

GOVERNMENT NOTICE NO. 73 published on 24/02/2017

THE CIVIL AVIATION ACT
(CAP 80)

THE CIVIL AVIATION (AERODROMES) REGULATION, 2017

ARRANGEMENT REGULATIONS

PART I
PRELIMINARY PROVISIONS

Regulation Title

1. Citation
2. Interpretation
3. Applicability
4. Use of common reference systems
5. Categories of aerodromes

PART II
CONSTRUCTION OF AERODROMES

6. Application of this Part
7. Requirements for application for an aerodrome construction permit
8. Issuance of aerodrome construction permits
9. Design and construction of aerodrome
10. Requirements for aerodrome design and construction
11. Aerodrome reference code

PART III
LICENSING OF AERODROMES

12. Application of this Part
13. Application for licence
14. Conditions for issuance of licence
15. Issuance of licence
16. Breach of conditions of licence and non-conformance

- with the licensing requirements
- 17. Specifications of an Aerodrome Licence
- 18. Validity of licence
- 19. Renewal of licence
- 20. Amendment of licence
- 21. Suspension and cancellation of licence
- 22. Surrender of licence
- 23. Charges at licensed aerodromes
- 24. Licences register
- 25. Notification and furnishing of information

PART IV CERTIFICATION OF AERODROMES

- 26. Application of this Part
- 27. Application for certificate
- 28. Conditions for issuance of certificate
- 29. Breach of conditions of certificate and non-conformance with certification requirements
- 30. Specifications of an Aerodrome certificate
- 31. Certification of aerodromes used for international operations.
- 32. Issuance of certificate
- 33. Validity of certificate
- 34. Renewal of certificate
- 35. Amendment of certificate
- 36. Suspension and cancellation of certificate
- 37. Surrender of certificate
- 38. Charges at certificated aerodromes
- 39. Certificates register

PART V CONSTRUCTION, REGISTRATION AND OPERATION OF CATEGORY E AERODROMES

- 40. Application of this Part
- 41. Construction of category E aerodromes
- 42. Issuance of an approval to construct category E aerodrome

- 43. Application for registration of a category E aerodrome
- 44. Registration of a category E aerodrome
- 45. Issuance of a registration approval
- 46. Validity of a registration approval
- 47. Renewal of a registration approval
- 48. Amendment of a registration approval
- 49. Cancellation of a registration approval
- 50. Obligations of category E aerodrome operator
- 51. Obligations of a pilot-in-command of an aircraft operating to and from a category E aerodrome
- 52. Notification of registered aerodromes

PART VI
OBLIGATIONS OF AERODROME OPERATOR

- 53. Application of this Part
- 54. Compliance with standards and conditions
- 55. Competence of operational and maintenance personnel
- 56. Aerodrome operations and maintenance
- 57. Safety management system
- 58. Storage of inflammable and other dangerous goods
- 59. Safety measures against fire
- 60. Access to and operations within restricted areas
- 61. Entry into or exit from restricted areas of aerodrome
- 62. Test-running of aircraft engine
- 63. Certain acts prohibited on aerodrome
- 64. Removal of obstructions from aerodrome movement surfaces
- 65. Maintenance of environment management programme
- 66. Protection of navigation aids
- 67. Responsibilities of operator
- 68. Inspection of aerodromes and unhindered access by inspectors of the Authority
- 69. Notifying and reporting
- 70. Aerodrome movement area inspections
- 71. Special inspections

72. Warning notices

PART VII
AERODROME MANUAL

73. Application of this Part
74. Requirements for aerodrome manual
75. Information to be included in an aerodrome manual
76. Amendment of an aerodrome manual

PART VIII
AERODROME DATA

77. Application of this part
78. Aeronautical data
79. Aerodrome reference point
80. Aerodrome and runway elevation
81. Aerodrome reference temperature
82. Aerodrome dimensions and related information
83. Strength of pavements
84. Pre-flight altimeter check location
85. Declared distances
86. Condition of movement area and related facilities
87. Water on a runway
88. Responsibility for removal of disabled aircraft
89. Information on level of protection of rescue and fire fighting
90. Visual approach slope indicator System
91. Coordination between aeronautical information services and aerodrome authorities

PART IX
WILDLIFE HAZARD MANAGEMENT

92. Application of this Part
93. Animals not allowed in restricted areas of an aerodrome
94. Wildlife hazard management
95. Wildlife hazard reduction at aerodrome
96. National Committee on Wildlife Hazard Management

- 97. Responsibilities of the National Committee on Wildlife Hazard Management
- 98. Composition of the National Committee on Wildlife Hazard Management

PART X
AERODROME PHYSICAL CHARACTERISTICS

- 99. Application of this Part
- 100. Conditions for operating an aerodrome
- 101. Standards for physical characteristics of an aerodrome
- 102. Number and orientation of runways
- 103. Choice of maximum permissible cross-wing component
- 104. Data to be used for the calculation of the runway usability factor
- 105. Location of threshold
- 106. Determination of actual length of runways
- 107. Determination of width of runway
- 108. Determination of minimum distance between parallel runways
- 109. Slopes on runways
- 110. Strength of runways
- 111. Surface of runways
- 112. Runway shoulders
- 113. Runway turn pads
- 114. Runway strips
- 115. Slopes on runway strips
- 116. Runway end safety area
- 117. Clearways
- 118. Stopways
- 119. Radio altimeter operating area
- 120. Taxiways
- 121. Rapid exit taxiways
- 122. Taxiway on bridges
- 123. Taxiway shoulders
- 124. Taxiway strips
- 125. Holding bays, runway holding positions, intermediate holding positions and road holding positions
- 126. Aprons

127. Isolated aircraft parking position

PART XI

OBSTACLE RESTRICTIONS AND REMOVAL

- 128. Application of this Part
- 129. Erection of obstacles
- 130. Establishment of obstacle limitation surfaces
- 131. Obstacle limitation surfaces
- 132. Conical surfaces
- 133. Inner horizontal surfaces
- 134. Approach surface
- 135. Inner approach surface
- 136. Transitional surface
- 137. Inner transitional surface
- 138. Balked landing surface
- 139. Take-off climb surface
- 140. Obstacle limitation requirements for non-instrument runways
- 141. Obstacle limitation requirements for non-precision approach runways
- 142. Obstacle limitation requirements for precision approach runways
- 143. Obstacle limitation requirements for runways meant for take-off
- 144. Construction above, beyond or outside the Obstacle Limitation Surface
- 145. Other objects
- 146. Authorisation to construct within the vicinity of an aerodrome
- 147. Removal of obstacle
- 148. Marking and lighting of obstacle.

PART XII

AERONAUTICAL GROUND LIGHTING

- 149. Application of this Part
- 150. Establishment and maintenance of aeronautical ground lights

- 151. Primary and Secondary power supplies
- 152. Aeronautical beacons

PART XIII
VISUAL AIDS FOR NAVIGATION

- 153. Application of this Part
- 154. Provision of visual aids for navigation
- 155. Wind direction indicators
- 156. Landing direction indicator
- 157. Signalling lamp
- 158. Signal panel and signalling area
- 159. Markings
- 160. Runway designation marking
- 161. Runway centreline marking
- 162. Threshold marking
- 163. Aiming point marking
- 164. Touchdown zone marking
- 165. Runway side stripe marking
- 166. Taxiway centreline marking
- 167. Runway turn pad marking
- 168. Runway-holding position marking and signs
- 169. Intermediate holding position marking
- 170. VOR aerodrome checkpoint marking and signs
- 171. Aircraft stand marking and identification signs
- 172. Apron safety lines
- 173. Road-holding position marking and signs
- 174. Mandatory instruction markings and signs
- 175. Information marking and signs
- 176. Lights which may endanger safety of aircraft
- 177. Laser emission which may endanger the safety of aircraft
- 178. Lights which may cause confusion
- 179. Elevated approach lights
- 180. Elevated lights
- 181. Surface lights
- 182. Light intensity and control
- 183. Emergency lighting
- 184. Aeronautical beacons
- 185. Aerodrome beacons

- 186. Identification beacon
- 187. Simple approach lighting systems
- 188. Precision approach category I lighting systems
- 189. Precision approach category II and III lighting systems
- 190. Visual approach slope indicator systems
- 191. Approach slope and elevation setting of light beams
- 192. PAPI and APAPI
- 193. Approach slope and elevation setting of light units
- 194. Obstacle protection, AVASIS, T-VASIS, PAPI and APAPI
- 195. Circling guidance lights
- 196. Runway lead-in lighting systems
- 197. Runway threshold identification lights
- 198. Runway edge lights
- 199. Runway threshold and wing bar lights
- 200. Runway end lights
- 201. Runway centre line lights
- 202. Runway touchdown zone lights
- 203. Simple touchdown zone lights
- 204. Rapid exit taxiway indicator lights
- 205. Stopway lights
- 206. Taxiway centre line lights
- 207. Taxiway centre line lights on taxiways
- 208. Taxiway centre line lights on other exit taxiways
- 209. Taxiway centre line lights on runways
- 210. Taxiway edge lights
- 211. Runway turn pad lights
- 212. Stop bars
- 213. Intermediate holding position lights
- 214. Runway guard lights
- 215. Apron floodlighting
- 216. Visual docking guidance system
- 217. Azimuth guidance unit
- 218. Stopping position indicator
- 219. Advanced Visual Docking Guidance System
- 220. Aircraft Stand manoeuvring guidance lights
- 221. Road holding position lights
- 222. No entry bar
- 223. Aerodrome Identification sign

- 224. Unpaved runways edge Markers
- 225. Stop way edge markers
- 226. Taxiway edge markers
- 227. Taxiway centreline markers
- 228. Unpaved taxiway edge markers
- 229. Boundary markers

PART XIV

VISUAL AIDS FOR DENOTING OBSTACLES

- 230. Provision of visual aids for denoting obstacles
- 231. Marking and lighting of objects within the lateral boundaries of obstacle limitation surfaces
- 232. Marking and lighting of objects outside the lateral boundaries of obstacle limitation surfaces
- 233. Intensity and colour of obstacle lights
- 234. Marking and lighting of mobile objects
- 235. Marking of fixed objects
- 236. Lighting of fixed objects
- 237. Lighting of objects with heights less than 45m above ground level
- 238. Lighting of objects with a height 45m or more to a height less than 150 m above ground level
- 239. Lighting of objects with a height 150 m or more above ground level
- 240. Marking of wind turbines
- 241. Lighting of wind turbines
- 242. Marking of overhead wires, cables, etc., and supporting towers
- 243. Lighting of overhead wires, cables, etc., and supporting towers

PART XV

VISUAL AIDS FOR DENOTING RESTRICTED USE AREAS

- 244. Application of this Part
- 245. Marking of restricted use areas
- 246. Marking and lighting of closed runways and taxiways, or

- parts thereof
- 247. Marking of non-load bearing surfaces
- 248. Marking of pre-threshold areas
- 249. Marking and lighting of unserviceable areas

PART XVI

AERODROME OPERATIONAL SERVICES, EQUIPMENT, INSTALLATIONS AND FACILITIES

- 250. Application of this Part
- 251. Immigration, customs and excise aerodromes
- 252. Supply of aviation fuel to aircraft
- 253. Aerodrome emergency planning
- 254. Emergency planning committee
- 255. Emergency Operation Centre and Command Post
- 256. Aerodrome emergency exercise
- 257. Emergencies in difficult environment
- 258. Establishment of Aerodrome rescue and firefighting services
- 259. Determination of aerodrome rescue and firefighting category
- 260. Level of protection for rescue and firefighting services
- 261. Provision of reserve supplies of water and foam for firefighting services
- 262. Provision of rescue equipment
- 263. Response time for rescue and firefighting services
- 264. Establishment of emergency access roads
- 265. Rescue and firefighting services stations
- 266. Provision of communication and alerting system for rescue and firefighting services
- 267. Minimum number of rescue and fire fighting vehicles
- 268. Requirements for rescue and firefighting personnel
- 269. Removal of disabled aircraft
- 270. Apron management service
- 271. Ground servicing of aircraft
- 272. Aerodrome vehicle operation
- 273. Surface movement guidance and control systems
- 274. Siting of equipment and installations on operational areas
- 275. Location, construction and installation of equipment on

- operational areas
- 276. Fencing of aerodromes, ground installations and facilities
- 277. Lighting of Security fences and barriers
- 278. Maintenance of safety inspection programme
- 279. Maintenance of fire prevention programme
- 280. Access of ground vehicles to aerodrome movement area
- 281. Operation of Aircraft exceeding certified characteristics of an aerodrome

PART XVII
AERODROME MAINTENANCE

- 282. Application of this Part
- 283. Maintenance programme
- 284. Maintenance of movement and adjacent areas
- 285. Removal of contaminants
- 286. Runway pavement overlays
- 287. Preventive maintenance of visual aids
- 288. Construction or maintenance activity during low visibility operations
- 289. Works at aerodromes

PART XVIII
ELECTRICAL SYSTEMS

- 290. Application of this Part
- 291. Electrical power supply systems for air navigation services and facilities
- 292. Electrical system design and operations
- 293. Monitoring of electrical systems

PART XIX
INFORMATION TO BE REPORTED TO AERONAUTICAL
INFORMATION SERVICES

- 294. Application of this Part
- 295. Availability of Information
- 296. Action required for occurrences of operational significance other than those involving electronic aids and

- communication facilities
- 297. Action required for occurrences that affect electronic aids and communication facilities
- 298. Aeronautical data reporting

PART XX
EXEMPTIONS

- 299. Application of this Part
- 300. Application for exemption
- 301. Initial review by the Authority
- 302. Evaluation of application for exemption

PART XXI
GENERAL PROVISIONS

- 303. Application of this Part
- 304. Change of name of a licence or certificate holder
- 305. Change of address of a licence or certificate holder
- 306. Use and retention of licences, certificates and records
- 307. Replacement of documents
- 308. Aeronautical user charges
- 309. Conditions for operating an aerodrome
- 310. Lighting of en-route obstacles
- 311. Land use in the vicinity of an aerodrome
- 312. Aeronautical studies and risk assessment
- 313. Deviations from standards
- 314. Safety inspections and audits
- 315. Obligation to insure an aerodrome
- 316. Certification, Licensing and Registration of Aerodromes.
- 317. Standards for Aerodromes in Category D
- 318. Manuals Standards

PART XXII
OFFENCES AND PENALTIES

- 319. Contravention of Regulations
- 320. Offences and Penalties

PART XXIII
SAVINGS AND TRANSITION

- 321. Savings and Transition
- 322. Revocation

SCHEDULES

THE CIVIL AVIATION ACT
(CAP. 80)

REGULATIONS

(Made under section 4)

THE CIVIL AVIATION (AERODROMES) REGULATIONS, 2017

PART I
PRELIMINARY PROVISIONS

Citation **1.** These Regulations may be cited as the Civil Aviation (Aerodromes) Regulations, 2017

Interpretation **2.** In these Regulations unless the context otherwise requires-
“accident” means an occurrence associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:
 (a) a person is fatally or seriously injured as a result of:
 (i) being in the aircraft;
 (ii) direct contact with any part of the aircraft, including parts which have become detached from the aircraft;
 (iii) direct exposure to jet blast, except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or
 (b) the aircraft sustains damage or structural failure which:

- (i) adversely affects the structural strength, performance or flight characteristics of the aircraft; and
- (ii) would normally require major repair or replacement of the affected component, except for engine failure or damage, when the damage is limited to a single engine including its cowlings or accessories, to propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreens, the aircraft skin such as small dents or puncture holes, or for minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike including holes in the radome; or
- (c) the aircraft is missing or is completely inaccessible. For statistical uniformity only, an injury resulting in death within thirty days of the date of the accident is classified as a fatal injury and an aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located

“accuracy” means a degree of conformance between the estimated or measured value and the true value;

Cap 80

“Act” means the Tanzania Civil Aviation Act;

“aerodrome” means 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;

“aerodrome beacon” means an aeronautical beacon used to indicate the location of an aerodrome from the air;

“aerodrome certificate” means a certificate issued by the Authority under Part IV of these regulations;

- “aerodrome elevation” means the elevation of the highest point of the landing area;
- “aerodrome facilities and equipment” means facilities and equipment, inside or outside the boundaries of an aerodrome that are constructed or installed and maintained for the arrival, departure and surface movement of aircraft;
- “aerodrome identification sign” means sign placed on an aerodrome to aid in identifying the aerodrome from the air;
- “aerodrome manual” means the manual that forms part of the application for a licence or a certificate under these Regulations, including any amendments to the manual, approved by the Authority;
- “aerodrome mapping data in its acronymy (AMD)” means data collected for the purpose of compiling aerodrome mapping information for aeronautical uses;
- “aerodrome mapping database in its acronymy (AMDB)” means a collection of aerodrome mapping data organized and arranged as a structured data set;
- “aerodrome operator” means a competent person or organization granted with aerodrome certificate, licence or registration upon ensuring that the person or organization can safely operate the aerodrome facilities, installations, equipment and services under these regulations or as prescribed by the Authority;
- “aerodrome reference code” means a code used for planning purposes to classify an aerodrome with respect to the critical aircraft characteristics for which the aerodrome is intended;
- “aerodrome reference point” means the designated geographical location of an aerodrome;
- “Aerodrome Standards” means standards prescribed by the Authority applicable to aerodromes;
- “aerodrome traffic density” means:

- (a) light where the number of movements in the mean busy hour is not greater than 15 per runway or typically less than 20 total aerodrome movements;
- (b) medium, where the number of movements in the mean busy hour is of the order of 16 to 25 per runway or typically between 20 to 35 total aerodrome movements;
- (c) heavy, where the number of movements in the mean busy hour is of the order of 26 or more per runway or typically more than 35 total aerodrome movements;

“aerodrome traffic zone” means the airspace extending from aerodrome level to a height of two thousand feet over the area comprising the aerodrome and the surrounding land or water within a distance of two thousand yards of its boundaries;

“aeronautical beacon” means an aeronautical ground light visible at all azimuths, either continuously or intermittently, to designate a particular point on the surface of the earth;

“aeronautical ground light” means any light provided as an aid to air navigation, other than a light displayed on an aircraft;

“Aeronautical Information Circular” means a notice containing information that does not qualify for the origination of a NOTAM or for inclusion in the Aeronautical Information Publication, but which relates to flight safety, air navigation, technical, administrative or legislative matters;

“Aeronautical Information Publication” means an aeronautical information publication of a lasting character essential to air navigation, issued by the Authority;

“Aeroplane” means a powered-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remains fixed under given conditions of flights;

- “aeroplane reference field length” means the minimum field length required for take-off at maximum certificated take-off mass, sea-level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aeroplane flight manual prescribed by the certifying authority or equivalent data from the aeroplane manufacturer;
- “air traffic service” means a flight information service, alerting service, air traffic advisory service, or air traffic control service;
- “air traffic service unit” is a generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office;
- “Aircraft Classification Number in its acronymy (ACN)” means a number expressing the relative effect of an aircraft on a pavement for a specified standard sub grade category;
- “aircraft stand” means a designated area on an apron intended to be used for parking an aircraft;
- “apron” means a defined area, on an aerodrome, intended to accommodate aircraft for purposes of loading or unloading of passengers, mail or cargo, fuelling, parking or maintenance;
- “apron management service” means a service provided to regulate the activities and the movement of aircraft and vehicles on an apron;
- “Authority” means the Tanzania Civil Aviation Authority established pursuant to the Act;
- “authorized person” means any person authorized by the Authority either generally or in relation to a particular case or class of cases and reference to an authorized person includes references to the holder for the time being of an office designated by the Authority;
- “balked landing” means a landing manoeuvre that is unexpectedly discontinued at any point below the obstacle clearance altitude or height (OCA/H);

- “barrette” means three or more aeronautical ground lights closely spaced in a transverse line so that from a distance they appear as a short bar of light;
- “calendar” means discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day;
- “capacitor discharge lights” means a lamp in which high- intensity flashes of extremely short duration are produced by the discharge of electricity at high voltage through a gas enclosed in a tube;
- “certificate” means the certificate to operate an aerodrome issued by the Authority under Part IV of these Regulations;
- “certified aerodrome” means an aerodrome whose operator has been granted an Aerodrome Certificate;
- “clearway” means a defined rectangular area under the control of the appropriate authority selected or prepared as a suitable area over which an aircraft may make a portion of its initial climb to a specified height;
- “controlled aerodrome” means an aerodrome where air traffic services are provided;
- “critical aircraft” means the most demanding aircraft with regard to the aircraft performance and dimensions for a range of aircraft, for which the aerodrome facilities is intended;
- “cross wind component” means the surface wind component at right angles to the runway centre line;
- “Cyclic Redundancy Check in its acronymy (CRC) means a mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data;
- “dangerous goods” means articles or substances which are capable of posing a risk to health, safety, property or the environment;
- “data quality” means a degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity;

“datum” means any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities;

“declared distance” means –

- (a) “accelerate-stop distance available (ASDA)” which is the length of the take-off run available plus the length of the stopway, if provided;
- (b) “landing distance available (LDA)” which is the length of the runway which is declared available and suitable for the ground run of an aircraft landing;
- (c) “take-off distance available (TODA)” which is the length of the take-off run available plus the length of the clearway, if provided;
- (d) “take-off run available (TORA)” which is the length of runway declared available and suitable for the ground run of an aircraft taking off;

“dependent parallel approaches” means simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are prescribed;

“displaced threshold” means a threshold not located at the extremity of a runway;

“effective intensity” means the effective intensity of a flashing light is equal to the intensity of a fixed light of the same colour which produces the same visual range under identical conditions of observation;

“field length” means balanced field length for aeroplane, if applicable, or take-off distance in other cases;

“ellipsoid height (Geodetic height)” means the height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question;

“fixed light” means a light having constant luminous intensity when observed from a fixed point;

- “frangible object” means an object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft;
- “geodetic datum” means a minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system or frame;
- “geoid” means the equipotential surface in the gravity field of the earth which coincides with the undisturbed Mean Sea Level extended continuously through the continents;
- “geoid undulation” means the distance of the geoid above positive or below negative the mathematical reference ellipsoid;
- “Gregorian calendar” means calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108***). (In the Gregorian calendar, common years have 365 days and leap years 366 days divided into twelve sequential months);
- “hazard beacon” means an aeronautical beacon used to designate a danger to air navigation;
- “heliport” means 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;
- “holding bay” means a defined area where aircraft can be held, or bypassed, to facilitate efficient surface movement of aircraft;
- “hotspot” means a location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots or drivers is necessary;
- “human factor principles” means principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance;

- “human performance” means human capabilities and limitations, which have an impact on the safety and efficiency of aeronautical operations;
- “identification beacon” means an aeronautical beacon emitting a coded signal by means of which a particular point of reference can be identified;
- “incident” means an occurrence other than an accident associated with the operation of an aircraft, which affect or may affect the safety of operation of aircraft;
- “independent parallel approaches” means simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are not prescribed;
- “independent parallel departures” means simultaneous departures from parallel or near-parallel instrument runways;
- “instrument runway” means one of the following types of runways intended for the operation of aircraft using instrument approach procedures -
 - (a) “non- precision approach runway” means a runway served by visual aids and non-visual aids intended for landing operations following an instrument approach operation type A and a visibility not less than 1000 m;
 - (b) “precision approach runway, category I”, means a runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B with a decision height (DH) not lower than 60 m (200 ft) and either a visibility not less than 800 m or a runway visual range not less than 550 m;

(c) “precision approach runway, category II”, means a runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B with a decision height (DH) lower than 60 m (200 ft) but not lower than 30 m (100 ft) and a runway visual range not less than 300 m;

(d) “precision approach runway category III” means a runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B to and along the surface of the runway and:

A — intended for operations with a decision height (DH) lower than 30 m (100 ft), or no decision height and a runway visual range not less than 175 m;

B — intended for operations with a decision height (DH) lower than 15 m (50 ft), or no decision height and a runway visual range less than 175 m but not less than 50 m;

C — intended for operations with no decision height (DH) and no runway visual range limitations.

(Visual aids need not necessarily be matched to the scale of non-visual aids provided. The criterion for the selection of visual aids is the conditions in which operations are intended to be conducted. Refer to the Civil Aviation (Operation of aircraft) regulations for instrument approach operation types)

“integrity aeronautical data” means a degree of assurance that an aeronautical data and its value has not been lost nor altered since the data origination or authorized amendment;

“integrity classification aeronautical data” means classification based upon the potential risk resulting from the use of corrupted data and is classified as:

- (a) routine data: there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;
- (b) essential data: there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; and
- (c) critical data: there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.

“International Airport” means any airport designated by the state as an airport of entry and departure for international air traffic, where the formalities incident to customs, immigration, public health, animal and plant quarantine and similar procedures are carried out;

“intermediate holding position” means a designated position intended for traffic control at which taxiing aircraft and vehicles stop and hold until they are cleared to proceed, when so instructed by the aerodrome control tower;

“landing area” means that part of a movement area intended for the landing or take-off of aircraft;

“landing direction indicator” means a device to indicate visually the direction currently designated for landing and take-off;

“Laser-beam Critical Flight Zone in its acronymy (LCFZ)” means an airspace in the proximity of an aerodrome but beyond the LFFZ where the irradiance is restricted to a level unlikely to cause glare effects;

“Laser-beam Free Flight Zone in its acronymy (LFFZ)” means an airspace in the immediate proximity of the aerodrome where the irradiance is restricted to a level unlikely to cause any visual disruption

- “Laser-beam Sensitive Flight Zone in its acronymy (LSFZ)” means an airspace outside, and not necessarily contiguous with, the LFFZ and LCFZ where the irradiance is restricted to a level unlikely to cause flash-blindness or after-image effects;
- “licence” means a licence to operate an aerodrome issued by the Authority under Part II of these Regulations;
- “lighting system reliability” means the probability that the complete installation operates within the specified tolerances and that the system is operationally usable;
- “manoeuvring area” means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons;
- “marker” means an object displayed above ground level in order to indicate an obstacle or delineate a boundary;
- “marking” means a symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information;
- “Minister” means the Minister for the time being responsible for civil aviation;
- “movement area” means that part of the aerodrome to be used for take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and apron;
- “near-parallel runways means “on-intersecting runways whose extended centre lines have an angle of convergence/divergence of 15 degrees or less;
- “notify” means shown in Aeronautical Information Publications, Aeronautical Information Circulars, NOTAM, civil aviation publications or any other official publication issued for the purpose of enabling any of the provisions of these Regulations to be complied with;
- “non-instrument runway” means a runway intended for the operation of aircraft using visual approach procedures;
- “normal flight zone in its acronymy (NFZ)” means airspace not defined as LFFZ, LCFZ or LSFZ but which must be protected from laser radiation capable of causing biological damage to the eye;

- “obstacle” means any fixed whether temporary or permanent and mobile object, or part thereof, that:
- (a) is located on an area intended for the surface movement of aircraft; or
 - (b) extends above a defined surface intended to protect aircraft in flight; or
 - (c) stands outside those defined surfaces and that has been assessed as being a hazard to air navigation;
- “obstacle free zone (OFZ)” means the airspace above the inner approach surface, inner transitional surfaces, the balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low-mass and frangibly mounted one required for air navigation purposes;
- “obstacle limitation surfaces” means a series of surfaces that define the volume of airspace at and around an aerodrome to be kept free of obstacles in order to permit the intended aircraft operations to be conducted safely and to prevent the aerodrome from becoming unusable by the growth of obstacles around the aerodrome;
- “orthometric height” means height of a point related to the geoid, generally presented as an MSL elevation;
- “operator” means a person operating an aerodrome licensed or certificated under these Regulations;
- “Pavement Classification Number in its acronymy (PCN)” means a number expressing the bearing strength of a pavement for unrestricted operations;
- “precision approach runway” (see instrument runway);
- “prescribed” means prescribed by the Authority in the Manual of Aerodrome standards, Manual of Standards for Category D Aerodromes (Heliports), Circulars, Orders, Notices, Aeronautical Publications and any other related guidance documents;
- “Pressure-fed fuel fires” means fires associated with fuel discharged under very high pressure from a ruptured fuel tank;

- “primary runway” means runway used in preference to others whenever conditions permit;
- “protected flight zones” means an airspace specifically designated to mitigate the hazardous effects of laser radiation;
- “recommended practice” means any specification for the physical characteristics configuration, material, performance or procedure, the uniform application of which is recognised as desirable in the interest of safety, regularity or efficiency of international air navigation;
- “registration approval” means an approval to operate an aerodrome granted by the Authority under Part V of these Regulations;
- “relevant authority” means any authority other than the Civil Aviation Authority whose action may be necessary or complimentary for the implementation of these Regulations;
- “road” means an established surface route on the movement area meant for the exclusive use of vehicles;
- “road holding position” means a designated position at which vehicles may be required to hold;
- “runway” means a defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft;
- “Runway End Safety Area in its acronymy (RESA)” means an area symmetrical about the extended runway centreline and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aircraft undershooting or overrunning the runway;
- “runway guard lights” means a light system intended to caution pilots or vehicle drivers that they are about to enter an active runway;

- “runway-holding position” means a designated position intended to protect a runway, an obstacle limitation surface, or an Instrument Landing System or Microwave Landing System critical or sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorized by the aerodrome control tower;
- “runway strip” means a defined area including the runway and stopway, if provided, intended -
- (a) to reduce the risk of damage to aircraft running off a runway; and
 - (b) to protect aircraft flying over it during take-off or landing operations;
- “runway turn pad” means a defined area on a land aerodrome adjacent to a runway for the purpose of completing a 180-degree turn on a runway;
- “Runway Visual Range in its acronymy (RVR)” means the range over which a pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line;
- “safety” means a state in which the risk of harm to persons or of property damage is reduced to, and maintained at or below unacceptable level through a continuing process or hazard identification and risk management;
- “Safety Management System in its acronymy (SMS)” means a systematic approach to managing safety including the necessary organizational structure, accountabilities, policies and procedures;
- “segregated parallel operations” means simultaneous operations on parallel or near-parallel instrument runways in which one runway is used exclusively for approaches and the other runway is used exclusively for departures;
- “shoulder” means an area adjacent to the edge of a pavement, prepared to provide a transition between the pavement and the adjacent surface;

“sign” means-

- (a) fixed message sign which presenting only one message.
- (b) variable message sign which is capable of presenting several predetermined messages or no message, as applicable.

“signal area” means an area on an aerodrome used for the display of ground signals;

“standard” means any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognised as necessary for the safety of air navigation;

“state safety programme” means an integrated set of regulations and activities aimed at improving safety;

“station declination” means an alignment variation between the zero degree radial of a VOR and true north, determined at the time the VOR station is calibrated;

“stopway” means a defined rectangular area on the ground at the end of the take-off run available, prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off;

“switch-over time light” means the time required for the actual intensity of a light measured in a given direction to fall from 50 per cent and recover to 50 per cent during a power supply change-over, when the light is being operated at intensities of 25 per cent or above;

“take-off runway” means a runway intended for take-off only;

“taxiway” means a defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including –

- (a) aircraft stand taxi lane which is a portion of an apron designated as a taxiway and intended to provide access to aircraft stands only;

- (b) apron taxiway which is a portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron;
- (c) rapid exit taxiway which is a taxiway connected to a runway at an acute angle and designed to allow landing aircrafts to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times;

“taxiway intersection” means a junction of two or more taxiways;

“taxiway strip” means an area including a taxiway intended to protect aircraft operating on a taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway;

“threshold” means the beginning of that portion of the runway usable for landing;

“touchdown zone” means the portion of a runway beyond the threshold, intended for landing aircraft on first contact with the runway;

“unservicable area” means a part of the movement area that is unfit and unavailable for use by aircraft;

“usability factor” means the percentage of time during which the use of a runway or system of runways is not restricted because of the cross-wind component;

“vicinity” means a defined airspace around an aerodrome for control of obstacles that may infringe the obstacle limitation surfaces around the aerodrome, contained within a radius of thirteen kilometres from the aerodrome reference point upto a height of one thousand five hundred feet above ground level;

“visual traffic pattern” means the aerodrome traffic zone of the aerodrome;

“wildlife” means feral birds and animals, including domestic animals out of the control of their owners; and

“wildlife hazard” means a potential for damaging aircraft collision with wildlife on or near an aerodrome.

Applicability

3. These regulations shall apply to all aerodromes in the United Republic of Tanzania except where otherwise specified.

Use of common reference systems

4.-(1) The World Geodetic System – 1984 (WGS-84) shall be used as the horizontal reference system to express aeronautical geographical coordinates for aerodromes.

(2) The Mean Sea Level datum shall be used as the vertical reference system (elevation) at aerodromes.

(3) Except where notified in the Tanzania Aeronautical Information Publication or the Aeronautical Information Circular, the Gregorian calendar and Coordinated Universal Time shall be used as the temporal reference system.

(4) Unless otherwise prescribed by the Authority, the International System of Units developed and maintained by the General Conference of Weights and Measures (CGPM) shall be used as the standard system of units of measurement.

Categories of aerodromes

5. In these Regulations aerodromes shall be categorized as follows-

- (a) category A comprising international airports available for use by both international and domestic air traffic;
- (b) category B comprising secondary international aerodromes, appropriate for use by aircraft of maximum certificated take off mass above five thousand seven hundred kilograms available for use by both international and domestic aircraft where the formalities for customs, immigration, health and similar procedures are carried out;
- (c) category C comprising public and private aerodromes, appropriate for use by aircraft of maximum certificated take off mass of above five thousand seven hundred kilograms available for use only by domestic air traffic only;
- (d) category D comprising aerodromes available for use only by domestic helicopters operations; and

- (e) category E comprising aerodromes available for use only by domestic air traffic of maximum certificated take-off mass not exceeding five thousand seven hundred kilogrammes or such aerodrome as may be determined by the Authority to be registered as a category E aerodrome using the methodology described in Part V of and Fifth Schedule of these Regulations.

PART II CONSTRUCTION OF AERODROMES

Application
of
this Part

6. This Part applies to aerodromes categories A, B, C, and D.

Requirements
for
application
for an
aerodrome
construction
permit

- 7.-(1) A person shall not construct an aerodrome unless that person has a valid aerodrome construction permit issued under regulation 8.

- (2) An application for an aerodrome construction permit shall be considered for approval, where –

- (a) the applicant holds a valid authorization from a relevant authority for use of the place as an aerodrome; and
- (b) the application is approved by the authority responsible for national environment management;

- (3) The Authority shall prior to issuance of a construction permit, assess the suitability of the place proposed for construction by taking into consideration -

- (a) the proximity of the place to other aerodromes and landing areas including military aerodromes;
- (b) obstacles, terrain and existing airspace restrictions; and
- (c) that it is not against public interest that the place where the aerodrome is to be constructed shall be used as such.

(4) An applicant for an aerodrome construction permit shall submit to the Authority for approval an application in the prescribed form accompanied by –

- (a) a detailed design of the proposed construction including related architectural requirements approved by the relevant authority;
- (b) aerodrome data in accordance with the characteristics of the aircraft for which the aerodrome is intended; and
- (c) a topographical map of the proposed aerodrome site as specified by the Authority.

Issuance
of
aerodrome
constructi
on
permits.

8. The Authority shall issue an aerodrome construction permit to an applicant where the application meets the requirements in regulation 7 and any other requirements as may be specified by any relevant authority.

Design
and
constructi
on of
aerodrome
s

9.-(1) An applicant for a construction permit shall ensure that the design and construction of the aerodrome is undertaken by a person registered by the relevant professional body.

(2) The Authority shall inspect the site of an aerodrome during construction to ascertain compliance with the standards prescribed and the terms of the aerodrome construction permit.

Requirem
ents
for
aerodrome
design
and
constructi
on

10.-(1) An aerodrome design shall –

- (a) indicate the physical characteristics in accordance with these regulations;
- (b) indicate the obstacle limitation surfaces;
- (c) integrate and optimize security measures in accordance with the Civil Aviation (Security) Regulations;
- (d) indicate visual aids for denoting obstacles and restricted areas; and

- (e) indicate the appropriate equipment and installations.
- (2) The physical characteristics, obstacle limitation surfaces, visual aids, facilities, equipment and installations, required under sub-regulation (1) shall -
 - (a) be appropriate to the critical aircraft characteristics for which the aerodrome intends to serve;
 - (b) be at the lowest meteorological minima for each runway;
 - (c) provide ambient light conditions during the operations of aircraft;
 - (d) comply with the appropriate aerodrome design standards as prescribed by the Authority.
 - (e) the design of aerodromes shall take into account, land-use and environmental control measures.

Aerodrom
e
reference
code

11.-(1) An aerodrome reference code comprising a code number and a code letter shall be used for aerodrome planning purposes.

(2) The Authority shall determine the aerodrome reference code in accordance with the critical aircraft characteristics for which the aerodrome facility is intended.

(3) The aerodrome reference code numbers and code letters required under sub-regulation (1) shall be determined as follows:

Aerodrome reference code				
Code Element 1		Code Element 2		
Code number (1)	Aeroplane reference field length (2)	Code letter (3)	Wing span (4)	Maximum gross weight (5)
1	Less than 800 m	A	Up to but not including 15 m	Up to but not including 2 000 kg
2	800 m up to but not including 1 200 m	B	15 m up to but not including 24 m	4.5 tonnes up to but not including 7 000 kg
3	1 200 m up to but not including 1 800 m	C	24 m up to but not including 36 m	7 tonnes up to but not including 12 000 kg
4	1 800 m and over	D	36 m up to but not including 52m	12 tonnes up to but not including 18 000 kg
		E	52 m up to but not including 65 m	18 tonnes up to but not including 27 000 kg
		F	65 m up to but not including 80 m	27 tonnes up to but not including 40 000 kg

PART III LICENSING OF AERODROMES

Application of this Part

12. This Part applies to aerodromes in categories B, C and D except where otherwise specified.

Application for licence

13. An application for a licence shall be made in the prescribed form accompanied by -

- an aerodrome manual;
- a site plan for the aerodrome;
- an environmental impact assessment report;
- approval from any relevant authority;
- proof of financial capability in the case of aerodromes in Category B;

- (f) particulars of any non-compliance or deviations from the appropriate aerodrome design, operation or equipment standards; and
- (g) charges as prescribed by the Authority in the Aeronautical Information Publication or Aeronautical Information Circular.

Condition
s for
issuance
of
licence

14.-(1) A licence may be issued subject to any conditions that may be prescribed by the Authority.

(2) The Authority shall endorse on a licence the conditions for use of an aerodrome and any other details as may be deemed necessary by the Authority.

(3) Subject to sub regulation (4), where an applicant requests or the Authority considers that an aerodrome shall be available for public use, a licence may be granted subject to a condition that the aerodrome and shall at all times be available to all persons on equal terms and conditions.

(4) An aerodrome operator may refuse an aircraft from using the aerodrome except in an emergency situation.

Issuance
of
licence

15.-(1) A person shall not operate an aerodrome without a licence issued by the Authority.

(2) The Authority shall issue a licence in the prescribed form and manner where-

- (a) an applicant is found to be competent to operate an aerodrome on consideration of the previous conduct and experience of the applicant, the equipment, organisation, staffing, maintenance and other arrangements of the applicant;
- (b) the physical characteristics of the aerodrome and its surroundings are safe for use by aircraft; and
- (c) an applicant for a licence complies with the Civil Aviation (Security) Regulations where applicable.

(3) The issuance of a licence shall be subject to compliance with these Regulations and standards prescribed by the Authority and any other condition as may be specified or notified by the Authority in accordance with safety audit and inspection.

(4) The Authority may refuse to grant a licence to an applicant, and where the Authority so refuses, it shall notify the applicant in writing, of the reasons for the refusal, not later than fourteen days after making that decision.

(5) The Authority shall following the issuance of a licence conduct continuing surveillance, audits, surveys and inspections to ensure continuing validity of the licence and capability of the aerodrome operator to maintain safe, regular and efficient operation of the aerodrome facilities, installations, equipment and services

Breach of conditions of licence and non-conformance with the licensing requirements

16.-(1)The breach of any condition subject to which a licence is issued including any approval, permission or exemption shall render the licence invalid.

(2) The Authority shall impose operating restrictions or sanctions at a licensed aerodrome in the event of non-conformance with the licensing requirements or any unresolved safety concerns.

Specifications of an Aerodrome licence

17.-(1) A licence shall specify -

- (a) the category of the Aerodrome and the aerodrome reference code;
- (b) the restrictions, if any, relating to non-compliance with or deviations from the appropriate aerodrome design, operation or equipment standards;
- (c) the period of validity of the licence.

(2) A licence issued under these Regulations shall not be transferable.

(3) A holder of an aerodrome licence which is suspended or cancelled shall within thirty days of the suspension or cancellation, surrender the licence to the Authority.

(4) Notwithstanding sub-regulation (3), where an aerodrome licence is suspended for a period of less than thirty days, a holder of the licence shall immediately surrender the licence.

Validity
of
licence

18.-(1) A licence issued under these Regulations shall be valid for a period of two years unless the licence is suspended, cancelled or revoked in accordance with these Regulations.

(2) A holder of an aerodrome licence which is suspended or cancelled shall within thirty days of the suspension or cancellation, surrender the licence to the Authority.

(3) Notwithstanding sub-regulation (2), where an aerodrome licence is suspended for a period of less than thirty days, a holder of the licence shall surrender the licence immediately.

Renewal
of
licence

19.-(1) An application for the renewal of a licence shall be made to the Authority in the prescribed form and shall be accompanied by –

- (a) the aerodrome manual if significant changes have been made following the initial licensing;
- (b) particulars of deviations, if any, from the appropriate design, operation or equipment standards; and
- (c) the appropriate charges as prescribed by the Authority in the Aeronautical Information Publication or Aeronautical Information Circular.

(2) An application for renewal shall be submitted sixty days before the expiry of the licence.

(3) The renewal of a licence shall be subject to compliance with these Regulations, standards prescribed by the Authority and any other conditions as may be specified or notified by the Authority as determined by safety inspections and audit procedures by the Authority, before the renewal of the licence.

Amendment of licence

20.-(1) An application for amendment of a licence shall be submitted in a form prescribed by the Authority.

(2) The Authority may request that the application be accompanied by any or all of the following -

- (a) an aerodrome manual;
- (b) a site plan for the aerodrome;
- (c) an environmental impact assessment report;
- (d) approval from any relevant authority;
- (e) proof of financial capability in the case of aerodromes in Category B;
- (f) particulars of any non-compliance or deviations from the appropriate aerodrome design, operation or equipment standards; and
- (g) charges as prescribed in the Aeronautical Information Publication or Aeronautical Information Circular by the Authority.

(3) The Authority may, provided the requirements of regulations 14 are met, where necessary, amend a licence -

- (a) for a change in the use or operation of the aerodrome;
- (b) for a change in the boundaries of the aerodrome;
- (c) if the holder of the licence requests an amendment; or
- (d) if the Authority deems it necessary.

Suspension and cancellation of licence

21.-(1) The Authority may suspend an aerodrome licence where -

- (a) following a safety inspection or audit, it is evident that the holder of the licence has not complied with the requirements prescribed in these Regulations and failed to remedy the non-compliance within a period of thirty days after the inspection;
- (b) the holder of the licence prevents the Authority from carrying out a safety inspection or audit in accordance with these Regulations;
- (c) the holder of the licence is under receivership, liquidation or bankruptcy proceedings;

(d) it is deemed necessary in the interest of aviation safety.

(2) The Authority may, on giving reasons to the holder of a licence, suspend the licence for a period not exceeding sixty days.

(3) A holder of a licence who is notified of a suspension in sub regulation (2) may submit a response in writing within a period not exceeding fourteen days.

(4) Notwithstanding sub regulation (3), the Authority may suspend any or all of the operations at an aerodrome pending receipt of a response from the holder.

(5) A holder of a licence who is aggrieved by the suspension of a licence may appeal against the suspension to the Minister, within thirty days of the suspension.

(6) Where an appeal is made under sub-regulation (5), the holder of a licence shall state in writing the reasons why in his opinion, the suspension shall be varied or set aside.

(7) The Minister may vary or set aside the suspension made under sub-regulation (2) on the basis of the reasons given in the appeal under sub-regulation (5).

(8) Where a holder of a licence does not appeal against the suspension in accordance with sub-regulation (5), the Authority may cancel the licence, on giving reasons to the holder of a licence.

Surrender
of licence

22.-(1) Subject to sub-regulation (2), a holder of a licence may surrender the licence to the Authority at any time.

(2) A holder of a licence who wishes to surrender the licence shall give the Authority not less than thirty days a notice in writing, before the date on which the licence is surrendered

(3) The Authority shall cancel the licence upon the expiry of the period of notice in sub-regulation (2).

(4) Where, after the expiry of the period in sub-regulation (2), an aerodrome is abandoned or is not maintained in accordance with the conditions of the licence, the holder of the licence shall remove, obliterate or modify the prescribed markings referred to in regulation 67 (f).

Charges at
Licensed
aerodrome
s

23.-(1) A holder of a licence shall prescribe charges for the use of the aerodrome or any facilities provided at the aerodrome for the safety, security, efficiency or regularity of air navigation.

(2) Where required by the Authority, a holder of a licence shall, furnish particulars of the charges levied for the use of an aerodrome or the performance of services at the aerodrome.

(3) Notwithstanding sub regulation (1), the Authority may where necessary, prescribe the maximum charges which may be levied for the use of an aerodrome or the performance of services at the aerodrome, for a specified period.

(4) A holder of a licence of the aerodrome for which the Authority prescribes charges under sub-regulation (3) shall not cause or permit any charges to be made in contravention of that sub-regulation.

(5) A holder of a licence of an aerodrome for which the Authority prescribes charges shall cause the prescribed charges to be posted in a conspicuous place at the aerodrome.

Licences
register

24.-(1) The Authority shall maintain a register of all licences issued in accordance with these Regulations.

(2) The register shall contain -

- (a) the full name of the holder of an aerodrome licence;
- (b) the nationality of the holder of a licence;
- (c) the postal, telephone, facsimile and e-mail addresses of a holder of a licence;
- (d) the name and location of the aerodrome for which a licence is issued;
- (e) the number of the licence;

- (f) the date on which the licence was issued;
- (g) the date on which the licence expire; and
- (h) any other relevant information.

Notification and furnishing of information

- 25.** An aerodrome operator shall –
- (a) in the case of a licence to operate an aerodrome for public use, cause to be notified, the times during which the aerodrome is to be available for take-off and landing of aircraft for public transport or instruction in flying; and
 - (b) upon request, furnish to an authorised person, information concerning the terms of the licence.

PART IV CERTIFICATION OF AERODROMES

Application of this Part

- 26.-(1)** This Part applies to aerodromes in category A.
- (2) This part may apply to aerodromes in category B where deemed necessary by the Authority.

Application for certificate

- 27.** An application for a certificate shall be submitted in a form prescribed by the Authority and shall be accompanied by -
- (a) two copies of the aerodrome manual;
 - (b) a plan for the aerodrome;
 - (c) an environmental impact assessment report;
 - (d) approval from any relevant authority;
 - (e) proof of financial capability;
 - (f) particulars of any non-compliance or deviations with the established requirements from the appropriate aerodrome design, operation or equipment standards to enable the Authority determine acceptance or otherwise based on the aeronautical studies and risk assessment;

- (g) details of competence and level of resources of the key aerodrome personnel including their curriculum vitae, verifiable training records and ; and
- (h) charges as prescribed by the Authority in the Aeronautical Information Publication or Aeronautical Information Circular
- (i) any other information that may be sought by the Authority to ascertain competence of the persons to perform critical activities for aerodrome operations and maintenance as prescribed by the Authority.

Condition
s
for
issuance
of
certificate

28.-(1) A certificate may be issued subject to any conditions that may be prescribed by the Authority.

(2) The Authority shall endorse on a certificate the conditions for use of an aerodrome and any other details as may be deemed necessary by the Authority.

Breach of
conditions
of
certificate
and
non-
conforman
ce
with the
certificatio
n
requireme
nts

29.-(1) The breach of any condition subject to which a certificate is issued including any approval, permission or exemption shall render the certificate invalid.

(2) The Authority shall impose operating restrictions or sanctions at certified aerodromes in the event of non-conformance with the certification requirements or any unresolved safety concerns.

Specificati
ons of
an
Aerodrom
e
certificate

30.-(1) A certificate shall specify –

- (a) the category of the Aerodrome, aerodrome reference code and type of use of the aerodrome;

(b) the restrictions, if any, relating to non-compliance with or deviations from the appropriate aerodrome design, operation or equipment standards;

(c) the period of validity of the certificate.

(2) A certificate issued under these Regulations shall not be transferable.

(3) A holder of an aerodrome certificate which is suspended or cancelled shall within thirty days of the suspension or cancellation, surrender the certificate to the Authority.

(4) Notwithstanding sub-regulation (2), where an aerodrome certificate is suspended for a period of less than thirty days, a holder of the certificate shall immediately surrender the certificate.

Certificates
on
of
aerodromes
used for
international
operations

31. A person shall not operate an aerodrome used for international operations unless that person holds a certificate issued by the Authority in accordance with this Part.

Issuance
of
certificate

32.-(1) The Authority shall issue a certificate in the prescribed form and manner where the Authority is satisfied that -

(a) the applicant and the personnel of the applicant are adequate in number and have the necessary competency and experience to operate and maintain an aerodrome;

(b) the aerodrome manual prepared for the aerodrome and submitted with the application contains all the relevant information;

(c) the aerodrome physical characteristics, facilities, services and equipment are established in accordance with approved standards;

(d) the aerodrome operating procedures make satisfactory provision for the safety of aircraft;

- (e) an acceptable safety management system is in place;
- (f) the applicant has an approved aviation security programme in accordance with the Civil Aviation (Security) Regulations.

(2) The issuance of a certificate shall be subject to compliance with these Regulations and standards prescribed by the Authority and any other condition as may be specified or notified by the Authority in accordance with safety audit and inspection.

(3) The Authority may refuse to grant a certificate to an applicant and where the Authority refuses, it shall notify the applicant in writing, of the reasons for the refusal, not later than fourteen days after making that decision.

(4) After issuance of a Certificate, the authority shall cause Publication of certified status of an aerodrome and the required details in the AIP

(5) The Authority shall following the issuance of a certificate conduct continuing surveillance, audits, surveys and inspections to ensure continuing validity of the certificate and capability of the aerodrome operator to maintain safe, efficient and regular operation of the aerodrome facilities, installations, equipment and services

(6) in pursuance of sub-regulation (5), the Authority shall prioritize inspections, audits and surveys towards those areas of greater safety concern or need and shall be based on the analysis of safety risks or data quality

(7) An aerodrome certificate issued under these Regulations is not transferable.

Validity
of
certificate

33. A certificate shall be valid for a period of one year, unless the certificate is suspended, cancelled or revoked in accordance with these Regulations.

Renewal
of
certificate

34.-(1) An application for the renewal of a certificate shall be made to the Authority in the prescribed form and shall be accompanied by-

- (a) the aerodrome manual if significant changes have been made following the initial certification;

(b) particulars of deviations, if any, from the appropriate design, operation or equipment standards; and

(c) the appropriate charges as prescribed by the Authority in the Aeronautical Information Circular.

(2) An application for renewal shall be submitted sixty days before the expiry of the certificate.

(3) The renewal of a certificate shall be subject to compliance with these Regulations, standards prescribed by the Authority and any other conditions as may be specified or notified by the Authority as determined by safety inspections and audit procedures by the Authority, before the renewal of the certificate.

Amendme
nt
of
certificate

35.-(1) An application for amendment of a certificate shall be submitted in a form prescribed by the Authority.

(2) The Authority may request that the application be accompanied by any or all of the following -

- (a) two copies of the aerodrome manual;
- (b) a site plan for the aerodrome;
- (c) an environmental impact assessment report;
- (d) approval from any relevant authority;
- (e) proof of financial capability;
- (f) particulars of any non-compliance or deviations from the appropriate aerodrome design, operation or equipment standards; and
- (g) charges as prescribed in the Aeronautical Information Publication or Aeronautical Information Circular by the Authority.

(3) The Authority may, provided the requirements of regulations 30, are met, where necessary, amend an aerodrome certificate -

- (a) for a change in the use or operation of the aerodrome;
- (b) for a change in the boundaries of the aerodrome;
- (c) if the holder of the aerodrome certificate requests an amendment; or

(d) if the Authority deems it necessary.

Suspension and
cancellation of
certificate

36.-(1) The Authority may suspend a certificate where -

- (a) following a safety inspection or audit, it is evident that the holder of the certificate has not complied with the requirements prescribed in these Regulations and failed to remedy the non-compliance within a period of thirty days after the inspection;
- (b) the holder of the certificate prevents the Authority from carrying out a safety inspection or audit in accordance with these Regulations;
- (c) the holder of the certificate is under receivership, liquidation or bankruptcy proceedings;
- (d) it is deemed necessary in the interest of aviation safety.

(2) The Authority may, on giving reasons to the holder of a certificate, suspend the certificate for a period not exceeding sixty days.

(3) A holder of a certificate who is notified of a suspension in sub regulation (2) may submit a response in writing within a period not exceeding fourteen days.

(4) Notwithstanding sub regulation (3), the Authority may suspend any or all of the operations at an aerodrome pending receipt of a response from the holder.

(5) A holder of a certificate who is aggrieved by the suspension of a certificate may appeal against the suspension to the Minister, within thirty days of the suspension.

(6) Where an appeal is made under sub-regulation (5), the holder of a certificate shall state in writing the reasons why in his or her opinion, the suspension shall be varied or set aside.

(7) The Minister may vary or set aside the suspension made under sub-regulation (2) on the basis of the reasons given in the appeal under sub-regulation (5).

(8) Where a holder of a certificate does not appeal against the suspension in accordance with sub-regulation (5), the Authority may cancel the certificate, on giving reasons to

the holder of a certificate.

Surrender
of
certificate

37.-(1) Subject to sub-regulation (2), a holder of a certificate may surrender the certificate to the Authority at any time.

(2) A holder of a certificate who wishes to surrender the certificate shall give the Authority not less than sixty days notice in writing, before the date on which the certificate is to be surrendered.

(3) The Authority shall cancel the certificate upon the expiry of the period of notice in sub-regulation (2).

(4) Where, after the expiry of the period in sub-regulation (2), an aerodrome is abandoned or is not maintained in accordance with the conditions of the certificate, the holder of the certificate shall remove, obliterate or modify the prescribed markings referred to in regulation 52 (f).

Charges at
certificate
d
aerodrome
s

38.-(1) A holder of a certificate shall prescribe charges for the use of the aerodrome or of any facilities provided at the aerodrome for the safety, security, efficiency or regularity of air navigation.

(2) Where required by the Authority, a holder of a certificate shall, furnish particulars of the charges levied for the use of an aerodrome or the performance of services at the aerodrome.

(3) Notwithstanding sub regulation (1), the Authority may where necessary, prescribe the maximum charges which may be levied for the use of an aerodrome or the performance of services at the aerodrome, for a specified period.

(4) A holder of a certificate of the aerodrome for which the Authority prescribes charges under sub-regulation (3) shall not cause or permit any charges to be made in contravention of that sub-regulation.

(5) A holder of a certificate of an aerodrome for which the Authority prescribes charges shall cause the prescribed charges to be posted in a conspicuous place at the aerodrome.

- Certificate
s
register
- 39.-(1)** The Authority shall maintain a register of all certificates issued in accordance with these Regulations.
- (2) The register shall contain -
- (a) the full name of the holder of an aerodrome certificates;
 - (b) the nationality of the holder of a certificate;
 - (c) the postal, telephone, facsimile and e-mail addresses of a holder of a certificate;
 - (d) the name and location of the aerodrome for which a certificate is issued;
 - (e) the number of the certificate;
 - (f) the date on which the certificate was issued;
 - (g) the date on which the certificate expires;
 - (h) the type of use of the aerodrome; and
 - (i) any other relevant information including type of use of the aerodrome.

PART V
CONSTRUCTION, REGISTRATION AND OPERATION OF
CATEGORY E AERODROMES

- Applicatio
n
of this
Part
- 40.** This Part applies to aerodromes in category E

- Constructi
on
of
category
E
aerodrome
s
- 41.-(1)** An application for construction of a category E aerodrome shall be considered for approval, where -
- (a) the applicant holds a valid authorization from a relevant Government or local authority for use of the place as an aerodrome;
 - (b) the application is approved by the authority responsible for national environment management;
- (2) The Authority shall prior to issuance of approval for construction of category E aerodrome, assess the suitability of the place proposed for construction taking into consideration –

- (a) the proximity of the place to other aerodromes and landing areas including military aerodromes;
- (b) obstacles, terrain and existing airspace restrictions; and
- (c) that it is not against public interest that the place where the aerodrome is to be constructed shall be used as such.

(3) An applicant for construction of a category E aerodrome shall submit to the Authority for approval an application in a form prescribed by the Authority, accompanied by –

- (a) aerodrome data in accordance with the Fifth Schedule;
- (b) a topographical map of the proposed aerodrome site as specified by the Authority;
- (c) Written permission from the owner of the land or evidence of ownership of the proprietary interest in the land on which the aerodrome is to be constructed; and
- (d) fees as prescribed by the Authority.

Issuance
of an
approval
to
construct
category
E
aerodrome

42 The Authority shall issue an approval to construct a category E aerodrome in writing where the application meets the requirements specified in these regulations and any other requirements as may be specified by any other relevant authority.

Applicatio
n
for
registratio
n
of a
category E
aerodrome

43. An application for registration of a category E aerodrome shall be submitted in writing accompanied by:

- (a) a Self-reporting Form in the format prescribed by the Authority;
- (b) charges as prescribed by the Authority; and
- (c) in the case of existing aerodromes, written permission from the owner of the land or evidence of ownership of the proprietary interest in the land on which the aerodrome is located.

Registration
of a
category E
aerodrome

44. The Authority shall, prior to registration of a category E aerodrome, assess the facilities of the aerodrome to verify information provided in the Self-reporting Form prescribed by the Authority and compliance with applicable aerodrome standards.

Issuance
of a
registration
approval

45.-(1) The Authority shall issue a registration approval in a form prescribed by the Authority where the applicant has-

- (a) complied with the requirements of these regulations, and the Self-reporting Form prescribed by the Authority;
- (b) complied with any applicable Civil Aviation (Security) Regulations, 2015; and
- (c) complied with any other requirements specified by the Authority.

(2) The issuance of a registration approval may be subject to any other condition as may be specified or notified by the Authority based on the results of the pre-registration safety audit or inspection.

(3) The Authority may decline to grant a registration approval to an applicant and where the Authority declines, it shall notify the applicant in writing giving the reasons not later than fourteen days after making that decision.

(4) The Authority shall, following the issuance of a registration approval, carry out surveillance inspections to ensure continuing validity of the registration and continuing capacity of the aerodrome operator to maintain safe and regular operation of the aerodrome and associated facilities and services.

(5) Notwithstanding the requirements of sub-regulation (4), the Authority may use aerodrome condition reports from pilots operating into category E aerodromes for surveillance purposes.

(6) An aerodrome registration approval issued under these Regulations is not transferable.

Validity
of a
registratio
n
approval

46. A Registration approval shall be valid for a period of three years unless otherwise suspended or revoked by the Authority.

Renewal
of a
registratio
n
approval

47. An application for renewal of an aerodrome registration approval shall be made to the Authority in the prescribed form and shall be accompanied by –

- (a) the Self-reporting Form prescribed by the Authority, if significant changes have been made following the initial registration;
- (b) particulars of deviations, if any, from the appropriate design, operation or equipment standards; and
- (c) the appropriate charges as prescribed by the Authority

Amendme
nt of
registratio
n
approval

48.-(1) An application for amendment of an aerodrome registration approval shall be submitted to the Authority in writing.

(2) The Authority may request the applicant to submit –

- (a) a Self-reporting Form as prescribed by the Authority;
- (b) particulars of any non-compliances and deviations from standards if applicable;
- (c) charges as prescribed by the Authority.

(3) The Authority may, provided the requirements of this regulation are met, amend an aerodrome registration approval if –

- (a) there is a change in the use or operation of the aerodrome;
- (b) the aerodrome operator requests an amendment;
or
- (c) it is deemed necessary based on results of an inspection.

Cancellation of a registration approval

49.-(1) The Authority may cancel an aerodrome registration approval where –

- (a) following a surveillance inspection, it is evident that the aerodrome is unsafe for the operation of aircraft and the operator has failed to remedy the situation within a period of sixty days after the inspection;
- (b) the holder of the registration requests for the cancellation; or
- (c) it is deemed necessary in the interest of aviation safety.

(2) Subject to sub-regulation (1) (a) and (c), the Authority shall give reasons for the cancellation in writing to the registered aerodrome operator.

(3) A holder of a registration approval who is aggrieved by the cancellation under sub-regulation (1) (a) and (c) may appeal to the Minister within thirty days of the cancellation.

Obligations of category E aerodrome operator

50. An operator of a category E aerodrome shall –

- (a) comply with the provisions of Part VI of these regulations as applicable;
- (b) comply with any conditions endorsed on the registration approval issued by the Authority;
- (c) comply with all relevant laws of the United Republic of Tanzania and obtain all necessary approvals in as far as they apply to development and operations of the aerodrome;
- (d) ensure the safety of the obstacle limitation surfaces of the aerodrome in accordance with these regulations;
- (e) ensure that the physical standards for the maneuvering areas and facilities provided at the aerodrome are appropriate for the critical aircraft for which the aerodrome is designed;
- (f) provide details on operations at the aerodrome as may be required from time to time by the Ministers responsible for civil aviation and national security;

- (g) operate and maintain the aerodrome in accordance with applicable standards to ensure safety of aircraft operating into such aerodromes;
- (h) address any safety concerns identified by the Authority in the course of surveillance inspection of the aerodrome and submit corrective action plans as required.

Obligations of pilot-in-command of an aircraft operating to and from a category E aerodrome

51. The pilot-in-command of an aircraft operating to or from a category E aerodrome shall –

- (a) comply with the rules of the air as specified in the Civil Aviation (Rules of the Air) Regulations;
- (b) comply with any applicable Civil Aviation (Security) Regulations, 2015;
- (c) file an airborne flight plan immediately after take-off from a category E aerodrome on the designated air traffic control frequency for all flights;
- (d) comply with any instructions as may be required from time to time by the Minister responsible for civil aviation or internal security for operation at such aerodromes;
- (e) obtain authorization from the operator of an aerodrome prior to operating into privately operated aerodromes;
- (f) pilots who have attained the rank of a captain are designated to inspect aerodromes in category E on behalf of the Authority; and
- (g) the authority may accept a report by a Pilots provided it is signed by the pilot in command using a format prescribed by the Authority.

Notifications of registered aerodromes

52. The Authority shall publish in the Tanzania Aeronautical Information Publication the list of all aerodromes registered by the Authority including the name, postal address, telephone and facsimile numbers and e-mail address of the registration holder and any other relevant information.

PART VI
OBLIGATIONS OF AERODROME OPERATOR

Application
n of this
Part

53. This Part applies to all aerodromes except where otherwise specified.

Compliance
with
Standards
and
conditions

54. An aerodrome operator shall comply with the Standards and conditions, endorsed on a licence, certificate or registration approval granted under these regulations.

Competence
of
operational
and
maintenance
personnel

55.-(1) An operator shall ensure that there is an adequate number of qualified and skilled personnel to perform activities for aerodrome operation and maintenance.

(2) Where the Authority or any other relevant authority requires competence certification for the personnel of an aerodrome, the operator shall employ only those persons with the required certification.

(3) This regulation shall not apply to category E aerodromes.

Aerodrome
operations
and
maintenance

56.-(1) Subject to any directives that the Authority may issue, an operator shall operate and maintain an aerodrome in accordance with the procedures set out in the aerodrome manual.

(2) The Authority may give written directives to an operator to alter the procedures set out in an aerodrome manual.

(3) An operator shall ensure proper and efficient maintenance of the aerodrome facilities.

(4) Where air traffic services are provided at an aerodrome, the operator shall co-ordinate with the air traffic services provider, to ensure the safety of aircraft operating for the local airspace, associated with the aerodrome.

(5) This regulation shall not apply to category E aerodromes.

Safety
managem
nt
system

G.N.
No.136

57.-(1) An operator of an aerodrome shall have in operation a safety management system (SMS) acceptable to the Authority and that complies with the requirements specified in the Civil Aviation (Safety Management) Regulations, 2015 or any other relevant requirements as may be prescribed by the Authority or provided for in Part A of First Schedule of these regulations .

(2) An operator shall establish and evaluate safety performance indicators, alert levels and target levels at an aerodrome acceptable to the Authority.

(3) The Authority shall conduct periodic review of the safety management system requirements under the State Safety Programme (SSP) to ensure they remain relevant and appropriate to the operators of certified aerodromes under these regulations.

(4) An operator shall require and ensure that organizations performing activities at the aerodrome comply with the established aerodrome safety requirements.

(5) This regulation may apply to aerodromes in category B where deemed necessary by the Authority.

(6) This regulation shall not apply to aerodromes in categories C, D and E.

Storage of
inflammab
le
and other
dangerous
goods

57. A person shall not store fuel, pyrotechnic materials and other highly inflammable or dangerous goods at an aerodrome except with the permission of the Authority and in accordance with the prescribed standards.

Safety
measures
against
fire

58.-(1) A person shall not -

(a) smoke within any place, or bring an open flame into any place, where that act is prohibited by a displayed notice;

- (b) where there is no notice prohibiting smoking in a place, smoke within that place, or bring an open flame into that place, within a distance of an aircraft or, of any vehicle used for the supply of fuel to an aircraft, or a store, dump, liquid fuel or explosives, as may be prescribed;
 - (c) wilfully give a false fire alarm;
 - (d) tamper or interfere with any fire hose reel, hydrant or any other item of equipment provided for firefighting purposes;
 - (e) keep, store, discard or discharge any flammable liquid, gas, signal flares or other like material in an aircraft, except in the receptacle appropriate for the purpose or in a place on the aerodrome specifically approved by the aerodrome operator for the purpose; or
 - (f) store, stack or use any material or equipment in a manner which constitutes or is likely to constitute a fire hazard.
- (2) An operator shall display in conspicuous places appropriate signage in respect of the acts prohibited under sub regulation (1).

Access to
and
operations
within
restricted
areas

59.-(1) A person shall not access a restricted area of an aerodrome unless authorised by the operator and subject to such conditions as the operator may impose.

(2) A person authorised to access a restricted area under sub-regulation (1) shall not -

- (a) move an aircraft or a vehicle in the restricted area except with the permission and directions issued by the air traffic services personnel;
- (b) move an aircraft or vehicle in the restricted area in a manner that endangers the safety of persons and property;
- (c) use a portion of the aerodrome for landing or taking off, other than the area designated for that purpose.

Entry into
or
exit from
restricted
areas of
aerodrome

60.-(1) A person, aircraft or vehicle shall not enter or leave a restricted area of an aerodrome except through points established by the operator for the purpose.

(2) Except in an emergency or at an appropriate point of entry or exit established by an operator for that purpose, a person -

- (a) other than a person carried in an aircraft or in a vehicle, shall not enter or leave a restricted areas of an aerodrome; or
- (b) shall not move an aircraft on the surface of an aerodrome or a vehicle into or from the restricted area.

Test-
running
of aircraft
engine

60. A person shall not test-run an aircraft engine at an aerodrome except at the approved aircraft maintenance facility of the aerodrome or a place designated for that purpose, by the operator.

Certain
acts
prohibited
on
aerodrome

61.-(1) A person shall not, on an aerodrome-

- (a) obstruct or interfere with the proper use of the aerodrome ;
- (b) obstruct any person executing his or her duties at the aerodrome ;
- (c) remove or deface any notice, writing, document or marking erected or displayed by the aerodrome operator;
- (d) throw, leave or drop anything capable of causing injury to any person or damage to any property;
- (e) dump any waste matter except at a place approved for the purpose by the aerodrome operator;
- (f) dump or spill any substance capable of causing water pollution, whether solid, liquid, vapour or gas or a combination of these, except at a place approved for that purpose by the aerodrome operator.

(2) Except with the permission of the operator, a person shall not -

- (a) interfere or tamper with any part of the aerodrome or any equipment associated with the operation of the aerodrome;
- (b) climb any wall, fence, barrier, ceiling, gate or post on an aerodrome;
- (c) handle any baggage or carry baggage for a passengers at an aerodrome;
- (d) bring a vehicle into or drive into an aerodrome; or
- (e) obstruct an entrance to or a passage at an aerodrome in a manner that inconvenience other users of the entrance or passage.

Removal
of
obstruction
from
the
aerodrome
movement
surface

62. An operator shall remove from the aerodrome surface any vehicle or other obstruction that is likely to be hazardous to aircraft operations.

Maintenan
ce of
environme
nt
manageme
nt
programm
e

63.-(1) An operator shall establish and maintain an aerodrome environment management programme for the area within the authority of the operator and for the area where any wildlife presents or is likely to present a hazard to aircraft operations.

(2) An operator shall ensure that the environment management programme established under sub-regulation (1) minimises the effects of any hazards or potential hazards taking into account the provisions of the laws on environmental management.

(3) This regulation shall not apply to aerodromes in categories C, D and E.

Protection
of

64. An operator shall in consultation with the Authority -

navigation
aids

- (a) prevent construction of any facilities on the aerodrome, which may adversely affect the operation of any electronic or visual navigation or air traffic service facility on the aerodrome;
- (b) as far as it is within the authority of the operator, prevent any interruption of visual or electronic signal of navigation aids.

Responsi-
bilities
of
operator

- 65.** An operator shall -
- (a) maintain the aerodrome in a serviceable condition;
 - (b) keep the aerodrome free of unauthorized persons, vehicles and animals which are not under proper control or any other obstructions;
 - (c) mark all obstructions in accordance with the prescribed guidelines;
 - (d) inform the Authority of any alterations to obstruction or works on the aerodrome;
 - (e) install approved wind direction indicators to show the surface direction of the wind and ensure that they function satisfactorily;
 - (f) maintain the prescribed markings in a conspicuous condition and ensure that they are readily visible to aircraft in the air or manoeuvring on the ground;
 - (g) avail facilities and ensure that they are in serviceable condition and that all apparatus installed function efficiently;
 - (h) appropriately mark the unserviceable areas on the landing terrain;
 - (i) inform the Authority where the aerodrome becomes unserviceable through any cause or where any portion of the surface of the landing area deteriorates to such an extent that the safe operation of aircraft may be endangered;
 - (j) submit to the Authority reports on the condition of the aerodrome as may be required by the Authority;

- (k) ensure that organisations performing activities at the aerodrome comply with safety requirements specified by the operator; and
- (l) report all incidents and accidents at the aerodrome to the Authority.

Inspection
of
aerodrome
s and
unhindere
d access
by
inspectors
of
the
Authority

66.-(1) Before an aerodrome licence or certificate is issued or renewed and, subsequently, at any other time, for the purpose of ensuring that safety at the aerodrome is maintained, the Authority shall inspect and carry out tests on the aerodrome facilities, services and equipment, inspect the documents and records of the aerodrome, where applicable, verify the safety management system of the aerodrome.

(2) Before an aerodrome registration approval is issued or renewed, the Authority shall inspect the aerodrome and associated facilities for the purpose of ensuring compliance with applicable requirements.

(3) For the purpose of facilitating the functions of the Authority specified in sub-regulations (1) and (2), an inspector of the Authority shall have unhindered access to any part of the aerodrome or any aerodrome facility, including equipment, records, documents and personnel.

Notifying
and
reporting

67.-(1) An operator shall notify and report to the Authority, the air traffic control unit and pilots, within the specified time limits, information on -

- (a) any inaccuracies in the Aeronautical Information Publication;
- (b) any changes to the aerodrome facilities, equipment and level of service planned in advance; and
- (c) issues that may require immediate notification including obstacles, obstructions and hazards, levels of service, movement areas, and any other condition that affects aviation safety at the aerodrome and against which precautions are warranted.

(2) Where it is not feasible for an operator to arrange for the air traffic control and the flight operations unit to receive notice of the circumstances referred to in sub-regulation (1) (c), the operator shall give immediate notice, directly to the pilots who may be affected by that circumstance.

Aerodrome
movement
area
inspections

68.-(1) An aerodrome operator shall carry out inspections of the movement area each day at least once for aerodromes in category B and at least twice for aerodromes in category A to monitor and report the condition of the movement areas and operational status of related facilities.

(2) An aerodrome operator shall carry out inspections of the movement area at least once a week for aerodromes in category C and D.

Special
inspections

69.-(1) An operator shall inspect an aerodrome –

- (a) as soon as practicable after any accident or incident;
- (b) during any period of construction or repair of the aerodrome facilities or equipment that is critical to the safety of aircraft operation; and
- (c) at any other time when there are conditions at the aerodrome that may affect aviation safety.

(2) An operator shall, within the specified time limits, notify and report to the Authority information on any special inspection carried out under sub regulation (1).

Warning
notices

70.-(1) Where a low flying aircraft, at or near an aerodrome, or where a taxiing aircraft, is likely to be hazardous to people or vehicles, an operator shall –

- (a) post hazard warning notices to that effect, on any public way that is adjacent to the manoeuvring area; or
- (b) where the public way is not controlled by the operator, inform the relevant authority of the hazard.

PART VII
AERODROME MANUAL

Applicatio
n of this
Part

71. This Part applies to aerodromes in categories A, B, C and D.

Require-
ments
for
aerodrome
manual

72.-(1) Upon making an application for a licence or a certificate the applicant shall submit to the Authority an aerodrome manual for approval.

(2) An aerodrome manual shall –

- (a) be typewritten or printed;
- (b) be signed by the operator;
- (c) be in a format that is easy to revise;
- (d) have a system for recording the current pages and any amendments, including a page for logging revisions; and
- (e) be organized in a manner that facilitates the preparation, review and approval processes.

(3) An operator shall keep at least one approved copy of the aerodrome manual at the aerodrome and one copy at the principal place of business of the operator, where it is different from the aerodrome.

(4) Where an operator of an aerodrome in category C and D is unable to keep a copy of the aerodrome manual at the aerodrome, the operator shall keep the aerodrome manual at a place authorised by the Authority.

Informatio
n to be
included
in an
aerodrome
manual

73.-(1) An aerodrome manual shall contain all information and instructions necessary to enable the personnel of an aerodrome perform their duties.

(2) Notwithstanding sub regulation (1), and to the extent that the particulars are applicable, a manual for an aerodrome in category A shall include the particulars provided in the Second Schedule, for an aerodrome in category B and C the particulars provided in the Third Schedule and for an aerodrome in category D, the particulars provided in the Fourth Schedule.

(3) Where a person is given an exemption in accordance with Part XIX, the aerodrome manual shall show the exemption notice number given for the exemption by the Authority, the date the exemption came into effect and any conditions or procedures subject to which the exemption was granted.

Amendme
nt
of an
aerodrome
manual

74.-(1) For the purpose of maintaining the accuracy of the information in an aerodrome manual –

(a) an operator shall whenever necessary, amend the aerodrome manual; or

(b) the Authority may issue a written directive requiring the operator to periodically review, alter or amend an aerodrome manual to ensure that the information contained in the manual is correct.

(2) Notwithstanding sub-regulation (1), an operator shall submit the proposed amendment to the Authority for approval, before the aerodrome manual is amended.

(3) The Authority shall approve the amendment made to an aerodrome manual where the amendment meets key safety assurance criteria on organizational competence and the requirements contained in these Regulations.

PART VIII AERODROME DATA

Applicabil
ity
of this part

75. This part applies to all aerodromes except where otherwise specified.

Aeronauti
cal
data

76.-(1) An aerodrome operator shall determine and report aerodrome-related aeronautical data in accordance with the accuracy and integrity requirements set forth in Tables A5-1 to A5-5 contained in the Eleventh Schedule to these Regulations, while taking into account the established quality system procedures.

(2) The accuracy requirements for aeronautical data shall be based upon a 95 per cent confidence level and in that respect, three types of positional data shall be identified:

- (a) surveyed points;
- (b) calculated points; and
- (c) declared points.

(3) The aerodrome operator shall make available to the aeronautical information services aerodrome mapping data for aerodromes where safety or performance-based operations suggest possible benefits.

(4) Where made available in accordance with sub-regulation (3), the selection of the aerodrome mapping data features to be collected shall be made with consideration of the intended applications.

(5) Where made available in accordance with sub-regulation (3), aerodrome mapping data shall comply with the accuracy and integrity requirements specified in the Eleventh Schedule to these Regulations

(6) Integrity of aeronautical data shall be maintained throughout the data process from survey or origin to the next intended user and based on the applicable integrity classification, the validation and verification procedures shall:

- (a) for routine data: avoid corruption throughout the processing of the data;
- (b) for essential data: assure corruption does not occur at any stage of the entire process and may include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and
- (c) for critical data: assure corruption does not occur at any stage of the entire process and include additional integrity assurance procedures to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

(7) Protection of electronic aeronautical data while stored or in transit shall be totally monitored by the cyclic redundancy check (CRC) and to achieve protection of the integrity level of critical and essential aeronautical data as classified in sub-regulation (6), a 32- or 24-bit CRC algorithm shall apply, respectively.

(8) To achieve protection of the integrity level of routine aeronautical data as classified in sub-regulation (6), a 16-bit CRC algorithm shall apply.

(9) Geographical coordinates indicating latitude and longitude shall be determined and reported to the aeronautical information services authority in terms of the World Geodetic System — 1984 (WGS-84) geodetic reference datum, identifying those geographical coordinates which have been transformed into WGS-84 coordinates by mathematical means and whose accuracy of original field work does not meet the requirements in Table A5-1 of the Eleventh Schedule to these regulations.

(10) The order of accuracy of the field work shall be such that the resulting operational navigation data for the phases of flight will be within the maximum deviations, with respect to an appropriate reference frame, as indicated in the tables contained in Eleventh Schedule to these regulations.

(11) For the purpose of subregulation 10, an appropriate reference frame is that which enables WGS-84 to be realized on a given aerodrome and with respect to which all coordinate data are related.

(12) In addition to the elevation (referenced to mean sea level) of the specific surveyed ground positions at aerodromes, geoid undulation (referenced to the WGS-84 ellipsoid) for those positions as indicated in the Eleventh Schedule shall be determined and reported to the aeronautical information services.

Aerodrom
e
reference
point

77.-(1) An aerodrome reference point shall be established for an aerodrome.

(2) The aerodrome reference point shall be located near the initial or planned geometric centre of the aerodrome and shall normally remain where first established.

(3) The position of the aerodrome reference point shall be measured and reported to the aeronautical information services authority in degrees, minutes and seconds.

