



# 交通部民用航空局 核定採用國際飛航標準

**主旨：直昇機性能及操作限制規定(Helicopter Performance and Operating Limitations)**

<b>發行日期：</b> <b>2019.07.10</b>	<b>依據：</b> <b>民用航空法第 41 條之 1 第 2 項；</b> <b>航空器飛航作業管理規則第 84 條第 3</b> <b>項及第 233 條第 3 項附件 5</b>	<b>編號：</b> <b>NO.3</b>
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## 一、適用對象

民用航空運輸業直昇機及普通航空業直昇機之空中遊覽、救護及商務專機等飛航業務。

## 二、說明

交通部民用航空局核定採用 ICAO Annex6 Part III Attachment A 有關直昇機性能及操作限制規定。

## 三、符合性

直昇機性能及操作限制應符合本文件第四節之規定。

## 四、作業標準

- (一) 直昇機性能及操作限制規定，採用 ICAO Annex 6 Part III (第 9 版第 22 次修訂) Attachment A. Helicopter performance and operating limitations，如附件一。

## 五、取代資訊

無。

# **附件一 Annex 6, Operation of Aircraft Part III — International Operations — Helicopters, Attachment A**

## **ATTACHMENTS**

### **ATTACHMENT A HELICOPTER PERFORMANCE AND OPERATING LIMITATIONS**

#### **2. DEFINITIONS**

**Category A.** With respect to helicopters, means a multi-engined helicopter designed with engine and system isolation features specified in Annex 8, Part IVB, and capable of operations using take-off and landing data scheduled under a critical engine failure concept which assures adequate designated surface area and adequate performance capability for continued safe flight or safe rejected take-off.

**Category B.** With respect to helicopters, means a single engine or multi-engined helicopter which does not meet Category A standards. Category B helicopters have no guaranteed capability to continue safe flight in the event of an engine failure, and a forced landing is assumed.

#### **3. GENERAL**

3.1 Helicopters operating in performance Classes 1 and 2 should be certificated in Category A.

3.2 Helicopters operating in performance Class 3 should be certificated in either Category A or Category B (or equivalent).

3.3 Except as permitted by the appropriate authority:

3.3.1 Take-off or landing from/to heliports in a congested hostile environment should only be conducted in performance Class 1.

3.3.2 Operations in performance Class 2 should only be conducted with a safe forced landing capability during take-off and landing.

3.3.3 Operations in performance Class 3 should only be conducted in a non-hostile environment.

3.4 To operate variations from 3.3.1, 3.3.2 and 3.3.3, should undertake a risk assessment, considering factors such as:

- a) the type of operation and the circumstances of the flight;
- b) the area/terrain over which the flight is being conducted;
- c) the probability of a critical engine failure and the consequence of such an event;
- d) the procedures to maintain the reliability of the engine(s);
- e) the training and operational procedures to mitigate the consequences of the critical engine

- failure; and
- f) installation and utilization of a usage monitoring system.

## Example

### Purpose and Scope

The following example provides *quantitative specifications* to illustrate a level of performance intended by the provisions of Section II, Chapter 3. A State may use this example as a basis for establishing its code of performance, but may introduce variations provided such variations meet the safety objectives of Section II, Chapter 3 and Attachment A.

### Abbreviations Specific to Helicopter Operations

#### Abbreviations

D	Maximum dimension of helicopter
DPBL	Defined point before landing
DPATO	Defined point after take-off
DR	Distance travelled (helicopter)
FATO	Final approach and take-off area
HFM	Helicopter flight manual
LDP	Landing decision point
LDAH	Landing distance available (helicopter)
LDRH	Landing distance required (helicopter)
R	Rotor radius of helicopter
RTODR	Rejected take-off distance required (helicopter)
TDP	Take-off decision point
TLOF	Touchdown and lift-off area
TODAH	Take-off distance available (helicopter)
TODRH	Take-off distance required (helicopter)
V <sub>TOSS</sub>	Take-off safety speed

## 1. DEFINITIONS

### 1.1 Only applicable to operations in performance Class 1

***Landing distance required (LDRH).*** The horizontal distance required to land and come to a full stop from a point 15 m (50 ft) above the landing surface.

***Rejected take-off distance required (RTODR).*** The horizontal distance required from the start of the take-off to the point where the helicopter comes to a full stop following an engine failure and rejection of the take-off at the take-off decision point.

***Take-off distance required (TODRH).*** The horizontal distance required from the start of the

take-off to the point at which  $V_{TOSS}$ , a selected height and a positive climb gradient are achieved, following failure of the critical engine being recognized at TDP, the remaining engines operating within approved operating limits.

*Note.— The selected height stated above is to be determined with reference to either:*

- a) the take-off surface; or
- b) a level defined by the highest obstacle in the take-off distance required.

## **1.2 Applicable to operations in all performance classes**

**D.** The maximum dimension of the helicopter.

**Distance DR.** The horizontal distance that the helicopter has travelled from the end of the take-off distance available.

**Landing distance available (LDAH).** The length of the final approach and take-off area plus any additional area declared available and suitable for helicopters to complete the landing manoeuvre from a defined height.

**R.** The rotor radius of the helicopter.

**Take-off distance available (TODAH).** The length of the final approach and take-off area plus the length of helicopter clearway (if provided) declared available and suitable for helicopters to complete the take-off.

**Take-off flight path.** The vertical and horizontal path, with the critical engine inoperative, from a specified point in the takeoff to 300 m (1 000 ft) above the surface.

**Touchdown and lift-off area (TLOF).** A load bearing area on which a helicopter may touch down or lift off.

**VToss.** Take-off safety speed for helicopters certificated in Category A.

**Vy .** Best rate of climb speed.

## **2. GENERAL**

### **2.1 Applicability**

2.1.1 Helicopters with a passenger seating configuration of more than 19, or helicopters operating to or from a heliport in a congested hostile environment should be operating in performance Class 1.

2.1.2 Helicopters with a passenger seating configuration of 19 or less but more than 9 should be operating in performance Class 1 or 2, unless operating to or from a congested hostile environment in which case the helicopters should be operating in performance Class 1.

