

Statutory Instrument No. 65 of 2022

CIVIL AVIATION ACT
(Cap. 71:01)

CIVIL AVIATION (AERONAUTICAL CHARTS) REGULATIONS, 2022
(Published on 13th June, 2022)

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SCHEDULES

IN EXERCISE of the powers conferred on the Minister of Transport and Public Works by section 89 of the Civil Aviation Act, the following Regulations are hereby made —

PART I — *Preliminary*

1. These Regulations may be cited as the Civil Aviation (Aeronautical Charts) Regulations, 2022. Citation
2. In these Regulations, unless the context otherwise requires — Interpretation
- “aerodrome elevation” means the elevation of the highest point of the landing area;
- “aerodrome operating minima” means the limits of usability of an aerodrome for —
- (a) take-off, expressed in terms of runway visual range or visibility and, if necessary, cloud conditions;
 - (b) landing in precision approach and landing operations, expressed in terms of visibility or runway visual range and decision altitude or height as appropriate to the category of the operation;
 - (c) landing in approach and landing operations with vertical guidance, expressed in terms of visibility or runway visual range and decision altitude or height; and
 - (d) landing in non-precision approach and landing operations, expressed in terms of visibility and/or runway visual range, minimum descent altitude or height and, if necessary, cloud conditions;
- “aerodrome reference point” means the designated geographical location of an aerodrome;
- “aeronautical chart” means a representation of a portion of the earth, its culture and relief, specifically designated to meet the requirements of air navigation;
- “aeronautical data (integrity classification)” means classification based upon the potential risk resulting from the use of corrupted data. Aeronautical 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;
 - (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;
- “aircraft stand” means a designated area on an apron intended to be used for parking an aircraft;
- “air defence identification zone” means a special designated airspace of defined dimensions within which aircraft are required to comply with special identification or reporting procedures additional to those related to the provision of air traffic services;
- “air traffic service” means a flight information service, alerting service, air traffic advisory service, or air traffic control services;
- “air transit route” means a defined route for the air transiting of helicopters;

“airway” means a control area or portion thereof established in the form of a corridor;

“altitude” means the vertical distance of a level, a point or an object considered as a point, measured from mean sea level;

“application” means manipulation and processing of data in support of user requirements (ISO 19104*);

“apron” means a defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fueling, parking or maintenance;

“area minimum altitude (AMA)” means the minimum altitude to be used under instrument meteorological conditions, which provides a minimum obstacle clearance within a specified area, normally formed by parallels and meridians;

“area navigation (RNAV)” means a method of navigation which permits aircraft operation on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these;

“arrival routes” means routes identified in an instrument approach procedure by which an aircraft may proceed from the en-route phase of flight to an initial approach fix;

“air traffic services route” means a specified route designed for channeling the flow of traffic as necessary for the provision of air traffic services;

“air traffic services surveillance system” means any ground-based system that enables the identification of aircraft, including Automatic Dependent Surveillance –Broadcast, (ADS-B), Primary Surveillance Radar, (PSR), Secondary Surveillance Radar (SSR);

“bare earth” means surface of the earth including bodies of water and permanent ice and snow, and excluding vegetation and man-made objects;

“calendar” means discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108*);

“clearway” means a defined rectangular area on the ground or water under the control of the appropriate authority selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height;

“conformal projection” means a map projection in which a small area is rendered in its true shape;

“contour line” means a line on a map or chart connecting points of equal elevation;

“culture” means all man-made features constructed on the surface of the earth, such as cities, railways and canals;

“danger area” means an airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times;

“data product specification” means detailed description of a data set or data set series together with additional information that will enable it to be created, supplied to and used by another party (ISO 19131*);

“data quality” means a degree or level of confidence that the data provided meets the requirements of the data user in terms of accuracy, resolution and integrity (or equivalent assurance level), traceability, timeliness, completeness and format;

“data set” means identifiable collection of data (ISO 19101*);

“data set series” means collection of data sets sharing the same product specification (ISO 19115*);

“datum” means any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104*);

“Digital Elevation Model (DEM)” means the representation of terrain surface by continuous elevation values at all intersections of a defined grid, referenced to common datum;

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

“electronic aeronautical chart display” means an electronic device by which flight crews are enabled to execute, in a convenient and timely manner, route planning, route monitoring and navigation by displaying required information;

“elevation” means the vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level;

“feature” means abstraction of real world phenomena (ISO 19101*);

“feature attribute” means characteristic of a feature (ISO 19101*);

“final approach” means that part of an instrument approach procedure which commences at the specified final approach fix or point, or where such a fix or point is not specified —

- (a) at the end of the last procedure turn, base turn or inbound turn of a racetrack procedure, if specified; or
- (b) at the point of interception of the last track specified in the approach procedure; and
- (c) ends at a point in the vicinity of an aerodrome from which —
 - (i) a landing can be made, or
 - (ii) a missed approach procedure is initiated;

“final approach and take-off area (FATO)” means a defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced:
Provided that where the Final approach and take-off area is to be used by performance Class 1 helicopters, the defined area includes the rejected take-off area available;

“final approach fix or point” means that fix or point of an instrument approach procedure where the final approach segment commences;

“final approach segment” means that segment of an instrument approach procedure in which alignment and descent for landing are accomplished;

“flight information region” means an airspace of defined dimensions within which flight information service and alerting service are provided;

“flight level” means a surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals;

“geodesic distance” means the shortest distance between any two points on a mathematically defined ellipsoidal surface;

“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;

“glide path” means a descent profile determined for vertical guidance during a final approach;

“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*);

“height” means the vertical distance of a level, point or an object considered as a point, measured from a specific datum;

“helicopter stand” means an aircraft stand which provides for parking a helicopter and where ground taxi operations are completed or where the helicopter touches down and lifts off for air taxi operations;

“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;

“heliport reference point (HRP)” means the designated location of a heliport or a landing location;

“holding procedure” means a predetermined manoeuvre which keeps an aircraft within a specified airspace while awaiting further clearance;

“hot spot” 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 factors 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;

“hypsometric tints” means a succession of shades or colour gradations used to depict ranges of elevation;

“instrument approach procedure” means a series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply and is classified as follows —

- (a) non-precision approach procedure (NPA) – an IAP which utilises lateral guidance but does not utilise vertical guidance;
- (b) approach procedure with vertical guidance (APV) – an IAP which uses lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations;
- (c) precision approach (PA) procedure – an IAP using precision lateral and vertical guidance with minima as determined by the category of operation;

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

“isogonal” means a line on a map or chart on which all points have the same magnetic variation for a specified epoch;

“lambert conformal conic projection” means a conformal conic map projection with straight-line meridians that meet at a common center beyond the limits of the map and with parallels of which two are standard that are arcs of circles intersecting the meridians at right angles;

- “landing area” means that part of a movement area intended for the landing or take-off of aircraft;
- “level” means, in relation to the vertical position of an aircraft in flight, height, altitude or flight level;
- “logon address” means a specified code used for data link logon to an air traffic services unit;
- “Magnetic variation” means the angular difference between True North and Magnetic North;
- “manoeuvring area” means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons;
- “marking” means a symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information;
- “metadata” means data about data (ISO 19115*);
- “minimum en-route altitude (MEA)” means the altitude for an en-route segment that provides adequate reception of relevant navigation facilities and air traffic services communications, complies with the airspace structure and provides the required obstacle clearance;
- “minimum obstacle clearance altitude (MOCA)” means the minimum altitude for a defined segment of flight that provides the required obstacle clearance;
- “minimum sector altitude (MSA)” means the lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centred on significant point, the aerodrome reference point, or the heliport reference point;
- “missed approach point (MAPt)” means that point in an instrument approach procedure at or before which the prescribed missed approach procedure must be initiated in order to ensure that the minimum obstacle clearance is not infringed;
- “missed approach procedure” means the procedure to be followed if the approach cannot be continued;
- “movement area” means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron;
- “navigation specification” means a set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace and classified as —
 - (a) required navigation performance specification – a navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH; and
 - (b) Area navigation specification – a navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV;
- “obstacle” means all fixed, whether temporary or permanent, and mobile objects, or parts thereof, that —
 - (a) are located on an area intended for the surface movement of aircraft; or
 - (b) extend above a defined surface intended to protect aircraft in flight; or
 - (c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation;

“obstacle clearance altitude (OCA) or obstacle clearance height (OCH)” means the lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation as applicable, used in establishing compliance with appropriate obstacle clearance criteria;

“obstacle free zone (OFZ)” means the airspace above the inner approach surface, inner transitional surfaces, and 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;

“point light” means a luminous signal appearing without perceptible length;

“portrayal” means presentation of information to humans (ISO 19116*);

“position (geographical)” means set of coordinates, latitude and longitude, referenced to the mathematical reference ellipsoid which define the position of a point on the surface of the earth;

“precision approach procedure” means an instrument approach procedure utilizing azimuth and glide path information provided by ILS or PAR;

“procedure altitude or height” means a published altitude or height used in defining the vertical profile of a flight procedure, at or above the minimum obstacle clearance Altitude or height where established;

“procedure turn” means manoeuvre in which a turn is made away from a designated track followed by a turn in the opposite direction to permit the aircraft to intercept and proceed along the reciprocal of the designated track;

“prohibited area” means an airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is prohibited;

“relief” means the inequalities in elevation of the surface of the earth represented on aeronautical charts by contours, hypsometric tints, shading or spot elevations;

“reporting point” means a specified geographical location in relation to which the position of an aircraft can be reported;

“resolution” means a number of units or digits to which a measured or calculated value is expressed and used;

“restricted area” means an airspace of defined dimensions, above the land areas or territorial waters of a State, within which the flight of aircraft is restricted in accordance with certain specified conditions;

“runway” means a defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft;

“runway-holding position” means a designated position intended to protect —

- (a) a runway;
- (b) an obstacle limitation surface; or an
- (c) instrument landing system or microwave landing system critical or sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorised by the aerodrome control tower;

“runway visual range (RVR)” means the range over which the 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;

“significant point” means a specified geographical location used in defining an air traffic services route or the flight path of an aircraft and for other navigation and air traffic services purposes;

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

“taxiing” means movement of an aircraft on the surface of an aerodrome under its own power, excluding take-off and landing;

“taxi-route” means a defined path established for the movement of helicopters from one part of a heliport to another. A taxi-route includes a helicopter air or ground taxiway which is centred on the taxi-route;

“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 – a portion of an apron designated as a taxiway and intended to provide access to aircraft stands only;
- (b) apron taxiway – 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 – a taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times;

“terminal arrival altitude (TAA)” means the lowest altitude that will provide a minimum clearance of 300 metres (1 000 feet) above objects located in an arc of a circle defined by a 46 kilometre (25 nautical miles) radius centred on the Initial Approach Fix, or where there is no Initial Approach Fix on the Intermediate approach Fix, delimited by straight lines joining the extremity of the arc to the Intermediate Approach Fix and the combined terminal arrival altitudes associated with an approach procedure shall account for an area of 360 degrees around the intermediate approach fix;

“terrain” means the surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles;

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

“touchdown and lift-off area (TLOF)” means a load bearing area on which a helicopter may touch down or lift off;

“touchdown zone” means the portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway;

“track” means the projection on the earth’s surface of the path of an aircraft, the direction of which path at any point is usually expressed in degrees from North (true, magnetic or grid) to South;

“transition altitude” means the altitude at or below which the vertical position of an aircraft is controlled by reference to altitudes;

“vectoring” means provision of navigational guidance to aircraft in the form of specific headings, based on the use of an air traffic services surveillance system;

“Very High Frequency Omni Directional Radio Range (VOR)” means a type of short-range radio navigation system for aircraft, enabling aircraft with a receiving unit to determine their position and stay on course by receiving radio signals transmitted by a network of fixed ground radio beacons;

- “VFR” means the symbol used to designate the visual flight rules;
- “VFR flight” means a flight conducted in accordance with the visual flight rules;
- “visual approach procedure” means a series of predetermined manoeuvres by visual reference, from the initial approach fix, or where applicable, from the beginning of a defined arrival route to a point from which a landing can be completed and thereafter, if a landing is not completed, a go-around procedure can be carried out; and
- “waypoint” means a specified geographical location used to define an area navigation route or the flight path of an aircraft employing area navigation and identified as either —
- (a) fly-by waypoint — a waypoint which requires turn anticipation to allow tangential interception of the next segment of a route or procedure; or
 - (b) flyover waypoint. A waypoint at which a turn is initiated in order to join the next segment of a route or procedure.

