7 Developing Personal Minimums

Primary learners are—or should be—guided through initial training under the direct supervision of a qualified and competent flight instructor. Military pilots are shepherded by more experienced aviators. Air carriers and many commercial operators have extensive operations and dispatch organizations. Ironically, after initial certification there is no such *safety umbrella* for General Aviation pilots. Our least trained and experienced pilots often have the least restrictions and consequently a relatively poor safety record.

It's long been acknowledged that a new pilot certificate or rating is a "ticket to learn." After initial certification General Aviation pilots, for the most part, must set their own limits based on their training and experience, currency in type—including equipment, type of operation, and the environment.

Flight planning strategies begin with a *sound* and *realistic* assessment of personal minimums. Setting, and *adhering* to, personal minimums is an essential part of risk assessment and management. FAA minimums are just that, *minimum*. They were developed when the Piper Cub and DC-3 were "state of the art" and remain much the same today. They apply to all grades of pilots and experience levels—primary through airline transport. Personal minimums don't have to be rigid; they should be flexible based on existing and expected conditions.

Other than FAA mandated requirements, parameters in this chapter are recommendations. We'll put some objective criteria into the discussion. You are the only one that can determine if a particular flight, under specific circumstances, is safe—acceptable risk. In every sense we hold our fate in our own hands.

General Aviation pilots have a comprehensive system of professionals who provide the latest and most up-to-date weather. These are the forecasters of the National Weather Service and the specialists of the Flight Service system—if we choose to use them.

FAA Mandated Minimums

Who is responsible for establishing minimums? The FAA puts down basic “rock bottom” parameters for all pilots and operations. Pilots operating under 14 CFR 61 Subpart C Student Pilots are governed by both federal regulations and the requirements imposed by their instructor. Various flying clubs and flight schools set minimums for their members and clients. But, for the most part General Aviation operations are governed by FAA mandated minimums.

Tombstone Mentality

> At times the FAA is accused of having a “tombstone mentality.” That is, people must die before things change. This notion certainly has some basis in fact; but, like most generalizations it’s not always true—or justified. The FAA must walk a fine line between safety and overregulation. A case in point is the 1994 Roselawn, Indiana accident. This tragic accident spurred several changes in aircraft design, regulations, and weather forecast products—some of which have since been discontinued. Some would say these changes came sixty-eight lives too late. On the other hand, aircraft have been operating relatively safely in icing conditions since the 1930s. Recall the Supreme Court’s observation, “Safe does not mean risk free.”

For a additional discussion of the Roselawn, Indiana accident refer to the Case Study in ch 22, Icing.

Just what is the purpose of VFR weather minimums? Weather minimums allow enough ceiling, visibility, and cloud clearance to provide a VFR pilot with a natural horizon or ground contact in order to “keep the dirty side down;” and allow pilots to “see and avoid” terrain, obstructions, and each other. VFR weather minimums evolved in much the same way as airspace. Especially below 10,000 ft, weather minimums are virtually the same as they were in the beginning day of the Piper Cub and DC-3. With today’s higher performance aircraft *minimum* does not necessarily mean *safe*!

The FAA, at least, tries not to unnecessarily restrict aircraft operations.

Weather minimums are based on the Class of Airspace. Exactly what does airspace classification do (Beside getting us hot under the collar!?) In simplest terms *Class of Airspace* establishes VFR minimums and/or mandates pilot and/or equipment requirements. Figure 7-1 depicts Class G and Class E weather minimums.

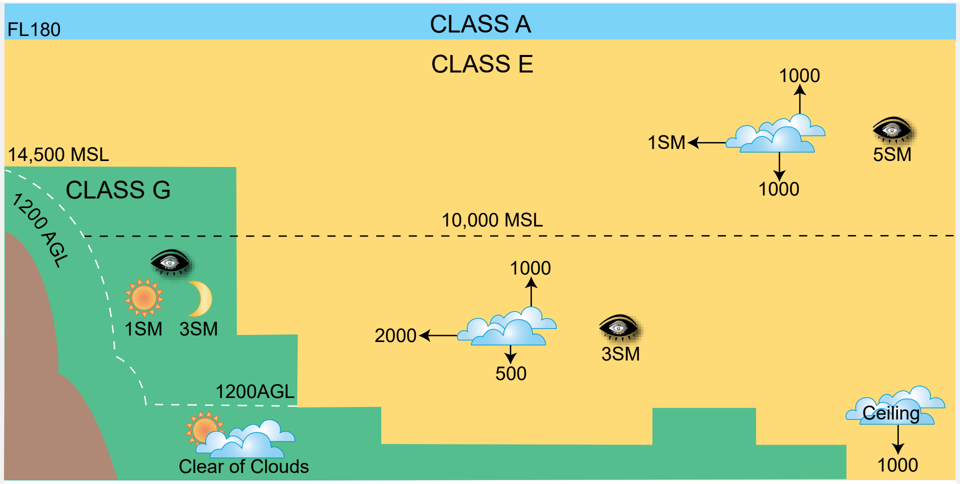

Fig. 7-1. *Class of Airspace establishes VFR minimums and/or mandates pilot and/or equipment requirements.*

In surface based Class E airspace, no person may operate an aircraft beneath a ceiling of less than 1000 ft. Class G and Class E minimums change at 10,000 ft MSL. Why? These days even the lowest performance aircraft exceed that of the Piper Cub, single engine pistons exceed the performance of the DC-3, and turbo-props—well you get the idea.

