U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Pilot Training and Checking (14 CFR Part 121 Subparts N and O, Including Appendices E and F)

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This advisory circular (AC) provides information regarding pilot training and checking under Title 14 of the Code of Federal Regulations (14 CFR) part 121 subparts N and O, including part 121 appendices E and F. It is intended to be used as a resource during the development, implementation, and revision of an air carrier's pilot training and qualification program. This AC is not mandatory and does not constitute a regulation. This AC describes an acceptable means, but not the only means, for an air carrier to develop procedures and performance standards for pilot training and checking. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide clarity to the public regarding existing requirements under the law or agency policies.

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CHAPTER 1. GENERAL

1.1 Purpose. This advisory circular (AC) provides information regarding pilot training and checking under Title 14 of the Code of Federal Regulations (14 CFR) part 121 subparts N and O, including part 121 appendices E and F. It is intended to be used as a resource during the development, implementation, and revision of an air carrier's pilot training and qualification program. This AC is not mandatory and does not constitute a regulation. This AC describes an acceptable means, but not the only means, for an air carrier to develop procedures and performance criteria for pilot training and checking. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide clarity to the public regarding existing requirements under the law or agency policies.

1.2 Audience. This AC may be valuable to the following:

- Air carriers conducting operations under part 121, including air carriers using an Advanced Qualification Program (AQP);
- Air carriers and operators conducting operations under 14 CFR part 135 required to comply with part 121 subparts N and O;
- Air carriers and operators conducting operations under part 135 that comply with part 121 subparts N and O;
- Program managers conducting operations under 14 CFR part 91 subpart K (part 91K) that comply with part 121 subparts N and O;
- Title 14 CFR part 142 training centers conducting training and checking under contract to a 14 CFR part 119 air carrier;
- Others involved in the development of standard operating procedures (SOP) and training and qualification programs; and
- Pilots and others involved in flight operations, training, and checking under part 121.

1.3 Regulatory Requirements. Each of the following 14 CFR parts can be found at https://www.ecfr.gov.

- Part 1, Definitions and Abbreviations.
- Part 60, Flight Simulation Training Device Initial and Continuing Qualification and Use.
- Part 61, Certification: Pilots, Flight Instructors, and Ground Instructors.
- Part 91, General Operating and Flight Rules.
- Part 121, Operating Requirements: Domestic, Flag, and Supplemental Operations.
- Part 135, Operating Requirements: Commuter and On Demand Operations and Rules Governing Persons On Board Such Aircraft.
- Part 142, Training Centers.

1.4 Related Reading Material. The current editions of the following documents support the knowledge and skill standards for pilot training and checking.

1.4.1 ACs. The current edition of each of the following ACs can be found at https://www.faa.gov/regulations_policies/advisory_circulars.

1. AC 00-6, Aviation Weather.
2. AC 00-45, Aviation Weather Services.
3. AC 60-22, Aeronautical Decision Making.
4. AC 60-28, FAA English Language Standard for an FAA Certificate Issued Under 14 CFR Parts 61, 63, 65, and 107.
5. AC 90-106, Enhanced Flight Vision Systems.
6. AC 91-79, Mitigating the Risks of a Runway Overrun Upon Landing.
7. AC 120-35, Flightcrew Member Line-Operational Simulations: Line-Oriented Flight Training, Special Purpose Operational Training, Line Operational Evaluation.
8. AC 120-50, Guidelines for Operational Approval of Windshear Training Programs.
9. AC 120-51, Crew Resource Management Training.
10. AC 120-53, Guidance for Conducting and Use of Flight Standardization Board Evaluations.
11. AC 120-54, Advanced Qualification Program.
12. AC 120-55, Air Carrier Operational Approval and Use of TCAS II.
13. AC 120-57, Surface Movement Guidance and Control System.
14. AC 120-71, Standard Operating Procedures and Pilot Monitoring Duties for Flight Deck Crewmembers.
15. AC 120-74, Parts 91, 121, 125, and 135 Flightcrew Procedures During Taxi Operations.
16. AC 120-80, In-Flight Fires.
17. AC 120-88, Preventing Injuries Caused by Turbulence.
18. AC 120-109, Stall Prevention and Recovery Training.
19. AC 120-111, Upset Prevention and Recovery Training.
20. AC 120-118, Criteria for Approval/Authorization of All Weather Operations (AWO) for Takeoff, Landing, and Rollout.
21. AC 121-39, Air Carrier Pilot Remedial Training and Tracking Program.
22. AC 121-42, Leadership and Command Training for Pilots in Command.

1.4.2 Other Documents.

- Pilot Guide to Takeoff Safety: https://www.faa.gov/other_visit/aviation_industry/airline_operators/training/media/takeoff_safety.pdf.
- Wake Turbulence Training Aid: https://www.faa.gov/training_testing/training/wake/media/02frmatr.pdf.
- Airplane Upset Recovery Training Aid, Revision 2: https://www.faa.gov/other_visit/aviation_industry/airline_operators/training/media/AP_UpsetRecovery_Book.pdf.
- Report of the Performance-based Operations Aviation Rulemaking Committee/Commercial Aviation Safety Team Flight Deck Automation Working Group: https://www.faa.gov/aircraft/air_cert/design_approvals/human_factors/media/OUFPMS_Report.pdf.
- FAA-H-8083-23, Seaplane, Skiplane, and Float/Ski Equipped Helicopter Operations Handbook.
- Flight Standardization Board (FSB) Report for the specific airplane.

1.5 Introduction. This AC describes procedures for completing tasks during ground training, flight training and checking, and emergency equipment training drills. It further sets out performance criteria for pilots when performing these tasks and conducting these operations. The air carrier should tailor these procedures and performance criteria to the specific airplane type to reflect the air carrier's operating environment. The recommendations of the Original Equipment Manufacturer (OEM) of the airplane take precedence regarding specific procedures that may differ from those contained herein. Tasks are applicable when the airplane is equipped for that task and, if appropriate, authorized for that task via operations specifications (OpSpecs).

1.5.1 FSB Reports. Air carriers should refer to the applicable FSB Report for:

- Specific flight characteristics which must be trained and checked, as required by part 121 appendices E and F;
- Part 121 appendix E maneuvers or procedures which are not applicable to the airplane;
- Special emphasis areas which may require additional stress or highlighting during training;
- Seat-dependent tasks; and
- Other training and checking recommendations for unique features or new avionics technologies available on the airplane.

1.5.2 OpSpecs Authorizations. Per part 119, § 119.43, air carriers must publish criteria to support the use of specific OpSpecs authorizations.

1.5.3 Manuals. In accordance with part 121, § 121.135(a), the air carrier's manual must include instructions and information to allow pilots to perform their duties and responsibilities

with a high degree of safety. As required by §§ 121.135(b)(2), 121.135(b)(16), and 121.403(b)(3), the manual must include the procedures and duties that apply to the pilot flying (PF) and to the pilot monitoring (PM) the airplane. The manual will be approved by the air carrier's Principal Operations Inspector (POI) and will be used to develop and conduct the air carrier's Federal Aviation Administration (FAA)-approved training and qualification program. Together, these efforts will provide the very best opportunity to ensure that pilots will fly as they are trained and that they will be trained as they are expected to fly.

1.6 Developing Training and Checking Requirements for Pilots.

1.6.1 Regulations. In accordance with § 121.315, each air carrier must develop normal, abnormal, and emergency procedures for each airplane type that pilots must use when operating that airplane type. These procedures may include operational recommendations from the airplane manufacturer provided they do not conflict with the procedures in the approved Airplane Flight Manual (AFM). Once these procedures are developed, in accordance with § 121.401, the air carrier must develop a training and qualification program that meets the requirements of part 121 subparts N and O and appendices E and F to ensure flightcrews are proficient in their assigned duties.

1.6.2 Ground Training. Ground training is instruction that provides individuals with the required knowledge and cognitive skills necessary to perform the tasks required for the duty position. The required subjects are combined with the information and procedures contained in the air carrier's manual and other pertinent references to create the ground training requirements. Curricula are then developed to support these knowledge requirements and ensure that knowledge is obtained and maintained. Chapter 2, Ground Subjects, of this AC contains information related to ground training of limitations, systems, performance, and procedures specific to the airplane type. Information related to other required ground training subjects may be found in various FAA publications.

1.6.3 Flight Training and Checking. Flight training is instruction, practice, and review that provides individuals with the practical, hands-on experience of integrating knowledge and cognitive skills with the psychomotor skills necessary to perform the tasks required for the duty position. Flight checking is a practical skills test conducted by a check pilot to determine if the pilot being checked is proficient in all assigned duties to serve in line operation. The flight maneuvers and procedures that should be addressed in initial, transition, conversion, upgrade, and/or recurrent training and/or checking are listed in Chapter 3, Flight Maneuvers and Procedures, of this AC. The operational requirements should reflect the air carrier's intent for the manner in which each maneuver and procedure is to be accomplished during line operations. These requirements should include recommendations from, (1) the airplane OEM, (2) the airplane FSB Report, or (3) other appropriate references that directly address specific maneuvers and procedures. In accordance with § 121.403, air carriers must develop training curricula and performance requirements for each required task.

1.6.4 Emergency Equipment Drills. Emergency equipment drills are the instruction, practice, and hands-on use of emergency equipment as required by § 121.417. When feasible,

emergency evacuation and ditching drills should be conducted jointly with flight attendants (F/A) to provide all crewmembers the opportunity to experience crew coordination and teamwork. Information related to emergency equipment drills can be found in Chapter 4, Emergency Equipment Drills, of this AC.

1.6.5 Performance Standard. Per part 121 appendix F, the pilot must demonstrate, under the prescribed conditions, good judgment consistent with a high level of safety considering adherence to approved procedures and qualities of prudence and care in selecting a course of action.

1.7 Training and Qualification Program Review and Revision.

1.7.1 Regulatory Requirements. In accordance with § 121.401, each air carrier must provide and keep current the training material, examinations, forms, instructions, and procedures for use in conducting the training and checking required by part 121. In addition, § 121.415(h) requires each air carrier to provide ground and flight training, instruction, and practice, as necessary, to ensure each pilot:

- Remains adequately trained and currently proficient with respect to each airplane, crewmember position, and type of operation in which each pilot serves; and
- Qualifies in new equipment, facilities, procedures, and techniques, including modifications to airplanes.

1.7.2 Review and Revision. In accordance with 14 CFR part 5, an air carrier must have procedures to regularly review the pilot training and qualification program. As a result of these assessments, an air carrier must, when necessary, develop modifications, changes, and/or updates to the training and qualification program (per part 5, § 5.75). Various assessment tools may be used, including, but not limited to, the following:

- Testing results;
- Checking results;
- Critiques from managers, instructors, check pilots, and students regarding the training, testing, checking, or qualification process, including, but not limited to, content, presentation, and applicability;
- Periodic evaluations and analyses by those who have knowledge of the program, its content, and its goals and purpose;
- Data from voluntary safety programs, such as Aviation Safety Action Program (ASAP), flight operations quality assurance (FOQA), and Line Operations Safety Audit (LOSA); and
- Other data from an air carrier’s Safety Management System (SMS).

CHAPTER 2. GROUND SUBJECTS

2.1 Premise of Ground Training. The basic premise of ground training is to instill a knowledge and understanding of each subject within each area of instruction.

2.1.1 Initial, Transition, Conversion, Upgrade (§ 121.419), and Recurrent. In accordance with §§ 121.419(a)(2) and 121.427(b)(2), the following subjects must be included in initial, transition, upgrade (§ 121.419), and recurrent ground training specific to each airplane type.

2.1.2 Upgrade (§ 121.420). Beginning April 27, 2022, upgrade ground training must include the following subjects, as applicable to the seat-dependent procedures and duty position procedures for the specific airplane type.

2.2 Limitations. As required by part 121 appendix F, the pilot must know the operating limitations appropriate to the airplane with respect to:

- Systems and components; and
- Performance.

2.3 Systems and Components. As required by part 121 appendix F, the pilot must understand and be knowledgeable about the following systems and components (as applicable to the airplane) and be able to explain their operation as described in the air carrier's manual and their applicability, as appropriate, to the minimum equipment list (MEL), Configuration Deviation List (CDL), and the OpSpecs.

2.3.1 Landing Gear. Landing gear including, as appropriate, extension and retraction system(s), indicators, brakes, anti-skid, tires, nosewheel steering, and shock absorbers.

2.3.2 Engine(s). Engines including controls and indications, induction system, carburetor and fuel injection, turbocharging, cooling, fire detection and protection, mounting points, turbine wheels, compressors, deicing, anti-icing, full-authority digital engine control (FADEC), and other related components.

2.3.3 Propellers. Propellers (if appropriate) including type, controls, feathering and unfeathering, autofeather, negative torque sensing, synchronizing, and synchrophasing.

2.3.4 Fuel Systems. Fuel systems including capacity, drains, pumps, controls, indicators, cross-feeding, transferring, jettison, fuel grade, color and additives, fueling and defueling procedures, and allowable fuel substitutions, if applicable.

2.3.5 Oil Systems. Oil systems including capacity, grade, quantities, and indicators.

2.3.6 Hydraulic Systems. Hydraulic systems including capacity, pumps, pressure, reservoirs, grade, and regulators.

2.3.7 Electrical Systems. Electrical systems including alternators, generators, battery, circuit breakers and protection devices, controls, indicators, and external and auxiliary power sources and ratings.

2.3.8 Environmental Systems. Environmental systems including heating, cooling, ventilation, oxygen and pressurization, controls, indicators, and regulating devices.

2.3.9 Avionics and Communications. Avionics and communications including flight director (FD), electronic flight instrument systems (EFIS), flight management system(s) (FMS), Head-Up Displays (HUD), enhanced flight vision systems (EFVS), Doppler Radar, inertial navigation systems (INS), Global Positioning System (GPS)/Differential GPS (DGPS), very high frequency omni-directional range (VOR), Nondirectional Radio Beacon (NDB), instrument landing system (ILS), Area Navigation (RNAV) systems and components, Aircraft Communications Addressing and Reporting Systems (ACARS), Automatic Dependent Surveillance-Broadcast (ADS-B), ADS-B In, ADS-B Out, Controller-Pilot Data Link Communication (CPDLC) departure/Automatic Dependent Surveillance-Contract (ADS-C) systems, indicating devices, transponder, and emergency locator transmitter (ELT).