Application

3. These Regulations shall apply to any person providing an aeronautical cartographic service within designated airspaces and at aerodromes for civil aviation purposes in Botswana.

Requirement for provision of cartographic service
Cap. 71:01
Sub. Leg.

4. (1) A person shall not provide an aeronautical cartographic service unless such person has been approved by the Authority, according to the Civil Aviation (Certification of Air Navigation Services Providers) Regulations.

(2) A person providing aeronautical cartographic services shall develop and avail charts to the Rescue Coordinator in the search and rescue region as prescribed by the Authority.

Availability of charts

5. The Authority shall —

- (a) on request by another Contracting State, provide information relating to its own territory that is necessary to enable the requirements of these Regulations to be met;
- (b) ensure the availability of charts in whichever of the following ways is appropriate for a particular chart or single sheet of a chart series —
 - (i) produce the chart or sheet itself,
 - (ii) arrange for the production of the chart or sheet by another State or by an agency, or
 - (iii) provide another State prepared to accept an obligation to produce the chart or sheet with the data necessary for its production;
- (c) for any chart or single sheet of a chart series which includes the territory of a Contracting State, determine, in consultation with the State having jurisdiction over the territory concerned, the manner in which the chart or sheet will be made available; and
- (d) take reasonable measures to ensure that the information provided and the aeronautical charts made available are adequate and accurate and that aeronautical charts are maintained up to date by an adequate revision service.

PART II — General Specifications for Charts

Operational requirements for charts

6. (1) An approved aeronautical cartographic service provider shall ensure that each type of chart —

- (a) provides information relevant to the function of the chart and that the design of the chart observes human factors principles to facilitate its optimum use;

- (b) provides information for the safe and expeditious operation of the aircraft appropriate to the phase of flight as listed below —
 - (i) Phase 1 – taxi from aircraft stand to take off,
 - (ii) Phase 2 – take-off and climb to en-route air traffic services route structure,
 - (iii) Phase 3 – en-route air traffic services route structure,
 - (iv) Phase 4 – descent to approach,
 - (v) Phase 5 – approach to land and missed approach, and
 - (vi) Phase 6 – landing and taxi to aircraft stand;
 - (c) provides information that is accurate, free from distortion and clutter, unambiguous, and readable under normal operating conditions;
 - (d) provides information that can be easily read and interpreted by the pilot in varying conditions of natural and artificial light by using the right colours or tints and type size;
 - (e) is in a form which enables the pilot to acquire information in a reasonable time consistent with workload and operating conditions; and
 - (f) permits smooth transition from chart to chart as appropriate to the phase of flight.
- (2) The charts shall be true North orientated.
- (3) The basic sheet size of the charts which forms part of the aeronautical information publication (AIP) shall be 210 × 297 mm (A4).
- (4) Notwithstanding subregulation (3), an en-route chart, shall be 297 x 420 mm (A3), to enhance legibility.

7. An aeronautical cartographic service provider shall ensure that the title of a chart or chart series prepared in accordance with these Regulations is that of the relevant part heading except that such title shall not include “ICAO” unless the chart conforms with the requirements specified in this Part and any other requirements specified for that particular chart in these Regulations.

Titles of charts

8. An aeronautical cartographic service provider shall ensure that —

- (a) the marginal note layout is as set out in Schedule 1, except as otherwise specified for a particular chart;
- (b) the following information is shown on the face of each chart unless otherwise stated in the specification of the chart concerned —
 - (i) designation or title of the chart series,
 - (ii) name and reference of the sheet, and
 - (iii) on each margin, an indication of the adjoining sheet where applicable;
- (c) a legend to the symbols and abbreviations used is provided on the face or reverse of each chart except that, where it is impracticable for reasons of space, a legend may be published separately; and
- (d) the name and adequate address of the producing agency is shown in the margin of the chart except that, where the chart is published as part of an aeronautical document, this information may be placed in the front of that document.

Miscellaneous information

9. An aeronautical cartographic service provider shall ensure that —

- (a) the symbols used conform to those specified in Schedule 2, except that where it is desired to show on an aeronautical chart, special features or items of importance to civil aviation for which no ICAO symbol is at present provided, any appropriate symbol may be chosen for this purpose, provided that it does not cause confusion with any existing ICAO chart symbol or impair the legibility of the chart;

Symbols

- (b) the same basic symbol is used on all charts on which it appears, regardless of chart purpose to represent ground-based navigation aids, intersections and waypoints;
 - (c) the symbol used for significant points is based on a hierarchy of symbols and selected in the following order —
 - (i) ground-based navigation aid;
 - (ii) intersection; and
 - (iii) waypoint symbol;
 - (d) a waypoint symbol is used only when a particular significant point does not already exist as either a ground-based navigation aid or intersection; and
 - (e) the symbols are shown in the manner specified in this regulation and in accordance with symbol number 121 set out in Schedule 2.
- 10.** An aeronautical cartographic service provider shall ensure that the —
- (a) distances are derived as geodesic distances;
 - (b) distances are expressed in either kilometres or nautical miles or both, provided the units are clearly differentiated;
 - (c) altitudes, elevations and heights are expressed in either metres or feet or both, provided the units are clearly differentiated;
 - (d) linear dimensions on aerodromes and short distances are expressed in metres;
 - (e) order of resolution of distances, dimensions, elevations and heights are as specified for a particular chart;
 - (f) units of measurement used to express distances, altitudes, elevations and heights are conspicuously stated on the face of each chart; and
 - (g) conversion scales are provided on each chart on which distances, elevations or altitudes are shown and shall be placed on the face of each chart.
- 11.** An aeronautical cartographic service provider shall ensure that —
- (a) the name and basic parameters and scale of the projection are indicated for charts of large areas; and
 - (b) for charts of small areas, only a linear scale is indicated.
- 12.** An aeronautical cartographic service provider shall clearly indicate on the face of each chart, the date of validity of the aeronautical information.
- 13.** An aeronautical cartographic service provider shall ensure that —
- (a) the symbols of the Roman alphabet are used for writing;
 - (b) the names of places and of geographical features in Botswana which officially use varieties of the Roman alphabet shall be accepted in their official spelling, including the accents and diacritical marks used in the respective alphabets;
 - (c) the word where a geographical term is abbreviated on any particular chart is spelt out in full; and
 - (d) the punctuation marks are not used in abbreviations within the body of a chart.
- 14.** An aeronautical cartographic service provider shall ensure that abbreviations are —
- (a) used on aeronautical charts whenever they are appropriate; and
 - (b) selected from the Procedures for Air Navigation Services – ICAO document abbreviations and codes number 8400 where applicable.

Units of measurement

Scale and projection

Date of validity of aeronautical information

Spelling of geographical names

Abbreviations

15. An aeronautical cartographic service provider shall ensure that the —
- (a) international boundaries are shown, but may be interrupted if data more important to the use of the chart would be obscured; and
 - (b) names identifying the countries are indicated where the territory of more than one State appears on a chart.
16. An aeronautical cartographic service provider shall ensure that the colours used on charts conform to the Colour Guide set out in Schedule 3 of these Regulations.
17. A cartographic service provider shall ensure that —
- (a) relief, where shown, is portrayed in a manner that will satisfy the chart users' need for —
 - (i) orientation and identification,
 - (ii) safe terrain clearance,
 - (iii) clarity of aeronautical cartographic when shown, and
 - (iv) planning;
 - (b) the tints used where relief is shown by hypsometric tints, are based on those shown in the Hypsometric Tint Guide in Schedule 4 of these Regulations;
 - (c) the spot elevations are shown for selected critical points where spot elevations are used; and
 - (d) the value of spot elevations of doubtful accuracy is followed by the sign \pm .
18. An aeronautical cartographic service provider shall ensure that the reference or other identification are included when prohibited, restricted or danger areas are shown.
19. An aeronautical cartographic service provider shall ensure that —
- (a) the class of airspace, the type, name or call sign, the vertical limits and the radio frequency to be used is indicated when air traffic services airspace is shown on a chart, and the horizontal limits specified in accordance to Schedule 2 to these Regulations; and
 - (b) on charts used for visual flight, those parts of the ATS airspace classes in the Schedule 1 to the Civil Aviation (Rules of the Air and Traffic Services) Regulations applicable to the airspace depicted on the chart to be on the face or reverse of each chart.
20. An aeronautical cartographic service provider shall ensure that —
- (a) the True North and magnetic variation are indicated and the order of resolution of magnetic variation is that as specified for a particular chart;
 - (b) when magnetic variation is shown on a chart, the values shown are those for the year nearest to the date of publication that is divisible by 5; and
 - (c) an interim date and value are quoted in exceptional cases where the current value would be more than one degree different, after applying the calculation for annual change;
 - (d) the publication of a magnetic variation change for instrument procedure charts shall be completed within a maximum of six AIRAC cycles; and
 - (e) in large terminal areas with multiple aerodromes, a single rounded value of magnetic variation shall be applied so that the procedures that service multiple aerodromes use a single, common variation value.
21. An aeronautical cartographic service provider shall ensure that —
- (a) necessary measures are taken to introduce a properly organised quality system containing procedures, processes and resources necessary to implement quality management at each function stage as specified in the Civil Aviation (Aeronautical Information Services) Regulations;

Political boundaries

Colours

Relief

Prohibited, restricted and danger areas

Air traffic services airspaces

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Magnetic variation

Aeronautical data

- (b) the execution of quality management is made demonstrable for each function stage, when required;
 - (c) the established procedures exist in order that aeronautical data at any moment is traceable to its origin so to allow any data anomalies or errors, detected during the production and maintenance phases or in the operational use, to be corrected;
 - (d) the order of chart resolution of aeronautical data is as specified for a particular chart and as presented in a tabular form in the Schedule 6 of these Regulations;
 - (e) the integrity of aeronautical data is maintained throughout the data process from origination to distribution to the next intended user;
 - (f) digital data error detection techniques shall be used during the transmission and/or storage of aeronautical data and digital data sets.
- 22.** An aeronautical cartographic service provider shall ensure that the —
- (a) World Geodetic System – 1984 is used as the horizontal reference system;
 - (b) published aeronautical geographical coordinates indicating latitude and longitude are expressed in terms of the World Geodetic System –1984 geodetic reference datum;
 - (c) geographical coordinates which have been transformed into World Geodetic System –1984 coordinates but whose accuracy of original field work does not meet the requirements in the Civil Aviation (Air Traffic Services) Regulations and the Civil Aviation (Aerodrome) Regulations are identified by an asterisk; and
 - (d) chart resolution of geographical coordinates is as specified for a particular chart series.
- 23.** An aeronautical cartographic service provider shall ensure that the —
- (a) mean sea level datum is used as the vertical reference system;
 - (b) elevations referenced to mean sea level, for the specific surveyed ground positions, geoid undulation for the surveyed positions are published as specified for a particular chart; and
 - (c) chart resolution of elevation and geoid undulation is as specified for a particular chart series.
- 24.** An aeronautical cartographic service provider shall ensure that —
- (a) the Gregorian calendar and Coordinated Universal Time are used as the temporal reference system; and
 - (b) when a different temporal reference system is used for charting, this shall be indicated in the Aeronautical Information Publication.
- 25.** An aeronautical cartographic service provider shall publish, as and when applicable and in accordance with the requirements as prescribed by the Authority, the following charts —
- (a) Aerodrome Obstacle Chart ;
 - (b) Precision Approach Terrain Chart;
 - (c) En route Chart;
 - (d) Area Chart or, alternatively, Standard Departure Chart – Instrument and Standard Arrival Chart – Instrument;
 - (e) Instrument Approach Chart;
 - (f) Visual Approach Chart;
 - (g) Aerodrome or Heliport Chart;
 - (h) Aerodrome Ground Movement Chart;
 - (i) Aircraft Parking or Docking Chart;

- (j) World Aeronautical Chart or, alternatively, Aeronautical Chart or Aeronautical Navigation Chart;
- (k) Plotting Chart; and
- (l) Air Traffic Control Surveillance Minimum Altitude Chart.

