



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

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Attachment 11 – Hazardous Weather Avoidance Criteria

OPERATIONAL FACTORS

DCA16IA215

Weather Planning

27 APR 11

2.6.4 Operation In Hazardous Weather Conditions.

Source: 14 CFR part 121.627

A flight may not continue toward a destination if the Pilot-In Command (PIC) or Dispatcher does not believe the flight can be completed safely. The only exception is when the PIC believes there is no safer procedure, and in this case the PIC may continue toward the destination only by exercising emergency authority.

Other Procedures.

1. During severe weather conditions, it is the responsibility of the Captain and Dispatcher to circumnavigate severe weather, and create a plan for allowing this.
2. If thunderstorm activity in the terminal area is such where recommended thunderstorm cell clearance cannot be maintained, the Captain will consider:
 - a. Detouring the area and landing at an alternate airport, if necessary, to avoid thunderstorm encounter;
 - b. Holding at the gate or delaying takeoff if not yet airborne until the activity lessens and the Captain determines a safe departure can be conducted.

• Note •

Such deviations are desirable, even though the flight may have to be refueled and/or incur a delay.

2.6.5 Weather Radar and Thunderstorm Avoidance.

Source: 14 CFR part 121.357

Airborne weather radar is a tool for detecting hazardous weather during flight.

• Note •

For information, refer to the applicable Flight Crew Operating Manual (FCOM), Vol. II.

Policy.

Weather Radar. Weather radar is designed for weather avoidance rather than weather penetration, and will not be used to penetrate thunderstorms (except in an emergency when no safer course of action is available).

Weather Radar usage is recommended:

- when operating in areas of reduced visibility
- if convective activity is possible
- at night over water

Weather Radar usage is required:

- when flying in IMC or night VMC conditions in areas where convective activity is present or forecasted on the route of flight.

Weather Planning

29 JAN 10

Thunderstorm Avoidance. Treat every thunderstorm as hazardous and avoid their immediate proximity. For practical purposes, the below table should be observed:

Table 2.7 Avoidance Distance Criteria

Precipitation Type	Avoidance Distance
Stratiform Rain. Stable air mass, layered clouds, no lightning present, shallow gradients.	May Penetrate.
Convective Shower. Round or oval echo shape, steep symmetrical gradient, radar top below 30,000, isolated cell, no lightning present.	Avoid by 3NM. <i>Potential Threats.</i> Moderate with occasional severe turbulence. Strong surface gusts, heavy rain, severe icing
General Thunderstorm. Lightning present, round or oval echo shape, steep symmetrical gradient, radar tops 30,000 to 35,000 feet, isolated storm.	Avoid by 10NM. <i>Potential Threats.</i> Moderate to severe turbulence, lightning strikes, severe icing, gusts to 50 knots, heavy rain in sheets
Severe thunderstorm. Pendant shape, asymmetrical gradients, notches, fingers, hooks or scalloped edges, radar top above 30,000 feet, southernmost cell in a line, cell movement faster than 10 knots, National Weather Service (NWS) reported as a level 5 or 6, prominent shadow	Below freezing level—Avoid by 10NM (upwind) 20NM (down wind). Above freezing level—Avoid by 20 NM. NOTE: Avoid flight below the anvil, remain 10NM upwind or if possible 1NM downwind for each knot of wind at altitude. For example wind at ALT taken from ND. 350/60, remain at least 60NM down wind of cell if possible to avoid hail encounters <i>Potential Threats.</i> Severe and extreme turbulence, large hail, severe icing, lightning strikes, tornadoes, water spouts, microbursts, gusts in excess of 50 knots, extreme rain, loss of lift (due to extreme rain)

WARNING

Flight beneath a convective shower or thunderstorm should not be attempted. Flight above a rapidly building thunderstorm should not be attempted with less than 5,000 feet vertical clearance from the cloud tops. Flight above any thunderstorm should not be attempted unless the pilot is assured of vertical clearance from the clouds.

WARNING

Flights will not be planned through areas of severe thunderstorms unless there is a practical alternate route available. If no practical alternate route is available, flights may be planned through severe weather forecast areas only if all thunderstorms are avoided by at least 20 miles.

2.6.6 Turbulence.

The route of flight shall be planned to avoid areas of **forecast** extreme turbulence and, when operationally necessary, severe turbulence. At no time will a flight be planned through **known** severe or greater turbulence.

When operations require a flight to be planned through an area of **forecast** severe turbulence, contingency plans shall be made for inflight rerouting (horizontal or vertical) and/or change of destination to avoid that area of **forecast** severe turbulence if the need arises during flight.

—Turbulence reports and forecasts are provided by the approved Enhanced Weather Information System (EWINS).

• Note •

Turbulence should be considered when choosing altitudes and routes of flight.

Flight Crews and Dispatchers should maintain familiarity with the turbulence intensity scale definitions outlined in [Paragraph 4.4.3, "Turbulence"](#) to ensure PIREP accuracy and common situational awareness.