2.1.3 Helicopters with a passenger seating configuration of 9 or less should be operating in performance Class 1, 2 or 3, unless operating to or from a congested hostile environment in which case the helicopters should be operating in performance Class 1.

### **2.2 Significant performance factors**

To determine the performance of the helicopter, account should be taken of at least the following factors:

- a) mass of the helicopter;
- b) elevation or pressure-altitude and temperature; and
- c) wind; for take-off and landing, accountability for wind should be no more than 50 per cent of any reported steady headwind component of 5 knots or more. Where take-off and landing with a tailwind component is permitted in the flight manual, not less than 150 per cent of any reported tailwind component should be allowed. Where precise wind measuring equipment enables accurate measurement of wind velocity over the point of take-off and landing, these values may be varied.

### **2.3 Operating conditions**

2.3.1 For helicopters operating in performance Class 2 or 3 in any flight phase where an engine failure may cause the helicopter to force-land:

- a) a minimum visibility should be defined by the operator, taking into account the characteristics of the helicopter, but should not be less than 800 m for helicopters operating in performance Class 3; and
- b) the operator should verify that the surface below the intended flight path permits the pilot to execute a safe forced landing.

2.3.2 Performance Class 3 operations are not to be performed:

- a) out of the sight of the surface; or
- b) at night; or
- c) when the cloud ceiling is less than 180 m (600 ft).

### **2.4 Obstacle accountability area**

2.4.1 For the purpose of the obstacle clearance requirements in 4 below, an obstacle should be considered if its lateral distance from the nearest point on the surface below the intended flight path is not further than:

- a) for VFR operations:
  - 1) half of the minimum width of the FATO (or the equivalent term used in the helicopter flight manual) defined in the helicopter flight manual (or when no width is defined, 0.75 D), plus 0.25 times D (or 3 m, whichever is greater), plus:
    - 0.10 DR for VFR day operations
    - 0.15 DR for VFR night operations
- b) for IFR operations:
  - 1) 1.5 D (or 30 m, whichever is greater), plus:
    - 0.10 DR for IFR operations with accurate course guidance
    - 0.15 DR for IFR operations with standard course guidance

- 0.30 DR for IFR operations without course guidance
- c) for operations with initial take-off conducted visually and converted to IFR/IMC at a transition point, the criteria required in 2.4.1 a) apply up to the transition point then the criteria required in 2.4.1 b) apply after the transition point.

2.4.2 For a take-off using a backup take-off procedure (or with lateral transition), for the purpose of the obstacle clearance requirements in 4 below, an obstacle located below the backup flight path (lateral flight path) should be considered if its lateral distance from the nearest point on the surface below the intended flight path is not further than half of the minimum width of the FATO (or the equivalent term used in the helicopter flight manual) defined in the helicopter flight manual (when no width is defined, 0.75 D plus 0.25 times D, or 3 m, whichever is greater) plus:

- a) 0.10 distance travelled from the back edge of the FATO for VFR day operations;
- b) 0.15 distance travelled from the back edge of the FATO for VFR night operations.

2.4.3 Obstacles may be disregarded if they are situated beyond:

- a) 7 R for day operations if it is assured that navigational accuracy can be achieved by reference to suitable visual cues during the climb;
- b) 10 R for night operations if it is assured that navigational accuracy can be achieved by reference to suitable visual cues during the climb;
- c) 300 m if navigational accuracy can be achieved by appropriate navigation aids; and
- d) 900 m in the other cases.

2.4.4 The transition point should not be located before the end of TODRH for helicopters operating in performance Class 1 and before the DPATO for helicopters operating in performance Class 2.

2.4.5 When considering the missed approach flight path, the divergence of the obstacle accountability area should only apply after the end of the take-off distance available.

## **2.5 Source of performance data**

The operator should ensure that the approved performance data contained in the helicopter flight manual is used to determine compliance with this Example, supplemented as necessary with other data acceptable to the CAA.

# **3. OPERATING AREA CONSIDERATIONS**

## **3.1 FATO**

For operations in performance Class 1, the dimensions of the FATO should be at least equal to the dimensions specified in the helicopter flight manual.

*Note.— A FATO that is smaller than the dimensions specified in the helicopter flight manual*

*may be accepted if the helicopter is capable of a hover out of ground effect with one engine inoperative (HOGE OEI), and the conditions of 4.1 below can be met.*

## **4. LIMITATIONS RESULTING FROM PERFORMANCE**

### **4.1 Operations in performance Class 1**

#### **4.1.1 Take-off**

4.1.1.1 The take-off mass of the helicopter should not exceed the maximum take-off mass specified in the flight manual for the procedure to be used and to achieve a rate of climb of 100 ft/min at 60 m (200 ft) and 150 ft/min at 300 m (1 000 ft) above the level of the heliport with the critical engine inoperative and the remaining engines operating at an appropriate power rating, taking into account the parameters specified in 2.2 (Figure A-1).

#### **4.1.1.2 Rejected take-off**

The take-off mass should be such that the rejected take-off distance required does not exceed the rejected take-off distance available.

#### **4.1.1.3 Take-off distance**

The take-off mass should be such that the take-off distance required does not exceed the take-off distance available.

*Note 1.— As an alternative, the requirement above may be disregarded provided that the helicopter with the critical engine failure recognized at TDP can, when continuing the take-off, clear all obstacles from the end of the take-off distance available to the end of the take-off distance required by a vertical margin of not less than 10.7 m (35 ft) (Figure A-2).*

*Note 2.— For elevated heliports, the airworthiness code provides appropriate clearance from the elevated heliport edge (Figure A-3).*

#### **4.1.1.4 Backup procedures (or procedures with lateral transition)**

The operator should ensure that, with the critical engine inoperative, all obstacles below the backup flight path (the lateral flight path) are cleared by an adequate margin. Only the obstacles specified in 2.4.2 should be considered.

#### **4.1.2 Take-off flight path**

From the end of the take-off distance required with the critical engine inoperative:

4.1.2.1 The take-off mass should be such that the climb path provides a vertical clearance of not



less than 10.7 m (35 ft) for VFR operations and 10.7 m (35 ft) plus 0.01 DR for IFR operations above all obstacles located in the climb path. Only obstacles as specified in 2.4 should be considered.