Aerodrome
elevation
and
runway
elevation

78.-(1) The aerodrome elevation and geoid undulation at the aerodrome elevation position shall be measured to the accuracy of one-half metre or foot and reported to the aeronautical information services authority.

(2) For an aerodrome used by international civil aviation for non-precision approaches, the elevation and geoid undulation of each threshold, the elevation of the runway end and any significant high and low intermediate points along the runway shall be measured to the accuracy of one-half metre or foot and reported to the aeronautical information services authority.

(3) For precision approach runway, the elevation and geoid undulation of the threshold, the elevation of the runway end and the highest elevation of the touchdown zone shall be measured to the accuracy of one-quarter metre or foot and reported to the aeronautical information services authority.

(4) Geoid undulation shall be measured in accordance with the appropriate system of coordinates.

Aerodrome
reference
temperature

79.-(1) An aerodrome reference temperature shall be determined for an aerodrome in degrees Celsius.

(2) The aerodrome reference temperature shall be the monthly mean of the daily maximum temperatures for the hottest month of the year the hottest month being that which has the highest monthly mean temperature and this temperature shall, where possible be averaged over a period of years.

Aerodrome
dimensions
and

80.-(1) The following data shall be measured or described, as appropriate, for each facility provided on an aerodrome:

related
information

- (a) runway — true bearing to one-hundredth of a degree, designation number, length, width, displaced threshold location to the nearest metre or foot, slope, surface type, type of runway and, for a precision approach runway category I, the existence of an obstacle free zone when provided;
 - (b) width to the nearest metre or foot, surface type of the-
 - (i) strip;
 - (ii) runway end safety area length;
 - (iii) stopway;
 - (c) taxiway — designation, width, surface type;
 - (d) apron — surface type, aircraft stands;
 - (e) the boundaries of the air traffic control service;
 - (f) clearway — length to the nearest metre or foot, ground profile;
 - (g) visual aids for approach procedures, marking and lighting of runways, taxiways and aprons, other visual guidance and control aids on taxiways and aprons, including taxi-holding positions and stopbars, and location and type of visual docking guidance systems;
 - (h) location and radio frequency of any VOR aerodrome checkpoint;
 - (i) location and designation of standard taxi-routes; and
 - (j) distances to the nearest metre or foot of localizer and glide path elements comprising an instrument landing system (ILS) or azimuth and elevation antenna of a microwave landing system (MLS) in relation to the associated runway extremities.
- (2) The geographical coordinates of each threshold shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and hundredths of seconds.
- (3) The geographical coordinates of appropriate taxiway centre line points shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and hundredths of seconds.

(4) The geographical coordinates of each aircraft stand shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and hundredths of seconds.

(5) The geographical coordinates of obstacles in Area 2 (the part within the aerodrome boundary) and in Area 3 shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and tenths of seconds. In addition, the top elevation, type, marking and lighting if any of obstacles shall be reported to the aeronautical information services authority.

Strength
of
pavements

81. The aerodrome operator shall comply with the requirements for the determination and reporting of pavement bearing strength as prescribed by the Authority in the Fifth Schedule.

Pre-flight
altimeter
check
location

82.-(1) One or more pre-flight altimeter check locations shall be established for an aerodrome.

(2) A pre-flight check location shall be located on an apron to enable an altimeter check to be made prior to obtaining taxi clearance and to eliminate the need for stopping for that purpose after leaving the apron, in which case, an entire apron can serve as a satisfactory altimeter check location.

(3) The elevation of a pre-flight altimeter check location shall be given as the average elevation, rounded to the nearest metre or foot, of the area on which it is located.

(4) The elevation of any portion of a pre-flight altimeter check location shall be within 3 m (10 ft) of the average elevation for that location.

Declared
distances

83.-(1) The following distances shall be calculated to the nearest metre or foot for a runway intended for use by international commercial air transport:

- (a) take-off run available;
- (b) take-off distance available;
- (c) accelerate-stop distance available; and
- (d) landing distance available.

(2) Declared distances shall be calculated in accordance with the Thirteenth Schedule and guidelines prescribed by the Authority.

Condition
of
the
movement
area and
related
facilities

84.-(1) Information on the condition of the movement area and the operational status of related facilities shall be provided to the appropriate aeronautical information services units, and similar information of operational significance to the air traffic services units, to enable those units to provide the necessary information to arriving and departing aircraft. Such information shall be kept up to date and changes in conditions reported without delay.

(2) The condition of the movement area and the operational status of related facilities shall be monitored, and reports on matters of operational significance affecting aircraft and aerodrome operations shall be provided in order to take appropriate action, particularly in respect of the following:

- (a) construction or maintenance work;
- (b) rough or broken surfaces on a runway, a taxiway or an apron;
- (c) water on a runway, a taxiway or an apron;
- (d) other contaminants on a runway, taxiway or apron such as mud, dust, sand, volcanic ash, oil and rubber;
- (e) other temporary hazards, including parked aircraft;
- (f) failure or irregular operation of part or all of the aerodrome visual aids; and
- (g) failure of the normal or secondary power supply.

(3) To facilitate compliance with sub-regulations (1) and (2), inspections of the movement area shall be carried out each day at least once where the code number is 1 or 2 and at least twice where the code number is 3 or 4.

(4) Personnel assessing and reporting runway surface conditions required in sub-regulation (2) shall be trained and competent to meet criteria set by the Authority.

Water on
a
runway

85.-(1) Whenever water is present on a runway, a description of the runway surface conditions shall be made available using the following terms:

(a) **DAMP** — the surface shows a change of colour due to moisture;

(b) **WET** — the surface is soaked but there is no standing water; or

(c) **STANDING WATER** — for aeroplane performance purposes, a runway where more than 25 per cent of the runway surface area whether in isolated areas or not within the required length and width being used is covered by water more than 3 mm deep.

(2) Information on water coverage on runway or portion thereof may be slippery when wet shall be made available to ensure that aircraft crews make operational adjustments in accordance with performance requirements of their relevant flight manuals.

(3) Notification shall be given to aerodrome users when the friction level of a paved runway or portion thereof is less than that specified in accordance with these Regulations.

(4) Conducting of a runway surface friction characteristics evaluation programme including determining and expressing the minimum friction level shall be in accordance with Thirteenth Schedule to these Regulations.

Responsibility
for
removal
of
disabled
aircraft

86.-(1) The aerodrome operator shall provide the telephone number or email address of the office of the aerodrome coordinator responsible for the removal of an aircraft disabled on or adjacent to the movement area and shall, on request, make available, this information to aircraft operators.

(2) Information concerning the capability to remove an aircraft disabled on or adjacent to the movement area shall be made available and such capability to remove a disabled aircraft may be expressed in terms of the largest type of aircraft which the aerodrome is equipped to remove.

Information on level of protection of rescue and fire fighting

87.-(1) An aerodrome operator shall provide information concerning the level of protection provided at an aerodrome for aircraft rescue and fire fighting purposes.

(2) The level of protection available at an aerodrome shall be expressed in terms of the category of the rescue and fire fighting services in accordance with the types and amounts of extinguishing agents available at the aerodrome.

(3) Changes in the level of protection normally available at an aerodrome for rescue and fire fighting services including availability and quantity of extinguishing agents, equipment and personnel shall be notified to the appropriate air traffic services units and aeronautical information services units by an operator to enable those units provide the necessary information to arriving and departing aircraft.

(4) When such a change has been corrected in terms of sub regulations (3) and return to normal operation, the appropriate air traffic services units and aeronautical information services units shall be notified accordingly by an operator.

(5) A change shall be expressed in terms of the new category of the rescue and fire fighting service available at the aerodrome.

Visual approach slope indicator system

88. The aerodrome operator shall make available information concerning about visual approach slope indicator system installation including:

- (a) associated runway designation number;
- (b) type of system - for an AT-VASIS, PAPI or APAPI installation, the side of the runway on which the lights are installed, i.e. left or right, shall be given;
- (c) where the axis of the system is not parallel to the runway centre line, the angle of displacement and the direction of displacement, i.e. left or right, shall be indicated;

- (d) nominal approach slope angle(s). For a T-VASIS or an AT-VASIS this shall be angle Θ according to the formula in Figure 5-18 and for a PAPI and an APAPI this shall be angle $(B + C) \div 2$ and $(A + B) \div 2$, respectively as in Figure 5-20; and
- (e) minimum eye height(s) over the threshold of the on-slope signal(s):
 - (i) for a T-VASIS or an AT-VASIS this shall be the lowest height at which only the wing bar(s) are visible; however, the additional heights at which the wing bar(s) plus one, two or three fly-down light units come into view may also be reported if such information would be of benefit to aircraft using the approach;
 - (ii) for a PAPI this shall be the setting angle of the third unit from the runway minus 2 minutes, i.e. angle B minus 2 minutes, and for an APAPI this shall be the setting angle of the unit farther from the runway minus 2 minutes, i.e. angle A minus 2 minutes.

Coordination
on
between
aeronautical
information
services
and
aerodrome
authorities

89.-(1) To ensure that aeronautical information services units obtain information to enable them to provide up-to-date pre-flight information and to meet the need for in-flight information, arrangements shall be made between aeronautical information services and aerodrome authorities responsible for aerodrome services to report to the responsible aeronautical information services unit, with a minimum of delay on the following:

- (a) information on the status of certification of aerodromes and aerodrome conditions;
- (b) the operational status of associated facilities, services and navigation aids within their area of responsibility; and
- (c) any other information considered to be of operational significance.

(2) Before introducing changes to the air navigation system, due account shall be taken by the services responsible for such changes of the time needed by aeronautical information services for the preparation, production and issue of relevant material for promulgation.

(3) To ensure timely provision of the information to aeronautical information services, close coordination between those services concerned is therefore required.

(4) A particular importance are changes to aeronautical information that affect charts or computer-based navigation systems which qualify to be notified by the aeronautical information regulation and control (AIRAC) system.

(5) The predetermined, internationally agreed AIRAC effective dates in addition to 14 days postage time shall be observed by the responsible aerodrome services when submitting the raw information or data to aeronautical information services.

(6) The aerodrome services responsible for the provision of raw aeronautical information or data to the aeronautical information services shall do that while taking into account accuracy and integrity requirements for aeronautical data.

PART IX
WILDLIFE HAZARD MANAGEMENT

Application
of this
Part

90. In this Part, regulation 93 applies to all categories of aerodromes and regulations 94, 95 and 96 applies only to aerodromes in categories A and B.

Animals
not
allowed in
restricted
areas
of the
aerodrome

91.-(1) A person shall not bring, permit or graze an animal in the restricted area of an aerodrome or cause any animal to graze or feed in the restricted area of an aerodrome.

(2) Subject to sub-regulation (1), a person who brings, permits or grazes an animal in the restricted area of an aerodrome or who causes an animal to graze or feed in a restricted area of an aerodrome or who receives an animal in the restricted area of the aerodrome, shall ensure that the animal is at all times under proper control while in the restricted area.

(3) For this regulation, “animal” means a domesticated animal and a bird.

Wildlife
hazard
management

92.-(1) An operator shall, in consultation with the authority responsible for wildlife, take necessary action to control wildlife hazards at the aerodrome.

(2) An operator shall ensure that procedures to deal with the danger posed to aircraft operations by the presence of wildlife in the aerodrome flight pattern or movement area are in place.

(3) The wildlife management plan of an aerodrome shall be approved by the Authority and shall form part of the aerodrome manual.

Wildlife
hazard
reduction
at
aerodrome

93.-(1) An operator shall, in consultation with the authority responsible for wildlife, take all reasonable steps to minimize the risks associated with wildlife strike hazards by establishing a Wildlife Hazard Management Programme

(2) An operator shall take practical measures to control the wildlife habitat at or around the aerodrome and to disperse birds, which are a potential hazard to aircraft operations.

(3) A 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 wildlife strikes to aircraft;
- (b) the collection of information from aircraft operators, aerodrome personnel, and other sources on the presence of wildlife on, or around the aerodrome constituting a potential hazard to aircraft operations.; and
- (c) an ongoing evaluation of the wildlife hazard by competent personnel.

(4) The aerodrome operator shall collect and forward wildlife strike reports to the Authority for submission to ICAO for inclusion in the ICAO Bird Strike Information System (IBIS) database.

(5) An aerodrome operator shall take action to decrease the risk to aircraft operations by adopting measures to minimize the likelihood of collisions between wildlife and aircraft.

(6) An aerodrome operator shall take action to eliminate or to prevent the establishment of refuse collection sites, garbage disposal dumps, including landfills, or any other source which may attract wildlife to the aerodrome, or its vicinity, unless an appropriate wildlife assessment indicates that they are unlikely to create conditions conducive to wildlife hazard problem.

(7) Subject to sub-regulation (6), refuse collection sites, garbage disposal dumps and landfills shall be located no closer than a 13km radius circle centred on the aerodrome reference point and shall be located further, if located in the vicinity of an approach and take-off path of an aerodrome, except where studies of flight lines of birds attracted to these sites show that the birds will not be problematic for the aerodrome.

(8) Where the elimination of existing sites is not possible, the operator and the relevant authorities shall ensure that any risk to aircraft posed by these sites is assessed and reduced to as low as reasonably practicable.

(9) An aerodrome operator shall establish a local wildlife hazard management committee to manage wildlife hazard at the aerodrome.

(10) An aerodrome operator shall establish aerodrome wildlife control unit, adequately equipped to control and manage wildlife hazard at the aerodrome.

(11) The operator shall cause records of all aspects of wildlife hazard control to be kept and shall report all wildlife strikes to the Authority.

(12) An operator shall monitor the local environment including any activities that may attract wildlife and in designing the wildlife hazard management programme, shall consider that environment and the activities that may attract wildlife.

(13) An aerodrome operator shall give due consideration to aviation safety concerns related to land developments in the vicinity of the aerodrome that may attract wildlife.

National
Committee
on
Wildlife
Hazard
Management

94. There shall be a national committee on wildlife hazard management established by the national authority responsible for airports.

Responsibilities of the National Committee on Wildlife Hazard Management

95. The national committee on wildlife hazard management shall be responsible for-

- (a) analysing wildlife hazard problems at aerodromes;
- (b) carrying out research and development on wildlife hazard management;
- (c) acting as an interface between the aerodrome operators and air operators;
- (d) advising aerodrome operators on wildlife hazard management; and
- (e) reviewing the effectiveness of the wildlife hazard management programmes at aerodromes.

Composition of the National Committee on Wildlife Hazard Management

96. -(1) The national committee on wildlife hazard management shall consist of:

- (a) the chief executive of the State's airports authority who shall be the chair;
- (b) representatives from the ministries responsible for civil aviation, local government, and defence;
- (c) aerodrome operator representatives from Aerodromes in Category A and B;
- (d) aircraft operator representatives;
- (e) chairpersons of the airports' local wildlife hazard management committees;
- (f) air navigation service provider representatives;
- (g) agencies responsible for wildlife services; and
- (h) such other persons or agencies as may be deemed necessary.

(2) The national committee shall convene meetings at least once annually.

PART X

AERODROMES PHYSICAL CHARACTERISTICS

Application of this Part

97. -(1) This Part applies to aerodromes categories A, B, C and E except where otherwise specified.

(2) The standards for physical characteristics for category D aerodromes shall be as prescribed by the Authority.

Condition
s
for
operating
an
aerodrome

98.-(1) A person shall not operate an aerodrome licensed, certificated or registered under these regulations unless the facilities, equipment and services of the aerodrome are compliant the needs of the aircraft for which the aerodrome is intended.

(2) Whenever change to the aerodrome physical characteristics, facilities or equipment is proposed, the aerodrome operator shall implement a procedure for evaluating the impact of change on the safety of existing operation.

Standards
for
physical
characteris
tics
of an
aerodrome

99. A person shall not operate an aerodrome unless the physical characteristics of the aerodrome comply with these Regulations.

Number
and
orientation
of
runways

100.-(1) The number and orientation of a runway at an aerodrome shall be such that the usability factor of the aerodrome is not less than 95 per cent for the aircraft for which the aerodrome is intended to serve, taking into account the wind distribution for the location.

(2) The sitting and orientation of runways at an aerodrome shall be such that the arrival and departure tracks minimize interference with areas approved for residential use and other noise-sensitive areas close to the aerodrome in order to avoid future noise problems.

(3) When a new instrument runway is being located, particular attention shall be given to areas over which aircraft will be required to fly when following instrument approach and missed approach procedures, so as to ensure that obstacles in these areas or other factors will not restrict the operation of the aircraft for which the runway is intended.

Choice of
maximum
permissible
cross-
wind
components

101.-(1) In determining the number and orientation of runways as required by regulation 100 the crosswind component for aircraft landing and taking off shall not exceed the cross-wind components –

- (a) 37 km/h (20 kts) in the case of aircraft whose reference field length is 1500 m or over, except that when poor runway braking action owing to an insufficient longitudinal coefficient of friction is experienced with some frequency, a crosswind component not exceeding 24 km/h (13 kts) shall be assumed;
- (b) 24 km/h (13 kts) in the case of aircraft whose reference field length is 1200 m or up to but not including 1 500 m; and
- (c) 19 km/h (10 kts) in the case of aircraft whose reference field length is less than 1200 m.

(2) Factors that may affect the calculation of the estimate of the usability factor and allowances to be made to take account of the effect of unusual circumstance shall include –

- (a) type of operation;
- (b) climatological conditions including wind distribution, wind statistics and crosswind components;
- (c) Topography of the aerodrome site, aircraft approach paths, and surroundings including:
 - (i) obstacle limitation surfaces, as applicable;
 - (ii) current and future land use;
 - (iii) construction costs;
 - (iv) Visual and non-visual aids;
- (d) Air traffic in the vicinity of the aerodrome including:
 - (i) proximity of other aerodromes or air traffic services routes;
 - (ii) traffic density;
 - (iii) air traffic control procedures where applicable and missed approach procedures.

Data to be
used for
the
calculatio
n
of the
runway
usability
factor

102.-(1) The selection of data to be used for the calculation of the runway usability factor shall be based on reliable wind distribution statistics that extend over a period of not less than five years with wind observations made at least eight times daily and spaced at equal intervals of time.

(2) Wind distribution statistics of a shorter period may be used for runways in category E aerodromes as determined by the operator and accepted by the Authority.

Location
of
threshold

103.-(1) A threshold shall be located at the extremity of a runway unless operational considerations justify the choice of another location.

(2) In determining that no obstacles penetrate above the approach surface, account shall be taken of mobile objects (vehicles on roads, trains, etc.) at least within that portion of the approach area within 1200 m longitudinally from the threshold and of an overall width of not less than 150 m.

(3) When it is necessary to displace a threshold, either permanently or temporarily, from its normal location, the operator shall take into account the various factors which may have a bearing on the location of the threshold as illustrated in Ninth Schedule of these Regulations.

(4) Where a displacement is due to an unserviceable runway condition, a cleared and graded area of at least 60 m in length shall be available between the unserviceable area and the displaced threshold and an additional distance shall be provided to meet the requirements of the runway end safety area.

(5) Pursuant to sub-regulation (3), factors to be considered in the determination of the location of a displaced threshold shall be:

- (a) obstacles in the approach surface;
- (b) landing distance available;
- (c) type of aircraft for which the runway is intended;
- (d) visibility and cloud base conditions;
- (e) obstacle clearance limit in the case of precision approach runways; and
- (f) provision for obstacle free surfaces.

Determina
tion
of actual
length
of
runways

104.-(1) Except as provided in sub-regulation (3), the actual runway length to be provided for a primary runway shall be adequate to meet the operational requirements of the aircraft for which the runway is intended and shall be not less than the longest length determined by applying the corrections for local conditions to the operations and performance characteristics of the relevant aircraft, including elevation, temperature, runway slope, humidity and the runway surface characteristics.

(2) The length of a secondary runway shall be determined in accordance with sub-regulation (1) except that consideration shall only be given to the needs of those aircraft which require to use the secondary runway in addition to other runways in order to obtain a usability factor of at least 95 per cent.

(3) (a) Where a runway is associated with a stop-way or clearway, an actual runway length less than that resulting from application of sub-regulations (1) or (2), as appropriate, may be considered satisfactory, but in such a case any combination of runway, stop-way and clearway provided shall permit compliance with the operational requirements for take-off and landing of the aircraft the runway is intended to serve.

(b) The use of stopways and clearways shall be as described in the Thirteenth Schedule to these Regulations.

Determina
tion
of width
of
runways

105.-(1) The width of a runway shall not be less than the appropriate dimension specified in the following tabulation:

Code number	Code letter				
	A	B	C	D	E
1	18 m	18 m	23 m	-	-
2	23 m	23 m	30 m	-	-
3	30 m	30 m	30 m	45 m	-
4	-	-	45 m	45 m	45

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

Determina
tion
of
minimum
distance
between
parallel
runways

106.-(1) Where parallel non-instrument runways are intended for simultaneous use, the minimum distance between their centre lines shall be:

- (a) 210 m where the higher code number is 3 or 4;
- (b) 150 m where the higher code number is 2; and
- (c) 120 m where the higher code number is 1.

(2) Where parallel instrument runways are intended for simultaneous use, the minimum distance between their centre lines shall be:

- (a) 1 035 m for independent parallel approaches;
- (b) 915 m for dependent parallel approaches;
- (c) 760 m for independent parallel departures;
- (d) 760 m for segregated parallel operations;

except that:

- (a) for segregated parallel operations the specified minimum distance:
 - (i) may be decreased by 30 m for each 150 m that the arrival runway is staggered toward the arriving aircraft, to a minimum of 300 m; and
 - (ii) shall be increased by 30 m for each 150 m that the arrival runway is staggered away from the arriving aircraft;
- (b) for independent parallel approaches, combinations of minimum distances and associated conditions may be applied when it is determined that such combinations would not adversely affect the safety of aircraft operations.

Slopes on
runways

107.-(1) The longitudinal slope of a runway shall be computed by dividing the difference between the maximum and minimum elevation along the runway centre line by the runway length and shall not exceed:

- (a) 1 per cent where the code number is 3 or 4;
and
- (b) 2 per cent where the code number is 1 or 2.

(2) The longitudinal slopes along any portion of a runway shall not exceed:

- (a) 1.25 per cent where the code number is 4, except that for the first and last quarter of the length of the runway the longitudinal slope shall not exceed 0.8 per cent;
- (b) 1.5 per cent where the code number is 3, except that for the first and last quarter of the length of a precision approach runway category II or III the longitudinal slope shall not exceed 0.8 per cent; and
- (c) 2 per cent where the code number is 1 or 2.

(3) Where slope changes cannot be avoided, the slope change between two consecutive slopes shall not exceed:

- (a) 1.5 per cent where the code number is 3 or 4; and
- (b) 2 per cent where the code number is 1 or 2.

(4) The transition from one slope to another shall be accomplished by a curved surface with a rate of change not exceeding:

- (a) per cent per 30 m (minimum radius of curvature of 30 000 m) where the code number is 4;
- (b) 0.2 per cent per 30 m (minimum radius of curvature of 15 000 m) where the code number is 3; and
- (c) 0.4 per cent per 30 m (minimum radius of curvature of 7 500 m) where the code number is 1 or 2.

- (5) Where slope changes cannot be avoided, they shall be such that there is an unobstructed line of sight from:
- (a) any point 3 m above a runway to all other points 3 m above the runway within a distance of at least half the length of the runway where the code letter is C, D, E or F;
 - (b) any point 2 m above a runway to all other points 2 m above the runway within a distance of at least half the length of the runway where the code letter is B; and
 - (c) any point 1.5 m above a runway to all other points 1.5 m above the runway within a distance of at least half the length of the runway where the code letter is A.
- (6) Undulations or appreciable changes in slopes located close together along a runway shall be avoided and the distance between the points of intersection of two successive curves shall not be less than:
- (a) the sum of the absolute numerical values of the corresponding slope changes multiplied by the appropriate value as follows:
 - (i) 30 000 m where the code number is 4;
 - (ii) 15 000 m where the code number is 3; and
 - (iii) 5 000 m where the code number is 1 or 2; or
 - (b) 45 m,
- whichever is greater.
- (7) rapid drainage of water, The runway surface shall, if practicable, be cambered except where a single crossfall from high to low in the direction of the wind most frequently associated with rain would ensure rapid drainage.

(8) The transverse slope shall where possible, be:

(a) 1.5 per cent where the code letter is C, D, E or F;

and

(b) 2 per cent where the code letter is A or B,

but in any event shall not exceed 1.5 per cent or 2 per cent, as applicable, nor be less than 1 per cent except at runway or taxiway intersections where flatter slopes may be necessary; and

(9) For a cambered surface the transverse slope on each side of the centre line shall be symmetrical.

(10) The transverse slope shall be substantially the same throughout the length of a runway except at an intersection with another runway or a taxiway where an even transition shall be provided taking into account the need for adequate drainage.

Strength
of
runways

108. A Runway shall be capable of withstanding the traffic of aircraft for which the runway is intended to serve.

Surface of
runways

108.-(1) The surface of a runway shall be constructed without irregularities that impairs the runway surface friction characteristics or otherwise adversely affect the take-off or landing of an aircraft.

(2) A paved runway shall be so constructed and maintained as to provide surface friction characteristics at or above the minimum friction level specified by the Authority.

(3) The surface of a paved runway shall be evaluated when constructed or resurfaced to determine that the surface friction characteristics achieve the design objectives.

(4) Measurements of the surface friction characteristics of a new or resurfaced paved runway shall be made with a continuous friction measuring device using self-wetting features.

(5) The average surface texture depth of a new surface shall be not less than 1.0 mm, taking into consideration macro texture and micro texture in order to provide the required surface friction characteristics.

(6) When the surface is grooved or scored, the grooves or scorings shall be either perpendicular to the runway centre line or parallel to non-perpendicular transverse joints, where applicable.

Runway
shoulders

109.-(1) Runway shoulders shall be provided for a runway where the code letter is D or E, and the runway width is less than 60 m.

(2) Runway shoulders shall be provided for a runway where the code letter is F.

(3) The runway shoulders shall extend symmetrically on each side of the runway so that the overall width of the runway and its shoulders is not less than:

- (a) 60 m where the code letter is D or E; and
- (b) 75 m where the code letter is F.

(4) The surface of the shoulder that abuts the runway shall be flush with the surface of the runway and its transverse slope shall not exceed 2.5 per cent.

(5) A runway shoulder shall be prepared or constructed so as to be capable, in the event of an aircraft running off the runway, of supporting the aircraft without inducing structural damage to the aircraft and of supporting ground vehicles which may operate on the shoulder.

Runway
turn pads

110.-(1) Where the end of a runway is not served by a taxiway or a taxiway turnaround and where the code letter is D, E, or F, a runway turn pad shall be provided to facilitate a 180-degree turn of aircraft.

(2) Where the end of a runway is not served by a taxiway or a taxiway turnaround and where the code letter is A, B, or C, a runway turn pad shall be provided to facilitate a 180-degree turn of aircraft.

(3) The runway turn pad may be located on either the left or right side of the runway and adjoining the runway pavement at both ends of the runway and at some intermediate locations where deemed necessary

(4) The intersection angle of the runway turn pad with the runway shall not exceed 30 degrees.

(5) The nose wheel steering angle to be used in the design of the runway turn pad shall not exceed 45 degrees.

(6) The design of a runway turn pad shall be such that, when the cockpit of the aircraft for which the turn pad is intended remains over the turn pad marking, the clearance distance between any wheel of the aircraft landing gear and the edge of the turn pad shall be not less than that given by the following tabulation:

Code letter	Clearance
A	1.5 m
B	2.25 m
C	3 m if the turn pad is intended to be used by aeroplanes with a wheel base less than 18 m; 4.5 m if the turn pad is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m.
D	4.5 m
E	4.5 m
F	4.5 m

(7) For the purpose of these regulations, wheel base means the distance from the nose gear to the geometric centre of the main gear.

(8) Where severe weather conditions and resultant lowering of surface friction characteristics prevail, a larger wheel-to-edge clearance of 6 m shall be provided where the code letter is E or F.

(9) The longitudinal and transverse slopes on a runway turn pad shall be sufficient to prevent the accumulation of water on the surface and facilitate rapid drainage of surface water, and the slopes shall be the same as those on the adjacent runway pavement surface.

(10) The strength of a runway turn pad shall be at least equal to that of the adjoining runway which it serves, due consideration being given to the fact that the turn pad will be subjected to slow-moving traffic making hard turns and consequent higher stresses on the pavement and where a runway turn pad is provided with flexible pavement, the surface shall be capable of withstanding the horizontal shear forces exerted by the main landing gear tires during turning manoeuvres.

(11) The surface of a runway turn pad shall not have surface irregularities that may cause damage to an aircraft using the turn pad.

(12) The surface of a runway turn pad shall be so constructed or resurfaced as to provide surface friction characteristics at least equal to that of the adjoining runway.

(13) The runway turn pads shall be provided with shoulders of such width as is necessary to prevent surface erosion by the jet blast of the most demanding aircraft for which the turn pad is intended, and any possible foreign object damage to the aircraft engines, and as a minimum, the width of the shoulders shall be required to cover the outer engine of the most demanding aircraft and thus may be wider than the associated runway shoulders.

(14) The strength of runway turn pad shoulders shall be capable of withstanding the occasional passage of the aircraft it is designed to serve without inducing structural damage to the aircraft and to the supporting ground vehicles that may operate on the shoulder.

(15) This regulation shall apply only to aerodromes in categories A and B.

Runway
strips

111.-(1) A runway and any associated stopways shall be included in a strip.

(2) A strip shall extend before the threshold and beyond the end of the runway or stopway for a distance of at least:

- (a) 60 m where the code number is 2, 3 or 4;
- (b) 60 m where the code number is 1 and the runway is an instrument one; and
- (c) 30 m where the code number is 1 and the runway is a non-instrument one.

(3) A strip including a precision approach runway shall, wherever practicable, extend laterally to a distance of at least:

- (a) 150 m where the code number is 3 or 4; and
- (b) 75 m where the code number is 1 or 2;
on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

(4) A strip including a non-precision approach runway shall extend laterally to a distance of at least:

- (a) 150 m where the code number is 3 or 4; and
- (b) 75 m where the code number is 1 or 2;
on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

(5) A strip including a non-instrument runway shall extend on each side of the centre line of the runway and its extended centre line throughout the length of the strip, to a distance of at least:

- (a) 75 m where the code number is 3 or 4;
- (b) 40 m where the code number is 2; and
- (c) 30 m where the code number is 1.

(6) An object situated on a runway strip which may endanger aircraft shall be regarded as an obstacle and shall, as far as practicable, be removed.

(7) No fixed object, other than visual aids required for air navigation or those required for aircraft safety purposes and which shall be sited on the runway strip, and satisfying the relevant frangibility requirement, shall be permitted on a runway strip:

- (a) within 77.5 m of the runway centre line of a precision approach runway category I, II or III where the code number is 4 and the code letter is F; or
- (b) within 60 m of the runway centre line of a precision approach runway category I, II or III where the code number is 3 or 4; or
- (c) within 45 m of the runway centre line of a precision approach runway category I where the code number is 1 or 2.

(8) No mobile object shall be permitted on this part of the runway strip during the use of the runway for landing or take-off.

(9) That portion of a strip of an instrument runway within a distance of at least:

- (a) 75 m where the code number is 3 or 4; and
- (b) 40 m where the code number is 1 or 2;

from the centre line of the runway and its extended centre line shall provide a graded area for aeroplanes which the runway is intended to serve in the event of an aircraft running off the runway.

(10) That portion of a strip of a non-instrument runway within a distance of at least:

- (a) 75 m where the code number is 3 or 4;
- (b) 40 m where the code number is 2; and
- (c) 30 m where the code number is 1;

from the centre line of the runway and its extended centre line shall provide a graded area for aeroplanes which the runway is intended to serve in the event of an aircraft running off the runway.

(11) The surface of that portion of a strip that abuts a runway, shoulder or stopway shall be flush with the surface of the runway, shoulder or stopway.

(12) That portion of a strip to at least 30 m before a threshold shall be prepared against blast erosion in order to protect a landing aircraft from the danger of an exposed edge.

(13) Where the areas in sub-regulation (12) have paved surfaces, they shall be able to withstand the occasional passage of the critical aircraft for runway pavement design.

Slopes on
runway
strips

112.-(1) A longitudinal slope along that portion of a strip to be graded shall not exceed:

- (a) 1.5 per cent where the code number is 4;
- (b) 1.75 per cent where the code number is 3; and
- (c) 2 per cent where the code number is 1 or 2.

(2) Slope changes on that portion of a strip to be graded shall be as gradual as practicable and abrupt changes or sudden reversals of slopes avoided.

(3) Transverse slopes on that portion of a strip to be graded shall be adequate to prevent the accumulation of water on the surface but shall not exceed:

- (a) 2.5 per cent where the code number is 3 or 4; and
- (b) 3 per cent where the code number is 1 or 2,

except for facilitating drainage the slope for the first 3 m outward from the runway, shoulder or stopway edge shall be negative as measured in the direction away from the runway and may be as great as 5 per cent.

(4) The transverse slopes of any portion of a strip beyond that to be graded shall not exceed an upward slope of 5 per cent as measured in the direction away from the runway.

(5) That portion of a strip of an instrument runway within a distance of at least:

- (a) 75 m where the code number is 3 or 4; and
- (b) 40 m where the code number is 1 or 2;

from the centre line of the runway and its extended centre line shall be so prepared or constructed as to minimize hazards arising from differences in load-bearing capacity to aeroplanes which the runway is intended to serve in the event of an aircraft running off the runway.

(6) That portion of a strip containing a non-instrument runway within a distance of at least:

- (a) 75 m where the code number is 3 or 4;
- (b) 40 m where the code number is 2; and
- (c) 30 m where the code number is 1,

from the centre line of the runway and its extended centre line shall be so prepared or constructed as to minimize hazards arising from differences in load-bearing capacity to aeroplanes which the runway is intended to serve in the event of an aircraft running off the runway.

Runway
end
safety area

113.-(1) A runway end safety area shall be provided at each end of a runway strip where:

- (a) the code number is 3 or 4; and
- (b) the code number is 1 or 2 and the runway is an instrument one.

(2) A runway end safety area shall be provided at each end of a runway strip where the code number is 1 or 2 and the runway is a non-instrument one.

(3) A runway end safety area shall extend from the end of a runway strip to a distance of at least 90 m where:

- (a) the code number is 3 or 4; and
- (b) the code number is 1 or 2 and the runway is an instrument one.

and, if an arresting system is installed, the above length may be reduced, based on the design specification of the system, subject to acceptance by the Authority.

(5) The width of a runway end safety area shall be at least twice that of the associated runway.

(6) The width of a runway end safety area shall, wherever practicable, be equal to that of the graded portion of the associated runway strip.

(7) An object situated on a runway end safety area which may endanger aeroplanes shall be regarded as an obstacle and shall, as far as practicable, be removed.

(8) A runway end safety area shall provide a cleared and graded area for aeroplanes which the runway is intended to serve in the event of an aircraft undershooting or overrunning the runway,

(9) The slopes of a runway end safety area shall be such that no part of the runway end safety area penetrates the approach or take-off climb surface.

(10) The longitudinal slopes of a runway end safety area shall not exceed a downward slope of 5 percent and longitudinal slope changes shall be as gradual as practicable with abrupt changes or sudden reversals of slopes avoided.

(11) The transverse slopes of a runway end safety area shall not exceed an upward or downward slope of 5 per cent and transitions between differing slopes shall be as gradual as practicable.

(12) A runway end safety area shall be so prepared or constructed as to reduce the risk of damage to an aircraft undershooting or overrunning the runway, enhance aircraft deceleration and facilitate the movement of rescue and fire fighting vehicles.

Clearways

114.-(1) The origin of a clearway shall where provided, be at the end of the take-off run available.

(2) The length of a clearway shall not exceed half the length of the take-off run available.

(3) A clearway shall extend laterally to a distance of at least 75 m on each side of the extended centre line of the runway.

(4) The ground in a clearway shall not project above a plane having an upward slope of 1.25 per cent, the lower limit of this plane being a horizontal line which:

(a) is perpendicular to the vertical plane containing the runway centre line; and

(b) passes through a point located on the runway centre line at the end of the take-off run available.

(5) Abrupt upward changes in slope shall be avoided when the slope on the ground in a clearway is relatively small or when the mean slope is upward and in such cases, that portion of the clearway within a distance of 22.5 m or half the runway width, whichever is greater, on each side of the extended centre line, the slopes, slope changes and the transition from runway to clearway shall conform with those of the runway with which the clearway is associated.

(6) An object situated on a clearway which may endanger aeroplanes in the air shall be regarded as an obstacle and shall be removed.

(7) This regulation shall apply only to aerodromes in categories A and B

Stopways

115.-(1) Where established, a stopway shall have the same width as the runway with which it is associated.

(2) Slopes and changes in slope on a stopway, and the transition from a runway to a stopway, shall comply with the requirements of regulations 90 to 96 for the runway with which the stopway is associated except that:

- (a) the limitation in regulation 91 of a 0.8 per cent slope for the first and last quarter of the length of a runway need not be applied to the stopway; and
- (b) at the junction of the stopway and runway and along the stopway the maximum rate of slope change may be 0.3 percent per 30 m (minimum radius of curvature of 10 000 m) for a runway where the code number is 3 or 4.

(3) A stopway shall be prepared or constructed so as to be capable, in the event of an abandoned take-off, of supporting the aircraft which the stopway is intended to serve without inducing structural damage to the aircraft.

(4) The surface of a paved stopway shall be so constructed or resurfaced as to provide surface friction characteristics at or above those of the associated runway.

Radio
altimeter
operating
area

116.-(1) A radio altimeter operating area shall be established in the pre-threshold area of a precision approach runway.

(2) A radio altimeter operating area shall extend before the threshold for a distance of at least 300 m.

(3) A radio altimeter operating area shall extend laterally, on each side of the extended centre line of the runway, to a distance of 60 m, except that, when special circumstances so warrant, the distance may be reduced to no less than 30 m if an aeronautical study indicates that such reduction would not affect the safety of operations of aircraft.

(4) Slope changes on a radio altimeter operating area, shall be avoided or kept to a minimum and where slope changes cannot be avoided, abrupt changes or sudden reversals of slopes shall be avoided and shall be as gradual as practicable and the rate of change between two consecutive slopes shall not exceed 2 percent per 30 m.

Taxiways

117.-(1) Taxiways shall be provided to permit the safe and expeditious surface movement of aircraft.

(2) Sufficient entrance and exit taxiways for a runway shall be provided to expedite the movement of aeroplanes to and from the runway and provision of rapid exit taxiways considered when traffic volumes are high.

(3) The design of a taxiway shall be such that, when the cockpit of the aircraft for which the taxiway is intended remains over the taxiway centre line markings, the clearance distance between the outer main wheel of the aircraft and the edge of the taxiway shall be not less than that given by the following tabulation:

Code letter	Clearance
A	1.5 m
B	2.25 m
C	3 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; 4.5 m if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m.
D	4.5 m
E	4.5 m
F	4.5 m

Where the code letter is F and the traffic density is high, a wheel-to-edge clearance greater than 4.5 m may be provided to permit higher taxiing speeds.

(4) For taxiways first put into service on or after 20 November 2008, the design of a taxiway shall be such that, when the cockpit of the aircraft for which the taxiway is intended remains over the taxiway centre line markings, the clearance distance between the outer main wheel of the aircraft and the edge of the taxiway shall be not less than that given by the following tabulation:

Code letter	Clearance
A	1.5 m
B	2.25 m
C	3 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; 4.5 m if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m.
D	4.5 m
E	4.5 m
F	4.5 m

Where the code letter is F and the traffic density is high, a wheel-to-edge clearance greater than 4.5 m may be provided to permit higher taxiing speeds.

(5) A straight portion of a taxiway shall have a width of not less than that given by the following tabulation:

Code letter	Taxiway width
A	7.5 m
B	10.5 m
C	15 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; 18 m if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m.
D	18 m if the taxiway is intended to be used by aeroplanes with an outer main gear wheel span of less than 9 m; 23 m if the taxiway is intended to be used by aeroplanes with an outer main gear wheel span equal to or greater than 9 m.
E	23 m
F	25 m

- (6) An operator shall ensure that:
 - (a) Changes in direction of taxiways shall be as few and small as possible;
 - (b) The radii of the curves shall be compatible with the manoeuvring capability and normal taxiing speeds of the aircraft for which the taxiway is intended;
 - (c) The design of the curve shall be such that, when the cockpit of the aircraft remains over the taxiway centre line markings, the clearance distance between the outer main wheels of the aircraft and the edge of the taxiway shall not be less than those specified in sub-regulation (3).

(7) To facilitate the movement of aeroplanes, fillets shall be provided at junctions and intersections of taxiways with runways, aprons and other taxiways. The design of the fillets shall ensure that the minimum wheel clearances specified in sub-regulation (3) are maintained when aeroplanes are manoeuvring through the junctions or intersections; and consideration shall be given to the aircraft datum length when designing fillets.

(8) The separation distance between the centre line of a taxiway and the centre line of a runway, the centre line of a parallel taxiway or an object shall not be less than the appropriate dimension specified in Table 2, except that it may be permissible to operate with lower separation distances at an existing aerodrome if an aeronautical study indicates that such lower separation distances would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(9) The longitudinal slope of a taxiway shall not exceed:

- (a) 1.5 per cent where the code letter is C, D, E or F;
and
- (b) 3 per cent where the code letter is A or B.

(10) Where slope changes on a taxiway cannot be avoided, the transition from one slope to another slope shall be accomplished by a curved surface with a rate of change not exceeding:

- (a) 1 per cent per 30 m (minimum radius of curvature of 3 000 m) where the code letter is C, D, E or F; and
- (b) 1 per cent per 25 m (minimum radius of curvature of 2 500 m) where the code letter is A or B.

Table 2. Taxiway minimum separation distances

Distance between taxiway centre line and runway centre line (metres)									
Instrument				Non-instrument runways code number				Taxiway centreline to taxiway centre line (metres)	Taxiway, other than aircraft stand taxilane, centre line to object (metres)
1	2	3	4	1	2	3	4		
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
82.5	82.5	-	-	37.5	47.5	-	-	23.75	16.25
87	87	-	-	42	52	-	-	33.5	21.5
-	-	168	-	-	-	93	-	44	26
-	-	176	176	-	-	101	101	66.5	40.5
-	-	-	182.5	-	-	-	107.5	80	47.5
-	-	-	190	-	-	-	115	97.5	57.5

(11) Where a change in slope on a taxiway cannot be avoided, the change shall be such that, from any point:

- (a) 3 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 300 m from that point, where the code letter is C, D, E or F;
- (b) 2 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 200 m from that point, where the code letter is B; and
- (c) 1.5 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 150 m from that point, where the code letter is A.

(12) The transverse slopes of a taxiway shall be sufficient to prevent the accumulation of water on the surface of the taxiway but shall not exceed:

- (a) 1.5 per cent where the code letter is C, D, E or F; and
- (b) 2 per cent where the code letter is A or B.

(13) The strength of a taxiway shall be at least equal to that of the runway it serves, due consideration being given to the fact that a taxiway will be subjected to a greater density of traffic and, as a result of slow moving and stationary aeroplanes, to higher stresses than the runway it serves.

(14) The surface of a taxiway shall not have irregularities that cause damage to aeroplane Structures

(15) The surface of a paved taxiway shall be so constructed or resurfaced as to provide suitable surface friction characteristics.

Rapid
exit
taxiways

118.-(1) A rapid exit taxiway shall be designed with a radius of turn-off curve of at least:

- (a) 550 m where the code number is 3 or 4; and
- (b) 275 m where the code number is 1 or 2;

to enable exit speeds under wet conditions of:

- (a) 93 km/h where the code number is 3 or 4; and
- (b) 65 km/h where the code number is 1 or 2.

(2) The radius of the fillet on the inside of the curve at a rapid exit taxiway shall be sufficient to provide a widened taxiway throat in order to facilitate early recognition of the entrance and turn-off onto the taxiway.

(3) A rapid exit taxiway shall include a straight distance after the turn-off curve sufficient for an exiting aircraft to come to a full stop clear of any intersecting taxiway.

(4) The intersection angle of a rapid exit taxiway with the runway shall not be greater than 45° nor less than 25° and preferably shall be 30°.

Taxiways
on
bridges

119.-(1) The width of that portion of a taxiway bridge capable of supporting aeroplanes, as measured perpendicularly to the taxiway centre line, shall not be less than the width of the graded area of the strip provided for that taxiway, unless a proven method of lateral restraint is provided which shall not be hazardous for aeroplanes for which the taxiway is intended.

(2) Access shall be provided to allow rescue and fire fighting vehicles to intervene in both directions within the specified response time to the largest aeroplane for which the taxiway bridge is intended.

(3) A bridge shall be constructed on a straight section of the taxiway with a straight section on both ends of the bridge to facilitate the alignment of aeroplanes approaching the bridge.

Taxiway
shoulders

120.-(1) Straight portions of a taxiway where the code letter is C, D, E or F shall be provided with shoulders which extend symmetrically on each side of the taxiway so that the overall width of the taxiway and its shoulders on straight portions is not less than:

- (a) 60 m where the code letter is F;
- (b) 44 m where the code letter is E;
- (c) 38 m where the code letter is D; and
- (d) 25 m where the code letter is C.

(2) On taxiway curves and on junctions or intersections where increased pavement is provided, the shoulder width shall be not less than that on the adjacent straight portions of the taxiway.

(3) When a taxiway is intended to be used by turbine-engined aeroplanes, the surface of the taxiway shoulder shall be so prepared as to resist erosion and the ingestion of the surface material by aircraft engines.

Taxiway
strips

121.-(1) A taxiway, other than an aircraft stand taxilane, shall be included in a strip.

(2) A taxiway strip shall 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 2, column 11.

(3) An operator shall ensure that the taxiway strip is clear of objects which may endanger taxiing aircraft taking into consideration the location and design of drains, including suitably designed drain covers, to prevent damage to an aircraft accidentally running off a taxiway.

(4) The centre portion of a taxiway strip shall provide a graded area to a distance from the centre line of the taxiway of at least:

- (a) 11 m where the code letter is A;
- (b) 12.5 m where the code letter is B or C;
- (c) 19 m where the code letter is D;
- (d) 22 m where the code letter is E; and
- (e) 30 m where the code letter is F.

(5) The surface of the strip shall be flush at the edge of the taxiway or shoulder, if provided, and the graded portion shall not have an upward transverse slope exceeding:

- (a) 2.5 per cent for strips where the code letter is C, D, E or F; and
- (b) 3 per cent for strips of taxiways where the code letter is A or B;

the upward slope being measured with reference to the transverse slope of the adjacent taxiway surface and not the horizontal. The downward transverse slope shall not exceed 5 per cent measured with reference to the horizontal.

(6) The transverse slopes on any portion of a taxiway strip beyond that to be graded shall not exceed an upward or downward slope of 5 per cent as measured in the direction away from the taxiway.

Holding
bays,

122.-(1) Holding bay(s) shall be provided at aerodromes where the traffic density is medium or heavy.

runway
holding
positions,
intermedi-
ate
holding
positions
and
road
holding
positions

(2) A runway-holding position or positions shall be established:

- (a) on the taxiway, at the intersection of a taxiway and a runway; and
- (b) at an intersection of a runway with another runway when the former runway is part of a standard taxi-route.

(3) A runway-holding position shall be established on a taxiway if the location or alignment of the taxiway is such that a taxiing aircraft or vehicle can infringe an obstacle limitation surface or interfere with the operation of radio navigation aids.

(4) An intermediate holding position shall be established on a taxiway at any point other than a runway-holding position where it is desirable to define a specific holding limit.

(5) A road-holding position shall be established at an intersection of a road with a runway.

(6) The distance between a holding bay, runway-holding position established at a taxiway or runway intersection or road-holding position and the centre line of a runway shall be in accordance with Table 3 and, in the case of a precision approach runway, such that a holding aircraft or vehicle will not interfere with the operation of radio navigation aids.

(7) At elevations greater than 700 m (2300 ft) the distance of 90 m specified in Table 3 for a precision approach runway code number 4 shall be increased as follows:

- (a) up to an elevation of 2000 m (6600 ft); 1 m for every 100 m (330 ft) in excess of 700 m (2300 ft);
- (b) elevation in excess of 2 000 m (6600 ft) and up to 4000 m (13320 ft); 13 m plus 1.5 m for every 100 m (330 ft) in excess of 2000 m (6 600 ft); and
- (c) elevation in excess of 4000 m (13320 ft) and up to 5000 m (16 650 ft); 43 m plus 2 m for every 100 m (330 ft) in excess of 4000 m (13320 ft).

(8) If a holding bay, runway-holding position or road-holding position for a precision approach runway code number 4 is at a greater elevation compared to the threshold, the distance of 90 m or 107.5 m, as appropriate, specified in Table 3 shall be further increased 5 m for every metre the bay or position is higher than the threshold.

(9) The location of a runway-holding position established in accordance with sub-regulation (3) shall be such that a holding aircraft or vehicle will not infringe the obstacle free zone, approach surface, take-off climb surface or ILS/MLS critical or sensitive area or interfere with the operation of radio navigation aids.

Table 3. Minimum distance from the runway centre line

to a holding bay, runway-holding position or road-holding position

Runway	Code Number			
	1	2	3	
ment	30 m	40 m	75 m	
sion	40 m	40 m	75 m	
	60 m	60 m	90 m	
	-	-	90 m	
and				
Runway	30 m	40 m	75 m	

- (a) if a holding bay, runway-holding position or road-holding position is at a lower elevation compared to the threshold, the distance of 90 m in columns 3 and 4 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) the distance of 60 m and 90 m in columns 1, 2, 3 and 4 may need to be increased to avoid interference with radio navigation aids, particularly the glide path and localizer facilities; and
- (c) where the code letter is F, the distance of 90 m in column 4 shall be 107.5 m.

Aprons

123.-(1) Aprons shall be provided where necessary to permit the on- and off-loading of passengers, cargo or mail as well as the servicing of aircraft without interfering with the aerodrome traffic.

(2) Where an apron is provided, the total apron area shall be adequate to permit expeditious handling of the aerodrome traffic at its maximum anticipated density.

(3) Each part of an apron shall be capable of withstanding the traffic of the aircraft it is intended to serve, due consideration being given to the fact that some portions of the apron will be subjected to a higher density of traffic and, as a result of slow moving or stationary aircraft, to higher stresses than a runway.

(4) Slopes on an apron, including those on an aircraft stand taxilane, shall be sufficient to prevent accumulation of water on the surface of the apron but shall be kept as level as drainage requirements permit.

(5) On an aircraft stand, where applicable, the maximum slope shall not exceed 1 per cent.

(6) An aircraft stand shall provide the following minimum clearances between an aircraft using the stand and any adjacent building, aircraft on another stand and other objects:

Code letter	Clearance
A	3 m
B	3 m
C	4.5 m
D	7.5 m
E	7.5 m
F	7.5 m

(a) When special circumstances so warrant, these clearances may be reduced at a nose-in aircraft stand, where the code letter is D, E or F:

(i) between the terminal, including any fixed passenger bridge, and the nose of an aircraft; and

(ii) over any portion of the stand provided with azimuth guidance by a visual docking guidance system.

(b) On aprons, consideration shall also be given to the provision of service roads and to manoeuvring and storage area for ground equipment

Isolated
aircraft
parking
position

124.-(1) An isolated aircraft parking position shall be designated or the aerodrome control tower shall be advised of an area or areas suitable for the parking of an aircraft which is known or believed to be the subject of unlawful interference, or which for other reasons needs isolation from normal aerodrome activities.

(2) The isolated aircraft parking position shall be located at the maximum distance practicable and in any case not less than 100 m from other parking positions, buildings or public areas, among others.

(3) In establishing an isolated aircraft parking, care shall be taken to ensure that the position is not located over underground utilities such as gas and aviation fuel and, to the extent feasible, electrical or communication cables.

(4) This regulation shall only apply to aerodromes in categories A and B.

PART XI OBSTACLE RESTRICTIONS AND REMOVAL

Applicat
ion
of this
Part

125. This Part applies to all categories of aerodromes. Specific standards for obstacle restrictions and removal for category D aerodromes shall be as prescribed by the Authority.

Erection
of
obstacle
s

126.-(1) A person shall not cause or permit the erection or growth of an obstacle at or in the vicinity of an aerodrome, where the obstacle may prevent an aircraft operation from being conducted safely or the aerodrome from being usable.

(2) A person shall not cause or permit any object, to penetrate the obstacle limitation surface, without the written permission of the Authority, where the object may cause an increase in an obstacle clearance altitude or in the height for an instrument approach procedure or of any associated visual circling procedure.

(3) The object referred to in sub-regulation (2) includes a new object or an extension of an existing object above the obstacle limitation surface.

(4) The obstacle clearance altitude and height applicable to obstacle limitation surface, and the obstacle limitation requirements shall comply with these regulations.

Establis
hment
of
obstacl

127.-(1) An operator shall ensure that obstacle limitation surfaces are established for the aerodrome in accordance with the standards prescribed in these Regulations and as provided in the Fourteenth Schedule.

e
limitati
on
surface
s

(2) An operator shall monitor the established obstacle limitation surfaces around the aerodrome for infringement by objects, buildings or other structures.

(3) An aerodrome operator shall establish a systematic means of surveying and monitoring any object that penetrates obstacle limitation surfaces around the aerodrome and report any penetration immediately to the Authority.

(4) An aerodrome operator shall notify through the Aeronautical Information Services any object that penetrates obstacle limitation surfaces around the aerodrome.

(5) The operator of an aerodrome shall work jointly with the Authority to plan and determine the allowable height limits for new developments in the vicinity of and outside its aerodrome and the type of instrument or visual flight operations that may be permitted taking the obstacle survey plan into account.

Obstacle
limitatio
n
surfaces

128. The obstacle limitation surfaces shall comprise the following surfaces as indicated Fourteenth schedule of these regulations:

- (a) Conical surface
- (b) Inner horizontal surface
- (c) Approach surface
- (d) Inner approach surface
- (e) Transitional surface
- (f) Inner transitional surface
- (g) Balked landing surface

Conical
surface

129.-(1) A conical surface shall be a surface sloping upwards and outwards from the periphery of the inner horizontal surface.

(2) The limits of the conical surface shall comprise the following characteristics:

- (a) a lower edge coincident with the periphery of the inner horizontal surface; and
- (b) an upper edge located at a specified height above the inner horizontal surface.

(3) The slope of the conical surface shall be measured in a vertical plane perpendicular to the periphery of the inner horizontal surface.

Inner
horizontal
surface

130.-(1) the Inner horizontal surface shall be a surface located in a horizontal plane above an aerodrome and its environs.

(2) The radius or outer limits of the inner horizontal surface shall be measured from a reference point or points established for such purpose.

(3) The height of the inner horizontal surface shall be measured above an elevation datum established for such purpose.

Approach
surface

131.-(1) An approach surface shall be an inclined plane or combination of planes preceding the threshold.

(2) The limits of the approach surface shall comprise the following characteristics

(a) an inner edge of specified length, horizontal and perpendicular to the extended centre line of the runway and located at a specified distance before the threshold;

(b) two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the runway; and

(c) an outer edge parallel to the inner edge;

(d) the above surfaces shall be varied when lateral offset, offset or curved approaches are utilized, specifically, two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the lateral offset, offset or curved ground track.

(3) The elevation of the inner edge shall be equal to the elevation of the mid-point of the threshold.

(4) The slope(s) of the approach surface shall be measured in the vertical plane containing the centre line of the runway.

Inner
approach
surface

132.-(1) An inner approach surface shall be a rectangular portion of the approach surface immediately preceding the threshold.

(2) The limits of the inner approach surface shall comprise the following characteristics:

- (a) an inner edge coincident with the location of the inner edge of the approach surface but of its own specified length;
- (b) two sides originating at the ends of the inner edge and extending parallel to the vertical plane containing the centre line of the runway; and
- (c) an outer edge parallel to the inner edge.

Transitional
surface

133.-(1) The transitional surface shall be a complex surface along the side of the strip and part of the side of the approach surface, the slopes upwards and outwards to the inner horizontal surface.

(2) The limits of the transitional surface shall comprise the following characteristics:

- (a) a lower edge beginning at the intersection of the side of the approach surface with the inner horizontal surface and extending down the side of the approach surface to the inner edge of the approach surface and from there along the length of the strip parallel to the runway centre line; and
 - (b) an upper edge located in the plane in the inner horizontal surface.
- (3) The elevation of a point on the lower edge shall be:
- (a) along the side of the approach surface – equal to the elevation of the approach surface at that point; and
 - (b) along the strip – equal to the elevation of the nearest point on the centre line of the runway or its extension.

(4) Pursuant to sub-regulation (3) (b) the transitional surface along the strip shall be curved if the runway profile is curved, or a plane if the runway profile is a straight line; the intersection of the transitional surface with the inner horizontal surface shall also be a curved or a straight line depending on the runway profile.

(5) The slope of the transitional surface shall be measured in a vertical plane at right angles to the centre line of the runway.

Inner
transitional
surface

134.-(1) The inner transitional surface shall be the controlling obstacle limitation surface for navigation aids, aircraft, buildings and vehicles that must be near the runway and shall not to be penetrated except for frangible objects.

(2) The inner transitional surface shall be a surface similar to the transitional surface but closer to the runway.

(3) The limits of an inner transitional surface shall comprise following characteristics:

(a) a lower edge beginning at the end of the inner approach surface and extending down the side of the inner approach surface to the inner edge of that surface, from there along the strip parallel to the runway centre line to the inner edge of the balked landing surface and from there up the side of the balked landing surface to the point where the side intersects the inner horizontal surface; and

(b) an upper edge located in the plane of the inner horizontal surface.

(4) The elevation of a point on the lower edge shall be:

(a) along the side of the inner approach surface and balked landing surface – equal to the elevation of the particular surface at that point; and

(b) along the strip – equal to the elevation of the nearest point on the centre line of the runway or its extension.

(5) Pursuant to sub-regulation (3) (b) the inner transitional surface along the strip shall be curved if the runway profile is curved or a plane if the runway profile is a straight line; the intersection of the inner transitional surface with the inner horizontal surface shall also be a curved or a straight line depending on the runway profile.

(6) The slope of inner transitional surface shall be measured in a vertical plane at right angles to the centre line of the runway.

Balked
landing
surface

135.-(1) The balked landing surface shall be an inclined plane located at a specified distance after the threshold, extending between the inner transitional surfaces.

(2) The limits of the balked landing surface shall comprise the following characteristics:

(a) an inner edge horizontal and perpendicular to the centre line of the runway and located at a specified distance after the threshold;

(b) two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centre line of the runway; and

(c) an outer edge parallel to the inner edge and located in the plane of the inner horizontal surface.

(3) The elevation of the inner edge shall be equal to the elevation of the runway centre line at the location of the inner edge.

(4) The slope of the balked landing surface shall be measured in the vertical plane containing the centre line of the runway.

Take-off
climb
surface

136.-(1) The take-off climb surface shall be an inclined plane or other specified surface beyond the end of a runway or clearway.

(2) The limits of the take-off climb surface shall comprise the following characteristics:

- (a) an inner edge horizontal and perpendicular to the centre line of the runway and located either at a specified distance beyond the end of the runway or at the end of the clearway when such is provided and its length exceeds the specified distance;
- (b) two sides originating at the ends of the inner edge, diverging uniformly at a specified rate from the take-off track to a specified final width and continuing thereafter at that width for the remainder of the length of the take-off climb surface; and
- (c) an outer edge horizontal and perpendicular to the specified take-off track.

(3) The elevation of the inner edge shall be equal to the highest point on the runway centre line between the end of the runway and the inner edge, except that when a clearway is provided the elevation shall be equal to the highest point on the ground on the centre line of the clearway.

(4) In the case of a straight take-off flight path, the slope of the take-off climb surface shall be measured in the vertical plane containing the centre line of the runway.

(5) In the case of a take-off flight path involving a turn, the take-off climb surface shall be a complex surface containing the horizontal normal to its centre line, and the slope of the centre line shall be the same as that for a straight take-off flight path.

Obstacle
limitatio
n
require
ments
for
non-
instrume
nt
runways

137.-(1) The requirements for obstacle limitation surfaces shall be specified on the basis of the intended use of a runway, that is, take-off or landing and type of approach, and shall be applied when such use is made of the runway and in cases where operations are conducted to or from both directions of a runway, then the function of certain surfaces may be nullified due to more stringent requirements of another lower surface.

(2) The following obstacle limitation surfaces shall be established for a non- instrument runway.

- (a) conical surface;
- (b) inner horizontal surface;
- (c) approach surface; and
- (d) transitional surfaces

(3) The heights and slopes of the surfaces shall not be greater than, and their other dimensions not less than, those specified in Table 4-1

(4) New objects or extensions of existing objects shall not be permitted above an approach or transitional surface except when the new object or extension would be shielded by an existing immovable object.

(5) The circumstances under which the shielding principle may reasonably be applied are described in the Sixth Schedule to these Regulations.

(6) New objects or extensions of existing objects shall not be permitted above the conical surface or inner horizontal surface except when the object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of aeroplane operations

Table 4-1 – Dimensions and slopes of obstacle limitation surfaces
APPROACH RUNWAYS

and ons ^a	RUNWAY CLASSIFICATION									
	Non-instrument				Non-precision approach			Precision approach Category		
	Code number				Code number			Code number		
	1	2	3	4	1,2	3	4	1,2	3,4	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
AL										
	5%	5%	5%	5%	5%	5%	5%	5%	5%	
	35 m	55 m	75 m	100m	60 m	75 m	100m	60 m	100m	
HORIZONTAL										
	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	
	2 000 m	2 500 m	4000 m	4000 m	3500 M	4000 m	4000 m	3500 m	4000 M	
APPROACH										
	-	-	-	-	-	-	-	90 m	120 m ^e	
	-	-	-	-	-	-	-	60 m	60 m	
d	-	-	-	-	-	-	-	900 m	900 M	
	-	-	-	-	-	-	-	2.5%	2%	
ACH										
if	60m	80m	150m	150m	150m	300m	300m	150m	300m	
ge	30m	60m	60m	60m	60m	60m	60m	60m	60m	
l										
ice	10%	10%	10%	15%	15%	15%	15%	15%	15%	
le)										
tion										
	1600 m	2500 m	3000 m	3000 m	2500 M	3000 m	3000 m	3000 m	3000 M	
	5%	4%	3.33%	2.5%	3.33%	2%	2%	2.5%	2%	

- a. All dimensions are measured horizontally unless specified otherwise.
- b. Variable length
- c. Distance to the end of strip.
- d. Or end of runway whichever is less.
- e. Where the code letter is F, the width is increased to 155 m.

(7) Existing objects above any of the surfaces required by paragraph 4.3.1 shall as far as practicable be removed except when, in the opinion of the Authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(8) (a) Due to transverse or longitudinal slopes on a strip, in certain cases the inner edge or portions of the inner edge of the approach surface may be below the corresponding elevation of the strip.

(b) The strip may not have to be graded to conform with the inner edge of the approach surface or the terrain or objects which are above the approach surface, and in addition, terrain or objects which are above the approach surface beyond the end of the strip, but below the level of the strip, may not have to be removed unless it is considered that they may endanger aircraft.

(9) In considering proposed construction, account shall be taken of the possible future development of an instrument runway and consequent requirement for more stringent obstacle limitation surfaces.

Obstacle
limitation
requirements for
Non-
precision
approach
runway

138.-(1) The following obstacle limitation surfaces shall be established for a non-precision approach runway:

- (a) conical surface;
- (b) inner horizontal surface;
- (c) approach surface; and
- (d) transitional surfaces.

(2) The heights and slopes of the surfaces shall not be greater than, and their other dimensions not less than, those specified in Table 4-1, except in the case of the horizontal section of the approach surface as per section 4.2.9).

(3) The approach surface shall be horizontal beyond the point at which the 2.5 per cent slope intersects:

(a) a horizontal plane 150m above the threshold elevation; or

(b) the horizontal plane passing through the top of any object that governs the obstacle clearance altitude or height (OCA/H),

whichever is the higher

(4) New objects or extensions of existing objects shall not be permitted above an approach surface within 3,000m of the inner edge or above a transitional surface except when the new object or extension would be shielded by an existing immovable object.

(5) New objects or extensions of existing objects shall not be permitted above the approach surface beyond 3000m from the inner edge, the conical surface or inner horizontal surface except when the object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of aeroplane operations.

(6) Existing objects above any of the surfaces shall as far as practicable be removed except when the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of aeroplane operations.

Obstacle
limitation
requirements for
precision
approach
runways

139.-(1) The following obstacle limitation surfaces shall be established for a precision approach runway category I:

(a) conical surface;

(b) inner horizontal surface;

(c) approach surface; and

(d) transitional surfaces.

(2) The following obstacle limitation surfaces may be established for a precision approach runway category I:

- (a) inner approach surface;
- (b) inner transitional surfaces; and
- (c) balked landing surface.

(3) The following obstacle limitation surfaces shall be established for a precision approach runway category II or III.

- (a) conical surface;
- (b) inner horizontal surface;
- (c) approach surface and inner approach surface;
- (d) transitional surfaces;
- (e) inner transitional surfaces; and
- (f) balked landing surface.

(4) The heights and slopes of the surfaces shall not be greater than, and their other dimensions not less than, those specified in Table 4-1 of these Regulations, except in the case of the horizontal section of the approach surface as per section 4.3.7 below).

(5) The approach surface shall be horizontal beyond the point at which the 2.5 per cent slope intersects:

- (a) a horizontal plane 150m above the threshold elevation; or
- (b) the horizontal plane passing through the top of any object that governs the obstacle clearance limit,

whichever is the higher.

(6) Fixed objects shall not be permitted above the inner approach surface, the inner approach surface, the inner transitional surface or the balked landing surface, except for frangible objects which because of their function must be located on the strip.

(7) Mobile objects shall not be permitted above these surfaces during the use of the runway for landing.

(8) New objects or extensions of existing objects shall not be permitted above an approach surface or a transitional surface except when, in the opinion of the Authority's Safety Division, the new object or extension would be shielded by an existing immovable object.

(9) New objects or extensions of existing objects shall not be permitted above the conical surface and the inner horizontal surface except when an object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of aeroplane operations.

(10) Existing objects above an approach surface, a transitional surface, the conical surface and inner horizontal surface shall as far as practicable be removed except when an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety aeroplane operations.

Obstacle
limitation
requireme
nts for
runways
meant for
take-off

140.-(1) Take-off climb surface shall be established for a runway meant for take-off.

(2) The dimension of the surface shall be not less than the dimensions specified in Table 4-2, except that a lesser length may be adopted or the take-off climb surface where such lesser length would be consistent with procedural measures adopted to govern the outward flight of aeroplanes.

(3) The operational characteristics of aeroplanes for which the runway is intended shall be examined to see if it is desirable to reduce the slope specified in Table 4-2 when critical operating conditions are to be catered to. If the specified slope is reduced, corresponding adjustment in the length of take-off climb surface shall be made so as to provide protection to a height of 300m.

(4) (a) When local conditions differ widely from sea level standard atmospheric conditions, it may be advisable for the slope specified in Table 4-2 to be reduced.

(b) The degree of this reduction shall depend on the divergence between local conditions and sea level standard atmospheric conditions, and on the performance characteristics and operational requirements of the aeroplanes for which the runway is intended.

(5) New objects or extensions of existing objects shall not be permitted above a take-off climb surface except when, in the opinion of the Authority, the new object or extension would be shielded by an existing immovable object.

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

(6) Existing objects that extend above a take-off climb surface shall as far as practicable be removed except when, in the opinion of the Authority, an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of operations of aeroplanes.

Table 4-2 – Dimensions and slopes of obstacle limitation surfaces

RUNWAYS MEANT FOR TAKE-OFF			
Code and dimensions ^a	Code number		
	1	2	3 or 4
	(2)	(3)	(4)
TAKE-OFF CLIMB			
Height of inner edge	60 m	80 m	180 m
Distance from runway end ^b	30 m	60 m	60 m
Slope (each side)	10 %	10%	12.5 %
Width	380 m	580 m	1 200 m or 1800 m
	1 600 m	2 500 m	15 000 m
	5%	4%	2%

Dimensions are measured horizontally unless specified otherwise.

Take-off climb surface starts at the end of the clearway if the clearway length is the specified distance.

1800 m when intended track includes changes of heading greater than 90 degrees. Operations conducted in IMC, VMC by night.

7 (a) Due to transverse slopes on a strip, or clearway, in certain cases portions of the inner edge of the take-off climb surface may be below the corresponding elevation of the strip, or clearway.

(b) The strip, or clearway may not have to be graded to conform with the inner edge of the take-off climb surface, and in addition, terrain or objects which are above the take-off climb surface beyond the end of the strip or clearway, but below the level of the strip or clearway, may not have to be removed unless it is considered that they may endanger aircraft.

Constructi
on
above,
beyond
or outside
the
Obstacle
Limitation
Surface

141.-(1) An aerodrome operator shall establish coordination with the land use Authorities concerning proposed construction above, beyond or outside the limits of the obstacle limitation surfaces in the interest of appropriate aviation interest.

(2) In areas beyond the limits of the obstacle limitation surfaces, at least those objects that extend to a height of 150 m or more above ground elevation shall be regarded as obstacles, unless a special aeronautical study indicate that they do not constitute a hazard to operations of aeroplanes.

Other
objects

142.-(1) Objects which do not project through the approach surface but which would nevertheless adversely affect the optimum siting or performance of visual or non-visual aids shall, as far as practicable, be removed.

(2) Anything which may, in the opinion of the aerodrome operator, after aeronautical study, endanger aeroplanes on the movement area or in the air within the limits of the inner horizontal and conical surfaces shall be regarded as an obstacle and shall be removed in so far as practicable.

(3) Objects that do not project above any of the surfaces described in these regulations, may constitute a hazard to aeroplanes as, for example, where there are one or more isolated objects in the vicinity of an aerodrome.

Authorisation to construct within the vicinity of an aerodrome

143.-(1) A person shall not construct a building or a structure within the vicinity of an aerodrome unless authorised by the Authority.

(2) Where the Authority is consulted regarding a proposed construction, the Authority shall cause an aeronautical study of the effect of the construction on operation of aircraft, to be carried out.

(3) Subject to these regulations, new obstacles or extensions of existing objects may be permitted above an obstacle limitation surface of an aerodrome when in the opinion of the Authority, the new object or extension shall be shielded by an existing immovable object in accordance with the Sixth Schedule to these regulations or after an aeronautical study, it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircraft.

(4) Notwithstanding any other provisions of these regulations, the Authority shall be consulted concerning proposed construction of obstacles beyond the limits of the obstacle limitation surfaces in order to conduct an aeronautical study of the effect of such construction on the operation of aeroplanes.

(5) In areas beyond the limits of the obstacle limitation surfaces, all aerial masts shall be regarded as obstacles, unless a special aeronautical study indicates that they do not constitute a hazard to aeroplanes and shall have regard to the nature of operations concerned and distinguish between day and night operations.

Removal of obstacle

144.-(1) A person shall remove any obstacle in the vicinity of aerodrome, except where, after an aeronautical study, the Authority determines that the obstacle does not adversely affect the safety or significantly affect the regularity of operations of aircraft.

(2) The Authority may direct the removal of any obstacle which, in the opinion of the Authority, constitutes a hazard to aircraft operations.

(3) Where an owner fails to remove an obstacle within the time directed by the Authority, the Authority shall arrange to have the obstacle removed at the cost of the owner of that obstacle.

Marking
and
lighting
of
obstacles

145.-(1) An operator shall ensure that an obstacle is marked and where a runway is used at night and is associated with the obstacle, that obstacle shall be lighted.

(2) The markings and lights referred to in sub-regulation (1) shall be in accordance with guidelines prescribed by the Authority.

(3) An operator shall, where practicable, ensure that all fixed obstacles to be marked in accordance with sub-regulation (1) are coloured as prescribed by the Authority.

(4) Where the conditions required in sub-regulation (3) are not practicable, markers or flags shall be displayed on or above the fixed obstacles, except the obstacles that are sufficiently conspicuous by their shape, size or colour, which may not be marked.

(5) An operator shall ensure that a mobile obstacle is coloured as prescribed by the Authority or has displayed on it or above it, a flag.

(6) An obstacle lighted in accordance with sub-regulation (1) shall be indicated as low-intensity, medium-intensity or high-intensity light obstacle or a combination of these lights and shall be displayed in accordance with guidelines prescribed by the Authority

(7) An obstacle in the vicinity of aerodrome which could otherwise present a hazard to aircraft shall be marked and lighted and regularly inspected by an operator to ensure safe operation of aircraft

PART XII AERONAUTICAL GROUND LIGHTING

Applicatio
n
of this
Part.

146. This Part applies to aerodromes in categories A and for all categories where an aerodrome is used at night or during conditions of low visibility.

Establish
ment
and
maintenan
ce
of
aeronautic
al
ground
lights

147.-(1) An operator shall establish and maintain aeronautical ground lights and any other lights as may be appropriate for the safe operation of aircraft and for runways, taxiways, aprons, thresholds and stopways.

(2) Where an aerodrome is used at night or during conditions of poor visibility, an operator shall ensure that aeronautical ground lights and any other lights are installed on the aerodrome.

(3) Without prejudice to the generality of sub-regulation (1), the location, characteristics, intensity control and settings of aeronautical ground lights shall be in accordance with these regulations.

(4) A non-aeronautical ground light, which, by reason of its intensity, configuration or colour, may prevent or cause confusion in the clear interpretation of aeronautical ground lights, shall be extinguished, screened or modified to eliminate hazard to aircraft safety.

(5) Except with the permission of the Authority, a person shall not establish, maintain or alter the character of –

(a) an aeronautical beacon within the United Republic of Tanzania except an aeronautical beacon which is or may be visible from the waters;

(b) any aeronautical ground light, other than an aeronautical beacon, at an aerodrome, or any aeronautical ground light which forms part of the lighting system for use by aircraft taking off from or landing at the aerodrome.

(6) A person shall not –

(a) intentionally or negligently damage an aeronautical ground light; or

(b) interfere with an aeronautical ground light without the permission of the operator.

(7) The Authority shall not grant permission under this regulation except with the consent of the lighthouse authority of the area where the aerodrome is situated.

Primary and Secondary power supplies **148.** An operator shall not operate or maintain an aerodrome provided with runway lighting, without a primary and secondary power supply commensurate with the level of operation and demand of the facilities, installations, equipment and services at an aerodrome.

Aeronautical beacons **149.-(1)** An operator shall provide, where necessary, at each aerodrome intended for use at night, an aerodrome beacon, where –
 (a) aircraft navigate predominantly by visual means;
 (b) reduced visibility is frequent; or
 (c) it is difficult to locate the aerodrome from the air due to a surrounding light or terrain.
 (2) An identification beacon shall be provided at an aerodrome, which is intended for use at night and which is not easily identifiable from the air by other means.
 (3) The location and characteristics of an aerodrome and identification beacon described in sub-regulations (1) and (2) shall be in accordance with these regulations.

PART XIII VISUAL AIDS FOR NAVIGATION

Application of this Part **150.** This Part applies to all categories of aerodromes.. Specific standards for visual aids for navigation for category D aerodromes shall be as prescribed by the Authority.

Provision of visual aids for navigation **151.-(1)** An aerodrome operator shall comply with the requirements for provision of visual aids including lights, markings, markers and signs as prescribed by the Authority and Seventh Schedule of these Regulations.
 (2) The aerodrome operator plan for lighting, signs and markings shall meet national requirements for individual elements
 (3) In complementary with sub-regulation (2), the operator's plan for lighting, signs and markings shall be integrated as a whole into the aerodrome's runway incursion and collision avoidance strategy taking into account of

different traffic intensities and visibility conditions

Wind
direction
indicators

152.-(1) An operator shall provide and maintain at least one wind direction indicator for an aerodrome.

(2) The wind direction indicator required under sub-regulation (1) shall be located so as to be visible to an aircraft in-flight or on the movement area and in such a way as to be free from the effects of air disturbances caused by nearby objects.

(3) The characteristics of the wind direction indicator, the methods and procedures for installation and maintenance shall be in accordance with these Regulations.

Landing
direction
indicator

153.-(1) Where provided a landing direction indicator shall be located in a conspicuous place on the aerodrome

(2) The landing direction indicator shall be in the form of a “T”.

(3) The shape and minimum dimensions of a landing “T” shall be as shown in the Figure bellow. The colour of the landing “T” shall be either white or orange, the choice being dependent on the colour that contrasts best with the background against which the indicator will be viewed. Where required for use at night, the landing “T” shall either be illuminated or outlined by white lights.

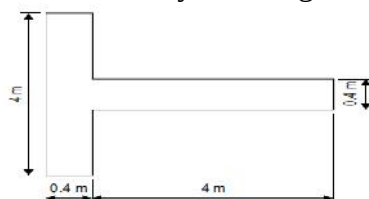


Figure 5.1 Landing direction indicator

Signalling
lamp

154.-(1) An operator shall ensure that a signalling lamp is provided at a controlled aerodrome in the aerodrome control tower.

(2) The characteristics and operating procedure of a signalling lamp shall be in accordance with these Regulations.

Signal
panel
and
signalling
area

155.-(1) The Authority may where it deems necessary, require a signalling panel and a signalling area to be provided at an aerodrome for safe operation of aircraft.

(2) Where provided, the location and the characteristics of the signal area shall be as prescribed by the Authority.

Markings

156.-(1) An operator shall provide markings for paved runway centreline, paved runway edge, paved runway threshold, paved runway touchdown zone, paved runway holding position, aiming point, paved runway side stripe, paved runway turn pad, and intermediate holding positions at an aerodrome, in accordance with these Regulations.

(2) Runway marking shall be white in colour.

(3) Taxiway markings, runway turn pad markings and aircraft stand markings shall be yellow in colour.

(4) Apron safety-lines shall be of a conspicuous colour, which shall contrast with that used for aircraft stand markings.

(5) At aerodromes where operations take place at night, pavement markings shall be made with reflective materials designed to enhance the visibility of the markings.

(6) An unpaved taxiway shall be provided, so far as practicable, with the markings prescribed for paved taxiways.

(7) The application, location and the characteristics of markers for unpaved runway edge markers, stopway edge markers, taxiway edge markers, taxiway centreline markers and boundary markers shall be in accordance with these Regulations.

Runway
designation
marking

157.-(1) A runway designation marking shall be provided at the thresholds of a paved runway and shall be as far as practicable, at the thresholds of an unpaved runway.

(2) A runway designation marking shall be located at a threshold as shown in prescribed by the Authority in Ninth Schedule of these Regulations.

(3) If the runway threshold is displaced from the extremity of the runway, a sign showing the designation of the runway may be provided for aeroplanes taking off.

