

VOLUME 5 AIRMAN CERTIFICATION

CHAPTER 3 AIRLINE TRANSPORT PILOT (ATP) CERTIFICATION UNDER TITLE 14 CFR PART 121, 135, OR 91 SUBPART K

Section 2 Oral and Flight Test Events in Airplanes for ATP Applicants Engaged in Operations Under 14 CFR Part 121, 135, or 91 Subpart K

Source Basis:

- **Title 14 CFR § 61.43, Practical Tests: General Procedures.**
- **Title 14 CFR § 61.71, Graduates of an Approved Training Program Other Than Under This Part: Special Rules.**
- **Title 14 CFR § 61.151, Applicability.**
- **Title 14 CFR § 61.157, Flight Proficiency.**
- **Title 14 CFR § 61.165, Additional Aircraft Category and Class Ratings.**
- **Title 14 CFR § 121.441, Proficiency Checks.**

5-826 GENERAL. Volume 5, Chapter 3, Sections 2 through 7 provide inspectors and designated examiners with detailed guidance for the conduct of airline transport pilot (ATP) flight tests conducted in the qualification curriculum segments of Title 14 of the Code of Federal Regulations (14 CFR) parts 121 and 135 training and qualification programs. This guidance has been specifically developed to account for the conditions encountered in such programs, particularly for the wide variation in aircraft, flight simulation training devices (FSTD), and educational delivery systems currently used by 14 CFR parts 121 and 135 operators.

A. Applicability. Inspectors and designated examiners must observe this guidance while conducting these flight tests instead of the guidance that applies to the testing of applicants trained and tested outside of 14 CFR parts 121 and 135 training and qualification programs, where different conditions prevail.

B. Scope. This section contains general direction and guidance for the conduct of all airplane flight tests, regardless of whether a test is conducted in an FSTD or in an airplane. Volume 5, Chapter 3, Section 3 contains specific guidance for the conduct of flight tests in an airplane FSTD. Volume 5, Chapter 3, Section 4 contains specific guidance for the conduct of flight tests in an actual airplane. Volume 5, Chapter 3, Sections 5 and 6 contain specific guidance for the conduct of flight tests in a helicopter. Volume 5, Chapter 3, Section 7 contains guidance for the documentation of practical tests.

5-827 ORAL TEST EVENTS.

A. Part 121. In accordance with 14 CFR § 61.157(f)(1)(i), a satisfactory 14 CFR § 121.441 proficiency check meets the flight test requirements for an ATP Certificate and type rating. Inspectors and examiners should see Volume 3, Chapter 19, Section 7, Paragraph 3-1279, Part 121 Pilot Proficiency Check, and Figure 3-80, Part 121 Pilot Proficiency Check, for direction and policy regarding a 14 CFR § 121.441 proficiency check, including the required equipment examination.

B. Title 14 CFR Parts 135 and 91K. Inspectors and examiners should use

Figure 5-112, Title 14 CFR Parts 135 and 91K ATP/Type Rating Oral Test Job Aid—Airplane, when conducting oral tests for ATP Certificates with airplane category ratings or for airplane type ratings being added to ATP Certificates (see Figure 5-112). The topics to be examined are printed on the job aid in an abbreviated form. Most of the topics are self-explanatory; however, a discussion of selected topics follows:

1) Takeoff Data. Applicants must be able to complete typical takeoff and landing data computations. These computations must include application of proper corrections (e.g., a contaminated runway, inoperative antiskid, and minimum equipment list (MEL) or Configuration Deviation List (CDL) penalties).

2) Performance Computations. An applicant must demonstrate the ability to extract aircraft performance data (e.g., maximum allowable altitude, cruise power settings, and driftdown performance from the aircraft performance charts).

3) Weight and Balance (W&B). An applicant must demonstrate the ability to compute or validate W&B using the operator's procedures.

Figure 5-112. Title 14 CFR Parts 135 and 91K ATP/Type Rating Oral Test Job Aid—Airplane**THE ORAL TEST**

[] A. Knowledge of aircraft systems:

[] Hydraulic	[] Electrical
[] Pneumatic	[] Powerplants
[] Flight instruments	[] Flight controls
[] Landing gear, wheel	[] Autopilot, FD
[] EFIS, FMS	[] Navigation systems
[] Fuel	[] Propellers
[] Pressurization	[] Air conditioning

[] B. Knowledge of, and ability to, compute performance data, takeoff, landing, and cruise performance

[] C. Weight and balance

[] D. Ability to perform or state immediate action items

[] E. Knowledge of, and ability to, state operating limitations

[] F. Knowledge of the MEL

5-828 WAIVER AUTHORITY. The waiver provisions of 14 CFR § 61.157(j) apply only to pilots employed by 14 CFR part 121 air carriers. Inspectors and examiners should see Volume 3,

Chapter 19, Section 7, Paragraph 3-1285, Conduct of Proficiency, Competency, and Flight Checks, for direction and policy regarding waiving of events.

5-829 PREPARATION AND SURFACE OPERATIONS EVENTS. Applicants must be observed performing interior, exterior, and emergency equipment inspections and performing engine start, taxi, and powerplant checks in accordance with the operator's aircraft operating manual.

