### ANNEX 14 VOLUME I: ICAO

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TERMIN

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### INTRODUCTION TO ANNEX 14



International Standards and Recommended Practices



International Standards and Recommended Practices

Annex 14 to the Convention on International Civil Aviation

#### Aerodromes

**Volume I** Aerodrome Design and Operations Eighth Edition, July 2018



This edition supersedes, on 8 November 2018, all previous editions of Annex 14, Volume I.

For information regarding the applicability of the Standards and Recommended Practices, see Chapter 1, 1.2 and the Foreword.

#### INTERNATIONAL CIVIL AVIATION ORGANIZATION

Annex 14 to the Convention on International Civil Aviation

#### Aerodromes

**Volume II** Heliports Fifth Edition, July 2020



This edition supersedes, on 5 November 2020 all previous editions of Annex 14, Volume II.

For information regarding the applicability of the Standards and Recommended Practices, see Chapter 1, 1.2 and the Foreword.

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International Standards and Recommended Practices



#### Aerodromes

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#### INTERNATIONAL CIVIL AVIATION ORGANIZATION



#### INTERNATIONAL CIVIL AVIATION ORGANIZATION

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### International Civil Aviation Organization (ICAO)

- A UN specialized agency, established in 1944 to manage the administration and governance of the Convention on International Civil Aviation (Chicago Convention)
- The Convention's 193 Member States and industry groups work to reach consensus on international civil aviation Standards and Recommended Practices (SARPs) and policies in support of a safe, efficient, secure, economically sustainable and environmentally responsible civil aviation sector



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#### INTERNATIONAL CIVIL AVIATION ORGANIZATION

Annex 14 to the Convention on International Civil Aviation

Convention on International Civil Aviation (Chicago Convention), 7 December 1944

- Established the International Civil Aviation Organization (ICAO),
- Establishes rules of airspace, aircraft registration and safety, security, and sustainability, and details the rights of the signatories in relation to air travel.
- Revised eight times (in 1959, 1963, 1969, 1975, 1980, 1997, 2000 and 2006)
- Supported by 19 Annexes that contain Standards and Recommended Practices (SARPs)
- Only applicable to civil aviation

### Convention on International Civil Aviation (Chicago Convention) – Notable articles

- Article 1: Every state has complete and exclusive sovereignty over airspace above its territory.
- Article 3 bis: Every State must refrain from resorting to the use of weapons against civil aircraft in flight.
- Article 6: (Scheduled air services) No scheduled international air service may be operated over or into the territory of a contracting State, except with the special permission or other authorization of that State.
- Article 10: (Landing at customs airports): The state can require that landing to be at a designated customs airport and similarly departure from the territory can be required to be from a designated customs airport.

### **Convention on International Civil Aviation (Chicago Convention)**

- Article 12: Each state shall keep its own rules of the air as uniform as possible with those established under the convention, the duty to ensure compliance with these rules rests with the contracting state.
- Article 13: (Entry and Clearance Regulations) A state's laws and regulations regarding the admission and departure of passengers, crew or cargo from aircraft shall be complied with on arrival, upon departure and whilst within the territory of that state.
- Article 16: The authorities of each state shall have the right to search the aircraft of other states on landing or departure, without unreasonable delay.

	Annex 1	Personnel Licensing						
	Annex 2	Rules of the Air						
	Annex 3	Meteorological Service for International Air Navigation						
	Annex 4	Aeronautical Charts						
	Annex 5	Units of Measurement to be Used in Air and Ground Operations						
	Annex 6	Operation of Aircraft						
	Annex 7	Aircraft Nationality and Registration Marks						
	Annex 8	Airworthiness of Aircraft						
	Annex 9	Facilitation						
	Annex 10	Aeronautical Telecommunications						
/	Annex 11	Air Traffic Services						
	Annex 12	Search and Rescue						
	Annex 13	Aircraft Accident and Incident Investigation						
	Annex 14	Aerodromes						
	Annex 15	Aeronautical Information Services						
	Annex 16	Environmental Protection						
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	Annex 19	Safety Management						

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#### INTERNATIONAL CIVIL AVIATION ORGANIZATION

#### International Standards and Recommended Practices

Spesifikasi teknikal yang digunakan ICAO berdasarkan Artikel 37 kepada Convention on International Civil Aviation untuk mencapai:

### International Standards & Recommended Practices (SARPs)

"The highest practicable degree of uniformity in regulations, standards, procedures and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation".

# International Standards & Recommended Practices (SARPs)

#### **Standards**

"Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognised as necessary for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the Convention".

Standards have been printed in light face roman and the operative verb "shall" is used.

Surface of runways

3.1.22 The surface of a runway shall be constructed without irregularities that would impair the runway surface friction characteristics or otherwise adversely affect the take-off or landing of an aeroplane.





# International Standards & Recommended Practices (SARPs)

#### **Recommended Practice**

"Any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognised as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention".

Recommended Practices have been printed in *light face italics* and the operative verb "should" is used.

Strength of runways

3.1.21 **Recommendation.**— A runway should be capable of withstanding the traffic of aeroplanes the runway is intended to serve.







Annex 14 to the Convention on International Civil Aviation

#### Aerodromes

**Volume I** Aerodrome Design and Operations

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### Amendments

The issue of amendments is announced regularly in the ICAO Journal and in the monthly Supplement to the Catalogue of ICAO Publications and Audio-visual Training Aids, which holders of this publication should consult. The space below is provided to keep a record of such amendments.

#### AMENDMENTS

Amendments are announced in the supplements to the *Products and Services Catalogue;* the Catalogue and its supplements are available on the ICAO website at <u>www.icao.int</u>. The space below is provided to keep a record of such amendments.

#### RECORD OF AMENDMENTS AND CORRIGENDA

	1	AMENDMENTS						
No.	Date applicable	Date entered	Entered by					
1-14	I	Incorporated in this edition						
15	5.11.2020	29.10.2020	FOCA					
16	4.11.2021	29.10.2020	FOCA					

No.	Date of issue	Date entered	Entered by





### Amendments

oreword		Annex 14 — Aerodron				
Amendment	Source(s)	Subject(s)	Adopted/Approved Effective Applicable			
13-B	Third meeting of the Aerodromes Panel (AP/3) developed by the Friction Task Force	Enhanced global reporting format for assessing and reporting runway surface condition.	22 February 2016 11 July 2016 5 November 2020			
14 Annex 14, Volume I, th Edition)	Second meeting of the Aerodrome Design and Operations Panel (ADOP/2); Thirteenth meeting of the Instrument Flight Procedures Panel (IFPP/13); and Twelfth meeting of the Aeronautical Information Service (AIS) Aeronautical Information Management (AIM) Study Group (AIS-AIMSG/12).	Revised aerodrome reference code in Table 1-1; runway widths, shoulders, tum pads and strips; taxiway widths, shoulders and strips; reduced taxiway minimum separation distances; an amendment to update footnote e. in Table 4-1; and a consequential amendment, as a result of the restructuring of Annex 15 and the introduction of PANS-AIM (Doc 10066), relating to change of references, data quality requirements and performance-based data error detection requirements.	9 March 2018 16 July 2018 8 November 2018			
15	Third meeting of the Aerodrome Design and Operations Panel (ADOP/3); Eighth meeting of the PANS- Aerodromes Study Group (PASG/8)	Revised definition of precision approach runway category III; airport master plan; aeroplanes equipped with folding wing tips; reporting of pavement strength; reporting of works in progress on movement areas; width of clearways; standardized taxiway nomenclature; runway guard lights; no-entry bars; minimum sizes of signs; autonomous aircraft detection system; visual aids for denoting closed runways and taxiways or part thereof; training of aerodrome personnel; procedures on management of wildlife, apron safety and establishment of airside driver permit.	9 March 2020 20 July 2020 5 November 2020 3 November 2022 28 November 2024			
16	Eighth Meeting of the 220th Session of the ICAO Council	Postponement of the applicability date of Amendment 13-B: Amendment concerning the use of an enhanced global reporting format for assessing and reporting runway surface conditions.	19 June 2020 30 September 2020 4 November 2021			







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International Standards and Recommended Practices

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Aerodromes

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#### INTERNATIONAL CIVIL AVIATION ORGANIZATION

### **Aerodromes vs Heliports**



#### **Aerodromes**

A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.



#### **Heliport**

An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.





### Publications Related to Annex 14

• Aerodrome Design Manual (Doc 9157)

Part I - Runways

Part 2 - Taxiways, Aprons and Holding Bays

Part 3 - Pavements

Part 4 - Visual Aids

Part 5 - Electrical Systems

Part 6 - Frangibility

#### • Airport Services Manual (Doc 9137)

- Part 1 Rescue and Fire Fighting
- Part 2 Pavement Surface Conditions
- Part 3 Bird Control and Reduction
- Part 4 Fog Dispersal [Withdrawn]
- Part 5 Removal of Disabled Aircraft
- Part 6 Control of Obstacles
- Part 7 Airport Emergency Planning
- Part 8 Airport Operational Services
- Part 9 Airport Maintenance Practices

• Airport Planning Manual (Doc 9184)

Part I - Master Planning

Part 2 - Land Use and Environmental Control

Part 3 - Guidelines for Consultant/Construction Services

- Manual on Certification of Aerodromes (Doc 9774)
- Safety Management Manual (SMM) (Doc 9859)
- Manual on the ICAO Bird Strike Information System (IBIS) (Doc 9332)
- Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476)
- Heliport Manual (Doc 9261)

- Stolport Manual (Doc 9150)
- World Geodetic System 1984 (WGS-84) Manual (Doc 9674)
- Aeronautical Information Services Manual (Doc 8126)
- Air Traffic Services Planning Manual (Doc 9426)
- Airworthiness Manual (Doc 9760)
- Volume I Organization and Procedures
- Volume II Design Certification and Continuing Airworthiness
- Guidance on the Balanced Approach to Aircraft Noise Management (Doc 9829)

- Human Factors Training Manual (Doc 9683)
- Manual of Aircraft Ground De-icing/Antiicing Operations (Doc 9640)
- Manual on Laser Emitters and Flight Safety (Doc 9815)
- Procedures for Air Navigation Services -Aircraft Operations (PANS-OPS) (Doc 8168)
- Volume I Flight Procedures
- Volume II Construction of Visual and Instrument Flight Procedures
- Procedures for Air Navigation Services Air Traffic Management (PANS-ATM) (Doc 4444)

### ANNEX 14: TABLE OF CONTENTS

### Annex 14: Table of Contents

Chapter 1 – General Chapter 2 – Aerodrome data Chapter 3 – Physical characteristics Chapter 4 – Obstacle restriction and removal Chapter 5 – Visual Aids for navigation Chapter 6 – Visual Aids for denoting obstacles Chapter 7 – Visual Aids for denoting restricted use areas Chapter 8 – Electrical Systems

Chapter 9 – Aerodrome operational services, equipment and installations

Chapter 10 – Aerodrome maintenance

### **Appendices and Definitions**



**Appendices** 

?

