U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: GUIDELINES FOR OPERATIONAL APPROVAL OF WINDSHEAR TRAINING PROGRAMS

Date: 2/9/96 **AC No:** 120-50A
Initiated by: AFS-210 **Change:**

1. PURPOSE. This advisory circular (AC) provides guidance for approval of low-altitude windshear training for operations under Title 14 of the Code of Federal Regulations (CFR) parts 121 and 135. Compliance with these guidelines is not, in itself, mandatory and does not constitute a regulation. This AC is issued for guidance purposes to outline a method of compliance with the regulations. An applicant may elect to follow an alternate method, provided that alternate method is found acceptable by the Federal Aviation Administration (FAA).

2. CANCELLATION. AC 120-50, Guidelines for Operational Approval of Windshear Training Programs, dated 10/10/89, is canceled.

3. DEFINITIONS. The following definitions apply for purposes of this advisory circular only:

a. Turbine-Powered Airplanes. The definition includes turbofan, turbojet, prop fan, and ultra-high-bypass fan-powered airplanes; but, specifically excludes turbopropeller-powered airplanes equipped with variable pitch, constant speed propellers.

b. Windshear Escape Maneuver. A pilot recovery technique used when an inadvertent windshear encounter is experienced. It is achieved by pitching toward an initial target attitude while using necessary thrust to effect escape. The objective of the recovery technique is to keep the airplane flying as long as possible in hope of exiting the windshear. The maneuver is an operational technique to be used to escape from an encounter with windshear. It was specifically developed to be effective, simple, and easily remembered by the crewmembers. The maneuver should also have general applicability.

4. FOCUS. The guidance in this AC is applicable to operators subject to the training and qualification requirements of parts 121 and/or 135.

5. RELATED MATERIALS. A two-volume Windshear Training Aid publication, which includes an "Example Windshear Training Program," may be purchased from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia, 22161, telephone (703) 487-4650. Volume I's order number is PB88127196, and Volume II's is PB88127204. A multimedia package is also available. Ask for "The Windshear Training Package," order number AVA19756KK00.

6. BACKGROUND.

a. National Transportation Safety Board investigations have shown that low-altitude windshear has been a prime cause of air carrier accidents.

b. In 1985, the FAA contracted with a consortium of aviation specialists from The Boeing Company, United Airlines, McDonnell Douglas, Lockheed-California, Aviation Weather Associates, and Helliwell, Inc., to produce a windshear training aid to enhance a pilot's understanding of windshear. The resulting Windshear Training Aid consists of documents, slides, a compact disc, and video tapes designed to present effective training for flightcrews in order to minimize the windshear threat.

c. The consortium of aviation specialists who developed this uniform, industry-wide Windshear Training Aid focused on the cause and effect of windshear and developed instructions for windshear identification, avoidance, and recovery. This information provides any operator with the necessary data to create or update its own windshear training program.

d. There is a clear and independent need for effective windshear training. For this reason, windshear training requirements were established in 14 CFR parts 121 and 135, Amendment Numbers 121-199 and 135-27, which were issued on September 27, 1988. Section 121.404 states in part that after January 2, 1991, no certificate holder may use a person as a flight crewmember unless that person has completed windshear ground training in accordance with section 121.419 and windshear flight training, if applicable, in accordance with sections 121.409, 121.424, and 121.427. Section 135.345(b)(6)(ii), in part, states that initial, transition, and upgrade ground training for pilots must include instruction in the knowledge and procedures needed to escape from severe weather situations, including low-altitude windshear. Section 135.351 requires recurrent training and instruction as necessary in the subjects required for initial ground training, including the low-altitude windshear training prescribed in section 135.341 and described by section 135.345.

7. APPROVAL PROCESS.

a. Overall approval for a windshear training program will rest with the principal operations inspector (POI) assigned to each certificate holder. Certificate holders can use the "Example Windshear Training Program" section of the Windshear Training Aid. It is an example of a typical windshear training program. The checklists in the appendices can be used as a guide for training program approval.

b. Operators of those aircraft that were not included in the original Windshear Training Aid are encouraged to develop their windshear training programs to reflect necessary aircraft specific differences. Windshear training programs that include recovery techniques different from those presented in the Windshear Training Aid are acceptable as long as they are based on reliable engineering data. This data will normally be supplied by an aircraft manufacturer or other sources considered reliable by the FAA.