Recall the first word in the regulations is except! Weather minimums are a good example. Table 7-1 contains Class G weather minimums; exceptions are listed.

*Class G Airspace. ...The following operations may be conducted in Class G airspace below 1200 ft above the surface:

(1) Helicopter. A helicopter may be operated clear of clouds if operated at a speed that allows the pilot adequate opportunity to see any air traffic or obstruction in time to avoid a collision.

Table 7-1. *Class G Weather Minimums*

Altitude	Day	Night	Day	Night
≤1200 AGL	Clear of Clouds	1000 above, 2000 horizontal, 500 below	1 SM	3 SM*
>1200 AGL <10,000 MSL	1000 above, 2000 horizontal, 500 below		1 SM	3 SM
>1200 AGL ≥10,000 MSL	1000 above, 1 SM horizontal, 1000 below		5 SM	

§ 91.155 Basic VFR weather minimums.

Some confusion exists about to purpose and requirements of Class G (Uncontrolled) Airspace. As its generic names implies its airspace where *air traffic control* is NOT exercised. It does not mean that applicable VFR or IFR minimums/ requirements, include minimum safe altitudes, do not apply—they do!.

(2) Airplane, powered parachute, or weight-shift-control aircraft. If the visibility is less than 3 statute miles but not less than 1 statute mile during night hours and you are operating in an airport traffic pattern within 1/2 mile of the runway, you may operate an airplane, powered parachute, or weight-shift-control aircraft clear of clouds.

Refer to Fig. 7-2. VFR minimums in Class D, C, and B airspace are the same as Class E, except Class B airspace "clear of clouds." Why? Since all aircraft in Class B airspace are under "positive control," cloud clearance for "see and avoid" is not required.

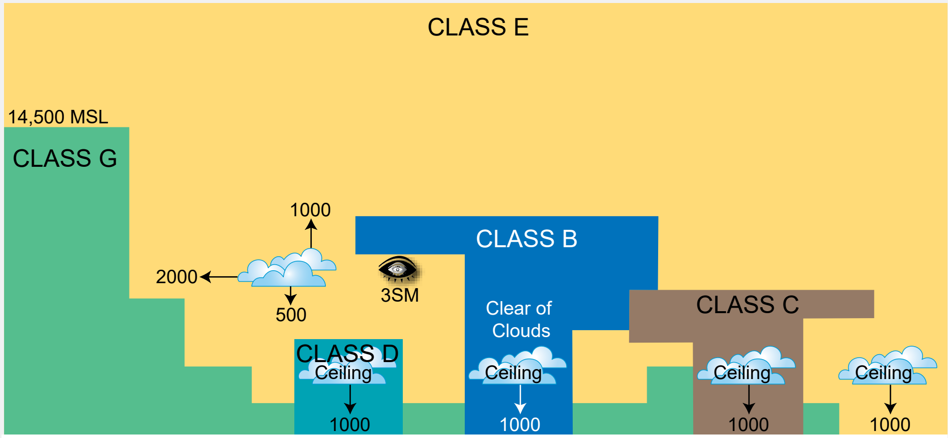

Fig. 7-2. *VFR minimums in Class D, C, and B airspace are the same as Class E, except cloud clearance in Class B airspace.*

Fixed-wing special VFR (SVFR) is normally available in surface based controlled airspace—including Class E, except in certain high density Class B airspace. When fixed-wing special VFR is not authorized the charted airport data block states: "NO SVFR." We'll specifically address Special VFR later in the chapter.

Factor Affecting Personal Minimums

When we discuss personal minimums there are several factors to consider. These include the items in Table 7-2.

Certificates and ratings are important. But when were they earned? A 20 year old commercial certificate or instrument rating may not provide enough knowledge or skills to operate in today's ATC system. Some pilots obtain an instrument rating without ever having flown in clouds. Do they have the experience to operate in actual instrument conditions? A prudent pilot without experience in "actual" instrument conditions should have another qualified, experienced pilot or flight instructor along until they become familiar and proficient with flight in actual instrument conditions.

Table 7-2. *Factors Affecting Personal Minimums.*

Training	Certificates & Ratings.
Experience	Currency; Recent Experience.
Environment	Weather; Terrain, Time of Day.
Aircraft	Time in Make/Model; Equipment
Pilot/Passengers	Physical/Psychological Condition.

Currency and recent experience are important. A pilot without either would do well to seek training from a competent instructor rather than trying to "get current" on their own. FAA recent flight experience requirements do not guarantee proficiency. (Like many aspects of aviation, it may be legal, but not safe.)