4.1.2.2 Where a change of direction of more than 15 degrees is made, obstacle clearance requirements should be increased by 5 m (15 ft) from the point at which the turn is initiated. This turn should not be initiated before reaching a height of 60 m (200 ft) above the take-off surface, unless permitted as part of an approved procedure in the flight manual.

#### 4.1.3 *En route*

The take-off mass is such that it is possible, in case of the critical engine failure occurring at any point of the flight path, to continue the flight to an appropriate landing site and achieve the minimum flight altitudes for the route to be flown.

#### 4.1.4 *Approach, landing and balked landing* (Figures A-4 and A-5)

The estimated landing mass at the destination or alternate should be such that:

- a) it does not exceed the maximum landing mass specified in the flight manual for the procedure to be used and to achieve a rate of climb of 100 ft/min at 60 m (200 ft) and 150 ft/min at 300 m (1 000 ft) above the level of the heliport with the critical engine inoperative and the remaining engines operating at an appropriate power rating, taking into account the parameters specified in 2.2;
- b) the landing distance required does not exceed the landing distance available unless the helicopter, with the critical engine failure recognized at LDP can, when landing, clear all obstacles in the approach path;
- c) in case of the critical engine failure occurring at any point after the LDP, it is possible to land and stop within the FATO; and
- d) in the event of the critical engine failure being recognized at the LDP or at any point before the LDP, it is possible either to land and stop within the FATO or to overshoot, meeting the conditions of 4.1.2.1 and 4.1.2.2.

*Note.— For elevated heliports, the airworthiness code provides appropriate clearance from the elevated heliport edge.*

## **4.2 Operations in performance Class 2**

### 4.2.1 *Take-off* (Figures A-6 and A-7)

The mass of the helicopter at take-off should not exceed the maximum take-off mass specified in the flight manual for the procedures to be used and to achieve a rate of climb of 150 ft/min at 300 m

(1 000 ft) above the level of the heliport with the critical engine inoperative and the remaining engines operating at an appropriate power rating, taking into account the parameters specified in 2.2.

#### 4.2.2 *Take-off flight path*

From DPATO or, as an alternative, no later than 60 m (200 ft) above the take-off surface with the critical engine inoperative, the conditions of 4.1.2.1 and 4.1.2.2 should be met.

#### 4.2.3 *En route*

The requirements of 4.1.3 should be met.

#### 4.2.4 *Approach, landing and balked landing* (Figures A-8 and A-9)

The estimated landing mass at the destination or alternate should be such that:

- a) it does not exceed the maximum landing mass specified in the flight manual for a rate of climb of 150 ft/min at 300 m (1 000 ft) above the level of the heliport with the critical engine inoperative and the remaining engines operating at an appropriate power rating, taking into account the parameters specified in 2.2;
- b) it is possible, in case of the critical engine failure occurring at or before the DPBL, either to perform a safe forced landing or to overshoot, meeting the requirements of 4.1.2.1 and 4.1.2.2.

Only obstacles as specified in 2.4 should be considered.

### **4.3 Operations in performance Class 3**

#### 4.3.1 *Take-off*

The mass of the helicopter at take-off should not exceed the maximum take-off mass specified in the flight manual for a hover in ground effect with all engines operating at take-off power, taking into account the parameters specified in 2.2. If conditions are such that a hover in ground effect is not likely to be established, the take-off mass should not exceed the maximum mass specified for a hover out of ground effect with all engines operating at take-off power, taking into account the parameters specified in 2.2.

#### 4.3.2 *Initial climb*

The take-off mass should be such that the climb path provides adequate vertical clearance above all obstacles located along the climb path, all engines operating.

