

ELECTRONIC CODE OF FEDERAL REGULATIONS

e-CFR data is current as of February 18, 2021

Title 14 → Chapter I → Subchapter F → Part 91 → Subpart B → Subject Group

Title 14: Aeronautics and Space

PART 91—GENERAL OPERATING AND FLIGHT RULES

Subpart B—Flight Rules

INSTRUMENT FLIGHT RULES

§91.167 Fuel requirements for flight in IFR conditions.

(a) No person may operate a civil aircraft in IFR conditions unless it carries enough fuel (considering weather reports and forecasts and weather conditions) to—

(1) Complete the flight to the first airport of intended landing;

(2) Except as provided in paragraph (b) of this section, fly from that airport to the alternate airport; and

(3) Fly after that for 45 minutes at normal cruising speed or, for helicopters, fly after that for 30 minutes at normal cruising speed.

(b) Paragraph (a)(2) of this section does not apply if:

(1) Part 97 of this chapter prescribes a standard instrument approach procedure to, or a special instrument approach procedure has been issued by the Administrator to the operator for, the first airport of intended landing; and

(2) Appropriate weather reports or weather forecasts, or a combination of them, indicate the following:

(i) *For aircraft other than helicopters.* For at least 1 hour before and for 1 hour after the estimated time of arrival, the ceiling will be at least 2,000 feet above the airport elevation and the visibility will be at least 3 statute miles.

(ii) *For helicopters.* At the estimated time of arrival and for 1 hour after the estimated time of arrival, the ceiling will be at least 1,000 feet above the airport elevation, or at least 400 feet above the lowest applicable approach minima, whichever is higher, and the visibility will be at least 2 statute miles.

[Doc. No. 98-4390, 65 FR 3546, Jan. 21, 2000]

§91.169 IFR flight plan: Information required.

(a) *Information required.* Unless otherwise authorized by ATC, each person filing an IFR flight plan must include in it the following information:

- (1) Information required under §91.153 (a) of this part;
- (2) Except as provided in paragraph (b) of this section, an alternate airport.

(b) Paragraph (a)(2) of this section does not apply if :

(1) Part 97 of this chapter prescribes a standard instrument approach procedure to, or a special instrument approach procedure has been issued by the Administrator to the operator for, the first airport of intended landing; and

(2) Appropriate weather reports or weather forecasts, or a combination of them, indicate the following:

(i) *For aircraft other than helicopters.* For at least 1 hour before and for 1 hour after the estimated time of arrival, the ceiling will be at least 2,000 feet above the airport elevation and the visibility will be at least 3 statute miles.

(ii) *For helicopters.* At the estimated time of arrival and for 1 hour after the estimated time of arrival, the ceiling will be at least 1,000 feet above the airport elevation, or at least 400 feet above the lowest applicable approach minima, whichever is higher, and the visibility will be at least 2 statute miles.

(c) *IFR alternate airport weather minima.* Unless otherwise authorized by the Administrator, no person may include an alternate airport in an IFR flight plan unless appropriate weather reports or weather forecasts, or a combination of them, indicate that, at the estimated time of arrival at the alternate airport, the ceiling and visibility at that airport will be at or above the following weather minima:

(1) If an instrument approach procedure has been published in part 97 of this chapter, or a special instrument approach procedure has been issued by the Administrator to the operator, for that airport, the following minima:

(i) *For aircraft other than helicopters:* The alternate airport minima specified in that procedure, or if none are specified the following standard approach minima:

(A) *For a precision approach procedure.* Ceiling 600 feet and visibility 2 statute miles.

(B) *For a nonprecision approach procedure.* Ceiling 800 feet and visibility 2 statute miles.

(ii) *For helicopters:* Ceiling 200 feet above the minimum for the approach to be flown, and visibility at least 1 statute mile but never less than the minimum visibility for the approach to be flown, and

(2) If no instrument approach procedure has been published in part 97 of this chapter and no special instrument approach procedure has been issued by the Administrator to the

and the special instrument approach procedure has been issued by the Administrator to the operator, for the alternate airport, the ceiling and visibility minima are those allowing descent from the MEA, approach, and landing under basic VFR.

(d) *Cancellation.* When a flight plan has been activated, the pilot in command, upon canceling or completing the flight under the flight plan, shall notify an FAA Flight Service Station or ATC facility.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91-259, 65 FR 3546, Jan. 21, 2000]

§91.171 VOR equipment check for IFR operations.

(a) No person may operate a civil aircraft under IFR using the VOR system of radio navigation unless the VOR equipment of that aircraft—

(1) Is maintained, checked, and inspected under an approved procedure; or

(2) Has been operationally checked within the preceding 30 days, and was found to be within the limits of the permissible indicated bearing error set forth in paragraph (b) or (c) of this section.