26. An aeronautical cartographic service provider shall ensure that an aeronautical charting automated system comply with the following requirements —
- (a) provide for continuous and timely updating of the system database and monitoring of the validity;
 - (b) quality of the aeronautical information stored;
 - (c) integrate data from a wide variety of sources;
 - (d) temporally manage information and related products, to make sure that charts are always up to date;
 - (e) facilitate inspection of the aeronautical chart content, possibly through the synchronization of the graphical elements with the central database content via specific metadata;
 - (f) provide users with definable rules or templates to facilitate the assembling of the final chart product; and
 - (g) ensure products and services are equally available to humans and computer systems, through specific digital formats for capturing and processing the information.

Use of automation
in aeronautical
charting

PART III — *Aerodrome Obstacle Chart – Type A*

27. An aeronautical cartographic service provider shall ensure that the Aerodrome Obstacle Chart Type A in combination with the relevant cartographic information published in the Aeronautical Information Publication, provides the data necessary to enable an operator to comply with the operating limitations of the Civil Aviation (Aircraft Operations) Regulations.

Function

28. An aeronautical cartographic service provider shall ensure that —

Availability

- (a) the Aerodrome Obstacle Chart Type A is made available in the manner specified in regulation 5(b) for aerodromes regularly used by international civil aviation, except for those aerodromes where there are no obstacles in the take-off flight path areas or where the Aerodrome Terrain and Obstacle Chart is provided in accordance with Part V of these Regulations; and
- (b) a notification is published in the Aeronautical Information Publication where a chart is not required because no obstacles exist in the take-off flight path area.

29. An aeronautical cartographic service provider shall ensure that the —

Units of
measurement

- (a) elevations are shown to the nearest to the nearest foot; and
- (b) linear dimensions are shown to the nearest half-metre.

30. A cartographic service provider shall ensure that the —

Coverage and
scale

- (a) extent or coverage of each chart is sufficient to cover all obstacles;
- (b) horizontal scale is within the range of 1:10 000 to 1:15 000;
- (c) vertical scale is 10 times the horizontal scale; and
- (d) horizontal and vertical linear scales showing both metres and feet are included in the charts.

31. An aeronautical cartographic service provider shall ensure that the —

Format

- (a) charts depict a plan and profile of each runway, any associated stop way or clearway, the take-off flight path area and obstacles;

- (b) profile for each runway, stop way, clearway and the obstacles in the take-off flight path area are shown above its corresponding plan;
- (c) profile of an alternative take-off flight path area comprises a linear projection of the full take-off flight path and is disposed above its corresponding plan in the manner most suited to the ready interpretation of the information;
- (d) profile grid is ruled over the entire profile area exclusive of the runway;
- (e) zero for vertical coordinates is mean sea level;
- (f) zero for horizontal coordinates is at the end of the runway furthest from the take-off flight path area concerned;
- (g) graduation marks indicating the sub-divisions of intervals is shown along the base of the grid and along the vertical margins;
- (h) vertical grid to have intervals of 30 m (100 ft) and the horizontal grid to have intervals of 300 m (1 000 ft);
- (i) chart includes —
 - (i) a box for recording the operational data specified in regulation 36, and
 - (ii) a box for recording amendments and dates thereof.

Identification

32. An aeronautical cartographic service provider shall ensure that the chart is identified by the —

- (a) name of the country in which the aerodrome is located;
- (b) name of the city or town or area which the aerodrome serves;
- (c) name of the aerodrome; and
- (d) designator of the runway.

Magnetic variation

33. An aeronautical cartographic service provider shall ensure that the magnetic variation to the nearest degree and date of information is indicated.

Aeronautical data

Obstacles

34. An aeronautical cartographic service provider shall ensure that —

- (a) objects in the take-off flight path area which project above a plane surface having a 1.2 per cent slope and having a common origin with the take-off flight path area are regarded as obstacles, except that obstacles lying wholly below the shadow of other obstacles as defined in paragraphs (c), (d) and (f) need not be shown;
- (b) mobile objects such as trains and trucks, which may project above the 1.2 per cent plane, are considered obstacles but are not considered as being capable of creating a shadow;
- (c) plane surface originating at a horizontal line passing through the top of the obstacle at right angles to the centre line of the take-off flight path area is considered as the shadow of an obstacle;
- (d) the plane covers the complete width of the take-off flight path area and extends to the plane defined in paragraph (a) and (b) or to the next higher obstacle if it occurs first;
- (e) the first 300 m (1 000 ft) of the take-off flight path area, the shadow planes are horizontal and beyond this point such planes have an upward slope of 1.2 per cent; and
- (f) if the obstacle creating a shadow is likely to be removed, objects that would become obstacles by its removal shall be shown.

Take-off flight path area

35. An aeronautical cartographic service provider shall ensure that the —

- (a) take-off flight path area consists of a quadrilateral area on the surface of the earth lying directly below, and symmetrically disposed about the take-off flight path and has the following characteristics —
 - (i) commences at the end of the area declared suitable for take-off,
 - (ii) the width at the point of origin is 180 m (600 ft) and this width increases at the rate of 0.25D to a maximum of 1 800 m (6 000 ft), where D is the distance from the point of origin, and
 - (iii) extends to the point beyond which no obstacles exist or to a distance of 10.0 km (5.4 NM), whichever is the lesser; and
 - (b) for runways serving aircraft having operating limitations which do not preclude the use of a take-off flight path gradient of less than 1.2 percent, the extent of the take-off flight path area specified in paragraph (a) (iii) shall be increased to not less than 12.0 km (6.5 NM) and the slope of the plane surface specified in regulation 34 (a) and (b) shall be reduced to 1.0 percent less.
- 36.** An aeronautical cartographic service provider shall ensure that — Declared distances
- (a) the following information for each direction of each runway is provided —
 - (i) take-off run available,
 - (ii) accelerate-stop distance available,
 - (iii) take-off distance available, and
 - (iv) landing distance available; and
 - (b) a runway is identified as “not usable for take-off, landing or both” where a declared distance is not provided because a runway is usable in one direction only.
- 37.** (1) An aeronautical cartographic service provider shall ensure that the plan view shows — Plan and profile views
- (a) the outline of the runways by a solid line, including the length and width, the magnetic bearing to the nearest degree, and the runway number;
 - (b) the outline of the clearways by a broken line, including the length and identification as such;
 - (c) take-off flight path areas by a dashed line and the centre line by a fine line consisting of short and long dashes;
 - (d) alternative take-off flight path areas and where alternative take-off flight path areas not centered on the extension of the runway centre line are shown, notes are provided explaining the significance of such areas; and
 - (e) obstacles, including —
 - (i) the exact location of each obstacle together with a symbol indicative of its type,
 - (ii) the elevation and identification of each obstacle, and
 - (iii) the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.
- (2) An aeronautical cartographic service provider shall ensure that —
- (a) the nature of the runway and stop way surfaces are indicated;
 - (b) stop ways are identified as such and are shown by a broken line; and
 - (c) the length of each stopway is indicated.
- (3) An aeronautical cartographic service provider shall ensure that the profile view shows —
- (a) the profile of the centre line of the runway by a solid line and the profile of the centre line of any associated stop ways and clearways by a broken line;

- (b) the elevation of the runway centre line at each end of the runway, at the stop way and at the origin of each take-off;
- (c) obstacles, including —
 - (i) each obstacle by a solid vertical line extending from a convenient grid line over at least one other grid line to the elevation of the top of the obstacle,
 - (ii) identification of each obstacle, and
 - (iii) the limits of penetration of obstacles of large extent in a distinctive manner identified in the legend.

Accuracy

- 38.** An aeronautical cartographic service provider shall ensure that the —
- (a) order of accuracy attained is shown on the chart;
 - (b) horizontal dimensions and the elevations of the runway, stop way and clearway to be printed on the chart are determined to the nearest 0.5 m (1 ft);
 - (c) order of accuracy of the field work and the precision of chart production are such that measurements in the take-off flight path areas can be taken from the chart within the following maximum deviations —
 - (i) horizontal distances: 5 m (15 ft) at a point of origin increasing at a rate of 1 per 500,
 - (ii) vertical distances: 0.5 m (1.5 ft) in the first 300 m (1 000ft) and increasing at a rate of 1 per 1 000; and
 - (d) elevation of the datum used is stated and is identified as assumed where no accurate datum for vertical reference is available.

PART IV — *Aerodrome Obstacle Chart – Type B*

Function

39. An aeronautical cartographic service provider shall ensure that the Aerodrome Obstacle Chart – Type B provides information to satisfy the following functions —

- (a) the determination of minimum safe altitudes or heights including those for circling procedures;
- (b) the determination of procedures for use in the event of an emergency during take-off or landing;
- (c) the application of obstacle clearing and marking criteria; and
- (d) the provision of source material for aeronautical charts.

Availability

40. An aeronautical cartographic service provider shall ensure that the —

- (a) Aerodrome Obstacle Chart Type B is made available, in the manner prescribed in regulation 5 (b) for all aerodromes regularly used by international civil aviation except for those aerodromes where the Aerodrome Terrain and Obstacle Chart is provided in accordance with Part V;
- (b) Aerodrome Obstacle Chart Type B is called the Aerodrome Obstacle Chart when a chart combining the specifications of Part III and Part IV of these Regulations is made available.

Units of measurement

41. An aeronautical cartographic service provider shall ensure that the —

- (a) elevations are shown to the nearest foot; and
- (b) linear dimensions are shown to the nearest half-metre.

Coverage and scale

42. An aeronautical cartographic service provider shall ensure that —

- (a) the extent or coverage of each chart is sufficient to cover all obstacles;
- (b) the horizontal scale is within the range of 1:10 000 to 1:20 000; and
- (c) a horizontal linear scale showing both metres and feet is included in the chart and when necessary, a linear scale for kilometres and a linear scale for nautical miles is also shown.

- 43.** An aeronautical cartographic service provider shall ensure that the chart include — Format
- (a) any necessary explanation of the projection used;
 - (b) any necessary identification of the grid used;
 - (c) a notation indicating that obstacles are those which penetrate the surfaces specified in Civil Aviation (Aerodromes) Regulations;
 - (d) a box for recording amendments and dates thereof; and
 - (e) outside the neat line, every minute of latitude and longitude marked in degrees and minutes.
- 44.** An aeronautical cartographic service provider shall ensure that the chart is identified by the — Identification
- (a) name of the country in which the aerodrome is located;
 - (b) name of the city or town or area which the aerodrome serves; and
 - (c) name of the aerodrome.
- 45.** An aeronautical cartographic service provider shall ensure that the — Culture and topography
- (a) drainage and hydrographic details are kept to a minimum;
 - (b) buildings and other salient features associated with the aerodrome are shown and wherever possible, to scale;
 - (c) objects, either cultural or natural, that project above the take-off and approach surfaces specified in regulation 48 or the clearing and marking surfaces specified in Civil Aviation (Aerodromes) Regulations are shown; and
 - (d) roads and railroads within the take-off and approach area, and less than 600 m (2 000 ft) from the end of the runway or runway extensions, are shown.
- 46.** An aeronautical cartographic service provider shall ensure that the chart shows a compass rose orientated to the True North, or a North point, showing the magnetic variation to the nearest degree with the date of magnetic cartographic and annual change. Magnetic variation
- 47.** An aeronautical cartographic service provider shall ensure that the chart shows — Aeronautical data
- (a) the aerodrome reference point and its geographical coordinates in degrees, minutes and seconds;
 - (b) the outline of the runways by a solid line;
 - (c) the length and width of the runway;
 - (d) the magnetic bearing to the nearest degree of the runway and the runway number;
 - (e) the elevation of the runway centre line at each end of the runway, at the stop way, at the origin of each take-off and approach area, and at each significant change of slope of runway and stop way;
 - (f) taxiways, aprons and parking areas identified as such, and the outlines by a solid line;
 - (g) stop ways identified as such and depicted by a broken line;
 - (h) the length of each stop way;
 - (i) clearways identified as such and depicted by a broken line;
 - (j) the length of each clearway;
 - (k) take-off and approach surfaces identified as such and depicted by a broken line;
 - (l) take-off and approach areas;

- (m) obstacles at their exact location, including —
 - (i) a symbol indicative of their type,
 - (ii) elevation,
 - (iii) identification, and
 - (iv) limits of penetration of large extent in a distinctive manner identified in the legend;
- (n) any additional obstacles, as determined by regulation 34 (a) including the obstacles in the shadow of an obstacle, which would otherwise be exempted —
 - (i) the nature of the runway and stopway surfaces shall be given,
 - (ii) the highest object or obstacle between adjacent approach areas within a radius of 5 000 m (15 000 ft) from the aerodrome reference point shall be indicated in a prominent manner, wherever practicable, and
 - (iii) the extent of tree areas and relief features, part of which constitute obstacles, shall be shown.