2.3.10 Ice Protection (Anti-Ice and Deice). Ice protection (anti-ice and deice) including pitot static system, propeller (if appropriate), windshield, wing, and tail surfaces.

2.3.11 Emergency Equipment and Procedures. Crewmember and passenger emergency equipment and procedures including oxygen system, survival gear, emergency exits, evacuation procedures with crew duties, and quick donning oxygen mask for crewmembers and passengers.

2.3.12 Flight Controls. Flight controls including ailerons, elevator(s), rudder(s), control tabs, balance tabs, stabilizer, flaps, spoilers, leading edge flaps and slats, and trim systems.

2.3.13 Flight Deck Automation. Flight deck automation (e.g., autopilot and autothrottle/autothrust) including the air carrier's flightpath management policies and procedures for selecting appropriate levels of automation. As required by OpSpec C060, Category II and Category III Instrument Approach and Landing Operations, this must include the air carrier's policy for conducting Category (CAT) II and CAT III approaches when authorized.

2.3.14 Pneumatic System. Pneumatic system including compressors, valves, pressure, backup sources, and regulators.

2.4 Normal, Abnormal, and Emergency Procedures. Per part 121 appendix F, the pilot must be knowledgeable in the normal, abnormal, and emergency procedures applicable to the airplane.

2.5 Performance and Loading. Per part 121 appendix F, the pilot must understand and be proficient in the use of (as appropriate to the airplane) performance charts, tables, graphs, and other data relating to items such as:

1. Accelerate-stop distance.
2. Accelerate-go distance.
3. Balanced field.
4. Takeoff performance, all engines and with engine(s) inoperative, as appropriate.
5. Climb performance including segmented climb performance; with all engines operating, with one or more engines inoperative, and with other engine malfunctions, as appropriate.
6. Service ceiling, all engines and with engine(s) inoperative, including engine(s) inoperative driftdown, if appropriate.
7. Cruise performance.
8. Fuel consumption, range, and endurance.
9. Descent performance.
10. Landing performance, all engines and with engine(s) inoperative, as appropriate.
11. Go-around from rejected landings.
12. The effects of meteorological conditions on performance characteristics with correct application of these factors to a specific chart, table, graph, or other performance data.
13. How to determine longitudinal and lateral center of gravity location for a specific load condition, including how to add, remove, or shift weight to meet longitudinal (forward and aft) and lateral balance limits for takeoff, cruise, and landing.
14. Planning and application of operational factors affecting airplane performance, such as high-altitude airports, cluttered and contaminated runways, and ground and in-flight icing.
15. Other performance data (appropriate to the airplane).

2.6 Airplane Flight Manual (AFM). Per part 121 appendix F, the pilot must be knowledgeable on the provisions contained in the approved AFM.

2.7 Stall Prevention and Recovery. Per part 121 appendix F, the pilot must be knowledgeable in stall prevention and recovery in the clean configuration, takeoff and maneuvering configuration, and landing configuration. Refer to the current edition of AC 120-109, Stall Prevention and Recovery Training, for information regarding stall prevention and recovery training.

2.8 Upset Prevention and Recovery. Per part 121 appendix F, the pilot must be knowledgeable in upset prevention and recovery. Refer to the current edition of AC 120-111, Upset Prevention and Recovery Training, for information regarding upset prevention and recovery training.

2.9 Severe Weather Situations. Per § 121.419(a)(2)(vi), the pilot must be knowledgeable in procedures for recognizing, avoiding, escaping, and operating in or near severe weather or other potentially hazardous meteorological conditions, including, but not limited to:

- Thunderstorms;
- Clear air turbulence;
- Icing;
- Hail; and
- Low-altitude wind shear. (Refer to the current edition of AC 120-50, Guidelines for Operational Approval of Windshear Training Programs, for information regarding wind shear training.)

CHAPTER 3. FLIGHT MANEUVERS AND PROCEDURES

3.1 Premise of Flight Training. The basic premise of flight training is to provide a pilot with the following:

- An understanding of what maneuvers/procedures are to be performed;
- A general description of what each maneuver/procedure is to look like and what that maneuver/procedure is to provide;
- Sufficient information as to where and how the airplane will be maneuvered, including the timing for that maneuvering, to position the airplane in the proper configuration, location, speed, and inertia that will facilitate the correct accomplishment of the maneuver/procedure;
- Sufficient practice for the pilot to be able to get the airplane to the required configuration, location, speed, and inertia each time he or she attempts a given maneuver/procedure;
- Sufficient understanding of the maneuver/procedure to be able to identify when one or more of the necessary parameters is not correct, or to identify that inertia is taking the airplane to an unsatisfactory condition; and
- Sufficient practice in determining how to correct parameters and continue the maneuver/procedure or determining that the maneuver/procedure should be abandoned.

3.2 Premise of Flight Checking. The basic premise of flight checking is to determine if the pilot is proficient in all assigned duties to serve in line operations.

3.2.1 Waiving of Maneuvers or Procedures. In accordance with § 121.441(d), a check pilot conducting a proficiency check may, at his or her discretion, waive a maneuver or procedure only as specifically identified in part 121 appendix F if:

- The FAA has not specifically required the particular maneuver or procedure to be performed; and
- For recurrent proficiency checks, the pilot is currently qualified for operations under part 121 in the particular type airplane and flightcrew member duty position; or
- For all other proficiency checks, the pilot has, within the preceding 6 calendar-months, satisfactorily completed an approved training curriculum, except upgrade training in accordance with §§ 121.420 and 121.426, for the particular type airplane.

Note: A pilot completing a pilot-in-command (PIC) proficiency check after upgrade training completed in accordance with §§ 121.420 and 121.426 must complete all maneuvers and procedures required by part 121 appendix F without any waiving of events.

3.2.1.1 Use of Waiver Authority is Not Automatic. The use of waiver authority is not automatic. Air carriers should not have policies requiring check pilots to use waiver authority. Check pilots should exercise judgment in the use of this authority. If a pilot demonstrates a high level of performance, a check pilot may use the waiver authority. If a pilot's performance only meets the minimum acceptable standards, none of the maneuvers or procedures required for the proficiency check should be waived.

3.2.1.2 Waiving Conditions and Restrictions. Some maneuvers and procedures have specific conditions, identified in part 121 appendix F, which must be met before waiver authority may be used (e.g., either the area arrival or area departure, but not both may be waived). Additionally, some maneuvers and procedures have specific restrictions, identified in part 121 appendix F, on the use of waiver authority (e.g., the circling approach maneuver may not be waived for two successive checks). If a check pilot is unsure whether the specific waiver conditions and restrictions have been met, the maneuver or procedure may not be waived.

3.2.2 Training to Proficiency. In accordance with § 121.441(e), if a pilot fails a maneuver or procedure during a proficiency check, the check pilot may conduct training and repeat the checking of that maneuver or procedure.

3.2.2.1 Training and Checking Not Simultaneous. Training and checking may not be conducted simultaneously. If training is required, the check pilot should complete the following actions:

1. Temporarily suspend the check. The pilot should be clearly informed that the check has been suspended.
2. Provide the pilot with additional training on the maneuver(s) and/or procedure(s) that was failed.
3. Resume the check. The pilot should be clearly informed that the check has been resumed.
4. Repeat/recheck the maneuver(s) and/or procedure(s) that was failed.

3.2.2.2 Recordkeeping. In accordance with §§ 121.415(i) and 121.683, the pilot's record must identify the maneuver(s) and/or procedure(s) which were initially failed, the additional training provided by the check pilot, and whether the recheck of the maneuver(s) and/or procedure(s) was satisfactory. If the recheck of the maneuver(s) and/or procedure(s) is unsatisfactory, the pilot's record must identify the second failure and the failure of the proficiency check.

3.3 Task Organization Legend.

3.3.1 Area of Operations. This chapter is organized by the phases of flight. Each area of operation includes the tasks related to that phase of flight. The competencies for each task are described as conditions, awareness, and action criteria.

3.3.2 Task Description. The pilot flying (PF) and pilot monitoring (PM) should demonstrate the awareness criteria and action criteria under the prescribed conditions. Per §§ 119.43(c) and 121.415(h), the air carrier must train pilots in all tasks, procedures, and environments for which they hold operations specification (OpSpec) approval to operate, under all specified conditions. Any condition may be selected for checking unless a particular condition is specified.

3.3.2.1 Conditions Included.

3.3.2.1.1 Environmental conditions and circumstances, including those that compound the difficulty of the task when encountered. The instructor or check pilot selects conditions, as appropriate:

1. Day or night conditions.
2. Weather that is, or is not, a complicating factor.
3. If visibility is a complicating factor, the task will use the prescribed procedures for the existing conditions.
4. If performance is influenced by temperature, pressure altitude, atmospheric, or precipitation conditions (e.g., rain, drizzle, ice, or snow), the following is required:
   - Appropriate adjustments will be made to the type of takeoff or approach and landing that is to be flown;
   - The airplane configuration that is to be used; and
   - The requirement to operate the airplane within the reduced tolerances applicable, including airspeed and runway touchdown point.

3.3.2.1.2 Clarifying information about the nature of the task.

3.3.2.1.3 Explanatory language about the goal, or intent of the task or area to aid in setting the stage for its effective conduct.

3.3.2.2 Awareness Criteria. Identify the specific aspects of the task and environment that indicate proper operation, a need to seek further information, or a need to take action to prevent encountering a hazard or compounding the difficulty unnecessarily. These are generally an application of cognitive skill to support the action criteria or passive action(s) that should be applied throughout the entire task.

3.3.2.3 Action Criteria. Procedures for completing a task, including operations in or near a critical environment, when appropriate. These are steps that are active and generally are completed in an order to achieve the goal of the task. Provide relevant parameters with tolerances to reflect satisfactory levels of performance.

3.4 General. The criteria for normal procedures, airplane handling, and air traffic control (ATC) communications and procedures are applicable to all flight maneuvers and procedures.

3.4.1 Normal Procedures.

3.4.1.1 Condition(s). Not applicable.

3.4.1.2 Awareness Criteria:

1. Maintain situational awareness of the events and circumstances at all times.
2. Demonstrate ability to continuously monitor and to identify any potential hazards or threats to the safety of the flight.
3. Demonstrate ability to communicate and manage available resources.
4. Maintain adequate lookout and traffic avoidance for the conditions.
5. Maintain awareness of airplane position relative to the “nearest suitable airport.”
6. Monitor system indications to ensure normal operation or identify abnormal situations.

3.4.1.3 Action Criteria:

1. Adhere to the duties and responsibilities of the PF and PM as prescribed in the air carrier’s manual.
2. Ensure operation of the airplane within the limitations established by the air carrier’s manual.
3. Comply with the provisions of the air carrier’s manual, minimum equipment list (MEL), and Configuration Deviation List (CDL) (if appropriate), as they pertain to the particular airplane, through all phases of flight and all operations.
4. Accomplish the applicable checklist items, and complete all required checks as specified by the air carrier’s manual.
5. Make correct use of instruments, flight director (FD), autoflight (e.g., autopilot and autothrottle/autothrust), and navigation and communication equipment as prescribed by the air carrier’s manual and as appropriate to the phase of flight.

6. Plan and brief automation modes and configurations.
7. Follow guidelines for PF and PM duties during manual flying and for operation of automated systems.
8. Plan workload and allow sufficient time for programming the flight management system (FMS).
9. Change the level of automation to correspond to situational awareness and workload requirements.
10. Call for and complete the proper normal, abnormal, or emergency checklist(s).
11. Alert ATC and the air carrier, as necessary.
12. Ensure proper crew and passenger briefings are completed.
13. Conduct the takeoff briefing according to the air carrier's manual prior to taking the active runway.
14. Conduct the approach briefing according to the air carrier's manual prior to initial descent.
15. Ensure potential terrain or obstacle threats are included in departure and arrival briefings.
16. Ensure that passengers, crew, and cargo are properly secured for takeoff or landing.
17. Locate and proceed to the nearest suitable airport when necessary.
18. Determine the best course of action when an immediate landing is required, but not possible.
19. Demonstrate sound judgment and operating practices in those instances where specific instructions or checklist items are not published.
20. Comply with sterile flight deck requirements.
21. Select the systems and procedures appropriate to the air carrier's operation:
    - Air conditioning;
    - Airborne radar devices;
    - Auxiliary power unit (APU);
    - Automatic or other approach aids, including Head-Up Display (HUD) and enhanced flight vision system (EFVS);
    - Autoflight (e.g., autopilot and autothrottle/autothrust);
    - Anti-icing and deicing;
    - Brakes;

- Communications, including Controller-Pilot Data Link Communication (CPDLC) departure/Automatic Dependent Surveillance-Contract (ADS-C) systems;
- Doors;
- Electrical power;
- Engine;
- Fire protection;
- Flaps;
- Flight controls;
- Fuel and oil;
- Ground proximity warning system (GPWS), enhanced ground proximity warning system (EGPWS), or Terrain Awareness and Warning System (TAWS);
- Hydraulic power;
- Flight instruments;
- Landing gear;
- Navigation;
- Oxygen;
- Pneumatic;
- Pressurization;
- Propellers;
- Stability augmentation devices;
- Stall warning devices and stall avoidance devices;
- Thrust reversers;
- Warning systems; and
- Any other systems, devices, or aids available.

3.4.2 Airplane Handling.

3.4.2.1 Condition(s). Not applicable.

3.4.2.2 Awareness Criteria:

1. Demonstrate awareness of the airplane's trim condition.
2. Demonstrate awareness of the airplane's configuration.
3. Demonstrate awareness of the autoflight mode when in use.

4. Demonstrate awareness of the airplane's flightpath, attitude, and speed.
5. Demonstrate knowledge of the dangerous combinations of sideslip angles, rudder positions, or other flight parameters resulting from maximum, indiscriminate, uncoordinated, or rapid deflection of the rudder.

3.4.2.3 Action Criteria:

3.4.2.3.1 General:

- Maintain smooth, positive airplane attitude control in pitch, roll, and yaw to achieve and maintain appropriate flightpath;
- Maintain proper control of speed, pitch attitude, roll (bank), altitude, rate of descent, configuration, heading, course, and track, in accordance with the procedures and limitations in the approved Airplane Flight Manual (AFM) and/or air carrier's manual;
- Properly trim for the configuration or condition, if not automatic;
- The successful outcome of a procedure or maneuver can never be in doubt; and
- Continuously correct back to the target parameter.