A. Exterior Inspection. The exterior inspection is not an extension of the oral phase in which systems knowledge is examined but rather a demonstration of an applicant's ability to perform appropriate safety checks. Inspectors and examiners should limit questions to only those necessary for determining if an applicant can recognize when a component is in an unsafe condition. The exterior inspection may be waived when a flight engineer (FE) is a required crewmember. When the exterior inspection is waived, pilot applicants are required to complete those flight deck, interior, and emergency equipment inspections defined as the pilot in command's (PIC) responsibility. Inspectors and examiners must determine whether an applicant inspects these items in accordance with the procedures in the operator's aircraft operating manual.

B. Cabin Inspection. An applicant must be evaluated on the ability to perform a cabin inspection when this inspection is specified as a PIC responsibility by the operator's aircraft operating manual. Inspectors and examiners should occasionally sample an applicant's knowledge of the location and use of emergency equipment in the cabin, and the operation of cabin doors, even when the cabin inspection is not designated as a flightcrew member responsibility.

C. Flight Deck Preflight Inspection. An applicant is required to complete the flight deck preflight checks using the procedures specified in the operator's aircraft operating manual and using the appropriate checklists. The proper challenges and responses to the checklist must be used. When the flight test is conducted in an FSTD, it is appropriate for the inspectors or examiners to present minor malfunctions to determine if the applicant is accurately performing the specified checks.

D. Engine Start Procedures. An applicant is required to perform an engine start using the correct procedures. When the flight test is conducted in an FSTD, it is appropriate for inspectors and examiners to present an abnormal condition such as a hot-start or malfunctioning air or start valve. The abnormal condition should be carried through to the expected conclusion in line operations for the purpose of evaluating crew coordination and the applicant's proficiency.

E. Taxiing or Sailing. Inspectors and examiners must evaluate the applicant's ability to safely maneuver the airplane on the surface and to manage outside vigilance while accomplishing flight deck procedures. The applicant must ensure that the taxi path is clear of obstructions, comply with local taxi rules and air traffic control (ATC) instructions, properly use checklists, and maintain control of the crew and airplane.

F. Powerplant Checks. Powerplant checks must be accomplished in accordance with the appropriate checklist and procedures before takeoff. In an FSTD, inspectors and examiners should present appropriate instrument or system malfunctions to determine if the applicant is accurately performing these checks.

5-830 TAKEOFF EVENTS. An applicant is required to accomplish each of the following takeoff events. These events may be combined when convenient and practical.

A. Normal Takeoff. A normal takeoff is defined as a takeoff beginning from a standing or rolling start (not from a touch-and-go) with all engines operating normally during the takeoff and initial climb phase.

B. Instrument Takeoff. An instrument takeoff is defined as one in which instrument conditions are encountered or simulated at or before reaching an altitude of 100 feet above airport elevation. In an FSTD, the visibility value should be set to the minimum authorized by the operator's operations specifications (OpSpecs). An applicant must be evaluated on the ability to control the airplane, including making the transition to instruments as visual cues deteriorate. An applicant must also be evaluated on the planning of the transition to an instrument navigation environment. This event may be conveniently combined with an area departure.

C. Engine Failure on Takeoff (For Multiengine Airplanes). An applicant must demonstrate the ability to maintain control of the airplane and to continue a takeoff with the failure of the most critical powerplant. When the flight test is conducted in an airplane, the failure must be simulated. The takeoff configuration, airspeeds, and operational procedures must be in accordance with the operator's aircraft operating manual. When the flight test is conducted in two segments (full flight simulator (FFS) and airplane), this event must be conducted in the FFS segment of the flight test. This event should not be repeated in the airplane portion of the flight test unless an unusual situation occurs.

1) When the flight test is being conducted in an airplane belonging to the transport and commuter category family, the engine failure must be introduced at a speed after takeoff decision speed (V_1) and before takeoff safety speed (V_2), and appropriate to the airplane and the prevailing conditions. When either V_1 and V_2 , or V_1 and rotation speed (V_r), are identical, the failure must be introduced as soon as possible after V_1 is passed.

2) When the flight test is conducted in an airplane not in the transport and commuter category family, the engine failure must be introduced at a speed and altitude that is appropriate for the airplane.

NOTE: Some nontransport multiengine airplanes cannot climb or maintain altitude with an engine failed. When conducting a flight test in such an airplane, inspectors and examiners should use their authority to modify this event. For example, an engine failure recognition problem and engine shutdown may be performed at a safe altitude.

D. Rejected Takeoff. A rejected takeoff is a potentially hazardous situation that flightcrews must be trained to handle correctly. As a testing event, it must be presented in a realistic and meaningful manner. The event is a test of an applicant's ability to correctly respond

to a critical situation and to correctly manage the actions necessary for safeguarding the airplane and passengers once the airplane is brought to a stop.

1) When a flight test is conducted in an FFS, performance parameters should be adjusted to make the takeoff critical. For example, the temperature and airplane weight can be adjusted so that takeoff performance is runway-limited. Another technique is to lower the visibility and make the runway wet, presenting the applicant with a tracking problem. Inspectors and examiners should take care in selecting the malfunction used to induce the reject response. The malfunction should be one that clearly and unequivocally requires rejection of the takeoff. The malfunction should be introduced at a speed that is as close to V_1 as possible yet still allowing the applicant enough time to perceive and respond to the problem before reaching V_1 . It is appropriate for inspectors and examiners to occasionally introduce a problem in a way that leads to an evacuation of the airplane.