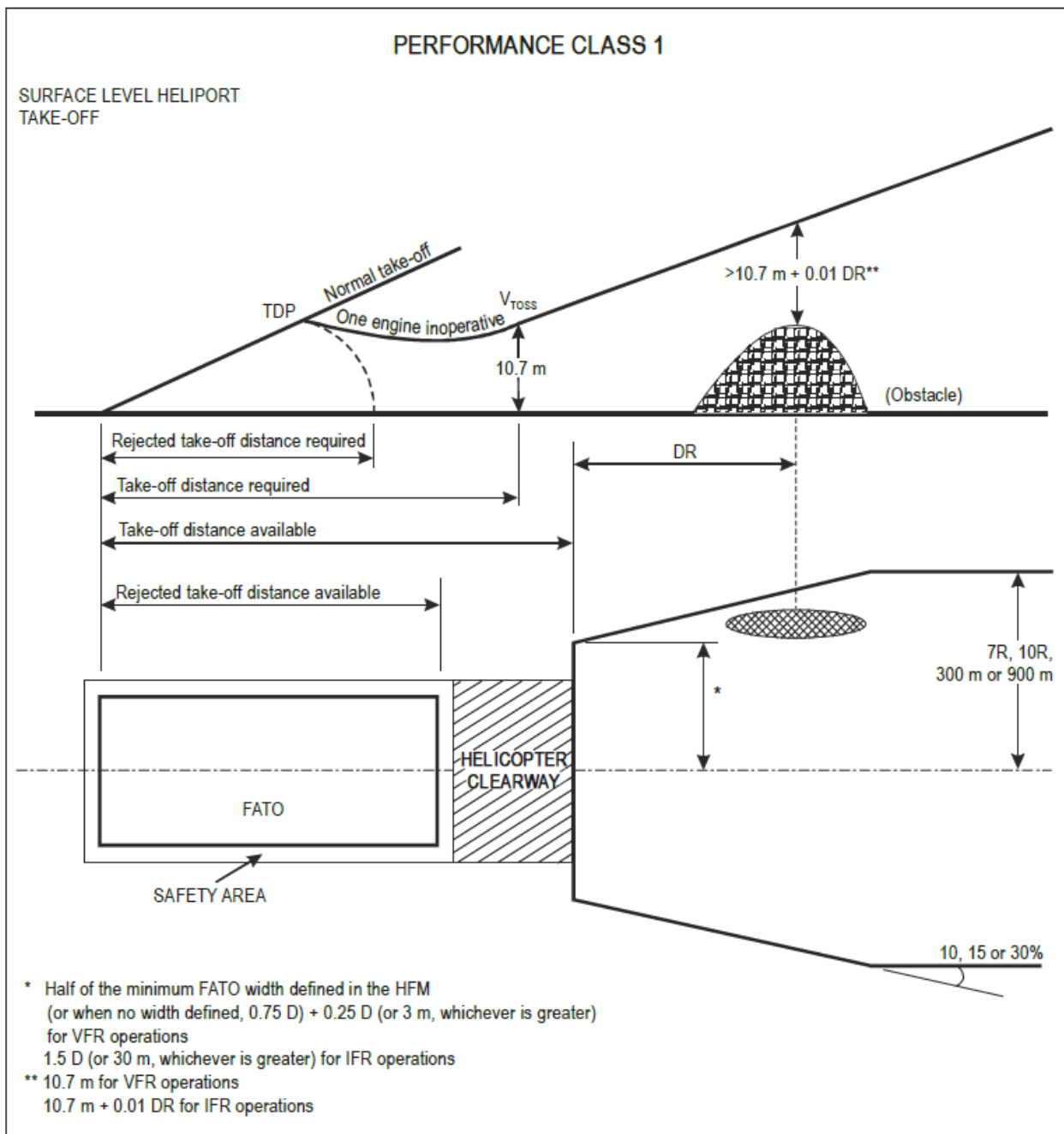
#### 4.3.3 *En route*

The take-off mass is such that it is possible to achieve the minimum flight altitudes for the route to be flown, all engines operating.

#### 4.3.4 *Approach and landing*

The estimated landing mass at the destination or alternate should be such that:

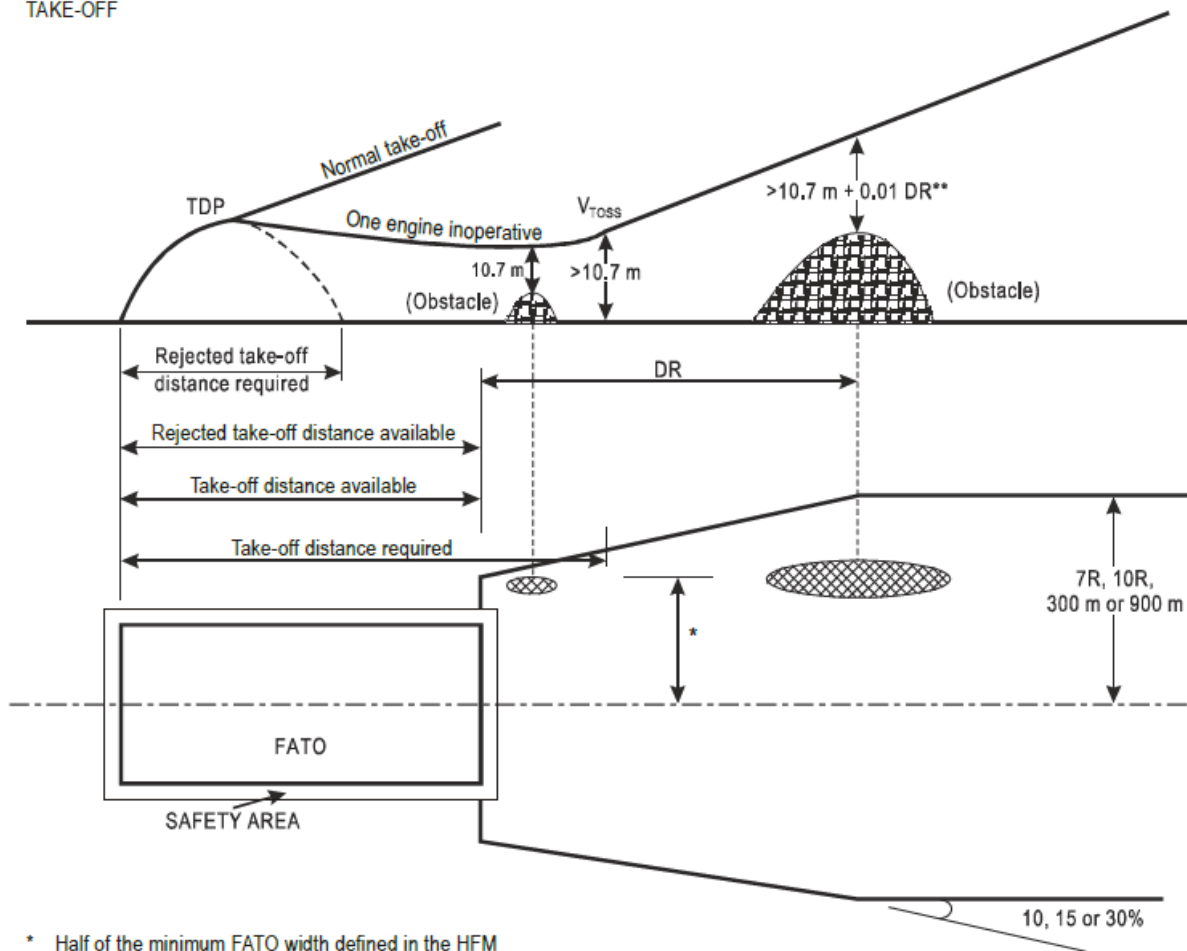
- a) it does not exceed the maximum landing mass specified in the flight manual for a hover in ground effect with all engines operating at take-off power, taking into account the parameters specified in 2.2. If conditions are such that a hover in ground effect is not likely to be established, the take-off mass should not exceed the maximum mass specified for a hover out of ground effect with all engines operating at take-off power, taking into account the parameters specified in 2.2;
- b) it is possible to perform a balked landing, all engines operating, at any point of the flight path and clear all obstacles by an adequate vertical interval.