3.4.2.3.2 Final Approach Segment (FAS). Maintain a stabilized approach:

- Have the airplane in the desired configuration for landing with the engines spooled and stable;
- Maintain a constant pitch attitude;
- Maintain a constant heading (within ±10°) or maintain electronic navigation indication with no more than one-quarter scale deviation vertically and laterally;
- Maintain an appropriate airspeed;
- Maintain a constant rate of descent;
- Keep the airplane trimmed;
- Execute a missed approach when reaching the minimum descent altitude (MDA), decision altitude (DA), or decision height (DH), as appropriate; and
- For Nonprecision Approaches (NPA) without vertical guidance, maintain altitude at MDA, when reached within +50 to –0 feet.

3.4.3 ATC Communications and Procedures.

3.4.3.1 Condition(s). The Aeronautical Information Manual (AIM) is a reference to the generally accepted practices of basic flight rules and instrument flight operations.

3.4.3.2 Awareness Criteria:

1. Interpret all ATC clearances received and, when necessary, request clarification, verification, or change.
2. Recognize the indication(s) of navigational station or waypoint passage.
3. Recognize navigation signal loss or Required Navigation Performance (RNP)-related alerting.

3.4.3.3 Action Criteria:

1. Select and use appropriate communication frequencies.
2. Establish communications with ATC, using proper phraseology or data link procedures.
3. Comply with all ATC clearances, instructions, and airspace restrictions.
4. Promptly advise ATC when unable to comply with a clearance.
5. Comply with ATC reporting requirements.
6. Demonstrate competency in two-way radio communications failure or ATC data link failure.
7. Use the current and appropriate navigation publications for the proposed flight.
8. Identify the navigation aids associated with approach procedures.
9. Select and correctly identify the appropriate navigation frequencies and facilities associated with navigation if not using Area Navigation (RNAV) or Global Positioning System (GPS).
10. Select, tune, identify, and confirm the operational status of ground and airplane navigation equipment to be used for the approach. Low frequency (Nondirectional Radio Beacon (NDB)) identification should be continuously monitored when used as the primary navigation reference. Where applicable, check automatic navigational aid identification on the navigation display.
11. Set the correct RNP reference prior to any procedure where the default RNP is not appropriate.
12. Locate the airplane position using radials, bearing, distance measuring equipment (DME) range, coordinates, or navigation displays, as appropriate.

13. Adhere to ATC airspeed restrictions and adjustments.
14. Intercept all courses, radials, bearings, or DME arcs appropriate to the procedure, route, and clearance.
15. Comply with the procedures for the instrument or visual approach.
16. Perform correct altimetry procedures, in accordance with the regulations, the air carrier's manual, and ATC requirements.

3.5 Preflight Procedures.

3.5.1 Exterior Inspection.

3.5.1.1 Condition(s). The exterior inspection is a demonstration of a pilot's ability to perform appropriate safety checks. Training and checking should include recognition of unsafe conditions.

3.5.1.2 Awareness Criteria. Check the general area around the airplane for hazards to the safety of the airplane and personnel.

3.5.1.3 Action Criteria. As appropriate to the airplane and the air carrier's manual, check the following items:

1. Engines, for closed and latched access panels, leaks other than normal drainage, intake and exhaust areas for freedom from foreign object damage (FOD) hazards, and pylon alignment marks.
2. Fuel quantity.
3. Oil quantity.
4. Hydraulic fluid quantity.
5. Crew and passenger oxygen quantity, pressures, and discharge indications.
6. Steering system, brakes, and landing gear, including removal of pins.
7. Tires for condition, inflation, and correct mounting.
8. Fire protection and detection systems pressures and discharge indications.
9. Pneumatic system pressures.
10. APU, for closed and latched access panels, leaks other than normal drainage, intake and exhaust areas for freedom from FOD hazards.
11. Flight control systems, including trim, spoilers, ailerons, leading and trailing edge slats and flaps, elevator, stabilizer, and rudder.
12. Anti-ice and deice systems, including ice detector probes and deice boots.
13. Windshields and windows.
14. Pitot tubes, static ports, angle of attack (AOA) vanes, stall warning vanes, static wicks, and probes.

15. Radome, communication, and navigation antennas.
16. Air inlets for avionics bays and air conditioning systems.
17. All exterior lights, including landing, taxi, navigation, recognition, and strobe lights.
18. Entry door stairs.
19. General airframe and structural integrity, including scratches, tears, holes, or dents and the fit and security of panels, doors, and hatches.

3.5.2 Cabin and Cargo Compartment Inspection.

3.5.2.1 Condition(s). The cabin and/or cargo compartment inspection is a demonstration of a pilot's ability to perform appropriate safety checks. Training and checking should include recognition of unsafe conditions.

3.5.2.2 Awareness Criteria. Conduct a visual inspection of the cabin and/or cargo compartment for hazards to the safety of the airplane, personnel, and passengers.

3.5.2.3 Action Criteria:

1. Note any discrepancies and take proper corrective action.
2. Determine if the airplane is airworthy and safe for flight.
3. Per part 121 appendix F, the pilot must verify that the airplane is safe for flight by examining, as appropriate, items such as:
    - Emergency equipment, including fire extinguishers, smoke detectors, Protective Breathing Equipment (PBE), portable oxygen bottles, first aid kits, emergency medical kits, megaphones, flotation devices, liferafts, and flashlights;
    - Emergency exits and emergency lighting system;
    - Signs, placards, passenger safety information cards, and emergency exit row cards;
    - Passenger seats, seatbelts, tray tables, and passenger service units (PSU);
    - Galley equipment;
    - Flight attendant (F/A) seats;
    - Lavatories; and
    - For cargo airplanes, check load security.

3.5.3 Flight Deck Inspection.

3.5.3.1 Condition(s). Select appropriate weather and environmental conditions.

3.5.3.2 Awareness Criteria:

1. Coordinate with ground crew and ensure adequate clearance prior to supplying power to, or operating, any devices such as doors, hatches, or flight control surfaces.
2. Know the system tests that are required.

3.5.3.3 Action Criteria:

1. Demonstrate proper operation of applicable airplane systems.
2. Note any discrepancies and take proper corrective action.
3. Determine if the airplane is airworthy and safe for flight.
4. Locate the documents required for flight, including airworthiness and registration certificates, OpSpecs (if appropriate), the air carrier's manual, MEL, CDL, Weight and Balance (W&B) data, and the maintenance logbook.
5. Per part 121 appendix F, the pilot must verify that the airplane is safe for flight by examining, as appropriate, items such as:
   - Engines, including controls and indicators;
   - Fuel quantity and distribution;
   - Oil quantity and pressure;
   - Hydraulic fluid quantity and pressure;
   - Crew and passenger oxygen quantity, pressures, and discharge indications;
   - Fire protection and detection systems, pressures, and discharge indications;
   - Pneumatic system for proper operation and pressures;
   - Ground environmental systems;
   - APU;
   - Anti-ice and deice systems;
   - Avionics systems, including communication, navigation, weather radar, GPWS, Traffic Alert and Collision Avoidance System (TCAS), passenger address, and interphone;
   - Lighting systems;

- Warning systems;
- Electrical systems;
- Airspeed indicators, heading indicators, attitude indicators, vertical speed indicators, and altitude indicators;
- Flight controls and steering system;
- Emergency equipment, including fire extinguishers, PBEs, flashlights, life vests, escape ropes, smoke goggles, oxygen masks, and crash axe;
- Circuit breaker panels; and
- Seats and seatbelts.

3.5.4 Navigation System Setup.

3.5.4.1 Condition(s). Select appropriate weather and environmental conditions. Setup includes, but is not limited to, FMS, inertial navigation systems (INS), and GPS.

3.5.4.2 Awareness Criteria:

1. Monitor the navigation system for fault indication, or for the results of self-tests.
2. Ensure the system is operating normally.

3.5.4.3 Action Criteria:

1. Verify airplane, engine, and other data for accuracy.
2. Enter or recall the planned route of flight.
3. Enter performance-related data, such as thrust levels, planned speeds, airplane weight, and other vertical navigation (VNAV) profile information.
4. Perform crosschecks and crew verification procedures in accordance with the air carrier's manual.

3.6 Ground Operations.

3.6.1 Engine Start.

3.6.1.1 Condition(s). Select appropriate weather and environmental conditions, including, but not limited to: hot or cold weather, tailwind, icing condition, and low-density altitude.

3.6.1.2 Awareness Criteria:

1. Exhibit adequate knowledge of the correct engine start procedures under various atmospheric conditions, normal and abnormal starting limitations, and the proper action required in the event of a malfunction.
2. Ensure ground safety procedures are followed during the before-start, start, and after-start phases.
3. Ensure the use of appropriate ground crew personnel during the start procedures.
4. Consider the effect of jet blast on personnel, other aircraft, vehicles, ground equipment, and structures.

3.6.1.3 Action Criteria:

1. Use required ground crew personnel during the before-start, start, and after-start phases (as appropriate).
2. Start the engine(s) under varying environmental conditions using normal, APU, external power, battery, pneumatic sources, or cross-bleed, as appropriate.
3. Take appropriate action in the event of a malfunction during the start process.

3.6.2 Pushback and Powerback.

3.6.2.1 Condition(s). Select appropriate weather and environmental conditions.

3.6.2.2 Awareness Criteria:

1. Maintain constant vigilance and lookout of the general area around the airplane for hazards to the safety of the airplane, personnel, other aircraft, vehicles, equipment, and structures.
2. Properly divide attention inside and outside the flight deck.
3. Consider the effect of jet blast on personnel, other aircraft, vehicles, ground equipment, and structures.

3.6.2.3 Action Criteria:

1. Maintain proper spacing from other aircraft, obstructions, and personnel.
2. Maintain communications with the ground crew.
3. Avoid use of brakes unless requested by the ground crew.

3.6.3 Taxi.

3.6.3.1 **Condition(s).** Select appropriate weather and environmental conditions. Training must, as required by §§ 119.5(g), 121.415(h), and OpSpec C078, IFR Lower Than Standard Takeoff Minima, 14 CFR Part 121 Airplane Operations - All Airports, as applicable, be conducted in taxi operations at the lowest visibility authorized for takeoff by OpSpecs. Training should also include Surface Movement Guidance and Control System (SMGCS) procedures if the air carrier is authorized to conduct operations at an airport with SMGCS. Refer to the current edition of AC 120-57, Surface Movement Guidance and Control System, for recommended training items for SMGCS. Refer to the Seaplane, Skiplane, and Float/Ski Equipped Helicopter Operations Handbook (FAA-H-8083-23) for recommended training items for seaplanes.

3.6.3.2 **Awareness Criteria:**

1. Comply with air carrier and airport low-visibility procedures, as applicable.
2. Exhibit adequate knowledge of safe taxi procedures.
3. Maintain constant vigilance and lookout of the general area around the airplane for hazards to the safety of the airplane, personnel, other aircraft, vehicles, equipment, and structures.
4. Properly divide attention inside and outside the flight deck.
5. Consider the effect of jet blast on personnel, other aircraft, vehicles, ground equipment, and structures.

3.6.3.3 **Action Criteria:**

1. Use the minimum thrust necessary to breakaway and to maintain taxi speed.
2. Demonstrate proficiency by maintaining correct and positive airplane control.
3. Maintain proper spacing on other aircraft, vehicles, ground equipment, structures, and persons.
4. Maintain desired track and speed.
5. Comply with ATC instructions.
6. Use airport diagram (surface movement chart).
7. Obtain appropriate clearance before crossing or entering active runways.
8. Observe all surface movement guidance control markings and lighting.

3.6.4 Pretakeoff Procedures.

3.6.4.1 Condition(s). Not applicable.

3.6.4.2 Awareness Criteria:

1. Be aware of the operational factors that could affect takeoff, such as takeoff warning inhibit systems or other airplane characteristics, runway length, surface conditions, wind, wake turbulence, obstructions, and other related factors that could adversely affect safety.
2. Divide attention properly inside and outside flight deck.
3. Be able to determine the need for deicing and/or anti-icing prior to takeoff.

3.6.4.3 Action Criteria:

1. Determine if the airplane is safe for the proposed flight.
2. Determine the airplane's takeoff performance, considering such factors as wind, density altitude, weight, temperature, pressure altitude, obstructions, and runway condition and length.
3. Determine airspeeds/V-speeds and properly set all instrument references.
4. Configure the FD and autoflight controls, and navigation and communications equipment, to properly fly the airplane in accordance with the ATC clearance.
5. Review procedures for emergency and abnormal situations which may be encountered during takeoff.
6. Obtain and correctly interpret the takeoff and departure clearance as issued by ATC.
7. Confirm that the airplane trim and high-lift devices are configured properly.
8. Complete engine checks.
9. In accordance with the air carrier's procedures, ensure the wings, control surfaces, and other critical surfaces are free of frost, ice, and snow before flight.
10. Correctly operate anti-icing and deicing systems or equipment.
11. Confirm airplane location and FMS entry (if appropriate) for departure runway prior to crossing hold-short line for takeoff.

3.7 Takeoffs.

3.7.1 Normal Takeoff with All Engines Operating.

3.7.1.1 Condition(s). Select appropriate weather and environmental conditions.

3.7.1.2 Awareness Criteria:

1. Monitor engine and other airplane controls, settings, and instruments during takeoff to ensure all predetermined parameters are achieved and maintained.
2. Monitor airplane airspeed to determine normal acceleration during takeoff ground roll.
3. Assess takeoff and climb hazards, particularly those related to obstacles.
4. Consider the effect of land-and-hold-short operations (LAHSO), if applicable.
5. Monitor the airplane's position relative to the departure end of the runway using runway signage, marking(s), and lighting.