2) When a flight test is conducted in an airplane belonging to the transport and commuter category family, a rejected takeoff at approximately V_1 can be unsafe and can cause damage to the airplane. Inspectors and examiners are expected to use caution when inducing a rejected takeoff in an airplane for flight test purposes. For this event to be meaningful, it should be introduced at a speed close to V_1 . In other families of airplanes, the rejected takeoff must be performed at a speed of less than 50 percent of the minimum controllable airspeed with the critical engine inoperative (V_{MC}).

3) An applicant must be able to recognize the need to initiate a rejected takeoff, perform the correct procedures in a timely manner, and to bring the airplane to a stop on the runway. Once the airplane or FFS is brought to a stop, appropriate procedures must be initiated. Consideration must be given to the possibility of overheated brakes and fire.

E. Crosswind Takeoffs. A crosswind takeoff from a standing or rolling start (not a touch-and-go) must be evaluated to the extent practical on all flight tests. When appropriate, a crosswind takeoff may be evaluated simultaneously with other types of takeoffs.

1) When the flight test is conducted in an airplane, inspectors and examiners will usually have very little control over existing meteorological, airport, and traffic conditions. Inspectors and examiners are expected to make a reasonable attempt to evaluate a takeoff on a runway not favorably aligned with the prevailing wind. It will frequently be necessary, however, to evaluate this event with the crosswind component that exists on the active runway.

2) FFSs are capable of realistically duplicating crosswinds. Crosswind takeoffs must be evaluated on all flight tests conducted in an FFS. The crosswind component entered in the Instructor Operating Station (IOS) should be between 10 and 15 knots. Occasionally, however, the crosswind components should be in excess of 15 knots but must not exceed the crosswind component allowed by the operator's aircraft operating manual, or the maximum demonstrated value given in the approved Airplane Flight Manual (AFM). The purpose of testing at such higher crosswind components is to determine whether applicants are being trained throughout the range of the flight envelope. When Level A FFSs are used, Principal Operations Inspectors (POI) must determine the maximum values at which the crosswind simulation is realistic.

5-831 CLIMB, EN ROUTE, AND DESCENT EVENTS.

A. Area Departures and Arrivals. The area departure and arrival events should include intercepting radials, tracking, and climbs or descents with restrictions. Whenever practical, a standard instrument departure or standard arrival should be used. Many of the standard procedures, however, are not suitable for the purpose of testing an applicant's abilities. For example, common radar departures are essentially initial-climb instructions for a radar handoff and provide little opportunity for testing an applicant's ability to set up and use the navigation equipment normally used on an area departure. If a suitable published procedure is not available and circumstances allow, the inspector or examiner should give a clearance that presents the desired tests. Inspectors and examiners should allow applicants to use all installed equipment. The autopilot may or may not be used at the inspector's or examiner's discretion. The applicant's use of navigation equipment and other crewmembers, and the applicant's ability to adhere to ATC clearances and restrictions must be evaluated.

B. Holding. Inspectors and examiners should give holding clearances with adequate time available for the applicant to identify the holding fix, select the appropriate speed, and plan the entry. Applicants should be allowed to use all aids normally available on the flight deck (such as wind drift readouts). At least the initial entry and one complete turn in the holding pattern should be completed before another clearance is issued. The applicant's performance should be evaluated in accordance with the holding procedures outlined in the operator's aircraft operating manual, the instructions issued by ATC, and the published holding pattern criteria. Holding airspeed must be as specified by the operator's aircraft operating manual; however, it must not be allowed to exceed the regulatory limit. If the operator's manual requires a speed higher than that allowed by regulation, the applicant must resolve the conflict by requesting an amended ATC clearance or by selecting an airplane configuration in which it is safe to comply with the regulatory speed.

C. Steep Turns. This event consists of a level turn in each direction with a bank of 45 degrees, continuing for at least 180 degrees, but not more than 360 degrees. Inspectors and examiners should direct special attention to an applicant's smoothness, coordination, and orientation.

D. Stall Prevention (Approaches to Stalls). Inspectors and examiners must evaluate the applicant's ability to recognize and recover from an impending stall in three separate airplane configurations: clean configuration, takeoff configuration (except where the airplane uses only a zero-flap takeoff configuration), and landing configuration. At least one impending stall recovery must be performed while in a turn with a bank angle between 15 and 30 degrees. One impending stall should be initiated by commands to the autopilot (if installed). Impending stall recovery in the clean configuration should be evaluated at a high altitude near the airplane's maximum operating altitude. (Refer to the current edition of Advisory Circular (AC) 120-109, Stall Prevention and Recovery Training.)

NOTE: This requirement applies to all airplane types, including those with flight envelope protection and fly-by-wire flight controls. Inspectors and examiners should reference the applicable Flight Standardization Board Report (FSBR) for recommendations to conduct this maneuver.

