Australian Government
Civil Aviation Safety Authority

ADVISORY CIRCULAR
AC 173-05 v1.1

Off-shore helicopter obstacle clearance check procedure

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Advisory circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to:

- authorised designers who conduct helicopter instrument flight rules (IFR) approach operations to off-shore facilities under Part 173 of the *Civil Aviation Safety Regulation 1998 (CASR)*
- certified designers authorised under Part 173 of CASR.

Purpose

The purpose of this AC is to provide operators with a procedure that will allow off-shore helicopter crews to undertake obstacle clearance checks while ensuring they do not descend below the coverage of the radar beam.

For further information

For further information, contact CASA's Personnel Licensing, Aero and Air Navigation Standards (telephone 131 757).

Status

This version of the AC is approved by the Branch Manager, Flight Standards.

Note: Changes made in the current version are not annotated. The document should be read in full.

Version	Date	Details
v1.1	December 2022	Administrative review only.
v1.0	March 2017	Initial version of this AC.

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Contents

1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Acronym	Description
AC	Advisory Circular
ATP	approach termination point
CAR	*Civil Aviation Regulations 1988*
CASA	Civil Aviation Safety Authority
CASR	*Civil Aviation Safety Regulations 1998*
IFR	instrument flight rules
ØMin	minimum descent angle

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the civil aviation legislation have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the civil aviation legislation, the definition in the legislation prevails.

Term	Definition
Cosecant^2 beam	A radar beam whose energy distribution is such that returns are received simultaneously from a wide area. For airborne radar, ground returns will be displayed from below the aircraft to the radar's display limit in each sweep of the antenna.
Minimum descent angle (ØMin)	The shallowest descent angle that will ensure the aircraft will not descend below the airborne radar beam.

1.3 References

Legislation

Legislation is available on the Federal Register of Legislation website https://www.legislation.gov.au/

Document	Title
Part 173 Manual of Standards (MOS)	Standards Applicable to Instrument Flight Procedures Design

2 Guidance

During the conduct of off-shore IFR helicopter approach procedures, the airborne radar is used for obstacle detection and avoidance. This AC describes one example of a technique that will permit obstacle clearance checks to be conducted in a consistent way.

2.1 Obstacle clearance checks

2.1.1 Instrument approach operations to offshore installations rely on the use of airborne radar for both navigation and the avoidance of obstacles. The detection and avoidance of obstacles (e.g. shipping and extraction rigs) is critical to the safe conduct of the operation.

2.1.2 The radars used in these operations are normally weather radars that have a narrow vertical beam width. Depending on the depression of the radar antenna, obstacles close to the aircraft may not be detected. The procedure discussed below describes a technique that calculates a minimum descent angle (ØMin) that keeps the aircraft above the bottom side of the radar beam and, therefore, in radar contact with the surface towards which the aircraft is descending.

2.1.3 The sequence of steps that constitutes the obstacle clearance check is:

a. lowering the radar antenna elevation until the approach termination point (ATP) return is only just retained at the top of the sweep
b. locating, and if possible, identifying returns other than the ATP
c. using target information to determine landing minima.

2.2 Minimum descent angle

2.2.1 The ØMin is located at the half-vertical beam width of the radar beam. Descent at an angle greater than ØMin will keep the aircraft within or above the vertical profile of the beam, while descent at ØMin maintains an obstacle detection margin below the aircraft. Therefore, the aircraft will not be at risk from undetected obstacles (see Figure 1).

2.2.2 Procedure for determining the minimum descent angle

2.2.2.1 The ØMin is determined as follows:

BW = radar vertical beam width (degrees)
ØT = angle of top of radar beam in contact with the landing location (degrees)
SR = radar slant range (ft)
MEA = minimum en route altitude (ft—normally 1,500 ft above mean sea level)

$$\text{ØMin} = 90° - (\text{ØT} - 0.5\text{BW})$$
$$= 90° - (\arccos \text{MEA/SR} - 0.5\text{BW})$$

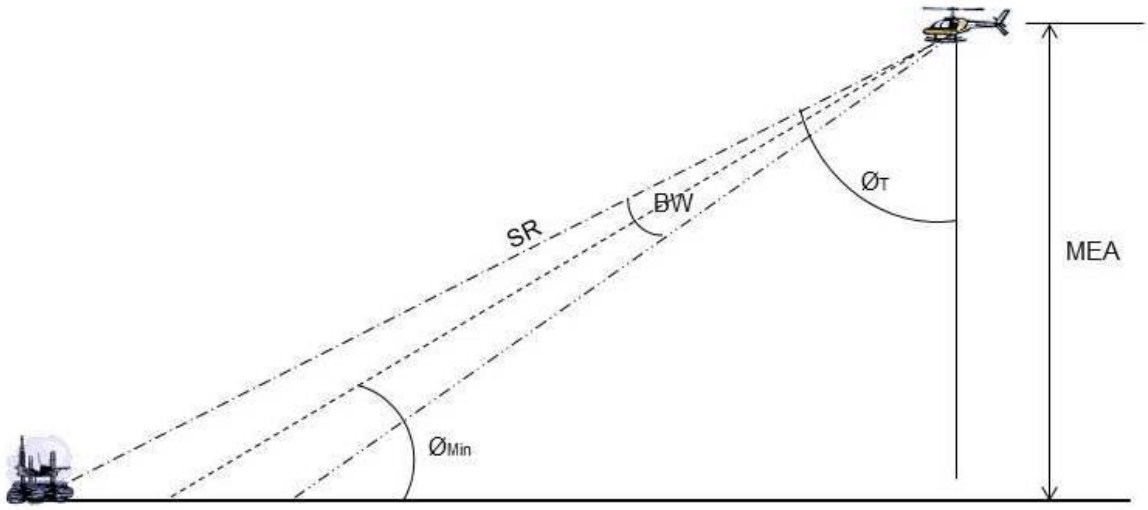

Figure 1: Obstacle clearance descent profile

2.2.2.2 If the airborne radar in use has a mode (normally a ground mapping mode) that generates a cosec2 vertical beam, then the radar will simultaneously illuminate the surface directly below the aircraft to the limit of the radar's range. In these circumstances, a dedicated descent procedure to retain the aircraft within the radar beam is not required.