3.7.1.3 Action Criteria:

1. Taxi into position to maximize the available runway.
2. Align the airplane on the runway centerline (RCL).
3. Apply the controls correctly to maintain longitudinal alignment on the center line of the runway prior to and during the takeoff.
4. Adjust the engine controls for the existing conditions and verify expected engine performance.
5. Maintain a wings-level attitude during the takeoff roll and during the rotation to proper pitch attitude.
6. For tricycle-gear airplanes, maintain forward pitch control pressure, as necessary, to ensure positive contact of the nose gear with the runway surface for adequate nosewheel/rudder pedal steering capability until sufficient aerodynamic control is achieved.
7. Rotate at the proper airspeed, at the proper rate, to the proper pitch attitude for the airplane configuration.
8. Perform required pitch changes and, as appropriate, perform or call for and verify the accomplishment of, gear and flap retractions, power adjustments, and other required pilot-related activities at the required airspeeds.
9. After lift-off, maintain required ground track or heading ±5°, as appropriate, until a turn is required.
10. Maintain a positive rate of climb throughout the takeoff and initial climb.
11. Adjust to the desired pitch attitude at the predetermined airspeed ±5 knots to attain the desired performance for the particular takeoff segment.
12. Use the applicable noise abatement and wake turbulence avoidance procedures, as required.

3.7.2 Takeoff with Instrument Meteorological Conditions (IMC).

3.7.2.1 Condition(s):

1. Takeoffs with instrument conditions simulated at or before reaching an altitude of 100 feet above the airport elevation.
2. Takeoffs practiced to proficiency in training under the lowest visibility authorized by the air carrier's OpSpecs.

3.7.2.2 Awareness Criteria:

1. Comply with normal takeoff awareness criteria in paragraph 3.7.1.2.
2. Exhibit knowledge of an instrument takeoff.

3.7.2.3 Action Criteria:

1. Comply with normal takeoff action criteria in paragraph 3.7.1.3.
2. Transition smoothly and accurately from outside visual references to IMC.

3.7.3 Crosswind Takeoff Including Crosswind Takeoff with Gusts.

3.7.3.1 Condition(s):

1. When conducting training or checking in a flight simulation training device (FSTD), select appropriate weather and environmental conditions, including crosswind with gusts.
2. When conducting training or checking in an airplane in flight, crosswind takeoff with gusts is required, if practicable under the existing meteorological, airport, and traffic conditions.
3. Per § 121.415(h), takeoff with the maximum crosswind for the airplane, as specified in the air carrier's manual, must be trained to proficiency (if practicable for training conducted in an airplane in flight).

3.7.3.2 Awareness Criteria:

1. Assess the changing effect of the crosswind component to make control corrections, as required.
2. Comply with normal takeoff awareness criteria in paragraph 3.7.1.2.

3.7.3.3 Action Criteria. Comply with normal takeoff action criteria in paragraph 3.7.1.3.

3.7.4 Takeoff with Simulated Engine Failure.

3.7.4.1 Condition(s). Select appropriate weather and environmental conditions. Per part 121 appendices E and F, takeoff must be demonstrated with a simulated failure of the most critical engine:

1. After takeoff decision speed (V_1) and prior to takeoff safety speed (V_2);
2. As close as possible after V_1 when V_1 and V_2, or V_1 and rotation speed (V_R), are identical; or
3. At the appropriate speed for nontransport category airplanes.

3.7.4.2 Awareness Criteria:

1. Comply with normal takeoff awareness criteria in paragraph 3.7.1.2.
2. For nontransport category airplanes, be able to determine the appropriate speed at which the takeoff will continue with an abnormality or emergency.
3. Observe flight and engine instruments or divergence from the RCL to assess loss of thrust.
4. Identify those situations that require a rejected takeoff and make a timely decision to continue the takeoff or reject the takeoff.
5. Identify the location of the engine failure (e.g., right side, left side, or center).

3.7.4.3 Action Criteria:

1. Comply with normal takeoff action criteria in paragraph 3.7.1.3.
2. Apply rudder as required to counteract asymmetric thrust.
3. Maintain the airplane alignment with the runway.
4. For transport category airplanes, continue the takeoff if an abnormality or emergency occurs at or after V_1 speed. For nontransport category airplanes, continue the takeoff if an abnormality or emergency occurs at or after the predetermined speed.
5. Transition smoothly and accurately into a stabilized climb, achieving and maintaining the airplane in coordinated flight.
6. Maintain the required ground track (or heading) and attitude appropriate for climb performance and terrain clearance, as appropriate, until a turn is required.
7. Make a suitable decision to return to airport or divert, as appropriate.

3.7.5 Rejected Takeoff.

3.7.5.1 Condition(s). Select appropriate weather and environmental conditions. The cause for the decision to reject needs to be presented so that the first action to reject the takeoff may be made by, (1) V_1 speed for transport category airplanes or (2) a predetermined speed for nontransport category airplanes. Rejected takeoffs should be conducted in realistic scenarios, such as:

1. Airspeed discrepancies;
2. Takeoff configuration warnings;
3. Cargo or cabin door warnings;
4. Mechanical issues;
5. Tire failures;
6. ATC instruction to reject or canceled clearance;
7. Bird strike;
8. Engine failure; or
9. Other scenarios, that per the air carrier's manual, should require a rejected takeoff.

3.7.5.2 Awareness Criteria:

1. Identify a critical situation and take action to reject the takeoff prior to either V_1 speed for transport category airplanes or a predetermined speed for non-transport category airplanes.
2. For nontransport category airplanes, be able to determine the appropriate speed at which the takeoff will continue with an abnormality or emergency.

3.7.5.3 Action Criteria:

1. Reduce the power promptly to idle and simultaneously apply maximum wheel brakes when a cause for aborting the takeoff is recognized.
2. Use spoilers, thrust or propeller reverse, and other drag or braking devices, as appropriate, to bring the airplane to a safe stop on the runway or stopway surface.

3.8 In-Flight Maneuvers. The purpose of these maneuvers is to provide familiarity with the handling behavior of the airplane. The intent is to teach the pilot to recognize deviation from normal flight and to practice the return of the airplane to a safe state. In this context, a safe state is considered an airplane attitude (e.g., pitch, bank, and yaw), airspeed, trim, and thrust setting appropriate for the airplane configuration and altitude at which the pilot is able to maintain control of the airplane. If the instructor or check pilot requires the assistance of the pilot to maneuver or configure the airplane, to fly a particular airspeed,

or to set a particular power or trim setting, the instructor or check pilot should provide progressive instructions to the pilot to achieve the desired "set up" position for the task. Returning the airplane to a safe state requires that the pilot continue to control the airplane away from attitudes and airspeeds that would exceed critical performance parameters (e.g., airspeed limits and "G" loading).

3.8.1 Turns With and Without Spoilers.

3.8.1.1 Condition(s):

1. The airplane may be equipped with ailerons or a combination of ailerons and roll control flight spoilers. For those airplanes equipped with a combination of ailerons and roll control flight spoilers, this maneuver should be accomplished without the roll control flight spoilers.
2. Training should include use of manual and autoflight controls at altitudes, airspeeds, airplane configurations, and environmental conditions representative of normal operations during departures, arrivals, and cruise.

3.8.1.2 Awareness Criteria. Experience the handling qualities of the airplane with various spoiler configurations.

3.8.1.3 Action Criteria:

1. Make turns left and right with a normal flight control configuration.
2. Make turns left and right with ailerons only.

3.8.2 Mach Tuck and Mach Buffet.

3.8.2.1 Condition(s). Select appropriate weather and environmental conditions.

3.8.2.2 Awareness Criteria. Experience the handling qualities of the airplane at high Mach numbers.

3.8.2.3 Action Criteria:

1. Increase airspeed slowly.
2. Observe the performance of the compensating device or system, if installed.
3. Disable the compensating device or system, if installed, and continue to accelerate until the tuck or buffet occurs.
4. Observe the airframe vibration and/or flight instrument indications.
5. Make a shallow level turn to feel the increased buffeting associated with an increase in G load.

3.8.3 En Route Navigation.

3.8.3.1 Condition(s). All.

3.8.3.2 Awareness Criteria:

1. Monitor fuel burn, cruise speed, and thrust to achieve planned performance.
2. Monitor navigation system performance.
3. Understand maximum operating altitude and optimum cruise altitude.

3.8.3.3 Action Criteria:

1. Use Class I or oceanic and remote continental airspace navigation procedures as authorized by the OpSpecs and prescribed by the air carrier's manual.
2. Navigate to the degree of accuracy required by the airspace in which the airplane is being operated.
3. Conduct required navigation system crosschecks.
4. Perform correct altimetry procedures and monitor flight level or altitude clearances.
5. Report equipment failure that may degrade navigation as dictated by airspace or regional differences.
6. Determine the optimum cruise altitude for a given gross weight and desired airspeed or Mach.
7. Use appropriate onboard reference to determine the maximum cruise altitude for the gross weight that affords the required maneuver buffet margin.

3.8.4 Runaway Pitch Trim or Stabilizer.

3.8.4.1 Condition(s). Select appropriate weather and environmental conditions.

3.8.4.2 Awareness Criteria:

1. Experience the pitch handling qualities of the airplane with runaway stabilizer or runaway pitch trim during takeoff, cruise, and landing.
2. Observe the effects of early versus late detection of runaway.
3. Observe the effects of deactivation of pitch trim or stabilizer or correction of runaway.

3.8.4.3 Action Criteria:

1. Identify runaway pitch trim or stabilizer.
2. Take appropriate action to stop runaway.
3. Disengage autoflight, as appropriate.
4. Use alternative methods to control pitch, such as manual stabilizer trim and thrust.
5. Use PM and Crew Resource Management (CRM), as necessary, to maintain control of pitch.
6. Comply with runaway trim procedures provided in the air carrier's manual.

3.8.5 Jammed Pitch Trim or Stabilizer.

3.8.5.1 Condition(s). Select appropriate weather and environmental conditions.

3.8.5.2 Awareness Criteria:

1. Experience the pitch handling qualities of the airplane with jammed stabilizer or pitch trim during takeoff, cruise, and landing.
2. Observe the effect of an increase and decrease in airspeed.
3. Recognize the insidious nature of the failure during periods of unaccelerated flight.

3.8.5.3 Action Criteria:

1. Identify jammed pitch trim or stabilizer.
2. Disengage autoflight, as appropriate.
3. Use alternative methods to control pitch, such as thrust.
4. Use PM and CRM, as necessary, to maintain control of pitch.
5. Comply with runaway trim procedures provided in the air carrier's manual.

3.8.6 Steep Turns.

3.8.6.1 Condition(s). Per part 121 appendices E and F, each steep turn must involve a bank angle of 45° with a heading change of at least 180°, but not more than 360°.

3.8.6.2 Awareness Criteria. Exhibit knowledge of factors associated with steep turns, including wing loading, angle of bank, stall speed, pitch, power requirements, and overbanking tendency.

3.8.6.3 Action Criteria:

1. Apply smooth coordinated pitch, bank, and power to maintain the specified altitude within ±100 feet, airspeed within ±10 knots, and bank angle of 45° ±5°.
2. Complete a steep turn of at least 180° left and right.
3. Roll out of steep turn within ±10° of specified heading.

3.8.7 Recovery From Specific Flight Characteristics Peculiar to the Airplane Type.

3.8.7.1 Condition(s). Select appropriate weather and environmental conditions. Specific flight characteristics are identified in the Flight Standardization Board (FSB) Report for the specific airplane.

3.8.7.2 Awareness Criteria. Exhibit knowledge of the specific flight characteristics appropriate to the specific airplane type.

3.8.7.3 Action Criteria. Use proper technique to recover from specific flight situations.

3.8.8 Manually Controlled Slow Flight. Refer to the current edition of AC 120-111, Upset Prevention and Recovery Training.

3.8.9 Stall Prevention.

3.8.9.1 Condition(s). Select appropriate weather and environmental conditions:

1. Per part 121 appendices E and F, recovery procedures must be initiated at the first indication of an impending stall (e.g., buffet, stick shaker, aural warning).
2. Per part 121 appendices E and F, stall prevention must be conducted in at least the following configurations:
   - Takeoff configuration (except where the airplane uses only a zero-flap takeoff configuration);
   - Clean configuration; and
   - Landing configuration.
3. The pilot should not be expected to be proficient in executing the method used to enter the maneuver.

3.8.9.2 Awareness Criteria. Refer to the current edition of AC 120-109, Stall Prevention and Recovery Training.

3.8.9.3 Action Criteria. Refer to AC 120-109.

3.8.10 Full Stall Recovery.

3.8.10.1 Condition(s). Select appropriate weather and environmental conditions.

1. This maneuver should only be conducted during training in an FSTD. This maneuver should not be conducted in an airplane in flight.
2. This maneuver should be conducted as instructor guided hands-on experience of recovery from full stall and stick pusher activation, if equipped.

3.8.10.2 Awareness Criteria. Refer to AC 120-109.

3.8.10.3 Action Criteria. Refer to AC 120-109.

3.8.11 Upset Prevention and Recovery. Refer to AC 120-111.

3.8.12 Manually Controlled Loss of Reliable Airspeed.

3.8.12.1 Condition(s):

1. Select appropriate IMC weather and environmental conditions for the task.
2. This event may be conducted in any phase of flight.
3. Select appropriate maneuvers for the selected phase of flight to then be accomplished with sole reference to pitch and power.

3.8.12.2 Awareness Criteria. Refer to AC 120-111.

3.8.12.3 Action Criteria. Refer to AC 120-111.

3.8.13 Operation of Systems and Controls at the Flight Engineer's (FE) Panel.

3.8.13.1 Condition(s). All environmental conditions and circumstances.

3.8.13.2 Awareness Criteria:

1. Demonstrate an understanding and proper use of the systems, controls, and displays represented on the FE's panel.
2. Demonstrate an understanding of the relationship of the airplane's phase of flight, how to assess the status of the airplane's systems, and when to take necessary corrective actions.

3.8.13.3 Action Criteria. Be familiar with the systems and properly exercise the controls represented at the FE's panel during all phases of flight.

3.8.14 Wind-Shear Avoidance and Encounter.

3.8.14.1 Condition(s):

1. Select environmental conditions and circumstances conducive to wind shear.
2. Refer to the current edition of the FAA Windshear Training Aid.
3. Practice wind-shear avoidance and encounter during takeoff, departure, and approach.

3.8.14.2 Awareness Criteria:

1. Know the sources of information that indicate the possible presence of wind shear or turbulence.
2. Observe the visual indications that usually indicate the presence of wind shear or turbulence.
3. Understand the effect of wind shear or turbulence on the performance of the airplane during low-altitude operations.