Accuracy

- 48.** An aeronautical cartographic service provider shall ensure that the —
- (a) order of accuracy attained is shown on the chart;
 - (b) horizontal dimensions and the elevations of the movement area, stop ways and clearways to be printed on the chart is determined to the nearest 0.5 m (1 ft);
 - (c) order of accuracy of the field work and the precision of chart production is such that the resulting data will be within the following maximum deviations —
 - (i) take-off and approach areas —
 - (aa) horizontal distances, 5 m (15 ft) at point of origin increasing at a rate of 1 per 500, and
 - (bb) vertical distances, 0.5 m (1.5ft) in the first 300 m (1000 ft) and increasing at a rate of 1 per 1000;
 - (ii) other areas —
 - (aa) horizontal distances: 5 m (15 ft) within 5 000 m (15 000 ft) of the aerodrome reference point and 12 m (40 ft) beyond that area, and
 - (bb) vertical distances: 1 m (3 ft) within 1 500 m (5 000 ft) of the aerodrome reference point increasing at a rate of 1 per 1 000;
 - (d) elevation of the datum used is stated and identified as assumed, where no accurate datum for vertical reference is available.

PART V — Aerodrome Terrain And Obstacle Chart — (Electronic)

Function

- 49.** An aeronautical cartographic service provider shall ensure that the Aerodrome Terrain and Obstacle Chart electronic portrays the terrain and obstacle data in combination with aeronautical data, as appropriate, necessary to —
- (a) enable an operator to comply with the operating limitations of the Civil Aviation (Aircraft Operations) Regulations, by developing contingency procedures for use in the event of an emergency during a missed approach or take-off, and by performing aircraft operating limitations analysis; and
 - (b) support the following air navigation applications —

- (i) instrument procedure design (including circling procedure),
 - (ii) aerodrome obstacle restriction and removal, and
 - (iii) provision of source data for the production of other aeronautical charts.
- 50.** An aeronautical cartographic service provider shall ensure that the — Availability
- (a) an aerodrome terrain and obstacle chart is made available in the manner specified in regulation 5 (b) for aerodromes regularly used by international civil aviation;
 - (b) an aerodrome terrain and obstacle chart is made available in hard copy format upon request; and
 - (c) ISO 19100 series of standards for geographic cartographic are used as a general data modelling framework.
- 51.** An aeronautical cartographic service provider shall ensure that electronic charts are identified by the — Identification
- (a) name of the country in which the aerodrome is located;
 - (b) name of the city or town which the aerodrome serves; and
 - (c) name of the aerodrome.
- 52.** An aeronautical cartographic service provider shall ensure that the extent of each chart is sufficient to cover Area 2 as specified in the Civil Aviation (Aeronautical Information Services) Regulations. Chart coverage
- 53.** An aeronautical cartographic service provider shall ensure that the — General specifications
- (a) relationships between features, feature attributes, and the underlying spatial geometry and associated topological relationships are specified by an application schema when developing computer graphic applications that are used to portray features on the chart;
 - (b) portrayed information is provided on the basis of portrayal specifications applied according to defined portrayal rules whereby portrayal specifications and portrayal rules are not part of the data set;
 - (c) portrayal rules are stored in a portrayal catalogue which shall make reference to separately stored portrayal specifications; and
 - (d) symbols used to portray features are in accordance with regulation 8 and the International Civil Aviation Organization Chart Symbols set out in Schedule 2.
- 54.** An aeronautical cartographic service provider shall ensure that — Terrain features
- (a) the terrain feature and associated attributes, to be portrayed, and database-linked to the chart are based on the terrain data sets which satisfy the requirements in the Civil Aviation (Aeronautical Information Services) Regulations;
 - (b) the terrain feature is portrayed in a manner that provides an effective general impression of a DEM;
 - (c) representation of terrain surface shall be provided as a selectable layer of contour lines in addition to the DEM;
 - (d) an ortho-rectified image which matches the features on the DEM with features on the overlying image is to be used to enhance the DEM;
 - (e) the portrayed terrain feature is linked to the following associated attributes in the database —
 - (i) horizontal positions of grid points in geographic coordinates and elevations of the points,
 - (ii) surface type,
 - (iii) contour line values, if provided, and
 - (iv) names of cities, towns and other prominent topographic features; and

- (f) additional terrain attributes provided in the database is linked to the portrayed terrain feature.
- Obstacle features**
- 55.** An aeronautical cartographic service provider shall ensure that the —
- (a) obstacle features, and associated attributes, portrayed or database-linked to the chart is based on electronic obstacle data sets which satisfy the requirements of the Civil Aviation (Aeronautical Information Services) Regulations;
 - (b) each obstacle is portrayed by an appropriate symbol and obstacle identifier;
 - (c) the portrayed obstacle feature is linked to the following associated attributes in the database —
 - (i) horizontal position in geographic coordinates and associated elevation,
 - (ii) obstacle type, and
 - (iii) obstacle extent, if appropriate; and
 - (d) additional obstacle attributes provided in the database must be linked to the portrayed obstacle feature.
- Aerodrome features**
- 56.** An aeronautical cartographic service provider shall ensure that the —
- (a) aerodrome features, and associated attributes, portrayed and database-linked to the chart is used on aerodrome data which satisfy the requirements of the Civil Aviation (Aerodromes) Regulations and the Civil Aviation (Aeronautical Information Services) Regulations;
 - (b) following aerodrome features are portrayed by an appropriate symbol —
 - (i) aerodrome reference point,
 - (ii) runway, with designation numbers, and if available, stop way and clearway, and
 - (iii) taxiways, aprons, large buildings and other prominent aerodrome features; and
 - (c) portrayed aerodrome feature is linked to the following associated attributes in the database —
 - (i) geographical coordinates of the aerodrome reference point,
 - (ii) aerodrome magnetic variation, year of cartographic and annual change,
 - (iii) length and width of a runway, stop way and clearway,
 - (iv) type of surface of runway and stop way,
 - (v) magnetic bearings of the runway to the nearest degree,
 - (vi) elevations at each end of runway, stop way and clearway, and at each significant change in slope of the runway and stop way, and
 - (vii) declared distances for each runway direction, or the abbreviation “NU” where a runway direction cannot be used for take-off or landing or both.
- Radio navigation aid features**
- 57.** An aeronautical cartographic service provider shall ensure that the each radio navigation aid feature located within the chart coverage is portrayed by an appropriate symbol.
- Accuracy and resolution**
- 58.** An aeronautical cartographic service provider shall ensure that the —
- (a) order of accuracy of aeronautical, terrain and obstacle data is in accordance with its intended use; and
 - (b) aeronautical terrain and obstacle data resolution is commensurate with the actual data accuracy.
- Electronic functionality**
- 59.** An aeronautical cartographic service provider shall ensure that —
- (a) the symbols and text size varies with chart scale to enhance readability;
 - (b) the information on the chart is geo-referenced, and it is possible to determine cursor position to at least the nearest second;

- (c) the chart is compatible with widely available desktop computer hardware, software and media;
- (d) the chart includes a reader software;
- (e) it is not possible to remove information from the chart without an authorised update;
- (f) selectable information layers are provided to allow for the customised combination of information, when due to congestion of information, the details necessary to support the function of the chart cannot be shown with sufficient clarity on a single comprehensive chart view; and
- (g) the chart can be printed in hard copy format according to the content specifications and scale determined by the user.

60. An aeronautical cartographic service provider shall ensure that —

Chart data
product
specifications

- (a) a comprehensive statement of the data sets comprising the chart is provided in the form of data product specifications on which basis, air navigation users will be able to evaluate the chart data product and determine whether it fulfils the requirements for its intended use;
- (b) the chart data product specifications include —
 - (i) an overview,
 - (ii) a specification scope,
 - (iii) a data product identification,
 - (iv) data content information,
 - (v) the reference systems used,
 - (vi) the data quality requirements, and
 - (vii) information on data on data capture, data maintenance, data portrayal, data product delivery, metadata and any available additional information;
- (c) the overview of the chart data product specifications provides an informal description of the product and contains the general information about the data product and that the scope of the chart data product specifications contains the spatial (horizontal) extent of the chart coverage;
- (d) the chart data product identification includes the title of the product, a brief narrative summary of the content and purpose, and a description of the geographic area covered by the chart;
- (e) the data content of the chart data product specifications clearly identifies the type of coverage and imagery and provide a narrative description of each;
- (f) the chart data product specifications include information that defines the reference systems used including —
 - (i) the spatial reference system (horizontal and vertical) and, if appropriate,
 - (ii) temporal reference system;
- (g) the chart data product specifications identify the data quality requirements including —
 - (i) a statement on acceptable conformance quality levels, and
 - (ii) corresponding data quality measures;
- (h) statement in paragraph (g) covers the data quality elements and data quality sub-elements; even if only to state that a specific data quality element or sub-element is not applicable;
- (i) the chart data product specifications include —
 - (i) a data capture statement providing a general description of the sources and processes applied for the capture of chart data,
 - (ii) the principles and criteria applied in the maintenance of the chart,

- (iii) the frequency with which the chart product is updated,
 - (iv) the maintenance cartographic of obstacle data sets included on the chart, and
 - (v) an indication of the principles, methods and criteria applied for obstacle data maintenance;
- (j) chart data product specifications contain —
- (i) information on how data are portrayed on the chart, as detailed in regulation 54;
 - (ii) the chart data product delivery information which include delivery formats and delivery medium information; and
- (k) core chart metadata elements are included in the chart data product specifications and any additional metadata items required to be supplied are stated in the product specifications together with the format and encoding of the metadata.

PART VI — *Precision Approach Terrain Chart*

Function	61. An aeronautical cartographic service provider shall ensure that the precision approach terrain chart provides detailed terrain profile information within a defined portion of the final approach so as to enable aircraft operating agencies to assess the effect of the terrain on decision height determination by the use of radio altimeters.
Availability	62. An aeronautical cartographic service provider shall ensure that the — <ul style="list-style-type: none"> (a) precision approach terrain chart is made available for precision approach runways Categories II and III at aerodromes used by international civil aviation, except where the requisite information is provided in the aerodrome terrain and obstacle chart as provided for in Part V of these Regulations; (b) precision approach terrain chart is revised whenever any significant change occurs.
Scale	63. An aeronautical cartographic service provider shall ensure that — <ul style="list-style-type: none"> (a) the horizontal scale is 1:2500, and the vertical scale is 1:500; and (b) when the chart includes a profile of the terrain to a distance greater than 900 m (3 000 ft) from the runway threshold, the horizontal scale is 1:5000.
Identification	64. An aeronautical cartographic service provider shall ensure that the precision approach terrain chart is identified by the — <ul style="list-style-type: none"> (a) name of the country in which the aerodrome is located; (b) the name of the city or town or area which the aerodrome serves, (c) the name of the aerodrome; and (d) designator of the runway.
Plan and profile information	65. An aeronautical cartographic service provider shall ensure that the — <ul style="list-style-type: none"> (a) precision approach terrain chart includes — <ul style="list-style-type: none"> (i) a plan showing contours at 1m (3 ft) intervals in the area 60m (200 ft) on either side of the extended centre line of the runway, to the same distance as the profile, and the contours are related to the runway threshold, (ii) an indication where the terrain or any object thereon, within the plan defined in subparagraph (i), differs by ± 3 m (10 ft) in height from the centre line profile and is likely to affect a radio altimeter, and (iii) a profile of the terrain to a distance of 900 m (3 000 ft) from the threshold along the extended centre line of the runway;

- (b) where the terrain at a distance greater than 900 m (3 000 ft) from the runway threshold is mountainous or otherwise significant to users of the chart, the profile of the terrain is shown to a distance not exceeding 2000m (6500ft) from the runway threshold; and
- (c) ILS reference datum height is shown to the nearest foot.

