



# GO-AROUND PROCEDURE - IFR

## 1. Introduction

This documentation deals with going-around when flying under instrument flight rules. It will in particular describe how a missed approach is structured and it will bring practical aspects about going-around when operating under IFR.

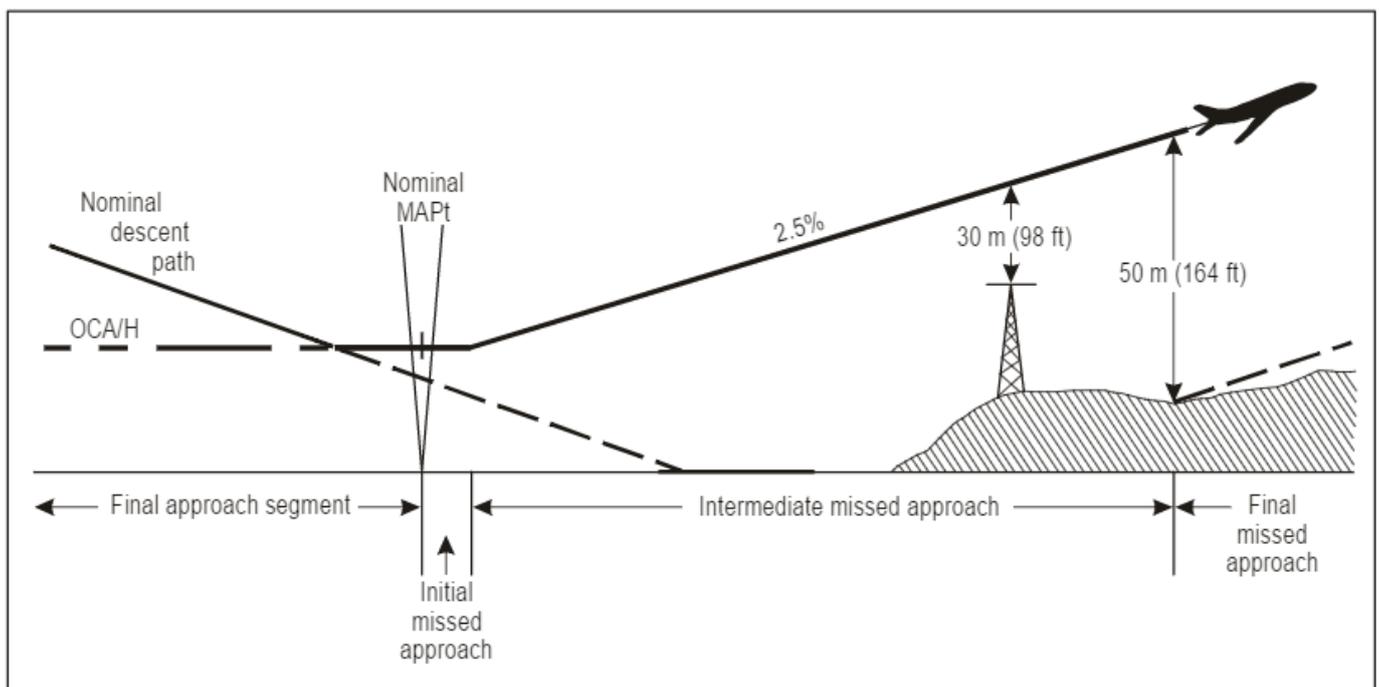
The expression “missed approach” only applies to IFR flights and is irrelevant to VFR flights. Note that a specific document exists for flights under visual flight rules.

## 2. Regulations

### 2.1. Missed approach structure

Extract from **ICAO Doc 8168**: “During the missed approach phase of the instrument approach procedure, the pilot is faced with the demanding task of changing the aircraft configuration, attitude and altitude. For this reason, the design of the missed approach has been kept as simple as possible and consists of three phases (initial, intermediate and final).”

Missed approach should neither be initiated lower than the applicable (M)DA/H, nor before reaching the missed approach point (MAPt).