3.8.14.3 Action Criteria:

1. Practice avoiding and escaping wind shear during low-altitude operations to include takeoff, departure, and approach.
2. Avoid indicated areas of possible wind shear, if possible.
3. Recognize the indications of wind shear during takeoff, departure, approach, and rejected landing.
4. Execute the air carrier's procedures for avoiding wind shear; and, if not possible to avoid, execute procedures for escaping wind shear during low-altitude operations.

3.8.15 Go-Around Maneuvers. A go-around task may incorporate more than one of the following conditions into a single maneuver. These tasks may also be combined with missed approach tasks. (See paragraphs 3.9.11–3.9.13.)

Note: The somatogravic illusion is a vestibular illusion (a false sensation of movement triggered in the inner ear) which is prevalent during high accelerations/decelerations when a pilot has no clear visual reference. During a go-around or a takeoff, the somatogravic illusion arises from a sudden forward linear acceleration which causes a strong sensation of pitching up. A pilot not relying on instruments to make control inputs during a go-around may feel like the pitch attitude is too great and be tempted to push forward on the control column or sidestick, leading to a controlled flight into terrain (CFIT) event. This illusion is a challenge to replicate well in an FSTD; however, pilots should be aware that the illusion may be encountered in an airplane.

3.8.15.1 Condition(s). Go-arounds should be conducted in realistic scenarios in the following conditions:

1. From various stages of the approach, including configurations other than final landing configuration.
2. From visual approaches followed by loss of visual references.
3. Extreme pitch trim configuration, such as nose-up trim resulting from flight at speeds below reference landing speed (V_{REF}) for final approach with the autopilot engaged.
4. Low-weight configuration with all engines at go-around thrust.
5. ATC clearance change just after go-around is initiated.

3.8.15.2 Awareness Criteria:

1. The pilot will be able to demonstrate proficiency in the published, or otherwise directed, missed approach procedures.
2. Exhibit adequate knowledge of applicable missed approach procedures and situational awareness in IMC.
3. Exhibit knowledge of the potential pitch force change during power changes due to the engine placement on the airframe.

3.8.15.3 Action Criteria:

1. Simultaneously, adjust the throttles to go-around thrust and adjust pitch attitude, as necessary, to accelerate and maintain the appropriate airspeed for the configuration.
2. Care should be taken to anticipate a nose-up pitching tendency if additional forward thrust is required, higher-than-anticipated trim is present, or if the engines are mounted under the wing.
3. Depending on the energy state of the airplane and height above the runway, touchdown may occur as the airplane accelerates.
4. When safely established in the go-around profile and a positive rate of climb, establish the proper pitch attitude and transition to the missed approach task.
5. Follow the published missed approach procedure (or follow the assigned clearance), maintaining proper airspeed and altitude for the configuration.
6. Request clearance for another approach, to a holding fix, or to the alternate airport.

3.9 Instrument Procedures.

3.9.1 General.

3.9.1.1 Condition(s). Select appropriate IMC weather and environmental conditions for the task.

3.9.1.2 Awareness Criteria. Exhibit adequate knowledge of applicable departure procedures (DP), en route low- and high-altitude charts, Profile Descent charts, Standard Terminal Arrival (STAR) procedures, instrument approach procedures (IAP), and related pilot and controller responsibilities.

3.9.1.3 Action Criteria:

1. Use the current and appropriate navigation publications for the proposed flight.
2. Select, configure, and use the appropriate communications frequencies, navigation and systems displays; select and identify the navigation aids and routes necessary to properly fly the assigned ATC clearance.
3. Coordinate with the flight deck crew to ensure performance of appropriate checklist items as specified by the air carrier's manual.
4. Establish communications with ATC using proper phraseology, and advise ATC when unable to comply with a clearance or restriction.
5. Comply with all instructions and airspace restrictions.
6. Exhibit adequate knowledge of two-way radio communications failure procedures.
7. Maintain the appropriate airspeed within ±10 knots (but not less than the minimum speed for the configuration), headings within ±10°, and altitude within ±100 feet; and accurately track a course, radial, or bearing.
8. Intercept all courses, radials, and bearings appropriate to the procedure, route, or clearance.
9. Adhere to airspeed restrictions and adjustments required by regulations, ATC, the air carrier's manual, and the AFM.

3.9.2 Area Departure.

3.9.2.1 Condition(s). Select appropriate IMC weather and environmental conditions.

3.9.2.2 Awareness Criteria:

1. Exhibit knowledge of applicable DP, including Obstacle Departure Procedures (ODP) and Standard Instrument Departure (SID) procedures.
2. Monitor the climb profile to ensure crossing altitudes, speed restrictions, and ATC clearances can be met.

3.9.2.3 Action Criteria:

1. Establish, where appropriate, a rate of climb consistent with the airplane operating characteristics and safety.
2. Comply with ATC clearances.
3. Comply with the provisions of the DP, SID, and other departure instructions, as appropriate, and verify airplane position relative to first departure fix.

3.9.3 Area Arrival.

3.9.3.1 Condition(s). Select IMC weather and environmental conditions.

3.9.3.2 Awareness Criteria:

1. Exhibit knowledge of applicable OPD and STAR procedures.
2. Monitor the descent profile to ensure crossing altitudes, airspeed restrictions, and ATC clearances can be met.

3.9.3.3 Action Criteria:

1. Establish, where appropriate, a rate of descent consistent with the airplane operating characteristics and safety.
2. Comply with ATC clearances.
3. Comply with the provisions of the OPD, STAR, and other arrival instructions, as appropriate.

3.9.4 Holding.

3.9.4.1 Condition(s). Select appropriate IMC weather and environmental conditions.

3.9.4.2 Awareness Criteria:

1. Exhibit knowledge of applicable DP, en route low- and high-altitude charts, OPD, STAR, and IAPs.
2. Recognize arrival at the clearance limit or holding fix.
3. Apply knowledge of proper holding entry including direct, teardrop, and parallel.
4. Apply wind-drift correction techniques to maintain the desired radial, track, or bearing.
5. Apply knowledge of holding endurance, including fuel on board, fuel flow while holding, and fuel required to alternate.
6. Apply knowledge of the maximum holding airspeed. Notify ATC if unable to comply with the maximum airspeed restriction.

3.9.4.3 Action Criteria:

1. Select holding airspeed appropriate for the airplane configuration and holding altitude.
2. Adjust airspeed to cross the holding fix at or below maximum holding airspeed.
3. Follow appropriate entry procedures for a standard, nonstandard, published, or nonpublished holding pattern.
4. Use the proper timing criteria required by the holding altitude and ATC, or comply with the navigation system holding procedure, as appropriate.
5. Comply with the holding pattern leg length when a DME distance is specified.
6. Follow appropriate exit procedures.

3.9.5 Manually Controlled Instrument Departure and Arrival.

3.9.5.1 Condition(s):

1. Select appropriate IMC weather and environmental conditions.
2. Experience dealing with the autoflight systems (e.g., autopilot and autothrottle/autothrust), and the related non-normal condition, balanced with the need to fly the airplane.
3. Correctly follow the climb or descent profile, the departure or arrival profile, or any other authorized departure or arrival procedure(s) without the aid of the autopilot and autothrottle/autothrust.

3.9.5.2 Awareness Criteria:

1. Comply with instrument procedures awareness criteria in paragraphs 3.9.2.2 and 3.9.3.2.
2. Expect significant workload challenges.
3. Maintain the crew focus on flying ahead of any other activity.

3.9.5.3 Action Criteria. Comply with instrument procedures action criteria in paragraphs 3.9.2.3 and 3.9.3.3.

3.9.6 Normal Instrument Landing System (ILS) Approach.

3.9.6.1 Condition(s). Select appropriate IMC weather and environmental conditions. As required by §§ 119.5(g) and 121.415(h); OpSpec C052, Straight-in Non-Precision, APV, and Category I Precision Approach and Landing Minima – All Airports; and OpSpec C060, Category II and Category III Instrument Approach and Landing Operations, ILS approaches must be

completed to the lowest visibility (Runway Visual Range (RVR)) authorized by the air carrier's OpSpecs for the respective category of approach.

3.9.6.2 Awareness Criteria:

1. Recognize changing weather conditions, including winds (and the potential for wind shifts or wind shear) and limitations to forward and lateral visibility.
2. Exhibit knowledge of ILS approach procedures.
3. Consider factors to be applied to the approach and landing, such as displaced thresholds, meteorological conditions, Notices to Airmen (NOTAM), and ATC instructions.

3.9.6.3 Action Criteria:

1. Engage (and disengage, if appropriate) the FD(s) at the appropriate points during the approach.
2. Apply the necessary adjustments to the published DA/DH and visibility criteria for the airplane approach category as required, such as NOTAMs, inoperative airplane and ground navigation equipment, and inoperative approach lighting.
3. Establish appropriate airplane configuration and airspeed considering turbulence, wind shear, microburst conditions, or other meteorological and operating conditions.
4. Prior to beginning the FAS, maintain the desired altitude ±100 feet, the desired airspeed within ±10 knots, and the desired heading within ±5°; and accurately track radials, courses, and bearings.
5. Cross the final approach fix (FAF), or the point at which the final approach begins, at the proper altitude, in the proper airplane configuration, and with the proper airspeed for the approach.
6. Establish a predetermined rate of descent at the point where the electronic glideslope (GS) begins, which approximates that required for the airplane to follow the GS.
7. Maintain a stabilized final approach, from the FAF to DA/DH, allowing no more than one-quarter scale deflection of either the GS or localizer indications, and maintain the desired airspeed as specified in the air carrier's manual.
8. If required visual references for the runway are not unmistakably visible and identifiable at the DA/DH, immediately initiate and execute the missed approach.
9. Transition to a landing only when the airplane is in a position from which a descent to a landing on the runway can be made at a normal rate of descent using normal maneuvering.

10. The PM calls deviations from altitude, speed, course, and rate of descent in accordance with the air carrier's manual.

3.9.7 Manually Controlled ILS Approach with Simulated Engine Failure.

3.9.7.1 Condition(s):

1. Select appropriate IMC weather and environmental conditions.
2. Per part 121 appendices E and F, the simulated engine failure should occur before initiating the final approach course and must continue to touchdown or through the missed approach procedure.
3. Manually controlled approach may use raw data displays or may be FD-assisted.

3.9.7.2 Awareness Criteria:

1. Recognize changing weather conditions, including winds (and the potential for wind shifts or wind shear) and limitations to forward and lateral visibility.
2. Exhibit knowledge of ILS approach procedures.
3. Consider factors to be applied to the approach and landing, such as displaced thresholds, meteorological conditions, NOTAMs, and ATC instructions.

3.9.7.3 Action Criteria:

1. Engage (and disengage, if appropriate) the FD(s) at the appropriate points during the approach.
2. Apply the necessary adjustments to the published DA/DH and visibility criteria for the airplane approach category as required, such as NOTAMs, inoperative airplane and ground navigation equipment, and inoperative approach lighting.
3. If necessary, request an alternate missed approach procedure from ATC. If the air carrier's manual includes a specific engine-out missed approach procedure, the pilot should request that procedure from ATC.
4. Establish appropriate airplane configuration and airspeed considering turbulence, wind shear, microburst conditions, or other meteorological and operating conditions.
5. Apply flight controls as required to counteract asymmetric thrust.
6. Prior to beginning the FAS, maintain the desired altitude ±100 feet, the desired airspeed within ±10 knots, and the desired heading within ±5°; and accurately track radials, courses, and bearings.

7. Cross the FAF, or the point at which the final approach begins, at the proper altitude, in the proper airplane configuration, and with the proper airspeed for the approach.
8. Establish a predetermined rate of descent at the point where the electronic GS begins, which approximates that required for the airplane to follow the GS.
9. Maintain a stabilized final approach, from the FAF to DA/DH, allowing no more than one-quarter scale deflection of either the GS or localizer indications, and maintain the desired airspeed as specified in the air carrier's manual.
10. If required visual references for the runway are not unmistakably visible and identifiable at the DA/DH, immediately initiate and execute the missed approach.
11. Transition to a landing only when the airplane is in a position from which a descent to a landing on the runway can be made at a normal rate of descent using normal maneuvering.
12. The PM calls deviations from altitude, speed, course, and rate of descent in accordance with the air carrier's manual.

3.9.8 Nonprecision Approach (NPA).

3.9.8.1 Condition(s):

1. Select appropriate weather and environmental conditions. As required by §§ 119.5(g) and 121.415(h), NPAs must be completed in instrument conditions to the minimums appropriate for the type of approach being flown.
2. As required by part 121 appendix E and § 121.415(h), training must include all types of instrument approaches authorized for the airplane by the air carrier's OpSpecs, such as very high frequency omni-directional range (VOR), NDB, RNAV, etc. One type of instrument approach may meet the training requirement for another type of instrument approach if the two types of instrument approaches have similar procedures and design (e.g., training of a VOR-DME approach may meet the training requirement for a VOR approach).

3.9.8.2 Awareness Criteria:

1. Recognize changing weather conditions, including winds (and the potential for wind shifts or wind shear) and limitations to forward and lateral visibility.
2. Exhibit knowledge of NPA procedures authorized by the air carrier's OpSpecs.

3. Consider factors to be applied to the approach and landing, such as displaced thresholds, meteorological conditions, NOTAMs, and ATC instructions.

3.9.8.3 Action Criteria:

1. Comply with the air carrier's NPA procedures for manually controlled (e.g., airspeed, tracking, and vertical speed/flightpath angle) or automatic controlled (e.g., lateral navigation (LNAV)/VNAV).
2. Engage (and disengage, if appropriate) the FD(s) at the appropriate points during the approach.
3. Apply the necessary adjustments to the published MDA and visibility criteria for the airplane approach category as required, such as NOTAMs, inoperative airplane and ground navigation equipment, and inoperative approach lighting.
4. Establish appropriate airplane configuration and airspeed considering turbulence, wind shear, microburst conditions, or other meteorological and operating conditions.
5. Prior to beginning the FAS, maintain the desired altitude ±100 feet, the desired airspeed within ±10 knots, and the desired heading within ±5°; and accurately track radials, courses, and bearings.
6. Cross the FAF, or the point at which the final approach begins, at the proper altitude, in the proper airplane configuration, and with the proper airspeed for the approach.
7. Establish a rate of descent that will ensure arrival at the MDA (at, or prior to reaching the visual descent point (VDP), if published) with the airplane in a position from which a descent from MDA to a landing on the intended runway can be made at a normal rate using normal maneuvering. The rate of descent should be established as soon as possible (immediately) after passing the FAF at a maximum of 1,000 feet per minute, unless a greater descent rate is specifically required by the approach.
8. Maintain a stabilized final approach, from the FAF to the MDA, allowing no more than either one-quarter scale deflection of the course deviation indicator (CDI), or ±5° in the case of the radio magnetic indicator (RMI) or bearing indicator, and maintain the desired airspeed as specified in the air carrier's manual.
9. Maintain MDA within −0, +50 feet, when reached, to the missed approach point (MAP) or until descent is initiated toward the runway of intended landing.
10. If required visual references for the runway are not unmistakably visible and identifiable at the MAP, immediately initiate and execute the missed approach.