The environment consists of the weather, and an evaluation of terrain and time of day. Sparsely populated, desert, mountainous, and overwater operations all have their challenges. The time of day presents unique problems. For example, takeoff and landing in an area with few lights. Currency with the type of operation is another personal minimums factor. Here again, legal does not necessarily mean safe. If we've been recently qualified to fly at night, we would certainly want to gain experience before tackling weather close to minimums—either VFR or IFR. (Recall the JFK Jr. accident in 1999. He lost control of the airplane over water. It was a dark night with visibilities reported 5 to 8 miles in haze.)

Are we confident with our skills in the aircraft—just checked out, multiengine, complex, high performance, Technically Advance Airplane (TAA)? What about the aircraft equipment? For example: the Global Positioning System (GPS), radar, lightning detection, glass cockpit, auto pilot, and data link—including Automatic Dependent Surveillance-Broadcast (ADS-B). Are we comfortable and proficient with their operation? (If you must think, "What button or switch do I use to get that function?" It's probably too late!) If you've been trained and certified in a "Glass Cockpit" it is just as difficult to transition to "Analog Gauges." (Yes, analog; they're not power by "steam.")

data link—For our purposes data link refers to any cockpit display of digital weather information (textual or graphical) provided by an outside source.

Student v. Learner

> While often interchangeable the FAA prefers "learner" over "student." In many instances "learner" is more descriptive. For out purposes we'll refer to a person working on an initial pilot certificate (Private, Recreational, Sport, etc., for any category or class) and holding a Student Pilot Certificate as a "student pilot."

We've mentioned the pilot's physical and psychological condition. What about our passengers? A sick, uncomfortable, or annoying passenger can be a dangerous distraction. As our level of training and experience increases, we may wish to consider different minimums. As a flight instructor I tailor student minimums to their training and experience levels.

Case Study

> I had a student flying out of Lancaster's Fox Field, in California's Mojave Desert—where the wind never blows less than 30 knots. We trained in strong, gusty surface winds. When the student became proficient, I increased his minimums.

Establishing Personal Minimums

FAA weather minimums address ceiling, visibility, and cloud clearance. Let's not forget we must also comply with minimum safe altitudes, fuel requirements, and alternates. In addition to these parameters pilots must also consider wind and weather. Within these parameters there are two categories: VFR and IFR, and a sub-set Special VFR.

In addition to the requirements of 14 CFR 91 *General Operating and Flight Rules*, Student, Sport, and Recreational pilots have limitations contained in 14 CFR 61 *Certification: Pilots, Flight Instructors, and Ground Instructors*. These requirements address night flying, minimum visibility, and the prohibition of flying without visual reference to the surface.

Personal minimums, as described in this chapter, establish reasonable initial requirements. Remember, like FAA minimums, these are *lower limits*, and we should consider higher restrictions based on factors described in the previous sections. Personal minimums should be flexible and may be modified based on existing and expected circumstances.

VFR Minimums

Student pilot minimums contained in Table 7-3 reflect the minimums used in our U.S. Air Force Aero Club where I first started flying in 1966. I've used these throughout my career as a flight instructor; and, in fact, they are the minimums we use at Ahart Aviation in Livermore, California. They've stood the test of time.

Table 7-3. *Student Pilot Minimums*

PILOT	CROSS COUNTRY[1]			SURFACE WINDS			LOCAL[2]		PATTERN[2]	
	DAY	NIGHT	WINDS ALOFT	CROSS WIND	SUS-TAINED	GUSTS	DAY	NIGHT	DAY	NIGHT
STUDENT	5000/7	NA	25 KT	7 KT	15 KT	NONE	3000/5	NA	2000/3	NA

[1]Maximum allowable fuel.
[2]ETE plus 1 hour reserve or 2 hours, whichever is greater.

Note

All heights are AGL; all visibilities SM (5000/7-cloud bases five thousand ft AGL, visibility seven SM).

For student pilots cloud bases refer to any cloud layer (FEW, SCT, BKN, OVC). Cross country winds aloft are limited to 25 knots. This should limit student exposure to light, possibly locally moderate mechanical turbulence.

Caution

The venture effect (ch 16, Enroute Forecasts Products/ch 21, Turbulence) accelerates winds over mountains and passes. Expect higher than forecast winds and an increase in turbulence through these areas.

Surface winds must be limited to those a student pilot is comfortable and competent to handle. (As a flight instructor I always gave students specific crosswind limitations and always with an alternate should they be exceeded.) Depending on a student's proficiency and training an instructor may wish to modify these limits. Pattern flying requires no clouds below 2000 ft. Recall cloud clearance in all, but Class G airspace requires the pilot to remain at least 500 ft below any cloud formation. With most traffic patterns at 1000 ft AGL, this requires cloud bases at or above 1500 ft. As shown in Table 7-3, student night solo is prohibited, even though permitted by regulations. Why? Because it's considered an unacceptable risk.