**Figure A-1**

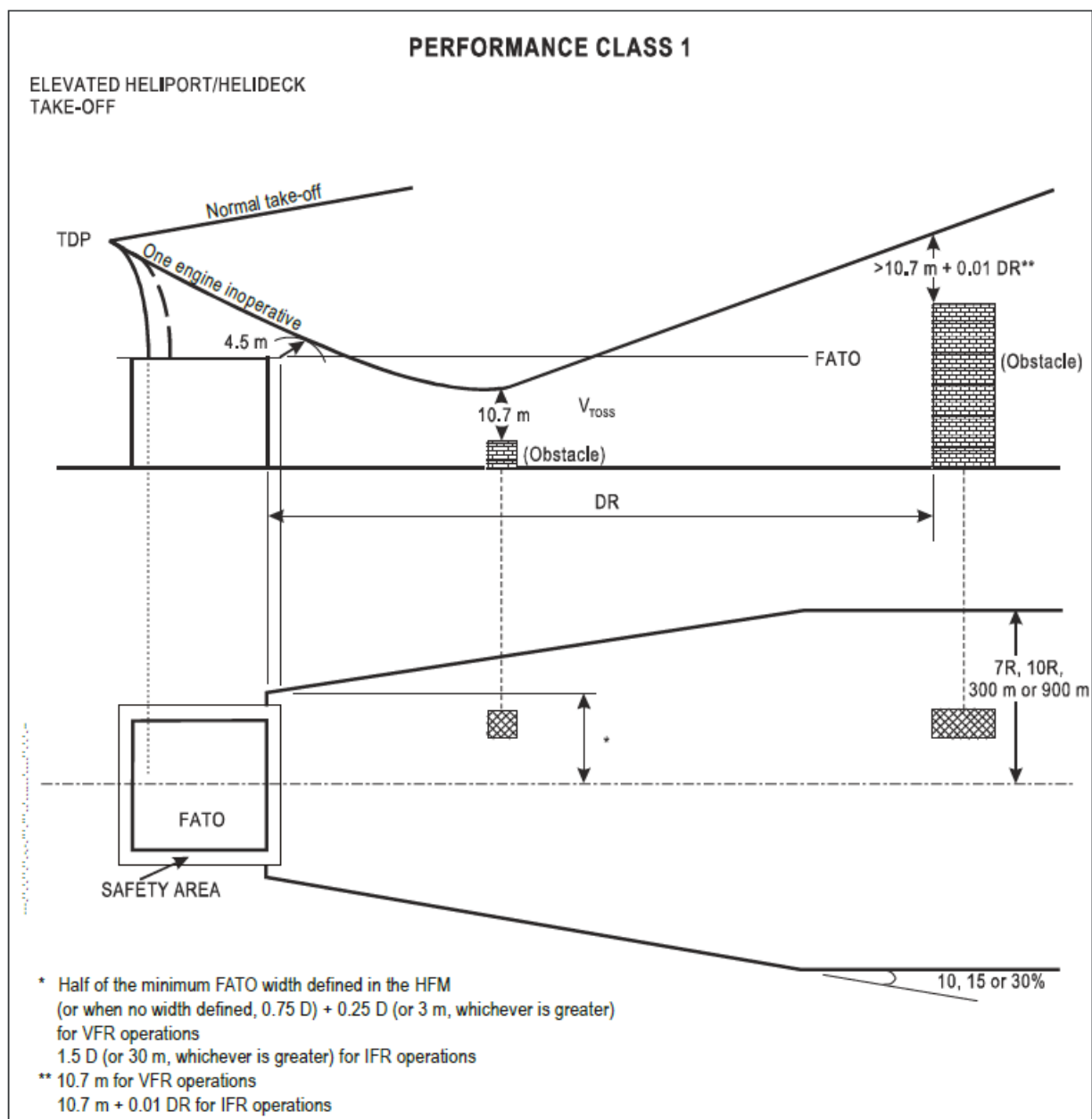
## PERFORMANCE CLASS 1

SURFACE LEVEL HELIPORT  
(Alternative presented in Note 1 to 4.1.1.3)  
TAKE-OFF



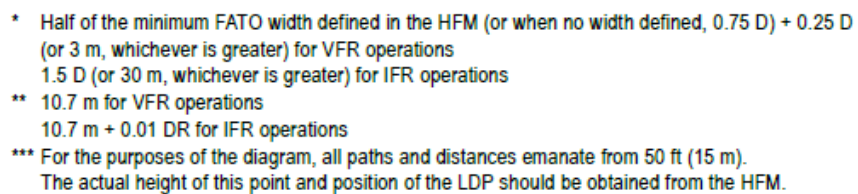
- \* Half of the minimum FATO width defined in the HFM  
(or when no width defined,  $0.75 D + 0.25 D$  (or 3 m, whichever is greater)  
for VFR operations  
 $1.5 D$  (or 30 m, whichever is greater) for IFR operations
- \*\* 10.7 m for VFR operations  
 $10.7 \text{ m} + 0.01 \text{ DR}$  for IFR operations