(b) Except as provided in paragraph (c) of this section, each person conducting a VOR check under paragraph (a)(2) of this section shall—

(1) Use, at the airport of intended departure, an FAA-operated or approved test signal or a test signal radiated by a certificated and appropriately rated radio repair station or, outside the United States, a test signal operated or approved by an appropriate authority to check the VOR equipment (the maximum permissible indicated bearing error is plus or minus 4 degrees); or

(2) Use, at the airport of intended departure, a point on the airport surface designated as a VOR system checkpoint by the Administrator, or, outside the United States, by an appropriate authority (the maximum permissible bearing error is plus or minus 4 degrees);

(3) If neither a test signal nor a designated checkpoint on the surface is available, use an airborne checkpoint designated by the Administrator or, outside the United States, by an appropriate authority (the maximum permissible bearing error is plus or minus 6 degrees); or

(4) If no check signal or point is available, while in flight—

(i) Select a VOR radial that lies along the centerline of an established VOR airway;

(ii) Select a prominent ground point along the selected radial preferably more than 20 nautical miles from the VOR ground facility and maneuver the aircraft directly over the point at a reasonably low altitude; and

(iii) Note the VOR bearing indicated by the receiver when over the ground point (the maximum permissible variation between the published radial and the indicated bearing is 6 degrees).

(c) If dual system VOR (units independent of each other except for the antenna) is installed in the aircraft, the person checking the equipment may check one system against the other in place of the check procedures specified in paragraph (b) of this section. Both systems shall be tuned to the same VOR ground facility and note the indicated bearings to that station. The maximum permissible variation between the two indicated bearings is 4 degrees.

(d) Each person making the VOR operational check, as specified in paragraph (b) or (c) of this section, shall enter the date, place, bearing error, and sign the aircraft log or other record. In addition, if a test signal radiated by a repair station, as specified in paragraph (b)(1) of this section, is used, an entry must be made in the aircraft log or other record by the repair station certificate holder or the certificate holder's representative certifying to the bearing transmitted by the repair station for the check and the date of transmission.

(Approved by the Office of Management and Budget under control number 2120-0005)

§91.173 ATC clearance and flight plan required.

No person may operate an aircraft in controlled airspace under IFR unless that person has—

- (a) Filed an IFR flight plan; and
- (b) Received an appropriate ATC clearance.

§91.175 Takeoff and landing under IFR.

(a) *Instrument approaches to civil airports.* Unless otherwise authorized by the FAA, when it is necessary to use an instrument approach to a civil airport, each person operating an aircraft must use a standard instrument approach procedure prescribed in part 97 of this chapter for that airport. This paragraph does not apply to United States military aircraft.

(b) *Authorized DA/DH or MDA.* For the purpose of this section, when the approach procedure being used provides for and requires the use of a DA/DH or MDA, the authorized DA/DH or MDA is the highest of the following:

- (1) The DA/DH or MDA prescribed by the approach procedure.
- (2) The DA/DH or MDA prescribed for the pilot in command.

(3) The DA/DH or MDA appropriate for the aircraft equipment available and used during the approach.

(c) *Operation below DA/DH or MDA.* Except as provided in §91.176 of this chapter, where a DA/DH or MDA is applicable, no pilot may operate an aircraft, except a military aircraft of the United States, below the authorized MDA or continue an approach below the authorized DA/DH unless—

(1) The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and for operations conducted under part 121 or part 135 unless that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing;

(2) The flight visibility is not less than the visibility prescribed in the standard instrument approach being used; and

(3) Except for a Category II or Category III approach where any necessary visual reference requirements are specified by the Administrator, at least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(i) The approach light system, except that the pilot may not descend below 100 feet above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable.

(ii) The threshold.

(iii) The threshold markings.

(iv) The threshold lights.

(v) The runway end identifier lights.

(vi) The visual glideslope indicator.

(vii) The touchdown zone or touchdown zone markings.

(viii) The touchdown zone lights.

(ix) The runway or runway markings.

(x) The runway lights.

(d) *Landing*. No pilot operating an aircraft, except a military aircraft of the United States, may land that aircraft when—

(1) For operations conducted under §91.176 of this part, the requirements of paragraphs (a)(3)(iii) or (b)(3)(iii), as applicable, of that section are not met; or

(2) For all other operations under this part and parts 121, 125, 129, and 135, the flight visibility is less than the visibility prescribed in the standard instrument approach procedure being used.

(e) *Missed approach procedures*. Each pilot operating an aircraft, except a military aircraft of the United States, shall immediately execute an appropriate missed approach procedure when either of the following conditions exist:

(1) Whenever operating an aircraft pursuant to paragraph (c) of this section or §91.176 of this part, and the requirements of that paragraph or section are not met at either of the following times:

(i) When the aircraft is being operated below MDA; or

(ii) Upon arrival at the missed approach point, including a DA/DH where a DA/DH is specified and its use is required, and at any time after that until touchdown.

(2) Whenever an identifiable part of the airport is not distinctly visible to the pilot during a circling maneuver at or above MDA, unless the inability to see an identifiable part of the airport results only from a normal bank of the aircraft during the circling approach.