Aviation forecasts relate cloud bases to AGL or MSL heights, it's an important factor in determining whether cross county weather meets "personal minimums." We'll talk more about this in Part Three: Weather Resources.

Like weather minimums, the FAA specifies minimum "rock bottom" fuel requirements: 30 minutes DAY; 45 minutes NIGHT. Our personal minimum fuel requirements are more realistic. Local flights require fuel reserves of 1 hour—Estimated Time Enroute (ETE) + 1 hour—or 2 hours, whichever is greater. For cross country flights maximum allowable fuel is mandated. Although not specifically stated, students on solo cross country flights should have a minimum of 2 hours fuel reserve. When minimum fuel reserves are reached, the pilot must land and refuel. On certain airplanes filling the tanks to the "tabs" (or other reference points) may be required to accommodate additional passengers and baggage. Most aircraft are designed to be flexible between fuel load, passengers, and baggage. Pilots must understand and apply these limitations.

Case Study

> I had flown to Lancaster, California's Fox Field in the Mojave desert with a student. While debriefing the flight in the coffee shop my student pointed out an airplane veering off the runway. We rushed out to see if we could assist.
>
> The student pilot became excited during the takeoff run and inadvertently tried to maintain direction control with the wrong rudder. (We've never done that. Have we?) He asked me to taxi the airplane to the ramp. I told him I would ride with him, but insisted he taxi the airplane.

It was mid-afternoon and we discussed the problem, and I found the pilot had only an hour and half of fuel for an hour flight to Oxnard—along the coast. I persuaded him to "top off" before proceeding. I don't understand how an instructor would sign off a student for such a flight. With California's notorious coastal marine layer, arriving along the coast with minimum fuel is folly—as the pilot in a previous Case Study discovered the hard way.

Private pilot personal minimums are specified in Table 7-4. Cloud cover requirements refer to a ceiling. Lower ceiling and visibility minimums reflect the training, experience, and certification required to earn the certificate. Night minimums indicate the additional risk of such operations. However, pilots must consider other factors such as a moonless night and sparsely populated terrain. Under such conditions VFR flight may be too risky.

Table 7-4. *Private Pilot Minimums*

PILOT	CROSS COUNTRY[1]			SURFACE WINDS			LOCAL[2]		PATTERN[2]	
	DAY	NIGHT	WINDS ALOFT	CROSS WIND	SUS-TAINED	GUSTS	DAY	NIGHT	DAY	NIGHT
PRIVATE	4000/5	7000/7	25 KT	POH[3]	20 KT	10 KT	FAR[4]	4000/3	FAR[4]	1500/3

Note: All heights are AGL; all visibilities SM.
[1]Maximum allowable fuel.
[2]ETE plus 1 hour reserve or 2 hours, whichever is more.
[3]Pilots Operating Handbook (POH) maximum demonstrated crosswind component.
[4]14 CFR Part 91 minimums.

Cross country winds aloft remain limited to 25 knots. This should limit exposure to light, possibly locally moderate mechanical turbulence. Crosswind component is restricted to the maximum specified in the Pilot's Operating Handbook (POH). Local and pattern work are only limited by FAA mandated requirements. Both preceding parameters must be governed by the elements described in the Factors Affecting Personal Minimums section and *sound judgment*.

Note

Most airplane flight manuals specify maximum demonstrated crosswind component. Every year pilots attempt to test these values—some succeed, others don't. We must know our limitations and that of our airplane.

Recommended minimum fuel requirements remain the same. However, lower fuel reserves may be appropriate based on the Factors Affecting Personal Minimums. For example, we typically limit fuel in our Mooney to three and one half hours rather than full, due to weight and balance issues. This is satisfactory for most flights up to two and one half hours, based on weather and the availability of alternate airports. (Other examples will be provided in subsequent sections and chapters.)

Table 7-5. *Commercial Pilot Minimums*

PILOT	CROSS COUNTRY[1]			SURFACE WINDS			LOCAL[2]		PATTERN[2]	
	DAY	NIGHT	WINDS ALOFT	CROSS WIND	SUS-TAINED	GUSTS	DAY	NIGHT	DAY	NIGHT
COMMERCIAL	FAR[4]	4000/3	35 KT	POH[3]	25 KT	10 KT	FAR[4]	4000/3	FAR[4]	1500/3

Note: All heights are AGL; all visibilities SM.
[1]Maximum allowable fuel.
[2]ETE plus 1 hour reserve or 2 hours, whichever is more.
[3]Pilots Operating Handbook (POH) maximum demonstrated crosswind component.
[4]14 CFR Part 91 minimums.

Table 7-5 depicts commercial pilot personal minimums. Commercial cross country winds aloft limits are suggested at 35 knots. This should limit exposure to light to moderate mechanical turbulence. Surface wind parameters are based on the additional training, experience, and certification required for the commercial pilot certificate. Fuel requirements remain the same as private pilots but have the same flexibility.