(4) A runway designation marking shall consist of a two-digit number and on parallel runways shall be supplemented with a letter provided that, on a single runway, dual parallel runways and triple parallel runways the two-digit number shall be the whole number nearest the one-tenth of the magnetic North when viewed from the direction of approach..

(5) On four or more parallel runways, one set of adjacent runways shall be numbered to the nearest one-tenth magnetic azimuth and the other set of adjacent runways numbered to the next nearest one-tenth of the magnetic azimuth provided that, when the above rule would give a single digit number, it shall be preceded by a zero.

(6) In the case of parallel runways, each runway designation number shall be supplemented by a letter as follows, in the order shown from left to right when viewed from the direction of approach:

- (a) for two parallel runways: “L” “R”;
- (b) for three parallel runways: “L” “C” “R”;
- (c) for four parallel runways: “L” “R” “L” “R”;
- (d) for five parallel runways: “L” “C” “R” “L” “R” or “L” “R” “L” “C” “R”; and
- (e) for six parallel runways: “L” “C” “R” “L” “C” “R”.

(7) The numbers and letters shall be in the form and proportion shown in Figure 5-3. The dimensions shall be not less than those shown in Figure 5-3, but where the numbers are incorporated in the threshold marking, larger dimensions shall be used in order to fill adequately the gap between the stripes of the threshold marking.

Runway
centreline
marking

158.-(1) A runway centre line marking shall be provided on a paved runway and it shall be located along the centre line of the runway between the runway designation markings as shown in Ninth Schedule, except when interrupted in compliance with regulation 124.

- (2) A runway centre line marking shall consist of a line of uniformly spaced stripes and gaps and the length of:
 - (a) a stripe and the gap shall be not less than 50 m or more than 75 m; and
 - (b) each stripe shall be at least equal to the length of the gap or 30 m, whichever is greater.
- (3) The width of the stripes shall be not less than:
 - (a) 0.90 m on precision approach category II and III runways;
 - (b) 0.45 m on non-precision approach runways where the code number is 3 or 4, and precision approach category I runways; and
 - (c) 0.30 m on non-precision approach runways where the code number is 1 or 2, and on non-instrument runways.
- (4) The stripes of the threshold marking shall commence 6 m from the threshold as illustrated in the Ninth Schedule of these Regulations.

Threshold
marking

159.-(1) A threshold marking shall be provided at the threshold of a paved instrument runway, and of a paved non-instrument runway where the code number is 3 or 4 and the runway is intended for use by international commercial air transport.

(2) A threshold marking shall be provided at the threshold of a paved non-instrument runway where the code number is 3 or 4 and the runway is intended for use by other than international commercial air transport.

(3) A threshold marking shall be provided, so far as practicable, at the thresholds of an unpaved runway

(4) The stripes of the threshold marking shall commence 6 m from the threshold.

(5) (a) A runway threshold marking shall consist of a pattern of longitudinal stripes of uniform dimensions disposed symmetrically about the centre line of a runway as shown in Figure 5-2 (A) and (B) for a runway width of 45 m.

(b) The number of stripes shall be in accordance with the runway width as follows:

Runway width	Number of stripes
18 m	4
23 m	6
30 m	8
45 m	12
60 m	16,

except that on non-precision approach and non-instrument runways 45 m or greater in width, they may be as shown in Figure 5-2 (C).

(6) (a) The stripes required by sub-regulations (4) and (5) shall extend laterally to within 3 m of the edge of a runway or to a distance of 27 m on either side of a runway centre line, whichever results in the smaller lateral distance;

(b) Where a runway designation marking is placed within a threshold marking there shall be a minimum of three stripes on each side of the centre line of the runway;

(c) Where a runway designation marking is placed above a threshold marking, the stripes shall be continued across the runway;

(d) The stripes shall be at least 30 m long and approximately 1.80 m wide with spacing of approximately 1.80 m between them except that, where the stripes are continued across a runway, a double spacing shall be used to separate the two stripes nearest the centre line of the runway, and in the case where the designation marking is included within the threshold marking this spacing shall be 22.5 m.

(7) Where a threshold is displaced from the extremity of a runway or where the extremity of a runway is not square with the runway centre line, a transverse stripe as prescribed by the Authority.

(8) A transverse stripe shall be not less than 1.80 m wide and where a runway threshold is permanently displaced, arrows conforming to Figure 5-4 (B) shall be provided on the portion of the runway before the displaced threshold..

(9) When a runway threshold is temporarily displaced from the normal position, it shall be marked as prescribed by the Authority.

Aiming
point
marking

160.-(1) An aiming point marking shall be provided at each approach end of a paved instrument runway where the code number is 2, 3 or 4 as illustrated in Ninth Schedule of these Regulations.

(2) An aiming point marking shall be provided at each approach end of:

- (a) a paved non-instrument runway where the code number is 3 or 4,
- (b) a paved instrument runway where the code number is 1, when additional conspicuity of the aiming point is desirable.

(3) The aiming point marking shall commence no closer to the threshold than the distance indicated in the appropriate column of Table 5-1 except that, on a runway equipped with a visual approach slope indicator system, the beginning of the marking shall be coincident with the visual approach slope origin.

(4) An aiming point marking shall consist of two conspicuous stripes. The dimensions of the stripes and the lateral spacing between their inner sides shall be in accordance with the provisions of the appropriate column of Table 5-1. Where a touchdown zone marking is provided, the lateral spacing between the markings shall be the same as that of the touch-down zone marking.

Touchdown
zone
marking

161.-(1) A touchdown zone marking shall be provided in the touchdown zone of a paved precision approach runway where the code number is 2, 3 or 4.

(2) A touchdown zone marking shall be provided in the touchdown zone of a paved non-precision approach or non-instrument runway where the code number is 3 or 4 and additional conspicuity of the touchdown zone is desirable as prescribed in the Ninth Schedule of these regulations.

(3) A touchdown zone marking shall consist of pairs of rectangular markings symmetrically disposed about the runway centre line with the number of such pairs related to the landing distance available and, where the marking is to be displayed at both the approach directions of a runway:

Landing distance available or the Pair(s) of markings

distance between thresholds

Less than 500 m

1

500m up to but not including 1 200 m

2

1 200m up to but not including 1 500 m

3

1 500m up to but not including 2 400 m

4

2 400m or more

6

(4) On a non-precision approach runway where the code number is 2, an additional pair of touchdown zone marking stripes shall be provided 150 m beyond the beginning of the aiming point marking.

Runway
side stripe
marking

162.-(1) A runway side stripe marking shall be provided between the thresholds of a paved runway where there is a lack of contrast between the runway edges and the shoulders or the surrounding terrain.

(2) A runway side stripe marking shall be provided on a precision approach runway irrespective of the contrast between the runway edges and the shoulders or the surrounding terrain.

(3) A runway side stripe marking shall consist of two stripes, one placed along each edge of the runway with the outer edge of each stripe approximately on the edge of the runway, except that, where the runway is greater than 60 m in width, the stripes shall be located 30 m from the runway centre line.

(4) Where a runway turn pad is provided, the runway side stripe marking shall be continued between the runway and the runway turn pad.

(5) A runway side stripe shall have an overall width of at least 0.5 m on runways 30 m or more in width and at least 0.45 m on narrower runways.

Taxiway
Centreline
marking

163.-(1) Taxiway centre line marking shall be provided on a paved taxiway and apron where the code number is 3 or 4 in such a way as to provide continuous guidance between the runway centre line and aircraft stands.

(2) Taxiway centre line marking shall be provided on a paved taxiway and apron where the code number is 1 or 2 in such a way as to provide continuous guidance between the runway centre line and aircraft stands.

(3) Taxiway centre line marking shall be provided on a paved runway when the runway is part of a standard taxi-route and:

- (a) there is no runway centre line marking; or
- (b) where the taxiway centre line is not coincident with the runway centre line.

(4) Where it is necessary to denote the proximity of a runway holding position, enhanced taxiway centre line marking shall be provided and where provided, enhanced taxiway centre line marking shall be installed at each taxiway/runway intersections.

(5) (a) On a straight section of a taxiway, the taxiway centre line marking shall be located along the taxiway centre line.

(b) On a taxiway curve the marking shall continue from the straight portion of the taxiway at a constant distance from the outside edge of the curve.

(6) (a) At an intersection of a taxi-way with a runway where the taxiway serves as an exit from the runway, the taxiway centre line marking shall be curved into the runway centre line marking.

(b) The taxiway centre line marking shall be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.

(7) Where taxiway centre line marking is provided on a runway, the marking shall be located on the centre line of the designated taxiway

(8) (a) On a straight section of a taxiway the taxiway centre line marking shall be located along the taxiway centre line.

(b) On a taxiway curve the marking shall continue from the straight portion of the taxiway at a constant distance from the outside edge of the curve.

(9) (a) At an intersection of a taxi-way with a runway where the taxiway serves as an exit from the runway, the taxiway centre line marking shall be curved into the runway centre line marking.

(b) The taxiway centre line marking shall be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.

- (10) Where provided:
- (a) An enhanced taxiway centre line marking shall extend from the runway-holding position to a distance of up to 47m in the direction of travel away from the runway;
 - (b) If the enhanced taxiway centre line marking intersects another runway-holding position marking, such as for a precision approach category II or III runway that is located within 47 m of the first runway-holding position marking, the enhanced taxiway centre line marking shall be interrupted 0.9 m prior to and after the intersected runway-holding position marking.
 - (c) The enhanced taxiway centre line marking shall continue beyond the intersected runway-holding position marking for at least three dashed line segments or 47 m from start to finish, whichever is greater.
 - (d) If the enhanced taxiway centre line marking continues through a taxiway/taxiway intersection that is located within 47 m of the runway-holding position marking, the enhanced taxiway centre line marking shall be interrupted 1.5 m prior to and after the point where the intersected taxiway centre line crosses the enhanced taxiway centre line.
 - (e) The enhanced taxiway centre line marking shall continue beyond the taxiway or taxiway intersection for at least three dashed line segments or 47 m from start to finish, whichever is greater.
 - (f) Where two taxiway centre lines converge at or before the runway-holding position marking, the inner dashed line shall not be less than 3 m in length.

- (g) Where there are two opposing runway-holding position markings and the distance between the markings is less than 94 m, the enhanced taxiway centre line markings shall extend over this entire distance.
- (h) The enhanced taxiway centre line markings shall not extend beyond either runway-holding position marking.
- (11) A taxiway centre line marking shall be at least 15cm in width and continuous in length except where it intersects with a runway-holding position marking or an intermediate holding position marking.

Runway
turn pad
marking

164.-(1) Where a runway turn pad is provided:

- (a) a runway turn pad marking shall be provided for continuous guidance to enable an aeroplane complete a 180-degree turn and align with runway centre line;
 - (b) the runway turn pad marking shall be curved from the runway centre line into the turn pad;
 - (c) the radius of the curve shall be compatible with the manoeuvring capability and normal taxiing speeds of the aeroplanes for which the runway turn pad is intended; and
- (2) The intersection angle of the runway turn pad marking with the runway centre line shall not be greater than 30 degrees.
- (3) The runway turn pad marking shall be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.
- (4) A runway turn pad marking shall guide the aeroplane in such a way as to allow a straight portion of taxiing before the point where a 180-degree turn is to be made.
- (5) The straight portion of the runway turn pad marking shall be parallel to the outer edge of the runway turn pad.

(6) The design of the curve allowing the aeroplane to negotiate a 180-degree turn shall be based on a nose wheel steering angle not exceeding 45 degrees.

Runway-
holding
position
marking
and signs

165.-(1) A runway-holding position marking shall be displayed along a runway-holding position as indicated in the Ninth Schedule of these regulations.

(2) The runway-holding position marking displayed at a runway-holding position established in accordance as prescribed by the Authority.

(3) Where increased conspicuity of the runway-holding position is required, the runway-holding position marking shall be done as appropriate.

(4) Where a pattern B runway-holding position marking is located on an area where it would exceed 60 m in length, the term "CAT II" or "CAT III" as appropriate shall be marked on the surface at the ends of the runway-holding position marking and at equal intervals of 45 m maximum between successive marks.

(5) The letters shall be not less than 1.8 m high and shall be placed not more than 0.5 m beyond the holding position marking.

(6) The runway-holding position marking displayed at a runway/runway intersection shall be perpendicular to the centre line of the runway forming part of the standard taxi-route.

Intermedia
te
holding
position
marking

166.-(1) An intermediate holding position marking shall be displayed along an intermediate holding position.

(2) Where an intermediate holding position marking is displayed at an intersection of two paved taxiways, it shall be –

(a) located across the taxiway at sufficient distance from the near edge of the intersecting taxiway to ensure safe clearance between taxiing aircraft;

(b) coincident with a stop bar or intermediate holding position lights, where provided.

(3) An intermediate holding position marking shall consist of a single broken line

VOR
aerodrome
checkpoint
marking
and
sign

167.-(1) An operator shall ensure that when a VOR aerodrome checkpoint is established, and indicated by a VOR aerodrome checkpoint marking and sign.

(2) A VOR aerodrome checkpoint marking shall be centred on the spot at which an aircraft is to be parked to receive the correct VOR signal and shall consist of a circle 6 m in diameter and have a line width of 15 cm.

(3) A VOR aerodrome checkpoint sign shall be located as near as possible to the checkpoint and the inscriptions visible from the cockpit of an aircraft properly positioned on the VOR aerodrome checkpoint marking.

(4) A VOR aerodrome checkpoint sign shall consist of an inscription in black on a yellow background.

Aircraft
stand
markings
and
identification
signs

168. An operator shall provide aircraft stand markings and identification signs for designated parking positions on a paved apron in accordance with these Regulations.

Apron
safety
lines

169. An operator shall provide apron safety lines on a paved apron as required by the parking configuration and ground facilities and in accordance with these Regulations.

Road-
holding
positions
markings
and signs

170.-(1) An operator shall provide road-holding position markings and signs at all road entrances to a runway.

(2) The road-holding position markings provided under sub-regulation (1) shall be located across the road at all the holding positions.

(3) The road-holding position marking shall be accordance with these Regulations.

(4) A road holding position sign shall be provided at all road entrances to a runway.

(5) A road holding position sign shall consist of an inscription in white on a red background.

(6) A road holding position sign shall consist of an inscription in white on a red background.

(7) The inscription on a road holding position shall be in the national language, be in conformity with local traffic regulation and include the following:

- (a) a requirement to stop; and
- (b) where appropriate a requirement to obtain ATC clearance and location designator.

(8) A road holding position sign intended for night use shall be retro reflective or illuminated.

Mandatory

instruction markings and signs

171.-(1) An operator shall provide a mandatory instruction markings and a signs to identify a location beyond which a taxiing aircraft or vehicle shall not proceed, unless authorized by the aerodrome control tower.

(2) Where it is impracticable to install a mandatory instruction marking and a sign in accordance with sub-regulation (1), a mandatory instruction marking or sign shall be provided on the surface of the pavement as prescribed in the Ninth Schedule and Tenth Schedule of these Regulations.

(3) The location and characteristics of the mandatory instruction marking or sign shall be in accordance with these Regulations.

(4) An operator shall provide signs to convey mandatory instructions and information on a specific location or destination on a movement area or to provide surface movement guidance and control.

(5) 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.

(6) Mandatory instruction signs shall include runway designation signs, runway precision approach category I, II or III, holding position signs, runway-holding position signs, road-holding position signs and NO ENTRY signs.

Information markings and signs

172.-(1) An operator shall install information marking where an information sign is required shall be as prescribed in the Ninth Schedule and Tenth Schedule of these Regulations.

- (2) An information marking shall consist of:
 - (a) an inscription in yellow upon a black background, when it replaces or supplements a location sign; and
 - (b) an inscription in black upon a yellow background, when it replaces or supplements a direction or destination sign.
- (3) Where there is insufficient contrast between the marking background and the pavement surface, the marking shall include:
 - (a) a black border where the inscriptions are in black; and
 - (b) a yellow border where the inscriptions are in yellow.
- (4) An information sign shall be provided where there is an operational need to identify by a sign, a specific location, or routing direction or destination information.
- (5) Information signs shall include direction signs, location signs, destination signs, runway exit signs, runway vacated signs and intersection take-off signs
- (6) Where an information sign would normally be installed and is impractical to install, as determined by the Authority, an information marking shall be displayed on the surface of the pavement.
- (7) An information sign other than a location sign shall not be collocated with a mandatory instruction sign
- (8) An information sign other than a location sign shall consist of an inscription in black on a yellow background.

Lights
which
may
endanger
the safety
of
aircraft

173.-(1) A person shall not exhibit a light in the vicinity of an aerodrome which, by its glare, endangers the safety of aircraft arriving or departing from the aerodrome.

(2) A non-aeronautical ground light near an aerodrome which might endanger the safety of aircraft shall be extinguished, screened or otherwise modified so as to eliminate the source of danger.

(3) Where a light appears to the Authority to be capable of endangering the safety of aircraft as described in sub-regulation (1), the Authority may direct the owner of the place where the light is exhibited or the person having charge of light to extinguish and to prevent in the future, the exhibition of the light within the period specified.

(4) Where a light is or may be visible from any waters within the area of a general lighthouse authority, the power of the Authority under this regulation shall not be exercised except with the consent of that lighthouse authority.

Laser
emissions
which
may
endanger
the
safety of
aircraft

174.-(1) A person shall not use laser emissions which are likely to endanger the safety of aircraft.

(2) To protect the safety of aircraft against the hazardous effects of laser emitters, the following protected zones shall be established around aerodromes:

- (a) a laser-beam free flight zone (LFFZ);
- (b) a laser-beam critical flights zone (LCFZ); and
- (c) a laser-beam sensitive flight zone.

(3) The flight zones shall be established in accordance with requirements prescribed by the Authority.

(4) Sub-regulations (2) and (3) shall not apply to aerodromes in categories C, D, and E unless deemed necessary by the Authority.

Lights
which
may cause
confusion

175. A non-aeronautical ground light which, by reason of its intensity, configuration or colour, might prevent, or cause confusion in, the clear interpretation of aeronautical ground lights shall be extinguished, screened or otherwise modified so as to eliminate such a possibility and particular attention shall be directed to a non-aeronautical ground light visible from the air within the areas described as:

- (a) Instrument runway — code number 4 within the areas before the threshold and beyond the end of the runway extending at least 4 500 m in length from the threshold and runway end and 750 m either side of the extended runway centre line in width;
 - (b) Instrument runway — code number 2 or 3 except that the length shall be at least 3 000 m;
 - (c) Instrument runway — code number 1; and
 - (d) non-instrument runway,
- within the approach area.

Elevated
approach
lights

176.-(1) Elevated approach lights and their supporting structures shall be frangible except that, in that portion of the approach lighting system beyond 300 m from the threshold:

- (a) where the height of a supporting structure exceeds 12 m, the frangibility requirement shall apply to the top 12 m only; and
 - (b) where a supporting structure is surrounded by non-frangible objects, only that part of the structure that extends above the surrounding objects shall be frangible.
- (2) When an approach light fixture or supporting structure is not in itself sufficiently conspicuous, it shall be suitably marked.

Elevated
lights

177. Elevated runway, stop-way and taxiway lights shall be frangible and their height shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

Surface
lights

178.-(1) Light fixtures inset in the surface of runways, stop-ways, taxiways and aprons shall be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the lights themselves.

(2) The temperature produced by conduction or radiation at the interface between an installed inset light and an aircraft tire shall not exceed 160°C during a 10-minute period of exposure.

Light
intensity
and
control

179.-(1) The intensity of runway lighting shall be adequate for the minimum conditions of visibility and ambient light in which use of the runway is intended, and compatible with that of the nearest section of the approach lighting system when provided.

(2) Where a high-intensity lighting system is provided, a suitable intensity control shall be incorporated to allow for adjustment of the light intensity to meet the prevailing conditions.

(3) Separate intensity controls or other suitable methods shall be provided to ensure that the following systems, when installed, can be operated at compatible intensities:

- (a) approach lighting system;
- (b) runway edge lights;
- (c) runway threshold lights;
- (d) runway end lights;
- (e) runway centre line lights;
- (f) runway touchdown zone lights; and
- (g) taxiway centre line lights.

Emergenc
y
lighting

180.-(1) At an aerodrome provided with runway lighting and without a secondary power supply, sufficient emergency lights shall be conveniently available for installation on at least the primary runway in the event of failure of the normal lighting system.

(2) When installed on a runway the emergency lights shall, as a minimum, conform to the configuration required for a non-instrument runway.

(3) The colour of the emergency lights shall conform to the colour requirements for runway lighting, except that, where the provision of coloured lights at the threshold and the runway end is not practicable, all lights may be variable white or as close to variable white as practicable.

Aeronautical
beacons

181.-(1) Where operationally necessary an aerodrome beacon or an identification beacon shall be provided at each aerodrome intended for use at night.

(2) The operational requirement shall be determined having regard to the requirements of the air traffic using the aerodrome, the conspicuity of the aerodrome features in relation to its surroundings and the installation of other visual and non-visual aids useful in locating the aerodrome.

Aerodrome
beacons

182.-(1) An aerodrome beacon shall be provided at an aerodrome intended for use at night if one or more of the following conditions exist:

- (a) aircraft navigate predominantly by visual means;
- (b) reduced visibilities are frequent; or
- (c) it is difficult to locate the aerodrome from the air due to surrounding lights or terrain.

(2) The aerodrome beacon shall be located on or adjacent to the aerodrome in an area of low ambient background lighting.

(3) The location of the beacon shall be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

(4) The aerodrome beacon shall show either coloured flashes alternating with white flashes, or white flashes only and. the frequency of total flashes shall be from 20 to 30 per minute.

(5) Where used, the coloured flashes emitted by beacons at land aerodromes shall be green and coloured flashes emitted by beacons at water aerodromes if used shall be yellow.

(6) In the case of a combined water and land aerodrome, coloured flashes, if used, shall have the colour characteristics of whichever section of the aerodrome is designated as the principal facility

(7) The light from the beacon shall show at all angles of azimuth.

(8) The vertical light distribution shall extend upwards from an elevation of not more than 1° to an elevation determined by the Authority to be sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used and the effective intensity of the flash shall be not less than 2 000 cd.

Identificat
ion
beacon

183.-(1) An identification beacon shall be provided at an aerodrome which is intended for use at night and cannot be easily identified from the air by other means.

(2) The identification beacon shall be located on the aerodrome in an area of low ambient background lighting.

(3) The location of the beacon shall be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

(4) An identification beacon at a land aerodrome shall show at all angles of azimuth.

(5) The vertical light distribution shall extend upwards from an elevation of not more than 1° to an elevation determined by the Authority to be sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used and the effective intensity of the flash shall be not less than 2 000 cd.

(6) An identification beacon shall show flashing-green at a land aerodrome and flashing-yellow at a water aerodrome.

(7) The identification characters shall be transmitted in the International Morse Code.

(8) Subject to subregulation (7), the speed of transmission shall be between six and eight words per minute, the corresponding range of duration of the Morse dots being from 0.15 to 0.2 seconds per dot.

Simple
approach
lighting
system

184.-(1) A simple approach lighting system shall consist of a row of lights on the extended centre line of the runway extending, whenever possible, over a distance of not less than 420 m from the threshold with a row of lights forming a crossbar 18 m or 30 m in length at a distance of 300 m from the threshold.

(2) The lights forming the crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights.

(3) The lights of the crossbar shall be spaced so as to produce a linear effect, except that, when a crossbar of 30 m is used, gaps may be left on each side of the centre line and shall be kept to a minimum to meet local requirements and each shall not exceed 6 m.

(3) The lights forming the centre line shall be placed at longitudinal intervals of 60 m, except that, when it is desired to improve the guidance, an interval of 30 m may be used.

(a) The innermost light shall be located either 60 m or 30 m from the threshold, depending on the longitudinal interval selected for the centre line lights.

(4) If it is not physically possible to provide a centre line extending for a distance of 420 m from the threshold, it shall be extended to 300 m so as to include the crossbar.

(a) If this is not possible, the centre line lights shall be extended as far as practicable, and each centre line light shall then consist of a barrette at least 3 m in length.

(b) Subject to the approach system having a crossbar at 300 m from the threshold, an additional crossbar may be provided at 150 m from the threshold

(5) The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(a) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(b) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching aircraft.

(6) Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

(7) The lights of a simple approach lighting system shall be fixed lights and the colour of the lights shall be such as to ensure that the system is readily distinguishable from other aeronautical ground lights, and from extraneous lighting if present. Each centre line light shall consist of either:

(a) a single source; or

(b) a barrette at least 3 m in length.

(8) Where provided for a non-instrument runway, the lights shall show at all angles in azimuth necessary to a pilot on base leg and final approach.

(a) The intensity of the lights shall be adequate for all conditions of visibility and ambient light for which the system has been provided.

- (9)
 - (a) Where provided for a non-precision approach runway, the lights shall show at all angles in azimuth necessary to the pilot of an aircraft which on final approach does not deviate by an abnormal amount from the path defined by the non-visual aid.
 - (b) The lights shall be designed to provide guidance during both day and night in the most adverse conditions of visibility and ambient light for which it is intended that the system shall remain usable.

Precision
approach
category I
lighting
system

185.-(1) A precision approach category I lighting system shall consist of a row of lights on the extended centre line of the runway extending, wherever possible, over a distance of 500 m from the runway threshold with a row of lights forming a crossbar 30 m in length at a distance of 300 m from the runway threshold.

(2) (a) The lights forming the crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights.

(b) The lights of the crossbar shall be spaced so as to produce a linear effect, except that gaps may be left on each side of the centre line.

(c) These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6 m

(3) The lights forming the centre line shall be placed at longitudinal intervals of 30 m with the innermost light located 30 m from the threshold.

(4) The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

- (a) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and
- (b) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching aircraft.

(5) Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly

(6) The centre line and crossbar lights of a precision approach category I lighting system shall be fixed lights showing variable white. Each centre line light position shall consist of either:

- (a) a single light source in the innermost 300 m of the centre line, two light sources in the central 300 m of the centre line and three light sources in the outer 300 m of the centre line to provide distance information; or
- (b) a barrette.

(7) Where the serviceability level of the approach lights specified as a maintenance objective can be demonstrated, each centre line light position may consist of either:

- (a) a single light source; or
- (b) a barrette.

(8) The barrettes shall be at least 4 m in length and when they are composed of lights approximating to point sources, the lights shall be uniformly spaced at intervals of not more than 1.5 m.

(9) If the centre line consists of barrettes as described in above, each barrette shall be supplemented by a capacitor discharge light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions

(10) (a) Each capacitor discharge light shall be flashed twice a second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system.

(b) The design of the electrical circuit shall be such that these lights can be operated independently of the other lights of the approach lighting system

(11) (a) If the centre line consists of lights as described in above additional crossbars of lights to the crossbar provided at 300 m from the threshold shall be provided at 150 m, 450 m, 600 m and 750 m from the threshold.

(b) The lights forming each crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights.

(c) The lights shall be spaced so as to produce a linear effect, except that gaps may be left on each side of the centre line.

(d) These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6 m.

Precision
approach
category
II
and III
lighting
system

186.-(1) (a) The approach lighting system shall consist of a row of lights on the extended centre line of the runway, extending, wherever possible, over a distance of 900 m from the runway threshold.

(b) In addition, the system shall have two side rows of lights, extending 270 m from the threshold, and two crossbars, one at 150 m and one at 300 m from the threshold, all as shown in Figure 5-14.

(c) Where the serviceability level of the approach lights specified as maintenance objectives in paragraph 10.4.7 can be demonstrated, the system may have two side rows of lights, extending 240 m from the threshold, and two crossbars, one at 150 m and one at 300 m from the threshold

(2) The lights forming the centre line shall be placed at longitudinal intervals of 30 m with the innermost lights located 30 m from the threshold.

(3) (a) The lights forming the side rows shall be placed on each side of the centre line, at a longitudinal spacing equal to that of the centre line lights and with the first light located 30 m from the threshold.

(b) Where the serviceability level of the approach lights specified as maintenance objectives above, can be demonstrated, lights forming the side rows may be placed on each side of the centre line, at a longitudinal spacing of 60 m with the first light located 60 m from the threshold.

(c) The lateral spacing (or gauge) between the innermost lights of the side rows shall be not less than 18 m nor more than 22.5 m, and preferably 18 m, but in any event shall be equal to that of the touchdown zone lights.

(4) The crossbar provided at 150 m from the threshold shall fill in the gaps between the centre line and side row lights

(5) The crossbar provided at 300 m from the threshold shall extend on both sides of the centre line lights to a distance of 15 m from the centre line

(6) If the centre line beyond a distance of 300 m from the threshold consists of lights as described above, additional crossbars of lights shall be provided at 450 m, 600 m and 750 m from the threshold.

(7) Where the additional crossbars described in these regulations are incorporated in the system, the outer ends of these crossbars shall lie on two straight lines that either are parallel to the centre line or converge to meet the runway centre line 300 m from the threshold.

(8) The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

- (a) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and
- (b) no light other than a light located within the central part of a crossbar or a centre line barrette not their extremities shall be screened from an approaching aircraft.

(9) Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

(10) The centre line of a precision approach category II and III lighting system for the first 300 m from the threshold shall consist of barrettes showing variable white, except that, where the threshold is displaced 300 m or more, the centre line may consist of single light sources showing variable white.

(11) Where the serviceability level of the approach lights specified as maintenance objectives in these regulations can be demonstrated, the centre line of a precision approach category II and III lighting system for the first 300 m from the threshold may consist of either:

- (a) barrettes, where the centre line beyond 300 m from the threshold consists of barrettes as above; or
- (b) alternate single light sources and barrettes, where the centre line beyond 300 m from the threshold consists of single light sources as described in above with the innermost single light source located 30 m and the innermost barrette located 60 m from the threshold; or
- (c) single light sources where the threshold is displaced 300 m or more; all of which shall show variable white.

(12) Beyond 300 m from the threshold each centre line light position shall consist of either:

- (a) a barrette as used on the inner 300 m; or
- (b) two light sources in the central 300 m of the centre line and three light sources in the outer 300 m of the centre line;

all of which shall show variable white.

(13) Where the serviceability level of the approach lights specified as maintenance objectives above can be demonstrated, beyond 300 m from the threshold each centre line light position may consist of either:

- (a) a barrette; or
- (b) a single light source,

all of which shall show variable white

(14) The barrettes shall be at least 4 m in length and when composed of lights approximating to point sources, the lights shall be uniformly spaced at intervals of not more than 1.5 m.

(15) If the centre line beyond 300 m from the threshold consists of barrettes as described above, each barrette beyond 300 m shall be supplemented by a capacitor discharge light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions.

(16) Each capacitor discharge light shall be flashed twice a second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system and the design of the electrical circuit shall be such that these lights can be operated independently of the other lights of the approach lighting system.

(17) The side row shall consist of barrettes showing red and the length of a side row barrette and the spacing of its lights shall be equal to those of the touchdown zone light barrettes.

(18) The lights forming the crossbars shall be fixed lights showing variable white and the lights shall be uniformly spaced at intervals of not more than 2.7 m.

(19) The intensity of the red lights shall be compatible with the intensity of the white lights

Visual
approach
slope
indicator
systems

187. A visual approach slope indicator system shall be provided to serve the approach to a runway whether or not the runway is served by other visual approach aids or by non-visual aids, where one or more of the following conditions exist:

- (a) the runway is used by turbojet or other aeroplanes with similar approach guidance requirements;
- (b) the pilot of any type of aeroplane may have difficulty in judging the approach due to:
 - (i) inadequate visual guidance such as is experienced during an approach over water or featureless terrain by day or in the absence of sufficient extraneous lights in the approach area by night,
 - (ii) or misleading information such as is produced by deceptive surrounding terrain or runway slopes;
 - (iii) the presence of objects in the approach area may involve serious hazard if an aeroplane descends below the normal approach path, particularly if there are no non-visual or other visual aids to give warning of such objects;
- (c) physical conditions at either end of the runway present a serious hazard in the event of an aeroplane undershooting or overrunning the runway; and
- (d) terrain or prevalent meteorological conditions are such that the aeroplane may be subjected to unusual turbulence during approach.

Approach
slope and

188.-(1) The approach slope shall be appropriate for use by the aeroplanes using the approach.

elevation
setting of
light
beams

(2) When the runway on which a T-VASIS is provided is equipped with an ILS and/or MLS, the siting and elevations of the light units shall be such that the visual approach slope conforms as closely as possible with the glide path of the ILS and/or the minimum glide path of the MLS, as appropriate.

(3) The elevation of the beams of the wing bar light units on both sides of the runway shall be the same.

(4) The elevation of the top of the beam of the fly-up light unit nearest to each wing bar, and that of the bottom of the beam of the fly-down light unit nearest to each wing bar, shall be equal and shall correspond to the approach slope.

(5) The cut-off angle of the top of the beams of successive fly-up light units shall decrease by 5 minutes of arc in angle of elevation at each successive unit away from the wing bar.

(6) The cut-in angle of the bottom of the beam of the fly-down light units shall increase by 7 minutes of arc at each successive unit away from the wing bar as prescribed by the Authority.

(7) The elevation setting of the top of the red light beams of the wing bar and fly-up light units shall be such that, during an approach, the pilot of an aeroplane to whom the wing bar and three fly-up light units are visible would clear all objects in the approach area by a safe margin if any such light did not appear red.

(8) The azimuth spread of the light beam shall be suitably restricted where an object located outside the obstacle protection surface of the system, but within the lateral limits of its light beam, is found to extend above the plane of the obstacle protection surface and an aeronautical study indicates that the object could adversely affect the safety of operations.

(9) The extent of the restriction shall be such that the object remains outside the confines of the light beam.

PAPI
and
APAPI

189.-(1) The PAPI system shall consist of a wing bar of 4 sharp transition multi-lamp or paired single lamp units equally spaced and the system shall be located on the left side of the runway unless it is physically impracticable to do so.

(2) The APAPI system shall consist of a wing bar of 2 sharp transition multi-lamp or paired single lamp units and the system shall be located on the left side of the runway unless it is physically impracticable to do so.

(3) The wing bar of a PAPI shall be constructed and arranged in such a manner that a pilot making an approach will:

- (a) when on or close to the approach slope, see the two units nearest the runway as red and the two units farthest from the runway as white;
- (b) when above the approach slope, see the one unit nearest the runway as red and the three units farthest from the runway as white; and when further above the approach slope, see all the units as white; and
- (c) when below the approach slope, see the three units nearest the runway as red and the unit farthest from the runway as white; and when further below the approach slope, see all the units as red.

(4) The wing bar of an APAPI shall be constructed and arranged in such a manner that a pilot making an approach will:

- (a) when on or close to the approach slope, see the unit nearer the runway as red and the unit farther from the runway as white;
- (b) when above the approach slope, see both the units as white;
- (c) when below the approach slope, see both the units as red.
- (d) located as in the basic configuration as prescribed by the Authority, subject to the installation tolerances given therein;

- (e) the units forming a wing bar shall be mounted so as to appear to the pilot of an approaching aircraft to be substantially in a horizontal line;
- (f) mounted as low as possible and shall be frangible;
- (g) suitable for both day and night operations.
- (5) The colour transition from red to white in the vertical plane shall be such as to appear to an observer, at a distance of not less than 300 m, to occur within a vertical angle of not more than 3°.
- (6) At full intensity the red light shall have a Y coordinate not exceeding 0.320.
- (7) Suitable intensity control shall be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.
- (8) The light unit shall be
 - (a) capable of adjustment in elevation so that the lower limit of the white part of the beam may be fixed at any desired angle of elevation between 1°30' and at least 4°30' above the horizontal.
 - (b) designed that deposits of condensation, dirt, on optically transmitting or reflecting surfaces shall interfere to the least possible extent with the light signals and shall not affect the contrast between the red and white signals and the elevation of the transition sector.

Approach
slope and
elevation
setting of
light units

190.-(1) When the runway is equipped with an ILS and/or MLS, the siting and the angle of elevation of the light units shall be such that the visual approach slope conforms as closely as possible with the glide path of the ILS or the minimum glide path of the MLS, as appropriate.

(2) The angle of elevation settings of the light units in a PAPI wing bar shall be such that, during an approach, the pilot of an aeroplane observing a signal of one white and three reds will clear all objects in the approach area by a safe margin.

(3) The angle of elevation settings of the light units in an APAPI wing bar shall be such that, during an approach, the pilot of an aeroplane observing the lowest on slope signal, one white and one red, will clear all objects in the approach area by a safe margin.

(4) The azimuth spread of the light beam shall be suitably restricted where an object located outside the obstacle protection surface of the PAPI or APAPI system, but within the lateral limits of its light beam, is found to extend above the plane of the obstacle protection surface and an aeronautical study indicates that the object could adversely affect the safety of operations.

(5) The extent of the restriction shall be such that the object remains outside the confines of the light beam.

(6) Where wing bars are installed on each side of the runway to provide roll guidance, corresponding units shall be set at the same angle so that the signals of each wing bar change symmetrically at the same time.

Obstacle
protection
surface for
AVASIS,
T-VASIS
and PAPI
and
APAPI

191.-(1) An obstacle protection surface shall be established when it is intended to provide a visual approach slope indicator system.

(2) The characteristics of the obstacle protection surface, on origin, divergence, length and slope, shall as prescribed by the Authority.

(3) New objects or extensions of existing objects shall not be permitted above an obstacle protection surface except when, in the opinion of the Authority, the new object or extension would be shielded by an existing immovable object.

(4) Existing objects above an obstacle protection surface shall be removed except when, in the opinion of the Authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of operations of aeroplanes.

(5) Where an aeronautical study indicates that an existing object extending above an obstacle protection surface could adversely affect the safety of operations of aeroplanes one or more of the following measures shall be taken:

- (a) suitably raise the approach slope of the system;
- (b) reduce the azimuth spread of the system so that the object is outside the confines of the beam;
- (c) displace the axis of the system and its associated obstacle protection surface by no more than 5°;
- (d) suitably displace the threshold; and
- (e) where d) is found to be impracticable, suitably displace the system upwind of the threshold to provide an increase in threshold crossing height equal to the height of the object penetration.

Circling
guidance
lights

192.-(1) Circling guidance lights shall be provided when existing approach and runway lighting systems do not satisfactorily permit identification of the runway and/or approach area to a circling aircraft in the conditions for which it is intended the runway be used for circling approaches.

(2) The location and number of circling guidance lights shall be adequate to enable a pilot, to:

- (a) join the downwind leg or align and adjust the aircraft's track to the runway at a required distance from it and to distinguish the threshold in passing; and
- (b) keep in sight the runway threshold or other features which will make it possible to judge the turn on to base leg and final approach, taking into account the guidance provided by other visual aids.

- (3) Circling guidance lights shall consist of:
 - (a) lights indicating the extended centre line of the runway and/or parts of any approach lighting system;
 - (b) lights indicating the position of the runway threshold;
 - (c) lights indicating the direction or location of the runway; or
 - (d) or a combination of such lights as is appropriate to the runway under consideration.
- (4) Circling guidance lights shall be fixed or flashing lights of an intensity and beam spread adequate for the conditions of visibility and ambient light in which it is intended to make visual circling approaches.
- (5) The flashing lights shall be-
 - (a) white, and the steady lights either white or gaseous discharge lights;
 - (b) designed and be installed in such a manner that they will not dazzle or confuse a pilot when approaching to land, taking off or taxiing.

Runway
lead-in
lighting
systems

193.-(1) A runway lead-in lighting system shall be provided at an aerodrome where it is desired to provide visual guidance along a specific approach path, for reasons such as avoiding hazardous terrain or for purposes of noise abatement.

- (2) A runway lead-in lighting system shall-
 - (a) consist of groups of lights positioned so as to define the desired approach path and so that one group may be sighted from the preceding group; and
 - (b) extend from a point as determined by the Authority, up to a point where the approach lighting system, if provided, or the runway or the runway lighting system is in view.
- (3) The interval between adjacent groups shall not exceed approximately 1600 m.
- (4) Each group of lights of a runway lead-in lighting system shall consist of

- (a) at least three flashing lights in a linear or cluster configuration;
- (b) flashing lights which are white, and the steady burning lights gaseous discharge lights
- (5) The system may be augmented by steady burning lights where such lights would assist in identifying the system.
- (6) Flash lights which are in sequence towards the runway.

Runway
threshold
identification
lights

194.-(1) Runway threshold identification lights shall be installed:

- (a) at the threshold of a non-precision approach runway when additional threshold conspicuity is necessary or where it is not practicable to provide other approach lighting aids; and
 - (b) where a runway threshold is permanently displaced from the runway extremity or temporarily displaced from the normal position and additional threshold conspicuity is necessary.
- (2) Runway threshold identification lights shall be located symmetrically about the runway centre line, in line with the threshold and approximately 10 m outside each line of runway edge lights.
- (3) Runway threshold identification lights shall be flashing white lights with a flash frequency between 60 and 120 per minute.
- (4) The lights shall be visible only in the direction of approach to the runway.

Runway
edge
lights

195.-(1) Runway edge lights shall be provided for a runway intended for use at night or for a precision approach runway intended for use by day or night.

(2) Runway edge lights shall be provided on a runway intended for take-off with an operating minimum below an RVR of the order of 800 m by day.

(3) Runway edge lights shall be placed along the full length of the runway and shall be in two parallel rows equidistant from the centre line.

(4) Runway edge lights shall be placed along the edges of the area declared for use as the runway or outside the edges of the area at a distance of not more than 3 m.

(5) Where the width of the area which could be declared as runway exceeds 60 m, the distance between the rows of lights shall be determined taking into account the nature of the operations, the light distribution characteristics of the runway edge lights, and other visual aids serving the runway.

(6) The lights shall be uniformly spaced in rows at intervals of not more than 60 m for an instrument runway, and at intervals of not more than 100 m for a non-instrument runway.

(7) The lights on opposite sides of the runway axis shall be on lines at right angles to that axis.

(a)

(b) at intersections of runways, may be spaced irregularly or omitted, provided that adequate guidance remains available to the pilot.

(8) Runway edge lights shall be fixed lights showing variable white, except that:

(a) in the case of a displaced threshold, the lights between the beginning of the runway and the displaced threshold shall show red in the approach direction; and

(b) a section of the lights 600 m or one-third of the runway length, whichever is the less, at the remote end of the runway from the end at which the take-off run is started, may show yellow.

(9) The runway edge lights shall show at all angles in azimuth necessary to provide guidance to a pilot landing or taking off in either direction and when the runway edge lights are intended to provide circling guidance, they shall show at all angles in azimuth.

Runway
threshold
and wing
bar lights

196.-(1) Runway threshold lights shall be provided for a runway equipped with runway edge lights except on a non-instrument or non-precision approach runway where the threshold is displaced and wing bar lights are provided.

(2) When a threshold is at the extremity of a runway, the threshold lights shall be placed in a row at right angles to the runway axis as near to the extremity of the runway as possible and, in any case, not more than 3 m outside the extremity.

(3) When a threshold is displaced from the extremity of a runway, threshold lights shall be placed in a row at right angles to the runway axis at the displaced threshold.

(4) Threshold lighting shall consist of:

- (a) on a non-instrument or non-precision approach runway, at least six lights;
- (b) on a precision approach runway category I, at least the number of lights that would be required if the lights were uniformly spaced at intervals of 3 m between the rows of runway edge lights; and
- (c) on a precision approach runway category II or III, lights uniformly spaced between the rows of runway edge lights at intervals of not more than 3 m.

(5) The lights prescribed in (4) (a) and (b) shall be either:

- (a) equally spaced between the rows of runway edge lights; or
- (b) Symmetrically disposed about the runway centre line in two groups, with the lights uniformly spaced in each group and with a gap between the groups equal to the gauge of the touchdown zone marking or lighting, where such is provided, or otherwise not more than half the distance between the rows of runway edge lights.

(5) Wing bar lights shall be provided on a precision approach runway when additional conspicuity is considered desirable.

(6) Wing bar lights shall be provided on a non-instrument or non-precision approach runway where the threshold is displaced and runway threshold lights are required, but are not provided.

(7) (a) Wing bar lights shall be symmetrically disposed about the runway centre line at the threshold in two groups, i.e. wing bars.

(b) Each wing bar shall be formed by at least five lights extending at least 10 m outward from, and at right angles to, the line of the runway edge lights, with the innermost light of each wing bar in the line of the runway edge lights.

(8) (a) Runway threshold and wing bar lights shall be fixed unidirectional lights showing green in the direction of approach to the runway.

(b) The intensity and beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

Runway
end lights

197.-(1) Runway end lights shall be provided for a run-way equipped with runway edge lights.

(2) Runway end lights shall be placed on a line at right angles to the runway axis as near to the end of the runway as possible and, in any case, not more than 3 m outside the end.

(3) Runway end lighting shall consist of at least six lights, which shall be either:

(a) equally spaced between the rows of runway edge lights, or

(b) symmetrically disposed about the runway centre line in two groups with the lights uniformly spaced in each group and with a gap between the groups of not more than half the distance between the rows of runway edge lights.

(4) For a precision approach runway category III, the spacing between runway end lights, except between the two innermost lights if a gap is used, shall not exceed 6 m.

(5) Runway end lights shall be fixed unidirectional lights showing red in the direction of the runway and the intensity.

(6) Beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

Runway
centre line
lights

198.-(1) Runway centre line lights shall be provided on a precision approach runway category II.

(2) Runway centre line lights shall be provided on a precision approach runway category I, particularly when the runway is used by aircraft with high landing speeds or where the width between the runway edge lights is greater than 50 m.

(3) Runway centre line lights shall be provided on a runway intended to be used for take-off with an operating minimum below an RVR of the order of 400 m.

(4) Runway centre line lights shall be provided on a runway intended to be used for take-off with an operating minimum of an RVR of the order of 400 m or higher when used by aeroplanes with a very high take-off speed, particularly where the width between the runway edge lights is greater than 50 m.

(5) Runway centre line lights shall be located along the centre line of the runway, except that the lights may be uniformly offset to the same side of the runway centre line by not more than 60 cm where it is not practicable to locate them along the centre line.

(6) The lights shall be located from the threshold to the end at longitudinal spacing of approximately 15 m.

(7) Centre line guidance for take-off from the beginning of a runway to a displaced threshold shall be provided by:

- (a) an approach lighting system if its characteristics and intensity settings afford the guidance required during take-off and it does not dazzle the pilot of an aircraft taking off; or
- (b) runway centre line lights; or
- (c) barrettes of at least 3 m length and spaced at uniform intervals of 30 m, as shown in Figure 5-23, designed so that their photometric characteristics and intensity setting afford the guidance required during take-off without dazzling the pilot of an aircraft taking off:
 - (i) where necessary, provision shall be made to extinguish those centre line lights specified in b) or reset the intensity of the approach lighting system or barrettes when the runway is being used for landing;
 - (ii) in no case shall only the single source runway centre line lights show from the beginning of the runway to a displaced threshold when the runway is being used for landing.

(8) Runway centre line lights shall be fixed lights showing-

- (a) variable white from the threshold to the point 900 m from the runway end;
- (b) alternate red and variable white from 900 m to 300 m from the runway end;
- (c) red from 300 m to the runway end, except that for runways less than 1 800 m in length;
- (d) alternate red and variable white lights shall extend from the mid-point of the runway usable for landing to 300 m from the runway end.

Runway
touchdown
zone
lights

199.-(1) Touchdown zone lights shall be provided in the touchdown zone of a precision approach runway category II or III.

(2) Touchdown zone lights shall extend from the threshold for a longitudinal distance of 900 m, except that, on runways less than 1 800 m in length, the system shall be shortened so that it does not extend beyond the midpoint of the runway.

(3) The pattern shall be formed by pairs of barrettes symmetrically located about the runway centre line.

(4) The lateral spacing between the innermost lights of a pair of barrettes shall be equal to the lateral spacing selected for the touchdown zone marking.

(5) The longitudinal spacing between pairs of barrettes shall be either 30 m or 60 m.

(6) Barrette shall be-

(a) composed of at least three lights with a spacing between the lights of not more than 1.5m;

(b) not less than 3 m nor more than 4.5 m in length;

(7) Touchdown zone lights shall be-

(a) fixed uni-directional lights showing variable white; and

(b) in accordance with the specifications of Figure A2-5 in the Eighth Schedule to these regulations.

Simple
Touchdown
Zone
Lights

200.-(1) Except where Touchdown Zone Lights are provided, at an aerodrome where the approach angle is greater than 3.5 degrees and the Landing Distance Available combined with other factors increases the risk of an overrun, Simple Touchdown Zone Lights shall be provided.

(2) Simple Touchdown Zone Lights shall be a pair of lights located on each side of the runway centreline 0.3 metres beyond the upwind edge of the final Touchdown Zone Marking.

(3) The lateral spacing between the inner lights of the two pairs of lights shall be equal to the lateral spacing selected for the Touchdown Zone Marking.

(4) The spacing between the lights of the same pair shall not be more than 1.5 m or half the width of the touchdown zone marking, whichever is greater.

(5) Where provided on a runway without TDZ markings, Simple Touchdown Zone lights shall be installed in such a position that provides the equivalent TDZ information.

(6) Simple Touchdown Zone Lights shall be fixed unidirectional lights showing variable white, aligned so as to be visible to the pilot of a landing aeroplane in the direction of approach to the runway

Rapid
exit
taxiway
indicator
lights

201.-(1) Rapid exit taxiway indicator lights shall be provided on a runway intended for use in runway visual range condition less than value of 350 m or where the traffic density is heavy.

(2) Rapid exit taxiway indicator lights shall not be displayed in the event of any lamp failure or other failure that prevents the display of the light pattern.

(3) A set of rapid exit taxiway indicator lights shall be located on the runway on the same side of the runway centre line as the associated rapid exit taxiway and in each set, the light shall be located 2 m apart and light nearest to the runway centre line shall be displaced 2 m from the runway centre line.

(4) Where more than one rapid exit taxiway exits on a runway, the set of rapid exit taxiway indicator light for each exit shall not overlap when displayed.

(5) Rapid exit taxiway indicator lights shall be fixed unidirectional yellow lights, aligned so as to be visible to the pilot of a landing aeroplane in the directional of approach to the runway

Stop-way
lights

202.-(1) Stop-way lights shall be provided for a stop-way intended for use at night.

(2) Stop-way lights shall be placed along the full length of the stop-way and shall be in two parallel rows that are equidistant from the centre line and coincident with the rows of the runway edge lights.

(3) Stop-way lights shall also be provided across the end of a stop-way on a line at right angles to the stop-way axis as near to the end of the stop-way as possible and, in any case, not more than 3 m outside the end

Taxiway
centre line
lights

203.-(1) Taxiway centre line lights shall be provided on -

- (a) an exit taxiway and apron intended for use in runway visual range conditions less than a value of 350 m in such a manner as to provide continuous guidance between the runway centre line and aircraft stands, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance;
- (b) a taxiway intended for use at night in runway visual range conditions of 350 m or greater, and particularly on complex taxiway intersections and exit taxiways, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance;
- (c) an exit taxiway, taxiway and apron in all visibility conditions where specified as components of an advanced surface movement guidance and control system in such a manner as to provide continuous guidance between the runway centre line and aircraft stands;

- (d) a runway forming part of a standard taxi-route and intended for taxiing in runway visual range conditions less than a value of 350 m, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance;
- (e) in all visibility conditions on a runway forming part of a standard taxi route where specified as components of an advanced surface movement guidance and control system;
- (2) Taxiway centre line lights on a taxiway other than an exit taxiway and on a runway forming part of a standard taxi-route shall be fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or in the vicinity of the taxiway
- (3) Taxiway centre line lights on an exit taxiway shall be fixed lights.
- (4) Alternate taxiway centre line lights shall show green and yellow from their beginning near the runway centre line to the perimeter of the ILS/MLS critical or sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway; and thereafter all lights shall show green.
- (5) The first light in the exit centre line shall always show green and the light nearest to the perimeter shall always show yellow.
- (6) Where it is necessary to denote the proximity to a runway, taxiway centre line lights shall be fixed lights showing alternating green and yellow from the perimeter of the ILS/MLS critical or sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway, to the runway and continue alternating green and yellow until:
 - (a) their end point near the runway centre line; or
 - (b) in the case of the taxiway centre line lights crossing the runway, to the opposite perimeter of the ILS/MLS critical or sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway.

(7) Where higher intensities are required, from an operational point of view, taxiway centreline lights on rapid exit taxiways intended for use in runway visual range conditions less than a value of 350m shall be in accordance with the specifications prescribed by the Authority.

(8) The number of levels of brilliancy settings for these lights shall be the same as that for the runway centreline lights.

(9) Where taxiway centre line lights are specified as components of an advanced surface movement guidance and control system and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, taxiway centre line lights shall be in accordance with the specifications prescribed by the Authority.

(10) Taxiway centre line lights shall normally be located on the taxiway centre line marking, except that they may be offset by not more than 30cm where it is not practicable to locate them on the marking.

Taxiway
centre line
lights on
taxiways

204.-(1) Taxiway centre line lights on a straight section of a taxiway shall be spaced at longitudinal intervals of not more than 30 m, except that:

- (a) larger intervals not exceeding 60 m may be used where, because of the prevailing meteorological conditions, adequate guidance is provided by such spacing;
- (b) intervals less than 30 m shall be provided on short straight sections; and
- (c) on a taxiway intended for use in RVR conditions of less than a value of 350 m, the longitudinal spacing shall not exceed 15 m

(2) Taxiway centre line lights on a taxiway curve shall continue from the straight portion of the taxiway at a constant distance from the outside edge of the taxiway curve.

(3) The lights shall be spaced at intervals such that a clear indication of the curve is provided

(4) On a taxiway intended for use in RVR conditions of less than a value of 350 m, the lights on a curve shall not exceed a spacing of 15 m and on a curve of less than 400 m radius the lights shall be spaced at intervals of not greater than 7.5 m; this spacing shall extend for 60 m before and after the curve.

Taxiway
centre line
lights on
other exit
taxiways

205.-(1) Taxiway centre line lights on exit taxiways other than rapid exit taxiways shall commence at the point where the taxiway centre line marking begins to curve from the runway centre line, and follow the curved taxiway centre line marking at least to the point where the marking leaves the runway and the first light shall be at least 60 cm from any row of runway centre line lights.

(2) The lights shall be spaced at longitudinal intervals of not more than 7.5 m.

Taxiway
centre line
lights on
runways

206. Taxiway centre line lights on a runway forming part of a standard taxi-route and intended for taxiing in runway visual range conditions less than a value of 350 m shall be spaced at longitudinal intervals not exceeding 15 m.

Taxiway
edge
lights

207.-(1) Taxiway edge lights shall be provided at the edges of a holding bay, apron, among others intended for use at night and on a taxiway not provided with taxiway centre line lights and intended for use at night, except that taxiway edge lights need not be provided where, considering the nature of the operations, adequate guidance can be achieved by surface illumination or other means

(2) Taxiway edge lights shall be provided on a runway forming part of a standard taxi-route and intended for taxiing at night where the runway is not provided with taxiway centre line lights

(3) Taxiway edge lights on a straight section of a taxiway and on a runway forming part of a standard taxi-route shall be spaced at uniform longitudinal intervals of not more than 60 m.

(4) The lights on a curve shall be spaced at intervals less than 60 m so that a clear indication of the curve is provided

(5) Taxiway edge lights-

(a) on a holding bay, apron, etc. shall be spaced at uniform longitudinal intervals of not more than 60 m; and

(b) a runway turn pad shall be spaced at uniform longitudinal interval of not more than 30m.

(6) The lights shall be located as near as practicable to the edges of the taxiway, runway turn pad, holding bay, apron or runway, etc. or outside the edges at a distance of not more than 3 m.

(7) Taxiway edge lights shall be fixed lights showing blue.

(8) The lights shall show up to at least 75° above the horizontal and at all angles in azimuth necessary to provide guidance to a pilot taxiing in either direction.

(9) At an intersection, exit or curve the lights shall be shielded as far as practicable so that they cannot be seen in angles of azimuth in which they may be confused with other lights.

(10) Intensity of taxiway edge lights shall be at least 2 cd from 0° to 6° vertical, and 0.2 cd at any vertical angles between 6° and 75°.

Runway
turn pad
lights

208.-(1) Runway turn pad lights shall be provided for continuous guidance on a runway turn pad intended for use in runway visual range conditions less than a value of 350 m, to enable an aeroplane to complete a 180-degree turn and align with the runway centre line.

(2) Runway turn pad lights shall normally be located on the runway turn pad marking, except that they may be offset by not more than 30 cm where it is not practicable to locate them on the marking.

(3) Runway turn pad lights on a straight section of the runway turn pad marking shall be spaced at longitudinal intervals of not more than 15 m.

(4) Runway turn pad lights on a curved section of the runway turn pad marking shall not exceed a spacing of 7.5 m.

(5) Runway turn pad lights shall be unidirectional fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or approaching the runway turn pad.

Stop bars

209.-(1) An aerodrome operator shall install stop bars intended to be controlled either manually or automatically by air traffic services.

(2) A stop bar shall be provided at every runway-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions less than a value of 350 m, except where:

- (a) appropriate aids and procedures are available to assist in preventing inadvertent incursions of traffic onto the runway; or
- (b) operational procedures exist to limit, in runway visual range conditions less than a value of 550 m, the number of:
 - (i) aircraft on the manoeuvring area to one at a time; and
 - (ii) vehicles on the manoeuvring area to the essential minimum.

(3) A stop bar shall be provided at every runway-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions of values between 350 m and 550 m, except where:

- (a) appropriate aids and procedures are available to assist in preventing inadvertent incursions of traffic onto the runway; or
- (b) operational procedures exist to limit, in runway visual range conditions less than a value of 550 m, the number of:
 - (i) aircraft on the manoeuvring area to one at a time; and
 - (ii) vehicles on the manoeuvring area to the essential minimum.

(4) Where there is more than one stop bar associated with a taxiway/runway intersection, only one shall be illuminated at any given time

(5) A stop bar shall be provided at an intermediate holding position when it is desired to supplement markings with lights and to provide traffic control by visual means

(6) Stop bars shall be located across the taxiway at the point where it is desired that traffic stop and where the additional lights specified by the Authority are provided, these lights shall be located not less than 3 m from the taxiway edge.

(7) Stop bars shall consist of lights spaced at uniform intervals of no more than 3 m across the taxiway, showing red in the intended direction of approach to the intersection or runway-holding position.

(8) A pair of elevated lights shall be added to each end of the stop bar where the in-pavement stop bar lights might be obscured from a pilot's view, for example, by rain, or where a pilot may be required to stop the aircraft in a position so close to the lights that they are blocked from view by the structure of the aircraft.

(9) Stop bars installed at a runway-holding position shall be unidirectional and shall show red in the direction of approach to the runway.

(10) Where the additional lights specified by the Authority are provided, these lights shall have the same characteristics as the lights in the stop bar, but shall be visible to approaching aircraft up to the stop bar position.

(11) Where stop bars are specified as components of an advanced surface movement guidance and control system and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, the intensity in red light and beam spreads of stop bar lights shall be in accordance with the specifications prescribed by the Authority.

(12) The lighting circuit shall be designed so that:

- (a) stop bars located across entrance taxiways are selectively switchable;
- (b) stop bars located across taxiways intended to be used only as exit taxiways are switchable selectively or in groups;
- (c) when a stop bar is illuminated, any taxiway centre line lights installed beyond the stop bar shall be extinguished for a distance of at least 90 m; and
- (d) stop bars are interlocked with the taxiway centre line lights so that when the centre line lights beyond the stop bar are illuminated the stop bar is extinguished and vice versa.

Intermediate
holding
position
lights

210.-(1) Except where a stop bar has been installed, intermediate holding position lights shall be provided at an intermediate holding position intended for use in runway visual range conditions less than a value of 350 m.

(2) Intermediate holding position lights shall be provided at an intermediate holding position where there is no need for stop-and-go signals as provided by a stop bar.

(3) Intermediate holding position lights shall be located along the intermediate holding position marking at a distance of 0.3 m prior to the marking

(4) (a) Intermediate holding position lights shall consist of three fixed unidirectional lights showing yellow in the direction of approach to the intermediate holding position with a light distribution similar to taxiway centre line lights if provided.

(b) The lights shall be disposed symmetrically about and at right angle to the taxiway centre line, with individual lights spaced 1.5 m apart.

Runway
guard
lights

211.-(1) Runway guard lights, Configuration A, shall be provided at each taxiway or runway intersection associated with a runway intended for use in:

- (a) runway visual range conditions less than a value of 550 m where a stop bar is not installed; and
- (b) runway visual range conditions of values between 550 m and 1 200 m where the traffic density is heavy.

(2) As part of runway incursion prevention measures, runway guard lights, Configuration A or B, shall be provided at each taxiway or runway intersection where runway incursion hot spots have been identified, and used under all weather conditions during day and night.

(3) Configuration B runway guard lights shall not be collocated with a stop bar.

(4) Runway guard lights, Configuration A, shall be located at each side of the taxiway at a distance from the runway centre line not less than that specified for a take-off runway.

(5) Runway guard lights, Configuration B, shall be located across the taxiway at a distance from the runway centre line not less than that specified for a take-off runway.

(6) Runway guard lights, Configuration A, shall consist of two pairs of yellow lights.

(7) Where there is a need to enhance the contrast between the on and off state of runway guard lights, Configuration A, intended for use during the day, a visor of sufficient size to prevent sunlight from entering the lens without interfering with the function of the fixture shall be located above each lamp.

(8) Runway guard lights, Configuration B, shall consist of yellow lights spaced at intervals of 3 m across the taxiway.

(9) The light beam shall be unidirectional and aligned so as to be visible to the pilot of an aeroplane taxiing to the holding position.

(10) The intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications prescribed by the Authority.

(11) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications prescribed by the Authority.

(12) Where runway guard lights are specified as components of an advanced surface movement guidance and control system where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications prescribed by the Authority.

(13) The intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications prescribed by the Authority.

(14) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications prescribed by the Authority.

(15) Where runway guard lights are specified as components of an advanced surface movement guidance and control system where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications prescribed by the Authority.

(16) The lights in each unit of Configuration A shall be illuminated alternately.

(17) For Configuration B, adjacent lights shall be alternately illuminated and alternative lights shall be illuminated in unison.

(18) The lights shall be illuminated between 30 and 60 cycles per minute and the light suppression and illumination periods shall be equal and opposite in each light.

Apron
floodlighting

212.-(1) Apron floodlighting shall be provided on an apron and on a designated isolated aircraft parking position intended to be used at night.

(2) Apron floodlights shall be located so as to provide adequate illumination on all apron service areas, with a minimum of glare to pilots of aircraft in flight and on the ground, aerodrome and apron controllers, and personnel on the apron.

(3) The arrangement and aiming of floodlights shall be such that an aircraft stand receives light from two or more directions to minimize shadows.

(5) The spectral distribution of apron floodlights shall be such that the colours used for aircraft marking connected with routine servicing, and for surface and obstacle marking, can be correctly identified.

(5) The average illuminance shall be at least the following:

(a) Aircraft stand:

(i) horizontal illuminance 20 lux with a uniformity ratio (average to minimum) of not more than 4 to 1; and

(ii) vertical illuminance 20 lux at a height of 2 m above the apron in relevant directions.

(b) Other apron areas orizontal illuminance — 50 per cent of the average illuminance on the aircraft stands with a uniformity ratio (average to minimum) of not more than 4 to 1.

Visual
docking
guidance
system

213.-(1) A visual docking guidance system shall be provided when it is intended to indicate, by a visual aid, the precise positioning of an aircraft on an aircraft stand and other alternative means, such as marshalls, are not practicable.

(2) The visual docking guidance system shall provide characteristics specifications, and azimuth and stopping guidance.

(3) The azimuth guidance unit and the stopping position indicator shall be adequate for use in all weather, visibility, background lighting and pavement conditions for which the system is intended both by day and night, but shall not dazzle the pilot.

(4) The azimuth guidance unit and the stopping position indicator shall be of a design such that:

- (a) a clear indication of malfunction of either or both is available to the pilot; and
- (b) they can be turned off.

(5) The azimuth guidance unit and the stopping position indicator shall be located in such a way that there is continuity of guidance between the aircraft stand markings, the aircraft stand manoeuvring guidance lights, if present, and the visual docking guidance system.

(6) The accuracy of the system shall be adequate for the type of loading bridge and fixed aircraft servicing installations with which it is to be used.

(7) The system shall be usable by all types of aircraft for which the aircraft stand is intended, preferably without selective operation.

(8) If selective operation is required to prepare the system for use by a particular type of aircraft, then the system shall provide an identification of the selected aircraft type to both the pilot and the system operator as a means of ensuring that the system has been set properly.

Azimuth
guidance
unit

214.-(1) The azimuth guidance unit shall be located on or close to the extension of the stand centre line ahead of the aircraft so that its signals are visible from the cockpit of an aircraft throughout the docking manoeuvre and aligned for use at least by the pilot occupying the left seat.

(2) The azimuth guidance unit shall be aligned for use by the pilots occupying both the left and right seats.

(3) The azimuth guidance unit shall provide unambiguous left or right guidance which enables the pilot to acquire and maintain the lead-in line without over controlling.

(4) When azimuth guidance is indicated by colour change, green shall be used to identify the centre line and red for deviations from the centre line.

Stopping
position
indicator

215.-(1) The stopping position indicator shall be located in conjunction with, or sufficiently close to, the azimuth guidance unit so that a pilot can observe both the azimuth and stop signals without turning the head.

(2) The stopping position indicator shall be usable at least by the pilot occupying the left seat.

(3) The stopping position indicator shall be usable by the pilots occupying both the left and right seats.

(4) The stopping position information provided by the indicator for a particular aircraft type shall account for the anticipated range of variations in pilot eye height and/or viewing angle.

(5) The stopping position indicator shall show the stopping position for the aircraft for which guidance is being provided, and shall provide closing rate information to enable the pilot to gradually decelerate the aircraft to a full stop at the intended stopping position

(6) The stopping position indicator shall provide closing rate information over a distance of at least 10 m

Advanced
Visual
Docking
Guidance
System

216.-(1) The A-VDGS shall be suitable for use by all types of aircraft for which the aircraft stand is intended.

(2) The A-VDGS shall be used only in conditions in which its operational performance is specified

(3) The docking guidance information provided by an A-VDGS shall not conflict with that provided by a conventional visual docking guidance system on an aircraft stand if both types are provided and are in operational use and a method of indicating that the A-VDGS is not in operational use or is unserviceable shall be provide.

(4) The A-VDGS shall be located such that unobstructed and unambiguous guidance is provided to the person responsible for, and persons assisting, the docking of the aircraft throughout the docking manoeuvre.

(5) The A-VDGS shall provide, at minimum, the following guidance information at the appropriate stage of the docking manoeuvre:

- (a) an emergency stop indication;
- (b) the aircraft type and model for which the guidance is provided;
- (c) an indication of the lateral displacement of the aircraft relative to the stand centre line;
- (d) the direction of azimuth correction needed to correct a displacement from the stand centre line;
- (e) an indication of the distance to the stop position;
- (f) an indication when the aircraft has reached the correct stopping position; and
- (g) a warning indication if the aircraft goes beyond the appropriate stop position.

(6) The A-VDGS shall be capable of providing docking guidance information for all aircraft taxi speeds encountered during the docking manoeuvre.

(7) Symbols and graphics used to depict guidance information shall be intuitively representative of the type of information provided.

(8) Information on the lateral displacement of the aircraft relative to the stand centre line shall be provided at least 25 m prior to the stop position.

(9) Continuous closure distance and closure rate shall be provided from at least 15 m prior to the stop position.

(10) Throughout the docking manoeuvre, an appropriate means shall be provided on the A-VDGS to indicate the need to bring the aircraft to an immediate halt. In such an event, which includes a failure of the A-VDGS, no other information shall be displayed.

(11) Provision to initiate an immediate halt to the docking procedure shall be made available to personnel responsible for the operational safety of the stand

Aircraft
Stand
manoeuvring
guidance
lights

217.-(1) Aircraft stand manoeuvring guidance lights shall be collocated with the aircraft stand markings.

(2) Aircraft stand manoeuvring guidance lights, other than those indicating a stop position, shall be fixed yellow lights, visible throughout the segments within which they are intended to provide guidance.

(3) The lights indicating a stop position shall be fixed unidirectional lights showing red.

Road-
holding
position
light

218.-(1) A road-holding position light shall be provided at each road-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions less than a value of 350 m.

(2) A road-holding position light shall be located adjacent to the holding position marking 1.5 m (± 0.5 m) from one edge of the road, i.e. left or right as appropriate to the local traffic regulations.

(3) The road-holding position light shall comprise:

(a) a controllable red (stop)/green (go) traffic light;

or

(b) a flashing-red light.

(4) The road-holding position light beam shall be unidirectional and aligned so as to be visible to the driver of a vehicle approaching the holding position.

(5) The intensity of the light beam shall be adequate for the conditions of visibility and ambient light in which the use of the holding position is intended, but shall not dazzle the driver.

(6) The flash frequency of the flashing-red light shall be between 30 and 60 flashes per minute.

No-entry
bar

219.-(1) A no-entry bar shall be provided across a taxiway which is intended to be used as an exit only taxiway to assist in preventing inadvertent access of traffic to that taxiway.

(2) The intensity in red light and beam spreads of no-entry bar lights shall be in accordance with the specifications of the Authority.

(3) Where provided the lighting circuit of a No entry sign shall be designed so that:

- (a) no-entry bars are switchable selectively or in groups;
- (b) when a no-entry bar is illuminated, any taxiway centre line lights installed beyond the no-entry bar, when viewed towards the runway, shall be extinguished for a distance of at least 90 m; and
- (c) when a no-entry bar is illuminated, any stop bar installed between the no-entry bar and the runway shall be extinguished.

Aerodrome
identification
sign

220. The aerodrome identification sign shall consist of the name of the aerodrome.

Unpaved
runways
edge
Markers

221.-(1) Markers shall be provided when the extent of an unpaved runway is not clearly indicated by the appearance of its surface compared with that of the surrounding ground.

(2) Where runway lights are provided, the markers shall be incorporated in the light fixtures. Where there are no lights, markers of flat rectangular or conical shape shall be placed so as to delimit the runway clearly.

(3) The flat rectangular markers shall have a minimum size of 1 m by 3 m and shall be placed with their long dimension parallel to the runway centre line. The conical markers shall have a height not exceeding 50cm

Stop way
edge
markers

222.-(1) Where provided, stopway edge markers shall be provided when the extent of a stopway is not clearly indicated by its appearance compared with that of the surrounding ground.

(2) The stopway edge markers shall be sufficiently different from any runway edge markers used to ensure that the two types of markers cannot be confused.

(3) Markers consisting of small vertical boards camouflaged on the reverse side, as viewed from the runway, have proved operationally acceptable.

Taxiway
edge
markers

223.-(1). Where provided ,taxiway edge markers shall be provided on a taxiway where the code number is 1 or 2 and taxiway centre line or edge lights or taxiway centre line markers are not provided.

(2) Taxiway edge markers shall be installed at least at the same locations as would the taxiway edge lights had they been used

(3) A taxiway edge marker shall be retroreflective blue.

(4) The marked surface as viewed by the pilot shall be a rectangle and shall have a minimum viewing area of 150 cm².

(5) Taxiway edge markers shall be frangible. Their height shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

Taxiway
centre line
markers

224.-(1).Where provided taxiway centre line markers shall be provided on a taxiway if there is a need to improve the guidance provided by the taxiway centre line marking.

(2) A taxiway centre line marker shall be retroreflective green

(3) Taxiway centre line markers shall be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the markers themselves.

(4) The marked surface as viewed by the pilot shall be a rectangle and shall have a minimum viewing area of 20 cm².

Unpaved
taxiway
edge
markers

225.-(1).Where the extent of an unpaved taxiway is not clearly indicated by its appearance compared with that of the surrounding ground, markers shall be provided.

(2) Where taxiway lights are provided, the markers shall be incorporated in the light fixtures. Where there are no lights, markers of conical shape shall be placed so as to delimit the taxiway clearly.

Boundary
markers

226.-(1).Boundary markers shall be provided at an aerodrome where the landing area has no runway

(2) Boundary markers shall be spaced along the boundary of the landing area at intervals of not more than 200 m or at approximately 90 m, if the conical type is used with a marker at any corner.

(3) Where provided, boundary markers shall be in the form of a cone not less than 50 cm high and not less than 75 cm in diameter at the base. The markers shall be coloured to contrast with the background against which they will be seen. A single colour, orange or red, or two contrasting colours, orange and white or alternatively red and white, shall be used, except where such colours merge with the background.

PART XIV

VISUAL AIDS FOR DENOTING OBSTACLES

Provision
of visual
aids for
denoting
obstacles

227. An aerodrome operator shall ensure that visual aids for denoting obstacles are duly provided and properly maintained so as to ensure the safe operation of aircraft at and around the aerodrome.

Marking
and
lighting of
objects
within the
lateral
boundaries
of the
obstacle
limitation
surfaces

228.-(1) Vehicles and other mobile objects, excluding aircraft, on the movement area of an aerodrome shall be considered to be obstacles and shall be marked and, if the vehicles and aerodrome are used at night or in conditions of low visibility, they shall be lighted, except that aircraft servicing equipment and vehicles used only on aprons may be exempt.

(2) 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.

(3) All obstacles within the distance specified in Table 2, 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.

(4) A fixed obstacle that extends above a take-off climb surface within 3000m of the inner edge of the take-off climb surface shall be marked and, if the runway is used at night, lighted, except that:

- (a) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;
- (b) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150m;
- (c) the marking may be omitted when the obstacle is lighted by high intensity obstacle lights by day; and
- (d) lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient.

(5) A fixed object, other than an obstacle, adjacent to a take-off climb surface shall be marked and, if the runway is used at night, lighted if such marking and lighting is considered necessary to ensure its avoidance, except that the marking may be omitted when:

- (a) the object is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150m; or
- (b) the object is lighted by high-intensity obstacle lights by day.

(6) A fixed obstacle that extends above an approach surface within 3 000 m of the inner edge or above a transitional surface shall be marked and, if the runway is used at night, lighted, except that:

- (a) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

- (b) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m;
 - (c) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day; and
 - (d) the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient.
- (7) A fixed obstacle that extends above a horizontal surface shall be marked and, if the aerodrome is used at night, lighted except that:
- (a) such marking and lighting may be omitted when:
 - (i) the obstacle is shielded by another obstacle; or
 - (ii) for a circuit extensively obstructed by immovable objects or terrain, procedures have been established to ensure safe vertical clearance below prescribed flight paths; or
 - (iii) an aeronautical study shows the obstacle not to be of operational significance;
 - (b) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150m;
 - (c) the marking may be omitted when the obstacle is lighted by high intensity obstacle lights by day; and
 - (d) the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient.
- (8) A fixed object that extends above an obstacle protection surface shall be marked and, if the runway is used at night, lighted.

(9) Other objects inside the obstacle limitation surfaces shall be marked and/or lighted if an aeronautical study indicates that the object could constitute a hazard to aircraft and this includes objects adjacent to visual routes e.g. waterway or highway).

(10) Overhead wires, cables, etc., crossing a river, waterway, valley or highway shall be marked and their supporting towers marked and lighted if an aeronautical study indicated that the wires or cables could constitute a hazard to aircraft.

Marking
and
lighting of
objects
outside
the lateral
boundaries
of the
obstacle
limitation
surfaces

229.-(1) Obstacles in areas beyond the limits of the obstacle limitation surfaces, which extend to a height of 150 m or more above ground elevation shall be considered as obstacles and shall be marked and lighted, except that the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day.

(2) Other objects outside the obstacle limitation surfaces shall be marked and/or lighted if an aeronautical study indicates that the object could constitute a hazard to aircraft including objects adjacent to visual routes such as waterways, and highways.

(3) Overhead wires, cables, etc., crossing a river, waterway, valley or highway shall 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.

Intensity
and colour
of
obstacle
lights

230.-(1) The presence of objects which must be lighted, in accordance with these regulations shall be indicated by low-, medium- or high-intensity lights, or a combination of such lights.

(2) Low-intensity obstacle lights, Types A B, C and D, medium-intensity obstacle lights, Types A, B and C, high-intensity obstacle lights Type A and B, shall be in accordance with the specifications in Table 4 and any other requirements prescribed by the Authority.

- (3) Pursuant to sub-regulations (1) and (2):
 - (a) The number and arrangement of low-, medium- or high-intensity obstacle lights at each level to be marked shall be such that the object is indicated from every angle in azimuth;
 - (b) Where a light is shielded in any direction by another part of the object, or by an adjacent object, additional lights shall be provided on that adjacent object or the part of the object that is shielding the light, in such a way as to retain the general definition of the object to be lighted; and
 - (c) If the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

Table 4. Characteristics of obstacle lights

1	2	3	4	5	6	7
Light Type	Colour	Signal type / (flash rate)	Peak intensity (cd) at given background luminance (b)			Light Distribution Table
			Day above 500 cd/m ²	Twilight (50-500 cd/m ²)	Night (Below 50 cd/m ²)	
Low-intensity, Type A (fixed obstacle)	Red	Fixed	N/A	N/A	10	Table 5
Low-intensity, Type B (fixed obstacle)	Red	Fixed	N/A	N/A	32	Table 5
Low-intensity, Type C (mobile obstacle)	Yellow /Blue (a)	Flashing (60-90fpm)	N/A	N/A	40	Table 5
Low-intensity, Type D (follow-me vehicle)	Yellow	Flashing (60-90fpm)	N/A	N/A	200	Table 5
Medium-intensity, Type A	White	Flashing (20-60fpm)	20 000	20 000	2 000	Table 6
Medium - intensity, Type B	Red	Flashing (20-60fpm)	N/A	N/A	2 000	Table 6
Medium - intensity, Type C	Red	Fixed	N/A	N/A	2 000	Table 6
High-intensity, Type A	White	Flashing (40-60fpm)	200 000	20 000	2 000	Table 6

Table 5. Light distribution for low-intensity obstacle lights

	Minimum intensity (a)	Maximum intensity (a)	Vertical beam spread (f)	
			Minimum beam spread	Intensity
Type A	10 cd (b)	N/A	10°	5 cd
Type A	32 cd (b)	N/A	10°	16 cd
Type A	40 cd (b)	400 cd	12° (d)	20 cd
Type A	200 cd (b)	400 cd	N/A (e)	N/A

Note.— This table does not include recommended horizontal beam spreads. Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as the shape of the obstacle. Thus, with narrower beam spreads, more lights will be required.