(f) *Civil airport takeoff minimums.* This paragraph applies to persons operating an aircraft under part 121, 125, 129, or 135 of this chapter.

(1) Unless otherwise authorized by the FAA, no pilot may takeoff from a civil airport under IFR unless the weather conditions at time of takeoff are at or above the weather minimums for IFR takeoff prescribed for that airport under part 97 of this chapter.

(2) If takeoff weather minimums are not prescribed under part 97 of this chapter for a particular airport, the following weather minimums apply to takeoffs under IFR:

(i) For aircraft, other than helicopters, having two engines or less—1 statute mile visibility.

(ii) For aircraft having more than two engines— $\frac{1}{2}$ statute mile visibility.

(iii) For helicopters— $\frac{1}{2}$ statute mile visibility.

(3) Except as provided in paragraph (f)(4) of this section, no pilot may takeoff under IFR from a civil airport having published obstacle departure procedures (ODPs) under part 97 of this chapter for the takeoff runway to be used, unless the pilot uses such ODPs or an alternative procedure or route assigned by air traffic control.

(4) Notwithstanding the requirements of paragraph (f)(3) of this section, no pilot may takeoff from an airport under IFR unless:

(i) For part 121 and part 135 operators, the pilot uses a takeoff obstacle clearance or avoidance procedure that ensures compliance with the applicable airplane performance operating limitations requirements under part 121, subpart I or part 135, subpart I for takeoff at that airport; or

(ii) For part 129 operators, the pilot uses a takeoff obstacle clearance or avoidance procedure that ensures compliance with the airplane performance operating limitations prescribed by the State of the operator for takeoff at that airport.

(g) *Military airports.* Unless otherwise prescribed by the Administrator, each person operating a civil aircraft under IFR into or out of a military airport shall comply with the instrument approach procedures and the takeoff and landing minimum prescribed by the military authority having jurisdiction of that airport.

(h) *Comparable values of RVR and ground visibility.* (1) Except for Category II or Category III minimums, if RVR minimums for takeoff or landing are prescribed in an instrument approach procedure, but RVR is not reported for the runway of intended operation, the RVR minimum shall be converted to ground visibility in accordance with the table in paragraph (h)(2) of this section and shall be the visibility minimum for takeoff or landing on that runway.

(2)

RVR (feet)	Visibility (statute miles)
1,600	$\frac{1}{4}$
2,400	$\frac{1}{2}$
3,200	$\frac{5}{8}$
4,000	$\frac{3}{4}$
4,500	$\frac{7}{8}$
5,000	1
6,000	$1\frac{1}{4}$

(i) *Operations on unpublished routes and use of radar in instrument approach procedures.* When radar is approved at certain locations for ATC purposes, it may be used not only for surveillance and precision radar approaches, as applicable, but also may be used in conjunction with instrument approach procedures predicated on other types of radio navigational aids. Radar vectors may be authorized to provide course guidance through the segments of an approach to the final course or fix. When operating on an unpublished route or while being radar vectored, the pilot, when an approach clearance is received, shall, in addition to complying with §91.177, maintain the last altitude assigned to that pilot until the aircraft is established on a segment of a published route or instrument approach procedure unless a different altitude is assigned by ATC. After the aircraft is so established, published altitudes apply to descent within each succeeding route or approach segment unless a different altitude is assigned by ATC. Upon reaching the final approach course or fix, the pilot may either complete the instrument approach in accordance with a procedure approved for the facility or continue a surveillance or precision radar approach to a landing.

(j) *Limitation on procedure turns.* In the case of a radar vector to a final approach course or fix, a timed approach from a holding fix, or an approach for which the procedure specifies "No PT," no pilot may make a procedure turn unless cleared to do so by ATC.

(k) *ILS components.* The basic components of an ILS are the localizer, glide slope, and outer marker, and, when installed for use with Category II or Category III instrument approach procedures, an inner marker. The following means may be used to substitute for the outer marker: Compass locator; precision approach radar (PAR) or airport surveillance radar (ASR); DME, VOR, or nondirectional beacon fixes authorized in the standard

instrument approach procedure; or a suitable RNAV system in conjunction with a fix identified in the standard instrument approach procedure. Applicability of, and substitution for, the inner marker for a Category II or III approach is determined by the appropriate 14 CFR part 97 approach procedure, letter of authorization, or operations specifications issued to an operator.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91-267, 66 FR 21066, Apr. 27, 2001; Amdt. 91-281, 69 FR 1640, Jan. 9, 2004; Amdt. 91-296, 72 FR 31678, June 7, 2007; Amdt. 91-306, 74 FR 20205, May 1, 2009; Docket FAA-2013-0485, Amdt. 91-345, 81 FR 90172, Dec. 13, 2016; Amdt. 91-345B, 83 FR 10568, Mar. 12, 2018]

§91.176 Straight-in landing operations below DA/DH or MDA using an enhanced flight vision system (EFVS) under IFR.