#### **Definitions**

Comprise of materials grouped separately for convenience but forming part of the Standards and Recommended Practices adopted by the Council. Definitions of terms used in the Standards and Recommended Practices which are not selfexplanatory in that they do not have accepted dictionary meanings.

A definition does not have independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.





### **Table and Figures**

Tables and Figures which add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

	Distance between taxiway centre line and runway centre line (metres)							Taxiway	Taxiway, other than aircraft stand	Aircraft stand taxilane centre line	Aircraft stand	
Code	Instrument runways Code number			Non-instrument runways Code number			centre line to taxiway centre line (metres)	taxilane, centre line to object (metres)	to aircraft stand taxilane centre line (metres)	taxilane centre line to object (metres)		
letter	1	2	3	4	1	2	3	4				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
А	77.5	77.5	-	-	37.5	47.5	-	-	23	15.5	19.5	12
в	82	82	152	-	42	52	87	-	32	20	28.5	16.5
с	88	88	158	158	48	58	93	93	44	26	40.5	22.5
D	-	-	166	166	-	-	101	101	63	37	59.5	33.5
E	-	-	172.5	172.5	-	-	107.5	107.5	76	43.5	72.5	40
F	-	-	180	180	_	-	115	115	91	51	87.5	47.5

Note 1.— The separation distances shown in columns (2) to (9) represent ordinary combinations of runways and taxiways. The basis for development of these distances is given in the Aerodrome Design Manual (Doc 9157), Part 2.

Note 2.— The distances in columns (2) to (9) do not guarantee sufficient clearance behind a holding aeroplane to permit the passing of another aeroplane on a parallel taxiway. See the Aerodrome Design Manual (Doc 9157), Part 2.



### **CHAPTER 1:**

### GENERAL

### **1. GENERAL**

- Annex 14 Vol. 1 contains
  - Standards and Recommended Practices (specifications) that prescribe the physical characteristics and obstacle limitation surfaces to be provided for at aerodromes, and
- Certain facilities and technical services normally provided at an aerodrome.
- It is not intended that these specifications limit or regulate the operation of an aircraft.

#### Annex 14 Vol. I does not contain:

• Specifications relating to the overall planning of aerodromes. (Information on these subjects is included in the Airport Planning Manual, Part 1)

 Specifications on aerodrome facilities related to aviation security (Annex 14, Vol. I contains several specifications aimed at enhancing the level of security at aerodrome.)

### **1. GENERAL**

### **1. GENERAL**

### Definitions

### The meanings of specialised technical terms used in Annex 14.

Precision approach runway, see Instrument runway.

Primary runway(s). Runway(s) used in preference to others whenever conditions permit.

Protected flight zones. Airspace specifically designated to mitigate the hazardous effects of laser radiation.

Road. An established surface route on the movement area meant for the exclusive use of vehicles.

Road-holding position. A designated position at which vehicles may be required to hold.

Runway. A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.



Surface-level heliport. A heliport located on the ground or on a structure on the surface of the water.



### **1.2 Applicability**

 The specifications, unless otherwise indicated in a particular context, shall apply to all aerodromes open to public use in accordance with the requirements of Article 15 of the Convention.

### **1. GENERAL**

- The specifications of Annex 14, Volume I, Chapter 3 shall apply only to land aerodromes.
- The specifications in this volume shall apply, where appropriate, to heliports but shall not apply to stolports.

Lat	Lon
60°20,141'N	27°35,485'E
60°24,069'N	26°57,141'E
60°23,816'N	27°39,434'E
60°23,043'N	27°27,252'E
60°29,537'N	27°03,062'E
60°23,053'N	27°16,577'E
60°10,751'N	27°05,432'E
60°23,08'N	27°17,66'E
60°22,61'N	26°38,95'E
60°24,61'N	26°21,94'E

### **1. GENERAL**

#### **1.3 Common Reference Systems**

#### • Horizontal reference system:

World Geodetic System - 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system.

#### Vertical reference system

Mean sea level (MSL) datum shall be used as the vertical reference system.

e.g. Malaysia mean sea level is 3.624m above zero tide gauge

#### • Temporal reference system

The Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system.

UTC is 8 hours slower than Malaysian Time.

# CAAM

**Civil Aviation Authority of Malaysia** 

### **1. GENERAL**

#### **1.4** Certification of aerodromes

Aerodromes used for international operations are to be certified by the State responsible:

- according to Annex 14 specifications,
- through an appropriate regulatory framework, that has established certification criteria and requires a manual with pertinent aerodrome information, and
- that has a Safety Management System in operation


#### **1.5 Airport Design**

- Architectural and infrastructure-related requirements for the optimum implementation of international civil aviation security measures shall be integrated into the design and construction of new facilities and alterations to existing facilities at an aerodrome
- The design of aerodromes should take into account, where appropriate, land-use and environmental control measures.

### **1. GENERAL**

(see 1.6.2 to 1.6.4)								
	Code element 1							
Code number	Aeroplane reference field length							
1	Less than 800 m							
2	800 m up to but not including 1 200 m							
3	1 200 m up to but not including 1 800 m							
4	1 800 m and over							
	Code element 2							
Code letter	Wingspan							
А	Up to but not including 15 m							
В	15 m up to but not including 24 m							
С	24 m up to but not including 36 m							
D	36 m up to but not including 52 m							
Е	52 m up to but not including 65 m							
F	65 m up to but not including 80 m							

Table 1-1. Aerodrome reference code



Note.— Guidance on planning for aeroplanes with wingspans greater than 80 m is given in the Aerodrome Design Manual (Doc 9157), Parts 1 and 2.



# 1.6 AERODROME REFERENCE CODE

#### • Aeroplane Reference Field Length

 the minimum field length required for take-off at maximum certificated take-off mass, at sea level, in International Standard Atmosphere conditions in still air and with zero runway slope as documented in the Aircraft Flight Manual (AFM) or equivalent document



Wingspan



### **1.6 AERODROME REFERENCE CODE**

No.	Aircraft type	Code Element 1		Code	2	Aerodr. reference code
		Aeroplane reference field length, m	Code No.	Wing span, m	Code letter	
1.	DHC 6 (Twin Otter MasWing)	695		19.8		
2.	A320-200	2480		33.9		
3.	B737-800	2090		34.3		
4.	B747-400	2890	40	64.9		

**|| JKK** 

## **1.6 AERODROME REFERENCE CODE**

No.	Aircraft type	Aircraft Code type Element 1		Code	2	Aerodr. reference code
		Aeroplane reference field length, m	Code No.	Wing span, m	Code letter	
2.	Airbus A400M	980		42.4		
3.	Lockheed C130	1093		40.4		
4.	Casa CN 235	745		25.0		



### **1.6 AERODROME REFERENCE CODE**

Part 1. Runways Appendix 1. Aeroplane classification by code number and letter								
Aircraft Make	Model	Code	Aeroplane reference field length (m)	Wing span (m)	Outer main gear wheel span (m)			
Bombardier Aero.	CRJ 100	3B	1 470	21.2	4.0			
	CRJ 100ER	3B	1 720	21.2	4.0			
	CRJ 200	3B	1 440	21.2	4.0			
	CRJ 200ER	3B	1 700	21.2	4.0			
Dassault Aviation	Falcon 20	3B	1 463	16.3	3.7			
	Falcon 200	3B	1 700	16.3	3.5			
	F50/F50EX	3B	1 586	18.9	4.5			
	Falcon 900	3B	1 504	19.3	4.6			
	Falcon 900EX	3B	1 590	19.3	4.6			
	F2000	3B	1 658	19.3	5.0			
Embraer	EMB-135 LR	3B	1 745	20.0	4.1			
Fokker	F28-1000	3B	1 646	23.6	5.8			
	F28-2000	3B	1 646	23.6	5.8			