- (a) 360° horizontal. For flashing lights, the intensity is read into effective intensity.
- (b) Between 2 and 10° vertical. Elevation vertical angles are referenced to the horizontal when the light is levelled.
- (c) Between 2 and 20° vertical. Elevation vertical angles are referenced to the horizontal when the light is levelled.
- (d) Peak intensity shall be located at approximately 2.5° vertical.
- (e) Peak intensity shall be located at approximately 17° vertical.
- (f) Beam spread is defined as the angle between the horizontal plane and the directions for which the intensity exceeds that mentioned in the “intensity” column.

Table 6. Light distribution for medium-and high-intensity obstacle lights according to benchmark intensities of Table 4

Benchmark intensity	Minimum requirements					Recommendations				
	Vertical elevation angle (b)		Vertical beam spread			Vertical elevation angle (b)		Vertical beam spread		
	0°		-1°			0°		-1°		
	Minimum average intensity (a)	Minimum intensity (a)	Minimum intensity (a)	Minimum beam spread	Intensity (a)	Maximum intensity (a)	Maximum intensity (a)	Maximum intensity (a)	Maximum beam spread	Intensity (a)
200 000	200 000	150 000	75 000	3°	75 000	250 000	112 500	7 500	7°	75 000
100 000	100 000	75 000	37 500	3°	37 500	125 000	56 250	3 750	7°	37 500
20 000	20 000	15 000	7 500	3°	7 500	25 000	11 250	750	N/A	N/A
2 000	2 000	1 500	750	3°	750	2 500	1 125	75	N/A	N/A

Note.— This table does not include recommended horizontal beam spreads. Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as the shape of the obstacle. Thus, with narrower beam spreads, more lights will be required.

- (a) 360° horizontal. All intensities are expressed in Candela. For flashing lights, the intensity is read into effective intensity.
- (b) Elevation vertical angles are referenced to the horizontal when the light unit is levelled.
- (c) Beam spread is defined as the angle between the horizontal plane and the directions for which the intensity exceeds that mentioned in the “intensity” column.

Note.— An extended beam spread may be necessary under specific configuration and justified by an aeronautical study.

Marking and lighting of mobile objects

231.-(1) All mobile objects to be marked shall be coloured or display flags.

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

(3) Flags used to mark mobile objects shall be displayed around, on top of, or around the highest edge of the object. Flags shall not increase the hazard presented by the object they mark.

(4) Pursuant to sub-regulations (1) and (2):

(a) Flags used to mark mobile objects shall not be less than 0.9 m on each side and shall consist of a chequered pattern, each square having sides of not less than 0.3 m.

(b) The colours of the pattern shall contrast each with the other and with the background against which they will be seen.

(c) Orange and white or alternatively red and white shall be used, except where such colours merge with the background; and

(d) an extended beam spread may be necessary under specific configuration and justified by an aeronautical study.

(5) Low-intensity obstacle lights, Type C, shall be displayed on vehicles and other mobile objects excluding aircraft.

(6) Low-intensity obstacle lights, Type C, displayed on vehicles associated with emergency or security shall be flashing-blue and those displayed on other vehicles shall be flashing-yellow.

(7) Low-intensity obstacle lights, Type D, shall be displayed on follow-me vehicles.

(8) Low-intensity obstacle lights on objects with limited mobility such as aerobridges shall be fixed-red, and as a minimum be in accordance with the specifications for low-intensity obstacle lights, Type A, in Table 4 and the intensity of the lights shall be sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general levels of illumination against which they would normally be viewed.

Marking
of fixed
Objects

232.-(1) 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.

(2) Pursuant to sub-regulation (1):

- (a) an object shall 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;
- (b) the pattern shall 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;
- (c) the colours of the pattern shall contrast each with the other and with the background against which they will be seen; and
- (d) orange and white or alternatively red and white shall be used, except where such colours merge with the background;

as indicated in Fifteenth Schedule.

(3) An object shall be coloured to show alternating contrasting bands if:

- (a) 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; or
- (b) it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5 m.

- (4) Subject to sub regulation (3):
- (a) the bands shall be perpendicular to the longest dimension and have a width approximately $\frac{1}{7}$ of the longest dimension or 30 m, whichever is less.
 - (b) the colours of the bands shall contrast with the background against which they will be seen.
 - (c) orange and white shall be used, except where such colours are not conspicuous when viewed against the background.
 - (d) the bands on the extremities of the object shall be of the darker colour.
as indicated in Fifteenth Schedule of these regulations
- (5) The formula for determining bandwidth and for having an odd number of bands, thus permitting both the top and bottom bands to be of the darker colour shall be as indicated in Table 7.

Table 7. – Marking band widths

Longest dimension		Band width
Greater than	Not exceeding	
1.5 m	26 m	$\frac{1}{7}$ of longest dimension
210 m	270 m	$\frac{1}{9}$ of longest dimension
270 m	330 m	$\frac{1}{11}$ of longest dimension
330 m	390 m	$\frac{1}{13}$ of longest dimension
390 m	450 m	$\frac{1}{15}$ of longest dimension
450 m	510 m	$\frac{1}{17}$ of longest dimension
510 m	570 m	$\frac{1}{19}$ of longest dimension
570 m	630 m	$\frac{1}{21}$ of longest dimension

(6) An object shall be coloured in a single conspicuous colour if its projection on any vertical plane has both dimensions less than 1.5 m and orange or red shall be used, except where such colours merge with the background, in which case it may be necessary to use a different colour from orange or red to obtain sufficient contrast.

(7) Flags used to mark fixed objects shall be displayed around, on top of, or around the highest edge of, the object and when flags are used to mark extensive objects or groups of closely spaced objects, they shall be displayed at least every 15 m and such flags shall not increase the hazard presented by the object they mark.

(8) Flags used to mark fixed objects shall not be less than 0.6 m on each side.

(9) Flags used to mark fixed objects shall be orange in colour or a combination of two triangular sections, one orange and the other white, or one red and the other white, except that where such colours merge with the background; other conspicuous colours shall be used.

(10) Markers displayed on or adjacent to objects shall be located in conspicuous positions so as to retain the general definition of the object and shall be recognizable in clear weather from a distance of at least 1 000 m for an object to be viewed from the air and 300 m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object.

(11) Pursuant to sub-regulation (10) the shape of markers shall be distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information, and they shall be such that the hazard presented by the object they mark is not increased.

(12) A marker shall be of one colour and when installed, white and red, or white and orange markers shall be displayed alternately and the colour selected shall contrast with the background against which it will be seen.

Lighting
of fixed
objects

233.-(1) In the case of an object to be lighted, one or more low-, medium- or high-intensity obstacle lights shall be located as close as practicable to the top of the object.

(2) In the case of chimney or other structure of like function, the top lights shall be placed sufficiently below the top so as to minimize contamination by smoke, etc. as indicated in Figure 2.

(3) In the case of a tower or antenna structure indicated by high-intensity obstacle lights by day with an appurtenance, such as a rod or an antenna, greater than 12 m where it is not practicable to locate a high-intensity obstacle light on the top of the appurtenance, such a light shall be located at the highest practicable point and, if practicable, a medium-intensity obstacle light, Type A, mounted on the top.

(4) In the case of an extensive object or of a group of closely spaced objects to be lighted that are:

- (a) penetrating a horizontal obstacle limitation surface (OLS) or located outside an OLS, the top lights shall be so arranged as to at least indicate the points or edges of the object highest in relation to the obstacle limitation surface or above the ground, and so as to indicate the general definition and the extent of the objects; and
- (b) penetrating a sloping OLS, the top lights shall be so arranged as to at least indicate the points or edges of the object highest in relation to the OLS, and so as to indicate the general definition and the extent of the objects. If two or more edges are of the same height, the edge nearest the landing area shall be marked.

(5) When the obstacle limitation surface concerned is sloping and the highest point above the OLS is not the highest point of the object, additional obstacle lights shall be placed on the highest point of the object.

(6) Where lights are applied to display the general definition of an extensive object or a group of closely spaced objects, and

(a) low-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 45 m; and

(b) medium-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 900 m.

(7) High-intensity obstacle lights, Type A, and medium-intensity obstacle lights, Types A and B, located on an object shall flash simultaneously.

(8) The installation setting angles for high-intensity obstacle lights, Type A, shall be in accordance with Table 8, except that where high-intensity obstacle lights are intended for day use as well as night use, care shall be taken to ensure that these lights do not create disconcerting dazzle.

(9) The design, location and operation of high-intensity obstacle lights shall be in accordance with requirements prescribed by the Authority.

(10) Where, in the opinion of the Authority or the aerodrome operator, the use of high-intensity obstacle lights, Type A, or medium-intensity obstacle lights, Type A, at night may dazzle pilots in the vicinity of an aerodrome (within approximately 10 000 m radius) or cause significant environmental concerns, a dual obstacle lighting system shall be provided, in which case, this system shall be composed of high-intensity obstacle lights, Type A, or medium-intensity obstacle lights, Type A, as appropriate, for daytime and twilight use and medium-intensity obstacle lights, Type B or C, for night-time use.

Lighting
of objects
with
height less
than 45 m
above
ground
level

234.-(1) Low-intensity obstacle lights, Type A or B, shall be used where the object is a less extensive one and its height above the surrounding ground is less than 45 m.

(2) Where the use of low-intensity obstacle lights, Type A or B, would be inadequate or an early special warning is required, then medium- or high-intensity obstacle lights shall be used.

(3) Low-intensity obstacle lights, Type B, shall be used either alone or in combination with medium-intensity obstacle lights, Type B, in accordance with sub-regulation (4).

(4) Medium-intensity obstacle lights, Type A, B or C, shall be used where the object is an extensive one (including a group of buildings), and medium-intensity obstacle lights, Types A and C, shall be used alone, whereas medium-intensity obstacle lights, Type B, shall be used either alone or in combination with low-intensity obstacle lights, Type B.

Lighting
of objects
with a
height
45m or
more to a
height less
than 150
m above
ground
level

235.-(1) Medium-intensity obstacle lights, Type A, B or C, shall be used, medium-intensity obstacle lights, Types A and C, shall be used alone, whereas medium-intensity obstacle lights, Type B, shall be used either alone or in combination with low-intensity obstacle lights, Type B as prescribed in Twelfth Schedule of these regulations.

(2) Where an object is indicated by medium-intensity obstacle lights, Type A, and the top of the object is more than 105 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels.

(3) Pursuant to sub-regulation (2), these additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 105 m.

(4) Where an object is indicated by medium-intensity obstacle lights, Type B, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings, when the object to be marked is surrounded by buildings, additional lights shall be provided at intermediate levels.

(5) Pursuant to sub-regulation (3), these additional intermediate lights shall be alternately low-intensity obstacle lights, Type B, and medium-intensity obstacle lights, Type B, and shall be spaced as equally as practicable between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.

(4) (a) Where an object is indicated by medium-intensity obstacle lights, Type C, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings, when the object to be marked is surrounded by buildings, additional lights shall be provided at intermediate levels.

(b) These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.

(5) Where high-intensity obstacle lights, Type A, are used, they shall be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s), except that where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels.

Lighting
of objects
with a
height 150
m or more
above
ground
level

236.-(1) High-intensity obstacle lights, Type A, shall be used to indicate the presence of an object if its height above the level of the surrounding ground exceeds 150 m and an aeronautical study indicates such lights to be essential for the recognition of the object by day.

(2) Where high-intensity obstacle lights, Type A, are used, they shall be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s), except that where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels.

(3) Where, in the opinion of the appropriate authority, the use of high-intensity obstacle lights, Type A, at night may dazzle pilots in the vicinity of an aerodrome, within approximately 10 000 m radius, or cause significant environmental concerns, medium-intensity obstacle lights, Type C, shall be used alone, whereas medium-intensity obstacle lights, Type B, shall be used either alone or in combination with low-intensity obstacle lights, Type B.

(4) Where an object is indicated by medium-intensity obstacle lights, Type A, additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 105 m.

(5) Where an object is indicated by medium-intensity obstacle lights, Type B, additional lights shall be provided at intermediate levels and these additional intermediate lights shall be alternately low-intensity obstacle lights, Type B, and medium-intensity obstacle lights, Type B, and shall be spaced as equally as practicable between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.

(6) Where an object is indicated by medium-intensity obstacle lights, Type C, additional lights shall be provided at intermediate levels and these additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.

Marking
of wind
turbines

237.-(1) A wind turbine shall be marked and/or lighted if is determined to an obstacle by the Authority.

(2) The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines shall be painted white, unless otherwise indicated by an aeronautical study.

Lighting
of wind
turbines

238.-(1) When lighting is deemed necessary, medium-intensity obstacle lights shall be used and in the case of a wind farm, i.e. a group of two or more wind turbines, it shall be regarded as an extensive object and the lights shall be installed –

- (a) to identify the perimeter of the wind farm;
- (b) respecting the maximum spacing between the lights along the perimeter, unless a dedicated assessment shows that a greater spacing can be used;
- (c) so that, where flashing lights are used, they flash simultaneously; and
- (d) so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located.

(2) The obstacle lights shall be installed on the nacelle in such a manner as to provide an unobstructed view for aircraft approaching from any direction.

Marking
of
overhead
wires,
cables,
etc., and
supporting
towers

239.-(1) The wires, cables, etc., to be marked shall be equipped with markers and the supporting tower shall be coloured.

(2) The supporting towers of overhead wires, cables, etc., that require marking shall be marked in accordance with these regulations, except that the marking of the may be omitted when they are lighted by high-intensity obstacle lights by day.

(3) Markers displayed on or adjacent to objects shall be located in conspicuous positions so as to retain the general definition of the object and shall be recognizable in clear weather from a distance of at least 1 000 m for an object to be viewed from the air and 300 m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object.

(4) Subject to sub-regulation (3), the shape of markers shall be distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information, and they shall be such that the hazard presented by the object they mark is not increased.

(5) A marker displayed on an overhead wire, cable, etc., shall be spherical and have a diameter of not less than 60 cm.

(6) The spacing between two consecutive markers or between a marker and a supporting tower shall be appropriate to the diameter of the marker, but in no case shall the spacing exceed:

- (a) 30 m where the marker diameter is 60 cm progressively increasing with the diameter of the marker to
- (b) 35 m where the marker diameter is 80 cm and further progressively increasing to a maximum of
- (c) 40 m where the marker diameter is of at least 130 cm.

and where multiple wires, cables, etc., are involved, a marker shall be located not lower than the level of the highest wire at the point marked.

(7) A marker shall be of one colour and when installed, white and red, or white and orange markers shall be displayed alternately and the colour selected shall contrast with the background against which it will be seen.

(8) 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, shall be provided on their supporting towers.

Lighting
of
overhead
wires,
cables,
etc., and
supporting
towers

240.-(1) High-intensity obstacle lights, Type B, shall be used to indicate the presence of a tower supporting overhead wires, cables, etc., where –

- (a) an aeronautical study indicates such lights to be essential for the recognition of the presence of wires, cables, etc.; or
- (b) it has not been found practicable to install markers on the wires, cables, etc.

(2) Where high-intensity obstacle lights, Type B, are used, they shall be located at three levels:

- (a) at the top of the tower;
- (b) at the lowest level of the catenary of the wires or cables; and
- (c) at approximately midway between these two levels.

and in some cases, this may require locating the lights off the tower.

(3) High-intensity obstacle lights, Type B, indicating the presence of a tower supporting overhead wires, cables, etc., shall flash sequentially; first the middle light, second the top light and last, the bottom light, and the intervals between flashes of the lights shall approximate the following ratios:

Flash interval between time	Ratio of cycle
middle and top light	1/13
top and bottom light	2/13
bottom and middle light	10/13

and where high intensity obstacle lights are intended for day use as well as for night use, care shall be taken to ensure that these lights do not create disconcerting dazzle.

(4) Where, in the opinion of the appropriate authority, the use of high-intensity obstacle lights, Type B, at night may dazzle pilots in the vicinity of an aerodrome (within approximately 10 000 m radius) or cause significant environmental concerns, a dual obstacle lighting system shall be provided.

(5) The dual obstacle lighting system required by sub-regulation (4) shall be composed of high-intensity obstacle lights, Type B, for daytime and twilight use and medium-intensity obstacle lights, Type B, for night-time use and where medium-intensity lights are used they shall be installed at the same level as the high-intensity obstacle light Type B.

(6) The installation setting angles for high-intensity obstacle lights, Type B, shall be in accordance with Table 8.

Table 8. Installation setting angles for high-intensity obstacle lights

Height of light unit above terrain	Angle of the p above the
greater than 151 m AGL	
122 m to 151 m AGL	
92 m to 122 m AGL	
less than 92 m AGL	

PART XV

VISUAL AIDS FOR DENOTING RESTRICTED USE AREAS

241. This Part applies to all categories of aerodromes.

242.-(1) An operator shall ensure that restricted areas are marked in a manner that is visible to aircraft operating on the ground and in the air.

(2) An aerodrome operator shall adhere to visual aids requirements prescribed in these regulations so as to ensure that aircraft operations can be conducted safely on the aerodrome.

243.-(1) A closed marking shall be displayed on a runway or taxiway, or portion thereof, which is permanently closed to the use of all aircraft as prescribed in the Ninth Schedule.

(2) A closed marking shall 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 (less than 3 days) and adequate warning by air traffic services is provided.

(3) On a runway, a closed marking shall be placed at each end of the runway, or portion thereof, declared closed, and additional markings shall be so placed that the maximum interval between markings does not exceed 300m and on a taxiway a closed marking shall be placed at least at each end of the taxiway or portion thereof closed.

(4) The closed marking shall be of the form and proportions as detailed in Figure 3, Illustration a), when displayed on a runway, and shall be of the form and proportions as detailed in Figure 3 (Illustration b), when displayed on a taxiway and the marking shall be white when displayed on a runway and shall be yellow when displayed on a taxiway.

(5) When an area is temporarily closed, frangible barriers or markings utilizing materials other than paint or other suitable means may be used to identify the closed area.

(6) When a runway or taxiway or portion thereof is permanently closed, all normal runway and taxiway markings and lighting shall be obliterated or removed.

(7) Lighting on a closed runway or taxiway or portion thereof shall not be operated, except as required for maintenance purposes.

(8) 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, un-serviceability lights shall be placed across the entrance to the closed area at intervals not exceeding 3m.

Marking
of non-
load-
bearing
surfaces

244.-(1) Shoulders for taxiways, 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.

(2) A taxi side stripe marking shall be placed along the edge of the load-bearing pavement, with the outer edge of the marking approximately on the edge of the load-bearing pavement.

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

Marking
of Pre-
threshold
areas

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

(2) A chevron marking shall point in the direction of the runway and be placed at pre-threshold pavement.

(3) A chevron marking shall be of conspicuous colour and contrast with the colour used for the runway markings; it shall preferably be yellow. It shall have an overall width of at least 0.9m.

Marking
and
lighting of
unservicea-
ble areas

246.-(1) Un-serviceability 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 and shall also be displayed at the entrances to a permanently or temporarily closed runway or taxiway, or part thereof whereas on a movement area used at night, un-serviceability lights shall be used.

(2) Un-serviceability markers and lights shall be placed at intervals sufficiently close so as to delineate the unserviceable area.

(3) Un-serviceability markers shall consist of conspicuous upstanding devices such as flags, cones or marker boards.

(4) An un-serviceability light shall consist of a red fixed light and the light shall have intensity sufficient to ensure conspicuity considering the 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 and in no case shall the intensity be less than 10 cd of red light.

(5) An un-serviceability cone shall be at least 0.5m in height and red, orange or yellow or any one of these colours in combination with white.

(6) An un-serviceability flag shall be at least 0.5m square and red, orange or yellow or any one of these colours in combination with white.

(7) An un-serviceability marker board shall be at least 0.5m in height and 0.9m in length, with alternate red and white or orange and white vertical stripes.

PART XVI

AERODROME OPERATIONAL SERVICES, EQUIPMENT, INSTALLATIONS AND FACILITIES

Applicatio
n of this
Part

247. This Part applies to all categories of aerodromes except where otherwise specified.

Immigrati
on,
customs
and excise
aerodrome
s

248. The Authority may, in consultation with the authorities responsible for immigration, customs and excise, notify of any aerodrome which is introduced as, or ceases to be a place for landing or departure of aircraft for purposes of the laws relating to immigration, customs and excise.

Supply of
aviation
fuel to
aircraft

249.-(1) An operator of an aviation fuel installation at an aerodrome shall not cause or permit any aviation fuel to be delivered to that installation or from it, to an aircraft unless -

- (a) when the aviation fuel is delivered to the installation, the operator of the aviation fuel installation is satisfied that -
 - (i) the installation is capable of storing and dispensing the fuel so as not to render it unfit for use in an aircraft;
 - (ii) the installation is marked in an appropriate manner to the grade of the fuel stored or where different grades are stored in different parts, that each part is so marked;

(iii) in the case of delivery into the installation or part of the installation from a vehicle or vessel, the fuel has been sampled and is of the grade appropriate to that installation or part of the installation as the case may be and is fit for use in an aircraft;

(b) when aviation fuel is dispensed from the installation, the operator of the aviation fuel installation is satisfied after sampling, that the fuel is fit for use in an aircraft.

(2) A person shall not cause or permit aviation fuel to be dispensed for use in an aircraft where that person knows or has reason to believe that the aviation fuel is not fit for use in an aircraft.

(3) An operator of an aviation fuel installation shall not on an aerodrome, supply fuel to an aircraft except at a place and in a manner approved by the operator.

(4) An operator may subject to the approval granted under sub-regulation (3), ensure compliance with any conditions as the operator may impose, in order to safeguard persons or property on the ground.

(5) An operator of an aviation fuel installation shall keep a written record in respect of each installation managed by that operator.

(6) The record in sub-regulation (5) shall include -

(a) particulars of the grade and quantity of aviation fuel delivered and the date of delivery;

(b) particulars of all samples taken of the aviation fuel and of the results of the tests of those samples; and

(c) particulars of the maintenance and cleaning of the installation.

(7) An operator of an aviation fuel installation shall preserve the written record for a period of twelve months or such longer period as the Authority may in a particular case direct and shall, within a reasonable time after being requested to do so by an authorised person, produce the record to that authorised person.

(8), The Authority or an authorised person may direct the operator of an aviation fuel installation not to permit aviation fuel to be dispensed from that installation until the direction is revoked by the Authority or that authorised person, where it appears to the Authority or to that authorised person that aviation fuel is intended or likely to be delivered in contravention of this regulation.

For the purpose of this regulation –

- (a) “aviation fuel” means fuel intended for use in an aircraft; and
- (b) “aviation fuel installation” means any apparatus or container, including a vehicle designed, manufactured or adapted for the storage of aviation fuel or for the delivery of fuel to an aircraft.

Aerodrom
e
emergenc
y planning

250.-(1) An operator shall establish an aerodrome emergency plan at the aerodrome, which shall be commensurate with the aircraft operations and other activities conducted at the aerodrome.

(2) An aerodrome emergency plan shall set forth the procedures for cooperation and coordinating the response of different aerodrome agencies and services and of those agencies in the surrounding community that could be of assistance in responding to an emergency.

(3) An aerodrome emergency plan shall provide for the coordination of the actions to be taken in the event of an emergency occurring at the aerodrome or in its vicinity.

(4) Aerodrome emergencies shall include –

- (a) aircraft emergencies;
- (b) sabotage including bomb threats;
- (c) unlawfully seizure of aircraft;
- (d) dangerous goods occurrences;
- (e) building fires;
- (f) natural disasters; and
- (g) public health emergencies.

(5) Subject to sub-regulation (4) (e), public health emergencies shall include—

- (a) increased risk of travellers or cargo spreading a serious communicable disease internationally through air transport; and
- (b) severe outbreak of a communicable disease potentially affecting a large proportion of aerodrome staff.

(6) The emergency plan shall provide for the response and participation of all agencies whose assistance is required in the event of an emergency, including -

- (a) at an aerodrome -
 - (i) air traffic control unit;
 - (ii) rescue and fire fighting services;
 - (iii) aerodrome administration;
 - (iv) medical and ambulance services;
 - (v) aircraft operators;
 - (vi) security services; and
 - (vii) airport police unit
- (b) outside the aerodromes -
 - (i) fire departments;
 - (ii) Police services;
 - (iii) health authorities including medical, ambulance services, hospitals and public health services;
 - (iv) the military forces
 - (v) harbour patrol or coast guard

(7) Public health services shall include planning to minimize adverse effects to the community from health-related events and deal with population health issues rather than provision of health services to individuals.

(8) The plan shall provide for cooperation and coordination with the rescue coordination centre as necessary.

(9) The aerodrome emergency plan shall include at least the following-

- (a) the types of emergencies planned for;
- (b) agencies to be involved in the plan;

- (c) the responsibility and role of each agency, the emergency operation centre and the command post for each type of emergency;
- (d) names and contacts 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.

(10) In developing an aerodrome emergency plan, the operator shall take into consideration the human factor principles to ensure optimum response by all existing agencies participating in the emergency operations.

(11) This regulation applies to aerodromes in category A.

(12) This regulation may apply to aerodromes in category B where deemed necessary by the Authority.

(13) This regulation shall not apply to aerodromes in categories C, D and E.

Emergency
planning
committee

251.-(1) An operator shall form an emergency planning committee to discuss, determine and implement emergency planning arrangements commensurate with the size and type of aircraft that use the aerodrome.

(2) This regulation applies to aerodromes in category A,

(3) This regulation may apply to an aerodrome in category B where deemed necessary by the Authority.

(4) This regulation shall not apply to aerodromes in categories C, D and E.

Emergency
operation
centre and
command
post

252.-(1) An operator of an aerodrome shall ensure that a fixed emergency operations centre and mobile command posts are available for use during an emergency.

(2) The emergency operations centre shall be a part of the aerodrome facilities and shall be responsible for the overall coordination and general direction of the response to an emergency.

(3) The command post shall be a facility capable of being moved rapidly to the site of an emergency, when required, and shall undertake the local coordination of those agencies responding to the emergency.

(4) An operator shall ensure that a person is assigned to assume control of the emergency operations centre and, when appropriate, another person for the mobile command post.

(5) An operator shall ensure that adequate communication systems linking the command post and the emergency operations centre with each other and with the participating agencies are provided in accordance with the plan and are consistent with the particular requirements of the aerodrome.

(6) This regulation applies to aerodromes in category A.

(7) This regulation may apply to an aerodrome in category B where deemed necessary by the Authority.

(8) This regulation shall not apply to aerodromes in categories C, D and E.

Aerodrome
emergency
exercise

253.-(1) The aerodrome emergency plan shall contain procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness and shall include all participating agencies and associated equipment.

(2) The aerodrome emergency plan required by sub-regulation (1) shall be tested by conducting –

- (a) a full-scale aerodrome emergency exercise at intervals not exceeding two years and partial emergency exercises in the intervening year to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected; or

- (b) a series of modular tests commencing in the first year and concluding in a full-scale aerodrome emergency exercise at intervals not exceeding three years;
 - (c) and reviewed thereafter, or after an actual emergency, so as to correct any deficiency found during such exercises or actual emergency;
 - (d) contingency plan exercises in accordance with the Civil Aviation (Security) Regulations.
- (3) The purpose of a full-scale exercise shall be to ensure the adequacy of the plan to cope with different types of emergencies.
- (4) The purpose of a partial exercise shall be to ensure the adequacy of the response to individual participating agencies and components of the plan, such as the communications system.
- (5) The purpose of modular tests shall be to enable concentrated effort on specific components of established emergency plans
- (6) An assessment of the approach and departure areas within 1 000 m of the runway threshold shall be carried out to determine the options available for intervention.
- (7) This regulation applies to aerodromes in category A.
- (8) This regulation may apply to an aerodrome in category B where deemed necessary by the Authority.

Emergencies in difficult environment

254.-(1) The aerodrome emergency plan shall include the ready availability of and coordination with appropriate specialist rescue services to be able to respond to emergencies where an aerodrome is located close to water, and/or swampy areas or difficult terrain and where a significant portion of approach or departure operations takes place over these areas.

(2) At an aerodrome located close to a water body, a swampy area, or difficult terrain, the aerodrome emergency plan shall include the establishment, testing and assessment at regular intervals of a pre-determined response for the specialist rescue services.

(3) An assessment of the approach and departure areas within 1,000 m of the runway threshold shall be carried out to determine the options available for intervention.

(4) This regulation applies to aerodromes in category A.

(5) This regulation may apply to an aerodrome in category B where deemed necessary by the Authority.

(6) This regulation shall not apply to aerodromes in categories C, D and E.

Establish
ment of
aerodrome
rescue and
fire
fighting
services

255. -(1) An operator shall put in place rescue and firefighting equipment and services commensurate with the category of the aerodrome.

(2) Public or private organizations, suitably located and equipped, may be designated to provide the rescue and fire fighting service and where designated the fire station housing these organizations shall where possible be located on the aerodrome.

(3) The rescue and fire fighting service at an aerodrome shall be under the administrative control of the aerodrome management, which shall also be responsible for ensuring that the service provided is organized, equipped, staffed, trained and operated in such a manner as to fulfil its proper functions.

(4) Where an aerodrome is located close to a water body, a swampy area or difficult terrain and where a significant portion of approach or departure operations takes place over such an area, specialist rescue services and fire-fighting equipment appropriate to the hazard and risk shall be made available.

(5) Subject to sub-regulation (3), the operator of the aerodrome shall plan and deploy the necessary life-saving flotation equipment as expeditiously as possible in a number commensurate with the largest aeroplane normally using the aerodrome.

(6) These regulations shall apply to aerodromes in categories A and B

(7) The Authority may prescribe alternative means of compliance with this regulation for aerodromes in categories C and D.

Determina
tion of
aerodrome
rescue and
fire
fighting
category

256.-(1) The aerodrome rescue and fire fighting services category shall be determined using Table 9 and shall be based on the longest aircraft that normally uses the aerodrome, and its fuselage width.

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

Table 9 – Aerodrome category for rescue and fire fighting

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

Level of
protection
for rescue
and fire

257.-(1) A operator shall provide an appropriate level of protection commensurate with the rescue and fire fighting category as described in Table 9.

fighting
services

(2) The level of protection provided at an aerodrome for rescue and fire fighting shall be appropriate to the aerodrome category 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.

(3) 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.

(4) Both principal and complementary agents shall be provided at an aerodrome.

(5) The principal extinguishing agent shall be:

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

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

(c) a foam meeting the minimum performance level C; or

(d) a combination of these agents;

except that the principal extinguishing agent for aerodromes in categories 1 to 3 shall preferably meet the minimum performance level B or C foam.

(6) The complementary extinguishing agent shall be a dry chemical powder suitable for extinguishing hydrocarbon fires, and care must be taken to ensure compatibility when selecting dry chemical powder for use with foam; and alternate complementary agents having equivalent fire fighting capability may be utilised.

(7) (a) 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 aerodrome category determined in accordance with Table 10 below.

(b) For the purpose of agent substitution, 1 kg of complementary agent shall be taken as equivalent to 1.0 L of water for production of a foam meeting performance level A.

(c) The amounts of water specified for foam production shall be predicated on an application rate of 8.2 L/min/m² for a foam meeting performance level A, 5.5 L/min/m² for a foam meeting performance level B and 3.75 L/min/m² for a foam meeting performance level C; and when any other complementary agent is used, the substitution ratios shall be checked.

Table 10 - Minimum usable amounts of extinguishing agents

Aerodrome fire Category	Foam meeting performance level A		Foam meeting performance level B		Foam meeting Performance level C		Complementary agents	
	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 Powder (DCP) (kg)	Discharge rate (kg/sec)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	50	50	30	30	60	160	45	2.25
2	000	00	70	50	60	360	90	2.25
3	800	300	200	00	20	630	135	2.25
4	600	600	400	800	700	1100	135	2.25
5	100	500	400	000	900	2200	180	2.25
6	1800	000	900	000	800	2900	225	2.25
7	8200	900	2100	300	800	3800	225	2.25
8	7300	0800	8200	200	2800	5100	450	4.5
9	6400	3500	4300	000	7100	6300	450	4.5
10	8200	6600	2300	1200	2800	7900	450	4.5

(8) For aerodrome fire fighting categories 1 and 2, up to one hundred per cent of water may be replaced by a complementary agent.

(9) At aerodromes where operations by aeroplanes larger than the average size in a given category are planned, the quantities of water shall be recalculated and the amount of water for foam production and the discharge rates for foam solution shall be increased accordingly.

(11) The quantity of foam concentrates separately provided on vehicles for foam production shall be in proportion to the quantity of water provided and the foam concentrate selected.

(12) The amount of foam concentrate provided on a vehicle shall be sufficient to produce at least two loads of foam solution.

(13) Supplementary water supplies, for the expeditious replenishment of rescue and fire fighting vehicles at the scene of an aircraft accident, shall be provided.

(14) When a combination of different performance level foams are provided at an aerodrome, the total amount of water to be provided for foam production shall be calculated for each foam type and the distribution of these quantities shall be documented for each vehicle and applied to the overall rescue and firefighting equipment.

(15) The complementary agents shall comply with the appropriate specifications of the International Organization for Standardisation (ISO 7202 (Powder)).

(16) The discharge rate of the foam solution and of complementary agents shall be no less than the values shown in Table 10.

(17) The discharge rate of complementary agents shall be no less than the values shown in Table 10.

(18) Dry chemical powders shall only be substituted with an agent that has equivalent or better fire fighting capabilities for all types of fires where complementary agent is expected to be used.

(19) This regulation applies to aerodromes in category A.

(20) This regulation may apply to aerodromes in category B where deemed necessary by the Authority.

Provision
of reserve
supplies
of water
and foam
for fire
fighting
vehicles

258.-(1) A reserve supply of foam concentrate, equivalent to 200 per cent of the quantities identified in Table 10, shall be maintained on the aerodrome for vehicle replenishment purposes and foam concentrate carried on fire vehicles in excess of the quantities specified in Table 10, shall be considered to contribute to the reserve.

(2) A reserve supply of complementary agent, equivalent to 100 per cent of the quantity identified in Table 10, shall be maintained on the aerodrome for vehicle replenishment purposes and sufficient propellant gas shall be included to utilize this reserve complementary agent.

(3) Category 1 and 2 aerodromes that have replaced up to 100 per cent of the water with complementary agent shall hold a reserve supply of complementary agent of 200 per cent.

(4) Where a major delay in the replenishment of the supplies is anticipated, the amount of reserve supply required by sub-regulations (1), (2) and (3) shall be increased as determined by a risk assessment.

(5) This regulation applies to aerodromes in categories A

(6) This regulation may apply to aerodromes in category B where deemed necessary by the Authority.

Provision
of rescue
equipment

259.-(1) An operator shall ensure that rescue equipment commensurate with the level of aircraft operations are provided on the rescue and fire fighting vehicle(s)

(2) This regulation applies to aerodromes in category A.

(3) This regulation may apply to aerodromes in category B where deemed necessary by the Authority.

Response
time for
rescue and
fire
fighting
services

260.-(1) The operational objective of the rescue and fire fighting service shall be to achieve a response time not exceeding three minutes to any point of each operational runway in optimum visibility and surface conditions.

(2) The operational objective of the rescue and fire fighting service shall be to achieve a response time not exceeding three minutes to any other part of the movement area in optimum visibility and surface conditions.

(3) For the purpose of these regulations, response time means 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 10 and optimum visibility while optimum visibility and surface conditions means daytime, good visibility, no precipitation with normal response route free of surface contamination such as water.

(4) To meet the operational objectives as nearly as possible in less than optimum conditions of visibility, especially during low visibility operations, suitable guidance, equipment and/or procedures for rescue and fire fighting services shall be provided.

(5) Any vehicles, other than the first responding vehicle(s), required to deliver the amounts of extinguishing agents specified in Table 10 shall ensure continuous agent application and shall arrive no more than four minutes from the initial call.

(6) A system of preventive maintenance of rescue and fire fighting vehicles shall be employed to ensure effectiveness of the equipment and compliance with the specified response time throughout the life of the vehicle.

(7) This regulation applies to aerodromes in category A.

(8) This regulation may apply to aerodromes in category B where deemed necessary by the Authority.

(9) This regulation shall not apply to aerodromes in categories C, D and E.

Establish
ment of
emergenc
y access
roads

261.-(1) Emergency access roads shall be provided aton an aerodrome where terrain conditions permit their construction, so as to facilitate achieving minimum response times.

(2) Particular attention shall be given to the provision of ready access to approach areas up to 1 000 m from the threshold, or at least within the aerodrome boundary and where a fence is provided, the need for convenient access to outside areas shall be taken into account.

(3) Aerodrome service roads may serve as emergency access roads when they are suitably located and constructed.

(4) Emergency access roads shall be capable of supporting the heaviest vehicles which will use them, and be usable in all weather conditions.

(5) Roads within 90 m of a runway shall be surfaced to prevent surface erosion and the transfer of debris to the runway. Sufficient vertical clearance shall be provided from overhead obstructions for the largest vehicles.

(6) When the surface of the road is indistinguishable from the surrounding area, edge markers shall be placed at intervals of about 10 m.

(7) This regulation applies to aerodromes in category A and B.

Rescue
and fire
fighting
service
stations

262.-(1) Rescue and fighting vehicles shall be housed in a fire station.

(2) Satellite fire stations shall be provided where the response time cannot be achieved from a single fire station.

(3) The fire station shall 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.

(4) This regulation applies to aerodromes category A and as appropriate, to aerodromes in category B.

Provision
of
communication and
alerting
systems
for rescue
and fire
fighting
services

263.-(1) An operator shall provide a discreet communication system linking a fire station with the control tower, any other fire station on the aerodrome and the rescue and fire fighting vehicles.

(2) An alerting system for rescue and fire fighting personnel, capable of being operated from that station, shall be provided at a fire station, any other fire station on the aerodrome and at the aerodrome control tower.

- (3) This regulation applies to aerodromes in category A.
- (4) This regulation shall apply to aerodromes in category B as appropriate

Minimum
number of
rescue and
fire
fighting
vehicles

264. The minimum number of rescue and fire fighting vehicle provided at an aerodrome shall be in accordance with table 11.

Table 11 - Minimum number of rescue and fire fighting vehicles

Aerodrome fire category	Number of 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

Requirem
ents for
rescue and
fire
fighting
personnel

265.-(1) An operator shall carry out a task resource analysis to determine the minimum number of rescue and fire fighting personnel required at the aerodrome, and shall document in the Aerodrome Manual, the level of staffing.

(2) An operator shall ensure that all rescue and fire fighting personnel are properly trained to perform their duties in an efficient manner, and shall participate in live fire drills commensurate with the types of aircraft and type of rescue and firefighting equipment in use at the aerodrome, including pressure-fed fuel fires.

For the purpose of these regulations, Pressure-fed fires are fires associated with fuel discharge under very high pressure from a ruptured fuel tank.

(3) The training curriculum shall include initial and recurrent instruction in at least the following areas:

- (a) airport familiarization;
- (b) aircraft familiarization;
- (c) rescue and fire fighting personnel safety;
- (d) emergency communications systems on the aerodrome, including aircraft fire-related alarms;
- (e) use of the fire hoses, nozzles, turrets and other appliances required for compliance with standards prescribed by the authority
- (f) application of the types of extinguishing agents required for compliance with standards prescribed by the authority
- (g) emergency aircraft evacuation assistance;
- (h) fire fighting operations;
- (i) adaptation and use of structural rescue and firefighting equipment for aircraft rescue and fire fighting;
- (j) dangerous goods;
- (k) familiarization with fire fighters' duties under the aerodrome emergency plan; and
- (l) protective clothing and respiratory protection.

(4) The rescue and fire fighting personnel training programme shall include training in live fire training, human performance, including team coordination.

(5) During flight operations, sufficient trained and competent personnel shall be designated to be readily available to ride operate the rescue and fire fighting vehicles and to operate the equipment at maximum capacity.

(6) The rescue and fire fighting personnel shall be deployed in a way that ensures that minimum response times can be achieved and that continuous agent application at the appropriate rate can be fully maintained, taking into account, the need for the personnel to use hand lines, ladders and other rescue and firefighting equipment normally associated with aircraft rescue and fire fighting operations.

(7) All responding rescue and fire fighting personnel shall be equipped provided with protective clothing and respiratory equipment to enable them to perform their duties in an effective manner including –

- (a) helmets;
- (b) proximity suits;
- (c) boots;
- (d) gloves;

(8) This regulation shall apply to aerodromes in category A and to category B as appropriate.

Removal
of
disabled
aircraft

266.-(1) An operator shall have in place a plan for the removal of an aircraft disabled on, or adjacent to, the movement area and shall designate a coordinator to implement the plan when necessary.

(2) The disabled aircraft removal plan shall 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) arrangement for the rapid receipt of aircraft recovery equipment kits from other aerodromes, where applicable; and
- (c) the name and contact information and capability of the aerodrome for the s of the co-ordinator designated to implementation the plan.

(3) The plan under this regulation shall include particulars of the procedures for removing a disabled aircraft on the movement area or adjacent to it.

(4) This regulation shall not apply to aerodromes in categories B, C, D and E unless otherwise specified by the Authority.

Apron
management
service

267.-(1) When warranted by the volume of traffic and operating conditions, an appropriate apron management service shall be provided on an apron by an aerodrome air traffic services unit, by the 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.

(2) Where the aerodrome control tower does not participate in the apron management service, procedures shall be established to facilitate the orderly transition of aircraft between the apron management unit and the aerodrome control tower.

(3) An operator shall ensure that, where an apron management service is established and, radio telephony communication facilities are provided.

(4) Where low visibility procedures are in effect, persons and vehicles operating in the apron shall be restricted to the essential minimum.

(5) An emergency vehicle responding to an emergency shall have priority over all other surface movement traffic.

(6) vehicle operating on an apron shall:

- (a) give way to an emergency vehicle; an aircraft taxiing, about to taxi, or being pushed or towed; and
- (b) give way to other vehicles in accordance with local regulations.

(7) An operator shall ensure visual monitoring of aircraft stand shall be visually monitored to ensure that the recommended clearances distances are provided to an aircraft using the stand and the control of vehicle movement on apron.

(8) This regulation does not apply to aerodromes in categories C, D and E unless otherwise deemed necessary by the Authority.

Ground
servicing
of aircraft

268.-(1) An operator shall ensure that trained personnel and fire extinguishing equipment, suitable for at least the initial intervention in the event of a fuel fire, is readily available during the ground servicing of an aircraft, and that there is means of quickly summoning the rescue and fire fighting service in the event of a fire or major fuel spill.

(2) An operator shall ensure that, when aircraft refuelling operations take place while passengers are on board, embarking or disembarking, ground equipment are positioned in a manner that allows -

(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.

Aerodrom
e vehicle
operation

269.-(1) A person shall not operate a vehicle on the manoeuvring area at an aerodrome where air traffic service is provided, except where authorized by the aerodrome control tower.

(2) A person shall not operate a vehicle on an apron of an aerodrome except where authorized by the aerodrome operator.

(3) A vehicle operating on the movement area shall have a rotating beacon.

(4) A driver of the vehicle on the movement area shall comply with all mandatory instructions conveyed by markings and signs, where the vehicle is on the manoeuvring area, except where the driver is authorized by:

- (a) the aerodrome control tower when on the manoeuvring area; and
- (b) on an apron only as authorized by the appropriate designated authority.

(5) A driver of the vehicle on the movement area shall comply with all mandatory instructions conveyed by lights.

(6) A driver of a vehicle on the movement area shall comply with all mandatory instructions conveyed by lights and instructions issued by the aerodrome control tower where the vehicle is on the manoeuvring area or by the appropriate designated authority, where the vehicle is on an apron.

(7) A driver of a vehicle on the movement area shall be appropriately trained for the tasks to be performed and shall comply with the instructions issued by:

- (a) the aerodrome control tower, when on the manoeuvring area; and
- (b) the appropriate designated authority, when on the apron.

(8) A driver of a radio-equipped vehicle shall establish satisfactory two-way radio communication with the aerodrome control tower before entering the manoeuvring area and with the appropriate designated authority before entering the apron, and shall maintain a continuous listening watch on the assigned frequency while on the movement area.

Surface
movement

270.-(1) A surface movement guidance and control system (SMGCS) shall be provided at an aerodrome.

guidance
and
control
systems

(2) The design of an SMGCS provided at an aerodrome shall take into account:

- (a) the density of air traffic;
- (b) the visibility conditions under which operations are intended;
- (c) the need for pilot orientation;
- (d) the complexity of the aerodrome layout;
- (e) and movements of vehicles.

(3). The visual aid components of an SMGCS, that is, markings, lights and signs, shall be designed to conform with the relevant specifications in these regulations

(4) An SMGCS shall be designed to assist in the prevention of inadvertent incursions of aircraft and vehicles onto an active runway or taxiway, and collision on any part of the movement area, taking into account of sub regulation (2) above.

(5) The system shall be designed to assist in the prevention of collisions between aircraft, and between aircraft and vehicles or objects, on any part of the movement area.

(6) Where an SMGCS is provided by selective switching of stop bars and taxiway centre line lights, the following requirements shall be met:

- (a) taxiway routes which are indicated by illuminated taxiway centre line lights shall be capable of being terminated by an illuminated stop bar;
- (b) the control circuits shall be so arranged that when a stop bar located ahead of an aircraft is illuminated, the appropriate section of taxiway centre line lights beyond it is suppressed; and
- (c) the taxiway centre line lights are activated ahead of an aircraft when the stop bar is suppressed.

(7) Surface movement radar for the maneuvering area shall be provided at an aerodrome intended for use in runway visual range conditions less than a value of 350 m.

(8) Surface movement radar for the maneuvering area shall be provided at an aerodrome other than that in sub-regulation (7) when traffic density and operating conditions are such that regularity of traffic flow cannot be maintained by alternative procedures and facilities.

(9) This regulation shall apply to aerodromes in category A.

Sitting of
equipment
and
installations
on
operational
areas

271.-(1) An aerodrome operator shall comply with the frangibility and height restriction requirements for equipment or installations located near or on a runway strip, on the non-graded portion of a runway strip, on precision approach runways, or for obstacles of operational significance

(2) Unless its function requires it to be there for air navigation or for aircraft safety 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 2, column 11, if it would endanger an aircraft; or

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

(3) Any equipment or installation required for air navigation or for aircraft safety purposes which must be located:

(a) on that portion of a runway strip within:

(i) 75 m of the runway centre line where the code number is 3 or 4; or

(ii) 45 m of the runway centre line where the code number is 1 or 2; or

(b) on a runway end safety area, a taxiway strip or within the distances specified in Table 2; or

(c) on a clearway and which would endanger an aircraft in the air;

shall be frangible and mounted as low as possible.

(3) Any equipment or installation required for air navigation or for aircraft safety purposes which must be located on the non-graded portion of a runway strip shall be regarded as an obstacle and shall be frangible and mounted as low as possible.

(4) Unless its function requires it to be there for air navigation or for aircraft safety purposes, no equipment or installation shall be located within 240 m from the end of the strip and within:

- (a) 60 m of the extended centre line where the code number is 3 or 4; or
 - (b) 45 m of the extended centre line where the code number is 1 or 2;
- of a precision approach runway category I, II or

III.

(5) Any equipment or installation required for air navigation or for aircraft safety purposes which must be located on or near a strip of a precision approach runway category I, II or III and which:

- (a) is situated on that portion of the strip within 77.5 m of the runway centre line where the code number is 4 and the code letter is F; or
- (b) is situated within 240 m from the end of the strip and within:
 - (i) 60 m of the extended runway centre line where the code number is 3 or 4; or
 - (ii) 45 m of the extended runway centre line where the code number is 1 or 2; or
- (c) penetrates the inner approach surface, the inner transitional surface or the balked landing surface; shall be frangible and mounted as low as possible.

(6) Any equipment or installation required for air navigation or for aircraft safety purposes which is an obstacle of operational significance shall be frangible and mounted as low as possible.

Location,
constructi
on and
installatio
n of
equipment
on
operationa
l areas

272.-(1) Except for the purpose of air navigation or for aircraft safety, a person shall not construct or install equipment or any installation on a runway strip, a runway end safety area, a taxiway strip, a clearway or within any distances determined by the Authority, where the construction or the equipment may endanger the safety of an aircraft.

(2) Where any equipment or installation required for air navigation or for aircraft safety purposes is to be located on a portion of a runway strip or on a runway end safety area, a taxiway strip or within any distances determined by the Authority, the equipment or installation shall be frangible and mounted as low as possible in accordance with the standards prescribed in these regulations.

Fencing of
aerodrome
s, and
ground
installatio
ns and
facilities

273.-(1) An operator of an aerodrome shall provide a fence or a suitable barrier on the aerodrome or off-aerodrome, ground installations and facilities, including sewers, ducts and tunnels -

- (a) to prevent the entrance into the movement area, of persons or any animals likely to be a hazard to aircraft; and
- (b) to deter the inadvertent or premeditated access of an unauthorised person onto a non-public area of the aerodrome.

(2) An operator shall provide suitable means of protection for an aerodrome to deter the inadvertent or premeditated access of unauthorised persons into ground installations and facilities essential for the safe operation of aircraft.

(3) The fence or barrier required under sub-regulation (1) shall be located so as to separate the movement area and other facilities or zones on the aerodrome which are vital to the safe operation of aircraft from areas open to public use.

(4) Where greater security is needed, a cleared area shall be provided on both sides of the fence or barrier to facilitate the work of patrols and to make trespassing more difficult and provision for a perimeter road along the aerodrome fencing for the use of both maintenance personnel and security patrols may be made.

(5) This regulation applies to aerodromes in category A.

(6) This regulation applies to aerodromes in category B except where deemed otherwise by the Authority

Lighting
of
Security
fences and
barriers
Security
lighting of
aerodrome
fence

274. Where it is deemed desirable for security reasons, a fence or other barriers provided for the protection of international civil aviation and its facilities shall be illuminated at a minimum essential level and the security lighting shall be located so that the ground area on both sides of the fence or barrier, particularly at access points, is illuminated.

Maintenan
ce of
safety
inspection
programm
e

275.-(1) An operator shall establish and maintain a safety inspection programme for the aerodrome.

(2) The safety inspection programme shall —

- (a) provide procedures to ensure that competent aerodrome personnel execute the programme effectively; and
- (b) provide a reporting system to ensure prompt correction of unsafe aerodrome conditions noted during any inspection.

Maintenan
ce of fire
prevention
programm
e

276.-(1) An operator shall establish a fire prevention programme with preventive measures against possible fires on the aerodrome and identify a person to maintain the fire prevention programme for the aerodrome and the aerodrome buildings.

(2) Where an aerodrome does not have designated fire service, the operator shall arrange with the relevant local government authority or any other concerned authority to maintain a fire prevention programme for the aerodrome and to advise the operator of any dangerous conditions for rectification.

(3) An operator shall ensure that unsafe practices that may result in fire are not performed on the aerodrome or within its vicinity.

(4) Notwithstanding sub-regulation (3) where unsafe practices are performed during maintenance on the aerodrome, an operator shall alert the rescue and fire fighting services concerned, to be on standby for the duration of the practices.

(5) Sub-regulation (1) shall not apply to aerodromes in category E

Access of
ground
vehicles to
aerodrome
movement
area

277.-(1) An operator shall -

- (a) limit the access of any ground vehicles used for aerodrome and aircraft operations, to the aerodrome manoeuvring area;
- (b) provide adequate procedures for the safe and orderly access of ground vehicles to the aerodrome and operation in the manoeuvring area of ground vehicles, where an air traffic service unit is in operation at the aerodrome, in order to ensure that each ground vehicle operating in the aerodrome manoeuvring area is controlled by -
 - (i) two-way radio communication between the vehicle and the air traffic service unit;
 - (ii) an accompanying radio communication or an escort vehicle with adequate measures including signals or guards to control the vehicle, where the vehicle does not have a radio;

- (c) provide adequate measures to ensure that ground vehicles operating in the aerodrome movement area are controlled by signs, pre-arranged signals or standards prescribed by the Authority, where an air traffic service unit is not in operation at the aerodrome;
- (d) ensure that any person who operates a ground vehicle on the aerodrome movement area is familiar with and complies with the rules and procedures for the operation of ground vehicles as prescribed by the Authority.

(2) An operator shall ensure that a person who has access to the aerodrome movement area wears a coloured reflective gear which shall be conspicuously displayed while on the movement area.

(3) In this regulation, “gear” includes a vest, band, overcoat, helmet and socks.

Operation
of Aircraft
exceeding
certified
characteris-
tics of an
aerodrome

288.-(1). An operator shall not accommodate an aircraft that exceeds the certified characteristics of aerodromes unless approved by the Authority

(2) . An aerodrome operator intending to accommodate an aircraft exceeding the certified characteristics of the aerodrome shall carry out a compatibility study in collaboration with stakeholders including but not limited to aircraft operator(s), Air Navigation Service providers and Ground handling agencies

(3). The operator shall assess the compatibility between the operation of the aeroplane and aerodrome infrastructure shall develop and implement appropriate measures in order to maintain an acceptable level of safety during operations

(4). Information concerning alternative measures, operational procedures and operating restrictions implemented at an aerodrome arising from sub regulations (2) and (3) above shall be published in Aeronautical Information Publication

PART XVII
AERODROME MAINTENANCE

Application of this Part

289. This part shall apply only to aerodromes in categories A and B.

Maintenance programme

290.-(1) An operator shall establish at the aerodrome, a maintenance programme, including preventive maintenance to maintain a facility in a condition that does not impair the safety, efficiency regularity and regularity efficiency of air navigation aircraft operations.

(2) the aerodrome operator maintenance shall include precautions for runway, taxiway and apron pavements and taxiway shoulders in relation to surface debris and regularity

(3) In this regulation -

“facility” includes a pavement, visual aid, fencing, drainage system and building;

“preventive maintenance” means programmed maintenance work done to prevent failure or degradation of a facility.

(4) The design and application of the maintenance programme shall observe Human Factors principles.

Maintenance of pavements and adjacent areas

291.-(1) An operator shall at all times ensure that -

(a) the surfaces of all movement areas including pavements (runways, taxiways, and aprons) and adjacent areas are inspected and their conditions monitored regularly as part of an aerodrome preventive and corrective maintenance programme with the objective of avoiding and eliminating any loose objects/debris that might cause damage to aircraft or impair the operation of aircraft systems;

(b) the surface of the runway is maintained in a condition that precludes formation of harmful irregularities such as water pools and rough surfaces;

- (c) a paved runway is be maintained in a condition so as to provide surface friction characteristics at or above the minimum friction level specified by the Authority.
- (d) runway surface friction characteristics for maintenance purposes is periodically measured with a continuous friction measuring device using self-wetting features and documented and that the frequency of these measurements are sufficient to determine the trend of the surface friction characteristics of the runway;
- (e) corrective maintenance action is taken to prevent the runway surface friction characteristics for either the entire runway or a portion thereof from falling below a minimum friction level specified by the Authority;
- (f) when there is reason to believe that the drainage characteristics of a runway or portions of the runway, are poor due to slopes or depressions, then the runway friction characteristics are assessed under natural or simulated conditions that are representative of local rain and corrective maintenance action is taken where necessary;
- (g) where a taxiway is used by turbine-engine aircraft, the surface of the taxiway shoulders is maintained so as to be free of any loose stones or other objects that may be ingested by the aircraft engines;

Removal
of
contamina
nts

292.-(1) Standing water, mud, dust, sand, oil, rubber deposits and other contaminants are removed from the surface of runways in use as rapidly and completely as possible to minimize accumulation.

(2) Chemicals which may have harmful effects on aircraft or pavements, or chemicals which may have toxic effects on the aerodrome environment, shall not be used.

Runway
pavement
overlays

293.-(1) An operator shall ensure that the overlaying of runway pavement overlays is done in accordance with standards prescribed in these regulations.

(2) The longitudinal slope of the temporary ramp, measured with reference to the existing runway surface or previous overlay course, shall be:

(a) 0.5 to 1.0 per cent for overlays up to and including 5 cm in thickness; and

(b) not more than 0.5 per cent for overlays more than 5 cm in thickness.

(3) Overlaying shall proceed from one end of the runway toward the other end so that based on runway utilization most aircraft operations will experience a down ramp.

(4) The entire width of the runway shall be overlaid during each work session.

(5) Before a runway being overlaid is returned to a temporary operational status, a runway centre line marking shall be provided and in addition, the location of any temporary threshold shall be identified by a 3.6 m wide transverse stripe.

(6) The frequency of these measurements shall be sufficient to determine the trend of the surface friction characteristics of the runway.

(7) An operator shall ensure that, the overlay is constructed and maintained above the minimum friction level specified by the Authority.

Preventive
maintenan
ce of
visual aids

294.-(1) An operator shall not operate an aerodrome unless a system of preventive maintenance of visual aids is employed at the aerodrome.

(2) The system of preventive maintenance of visual aids to be employed shall ensure lighting and marking system reliability and maintenance performance level objectives at an aerodrome.

(3) (a) A light shall be deemed to be unserviceable when the main beam average intensity is less than 50 per cent of the value specified in the appropriate figure in the Eighth Schedule to these regulations.

(b) For light units where the designed main beam average intensity is above the value shown in the Eighth Schedule to these regulations, the 50 per cent value shall be related to that design value.

(4) The system of preventive maintenance employed for a precision approach runway category II or III shall include at least the following checks:

- (a) visual inspection and in-field measurement of the intensity, beam spread and orientation of lights included in the approach and runway lighting systems;
- (b) control and measurement of the electrical characteristics of each circuitry included in the approach and runway lighting systems; and
- (c) control of the correct functioning of light intensity settings used by air traffic control.

(5) The in-field measurements of intensity, beam spread and orientation of lights included in approach and runway lighting systems for a precision approach runway category II or III shall be undertaken by measuring all lights, as far as practicable, to ensure conformance with the applicable specification of in the Eighth Schedule to these regulations.

(6) Measurement of intensity, beam spread and orientation of lights included in approach and runway lighting systems for a precision approach runway category II or III shall be undertaken using a mobile measuring unit of sufficient accuracy to analyse the characteristics of the individual lights.

(7) The frequency of measurement of lights for a precision approach runways categories II or III shall be based on traffic density, the local pollution level, the reliability of installed lighting equipment and the continuous assessment of the result of the in-field measurements but, in any event, shall not be less than twice a year for in-pavement lights and not less than once a year for other lights.

(8) The system of preventive maintenance employed for a precision approach runway category II or III shall have as its objective that, during any period of category II or III operations, all approach and runway lights are serviceable and that,

in any event, at least:

(a) 95 per cent of the lights are serviceable in each of the following particular significant elements:

(i) precision approach category II and III lighting system, the inner 450 m;

(ii) runway centre line lights;

(iii) runway threshold lights; and

(iv) runway edge lights;

(b) 90 per cent of the lights are serviceable in the touchdown zone lights;

(c) 85 per cent of the lights are serviceable in the approach lighting system beyond 450 m; and

(d) 75 per cent of the lights are serviceable in the runway end lights.

In order to provide continuity of guidance, the allowable percentage of unserviceable lights shall not be permitted in such a way as to alter the basic pattern of the lighting system. Additionally, an unserviceable light shall not be permitted adjacent to another unserviceable light, except in a barrette or a crossbar where two adjacent unserviceable lights may be permitted.

With respect to barrettes, crossbars and runway edge lights, lights are considered to be adjacent if located consecutively and:

(a) laterally: in the same barrette or crossbar; or

(b) longitudinally: in the same row of edge lights or barrettes.

(9) The system of preventive maintenance employed for a stop bar provided at a runway-holding position used in conjunction with a runway intended for operations in runway visual range conditions less than a value of 350 m shall have the following objectives:

- (a) no more than two lights will remain unserviceable; and
- (b) two adjacent lights will not remain unserviceable unless the light spacing is significantly less than that specified.

(10) The system of preventive maintenance employed for a taxiway intended for use in runway visual range conditions less than a value of 350 m shall have as its objective that no two adjacent taxiway centre line lights be unserviceable.

(11) The system of preventive maintenance employed for a precision approach runway category I shall have as its objective that, during any period of category I operations, all approach and runway lights are serviceable and that, in any event, at least 85 per cent of the lights are serviceable in each of the following:

- (a) precision approach category I lighting system;
- (b) runway threshold lights;
- (c) runway edge lights; and
- (d) runway end lights.

(12) In order to provide continuity of guidance an unserviceable light shall not be permitted adjacent to another unserviceable light unless the light spacing is significantly less than that specified.

(13) The system of preventive maintenance employed for a runway meant for take-off in runway visual range conditions less than a value of 550 m shall have as its objective that, during any period of operations, all runway lights are serviceable and that in any event:

- (a) at least 95 per cent of the lights are serviceable in the runway centre line lights (where provided) and in the runway edge lights; and
- (b) at least 75 per cent of the lights are serviceable in the runway end lights.

In order to provide continuity of guidance, an unserviceable light shall not be permitted adjacent to another unserviceable light.

(14) The system of preventive maintenance employed for a runway meant for take-off in runway visual range conditions of a value of 550 m or greater shall have as its objective that, during any period of operations, all runway lights are serviceable and that, in any event, at least 85 per cent of the lights are serviceable in the runway edge lights and runway end lights. In order to provide continuity of guidance, an unserviceable light shall not be permitted adjacent to another unserviceable light.

(15) During low visibility procedures the appropriate authority shall restrict construction or maintenance activities in the proximity of aerodrome electrical systems.

(16) These regulations shall apply to aerodromes category A and where deemed necessary by the Authority, Category B.

Constructi
on or
maintenan
ce activity
during
low
visibility
operations

295. An operator shall ensure that any construction or maintenance activity is not undertaken in the proximity of aerodrome electrical systems at any time during periods of low visibility operations.

Works at
aerodromes

296.-(1) An operator shall establish procedures, processes and precautions to ensure that any works carried out at an aerodrome do not endanger the safety of any aircraft operations.

(2) The procedures and precautions in sub-regulation (1) shall comply with guidelines prescribed by the Authority.

PART XVIII ELECTRICAL SYSTEMS

Application of this Part

297.-(1) This part shall apply to aerodromes in category A.

(2) This part may apply to aerodromes in categories B, C, and D where deemed necessary by the Authority.

Electrical power supply systems for air navigation services facilities

298.-(1) An operator shall not operate an aerodrome unless adequate primary power supply systems are made available for the safe functioning of air navigation services and facilities.

(2) The design and provision of electrical power systems for aerodrome visual and radio navigation aids shall be such that an equipment failure does not leave the pilot with inadequate visual and non-visual guidance or misleading information.

(3) The design and installation of the electrical systems shall take into consideration factors that can lead to malfunction, such as electromagnetic disturbances, line losses, power quality, among others.

(4) Where secondary power is required for air navigation services and facilities, the operator shall arrange the electric power supply connections so as to ensure that the facilities are automatically connected to the secondary power supply upon failure of the primary power supply.

(5) At an aerodrome provided with runway lighting and without a secondary power supply, sufficient emergency lights shall be conveniently available for installation on at least the primary runway in the event of failure of the normal lighting system. Emergency lighting may also be useful to mark obstacles or delineate taxiways and apron areas.

(6) The time interval between failure of the primary source of power and the complete restoration of the services required by sub regulation (8) shall be as short as practicable, except that for visual aids associated with non-precision, precision approach or take-off runways the requirements of Table 11 for maximum switch-over times shall apply.

(7) At an aerodrome where the primary runway is a non-instrument runway, a secondary power supply capable of meeting the requirements of sub regulation (6) shall be provided, except that a secondary power supply for visual aids need not be provided when an emergency lighting system in accordance with sub regulation (5) is provided and capable of being deployed in 15 minutes.

(8) An operator shall provide the following aerodrome facilities with secondary power supply capable of supplying power where there is a failure of the primary power supply

- (a) the signalling lamp and the minimum lighting necessary to enable air traffic services personnel to carry out their duties;
- (b) all obstacle lights which, in the opinion of the Authority are essential to ensure the safe operation of aircraft;
- (c) approach, runway and taxiway lighting;
- (d) meteorological equipment;
- (e) essential security lighting, if provided;
- (f) essential equipment and facilities for the aerodrome emergency agencies;
- (g) floodlighting on a designated isolated aircraft parking position if provided; and
- (h) illumination of apron areas over which passengers may walk.

(7) The maximum switch-over time between failure of the primary source of power and the secondary source of power for the services shall be as indicated in Table 121.

Table 121 - Secondary power supply requirements

Runway Type	Lighting aids requiring power	Maximum switch-over time
Non-instrument	Visual approach slope indicators ^a Runway edge ^b Runway threshold ^b Runway end ^b Obstacle	See regulations 291(6) and 291(7)
Non-precision approach	Approach lighting system Visual approach slope indicators ^{a,d} Runway edge ^d Runway threshold ^d Runway end Obstacle ^a	15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds
Precision approach category I	Approach lighting system Visual approach slope indicators ^{a,d} Runway edge ^d Runway threshold ^d Runway end Essential taxiways ^a Obstacle ^a	15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds
Precision approach category II	Inner 300 m of the approach lighting system Other parts of the approach lighting system Obstacle ^a Runway edge Runway threshold Runway end Runway centre line Runway touchdown zone All stop bars Essential taxiway	1 second 15 seconds 15 seconds 15 seconds 1 second 1 second 1 second 1 second 1 second 15 seconds 15 seconds

- (a) Supplied with secondary power when their operation is essential to the safety of flight operation;
- (b) See Part XIV– Visual aids for air navigation on prescription on , regarding the use of emergency lighting;
- (c) One second where no runway centre line lights are provided;
- (d) One second where approaches are over hazardous or precipitous terrain.

(8) For the purpose of this regulation, “switch-over time” means the time required for the actual intensity of a light measured in a given direction to fall from fifty per cent and recover to fifty per cent during a power supply changeover, when the light is being operated at intensities of twenty five per cent or more.

(9) The time interval between failure of the primary source of power and the complete restoration of the services required by sub-regulation (6) shall be as short as practicable, except that for visual aids associated with non-precision, precision approach or take-off runways the requirements of Table 121 for maximum switch-over times shall apply.

(10) The provision of a definition of a switch-over time shall not require the replacement of an existing secondary power supply before 1st January 2010.

(11) For a secondary power supply installed after 4 November 1999, the electric power supply connections to those facilities for which secondary power is required shall be so arranged that the facilities are capable of meeting the requirements of Table 121 for maximum switch-over times.

(13) For a precision approach runway, a secondary power supply capable of meeting the requirements of Table 12 1 for the appropriate category of precision approach runway shall be provided.

(14) Electric power supply connections to those facilities for which secondary power is required shall be so arranged that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.

(15) For a runway meant for take-off in runway visual range conditions less than a value of 800 m, a secondary power supply capable of meeting the relevant requirements of Table 121 shall be provided.

(16) At an aerodrome where the primary runway is a non-precision approach runway, a secondary power supply capable of meeting the requirements of Table 121 shall be provided, except that a secondary power supply for visual aids need not be provided for more than one non-precision approach runway.

(17) At an aerodrome where the primary runway is a non-instrument runway, a secondary power supply capable of meeting requirements of sub-regulation (9) shall be provided, except that a secondary power supply for visual aids need not be provided when an emergency lighting system is provided and capable of being deployed in 15 minutes.

(18) Requirements for a secondary power supply shall be met by either of the following:

- (a) independent public power, which is a source of power supplying the aerodrome service from a substation other than the normal substation through a transmission line following a route different from the normal power supply route and such that the possibility of a simultaneous failure of the normal and independent public power supplies is extremely remote; or
- (b) standby power unit(s), which are engine generators, batteries, etc., from which electric power can be obtained.

Electrical
System
design and
operations

299.-(1) For a runway meant for use in runway visual range conditions less than a value of 550 m, the electrical systems for the power supply, lighting and control of the lighting systems included in Table under regulation 291 shall be so designed that an equipment failure will not leave the pilot with inadequate visual guidance or misleading information.

(2) Where the secondary power supply of an aerodrome is provided by the use of duplicate feeders, such supplies shall be physically and electrically separate so as to ensure the required level of availability and independence.

(3) Where a runway forming part of a standard taxi-route is provided with runway lighting and taxiway lighting, the lighting systems shall be interlocked to preclude the possibility of simultaneous operation of both forms of lighting.

Monitoring
of
electrical
systems

300.-(1) A system of monitoring lighting system reliability shall be employed to indicate the operational status or any fault appropriate to the type and level of operations at an aerodrome of the lighting systems.

(2) Where lighting systems are used for aircraft control purposes, such systems shall be monitored automatically so as to provide an indication of any fault which may affect the control functions and this information shall be relayed to the air traffic service unit.

(3) Where a change in the operational status of lights occurs, an indication may be provided within two seconds for a stop bar at a runway holding position and within five seconds for all other types of visual aids.

(4) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in regulation 292 shall be monitored automatically so as to provide an indication when the serviceability level of any element falls below the minimum serviceability level specified by the Authority and this information shall be relayed to the maintenance crew.

(5) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in regulation 292 shall be monitored automatically to provide an indication when the serviceability level of any element falls below the minimum level specified below which operations shall not continue and such information shall be relayed to the air traffic services unit and displayed in a prominent position.

PART XIX
INFORMATION TO BE REPORTED TO AERONAUTICAL
INFORMATION SERVICES

Application
of this
Part

301. This part shall apply to all categories of aerodromes.

Availability
of
Information

302.-(1) An operator shall ensure that information relating to the aerodrome and its facilities, which is significant for the conduct of flights to and from the aerodrome, is available to the users of the aerodrome.

(2) An operator shall be responsible for notifying the Aeronautical Information Services of any errors and omissions in the aeronautical information of operational significance, published in the Aeronautical Information Publication or Aeronautical Information Circular or in the NOTAM, and of any pending changes in the aerodrome or its facilities which are likely to affect this information.

(3) An operator shall be responsible for measurement and reporting to the Aeronautical Information Services of geographical coordinates of obstacles affecting operations or navigable airspace in accordance with the obstacle limitation surfaces prescribed in these Regulations

(4) An operator shall, for the guidance of pilots and other operators provide information on the -

- (a) status of licensing or certification of the aerodrome;
- (b) construction or maintenance work on or immediately adjacent to the manoeuvring area;
- (c) unserviceable portions of any part of the manoeuvring area;
- (d) the runway surface conditions when affected by water, damp, wet, water patches or flooded, as appropriate;
- (e) parked aircraft or other objects on, or immediately adjacent to the taxiways;
- (f) the presence of other temporary hazards;
- (g) failure or irregular operation of any part of the aerodrome lighting system, or of the aerodrome main and secondary power supplies;

- (h) failure, irregular operation and changes in the operational status of any electronic approach or navigation aid, or aeronautical communication facility;
- (i) failures and changes in the runway visual range observer system; and
- (j) any other information of operational significance.

Action
required
for
occurrences of
operational
significance other
than those
involving
electronic
aids and
communication
facilities

303.-(1) Where any of the following conditions occur or are anticipated, an operator shall take immediate action to amend the information contained in the Aeronautical Information Circular and where necessary, promulgate the change by NOTAM through the Aeronautical Information Services using the Aeronautical Information Services address notified in the Aeronautical Information Circular -

- (a) changes in the availability of the manoeuvring area and changes in the runway declared distance, except that increases in declared distances may only be made with the approval of the Authority;
- (b) significant changes in aerodrome lighting and other visual aids;
- (c) presence or removal of temporary obstructions to aircraft operation in the manoeuvring area;
- (d) presence of airborne hazards to air navigation;
- (e) interruption, return to service, or major changes to rescue facilities and fire fighting services in terms of the new category of the rescue and fire fighting service available at the aerodrome; except that permanent changes to the promulgated rescue fire fighting category may only be made with the approval of the Authority;
- (f) failure of or return to operation of hazard beacons and obstruction lights on or in the vicinity of the aerodrome;
- (g) erection or removal of obstructions to air navigation, and erection or removal of significant obstacles in take-off, climb or approach areas;
- (h) air displays, air races, parachute jumping, or any unusual aviation activity; and

- (i) any other information of operational significance.
- (2) Where any of the conditions in sub-regulation (1) arises at short notice, an operator shall notify the Aeronautical Information Services for promulgation of a NOTAM.
- (3) Where any of the conditions in sub-regulation (1) is intended, the operator shall make a written request to the Aeronautical Information Services, for the amendment of the Aeronautical Information Publication and Aeronautical Information Circular or for supplementary action.

Action
required
for
occurrenc
es that
affect
electronic
aids and
communic
ation
facilities

- 304.**-(1) An operator or a person in charge of a navigation facility shall initiate NOTAM action -
- (a) for the establishment or withdrawal of electronic aids to air navigation; and
 - (b) for changes in the regularity or reliability of operation of any electronic aid to air navigation or aeronautical communication facility.
- (2) An operator or a person in charge of a navigation facility shall request for the NOTAM action, or an amendment or a supplement of Aeronautical Information Publication or Aeronautical Information Circular directly from the Aeronautical Information Services or through channels established by the Authority.

Aeronauti
cal data
reporting

- 305.**-(1) An operator shall provide to the Authority for promulgation, accurate aeronautical data as specified in these Regulations.
- (2) An operator shall ensure that aerodrome related aeronautical data is adequate and accurate and that the integrity of the data is maintained and protected throughout the data process from survey or origin up to the next intended user.
- (3) An operator shall determine and report aerodrome related aeronautical data in accordance with prescribed accuracy and integrity requirements while taking into account the established quality system procedures.

(4) Accuracy requirements for aeronautical data shall be based upon a ninety five per cent confidence level and in that respect, three types of positional data, namely; surveyed points, calculated points and declared points shall be identified.

(5) Aerodrome mapping data shall be made available to the aeronautical information services for aerodromes in category A where safety and/or performance-based operations suggest possible benefits.

(6) Where made available in accordance with these regulations, the selection of the aerodrome mapping data features to be collected shall be made with consideration of the intended applications.

(7) Where made available in accordance with these regulations, aerodrome mapping data shall comply with the accuracy and integrity requirements specified by the Authority.

(8) Subject to sub-regulation (7), the following classification and data integrity levels shall apply –

- (a) for routine data: avoid corruption throughout the processing of the data;
- (b) for essential data: assure corruption does not occur at any stage of the entire process and may include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and
- (c) for critical data: assure corruption does not occur at any stage of the entire process and include additional integrity assurance procedures to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

PART XX EXEMPTIONS

Applicatio
n of this
Part

306. This regulation shall apply to all categories of aerodromes.

Application
for
exemption

307.-(1) A person may apply to the Authority for an exemption from any provision of these Regulations.

(2) An application for an exemption from any provision of these Regulations shall be submitted at least sixty days before the proposed effective date of exemption.

(3) An application for exemption shall contain -

- (a) the name, physical address, mailing address, telephone number, fax number and email address of the applicant, where available;
- (b) the specific requirement from which the applicant seeks exemption;
- (c) justification for the exemption;
- (d) a description of the type of operations to be conducted under the proposed exemption;
- (e) the proposed duration of the exemption;
- (f) a detailed description of the alternative means by which the applicant is to ensure a level of safety equivalent to that established by the regulation from which the exemption is applied for;
- (g) a review of any known safety concerns related to the required exemption, including information about any relevant accidents or incidents of which the applicant is aware;
- (h) where the applicant seeks to operate under the proposed exemption outside the air space of the State, an indication as to whether the exemption may contravene any provision of the standards and any regulations pertaining to the airspace in which the operation is to occur; and
- (i) any other relevant information that may be required by the Authority.

(4) Where the applicant seeks emergency processing of an application for exemption, the application shall contain facts and reasons to support the reasons for not filing the application within the time specified in sub regulation (2) and satisfactory reasons for deeming the application an emergency.

(5) The Authority may refuse an application made under sub-regulation (4) where in the opinion of the Authority, the reasons given for the exemption are not satisfactory.

(6) An application for exemption shall be accompanied by a fee specified by the Authority.

Initial
review by
the
Authority

308.-(1) The Authority shall review an application for exemption for accuracy and compliance with the requirements of these regulation.

(2) Where the Authority determines that the application for exemption meets the requirements of this Part and that a review of its merits are justified, the Authority shall notify and may publish in the Gazette or at least one local daily newspaper of wide circulation, a detailed summary of the application, for public comment, specifying the date by which the comments are to be received by the Authority for consideration.

(3) Where the applicant does not meet the requirements of regulations 194, the Authority shall inform the applicant and no further action shall be taken on that application.

Evaluation
of
applicatio
n for
exemption

309.-(1) The Authority shall conduct an evaluation of an application after the initial review in accordance with regulation 195, to determine whether -

- (a) based on the aeronautical study and risk assessment, the proposal by the applicant provides a level of safety equivalent to that established by the regulation from which the exemption is sought;
- (b) a grant of the exemption would contravene the applicable standards;
- (c) the request shall be granted or refused and any conditions or limitations that may be part of the exemption.

(2) The Authority shall inform the applicant in writing and publish a detailed report of its evaluation and decision to grant or deny the application for exemption.

(3) The report referred to in sub-regulation (2) shall specify the duration of the exemption and any conditions or limitations of the exemption.

(4) Where an exemption affects a significant population of the aviation industry in the State, the Authority shall publish the report in the Aeronautical Information Circular.

PART XXI GENERAL PROVISIONS

Applicatio
n of this
Part

310. This part shall apply to all categories of aerodromes except where otherwise specified.

Change of
name of a
licence or
certificate
holder

311.-(1) A holder of a licence, certificate or registration approval may apply to the Authority to change the name of the holder of the licence, certificate or registration approval.

(2) An application in sub regulation (1) shall be accompanied by -

- (a) the current licence, certificate or registration approval; and
- (b) a court order, or any other legal document verifying the change of name, if any.

(3) The Authority shall change the name of the holder and issue a replacement licence, certificate or registration approval with the appropriate endorsement.

(4) The Authority shall retain copies of the documents submitted under sub regulation (2).

Change of
address of
a licence
or
certificate
holder

312. A holder of a licence, certificate or registration approval, shall inform the Authority of –

- (a) change in the physical address at least fourteen days in advance; and
- (b) the mailing address upon the change.

(2) Where a holder of a licence, certificate or registration approval does not inform the Authority of the change in the physical address within the time specified in sub regulation (1), the Authority may suspend the licence, certificate or registration approval.

Use and
retention
of
licences,
certificate
s,
approvals
and
records

313.-(1)A person shall not -

- (a) use a licence, certificate, approval, permission, exemption or any other document issued or required by or under these Regulations which is forged, altered, revoked, or suspended, or which the person is not entitled to use;
- (b) forge or alter a licence, certificate, approval, permission, exemption or any other document issued or required by or under these Regulations;
- (c) lend a licence, certificate, approval, permission, exemption or any other document issued or required by or under these Regulations to any other person; or
- (d) make any false representation for the purpose of procuring for himself, herself or any other person the issue, renewal or variation of an licence, certificate, approval, permission or exemption or other document.

