) should be available assuming the stall warning system is operating on its nominal setting. In addition, when the stall warning system is operating at its low angle of attack limit, the maneuver capabilities should not be reduced by more than 2 degrees of bank angle from those specified in § 25.143(g).

(C) The stall warning margin and maneuver capabilities may be demonstrated by flight testing at the settings specified above for the stall warning and, if applicable, stall identification systems. Alternatively, compliance may be shown by applying adjustments to flight test data obtained at a different system setting.

Revise paragraph 29f(3) as follows:

(3) *Procedures.* Stall warning tests are normally conducted in conjunction with the stall testing required by §§ 25.103 (stall speeds), 25.201 (stall demonstration), and 25.203 (stall characteristics), including consideration of the prescribed bank angles, power settings, and center-of-gravity position. In addition, if the stall warning margin may be affected by a system (*e.g.*, a stall warning or stick pusher system that modifies the stall warning or stall identification speed as a function of thrust, bank angle, angle-of-attack rate, *etc.*), compliance with § 25.207(c) should be demonstrated at the most critical conditions in terms of stall warning margin. However, bank angles greater than 40 degrees and power or thrust exceeding maximum continuous power or thrust need not be demonstrated. If the effect of the stall identification or stall warning system compensation is to increase the stall warning margin relative to the nominal values demonstrated during the testing required by §§ 25.103, 25.201, and

25.203, no further stall warning margin demonstrations need to be done.

Revise paragraph 29f(4) as follows:

(4) *Data Acquisition and Reduction.* The stall warning speed and type and quality of warning should be noted. The speed at which acceptable stall warning begins should then be compared to the stall identification speed and, for the conditions under which VSR is defined, VSR, to determine if the required margin exists. The stall warning speed margin required by § 25.207(d) should be determined at a constant load factor.

Revise paragraph 29g as follows:

g. *Accelerated Stall Warning.* (1) *Explanation.* Section 25.207(e) requires that, in slow-down turns with at least a 1.5g load factor normal to the flight path and an airspeed deceleration rate greater than 2 knots per second, sufficient stall warning is provided to prevent stalling when the pilot takes recovery action not less than one second after recognition of stall warning. The purpose of the requirement is to ensure that adequate stall warning exists to prevent an inadvertent stall under the most demanding conditions that are likely to occur in normal flight. The conditions of 1.5g and an airspeed deceleration rate greater than 2 knots per second correspond to the steep turn maneuver prescribed in Part 121, Appendices E and F for pilot initial and proficiency training, respectively, plus some margin for error (3 degrees more bank and a decreasing airspeed). The elevated load factor will emphasize any adverse stall characteristics, such as wing drop or asymmetric wing flow breakdown, while also investigating Mach and potential aeroelastic effects on available lift. The greater than 2 knot per second deceleration rate is intended to result in a reasonable penetration beyond the onset of stall warning.

(2) *Procedures.* (i) Trim at 1.3 $V_{SR.}$ Once trimmed, accelerate to a speed that will allow enough time to set up and complete the maneuver at the specified load factor and airspeed deceleration rate. Power or thrust should be set appropriate to the power for level flight at 1.3 $V_{SR}$ and not adjusted during the maneuver. In a level flight maneuver, 1.5g equates to a bank angle of 48 degrees. To prevent an excessive deceleration rate (*e.g.*, greater than 3 knots per second), a descent may be used. Conversely, if the deceleration rate is too low, the maneuver should be conducted in a climbing turn.

(ii) After the onset of stall warning, continue the maneuver without releasing stick force for one second before attempting recovery. Normal low speed recovery techniques should be used. If any of the indications of a stall prescribed in § 25.201(d) (see paragraph 29b(3) of this AC) occur during the accelerated stall warning demonstration, compliance with § 25.207(d) will not have been demonstrated.

Revise paragraph 29h as follows:

h. *Maneuver Margins.* See paragraph 20 of this AC for guidance material associated with demonstrating compliance to the maneuvering capability requirements of § 25.143(g).

Redesignate existing paragraph 29i as 29j and add a new paragraph 29i as follows:

i. *Tolerance Considerations for Airplanes Equipped with Stall Identification Systems.* For airplanes equipped with a stall identification device, the applicant should consider the combined effects of the variables listed in paragraphs (1) through (4) below to determine the critical configuration for stall testing. A maximum deviation in stall speed of ±1 knot, from that defined in the nominal configuration, is considered acceptable for the combined effects of the items listed in paragraphs (1) through (3). The deviation in stall speed due to stall identification system tolerances (paragraph 3), alone, should not exceed ±0.5 knots. (The stall identification system consists of everything from the angle of attack sensing device to the connection of the force application actuator to the longitudinal control system.) It should be verified that threshold tolerances and system design features (*e.g.*, filtering, phase advancing) will not result in an unsafe diminishing of the margin between stall warning and pusher activation, or pusher activation and some dangerous airplane characteristic. Investigations should include the demonstration of maneuver margins, dynamic stall entries, the effects of atmospheric turbulence, and operation in windshear environments where the airplane will be flown at, or very near, stall warning. These flying conditions should not result in unwanted activation of the stall identification system or aerodynamic stall prior to, or close to, activation of the stall warning system. This verification may be provided by a combination of analysis, simulation, and flight test.

(1) High lift device and control surface rigging—at the limits of their respective tolerance bands that is most detrimental to the production of lift;

(2) Airframe build tolerances—the impact of wing angle of incidence variation relative to stall identification system vane angle;

(3) Stall identification system tolerances—activation vane angles should be at the low end of the tolerance band for stall speed testing, and at the high end for stall characteristics testing; and

(4) Wing leading edge condition—the effect of wing leading edge contamination (*e.g.*, insects) on stall speeds should be determined and accounted for if significant. The critical height and density of the contaminant should be substantiated by Generic. This testing may be accomplished using an artificial contaminant.

Remove existing Figure 29–1, renumber Figure 29–5 as Figure 29–1, add a new Figure 29–2, and reorder the remaining figures appropriately.

Revise paragraphs 30c(2)(i), 30e(1)(iii), and 30e(2)(ii) by replacing ''$V_{S0}$'' with ''$V_{SR0.}$''

Revise Page 2 of Appendix 4 by replacing ''$1.2V_S$'' with ''$1.13\ V_{SR}$'' (two occurrences).

Remove Appendix 5.

Issued in Renton, Washington, on December 20, 2002.

**Vi L. Lipski,**

*Manager, Transport Airplane Directorate, Aircraft Certification Service, ANM–100.*

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## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

### Aging Transport Systems Rulemaking Advisory Committee Meeting

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Notice of public meeting.

**SUMMARY:** This notice announces a public meeting of the FAA's Aging Transport Systems Rulemaking Advisory Committee (ATSRAC).

**DATES:** The FAA will hold the meeting on January 22 and 23, 2003, in Savannah, Georgia from 8:30 a.m. to 4:30 p.m. on the 22nd and from 8:30 a.m. to noon on the 23rd.

**ADDRESSES:** Hyatt Regency Savannah, 2 West Bay Street, Savannah, Georgia, 31401.

**FOR FURTHER INFORMATION CONTACT:** Shirley Stroman, Office of Rulemaking, ARM–208, FAA, 800 Independence Avenue, SW, Washington, DC 20591; telephone (202)267–7470; fax (202)267–5075; or e-mail *shirley.stroman@faa.gov.*

**SUPPLEMENTARY INFORMATION:** The ATSRAC will meet at the Hyatt Regency Savannah at the address shown under the **ADDRESSES** heading in this notice. The meeting agenda will include the following:

- Presentation of Working Group 10's (Small Transport Airplane