PART VII — *En-route Chart*

- | | |
|---|------------------------------|
| <p>66. An aeronautical cartographic service provider shall ensure that the en-route chart provides flight crews with information to facilitate navigation along air traffic service routes in compliance with air traffic services procedures.</p> | Function |
| <p>67. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) the en-route chart is made available in the manner prescribed in regulation 5 (b) for areas where flight information regions have been established in Botswana; and (b) separate charts are provided where different air traffic services routes, position reporting requirements or lateral limits of flight information regions or control areas exist in different layers of airspace and cannot be shown with sufficient clarity on one chart. | Availability |
| <p>68. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) the layout of sheet lines is determined by the density and pattern of the air traffic service route structure; (b) large variations of scale between adjacent charts showing a continuous route structure is not used; and (c) an adequate overlap of charts is provided to ensure continuity of navigation. | Coverage and scale |
| <p>69. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) a conformal projection on which a straight line approximates a great circle is used; (b) parallels and meridians are shown at suitable intervals; and (c) graduation marks are placed at consistent intervals along selected parallels and meridians. | Projection |
| <p>70. An aeronautical cartographic service provider shall ensure that each sheet of the chart is identified by chart series and number.</p> | Identification |
| <p>71. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) generalised shore lines of all open water areas, large lakes and rivers are shown except where they conflict with data more applicable to the function of the chart; (b) area minimum altitude is shown within each quadrilateral formed by the parallels and meridians; (c) selected orientation used is clearly indicated, where charts are not True North orientated. | Culture and topography |
| <p>72. An aeronautical cartographic service provider shall ensure that the isogonic are indicated and the date of the isogonic information is given.</p> | Magnetic variation |
| <p>73. An aeronautical cartographic service provider shall ensure that the —</p> <ul style="list-style-type: none"> (a) bearings, tracks and radials are — <ul style="list-style-type: none"> (i) magnetic, except as provided for in subparagraph (ii), (ii) shown in parentheses to the nearest tenth of a degree where bearings and tracks are additionally provided as true values for area navigation segments, and | Bearings, tracks and radials |

- (iii) clearly indicated where given with reference to True North or Grid North; and
- (b) where Grid North is used, its reference grid meridian is identified.

Aeronautical data

Aerodromes

74. An aeronautical cartographic service provider shall ensure that aerodromes used by international civil aviation to which an instrument approach can be made are shown.

Prohibited, restricted and danger areas

75. An aeronautical cartographic service provider shall ensure that prohibited, restricted and danger areas relevant to the layer of airspace are depicted with their identification and vertical limits.

Air traffic services system

76. An aeronautical cartographic service provider shall ensure that the following components of established air traffic services system are shown where appropriate —

- (a) the radio navigation aids associated with the air traffic services system together with their names, identifications, frequencies and geographical coordinates in degrees, minutes and seconds;
- (b) in respect of distance measuring equipment, the elevation of the transmitting antenna of the distance measuring equipment to the nearest 30 m (100 ft);
- (c) an indication of designated airspace, including lateral and vertical limits and the appropriate class of airspace;
- (d) air traffic services routes for en route flight including route designators, the track to the nearest degree in both directions along each segment of the routes and, where established, the designation of the navigation specification(s) including any limitations and the direction of traffic flow;
- (e) significant points which define the air traffic services routes and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in degrees, minutes and seconds;
- (f) in respect of waypoints defining VOR or distance measuring equipment area navigation route, the station identification and radio frequency of the reference VOR or distance measuring equipment and the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR or distance measuring equipment, if the waypoint is not collocated with it;
- (g) an indication of compulsory and “on-request” reporting points and air transport services or MET reporting points;
- (h) the distances, to the nearest kilometre or nautical mile, between significant points constituting turning points or reporting points;
- (i) change-over points on route segments defined by reference to very high frequency omnidirectional radio ranges, indicating the distances to the nearest kilometre or nautical mile to the navigation aids;
- (j) minimum en route altitudes and minimum obstacle clearance altitudes, on air transport services routes to the nearest higher 50 metres or 100 feet in accordance with the Civil Aviation (Rules of the Air and Air Traffic Services) Regulations;
- (k) communication facilities listed with their channels and, if applicable, logon address and satellite voice communications number; and
- (l) air defence identification zone properly identified.

- 77.** An aeronautical cartographic service provider shall ensure that — Supplementary information
- (a) details of departure and arrival routes and associated holding patterns in terminal areas are shown unless they are shown on an area chart, a standard departure chart – instrument or a standard arrival chart – instrument; and
 - (b) altimeter setting regions are shown and identified where established.

PART VIII — *Area Chart*

- 78.** An aeronautical cartographic service provider shall ensure that an area chart provides the flight crew with information to facilitate the following phases of instrument flight — Function
- (a) the transition between the en-route phase and approach to an aerodrome;
 - (b) the transition between take-off or missed approach and en route phase of flight; and
 - (c) flights through areas of complex air traffic services routes or airspace structure.
- 79.** An aeronautical cartographic service provider shall ensure that — Availability
- (a) the area chart is made available in the manner specified in regulation 5 (b) where the air traffic services routes or position reporting requirements are complex and cannot be adequately shown on an en route chart; and
 - (b) separate charts are provided where air traffic services routes or position reporting requirements are different for arrivals and for departures, and cannot be shown with sufficient clarity on one chart.
- 80.** An aeronautical cartographic service provider shall ensure that — Coverage and scale
- (a) coverage of each area chart extends to points that effectively show departure and arrival routes; and
 - (b) the area chart is drawn to scale and a scale-bar is shown.
- 81.** An aeronautical cartographic service provider shall ensure that — Projection
- (a) a conformal projection on which a straight line approximates a great circle is used;
 - (b) parallels and meridians are shown at suitable intervals; and
 - (c) graduation marks are placed at consistent intervals along the neat lines, as appropriate.
- 82.** An area chart shall be identified by a name associated with the airspace portrayed. Identification
- 83.** An aeronautical cartographic service provider shall ensure that — Culture and topography
- (a) generalised shorelines of open water areas, large lakes and rivers are shown except where they conflict with data more applicable to the function of the charts;
 - (b) relief exceeding 300 m (1 000 ft) above the elevation of the primary aerodrome is shown by smoothed contour lines, contour values and layer tints printed in brown, in areas where significant relief exists; and
 - (c) appropriate spot elevations, including the highest elevation within each top contour line, are shown printed in black and obstacles shown.
- 84.** An aeronautical cartographic service provider shall ensure that the average magnetic variation of the area covered by the chart is shown to the nearest degree. Magnetic variation
- 85.** An aeronautical cartographic service provider shall ensure that — Bearings, tracks and radials
- (a) bearings, tracks and radials —
 - (i) are magnetic, and

- (ii) are shown in parentheses to the nearest tenth of a degree where bearings and tracks are additionally provided as true values for area navigation segments;
 - (iii) where given with reference to True North or Grid North, this is clearly indicated; and
- (b) where Grid North is used, its reference grid meridian is identified.

Aeronautical data

Aerodromes	86. An aeronautical cartographic service provider shall ensure that aerodromes which affect the terminal routings are shown and where appropriate, a runway pattern symbol is used.
Prohibited, restricted and danger areas	87. An aeronautical cartographic service provider shall ensure that prohibited, restricted and danger areas are depicted with their identification and vertical limits.
Area minimum altitudes	88. An aeronautical cartographic service provider shall ensure that the area minimum altitudes are shown within quadrilaterals formed by the parallels and meridians.
Air traffic services system	<p>89. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) components of the established relevant air traffic services system are shown; (b) components referred to in paragraph (a) include the following — <ul style="list-style-type: none"> (i) the radio navigation aids associated with the air traffic services system, together with their names, identifications, frequencies and geographical coordinates in degrees, minutes and seconds, (ii) the elevation of the transmitting antenna of the distance measuring equipment to the nearest 30 m (100 ft), (iii) terminal radio aids which are required for outbound and inbound traffic and for holding patterns, (iv) the lateral and vertical limits of designated airspace and the appropriate class of airspace, (v) the designation of the navigation specification including any limitations, where established, (vi) holding patterns and terminal routings, together with the route designators, and the track to the nearest degree along each segment of the prescribed airways and terminal routings, (vii) significant points which define the terminal routings and are not marked by the position of a radio navigation aid, together with their name-codes and geographical coordinates in degrees, minutes and seconds, (viii) in respect of waypoints defining VOR or distance measuring equipment area navigation routes, additionally, the station identification and radio frequency of the reference VOR or distance measuring equipment and the bearing to the nearest tenth of a degree and the distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference VOR or distance measuring equipment, if the waypoint is not collocated with it, (ix) an indication of compulsory and “on-request” reporting points, (x) the distances to the nearest kilometre or nautical mile between significant points constituting turning points or reporting points, (xi) change-over points on route segments defined by reference to very high frequency omnidirectional radio ranges, indicating the distances to the nearest kilometre or nautical mile to the radio navigation aids,

- (xii) minimum en-route altitudes and minimum obstacle clearance altitudes, on air traffic services routes to the nearest higher 50 metres or 100 feet,
- (xiii) established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified,
- (xiv) area speed and level or altitude restrictions where established,
- (xv) communication facilities listed with their channels and, if applicable, logon address and satellite voice communications number, and
- (xvi) an indication of “flyover” significant points.

PART IX — Standard Departure Chart – Instrument (SID)

- | | |
|--|------------------------|
| <p>90. An aeronautical cartographic service provider shall ensure that the standard departure chart – instrument provides the flight crew with information to enable it to comply with the designated standard departure route instrument from take-off phase to the en route phase.</p> | Function |
| <p>91. An aeronautical cartographic service provider shall ensure that the standard departure Chart – instrument is made available wherever standard departure route – instrument has been established and cannot be shown with sufficient clarity on the area chart.</p> | Availability |
| <p>92. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) the coverage of the standard departure chart – instrument is sufficient to indicate the point where the departure route begins and the specified significant point at which the en route phase of flight along a designated air traffic services route can be commenced; (b) the standard departure chart – instrument is drawn to scale and a scale-bar is shown; and (c) the symbol for scale break is used on tracks and other aspects of the chart which are too large to be drawn to scale. | Coverage and scale |
| <p>93. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) a conformal projection on which a straight line approximates a great circle is used; (b) when the standard departure chart – instrument is drawn to scale, parallels and meridians are shown at suitable intervals; and (c) graduation marks are placed at consistent intervals along the neat lines. | Projection |
| <p>94. An aeronautical cartographic service provider shall ensure that the standard departure chart – instrument is identified by the —</p> <ul style="list-style-type: none"> (a) name of the city or town or area which the aerodrome serves; (b) name of the aerodrome; (c) identification of the standard departure route(s) – instrument as established in accordance with the Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS, Doc 8168), Volume II, Part I, Section 3, Chapter 5. | Identification |
| <p>95. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) generalised shore lines of open water areas, large lakes and rivers are shown where the chart is drawn to scale except where they conflict with data more applicable to the function of the chart; (b) in areas where significant relief exists, the standard departure chart – instrument is drawn to scale and relief exceeding 300 m (1 000 ft) above the aerodrome elevation is shown by smoothed contour lines, contour values and layer tints printed in brown; | Culture and topography |

- (c) appropriate spot elevations, including the highest elevation within each top contour line, are shown printed in black; and
 - (d) obstacles are also shown.
- 96.** An aeronautical cartographic service provider shall ensure that the magnetic variation used in determining the magnetic bearings, tracks and radials is shown to the nearest degree.
- 97.** An aeronautical cartographic service provider shall ensure that —
- (a) bearings, tracks and radials —
 - (i) are magnetic, and
 - (ii) are shown in parentheses to the nearest tenth of a degree where bearings and tracks are additionally provided as true values for area navigation segments,
 - (iii) where given with reference to True North or Grid North, this is clearly indicated; and
 - (b) where Grid North is used, its reference grid meridian is identified.