(a) *EFVS operations to touchdown and rollout.* Unless otherwise authorized by the Administrator to use an MDA as a DA/DH with vertical navigation on an instrument approach procedure, or unless paragraph (d) of this section applies, no person may conduct an EFVS operation in an aircraft, except a military aircraft of the United States, at any airport below the authorized DA/DH to touchdown and rollout unless the minimums used for the particular approach procedure being flown include a DA or DH, and the following requirements are met:

(1) *Equipment.* (i) The aircraft must be equipped with an operable EFVS that meets the applicable airworthiness requirements. The EFVS must:

(A) Have an electronic means to provide a display of the forward external scene topography (the applicable natural or manmade features of a place or region especially in a way to show their relative positions and elevation) through the use of imaging sensors, including but not limited to forward-looking infrared, millimeter wave radiometry, millimeter wave radar, or low-light level image intensification.

(B) Present EFVS sensor imagery, aircraft flight information, and flight symbology on a head up display, or an equivalent display, so that the imagery, information and symbology are clearly visible to the pilot flying in his or her normal position with the line of vision looking forward along the flight path. Aircraft flight information and flight symbology must consist of at least airspeed, vertical speed, aircraft attitude, heading, altitude, height above ground level such as that provided by a radio altimeter or other device capable of providing equivalent performance, command guidance as appropriate for the approach to be flown, path deviation indications, flight path vector, and flight path angle reference cue. Additionally, for aircraft other than rotorcraft, the EFVS must display flare prompt or flare guidance.

(C) Present the displayed EFVS sensor imagery, attitude symbology, flight path vector, and flight path angle reference cue, and other cues, which are referenced to the EFVS sensor imagery and external scene topography, so that they are aligned with, and scaled to, the external view.

(D) Display the flight path angle reference cue with a pitch scale. The flight path angle reference cue must be selectable by the pilot to the desired descent angle for the approach and be sufficient to monitor the vertical flight path of the aircraft.

(E) Display the EFVS sensor imagery, aircraft flight information, and flight symbology such that they do not adversely obscure the pilot's outside view or field of view through the cockpit window.

(F) Have display characteristics, dynamics, and cues that are suitable for manual control of the aircraft to touchdown in the touchdown zone of the runway of intended landing and during rollout.

(ii) When a minimum flightcrew of more than one pilot is required, the aircraft must be equipped with a display that provides the pilot monitoring with EFVS sensor imagery. Any symbology displayed may not adversely obscure the sensor imagery of the runway environment.

(2) *Operations.* (i) The pilot conducting the EFVS operation may not use circling minimums.

(ii) Each required pilot flightcrew member must have adequate knowledge of, and familiarity with, the aircraft, the EFVS, and the procedures to be used.

(iii) The aircraft must be equipped with, and the pilot flying must use, an operable EFVS that meets the equipment requirements of paragraph (a)(1) of this section.

(iv) When a minimum flightcrew of more than one pilot is required, the pilot monitoring must use the display specified in paragraph (a)(1)(ii) to monitor and assess the safe conduct of the approach, landing, and rollout.

(v) The aircraft must continuously be in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers.

(vi) The descent rate must allow touchdown to occur within the touchdown zone of the runway of intended landing.

(vii) Each required pilot flightcrew member must meet the following requirements—

(A) A person exercising the privileges of a pilot certificate issued under this chapter, any person serving as a required pilot flightcrew member of a U.S.-registered aircraft, or any person serving as a required pilot flightcrew member for a part 121, 125, or 135 operator, must be qualified in accordance with part 61 and, as applicable, the training, testing, and qualification provisions of subpart K of this part, part 121, 125, or 135 of this chapter that apply to the operation; or

(B) Each person acting as a required pilot flightcrew member for a foreign air carrier subject to part 129, or any person serving as a required pilot flightcrew member of a foreign registered aircraft, must be qualified in accordance with the training requirements of the civil aviation authority of the State of the operator for the EFVS operation to be conducted.

(viii) A person conducting operations under this part must conduct the operation in accordance with a letter of authorization for the use of EFVS unless the operation is

conducted in an aircraft that has been issued an experimental certificate under §21.191 of this chapter for the purpose of research and development or showing compliance with regulations, or the operation is being conducted by a person otherwise authorized to conduct EFVS operations under paragraphs (a)(2)(ix) through (xii) of this section. A person applying to the FAA for a letter of authorization must submit an application in a form and manner prescribed by the Administrator.

(ix) A person conducting operations under subpart K of this part must conduct the operation in accordance with management specifications authorizing the use of EFVS.

(x) A person conducting operations under part 121, 129, or 135 of this chapter must conduct the operation in accordance with operations specifications authorizing the use of EFVS.

(xi) A person conducting operations under part 125 of this chapter must conduct the operation in accordance with operations specifications authorizing the use of EFVS or, for a holder of a part 125 letter of deviation authority, a letter of authorization for the use of EFVS.