(2) A person shall not, during the period for which it is required under these Regulations to be preserved -

- (a) mutilate, alter, render illegible or destroy a licence, certificate or registration approval or any entry made in any record;
- (b) knowingly make, procure or assist in the making of any false entry in a licence, certificate or record, or
- (c) wilfully omit to make a material entry in a licence, certificate or registration approval or record.

(3) A record required to be maintained under these Regulations shall be recorded in a permanent and indelible material.

(4) A person shall not purport to issue a licence, certificate, approval or exemption for the purpose of these Regulations unless that person is authorised to do so.

(5) The Authority may suspend or cancel a licence, certificate or approval of an operator who contravenes any provision of these Regulations.

Replacement
of
documents

314. A holder of a licence, certificate or approval who requires a replacement of the licence or certificate may apply to the Authority in the prescribed form

Aeronautical
user
charges

315.-(1) The Authority shall notify of the fees to be charged in connection with –

- (a) the issue, validation, renewal, extension or variation of any licence, certificate, approval or any other document, including a copy of any of these;
- (b) the undertaking of any examination, test, inspection or investigation;
- (c) the grant of any permission or approval required for the purpose of these Regulations.

(2) Where an application for which any fee is chargeable under sub-regulation (1) is made, the applicant shall, before the application is processed, pay the required fee.

(3) The Authority shall not refund the fees where an application is withdrawn after payment of fees is made or where the application ceases to have effect or is refused.

Conditions
for
operating
an
aerodrome

316.-(1) A person shall not operate an aerodrome licensed, certificated or registered under these Regulations unless the facilities and characteristics of the aerodrome are effectively related and match the needs of the aircraft for which the aerodrome is intended.

(2) When the aerodrome accommodates an aeroplane that exceeds the certificated characteristics of the aerodrome, the compatibility between the operation of the aeroplane and the aerodrome infrastructure and operations shall be assessed and appropriate measures developed and implemented in order to maintain an acceptable level of safety during operations.

(3) Information concerning alternative measures, operational procedures and operating restrictions implemented at an aerodrome arising from regulation 309(1) above shall be promulgated.

Lighting
of en-
route
obstacles

317.-(1)An owner or a person in charge of an en-route obstacle shall ensure that the en-route obstacle is fitted with medium intensity steady red light –

- (a) positioned as close as possible to the top of the obstacle; and
- (b) spaced as far as practicable, equally between the top lights and ground level with an interval not exceeding thirty three metres, at the intermediate levels.

(2) Where any light which is required by this regulation to be displayed fails, an owner or a person in charge of an en-route obstacle shall repair or replace the light as soon as is reasonably practicable but in any case not later than twenty four hours after the failure of the light.

(3) Subject to sub-regulation (2), an owner or a person in charge of an en-route obstacle shall ensure that the lights required to be fitted by this regulation are displayed.

(4) An owner or a person in charge of an en-route obstacle shall ensure that sufficient light is fitted and arranged at each level of an obstacle where lights are required to be fitted, so as to show, when displayed, in all directions.

(5) The Authority may direct that an en-route obstacle is fitted with additional lights which shall be displayed in such positions and at such times as the Authority may specify.

- (6) For the purpose of this regulation –
- (a) “en-route obstacle” means any building, structure or erection, which is one hundred metres or more, above ground level, except a building, structure or erection, which is in the vicinity of an aerodrome;
 - (b) “medium intensity steady light” means a light, which complies with the characteristics described for a medium intensity type C light.

Land use
in the
vicinity of
an
aerodrome

318. All land use practices and activities in the vicinity of an aerodrome shall conform to the guidelines prescribed by the Authority.

Aeronauti
cal study
and risk
assessment

319.-(1) Where an aerodrome does not meet the requirements of the prescribed standards, the Authority may determine, after carrying out aerodrome operator shall conduct an aeronautical studies and risk assessment and propose measures to be implemented to ensure maintenance of equivalent operational safety at an aerodrome without compromising the established requirements, the conditions and procedures that are necessary to ensure a level of safety equivalent to that established by the relevant prescribed standard.

(2) The Authority shall assess the outcome of the conduct of risk assessment and aeronautical study in order to ensure compliance with the safety policies, processes and adequacy of the equivalent level of safety performance proposed by the operator.

Deviations
from
standards

320. Any deviation from a prescribed standard or procedure in these Regulations shall be set out in an endorsement on the aerodrome manual.

Safety
inspection
s and
audits

- 321.** The Authority shall at any time and discretion –
- (a) carry out such safety inspections and audits as may be necessary for the purpose of verifying the validity of an application for construction and operation of an aerodrome;
 - (b) carry out safety inspections and audits of any document and records of an operator, which may be necessary to determine compliance with the appropriate requirements as prescribed in these Regulations.

Obligation
to insure
an
aerodrome

322.-(1) A person shall not operate, or cause or permit any other person to operate, an aerodrome unless there is a policy of insurance in force in relation to that aerodrome.

(2) A policy of insurance shall be of no effect for the purposes of sub regulation (1) unless-

- (a) there has been issued by the insurer to the operator a certificate in relation to the policy of insurance in such form and containing such particulars as the Authority may prescribe, and
- (b) the operator has sent, or caused to be sent, to the Authority a copy of such certificate.

(3) If the policy of insurance at any time or for any reason ceases to have effect, any licence or certificate issued under these Regulations in respect of the aerodrome to which the policy of insurance relates shall thereupon be deemed to have been revoked.

(4) A licence or certificate shall not be renewed or amended under these Regulations in relation to the operation of an aerodrome where the policy of insurance has expired.

(5) In this regulation "policy of insurance" means a policy which insures the operator of an aerodrome against liability in respect of loss and damage caused to any person or property at that aerodrome and which complies with such conditions as may be prescribed by the Authority.

(6) This regulation shall not apply to aerodromes in categories C, D and E unless required by the Authority.

Certification
Licensing
and
Registration
of
aerodromes

323. A person shall not operate an aerodrome unless that person holds a certificate, licence or a registration approval issued by the Authority in accordance with Part III, Part IV and Part V of these regulations.

Standards
for
Aerodro-
mes in
Category
D

324. Specific Standards for physical characteristics, obstacle restrictions and removal, aeronautical ground lights and visual aids for navigation shall be as prescribed by the Authority in the Manual of standards for aerodromes in category D (Heliports).

Manuals
of
standards

325. Whenever there is a conflict between provisions of these regulation and provisions of the Manuals of standards, provisions of these regulations prevails.

PART XXII

OFFENCES AND PENALTIES

Contrave-
ntion of
Regulatio
ns

326. A person who contravenes any provision of these Regulations may have his certificate, licence, approval, authorization or such other document revoked or suspended.

Offences
and
Penalties

327.-(1) A person who contravenes any provision of these Regulations, shall, be guilty of an offence and upon conviction, shall be liable to a fine or imprisonment or both, and in the case of a continuing contravention, each day of the contravention shall constitute a separate offence.

(2) Any person who has been convicted under sub regulation (1) shall be liable to a fine of not more than two million shillings or to imprisonment for a term not more than six months or to both, and in a case of a continuing offence shall be liable to a fine of not more than fifty thousand shillings for each day the offence continues.

(3) Where it is proved that an act or omission of any person, which would otherwise have been a contravention by that person of a provision of these Regulations, orders or notices made there under was due to any cause not avoidable by the exercise of reasonable care by that person, the act or omission shall be deemed not to be a contravention by that person of that provision.

PART XXIII
SAVINGS AND TRANSITION

Savings
and
Transition

328. A licence, certificate, approval or any other document issued to an operator prior to the commencement of these Regulations shall continue in force as if it was issued under these Regulations until it expires or is cancelled by the Authority.

Revocation

329. The Civil Aviation (Aerodromes) Regulations, 2013 is revoked.

FIRST SCHEDULE

(Made under Regulation 57)

PART A

SAFETY MANAGEMENT SYSTEM AT AERODROMES

1. Safety Management
Aerodromes in Category A shall have in place a system for managing safety, to which it is committed, is readily identifiable by the personnel of the Aerodrome and the personnel of the Authority and is clearly documented in the Aerodrome Manual.
2. Interpretation
In this Schedule, unless the context otherwise requires -
“risk” is the combination of the probability, or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence.
3. Safety Objective
An aerodrome and the facilities, equipment and systems of the aerodrome shall be designed and operated such that for any hazard, the combination of the probability of occurrence and the seriousness of the consequences of the hazard occurring must not result in a level of risk that is unacceptable.
4. Safety Management Policy Statements
Safety Management Systems (SMS) established at aerodromes shall include the following-
 - (a) a statement that the highest priority shall be attached to safety in relations to all business activities;
 - (b) a business objective for safety that shall minimise the aerodrome’s contribution to aviation accidents risk to as low as reasonably practicable;
 - (c) a commitment by the aerodrome operator to adopt an explicit and pro-active approach to safety management;
 - (d) statements of safety-related responsibilities and accountabilities at all levels of the organization;
 - (e) a commitment to comply with all appropriate safety standards;
 - (f) a commitment that the safety assurance processes used by external suppliers comply with safety standards and requirements;
 - (g) an emergency response plan that provides for the orderly and efficiency transition and coordination of operations from normal to emergency and back to normal.
5. Safety Management Principles

- (1) (a) Whenever practicable, quantitative safety levels shall be derived, maintained and improved for all aviation products and services delivered by the aerodrome; and when quantitative safety levels cannot be derived, a qualitative reasoning shall be performed in order to meet the safety objective.
 - (b) An operator shall assess all existing operations, proposed changes, additions or replacements for their safety significance.
 - (c) An operator shall identify and record the safety requirements for a service or product, the results of the safety assessment process and the evidence that the safety requirements have been met; and the records shall be maintained throughout the life of the service or product.
 - (d) An operator shall ensure that personnel whose functions impact on safety at the aerodrome are adequate, trained and qualified for the job they are required to do and for which they have accountability.
- (2) (a) An operator shall ensure that there is accountability, at a suitable senior level for the management, development and monitoring of the safety management system.
- (b) An operator shall routinely carry out internal safety audits to provide assurance of the safety activities and to confirm compliance with the safety requirements and the safety management system.
- (c) An operator shall have in place suitable monitoring arrangements so that undesirable trends in service or product performance can be recognized and be subject to remedial action; and in order to achieve this, the operator shall in accordance with the provisions of the Part B of this Schedule –
- (i) establish a reporting system for accident and incident reporting that ensures the Authority is informed of the aviation safety aspects in connection with the aerodrome;
 - (ii) investigate safety significant occurrences, identify any failures of its management of safety and take corrective action if required;
- (d) The operator shall establish and maintain procedures, which enable tracing of documents and data related to the safety management system, and the procedures shall ensure that all safety related documents and data are available, and that invalid documents and data shall be destroyed and secured against unintended use.
6. Safety Management Strategy
- (1) An operator shall establish processes to identify safety shortcomings, so that remedial action can be taken to ensure safety levels are maintained.
- (2) The basic principles to be applied in the safety management strategy shall include -
- (a) safety achievement; specifying the means by which the safety performance of the organization meets its safety objectives and derived requirements;
 - (b) safety assurance; specifying the means for providing assurance

that risks are being managed properly and effectively;

- (c) safety performance monitoring and measurement; specifying the means to verify safety performance of the organisation and to validate the effectiveness of safety risk controls;
- (d) safety promotion; specifying the means by which safety issues are communicated within the aerodrome to eliminate unnecessary risks and avoid repeat errors or risks and safety training programme that ensures personnel are trained and competent to perform SMS duties.

(3) An operator shall develop and maintain a formal process to:

- (a) ensure that hazards in operations are identified.
- (b) identify changes within the organisation which may affect processes and services and shall describe arrangements to ensure safety performance before implementing changes.
- (c) identify the causes of substandard performance of safety management systems, determine the implications of substandard performance of the SMS in operation and eliminate or mitigate such processes.

7. Operational safety assurances documentation

An operator shall produce and maintain safety assurance documentation, and this documentation shall cover-

- (a) all safety related roles and functions;
- (b) a safety based risk assessment of the roles and functions where practicable;
- (c) a process of risk management for safety related tasks and functions to ensure that identified risks remain tolerable;
- (d) safety performance measurements of the current operations as part of the ongoing risk management; and
- (e) corrective procedures and measures that modify the original tasks or functions to address inadequate performance.

8. Safety assurance documentation on systems requiring approval

- (1) An operator shall, when intending to introduce new systems into operation, or introduce changes to, or replace existing systems, submit an application for approval by the Authority.
- (2) The aerodrome operator shall also submit an application for approval if the intended changes affect the approvals in the aerodrome licence.
- (3) An aerodrome licensee shall, if satisfied that their own safety requirements as well as those issued by the Authority have met the compliance criteria, notify the Authority in writing indicating compliance with the specified safety requirements for any operational system.

9. Safety assessment methodology

The safety assessment of the aerodrome shall involve -

- (a) systematic identification of possible hazards to aircraft;
- (b) evaluation of the seriousness of the consequences of the hazard occurring;
- (c) considering the chances of a hazard happening;
- (d) determining whether the consequent risk is tolerable and within the operators acceptable safety performance criteria; and
- (e) taking action to reduce the severity of the hazard or the probability of it arising in order to reduce the risk to a tolerable level.

10. Safety auditing of aerodromes

An operator shall carry out internal safety auditing of the aerodrome in order to determine -

- (a) the level of compliance with requirements;
- (b) the areas and degree of risk and their effective management; and
- (c) the competence and performance of those responsible for safety.

PART B

AIRCRAFT ACCIDENT AND INCIDENT REPORTING AND INVESTIGATION
AT AERODROMES

1. Aerodrome occurrence reporting

(1) This schedule prescribes the requirements for reporting the occurrence or detection of defects, failures or malfunctions at an aerodrome, its components or equipment, which could jeopardize the safe operation of the aerodrome or cause it to become a danger to persons or property.

(2) The objectives of the aerodrome occurrence reports are as follows -

- (a) to ensure that knowledge of these occurrences is disseminated so that other persons and organizations may learn from them; and
- (b) to enable an assessment to be made by those concerned (whether internal or external to the aerodrome operator) of the safety implications of each occurrence, both in itself and in relation to previous similar occurrences, so that they may take or initiate any necessary action.

2. Reportable occurrences and reporting procedures

(1) An operator shall notify the Authority of any accident, serious incident, fatal or serious injury occurring at the aerodrome as soon as practicable after the occurrence and provide a detailed occurrence report thereafter.

(2) For the purpose of this Schedule -

- (a) “accident” means an occurrence associated with the operation of an aircraft, which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which;

- (i) a person is fatally or seriously injured as a result of-
 - (aa) being in the aircraft, or
 - (bb) direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
 - (cc) direct exposure to jet blast, except when the injury are from natural causes, self-inflicted, or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew or;
- (ii) the aircraft sustains damage or structural failure which-
 - (aa) adversely affects the structural strength, performance or flight characteristics of the aircraft; and
 - (bb) would normally require major repair or replacement of the affected component except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tires, brakes, fairings, small dents or puncture holes in the aircraft skin; or
 - (iii) the aircraft is missing or is completely inaccessible.
- (b) “serious incident” includes-
 - (i) a near collision requiring avoidance manoeuvre to avoid a collision or an unsafe situation or where an avoidance action would have been appropriate;
 - (ii) a controlled flight into terrain only marginally avoided;
 - (iii) an aborted take-off on a closed or engaged runway;
 - (iv) a take-off from a closed or engaged runway with marginal separation from an obstacle;
 - (v) a landing or attempted landing on a closed or engaged runway;
 - (vi) a take-off or landing incident such as undershooting; or overrunning or running off the side of runways; or
 - (v) a major failure of any navigation aid when a runway is in use;
- (c) “serious injury” means any injury that is sustained by a person in an accident and that-
 - (i) requires hospitalisation for more than forty eight hours, commencing within seven days from the date the injury was received;
 - (ii) results in a fracture of any bone, except simple fractures of fingers, toes or nose;
 - (iii) involves lacerations which cause severe haemorrhage, nerve, muscle, or tendon damage;
 - (iv) involves any injury to any internal organ;
 - (v) involves second or third degree burns, or any burns affecting more than 5% of the body surface; or
 - (vi) involves verified exposure to infectious substances or injurious radiation.
- (3) The operator shall notify the Aircraft Accident and Incident Investigation Branch whenever an accident or serious incident occurs on or adjacent to his aerodrome in accordance with the provisions of the Civil Aviation (Aircraft Accident and Incident Investigation) Regulations.

- (4) Information to be provided in the reporting and notification of an accident, serious incident or serious injury shall as far as possible include the following -
- (a) the date and local time of occurrence;
 - (b) the exact location of the occurrence with reference to some easily defined geographical point ;
 - (c) detailed particulars of the parties involved, including the owner, operator, manufacturer, nationality, registration marks, serial numbers, assigned identities of aircraft and equipment;
 - (d) a detailed description of the sequence of events leading up to the incident;
 - (e) the physical characteristics, environment or circumstances of the area in which the incident occurred and an indication of the access difficulties or special requirements to reach the site;
 - (f) the identification of the person sending the notice and where the incident occurred;
 - (g) in the case of an aircraft accident, the number of crew members, passengers or other persons respectively killed or seriously injured as a result of the accident; and
 - (h) a description of the follow-up action being taken after the incident has occurred.

3. Aerodrome occurrence records

- (1) An operator shall establish and maintain aerodrome occurrence reports for any accident, serious incident, serious injury or any occurrence or event that has a bearing on the safety of aerodrome operations.
- (2) An operator shall use aerodrome occurrence reports to monitor and improve the level of operational safety, including reviews of safety standards required.
- (3) The Authority may require the operator to produce and provide information contained in the aerodrome occurrence report relating to any safety occurrence or event.

4. Aircraft accident and incident investigation

- (1) In the event of an accident or serious incident, an operator shall carry out its own investigations.
- (2) The investigations carried out by the aerodrome operator shall be additional to that carried out by the Aircraft Accident and Incident Investigation Branch to enable the operator to assess safety of aircraft operations at his aerodrome.
- (3) The investigator, or team of investigators, shall be technically competent and shall either possess or have access to the background information, so that the facts and events are interpreted accurately. The investigations shall be a search to establish how the mishap happened, why it occurred, including organizational contributing factors, and to recommend action to prevent a recurrence, and shall not be intended to apportion blame.

- (4) The lesson learnt derived from an aerodrome incident or accident investigation shall be disseminated to personnel to provide feedback for safety improvement.
- (5) The Authority may require the operator to produce and provide information contained in the aerodrome accident or incident investigation report relating to any such event.
- (6) An operator shall inspect his aerodrome, as circumstances require, to ensure safety as soon as practicable after any aircraft accident or incident.

SECOND SCHEDULE

(Made under Regulations 75)

PARTICULARS TO BE INCLUDED IN AN AERODROME MANUAL FOR
AERODROMES IN CATEGORY A

PART I: GENERAL

General information, including the following –

- (a) purpose and scope of the aerodrome manual;
- (b) the legal requirement for an certificate and an aerodrome manual as prescribed in the national regulations;
- (c) conditions for use of the aerodrome - a statement to indicate that the aerodrome shall at all times, when it is available for the take-off and landing of aircraft, be so available to all persons on equal terms and conditions;
- (d) the available aeronautical information system and procedures for its promulgation;
- (e) the system for recording aircraft movements; and
- (f) obligations of the operator.

PART 2: PARTICULARS OF THE AERODROME SITE

General information, including the following –

- (a) a plan of the aerodrome showing the main aerodrome facilities for the operation of the aerodrome including, particularly, the location of each wind direction indicator;
- (b) a plan of the aerodrome showing the aerodrome boundaries;
- (c) a plan showing the distance of the aerodrome from the nearest city, town or other populous area, and the location of any aerodrome facilities and equipment outside the boundaries of the aerodrome; and
- (d) particulars of the land title of the aerodrome site. If the boundaries of the aerodrome are not defined in the land title documents particulars of the land title to, or interest in, the property on which the aerodrome is located and a plan showing the boundaries and position of the aerodrome.

**PART 3: PARTICULARS OF THE AERODROME REQUIRED TO BE
REPORTED TO THE AERONAUTICAL INFORMATION
SERVICE**

1. General Information

- (a) the name of the aerodrome;

- (b) the location of the aerodrome;
- (c) the geographical coordinates of the aerodrome reference point determined in terms of the World Geodetic System - 1984 reference datum;
- (d) the aerodrome elevation and geoid undulation;
- (e) the elevation of each threshold and geoid undulation, the elevation of each runway end and any significant high and low points along the runway, and the highest elevation of the touchdown zone of a precision approach runway;
- (f) the aerodrome reference temperature;
- (g) details of the aerodrome beacon; and
- (h) the name of the operator and the address, telephone and facsimile numbers at which the operator may be contacted at all times.

2. Aerodrome dimensions and related information

General information, including the following –

- (a) runway - true bearing, designation number, length, width, displaced threshold location, slope, surface type, type of runway and, for a precision approach runway, the existence of an obstacle free zone;
- (b) length, width and surface type of strip, runway end safety areas, stopways;
- (c) length, width and surface type of taxiways;
- (d) apron surface type and aircraft stands;
- (e) clearway length and ground profile;
- (f) visual aids for approach procedures, viz. Approach lighting type and visual approach slope indicator system (PAPI/APAPI and T-VASIS/AT-VASIS); marking and lighting of runways, taxiways, and aprons; other visual guidance and control aids on taxiways (including runway holding positions, intermediate holding positions and stop bars) and aprons, location and type of visual docking guidance system; availability of standby power for lighting;
- (g) the location and radio frequency of VOR aerodrome checkpoints;
- (h) the location and designation of standard taxi routes;
- (i) the geographical coordinates of each threshold;
- (j) the geographical coordinates of appropriate taxiway centre line points;
- (k) the geographical coordinates of each aircraft stand;
- (l) the geographical coordinates and the top elevation of significant obstacles in the approach and take-off area, in the circling area and in the vicinity of the aerodrome. (This information may best be shown in the form of charts such as those required for the preparation of aeronautical information publications, as specified in Annexes 4 and 15 to the Convention);
- (m) pavement surface type and bearing strength using the Aircraft Classification Number - Pavement Classification Number method;
- (n) one or more pre-flight altimeter check locations established on an

- apron and their elevation;
- (o) declared distances: take-off run available, take-off distances available, accelerate-stop distance available, landing distance available;
- (p) disabled aircraft removal plan: the telephone/telex/ facsimile number and e-mail address of the aerodrome coordinator for the removal of a disabled aircraft on or adjacent to the movement area, information on the capability to remove a disabled aircraft, expressed in terms of the largest type of aircraft which the aerodrome is equipped to remove; and
- (q) rescue and fire-fighting; the level of protection provided, expressed in terms of the category of the rescue and fire-fighting services, which shall be in accordance with the longest aircraft normally using the aerodrome and the type and amounts of extinguishing agents normally available at the aerodrome.

Note.- the accuracy of the information in Part 3 is critical to aircraft safety. Information requiring engineering survey and assessment shall be gathered or verified by qualified technical persons.

PART 4: PARTICULARS OF THE AERODROME OPERATING PROCEDURES AND SAFETY MEASURES

1. Aerodrome reporting

Particulars of the procedures for reporting any changes to the aerodrome information set out in the Aeronautical Information Publication and Aeronautical Information Circular and procedures for requesting the issue of NOTAMs, including the following –

- (a) arrangements for reporting any changes to the Authority and recording the reporting of changes during and outside the normal hours of aerodrome operations;
- (b) the names and roles of persons responsible for notifying the changes, and their telephone numbers during and outside the normal hours of aerodrome operations; and
- (c) the address and telephone and facsimile numbers, as provided by the Authority, of the place where changes are to be reported to the Authority.

2. Access to the aerodrome movement area

Particulars of the procedures that have been developed and are to be followed in coordination with the agency responsible for preventing unlawful interference in civil aviation at the aerodrome and for preventing unauthorized entry of persons, vehicles, equipment, animals or other things into the movement area, including the following –

- (a) the role of the operator, the aircraft operator, aerodrome fixed-base operator, the aerodrome security entity, the Authority and other government departments, as applicable; and
- (b) the personnel responsible for controlling access to the aerodrome, and the telephone numbers for contacting them during and after working hours.

3. Aerodrome emergency plan

Particulars of the aerodrome emergency plan, including the following –

- (a) plans for dealing with emergencies occurring at the aerodrome or in its vicinity, including the malfunction of aircraft in flight; structural fires; sabotage, including bomb threats (aircraft or structure); unlawful seizure of aircraft; and incidents on the aerodrome covering “during the emergency” and “after the emergency” considerations;
- (b) details of test and aerodrome facilities and equipment to be used in emergencies, including the frequency of those tests;
- (c) details of exercises to test emergency plans, including the frequency of those exercises;
- (d) a list of organizations, agencies and persons of authority, both on-and/off-aerodrome, for site roles; their telephone and facsimile numbers, e-mail addresses and the radio frequencies of their offices;
- (e) the establishment of an aerodrome emergency committee to organize training and other preparations for dealing with emergencies; and
- (f) the appointment of an on-scene commander for the overall emergency operation.

4. Rescue and fire-fighting

Particulars of the facilities, equipment, personnel and procedures for meeting the rescue and fire-fighting requirements, including the names and roles of the persons responsible for dealing with the rescue and fire-fighting services at the aerodrome.

5. Inspection of the aerodrome movement area and obstacle limitation surface by the operator

Particulars of the procedures for the inspection of the aerodrome movement area and obstacle limitation surfaces, including the following –

- (a) arrangements for carrying out inspections, including runway friction and water-depth measurements on runways and taxiways, during and outside the normal hours of aerodrome operations;
- (b) arrangements and means of communicating with air traffic control during an inspection;

- (c) arrangements for keeping an inspection logbook, and the location of the logbook;
- (d) details of inspection intervals and times;
- (e) inspection checklist;
- (f) arrangements for reporting the results of inspections and for taking prompt follow-up actions to ensure correction of unsafe conditions; and
- (g) the names and roles of persons responsible for carrying out inspections, and their telephone numbers during and after working hours.

6. Visual aids and aerodrome electrical systems

Particulars of the procedures for the inspection and maintenance of aeronautical lights (including obstacle lighting), signs, markers and aerodrome electrical systems, including the following –

- (a) arrangements for carrying out inspections during and outside the normal hours of aerodrome operation, and the checklist for such inspections;
- (b) arrangements for recording the result of inspections and for taking follow-up action to correct deficiencies;
- (c) arrangements for carrying out routine maintenance and emergency maintenance;
- (d) arrangements for secondary power supplies and, if applicable, the particulars of any other method of dealing with partial or total system failure; and
- (e) personnel responsible for the inspection and maintenance of the lighting, and the telephone numbers for contacting those persons during and after working hours.

7. Maintenance of the movement area

Particulars of the facilities and procedures for the maintenance of the movement area, including arrangements for-

- (a) maintaining the paved areas;
- (b) maintaining the unpaved runways and taxiways;
- (c) maintaining the runway and taxiway strips; and
- (d) the maintenance of aerodrome drainage.

8. Aerodrome works - safety

Particulars of the procedures for planning and carrying out construction and maintenance work safely (including work that may have to be carried out at short notice) on or in the vicinity of the movement area which may extend above an obstacle limitation surface, including the following –

- (a) arrangements for communicating with air traffic control during the

- progress of such work;
- (b) the names, telephone numbers and roles of the persons and organizations responsible for planning and carrying out the work, and arrangements for contacting those persons and organizations at all times;
- (c) the names and telephone numbers, during and after working hours, of the aerodrome fixed-base operators, ground handling agents and aircraft operators who are to be notified of the work;
- (d) a distribution list for work plans, if required.

9. Apron management

Particulars of the apron management procedures, including the following –

- (a) arrangements between air traffic control and the apron management unit;
- (b) arrangements for allocating aircraft parking positions;
- (c) arrangements for initiating engine start and ensuring clearance of aircraft push-back;
- (d) marshalling service; and
- (e) leader (van) service.

10. Apron safety management

Procedures to ensure apron safety, including –

- (a) protection from jet blasts;
- (b) enforcement of safety precautions during aircraft refuelling operations;
- (c) apron sweeping;
- (d) apron cleaning;
- (e) arrangements for reporting incidents and accidents on an apron; and
- (f) arrangements for auditing the safety compliance of all personnel working on the apron.

11. Airside vehicle control

Particulars of the procedure for the control of surface vehicles operating on or in the vicinity of the movement area, including the following –

- (a) details of the applicable traffic rules (including speed limits and the means of enforcing the rules);
- (b) the method of issuing driving permits for operating vehicles in the movement area.

12. Birds and wildlife hazard management

Particulars of the procedures to deal with the danger posed to aircraft operations by the presence of birds or mammals in the aerodrome flight pattern or movement area, including the following-

- (a) arrangements for assessing birds and wildlife hazards;
- (b) arrangements for implementing birds and wildlife control programmes; and
- (c) the names and roles of the persons responsible for dealing with birds and wildlife hazards, and their telephone numbers during and after working hours.

13. Obstacle control

Particulars setting out the procedures for –

- (a) monitoring the obstacle limitation surfaces and type A chart for obstacles in the take-off surface;
- (b) controlling obstacles within the authority of the operator;
- (c) monitoring the height of buildings or structures within the boundaries of the obstacle limitation surfaces;
- (d) controlling new developments in the vicinity of aerodromes; and
- (e) notifying the Authority of the nature and location of obstacles and subsequent addition or removal of obstacles for action as necessary, including amendment of the Aeronautical Information Services publications.

14. Removal of disabled aircraft

Particulars of the procedures for removing a disabled aircraft on or adjacent to the movement area, including the following –

- (a) the roles of the operator and the holder of the aircraft operator certificate.
- (b) arrangements for notifying the aircraft operator.
- (c) arrangements for liaising with the air traffic control unit;
- (d) arrangements for obtaining equipment and personnel to remove the disabled aircraft; and
- (e) role and telephone numbers of personnel responsible for arranging for the action as necessary, including amendment of the AIS publications.

15. Handling of hazardous materials

- (1) Particulars of the procedures for the safe handling and storage of hazardous materials on the aerodrome, including the following -
 - (a) arrangements for special areas of the aerodrome to be set up for the storage of inflammable liquids (including aviation fuels) and

any other hazardous materials; and
(b) the method to be followed for the delivery storage, dispensing and handling of hazardous materials.

- (2) For the purposes of this paragraph “hazardous materials” include inflammable liquids and solids, corrosive liquids, compressed gases and magnetized or radioactive materials.

16. Low visibility operations

Particulars of procedures to be introduced for low-visibility operations, including the measurement and reporting of runway visual range as and when required, and the personnel, their telephone numbers, responsible for measuring the Runway Visual Range.

17. Protection of sites for radar and navigational aids

Particulars of the procedures for the protection of sites for radar and radio navigational aids located on the aerodrome to ensure that their performance will not be degraded, including the following-

- (a) arrangements for the control of activities in the vicinity of radar and navigational aids installations;
- (b) arrangements for ground maintenance in the vicinity of these installations; and
- (c) arrangements for the supply and installation of signs warning of hazardous microwave radiation.

Note 1. In writing the procedures for each category, clear and precise information shall be included on -

- (i) when, or in what circumstances, an operating procedure is to be activated;
- (ii) how an operating procedure is to be activated;
- (iii) actions to be taken;
- (iv) the equipment necessary for carrying out the actions, and access to such equipment.

Note 2. if any of the procedures specified above are not relevant or applicable, reasons shall be given.

PART 5: AERODROME ADMINISTRATION AND SAFETY MANAGEMENT SYSTEM

1. Aerodrome administration

Particulars of the aerodrome administration, including the following –

- (a) an aerodrome organizational chart showing the names and positions

- of key personnel, including their responsibilities;
- (b) the name, position and telephone number of the person who has overall responsibility for aerodrome safety; and
- (c) airport committees.

2. Safety Management System

Particulars of the safety management system established for ensuring compliance with all safety requirements and achieving continuous improvement in safety performance, the essential features being –

- (a) the safety policy, in so far as applicable, on the safety management process and its relation to the operational and maintenance process;
- (b) the structure or organization of the Safety Management System, including staffing and the assignment of individual and group responsibilities for safety issues;
- (c) Safety Management System strategy and planning, such as setting safety performance target, allocating priorities for implementing safety initiative and providing a framework for controlling the risks to as low a level as is reasonably practicable keeping always in view the requirements of the prescribed standards and recommended practice, and regulations;
- (d) Safety Management System implementation, including facilities, methods and procedures for the effective communication of safety messages and the enforcement of safety requirements;
- (e) a system for the implementation of, and action on, critical safety areas which require a higher level of safety management integrity (safety measures programme);
- (f) measures for safety promotion and accident prevention and a system for risk control involving analysis and handling of accidents, incidents, complaints, defects, faults, discrepancies and failures, and continuing safety monitoring.
- (g) the internal safety audit and review system detailing the systems and programmes for quality control of safety;
- (h) the system for documenting all safety-related aerodrome facilities as well as airport operational and maintenance records, including information on the design and construction of aircraft movements and aerodrome lighting. The system shall enable easy retrieval of records including charts;
- (i) personnel training and competency, including the review and evaluation of the adequacy of training provided to personnel on safety-related duties and of the certification system for testing their competency; and
- (j) the incorporation and enforcement of safety-related clauses in the contract for construction work at the aerodrome.

THIRD SCHEDULE

(Made under Regulation 75)

**PARTICULARS TO BE INCLUDED IN AN AERODROME
MANUAL FOR AERODROMES IN CATEGORIES B AND C.**

**PART I:
GENERAL**

General information, including the following –

- (a) purpose and scope of the aerodrome manual;
- (b) the legal requirement for an aerodrome licence and an aerodrome Handbook as prescribed in the national regulations;
- (c) conditions for use of the aerodrome - a statement to indicate that the aerodrome shall at all times, when it is available for the take-off and landing of aircraft, be so available to all persons on equal terms and conditions;
- (d) the available aeronautical information system and procedures for its promulgation;
- (e) the system for recording aircraft movements; and
- (f) obligations of the aerodrome operator.

**PART 2:
PARTICULARS OF THE AERODROME SITE**

General information, including the following –

- (a) a plan of the aerodrome showing the main aerodrome facilities for the operation of the aerodrome including, particularly, the location of each wind direction indicator;
- (b) a plan of the aerodrome showing the aerodrome boundaries;
- (c) a plan showing the distance of the aerodrome from the nearest city, town or other populous area, and the location of any aerodrome facilities and equipment outside the boundaries of the aerodrome; and

**PART 3:
PARTICULARS OF THE AERODROME REQUIRED TO BE REPORTED
TO THE AERONAUTICAL INFORMATION SERVICE (AIS)**

1. General Information

- (a) the name of the aerodrome;
- (b) the location of the aerodrome;
- (c) the geographical coordinates of the aerodrome reference point determined in terms of the World Geodetic System - 1984 (WGS-84) reference datum;

- (d) the aerodrome elevation
- (e) points along the runway, and the highest elevation of the touchdown zone of a precision approach runway;
- (f) the aerodrome reference temperature;
- (h) the name of the aerodrome operator and the address, telephone and facsimile numbers at which the aerodrome operator may be contacted at all times.

2. Aerodrome dimensions and related information

General information, including the following –

- (a) runway - true bearing, designation number, length, width, displaced threshold location, slope, surface type, type of runway and, for a precision approach runway, the existence of an obstacle free zone;
- (b) Length, width and surface type of strip,
- (c) apron surface type and aircraft stands;
- (d) one or more pre-flight altimeter check locations established on an apron and their elevation;
- (e) rescue and fire-fighting plan;

Note.- the accuracy of the information in this Part is critical to aircraft safety. Information requiring engineering survey and assessment shall be gathered or verified by qualified technical persons.

**PART 4:
PARTICULARS OF THE AERODROME OPERATING
PROCEDURES AND SAFETY MEASURES**

1. Aerodrome reporting

Particulars of the procedures for reporting any changes to the aerodrome information set out in the AIP and AIC and procedures for requesting the issue of NOTAMs, including the following -

- (a) arrangements for reporting any changes to the Authority and recording the reporting of changes during and outside the normal hours of aerodrome operations;
- (b) the names and roles of persons responsible for notifying the changes, and their telephone numbers during and outside the normal hours of aerodrome operations; and
- (c) the address and telephone and facsimile numbers, as provided by the Authority, of the place where changes are to be reported to the Authority.

2. Access to the aerodrome movement area

Particulars of the procedures that have been developed and are to be followed

in coordination with the agency responsible for preventing unlawful interference in civil aviation at the aerodrome and for preventing unauthorized entry of persons, vehicles, equipment, animals or other things into the movement area, including the following –

- (a) the role of the aerodrome operator, the aircraft operator, aerodrome fixed-base operator, the aerodrome security entity, the Authority and other government departments, as applicable; and
- (b) the personnel responsible for controlling access to the aerodrome, and the telephone numbers for contacting them during and after working hours.
- (c) inspection checklist;
- (d) arrangements for reporting the results of inspections and for taking prompt follow-up actions to ensure correction of unsafe conditions; and
- (e) the names and roles of persons responsible for carrying out inspections, and their telephone numbers during and after working hours.

4. Maintenance of the movement area

Particulars of the facilities and procedures for the maintenance of the movement area, including -

- (a) Arrangements for maintaining the unpaved runways and taxiways;
- (b) arrangements for maintaining the runway and taxiway strips; and
- (c) arrangements for the maintenance of aerodrome drainage.

5. Aerodrome works – safety

Particulars of the procedures for planning and carrying out construction and maintenance work safely (including work that may have to be carried out at short notice) on or in the vicinity of the movement area which may extend above an obstacle limitation surface, including the following –

- (a) the names, telephone numbers and roles of the persons and organizations responsible for planning and carrying out the work, and arrangements for contacting those persons and organizations at all times;
- (b) a distribution list for work plans, if required.

6. Birds and Wildlife Hazard Management

Particulars of the procedures to deal with the danger posed to aircraft operations by the presence of birds or mammals in the aerodrome flight pattern or movement area, including the following-

- (a) arrangements for assessing birds and wildlife hazards;
- (b) arrangements for implementing birds and wildlife control programmes; and

- (c) the names and roles of the persons responsible for dealing with birds and wildlife hazards, and their telephone numbers during and after working hours.

7. Obstacle Control

Particulars setting out the procedures for –

- (a) monitoring the obstacle limitation surfaces and Type A Chart for obstacles in the take-off surface;
- (b) controlling obstacles within the authority of the operator;
- (c) monitoring the height of buildings or structures within the boundaries of the obstacle limitation surfaces;
- (d) controlling new developments in the vicinity of aerodromes; and
- (e) notifying the Authority of the nature and location of obstacles and subsequent addition or removal of obstacles for action as necessary, including amendment of the AIS publications.

8. Handling of Hazardous Materials

- (1) Particulars of the procedures for the safe handling and storage of hazardous materials on the aerodrome, including the following –

- (a) arrangements for special areas of the aerodrome to be set up for the storage of inflammable liquids (including aviation fuels) and any other hazardous materials; and
- (b) the method to be followed for the delivery storage, dispensing and handling of hazardous materials.

- (2) For the purposes of regulation 15 (1) “hazardous materials” include inflammable liquids and solids, corrosive liquids, compressed gases and magnetized or radioactive materials.

9. Protection of Sites for Radar and Navigational Aids

Particulars of the procedures for the protection of sites for radar and radio navigational aids located on the aerodrome to ensure that their performance will not be degraded, including the following

- (a) arrangements for the control of activities in the vicinity of radar and navigational aids installations;
- (b) arrangements for ground maintenance in the vicinity of these installations; and
- (c) arrangements for the supply and installation of signs warning of hazardous microwave radiation.

Note 1. In writing the procedures for each category, clear and precise information shall be included on -

- when, or in what circumstances, an operating procedure is to be activated;
- how an operating procedure is to be activated;
- actions to be taken;
- the equipment necessary for carrying out the actions, and access to such equipment.

Note 2. if any of the procedures specified above are not relevant or applicable, the reason shall be given.

FOURTH SCHEDULE

(Made under Regulation 75)

PARTICULARS TO BE INCLUDED IN AN AERODROME MANUAL FOR AERODROMES IN CATEGORY D

PART I: GENERAL

General information, including the following –

- (a) purpose and scope of the aerodrome manual;
- (b) the legal requirement for an aerodrome licence and an aerodrome Handbook as prescribed in the national regulations;
- (c) conditions for use of the aerodrome - a statement to indicate that the aerodrome shall at all times, when it is available for the take-off and landing of aircraft, be so available to all persons on equal terms and conditions;
- (d) the available aeronautical information system and procedures for its promulgation;
- (e) the system for recording aircraft movements; and
- (f) obligations of the aerodrome operator.

PART 2: PARTICULARS OF THE AERODROME SITE

General information, including the following –

- (a) a plan of the aerodrome showing the main aerodrome facilities for the operation of the aerodrome including, particularly, the location of each wind direction indicator;
- (b) a plan of the aerodrome showing the aerodrome boundaries;

- (c) a plan showing the distance of the aerodrome from the nearest city, town or other populous area, and the location of any aerodrome facilities and equipment outside the boundaries of the aerodrome; and

**PART 3:
PARTICULARS OF THE AERODROME REQUIRED
TO BE REPORTED TO THE AERONAUTICAL INFORMATION SERVICE
(AIS)**

1. General Information

- (a) the name of the aerodrome;
- (b) the location of the aerodrome;
- (c) the geographical coordinates of the aerodrome reference point determined in terms of the World Geodetic System - 1984 (WGS-84) reference datum;
- (d) the heliport elevation of the touchdown and lift off area (TLOF) and or the elevation and geoid undulation of each threshold of the final approach and take off area (FATO);
- (e) FATO type, true bearing, designation number, length, width, slope, surface type;
- (f) safety area: length, width and surface type;
- (g) apron: surface type, helicopter stands and geographical coordinates of specific points;
- (h) declared distances: take off distance available, rejected take off distance available and landing distance available;
- (i) the aerodrome reference temperature;
- (j) the name of the aerodrome operator and the address, telephone and facsimile numbers at which the aerodrome operator may be contacted at all times.
- (k) maximum allowable mass;
- (l) visual aids available;
- (m) rescue and fire fighting surface and level of protection;
- (n) availability of PAPI, APAPI or helicopter approach PAPI indicator;

2. Aerodrome dimensions and related information

General information, including the following –

- (a) dimensions of safety areas, apron, clear way, FATO and TLOF, obstacle limitation surfaces, helideck obstacle-free sector, helideck obstacle limitation sector and approach surface;
- (b) helicopter ground taxiway, air taxiway and air transit route;
- (c) one or more pre-flight altimeter check locations established on an apron and their elevation;

Note.- the accuracy of the information in this Part is critical to aircraft safety. Information requiring engineering survey and assessment shall be gathered or verified by qualified technical persons.

**PART 4:
PARTICULARS OF THE AERODROME OPERATING
PROCEDURES AND SAFETY MEASURES**

1. Aerodrome reporting

Particulars of the procedures for reporting any changes to the aerodrome information set out in the AIP and AIC and procedures for requesting the issue of NOTAMs, including the following -

- (a) arrangements for reporting any changes to the Authority and recording the reporting of changes during and outside the normal hours of aerodrome operations;
- (b) the names and roles of persons responsible for notifying the changes, and their telephone numbers during and outside the normal hours of aerodrome operations; and
- (c) the address and telephone and facsimile numbers, as provided by the Authority, of the place where changes are to be reported to the Authority.

2. Access to the aerodrome movement area

Particulars of the procedures that have been developed and are to be followed in coordination with the agency responsible for preventing unlawful interference in civil aviation at the aerodrome and for preventing unauthorized entry of persons, vehicles, equipment, animals or other things into the movement area, including the following –

- (a) the role of the aerodrome operator, the aircraft operator, aerodrome fixed-base operator, the aerodrome security entity, the Authority and other government departments, as applicable;
- (b) the personnel responsible for controlling access to the aerodrome, and the telephone numbers for contacting them during and after working hours;
- (c) inspection checklist;
- (d) arrangements for reporting the results of inspections and for taking prompt follow-up actions to ensure correction of unsafe conditions; and
- (e) the names and roles of persons responsible for carrying out inspections, and their telephone numbers during and after working hours.

4. Maintenance of the movement area

Particulars of the facilities and procedures for the maintenance of the movement area, including -

- (a) arrangements for maintaining the unpaved areas and taxiways;
- (b) arrangements for maintaining the FATO and TLOF; and
- (c) arrangements for the maintenance of aerodrome drainage.

5. Aerodrome works – safety

Particulars of the procedures for planning and carrying out construction and maintenance work safely (including work that may have to be carried out at short notice) on or in the vicinity of the movement area which may extend above an obstacle limitation surface, including the following –

- (a) the names, telephone numbers and roles of the persons and organizations responsible for planning and carrying out the work, and arrangements for contacting those persons and organizations at all times;
- (b) a distribution list for work plans, if required.

6. Obstacle Control

Particulars setting out the procedures for –

- (a) monitoring the obstacle limitation surfaces;
- (b) controlling obstacles within the authority of the operator;
- (c) monitoring the height of buildings or structures within the boundaries of the obstacle limitation surfaces;
- (d) controlling new developments in the vicinity of aerodromes; and
- (f) notifying the Authority of the nature and location of obstacles and subsequent addition of removal of obstacles for action as necessary, including amendment of the AIS publications.

7. Protection of Sites for Radar and Navigational Aids

Particulars of the procedures for the protection of sites for radar and radio navigational aids located on the aerodrome to ensure that their performance will not be degraded, including the following:

- (a) arrangements for the control of activities in the vicinity of radar and navigational aids installations;
- (b) arrangements for ground maintenance in the vicinity of these installations; and
- (c) arrangements for the supply and installation of signs warning of hazardous microwave radiation.

Note 1. In writing the procedures for each category, clear and precise information shall be included on -

- when, or in what circumstances, an operating procedure is to be activated;
- how an operating procedure is to be activated;
- actions to be taken;
- the equipment necessary for carrying out the actions, and access to such equipment.

Note 2. if any of the procedures specified above are not relevant or applicable, the reason shall be given.

FIFTH SCHEDULE

(Made under Regulation 83)

DETERMINATION AND REPORTING OF PAVEMENT BEARING STRENGTH

(1) The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5 700 kg shall be made available using the aircraft classification number — pavement classification number (ACN-PCN) method by reporting all of the following information:

- (a) the pavement classification number (PCN);
- (b) pavement type for ACN-PCN determination;
- (c) subgrade strength category;
- (d) maximum allowable tire pressure category or maximum allowable tire pressure value; and
- (e) evaluation method;

and if necessary, PCNs may be published to an accuracy of one-tenth of a whole number.

(2) The pavement classification number (PCN) reported shall indicate that an aircraft with an aircraft classification number (ACN) equal to or less than the reported PCN can operate on the pavement subject to any limitation on the tire pressure, or aircraft all-up mass for specified aircraft type(s).

(3) Different PCNs may be reported if the strength of the pavement is subject to significant seasonal variation.

(4) The ACN of an aircraft shall be determined in accordance with the standard procedures associated with the ACN-PCN method.

(5) For the purposes of determining the ACN, the behaviour of a pavement shall be classified as equivalent to a rigid or flexible construction.

(6) Information on pavement type for ACN-PCN determination, subgrade strength category, maximum allowable tire pressure category and evaluation method shall be reported using the following codes:

(a) Pavement type for ACN-PCN determination:

	Code
Rigid pavement	R
Flexible pavement	F

(b) Subgrade strength category:

<i>High strength:</i> characterized by $K = 150 \text{ MN/m}^3$ and representing all K values above 120 MN/m^3 for rigid pavements, and by $\text{CBR} = 15$ and representing all CBR values above 13 for flexible pavements.	Code A
<i>Medium strength:</i> characterized by $K = 80 \text{ MN/m}^3$ and representing a range in K of 60 to 120 MN/m^3 for rigid pavements, and by $\text{CBR} = 10$ and representing a range in CBR of 8 to 13 for flexible pavements	B
<i>Low strength:</i> characterized by $K = 40 \text{ MN/m}^3$ and representing a range in K of 25 to 60 MN/m^3 for rigid pavements, and by $\text{CBR} = 6$ and representing a range in CBR of 4 to 8 for flexible pavements.	C
<i>Ultra low strength:</i> characterized by $K = 20 \text{ MN/m}^3$ and representing all K values below 25 MN/m^3 for rigid pavements, and by $\text{CBR} = 3$ and representing all CBR values below 4 for flexible pavements.	D

(c) Maximum allowable tire pressure category:

Unlimited: no pressure limit	Code W
High: pressure limited to 1.75 MPa	X
Medium: pressure limited to 1.25 MPa	Y
Low: pressure limited to 0.50 MPa	Z

(c) Evaluation method:

Technical evaluation: representing a specific study of the pavement characteristics and application of pavement behaviour technology.	Code A
Using aircraft experience: representing knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use.	U

(7) The following examples shall be used to illustrate how pavement strength data are reported under the ACN-PCN method.

- (a) If the bearing strength of a rigid pavement, resting on a medium strength subgrade, has been assessed by technical evaluation to be PCN 80 and there is no tire pressure limitation, then the reported information would be:

PCN 80 / R / B / W / T

- (b) If the bearing strength of a composite pavement, behaving like a flexible pavement and resting on a high strength subgrade, has been assessed by using aircraft experience to be PCN 50 and the maximum tire pressure allowable is 1.25 MPa, then the reported information would be:

PCN 50 / F / A / Y / U

- (c) If the bearing strength of a flexible pavement, resting on a medium strength subgrade, has been assessed by technical evaluation to be PCN 40 and the maximum allowable tire pressure is 0.80 MPa, then the reported information would be:

PCN 40 / F / B / 0.80 MPa /T

- (d) If a pavement is subject to a B747-400 all-up mass limitation of 390 000 kg, then the reported information would include a note to the effect that the reported PCN is subject to a B747-400 all-up mass limitation of 390 000 kg.

(9) Criteria shall be established to regulate the use of a pavement by an aircraft with an ACN higher than the PCN reported for that pavement in accordance with sub-regulations (2) and (3).

(10) The bearing strength of a pavement intended for aircraft of apron (ramp) mass equal to or less than 5 700 kg shall be made available by reporting the following information:

- (a) maximum allowable aircraft mass; and
- (b) maximum allowable tire pressure.

e.g.: 4 000 kg/0.50 MPa.

SIXTH SCHEDULE

(Made under Regulation 140(5))

SHIELDING OF OBSTACLES

1. General

1.1 The principle of shielding as applied to obstacles to air navigation may reduce the necessity for removing obstacles or prohibiting the construction of new constructions.

1.2 Shielding principles are employed when some object, an existing building or natural terrain already penetrates above one of the obstacle limitation surfaces.

2. The principles of Shielding

2.1 If it is considered that the nature of an object is such that its presence may be described as permanent, the additional objects within a specified area around it may be permitted to penetrate the surface without being considered as obstacles. The original obstacle is considered as dominating or shielding the surrounding area.

2.2 The formula for shielding shall be based on a horizontal plane projected from the top of each obstacle away from the runway and a plane with a negative slope of 10% towards the runway. Any object which is below either of the two planes would be considered shielded. The permission to allow objects to penetrate an obstacle limitation surface under the shielding principle shall however be qualified by reference to the need for an aeronautical study in all cases.

2.3 The shielding effect of immovable obstacles laterally in approach and take-off climb shall be more critically considered. It is important to preserve existing unobstructed cross section areas particularly when the obstacle is close to the runway. This would guard against future changes in either approach or take-off climb area specifications or the adoption of a turned take-off procedure.

2.4 An object shall be considered as permanent and immovable obstacle only if, when taking the longest view possible, there is no prospect of removal being practicable, possible or justifiable, regardless of how the pattern, type or density of air operations might change. Generally, an aeronautical study will need to be carried out to determine the exact effect the construction of a new object will have on air operations.

3. Alternative methods for assessing Obstacles in critical areas

The Authority may assess and determine whether an obstacle is shielded. In assessing whether an existing obstacle shields other obstacles, the Authority may be guided by the following shielding practices:

3.1 Obstacles in the Take-off climb and Approach Surfaces

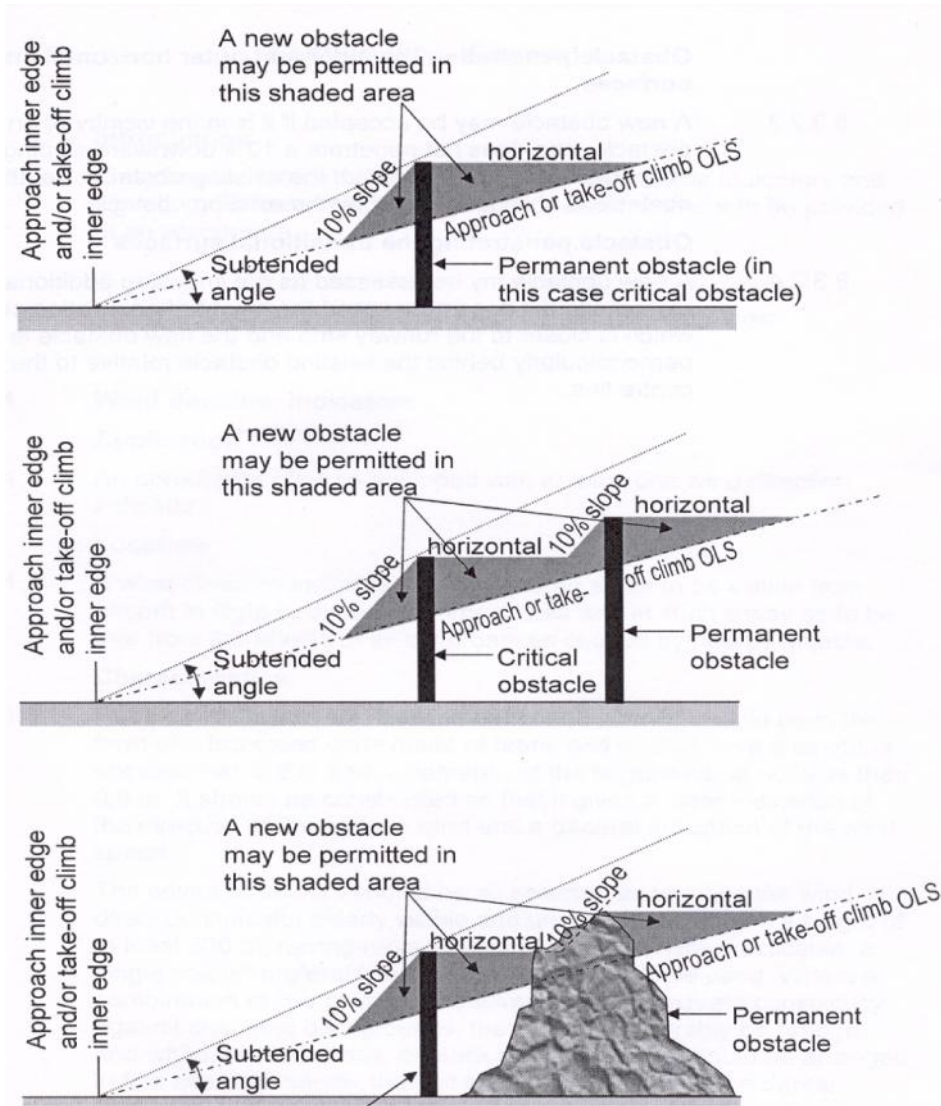
An obstacle may be assessed as not imposing additional restrictions if:

- (i) when located between the inner edge end and the critical obstacle, the obstacle being assessed is below a plane sloping downwards at 10% from the top of the critical obstacle toward the inner edge;
- (ii) when located beyond the critical obstacle from the inner edge end, the obstacle being assessed is not higher than the height of the permanent obstacle; and
- (iii) where there is more than one critical obstacle within the approach and take-off climb area, and the obstacle being assessed is located between two critical obstacles, the height of the obstacle being assessed is not above a plane sloping downwards at 10% from the top of the next critical obstacle.

3.2 Obstacle in the Transitional Surfaces

An obstacle may be assessed as not imposing additional restrictions if it does not exceed the height of an existing obstacle which is closer to the runway strip and the obstacle being assessed is located perpendicularly behind the existing obstacle relative to the runway centre line.

Figure 4-3 – Shielding of obstacles penetrating the approach and take-off climb surfaces



3.3 Obstacle in the Horizontal and Conical Surfaces

An obstacle may be assessed as not imposing additional restrictions if it is in the vicinity of an existing obstacle, and does not penetrate a 10% downward sloping conical shaped surface from the top of the existing obstacle, i.e. the obstacle is shielded radially by the existing obstacle.

SEVENTH SCHEDULE

(Made under Regulation 154)

COLOURS FOR AERONAUTICAL GROUND LIGHTS, MARKINGS, SIGNS AND PANELS

1. General

Introductory Note.— The following specifications define the chromaticity limits of colours to be used for aeronautical ground lights, markings, signs and panels. The specifications are in accord with the 1983 specifications of the International Commission on Illumination (CIE).

It is not possible to establish specifications for colours such that there is no possibility of confusion. For reasonably certain recognition, it is important that the eye illumination be well above the threshold of perception, that the colour not be greatly modified by elective atmospheric attenuations and that the observer's colour vision be adequate.

There is also a risk of confusion of colour at an extremely high level of eye illumination such as may be obtained from a high-intensity source at very close range. Experience indicates that satisfactory recognition can be achieved if due attention is given to these factors.

The chromaticities are expressed in terms of the standard observer and coordinate system adopted by the International Commission on Illumination (CIE) at its Eighth Session at Cambridge, England, in 1931.*

2. Colours for aeronautical ground lights

2.1 Chromaticities

2.1.1 The chromaticities of aeronautical ground lights shall be within the following boundaries:

CIE Equations (see Figure A1-1):

a) Red

Purple boundary $y = 0.980 - x$

Yellow boundary $y = 0.335$

b) Yellow

Red boundary $y = 0.382$

White boundary $y = 0.790 - 0.667x$

Green boundary $y = x - 0.120$

c) Green

Yellow boundary $x = 0.360 - 0.080y$

White boundary $x = 0.650y$

Blue boundary $y = 0.390 - 0.171x$

d) Blue

Green boundary	$y = 0.805x + 0.065$
White boundary	$y = 0.400 - x$
Purple boundary	$x = 0.600y + 0.133$

e) White

i) Incandescent

Yellow boundary	$x = 0.500$
Blue boundary	$x = 0.285$
Green boundary	$y = 0.440$
	and $y = 0.150 + 0.640x$
Purple boundary	$y = 0.050 + 0.750x$
	and $y = 0.382$

ii) LED

Yellow boundary	$x = 0.440$
Blue boundary	$x = 0.320$
Green boundary	$y = 0.150 + 0.643x$
Purple boundary	$y = 0.050 + 0.757x$

f) Variable white

Yellow boundary	$x = 0.255 + 0.750y$
and	$x = 1.185 - 1.500y$
Blue boundary	$x = 0.285$
Green boundary	$y = 0.440$
and	$y = 0.150 + 0.750x$
and	$y = 0.382$

Note.— Guidance on chromaticity changes resulting from the effect of temperature on filtering elements is given in the ICAO Aerodrome Design Manual, Part 4.

2.1.2 Where dimming is not required, or where observers with defective colour vision must be able to determine the colour of the light, green signals shall be within the following boundaries:

Yellow boundary	$y = 0.726 - 0.726x$
White boundary	$x = 0.650y$
Blue boundary	$y = 0.390 - 0.171x$

2.1.3 Where increased certainty of recognition is more important than maximum visual range, green signals shall be within the following boundaries:

Yellow boundary	$y = 0.726 - 0.726x$
White boundary	$x = 0.625y - 0.041$
Blue boundary	$y = 0.390 - 0.171x$

2.2 Discrimination between lights

2.2.1 If there is a requirement to discriminate yellow and white from each other, they shall be displayed in close proximity of time or space as, for example, by being flashed successively from the same beacon.

2.2.2 If there is a requirement to discriminate yellow from green and/or white, as for example on exit taxiway centre line lights, the y coordinates of the yellow light shall not exceed a value of 0.40.

Note.— The limits of white have been based on the assumption that they will be used in situations in which the characteristics (colour temperature) of the light source will be substantially constant.

2.2.3 The colour variable white is intended to be used only for lights that are to be varied in intensity, e.g. to avoid dazzling. If this colour is to be discriminated from yellow, the lights shall be so designed and operated that:

- a) the x coordinate of the yellow is at least 0.050 greater than the x coordinate of the white; and
- b) the disposition of the lights will be such that the yellow lights are displayed simultaneously and in close proximity to the white lights.

2.2.4 The colour of aeronautical ground lights shall be verified as being within the boundaries specified in Figure A1-1 by measurement at five points within the area limited by the innermost isocandela curve (isocandela diagrams in Appendix 2 refer), with operation at rated current or voltage. In the case of elliptical or circular isocandela curves, the colour measurements shall be taken at the centre and at the horizontal and vertical limits. In the case of rectangular isocandela curves, the colour measurements shall be taken at the centre and the limits of the diagonals (corners). In addition, the colour of the light shall be checked at the outermost isocandela curve to ensure that there is no colour shift that might cause signal confusion to the pilot.

Note 1.— For the outermost isocandela curve, a measurement of colour coordinates shall be made and recorded for review and judgment of acceptability by the appropriate authority.

Note 2.— Certain light units may have application so that they may be viewed and used by pilots from directions beyond that of the outermost isocandela curve (e.g. stop bar lights at significantly wide runway-holding positions). In such instances, the appropriate authority shall assess the actual application and if necessary require a check of colour shift at angular ranges beyond the outermost curve.

2.2.5 In the case of visual approach slope indicators and other light units having a colour transition sector, the colour shall be measured at points in accordance with 2.2.4 above, except that the colour areas shall be treated separately and no point shall be within 0.5 degrees of the transition sector.

3. Colours for markings, signs and panels

Note 1.— The specifications of surface colours given below apply only to freshly coloured surfaces. Colours used for markings, signs and panels usually change with time and therefore require renewal.

Note 2.— Guidance on surface colours is contained in the CIE document entitled Recommendations for Surface Colours for Visual Signalling — Publication No. 39-2 (TC-106) 1983.

Note 3.— The specifications recommended in 3.4 below for transilluminated panels are interim in nature and are based on the CIE specifications for transilluminated signs. It is intended that these specifications will be reviewed and updated as and when CIE develops specifications for transilluminated panels.

3.1 The chromaticities and luminance factors of ordinary colours, colours of retro-reflective materials and colours of transilluminated (internally illuminated) signs and panels shall be determined under the following standard conditions:

- a) angle of illumination: 45°;
- b) direction of view: perpendicular to surface; and
- c) illuminant: CIE standard illuminant D₆₅.

3.2 The chromaticity and luminance factors of ordinary colours for markings and externally illuminated signs and panels shall be within the following boundaries when determined under standard conditions.

CIE Equations (see Figure A1-2):

a) Red

Purple boundary $y = 0.345 - 0.051x$

White boundary $y = 0.910 - x$

Orange boundary $y = 0.314 + 0.047x$

Luminance factor $\beta = 0.07$ (mnm)

b) Orange

Red boundary $y = 0.285 + 0.100x$

White boundary $y = 0.940 - x$

Yellow boundary $y = 0.250 + 0.220x$

Luminance factor $\beta = 0.20$ (mnm)

c) Yellow

Orange boundary $y = 0.108 + 0.707x$

White boundary $y = 0.910 - x$

Green boundary $y = 1.35x - 0.093$

Luminance factor $\beta = 0.45$ (mnm)

d) White

Purple boundary $y = 0.010 + x$

Blue boundary $y = 0.610 - x$

Green boundary $y = 0.030 + x$

Yellow boundary $y = 0.710 - x$

Luminance factor $\beta = 0.75$ (mnm)

e) Black

Purple boundary $y = x - 0.030$

Blue boundary $y = 0.570 - x$

Green boundary $y = 0.050 + x$

Yellow boundary $y = 0.740 - x$

Luminance factor $\beta = 0.03$ (max)

f) Yellowish green

Green boundary $y = 1.317x + 0.4$

White boundary $y = 0.910 - x$

Yellow boundary $y = 0.867x + 0.4$

g) Green

Yellow boundary $x = 0.313$

White boundary $y = 0.243 + 0.067x$

Blue boundary $y = 0.493 - 0.524x$

Luminance factor $\beta = 0.10$ (mnm)

Note.— The small separation between surface red and surface orange is not sufficient to ensure the distinction of these colours when seen separately.

3.3 The chromaticity and luminance factors of colours of retro-reflective materials for markings, signs and panels shall be within the following boundaries when determined under standard conditions. CIE Equations (see Figure A1-3):

a) Red

Purple boundary $y = 0.345 - 0.051x$

White boundary $y = 0.910 - x$

Orange boundary $y = 0.314 + 0.047x$

Luminance factor $\beta = 0.03$ (mnm)

b) Orange

Red boundary $y = 0.265 + 0.205x$
White boundary $y = 0.910 - x$
Yellow boundary $y = 0.207 + 0.390x$
Luminance factor $\beta = 0.14$ (mnm)

c) Yellow

Orange boundary $y = 0.160 + 0.540x$
White boundary $y = 0.910 - x$
Green boundary $y = 1.35x - 0.093$
Luminance factor $\beta = 0.16$ (mnm)

d) White

Purple boundary $y = x$
Blue boundary $y = 0.610 - x$
Green boundary $y = 0.040 + x$
Yellow boundary $y = 0.710 - x$
Luminance factor $\beta = 0.27$ (mnm)

e) Blue

Green boundary $y = 0.118 + 0.675x$
White boundary $y = 0.370 - x$
Purple boundary $y = 1.65x - 0.187$
Luminance factor $\beta = 0.01$ (mnm)

f) Green

Yellow boundary $y = 0.711 - 1.22x$
White boundary $y = 0.243 + 0.670x$
Blue boundary $y = 0.405 - 0.243x$
Luminance factor $\beta = 0.03$ (mnm)

3.4 The chromaticity and luminance factors of colours for trans-illuminated (internally illuminated) signs and panels shall be within the following boundaries when determined under standard conditions.

CIE Equations (see Figure A1-4):

a) Red

Purple boundary $y = 0.345 - 0.051x$
White boundary $y = 0.910 - x$
Orange boundary $y = 0.314 + 0.047x$
Luminance factor $\beta = 0.07$ (mnm)
(day condition)

Relative luminance 5% (mnm)
to white (night 20% (max)
condition)

b) Yellow

Orange boundary $y = 0.108 + 0.707x$

White boundary $y = 0.910 - x$

Green boundary $y = 1.35x - 0.093$

Luminance factor $\beta = 0.45$ (mnm)

(day condition)

Relative luminance 30% (mnm)

to white (night 80% (max)

condition)

c) White

Purple boundary $y = 0.010 + x$

Blue boundary $y = 0.610 - x$

Green boundary $y = 0.030 + x$

Yellow boundary $y = 0.710 - x$

Luminance factor $\beta = 0.75$ (mnm)

(day condition)

Relative luminance 100%

to white (night

condition)

d) Black

Purple boundary $y = x - 0.030$

Blue boundary $y = 0.570 - x$

Green boundary $y = 0.050 + x$

Yellow boundary $y = 0.740 - x$

Luminance factor $\beta = 0.03$ (max)

(day condition)

Relative luminance 0% (mnm)

to white (night 2% (max)

condition)

e) Green

Yellow boundary $x = 0.313$

White boundary $y = 0.243 + 0.670x$

Blue boundary $y = 0.493 - 0.524x$

Luminance factor $\beta = 0.10$ minimum (day conditions)

Relative luminance 5% (minimum)

to white (night 30% (maximum)

conditions)

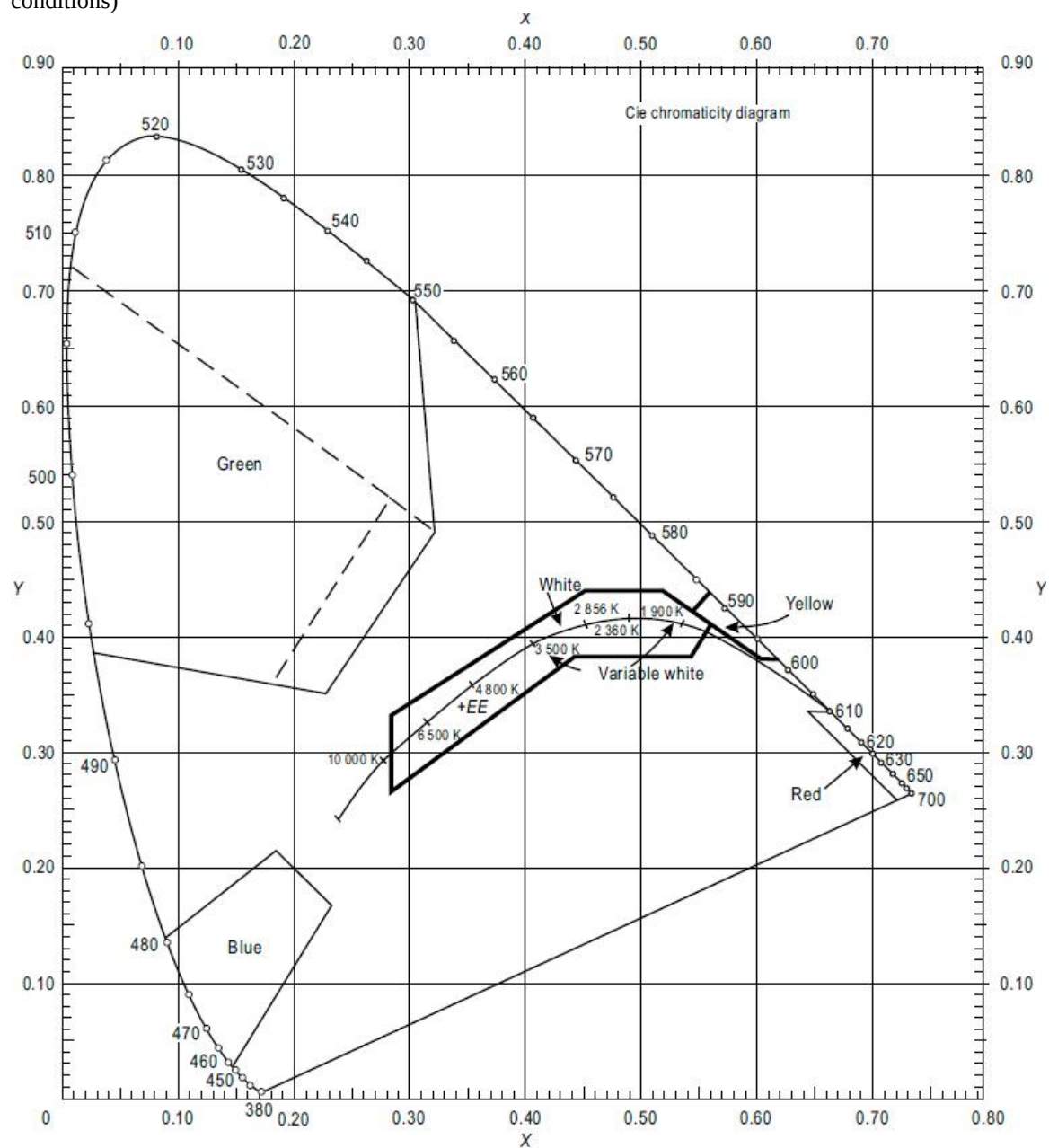


Figure A1-1. Colours for aeronautical ground lights

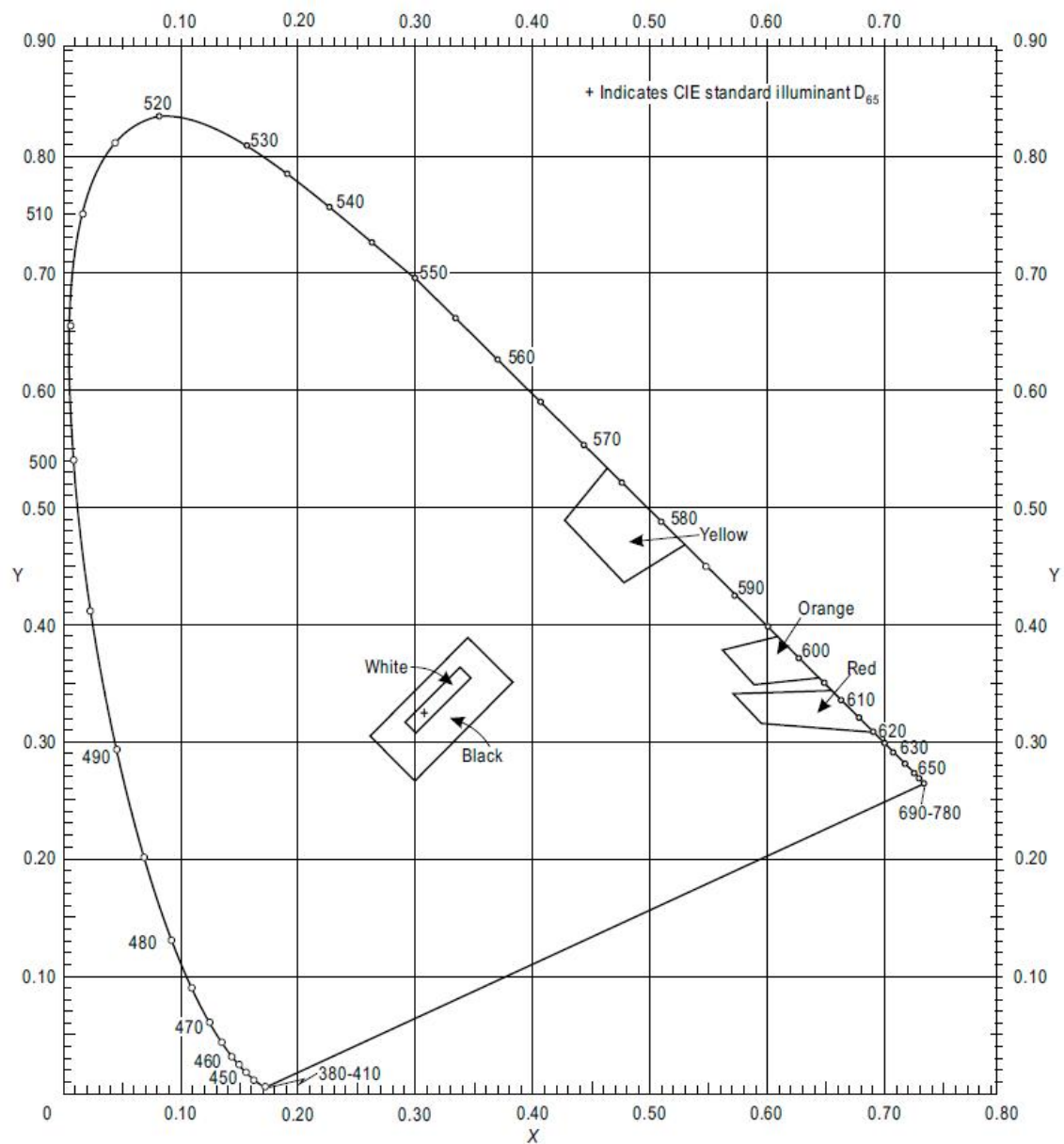


Figure A1-2. Ordinary colours for markings and externally illuminated signs and panels

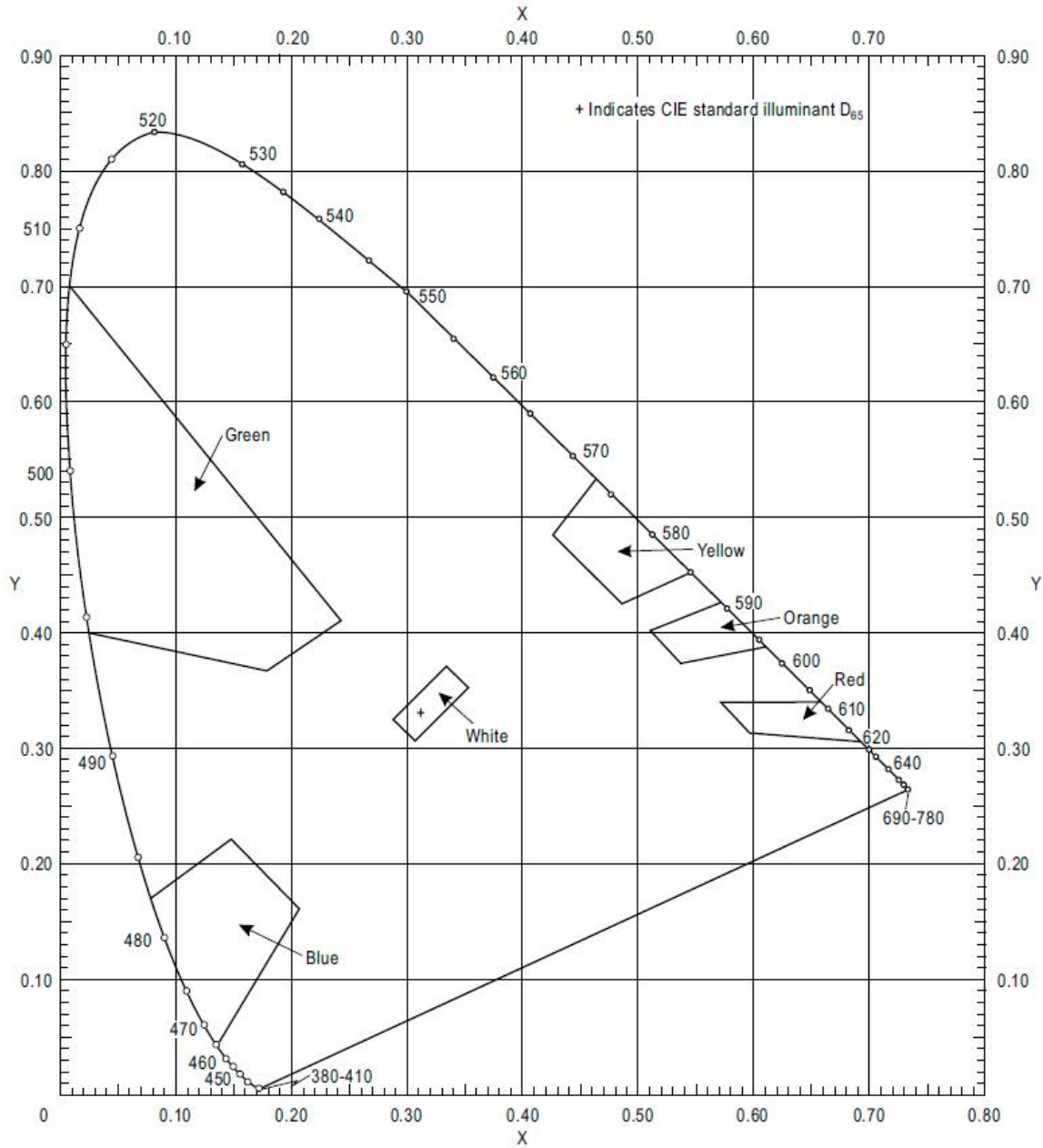


Figure A1-3. Colours of retro-reflective materials for markings, signs and panels

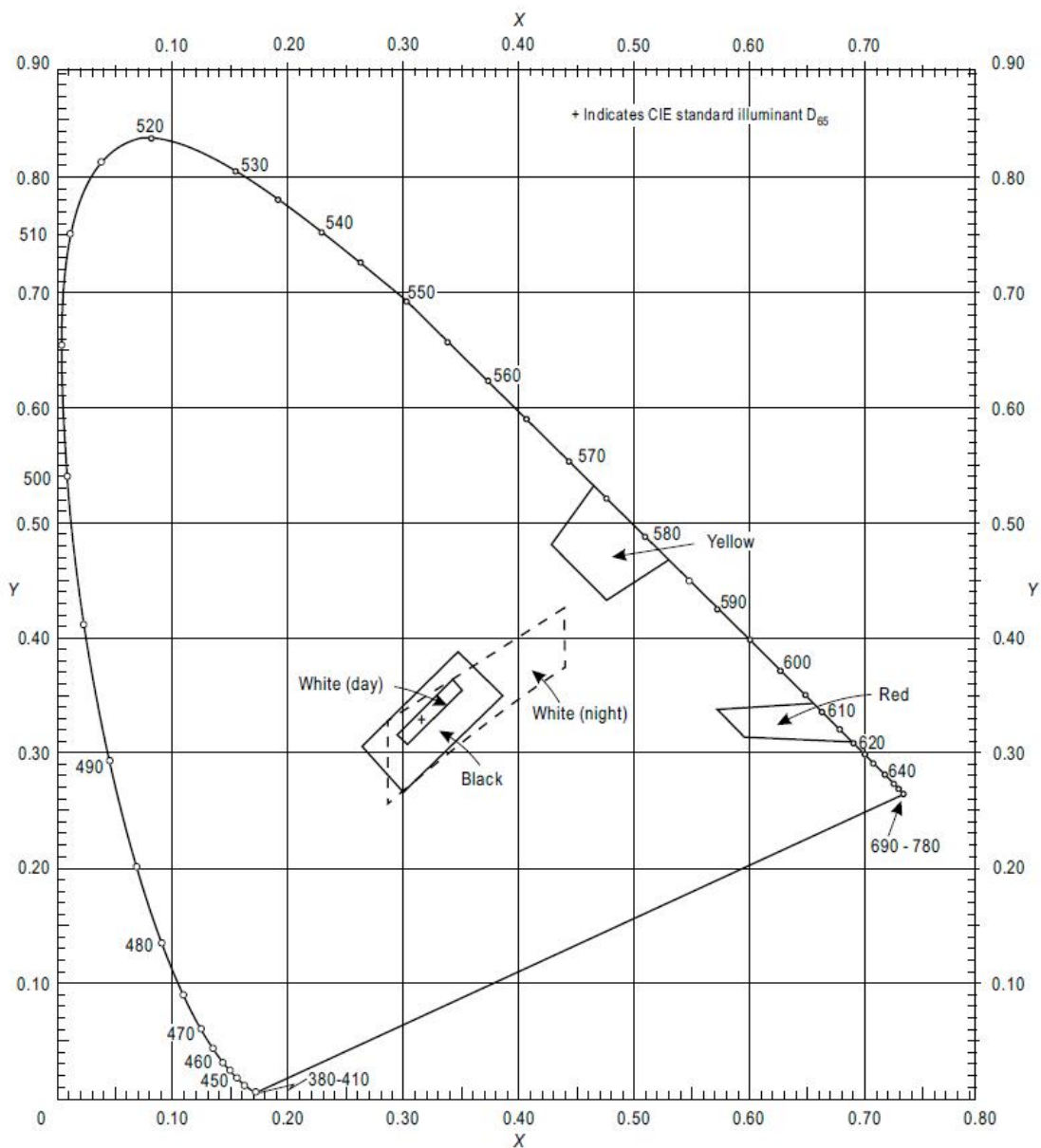
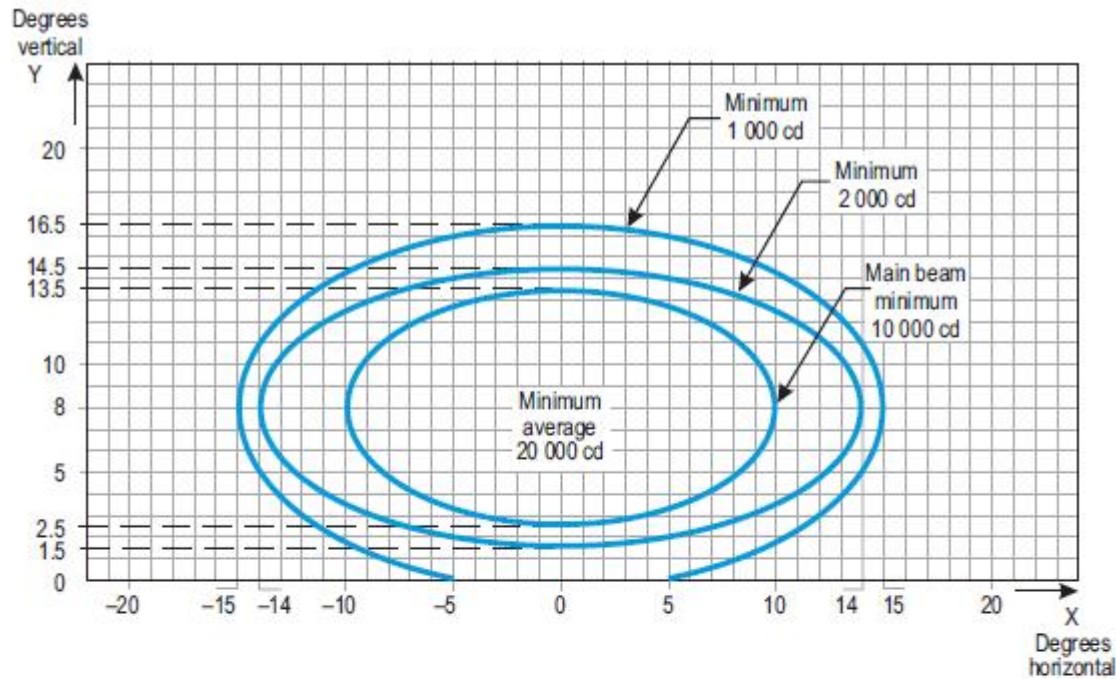


Figure A1-4. Colours of transilluminated (internally illuminated) signs and panels

EIGHTH SCHEDULE

(Made under Regulation 287)

AERONAUTICAL GROUND LIGHT CHARACTERISTICS



Notes:

1. Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

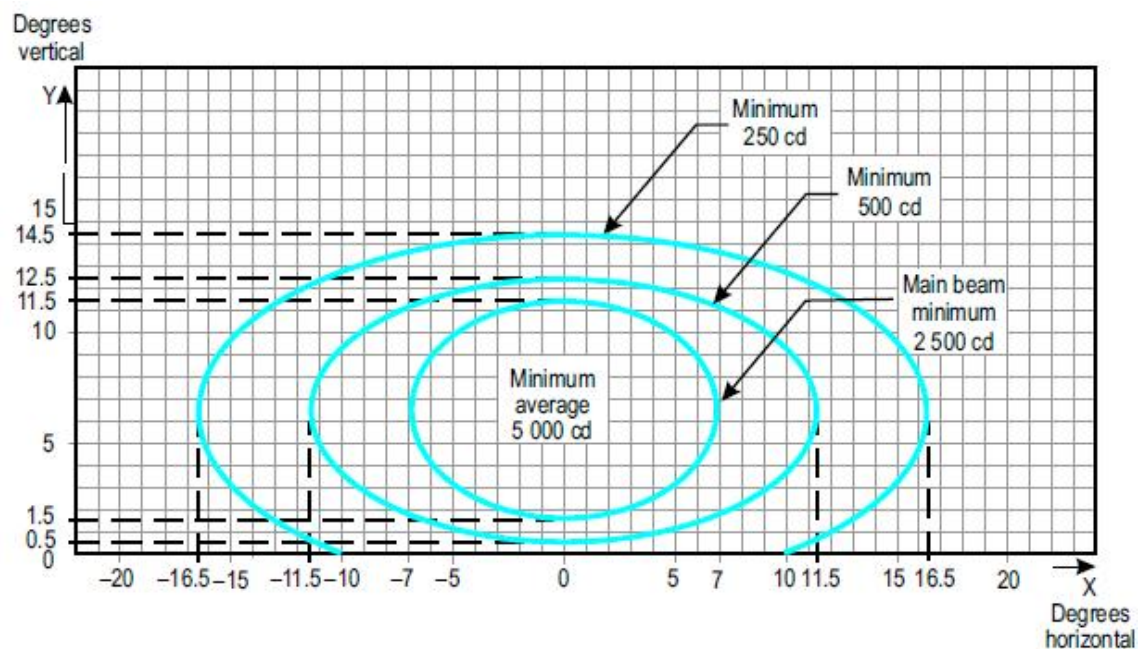
a	10	14	15
b	5.5	6.5	8.5

2. Vertical setting angles of the lights shall be such that the following vertical coverage of the main beam will be met:

distance from threshold	vertical main beam coverage
threshold to 315 m	0° — 11°
316 m to 475 m	0.5° — 11.5°
476 m to 640 m	1.5° — 12.5°
641 m and beyond	2.5° — 13.5° (as illustrated above)

3. Lights in crossbars beyond 22.5 m from the centre line shall be toed-in 2 degrees. All other lights shall be aligned parallel to the centre line of the runway.
4. See collective notes for Figures A2-1 to A2-11.