### CHAPTER 2:

## **AERODROME DATA**



# LIST OF MALAYSIA AIRPORTS

City served	State	ICAO <sup>[1][2]</sup> •	IATA <sup>[3]</sup> •	Airport name ¢	Coordinates •
Nor Setar	Kedah	WMKA	AOR	Sultan Abdul Halim Airport <sup>[4]</sup> / RMAF Alor Setar	🔍 06°11'40'N 100°24'03'E
lulu Selangor	Selangor	WMBR		Bernam River Airfield <sup>[5]</sup>	🔍 03°45′58'N 101°19′08'E
Butterworth	Penang	WMKB	BWH	RMAF Butterworth <sup>[6]</sup>	🔍 05°27′58'N 100°23′28'E
Bayan Lepas (near George Town)	Penang	WMKP	PEN	Penang International Airport <sup>[7]</sup>	🔍 05°17′50'N 100°16′36'E
Gong Kedak	Terengganu / Kelantan	WMGK		RMAF Gong Kedak <sup>[8]</sup>	🔍 05°47'56'N 102°29'25'E
ooh	Perak	WMKI	IPH	Sultan Azlan Shah Airport <sup>[9]</sup>	🔍 04°34'09'N 101°05'35'E
endarata Estate, Teluk Intan	Perak	WMAJ		Jendarata Airport <sup>[1]</sup>	🔍 03°53'59'N 100°56'55'E
(erteh	Terengganu	WMKE	KTE	Kerteh Airport <sup>[1]</sup>	Q 04°32'15'N 103°25'36'E
Juang	Johor	WMAP		Kluang Airport <sup>[10]</sup>	🔍 02°02'38'N 103°18'27'E
íota Bharu	Kelantan	WMKC	KBR	Sultan Ismail Petra Airport[11] / RAF Kota Bharu	🔍 06°09'58'N 102°17'33'E
uala Terengganu	Terengganu	WMKN	TGG	Sultan Mahmud Airport <sup>[12]</sup>	🔍 05°02'53'N 103°06'17'E
luantan	Pahang	WMKD	KUA	Sultan Haji Ahmad Shah Airport <sup>[13]</sup> / RMAF Kuantan	🔍 03°46'11'N 103°12'34'E
angkawi	Kedah	WMKL	LGK	Langkawi International Airport <sup>[14]</sup>	🔍 06°20'00'N 099°44'00'E
atu Berendam	Melaka	WMKM	MKZ	Melaka International Airport <sup>[15]</sup>	🔍 02°15'47'N 102°15'09'E
lersing	Johor	WMAU	MEP	Mersing Airport <sup>[1]</sup>	🔍 02°23'00'N 103°51'34'E
angkor Island	Perak	WMPA	PKG	Pangkor Airport <sup>[1]</sup>	🔍 04°14'41'N 100°33'12'E
Redang Island	Terengganu	WMPR	RDN	Redang Airport <sup>[16]</sup>	🔍 05°45′55'N 103°00′25'E
enai (near Johor Bahru)	Johor	WMKJ	JHB	Senai International Airport <sup>[17]</sup>	🔍 01°38'26'N 103°40'13'E
epang, Klang Valley	Selangor	WMKK	KUL	Kuala Lumpur International Airport <sup>[18]</sup>	Q 02°44'36'N 101°41'53'E
itiawan	Perak	WMBA	SWY	Sitiawan Airport <sup>[1]</sup>	🔍 04°12'59'N 100°41'55'E
ubang (outskirts of Shah Alam, Subang Jaya and Petaling Jaya)	Selangor	WMSA	SZB	Sultan Abdul Aziz Shah Airport <sup>[19]</sup> / RMAF Subang	🔍 03°07'52'N 101°32'53'E
ungai Besi	Kuala Lumpur	WMKF		Simpang Airport <sup>[20]</sup> / RMAF Sungai Besi/ RAF Kuala Lumpur	🔍 03°06'41'N 101°42'10'E
aiping	Perak	WMBI	TPG	Taiping Airport <sup>[1]</sup> (Tekah Airport)	Q 04°51'49'N 100°42'55'E
ioman Island	Pahang	WMBT	TOD	Tioman Airport <sup>[21]</sup>	Q 02°49'09'N 104°09'36'E
Ba'kelalan	Sarawak	WBGQ	BKM	Ba'kelalan Airport <sup>[1]</sup>	😂 03°59'19'N 115°37'08'E

# LIST OF MALAYSIA **AIRPORTS**

Bario	Sarawak	WBGZ	BBN	Bario Airport <sup>[1]</sup>	🔍 03°44'13'N 115°28'10'E
Belaga	Sarawak	WBGC	BLG	Belaga Airport <sup>[1]</sup>	Q 02°38'10'N 113°45'38'E
Bintulu	Sarawak	WBGB	BTU	Bintulu Airport <sup>[22]</sup>	🔍 03°07'27'N 113°01'11'E
Kapit	Sarawak	WBGP	KPI	Kapit Airport <sup>[1]</sup>	Q 02°00'35'N 112°55'55'E
Keningau	Sabah	WBKG	KGU	Keningau Airport <sup>[1]</sup>	Q 05°21'19'N 116°09'54'E
Kota Kinabalu	Sabah	WBKK	BKI	Kota Kinabalu International Airport <sup>[23]</sup>	🔍 05°56'41'N 116°03'31'E
Kuching	Sarawak	WBGG	KCH	Kuching International Airport <sup>[24]</sup> / RMAF Kuching	Q 01°29'05'N 110°20'16'E
Kudat	Sabah	WBKT	KUD	Kudat Airport <sup>[1]</sup>	🔍 06°55'27'N 116°49'51'E
Labuan	Labuan Federal Territory	WBKL	LBU	Labuan Airport <sup>[25]</sup> / RMAF Labuan	🔍 05°18'06'N 115°14'54'E
Lahad Datu	Sabah	WBKD	LDU	Lahad Datu Airport <sup>[26]</sup>	🔍 05°01′59'N 118°19′16'E
Lawas	Sarawak	WBGW	LWY	Lawas Airport <sup>[1]</sup>	🔍 04°50'57'N 115°24'10'E
Layang Layang Atoll	Sabah		LAC	Layang Layang Airport	
Limbang	Sarawak	WBGJ	LMN	Limbang Airport <sup>[27]</sup>	🔍 04°48'29'N 115°00'37'E
Long Akah	Sarawak	WBGL	LKH	Long Akah Airport <sup>[1]</sup>	🔍 03°18'47'N 114°46'59'E
Long Banga	Sarawak	1	LBP	Long Banga Airport <sup>[1]</sup>	🔍 03°11′00'N 115°27′00'E
Long Geng	Sarawak	WBGE	1	Long Geng Airport <sup>[28]</sup>	🔍 02°37'00'N 114°08'00'E
Long Lellang	Sarawak	WBGF	LGL	Long Lellang Airport <sup>[1]</sup>	🔍 03°27'34'N 115°10'43'E
Long Pasia	Sabah	WBKN	GSA	Long Pasia Airport <sup>[1]</sup>	🔍 04°24'34'N 115°43'08'E
Long Semado	Sarawak	WBGD	LSM	Long Semado Airport <sup>[1]</sup>	🔍 04°12'59'N 115°34'58'E
Long Seridan	Sarawak	WBGI	ODN	Long Seridan Airport <sup>[1]</sup>	🔍 03°58'34'N 115°03'48'E
Long Sukang	Sarawak	WBGU	LSU	Long Sukang Airport <sup>[29]</sup>	🔍 04°33'08'N 115°29'38'E
Marudi	Sarawak	WBGM	MUR	Marudi Airport <sup>[1]</sup>	🔍 04°10'39'N 114°19'19'E
Miri	Sarawak	WBGR	MYY	Miri Airport <sup>[30]</sup>	🔍 04°19'31'N 113°59'18'E
Mukah	Sarawak	WBGK	MKM	Mukah Airport <sup>[1]</sup>	🔍 02°54'25'N 112°04'30'E
Mulu	Sarawak	WBMU	MZV	Mulu Airport <sup>[1]</sup>	🔍 04°03'02'N 114°48'33'E
Pamol	Sabah	WBKP	PAY	Hutan Bakau Pamol Airport	🔍 05°59'34'N 117°23'47'E
Ranau	Sabah	WBKR	RNU	Ranau Airport	🗅 05°57'29'N 116°40'25'E
Sahabat	Sabah	WBKH	SXS	Sahabat Airport	
Sandakan	Sabah	WBKS	SDK	Sandakan Airport <sup>[31]</sup>	Q 05°54'06'N 118°02'55'E
Sematan	Sarawak	WBGN	BSE	Sematan Airport <sup>[32]</sup>	🔍 01°48'49'N 109°45'46'E
Semporna	Sabah	WBKA	SMM	Semporna Airport <sup>[1]</sup>	Q 04°26′59'N 118°35′47'E
Sepulot	Sabah	WBKO	SPE	Sepulot Airport	Q 04°42'44'N 116°27'13'E
Sibu	Sarawak	WBGS	SBW	Sibu Airport <sup>[33]</sup>	Q 02°15′51'N 111°58′57'E
Sri Aman	Sarawak	WBGY	SGG	Simanggang Airport	
Tanjung Manis, Mukah	Sarawak	WBGT		Tanjung Manis Airport <sup>[1]</sup>	🔍 02°10'40'N 111°12'07'E
Tawau	Sabah	WBKW	TWU	Tawau Airport <sup>[34]</sup>	🔍 04°18'48'N 118°07'19'E
Tommanggong	Sabah	WBKM	TMG	Tommanggong Airport <sup>[35]</sup>	Q 05°23'59'N 118°38'47'E

#### **Governing Documents**

- Annex 15 : Aeronautical Information System
- ICAO Doc 8126 : Aeronautical Information Services Manual
- Annex 4 : Aeronautical Charts

# **2. AERODROME DATA**



#### AERODROME DATA

#### **AIP** Permanent or longterm information on facilities and services

## AIP

Supplements

Temporary changes to the AIP of long duration

#### NOTAM

Information of a temporary nature and of short duration Operationally significant permanent changes and changes of long duration made at short duration (3 months validity)

#### AIP

#### Amendments

Permanent changes or additions to the AIP

AIC Long term forecast administrative explanatory information

# PERMANENT CHANGES

e.g. apron expansion



# LONG DURATION

e.g. construction period



# SHORT DURATION

e.g. twy closure due to HDD works



# PUBLICATION OF AIP SUPPLEMENT AND AIP AMENDMENTS

3. PUBLICATION OF AMENDMENTS TO AERONAUTICAL INFORMATION PUBLICATION MALAYSIA

3.1 The proposed amendment programme to the above publication for the year is hereby notified for information and guidance of all concerned.

Amendment Number	Latest Date For Information To Reach AIS	Publication Date
4/2020	27. 08. 2020	05. 11. 2020
1/2021	14. 01. 2021	25. 03. 2021
2/2021	11. 03. 2021	20. 05. 2021
3/2021	03. 06. 2021	12. 08. 2021
4/2021	26. 08. 2021	04. 11. 2021

This AIC cancels AIC 04/2019 dated 02 October 2019.

4

#### PUBLICATION OF AIP SUPPLEMENTS AND AIP AMENDMENTS TO AIP MALAYSIA FOR YEAR 2021

- The pre-determined dates of the "Regulated System" for publication of aeronautical information applicable for 2021 are hereby notified for the information and guidance of all concerned.
  - Such publication shall be issued by AIP Supplement and identified by the acronym "AIRAC".

2.