(xii) A person conducting an EFVS operation during an authorized Category II or Category III operation must conduct the operation in accordance with operations specifications, management specifications, or a letter of authorization authorizing EFVS operations during authorized Category II or Category III operations.

(3) *Visibility and visual reference requirements.* No pilot operating under this section or §§121.651, 125.381, or 135.225 of this chapter may continue an approach below the authorized DA/DH and land unless:

(i) The pilot determines that the enhanced flight visibility observed by use of an EFVS is not less than the visibility prescribed in the instrument approach procedure being used.

(ii) From the authorized DA/DH to 100 feet above the touchdown zone elevation of the runway of intended landing, any approach light system or both the runway threshold and the touchdown zone are distinctly visible and identifiable to the pilot using an EFVS.

(A) The pilot must identify the runway threshold using at least one of the following visual references—

(1) The beginning of the runway landing surface;

(2) The threshold lights; or

(3) The runway end identifier lights.

(B) The pilot must identify the touchdown zone using at least one of the following visual references—

(1) The runway touchdown zone landing surface;

(2) The touchdown zone lights;

(2) The touchdown zone lights;

(3) The touchdown zone markings; or

(4) The runway lights.

(iii) At 100 feet above the touchdown zone elevation of the runway of intended landing and below that altitude, the enhanced flight visibility using EFVS must be sufficient for one of the following visual references to be distinctly visible and identifiable to the pilot—

(A) The runway threshold;

(B) The lights or markings of the threshold;

(C) The runway touchdown zone landing surface; or

(D) The lights or markings of the touchdown zone.

(4) *Additional requirements.* The Administrator may prescribe additional equipment, operational, and visibility and visual reference requirements to account for specific equipment characteristics, operational procedures, or approach characteristics. These requirements will be specified in an operator's operations specifications, management specifications, or letter of authorization authorizing the use of EFVS.

(b) *EFVS operations to 100 feet above the touchdown zone elevation.* Except as specified in paragraph (d) of this section, no person may conduct an EFVS operation in an aircraft, except a military aircraft of the United States, at any airport below the authorized DA/DH or MDA to 100 feet above the touchdown zone elevation unless the following requirements are met:

(1) *Equipment.* (i) The aircraft must be equipped with an operable EFVS that meets the applicable airworthiness requirements.

(ii) The EFVS must meet the requirements of paragraph (a)(1)(i)(A) through (F) of this section, but need not present flare prompt, flare guidance, or height above ground level.

(2) *Operations.* (i) The pilot conducting the EFVS operation may not use circling minimums.

(ii) Each required pilot flightcrew member must have adequate knowledge of, and familiarity with, the aircraft, the EFVS, and the procedures to be used.

(iii) The aircraft must be equipped with, and the pilot flying must use, an operable EFVS that meets the equipment requirements of paragraph (b)(1) of this section.

(iv) The aircraft must continuously be in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers.

(v) For operations conducted under part 121 or part 135 of this chapter, the descent rate must allow touchdown to occur within the touchdown zone of the runway of intended landing.

(vi) Each required pilot flightcrew member must meet the following requirements—

(A) A person exercising the privileges of a pilot certificate issued under this chapter, any person serving as a required pilot flightcrew member of a U.S.-registered aircraft, or any person serving as a required pilot flightcrew member for a part 121, 125, or 135 operator, must be qualified in accordance with part 61 and, as applicable, the training, testing, and qualification provisions of subpart K of this part, part 121, 125, or 135 of this chapter that apply to the operation; or

(B) Each person acting as a required pilot flightcrew member for a foreign air carrier subject to part 129, or any person serving as a required pilot flightcrew member of a foreign registered aircraft, must be qualified in accordance with the training requirements of the civil aviation authority of the State of the operator for the EFVS operation to be conducted.

(vii) A person conducting operations under subpart K of this part must conduct the operation in accordance with management specifications authorizing the use of EFVS.

(viii) A person conducting operations under part 121, 129, or 135 of this chapter must conduct the operation in accordance with operations specifications authorizing the use of EFVS.

(ix) A person conducting operations under part 125 of this chapter must conduct the operation in accordance with operations specifications authorizing the use of EFVS or, for a holder of a part 125 letter of deviation authority, a letter of authorization for the use of EFVS.

(x) A person conducting an EFVS operation during an authorized Category II or Category III operation must conduct the operation in accordance with operations specifications, management specifications, or a letter of authorization authorizing EFVS operations during authorized Category II or Category III operations.

(3) *Visibility and Visual Reference Requirements.* No pilot operating under this section or §121.651, §125.381, or §135.225 of this chapter may continue an approach below the authorized MDA or continue an approach below the authorized DA/DH and land unless:

(i) The pilot determines that the enhanced flight visibility observed by use of an EFVS is not less than the visibility prescribed in the instrument approach procedure being used.