1) The inspector or examiner is responsible for establishing the flight conditions associated with the configuration being evaluated. While the pilot may fly the entry profile, the pilot will not be evaluated on the entry. The satisfactory completion of the event is based on the pilot's initiating recovery at the first indication of an impending stall (e.g., buffet, stick shaker, or aural warning) and the accomplishment of the proper recovery procedure.

2) When evaluation of stall prevention is performed in an airplane, the operator's minimum entry and recovery altitudes must be observed. In an FSTD, evaluation of stall prevention may be maneuver-based or scenario-based with an entry altitude consistent with normal operating environments. The entry parameters, including W&B, should be within airplane limitations to ensure adequate performance for recovery from first indication of an impending stall.

3) When the flight test is conducted in an FSTD, inspectors and examiners should occasionally require an applicant to recover from an impending stall at high altitude. Evaluation of stall prevention in various flight regimes should be accomplished to determine whether the operator's training program has adequately prepared applicants for flight in those regimes.

4) Evaluation of stall prevention must not be based on altitude loss. Pilots must be evaluated on recovering at the first indication of an impending stall, even if it is based on an aural or visual indication that occurs before the stick shaker or stick pusher (if installed), and their timely and effective use of available energy (i.e., altitude and speed) during recovery. The inspector or examiner must consider the variables that are present at the time of the indication of an impending stall and their effect on the recovery. Evaluation criteria are:

- Prompt recognition of impending stall;
- Correct application of the stall recovery procedure; and
- Recovery without exceeding the airplane's limitations.

5) Stall recovery procedures must be in accordance with the operator's aircraft operating manual (if applicable) or AC 120-109.

E. Specific Flight Characteristics. This event consists of recovery from flight characteristics specific to the airplane type, such as a Dutch roll or a high rate of descent. These specific flight characteristics, when applicable, are specified in the FSBR for the particular airplane type. Inspectors and examiners must evaluate an applicant on recognition and recovery from these specific flight characteristics, when applicable. The procedures used for recovery must be those specified in the operator's aircraft operating manual.

5-832 APPROACH EVENTS. The approaches described in this paragraph are required on all flight tests. They may be combined when appropriate.

A. Instrument Landing System (ILS) Approach. Inspectors and examiners must require applicants to fly a minimum of one normal (all-engines-operative) ILS. In addition, when multiengine airplanes are used, one manually controlled ILS with a powerplant failure is also required. When the flight test is conducted as a two-segment flight test, a manually controlled, normal ILS must be flown in the airplane segment of the flight test.

- 1) When the operator's aircraft operating manual prohibits raw data approaches, the flight directors (FD) must be used during the manually controlled ILS approach. In this case, a raw data approach is not required to complete the flight test.
- 2) If the operator's aircraft operating manual permits raw data ILS approaches to be conducted, the operator must provide training in the use of raw data for controlling an airplane during ILS approaches. If the operator's airplanes are equipped with a FD system, the FD must be used on at least one manually controlled ILS approach. While a raw data approach is not required to complete a flight test, inspectors and examiners should occasionally require a raw data approach to determine whether the operator's training program is adequately preparing applicants.
- 3) For all raw data and FD ILS approaches flown in an FSTD, inspectors and examiners must require applicants to use a decision height (DH) of 200 feet above the touchdown zone (TDZ). When raw data is used on ILS approaches in an airplane, inspectors and examiners must require applicants to use a DH of 200 feet above the TDZ. When the FD is used on ILS approaches in an airplane, inspectors and examiners must require applicants to use a DH of 100 feet above the TDZ. However, if the applicant has accomplished an ILS using a 200-foot height above touchdown (HAT) in the FSTD segment of the flight test, the published DH should be used in the airplane portion of the test. The DH must be determined by barometric altimeter. Inspectors and examiners must inform applicants that this DH is for flight test purposes only and does not correlate to any minimums used in actual operations. If the flight test is being conducted in actual weather conditions, the DH must be the published DH. The applicant must be able to track the Localizer (LOC) and glideslope (GS) smoothly and without significant excursion during the final approach segment. The LOC indication must not exceed $\frac{1}{4}$ scale deflection at DH. When the ILS indicator is calibrated with the first dot at the $\frac{1}{2}$ -scale deflection point and a second dot at the full-scale point, the deflection at DH must not exceed half the distance to the first dot. The GS must not exceed $\frac{1}{2}$ -scale deviation (one dot) at DH.
- 4) When the operator's airplanes are equipped with autopilot couplers, at least one coupled autopilot ILS approach must be flown. If the autopilot has the capability and the operator is authorized by OpSpecs to conduct automatic landings, the coupled approach must terminate in either an autoland or a coupled missed approach. When an autoland is conducted, it may not be credited as one of the three required manually controlled landings. When the flight test is conducted entirely in an airplane or entirely in an FFS, the autopilot coupled approach may be combined with the normal ILS (all-engines-operative) approach. This combination is permitted because the applicant's ability to manually control an ILS approach is evaluated on the ILS with an engine out.
- 5) Qualification for Category (CAT) II and CAT III operations are not part of a type rating or ATP flight test. To satisfy the requirements for these types of operations, additional events that are not required for the ATP Certificate or a type rating will normally be required. The qualification checks for these types of operations, however, may be conducted in conjunction with an ATP or type rating test as a convenience to the operator and the applicant. However, if one of these additional events is unsatisfactory, the entire flight test is unsatisfactory. Therefore, the choice of whether to combine these events with the certification flight test is up to the applicant. Inspectors and examiners must ensure that applicants understand

these ground rules before conducting these additional events in conjunction with a certification test.