Cycle Number	Latest Date For Information To Reach AIS	Publication Date Of AIP Supplement	Effective Date Of Implementation
12/20	10. 09.2020	24. 09.2020	05.11.2020
13/20	08. 10.2020	22. 10.2020	03.12.2020
14/20	05. 11. 2020	19. 11. 2020	31. 12. 2020
1/21	03. 12. 2020	17. 12. 2020	28. 01. 2021
2/21	31. 12. 2020	14. 01. 2021	25. 02. 2021
3/21	28. 01. 2021	11. 02. 2021	25. 03. 2021
4/21	25. 02. 2021	11. 03. 2021	22. 04. 2021
5/21	25. 03. 2021	08. 04. 2021	20. 05. 2021
6/21	22. 04. 2021	06. 05. 2021	17. 06. 2021
7/21	20. 05. 2021	03. 06. 2021	15. 07. 2021
8/21	17. 06. 2021	01. 07. 2021	12. 08. 2021
9/21	15. 07. 2021	29. 07. 2021	09. 09. 2021
10/21	12. 08. 2021	26. 08. 2021	07. 10. 2021
11/21	09. 09. 2021	23. 09. 2021	04. 11. 2021
12/21	07. 10. 2021	21. 10. 2021	02. 12. 2021

- END -

### **CHAPTER 3:**

### PHYSICAL CHARACTERISTICS



# **RUNWAY LENGTH**

### • Factors influencing runway length

- a) Performance characteristics of aircraft
- b) Landing & take-off gross weight of aircraft
- c) Elevation of the airport
- d) Average maximum air temperature at the airport
- e) Runway gradient





### **RUNWAY WIDTH**

3.1.10 Recommendation.— The width of a runway should be not less than the appropriate dimension specified in the following tabulation:

	Outer Main Gear Wheel Span (OMGWS)									
Code number	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m						
Iª	18 m	18 m	23 m	-						
24	23 m	23 m	30 m	-						
3	30 m	30 m	30 m	45 m						
4	_	_	45 m	45 m						

a. The width of a precision approach runway should be not less than 30 m where the code number is 1 or 2.





# **RUNWAY CLEARANCE**

# 3.1.12 Distance between parallel runway (CL to CL)

- 1035m for independent parallel approaches
- 915m for dependent parallel approaches
- 760m for independent parallel departures
- 760m for segregated parallel operations





# **RUNWAY SLOPES**

### **3.1.13 Longitudinal slopes**

- 1 % for code number 3 or 4
- 2 % for code number 1 or 2

### 3.1.19 Transverse slopes

- 1.5 % for code letter C,D,E or F
- 2 % for code letter A or B





# **RUNWAY SURFACE**

## 3.1.22 Surface of Runways

- Constructed without irregularities that would result in loss in friction characteristics or otherwise adversely affect the take-off or landing of an aeroplane (Minimum Friction Level (MFL)  $\mu$  is specified by local air authority. A value less than 0.34 is seen by ICAO as slippery)
- Provide good friction characteristics when the runway is wet
- Avg surface texture depth of a new surface should be NOT LESS than 1.0mm
- Runway grooves should be perpendicular to the runway centre line





# **RUNWAY SHOULDERS**

#### **3.2 Runway Shoulders**

• Should be provided for a runway where the code letter is D, E or F

#### **3.2.2 Width of Runway Shoulders**

- 60m for code letter D or E (rwy+rwy shoulder)
- 60m for code letter F with two or three engine aeroplanes (rwy+rwy shoulder)
- 75m for code letter F with four or more engine aeroplanes (rwy+rwy shoulder)

#### **3.2.3 Slopes on Runway Shoulders**

• Should not exceed 2.5%





# **RUNWAY SHOULDERS**







Total width

incl. RWY

A380-800

& B747-8

79.8m

60 m

PAVED

75 m

## **RUNWAY SHOULDER**

#### **3.2.4 Strength of Runway Shoulders**

• The portion of a runway shoulder between the runway edge and a distance of 30m from the runway centre line should be constructed as to be capable of supporting an aeroplane without inducing structural damage to the aeroplane and ground service equipment.





# **RUNWAY STRIPS**

#### 3.4 Runway Strips

• An object situated on a runway which may endanger aeroplanes should be regarded as an obstacle and should, as far as practicle, be removed.

#### 3.4.3 Runway strip should extend before threshold and beyond End of Runway

- 60m for code number 2,3 or 4
- 60m for code number 1 on instrument rwy
- 30m for code number 1 on non instrument rwy

#### 3.4.3 Width of Runway Strips for Instrument Runway

- 140m for code number 3 or 4 (from rwy centerline)
- 70m for code number 1 or 2 (from rwy centerline)

#### **3.4.5 Width of Runway Strips for Non Instrument Runway**

- 75m for code number 3 or 4 (from rwy centerline)
- 40m for code number 2 (from rwy centerline)
- 30m for code number 1 (from rwy centerline)





## **RUNWAY STRIPS**

#### 3.4.8 Grading of Runway Strips (Instrument Rwy)

- 75 m for code number 3 or 4 (from rwy centerline)
- 40m for code number 1 or 2 (from rwy centerline)

### **3.4.15 Transverse Slopes Runway Strips**

- 2.5% for code number 3 or 4
- 3% for code number 1 or 2















- LDA : Landing Distance Available
  - length of the runway which is declared available by the appropriate Authority and is suitable for the ground run of an aeroplane landing

#### • CWY: Clearway

• area beyond the runway not less than 152m wide centrally located about the extended centerline of the runway and under the control of airport authorities

#### SWY: Stopway

- area at the end of take-off runway no less wide than the runway and centered upon extended centerline of runway and able to support the aeroplane during an aborted takeoff without causing structural damage to the aeroplane
- TORA (Take off Run Available)
  - length of runway suitable for normal operations

#### TODA (Take off Distance Available)

• length of runway plus any clearway if available. TODA includes ground as well as air segments.

#### • ASDA (Accelerate-Stop Distance Available)

• In case take off is aborted the aircraft can be brought to a stop either on the runway or on Stopway.

## TAXIWAY WIDTH

#### 3.9.4 Width of Taxiway

3.9.4 **Recommendation.**— A straight portion of a taxiway should have a width of not less than that given by the following tabulation:

	OMGWS						
	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m			
Taxiway width	7.5 m	10.5 m	15 m	23 m			

Note.— Guidance on width of taxiways is given in the Aerodrome Design Manual (Doc 9157), Part 2.





#### TAXIWAY MINIMUM SEPARATION DISTANCES

			Dista an	nce betw d runway	veen taxiway v centre line	centre (metre	line s)		Taxiway	Taxiway, other than aircraft stand	Aircraft stand taxilane centre line	Aircraft stand
Code	In	Instrument runways Code number			N	Non-instrument runways Code number			centre line to taxiway centre line (metres)	taxilane, centre line to object (metres)	to aircraft stand taxilane centre line (metres)	taxilane centre line to object (metres)
letter	1	2	3	4	1	2	3	4				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
А	77.5	77.5	-	-	37.5	47.5	-	-	23	15.5	19.5	12
В	82	82	152	-	42	52	87	-	32	20	28.5	16.5
С	88	88	158	158	48	58	93	93	44	26	40.5	22.5
D	_	_	166	166	-	_	101	101	63	37	59.5	33.5
Е	-	-	172.5	172.5	-	_	107.5	107.5	76	43.5	72.5	40
F	_	_	180	180	_	_	115	115	91	51	87.5	47.5

Note 1.— The separation distances shown in columns (2) to (9) represent ordinary combinations of runways and taxiways. The basis for development of these distances is given in the Aerodrome Design Manual (Doc 9157), Part 2.

Note 2.— The distances in columns (2) to (9) do not guarantee sufficient clearance behind a holding aeroplane to permit the passing of another aeroplane on a parallel taxiway. See the Aerodrome Design Manual (Doc 9157), Part 2.

TAXIWAY MINIMUM SEPARATION DISTANCES



# **TAXIWAY SLOPES AND SURFACE**

#### **3.9.11 Transverse Slopes**

- 1.5% for code letter C,D,E or F
- 2% for code letter A or B

### 3.9.13 Surface of Taxiway

- Should not have irregularities that can cause damage to aeroplane structures
- Should be so constructed as to provide good friction characteristics when the taxiway is wet





## **TAXIWAY SHOULDER**

#### 3.10 Taxiway Shoulder

- 44m for code letter F (twy+twy shoulder)
- 38m for code letter E (twy+twy shoulder)
- 34m for code letter D (twy+twy shoulder)
- 25m for code letter C (twy+twy shoulder)




TAXIWAY Taxiway, STRIPS other than aircraft stand taxilane. centre line to object (metres) Code letter (1)(11)15.5 Α в 20 С 26 D 37 Е 43.5 51 F

### 3.11 Taxiway Strips

 The taxiway strip should provide an area clear of objects which may endanger taxiing aeroplanes

### 3.11.2 Width of Taxiway Strips

• A taxiway strip should extend symmetrically on each side of the centre line of the taxiway throughout the length of the taxiway to at least the distance from the centre line given in Table 3-1, column 11.

# **TAXIWAY STRIPS AND SLOPES**

### 3.11.4 Grading of Taxiway Strips (from twy centerline)

- 10.25m for OMGWS < 4.5m
- 11.0m for  $4.5m \le OMGWS < 6m$
- 12.5m for  $6m \le OMGWS < 9m$
- 18.5m for  $9m \le OMGWS < 15m$ ; Code letter D
- 19.0m for 9m ≤ OMGWS <15m ; Code letter E
- 22.0m for  $9m \le OMGWS < 15m$ ; Code letter F

### 3.11.5 Transverse Slopes

- 2.5% for code letter C,D,E or F
- 3% for code letter A or B
- 5% beyond taxiway strip





### HOLDING POSITIONS

### Table 3-2.Minimum distance from the runway centre lineto a holding bay, runway-holding position or road-holding position

	Code number			
Type of runway	1	2	3	4
Non-instrument	30 m	40 m	75 m	75 m
Non-precision approach	40 m	40 m	75 m	75 m
Precision approach category I	$60 \text{ m}^{b}$	$60 \text{ m}^{b}$	90 m <sup>a,b</sup>	90 m <sup>a,b,c</sup>
Precision approach categories II and III		_	90 m <sup>a,b</sup>	90 m <sup>a,b,c</sup>
Take-off runway	30 m	40 m	75 m	75m

a. If a holding bay, runway-holding position or road-holding position is at a lower elevation compared to the threshold, the distance may be decreased 5 m for every metre the bay or holding position is lower than the threshold, contingent upon not infringing the inner transitional surface.

b. This distance may need to be increased to avoid interference with radio navigation aids, particularly the glide path and localizer facilities. Information on critical and sensitive areas of ILS and MLS is contained in Annex 10, Volume I, Attachments C and G, respectively (see also 3.12.6).