Aeronautical data

- 98.** An aeronautical cartographic service provider shall ensure that —
- (a) the aerodrome of departure is shown by the runway pattern; and
 - (b) aerodromes which affect the designated standard departure route – instrument are shown and identified and where appropriate, the aerodrome runway patterns are shown.
- 99.** An aeronautical cartographic service provider shall ensure that the prohibited, restricted and danger areas which may affect the execution of the procedures are shown with their identification and vertical limits.
- 100.** An aeronautical cartographic service provider shall ensure that —
- (a) established minimum sector altitude is shown with a clear indication of the sector to which minimum sector altitude applies;
 - (b) standard departure chart – instrument is drawn to scale and area minimum altitudes are shown within quadrilaterals formed by the parallels and meridians; and
 - (c) area minimum altitudes are shown in those parts of the standard departure chart – instrument not covered by the minimum sector altitude where the minimum sector altitude has not been established.
- 101.** (1) An aeronautical cartographic service provider shall ensure that components of the established relevant air traffic services system are shown.
- (2) Components of the established relevant air traffic services system shall comprise of the following —
- (a) a graphic portrayal of each standard departure route – instrument, including —
 - (i) for departure procedures designed specifically for helicopters, the term “CAT H” shall be depicted in the departure chart plan view,
 - (ii) route designator,
 - (iii) significant points defining the route,
 - (iv) track or radial to the nearest degree along each segment of the route,
 - (v) distances to the nearest kilometre or nautical mile between significant points,
 - (vi) minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 feet and flight level restrictions where established,

- (vii) where the chart is drawn to scale and vectoring on departure is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft. clearly identified;
- (b) the radio navigation aid associated with the route including —
 - (i) plain language name,
 - (ii) identification,
 - (iii) frequency,
 - (iv) geographical coordinates in degrees, minutes and seconds, and
 - (v) for distance measuring equipment, the channel and the elevation of the transmitting antenna of the distance measuring equipment to the nearest 30 m (100 ft);
- (c) the name-codes of the significant points not marked by the position of a radio navigation aid, their geographical coordinates in degrees, minutes and seconds and the bearing to the nearest tenth of a degree and distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid;
- (d) applicable holding patterns;
- (e) transition altitude or height to the nearest higher 300 m or 1 000 ft;
- (f) the position and height of close-in obstacles which penetrate the obstacle identification surface, and a note shall be included whenever close-in obstacles penetrating the obstacle identification surface exist but which were not considered for the published procedure design gradient;
- (g) area speed restrictions, where established;
- (h) the designation of the navigation specification(s) including any limitations, where established;
- (i) compulsory and “on-request” reporting points;
- (j) radio communication procedures, including —
 - (i) call sign of air traffic services unit,
 - (ii) frequency and if applicable, satellite voice communications number, and
 - (iii) transponder setting, where appropriate;
- (k) an indication of “flyover” significant points; and
- (l) a textual description of standard departure route(s) – instrument and relevant communication failure procedures are provided and whenever feasible, be shown on the chart or on the same page which contains the chart.

102. An aeronautical cartographic service provider shall ensure that the appropriate data to support navigation database coding is published in accordance with the procedures for Air Navigation Services - Aircraft Operations, Document 8168, Volume II, Part III, Section 5, Chapter 2, 2.1, on the reverse of the chart or as a separate, properly referenced sheet.

Aeronautical
database
requirements

PART X — Standard Arrival Chart – Instrument (STAR)

103. An aeronautical cartographic service provider shall ensure that the standard arrival chart – instrument provides the flight crew with information to enable the flight crew to comply with the designated standard arrival route instrument from the en-route phase to the approach phase.

Function

104. An aeronautical cartographic service provider shall ensure that the standard arrival chart – instrument is made available wherever a standard arrival route – instrument has been established and cannot be shown with sufficient clarity on the area chart.

Availability

- Coverage and scale **105.** An aeronautical cartographic service provider shall ensure that —
- (a) the coverage of the standard arrival chart – instrument is sufficient to indicate the points where the en-route phase ends and the approach phase begins;
 - (b) the standard arrival chart – instrument is drawn to scale and a scale-bar is shown; and
 - (c) the symbol for scale break is used on tracks and other aspects of the standard arrival chart – instrument which are too large to be drawn to scale.
- Projection **106.** An aeronautical cartographic service provider shall ensure that —
- (a) the graduation marks are placed at consistent intervals along the neat lines;
 - (b) a conformal projection on which a straight line approximates a great circle is used; and
 - (c) when the standard arrival chart – instrument is drawn to scale, parallels and meridians are shown at suitable intervals.
- Identification **107.** An aeronautical cartographic service provider shall ensure that the standard arrival chart – instrument is identified by the —
- (a) name of the city or town or area which the aerodrome serves;
 - (b) name of the aerodrome; and
 - (c) identification of the standard arrival route(s) – instrument as established in accordance with the Procedures for Air Navigation Services – Aircraft Operations Document 8168, Volume II, Part I, Section 4, Chapter 2.
- Culture and topography **108.** An aeronautical cartographic service provider shall ensure that —
- (a) generalised shore lines of open water areas, large lakes and rivers are shown where the chart is drawn to scale, except where they conflict with data more applicable to the function of the chart;
 - (b) areas where significant relief exists, the chart to be drawn to scale and all relief exceeding 300 m (1 000 ft.) above the aerodrome elevation to be shown by smoothed contour lines, contour values and layer tints printed in brown;
 - (c) appropriate spot elevations, including the highest elevation within each top contour line, should be shown printed in black; and
 - (d) obstacles also are shown.
- Magnetic variation **109.** The magnetic variation used in determining the magnetic bearings, tracks and radials shall be shown to the nearest degree.
- Bearings, tracks and radials **110.** An aeronautical cartographic service provider shall ensure that —
- (a) bearings, tracks and radials —
 - (i) are magnetic, and
 - (ii) are shown in parentheses to the nearest tenth of a degree where they are provided additionally as true values for area navigation segments;
 - (iii) where given with reference to True North or Grid North, this is clearly indicated; and
 - (b) where Grid North is used, its reference grid meridian is identified.

Aeronautical data

- Aerodromes **111.** An aeronautical cartographic service provider shall ensure that —
- (a) the aerodrome of landing is shown by the runway pattern; and
 - (b) aerodromes which affect the designated standard arrival route – instrument are shown and identified and where appropriate, the aerodrome runway patterns are shown.

- 112.** An aeronautical cartographic service provider shall ensure that the prohibited, restricted and danger areas which may affect the execution of the procedures are shown with their identification and vertical limits. Prohibited, restricted and danger areas
- 113.** An aeronautical cartographic service provider shall ensure that — Minimum sector altitude
- (a) established minimum sector altitude is shown with a clear indication of the sector to which the minimum sector altitude applies;
 - (b) standard arrival chart - instrument is drawn to scale and area minimum altitudes are shown within quadrilaterals formed by the parallels and meridians where the minimum sector altitude has not been established; and
 - (c) area minimum altitudes are shown in those parts of the chart not covered by the minimum sector altitude.
- 114.** (1) An aeronautical cartographic service provider shall ensure that components of the established relevant air traffic services system shall be shown. Air traffic services system
- (2) Components of the established relevant air traffic services system shall comprise —
- (a) graphic portrayal of each standard arrival route – instrument, including —
 - (i) route designator,
 - (ii) significant points defining the route,
 - (iii) track or radial to the nearest degree along each segment of the route,
 - (iv) distances to the nearest kilometre or nautical mile between significant points,
 - (v) minimum obstacle clearance altitudes, along the route or route segments and altitudes required by the procedure to the nearest higher 50 m or 100 feet and flight level restrictions where established,
 - (vi) where the chart is drawn to scale and vectoring on arrival is provided, established minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified;
 - (b) the radio navigation aid associated with the route including —
 - (i) plain language name,
 - (ii) identification,
 - (iii) frequency,
 - (iv) geographical coordinates in degrees, minutes and seconds,
 - (v) for distance measuring equipment, the channel and the elevation of the transmitting antenna of the distance measuring equipment to the nearest 30 m (100 ft);
 - (c) the name-codes of the significant points not marked by the position of a radio navigation aid, their geographical coordinates in degrees, minutes and seconds and the bearing to the nearest tenth of a degree and distance to the nearest two-tenths of a kilometre (tenth of a nautical mile) from the reference radio navigation aid;
 - (d) applicable holding patterns;
 - (e) transition altitude or height to the nearest higher 300 m or 1 000 ft;
 - (f) area speed restrictions, where established;
 - (g) the designation of the navigation specification including any limitations, where established;
 - (h) compulsory and “on-request” reporting points;
 - (i) radio communication procedures, including —
 - (i) call sign of air traffic services unit,
 - (ii) frequency and if applicable, satellite voice communications number, and
 - (iii) transponder setting, where appropriate;

- (j) an indication of “flyover” significant waypoints; and
 - (k) for arrival procedures to an instrument approach designed specifically for helicopters the term “CAT H” shall be depicted in the arrival chart plan view; and
 - (l) a textual description of standard arrival route(s) – instrument and relevant communication failure procedures are provided and whenever feasible, be shown on the chart or on the same page which contains the chart.
- 115.** An aeronautical cartographic service provider shall ensure that appropriate data to support navigation database coding is published in accordance with the Procedures for Air Navigation Services – Aircraft Operations Document 8168, Volume II, Part III, on the reverse of the chart or as a separate, properly referenced sheet.

Aeronautical
database
requirements

PART XI — *Instrument Approach Chart*

- 116.** An aeronautical cartographic service provider shall ensure that the instrument approach chart provides flight crews with information which will enable the flight crew to perform an approved instrument approach procedure to the runway of intended landing including the missed approach procedure and, where applicable, associated holding patterns.
- 117.** An aeronautical cartographic service provider shall ensure that —
- (a) the instrument approach charts are made available for aerodromes used by international civil aviation where instrument approach procedures have been established by the Authority;
 - (b) a separate instrument approach chart is provided for each precision approach procedure established by the Authority;
 - (c) a separate instrument approach chart is provided for each non-precision approach procedure established by the Authority;
 - (d) more than one chart is provided when the values for track, time or altitude differ between categories of aircraft on other than the final approach segment of the instrument approach procedures and the listing of these differences on a single chart could cause clutter or confusion; and
 - (e) the instrument approach charts are revised whenever information essential to safe operation becomes out of date.
- 118.** An aeronautical cartographic service provider shall ensure that —
- (a) the coverage of the instrument approach chart is sufficient to include all segments of the instrument approach procedure and such additional areas as may be necessary for the type of approach intended;
 - (b) the scale selected ensures optimum legibility consistent with —
 - (i) the procedure shown on the chart, and
 - (ii) sheet size;
 - (c) a scale indication is given;
 - (d) a distance circle with a radius of 20 kilometres (10 nautical miles) centered on a distance measuring equipment located on or close to the aerodrome, or on the aerodrome reference point where no suitable distance measuring equipment is available, is shown and the radius of the distance measuring equipment indicated on the circumference, except where this is not practicable; and
 - (e) a distance scale is shown directly below the profile.