6) Qualification check requirements for CAT II and CAT III operations, including the required number and types of approaches, are established by the operator's approved training program. If an applicant is simultaneously qualifying for these authorizations during the certification flight test, the approaches discussed in subparagraphs 1)–3) above may be credited toward these requirements when the approach requirements are compatible.

7) Inspectors and examiners must use a crosswind component of 8 to 10 knots (not to exceed 10 knots) on at least one of the ILS approaches conducted in an FSTD. The use of this crosswind is to evaluate the applicant's ability to track the LOC and not the applicant's ability to accomplish a crosswind landing.

8) When the flight test is conducted in an FSTD, the Runway Visual Range (RVR) should be set to the minimum value specified for the approach. If the inspector or examiner plans for the applicant to acquire the runway and to continue below DH, the ceiling should be set to a value of approximately 50 feet above HAT (the exact value depends on the characteristics of the specific FSTD). When the flight test is conducted in an airplane, the vision restriction device must remain in use until just before the airplane arrives at the DH used for the flight test.

9) Flightcrew procedures, airplane configuration, and airspeeds must be as specified in the operator's aircraft operating manual. Turbojet airplanes must be stabilized before descending below 1,000 feet above the TDZ.

B. Nonprecision Approaches (NPA). Inspectors and examiners must require applicants to demonstrate two nonprecision instrument approaches that are authorized in the operator's OpSpecs. The second approach must be based on a different type of Navigational Aid (NAVAID) than the first approach.

1) Inspectors and examiners must allow the applicant to use any aid normally available on the flight deck, such as the FD and drift and groundspeed readouts. Many operators train their pilots to perform NPAs using the autopilot. At least one NPA must be manually flown on the flight test, except when the operator's manual prohibits manually flown NPAs.

2) When NPAs are conducted in an FSTD, a crosswind component of 10 to 15 knots must be used on at least one of the NPAs. The purpose of the crosswind component is to test an applicant's ability to track the approach course, not to evaluate crosswind landings. Crosswind landings, however, may be combined with an NPA.

3) In an airplane, the vision restriction device must remain in use until the airplane arrives at the minimum descent altitude (MDA) and a distance from the runway approximating the required visibility for the approach. In an FSTD, inspectors and examiners must enter a ceiling of approximately 50 feet higher than the published MDA. A visibility value of approximately $\frac{1}{4}$ mile greater than the published minimums value must be used, depending on the characteristics of the particular FSTD.

NOTE: If the approach to be conducted is a lateral navigation (LNAV)/vertical navigation (VNAV) with a published decision altitude (DA), the FSTD visibility should be set to the HAT at the DA, divided by 300 feet (a constant); then add $\frac{1}{4}$ mile. For example:

To set FSTD visibility where DA = 1000 ft and HAT at DA = 600 ft:

- Divide 600 ft by 300 ft = 2 (miles visibility),
- Add $\frac{1}{4}$ mile visibility, and
- Set FSTD visibility at $2\frac{1}{4}$ miles.

This setting permits the flightcrew to acquire the approach lights visually before reaching the published DA and precludes an unnecessary missed approach when the approach is otherwise satisfactory.

4) When tracking is accomplished by means of an automatic direction finder (ADF) bearing pointer, the tolerance is ± 5 degrees of the final approach course. When tracking an LOC signal, the tolerance is a $\frac{1}{4}$ -scale deviation ($\frac{1}{2}$ -dot). When tracking a very high frequency omnidirectional range station (VOR) signal, the tolerance is a $\frac{1}{4}$ -scale deviation of the course deviation indicator (CDI). The reason for these tolerances is terrain. Also, at the visual descent point (VDP) or its equivalent, the airplane must be in a position that it can be aligned with the runway without excessive maneuvering. Turbojet airplanes must be stabilized before descending below the MDA or 500 feet, whichever is lower.

C. Circling Approach Maneuver. Operators are not required to train flightcrew members in circling approach maneuvers if the operator's manual prohibits such maneuvers with a ceiling below 1,000 feet and a visibility of less than 3 miles.

1) For the purpose of flight testing, the visual maneuvering portion of a circling maneuver begins at the circling MDA of an NPA. The circle to land maneuver may be conducted to a runway that is less than 90 degrees offset from the final approach course provided the pilot flying makes at least 90 degrees of total heading change(s). The inspector or examiner, however, is authorized to modify this event. For example, when traffic conditions preclude a circling approach, if ATC approval is attained, the visual portion of the event can be entered from a modified visual flight rules (VFR) traffic pattern at a point downwind and abeam the touchdown point.

2) The angle of bank for a circling maneuver should not exceed 30 degrees. The airplane must not descend below MDA until the runway environment is clearly visible to the applicant, and the airplane is in a position for a normal descent to the touchdown point. Turbojet airplanes must be stabilized in the landing configuration before descending below the MDA or 500 feet above touchdown zone elevation (TDZE), whichever is lower.