A private pilot with years of experience and thousands of hours in a specific make and model of aircraft may be competent to exercise limits in the commercial category. The maximum cross wind component should be based on the pilot's training and experience. Pilots should consider the personal minimums described as a starting point. The relatively high local and cross country cloud cover/ceiling recommendations are due to the high terrain in the western United States. In the mid-west and along the coasts—in the absence of mountainous terrain—these would normally be lower. (Our Air Force Aero Club in England had ceiling minimums of 2500 ft because of the flat terrain.) This was certainly sufficient for operations in eastern England—and may be suitable for flights over flat terrain.

Special VFR

In order not to unnecessarily restrict aircraft operations special VFR evolved. Recall that basic VFR weather minimums allow pilots to fly visually; a visual horizon or contact with the ground, and enough visibility to see and avoid terrain, obstructions, and other aircraft. Pilots can safely operate visually in less than basic VFR—as reflected in Class G weather minimums. Special VFR operations come with increased risk. Pilots have been known to become disoriented and lose aircraft control in visibilities as much as five miles or more. We are still responsible for determining if the flight can be safely conducted. Should we wish to add special VFR to our "flight bag" we should obtain training from a competent instructor in operations under special VFR—in actual special VFR weather conditions.

Special VFR operations often come with increased risk.

Special VFR (§91.157 Special VFR Weather Minimums) allows us to fly in controlled airspace clear of clouds with one mile visibility. Under these conditions someone else—Air Traffic Control—must ensure separation from other aircraft. It remains our responsibility to maintain terrain and obstruction clearance, and minimum safe altitudes. Special VFR operations are only permitted in surface based controlled airspace—except certain Class B airspace. Special VFR is intended to allow a pilot to depart or enter surface based controlled airspace when conditions are less than basic VFR, but safe enough for contact flying. To operate special VFR at night the pilot and aircraft must be equipped and certified for IFR.

Prior to departure or before entering less than basic VFR weather we must obtain a clearance from the ATC facility having jurisdiction over the airspace. The pilot must initiate the request for special VFR.

Case Study

> A pilot was attempting to land at Brackett Field, Pomona, California with visibility less than basic VFR. The tower asked the pilot for his "intentions." After repeated radio transmissions, the controller asked: "Would you like

something special?

It might seem that special VFR is of little practical use. This is not necessarily the case. Special VFR has specific and practical applications. This may occur in metropolitan areas where surface visibilities are reduced to less than three miles in haze, smoke, and fog, but remain above one mile. Typically, visibilities improve significantly a few hundred feet above the surface. This procedure may also allow a pilot to depart controlled airspace into uncontrolled airspace, with its reduced VFR requirements. Be careful, special VFR can be a clearance to nowhere! The provisions of special VFR do not relieve us from maintaining appropriate minimum safe altitudes.

Case Study

> Fresno, California was reporting visibility one mile, ceiling 400 overcast. A pilot departed special VFR and flew 15 miles before tangling with high tension wires.

Pilots must report on top or leaving surface based controlled airspace. ATC provides separation, so when the pilot fails to report, the airspace must be "sterilized" until the aircraft is located. This often causes extensive, unnecessary delays.

Case Study

> Departing Long Beach, California one morning with a surface visibility of 2 1/2 miles, we requested and received a special VFR clearance. We were cleared out of Class D airspace to the north, "Climb and maintain VFR conditions." "Report VFR on top or leaving Class D airspace." As soon as we topped the haze, we had almost unlimited visibility, reported on top, and were cleared to leave the frequency.

Arrivals are conducted the same way. The pilot reports over the airport, or other prominent landmark, in VFR conditions above the visibility restriction, and contacts the control facility for a special VFR clearance.

Special VFR might be more efficient than an IFR approach.

Case Study

> Santa Barbara, California was reporting 10 miles visibility, ceiling 500 broken. Even though the ceiling was less than VFR, we could see the runway. We requested special VFR and made a straight-in approach, rather than a 15 mile round trip, which would have been required to execute the ILS approach.

Special VFR can be used when an instrument approach is not available.

Case Study

> Our destination was Crescent City, California. The VOR was out of service, eliminating an IFR approach. The weather was one mile visibility ceiling 500 ft overcast. Finding a hole near the coastline, we requested special VFR. Because of the low ceiling and visibility, I slowed the Mooney to approach speed, about 100 knots.

There was no sane reason to be blasting along in these conditions at 160 knots. We knew the tops were at 1500 ft; if the ceiling or visibility dropped, we could climb through the clouds to on top. ATC was providing separation, so there shouldn't be any other aircraft in the airspace.

Case Study

> I was flying from Ontario to my home airport Whiteman Airpark in the Los Angeles Basin one rainy afternoon. I had obtained clearance through Burbank's Class C airspace when the controller advised visibility was 2 1/2 miles in rain and fog and requested my intentions. I requested and received a special VFR clearance out of Class C airspace to the northwest. I reported leaving Class C airspace and landed at my intended destination, which was in Class G airspace. This was a case where restricted visibility resulted in the less than basic VFR, rather than a ceiling.