Note 1.— The distance of 90 m for code number 3 or 4 is based on an aircraft with a tail height of 20 m, a distance from the nose to the highest part of the tail of 52.7 m and a nose height of 10 m holding at an angle of  $45^{\circ}$  or more with respect to the runway centre line, being clear of the obstacle free zone and not accountable for the calculation of OCA/H.

Note 2.— The distance of 60 m for code number 2 is based on an aircraft with a tail height of 8 m, a distance from the nose to the highest part of the tail of 24.6 m and a nose height of 5.2 m holding at an angle of  $45^{\circ}$  or more with respect to the runway centre line, being clear of the obstacle free zone.

c. Where the code letter is F, this distance should be 107.5 m.

Note.— The distance of 107.5 m for code number 4 where the code letter is F is based on an aircraft with a tail height of 24 m, a distance from the nose to the highest part of the tail of 62.2 m and a nose height of 10 m holding at an angle of 45° or more with respect to the runway centre line, heing clear of the obstacle free zone.

### **APRONS**

### 3.13 Aprons

- Aprons should be provided where necessary to permit the on- and off-loading of passenger, cargo or mail as well as the servicing of aircraft without interfering with the aerodrome traffic
- Permit expeditious handling of the aerodrome traffic at its maximum anticipated density

### 3.13.4 Slopes on apron

• SHOULD NOT EXCEED 1%







(

### **3.13.6 Clearance distances on aircraft stands**

Code letter	Clearance	
A	3m	
В	3m	
С	4.5m	
D	7.5m	
E	7.5m	
F	7.5m	







Full Code C wingspan = 36m Min distance between lead in line = 36/2 + 4.5 + 36/2 = 40.5m Recheck with table 3-1



### **CHAPTER 4:**

### OBSTACLE RESTRICTION AND REMOVAL

# OBSTACLE LIMITATION SURFACE



### Table 4-1. Dimensions and slopes of obstacle limitation surfaces — Approach runways

### RUNWAY CLASSIFICATION Precision approach category Non-instrument Non-precision approach I. II or III Code number Code number Code number Code number Surface and dimensions\* 2 1,2 1 з 4 3 4 1.2 3.4 3.4 (4) (5) (8) (11)(1)(2)(3) (6) (7)(9) (10)CONICAL 5% Slope 5% 5% 5% 5% 5% 5% 5% 5% 5% Height 35 m 55 m 75 m 100 m 60 m75 m 100 m 60 m 100 m 100 mINNER HORIZONTAL Height 45 m 45 m45 m45 m45 m45 m 45 m 45 m 45 m 45 m $2\ 000\ m$ 2 500 m $4\ 000\ m$ 4 000 m 3 500 m 4 000 m 4 000 m Radius 4 000 m 3 500 m 4 000 m INNER APPROACH Width 90 m 120 m<sup>e</sup> 120 m° Distance from threshold 60 m 60 m 60 m \_ \_\_\_\_ \_\_\_\_ \_\_\_\_ Length 900 m 900 m 900 m \_\_\_\_ \_ \_ \_\_\_\_ -----2.5% 2% Slope 2% APPROACH Length of inner edge 80 m 150 m 150 m 140 m 280 m 280 m 140 m 280 m 280 m60 m 60 m60 m Distance from threshold 30 m 60 m 60 m 60 m60 m 60 m 60 m 60 m Divergence (each side) 10% 10% 10% 10% 15% 15% 15% 15% 15% 15% First section 2 500 m 3 000 m Length 1 600 m 2 500 m 3 000 m $3\ 000\ m$ 3 000 m 3 000 m 3 000 m 3 000 m 5% 4% 2.5% 2% 2% 2% Slope 3.33% 3.33% 2.5% 2% Second section Length 3 600 m<sup>b</sup> 3 600 m<sup>b</sup> 12 000 m 3 600 m<sup>b</sup> 3 600 m<sup>b</sup> \_ 2.5% 2.5% 3% 2.5% 2.5% Slope Horizontal section 8 400 m<sup>b</sup> 8 400 m<sup>b</sup> Length 8 400 m<sup>b</sup> 8 400 m<sup>b</sup> \_ \_ Total length 15 000 m TRANSITIONAL Slope 20% 20% 14.3% 14.3% 20% 14.3% 14.3% 14.3% 14.3% 14.3% INNER TRANSITIONAL Slope 40% 33.3% 33.3% BALKED LANDING SURFACE Length of inner edge 90 m 120 m<sup>e</sup> 120 m<sup>e</sup> 1 800 m<sup>d</sup> Distance from threshold 1 800 m<sup>d</sup> c \_ \_ \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ Divergence (each side) 10% 10% 10% \_\_\_\_ \_\_\_\_ \_ -----\_\_\_\_ \_\_\_\_ Slope 4% 3.33% 3.33%

\_\_\_\_

\_\_\_\_

### APPROACH RUNWAYS

# **OBSTACLE** LIMITATION **SURFACE**

# OBSTACLE LIMITATION SURFACES





APPROACH SLOPE Example





### TRANSITION & APPROACH SLOPES



# TAKE OFF SLOPE

Table 4-2.Dimensions a	nd slopes of obst	acle limitation su	rfaces		
RUNWAYS	RUNWAYS MEANT FOR TAKE-OFF				
Surface and dimensions <sup>a</sup>	1	Code number 2	3 or 4		
(1)	(2)	(3)	(4)		
TAKE-OFF CLIMB					
Length of inner edge	60 m	80 m	180 m		
Distance from runway end <sup>b</sup>	30 m	60 m	60 m		
Divergence (each side)	10%	10%	12.5%		
Final width	380 m	580 m	1 200 m 1 800 m <sup>c</sup>		
Length	1 600 m	2 500 m	15 000 m		
Slope	5%	4%	2% <sup>d</sup>		

d. If no object reaches the 2 per cent (1:50) take-off climb surface, new objects should be limited to preserve the existing obstacle free surface or a surface down to a slope of 1.6 per cent (1:62.5).



This example takes 1.6% assuming that the buildings to be constructed are built within the take off path of existing runway



TAKE OFF SLOPE



### **CHAPTER 5:**

### VISUAL AIDS FOR NAVIGATION

# WIND DIRECTION INDICATOR

# 5.1.1.1 An aerodrome shall be equipped with at least one WDI



# TYPICAL MARKINGS



# TYPICAL MARKINGS



### **MARKINGS - COLOURS**



# 5.2.1.5 Taxiway, runway turn pad and aircraft stand – YELLOW

5.2.1.6 Apron safety line - **RED** 









# MARKINGS - RUNWAY



Form & proportions of runway designation markings

### MARKINGS - RUNWAY



Aiming point & touchdown zone marking (runway > 2400m)

# MARKINGS - RUNWAY



### Aiming point (runway < 2400m)



# MARKINGS - TAXIWAY



**₹**1, **\*** 0.9 m 0.9 ml



See 5.2.10.1

and 3.12.2

150mm thk

+

# MARKINGS - TAXIWAY



### 5.2.8.9 Enhanced Taxiway Marking



### MANDATORY INSTRUCTION MARKINGS



5.2.16.1 Where it is impractical to install a mandatory instruction sign, a mandatory instruction marking shall be provided on the surface of the pavement

### APRON SAFETY LINES



# **INFORMATION MARKINGS**

• 5.2.17.1 Where an information sign would normally be installed and is impractical to install, as determined by the appropriate authority, an information marking shall be displayed on the surface of the pavement

• Yellow background; black letters



### Black background , yellow letters



### LOCATION MARKINGS

### LOCATION MARKINGS

Characteristi	ę		
Dimension :	A	1.0 m	
	в	1.5 m	8
	с	Acc. to character width	
		r	1
1	_		
		A320	
1	-		
	Figur	e 10A. Option 1 – Single aircraft type	
	Figur	e 10A. Option 1 – Single aircraft type	
	Figur	e 10A. Option 1 – Single aircraft type	
Option 1 – M	Figur	e 10A. Option 1 – Single aircraft type - e aircraft type	
Option 1 – M Characteristi	Figur Iultiple c	e 10A. Option 1 – Single aircraft type - e aircraft type	
Option 1 – M Characteristi Dimension :	Figur Iultiple C	e 10A. Option 1 – Single aircraft type e aircraft type 1.0 m	
Option 1 – M Characteristi Dimension :	Figur Iultiple C B	e 10A. Option 1 – Single aircraft type e aircraft type 1.0 m 1.5 m	
Option 1 – M Characteristi Dimension :	Figur Iultiple C B C	e 10A. Option 1 – Single aircraft type e aircraft type 1.0 m 1.5 m Acc. to character width	
Option 1 – M Characteristi Dimension :	Figur Iultiple C B C D	e 10A. Option 1 – Single aircraft type e aircraft type 1.0 m 1.5 m Acc. to character width 0.5 m	
Option 1 – M Characteristi Dimension :	Figur Iultiple C D	e aircraft type 1.0 m 1.5 m Acc. to character width 0.5 m	
Option 1 – M Characteristi Dimension :	Figur ultiple c A B C D	e aircraft type 1.0 m 1.5 m Acc. to character width 0.5 m	
Option 1 – M Characteristi Dimension :	Figur Iultiple C D	e aircraft type 1.0 m 1.5 m Acc. to character width 0.5 m 737	
Option 1 – M Characteristi Dimension :	Figur Iultiple C D	e aircraft type 1.0 m 1.5 m Acc. to character width 0.5 m 737 A320	
Option 1 – M Characteristi Dimension :	Figur uuttiple c A B C D	e aircraft type 1.0 m 1.5 m Acc. to character width 0.5 m 0.5 m 0.5 m 0.5 m	
Option 1 – M Characteristi Dimension :	Figur uultiplo c D Figur	e aircraft type 1.0 m 1.5 m Acc. to character width 0.5 m 0.5 m 0.	
Option 1 – M Characteristi Dimension :	Figur duttiple c D Figur	e aircraft type 1.0 m 1.5 m Acc. to character width 0.5 m 0.5 m 0.	
Option 1 – M Characteristi Dimension :	Figur dultiple C D Figu	e aircraft type 1.0 m 1.5 m Acc. to character width 0.5 m 0.5 m 0.	

