

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 paragraph (1) of this section, 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 approach slope 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 paragraph (1) of this section, the requirements of (1)(4) of this section are not met; or
- (2) For all other part 91 operations and parts 121, 125, 129, and 135 operations, 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) or (1) of this section and the requirements of that paragraph 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.

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(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—½ statute mile visibility.

(iii) For helicopters—½ 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	¼
2,400	½
3,200	⅝
4,000	¾
4,500	⅞
5,000	1
6,000	1¼

(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.

(l) *Approach to straight-in landing operations below DH, or MDA using an enhanced flight vision system (EFVS).* For straight-in instrument approach procedures other than Category II or Category III, no pilot operating under this section or §§ 121.651, 125.381, and 135.225 of this chapter may operate an aircraft at any airport below the authorized MDA or continue an approach below the authorized DH and land 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 of this chapter, the descent rate will allow touchdown to occur within the touchdown zone of the runway of intended landing;

(2) The pilot determines that the enhanced flight visibility observed by use of a certified enhanced flight vision system is not less than the visibility prescribed in the standard instrument approach procedure being used;

(3) The following visual references for the intended runway are distinctly visible and identifiable to the pilot using the enhanced flight vision system:

(i) The approach light system (if installed); or

(ii) The following visual references in both paragraphs (1)(3)(ii)(A) and (B) of this section:

(A) The runway threshold, identified by at least one of the following:

(1) The beginning of the runway landing surface;

(2) The threshold lights; or

(3) The runway end identifier lights.

(B) The touchdown zone, identified by at least one of the following:

(1) The runway touchdown zone landing surface;

(2) The touchdown zone lights;

(3) The touchdown zone markings; or

(4) The runway lights.

(4) 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 the following to be distinctly visible and identifiable to the pilot without reliance on the enhanced flight vision system to continue to a landing:

(i) The lights or markings of the threshold; or

(ii) The lights or markings of the touchdown zone;

(5) The pilot(s) is qualified to use an EFVS as follows—

(i) For parts 119 and 125 certificate holders, the applicable training, testing and qualification provisions of parts 121, 125, and 135 of this chapter;

(ii) For foreign persons, in accordance with the requirements of the civil aviation authority of the State of the operator; or

(iii) For persons conducting any other operation, in accordance with the applicable currency and proficiency requirements of part 61 of this chapter;

(6) For parts 119 and 125 certificate holders, and part 129 operations specifications holders, their operations

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specifications authorize use of EFVS; and

(7) The aircraft is equipped with, and the pilot uses, an enhanced flight vision system, the display of which is suitable for maneuvering the aircraft and has either an FAA type design approval or, for a foreign-registered aircraft, the EFVS complies with all of the EFVS requirements of this chapter.

(m) For purposes of this section, “enhanced flight vision system” (EFVS) is an installed airborne system comprised of the following features and characteristics:

(1) An electronic means to provide a display of the forward external scene topography (the 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, such as a forward-looking infrared, millimeter wave radiometry, millimeter wave radar, and low-light level image intensifying;

(2) The EFVS sensor imagery and aircraft flight symbology (*i.e.*, at least airspeed, vertical speed, aircraft attitude, heading, altitude, command guidance as appropriate for the approach to be flown, path deviation indications, and flight path vector, and flight path angle reference cue) are presented on a head-up display, or an equivalent display, so that they are clearly visible to the pilot flying in his or her normal position and line of vision and looking forward along the flight path, to include:

(i) The displayed EFVS imagery, attitude symbology, flight path vector, and flight path angle reference cue, and other cues, which are referenced to this imagery and external scene topography, must be presented so that they are aligned with and scaled to the external view; and

(ii) The flight path angle reference cue must be displayed with the pitch scale, selectable by the pilot to the desired descent angle for the approach, and suitable for monitoring the vertical flight path of the aircraft on approaches without vertical guidance; and

(iii) The displayed imagery and aircraft flight symbology do not adversely obscure the pilot’s outside view or field of view through the cockpit window;

(3) The EFVS includes the display element, sensors, computers and power supplies, indications, and controls. It may receive inputs from an airborne navigation system or flight guidance system; and

(4) The display characteristics and dynamics are suitable for manual control of the aircraft.

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§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