(ii) From the authorized MDA or DA/DH to 100 feet above the touchdown zone elevation of the runway of intended landing, any approach light system or both the runway threshold and the touchdown zone are distinctly visible and identifiable to the pilot using an EFVS.

(A) The pilot must identify the runway threshold using at least one of the following visual references-

(1) The beginning of the runway landing surface;

(2) The threshold lights; or

(3) The runway end identifier lights.

(B) The pilot must identify the touchdown zone using at least one of the following visual references—

(1) The runway touchdown zone landing surface;

(2) The touchdown zone lights;

(3) The touchdown zone markings; or

(4) The runway lights.

(iii) At 100 feet above the touchdown zone elevation of the runway of intended landing and below that altitude, the flight visibility must be sufficient for one of the following visual references to be distinctly visible and identifiable to the pilot without reliance on the EFVS—

(A) The runway threshold;

(B) The lights or markings of the threshold;

(C) The runway touchdown zone landing surface; or

(D) The lights or markings of the touchdown zone.

(4) Compliance Date. Beginning on March 13, 2018, a person conducting an EFVS operation to 100 feet above the touchdown zone elevation must comply with the requirements of paragraph (b) of this section.

(c) *Public aircraft certification and training requirements.* A public aircraft operator, other than the U.S. military, may conduct an EFVS operation under paragraph (a) or (b) of this section only if:

(1) The aircraft meets all of the civil certification and airworthiness requirements of paragraph (a)(1) or (b)(1) of this section, as applicable to the EFVS operation to be conducted; and

(2) The pilot flightcrew member, or any other person who manipulates the controls of an aircraft during an EFVS operation, meets the training, recent flight experience and refresher training requirements of §61.66 of this chapter applicable to EFVS operations.

(d) *Exception for Experimental Aircraft.* The requirement to use an EFVS that meets the applicable airworthiness requirements specified in paragraphs (a)(1)(i), (a)(2)(iii), (b)(1)(i), and (b)(2)(iii) of this section does not apply to operations conducted in an aircraft issued an experimental certificate under §21.191 of this chapter for the purpose of research and development or showing compliance with regulations, provided the Administrator has determined that the operations can be conducted safely in accordance with operating limitations issued for that purpose.

[Docket FAA-2013-0485, Amdt. 91-345, 81 FR 90172, Dec. 13, 2016; 82 FR 2193, Jan. 9, 2017]

§91.177 Minimum altitudes for IFR operations.

(a) *Operation of aircraft at minimum altitudes.* Except when necessary for takeoff or landing, or unless otherwise authorized by the FAA, no person may operate an aircraft under IFR below—

(1) The applicable minimum altitudes prescribed in parts 95 and 97 of this chapter. However, if both a MEA and a MOCA are prescribed for a particular route or route segment, a person may operate an aircraft below the MEA down to, but not below, the MOCA, provided the applicable navigation signals are available. For aircraft using VOR for navigation, this applies only when the aircraft is within 22 nautical miles of that VOR (based on the reasonable estimate by the pilot operating the aircraft of that distance); or

(2) If no applicable minimum altitude is prescribed in parts 95 and 97 of this chapter, then—

(i) In the case of operations over an area designated as a mountainous area in part 95 of this chapter, an altitude of 2,000 feet above the highest obstacle within a horizontal distance of 4 nautical miles from the course to be flown; or

(ii) In any other case, an altitude of 1,000 feet above the highest obstacle within a horizontal distance of 4 nautical miles from the course to be flown.

(b) *Climb.* Climb to a higher minimum IFR altitude shall begin immediately after passing the point beyond which that minimum altitude applies, except that when ground obstructions intervene, the point beyond which that higher minimum altitude applies shall be crossed at or above the applicable MCA.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91-296, 72 FR 31678, June 7, 2007; Amdt. 91-315, 75 FR 30690, June 2, 2010]

§91.179 IFR cruising altitude or flight level.

Unless otherwise authorized by ATC, the following rules apply—

(a) *In controlled airspace.* Each person operating an aircraft under IFR in level cruising flight in controlled airspace shall maintain the altitude or flight level assigned that aircraft by ATC. However, if the ATC clearance assigns “VFR conditions on-top,” that person shall maintain an altitude or flight level as prescribed by §91.159.

(b) *In uncontrolled airspace.* Except while in a holding pattern of 2 minutes or less or while turning, each person operating an aircraft under IFR in level cruising flight in uncontrolled airspace shall maintain an appropriate altitude as follows:

(1) When operating below 18,000 feet MSL and—

(i) On a magnetic course of zero degrees through 179 degrees, any odd thousand foot MSL altitude (such as 3,000, 5,000, or 7,000); or

(ii) On a magnetic course of 180 degrees through 359 degrees, any even thousand foot MSL altitude (such as 2,000, 4,000, or 6,000).