Dimension :	A B C	1.0 m 3.0 m Acc. to character width
		۱ <del>۶</del> – ۲
A		A320
B		7.020
		B737
	Figure	e 10C. Option 2 – Multiple aircraft type
Option 3 – N Characterist	luitipi	le aircraft type
Dimension :	A	1.0 m
	В	1.5 m Acc. to character width

Figure 10D. Option 3 - Multiple aircraft type

### LOCATION MARKINGS







### MARKINGS – SIZE & PROPORTIONS




## SIGNS

#### 5.4.1.1 Application

 Signs shall be provided to convey a mandatory instruction, information on a specific location or destination on a movement area or to provide other information to meet the requirements of the surface movement guidance and control systems.

#### 5.4.1.3 Characteristics

• Signs shall be frangible. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers and the engine pods of jet aircraft. The installed height of the sign shall not exceed the dimension shown in the appropriate column of Table 5-5.





#### TAXIING AND GUIDANCE

Sign height (mm)			Perpendicular	Perpendicular distance from	
Code number	Legend	Face (min.)	Installed (max.)	defined taxiway pavement edge to near side of sign	defined runway pavement edge to near side of sign
1 or 2	200	400	700	5–11 m	3–10 m
1 or 2	300	600	900	5–11 m	3–10 m
3 or 4	300	600	900	11–21 m	8–15 m
3 or 4	400	800	1 100	11–21 m	8–15 m

#### Table 5-5. Location distances for taxiing guidance signs including runway exit signs

#### TAXIING AND GUIDANCE

#### **Characteristics**

- Signs shall be rectangular, as shown in Figures with the longer side horizontal.
- The only signs on the movement area utilizing red shall be mandatory instruction signs.



RUNWAY VACATED/LOCATION



RUNWAYEXIT



#### **TAXIING** AND **GUIDANCE**



		1 1				
	a) Letter to letter code number					
		Following Letter				
		BDEE				Le
	Preceding	HIKL	C. G. O.	A.J.T.		
	Letter	M. N. P. R. U	Q. S. X. Z	V. W. Y		
		Code number				
	A	2	2	4		
	в	1	2	2		1
	2	2	2	3		
	E	2	2	4		(
	E	2	2	2		ł
	G	1	2	2		
	н	1	1	2		
	ï	1	1	2		1
	Ĵ	1	1	2		
	ĸ	2	2	3		1
	L	2	2	4		
	M	1	1	2		
	N	1	1	2		
	0	1	2	2		
	P	1	2	2		
	Q	1	2	2		
	R	1	2	2		1
	s Ŧ	1	2	2		1
		2	2	*		۱ ۱
	v	2	2	4		3
	ŵ	2	2	4		`
	x	2	2	3		
	Ŷ	2	2	4		
	z	2	2	3		
		b) Numeral to num	neral code number			Nun
	Preceding		2.3.6			
	Numeral	1, 5	8, 9, 0	4.7		
						:
		Code number				
	1	1	1	2		
	2		2	2		
	4	2	2	4		
	5	1	2	2		
	6	1	2	2		
	7	2	2	4		
	8	1	2	2		INSTRUC
	9	1	2	2		1. To
	0	1	2	2		the

	c) Space betw	reen characters	
Contro No.	200	Character height (mn	n) 400
Code No.	200	Space (mm)	400
1	48	71	96
2	38	57	76
3 4	25 13	38 19	28

Letter	200 300		400			
A	170	255	340			
В	137	205	274			
с	137	205	274			
D	137	205	274			
E	124	186	248			
F	124	186	248			
G	137	205	274			
н	137	205	274			
1	32	48	64			
J	127	190	254			
К	140	210	280			
L	124	186	248			
M	157	236	314			
N	137	205	274			
0	143	214	286			
P	137	205	274			
Q	143	214	286			
R	137	205	274			
S	137	205	274			
т	124	186	248			
U	137	205	274			
V	152	229	304			
w	178	267	356			
х	137	205	274			
Y	171	257	342			
Z	137	205	274			
	e) Width o	foumeral				
	e) vitati e	e) width of humeral				
	200	umeral neight (mm	)			
Numeral	200	300	400			
	Width (mm)					
1	50	74	98			
2	137	205	274			
3	137	205	274			
4	149	224	298			
5	137	205	274			
6	137	205	274			
7	137	205	274			
8	137	205	274			
9	137	205	274			
0	143	214	286			

d) Width of letter

Letter height (mm)

ICTIONS

- determine the proper SPACE between letters or numerals, obtain code number from table a) or b) and enter table c) for that code number to the desired letter or numeral height.
- 2. The space between words or groups of characters forming an abbreviation or symbol should be equal to 0.5 to 0.75 of the height of the characters used except that where an arrow is located with a single character such as 'A  $\rightarrow$ ', the space may be reduced to not less than one quarter of the height of the character in order to provide a good visual balance.
- Where the numeral follows a letter or vice versa use Code 1. 3.
- 4. Where a hyphen, dot, or diagonal stroke follows a character or vice versa use Code 1.
- 5. For the intersection take-off sign, the height of the lower case "m" is 0.75 of the height of the preceding "0" (zero) and spaced from the preceding "0" at code 1 for the character height of the numerals.



#### Application

- A mandatory instruction sign shall be provided to identify a location beyond which an aircraft taxiing or vehicle shall not proceed unless authorized by the aerodrome control tower.
- Mandatory instruction signs shall include runway designation signs, category I, II or III holding position signs, runway-holding position signs, road-holding position signs and NO ENTRY signs.





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Note.— Distance X is established in accordance with Table 3-2. Distance Y is established at the edge of the ILS/ML ritical/sensitive area.

Figure 5-32. Examples of sign positions at taxiway/runway intersections



Runway designation of a runway extremity

To indicate a runwayholding position at a runway extremity





Runway designation of both extremities of a runway To indicate a runwayholding position located at other taxiway/runway intersections or runway/runway intersections



NO ENTRY Sign

To indicate that entry to an area is prohibited



Runway designation of a runway extremity of Cat. I runway To indicate a category I runwayholding position at the threshold of runway 27



Runway designation of a runway extremity of Cat. II runway To indicate a category II runway-holding position at the threshold of runway 27



Runway designation of a runway extremity of Cat. III runway

To indicate a category III runway-holding position at the threshold of runway 27



Runway holding position To indicate a runway-holding sign position [established in accordance with 3.12.3]



#### **Characteristics**

- An information sign other than a location sign shall consist of an inscription in black on a yellow background.
- A location sign shall consist of an inscription in yellow on a black background and where it is a stand-alone sign shall have a yellow border.



RUNWAY VACATED/LOCATION

- A runway exit sign shall be provided where there is an operational need to identify a runway exit.
- A runway vacated sign shall be provided where the exit taxiway is not provided with taxiway centre line lights and there is a need to indicate to a pilot leaving a runway the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface whichever is farther from the runway centre line.



An intersection take-off sign should be provided when there is an operational need to indicate the remaining take-off run available (TORA) for intersection take-offs.



Where necessary, a destination sign should be provided to indicate the direction to a specific destination on the aerodrome, such as cargo area, general aviation, etc.



5.4.3 A location sign should be provided at an intermediate holding position.

A location sign shall be provided in conjunction with a direction sign, except that it may be omitted where an aeronautical study indicates that it is not needed.







 A direction sign shall be provided when there is an operational need to identify the designation and direction of taxiways at an intersection.

 A combined location and direction sign shall be provided when it is intended to indicate routing information prior to a taxiway intersection.



**Recommendation.**— Where a taxiway ends at an intersection such as a "T" and it is necessary to identify this, a barricade, direction sign and/or other appropriate visual aid should be used.

# **VOR AERODROME CHK POINT SIGN**

#### Application

When a VOR aerodrome check-point is established, it shall be indicated by a VOR aerodrome check-point marking and sign.

#### Location

A VOR aerodrome check-point sign shall be located as near as possible to the check-point and so that the inscriptions are visible from the cockpit of an aircraft properly positioned on the VOR aerodrome check-point marking.







## **VOR AERODROME CHK POINT SIGN**



VOR: is an abbreviation identifying this as a VOR check-point;

116.3: is an example of the radio frequency of the VOR concerned;

147°: is an example of the VOR bearing, to the nearest degree, which should be indicated at the VOR check-point; and



4.3 NM: is an example of the distance in nautical miles to a DME collocated with the VOR concerned.



#### AIRCRAFT STAND IDENTIFICATION MARKING



An aircraft stand identification marking should be supplemented with an aircraft stand identification sign where feasible.

An aircraft stand identification sign should be located so as to be clearly visible from the cockpit of an aircraft prior to entering the aircraft stand.

An aircraft stand identification sign should consist of an inscription in black on a yellow background.

#### ROAD HOLDING POSITION



- A road-holding position sign shall be provided at all road entrances to a runway.
- The road-holding position sign shall be located 1.5 m from one edge of the road (left or right as appropriate to the local traffic regulations) at the holding position.

 A road-holding position sign intended for night use shall be retroreflective or illuminated.

#### MANDATORY, INSTRUCTION AND INFORMATION SIGNS AT SINGLE RUNWAY AIRPORT



#### **CHAPTER 6:**

#### VISUAL AIDS FOR DENOTING OBSTACLES

# **OBJECTS TO BE MARKED AND/ OR LIGHTED**

- A fixed object that extends above an obstacle protection surface shall be marked and, if the runway is used at night, lighted.
- Vehicles and other mobile objects, excluding aircraft, on the movement area of an aerodrome are obstacles and shall be marked and, if the vehicles and aerodrome are used at night or in conditions of low visibility, lighted, except that aircraft servicing equipment and vehicles used only on aprons may be exempt.
- Elevated aeronautical ground lights within the movement area shall be marked so as to be conspicuous by day. Obstacle lights shall not be installed on elevated ground lights or signs in the movement area.
- All obstacles within the distance specified in Table 3-1, column 11 or 12, from the centre line of a taxiway, an apron taxiway or aircraft stand taxilane shall be marked and, if the taxiway, apron taxiway or aircraft stand taxilane is used at night, lighted.