### 2.1.1. Missed approach point – MAPt

The missed approach point is the waypoint at the end of the final approach segment and at the beginning of the initial missed approach segment.

It may be defined as:

- the moment at which the aircraft will reach the DA/H at the end of the descent during a precision approach (ILS, MLS, GLS, APV)
- a radio-navigation means (NDB/VOR/Marker), a specified radial-distance from a VOR/DME or a NDB/DME, or a GPS waypoint ; during non-precision approach (LOC, VOR, NDB, LNAV).

Some non-precision approaches, in particular those to be performed without DME support, include a time-based missed approach point.

The pilot will start a timer when passing the final approach point. It will compare it to a provided or computed timer until the missed approach point.

When reaching the MAPt, it is expected from the pilot that he will perform the missed approach procedure immediately if he did not acquire visual references.

Failure to comply will lead to fly below safety altitudes in relation with obstacle protection.

### 2.1.2. Initial segment

The initial segment of the missed approach begins at the missed approach point and ends when the aircraft has established its climb – Start Of Climb (SOC).

No turn can be prescribed during this phase as it is assumed that guidance equipment is not used.

The concentration of the pilots should be focused on establishing the climb and changing the aircraft configuration (landing gear, flaps).

### 2.1.3. Intermediate segment

The intermediate segment begins at the start of climb and ends at the first point where 50 meters / 164 feet of obstacle clearance can be maintained.

A track change of maximum 15° can be prescribed as the pilot is required to begin track correction.

### 2.1.4. Final segment

The final segment begins at the point where an OCH of 50 meters can be maintained and extends until a new approach, a hold or a diversion is initiated.

Turns may be prescribed in this phase.

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## 2.2. Types of missed approaches

### 2.2.1. Straight-in missed approach

Whenever practicable, the missed approach will lead to fly along the extended runway centerline until being vectored back by the ATC

Example: ILS35R - Lyon LFLL

LFLL/LYS ST EXPERY		JEPPESEN		LYON, FRANCE	
9 SEP 16 (11-2A) Eff 15 Sep		ILS or LOC Rwy 35L			
ATIS	LYON Approach West Sector	East Sector	SAINT EX Tower	Ground	
126.175	136.075	125.8	120.450	121.825	
LOC SAN	Final Apch Crs	GS	ILS DA(H)	Apt Elev 821'	
110.75	354°	2550' (1736')	1014' (200')	Rwy 814'	
<b>MISSED APCH:</b> Climb STRAIGHT AHEAD to 5000' and expect radar vectors. <b>MISSED APCH WITH COMM FAILURE:</b> Climb STRAIGHT AHEAD. At D1.8 LSE turn RIGHT (MAX 185 KT) to intercept and follow R-015 LSE climbing to 5000'. At D29.0 LSE turn RIGHT to join RIPTU holding at 5000'. Acceleration segment not calculated.					
Alt Set: hPa		Rwy Elev: 29 hPa	Trans level: By ATC		Trans alt: 5000'

### 2.2.2. Turning missed approach

When proven that the terrain is a factor, a turning missed approach will be established.

Example: LOC18 - Calvi LFKC

LFKC/CLY ST CATHERINE		JEPPESEN		CALVI, FRANCE	
15 JAN 16 (11-1) CAT A, B & C		LOC Rwy 18			
ATIS	BASTIA Approach (up to FL 200)	*CALVI Tower	*Ground		
131.175	123.825	123.2	121.7		
LOC CLI	Final Apch Crs	Procedure Alt	DA/MDA(H) Refer to Minimums	Apt Elev 210'	
109.5	178°	2300' (2235')		Rwy 65'	
<b>MISSED APCH:</b> As soon as the aircraft is established on climb, turn RIGHT onto 332° climbing to 4000' to intercept and follow 302° from Lctr to CALNO, and as directed. Climb to 2000' prior to level acceleration.					
Alt Set: hPa		Rwy Elev: 2 hPa	Trans level: By ATC		Trans alt: 5000'

### 2.2.3. Subtype: Turning point missed approach

A straight-in missed approach may include a turning point during the final segment at which a turn will be initiated. This waypoint will be a radio navigation means, an RNAV waypoint, or a radial/distance waypoint.