Figure A-2

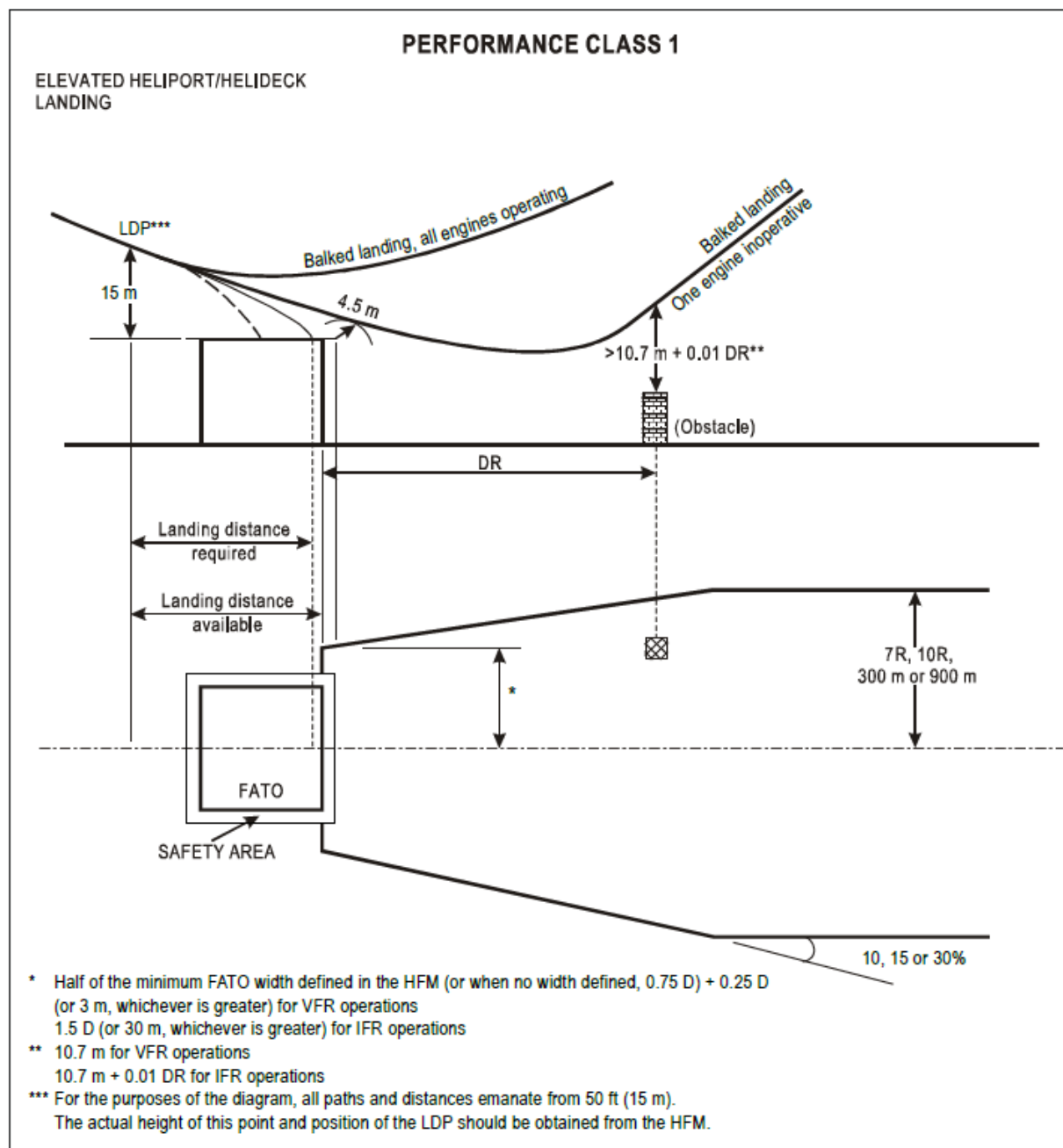


**Figure A-3**

**SURFACE LEVEL HELIPORT  
LANDING**