8. GROUND TRAINING PROGRAM.

a. General Training Objectives.

(1) Reduce windshear related accidents and incidents through flight crewmember education; and

(2) Stress the importance of windshear avoidance to flightcrews.

b. Specific Training Objectives. Provide pilots with the knowledges needed to:

(1) Identify the actual or potential presence of windshear from a variety of information sources and cues.

(2) Adhere to a policy of avoiding, whenever possible, encounters with windshear.

(3) Adhere to a policy that when executing a missed approach or go-around in weather conditions conducive to windshear, that the missed approach or go-around be conducted in an aggressive manner, and the flightcrew is ready to accomplish windshear escape procedures should an ensuing windshear be encountered.

(4) Use operating procedures and techniques designed to enhance the possibility of surviving an inadvertent encounter with windshear during takeoff, approach, or landing.

(5) Identify unique stall characteristics and windshear recovery techniques that are specific to the aircraft type. Special attention should be given to low airspeed lateral control characteristics, loss of climb capability, unique windshear characteristics, windshear flight guidance system limitations, etc.

NOTE: See the Windshear Training Aid for an example of an acceptable ground training curriculum.

9. FLIGHT SIMULATOR TRAINING. Flight Simulator Training is required for part 121 operators of turbine-powered airplanes and is recommended for part 135 operators. It primarily addresses the second major goal of windshear pilot training--windshear recovery techniques. Training and practice will be provided in critical pilot functions, which include operational precautions, use of standard operating techniques (to improve cockpit recognition of a windshear encounter), and the recommended recovery techniques for inadvertent windshear encounters. The following applies:

a. Flight Simulator Training Objectives. The training objectives of the simulator training program will be to provide pilots with the necessary experience and skills to:

(1) Recognize onset of a severe windshear encounter using available flight instrumentation.

(2) Coordinate cockpit activities to improve the pilot's ability to recognize and take the appropriate actions to recover from an inadvertent windshear encounter.

(3) Make proper use of pitch, power, and airplane configuration to recover from an inadvertent windshear encounter.

b. Simulator Equipment.

(1) Flight simulators used for windshear training will be specifically qualified for that purpose by the National Simulator Program Manager (NSPM), AFS-205. Only then can the simulator be approved by the POI for use in a windshear training curriculum. (Refer to the current edition of AC 120-40, Airplane Simulator and Visual System Evaluation).

(2) The simulator used for windshear training will be equipped with windshear avionics operationally equivalent to that which is in the type of aircraft the pilot will fly. Such equipment may be actual aircraft-type hardware, or a simulation

thereof, which presents to the pilot an accurate replication of displays and aural warnings.

NOTE: See paragraph 9(d)(5) for predictive windshear simulator avionics equipment.

c. Training Plan.

(1) An operator's training plan will define the windshear avionics equipment in its flight simulators. All pilots, who operate aircraft in part 121 operations, must receive flight simulator training on windshear techniques and procedures.

(2) Training must ensure that pilots know how to operate the windshear avionics equipment.

(3) All flight simulators used by the operator for windshear training will be equipped with windshear equipment that is operationally equivalent to that which is in the aircraft the pilot will fly.

(4) Flight training, for the purpose of compliance, is considered complete when all the basic windshear escape maneuvers have been trained in the simulator.

d. Flight Simulator Curriculum.

(1) Pilots should be thoroughly familiar with the material contained in the ground training program prior to flight simulator windshear training.

(2) A flight simulator training program (other than recurrent) should include at least one encounter in each of the following three phases of flight. Recurrent training should include at least one of the following on a rotating basis during successive training periods:

(a) Takeoff prior to Vr.

(b) Takeoff after Vr.

(c) On approach.

(3) The pilot should be trained in the proper windshear recognition criteria and crew coordination and the correct use of pitch, power, and airplane configuration to control flightpath.