Example: VORDME 05L/R - Mexico MMMX  
Initiate a turn when passing 9.0DME of MEX VOR.

MMMX/MEX BENITO JUAREZ INTL		JEPPESEN		MEXICO CITY, MEXICO	
25 MAR 16 (13-1) Eff 31 Mar		VOR DME Rwy 05L/R			
D-ATIS	MEXICO Terminal (R) (APP)	MEXICO Approach (R) Final	MEXICO Tower	Ground	
127.65	129.6	121.2	119.75 118.55 118.7	North	South Southwest
VOR MEX	Final Apch Crs	Minimum Alt PLAZA	MDA(H)	Apt Elev 7316'	
115.9	053°	8800' (1484')	7900' (584')		
<b>MISSED APCH:</b> Climb outbound on MEX VOR R-053 to D9.0 MEX, turn LEFT to intercept inbound SLM VOR R-140 to SLM VOR, join holding to 12000 in accordance with ATC instructions.					
<b>MISSED APCH:</b> Max Distance Outbound Track D9.0 MEX					
Alt Set: IN (MB on req)		Trans level: FL 195		Trans alt: 18500'	
1. Restriction: At SMO VOR reduce speed to 160 KIAS.					

## 2.2.4. Subtype: Turning altitude missed approach

A straight-in missed approach may include a turning altitude during the final segment at which a turn will be initiated. This altitude ensures generally that a safe return to the IAF may be done.

Example: NDB 25R - Jakarta WIII  
Initiate a turn when passing 2000 feet.

WIII/CGK SOEKARNO-HATTA INTL		JEPPESEN 23 OCT 15 (16-4)		JAKARTA, INDONESIA NDB Rwy 25R		
ATIS	*JAKARTA Arrival (R)	JAKARTA Approach (R) West East		SOEKARNO-HATTA Tower North South	*NORTH Ground	
126.85	125.45	119.75	127.9	118.2 120.25	121.6	
LOM CR 242	Final Apch Crs 248°	Minimum Alt D17.0 DKI 2000' (1979')	MDA(H) 490' (469')	Apt Elev 34' Rwy 25R 21'		
<b>MISSED APCH: Climb to 6000', after passing 2000' turn RIGHT to intercept CKG VOR R-028 outbound, proceed to NOKTA or as instructed by ATC .</b>						
Alt Set: hPa		Rwy Elev: 1 hPa		Trans level: FL 130		Trans alt: 11000'

## 2.3. Regulatory flight parameters

### 2.3.1. Airspeed

The following airspeed table must be enforced during a missed approach.

Aircraft category	$V_{at}$	Range of speeds for initial approach	Range of final approach speeds	Maximum speeds for visual manoeuvring (circling)	Maximum speeds for missed approach	
					Intermediate	Final
A	<91	90/150(110*)	70/100	100	100	110
B	91/120	120/180(140*)	85/130	135	130	150
C	121/140	160/240	115/160	180	160	240
D	141/165	185/250	130/185	205	185	265
E	166/210	185/250	155/230	240	230	275
H	N/A	70/120**	60/90***	N/A	90	90
CATH (PinS)***	N/A	70/120	60/90	N/A	70 or 90	70 or 90

Missed approach procedures may be more restrictive than these airspeeds. Therefore, the pilot should review the following mention: "MAX xxx KTS"

### 2.3.2. Bank angle

A minimum bank angle of 15° in average is required during a turning missed approach. This includes protection up to an omnidirectional wind of 30 knots.

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### 2.3.3. Climb gradient

The standard missed approach climb gradient is 2.5%.

Where it is appropriate, ATS authority will establish parametric minima, and the (M)DA/H will depend on the capability of the aircraft.

The aircraft capability to be taken into account is in the one-engine inoperative scenario.

Example: ILS18 – Chambéry LFLB

Minima vary with aircraft one-engine inoperative climb gradient.