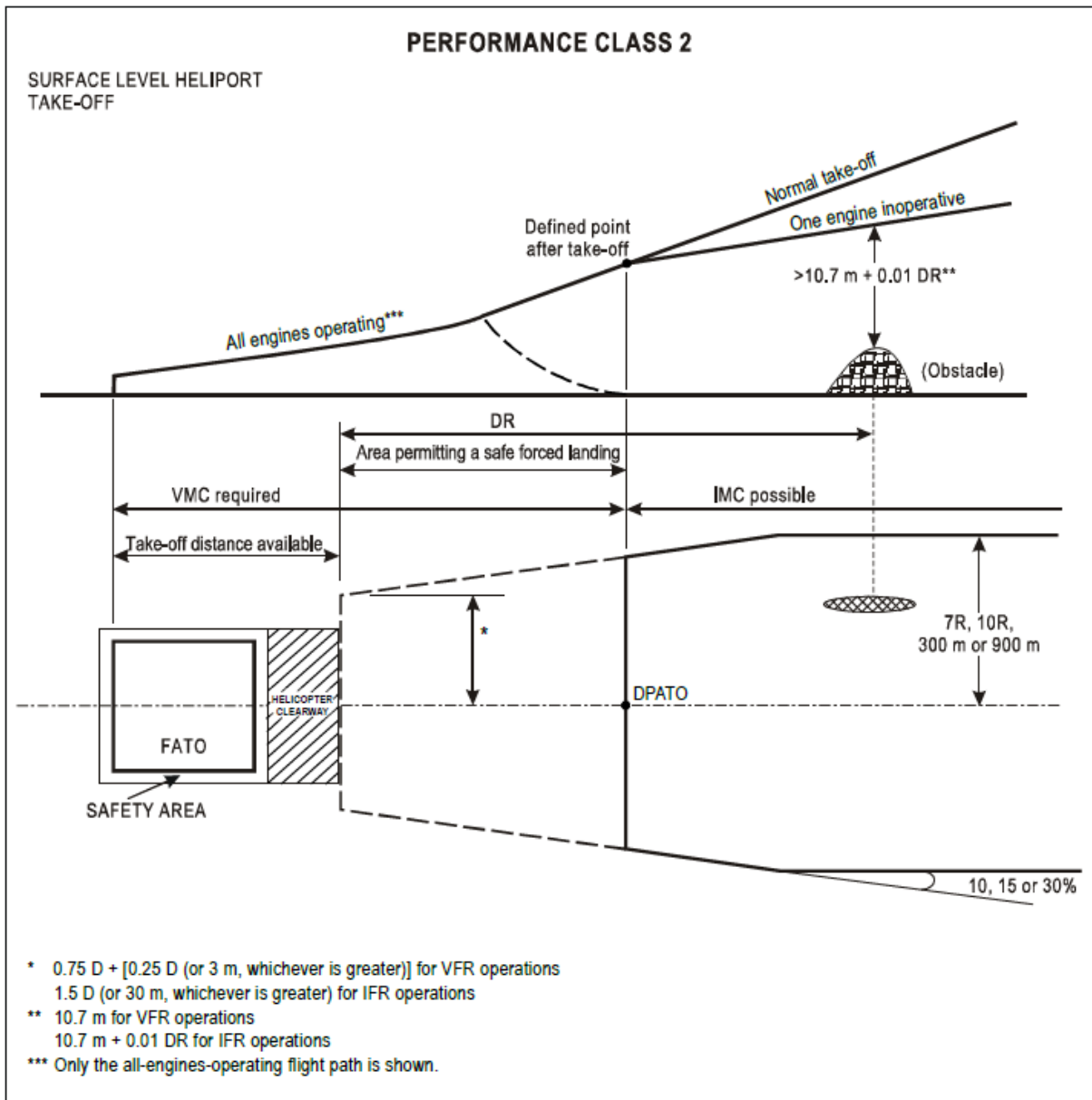


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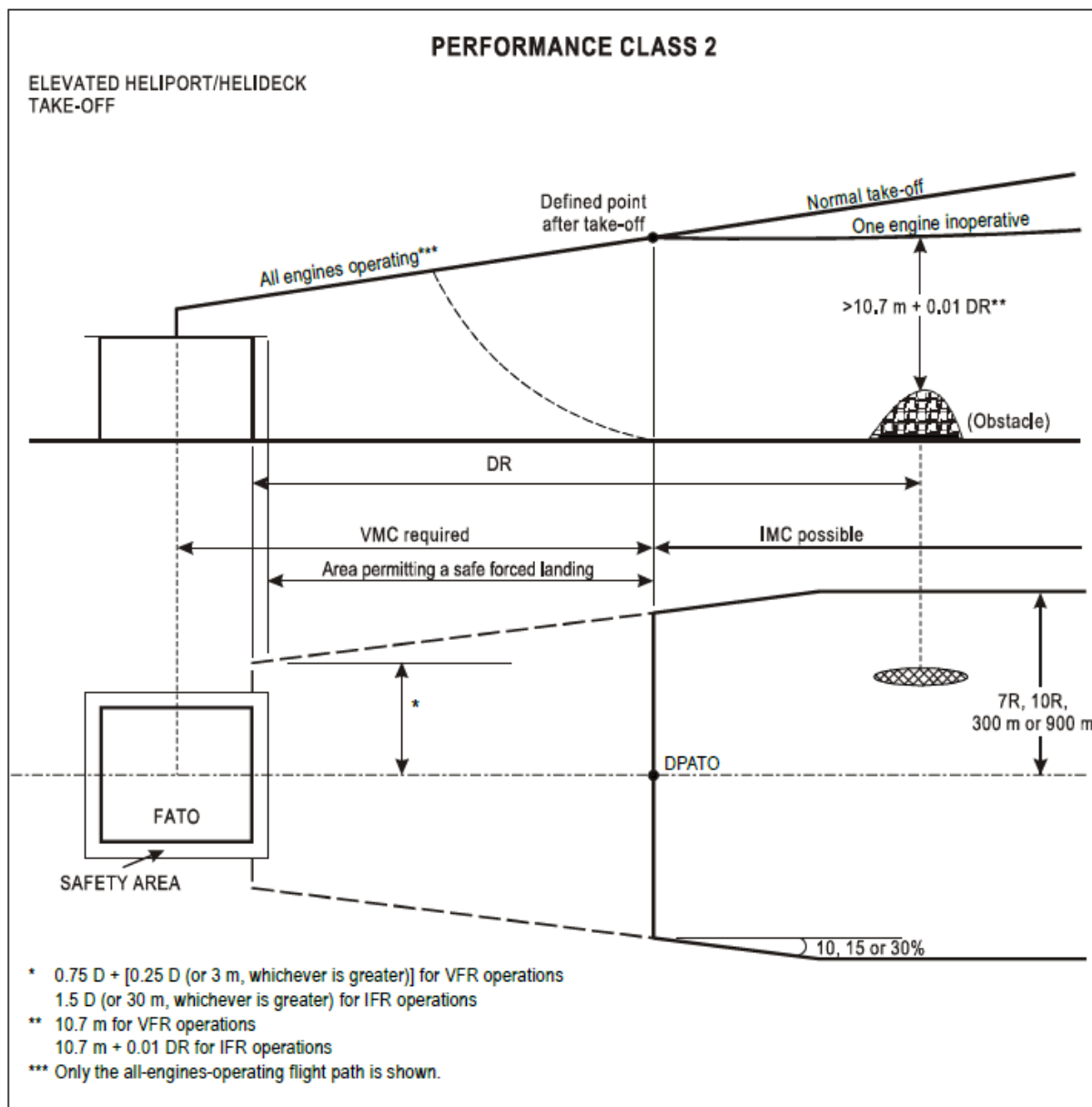