11. Transition to a landing only when the airplane is in a position from which a descent to a landing on the runway can be made at a normal rate of descent using normal maneuvering.
12. The PM calls deviations from altitude, speed, course, and rate of descent in accordance with the air carrier's manual.

3.9.9 Circling Approach.

3.9.9.1 Condition(s). Select appropriate weather and environmental conditions. Per part 121 appendices E and F, circling approaches must be completed in simulated instrument conditions to the circling minimums. Per part 121 appendices E and F, after reaching the circling minimums, visual references must be used to change heading and maneuver the airplane to maintain a flightpath that permits a normal landing on a runway that requires at least a 90° change of direction from the final approach course.

3.9.9.1.1 In accordance with part 121 appendices E and F, if the air carrier's OpSpecs prohibit a circling approach when the weather is below a 1,000-foot ceiling and 3 miles visibility, the pilot is not required to be trained or checked on a circling approach. However, to ensure a pilot is adequately trained as required by § 121.415(h), a pilot should be trained on circling approach if the air carrier's OpSpecs authorize circling approach when the weather is above a 1,000-foot ceiling and 3 miles visibility.

3.9.9.2 Awareness Criteria:

1. Recognize changing weather conditions, including winds (and the potential for wind shifts or wind shear) and limitations to forward and lateral visibility.
2. Exhibit knowledge of circle-to-land approach categories, speeds, and procedures authorized by the air carrier's OpSpecs.
3. Consider factors to be applied to the approach and landing such as displaced thresholds, meteorological conditions, NOTAMs, and ATC instructions.

3.9.9.3 Action Criteria:

1. Engage (and disengage, if appropriate) the FD(s) at the appropriate points during the approach.
2. Apply the necessary adjustments to the published MDA and visibility criteria for the airplane approach category as required, such as NOTAMs, inoperative airplane and ground navigation equipment, and inoperative approach lighting.

3. Establish appropriate airplane configuration and airspeed considering turbulence, wind shear, microburst conditions, or other meteorological and operating conditions.
4. Prior to beginning the FAS, maintain the desired altitude ±100 feet, the desired airspeed within ±10 knots, and the desired heading within ±5°; and accurately track radials, courses, and bearings.
5. Cross the FAF, or the point at which the final approach begins, at the proper altitude, in the proper airplane configuration, and with the proper airspeed for the approach.
6. Establish a predetermined rate of descent at the point where the electronic GS begins (which approximates that required for the airplane to follow the GS) or establish a rate of descent that will ensure arrival at the MDA (at, or prior to reaching, the VDP, if published) with the airplane in a position from which a descent from MDA to a landing on the intended runway can be made at a normal rate using normal maneuvering. The rate of descent should be established as soon as possible (immediately) after passing the FAF at a maximum of 1,000 feet per minute, unless a greater descent rate is specifically required by the approach.
7. Maintain a stabilized final approach, from the FAF to MDA, allowing no more than one-quarter scale deflection of the GS (if applicable), CDI, or ±5° in the case of the RMI or bearing pointer and maintain the desired airspeed as specified in the air carrier's manual.
8. Maintain the MDA within −0, +50 feet, when reached, to the MAP or until descent is initiated toward the runway of intended landing.
9. If required visual references for the runway are not unmistakably visible and identifiable at the MAP, immediately initiate and execute the missed approach.
10. Transition to a circle-to-land only when the airplane is in a position from which a descent to a landing on the runway can be made at a normal rate of descent using normal maneuvering.
11. The PM calls deviations from altitude, speed, course, and rate of descent in accordance with the air carrier's manual.

3.9.10 Zero-Flap Approach.

3.9.10.1 Condition(s). Select appropriate weather and environmental conditions. In certain airplanes, the FAA has determined that the probability of complete flap failure is extremely remote due to system design. For these airplanes, the FAA has determined whether training on slats-only approaches or partial-flaps approaches is appropriate. Consult the FSB Report for the specific airplane to ascertain the training requirement for zero-flap approach.

3.9.10.2 Awareness Criteria:

1. Adhere to the air carrier's manual.
2. Recognize changing weather conditions, including winds (and the potential for wind shifts or wind shear) and limitations to forward and lateral visibility.
3. Consider factors to be applied to the approach and landing, such as displaced thresholds, meteorological conditions, NOTAMs, and ATC instructions.

3.9.10.3 Action Criteria:

1. Demonstrate and practice in training to ensure that the pilot understands and is able to correctly and safely maneuver the airplane to a landing while using zero or partial landing flaps.
2. Use a runway of sufficient length.
3. Use the correct airspeeds or V-speeds for this configuration.
4. Maintain the proper airplane pitch attitude and flightpath for the configuration, gross weight, and other applicable operational considerations.
5. Use caution when adjusting the attitude for touchdown.

3.9.11 Missed Approach from an ILS Approach.

3.9.11.1 Condition(s). Select appropriate IMC weather and environmental conditions.

3.9.11.2 Awareness Criteria:

1. Discern airplane position with respect to the MAP.
2. If a stabilized approach is not achieved as specified in the air carrier's manual, recognize the requirement to initiate a missed approach.
3. Exhibit knowledge of missed approach procedures associated with ILS approaches.

3.9.11.3 Action Criteria:

1. If the approach is abandoned prior to reaching the DA/DH, begin a climb to the missed approach altitude (unless there is a maximum altitude between the FAF and the MAP which must be complied with), but continue to navigate to the MAP before complying with the published missed approach procedure.
2. Initiate the missed approach procedure promptly by the timely application of power, establish the proper climb attitude, and reduce drag in accordance with approved procedures.

3. Comply with the appropriate missed approach procedure or ATC clearance maintaining proper airspeed and altitude for the configuration.
4. Maintain required altitudes ±100 feet, required airspeeds ±5 knots, and required headings ±5°; and accurately track courses, radials, and bearings.

Note: Continuing an ILS approach below DA/DH without complying with part 91, § 91.175(c) is considered unsatisfactory performance. However, even if the missed approach is properly initiated at DA/DH, most airplanes descend below DA/DH because of the momentum of the airplane transitioning from a stabilized approach to a missed approach. This descent below DA/DH is considered satisfactory as long as the ILS approach was not continued below DA/DH.

3.9.12 Missed Approach from an NPA.

3.9.12.1 Condition(s). Select appropriate IMC weather and environmental conditions.

3.9.12.2 Awareness Criteria:

1. Discern airplane position with respect to the MAP and the center of the airport.
2. If a stabilized approach is not achieved as specified in the air carrier's manual, recognize the requirement to initiate a missed approach.
3. Exhibit knowledge of missed approach procedures associated with NPAs.

3.9.12.3 Action Criteria:

1. If the approach is abandoned prior to reaching the MAP, begin a climb to the missed approach altitude (unless there is a maximum altitude between the FAF and the MAP which must be complied with), but continue to navigate to the MAP before complying with the published missed approach procedure.
2. Initiate the missed approach procedure promptly by the timely application of power, establish the proper climb attitude, and reduce drag in accordance with approved procedures.
3. If a missed approach is initiated after starting a circle-to-land maneuver, turn in the appropriate direction and climb according to the published missed approach procedure.
4. Comply with the appropriate missed approach procedure or ATC clearance maintaining proper airspeed and altitude for the configuration.
5. Maintain required altitudes ±100 feet, required airspeeds ±5 knots, and required headings ±5°; and accurately track courses, radials, and bearings.

Note: Descending below the MDA without complying with § 91.175(c) is considered unsatisfactory performance.

3.9.13 Missed Approach with Engine Failure.

3.9.13.1 Condition(s). Select appropriate IMC weather and environmental conditions.

3.9.13.2 Awareness Criteria:

1. Discern airplane position with respect to the MAP.
2. If a stabilized approach is not achieved as specified in the air carrier's manual, recognize the requirement to initiate a missed approach.
3. Exhibit knowledge of missed approach procedures with an engine failure.
4. Recognize need for alternate missed approach procedure due to terrain and effect of engine failure on climb performance and airplane maneuverability.

3.9.13.3 Action Criteria:

1. If the approach is abandoned prior to reaching the MAP, begin a climb, but continue to navigate to the MAP before complying with the published missed approach procedure.
2. Initiate the missed approach procedure promptly by the timely application of power, establish the proper climb attitude, and reduce drag in accordance with approved procedures.
3. As the power is advanced for the missed approach, maintain coordinated flight to counter asymmetric thrust, and maintain wings level.
4. Request alternate missed approach procedure from ATC, if necessary. If the air carrier's manual includes a specific engine-out missed approach procedure, the pilot should request that procedure from ATC.
5. Comply with the appropriate missed approach procedure or ATC clearance maintaining proper airspeed and altitude for the configuration.
6. Maintain required altitudes ±100 feet, required airspeeds ±5 knots, and required headings ±5°; and accurately track courses, radials, and bearings.

3.10 Landings.

3.10.1 Normal Landing with All Engines Operating.

3.10.1.1 Condition(s). Select appropriate weather and environmental conditions.

3.10.1.2 Awareness Criteria:

1. Consider factors to be applied to the landing, such as displaced thresholds, meteorological conditions, NOTAMs, and ATC instructions.
2. Apply gust and wind factors and take into account meteorological phenomena such as wake turbulence, wind shear, microburst, and other related safety of flight factors.
3. Verify existing wind conditions, make proper corrections for drift, and maintain a precise ground track.
4. Transition to a normal landing only when the required visual references for the runway, or the intended landing area, are distinctly visible and identifiable, and the airplane is in a position from which a descent to a landing on the runway, or the intended landing area, can be made at a normal rate of descent using normal maneuvering as required by § 91.175(c).
5. Use the appropriate airplane configuration.
6. Consider the effect of LAHSO, if applicable.

3.10.1.3 Action Criteria:

1. Establish the landing configuration appropriate for the runway and meteorological conditions, and adjust the engine controls as required.
2. Maintain a ground track that ensures the desired traffic pattern will be flown, taking into account any obstructions and ATC instructions.
3. Maintain a stabilized approach and the desired airspeed/V-speed within ±5 knots.
4. Ensure runway is open and clear of aircraft, vehicles, persons, animals, and debris.
5. Transition to outside visual references.
6. Determine that a landing is assured.
7. Complete a smooth, positively controlled transition from descent flightpath to touchdown:
    - Achieve and maintain the longitudinal axis of the airplane parallel with the RCL and the center line between the main landing gear.
    - Touchdown should be within the touchdown zone (TDZ), with the RCL between the main gear, and with the airplane tracking parallel to the RCL.
    - As touchdown occurs, ensure that the throttles are at idle; ensure that the spoilers have deployed (if applicable); and, for tricycle-gear airplanes, without delay, fly the nose gear onto the runway.

- Apply wheel brakes, select reverse thrust as appropriate for the conditions, maintain directional control with aerodynamic controls throughout the landing roll, until the groundspeed allows directional control with rudder pedal steering or nosewheel steering, as appropriate.
- If applicable, the PM should monitor thrust reverser and spoiler deployment and should advise the PF of thrust reverser and spoiler status.

3.10.2 Crosswind Landing Including Crosswind Landing with Gusts.

3.10.2.1 Condition(s):

1. When conducting training or checking in an FSTD, select appropriate weather and environmental conditions, including crosswind with gusts.
2. When conducting training or checking in an airplane in flight, crosswind landing with gusts is required, if practicable under the existing meteorological, airport, and traffic conditions.
3. Per § 121.415(h), landing with the maximum crosswind for the airplane, as specified in the air carrier's manual, must be trained to proficiency (if practicable for training conducted in an airplane in flight).

3.10.2.2 Awareness Criteria:

1. Assess the relationship between the airplane limitation(s), performance data, and any surface contaminant(s).
2. Assess the changing effect of the crosswind component and adjust controls, as required.
3. Comply with the normal landing awareness criteria in paragraph 3.10.1.2.

3.10.2.3 Action Criteria:

1. Maintain positive directional control using an approved means of controlling the effects of the crosswind.
2. Touchdown with the airplane tracking parallel to the RCL. Per part 121 appendix F, maximum bank angle limitations specified in the AFM or air carrier's manual must not be exceeded.
3. Comply with the normal landing action criteria in paragraph 3.10.1.3.

3.10.3 Landing with Horizontal Stabilizer Out of Trim.

3.10.3.1 Condition(s). Select appropriate weather and environmental conditions.

3.10.3.2 Awareness Criteria. Exhibit knowledge of the potential pitch force change during power changes due to the engine placement on the airframe.

3.10.3.3 Action Criteria:

1. Identify out-of-trim stabilizer.
2. Disengage autoflight, as appropriate.
3. Use alternative methods to control pitch, such as thrust.
4. Comply with stabilizer out-of-trim landing procedures provided in the air carrier's manual.
5. The PM should be prepared to assist in helping control the pitch force, as necessary.

3.10.4 Landing from an ILS Approach.

3.10.4.1 Condition(s). Select appropriate IMC and environmental conditions.

3.10.4.2 Awareness Criteria:

1. Exhibit awareness of landing in sequence from an ILS approach.
2. Comply with normal landing awareness criteria in paragraph 3.10.1.2.

3.10.4.3 Action Criteria. Comply with normal landing action criteria in paragraph 3.10.1.3.

3.10.5 Landing with a Simulated Engine Failure.

3.10.5.1 Condition(s). Select appropriate weather and environmental conditions:

1. Per part 121 appendices E and F, landing in airplanes with two engines must be demonstrated with the simulated failure of one engine.
2. Per part 121 appendices E and F, landing in airplanes with three engines must be demonstrated with the simulated failure of the center and one outboard engine.
3. Per part 121 appendices E and F, landing in airplanes with more than three engines must be demonstrated with the simulated failure of 50 percent of available engines, all on one side of the airplane.