Figure A2-1. Isocandela diagram for approach centre line light and crossbars (white light)



Notes:

1. Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

a	7.0	11.5	16.5
b	5.0	6.0	8.0

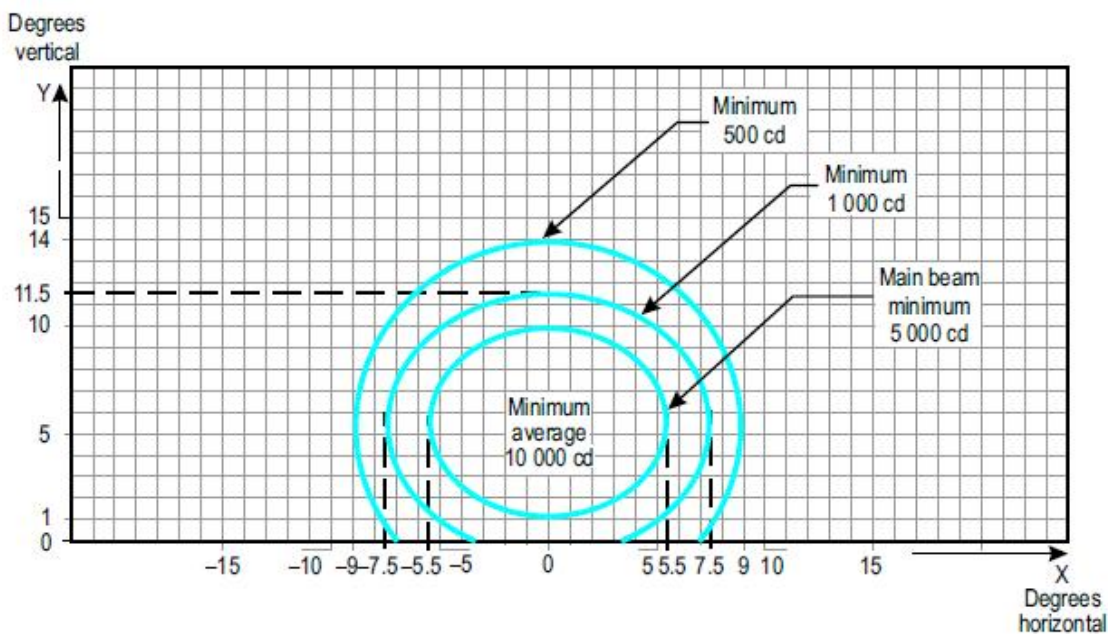
2. Toe-in 2 degrees

3. Vertical setting angles of the lights shall be such that the following vertical coverage of the main beam will be met:

distance from threshold	vertical main beam coverage
threshold to 115 m	0.5° — 10.5°
116 m to 215 m	1° — 11°
216 m and beyond	1.5° — 11.5° (as illustrated above)

4. See collective notes for Figures A2-1 to A2-11.

Figure A2-2. Isocandela diagram for approach side row light (red light)



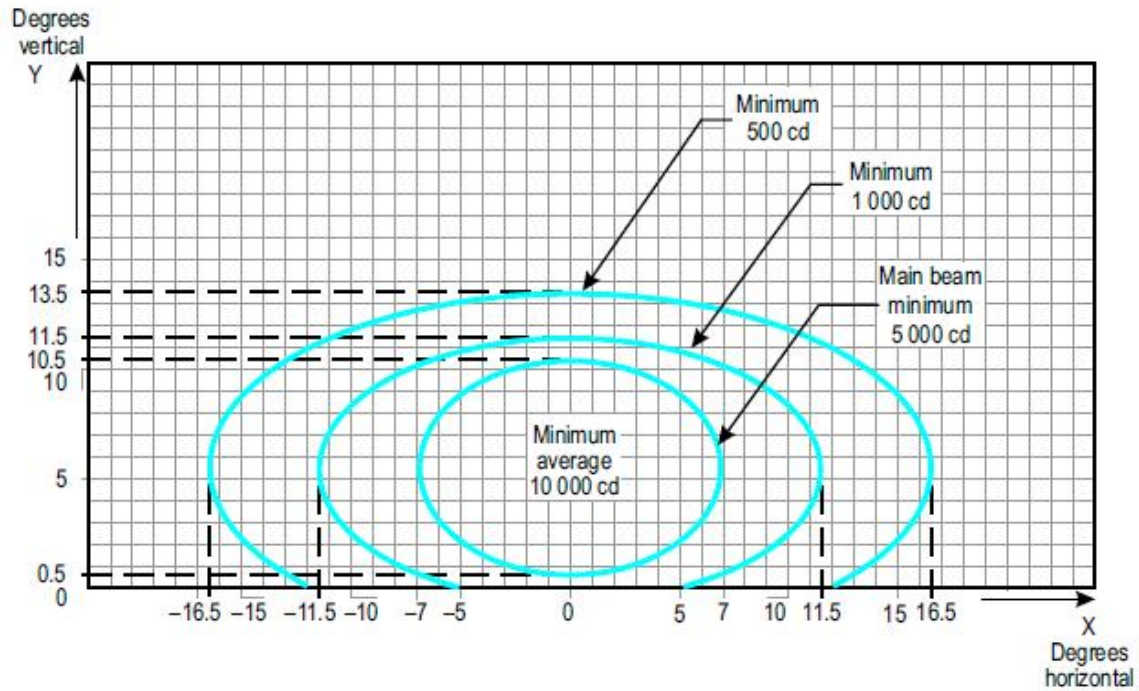
Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	5.5	7.5	9.0
b	4.5	6.0	8.5

2. Toe-in 3.5 degrees
3. See collective notes for Figures A2-1 to A2-11.

Figure A2-3. Isocandela diagram for threshold light (green light)



Notes:

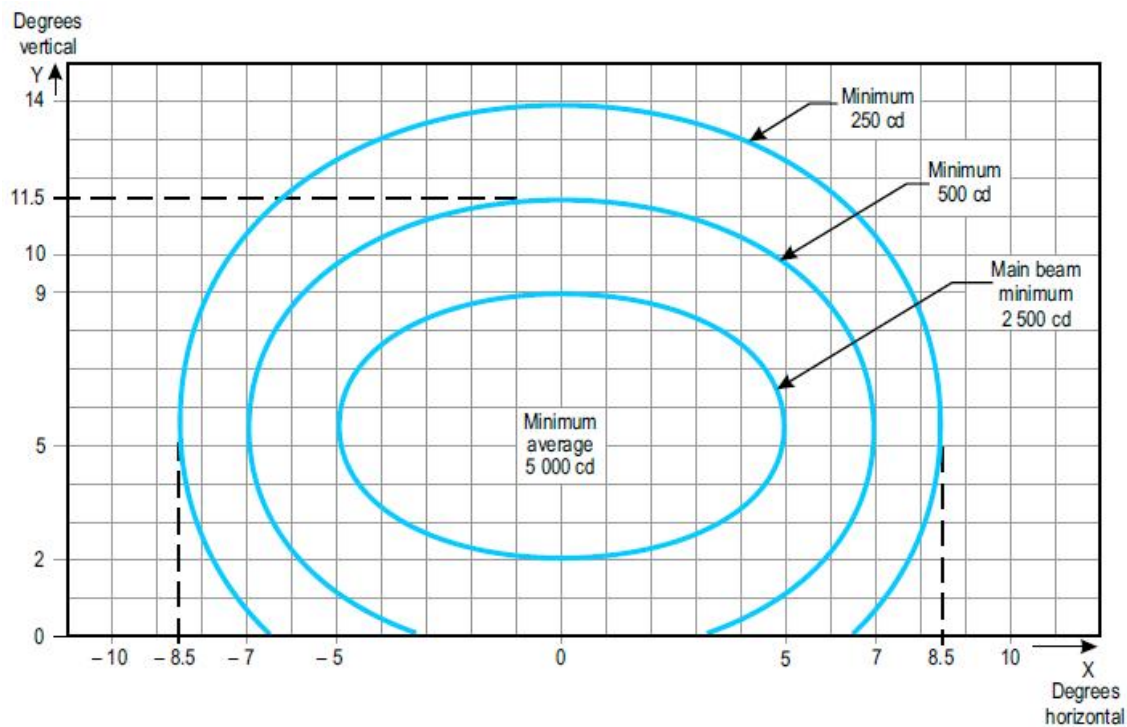
1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	7.0	11.5	16.5
b	5.0	6.0	8.0

2. Toe-in 2 degrees

3. See collective notes for Figures A2-1 to A2-11.

Figure A2-4. Isocandela diagram for threshold wing bar light (green light)



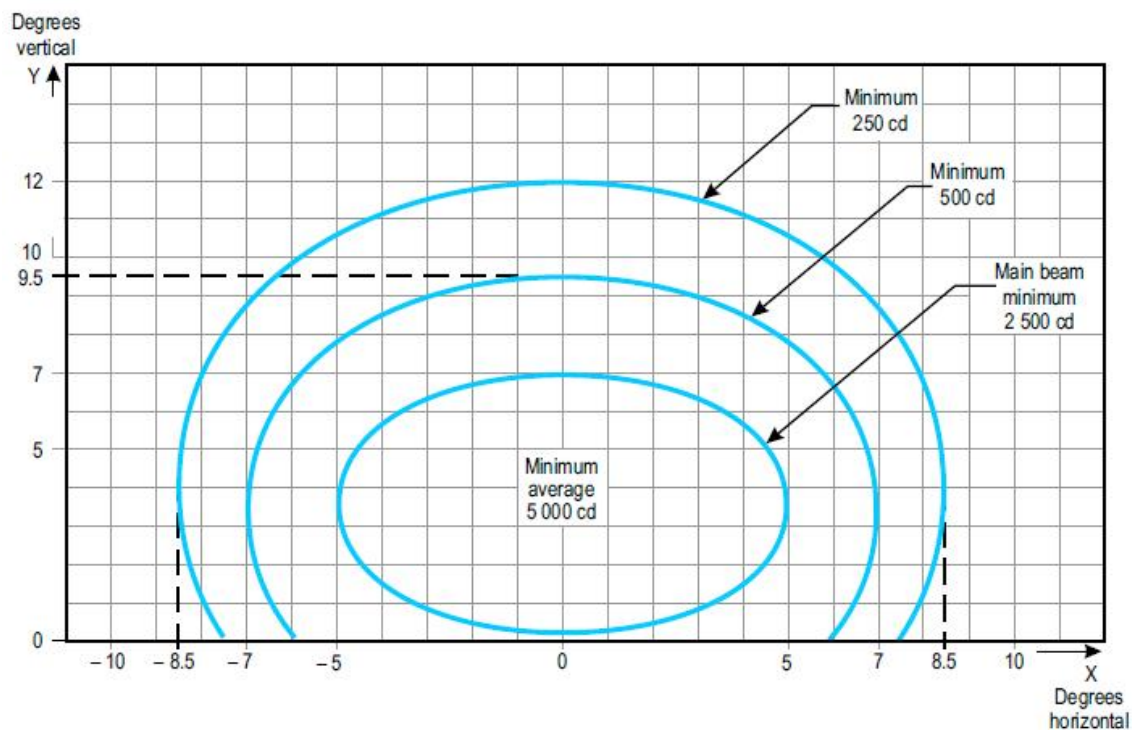
Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	5.0	7.0	8.5
b	3.5	6.0	8.5

2. Toe-in 4 degrees
3. See collective notes for Figures A2-1 to A2-11.

Figure A2-5. Isocandela diagram for touchdown zone light (white light)



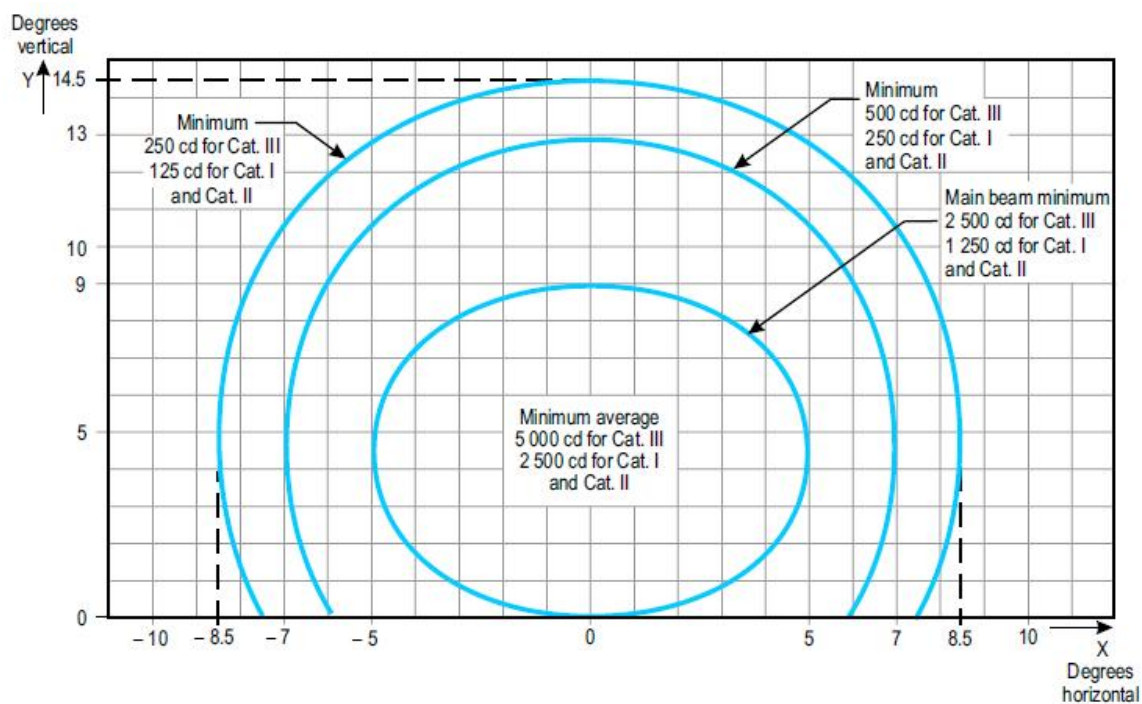
Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	5.0	7.0	8.5
b	3.5	6.0	8.5

2. For red light, multiply values by 0.15.
3. For yellow light, multiply values by 0.40.
4. See collective notes for Figures A2-1 to A2-11.

Figure A2-6. Isocandela diagram for runway centre line light with 30 m longitudinal spacing (white light) and rapid exit taxiway indicator light (yellow light)



Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

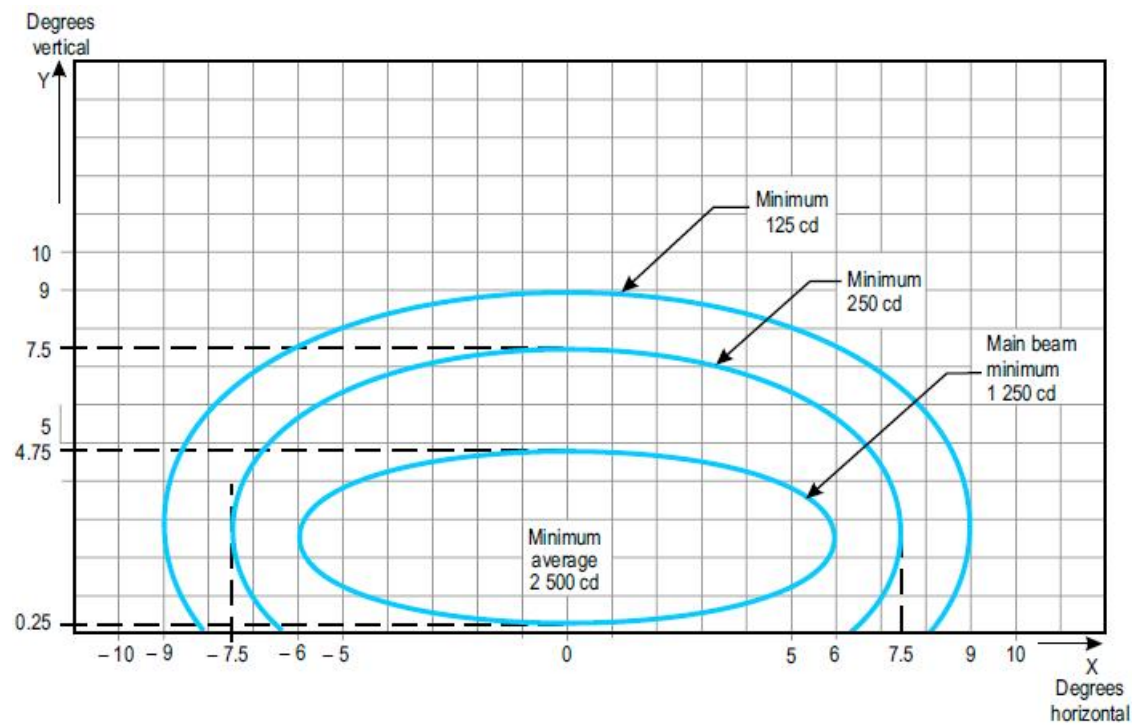
a	5.0	7.0	8.5
b	4.5	8.5	10

2. For red light, multiply values by 0.15.

3. For yellow light, multiply values by 0.40.

4. See collective notes for Figures A2-1 to A2-11.

Figure A2-7. Isocandela diagram for runway centre line light with 15 m longitudinal spacing (white light) and rapid exit taxiway indicator light (yellow light)



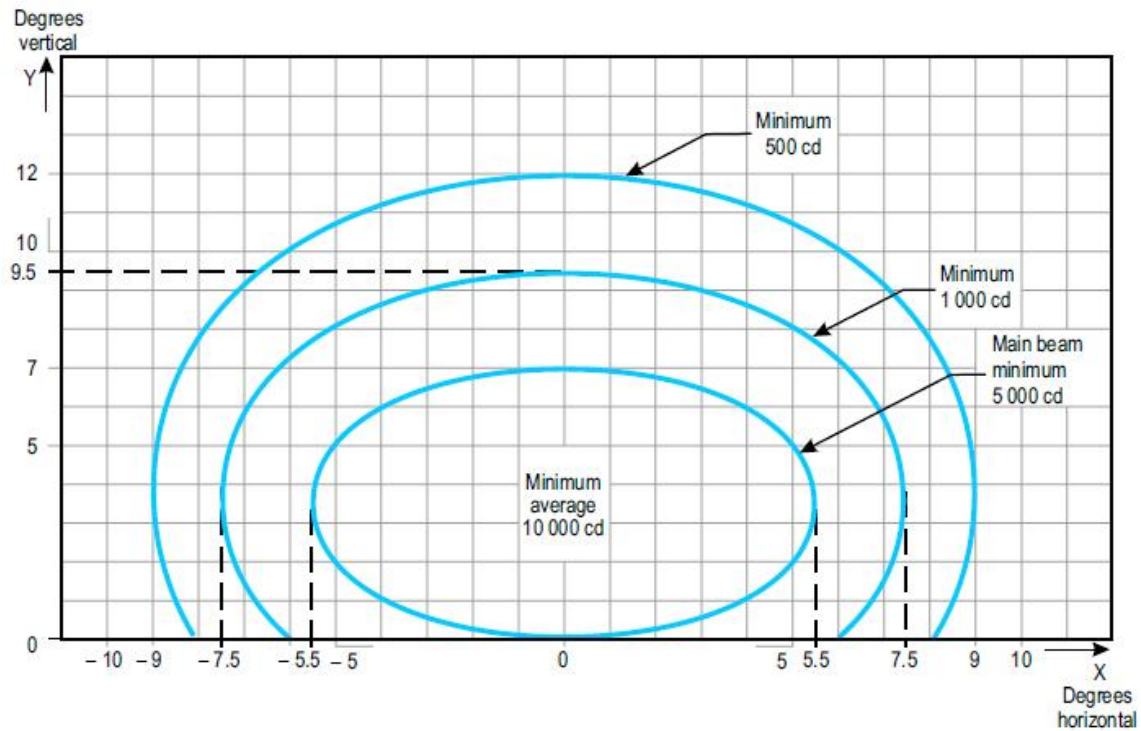
Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	6.0	7.5	9.0
b	2.25	5.0	6.5

2. See collective notes for Figures A2-1 to A2-11.

Figure A2-8. Isocandela diagram for runway end light (red light)



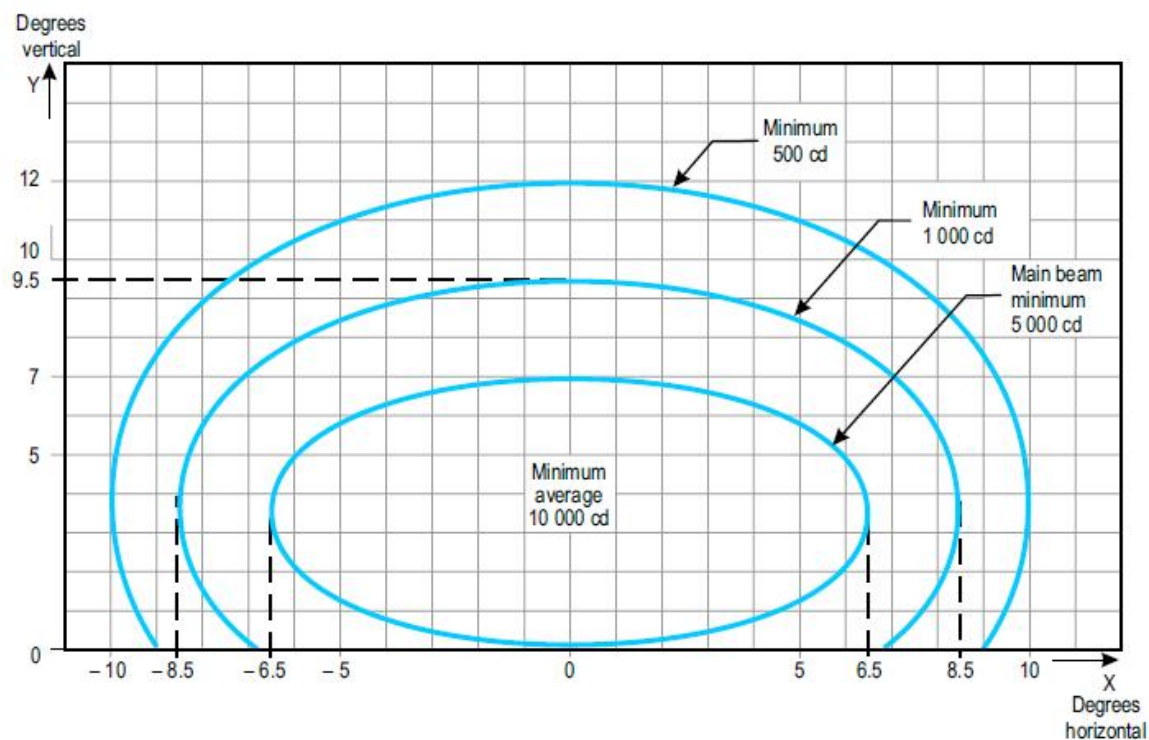
Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	5.5	7.5	9.0
b	3.5	6.0	8.5

2. Toe-in 3.5 degrees
3. For yellow light, multiply values by 0.40.
4. See collective notes for Figures A2-1 to A2-11.

Figure A2-9. Isocandela diagram for runway edge light where width of runway is 45 m (white light)



Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	6.5	8.5	10.0
b	3.5	6.0	8.5

2. Toe-in 4.5 degrees
3. For yellow light, multiply values by 0.40.
4. See collective notes for Figures A2-1 to A2-11.

Figure A2-10. Isocandela diagram for runway edge light where width of runway is 60 m (white light)

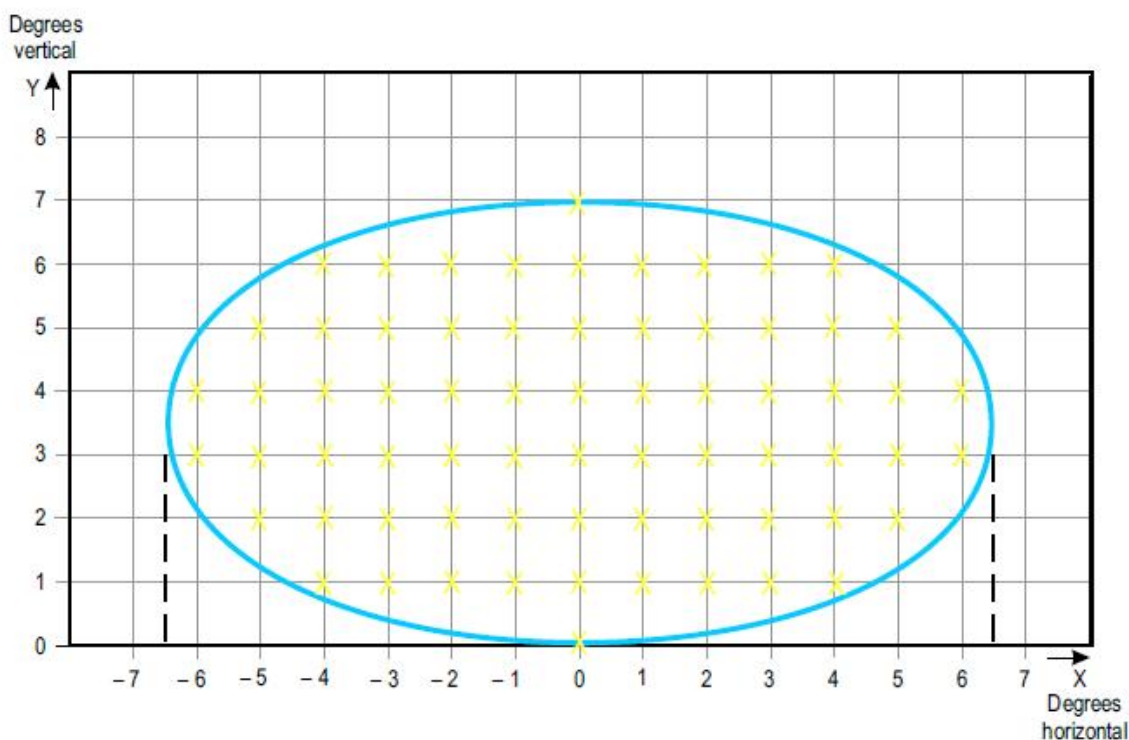


Figure A2-11. Grid points to be used for the calculation of average intensity of approach and runway lights

Collective notes to Figures A2-1 to A2-11

1. The ellipses in each figure are symmetrical about the common vertical and horizontal axes.

2. Figures A2-1 to A2-10 show the minimum allowable light intensities. The average intensity of the main beam is calculated by

establishing grid points as shown in Figure A2-11 and using the intensity value measures at all grid points located within and on the perimeter of the ellipse representing the main beam. The average value is the arithmetic average of light intensities measured at all considered grid points.

3. No deviations are acceptable in the main beam pattern when the lighting fixture is properly aimed.

4. Average intensity ratio. The ratio between the average intensity within the ellipse defining the main beam of a typical new light and the average light intensity of the main beam of a new runway edge light shall be as follows:

Figure A2-1	Approach centre line and crossbars	1.5 to 2.0 (white light)
Figure A2-2	Approach side row	0.5 to 1.0 (red light)
Figure A2-3	Threshold	1.0 to 1.5 (green light)
Figure A2-4	Threshold wing bar	1.0 to 1.5 (green light)
Figure A2-5	Touchdown zone	0.5 to 1.0 (white light)
Figure A2-6	Runway centre line (longitudinal spacing 30 m)	0.5 to 1.0 (white light)
Figure A2-7	Runway centre line (longitudinal spacing 15 m)	0.5 to 1.0 for CAT III (white light) 0.25 to 0.5 for CAT I, II (white light)
Figure A2-8	Runway end	0.25 to 0.5 (red light)
Figure A2-9	Runway edge (45 m runway width)	1.0 (white light)
Figure A2-10	Runway edge (60 m runway width)	1.0 (white light)

5. The beam coverages in the figures provide the necessary

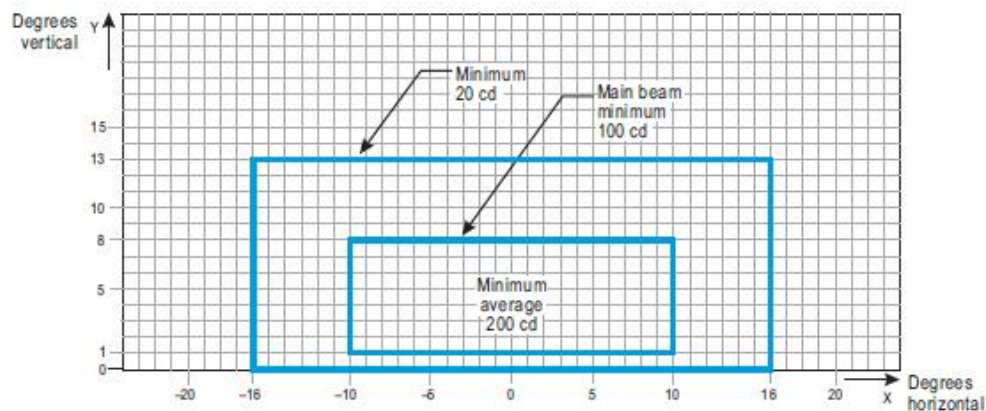
guidance for approaches down to an RVR of the order of 150 m and take-offs down to an RVR of the order of 100 m.

6. Horizontal angles are measured with respect to the vertical plane through the runway centre line. For lights other than centre line lights, the direction towards the runway centre line is considered positive. Vertical angles are measured with respect to the horizontal plane.

7. Where, for approach centre line lights and crossbars and for approach side row lights, inset lights are used in lieu of elevated lights, e.g. on a runway with a displaced threshold, the intensity requirements can be met by installing two or three fittings (lower intensity) at each position.

8. The importance of adequate maintenance cannot be overemphasized. The average intensity shall never fall to a value less than 50 per cent of the value shown in the figures, and it shall be the aim of airport authorities to maintain a level of light output close to the specified minimum average intensity.

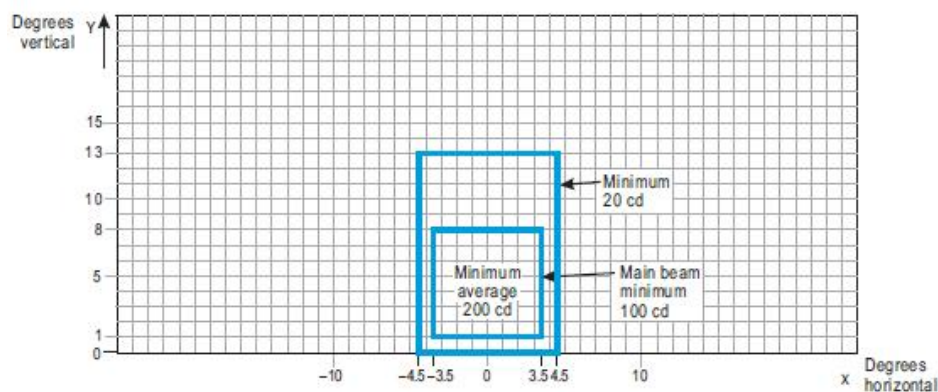
9. The light unit shall be installed so that the main beam is aligned within one-half degree of the specified requirement.



Notes:

1. These beam coverages allow for displacement of the cockpit from the centre line up to distances of the order of 12 m and are intended for use before and after curves.
2. See collective notes for Figures A2-12 to A2-21.
3. Increased intensities for enhanced rapid exit taxiway centre line lights as recommended in 5.3.16.9 are four times the respective intensities in the figure (i.e. 800 cd for minimum average main beam).

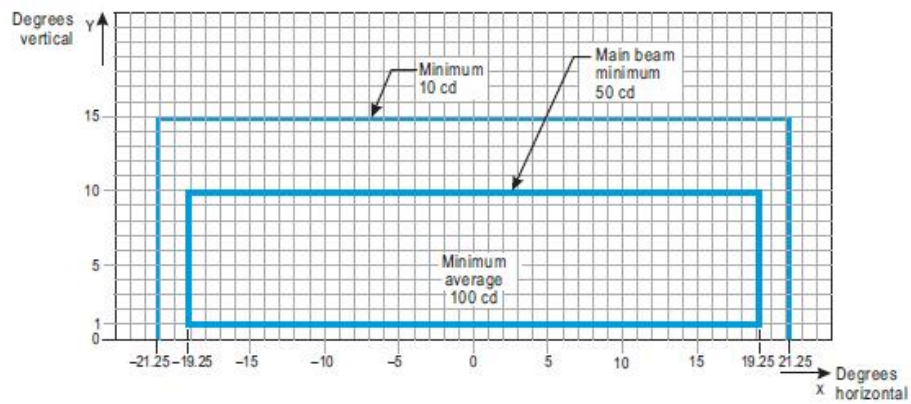
Figure A2-12. Isocandela diagram for taxiway centre line (15 m spacing), no-entry bar and stop bar lights in straight sections intended for use in runway visual range conditions of less than a value of 350 m where large offsets can occur and for low-intensity runway guard lights, Configuration B



Notes:

1. These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit from the centre line of approximately 3 m.
2. See collective notes for Figures A2-12 to A2-21.

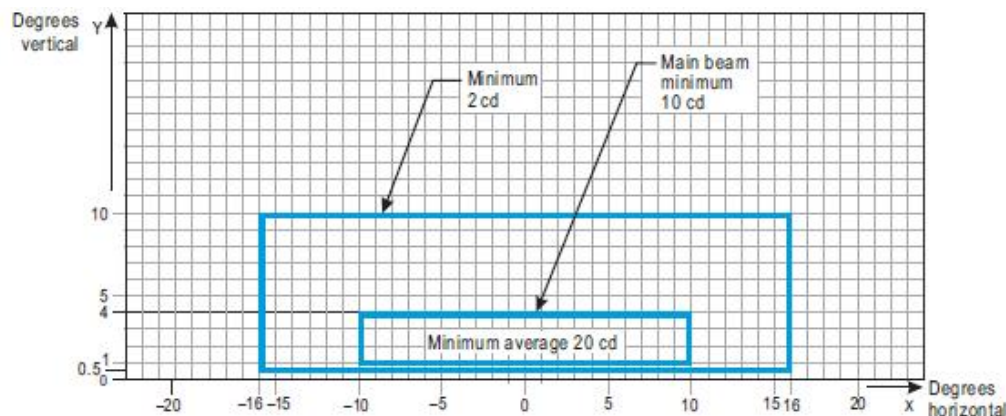
Figure A2-13. Isocandela diagram for taxiway centre line (15 m spacing), no-entry bar and stop bar lights in straight sections intended for use in runway visual range conditions of less than a value of 350 m



Notes:

1. Lights on curves to be toed-in 15.75 degrees with respect to the tangent of the curve.
2. See collective notes for Figures A2-12 to A2-21.

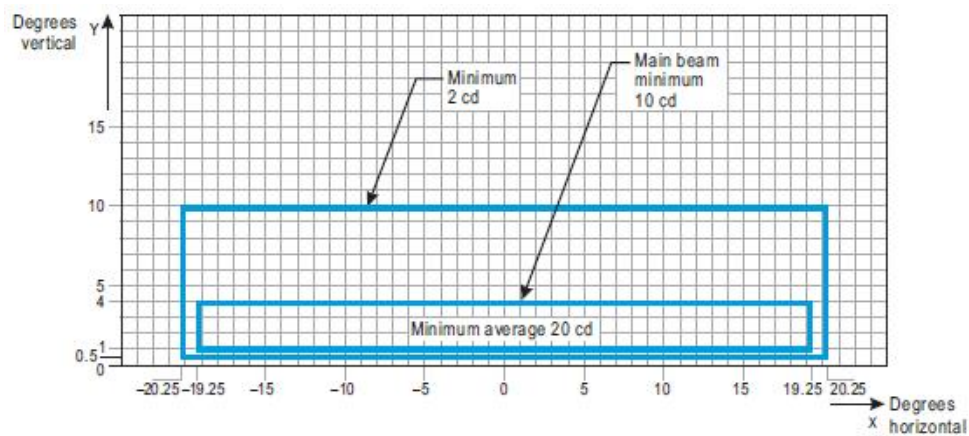
Figure A2-14. Isocandela diagram for taxiway centre line (7.5 m spacing), no-entry bar and stop bar lights in curved sections intended for use in runway visual range conditions of less than a value of 350 m



Notes:

1. At locations where high background luminance is usual and where deterioration of light output resulting from dust, snow and local contamination is a significant factor, the cd-values should be multiplied by 2.5.
2. Where omnidirectional lights are used they shall comply with the vertical beam requirements in this figure.
3. See collective notes for Figures A2-12 to A2-21.

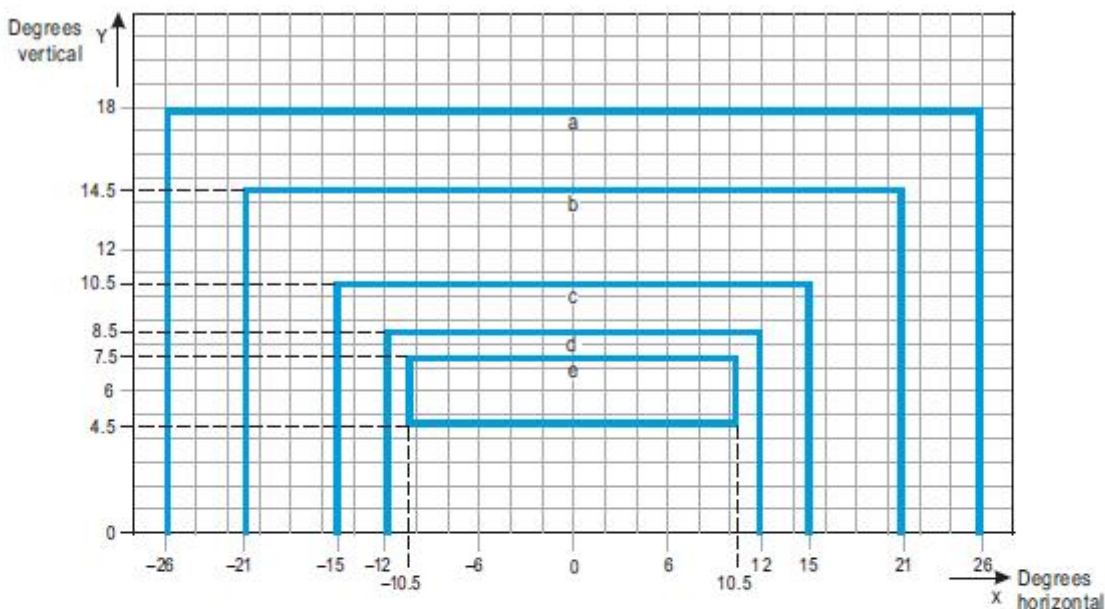
Figure A2-15. Isocandela diagram for taxiway centre line (30 m, 60 m spacing), no-entry bar and stop bar lights in straight sections intended for use in runway visual range conditions of 350 m or greater



Notes:

1. Lights on curves to be toed-in 15.75 degrees with respect to the tangent of the curve.
2. At locations where high background luminance is usual and where deterioration of light output resulting from dust, snow and local contamination is a significant factor, the cd-values should be multiplied by 2.5.
3. These beam coverages allow for displacement of the cockpit from the centre line up to distances of the order of 12 m as could occur at the end of curves.
4. See collective notes for Figures A2-12 to A2-21.

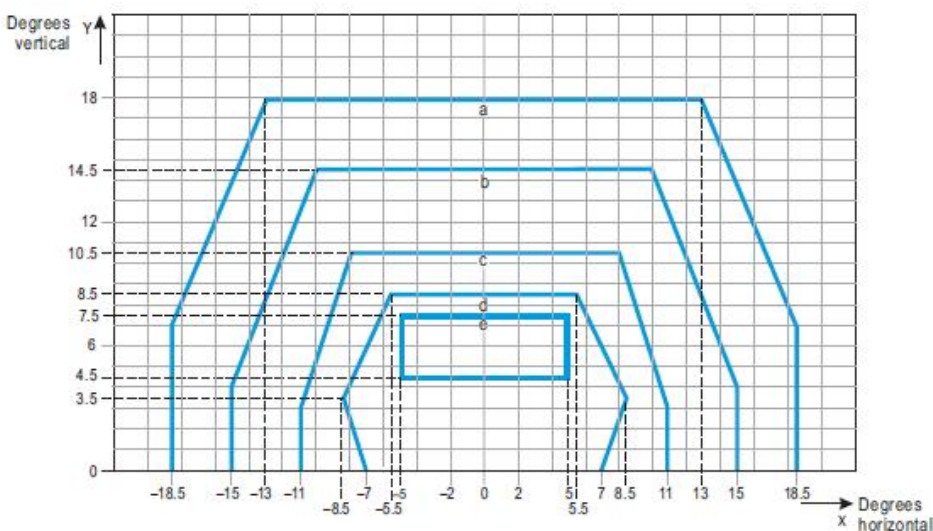
Figure A2-16. Isocandela diagram for taxiway centre line (7.5 m, 15 m, 30 m spacing), no-entry bar and stop bar lights in curved sections intended for use in runway visual range conditions of 350 m or greater



Notes:

1. These beam coverages allow for displacement of the cockpit from the centre line up to distances of the order of 12 m and are intended for use before and after curves.
2. See collective notes for Figures A2-12 to A2-21.

Figure A2-17. Isocandela diagram for high-intensity taxiway centre line (15 m spacing), no-entry bar and stop bar lights in straight sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required and where large offsets can occur

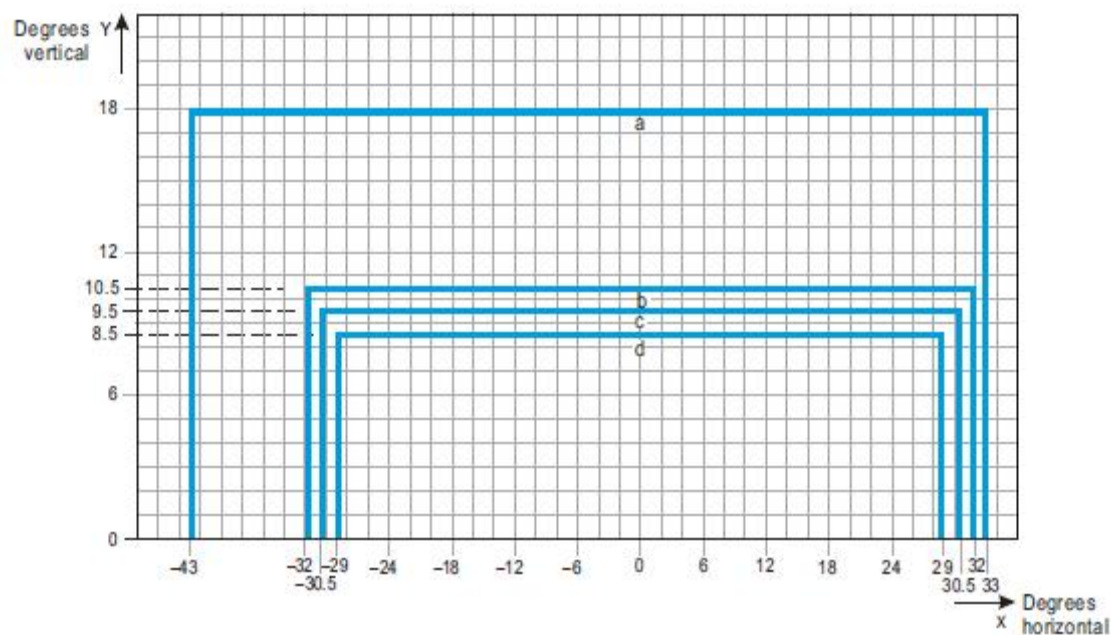


Curve	a	b	c	d	e
Intensity (cd)	8	20	100	450	1 800

Notes:

1. These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit corresponding to the outer main gear wheel on the taxiway edge.
2. See collective notes for Figures A2-12 to A2-21.

Figure A2-18. Isocandela diagram for high-intensity taxiway centre line (15 m spacing), no-entry bar and stop bar lights in straight sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required

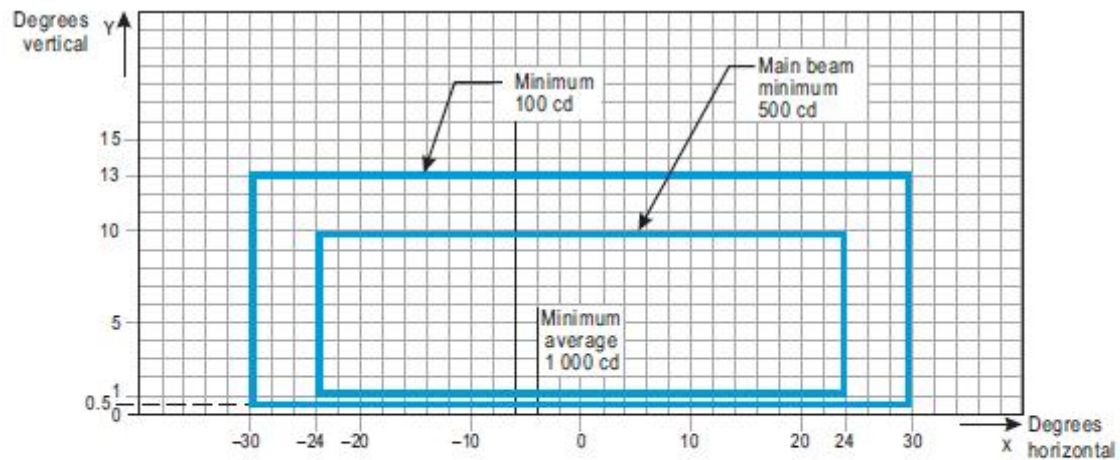


Curve	a	b	c	d
Intensity (cd)	8	100	200	400

Notes:

1. Lights on curves to be toed-in 17 degrees with respect to the tangent of the curve.
2. See collective notes for Figures A2-12 to A2-21.

Figure A2-19. Isocandela diagram for high-intensity taxiway centre line (7.5 m spacing), no-entry bar and stop bar lights in curved sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required.



Notes:

1. Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.
2. See collective notes for Figures A2-12 to A2-21.

Figure A2-20. Isocandela diagram for high-intensity runway guard lights, Configuration B

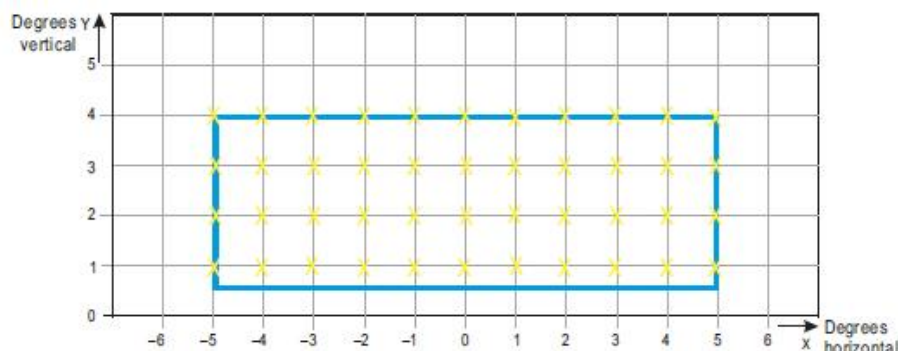


Figure A2-21. Grid points to be used for calculation of average intensity of taxiway centre line and stop bar lights

Collective notes to Figures A2-12 to A2-21

1. The intensities specified in Figures A2-12 to A2-20 are in green and yellow light for taxiway centre line lights, yellow light for runway guard lights and red light for stop bar lights.

2. Figures A2-12 to A2-20 show the minimum allowable light intensities. The average intensity of the main beam is calculated by establishing grid points as shown in Figure A2-21 and using the intensity values measured at all grid points located within and on the perimeter of the rectangle representing the main beam. The average value is the arithmetic average of the light intensities measured at all considered grid points.

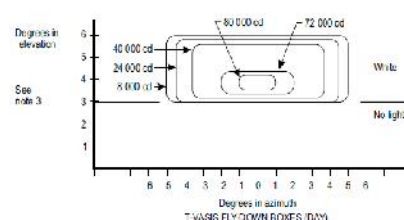
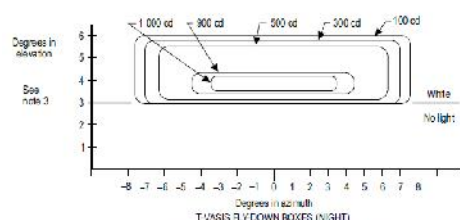
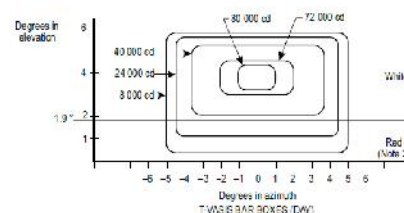
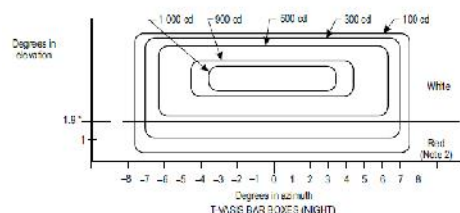
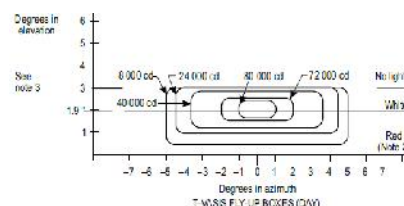
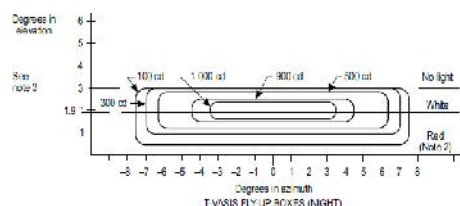
3. No deviations are acceptable in the main beam or in the innermost beam, as applicable, when the lighting fixture is properly aimed.

4. Horizontal angles are measured with respect to the vertical plane through the taxiway centre line except on curves where they are measured with respect to the tangent to the curve.

5. Vertical angles are measured from the longitudinal slope of the taxiway surface.

6. The importance of adequate maintenance cannot be overemphasized. The intensity, either average where applicable or as specified on the corresponding isocandela curves, shall never fall to a value less than 50 per cent of the value shown in the figures, and it shall be the aim of airport authorities to maintain a level of light output close to the specified minimum average intensity.

7. The light unit shall be installed so that the main beam or the innermost beam, as applicable, is aligned within one-half degree of the specified requirement.



Note 1.—These curves are for minimum intensities in white light.

Note 2.—Filter transmissibility for red and signals is 15 per cent minimum at

Note 3.—A sharp transition from white to no light in elevation is essential to T-VASIS operations. For exact elevation settings, see Figure 5-17.

Figure A2-22. Light intensity distribution of T-VASIS and AT-VASIS

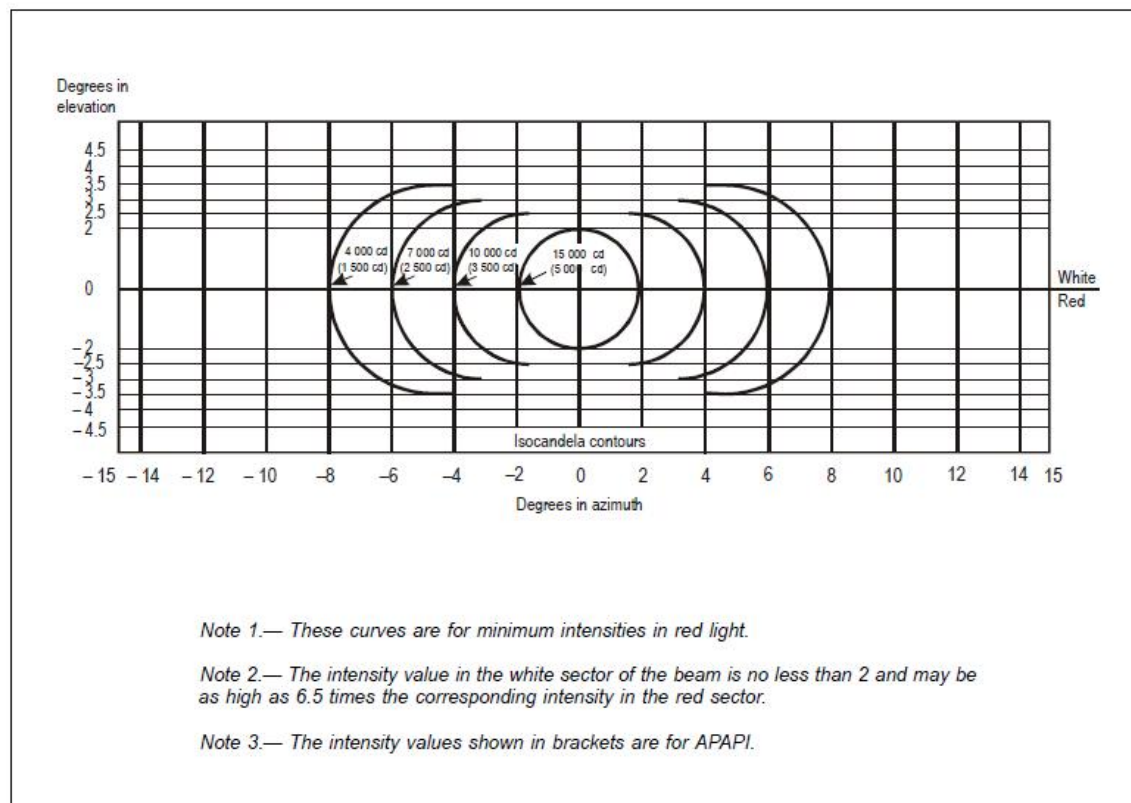
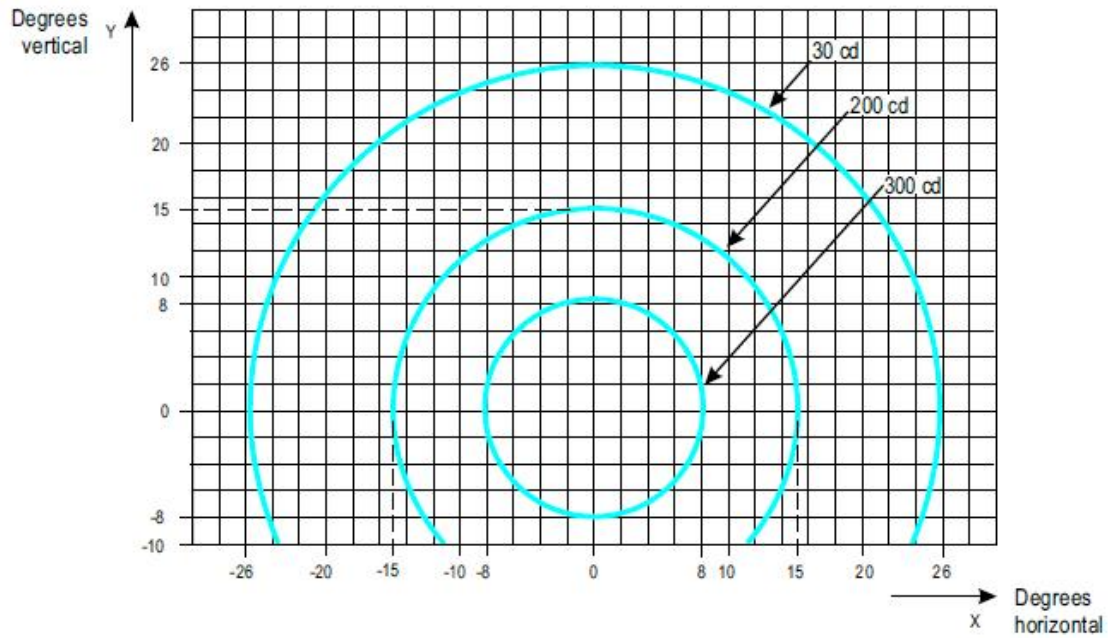


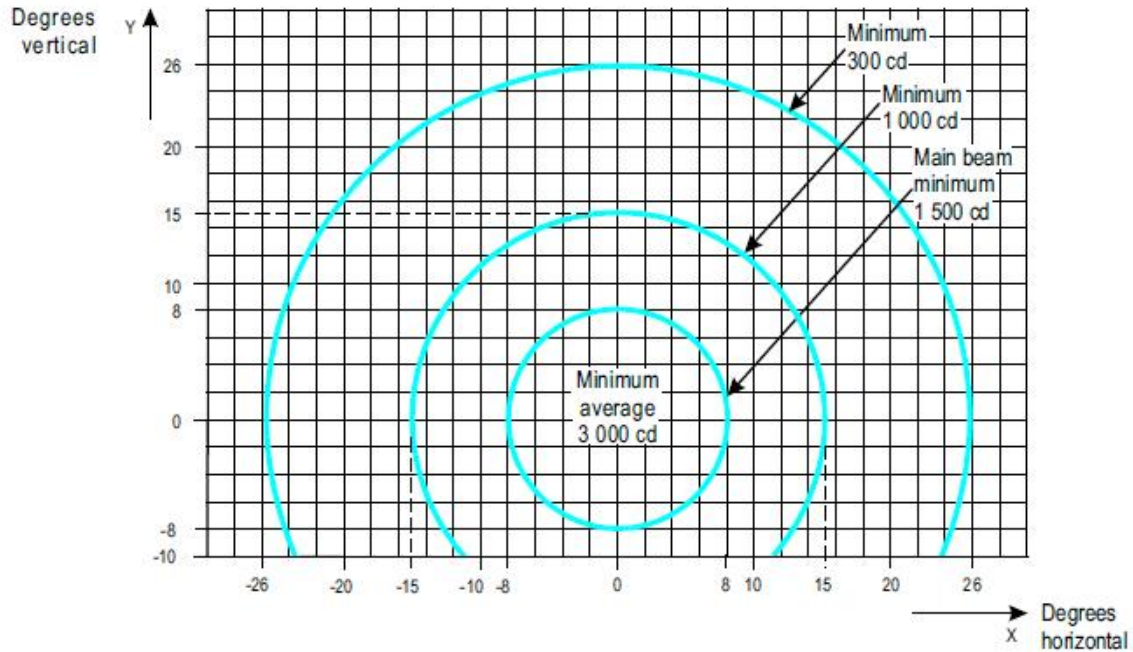
Figure A2-23. Light intensity distribution of PAPI and APAPI



Notes:

1. Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.
2. The intensities specified are in yellow light.

Figure A2-24. Isocandela diagram for each light in low-intensity runway guard lights, Configuration A



Notes:

1. Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.
2. The intensities specified are in yellow light.

Figure A2-25. Isocandela diagram for each light in high-intensity runway guard lights, Configuration A

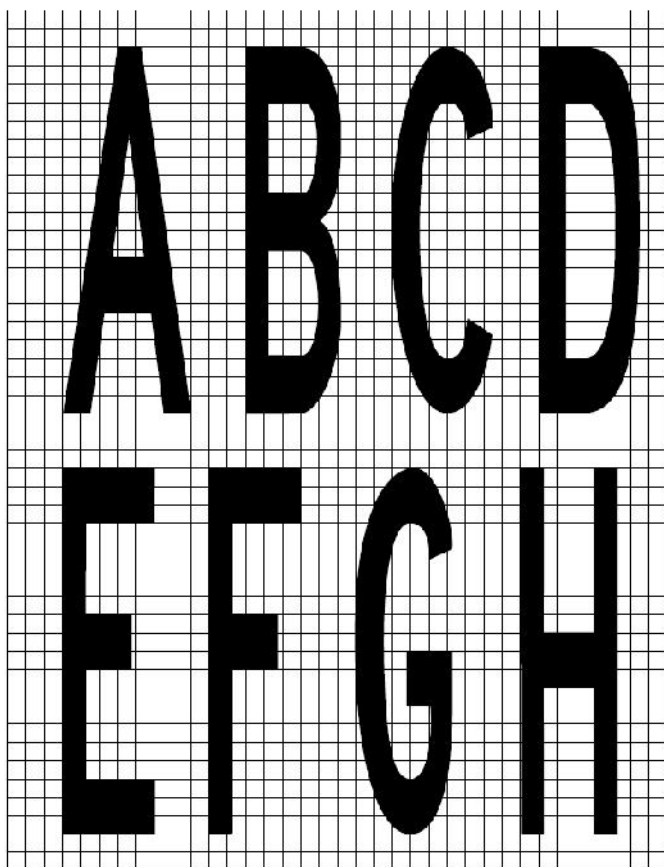
NINTH SCHEDULE

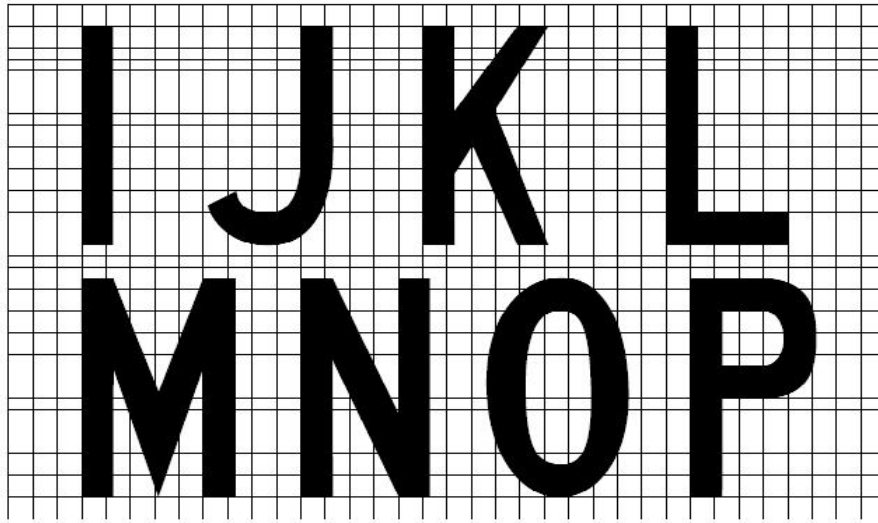
Regulations 174, 175

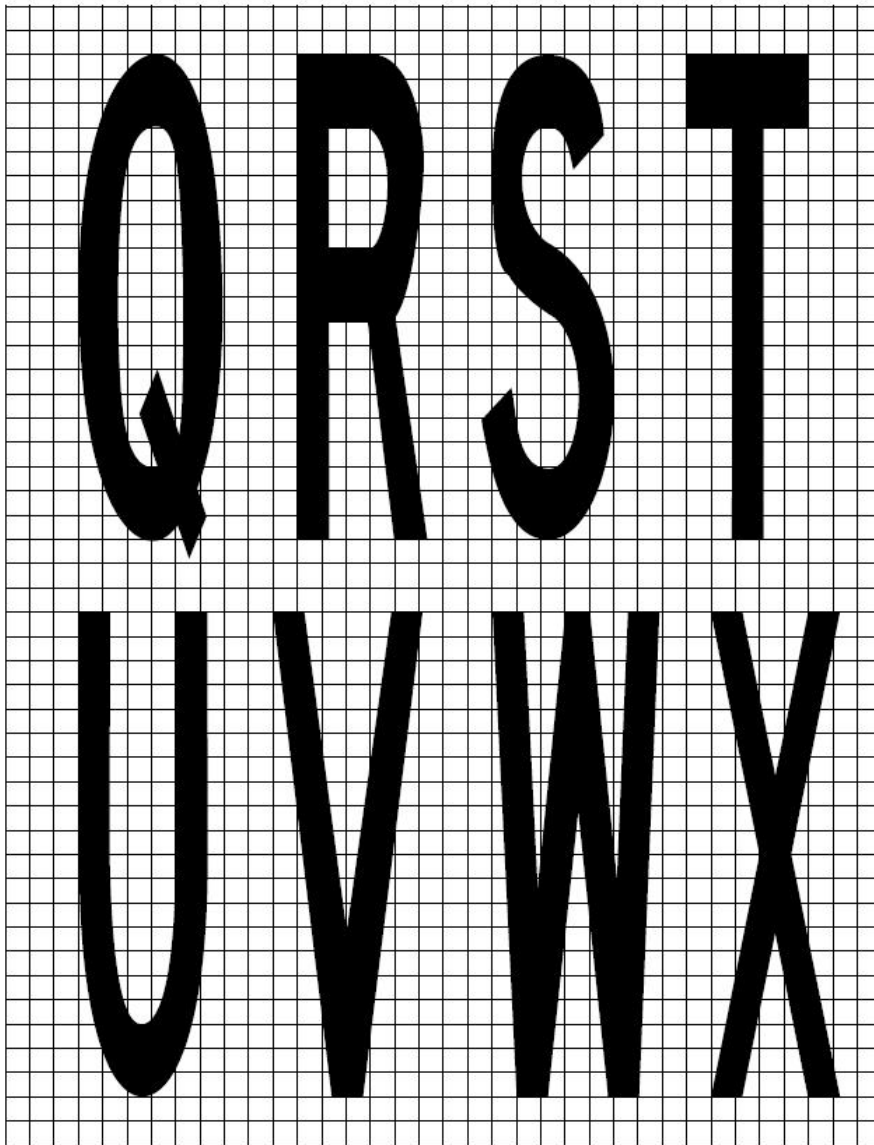
**MANDATORY INSTRUCTION MARKINGS AND
INFORMATION MARKINGS**

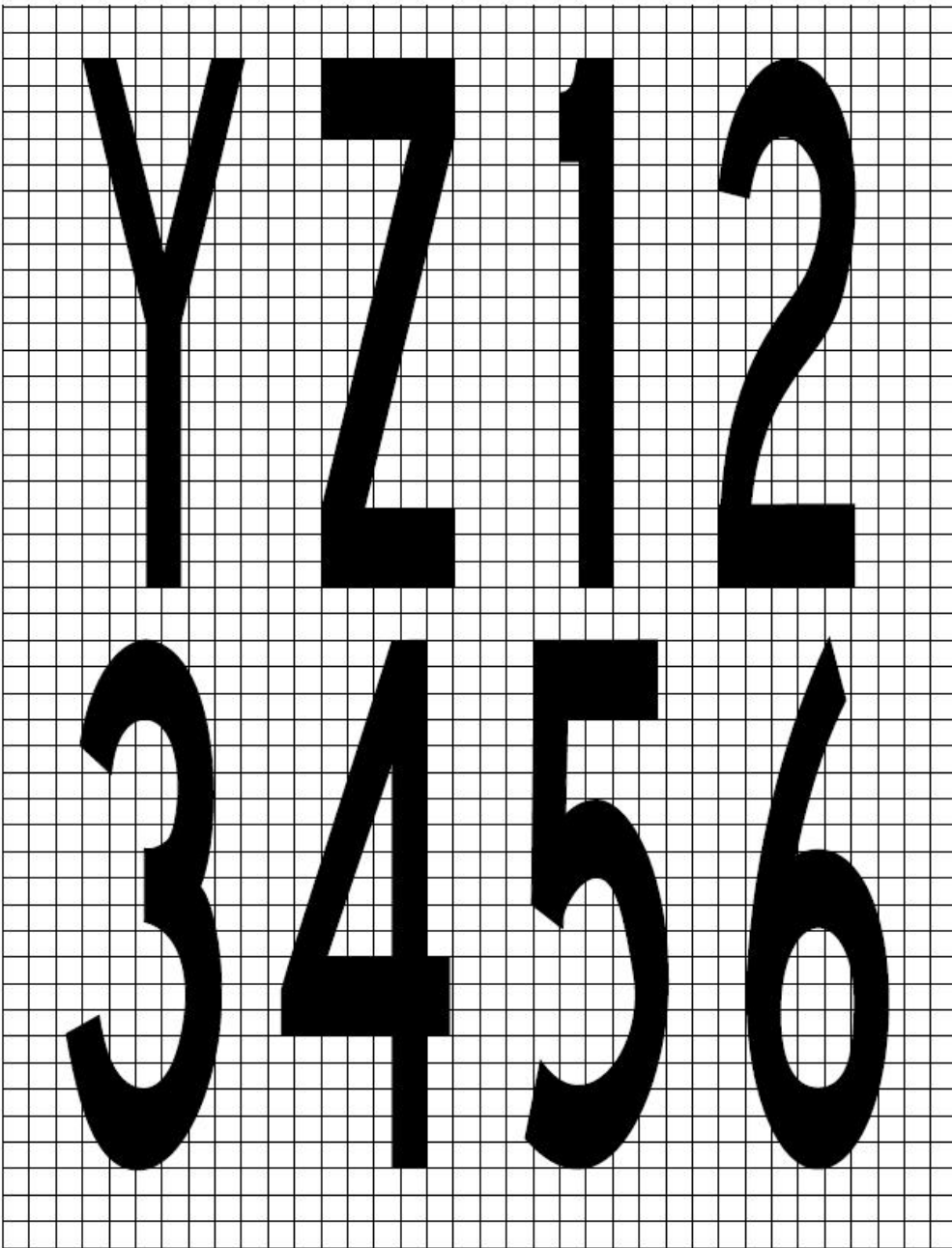
Note 1.— See regulations 174 and 175, for specifications on the application, location and characteristics of mandatory instruction markings and information markings.

