RD 09-01-213
TERPS Change 21 Circling Approaches

ACF 12-01 - Update Graphics

IFR LANDING MINIMA

The United States Standard for Terminal Instrument Procedures (TERPS) is the approved criteria for formulating instrument approach procedures. Landing minima are established for six aircraft approach categories (ABCDE and COPTER). In the absence of COPTER MINIMA, helicopters may use the CAT A minimums of other procedures.

LANDING MINIMA FORMAT

In this example airport elevation is 1179, and runway touchdown zone elevation is 1152.

Visibility (RVR 100's of feet) — DA — Aircraft Approach Category — HAT/HATh

CATEGORY	A	B	C	D
S-ILS 27	1352/24		200 (200-½)	
S-LOC 27	1440/24	288	(300-½)	1440/50 288 (300-1)
CIRCLING	1540-1 361 (400-1)	1640-1 461 (500-1)	1640-1½ 461 (500-1½)	1740-2 561 (600-2)

Straight-in ILS to Runway 27

Straight-in with Glide Slope Inoperative or not used to Runway 27

All weather minimums in parentheses not applicable to Civil Pilots. Military Pilots refer to appropriate regulations.

MDA — HAA — Visibility in Statute Miles

COPTER MINIMA ONLY

CATEGORY	COPTER
H-176°	680-½ 363 (400-½)

Copter Approach Direction — Height of MDA/DA Above Landing Area (HAL) — No circling minimums are provided

RNAV (GPS) MINIMA EXAMPLE

CATEGORY	A	B	C	D
LPV DA	1540/24 258 (300-½)			
LNAV/VNAV DA	1600/24 318 (400-½)			1600/40 318 (400-¾)
LNAV MDA	1840/24 558 (600-½)		1840/50 558 (600-1)	1840/60 558 (600-1¼)
CIRCLING	1840-1 545 (600-1)		1840-1½ 545 (600-1½)	1860-2 565 (600-2)

NOTE: The W symbol indicates outages of the WAAS vertical guidance may occur daily at this location due to initial system limitations. WAAS NOTAMS for vertical outages are not provided for this approach. Use LNAV minima for flight planning at these locations, whether as a destination or alternate. For flight operations at these locations, when the WAAS avionics indicate that LNAV/VNAV or LPV service is available, then vertical guidance may be used to complete the approach using the displayed level of service. Should an outage occur during the procedure, reversion to LNAV minima may be required. As the WAAS coverage is expanded, the W will be removed.

RNAV minimums are dependent on navigation equipment capability, as stated in the applicable AFM, AFMS, or other FAA approved document. See AIM paragraph 5-4-5, AC 90-105 and AC 90-107 for detailed requirements for each line of minima.

AIRCRAFT APPROACH CATEGORIES

Aircraft approach category indicates a grouping of aircraft based on a speed of VREF, if specified, or if VREF not specified, 1.3 VSO at the maximum certificated landing weight. VREF, VSO, and the maximum certificated landing weight are those values as established for the aircraft by the certification authority of the country of registry. Helicopters are Category A aircraft. An aircraft shall fit in only one category. However, if it is necessary to operate at a speed in excess of the upper limit of the speed range for an aircraft's category, the minimums for the category for that speed shall be used. For example, an airplane which fits into Category B, but is circling to land at a speed of 145 knots, shall use the approach Category D minimums. As an additional example, a Category A airplane (or helicopter) which is operating at 130 knots on a straight-in approach shall use the approach Category C minimums. See following category limits:

MANEUVERING TABLE

Approach Category	A	B	C	D	E
Speed (Knots)	0-90	91-120	121-140	141-165	Abv 165

CIRCLING APPROACH OBSTACLE PROTECTED AIRSPACE

The circling MDA provides safe vertical clearance from obstacles when conducting a circle-to-land maneuver within the obstacle protected airspace. Circling approach obstacle protected areas extend laterally and longitudinally from the centerlines and ends of all runways at an airport by the distances shown in the following tables. The areas are technically defined by the tangential connection of arcs drawn at the radius distance shown from each runway end.

STANDARD CIRCLING APPROACH MANEUVERING RADIUS

Circling approach protected areas developed prior to late 2011 used the radius distances shown in the following table, expressed in nautical miles (NM), dependent on aircraft approach category. The approaches using standard circling approach areas can be identified by the absence of the C symbol on the circling line of minima.

Circling MDA in feet MSL	Approach Category and Circling Radius (NM)				
	CAT A	CAT B	CAT C	CAT D	CAT E
All Altitudes	1.3	1.5	1.7	2.3	4.5

C EXPANDED CIRCLING APPROACH MANEUVERING AIRSPACE RADIUS

Circling approach protected areas developed after late 2011 use the radius distance shown in the following table, expressed in nautical miles (NM), dependent on aircraft approach category, and the altitude of the circling MDA, which accounts for true airspeed increase with altitude. The approaches using expanded circling approach areas can be identified by the presence of the C symbol on the circling line of minima.