Function

Availability

Coverage and
scale

- 119.** An aeronautical cartographic service provider shall ensure that the sheet size is 210 x 297 mm (8.27 x 11.69 inches) (A4). Format
- 120.** An aeronautical cartographic service provider shall ensure that — Projection
- (a) a conformal projection on which a straight line approximates a great circle is used; and
 - (b) graduation marks are placed at consistent intervals along the neat lines.
- 121.** An aeronautical cartographic service provider shall ensure that the instrument approach chart is identified by the — Identification
- (a) name of the city or town or area which the aerodrome serves;
 - (b) name of the aerodrome; and
 - (c) identification of the instrument approach procedure as established in accordance with the Procedures for Air Navigation Services – Aircraft Operations Document 8168, Volume II, Part I, Section 4, Chapter 9.
- 122.** An aeronautical cartographic service provider shall ensure that — Culture and topography
- (a) culture and topographic information pertinent to the safe execution of the instrument approach procedure, including the missed approach procedure, associated holding procedures and visual maneuvering (circling) procedure when established, is shown;
 - (b) topographic information is named, only when necessary, to facilitate the understanding of such information, and the minimum is delineation of land masses and significant lakes and rivers;
 - (c) relief is shown in a manner best suited to the particular elevation characteristics of the area;
 - (d) in areas where —
 - (i) relief exceeds 1 200 m (4 000 ft) above the aerodrome elevation within the coverage of the instrument approach chart,
 - (ii) relief exceeds or 600 m (2 000 ft) within 11 km (6 NM) of the aerodrome reference point, or
 - (iii) when final approach or missed approach procedure gradient is steeper than optimal due to terrain,
 all relief exceeding 150 m (500 ft) above the aerodrome elevation shall be shown by smoothed contour lines, contour values and layer tints printed in brown;
 - (e) appropriate spot elevations, including the highest elevation within each top contour line, is shown printed in black;
 - (f) in areas where relief is lower than specified in this regulation, all relief exceeding 150 m (500 ft) above the aerodrome elevation are shown by smoothed contour lines, contour values and layer tints printed in brown; and
 - (g) appropriate spot elevations, including the highest elevation within each top contour line, to be shown, printed in black.
- 123.** An aeronautical cartographic service provider shall ensure that — Magnetic variation
- (a) magnetic variation is shown; and
 - (b) the value of the variation, indicated to the nearest degree, agrees with that used in determining magnetic bearings, tracks and radials, when shown.
- 124.** An aeronautical cartographic service provider shall ensure that — Bearings, tracks and radials
- (a) bearings, tracks and radials are magnetic;
 - (b) bearings and tracks are shown in parentheses to the nearest tenth of a degree where bearings and tracks are additionally provided as true values for area navigation segments;
 - (c) bearings, tracks or radials are clearly indicated where bearings, tracks or radials are given with reference to True North or Grid North; and

- (d) where Grid North is used, its reference grid meridian is identified.

Aeronautical data

Aerodromes

- 125.** An aeronautical cartographic service provider shall ensure that —
- (a) aerodromes which show a distinctive pattern from the air are shown by the appropriate symbol and abandoned aerodromes are identified as abandoned;
 - (b) the runway pattern, at a scale sufficiently large to show it clearly is shown for —
 - (i) the aerodrome on which the procedure is based, and
 - (ii) aerodromes affecting the traffic pattern or so situated as to be likely, under adverse weather conditions, to be mistaken for the aerodrome of intended landing;
 - (c) the aerodrome elevation is shown to the nearest foot in a prominent position on the chart; and
 - (d) the threshold elevation or, where applicable, the highest elevation of the touchdown zone is shown to the nearest meter or foot.

Obstacles

- 126.** An aeronautical cartographic service provider shall ensure that —
- (a) obstacles are shown on the plan view of the instrument approach chart;
 - (b) obstacles are identified if one or more obstacles are the determining factor of an obstacle clearance altitude or height;
 - (c) the elevation of the top of obstacles are shown to the nearest metre or foot;
 - (d) the heights of obstacles above a datum other than mean sea level are shown and, are given in parentheses on the chart when shown;
 - (e) the datum is the aerodrome elevation when the heights of obstacles above a datum other than mean sea level are shown, except that, at aerodromes having an instrument runway with a threshold elevation more than 2 m (7 ft) below the aerodrome elevation, the chart datum shall be the threshold elevation of the runway to which the instrument approach is related;
 - (f) the datum is stated in a prominent position on the instrument approach chart, where a datum other than mean sea level is used;
 - (g) the obstacle free zone is indicated, where an obstacle free zone has not been established for a precision approach runway Category I; and
 - (h) obstacles that penetrate the visual segment surface are identified on the chart.

Prohibited, restricted and danger areas

- 127.** An aeronautical cartographic service provider shall ensure that prohibited areas, restricted areas, and danger areas which may affect the execution of the procedures are shown with their identification and vertical limits.

Radio communication facilities and navigation aids

- 128.** An aeronautical cartographic service provider shall ensure that —
- (a) radio navigation aids required for the procedures together with their frequencies, identifications and track-defining characteristics, if any, are shown;
 - (b) the facility to be used for track guidance for final approach is clearly identified in the case of a procedure in which more than one station is located on the final approach track;
 - (c) consideration is given to the elimination from the instrument approach chart of those facilities that are not used by the procedure;

- (d) the initial approach fix, the intermediate approach fix, the final approach fix or final approach point for an ILS approach procedure, the missed approach point, where established, and other essential fixes or points comprising the procedure are shown and identified;
- (e) the final approach fix or final approach point for an ILS approach procedure are identified with its geographical coordinates in degrees, minutes and seconds;
- (f) radio navigation aids that might be used in diversionary procedures together with their track-defining characteristics, if any, are shown or indicated on the instrument approach chart;
- (g) radio communication frequencies, including call signs that are required for the execution of the procedures are shown;
- (h) the distance to the aerodrome from each radio navigation aid concerned with the final approach is shown to the nearest kilometre or nautical mile when required by the procedures; and
- (i) the bearing is also being shown to the nearest degree when no track-defining aid indicates the bearing of the aerodrome.

129. An aeronautical cartographic service provider shall ensure that the minimum sector altitude or terminal arrival altitude established is shown, with a clear indication of the sector to which the minimum sector altitude or terminal arrival altitude applies.

Minimum
sector altitude
or terminal
arrival altitude

130. An aeronautical cartographic service provider shall ensure that —

- (a) plan view shows the following information in the manner indicated —
 - (i) the approach procedure track by an arrowed continuous line indicating the direction of flight,
 - (ii) the missed approach procedure track by an arrowed broken line,
 - (iii) any additional procedure track, other than those specified in subparagraphs (i) and (ii), by an arrowed dotted line,
 - (iv) bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure,
 - (v) where no track-defining aid is available, the magnetic bearing to the nearest degree to the aerodrome from the radio navigation aids concerned with the final approach,
 - (vi) the boundaries of any sector in which visual maneuvering is prohibited,
 - (vii) where specified, the holding pattern and minimum holding altitude or height associated with the approach and missed approach,
 - (viii) caution notes where required, prominently displayed on the face of the chart, and
 - (ix) an indication of “flyover” significant points;
- (b) plan view shows the distance to the aerodrome from each radio navigation aid concerned with the final approach;
- (c) a profile is provided normally below the plan view showing the following data —
 - (i) the aerodrome by a solid block at aerodrome elevation,
 - (ii) the profile of the approach procedure segments by an arrowed continuous line indicating the direction of flight,
 - (iii) the profile of the missed approach procedure segment by an arrowed broken line and a description of the procedure,
 - (iv) the profile of any additional procedure segment, other than those specified in subparagraphs (ii) and (iii), by an arrowed dotted line,

Portrayal of
procedure
tracks

- (v) bearings, tracks, radials to the nearest degree and distances to the nearest two-tenths of a kilometre or tenth of a nautical mile or times required for the procedure,
 - (vi) altitudes or heights required by the procedures, including transition altitude and procedure altitudes or heights, and heliport crossing height where established,
 - (vii) limiting distance to the nearest kilometre or nautical mile on procedure turn, when specified,
 - (viii) the intermediate approach fix or point, on procedures where no course reversal is authorised, and
 - (ix) a line representing the aerodrome elevation or threshold elevation, as appropriate, extended across the width of the chart including a distance scale with its origin at the runway threshold;
- (d) heights required by procedures are shown in parentheses, using the height datum selected in accordance with regulation 126; and
- (e) profile view includes a ground profile or a minimum altitude or height portrayal as follows —
- (i) a ground profile shown by a solid line depicting the highest elevations of the relief occurring within the primary area of the final approach segment, with the highest elevations of the relief occurring in the secondary areas of the final approach segment shown by a dashed line, or
 - (ii) minimum altitudes or heights in the intermediate and final approach segments indicated within bounded shaded blocks.

Aerodrome
operating
minima

- 131.** An aeronautical cartographic service provider shall ensure that —
- (a) aerodrome operating minima when established by the Authority is shown;
 - (b) obstacle clearance altitudes or heights for the aircraft categories for which the procedure is designed are shown; and
 - (c) for precision approach procedures, the obstacle clearance altitudes or heights for Category DL aircraft of wing span between 65 m and 80 m and vertical distance between the flight path of the wheels and the glide path antenna between 7 m and 8 m is published, when necessary.

Supplementary
cartographic

- 132.** An aeronautical cartographic service provider shall ensure that —
- (a) where the missed approach point is defined by —
 - (i) a distance from the final approach fix is shown, or
 - (ii) a facility or a fix and the corresponding distance from the final approach fix,

the distance to the nearest two-tenths of a kilometre or tenth of a nautical mile and a table showing ground speeds and times from the final approach fix to the missed approach point is shown;

- (b) a table showing altitudes or heights for each 2km or 1 NM is shown as appropriate when distance measuring equipment is required for use in the final approach segment;
- (c) the table does not include distances which would correspond to altitudes or heights below the obstacle clearance altitudes or heights;
- (d) a table showing the altitudes or heights is included for procedures in which distance measuring equipment is not required for use in the final approach segment but where a suitably located distance measuring equipment is available to provide advisory descent profile cartographic;

- (e) a rate of descent table is shown;
- (f) the final approach descent gradient to the nearest one-tenth of a percent and, in parentheses, descent angle to the nearest one-tenth of a degree is shown for non-precision approach procedures with a final approach fix;
- (g) the reference datum height to the nearest half metre or foot and the glide path or elevation or vertical path angle to the nearest one-tenth of a degree is shown for precision approach procedures and approach procedures with vertical guidance;
- (h) a clear indication is given whether it applies to the ILS, the associated ILS localizer only procedure, or both when a final approach fix is specified at the final approach point for ILS;
- (i) in the case of mean sea level, a clear indication is given when a final approach fix has been specified at the final approach point; and
- (j) a cautionary note is included, if the final approach descent gradient or angle for any type of instrument approach procedure exceeds the maximum value specified in the Procedures for Air Navigation Services – Aircraft Document 8168 Volume II, Part I, Section 4, Chapter 5.

133. An aeronautical cartographic service provider shall ensure that appropriate data to support navigation database coding is published in accordance with the Procedures for Air Navigation Services – Aircraft Operations Document 8168 Volume II, Part I, Section 4, Chapter 9, for non-RNAV procedures, on the reverse of the instrument approach chart or as a separate, properly referenced sheet.

Aeronautical
database
requirements

PART XII — Visual Approach Chart

134. An aeronautical cartographic service provider shall ensure that the Visual Approach chart provides flight crews with information which will enable the flight crew to transit from the en-route or descent to approach phases of flight to the runway of intended landing by means of visual reference.

Function

135. An aeronautical cartographic service provider shall ensure that the visual approach chart is made available in the manner specified in regulation 5 (b) for aerodromes used by international civil aviation where —

Availability

- (a) limited navigation facilities are available; or
- (b) radio communication facilities are not available; or
- (c) no adequate aeronautical charts of the aerodrome and its surroundings at 1:500,000 or greater scale are available; or
- (d) visual approach procedures have been established.

136. An aeronautical cartographic service provider shall ensure that —

Scale

- (a) the scale used for the visual approach chart is sufficiently large to permit depiction of significant features and indication of the aerodrome layout;
- (b) the scale is not smaller than 1:500 000; and
- (c) when an instrument approach chart is available for a given aerodrome, the visual approach chart is drawn to the same scale.

137. An aeronautical cartographic service provider shall ensure that the basic sheet size is 210 × 297 mm (8.27 x 11.69 inches) (A4).

Format

138. An aeronautical cartographic service provider shall ensure that —

Projection

- (a) a conformal projection on which a straight line approximates a great circle is used; and
- (b) graduation marks are placed at consistent intervals along the neat lines.