# **OBJECTS TO BE MARKED AND/ OR LIGHTED**

- Obstacles in accordance with 4.3.2 [objects, in areas beyond the limits of obstacle limitation surfaces, which extend to a height of 150 m or more above ground elevation] should be marked and lighted, except that the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day.
- Overhead wires, cables, etc., crossing a river, valley or highway should be marked and their supporting towers marked and lighted if an aeronautical study indicates that the wires or cables could constitute a hazard to aircraft, except that the marking of the supporting towers may be omitted when they are lighted by high-intensity obstacle lights by day.
- When it has been determined that an overhead wire, cable, etc., needs to be marked but it is not practicable to install markers on the wire, cable, etc., then high-intensity obstacle lights, Type B, should be provided on their supporting towers.





#### MARKING OF OBJECTS



- All fixed objects to be marked shall, whenever practicable, be coloured, but if this is not practicable, markers or flags shall be displayed on or above them, except that objects that are sufficiently conspicuous by their shape, size or colour need not be otherwise marked.
- All mobile objects to be marked shall be coloured or display flags.

#### MARKING OF OBJECTS



- An object should be coloured to show a chequered pattern if it has essentially unbroken surfaces and its projection on any vertical plane equals or exceeds 4.5 m in both dimensions.
- The pattern should consist of rectangles of not less than 1.5 m and not more than 3 m on a side, the corners being of the darker colour.
- The colours of the pattern should contrast each with the other and with the background against which they will be seen.
- Orange and white or alternatively red and white should be used, except where such colours merge with the background.





• An object should be coloured to show alternating contrasting bands if:

it has essentially unbroken surfaces and has one dimension, horizontal or vertical, greater than 1.5 m, and the other dimension, horizontal or vertical, less than 4.5 m;





#### MARKING OF OBJECTS





H is less than 45 m



An object should be coloured to show alternating contrasting bands if:

it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5 m.



# MARKING OF OBJECTS

• An object should be coloured in a single conspicuous colour if its projection on any vertical plane has both dimensions less than 1.5 m. Orange or red should be used, except where such colours merge with the background.

[Note.— Against some backgrounds it may be found necessary to use a different colour from orange or red to obtain sufficient contrast.]

• When mobile objects are marked by colour, a single conspicuous colour, preferably red or yellowish green for emergency vehicles and yellow for service vehicles should be used.





## **OBSTACLE LIGHTS**

#### Use of obstacle lights

 The presence of objects which must be lighted shall be indicated by low-, medium- or high-intensity obstacle lights, or a combination of such lights.

[Note.— High-intensity obstacle lights are intended for day use as well as night use. Care is needed to ensure that these lights do not create disconcerting dazzle.]





## LOCATION OF OBSTACLE LIGHTS





Light spacing (X) in accordance with Appendix 6

Number of levels of lights = N =  $\frac{Y \text{ (metres)}}{X \text{ (metres)}}$ 

#### CHAPTER 7:

## VISUAL AIDS FOR DENOTING RESTRICTED AREA

## **CLOSED RUNWAY AND TAXIWAYS**

- A closed marking shall be displayed on a runway or taxiway, or portion thereof, which is permanently closed to the use of all aircraft.
- A closed marking should be displayed on a temporarily closed runway or taxiway or portion thereof, except that such marking may be omitted when the closing is of short duration and adequate warning by air traffic services is provided.





## **CLOSED RUNWAY AND TAXIWAYS**

• The marking shall be:



white when displayed on a runway





shall be yellow when displayed on a taxiway.





# **CLOSED RUNWAY AND TAXIWAYS**

- When a runway or taxiway or portion thereof is permanently closed, all normal runway and taxiway markings shall be obliterated.
- Lighting on a closed runway or taxiway or portion thereof shall not be operated, except as required for maintenance purposes.
- In addition to closed markings, when the runway or taxiway or portion thereof closed is intercepted by a usable runway or taxiway which is used at night, unserviceability lights [red fixed lights] shall be placed across the entrance to the closed area at intervals not exceeding 3 m.





#### CLOSED RUNWAYS AND TAXIWAYS


# NON LOAD BEARING SURFACE

### Application

Shoulders for taxiways, runway turn pads, holding bays and aprons and other non-load bearing surfaces which cannot readily be distinguished from load-bearing surfaces and which, if used by aircraft, might result in damage to the aircraft shall have the boundary between such areas and the load-bearing surface marked by a taxi side stripe marking.

#### Location

A taxi side stripe marking should be placed along the edge of the loadbearing pavement, with the outer edge of the marking approximately on the edge of the load-bearing pavement.





# NON LOAD BEARING SURFACE

### **Characteristics**

A taxi side stripe marking should consist of a pair of solid lines, each 15 cm wide and spaced 15 cm apart and the same colour as the taxiway centre line marking.



Taxi side stripe marking



Taxi side stripe and transverse marking





# NON LOAD BEARING SURFACE



### **PRE THRESHOLD AREA**

#### Application

When the surface before a threshold is paved and exceeds 60 m in length and is not suitable for normal use by aircraft, the entire length before the threshold should be marked with a chevron marking.

#### Location

A chevron marking should point in the direction of the runway and be placed as shown in Figure.





## **UNSERVICEABLE AREAS**

### Application

Unserviceability markers shall be displayed wherever any portion of a taxiway, apron or holding bay is unfit for the movement of aircraft but it is still possible for aircraft to bypass the area safely. On a movement area used at night, unserviceability lights shall be used.

#### Location

Unserviceability markers and lights shall be placed at intervals sufficiently close so as to delineate the unserviceable area [at least one light should be installed for each 7.5 m of peripheral distance of the area].





### **UNSERVICEABLE AREAS**

### Characteristics of unserviceability markers

Unserviceability markers shall consist of conspicuous upstanding devices such as **flags, cones or marker boards**.

### Characteristics of unserviceability lights

An unserviceability light shall consist of a **red fixed light**. The light shall have an intensity sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general level of illumination against which it would normally be viewed. In no case shall the intensity be less than 10 cd of red light.





### **UNSERVICEABLE AREAS**

### **Characteristics of unserviceability cones**

An unserviceability cone should be at least 0.5 m in height and **red**, orange or yellow or any one of these colours in combination with .

#### **Characteristics of unserviceability flags**

An unserviceability flag should be at least 0.5 m square and **red**, orange or yellow or any one of these colours in combination with .

#### **Characteristics of unserviceability marker boards**

An unserviceability marker board should be at least 0.5 m in height and 0.9 m in length, with alternate **red** and or **orange** and vertical stripes.





### UNSERVICEABLE AREAS





### **CHAPTER 9:**

AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATIONS

- Aerodrome emergency planning is the process of preparing an aerodrome to cope with an emergency occurring at the aerodrome or in its vicinity.
- The objective of aerodrome emergency planning is to minimize the effects of an emergency, particularly in respect of saving lives and maintaining aircraft operations.
- The aerodrome emergency plan sets forth the procedures for coordinating the response of different aerodrome agencies (or services) and of those agencies in the surrounding community that could be of assistance in responding to the emergency.





### **Examples of emergencies are:**

- aircraft emergencies,
- sabotage including bomb threats,
- unlawfully seized aircraft,
- dangerous goods occurrences,
- building fires and
- natural disasters.





 The plan shall coordinate the response or participation of all existing agencies which, in the opinion of the appropriate authority, could be of assistance in responding to an emergency.

#### **Examples of agencies are:**

#### A) On the aerodrome:

- air traffic control unit,
- rescue and fire fighting services,
- aerodrome administration,
- medical and ambulance services,
- aircraft operators,
- security services, and
- police;

#### **B)** Off the aerodrome:

- fire departments,
- police,
- medical and ambulance services,
- hospitals,
- military, and
  - harbour patrol or coast guard



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• The aerodrome emergency plan document should include at least the following:

a) types of emergencies planned for

b) agencies involved in the plan;

c) responsibility and role of each agency, the emergency operations centre and the command post, for each type of emergency;

d) information on names and telephone numbers of offices or people to be contacted in the case of a particular emergency; and



e) a grid map of the aerodrome and its immediate vicinity.



#### Aerodrome emergency exercise

• The plan shall be tested by conducting:

a) a full-scale aerodrome emergency exercise at intervals not exceeding two years; and

b) partial emergency exercises in the intervening year to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected; and reviewed thereafter, or after an actual emergency, so as to correct any deficiency found during such exercises or actual emergency.

**The purpose of a full-scale exercise is :** to ensure the adequacy of the plan to cope with different types of emergencies.

**The purpose of a partial exercise is:** to ensure the adequacy of the response to individual participating agencies and components of the plan, such as the communications system.



### Application

Rescue and fire fighting equipment and services shall be provided at an aerodrome.

[Note. — Public or private organizations, suitably located and equipped, may be designated to provide the rescue and fire fighting service. It is intended that the fire station housing these organizations be normally located on the aerodrome, although an off-aerodrome location is not precluded provided the response time can be met.]





#### Level of protection to be provided

The level of protection provided at an aerodrome for rescue and fire fighting shall be appropriate to the aerodrome category determined using the principles described in [9.2.5 and 9.2.6] **AA and BB**, except that, where the number of movements of the aeroplanes in the highest category normally using the aerodrome is less than 700 in the busiest consecutive three months, the level of protection provided shall be not less than one category below the determined category.

#### Notes.—

1. Either a take-off or a landing constitutes a movement.

2. Movements of scheduled, non –scheduled and general aviation operations should be counted in determining the aerodrome category.







# Level of protection to be provided

#### **Principle AA:**

The aerodrome category shall be determined from Table 9-1 and shall be based on the longest aeroplanes normally using the aerodrome and their fuselage width.

[Note.— To categorize the aeroplanes using the aerodrome, first evaluate their overall length and second, their fuselage width.]

Aerodrome Maximum Aeroplane overall length fuselage width category (1)(2)(3) 0 m up to but not including 9 m 2 m 2 9 m up to but not including 12 m 2 m 3 12 m up to but not including 18 m 3 m 18 m up to but not including 24 m 4 m 4 5 24 m up to but not including 28 m 4 m 28 m up to but not including 39 m 6 5 m 7 39 m up to but not including 49 m 5 m 8 49 m up to but not including 61 m 7 m 9 61 m up to but not including 76 m 7 m 76 m up to but not including 90 m 10 8 m

 Table 9-1.
 Aerodrome category for rescue and fire fighting

# Level of protection to be provided

#### **Principle BB:**

 $\triangleright$ 

If, after selecting the category appropriate to the longest aeroplane's overall length, that aeroplane's fuselage width is than the greater maximum width in Table 9-1, column 3 for that category, then the category for that aeroplane shall actually be one category higher.