3.10.5.2 Awareness Criteria:

1. Monitor the operating engine(s) and make adjustments as necessary.
2. Comply with the normal landing awareness criteria in paragraph 3.10.1.2.

3.10.5.3 Action Criteria:

1. Maneuver with inoperative engine(s) while maintaining coordinated flight by application of rudder, as required to counter asymmetric thrust.

2. Comply with the normal landing action criteria in paragraph 3.10.1.3.
3. During the landing roll, use reverse thrust with caution for directional control capability under the existing environmental conditions.

3.10.6 Landing from a Circling Approach.

3.10.6.1 Condition(s). Select appropriate weather and environmental conditions:

1. Per part 121 appendices E and F, after reaching the circling minimums, visual references must be used to change heading and maneuver the airplane to maintain a flightpath that permits a normal landing on a runway that requires at least a 90° change of direction, from the final approach course, to align the airplane for landing.
2. If the air carrier's OpSpecs prohibit a circling approach when the weather is below a 1,000-foot ceiling and 3 miles visibility, the pilot is not required to be trained or checked on a landing from a circling approach. However, to ensure a pilot is adequately trained as required by § 121.415(h), a pilot should be trained on a landing from a circling approach if the air carrier's OpSpecs authorize circling approach when the weather is above a 1,000-foot ceiling and 3 miles visibility.

3.10.6.2 Awareness Criteria:

1. Consider the environmental, operational, and meteorological factors that affect landing from a circling approach.
2. Maintain awareness of the circling maneuvering area and associated visibility criteria for the category of airplane.
3. Comply with the normal landing awareness criteria in paragraph 3.10.1.2.

3.10.6.3 Action Criteria:

1. Avoid descent below the appropriate circling MDA until in a position from which a descent to a normal landing can be made.
2. After reaching the authorized circling approach altitude, maneuver the airplane by visual references within the circling maneuvering area and associated visibility criteria for the category of airplane.
3. Perform the procedure without excessive maneuvering and without exceeding the normal operating limits of the airplane (the angle of bank should not exceed 30°).
4. Maintain the required altitude within −0, +100 feet, required heading/track within ±5°, and the required airspeed/V-speed within ±5 knots.
5. Use the appropriate airplane configuration for normal and abnormal situations and procedures.

6. Perform all procedures required for the circle-to-land in a smooth, positive, and correct manner.

3.10.7 Zero-Flap Landing.

3.10.7.1 Condition(s). Select appropriate weather and environmental conditions. In certain airplanes, the FAA has determined that the probability of complete flap failure is extremely remote due to system design. For these airplanes, the FAA has determined whether training on slats-only landings or partial-flaps landings is appropriate. Consult the FSB Report for the specific airplane to ascertain the training requirement for zero-flap landing.

3.10.7.2 Awareness Criteria:

1. Exhibit knowledge of the factors, which affect the flight characteristics of an airplane when flaps fail.
2. Comply with normal landing awareness criteria in paragraph 3.10.1.2.

3.10.7.3 Action Criteria:

1. Select a runway of sufficient length for a zero- or partial-flap condition.
2. Maintain the proper airplane pitch attitude and flightpath for the configuration, gross weight, and other applicable operational considerations.
3. Use the correct airspeeds/V-speeds for the landing.
4. Comply with normal landing action criteria in paragraph 3.10.1.3.
5. After landing, use spoilers, propeller reverse, thrust reverse, wheel brakes, and other drag/braking devices, as appropriate, in such a manner to bring the airplane to a safe stop.

Note: "Flaring" the airplane with zero flaps or "over flaring" with partial landing flaps may result in "ballooning" or "floating" prior to touchdown and an unwanted and potentially dangerous extension in the landing distance required to stop the airplane.

3.10.8 Landing with Manual Reversion.

3.10.8.1 Condition(s). Select appropriate weather and environmental conditions.

3.10.8.2 Awareness Criteria:

1. Recognize the degraded flight control condition.
2. Demonstrate and apply knowledge of the maneuvering capabilities of the airplane in a nonstandard or degraded configuration.

3.10.8.3 Action Criteria:

1. Select a runway of sufficient length for the degraded flight control condition.
2. Maintain the proper airplane pitch attitude and flightpath for the configuration, gross weight, and other applicable operational considerations.
3. Use the correct airspeeds/V-speeds for the landing.
4. Comply with normal landing action criteria in paragraph 3.10.1.3.
5. After landing, use spoilers, propeller reverse, thrust reverse, wheel brakes, and other drag/braking devices, as appropriate, in such a manner to bring the airplane to a safe stop.

3.10.9 Rejected Landing.

3.10.9.1 Condition(s). Select appropriate weather and environmental conditions. Per part 121 appendices E and F, this maneuver must be initiated approximately 50 feet above the runway or landing area and approximately over the runway threshold.

3.10.9.2 Awareness Criteria. Exhibit knowledge of a rejected landing procedure, including the conditions that dictate a rejected landing, the importance of a timely decision, LAHSO considerations, the recommended airspeed/V-speeds, and the applicable "clean-up" procedure.

3.10.9.3 Action Criteria:

1. Make a timely decision to reject the landing.
2. Apply the appropriate thrust setting for the flight condition and establish the correct pitch attitude necessary to obtain the desired performance, assuming the airplane may touch down.
3. Establish a positive rate of climb.
4. Retract the wing flaps/drag devices and landing gear, if appropriate, in the correct sequence and at a safe altitude, establishing a positive rate of climb and the appropriate airspeed/V-speed within ±5 knots.
5. Maintain the proper ground track or heading during the rejected landing procedure.
6. Complete the normal missed approach procedure.

3.10.10 Recovery From a Bounced Landing.

3.10.10.1 Condition(s). Select appropriate weather and environmental conditions:

1. This maneuver should only be conducted during training in an FSTD. This maneuver should not be conducted in an airplane in flight.
2. Air carriers should use caution to ensure the bounce scenario is realistic. If a realistic scenario is infeasible, then the maneuver can instead be taught by the instructor calling "bounce" prior to landing. In either case, pilots should recognize and recover the condition appropriately.
3. Practice to proficiency in training to ensure that the pilot understands, and is able to execute, a recovery from a bounced landing.
4. The recovery technique may vary depending on the airplane type or height reached during the bounce.

3.10.10.2 Awareness Criteria:

1. Causes of a bounced landing usually include one or more of the following:
   - Excessive sink rate (requiring a rapid flare maneuver, often exceeding the recommended normal landing pitch attitude at touchdown);
   - Late flare initiation (not putting the airplane at the normal landing pitch attitude prior to touchdown);
   - Incorrect flare technique (i.e., continuing to move the airplane nose up until touchdown occurs, resulting in a higher-than-desired pitch attitude at touchdown; or "pumping" the elevator control through the flare maneuver);
   - Excessive airspeed, allowing the airspeed to bleed off during an excessive time held in the flared attitude; and/or
   - Touching down with power on, sometimes preventing the automatic extension of ground spoilers, if applicable.
2. Recognize the critical need to keep the airplane under control by maintaining a normal landing pitch attitude for the existing configuration and airspeed.

3.10.10.3 Action Criteria. Generally, for a high bounce, it is not recommended to try to continue the landing, as the remaining runway length may not be sufficient to stop the airplane. It is essential that a go-around is initiated.

1. Ignore the takeoff configuration warning, if any occurs.
2. Maintain the landing gear and flaps configuration.
3. Maintain airplane control by adjusting the elevator controls to ensure a normal landing pitch attitude.
4. Initiate a go-around.
5. Depending on the energy state of the airplane, a subsequent touchdown may occur as the airplane accelerates. With the pitch held at a landing

pitch attitude and additional power applied, the severity of this touchdown will be minimized.

6. When reaching the rotation speed, begin a 3° per second rotation rate to achieve the go-around attitude.
7. When safely established in the go-around profile and a positive rate of climb, transition to the go-around task.

3.11 Abnormal Procedures.

3.11.1 General.

3.11.1.1 Condition(s). Select appropriate weather and environmental conditions. Pilots are expected to observe, identify, use the manual and appropriate checklists, and apply systems knowledge only as required to resolve the situation to the safest possible outcome. (Refer to the current edition of AC 120-80, In-Flight Fires, regarding resetting of tripped circuit breakers.)

3.11.1.2 Awareness Criteria. Consider the impact of the abnormal condition on the safety of the flight and on the need to turn back, or continue to destination airport or another suitable airport.

3.11.1.3 Action Criteria:

1. If appropriate, complete the immediate action (memory) items in proper sequence.
2. Initiate the correct procedure or checklist for the abnormal situation.
3. Select the systems and procedures appropriate to the air carrier's operation:
   - Air conditioning;
   - Airborne radar devices;
   - APU;
   - Automatic or other approach aids including HUD and EFVS;
   - Autoflight (e.g., autopilot and autothrottle/autothrust);
   - Anti-icing and deicing;
   - Brakes;
   - Communications;
   - Doors;
   - Electrical power;
   - Engine;
   - Fire protection;

- Flaps;
- Flight controls;
- Fuel and oil;
- GPWS, EGPWS, or TAWS;
- Hydraulic power;
- Flight instruments;
- Landing gear;
- Navigation;
- Oxygen;
- Pneumatic;
- Pressurization;
- Propellers;
- Stability augmentation devices;
- Stall warning devices and stall avoidance devices;
- Thrust reversers;
- Warning systems; and
- Any other systems, devices, or aids available.

3.12 Emergency Procedures. Pilots should not "troubleshoot." They are expected to observe, identify, use the manual and appropriate checklists, and apply systems knowledge only as required to resolve the emergency to the safest possible outcome. (Refer to AC 120-80 regarding resetting of tripped circuit breakers.)

3.12.1 Engine, Heater, Cargo, Compartment, Cabin, Flight Deck, Wing, and Electrical Fires.

3.12.1.1 Condition(s). Select appropriate weather and environmental conditions.

3.12.1.2 Awareness Criteria:

1. Recognize the need for emergency descent, diversion, or evacuation, as appropriate.
2. Apply knowledge of fire detection and extinguishing systems, as necessary.

3.12.1.3 Action Criteria:

1. Promptly acknowledge the fire event.
2. If appropriate, complete the immediate action (memory) items in proper sequence.

3. Direct the use of oxygen and smoke goggles and/or Emergency Vision Assurance System (EVAS) to keep the crew functioning.
4. Establish crew communications.
5. Identify the source of fire, if possible.
6. Initiate the correct procedure or checklist for the type of fire.
7. Descend, land, and evacuate as quickly as possible.

3.12.2 Smoke Control.

3.12.2.1 Condition(s). Select appropriate weather and environmental conditions.

3.12.2.2 Awareness Criteria:

1. Recognize the need for emergency descent, diversion, or evacuation, as appropriate.
2. Apply knowledge of smoke detection systems, as necessary.

3.12.2.3 Action Criteria:

1. Promptly acknowledge the smoke or fumes event.
2. If appropriate, complete the immediate action (memory) items in proper sequence.
3. Direct the use of oxygen and smoke goggles and/or EVAS to keep the crew functioning.
4. Establish crew communications.
5. Identify the source of smoke or fumes, if possible.
6. Initiate the correct procedure or checklist for the type of smoke or fumes.
7. Descend, land, and evacuate as quickly as possible.

3.12.3 Simulated Engine Failures.

3.12.3.1 Condition(s). Select appropriate weather and environmental conditions.

3.12.3.2 Awareness Criteria. Correctly and safely respond to an engine failure(s), engine fire, severe damage, or separation.

3.12.3.3 Action Criteria:

1. Maintain positive control of the airplane.
2. Do not reduce airspeed unless additional altitude is necessary for the safe continuation of the flight and full thrust on the remaining engine(s) is insufficient to maintain current airspeed during a climb.

3. If appropriate, complete the immediate action (memory) items in proper sequence.
4. Initiate the correct procedure or checklist for the type of engine failure, fire, severe damage, or separation.
5. Land as soon as possible.
6. If required, accomplish emergency evacuation.

3.12.4 Fuel Jettisoning.

3.12.4.1 Condition(s). Select appropriate weather and environmental conditions.

3.12.4.2 Awareness Criteria:

1. Maintain awareness of airplane altitude and location during fuel jettisoning.
2. Correctly and safely perform fuel jettisoning.

3.12.4.3 Action Criteria:

1. Maintain positive control of the airplane.
2. Maintain proper airspeed and altitude for fuel jettisoning.
3. Notify ATC of fuel jettisoning.
4. Initiate the correct procedure or checklist for fuel jettisoning.
5. Maintain fuel balance within limits.
6. After fuel jettisoning is completed, land as soon as possible.
7. Accomplish emergency evacuation, if required.

3.12.5 Rapid Decompression.

3.12.5.1 Condition(s). Select appropriate weather and environmental conditions.

3.12.5.2 Awareness Criteria:

1. Promptly acknowledge the rapid decompression event.
2. Consider the altitude of the airplane and the need for an emergency descent or an alternative course of action, including the need for crew or passenger oxygen.

3.12.5.3 Action Criteria:

1. If appropriate, complete the immediate action (memory) items in proper sequence.
2. Direct use of oxygen by crew, as necessary.

3. Determine whether cabin pressure control can be regained.
4. Establish crew communications.
5. Complete the correct procedure or checklist for the type of rapid decompression.

3.12.6 Emergency Descent.

3.12.6.1 Condition(s). Select appropriate weather and environmental conditions.

3.12.6.2 Awareness Criteria:

1. Consider the appropriate configuration and airspeed for descent if airplane damage is known or suspected.
2. Choose an altitude for level off suitable to the terrain and conditions.

3.12.6.3 Action Criteria:

1. If appropriate, complete the immediate action (memory) items in proper sequence.
2. Direct use of oxygen by crew, as necessary.
3. Establish crew communications.
4. Initiate the correct procedure or checklist for emergency descent.
5. Notify ATC of emergency descent.
6. Perform emergency descent in a smooth, positive, and correct manner without exceeding limitations.
7. Complete the correct procedure or checklist for emergency descent.

3.12.7 All Other Emergencies.

3.12.7.1 Condition(s). Select appropriate weather and environmental conditions.

3.12.7.2 Awareness Criteria. Maintain focus on the flying task and a safe flightpath.

3.12.7.3 Action Criteria:

1. If appropriate, complete the immediate action (memory) items in proper sequence.
2. Direct use of oxygen by crew, as necessary.
3. Establish crew communications, if necessary.
4. Complete the correct procedure or checklist for the emergency situation.