Delays, extensive at times, should be anticipated when conditions are below basic VFR;

IFR operations have priority. We can never count on making it in "special VFR." A solid VFR alternate or two should always be within reach. We'll expand on these limitations in the last section.

IFR Minimums

FAA IFR minimums cover all categories of IFR operations. Personal instrument minimums in Table 7-6 have been developed for single engine reciprocating and limited performance small twin engine airplanes. These are lower limits. (FAA published IFR takeoff and departure and landing minimums may be higher—apply whichever is greater.) These values should allow in case of engine failure about two minutes and a radius of operation of about a mile after breaking out of the clouds.

Table 7-6. *Instrument Minimums*

PILOT	CROSS COUNTRY[1]			SURFACE WINDS			LOCAL[2]		PATTERN[2]	
	DAY	NIGHT	WINDS ALOFT	CROSS WIND	SUS-TAINED	GUSTS	DAY	NIGHT	DAY	NIGHT
COMMERCIAL	FAR[4]	4000/3	35 KT	POH[3]	25 KT	10 KT	FAR[4]	4000/3	FAR[4]	1500/3
INSTRUMENT	600/2[5]	1000/2[6]								

Note: All heights are AGL; all visibilities SM.

[1]Maximum allowable fuel.
[2]ETE plus 1 hour reserve or 2 hours, whichever is more.
[3]Pilots Operating Handbook (POH) maximum demonstrated crosswind component.
[4]14 CFR Part 91 minimums.
[5]Or, FAA published minimums, including climb gradients, whichever is greater
.[6]Night circling Not Authorized.

Day time operations require a minimum ceiling of 600 ft and visibility 2 SM. Night operations require a 1000 ft ceiling, visibility 2 SM. Personal minimums prohibit night circling approaches, since they present additional unique hazards. (If you think you might need to fly night circling approaches obtain instruction from a competent instructor during night, instrument conditions—including missed approaches at every point during the circling maneuver. Apply commercial pilot winds aloft and surface

wind limits and cross country fuel recommendations. Consider higher reserves based on other factors—such as weather (turbulence, icing, and thunderstorms).
14 CFR Part 91 *General Operating and Flight Rules* allows considerable IFR operational latitude. We've all seen single engine departures under Part 91 below takeoff minimums and even flight schools conducting approaches with less than landing minimums—even zero-zero conditions! Are these operations legal? Well, yes and no. They're not specifically prohibited under 14 CFR 91.175 *Takeoff and landing under IFR*. But like VFR weather minimums other provisions of the regulations apply, such as cloud clearance requirements and minimum safe altitudes. For example, 14 CFR 91.119 "An altitude allowing, if a power unit fails, an emergency landing without undue hazard to person or property on the surface." Let's not forget the FAA's "catch all" rule, 14 CFR 91.13 *Careless or reckless operation*. In the event of an engine failure under these conditions could anyone argue that the pilot: operated "...an aircraft in a careless or reckless manner...." Think about it!

Multiengine airplanes offer a degree of additional safety in the event of an engine failure. Or do they? As we'll see in the section on high density altitude operations, single engine performance for many small multiengine airplanes offers little more than a "glide extender" under many operational circumstances. Pilots must consider single engine missed approach performance—or the lack there-of.

Turbulence, Icing, and Thunderstorms

In addition to ceiling and visibility parameters, we must consider certain weather phenomena. Forecasts for these phenomena are addressed in Part Three: Weather Resources; other considerations are presented in Part Four: Strategies for Interpreting and Flying the Weather.

Turbulence

Forecasts or indicators for MODERATE, and especially SEVERE, turbulence are strong NO GO indicators. Winds aloft parameters should limit exposure. There are caveats to this parameter. Passenger comfort should be of prime concern. Can you imagine trying to control the airplane in severe turbulence with sick passengers!

Icing

Icing for VFR operations? Yes! How much frost is safe for takeoff? Easy, NONE! Any amount of frost, ice, or snow is NO GO. VFR, as well as IFR, operations can experience airframe, induction, and instrument icing. Expect icing anytime operating in visible moisture with temperatures below freezing, especially freezing drizzle and freezing rain which almost always mandates a NO GO decision. Ice is to be avoided in aircraft NOT certified for flight in icing conditions. Pilots who fly non-certified aircraft into icing must, in every sense of the words, have the “right stuff.” Because they become test pilots! Flight within 2000 ft of the freezing level, in visible moisture, is a strong NO GO indicator.