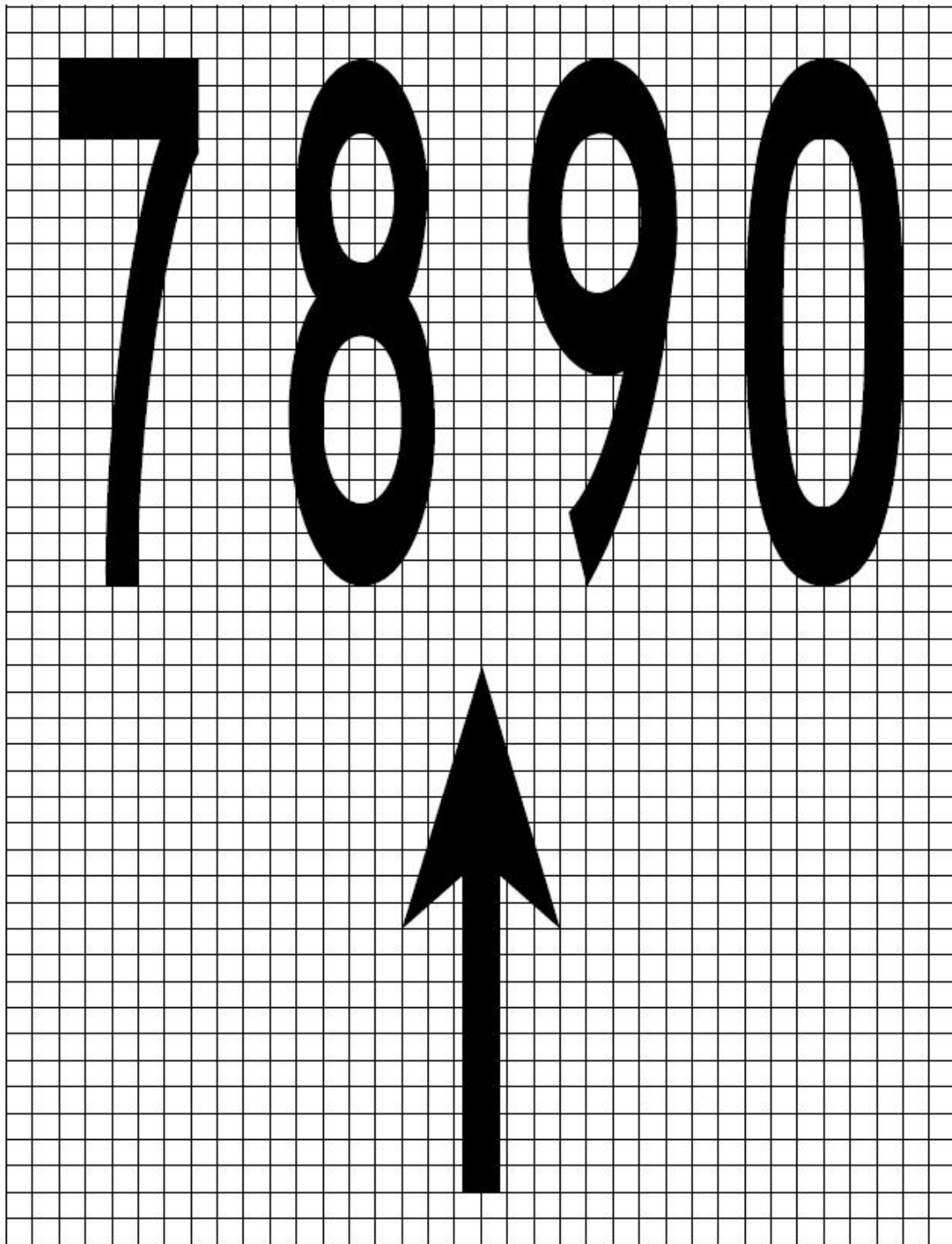
Note 2.— This appendix details the form and proportions of the letters, numbers and symbols of mandatory instruction markings and information markings on a 20 cm grid.

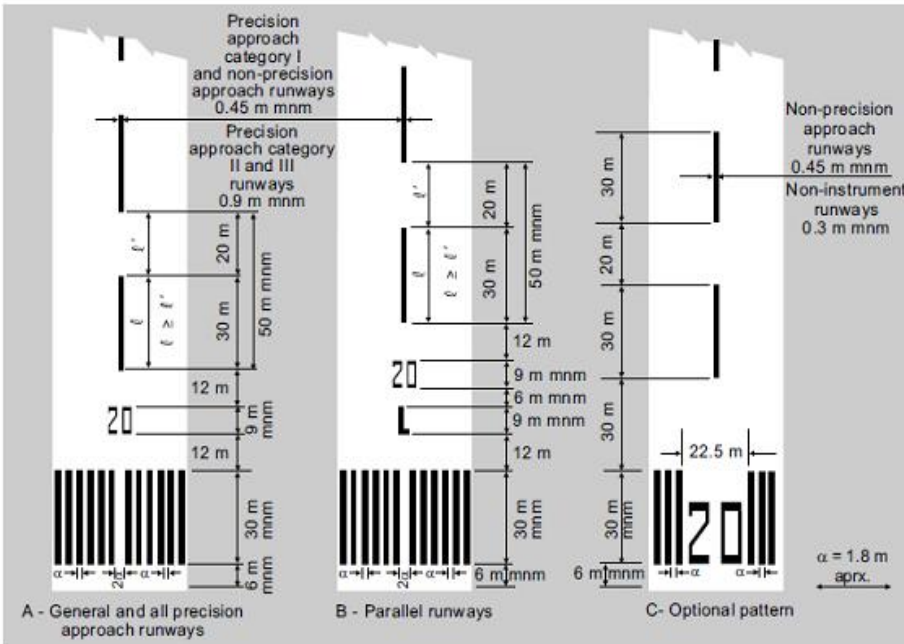




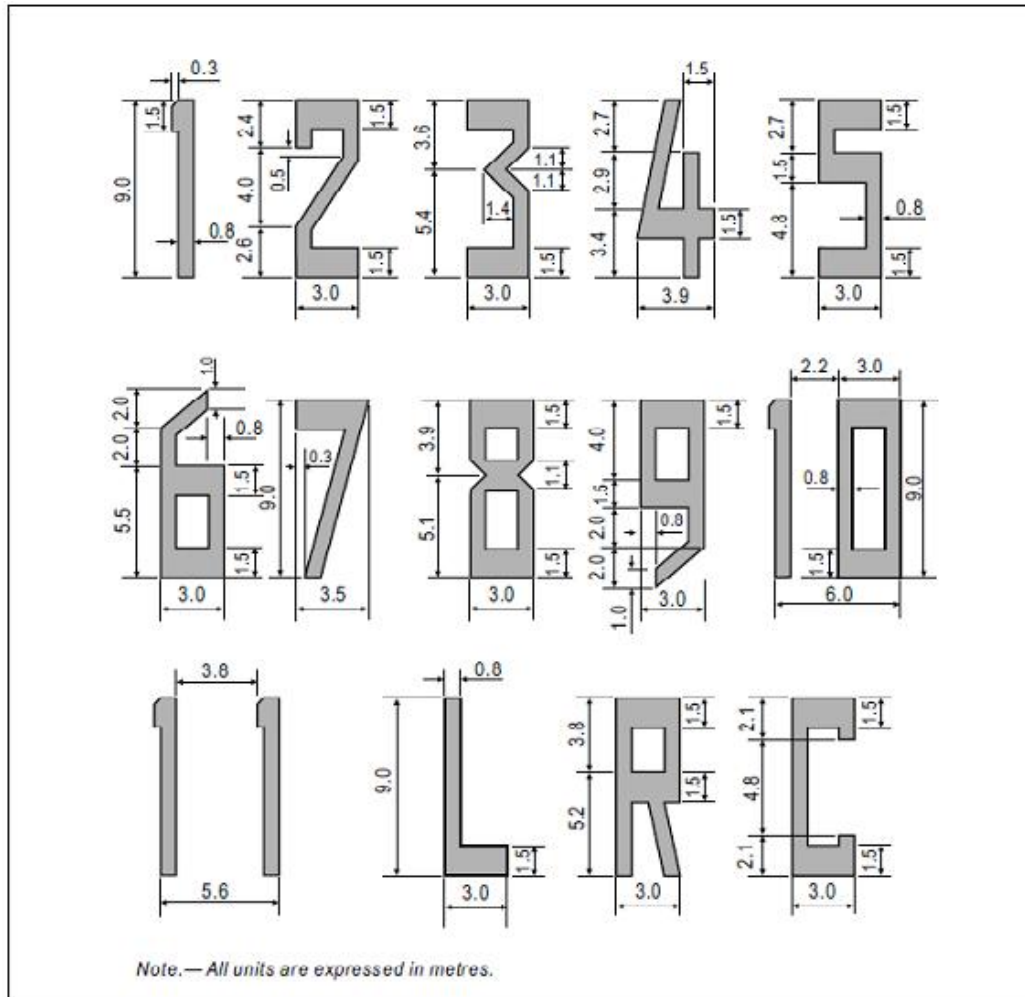




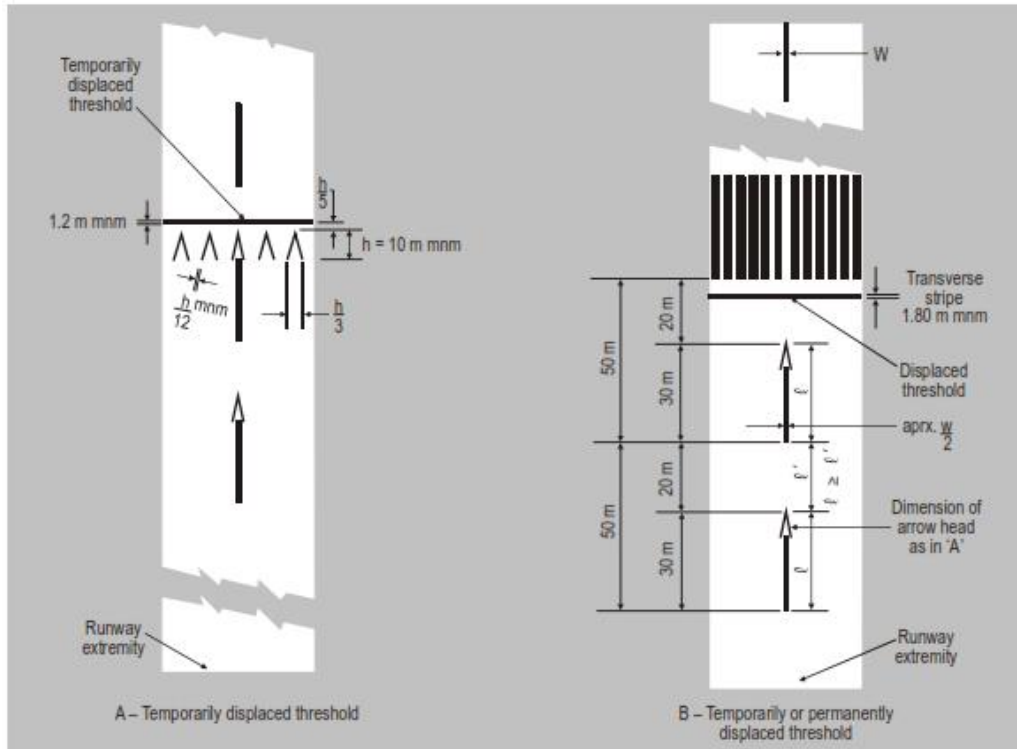




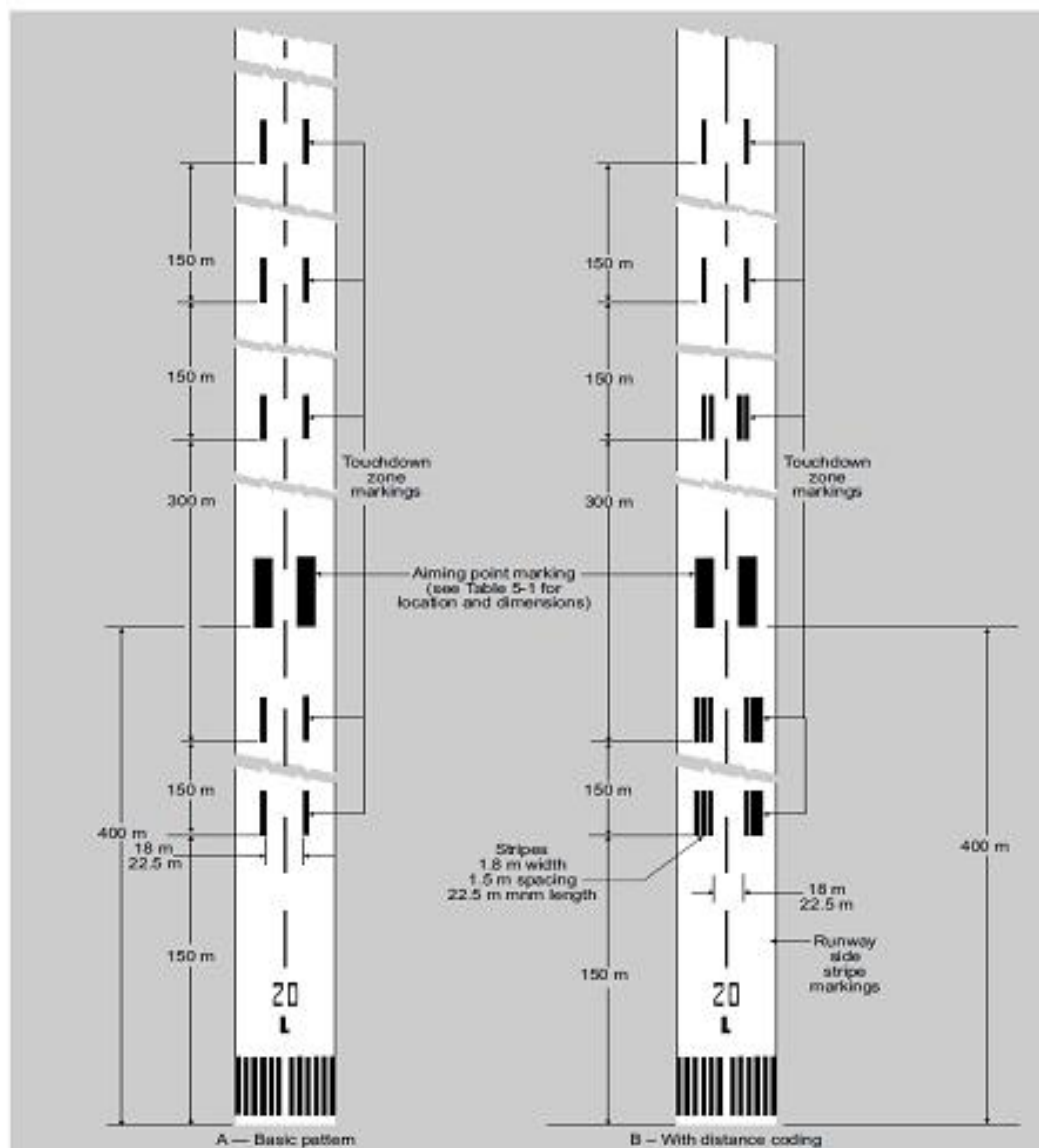
Runway designation, centre line and threshold markings



Form and proportions of numbers and letters for runway designation markings

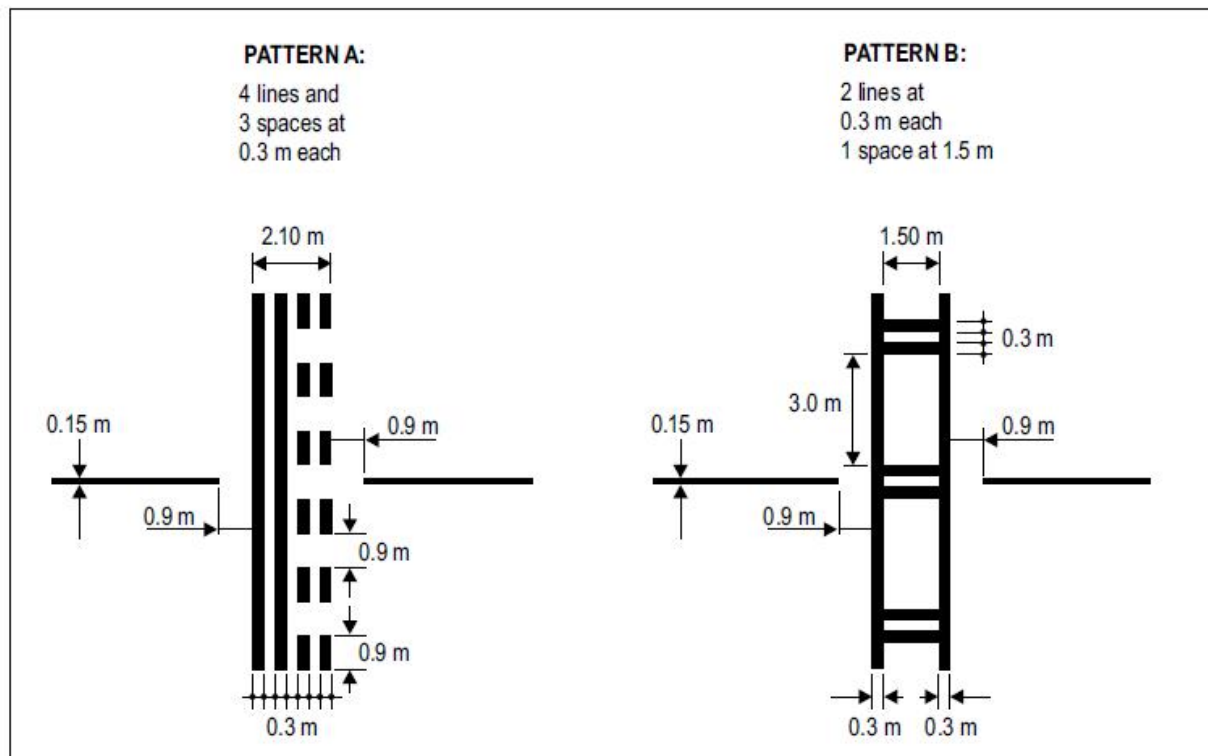


Displaced threshold markings

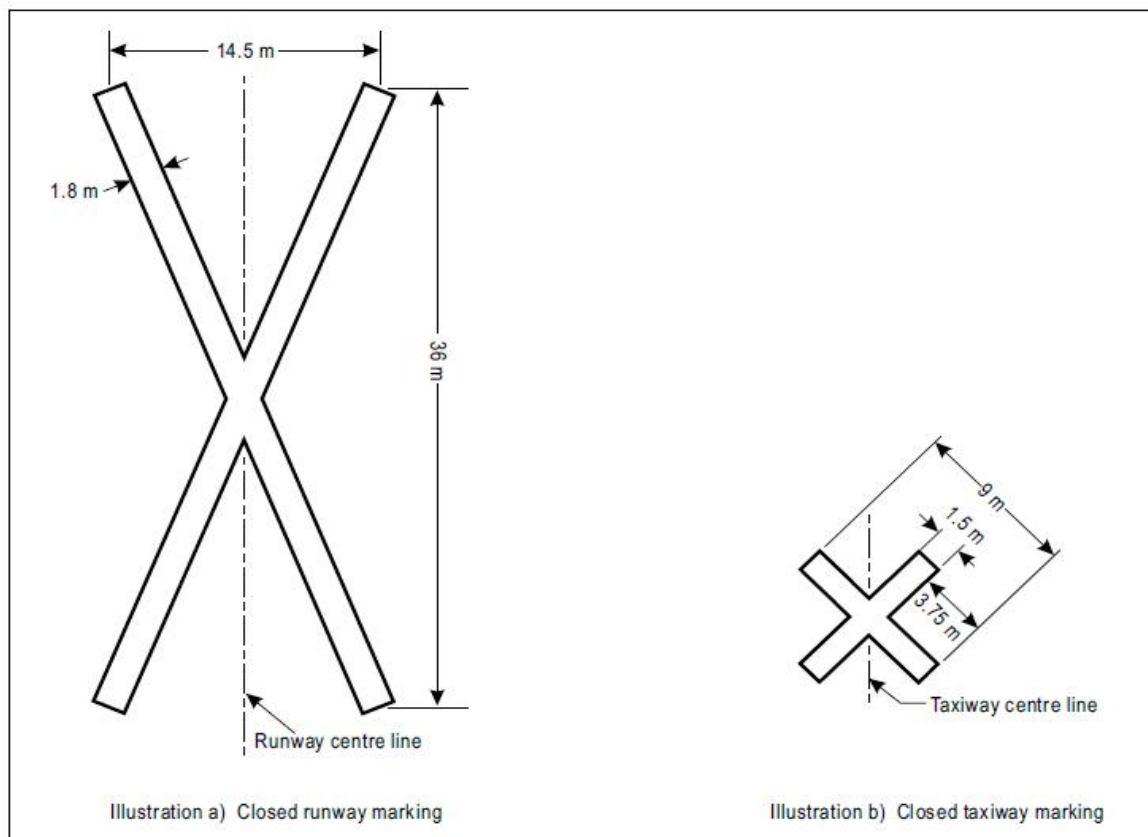


Aiming point and touchdown zone markings

(Illustrated for a runway with a length of 2 400 m or more)



Runway-holding position marking



Closed runway and taxiway markings

TENTH SCHEDULE

Regulations 174, 175

REQUIREMENTS CONCERNING DESIGN OF TAXIING GUIDANCE SIGNS

1. Inscription heights shall conform to the following tabulation.

1. Inscription heights shall conform to the following tabulation.

	Minimum character height

Runway code number	Mandatory instruction sign	Information sign	
		Runway exit and runway vacated signs	Other signs
1 or 2	300 mm	300 mm	200 mm
3 or 4	400 mm	400 mm	300 mm

Note.— Where a taxiway location sign is installed in conjunction with a runway designation sign, the character size shall be that specified for mandatory instruction signs

2. Arrow dimensions shall be as follows:

Legend height	Stroke
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

3. Stroke width for single letter shall be as follows:

Legend height	Stroke
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

4. Sign luminance shall be as follows:

a) Where operations are conducted in runway visual range conditions less than a value of 800m, average sign luminance shall be at least:

Red	30 cd/m ²
Yellow	150 cd/m ²
White	300 cd/m ²

b) Where operations are conducted in accordance with 5.4.1.7 b) and c) and 5.4.1.8, average sign luminance shall be at least:

Red	10 cd/m ²

Yellow	50 cd/m ²
White	100 cd/m ²

Note.— In runway visual range conditions less than a value of 400 m, there will be some degradation in the performance of signs.

5. The luminance ratio between red and white elements of a mandatory sign shall be between 1:5 and 1:10.

6. The average luminance of the sign is calculated by establishing grid points as shown in Figure B4-1 and using the luminance values measured at all grid points located within the rectangle representing the sign.

7. The average value is the arithmetic average of the luminance values measured at all considered grid points.

Note.— Guidance on measuring the average luminance of a sign is contained in the ICAO Aerodrome Design Manual, Part 4.

8. The ratio between luminance values of adjacent grid points shall not exceed 1.5:1. For areas on the sign face where the grid spacing is 7.5 cm, the ratio between luminance values of adjacent grid points shall not exceed 1.25:1. The ratio between the maximum and minimum luminance value over the whole sign face shall not exceed 5:1.

9. The forms of characters, i.e. letters, numbers, arrows and symbols, shall conform to those shown in Figure A4-2. The width of characters and the space between individual characters shall be determined as indicated in Table A4-1.

10. The face height of signs shall be as follows:

Legend height	Face height (min)
200 mm	400 mm
300 mm	600 mm
400 mm	800 mm

11. The face width of signs shall be determined using Figure A4-3 except that, where a mandatory instruction sign is provided on one side of a taxiway only, the face width shall not be less than:

- a) 1.94 m where the code number is 3 or 4; and
- b) 1.46 m where the code number is 1 or 2.

Note.— Additional guidance on determining the face width of a sign is contained in the ICAO Aerodrome Design Manual, Part 4.

12. Borders

- a) The black vertical delineator between adjacent direction signs shall have a width of approximately 0.7 of the stroke width.
- b) The yellow border on a stand-alone location sign shall be approximately 0.5 stroke width

13. The colours of signs shall be in accordance with the appropriate specifications in Appendix 1.

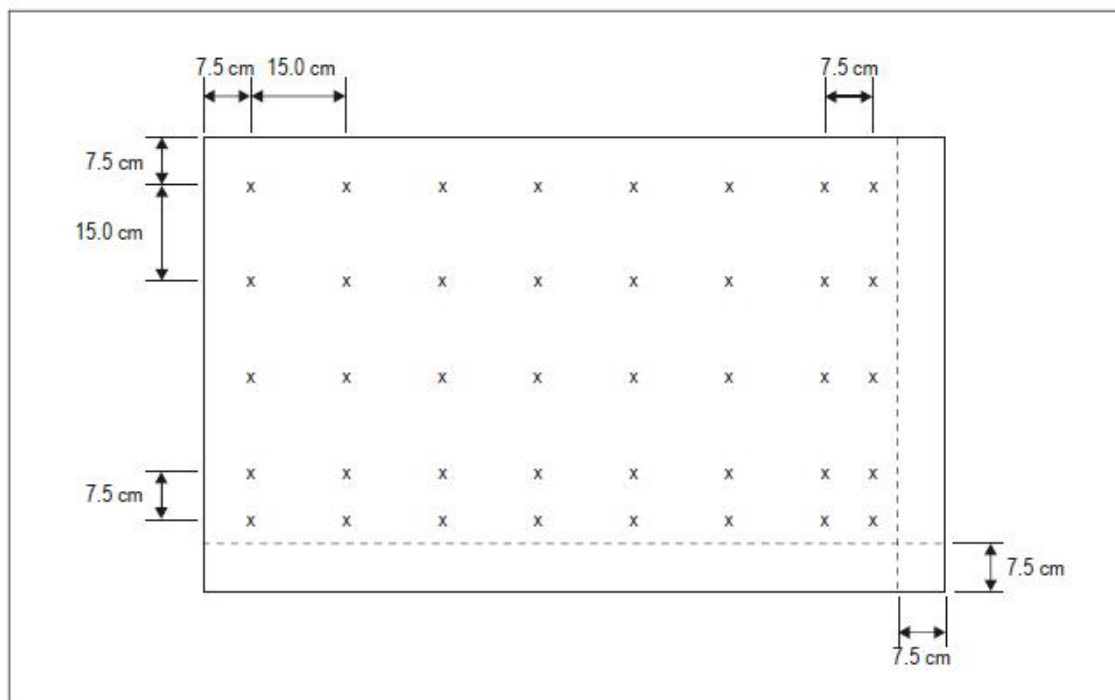


Figure A4-1. Grid points for calculating average luminance of a sign

Note 1.— The average luminance of a sign is calculated by establishing grid points on a sign face showing typical inscriptions and a background of the appropriate colour (red for mandatory instruction signs and yellow for direction and destination signs) as follows:

- (a) Starting at the top left corner of the sign face, establish a reference grid point at 7.5 cm from the left edge and the top of the sign face.

- (b) Create a grid of 15 cm spacing horizontally and vertically from the reference grid point. Grid points within 7.5 cm of the edge of the sign face shall be excluded.
- (c) Where the last point in a row/column of grid points is located between 22.5 cm and 15 cm from the edge of the sign face (but not inclusive), an additional point shall be added 7.5 cm from this point.
- (d) Where a grid point falls on the boundary of a character and the background, the grid point shall be slightly shifted to be completely outside the character.

Note 2.— Additional grid points may be required to ensure that each character includes at least five evenly spaced grid points.

Note 3.— Where one unit includes two types of signs, a separate grid shall be established for each type.

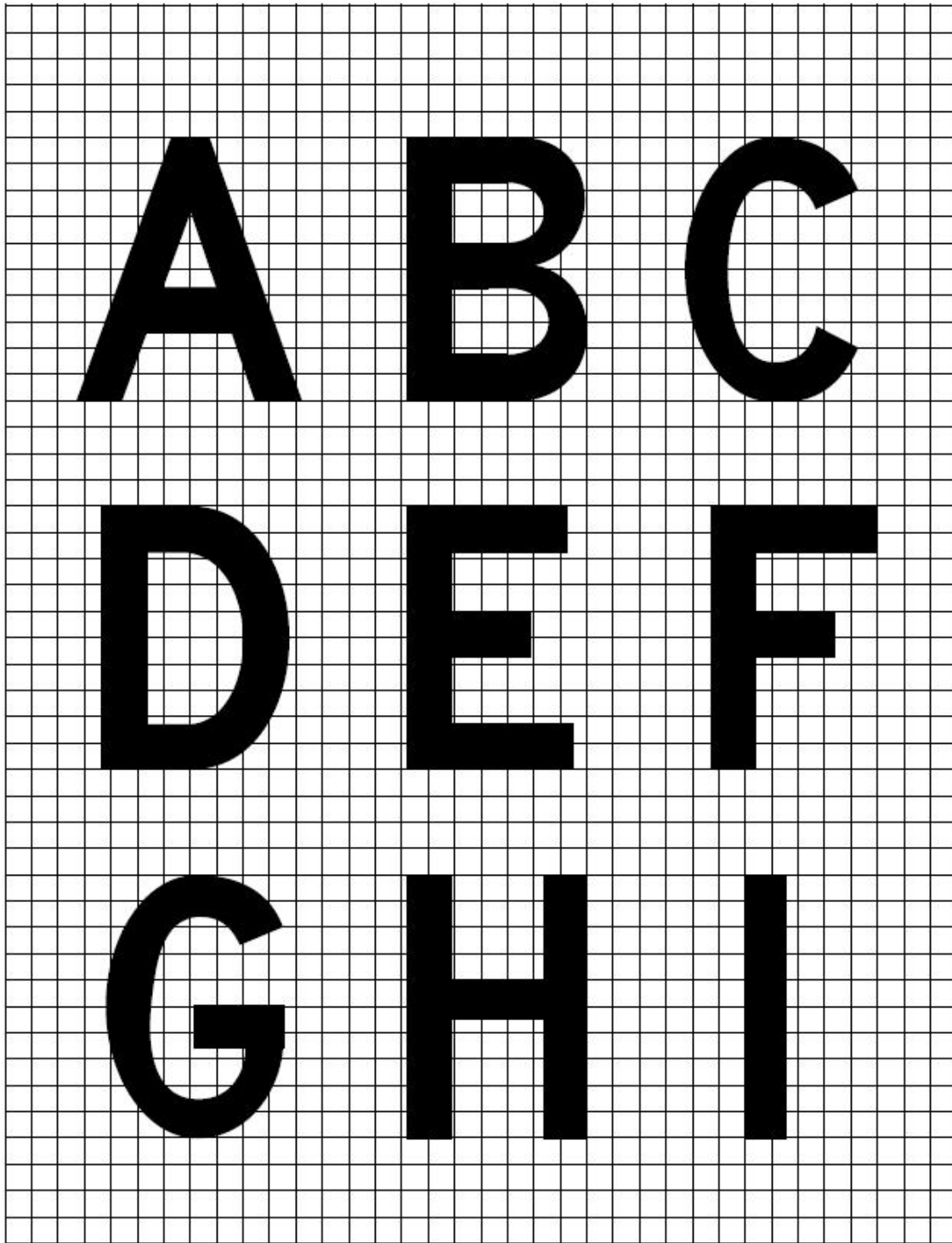


Figure A4-2. Forms of characters

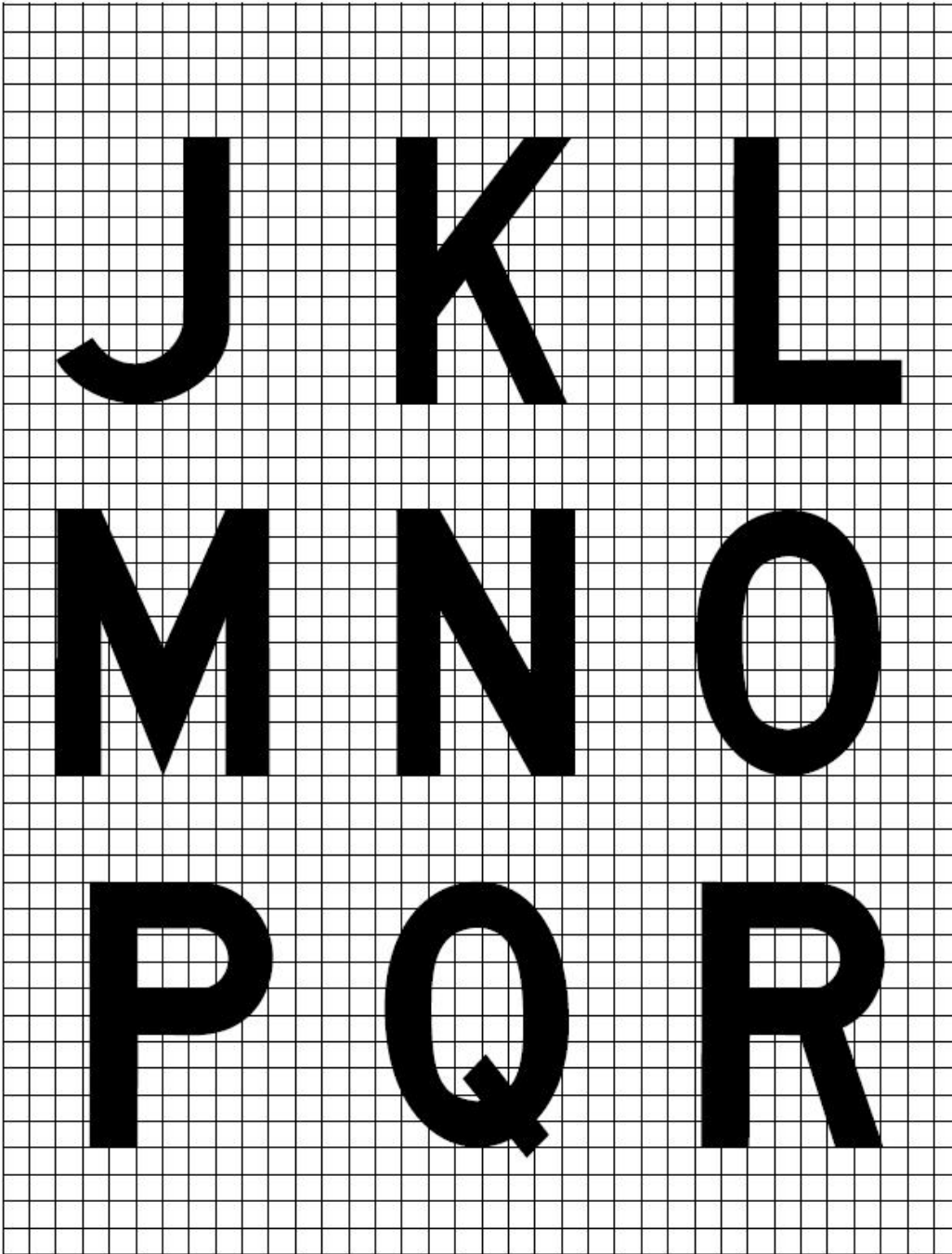


Figure A4-2. (cont.)

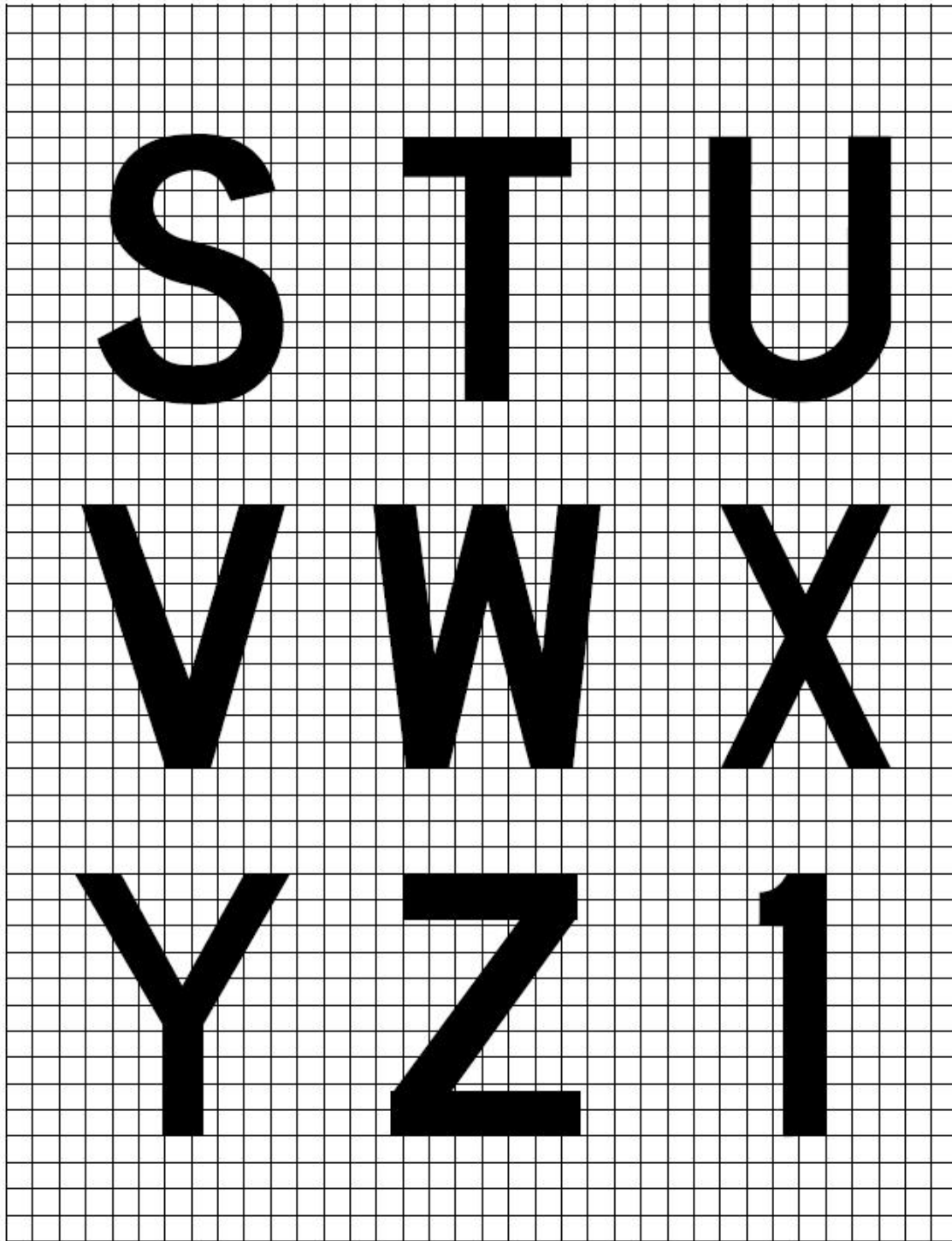


Figure A4-2. (cont.)

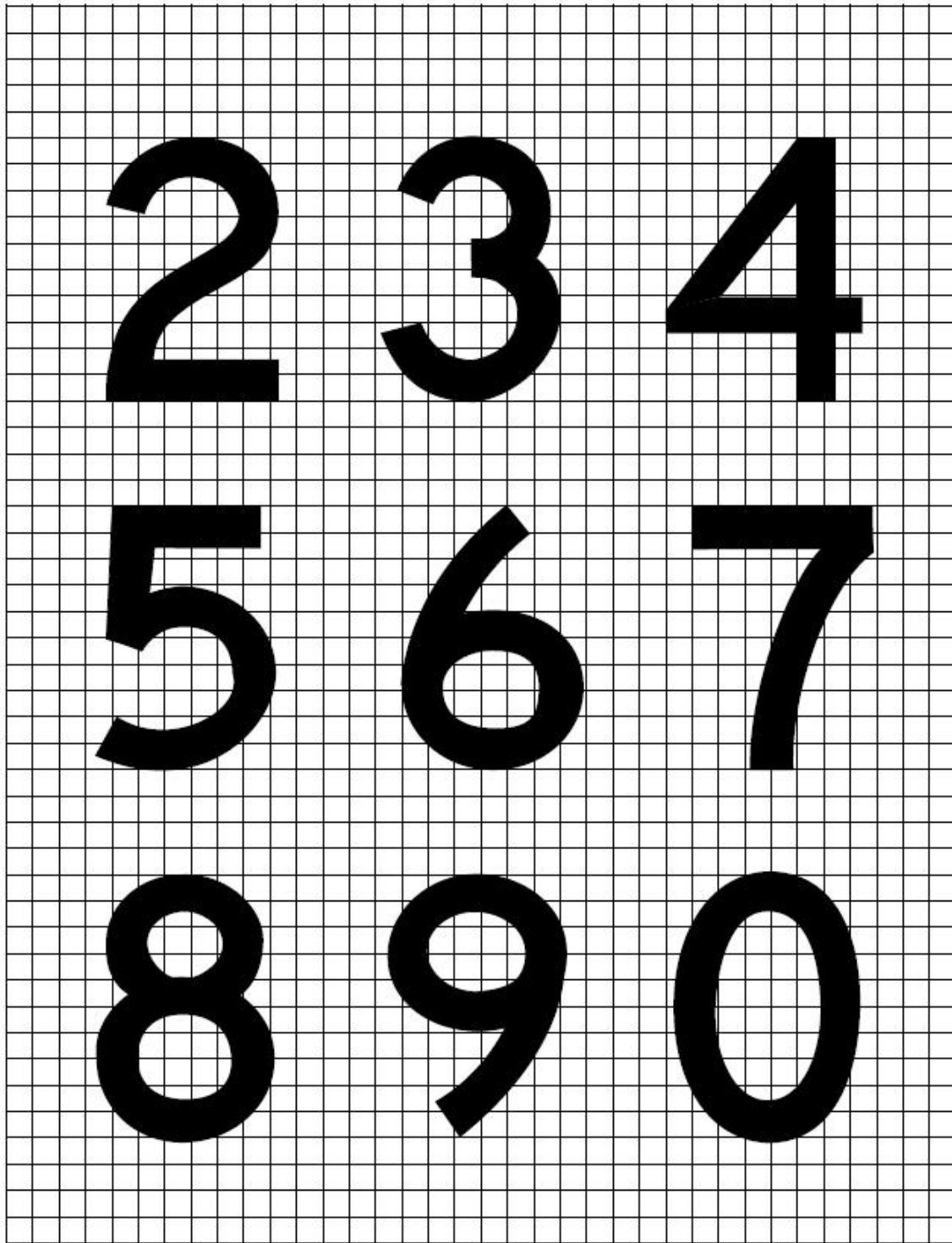


Figure A4-2. (cont.)

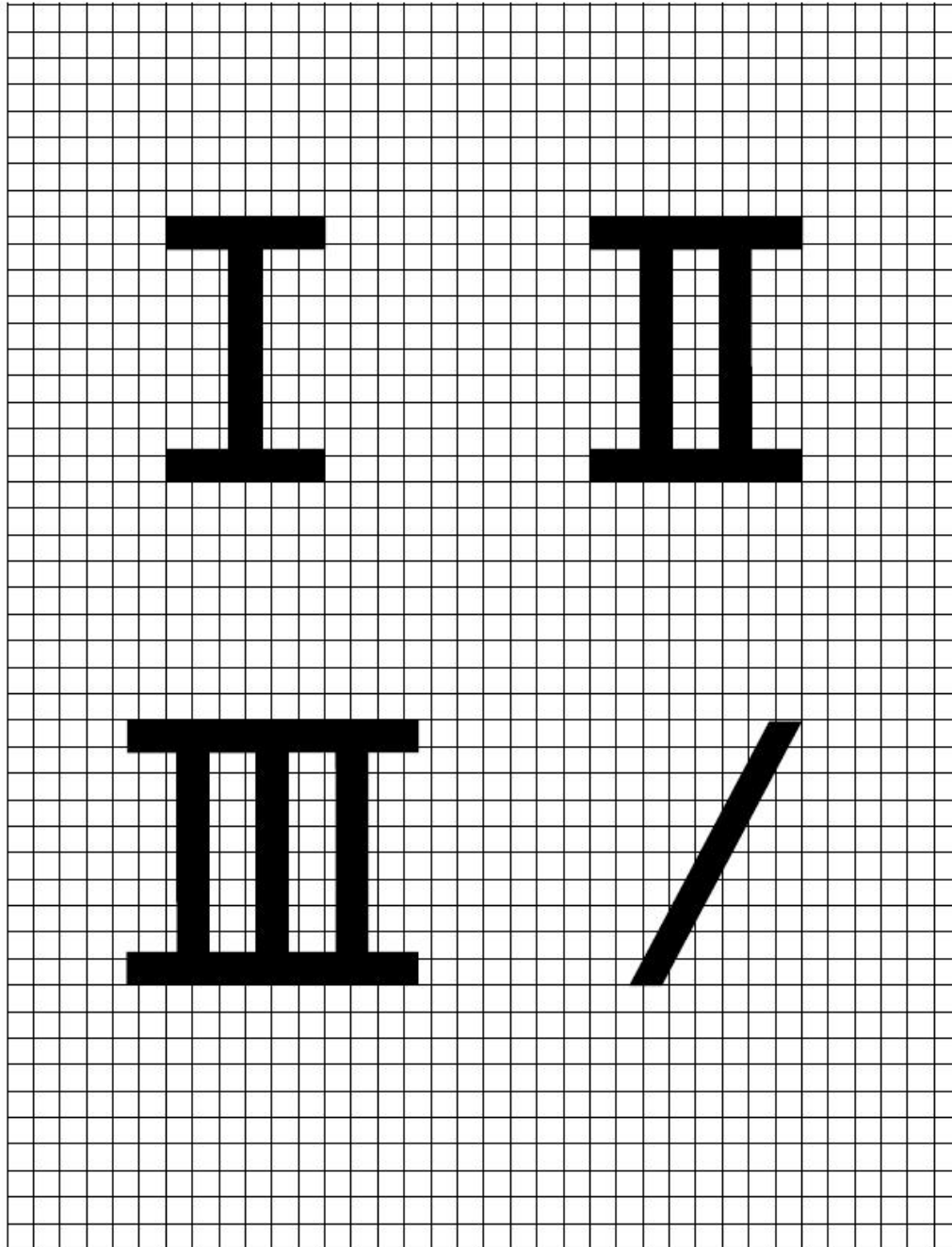
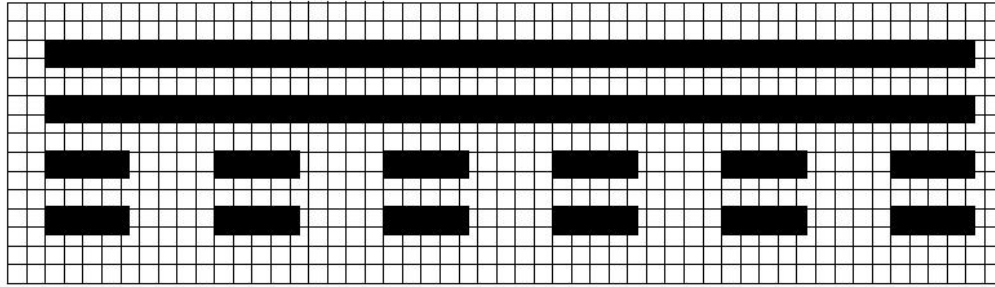
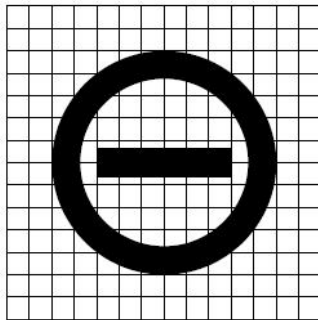


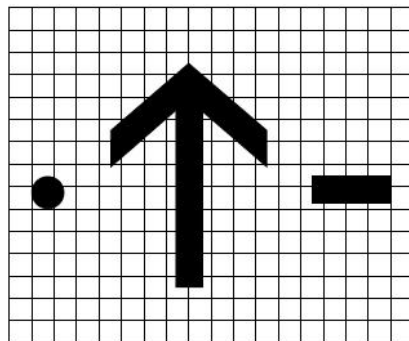
Figure A4-2. (cont.)



Runway vacated sign



NO ENTRY sign



Arrow, dot and dash

Note 1.— The arrow stroke width, diameter of the dot, and both width and length of the dash shall be proportioned to the character stroke widths.

Note 2.— The dimensions of the arrow shall remain constant for a particular sign size, regardless of orientation.

Figure A4-2. (cont.)

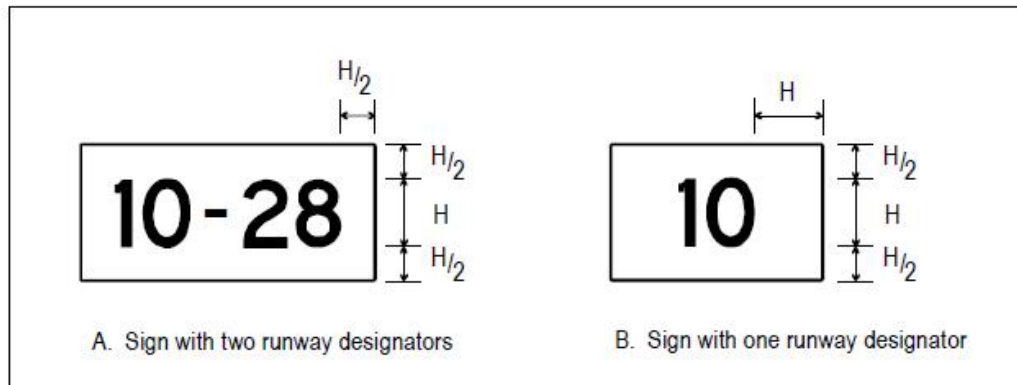


Figure A4-3. Sign dimensions

Table A4-1. Letter and numeral widths and space between letters or numerals

a) Letter to letter code number			
Preceding Letter	Following Letter		
	B, D, E, F, H, I, K, L, M, N, P, R, U	C, G, O, G, S, X, Z	A, J, T, V, W, Y
	Code number		
A	2	2	4
B	1	2	2
C	2	2	3
D	1	2	2
E	2	2	3
F	2	2	3
G	1	2	2
H	1	1	2
I	1	1	2
J	1	1	2
K	2	2	3
L	2	2	4
M	1	1	2
N	1	1	2
O	1	2	2
P	1	2	2
Q	1	2	2
R	1	2	2
S	1	2	2
T	2	2	4
U	1	1	2
V	2	2	4
W	2	2	4
X	2	2	3
Y	2	2	4
Z	2	2	3

b) Numeral to numeral code number			
Preceding Numeral	Following number		
	1, 5	2, 3, 6, 8, 9, 0	4, 7
	Code number		
1	1	1	2
2	1	2	2
3	1	2	2
4	2	2	4
5	1	2	2
6	1	2	2
7	2	2	4
8	1	2	2
9	1	2	2
0	1	2	2

c) Space between characters			
Code No.	Letter Height (mm)		
	200	300	400
	Space (mm)		
1	46	71	96
2	36	57	76
3	25	38	50
4	13	19	26

d) Width of letter			
Letter	Letter height (mm)		
	200	300	400
	Width (mm)		
A	170	255	340
B	137	205	274
C	137	205	274
D	137	205	274
E	124	186	248
F	124	186	248
G	137	205	274
H	137	205	274
I	32	48	64
J	127	190	254
K	140	210	280
L	124	186	248
M	157	236	314
N	137	205	274
O	143	214	286
P	137	205	274
Q	143	214	286
R	137	205	274
S	137	205	274
T	124	186	248
U	137	205	274
V	150	229	304
W	178	267	356
X	137	205	274
Y	171	257	342
Z	137	205	274

e) Width of numeral			
Letter	Numeral height (mm)		
	200	300	400
	Width (mm)		
1	50	74	98
2	137	205	274
3	137	205	274
4	148	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

INSTRUCTIONS

1. To determine the proper SPACE between letters or numerals, obtain the 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 →", 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.
3. Where the numeral follows a letter or vice versa use Code 1.
4. Where a hyphen, dot, or diagonal stroke follows a character or vice versa use Code 1.

ELEVENTH SCHEDULE

(Made under Regulations 78)

AERONAUTICAL DATA QUALITY REQUIREMENTS

Table A5-1. Latitude and longitude

	Accuracy	Integrity
Latitude and longitude	Data type	Classification
Aerodrome reference point	30 m surveyed/calculated	routine
Nav aids located at the aerodrome	3 m surveyed	essential
Obstacles in Area 3	0.5 m surveyed	essential
Obstacles in Area 2 (the part within the aerodrome boundary)	5 m surveyed	essential
Runway thresholds	1 m surveyed	critical
Runway end (flight path alignment point)	1 m surveyed	critical
Runway centre line points	1 m surveyed	critical
Runway-holding position	0.5 m surveyed	critical
Taxiway centre line/parking guidance line points ...	0.5 m surveyed	essential
Taxiway intersection marking line	0.5 m surveyed	essential
Exit guidance line	0.5 m surveyed	essential
Apron boundaries (polygon)	1 m surveyed	routine

De-icing/anti-icing facility (polygon)	1 m	routine
	surveyed	
Aircraft stand points/INS checkpoints	0.5 m	routine
	surveyed	

Table A5-2. Elevation/altitude/height

Elevation/altitude/height	Accuracy Data type	Integrity Classification
Aerodrome elevation	0.5 m	essential
	surveyed	
WGS-84 geoid undulation at aerodrome elevation position	0.5 m	essential
	surveyed	
Runway threshold, non-precision approaches	0.5 m	essential
	surveyed	
WGS-84 geoid undulation at runway threshold, non- precision approaches	0.5 m	essential
	surveyed	
Runway threshold, precision approaches	0.25 m	critical
	surveyed	
WGS-84 geoid undulation at runway threshold, precision approaches	0.25 m	critical
	surveyed	
Runway centre line points	0.25 m	critical
	surveyed	
Taxiway centre line/parking guidance line points	1 m	essential
	surveyed	
Obstacles in Area 2 (the part within the aerodrome boundary)	3 m	essential
	surveyed	
Obstacles in Area 3	0.5 m	essential
	surveyed	
Distance measuring equipment/precision (DME/P)	3 m	essential
	surveyed	

Table A5-3. Declination and magnetic variation

Declination/variation	Accuracy Data type	Integrity Classification
Aerodrome magnetic variation	1 degree surveyed	essential
ILS localizer antenna magnetic variation	1 degree surveyed	essential
MLS azimuth antenna magnetic variation	1 degree surveyed	essential

Bearing

Bearing	Accuracy Data type	Integrity Classification
ILS localizer alignment	1/100 degree surveyed	essential
MLS zero azimuth alignment	1/100 degree surveyed	essential
Runway bearing (True)	1/100 degree surveyed	routine

Table A5-5. Length/distance/dimension

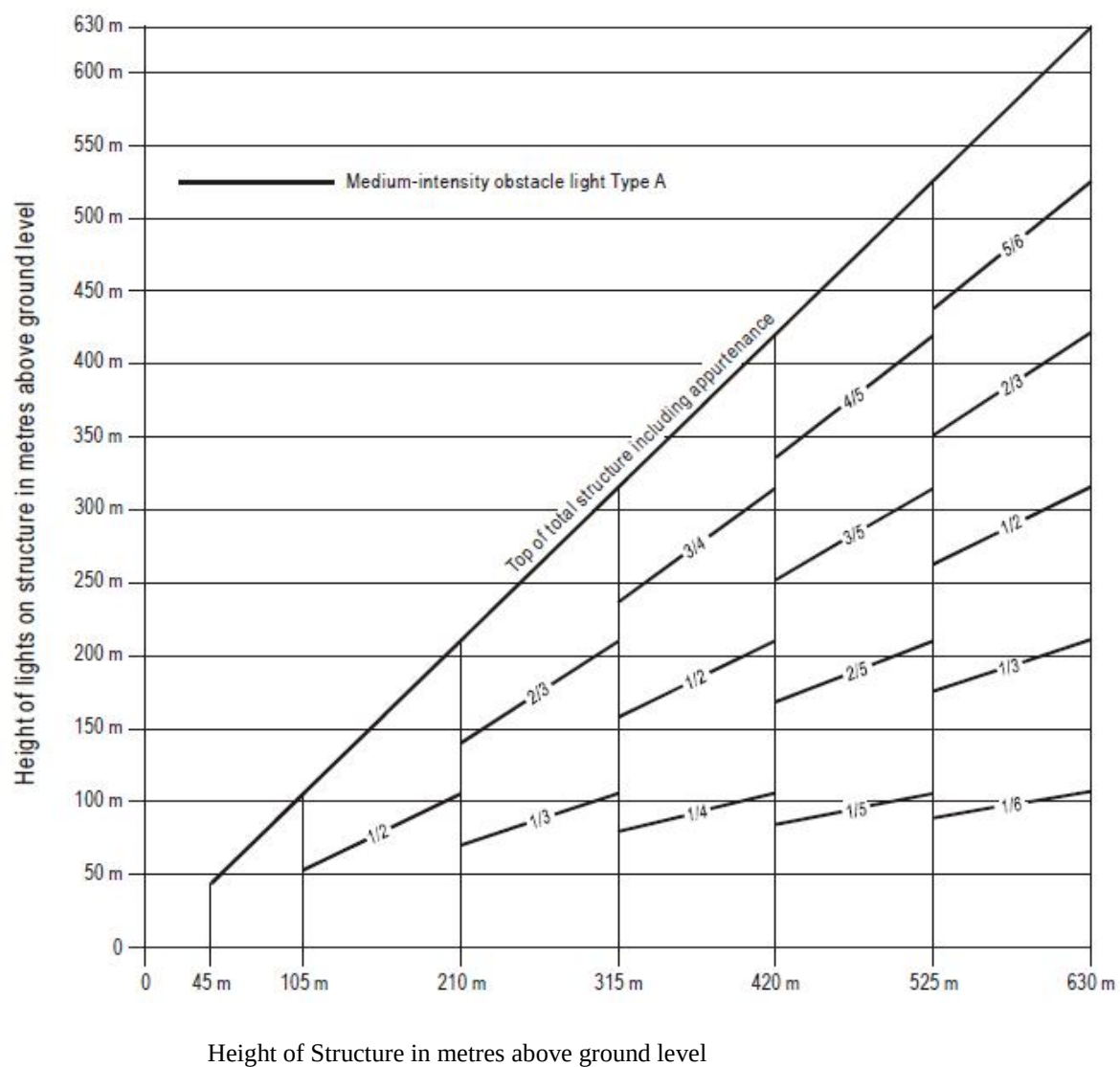
Length/distance/dimension	Accuracy Data type	Integrity Classification
Runway length	1 m surveyed	critical
Runway width	1 m surveyed	essential
Displaced threshold distance	1 m surveyed	routine
Stopway length and width	1 m surveyed	critical
Clearway length and width	1 m surveyed	essential
Landing distance available	1 m surveyed	critical
Take-off run available	1 m surveyed	critical
Take-off distance available	1 m surveyed	critical
Accelerate-stop distance available	1 m surveyed	critical
Runway shoulder width	1 m surveyed	essential
Taxiway width	1 m surveyed	essential
Taxiway shoulder width	1 m surveyed	essential
ILS localizer antenna-runway end, distance	3 m calculated	routine
ILS glide slope antenna-threshold, distance along centre line	3 m calculated	routine
ILS marker-threshold distance	3 m calculated	essential

ILS DME antenna-threshold, distance along centre line	3 m calculated	essential
MLS azimuth antenna-runway end, distance	3 m calculated	routine
MLS elevation antenna-threshold, distance along centre line	3 m calculated	routine
MLS DME/P antenna-threshold, distance along centre line	3 m calculated	essential

TWELFTH SCHEDULE

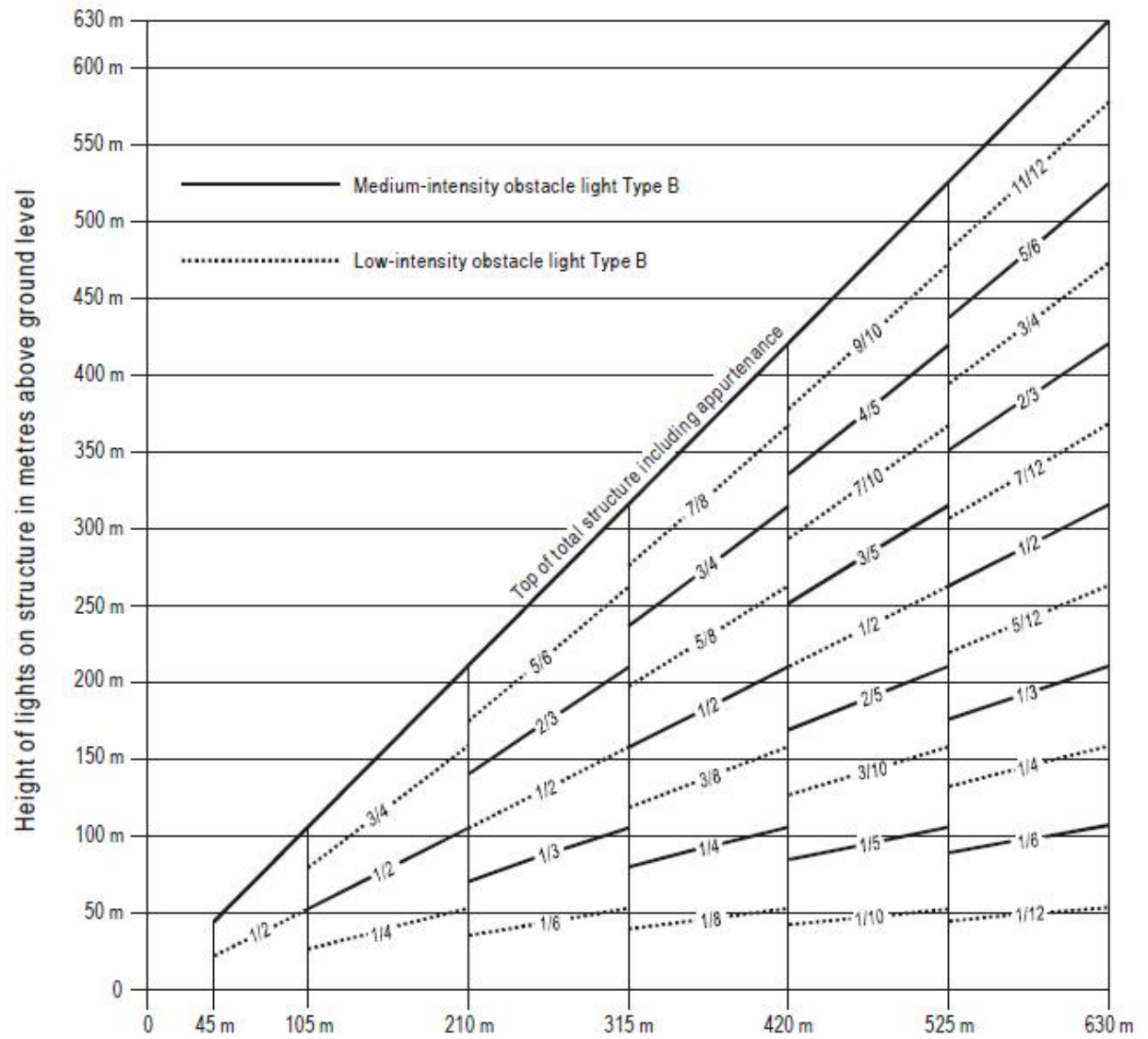
Regulations 238

LOCATION OF LIGHTS ON OBSTACLES



Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.

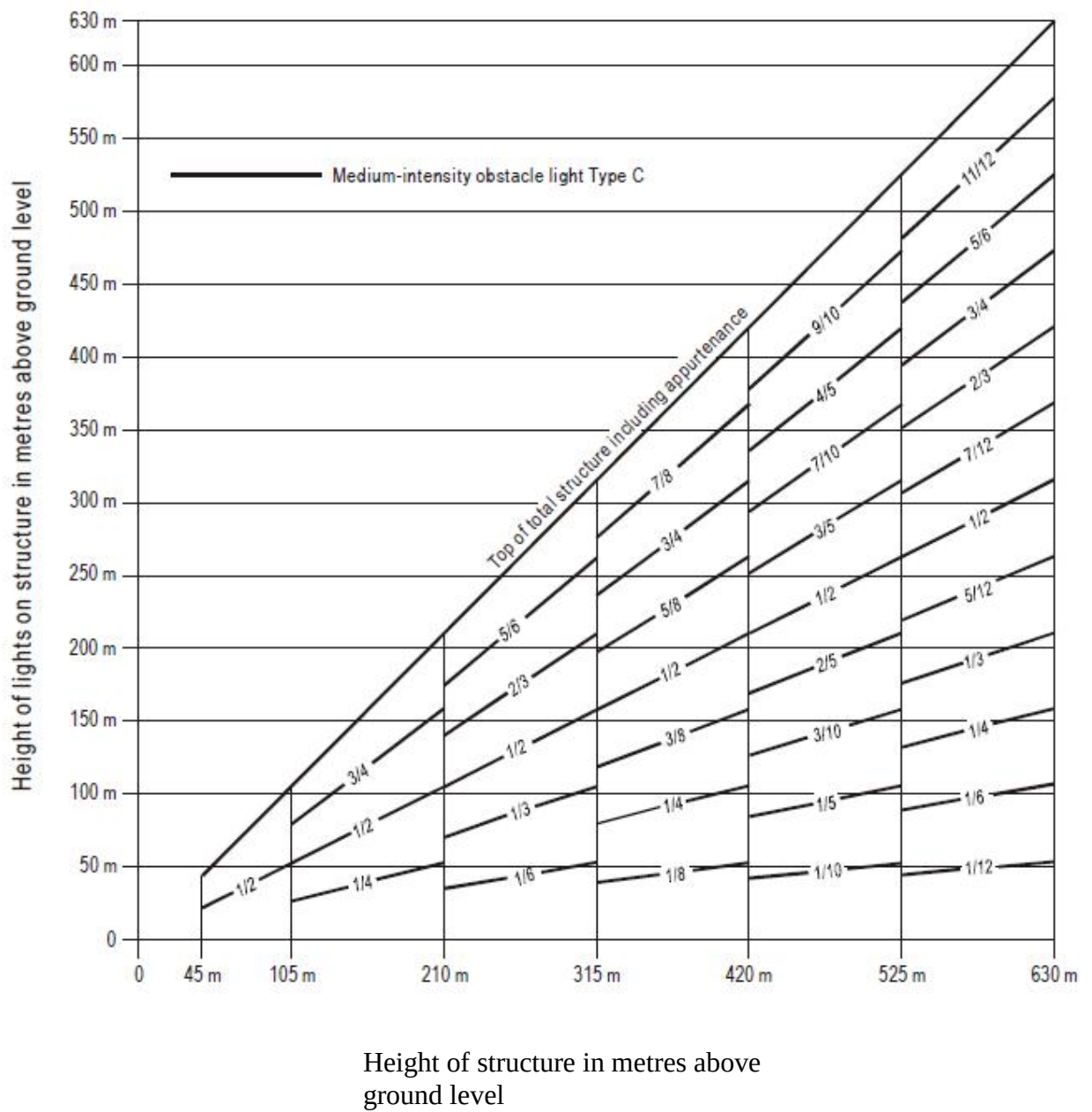
Figure A6-1. Medium-intensity flashing-white obstacle lighting system, Type A



Height of structure in metres above
ground level

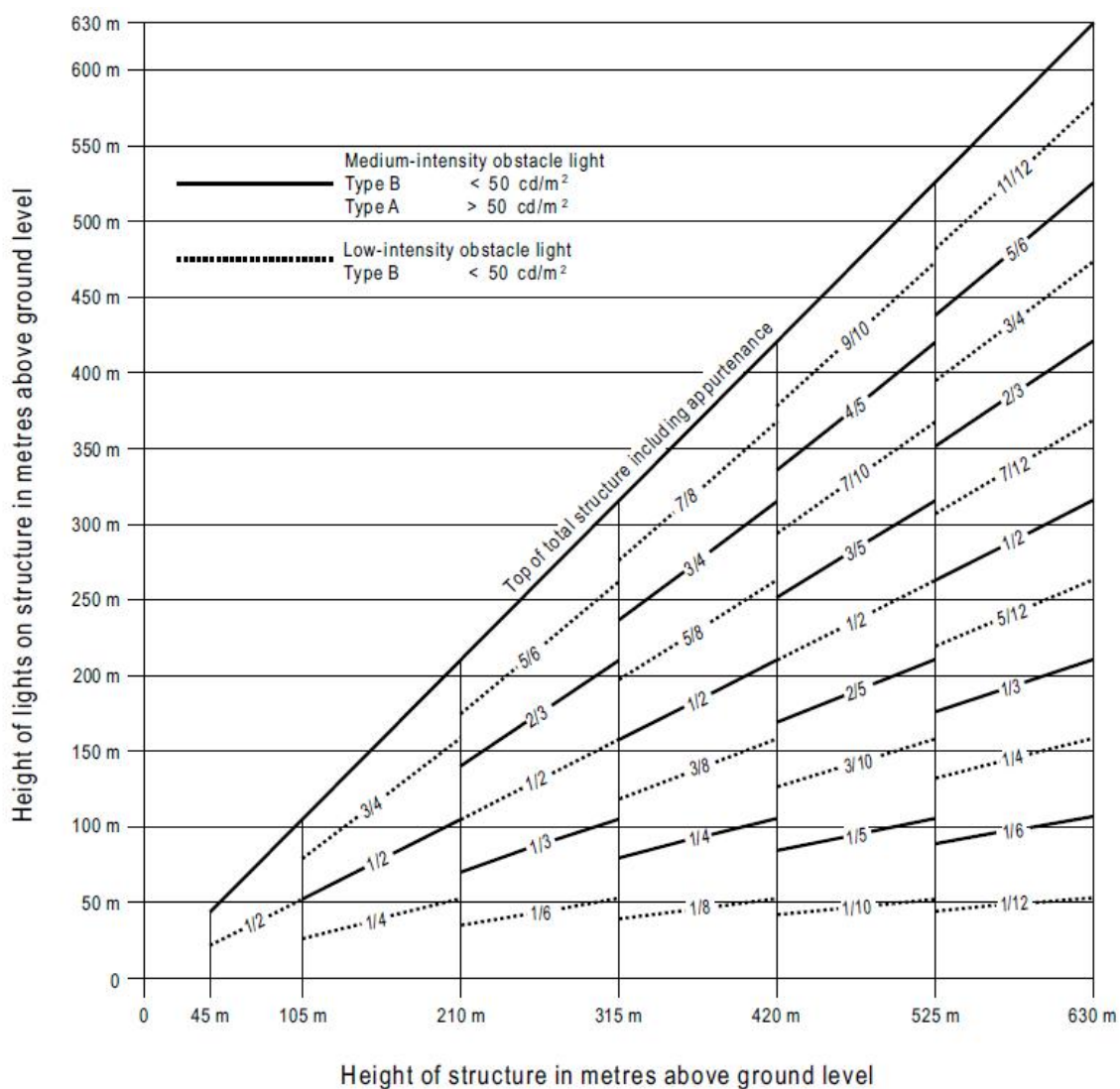
Note.— For night-time use only.

**Figure A6-2. Medium-intensity flashing-red obstacle lighting system,
Type B**



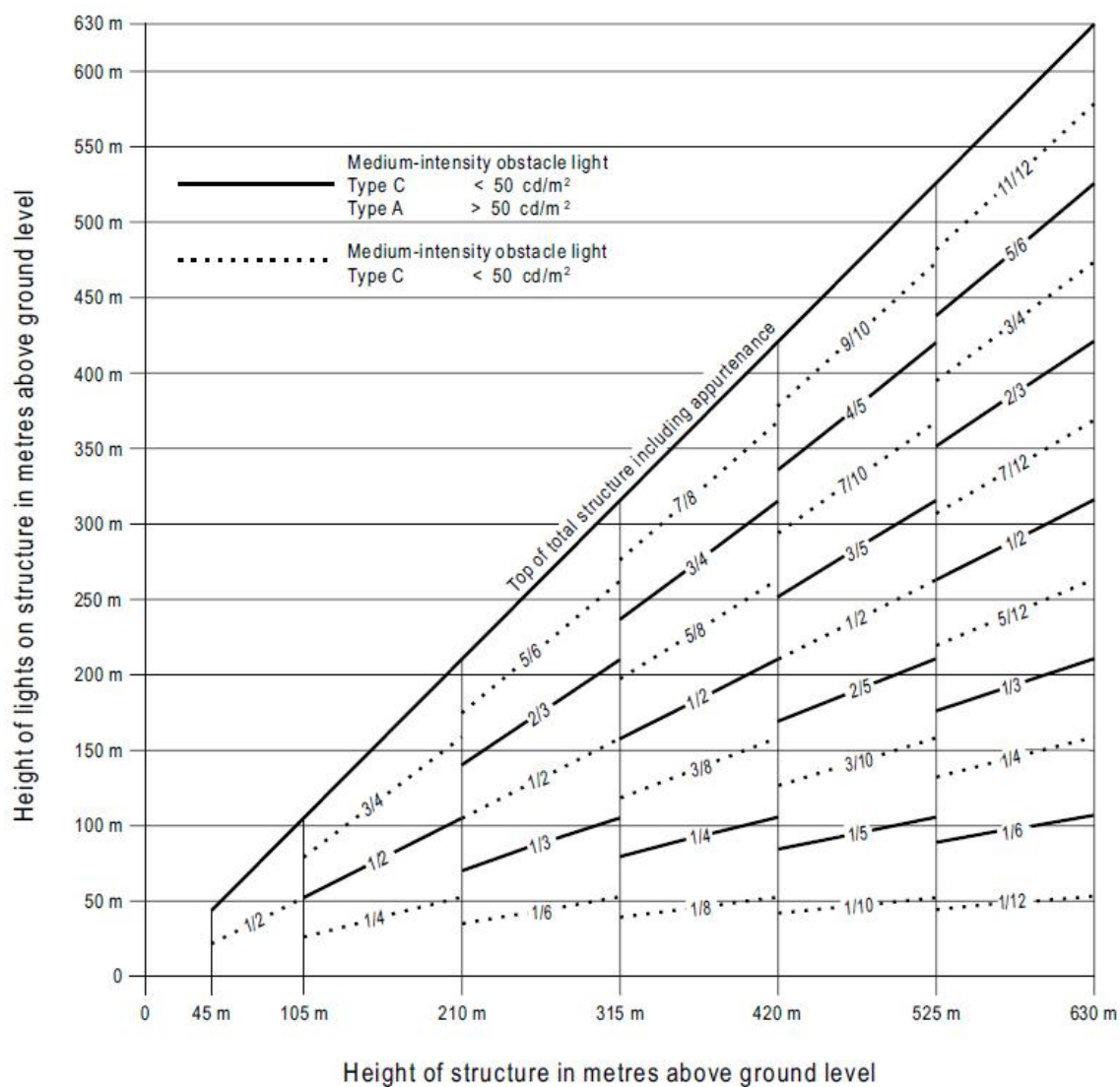
Note.— For night-time use only.

Figure A6-3. Medium-intensity fixed-red obstacle lighting system, Type C



Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level.
If medium-intensity lighting is used, marking will also be required.

Figure A6-4. Medium-intensity dual obstacle lighting system, Type A/Type B



*Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level.
If medium-intensity lighting is used, marking will also be required.*

Figure A6-5. Medium-intensity dual obstacle lighting system, Type A/Type C

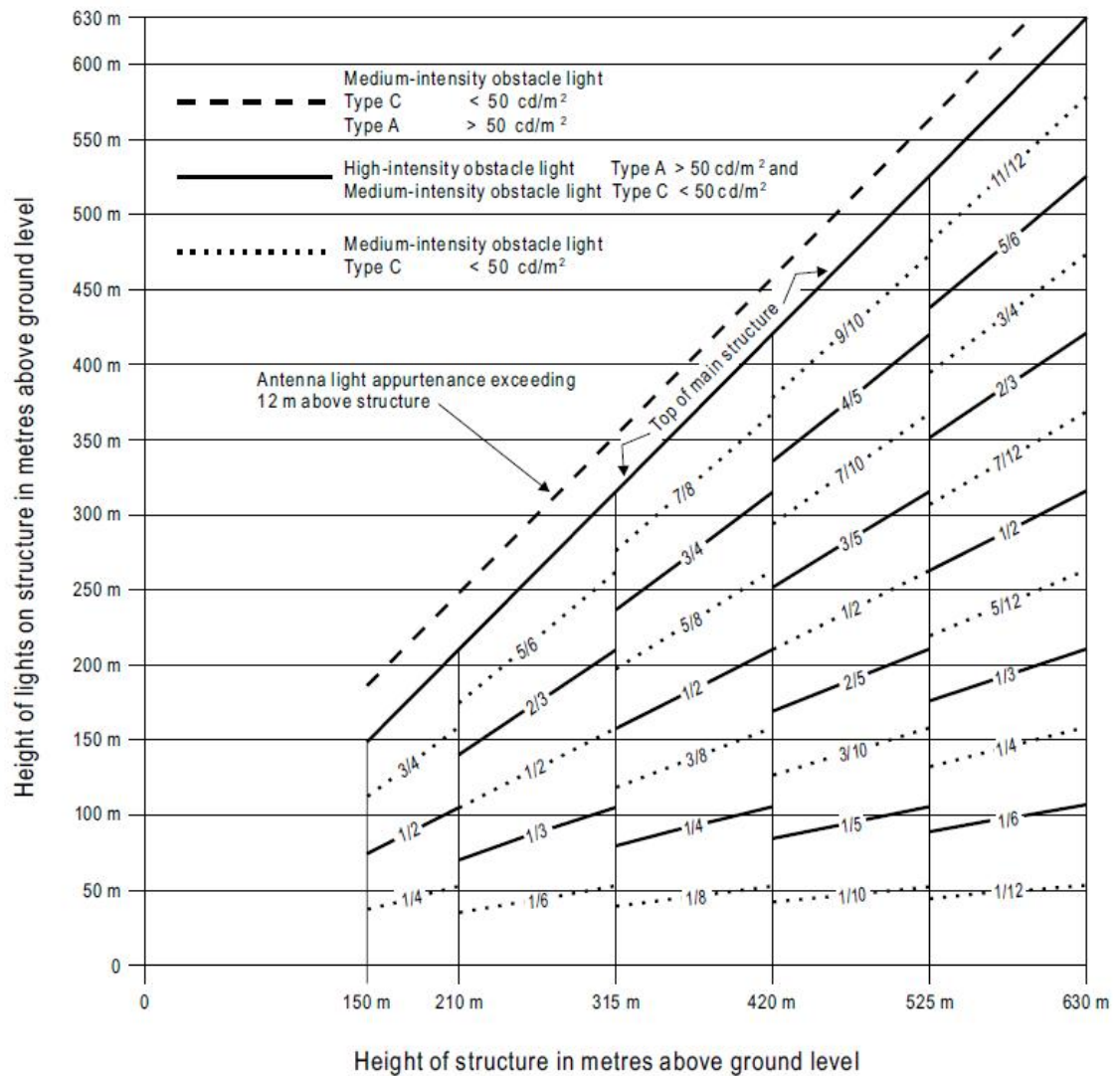


Figure A6-8. High-/medium-intensity dual obstacle lighting system, Type A/Type C

THIRTEENTH SCHEDULE

Regulations 85, 87, 106

GUIDANCE MATERIAL SUPPLEMENTARY TO THE MANUAL OF AERODROME STANDARDS

1. Number, siting and orientation of runways

Siting and orientation of runways

1.1 Many factors shall be taken into account in the determination of the siting and orientation of runways. Without attempting to provide an exhaustive list of these factors or an analysis of their effects, it appears useful to indicate those which most frequently require study. These factors may be classified under four headings:

1.1.1 Type of operation. Attention shall be paid in particular to whether the aerodrome is to be used in all meteorological conditions or only in visual meteorological conditions, and whether it is intended for use by day and night, or only by day.

