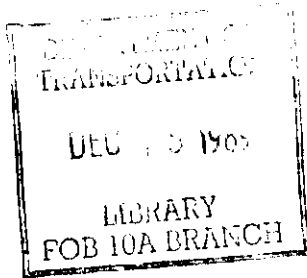




U.S. Department
of Transportation
**Federal Aviation
Administration**



Advisory Circular

Subject:

Date: 10/10/89

AC No: 120-50

Initiated by: AFS-210

Change:

**GUIDELINES FOR OPERATIONAL APPROVAL
OF WINDSHEAR TRAINING PROGRAMS**

1. **PURPOSE.** This advisory circular (AC) provides guidance for approval of low-altitude windshear training for Federal Aviation Regulations (FAR) Parts 121 and 135 certificate holders. 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 FAR. An applicant may elect to follow an alternate method, provided that alternate method is found acceptable by the Federal Aviation Administration (FAA).

2. **FOCUS.** The guidance in this AC is applicable to operators subject to the training and qualification requirements of FAR Parts 121 and/or 135.

3. **RELATED READING MATERIAL.** A two-volume Windshear Training Aid publication, which includes an "Example Windshear Training Program," may be purchased from the National Technical Information Service, 5385 Port Royal Road, Springfield, VA 22161, telephone (703) 487-4650. A multimedia package, including video tapes, slides, and the Windshear Training Aid, may be purchased from the National Audiovisual Center, 8700 Edgeworth Drive, Capitol Heights, MD 20743-3701, telephone (301) 763-1896.

4. **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, 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 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 by FAR Parts 121 and 135, Amendment Numbers 121-199 and 135-27, which were issued on September 27, 1988.

5. DEFINITIONS. The following definitions apply.

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, easily recalled, and to have general applicability.

6. 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 as a typical example of a windshear training program that would meet approval criteria. Also, the checklist provided in the appendixes can be used as a guide to facilitate compliance with the FAR.

b. Operators of 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 would normally be

supplied by an aircraft manufacturer or other sources considered reliable by the FAA.

c. Operators who have already been conducting windshear training as part of their initial, transition, and upgrade training programs may request that the POI credit that training toward the requirements of the windshear rule (see paragraph 4d). Normally, pilots that have been receiving ground and simulator windshear training from an air carrier will require only recurrent windshear training to comply with the training requirements of the rule. The POI will then determine what previously conducted training meets the requirements of the rule and deserves credit.

7. 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 knowledge to:

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

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

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

(4) Understand any 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.

8. FLIGHT SIMULATOR TRAINING. Flight Simulator Training is required for FAR Part 121 operators of turbine-powered airplanes and is recommended for FAR Part 135 operators. It primarily addresses the second major goal of windshear pilot training -- windshear recovery techniques. Training and practice should 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.

a. Flight Simulator Training Objectives. The training objectives of the simulator training program should 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 for the pilot flying, to 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) All flight simulators used for windshear training should be specifically qualified for that purpose by the National Simulator Program Manager (NSPM). Only then can it be approved by the POI for use in a windshear training curriculum. (Refer to the current editions of the following advisory circulars: AC 120-40, Airplane Simulator and Visual System Evaluation; AC 120-45, Advanced Training Devices (Airplane Only) Evaluation and Qualification; and AC 120-46, Use of Advanced Training Devices (Airplane Only).)

(2) At or before the compliance date for windshear equipment installation in the aircraft, the simulator used for windshear training should 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.

c. Training Implementation Plan.

(1) An operator's plan should include the installation schedule for windshear avionics equipment in its flight simulators. By January 2, 1991, all pilots must have received flight simulator training on windshear techniques and procedures, regardless of whether a phased compliance schedule has been approved. If the simulator is not yet equipped with windshear avionics, this training must include all the basic windshear escape maneuvers.

(2) Pilots who have received the required windshear ground training and the basic windshear escape maneuver training in a simulator not yet equipped with windshear avionics, will need additional training on the windshear avionic equipment prior to flying an aircraft so equipped. This training on the operation of the windshear avionics may be in any form which ensures that pilots know how to operate the avionics equipment.

(3) By the FAA-approved compliance date for windshear equipment installation in the aircraft, all flight simulators used by the operator for windshear training should be equipped with windshear equipment that is operationally equivalent to that which is in the aircraft the pilot will fly.

(4) Flight training is considered complete, for the purpose of compliance with Amendment Numbers 121-199 and 135-27, when all the basic windshear escape maneuvers have been trained in the simulator. Previously accomplished ground and flight windshear training which conforms with the above windshear rule is creditable toward the training requirements of the rule. This training must be completed by January 2, 1991. However, when the simulator becomes equipped with windshear avionics, pilots should receive training on that equipment during their next scheduled recurrent training.

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, with or without windshear alerting and escape guidance, and should be a different training scenario each time.

- (i) Takeoff prior to Vr.
- (ii) Takeoff after Vr.
- (iii) 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.

(5) 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, etc.) on the other types of installed windshear equipment.



Robert L. Goodrich
Director, Flight Standards Service

APPENDIX 1. RULE COMPLIANCE CHECKLIST - (FAR PART 121 OPERATOR)

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 they operate?
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 conducted during both recurrent training periods and proficiency checks?

APPENDIX 2. RULE COMPLIANCE CHECKLIST - (FAR 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 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 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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