3) Circling approaches that are conducted in an FSTD should comply with the requirements set forth in Volume 3, Chapter 54, Section 6.

D. Maneuver To a Landing With 50 Percent of Powerplants Inoperative. Inspectors and examiners must require an applicant to demonstrate an approach and landing with 50 percent of powerplants inoperative.

- 1) Inspectors and examiners should introduce this event in a realistic manner. Consideration should be given to the airplane weight, atmospheric conditions, and airplane position. The airplane position, when the engine failure is introduced (second engine in a three- or four-engine airplane) should provide enough room for the applicant to maneuver the airplane. In an FFS, the weight should be adjusted to simulate realistic conditions but still allow the applicant enough time to exercise judgment. In a three-engine airplane, this event must be performed with the center and an outboard engine failed. In a four-engine airplane, both powerplant failures must be on the same side.
- 2) In two-engine airplanes, the engine-out ILS may be credited simultaneously with this event. In three- and four-engine airplanes, this event should be conducted in visual conditions. A visual pattern should be used rather than a vector to the final approach, so that the applicant's judgment with respect to maneuvering the airplane can be evaluated. When this event is conducted in an FFS, the electronic GS or Visual Approach Slope Indicator (VASI) must not be made available for the applicant's use. In the airplane, it may not be possible to have the VASI turned off. In daylight conditions, however, inspectors and examiners should request that the VASI be turned off. In an airplane at night, an electronic GS or VASI must be available and used.

NOTE: An approach with a simulated failure of the most critical powerplant must always be performed in the airplane segment of a two-segment flight test. That event is required in the airplane segment, even when a maneuver and landing with 50 percent of powerplants inoperative has already been previously accomplished in an FFS.

E. No-Flap or Partial-Flap Approach. Inspectors and examiners must require an applicant to perform a no-flap approach in all airplanes except those airplanes that have alternate flap extension procedures and in which the Flight Standardization Board (FSB) has determined that no-flap approaches are not required. If a no-flap approach is not required, the FSB may still require that a partial-flap approach be accomplished. In this case, inspectors and examiners are only required to evaluate an applicant's demonstration of a partial-flap approach. However, inspectors and examiners may evaluate applicants conducting partial-flap or no-flap approaches any time procedures for such approaches are published in the operator's aircraft operating manual.

- 1) For either a partial- or no-flap approach, the limitations specified for the use of VASI and electronic GS guidance in the 50 percent engine failure maneuver apply (see subparagraph 5-832D2) above). The approach must be flown from a visual pattern from at least a downwind position, so that the applicant may be evaluated on planning for the approach. The approach should be presented in a realistic manner. In an FFS, inspectors and examiners must adjust the landing weight to require an applicant to exercise judgment in matters such as approach speed and runway limitations.

2) When the flight test is conducted in a transport or commuter category airplane, a touchdown from a no-flap or partial-flap approach is not required and must not be attempted. The approach must be flown to the point that the inspector or examiner can determine whether the landing would or would not occur in the TDZ. In an FFS, the landing must be completed to a full stop so that the applicant's ability to control the airplane and to use correct procedures may be evaluated.

NOTE: The events required in subparagraphs 5-832D and E above should be conducted in an FFS whenever practical. These events should not be repeated in the airplane segment of the flight test unless an unusual situation occurs.

F. Acceptable Performance for Approach Events. The airspeed and altitude on downwind and base leg, or on an intercept to final approach, must be as specified in the operator's flight manual. The airspeed on final approach must be adjusted for wind and gusts in accordance with the flight manual and must be positively and accurately maintained throughout the approach. The approach angle must be controlled and be appropriate to both the airplane and approach being flown. If a wind-shear or a ground proximity warning (GPW) should occur, an applicant must respond in a prompt and positive manner. For turbojets, the approach must be stabilized, the airplane in the landing configuration, with a sink rate of less than 1,000 feet per minute (fpm), not later than the following heights:

- 1)** For all straight-in instrument approaches, the approach must be stabilized before descending below 1,000 feet above the airport or TDZ.
- 2)** For visual approaches and landings, the approach must be stabilized before descending below 500 feet above the airport elevation.
- 3)** For the final segment of a circling approach maneuver, the approach must be stabilized 500 feet above the airport elevation or at the MDA, whichever is lower.

NOTE: Use of the stabilized concept is mandatory for all turbojet airplane operations. It is recommended for all propeller-driven airplanes when conducting operations in instrument flight rules (IFR) weather conditions.

5-833 LANDING EVENTS. A total of three manually controlled landings must be accomplished on all flight tests. When a two-segment FSTD and airplane flight test is conducted, a minimum of three manually controlled landings must be performed in the airplane. If the flight test is conducted in an amphibious airplane, one landing must be on water. The required events are as follows:

A. Normal Landings. A normal landing is defined as a manually controlled landing in the normal landing configuration (as specified in the operator's aircraft operating manual), with normal power available, and without reference to an electronic GS. A normal landing can be accomplished from either a visual pattern or from an NPA.

B. Crosswind Landings. A manually controlled landing with a crosswind must be accomplished on all flight tests. The crosswind landing may be combined with any other landing event.