1.1.2 Climatological conditions. A study of the wind distribution shall be made to determine the usability factor. In this regard, the following comments shall be taken into account:

- a) Wind statistics used for the calculation of the usability factor are normally available in ranges of speed and direction, and the accuracy of the results obtained depends, to a large extent, on the assumed distribution of observations within these ranges. In the absence of any sure information as to the true distribution, it is usual to assume a uniform distribution since, in relation to the most favorable runway orientations, this generally results in a slightly conservative for the usability factor.
- b) The maximum mean cross-wind components given in Chapter 3, 3.2.1.3 refer to normal circumstances. There are some factors which may require that a reduction of those maximum values be taken into account at a particular aerodrome. These include:
 - i) the wide variations which may exist, in handling characteristics and maximum permissible cross-wind components, among diverse types of aeroplanes (including future types) within each of the three groups given in 3.2.1.3;
 - ii) prevalence and nature of gusts;

- iii) prevalence and nature of turbulence;
- iv) the availability of a secondary runway;
- v) the width of runways;
- vi) the runway surface conditions — water, snow and ice on the runway materially reduce the allowable crosswind component; and
- vii) the strength of the wind associated with the limiting cross-wind component.

A study shall also be made of the occurrence of poor visibility and/or low cloud base. Account shall be taken of their frequency as well as the accompanying wind direction and speed.

1.1.3 Topography of the aerodrome site, its approaches, and surroundings, particularly:

- a) compliance with the obstacle limitation surfaces;
- b) current and future land use. The orientation and layout shall be selected so as to protect as far as possible the particularly sensitive areas such as residential, school and hospital zones from the discomfort caused by aircraft noise. Detailed information on this topic is provided in the ICAO Airport Planning Manual, Part 2, and in Guidance on the Balanced Approach to Aircraft Noise Management (Doc 9829);
- c) current and future runway lengths to be provided;
- d) construction costs; and
- e) possibility of installing suitable non-visual and visual aids for approach-to-land.

1.1.4 Air traffic in the vicinity of the aerodrome, particularly:

- a) proximity of other aerodromes or ATS routes;
- b) traffic density; and
- c) air traffic control and missed approach procedures.

Number of runways in each direction

1.2 The number of runways to be provided in each direction depends on the number of aircraft movements to be catered to.

2. Clearways and stopways

2.1 The decision to provide a stopway and/or a clearway as an alternative to an increased length of runway will depend on the physical characteristics of the area beyond the runway end, and on the operating performance requirements of the prospective aeroplanes. The runway, stopway and clearway lengths to be provided are determined by

the aeroplane takeoff performance, but a check shall also be made of the landing distance required by the aeroplanes using the runway to ensure that adequate runway length is provided for landing. The length of a clearway, however, cannot exceed half the length of take-off run available.

2.2 The aeroplane performance operating limitations require a length which is enough to ensure that the aeroplane can, after starting a take-off, either be brought safely to a stop or complete the take-off safely. For the purpose of discussion it is supposed that the runway, stopway and clearway lengths provided at the aerodrome are only just adequate for the aeroplane requiring the longest take-off and accelerate-stop distances, taking into account its take-off mass, runway characteristics and ambient atmospheric conditions. Under these circumstances there is, for each take-off, a speed, called the decision speed; below this speed, the take-off must be abandoned if an engine fails, while above it the take-off must be completed. A very long take-off run and take-off distance would be required to complete a take-off when an engine fails before the decision speed is reached, because of the insufficient speed and the reduced power available. There would be no difficulty in stopping in the remaining accelerate stop distance available provided action is taken immediately. In these circumstances the correct course of action would be to abandon the take-off.

2.3 On the other hand, if an engine fails after the decision speed is reached, the aeroplane will have sufficient speed and power available to complete the take-off safely in the remaining take-off distance available. However, because of the high speed, there would be difficulty in stopping the aeroplane in the remaining accelerate-stop distance available.

2.4 The decision speed is not a fixed speed for any aeroplane, but can be selected by the pilot within limits to suit the accelerate-stop and take-off distance available, aeroplane take-off mass, runway characteristics, and ambient atmospheric conditions at the aerodrome. Normally, a higher decision speed is selected as the accelerate-stop distance available increases.

2.5 A variety of combinations of accelerate-stop distances required and take-off distances required can be obtained to accommodate a particular aeroplane, taking into account the aeroplane take-off mass, runway characteristics, and ambient atmospheric conditions. Each combination requires its particular length of take-off run.

2.6 The most familiar case is where the decision speed is such that the take-off distance required is equal to the accelerate-stop distance required; this value is known as the balanced field length. Where stopway and clearway are not provided, these distances are both equal to the runway length. However, if landing distance is for the moment ignored, runway is not essential for the whole of the balanced field length, as the take-off run required is, of course, less than the balanced field length. The balanced field length can, therefore, be provided by a runway supplemented by an equal length of clearway and

stopway, instead of wholly as a runway. If the runway is used for take-off in both directions, an equal length of clearway and stopway has to be provided at each runway end. The saving in runway length is, therefore, bought at the cost of a greater overall length.

2.7 In case economic considerations preclude the provision of stopway and, as a result, only runway and clearway are to be provided, the runway length (neglecting landing requirements) shall be equal to the accelerate-stop distance required or the take-off run required, whichever is the greater. The take-off distance available will be the length of the runway plus the length of clearway.

2.8 The minimum runway length and the maximum stopway or clearway length to be provided may be determined as follows, from the data in the aeroplane flight manual for the aeroplane considered to be critical from the viewpoint of runway length requirements:

- a) if a stopway is economically possible, the lengths to be provided are those for the balanced field length. The runway length is the take-off run required or the landing distance required, whichever is the greater. If the accelerate-stop distance required is greater than the runway length so determined, the excess may be provided as stopway, usually at each end of the runway. In addition, a clearway of the same length as the stopway must also be provided;
- b) if a stopway is not to be provided, the runway length is the landing distance required, or if it is greater, the accelerate-stop distance required, which corresponds to the lowest practical value of the decision speed. The excess of the take-off distance required over the runway length may be provided as clearway, usually at each end of the runway.

2.9 In addition to the above consideration, the concept of clearways in certain circumstances can be applied to a situation where the take-off distance required for all engines operating exceeds that required for the engine failure case.

2.10 The economy of a stopway can be entirely lost if, after each usage, it must be re-graded and compacted. Therefore, it shall be designed to withstand at least a certain number of loadings of the aeroplane which the stopway is intended to serve without inducing structural damage to the aeroplane.

3. Calculation of declared distances

3.1 The declared distances to be calculated for each runway direction comprise: the take-off run available (TORA), take-off distance available (TODA), accelerate-stop distance available (ASDA), and landing distance available (LDA).

3.2 Where a runway is not provided with a stopway or clearway and the threshold is located at the extremity of the runway, the four declared distances shall normally be equal to the length of the runway, as shown in Figure B-1 (A).

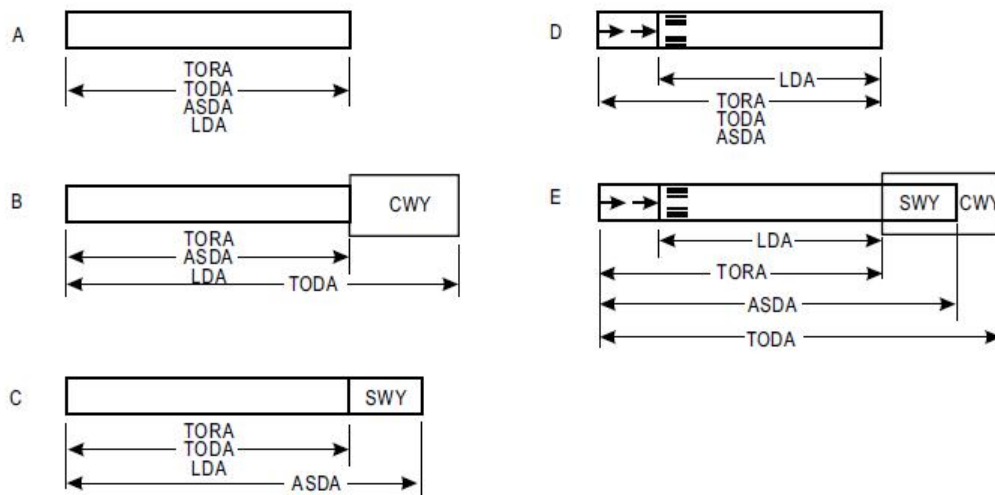
3.3 Where a runway is provided with a clearway (CWY), then the TODA will include the length of clearway, as shown in Figure B-1 (B).

3.4 Where a runway is provided with a stopway (SWY), then the ASDA will include the length of stopway, as shown in Figure B-1 (C).

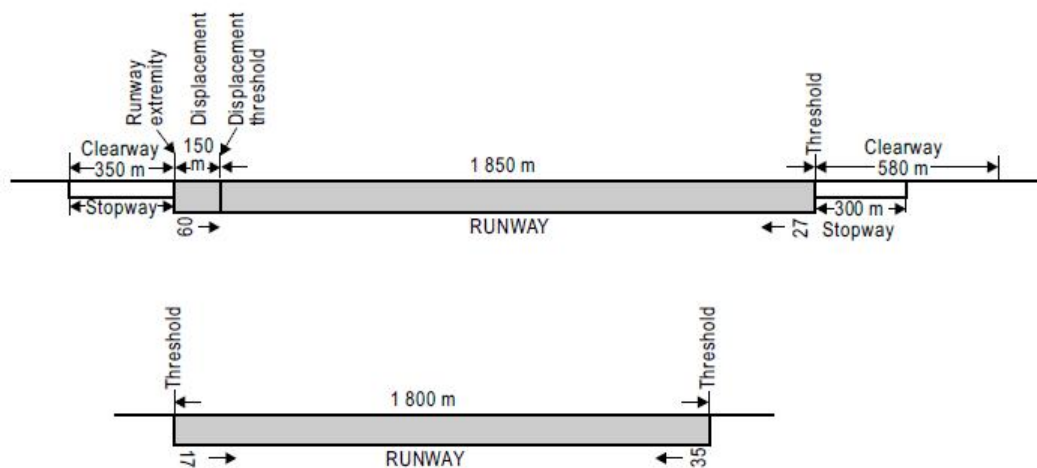
3.5 Where a runway has a displaced threshold, then the LDA will be reduced by the distance the threshold is displaced, as shown in Figure B-1 (D). A displaced threshold affects only the LDA for approaches made to that threshold; all declared distances for operations in the reciprocal direction are unaffected.

3.6 Figures B-1 (B) through B-1 (D) illustrate a runway provided with a clearway or a stopway or having a displaced threshold. Where more than one of these features exist, then more than one of the declared distances will be modified — but the modification will follow the same principle illustrated. An example showing a situation where all these features exist is shown in Figure B-1 (E).

3.7 A suggested format for providing information on declared distances is given in Figure B-1 (F). If a runway direction cannot be used for take-off or landing, or both, because it is operationally forbidden, then this shall be declared and the words “not usable” or the abbreviation “NU” entered.



Note.— All declared distances are illustrated for operations from left to right.



F

RUNWAY	TORA m	ASDA m	TODA m	LDA m
09	2 000	2 300	2 580	1 850
27	2 000	2 350	2 350	2 000
17	NU	NU	NU	1 800
35	1 800	1 800	1 800	NU

Figure B-1: Illustration of declared distances

4. Slopes on a runway

4.1 Distance between slope changes

The following example illustrates how the distance between slope changes is to be determined (see Figure B-2):

D for a runway where the code number is 3 shall be at least:

$15\,000 (|x - y| + |y - z|)$ m

$|x - y|$ being the absolute numerical value of $x - y$

$|y - z|$ being the absolute numerical value of $y - z$

Assuming $x = + 0.01$

Assuming $y = -0.005$

Assuming $z = +0.005$

then $|x - y| = 0.015$

then $|y - z| = 0.01$

To comply with the specifications, D shall be not less than:

that is, $15\,000 (0.015 + 0.01)$ m,

that is, $15\,000 \times 0.025 = 375$ m

4.2 Consideration of longitudinal and transverse slopes

When a runway is planned that will combine the extreme values for the slopes and changes in slope permitted under Chapter 3, 3.2.1.13 to 3.2.1.19, a study shall be made to ensure that the resulting surface profile will not hamper the operation of aeroplanes.

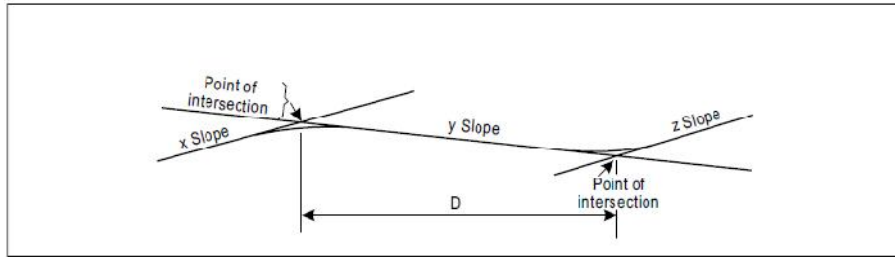


Figure B-2: Profile on centre line of runway

4.3 Radio altimeter operating area

In order to accommodate aeroplanes making auto-coupled approaches and automatic landings (irrespective of weather conditions) it is desirable that slope changes be avoided or kept to a minimum, on a rectangular area at least 300 m long before the threshold of a precision approach runway. The area shall be symmetrical about the extended centre line, 120 m wide. When special circumstances so warrant, the width may be reduced to no less than 60 m if an aeronautical study indicates that such reduction would not affect the safety of operations of aircraft. This is desirable because these aeroplanes are equipped with a radio altimeter for final height and flare guidance, and when the aeroplane is above the terrain immediately prior to the threshold, the radio altimeter will begin to provide information to the automatic pilot for auto flare. Where slope changes cannot be avoided, the rate of change between two consecutive slopes shall not exceed 2 per cent per 30 m.

5. Runway surface evenness

5.1 In adopting tolerances for runway surface irregularities, the following standard of construction is achievable for short distances of 3 m and conforms to good engineering practice:

Except across the crown of a camber or across drainage channels, the finished surface of the wearing course is to be of such regularity that, when tested with a 3 m straightedge placed anywhere in any direction on the surface, there is no deviation greater than 3 mm between the bottom of the straight-edge and the surface of the pavement anywhere along the straight edge.

5.2 Caution shall also be exercised when inserting runway lights or drainage grilles in runway surfaces to ensure that adequate smoothness of the surface is maintained.

5.3 The operation of aircraft and differential settlement of surface foundations will eventually lead to increases in surface irregularities. Small deviations in the above

tolerances will not seriously hamper aircraft operations. In general, isolated irregularities of the order of 2.5 cm to 3 cm over a 45 m distance are tolerable. Although maximum acceptable variations vary with the type and speed of an aircraft, the limits of acceptable surface irregularities can be estimated to a reasonable extent. The following table describes the maximum and temporarily acceptable limits. If the maximum limits are exceeded, the corrective action shall be undertaken as soon as reasonably practicable to improve the ride quality. If the temporarily acceptable limits are exceeded, the portions of the runway that exhibit such roughness shall have corrective measures taken immediately if aircraft operations are to be continued.

Surface irregularity	Minimum acceptable length of irregularity (m)								
	3	6	9	12	15	20	30	45	60
Maximum surface irregularity height (or depth) (cm)	3	3.5	4	5	5.5	6	6.5	8	10
Temporary acceptable surface irregularity height (or depth) (cm)	3.5	5.5	6.5	7.5	8	9	11	13	15

Note that “surface irregularity” is defined herein to mean isolated surface elevation deviations that do not lie along a uniform slope through any given section of a runway. For the purposes of this concern, a “section of a runway” is defined herein to mean a segment of a runway throughout which a continuing general uphill, downhill or flat slope is prevalent. The length of this section is generally between 30 and 60 metres, and can be greater, depending on the longitudinal profile and the condition of the pavement.

5.4 Figure B-3 illustrates a comparison of the surface roughness criteria with those developed by the United States Federal Aviation Administration.

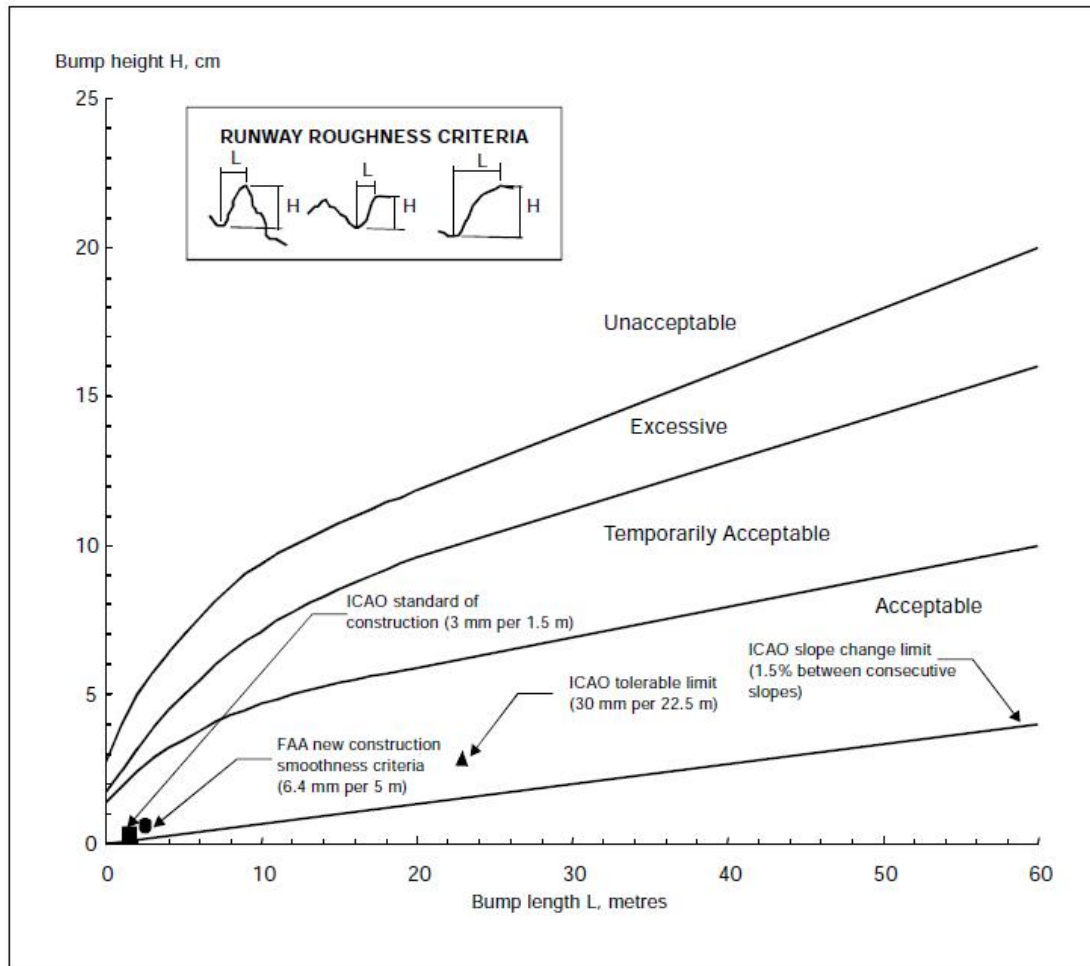


Figure B-3. Comparison of roughness criteria

5.5 Deformation of the runway with time may also increase the possibility of the formation of water pools. Pools as shallow as approximately 3 mm in depth, particularly if they are located where they are likely to be encountered at high speed by landing aeroplanes, can induce aquaplaning, which can then be sustained on a wet runway by a smaller shallow depth of water. Improved guidance regarding the significant length and depth of pools relative to aquaplaning is the subject of further research. It is, of course especially necessary to prevent pools from forming whenever there is possibility that they might become frozen.

6. Determination of surface friction characteristics for construction and maintenance purposes

The guidance in this section deals with the functional measurement of friction-related aspects related to runway construction and maintenance. Excluded in this section is the operational, as opposed to functional, measurement of friction for contaminated runways. However, the devices used for functional measurement could also be used for operational measurement, but in the latter case, the figures given in ICAO Airport Services Manual (Doc 9137), Part 2, Table 3-1 are not relevant.

6.1 The surface friction characteristics of a paved runway shall be:

- a) assessed to verify the surface friction characteristics of new or resurfaced paved runways (Chapter 3, 3.2.1.24);
- b) assessed periodically in order to determine the slipperiness of paved runways (Chapter 10, 10.2.5);

6.2 The condition of a runway pavement is generally assessed under dry conditions using a self-wetting continuous friction measuring device. Evaluation tests of runway surface friction characteristics are made on clean surfaces of the runway when first constructed or after resurfacing.

Note. - Although it is recognized that friction reduces with use, this value will represent the friction of the relatively long central portion of the runway that is uncontaminated by rubber deposits from aircraft operations and is therefore of operational value. Evaluation tests shall be made on clean surfaces. If it is not possible to clean a surface before testing, then for purposes of preparing an initial report a test could be made on a portion of clean surface in the central part of the runway.

6.3 Friction tests of existing surface conditions are taken periodically in order to avoid falling below the minimum friction level specified by the Authority. When the friction of any portion of a runway is found to be below this value, then such information is promulgated in a NOTAM specifying which portion of the runway is below the minimum friction level and its location on the runway. A corrective maintenance action must be initiated without delay. Friction measurements are taken at time intervals that will ensure the identification of runways in need of maintenance or of special surface treatment before the condition becomes serious. The time interval and mean frequency of measurement depend on factors such as: aircraft type and frequency of usage, climatic conditions, pavement type, and pavement service and maintenance requirements.

6.4 Friction measurements of existing, new or resurfaced runways are made with a continuous friction measuring device provided with a smooth tread tire. The device shall

use self-wetting features to allow measurements of the surface friction characteristics to be made at a water depth of at least 1 mm.

6.5 When it is suspected that the friction characteristics of a runway may be reduced because of poor drainage, owing to inadequate slopes or depressions, then an additional measurement is made, but this time under natural conditions representative of a local rain. This measurement differs from the previous one in that water depths in the poorly cleared areas are normally greater in a local rain condition. The measurement results are thus more apt to identify problem areas having low friction values that could induce aquaplaning than the previous test. If circumstances do not permit measurements to be conducted during natural conditions representative of a rain, then this condition may be simulated. (See Section 7)

6.6 When conducting friction tests using a self-wetting continuous friction measuring device, it is important to note that a wet runway produces a drop in friction with an increase in speed. However, as the speed increases, the rate at which the friction is reduced becomes less. Among the factors affecting the friction coefficient between the tire and the runway surface, texture is particularly important. If the runway has a good macro-texture allowing the water to escape beneath the tire, then the friction value will be less affected by speed. Conversely, a low macro-texture surface will produce a larger drop in friction with increase in speed.

6.7 These regulations requires the Authority to specify a minimum friction level below which corrective maintenance action shall be taken. As criteria for surface friction characteristics of new or resurfaced runway surfaces and its maintenance planning, the Authority is required to establish a maintenance planning level below which appropriate corrective maintenance action shall be initiated to improve the friction. Guidance provided in the Airport Services Manual (ICAO Doc 9137), Part 2, on establishing maintenance planning and minimum friction levels for runway surfaces in use shall apply.

7. Drainage characteristics of the movement area and adjacent areas

7.1 General

7.1.1 Rapid drainage of surface water is a primary safety consideration in the design, construction and maintenance of the movement area and adjacent areas. The objective is to minimize water depth on the surface by draining water off the runway in the shortest path possible and particularly out of the area of the wheel path. There are two distinct drainage processes taking place:

- a) natural drainage of the surface water from the top of the pavement surface until it reaches the final recipient such as rivers or other water bodies; and

- b) dynamic drainage of the surface water trapped under a moving tire until it reaches outside the tire-to-ground contact area.

7.1.2 Both processes can be controlled through:

- a) design;
- b) construction; and
- c) maintenance.

of the pavements in order to prevent accumulation of water on the pavement surface.

7.2 Design of pavement

7.2.1 Surface drainage is a basic requirement and serves to minimize water depth on the surface. The objective is to drain water off the runway in the shortest path. Adequate surface drainage is provided primarily by an appropriately sloped surface (in both the longitudinal and transverse directions). The resulting combined longitudinal and transverse slope is the path for the drainage run-off. This path can be shortened by adding transverse grooves.

7.2.2 Dynamic drainage is achieved through built-in texture in the pavement surface. The rolling tire builds up water pressure and squeezes the water out the escape channels provided by the texture. The dynamic drainage of the tire-to-ground contact area may be improved by adding transverse grooves provided that they are subject to rigorous maintenance.

7.3 Construction of pavement

7.3.1 Through construction, the drainage characteristics of the surface are built into the pavement. These surface characteristics are:

- a) slopes;
- b) texture:
 - 1) microtexture;
 - 2) macrotexture;

7.3.2 Slopes for the various parts of the movement area and adjacent parts are described in Chapter 3 and figures are given as per cent. Further guidance is given in the Aerodrome Design Manual (Doc 9157), Part 1, Chapter 5.

7.3.3 Texture in the literature is described as microtexture or macrotexture. These terms are understood differently in various parts of the aviation industry.

7.3.4 Microtexture is the texture of the individual stones and is hardly detectable by the eye. Microtexture is considered a primary component in skid resistance at slow speeds. On a wet surface at higher speeds a water film may prevent direct contact between the surface asperities and the tire due to insufficient drainage from the tire-to-ground contact area.

7.3.5 Microtexture is a built-in quality of the pavement surface. By specifying crushed material that will withstand polishing microtexture, drainage of thin water films are ensured for a longer period of time. Resistance against polishing is expressed in terms of the Polished Stone Values (PSV) which is in principle a value obtained from a friction measurement in accordance with international standards. These standards define the PSV minima that will enable a material with a good microtexture to be selected.

7.3.6 A major problem with microtexture is that it can change within short time periods without being easily detected. A typical example of this is the accumulation of rubber deposits in the touchdown area which will largely mask microtexture without necessarily reducing macrotexture.

7.3.7 Macrotexture is the texture among the individual stones. This scale of texture may be judged approximately by the eye. Macrotexture is primarily created by the size of aggregate used or by surface treatment of the pavement and is the major factor influencing drainage capacity at high speeds. Materials shall be selected so as to achieve good macrotexture.

7.3.8 The primary purpose of grooving a runway surface is to enhance surface drainage. Natural drainage can be slowed down by surface texture, but grooving can speed up the drainage by providing a shorter drainage path and increasing the drainage rate.

7.3.9 For measurement of macrotexture, simple methods such as the “sand and grease patch” methods described in the Airport Services Manual (Doc 9137), Part 2 were developed. These methods were used for the early research on which current airworthiness requirements are based, which refer to a classification categorizing macrotexture from A to E. This classification was developed, using sand or grease patch measuring techniques, and issued in 1971 by the Engineering Sciences Data Unit (ESDU).

Runway classification based on texture information from ESDU 71026:

Classification	Texture depths (mm)
A	0.10 – 0.14
B	0.15 – 0.24
C	0.25 – 0.50
D	0.51 – 1.00
E	1.01 – 2.54

7.3.10 Using this classification, the threshold value between microtexture and macrotexture is 0.1 mm mean texture depth (MTD). Related to this scale, the normal wet runway aircraft performance is based upon texture giving drainage and friction qualities midway between classification B and C (0.25 mm). Improved drainage through better texture might qualify for a better aircraft performance class. However such credit must be in accordance with aeroplane manufacturers' documentation and agreed by the State. Presently credit is given to grooved or porous friction course runways following design, construction and maintenance criteria acceptable to the State. The harmonized certification standards of some States refer to texture giving drainage and friction qualities midway between classification D and E (1.0 mm).

7.3.11 For construction, design and maintenance, States use various international standards. Currently ISO 13473-1: Characterization of pavement texture by use of surface profiles — Part 1: Determination of Mean Profile Depth links the volumetric measuring technique with non-contact profile measuring techniques giving comparable texture values. These standards describe the threshold value between microtexture and macrotexture as 0.5 mm. The volumetric method has a validity range from 0.25 to 5 mm MTD. The profilometry method has a validity range from 0 to 5 mm mean profile depth (MPD). The values of MPD and MTD differ due to the finite size of the glass spheres used in the volumetric technique and because the MPD is derived from a two-dimensional profile rather than a three-dimensional surface. Therefore a transformation equation must be established for the measuring equipment used to relate MPD to MTD.

7.3.12 The ESDU scale groups runway surfaces based on macrotexture from A through E, where E represents the surface with best dynamic drainage capacity. The ESDU scale thus reflects the dynamic drainage characteristics of the pavement. Grooving any of these surfaces enhances the dynamic drainage capacity. The resulting drainage capacity of the surface is thus a function of the texture (A through E) and grooving. The contribution from grooving is a function of the size of the grooves and the spacing between the grooves. Aerodromes exposed to heavy or torrential rainfall must ensure that the pavement and adjacent areas have drainage capability to withstand these rainfalls or put limitations on the use of the pavements under such extreme situations. These airports

shall seek to have the maximum allowable slopes and the use of aggregates providing good drainage characteristics. They shall also consider grooved pavements in the E classification to ensure that safety is not impaired.

7.4 Maintenance of drainage characteristics of pavement

7.4.1 Macrottexture does not change within a short timespan but accumulation of rubber can fill up the texture and as such reduce the drainage capacity, which can result in impaired safety. Furthermore the runway structure may change over time and give unevenness which results in ponding after rainfall. Guidance on rubber removal and unevenness can be found in the Airport Services Manual (Doc 9137), Part 2. Guidance on methods for improving surface texture can be found in the Aerodrome Design Manual (Doc 9157), Part 3.

7.4.2 When groovings are used, the condition of the grooves shall be regularly inspected to ensure that no deterioration has occurred and that the grooves are in good condition. Guidance on maintenance of pavements is available in the Airport Services Manual (Doc 9137), Part 2 — Pavement Surface Conditions and Part 9 — Airport Maintenance Practices and the Aerodrome Design Manual (Doc 9157), Part 2.

7.4.3 The pavement may be shot blasted in order to enhance the pavement macrottexture.

8. Strips

8.1 Shoulders

8.1.1 The shoulder of a runway or stopway shall be prepared or constructed so as to minimize any hazard to an aeroplane running off the runway or stopway. Some guidance is given in the following paragraphs on certain special problems which may arise, and on the further question of measures to avoid the ingestion of loose stones or other objects by turbine engines.

8.1.2 In some cases, the bearing strength of the natural ground in the strip may be sufficient, without special preparation, to meet the requirements for shoulders. Where special preparation is necessary, the method used will depend on local soil conditions and the mass of the aeroplanes the runway is intended to serve. Soil tests will help in determining the best method of improvement (e.g. drainage, stabilization, surfacing, light paving).

8.1.3 Attention shall also be paid when designing shoulders to prevent the ingestion of stones or other objects by turbine engines. Similar considerations apply here to those which are discussed for the margins of taxiways in the Aerodrome (Doc 9157) Design

8.1.4 Where shoulders have been treated specially, either to provide the required bearing strength or to prevent the presence of stones or debris, difficulties may arise because of a lack of visual contrast between the runway surface and that of the adjacent strip. This difficulty can be overcome either by providing a good visual contrast in the surfacing of the runway or strip, or by providing a runway side stripe marking.

Within the general area of the strip adjacent to the runway, measures shall be taken to prevent an aeroplane's wheel, when sinking into the ground, from striking a hard vertical face. Special problems may arise for runway light fittings or other objects mounted in the strip or at the intersection with a taxiway or another runway. In the case of construction, such as runways or taxiways, where the surface must also be flush with the strip surface, a vertical face can be eliminated by chamfering from the top of the construction to not less than 30 cm below the strip surface level. Other objects, the functions of which do not require them to be at surface level, shall be buried to a depth of not less than 30 cm.

Chapter 3, 3.5.8 recommends that the portion of a strip of an instrument runway within at least 75 m from the centre line shall be graded where the code number is 3 or 4. For a precision approach runway, it may be desirable to adopt a greater width where the code number is 3 or 4. Figure B-4 shows the shape and dimensions of a wider strip that may be considered for such a runway. This strip has been designed using information on aircraft running off runways. The portion to be graded extends to a distance of 105 m from the centre line, except that the distance is gradually reduced to 75 m from the centre line at both ends of the strip, for a length of 150 m from the runway end.

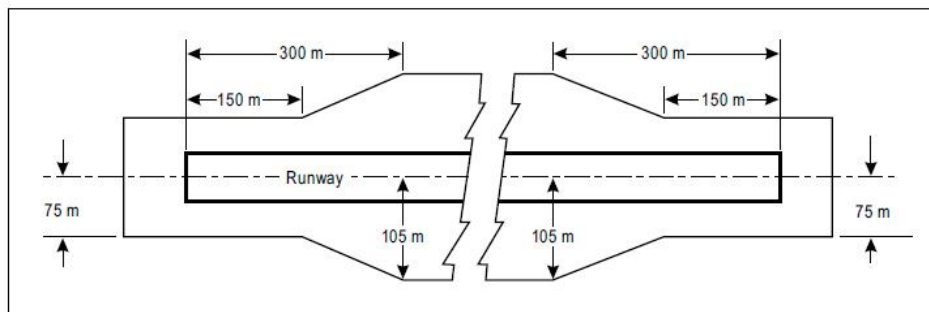


Figure B-4. Graded portion of a strip including a precision approach runway where the code number is 3 or 4

9. Runway end safety areas

9.1 Where a runway end safety area is provided in accordance with Chapter 3, consideration shall be given to providing an area long enough to contain overruns and undershoots resulting from a reasonably probable combination of adverse operational factors. On a precision approach runway, the ILS localizer is normally the first upstanding obstacle, and the runway end safety area shall extend up to this facility. In other circumstances, the first upstanding obstacle may be a road, a railroad or other constructed or natural feature. The provision of a runway end safety area shall take such obstacles into consideration.

9.2 Where provision of a runway end safety area would be particularly prohibitive to implement, consideration would have to be given to reducing some of the declared distances of the runway for the provision of a runway end safety area and installation of an arresting system.

9.3 Research programmes, as well as evaluation of actual aircraft overruns into arresting systems, have demonstrated that the performance of some arresting systems can be predictable and effective in arresting aircraft overruns.

9.4 Demonstrated performance of an arresting system can be achieved by a validated design method, which can predict the performance of the system. The design and performance shall be based on the type of aircraft anticipated to use the associated runway that imposes the greatest demand upon the arresting system.

9.5 The design of an arresting system must consider multiple aircraft parameters, including but not limited to, allowable aircraft gear loads, gear configuration, tire contact pressure, aircraft centre of gravity and aircraft speed. Accommodating undershoots must also be addressed. Additionally, the design must allow the safe operation of fully loaded rescue and fire fighting vehicles, including their ingress and egress.

9.6 The information relating to the provision of a runway end safety area and the presence of an arresting system shall be published in the AIP.

9.7 Additional information is contained in the Aerodrome Design Manual (Doc 9157), Part 1.

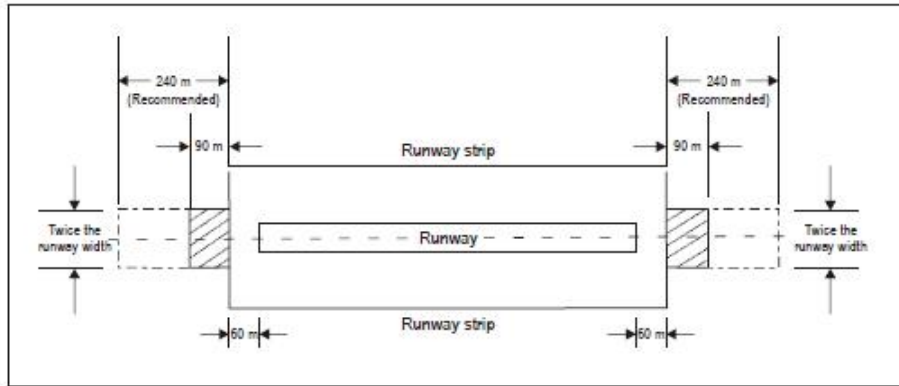


Figure B-5 Runway end safety area for a runway where the code number is 3 or 4

10. Location of threshold

10.1 General

10.1.1 The threshold is normally located at the extremity of a runway, if there are no obstacles penetrating above the approach surface. In some cases, however, due to local conditions it may be desirable to displace the threshold permanently (see below). When studying the location of a threshold, consideration shall also be given to the height of the ILS reference datum and/or MLS approach reference datum and the determination of the obstacle clearance limits. (Specifications concerning the height of the ILS reference datum and MLS approach reference datum are given in Annex 10, Volume I.)

10.1.2 In determining that no obstacle penetrate above the approach surface, account shall be taken of mobile objects (vehicles on roads, trains, etc.) at least within that portion of the approach area within 1 200 m longitudinally from the threshold and of an overall width of not less than 150 m.

10.2 Displaced threshold

10.2.1 If an object extends above the approach surface and the object cannot be removed, consideration shall be given to displacing the threshold permanently.

10.2.2 To meet the obstacle limitation objectives of Chapter 4, the threshold shall ideally be displaced down the runway for the distance necessary to provide that the approach surface is cleared of obstacles.

10.2.3 However, displacement of the threshold from the runway extremity will inevitably cause reduction of the landing distance available, and this may be of greater operational significance than penetration of the approach surface by marked and lighted obstacles. A decision to displace the threshold, and the extent of such displacement, shall therefore have regard to an optimum balance between the considerations of clear approach surfaces and adequate landing distance. In deciding this question, account will need to be taken of the types of aeroplanes which the runway is intended to serve, the limiting visibility and cloud base conditions under which the runway will be used, the position of the obstacles in relation to the threshold and extended centre line and, in the case of a precision approach runway, the significance of the obstacles to the determination of the obstacle clearance limit.

10.2.4 Notwithstanding the consideration of landing distance available, the selected position for the threshold shall not be such that the obstacle-free surface to the threshold is steeper than 3.3 per cent where the code number is 4 or steeper than 5 per cent where the code number is 3.

10.2.5 In the event of a threshold being located according to the criteria for obstacle-free surfaces in the preceding paragraph, the obstacle marking requirements shall continue to be met in relation to the displaced threshold.

11. Approach lighting systems

11.1 Types and characteristics

11.1.1 The specifications in this volume provide for the basic characteristics for simple and precision approach lighting systems. For certain aspects of these systems, some latitude is permitted, for example, in the spacing between centre line lights and crossbars. The approach lighting patterns that have been generally adopted are shown in Figures B-6 and B-7. A diagram of the inner 300 m of the precision approach category II and III lighting system is shown in Figure 5-14.

11.1.2 The approach lighting configuration is to be provided irrespective of the location of the threshold, i.e. whether the threshold is at the extremity of the runway or displaced from the runway extremity. In both cases, the approach lighting system shall extend up to the threshold. However, in the case of a displaced threshold, inset lights are used from the runway extremity up to the threshold to obtain the specified configuration. These inset lights are designed to satisfy the structural requirements specified in Chapter 5, 5.4.1.9, and the photometric requirements specified in Appendix 2, Figure A2-1 or A2-2.

11.1.3 Flight path envelopes to be used in designing the lighting are shown in Figure B-5.



Figure B-5. Flight path envelop to be used for lighting design for category I, II and III operations

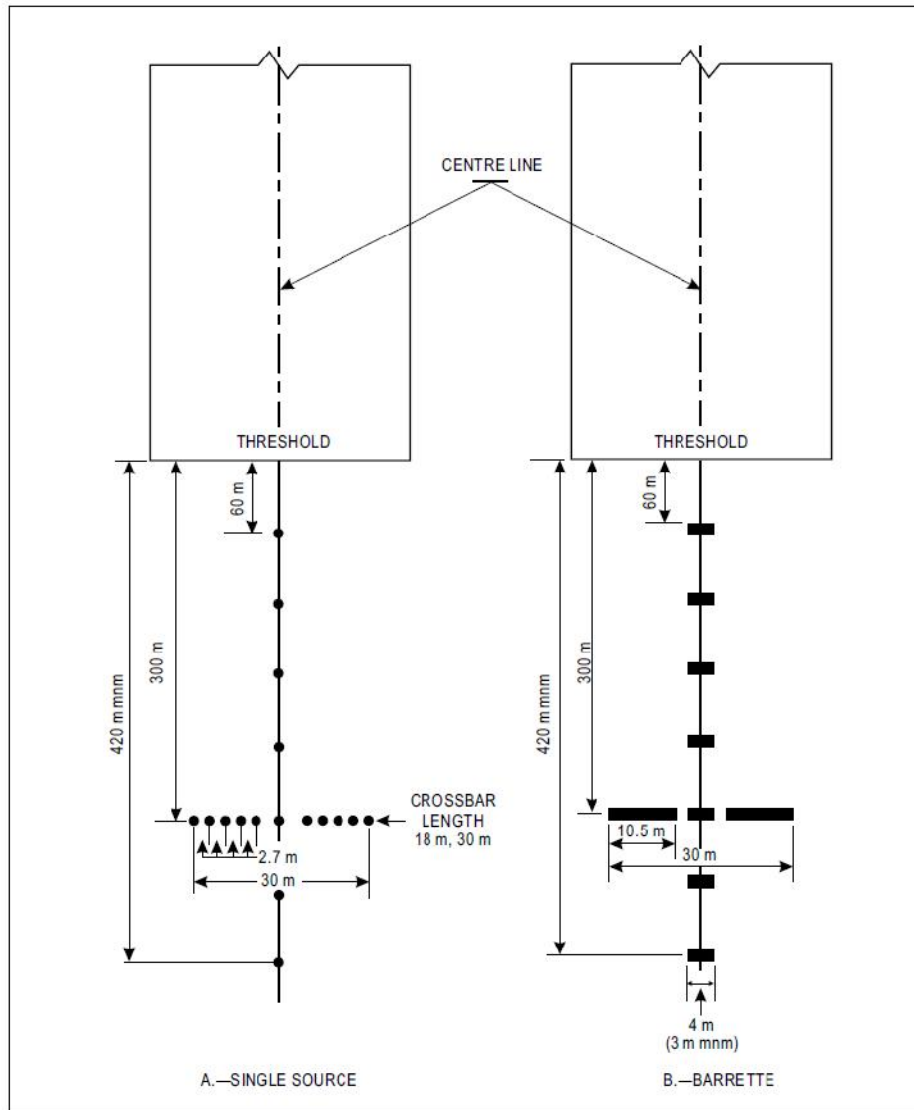


Figure B-6. Simple approach lighting system

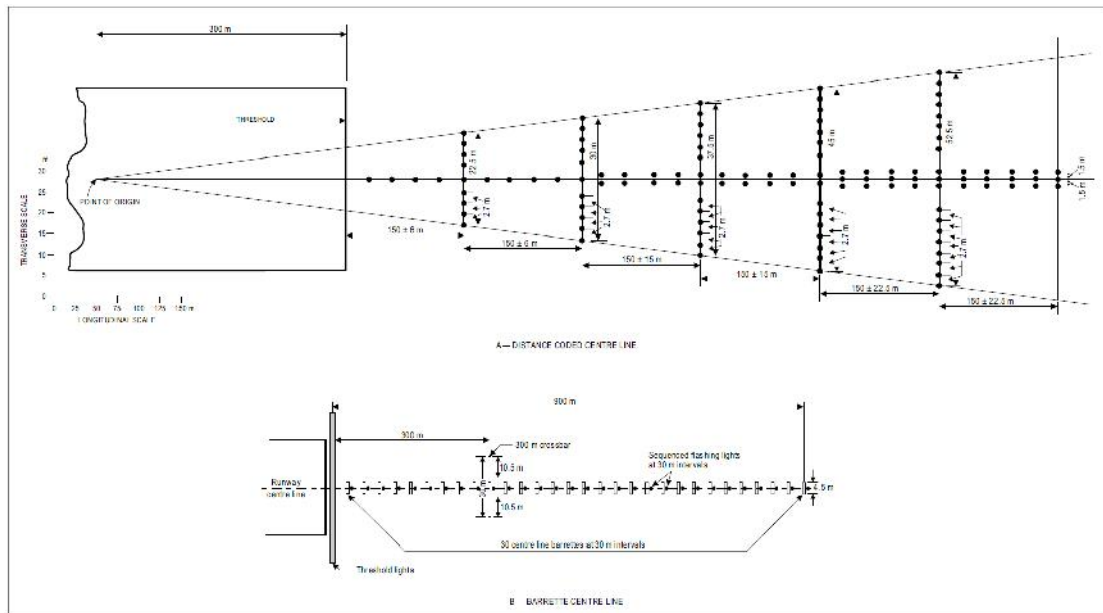


Figure B-7. Precision approach category I lighting systems

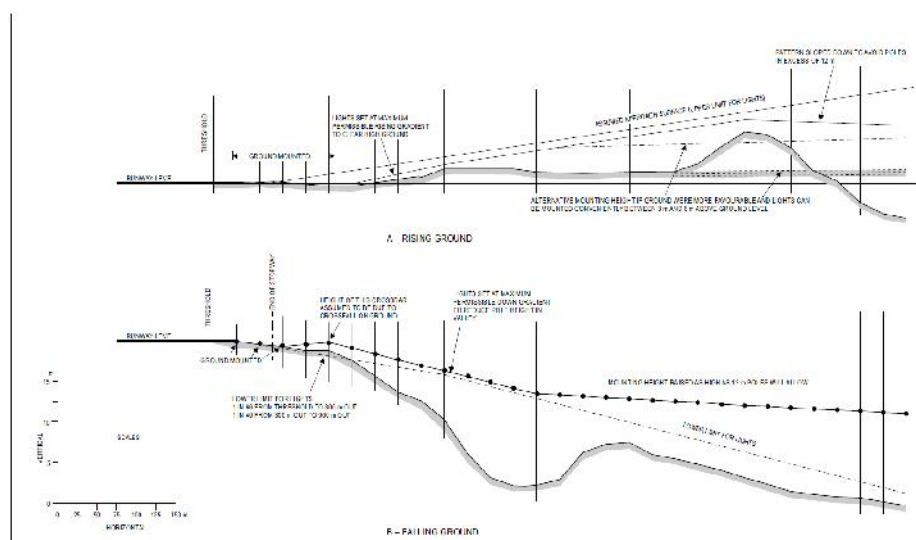


Figure B-8. Vertical installation tolerance

11.2 Installation tolerances

Horizontal

11.2.1 The dimensional tolerances are shown in Figure B-7.

11.2.2 The centre line of an approach lighting system shall be as coincident as possible with the extended centre line of the runway with a maximum tolerance of $\pm 15'$.

11.2.3 The longitudinal spacing of the centre line lights shall be such that one light (or group of lights) is located in the centre of each crossbar, and the intervening centre line lights are spaced as evenly as practicable between two crossbars or a crossbar and a threshold.

11.2.4 The crossbars and barrettes shall be at right angles to the centre line of the approach lighting system with a tolerance of $\pm 30'$, if the pattern in Figure B-7 (A) is adopted or $\pm 2^\circ$, if Figure B-7 (B) is adopted.

11.2.5 When a crossbar has to be displaced from its standard position, any adjacent crossbar shall, where possible, be displaced by appropriate amounts in order to reduce the differences in the crossbar spacing.

11.2.6 When a crossbar in the system shown in Figure B-7 (A) is displaced from its standard position, its overall length shall be adjusted so that it remains one twentieth of the actual distance of the crossbar from the point of origin. It is not necessary, however, to adjust the standard 2.7 m spacing between the crossbar lights, but the crossbars shall be kept symmetrical about the centre line of the approach lighting.

Vertical

11.2.7 The ideal arrangement is to mount all the approach lights in the horizontal plane passing through the threshold (see Figure B-8), and this shall be the general aim as far as local conditions permit. However, buildings, trees, etc., shall not obscure the lights from the view of a pilot who is assumed to be 1° below the electronic glide path in the vicinity of the outer marker.

11.2.8 Within a stopway or clearway, and within 150 m of the end of a runway, the lights shall be mounted as near to the ground as local conditions permit in order to minimize risk of damage to aeroplanes in the event of an overrun or undershoot. Beyond the stopway and clearway, it is not so necessary for the lights to be mounted close to the ground and therefore undulations in the ground contours can be compensated for by mounting the lights on poles of appropriate height.

11.2.9 It is desirable that the lights be mounted so that, as far as possible, no object within a distance of 60 m on each side of the centre line protrudes through the plane of the approach lighting system. Where a tall object exists within 60 m of the centre line and within 1 350 m from the threshold for a precision approach lighting system, or 900 m for a simple approach lighting system, it may be advisable to install the lights so that the plane of the outer half of the pattern clears the top of the object.

11.2.10 In order to avoid giving a misleading impression of the plane of the ground, the lights shall not be mounted below a gradient of 1 in 66 downwards from the threshold to a point 300 m out, and below a gradient of 1 in 40 beyond the 300 m point. For a precision approach category II and III lighting system, more stringent criteria may be necessary, e.g. negative slopes not permitted within 450 m of the threshold.

11.2.11 Centre line. The gradients of the centre line in any section (including a stopway or clearway) shall be as small as practicable, and the changes in gradients shall be as few and small as can be arranged and shall not exceed 1 in

60. Experience has shown that as one proceeds outwards from the runway, rising gradients in any section of up to 1 in 66, and falling gradients of down to 1 in 40, are acceptable.

11.2.12 Crossbars. The crossbar lights shall be so arranged as to lie on a straight line passing through the associated centre line lights, and wherever possible this line shall be horizontal. It is permissible, however, to mount the lights on a transverse gradient not more than 1 in 80, if this enables crossbar lights within a stopway or clearway to be mounted nearer to the ground on sites where there is a cross-fall.

11.3 Clearance of obstacles

11.3.1 An area, hereinafter referred to as the light plane, has been established for obstacle clearance purposes, and all lights of the system are in this plane. This plane is rectangular in shape and symmetrically located about the approach lighting system's centre line. It starts at the threshold and extends 60 m beyond the approach end of the system, and is 120 m wide.

11.3.2 No objects are permitted to exist within the boundaries of the light plane which are higher than the light plane except as designated herein. All roads and highways are considered as obstacles extending 4.8 m above the crown of the road, except aerodrome service roads where all vehicular traffic is under control of the aerodrome authorities and coordinated with the aerodrome traffic control tower. Railroads, regardless of the amount of traffic, are considered as obstacles extending 5.4 m above the top of the rails.

11.3.3 It is recognized that some components of electronic landing aids systems, such as reflectors, antennas, monitors, etc., must be installed above the light plane. Every effort shall be made to relocate such components outside the boundaries of the light plane. In the case of reflectors and monitors, this can be done in many instances.

11.3.4 Where an ILS localizer is installed within the light plane boundaries, it is recognized that the localizer, or screen if used, must extend above the light plane. In such cases the height of these structures shall be held to a minimum and they shall be located as far from the threshold as possible. In general the rule regarding permissible heights is 15 cm for each 30 m the structure is located from the threshold. As an example, if the localizer is located 300 m from the threshold, the screen will be permitted to extend above the plane of the approach lighting system by $10 \times 15 = 150$ cm maximum, but preferably shall be kept as low as possible consistent with proper operation of the ILS.

11.3.5 In locating an MLS azimuth antenna the guidance contained in Annex 10, Volume I, Attachment G shall be followed. This material, which also provides guidance on collocating an MLS azimuth antenna with an ILS localizer antenna, suggests that the MLS azimuth antenna may be sited within the light plane boundaries where it is not

possible or practical to locate it beyond the outer end of the approach lighting for the opposite direction of approach. If the MLS azimuth antenna is located on the extended centre line of the runway, it shall be as far as possible from the closest light position to the MLS azimuth antenna in the direction of the runway end. Furthermore, the MLS azimuth antenna phase centre shall be at least 0.3 m above the light centre of the light position closest to the MLS azimuth antenna in the direction of the runway end. (This could be relaxed to 0.15 m if the site is otherwise free of significant multipath problems.) Compliance with this requirement, which is intended to ensure that the MLS signal quality is not affected by the approach lighting system, could result in the partial obstruction of the lighting system by the MLS azimuth antenna. To ensure that the resulting obstruction does not degrade visual guidance beyond an acceptable level, the MLS azimuth antenna shall not be located closer to the runway end than 300 m and the preferred location is 25 m beyond the 300 m crossbar (this would place the antenna 5 m behind the light position 330 m from the runway end). Where an MLS azimuth antenna is so located, a central part of the 300 m crossbar of the approach lighting system would alone be partially obstructed. Nevertheless, it is important to ensure that the unobstructed lights of the crossbar remain serviceable all the time.

11.3.6 Objects existing within the boundaries of the light plane, requiring the light plane to be raised in order to meet the criteria contained herein, shall be removed, lowered or relocated where this can be accomplished more economically than raising the light plane.

11.3.7 In some instances objects may exist which cannot be removed, lowered or relocated economically. These objects may be located so close to the threshold that they cannot be cleared by the 2 per cent slope. Where such conditions exist and no alternative is possible, the 2 per cent slope may be exceeded or a “stair step” resorted to in order to keep the approach lights above the objects. Such “step” or increased gradients shall be resorted to only when it is impracticable to follow standard slope criteria, and they shall be held to the absolute minimum. Under this criterion no negative slope is permitted in the outermost portion of the system.

11.4 Consideration of the effects of reduced lengths

11.4.1 The need for an adequate approach lighting system to support precision approaches where the pilot is required to acquire visual references prior to landing, cannot be stressed too strongly. The safety and regularity of such operations is dependent on this visual acquisition. The height above runway threshold at which the pilot decides there are sufficient visual cues to continue the precision approach and land will vary, depending on the type of approach being conducted and other factors such as meteorological conditions, ground and airborne equipment, etc. The required length of approach lighting system which will support all the variations of such approaches is 900 m, and this shall always be provided whenever possible.

11.4.2 However, there are some runway locations where it is impossible to provide the 900 m length of approach lighting system to support precision approaches.

11.4.3 In such cases, every effort shall be made to provide as much approach lighting system as possible. The appropriate authority may impose restrictions on operations to runways equipped with reduced lengths of lighting. There are many factors which determine at what height the pilot must have decided to continue the approach to land or execute a missed approach. It must be understood that the pilot does not make an instantaneous judgment upon reaching a specified height. The actual decision to continue the approach and landing sequence is an accumulative process which is only concluded at the specified height. Unless lights are available prior to reaching the decision point, the visual assessment process is impaired and the likelihood of missed approaches will increase substantially. There are many operational considerations which must be taken into account by the appropriate authorities in deciding if any restrictions are necessary to any precision approach and these are detailed in Annex 6.

12. Priority of installation of visual approach slope indicator systems

12.1 It has been found impracticable to develop guidance material that will permit a completely objective analysis to be made of which runway on an aerodrome shall receive first priority for the installation of a visual approach slope indicator system. However, factors that must be considered when making such a decision are:

- a) frequency of use;
- b) seriousness of the hazard;
- c) presence of other visual and non-visual aids;
- d) type of aeroplanes using the runway; and
- e) frequency and type of adverse weather conditions under which the runway will be used.

12.2 With respect to the seriousness of the hazard, the order given in the application specifications for a visual approach slope indicator system, may be used as a general guide. These may be summarized as:

- a) inadequate visual guidance because of:
 - i) approaches over water or featureless terrain, or absence of sufficient extraneous light in the approach area by night;
 - ii) deceptive surrounding terrain;
- b) serious hazard in approach;
- c) serious hazard if aeroplanes undershoot or overrun; and
- d) unusual turbulence.

12.3 The presence of other visual or non-visual aids is a very important factor. Runways equipped with ILS or MLS would generally receive the lowest priority for a visual

approach slope indicator system installation. It must be remembered, though, that visual approach slope indicator systems are visual approach aids in their own right and can supplement electronic aids. When serious hazards exist and/or a substantial number of aeroplanes not equipped for ILS or MLS use a runway, priority might be given to installing a visual approach slope indicator on this runway.

12.4 Priority shall be given to runways used by turbojet aeroplanes.

13. Lighting of unserviceable areas

Where a temporarily unserviceable area exists, it may be marked with fixed-red lights. These lights shall mark the most potentially dangerous extremities of the area. A minimum of four such lights shall be used, except where the area is triangular in shape where a minimum of three lights may be employed. The number of lights shall be increased when the area is large or of unusual configuration. At least one light shall be installed for each 7.5 m of peripheral distance of the area. If the lights are directional, they shall be orientated so that as far as possible their beams are aligned in the direction from which aircraft or vehicles will approach. Where aircraft or vehicles will normally approach from several directions, consideration shall be given to adding extra lights or using omnidirectional lights to show the area from these directions. Unserviceable area lights shall be frangible. Their height shall be sufficiently low to preserve clearance for propellers and for engine pods of jet aircraft.

14. Rapid exit taxiway indicator lights (RETILs)

14.1 Rapid exit taxiway indicator lights (RETILs) comprise a set of yellow unidirectional lights installed in the runway adjacent to the centre line. The lights are positioned in a 3-2-1 sequence at 100 m intervals prior to the point of tangency of the rapid exit taxiway centre line. They are intended to give an indication to pilots of the location of the next available rapid exit taxiway.

14.2 In low visibility conditions, RETILs provide useful situational awareness cues while allowing the pilot to concentrate on keeping the aircraft on the runway centre line.

14.3 Following a landing, runway occupancy time has a significant effect on achievable runway capacity. RETILs allow pilots to maintain a good roll-out speed until it is necessary to decelerate to an appropriate speed for the turn into a rapid exit turn-off. A roll-out speed of 60 knots until the first RETIL (three-light barrette) is reached is seen as the optimum.

15. Intensity control of approach and runway lights

15.1 The conspicuity of a light depends on the impression received of contrast between the light and its background. If a light is to be useful to a pilot by day when on approach, it must have an intensity of at least 2 000 or 3 000 cd, and in the case of approach lights an intensity of the order of 20 000 cd is desirable. In conditions of very bright daylight fog it may not be possible to provide lights of sufficient intensity to be effective. On the other hand, in clear weather on a dark night, an intensity of the order of 100 cd for approach lights and 50 cd for the runway edge lights may be found suitable. Even then, owing to the closer range at which they are viewed, pilots have sometimes complained that the runway edge lights seemed unduly bright.

15.2 In fog the amount of light scattered is high. At night this scattered light increases the brightness of the fog over the approach area and runway to the extent that little increase in the visual range of the lights can be obtained by increasing their intensity beyond 2 000 or 3 000 cd. In an endeavour to increase the range at which lights would first be sighted at night, their intensity must not be raised to an extent that a pilot might find excessively dazzling at diminished range.

15.3 From the foregoing will be evident the importance of adjusting the intensity of the lights of an aerodrome lighting system according to the prevailing conditions, so as to obtain the best results without excessive dazzle that would disconcert the pilot. The appropriate intensity setting on any particular occasion will depend both on the conditions of background brightness and the visibility. Detailed guidance material on selecting intensity setting for different conditions is given in the Aerodrome Design Manual (Doc 9157), Part 4.

16. Signal area

A signal area need be provided only when it is intended to use visual ground signals to communicate with aircraft in flight. Such signals may be needed when the aerodrome does not have an aerodrome control tower or an aerodrome flight information service unit, or when the aerodrome is used by aeroplanes not equipped with radio. Visual ground signals may also be useful in the case of failure of two-way radio communication with aircraft. It shall be recognized, however, that the type of information which may be conveyed by visual ground signals shall normally be available in AIPs or NOTAM. The potential need for visual ground signals shall therefore be evaluated before deciding to provide a signal area.

17. Rescue and fire fighting services

17.1 Administration

17.1.1 The rescue and fire fighting service at an aerodrome shall be under the administrative control of the aerodrome management, which shall also be responsible for ensuring that the service provided is organized, equipped, staffed, trained and operated in such a manner as to fulfill its proper functions.

17.1.2 In drawing up the detailed plan for the conduct of search and rescue operations (Annex 12 paragraph 4.2.1), the aerodrome management shall coordinate its plans with the relevant rescue coordination centres to ensure that the respective limits of their responsibilities for an aircraft accident within the vicinity of an aerodrome are clearly delineated.

17.1.3 Coordination between the rescue and fire fighting service at an aerodrome and public protective agencies, such as local fire brigade, police force, coast guard and hospitals, shall be achieved by prior agreement for assistance in dealing with an aircraft accident.

17.1.4 A grid map of the aerodrome and its immediate vicinity shall be provided for the use of the aerodrome services concerned. Information concerning topography, access roads and location of water supplies shall be indicated. This map shall be conspicuously posted in the control tower and fire station and available on the rescue and fire fighting vehicles and such other supporting vehicles required to respond to an aircraft accident or incident. Copies shall also be distributed to public protective agencies as desirable.

17.1.5 Coordinated instructions shall be drawn up detailing the responsibilities of all concerned and the action to be taken in dealing with emergencies. The appropriate authority shall ensure that such instructions are promulgated and observed.

17.2 Training

The training curriculum shall include initial and recurrent instruction in at least the following areas:

- a) airport familiarization;
- b) aircraft familiarization;
- c) rescue and fire fighting personnel safety;
- d) emergency communications systems on the aerodrome, including aircraft fire related alarms;
- e) use of the fire hoses, nozzles, turrets and other appliances required for compliance with Chapter 9, 9.2;
- f) application of the types of extinguishing agents required for compliance with Chapter 9, 9.2;
- g) emergency aircraft evacuation assistance;
- h) fire fighting operations;

- i) adaptation and use of structural rescue and firefighting equipment for aircraft rescue and fire fighting;
- j) dangerous goods;
- k) familiarization with fire fighters' duties under the aerodrome emergency plan; and
- l) protective clothing and respiratory protection.

17.3 Level of protection to be provided

17.3.1 In accordance with Chapter 9, 9.2 aerodromes shall be categorized for rescue and fire fighting purposes and the level of protection provided shall be appropriate to the aerodrome category.

16.3.2 However, Chapter 9, 9.2.3 permits a lower level of protection to be provided for a limited period 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. It is important to note that the concession included in 9.2.3 is applicable only where there is a wide range of difference between the dimensions of the aeroplanes included in reaching 700 movements.

17.4 Rescue equipment for difficult environments

17.4.1 Suitable rescue equipment and services shall be available at an aerodrome where the area to be covered by the service includes water, swampy areas or other difficult environment that cannot be fully served by conventional wheeled vehicles. This is particularly important where a significant portion of approach/departure operations takes place over these areas.

17.4.2 The rescue equipment shall be carried on boats or other vehicles such as helicopters and amphibious or air cushion vehicles, capable of operating in the area concerned. The vehicles shall be so located that they can be brought into action quickly to respond to the areas covered by the service.

17.4.3 At an aerodrome bordering the water, the boats or other vehicles shall preferably be located on the aerodrome, and convenient launching or docking sites provided. If these vehicles are located off the aerodrome, they shall preferably be under the control of the aerodrome rescue and fire fighting service or, if this is not practicable, under the control of another competent public or private organization working in close coordination with the aerodrome rescue and fire fighting service (such as police, military services, harbour patrol or coast guard).

17.4.4 Boats or other vehicles shall have as high a speed as practicable so as to reach an accident site in minimum time. To reduce the possibility of injury during rescue

operations, water jet-driven boats are preferred to water propeller driven boats unless the propellers of the latter boats are ducted. Shall the water areas to be covered by the service be frozen for a significant period of the year, the equipment shall be selected accordingly. Vehicles used in this service shall be equipped with life rafts and life preservers related to the requirements of the larger aircraft normally using the aerodrome, with two-way radio communication, and with floodlights for night operations. If aircraft operations during periods of low visibility are expected, it may be necessary to provide guidance for the responding emergency vehicles.

17.4.5 The personnel designated to operate the equipment shall be adequately trained and drilled for rescue services in the appropriate environment.

17.5 Facilities

17.7.5.1 The provision of special telephone, two-way radio communication and general alarm systems for the rescue and fire fighting service is desirable to ensure the dependable transmission of essential emergency and routine information. Consistent with the individual requirements of each aerodrome, these facilities serve the following purposes:

- a) direct communication between the activating authority and the aerodrome fire station in order to ensure the prompt alerting and dispatch of rescue and fire fighting
- b) vehicles and personnel in the event of an aircraft accident or incident;
- c) emergency signals to ensure the immediate summoning of designated personnel not on standby duty;
- d) as necessary, summoning essential related services on or off the aerodrome; and
- e) maintaining communication by means of two-way radio with the rescue and fire fighting vehicles in attendance at an aircraft accident or incident.

17.5.2 The availability of ambulance and medical facilities for the removal and after-care of casualties arising from an aircraft accident shall receive the careful consideration of the aerodrome operator and shall form part of the overall emergency plan established to deal with such emergencies.

18. Operators of vehicles

18.1 The authorities responsible for the operation of vehicles on the movement area shall ensure that the operators are properly qualified. This may include, as appropriate to the driver's function, knowledge of:

- a) the geography of the aerodrome;
- b) aerodrome signs, markings and lights;
- c) radiotelephone operating procedures;
- d) terms and phrases used in aerodrome control including the ICAO spelling alphabet;
- e) rules of air traffic services as they relate to ground operations;
- f) airport rules and procedures; and
- g) specialist functions as required, for example, in rescue and fire fighting.

18.2 The operator shall be able to demonstrate competency, as appropriate, in:

- a) the operation or use of vehicle transmit/receive equipment;
- b) understanding and complying with air traffic control and local procedures;
- c) vehicle navigation on the aerodrome; and
- d) special skills required for the particular function.

In addition, as required for any specialist function, the operator shall be the holder of a driver's license issued by the state, a radio operator's license issued by the Authority or other licenses approved by the Authority.

18.3 The above shall be applied as is appropriate to the function to be performed by the operator and it is not necessary that all operators be trained to the same level, for example, operators whose functions are restricted to the apron.

18.4 If special procedures apply for operations in low visibility conditions, it is desirable to verify an operator's knowledge of the procedures through periodic checks.

19. The ACN-PCN method of reporting pavement strength

19.1 Overload operations

19.1.1 Overloading of pavements can result either from loads too large, or from a substantially increased application rate, or both. Loads larger than the defined (design or evaluation) load shorten the design life, whilst smaller loads extend it. With the exception of massive overloading, pavements in their structural behaviour are not subject to a particular limiting load above which they suddenly or catastrophically fail. Behaviour is such that a pavement can sustain a definable load for an expected number of repetitions during its design life. As a result, occasional minor over-loading is acceptable, when expedient, with only limited loss in pavement life expectancy and relatively small acceleration of pavement deterioration. For those operations in which magnitude of overload and/or the frequency of use do not justify a detailed analysis, the following criteria are suggested:

- a) for flexible pavements, occasional movements by aircraft with ACN not exceeding 10 per cent above the reported PCN shall not adversely affect the pavement;
- b) for rigid or composite pavements, in which a rigid pavement layer provides a primary element of the structure, occasional movements by aircraft with ACN not exceeding 5 per cent above the reported PCN shall not adversely affect the pavement;
- c) if the pavement structure is unknown, the 5 per cent limitation shall apply; and
- d) the annual number of overload movements shall not exceed approximately 5 per cent of the total annual aircraft movements.

19.1.2 Such overload movements shall not normally be permitted on pavements exhibiting signs of distress or failure. Furthermore, overloading shall be avoided during any periods of thaw following frost penetration, or when the strength of the pavement or its sub-grade could be weakened by water. Where overload operations are conducted, the appropriate authority shall review the relevant pavement condition regularly, and shall also review the criteria for overload operations periodically since excessive repetition of overloads can cause severe shortening of pavement life or require major rehabilitation of pavement.

19.2 ACNs for several aircraft types

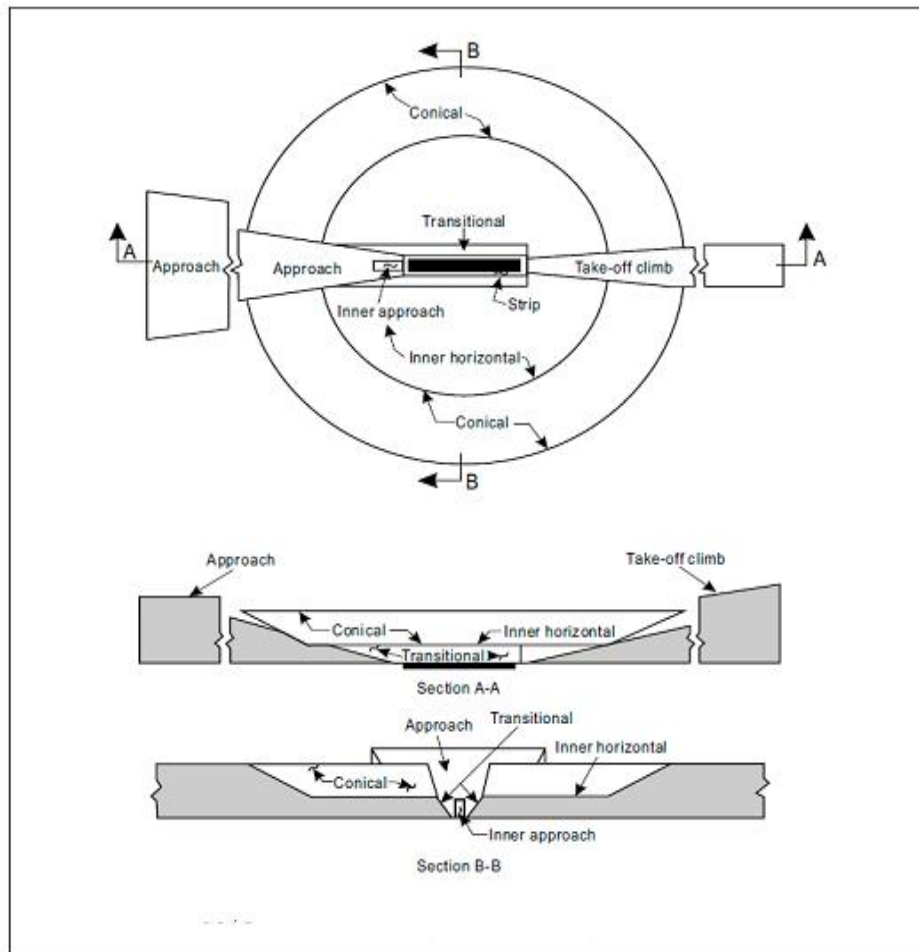
For convenience, several aircraft types currently in use have been evaluated on rigid and flexible pavements founded on the four sub-grade strength categories in Chapter 2, 2.6.6 b) and the results tabulated in the ICAO Aerodrome Design Manual (Doc 9157), Part 3.

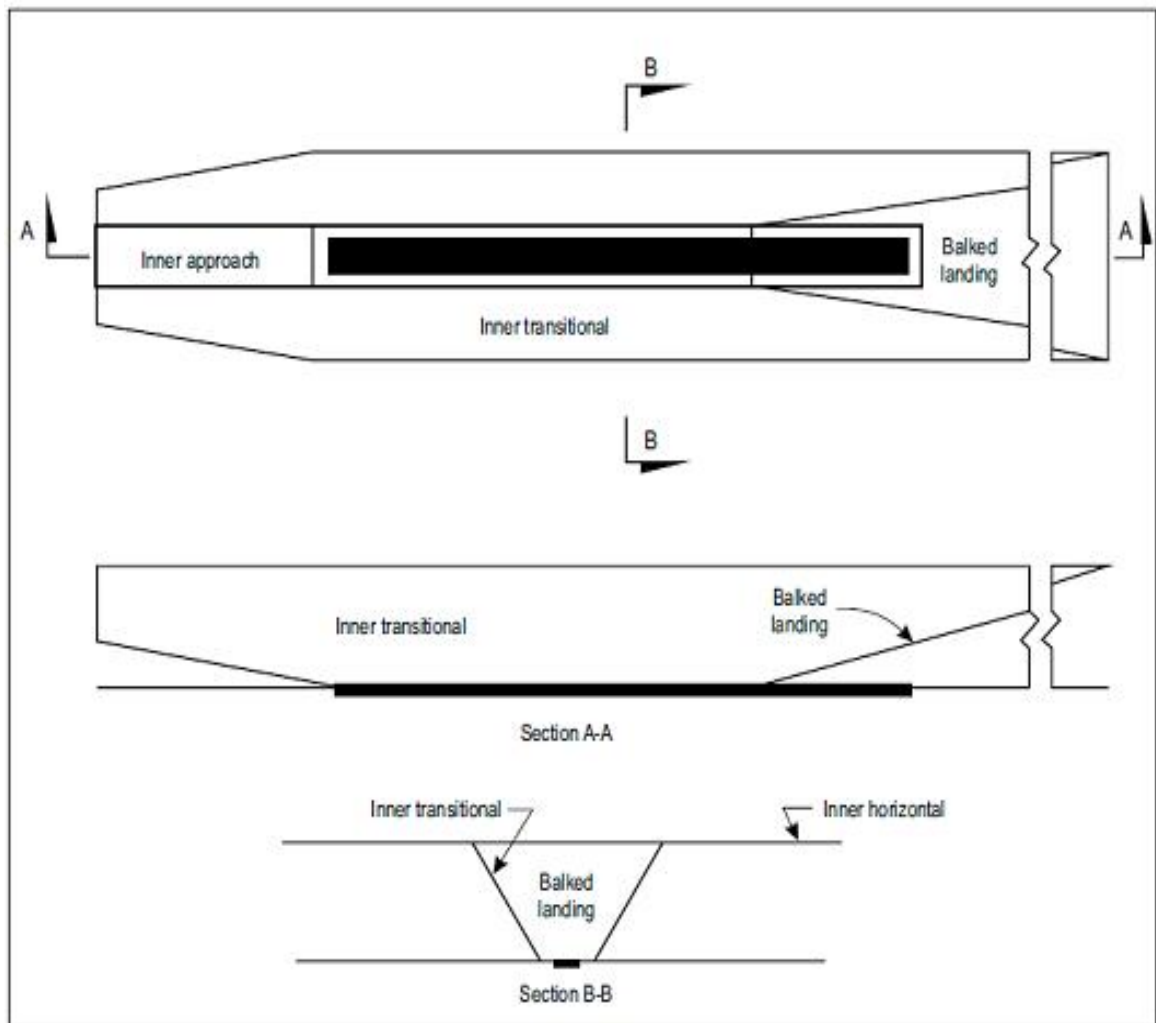
FOURTEENTH SCHEDULE

(Made under Regulation 130)

OBSTACLE LIMITATION SURFACES



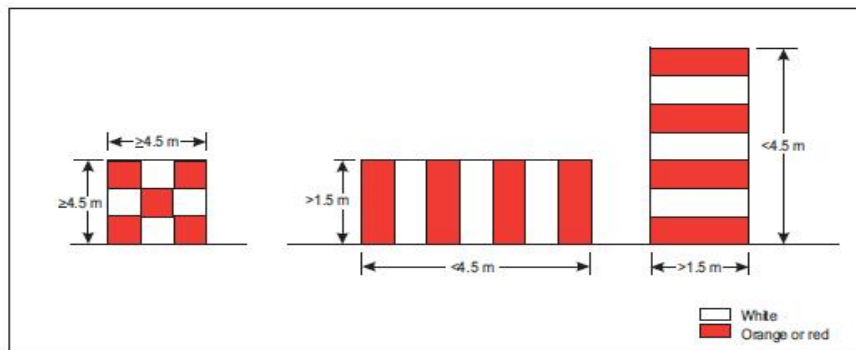




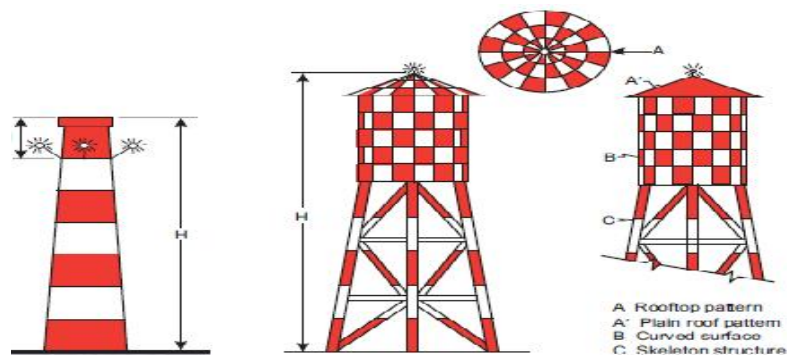
FIFTEENTH SCHEDULE

(Made under Regulation 235)

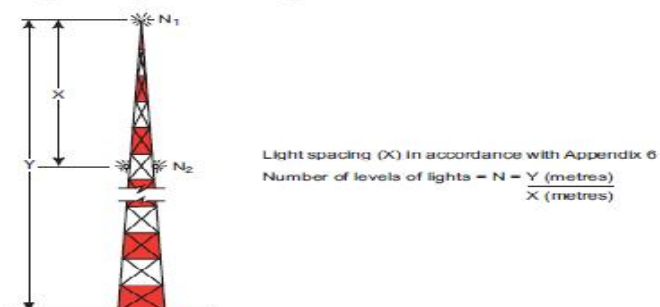
MARKING AND LIGHTING OF OBJECTS AND OBSTACLES



Basic marking pattern of fixed objects



*Note.— H is less than 45 m for the examples shown above.
For greater heights intermediate lights must be added as shown below.*



Marking and lighting of tall structures

Dar es Salaam,
29th February, 2017

MAKAME M. MBARAWA
*Minister for Works, Transport and
Communications*