Thunderstorms

If you fly within 20 miles of a thunderstorm or its anvil, you’re playing Russian Roulette. Thunderstorms can be obscured by haze or clouds. If you can’t see and avoid thunderstorms don’t GO, unless you have storm avoidance equipment (weather radar or lightning detection) and have been trained how to use it. These are storm avoidance systems—NOT storm penetration! (We’ll go into the specific use and limitations of thunderstorm avoidance in ch 23, Thunderstorm Avoidance.) Air Traffic Control can provide weather avoidance assistance. Some controllers do a better job than others. Remember the controller’s primary tasks are the separation of aircraft and expeditious flow of traffic. If it’s busy, especially in congested airspace, their ability to separate you from weather is problematic. And, ground based weather radar has limitations, especially in the west. ATC should never be your primary source of storm avoidance.

Case Study

> We departed St. Louis for Joplin, Missouri. Ceiling and visibility were marginal, but within limits. Thunderstorms were on either side of the route, but beyond the 20 mile parameter. About 50 miles southwest of St. Louis the weather began to deteriorate. Conditions were now going below personal minimums, and the only safe decision was to divert to Jefferson City. Several hours after landing, thunderstorms moved through Jefferson City—positive verification of the correct decision to divert and land.

The following day the weather at Jefferson City was visibility 4 miles, ceiling 800 ft, tops forecast at 6000 ft with conditions improving from the west. The freezing level was forecast to be 8000 with no thunderstorms—a stable weather system. This was an almost ideal IFR flight. We were in and out of the clouds at 6000 and had a beautiful, uneventful flight to Wichita, Kansas.

Application

We've discussed FAA mandated requirements. 14 CFR Part 91 personal minimums are difficult to quantify. We don't want to be unnecessarily restrictive. Table 7-7 does not take into consideration suitable performance based on existing and expected conditions, nor certain types of operation—such as Special VFR—or other factors described in Table 7-2 Factors Affecting Personal Minimums.

Table 7-7. *Personel Minimums*

PILOT	CROSS COUNTRY[1]			SURFACE WINDS			LOCAL[2]		PATTERN[2]	
	DAY	NIGHT	WINDS ALOFT	CROSS WIND	SUS-TAINED	GUSTS	DAY	NIGHT	DAY	NIGHT
STUDENT	5000/7	NA	25 KT	7 KT	15 KT	NONE	3000/5	NA	2000/3	NA
PRIVATE	4000/5	7000/7	25 KT	POH[3]	20 KT	10 KT	FAR[4]	4000/3	FAR[4]	1500/3
COMMERCIAL	FAR[4]	4000/3	35 KT	POH[3]	25 KT	10 KT	FAR[4]	4000/3	FAR[4]	1500/3
Dual VFR	FAR[4]	4000/5	35 KT	POH[3]	PD[7]	PD[7]	FAR[4]	4000/4	FAR[4]	1500/3
Dual IFR	FAR[4]	800/2	35 KT	POH[3]	PD[7]	PD[7]				
INSTRUMENT	600/2[5]	1000/2[6]								

Notes: All heights are AGL; all visibilities SM.
NA—Not Authorized

[1]Maximum allowable fuel.
[2]ETE plus 1 hour reserve or 2 hours, whichever is more.
[3]Pilots Operating Handbook (POH) maximum demonstrated crosswind component.
[4]14 CFR Part 91 minimums.
[5]Or, FAA published minimums, including climb gradients, whichever is greater.
[6]Night circling Not Authorized.
[7]Instructor Pilot's discretion (PD).

Note

In Table 7-7 dual instructional flights are based 14 CFR Part 91 minimums. Surface winds are left to the discretion of the instructor pilot (PD). This leaves considerable latitude for the instructor. For any instructional flight instructors must use their training, experience, and *judgment* to challenge, but not overwhelm learners.

In the "acceptable risk" determination consider the remaining factors affecting personal minimums. These include currency and recent experience, weather phenomena which include, but are not limited to, time of day, density altitude, precipitation, turbulence, icing, and thunderstorms, time in make and model and equipment, and pilot and passenger considerations. On any individual flight these may increase or decrease our personal minimums and influence our GO-NO GO decision. Like the weather, there are few, if any, always or never when dealing with personal minimums. Guidelines are contained in Table 7-8.

Table 7-8. *Acceptable Risk*

Flight Category		Ceiling	Visibility	Alternate	Fuel[1]
VFR	Night[2]				+1:15
Special VFR[3]	Departure			≥3000/5	+1:30
	Arrival			≥3000/5	+1:30
IFR	New[4]	+400	+1 SM	≥3000/5	+1:00
	<10 HR in Type	+400	+1 SM	≥3000/5	+1:00
	<5 HR PIC Inst.	+400	+1 SM	≥1000/3	+1:00
	Good to Poor			≥1000/3	+1:00
	TAA[5]	+400	+1 SM	≥1000/3	+1:00
	Recent[6]	+400	+1 SM	≥1000/3	+1:00
	Night Circling[2]	+500	+1 SM	≥2000/3	+1:00

[1]Above FAA minimums.
[2]NA over scarcely populated areas.
[3]NA until pilot receives training in SVFR weather.
[4]Less than 10 hours PIC in type and/or less than 5 hours PIC actual instrument.
[5]Or, training/certification in TAA, flying analog or non-TAA aircraft.
[6]Less than double FAA recent flight experience requirements.