1) When the flight test is conducted in an airplane, inspectors and examiners usually have little control over existing meteorological, airport, and traffic conditions. As such, an inspector or examiner is expected to make a reasonable attempt to evaluate a landing on a runway not favorably aligned with the prevailing wind. It will frequently be necessary, however, to evaluate this event with the crosswind component currently existing on the active runway.

2) FFSs are capable of realistically duplicating a crosswind for landing. Crosswind landings must be evaluated on all flight tests conducted in FFSs. The crosswind component entered in the IOS must be between 10 and 15 knots. Occasionally, however, the crosswind components should be in excess of 15 knots but must not exceed the crosswind component allowed by the operator's aircraft operating manual (or the maximum demonstrated value given in the AFM). The purpose of testing at such higher crosswind components is to determine whether applicants are being trained throughout the range of the flight envelope. When Level A FFSs are used, POIs must determine the maximum values at which the crosswind simulation is realistic. Crosswind landings should normally be performed from a VFR traffic pattern but may be accomplished from an NPA.

C. Landing in Sequence from an ILS Approach. On the landing from an ILS approach, the runway environment should become visible to the applicant as close as possible to the DH being used for the flight test. The applicant must complete the landing without excessive maneuvering and within the TDZ. The approach angle must not be erratic, excessively steep, or shallow in the visual segment.

D. Accuracy Landings (Single-Engine Only). The accuracy landing event consists of three approaches and spot landings from an altitude of 1,000 feet or less, with the engine throttled and an approach requiring a 180 degree change of heading. ("Throttled" means that as power is reduced, it must not again be increased above that point until after touchdown.) Touchdown must be in a normal landing attitude and configuration, beyond but within 200 feet of a designated point. One of the three landings must be from a forward slip. Although circular approaches are acceptable, two 90-degree turns with a straight base leg are preferred. This event is not required if the applicant holds a commercial pilot certificate.

E. Rejected Landing. The rejected landing must be initiated from a point approximately 50 feet above the runway. This event may be combined with an instrument missed approach.

F. Engine-Out Landing. One landing with the most critical powerplant inoperative must be evaluated. When a two-segment flight test is conducted, this event must be performed in the airplane. When conducted in an airplane, the engine failure must be simulated.

G. Landing With 50 Percent of Powerplants Inoperative. A landing with 50 percent of powerplants inoperative must be evaluated. In a three-engine airplane, the event must be performed with the center and one outboard engine inoperative. In a four-engine airplane, both powerplant failures must be on the same side. When this event is conducted in an airplane, the engine failures must be simulated.

H. No-Flap or Partial-Flap Landings. No-flap or partial-flap landings are not required to complete the flight test. When the flight test is conducted in a transport category airplane in

actual flight, a touchdown from a no-flap or partial-flap approach is not required and must not be attempted. The approach must be flown to the point that the inspector or examiner can determine whether the landing would or would not occur in the TDZ. In an FFS, the landing should be completed to a full stop so that the applicant's abilities to control the airplane and use correct procedures under abnormal circumstances may be evaluated. For example, the airplane might have a pitch-up tendency with spoiler extension in the no-flap or partial-flap landing configuration.

I. Acceptable Performance for Landing Events. Landings must be in the TDZ, at the correct speed for the airplane, without excessive float, and on the runway centerline (RCL). The rate of descent at touchdown must be controlled to an acceptable rate for the airplane involved. Side load on the landing gear must not be excessive, and positive directional control must be maintained through the rollout. Management of spoilers and thrust reversers must be in accordance with the operator's aircraft operating manual.

5-834 MISSED APPROACH EVENTS. Missed approaches from two separate instrument approaches are required to complete the flight test. At least one missed approach must be flown through the entire missed approach procedure unless traffic or ATC restrictions prevent completing the entire procedure. One missed approach is required from an ILS. When the flight test is conducted in a multiengine airplane that has a single-engine climb capability, one missed approach should be accomplished with the most critical powerplant inoperative. The engine-out and ILS missed approaches may be combined; however, to complete the flight test, at least two missed approaches are required. When the flight test is a two-segment flight test, the engine-out missed approach should be accomplished in the FSTD segment.

A. Flight Test Not in Transport or Commuter Category Airplane. When a flight test is conducted in an airplane that does not belong to the transport or commuter category family, airplane performance may be critical. Inspectors and examiners should use their authority to modify the event. For example, a missed approach may be combined with a simulated powerplant failure at a safe altitude.

B. Flight Test in a Three- or Four-Engine Airplane. A missed approach from an approach with 50 percent of powerplants inoperative is not required to complete the flight test for three- and four-engine airplanes. However, when procedures for 50 percent of powerplant-inoperative missed approaches are published in the operator's aircraft operating manual, inspectors and examiners may evaluate the event to determine if applicants are being trained to proficiency in the event. When this event is conducted in a three-engine airplane, the center and one outboard engine must be inoperative. When this event is conducted in a four-engine airplane, two engines on the same side must be inoperative. When the missed approach event is conducted in an airplane, the engine failures must be simulated.

C. Flight Test in an FSTD. When a flight test is conducted in an FSTD, inspectors and examiners should make use of the IOS environmental and fault panels to induce the missed approach decision. For example, many FSTDs have provisions to offset the LOC so that the airplane is not in a position to continue the approach below DH.