CHAPTER 4. EMERGENCY EQUIPMENT DRILLS

4.1 Training Equipment. In accordance with § 121.408, training equipment used during airplane emergency equipment training drills must:

1. Meet the form, fit, function, and weight, as appropriate, of the airplane equipment.
2. Replicate the normal operation (and abnormal and emergency operation, if appropriate) of the airplane equipment including the required force, actions, and travel of the equipment and variations in equipment operated by the air carrier, if applicable.
3. Replicate the operation of the airplane equipment under adverse conditions, if appropriate.

4.1.1 Objective. The key objective is that the training equipment reflects the equipment that the pilot would use in normal and/or emergency operations in order to accomplish the learning objectives of the drill.

4.2 Task Organization.

4.2.1 Task Description. The pilot should demonstrate the action criteria under the prescribed conditions. In accordance with § 121.415(h), the air carrier must train pilots in all tasks, procedures, and environments for which they hold operations specification (OpSpec) approval to operate, under all specified conditions.

4.2.1.1 Conditions Included:

1. Environmental conditions and circumstances, including those that compound the difficulty of the task when encountered.
2. Clarifying information about the nature of the task.

4.2.1.2 Action Criteria. Procedures for completing a task, including operations in or near a critical environment, when appropriate. These are steps that are active and generally are completed in an order to achieve the goal of the task. Provide relevant parameters to reflect satisfactory levels of performance.

4.3 One-Time Performance Drills.

4.3.1 Protective Breathing Equipment (PBE).

4.3.1.1 Condition(s):

1. The pilot will combat an actual or simulated fire using at least one type of hand fire extinguisher that is appropriate for the type of fire being fought, while using the type of installed PBE or approved PBE simulation device.
2. The hand fire extinguisher will be charged, but does not have to contain the actual extinguishing agent.

4.3.1.2 Action Criteria:

1. Recognize the type of fire.
2. Locate source of fire or smoke.
3. Remove PBE from stowage container and pouch (as appropriate).
4. Don the PBE and activate oxygen in proper sequence (activation of oxygen may be simulated).
5. Verify seal.
6. Select appropriate hand fire extinguisher for the class of fire.
7. Remove fire extinguisher from its bracketing or securing system.
8. Prepare extinguisher for use (e.g., rotate handle to pressurize, break tamper seals, pull pin, and release safety latch).
9. Approach fire or smoke.
10. Combat fire using proper techniques.
11. Operate extinguisher discharge mechanism properly.
12. Aim and discharge extinguisher at the base of the fire using proper discharge pattern, bottle position, and body position.
13. Maintain an appropriate distance from the fire in order to complete the task and maintain personal safety.
14. Be aware of PBE oxygen duration.
15. Be aware of signals that PBE is no longer generating oxygen to wearer.
16. Use protective techniques to back away.
17. Ensure fire is extinguished.
18. Use proper techniques for PBE removal.
19. Properly secure PBE and fire extinguisher.

4.3.2 Firefighting.

4.3.2.1 Condition(s). The pilot will combat an actual fire using at least one type of hand fire extinguisher that is appropriate for the type of fire being fought.

1. The hand fire extinguisher will be charged, but does not have to contain the actual extinguishing agent.
2. This firefighting drill is not required if the pilot performs the PBE drill by combating an actual fire.

4.3.2.2 Action Criteria. The pilot will complete the following during the drill:

1. Recognize the type of fire.
2. Locate source of fire or smoke.
3. Select appropriate hand fire extinguisher for the class of fire.
4. Remove fire extinguisher from its bracketing or securing system.
5. Prepare extinguisher for use (e.g., rotate handle to pressurize, break tamper seals, pull pin, and release safety latch).
6. Approach fire or smoke.
7. Combat fire using proper techniques.
8. Operate extinguisher discharge mechanism properly.
9. Aim and discharge extinguisher at the base of the fire using proper discharge pattern, bottle position, and body position.
10. Maintain an appropriate distance from the fire in order to complete the task and maintain personal safety.
11. Use protective techniques to back away.
12. Ensure fire is extinguished.
13. Properly secure fire extinguisher.

4.3.3 Emergency Evacuation (Airplane Equipped with Emergency Evacuation Slide(s)).

4.3.3.1 Condition(s). Each pilot will complete an emergency evacuation by egressing the airplane or approved training equipment using at least one type of installed emergency evacuation slide.

4.3.3.2 Action Criteria. The pilot will satisfactorily accomplish the following during the drill:

1. Observe the airplane exit(s) being opened in the emergency mode and the associated emergency evacuation slide or slide-raft being deployed and inflated or perform the tasks resulting in the completion of these actions.
2. Egress the airplane or approved training equipment and descend the slide while using the proper method.

4.4 Recurring Performance Drills.

4.4.1 Emergency Exits.

4.4.1.1 Condition(s). Per § 121.417, the pilot must complete a drill on the operation of each type of emergency exit in the normal and emergency modes, including the actions and forces required in the deployment of the emergency evacuation slide, if applicable.

4.4.1.2 Action Criteria:

4.4.1.2.1 Normal Operation. The pilot will satisfactorily accomplish the following during the drill:

1. Identify conditions under which each exit should be opened or closed, if appropriate.
2. Assess the exterior and interior conditions for obstacles or hazards to persons or the exit during the opening or closing (e.g., jetway, stairs, and barrier straps).
3. Follow procedure to ensure awareness at armed boarding door prior to airplane pushback (if applicable to the exit).
4. Identify signal for arming and disarming.
5. Coordinate and communicate with other crewmembers.
6. Properly arm and disarm the exit.
7. Verify exit is armed or disarmed, as appropriate for intended operation.
8. Use proper techniques for the operating mechanism (such as handles to open exit and secure in locked position).
9. Install and stow safety strap.
10. Release locking mechanism and properly use control handles to close exit and secure in locked position.

4.4.1.2.2 Emergency Operation. The pilot will satisfactorily accomplish the following during the drill:

1. Position emergency evacuation slide (if applicable).
2. Verify the exit is in the armed or disarmed mode (as appropriate).
3. Identify conditions under which the exit is to be opened in the emergency mode.
4. Use proper voice commands to passengers (as appropriate).
5. Assess conditions outside the exit to determine the exit usability (e.g., clear of obstruction, fire, and airplane attitude).
6. Open the exit in the armed mode (as applicable) and secure or stow the exit (as applicable) to ensure a fully open and unobstructed exit.
7. Hold onto assist handle (if applicable).
8. As applicable, pull the manual inflation handle(s) and verify deployment, inflation (e.g., emergency evacuation slide or emergency evacuation slide-raft).
9. Maintain appropriate protective body and hand positions.

10. Follow crew coordination procedures (as appropriate).
11. Access release handle(s) (e.g., slide disconnect, jettison tailcone, and ventral stairs).
12. Recognize when it is appropriate to exit the airplane.
13. Access escape tapes or escape ropes (if applicable).

4.4.2 Fire Extinguishers.

4.4.2.1 **Condition(s).** Per § 121.417, the pilot must complete a drill on each type of fire extinguisher installed on the airplane. The hand fire extinguisher will be charged, but does not have to contain the actual extinguishing agent.

4.4.2.2 **Action Criteria.** The pilot will satisfactorily accomplish the following during the drill:

1. Remove fire extinguisher from its bracketing or securing system.
2. Prepare extinguisher for use (e.g., rotate handle to pressurize, break tamper seals, pull pin, and release safety latch).
3. Operate extinguisher discharge mechanism.
4. Aim and discharge extinguisher using proper discharge pattern, bottle position, and body position.
5. Properly secure fire extinguisher.

4.4.3 Emergency Oxygen Systems.

4.4.3.1 **Condition(s).** This drill will provide the pilot with practice in donning and using the emergency oxygen system, including PBE.

4.4.3.2 **Action Criteria.** The pilot will satisfactorily accomplish the following during the drill for each type of emergency oxygen system, including PBE:

1. Remove oxygen mask, portable oxygen bottle, or PBE from its bracketing or securing system.
2. Don and activate the oxygen and test for flow, position, seal, and security of the mask or hood to the face or head.
3. Demonstrate proper precautions.
4. Secure the oxygen bottle, canister, or cartridge (as appropriate) and position it to monitor the supply.
5. Demonstrate proper handling techniques if using portable solid state units.
6. Deactivate and stow the oxygen mask, portable oxygen bottle, or PBE.

4.4.4 Individual Flotation Means.

4.4.4.1 **Condition(s).** Per § 121.417, the pilot must complete a drill on the donning, use, and inflation of individual flotation means. Individual flotation means include life preservers and other types of approved flotation devices, such as seat cushions.

4.4.4.2 **Action Criteria.** Each pilot will satisfactorily accomplish the following during the drill for each type of individual flotation means:

4.4.4.2.1 Life Preservers:

1. Remove life preserver from its bracketing or securing system.
2. Don and secure life preserver.
3. Inflate using automatic and manual inflation.
4. Demonstrate proper arm placement and use of the life preserver.
5. Locate, activate, and deactivate locator light.

4.4.4.2.2 Flotation Devices:

1. Remove flotation device from its bracketing or securing system.
2. Don and secure flotation device.
3. Demonstrate proper arm placement and use of the flotation device.

4.4.5 Ditching.

4.4.5.1 **Condition(s).** A wet training environment is recommended for the ditching drill during initial training. It should be conducted in water with sufficient depth and width under and around the raft or emergency evacuation slide-raft that does not allow participants the ability to touch the bottom or sides of the water containment structure. Raft boarding and subsequent activities should be done in water.

1. A ditching drill in a dry training environment will be conducted on a surface with sufficient space to conduct the drill without interference from nearby objects or structures.
2. Activities prior to raft boarding may be done in a classroom, the airplane, or using approved training equipment.

4.4.5.2 Action Criteria. The pilot will participate in the following ditching drill as applicable to the air carrier's operations:

1. Complete procedures to prepare flight deck.
2. Communicate and coordinate with flight attendants (F/A) and other crewmembers.
3. Conduct passenger briefing or verify F/As conducted passenger briefing.
4. Verify completion of procedures to prepare cabin including locating the portable emergency locator transmitter (ELT) if installed for stowage in the raft.
5. Don and inflate life preserver.
6. Remove and inflate raft.
7. Deploy and inflate emergency evacuation slide-raft.
8. Attach raft to airplane.
9. Identify boarding station and board raft.
10. Review the need to crawl and stay low.
11. Distribute the load.
12. Review the need to stay attached to the airplane as long as possible.
13. Review operation of the quick disconnect.
14. Review the need to get clear of fuel-covered water and debris.
15. Locate and deploy the sea anchor.
16. Retrieve the survival kit and review contents.
17. Identify inflation valve and review operation of inflation pump and raft repair kit.
18. Identify equipment for bailing raft dry (e.g., bailing bucket or sponge).
19. Install the canopy and discuss methods for collecting rain water and water purification techniques.
20. Demonstrate how canopy can be used in both hot and cold climates.
21. Review the use of signaling devices located in survival kits.
22. Discuss the cautions associated with flares and sea dye marker and proper use.
23. Point out raft lights.
24. Review alternate signaling devices (e.g., mirrors).
25. Locate and demonstrate use of heaving line. Review techniques to retrieve survivors.
26. Review raft maintenance techniques to include the need to relocate the portable onboard ELT to the raft.

4.5 Recurring Observation Drills.

4.5.1 Emergency Evacuation (Airplane Equipped with Emergency Evacuation Slide(s)).

4.5.1.1 Condition(s). The pilot will observe the specific procedural drill being conducted by other persons in a live setting or through an audiovisual medium.

4.5.1.2 Action Criteria. Each pilot qualifying or serving on an airplane equipped with emergency evacuation slide(s) will observe the evacuation of the airplane with passengers using the emergency evacuation slide. The observation will include:

1. Correct methods of evacuation.
2. Correct methods of entering the emergency evacuation slide.
3. Necessity for helpers at the bottom of the emergency evacuation slide.

4.5.2 Emergency Evacuation (Airplane Not Equipped with Emergency Evacuation Slide(s)).

4.5.2.1 Condition(s). The pilot will observe the specific procedural drill being conducted by other persons in a live setting or through an audiovisual medium.

4.5.2.2 Action Criteria. Each pilot qualifying or serving on an airplane not equipped with an emergency evacuation slide will observe the evacuation of the airplane. The observation will include:

1. Correct methods of evacuation at each emergency exit.
2. Necessity for helpers at each emergency exit.

4.5.3 Removal, Deployment, Inflation and Detachment of Emergency Evacuation Slide, Raft, or Emergency Evacuation Slide-Raft.

4.5.3.1 Condition(s). The pilot will observe the specific procedural drill being conducted by other persons in a live setting or through an audiovisual medium.

4.5.3.2 Action Criteria. Each pilot will observe the deployment, inflation, and detachment from the airplane of each type of installed emergency evacuation slide, raft, or emergency evacuation slide-raft. This observation will include:

1. Removal of the raft from the airplane.
2. Proper use of the exit operating handle.
3. Location and color of the inflation handle.

4. Demonstration of forces required to inflate the emergency evacuation slide, raft, or emergency evacuation slide-raft manually and automatically.
5. Attachment to airplane (if applicable).
6. Sound of inflating the emergency evacuation slide, raft, or emergency evacuation slide-raft.
7. Proper inflation and position of the emergency evacuation slide, raft, or emergency evacuation slide-raft.
8. Location of the ditching handle or laces.
9. Launching points (if required).
10. Procedure to pull ditching handle, including secondary actions that may be required.
11. Lanyard and the removal or cutting of lanyard.
12. Righting overturned rafts (if applicable).

4.5.4 Transfer of Emergency Evacuation Slide-Raft.

4.5.4.1 **Condition(s).** The pilot will observe the specific procedural drill being conducted by other persons in a live setting or through an audiovisual medium.

4.5.4.2 **Action Criteria.** Each pilot will observe the transfer of an emergency evacuation slide-raft from an unusable exit door to a usable exit door. This observation will include:

1. Disconnecting the emergency evacuation slide-raft from an unusable exit door.
2. Positioning the emergency evacuation slide-raft at a usable exit door.