### Level of protection to be provided

**During anticipated periods of reduced activity**, the level of protection available shall be no less than that **needed for the highest category of aeroplane planned to use the aerodrome during that time** irrespective of the number of movements.





**Examples for the determination of aerodrome category for RFFS:** 

#### Example No. 1

Aeroplane	Over-all length	Fuselage width	Category	Movements
TU 154	47 m	3.45 m		300
B 707-320	46.61	3.55		600

**Examples for the determination of aerodrome category for RFFS:** 

### Example No. 2

Aeroplane	Over-all length	Fuselage width	Category	Movements
DC-8-61	57.12 m	3.51 m		300
Super VC- 10	52.43 m	3.50 m		300
B 767-200	48.50 m	5.03 m		300

Highest category = 8 DC8 + VC10 = 300 + 300 = 600 < 700 , therefore can reduce one category

**Examples for the determination of aerodrome category for RFFS:** 



Aeroplane	Over-all length	Fuselage width	Category	Movements
DC-8-61	57.12 m	3.51 m		300
Super VC- 10	52.43 m	3.50 m		300
TU 154	47 m	3.45 m		300

**Examples for the determination of aerodrome category for RFFS:** 

### Example No. 4

Aeroplane	Over-all length	Fuselage width	Category	Movements
DC-10-30	53.35 m	5.72 m		400
B 767-200	48.50 m	5.03 m		400
TU 154	47 m	3.45 m		300

### **Extinguishing agents**

• Both principal and complementary agents should normally be provided at an aerodrome.

1. Principal agents produce a permanent control, i.e. for a period several minutes or longer.

2. Complementary agents have rapid fire suppression capability but offer a "transient" control which is usually only available during application.





### **Extinguishing agents**

• The principal extinguishing agent should be:

a) a foam meeting the minimum performance level A; or

b) a foam meeting the minimum performance level B; or

c) a combination of these agents;

 The complementary extinguishing agent should be a dry chemical powder suitable for extinguishing hydrocarbon fires.





#### Extinguishing agents

The amounts of water for foam production and the complementary agents to be provided on the rescue and fire fighting vehicles shall be in accordance with the determined aerodrome category and Table 9-2.

		Table 9-2.	Minimu	m usable amour	nts of exting	uishing agents		
	Foam meet le	ing performance evel A	Foam meet la	ing performance evel B	Foam meet l	ting performance evel C	Complem	entary agents
Aerodrome category	Water (L)	Discharge rate foam solution/ minute (L)	Water (L)	Discharge rate foam solution/ minute (L)	Water (L)	Discharge rate foam solution/ minute (L)	Dry chemical powders (kg)	Discharge Rate (kg/second)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1 2 3 4 5 6 7 8 9	350 1 000 1 800 3 600 8 100 11 800 18 200 27 300 36 400	350 800 1 300 2 600 4 500 6 000 7 900 10 800 13 500	230 670 1 200 2 400 5 400 7 900 12 100 18 200 24 300	230 550 900 1 800 3 000 4 000 5 300 7 200 9 000	160 460 820 1 700 3 900 5 800 8 800 12 800 17 100	160 360 630 1 100 2 200 2 900 3 800 5 100 6 300	45 90 135 135 180 225 225 450 450	2.25 2.25 2.25 2.25 2.25 2.25 2.25 2.25
10	48 200	16 600	32 300	11 200	22 800	7 900	450	4.5



Note.— The quantities of water shown in columns 2, 4 and 6 are based on the average overall length of aeroplanes in a given category.



### Response time

- Response time is considered to be the time between the initial call to the rescue and fire fighting service, and the time when the first responding vehicle(s) is (are) in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in Table 9-2.
- Optimum visibility and surface conditions are defined as daytime, good visibility, no precipitation with normal response route free of surface contamination e.g. water, ice or snow.





### **Response time**

- The operational objective of the rescue and fire fighting service should be to achieve a response time not exceeding two minutes to any point of each operational runway, in optimum visibility and surface conditions.
- The operational objective of the rescue and fire fighting service should be to achieve a response time not exceeding three minutes to any other part of the movement area in optimum visibility and surface conditions.





### **Fire stations**

- All rescue and fire fighting vehicles should normally be housed in a fire station.
- ✓ Satellite fire stations should be provided whenever the response time cannot be achieved from a single fire station.
- The fire station should be located so that the access for rescue and fire fighting vehicles into the runway area is direct and clear, requiring a minimum number of turns.





#### **Communication and alerting systems**

- ✓ A discrete communication system should be provided linking a fire station with:
  - the control tower,
  - any other fire station on the aerodrome and
  - the rescue and fire fighting vehicles.
- ✓ An alerting system for rescue and fire fighting personnel, capable of being operated from that station, should be provided at:
  - a fire station,
  - any other fire station on the aerodrome and
  - the aerodrome control tower.







Aerodrome category	Rescue and fire fighting vehicles		
1	1		
2	1		
3	1		
4	1		
5	1		
6	2		
7	2		
8	3		
9	3		
10	3		

Number of rescue and fire fighting vehicles

# **DISABLED AIRCRAFT REMOVAL**

- A plan for the removal of an aircraft disabled on, or adjacent to, the movement area should be established for an aerodrome, and a coordinator designated to implement the plan, when necessary.
- ✓ The disabled aircraft removal plan should be based on the characteristics of the aircraft that may normally be expected to operate at the aerodrome, and include among other things:

a) a list of equipment and personnel on, or in the vicinity of, the aerodrome which would be available for such purpose; and

b) arrangements for the rapid receipt of aircraft recovery equipment kits available from other aerodromes.





# WILDLIFE STRIKE HAZARD





### WILDLIFE STRIKE HAZARD REDUCTION

• The wildlife strike hazard on, or in the vicinity of, an aerodrome shall be assessed through:

a) the establishment of a national procedure for recording and reporting bird strikes to aircraft; and

b) the collection of information from aircraft operators,
 airport personnel, etc. on the presence of birds on or
 a round
 the aerodrome constituting a potential hazard to aircraft operations.

• Wildlife strike reports shall be collected and forwarded to ICAO for inclusion in the ICAO Bird Strike Information System (IBIS) database.





# WILDLIFE STRIKE HAZARD REDUCTION

• When a bird strike hazard is identified at an aerodrome, the appropriate authority shall take action to decrease the number of birds constituting a potential hazard to aircraft operations by adopting measures for discouraging their presence on, or in the vicinity of, an aerodrome.

[ Airport Services Manual, Part 3.]

• The appropriate authority shall take action to eliminate or to prevent the establishment of garbage disposal dumps or any such other source attracting bird activity on, or in the vicinity of, an aerodrome unless an appropriate aeronautical study indicates that they are unlikely to create conditions conducive to a bird hazard problem.

[Note.— Due consideration needs to be given to airport operators' concerns related to land developments close to the airport boundary that may attract birds/wildlife.]





# **APRON MANAGEMENT SERVICE**

When warranted by the volume of traffic and operating conditions, an appropriate apron management service should be provided on an apron by an aerodrome ATS unit, by another aerodrome operating authority, or by a cooperative combination of these, in order to :

a) regulate movement with the objective of preventing collisions between aircraft, and between aircraft and obstacles:

b) regulate entry of aircraft into, and coordinate exit of aircraft from, the apron with the aerodrome control tower; and

c) ensure safe and expeditious movement of vehicles and appropriate regulation of other activities.




# **APRON MANAGEMENT SERVICE**

- An apron management service shall be provided with radiotelephony communications facilities.
- Where low visibility procedures are in effect, persons and vehicles operating on an apron shall be restricted to the essential minimum.
- An emergency vehicle responding to an emergency shall be given priority over all other surface movement traffic.





# **APRON MANAGEMENT SERVICE**

- A vehicle operating on an apron shall:
  - a) give way to an emergency vehicle;
  - b) give way to an aircraft taxiing, about to taxi, or being pushed or towed; and
  - c) give way to other vehicles in accordance with local regulations.
- An aircraft stand shall be visually monitored to ensure that the recommended clearance distances are provided to an aircraft using the stand.





# **GROUND SERVICING OF AIRCRAFT**

- Fire extinguishing equipment suitable for at least initial intervention in the event of a fuel fire and personnel trained in its use shall be readily available during the ground servicing of an aircraft, and there shall be a means of quickly summoning the rescue and fire fighting service in the event of a fire or major fuel spill.
- When aircraft refuelling operations take place while passengers are embarking, on board or disembarking, ground equipment shall be positioned so as to allow:

a) the use of a sufficient number of exits for expeditious evacuation; and

b) a ready escape route from each of the exits to be used in an emergency.





# SITING OF EQUIPMENET AND INSTALLATIONS ON OPERATIONAL AREAS

 Unless its function requires it to be there for air navigation purposes, no equipment or installation shall be:

a) on a runway strip, a runway end safety area, a taxiway strip or within the distances specified in Table 3-1, column 11, if it would endanger an aircraft; or

b) on a clearway if it would endanger an aircraft in the air.





#### FENCING

- A fence or other suitable barrier shall be provided on an aerodrome:
  - ✓ to prevent the entrance to the movement area of animals large enough to be a hazard to aircraft.
  - ✓ to deter the inadvertent or premeditated access of unauthorized persons onto a non-public area of the aerodrome.

Note 1.— This is intended to include the barring of sewers, ducts, tunnels, etc., where necessary to prevent access.

Note 2.— Special measures may be required to prevent the access of an unauthorized person to runways or taxiways which overpass public roads.





# **SECURITY LIGHTING**

- ✓ At an aerodrome where it is deemed desirable for security reasons, a fence or other barrier provided for the protection of international civil aviation and its facilities should be illuminated at a minimum essential level.
- Consideration should be given to locating lights so that the ground area on both sides of the fence or barrier, particularly at access points, is illuminated.





# Thank You!

**QUESTIONS?**