D. Criteria for Initiation of Missed Approach. Applicants must promptly execute the missed approach procedure if the runway environment is not acquired at DH on an ILS approach. If the runway environment is not in sight on an NPA, or if the airplane is not in a position to land at the missed approach point, the applicant must initiate a missed approach. Should conditions prevent continuation of any type of approach at any point, the applicant must initiate a missed approach. For example, a missed approach above DH might be required when an instrument failure flag appears. A missed approach is required if the airplane is below DH or MDA and cannot be properly aligned with the runway or if the applicant loses sight of the runway environment. An applicant must adhere to the published missed approach or the instructions given by ATC and observe the procedures and limitations in the operator's aircraft operating manual. An applicant must properly use the available aids and other crewmembers when making the transition back to the instrument navigation environment.

5-835 NORMAL AND ABNORMAL PROCEDURES. Inspectors and examiners must require an applicant to demonstrate the proper use of as many of the airplane's systems and devices as necessary to determine if the applicant has a practical knowledge of the use of these systems. Evaluation of normal and abnormal procedures can usually be accomplished in conjunction with other events and does not normally require a specific event to test the applicant's use of the airplane's systems and devices. An applicant's performance must be evaluated on the maintenance of airplane control, the ability to recognize and analyze abnormal indications, and the ability to apply corrective procedures in a timely manner. Systems to be evaluated include, but are not limited to, the following:

- Anti-icing and deicing systems;
- Autopilot systems;
- Automatic or other approach system aids;
- Stall warning devices, stall avoidance devices, and stability augmentation devices;
- Airborne Radar (AR) devices; and
- Any other available systems, devices, or aids (e.g., flight management systems (FMS)).

5-836 EMERGENCY PROCEDURE EVENTS. An applicant must be able to competently operate all installed emergency equipment and to correctly apply the procedures specified in the operator's aircraft operating manual.

A. Powerplant Failures. Inspectors and examiners may introduce malfunctions requiring an engine shutdown at any time during the flight test. This provision is not intended as authority to require an unrealistic number of failures but to permit such failures at times when they are most appropriate. Powerplant failures should be limited to those necessary for determining an applicant's proficiency. An applicant must promptly identify the inoperative engine and initiate correct action while maneuvering the airplane safely. If the airplane is not capable of maintaining altitude with an engine inoperative, the applicant is expected to maintain the best engine-out climb speed while descending. Smooth application of flight controls and proper trim are required.

B. Other Emergency Procedures. Inspectors and examiners should sample as many of the following events as necessary for determining whether an applicant is proficient in identifying and responding to emergency situations:

- Fire in flight;
- Smoke control;
- Rapid decompression;
- Emergency descent (with and without structural damage);
- Hydraulic and electrical system failure or malfunctions (if safe and appropriate);
- Landing gear and flap systems failure or malfunctions;
- Navigation or communications equipment failure; and
- Any other emergency procedures outlined in the operator's aircraft operating manual or training program.

5-837 STANDARDS OF ACCEPTABLE PERFORMANCE. The ATP Certificate is the highest grade of pilot certificate awarded. An applicant for this certificate must possess a degree of piloting skills beyond that required for lower grades of certificates. The applicant must be the master of the airplane, the crew, and the situation throughout the airplane's operational envelope. Inspectors and examiners must sample an applicant's ability to safely and practically operate the airplane throughout the range of the approved operational envelope. For example, an ATP applicant would be expected to be able to maintain 180 knots to the marker, configure the aircraft, and establish a stabilized approach before descending below 1,000 feet above ground level (AGL) while smoothly tracking the GS and LOC.

A. Manipulative Skills. The manipulative skill standards for the ATP Certificate are the most rigorous of all pilot certificates issued. The skills requirement for the ATP Certificate and for other certificates differs not in the tolerances allowed but in the degree of mastery required.

1) The applicant for an ATP Certificate must demonstrate the ability to operate the airplane smoothly under a complex set of circumstances. The applicant's performance must be such that the inspector or examiner is never seriously in doubt of the successful outcome of each event of the flight test.

2) The determination of whether an applicant's performance is acceptable or not is derived from the experience and judgment of the inspector or examiner. It is imperative that inspectors and examiners be fair and consistent when making their determinations.

3) For example, weather, airplane responsiveness, traffic, and other factors beyond an applicant's control may cause the applicant to deviate briefly during the accomplishment of a maneuver. In the case of turbulence, the applicant is expected to adhere to the procedures for adjusting the target speed as specified in the operator's aircraft operating manual. In such a situation, an applicant who makes a determined effort, is generally successful in maintaining close control, and does not deviate to the extent safety is compromised, should be considered to have met the standard.

B. Flight Management Skills. The term "pilot-in-command" implies that the pilot is the leader of a crew and bears the final responsibility for the safe conduct of the flight. This

standard, more than any other, distinguishes the successful applicant for an ATP Certificate from those holding other grades of certificates. The ATP flight test must not be limited to a simple demonstration of a series of events. An ATP applicant must demonstrate a mastery of complex problems, good judgment, situational awareness, Crew Resource Management (CRM), and leadership skills.

RESERVED. Paragraphs 5-838 through 5-855.