Standard		MISSED APPROACH CLIMB GRADIENT					
IAS (KTS)		2.5%	3.0%	3.5%	4.0%	4.5%	5.0%
111	DA(H)	2009'(1240')	1819'(1050')	1649'(880')	1489'(720')	1349'(580')	1219'(450')
120	FULL/Limited ALS OUT	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2200m CMV 2400m	RVR 1700m CMV 2100m
121	DA(H)	2359'(1590')	2139'(1370')	1949'(1180')	1769'(1000')	1599'(830')	1449'(680')
130	FULL/Limited ALS OUT	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m
131	DA(H)	2679'(1910')	2439'(1670')	2219'(1450')	2019'(1250')	1829'(1060')	1659'(890')
140	FULL/Limited ALS OUT	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m
141	DA(H)	3039'(2270')	2779'(2010')	2539'(1770')	2319'(1550')	2119'(1350')	1929'(1160')
150	FULL/Limited ALS OUT	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m
151	DA(H)	3319'(2550')	3019'(2250')	2749'(1980')	2509'(1740')	2289'(1520')	2099'(1330')
160	FULL/Limited ALS OUT	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m	CMV 2400m CMV 2400m

## 3. Practical aspects

### 3.1. Occurrence

There are several situations that lead to perform a go-around procedure:

- Visual references are not acquired at minima or passing the MAPt
- Approach is not stabilized (runway axis, descent path, speed)
- Runway is not clear of traffic or obstacles
- ATC will not issue landing clearance
- ATC will command a go-around for safety reasons
- Training

Remember: pilots are required to perform an immediate go-around when passing the MAPt or reaching the decision altitude/height.

About stabilization, operators will issue mandatory or recommended stabilization heights at which an aircraft must be configured for landing, in good position with runway, at a correct airspeed.

Deviation values will exist to tolerate parameter variations due to environmental factors. If one of these values is exceeded, a go-around must be initiated.

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Here are some values extracted from a real aviation school:

- Stabilization height: 1000ft AGL under IMC / 500ft AGL under VMC
- Runway axis: 1 dot deviation on conventional approach / 0.5 dot on GNSS approach
- Descent path: 1 dot deviation above or below
- Airspeed: not below approach speed, no more than 5 knots in excess

### 3.2. Initiate a go-around

Following the pilot's decision or the ATC's order to go-around, it is vital to establish a climb as fast as possible confirmed by:

- a relevant pitch value necessarily positive, near the takeoff standard setting
- a positive rate of climb.

It is critical to ensure that power/thrust will be available when you will pitch up the aircraft! Throttle must be set to takeoff setting at the same time.

Failure to do so will result in:

- very low or no climb at all
- rapidly decreasing airspeed bringing the aircraft near stall.

### 3.3. Aircraft management

Just after initiating the go-around, workload will be very high for multiple reasons:

- You will need to adjust pitch and power/thrust
- You will have to adjust your aircraft configuration
- You will need to fly the published missed approach
- You will have to communicate with ATC

Remember that airmanship is achieved in this order: FLY – NAVIGATE – COMMUNICATE

Since you had configured your aircraft for landing, you will need to configure it back to takeoff/climb position. This will take more or less resources depending on your aircraft complexity:

- Retract flaps if required
- Retract landing gear if possible
- Adjust power/thrust to normal climb power/thrust

Then, consider your flight trajectory.

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### 3.4. Flight trajectory

Considering the definitions we established earlier, you should be concerned about your flightpath after having established clearly a positive climb.

The key to complete an IFR missed approach successfully is **anticipation!**  
You should review your trajectory during approach preparation and make sure you have in mind the first turn and altitude when starting the final approach phase.

Pay attention to ATC instructions that may differ from the published missed approach.  
Do not hesitate to step up and request to remain on the published missed approach if the workload is too high to manage new ATC instructions.

## 4. Conclusion

Performing an instrument missed approach is more challenging than a visual missed approach.  
However, with a good flight preparation, a good review and anticipation during the approach phase of the key points of the procedure, it is not a difficult exercise.

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