**Figure A-5**

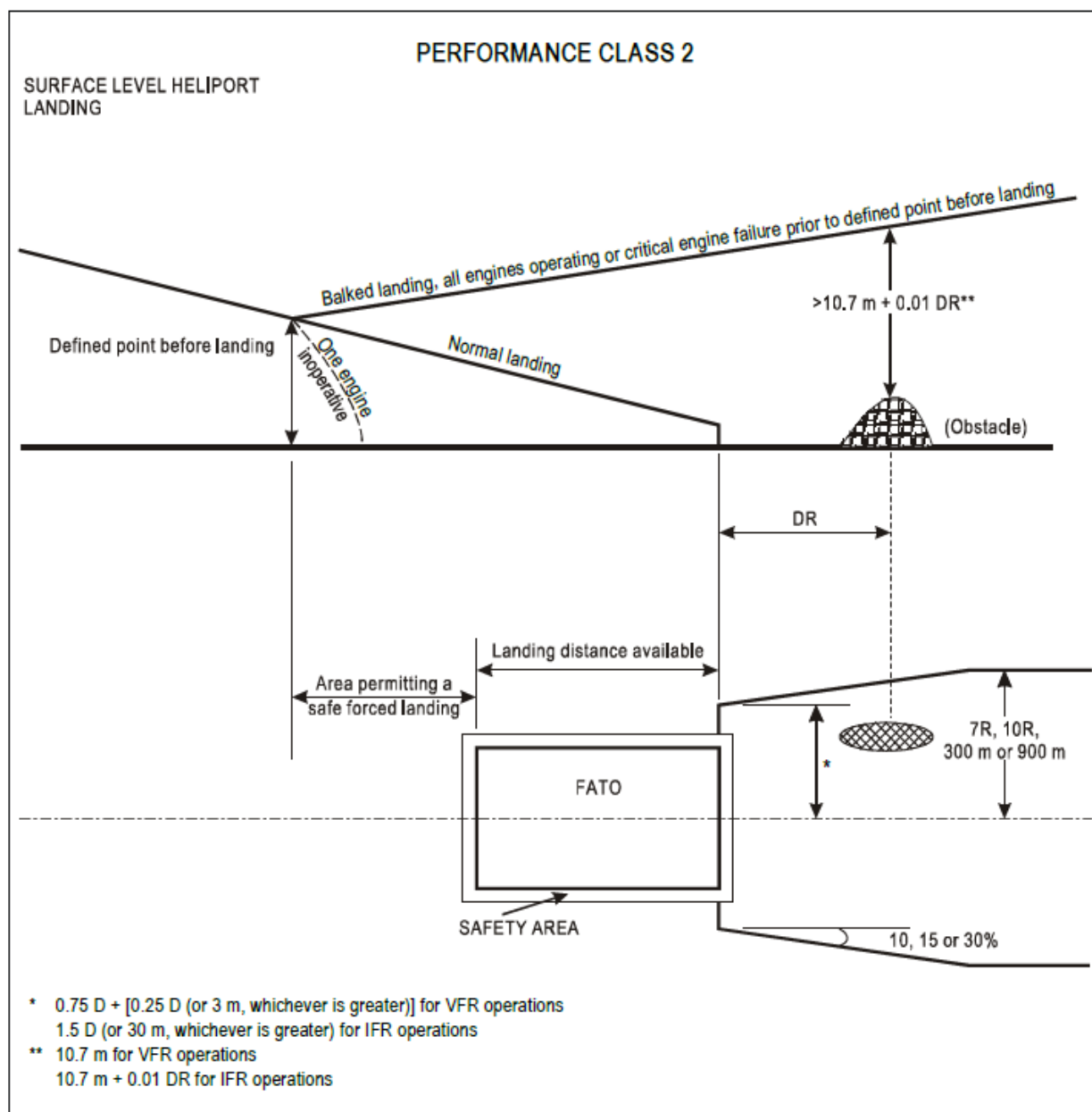




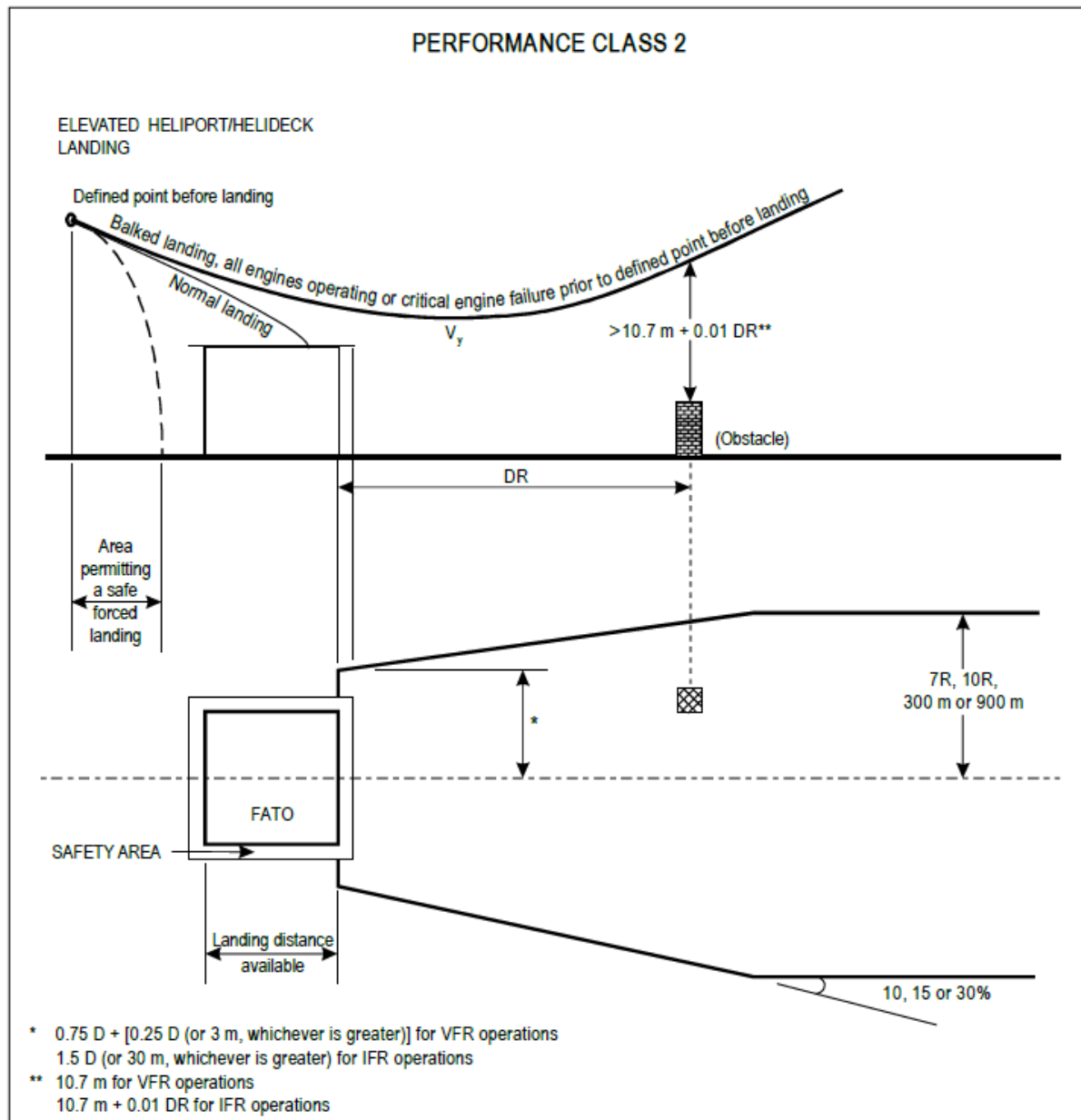
**Figure A-6**



**Figure A-7**



**Figure A-8**



**Figure A-9**

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