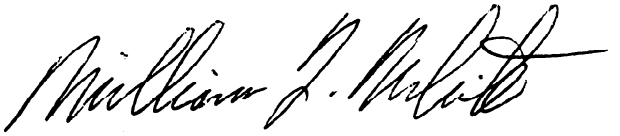
(4) The training scenarios should have windshear encounters of sufficient severity to allow the pilot an

opportunity to develop windshear recognition skills as well as recovery procedures. In addition to windshear training scenarios containing environmental conditions conducive to windshear such as turbulence, heavy precipitation, rapidly changing airspeed, etc., windshear training scenarios should also be offered in which no turbulence or rapid airspeed changes are presented. Actual windshear events have occurred where turbulence was absent.

(5) Predictive windshear flight simulator training is needed for pilots who operate aircraft equipped with predictive windshear detection. Currently, predictive windshear avionics are unique in that no flight command guidance is provided. Some, but not all, predictive windshear avionics should be installed in simulators used in predictive windshear training programs. The total predictive windshear avionics package need not be installed in the simulator; however, simulators used in predictive windshear training programs must be qualified for that purpose by the NSPM and have predictive windshear alerting systems installed (aural and visual caution alerts). Flight simulator training should be conducted using generic windshear escape procedures identified in paragraph 9(d)(2)(a, b, and c).

(6) If more than one type of windshear equipment is installed on the aircraft fleet that a pilot will fly, the training program should include specific training on each type of windshear equipment. This should be in the form of flight simulator training for, at least, one type of windshear equipment, and "differences" training (videos, bulletins, classroom lecture, etc.) on the other types of installed windshear equipment.

10. PART 135 OPERATORS NOT REQUIRED TO HAVE A TRAINING PROGRAM. Section 135.341(a) states that certificate holders who use only one pilot in their operation are not required to establish and maintain an approved pilot training program. Pilots of such certificate holders are responsible for knowing the factors associated with windshear including weather conditions conducive to windshear, the importance of avoiding such conditions, and the proper windshear escape maneuver for aircraft they operate. See section 135.293(a).



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APPENDIX 1. CHECKLIST (PART 121 OPERATORS)

1. _____ Does the certificate holder operate turbine-powered airplanes?

2. _____ Does the certificate holder perform its windshear FLIGHT training requirements in a qualified flight simulator?

3. _____ Does the certificate holder include the windshear FLIGHT training program in each of the flight crewmember FLIGHT training programs listed below?

_____ a. Initial, Transition, and Upgrade flight training.

_____ b. Recurrent flight training.

_____ c. Differences training (if appropriate).

4. _____ Does the certificate holder perform its windshear flight training requirements in an approved flight simulator for each airplane type the holder operates?

5. _____ Does the Initial, Transition, and Upgrade GROUND training for pilots and flight engineers include procedures listed below?

_____ a. Procedures for recognizing and avoiding severe weather situations.

_____ b. Procedures for escaping from severe weather situations in case of an inadvertent encounter, including low-altitude windshear.

6. _____ Is windshear flight training (in an approved simulator) conducted during both recurrent training periods and proficiency checks?

APPENDIX 2. CHECKLIST (PART 135 OPERATORS)

1. Does the certificate holder include in its initial and recurrent pilot oral testing requirements procedures listed below?

_____ a. Procedures for recognizing and avoiding severe weather situations.

_____ b. Procedures for escaping from severe weather situations in case of an inadvertent encounter, including low-altitude windshear (rotorcraft pilots are not required to be tested on escaping from low-altitude windshear).

_____ c. Procedures for operating in or near thunderstorms (including best penetrating altitudes), turbulent air (including clear air turbulence), icing, hail, and other potentially hazardous meteorological conditions.

2. Does the certificate holder include in its initial, transition, and upgrade ground training the procedures listed below?

_____ a. Procedures for recognizing and avoiding severe weather conditions.

_____ b. Procedures for escaping from severe weather situations in case of an inadvertent encounter, including low-altitude windshear (rotorcraft pilots are not required to be trained in escaping from low-altitude windshear).

_____ c. Procedures for operating in or near thunderstorms (including best penetrating altitudes), turbulent air (including clear air turbulence), icing, hail, and other potentially hazardous meteorological conditions.

3. It is recommended, although not required, that if the certificate holder has access to a flight simulator, that windshear recovery training be given in a flight simulator.

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