Circling MDA in feet MSL	Approach Category and Circling Radius (NM)				
	CAT A	CAT B	CAT C	CAT D	CAT E
1000 or less	1.3	1.7	2.7	3.6	4.5
1001-3000	1.3	1.8	2.8	3.7	4.6
3001-5000	1.3	1.8	2.9	3.8	4.8
5001-7000	1.3	1.9	3.0	4.0	5.0
7001-9000	1.4	2.0	3.2	4.2	5.3
9001 and above	1.4	2.1	3.3	4.4	5.5

Comparable Values of RVR and Visibility

The following table shall be used for converting RVR to ground or flight visibility. For converting RVR values that fall between listed values, use the next higher RVR value; do not interpolate. For example, when converting 1800 RVR, use 2400 RVR with the resultant visibility of ½ mile.

RVR (feet)	Visibility (statute miles)	RVR (feet)	Visibility (statute miles)
1600	¼	4500	⅞
2400	½	5000	1
3200	⅝	6000	1¼
4000	¾		

RADAR MINIMA

	RWY	GS/TCH/RPI	CAT	DA/ MDA-VIS	HAT/ HATh/ HAA	CEIL-VIS	CAT	DA/ MDA-VIS	HAT/ HATh/ HAA	CEIL-VIS
PAR (c)	10	2.5°/42/1000	ABCDE	**195**/16	100	(100-¼)				
(d)	28	2.5°/48/1068	ABCDE	**187**/16	100	(100-¼)				
ASR	10		ABC	**560**/40	463	(500-¾)	D	**560**/50	463	(500-1)
			E	**580**/60	463	(500-1¼)				
	28		AB	**600**/50	513	(600-1)	C	**600**/60	513	(600-1¼)
			DE	**600**-1½	513	(600-1½)				
CIR (b)	10		AB	**560**-1¼	463	(500-1¼)	C	**560**-1½	463	(500-1½)
	28		AB	**600**-1¼	503	(600-1¼)	C	**600**-1½	503	(600-1½)
	10, 28		DE	**660**-2	563	(600-2)				

Visibility (RVR 100's of feet)

Visibility in Statute Miles

All minimums in parentheses not applicable to Civil Pilots. Military Pilots refer to appropriate regulations.

Radar Minima:

1. Minima shown are the lowest permitted by established criteria. Pilots should consult applicable directives for their category of aircraft.
2. The circling MDA and weather minima to be used are those for the runway to which the final approach is flown- not the landing runway. In the above RADAR MINIMA example, a category C aircraft flying a radar approach to runway 10, circling to land on runway 28, must use an MDA of 560 feet with weather minima of 500-1½.

△ Alternate Minimums not standard. Civil users refer to tabulation. USA/USN/USAF pilots refer to appropriate regulations.

△NA Alternate minimums are Not Authorized due to unmonitored facility or absence of weather reporting service.

▽ Take off Minimums not standard and/or Departure Procedures are published. Refer to tabulation.

EXAMPLES:

CATEGORY	A	B	C	D
LPV DA	307-½ 250 (300-½)			
LNAV/ VNAV DA	556-1¼ 499 (500-1¼)			
LNAV MDA	460-½ 403 (500-½)		460-¾ 403 (500-¾)	460-1 403 (500-1)
C CIRCLING	540-1 483 (500-1)		540-1½ 483 (500-1½)	640-2 583 (600-2)

CATEGORY	A	B	C	D	E
S-ILS 22	3265-½ 200 (200-½)				
S-LOC 22	3340-½ 275 (300-½)			3340-¾ 275 (300-¾)	
C CIRCLING	3520-1 440 (500-1)	3540-1 460 (500-1)	3540-1½ 460 (500-1½)	3780-2¼ 700 (700-2¼)	3780-2½ 700 (700-2½)

CATEGORY	A	B	C	D	E
S-ILS 27	4052-½ 200 (200-½)				
S-LOC 27	5400-1¼ 1548 (1600-1¼)	5400-1½ 1548 (1600-1½)	5400-2½ 1548 (1600-2½)		
C CIRCLING	5400-1¼ 1523 (1600-1¼)	5400-1½ 1523 (1600-1½)	5400-3 1523 (1600-3)		
FERRI FIX MINIMUMS *					
S-LOC 27	4420-½ 568 (600-½)		4420-1 568 (600-1)	4420-1¼ 568 (600-1¼)	4420-1½ 568 (600-1½)
C CIRCLING	4640-1 763 (800-1)	4640-1¼ 763 (800-1¼)	4740-2½ 923 (1000-2½)	4740-2¾ 923 (1000-2¾)	4840-3½ 963 (1000-3½)

CATEGORY	A	B	C	D
S-ILS 25	542-2 509 (500-2)		636-3 603 (600-3)	697-4 664 (700-4)
S-LOC 25	580-2 547 (600-2)		620-2 587 (600-2)	1060-3 1027 (1000-3)
C CIRCLING 29, 36, 25	660-2½ 582 (600-2½)	720-2½ 642 (700-2½)	740-3 662 (700-3)	1060-4 982 (1000-4)
C CIRCLING 18	660-2½ 582 (600-2½)	1060-2½ 982 (1000-2½)	1260-3 1182 (1200-3)	1660-4 1582 (1600-4)

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ILS or LOC/DME Y RWY 25