(2) When operating at or above 18,000 feet MSL but below flight level 290, and—

(i) On a magnetic course of zero degrees through 179 degrees, any odd flight level (such as 190, 210, or 230); or

(ii) On a magnetic course of 180 degrees through 359 degrees, any even flight level (such as 180, 200, or 220).

(3) When operating at flight level 290 and above in non-RVSM airspace, and—

(i) On a magnetic course of zero degrees through 179 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 290 (such as flight level 290, 330, or 370); or

(ii) On a magnetic course of 180 degrees through 359 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 310 (such as flight level 310, 350, or 390).

(4) When operating at flight level 290 and above in airspace designated as Reduced Vertical Separation Minimum (RVSM) airspace and—

(i) On a magnetic course of zero degrees through 179 degrees, any odd flight level, at 2,000-foot intervals beginning at and including flight level 290 (such as flight level 290, 310, 330, 350, 370, 390, 410); or

(ii) On a magnetic course of 180 degrees through 359 degrees, any even flight level, at 2000-foot intervals beginning at and including flight level 300 (such as 300, 320, 340, 360, 380, 400).

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91-276, 68 FR 61321, Oct. 27, 2003; 68 FR 70133, Dec. 17, 2003; Amdt. 91-296, 72 FR 31679, June 7, 2007]

§91.180 Operations within airspace designated as Reduced Vertical Separation Minimum airspace.

(a) Except as provided in paragraph (b) of this section, no person may operate a civil aircraft in airspace designated as Reduced Vertical Separation Minimum (RVSM) airspace unless:

(1) The operator and the operator's aircraft comply with the minimum standards of appendix G of this part; and

(2) The operator is authorized by the Administrator or the country of registry to conduct such operations.

(b) The Administrator may authorize a deviation from the requirements of this section.

[Amdt. 91-276, 68 FR 70133, Dec. 17, 2003]

§91.181 Course to be flown.

Unless otherwise authorized by ATC, no person may operate an aircraft within controlled airspace under IFR except as follows:

(a) On an ATS route, along the centerline of that airway.

(b) On any other route, along the direct course between the navigational aids or fixes defining that route. However, this section does not prohibit maneuvering the aircraft to pass well clear of other air traffic or the maneuvering of the aircraft in VFR conditions to clear the intended flight path both before and during climb or descent.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91-296, 72 FR 31679, June 7, 2007]

§91.183 IFR communications.

Unless otherwise authorized by ATC, the pilot in command of each aircraft operated under IFR in controlled airspace must ensure that a continuous watch is maintained on the appropriate frequency and must report the following as soon as possible—

(a) The time and altitude of passing each designated reporting point, or the reporting points specified by ATC, except that while the aircraft is under radar control, only the passing of those reporting points specifically requested by ATC need be reported;

(b) Any unforecast weather conditions encountered; and

(c) Any other information relating to the safety of flight.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91-296, 72 FR 31679, June 7, 2007]

§91.185 IFR operations: Two-way radio communications failure.

(a) *General.* Unless otherwise authorized by ATC, each pilot who has two-way radio communications failure when operating under IFR shall comply with the rules of this section.

(b) *VFR conditions.* If the failure occurs in VFR conditions, or if VFR conditions are encountered after the failure, each pilot shall continue the flight under VFR and land as soon as practicable.

(c) *IFR conditions.* If the failure occurs in IFR conditions, or if paragraph (b) of this section cannot be complied with, each pilot shall continue the flight according to the

following:

- (1) *Route.* (i) By the route assigned in the last ATC clearance received;
 - (ii) If being radar vectored, by the direct route from the point of radio failure to the fix, route, or airway specified in the vector clearance;
 - (iii) In the absence of an assigned route, by the route that ATC has advised may be expected in a further clearance; or
 - (iv) In the absence of an assigned route or a route that ATC has advised may be expected in a further clearance, by the route filed in the flight plan.
- (2) *Altitude.* At the highest of the following altitudes or flight levels for the route segment being flown:
 - (i) The altitude or flight level assigned in the last ATC clearance received;
 - (ii) The minimum altitude (converted, if appropriate, to minimum flight level as prescribed in §91.121(c)) for IFR operations; or
 - (iii) The altitude or flight level ATC has advised may be expected in a further clearance.
 - (3) *Leave clearance limit.* (i) When the clearance limit is a fix from which an approach begins, commence descent or descent and approach as close as possible to the expect-further-clearance time if one has been received, or if one has not been received, as close as possible to the estimated time of arrival as calculated from the filed or amended (with ATC) estimated time en route.
 - (ii) If the clearance limit is not a fix from which an approach begins, leave the clearance limit at the expect-further-clearance time if one has been received, or if none has been received, upon arrival over the clearance limit, and proceed to a fix from which an approach begins and commence descent or descent and approach as close as possible to the estimated time of arrival as calculated from the filed or amended (with ATC) estimated time en route.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989; Amdt. 91-211, 54 FR 41211, Oct. 5, 1989]

§91.187 Operation under IFR in controlled airspace: Malfunction reports.