These are recommendations. Table 7-8 provides for increased ceiling and visibility, and alternate weather requirements above those established in the personal minimums Table 7-7, and increased fuel reserves above FAA mandated minimums.

Pilots planning night operations into and out of airports in sparsely populated areas should receive training from a competent instructor in night operations over sparsely populated areas. These individuals should consider a minimum of 10 hours night PIC and an additional 10 takeoffs and landings above initial certification. And an additional hour and 15 minutes of fuel, above FAA minimums (for a total of 2 hours reserve), is recommended.

Case Study

> A newly certificated private pilot was flying himself and friends to the Harris Ranch airport in the California's western San Joaquin Valley. Upon departure the pilot flew into terrain. Ceiling and visibility were not a factor. Sparsely lighted terrain and the pilot's limited experience were cited as the probable cause of this Controlled Flight Into Terrain (CFIT) accident.

Once we've received training in Special VFR operations "acceptable risk" requires a suitable VFR alternate. For SVFR departures or arrivals this calls for an alternate with a ceiling at or above 3000 ft and visibility at or above 5 SM. Also note the additional fuel reserve recommendations. During the day: Destination + Alternate + 2 Hours. At night IFR alternate requirements should be used.

Acceptable risk dictates higher minimums for newly certificated or rated pilots. (Commercial operators employ such restrictions and we should too.) These requirements apply to pilots without 10 hours Pilot-in-Command (PIC) in type and/or less than 5 hours PIC actual instrument time. Increased alternate and fuel requirements also apply.

It has long been acknowledged that new or low time pilots "get their feet wet" (or maybe it's their airplane's wet) flying from Poor to Good weather. (A good example would be the Case Study of the flight from Jefferson City, Missouri to Wichita, Kansas.) The opposite is also true. Pilots flying from Good to Poor weather—along with increase ceiling and visibility—would be well advised to increase alternate minimums and fuel reserves.

Technically Advance Airplane (TAA)

> Since the introduction of GPS and "glass cockpit" electronic flight displays the FAA has introduced the Technically Advanced Airplane (TAA) concept. The latest defines a TAA (14 CFR 61.1) as "an airplane equipped with an electronically advanced avionics system." The definition has changed over the years. Its generic definition is meant to accommodate future technologies. As provided in 14 CFR 61.129(j) TAA contain the following equipment:
>
> 1. An electronic primary flight display (PFD).
> 2. An electronic multi-function display (MFD) with a GPS moving map.
> 3. A two-axis autopilot with navigation and heading systems.
>
> For the purposes of Table 7-8 Acceptable Risk, we'll consider any or all of the above to be a TAA airplane.

If you did not receive your training and certification in a TAA, acceptable risk entails higher minimums. These values should be considered cumulative. A newly rated pilot transitioning into a TAA should increase ceiling by 800 ft and visibility by 2 miles! These requirements apply equally to a pilot trained and certified in a TAA transitioning to an Analog (non-TAA/Glass Cockpit) airplane.

A prudent pilot will increase basic FAA experience requirements and seek supplemental instruction from a competent instructor until they become seasoned pilots. Here's the rub. When, if ever, does a pilot become seasoned? Certainly, pilots who fly less than 100 hours and less than 10 hours PIC actual instrument a year should consider these limits.

Pilots planning night circling approaches, especially over sparsely populated areas, should consider applying the same limitations and training requirements recommended for VFR night operations. In addition, they should receive training from a competent instructor in actual night circling maneuvers.

There are several things we can do to mitigate risk. Fly with a second pilot—certified, current, and competent for the type of operation or a flight instructor. Don't accept a flight in an aircraft for which we are not completely comfortable and competent. For example, don't accept a TAA airplane if you're not completely trained; nor, a non-TAA airplane if you don't have the training for Analog equipment. There is some middle ground: If you're not completely familiar with the equipment, don't file with a GPS suffix. Plan non-GPS procedures and don't accept GPS approaches—even at the insistence of ATC.

Case Study

We were bringing a Cessna 172 from Alabama to California. It had an IFR certified GPS. But, neither of us were familiar with the unit. However, we were able to use the GPS as a substitute for DME. So, we filed as a "/A" (ICAO FP COM/NAV: SD) and navigated using VORs. In a second instance, I was getting instrument current in our Mooney which is equipped with a Garmin 430. However, it had been so long since I flew IFR with the GPS, I wasn't comfortable using it for the approach. I planned and executed an LDA approach and utilized the GPS as a DME substitute.

Warning

In our discussion we haven't touched on emergency procedures—such as night engine failure, loss of communication and navigational equipment, or primary flight instruments, which should be part of every pilot's continuing training.

Throughout the remainder of the material, we'll continue to apply ADM and personal minimums to flight operations.


The FAA puts down basic
“rock bottom” parameters
for all pilots and operations.
Legal does not necessarily
mean safe!