(a) The pilot in command of each aircraft operated in controlled airspace under IFR shall report as soon as practical to ATC any malfunctions of navigational, approach, or communication equipment occurring in flight.

(b) In each report required by paragraph (a) of this section, the pilot in command shall include the—

- (1) Aircraft identification;

(2) Equipment affected;

(3) Degree to which the capability of the pilot to operate under IFR in the ATC system is impaired; and

(4) Nature and extent of assistance desired from ATC.

§91.189 Category II and III operations: General operating rules.

(a) No person may operate a civil aircraft in a Category II or III operation unless—

(1) The flight crew of the aircraft consists of a pilot in command and a second in command who hold the appropriate authorizations and ratings prescribed in §61.3 of this chapter;

(2) Each flight crewmember has adequate knowledge of, and familiarity with, the aircraft and the procedures to be used; and

(3) The instrument panel in front of the pilot who is controlling the aircraft has appropriate instrumentation for the type of flight control guidance system that is being used.

(b) Unless otherwise authorized by the Administrator, no person may operate a civil aircraft in a Category II or Category III operation unless each ground component required for that operation and the related airborne equipment is installed and operating.

(c) *Authorized DA/DH.* For the purpose of this section, when the approach procedure being used provides for and requires the use of a DA/DH, the authorized DA/DH is the highest of the following:

(1) The DA/DH prescribed by the approach procedure.

(2) The DA/DH prescribed for the pilot in command.

(3) The DA/DH for which the aircraft is equipped.

(d) Except as provided in §91.176 of this part or unless otherwise authorized by the Administrator, no pilot operating an aircraft in a Category II or Category III approach that provides and requires the use of a DA/DH may continue the approach below the authorized decision height unless the following conditions are met:

(1) The aircraft is in a position from which a descent to a landing on the intended runway can be made at a normal rate of descent using normal maneuvers, and where that descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing.

(2) At least one of the following visual references for the intended runway is distinctly visible and identifiable to the pilot:

(i) The approach light system, except that the pilot may not descend below 100 feet above the touchdown zone elevation using the approach lights as a reference unless the red terminating bars or the red side row bars are also distinctly visible and identifiable.

(ii) The threshold.

(iii) The threshold markings.

(iv) The threshold lights.

(v) The touchdown zone or touchdown zone markings.

(vi) The touchdown zone lights.

(e) Except as provided in §91.176 of this part or unless otherwise authorized by the Administrator, each pilot operating an aircraft shall immediately execute an appropriate missed approach whenever, prior to touchdown, the requirements of paragraph (d) of this section are not met.

(f) No person operating an aircraft using a Category III approach without decision height may land that aircraft except in accordance with the provisions of the letter of authorization issued by the Administrator.

(g) Paragraphs (a) through (f) of this section do not apply to operations conducted by certificate holders operating under part 121, 125, 129, or 135 of this chapter, or holders of management specifications issued in accordance with subpart K of this part. Holders of operations specifications or management specifications may operate a civil aircraft in a Category II or Category III operation only in accordance with their operations specifications or management specifications, as applicable.

[Doc. No. 18334, 54 FR 34294, Aug. 18, 1989, as amended by Amdt. 91-280, 68 FR 54560, Sept. 17, 2003; Amdt. 91-296, 72 FR 31679, June 7, 2007; Docket FAA-2013-0485, Amdt. 91-345, 81 FR 90175, Dec. 13, 2016]

§91.191 Category II and Category III manual.

(a) Except as provided in paragraph (c) of this section, after August 4, 1997, no person may operate a U.S.-registered civil aircraft in a Category II or a Category III operation unless —

(1) There is available in the aircraft a current and approved Category II or Category III manual, as appropriate, for that aircraft;

(2) The operation is conducted in accordance with the procedures, instructions, and limitations in the appropriate manual; and

(3) The instruments and equipment listed in the manual that are required for a particular Category II or Category III operation have been inspected and maintained in accordance with the maintenance program contained in the manual.

(b) Each operator must keep a current copy of each approved manual at its principal base of operations and must make each manual available for inspection upon request by the Administrator.

(c) This section does not apply to operations conducted by a certificate holder operating under part 121 or part 135 of this chapter or a holder of management specifications issued in accordance with subpart K of this part.

[Doc. No. 26933, 61 FR 34560, July 2, 1996, as amended by Amdt. 91-280, 68 FR 54560, Sept. 17, 2003]

§91.193 Certificate of authorization for certain Category II operations.

The Administrator may issue a certificate of authorization authorizing deviations from the requirements of §§91.189, 91.191, and 91.205(f) for the operation of small aircraft identified as Category A aircraft in §97.3 of this chapter in Category II operations if the Administrator finds that the proposed operation can be safely conducted under the terms of the certificate. Such authorization does not permit operation of the aircraft carrying persons or property for compensation or hire.

§§91.195-91.199 [Reserved]

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