- Identification** **139.** An aeronautical cartographic service provider shall ensure that the chart is identified by the —
- (a) name of the city or town which the aerodrome serves; and
 - (b) the name of the aerodrome.
- Culture and topography** **140.** An aeronautical cartographic service provider shall ensure that the —
- (a) natural and cultural landmarks are shown;
 - (b) geographical place names are included only when they are required to avoid confusion or ambiguity;
 - (c) shore lines, lakes, rivers and streams are shown;
 - (d) relief is shown in a manner best suited to the particular elevation and obstacle characteristics of the area covered by the visual approach chart;
 - (e) spot elevations are carefully selected when shown; and
 - (f) figures relating to different reference levels are clearly differentiated in their presentation.
- Magnetic variation** **141.** An aeronautical cartographic service provider shall ensure that the magnetic variation is shown.
- Bearings, tracks and radials** **142.** An aeronautical cartographic service provider shall ensure that —
- (a) bearings, tracks and radials are magnetic;
 - (b) bearings and tracks are shown in parentheses to the nearest tenth of a degree where bearings and tracks are additionally provided as true values for area navigation segments;
 - (c) bearings, tracks or radials are clearly indicated where bearings, tracks or radials are given with reference to True North or Grid North; and
 - (d) where Grid North is used, its reference grid meridian is identified.

Aeronautical data

- Aerodromes** **143.** An aeronautical cartographic service provider shall ensure that —
- (a) aerodromes are shown by the runway pattern;
 - (b) the restrictions on the use of any landing direction is indicated;
 - (c) where there is any risk of confusion between two neighbouring aerodromes, this is indicated;
 - (d) abandoned aerodromes are identified as abandoned; and
 - (e) the aerodrome elevation is shown in a prominent position on the visual approach chart.
- Obstacles** **144.** An aeronautical cartographic service provider shall ensure that the —
- (a) obstacles are shown and identified;
 - (b) elevation of the top of obstacles is shown to the nearest next higher metre or foot;
 - (c) heights of obstacles above the aerodrome elevation are shown; and
 - (d) height datum is stated in a prominent position on the chart and the heights are given in parentheses on the chart, when the heights of obstacles are shown.
- Prohibited, restricted and danger areas** **145.** An aeronautical cartographic service provider shall ensure that the prohibited areas, restricted areas, and danger areas are depicted with their identification and vertical limits.
- Designated airspace** **146.** An aeronautical cartographic service provider shall ensure that the control zones and aerodrome traffic zones are depicted with their vertical limits and the appropriate class of airspace, where applicable.

- 147.** An aeronautical cartographic service provider shall ensure that the — Visual approach information
- (a) visual approach procedures are shown, where applicable;
 - (b) visual aids for navigation are shown as appropriate; and
 - (c) location and type of the visual approach slope indicator systems with their nominal approach slope angle, minimum eye height over the threshold of the on-slope signal and where the axis of the system is not parallel to the runway centre line, the angle and direction of displacement, either left or right, are shown.
- 148.** An aeronautical cartographic service provider shall ensure that the — Supplementary information
- (a) radio navigation aids together with their frequencies and identifications are shown as appropriate; and
 - (b) radio communication facilities with their frequencies are shown as appropriate.

PART XIII — Aerodrome or Heliport Chart

- 149.** An aeronautical cartographic service provider shall ensure that the — Function
- (a) aerodrome or heliport chart provides flight crews with information to facilitate the ground movement of aircraft from the —
 - (i) aircraft stand to the runway, and
 - (ii) runway to the aircraft stand;
 - (b) aerodrome or heliport chart provides flight crews with information to facilitate the helicopter movement —
 - (i) from the helicopter stand to the touchdown and lift-off area and to the final approach and take-off area,
 - (ii) from the final approach and take-off area to the touchdown and lift-off area and to the helicopter stand,
 - (iii) along helicopter ground and air taxiways, and
 - (iv) along air transit routes; and
 - (c) aerodrome or heliport chart provides essential operational information at the aerodrome or heliport.
- 150.** An aeronautical cartographic service provider shall ensure that the — Availability
- (a) aerodrome or heliport chart is made available in the manner specified in Civil Aviation (Aerodromes) Regulations for aerodromes or heliports regularly used by international civil aviation; and
 - (b) aerodrome or heliport chart is made available in the manner specified in regulation 5 (b) of these Regulations.
- 151.** An aeronautical cartographic service provider shall ensure that — Coverage and scale
- (a) the coverage and scale of the aerodrome or heliport chart are sufficiently large to show clearly the elements listed in regulation 154; and
 - (b) a linear scale is shown.
- 152.** An aeronautical cartographic service provider shall ensure that the chart is identified by the — Identification
- (a) name of the city or town or area which the aerodrome or heliport serves; and
 - (b) name of the aerodrome or heliport.
- 153.** An aeronautical cartographic service provider shall ensure that the True and Magnetic North arrows and magnetic variation to the nearest degree and annual change of the magnetic variation are shown. Magnetic variation
- 154.** (1) An aeronautical cartographic service provider shall ensure that an aerodrome or heliport chart shows — Aerodrome/heliport data

- (a) geographical coordinates in degrees, minutes and seconds for the aerodrome or heliport reference point;
- (b) elevations, to the nearest metre or foot, of the aerodrome or heliport and apron, altimeter checkpoint locations, where applicable, and for non-precision approaches, elevations and geoid undulations of runway thresholds and the geometric centre of the touchdown and lift-off area;
- (c) elevations and geoid undulations, to the nearest half-metre or foot, of the precision approach runway threshold, the geometric centre of the touchdown and lift-off area, and at the highest elevation of the touchdown zone of a precision approach runway;
- (d) runways including those under construction with designation number, length and width to the nearest metre, bearing strength, displaced thresholds, stopways, clearways, runway directions to the nearest degree magnetic, type of surface and runway markings;
- (e) all aprons, with aircraft or helicopter stands, lighting, markings and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems, type of surface for heliports, and bearing strengths or aircraft type restrictions where the bearing strength is less than that of the associated runways;
- (f) geographical coordinates in degrees, minutes and seconds for thresholds, geometric centre of touchdown and lift-off area and/or thresholds of the final approach and take-off area, where appropriate;
- (g) taxiways, helicopter air and ground taxiways with type of surface, helicopter air transit routes, with designations, width, lighting, markings, including runway-holding positions and, where established, intermediate holding positions, stop bars, other visual guidance and control aids, and bearing strength or aircraft type restrictions where the bearing strength is less than that of the associated runways;
- (h) where established, hot spot locations with additional information properly annotated;
- (i) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points and aircraft stands;
- (j) where established, standard routes for taxiing aircraft with their designators;
- (k) the boundaries of the air traffic control service;
- (l) position of runway visual range observation sites;
- (m) approach and runway lighting;
- (n) location and type of the visual approach slope indicator systems with their nominal approach slope angle, minimum eye height over the threshold of the on-slope signal, and where the axis of the system is not parallel to the runway centre line, the angle and direction of the displacement;
- (o) relevant communication facilities listed with their channels and, if applicable, logon address;
- (p) obstacles to taxiing;
- (q) aircraft servicing areas and buildings of operational significance;
- (r) VOR checkpoint and radio frequency of the aid concerned; and
- (s) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

(2) An aeronautical cartographic service provider shall, in addition to the items specified in subregulation (1), ensure that the chart shows in relation to heliports —

- (a) heliport type;
- (b) touchdown and lift-off area including dimensions to the nearest metre, slope, type of surface and bearing strength in tonnes;
- (c) final approach and take-off area including type, true bearing to the nearest degree, designation number, where appropriate, length and width to the nearest metre, slope and type of surface;
- (d) safety area including length, width and type of surface;
- (e) helicopter clearway including length and ground profile;
- (f) obstacles including type and elevation of the top of the obstacles to the nearest, next higher, metre or foot;
- (g) visual aids for approach procedures, marking and lighting of final approach and take-off area, and of touchdown and lift-off area; and
- (h) declared distances to the nearest metre for heliports, where relevant, including —
 - (i) take-off distance available,
 - (ii) rejected take-off distance available, and
 - (iii) landing distance available.

PART XIV — *Aerodrome Ground Movement Chart*

- | | |
|--|--------------------------|
| <p>155. An aeronautical cartographic service provider shall ensure that the aerodrome ground movement chart provides flight crews with detailed information to facilitate the ground movement of aircraft to and from the aircraft stands and the parking or docking of aircraft.</p> | Function |
| <p>156. An aeronautical cartographic service provider shall ensure that the aerodrome ground movement chart is made available in the manner specified in regulation 5 (b) where, due to congestion of information, details necessary for the ground movement of aircraft along the taxiways to and from the aircraft stands cannot be shown with sufficient clarity on the aerodrome or heliport chart.</p> | Availability |
| <p>157. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) the coverage and scale are sufficiently large to show clearly the elements specified in regulation 160; and (b) a linear scale is shown. | Coverage and scale chart |
| <p>158. An aeronautical cartographic service provider shall ensure that the chart is identified by the —</p> <ul style="list-style-type: none"> (a) name of the city or town or area which the aerodrome serves; and (b) name of the aerodrome. | Identification |
| <p>159. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) a True North arrow is shown; and (b) magnetic variation to the nearest degree and its annual change are shown. | Magnetic variation |
| <p>160. An aeronautical cartographic service provider shall ensure that the aerodrome ground movement chart shows in a similar manner, the information on the aerodrome or heliport chart relevant to the area depicted, including —</p> <ul style="list-style-type: none"> (a) apron elevation to the nearest metre or foot; (b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems; (c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands; | Aerodrome data |

- (d) taxiways with designations, width to the nearest metre, bearing strength or aircraft type restrictions where applicable, lighting, markings, including runway-holding positions and, where established, intermediate holding positions, stop bars, and other visual guidance and control aids;
- (e) where established, hot spot locations with additional information properly annotated;
- (f) where established, standard routes for taxiing aircraft, with their designators;
- (g) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;
- (h) the boundaries of the air traffic control service;
- (i) relevant communication facilities listed with their channels and, if applicable, logon address;
- (j) obstacles to taxiing;
- (k) aircraft servicing areas and buildings of operational significance;
- (l) VOR checkpoint and radio frequency of the aid concerned; and
- (m) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

PART XV — Aircraft Parking or Docking Chart

Function	161. An aeronautical cartographic service provider shall ensure that the aircraft parking or docking chart provides flight crews with detailed information to facilitate the ground movement of aircraft between the taxiways and the aircraft stands and the parking or docking of aircraft.
Availability	162. An aeronautical cartographic service provider shall ensure that the aircraft parking or docking chart is made available in the manner prescribed regulation 5 (b) where, due to the complexity of the terminal facilities, the information cannot be shown with sufficient clarity on the aerodrome or heliport chart or on the aerodrome ground movement chart.
Coverage and scale	163. An aeronautical cartographic service provider shall ensure that — <ul style="list-style-type: none"> (a) the coverage and scale of the aircraft parking or docking chart is sufficiently large to show clearly the elements specified in regulation 166; and (b) a linear scale is shown.
Identification	164. An aeronautical cartographic service provider shall ensure that the aircraft or docking chart is identified by the — <ul style="list-style-type: none"> (a) name of the city or town or area which the aerodrome serves; and (b) name of the aerodrome.
Magnetic variation	165. An aeronautical cartographic service provider shall ensure that — <ul style="list-style-type: none"> (a) a True North arrow is shown; and (b) magnetic variation to the nearest degree and its annual change are shown.
Aerodrome data	166. An aeronautical cartographic service provider shall ensure that the chart shows in a similar manner the information on the aerodrome or heliport chart and the aerodrome ground movement chart relevant to the area depicted, including — <ul style="list-style-type: none"> (a) apron elevation to the nearest metre or foot; (b) aprons with aircraft stands, bearing strengths or aircraft type restrictions, lighting, marking and other visual guidance and control aids, where applicable, including location and type of visual docking guidance systems; (c) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for aircraft stands;

- (d) taxiway entries with designations, including runway-holding positions and, where established, intermediate holding positions, and stop bars;
- (e) where established, hot spot locations with additional information properly annotated;
- (f) geographical coordinates in degrees, minutes, seconds and hundredths of seconds for appropriate taxiway centre line points;
- (g) the boundaries of the air traffic control service;
- (h) relevant communication facilities listed with their channels and, if applicable, logon address;
- (i) obstacles to taxiing;
- (j) aircraft servicing areas and buildings of operational significance;
- (k) VOR checkpoint and radio frequency of the aid concerned; and
- (l) any part of the depicted movement area permanently unsuitable for aircraft, clearly identified as such.

PART XVI — *World Aeronautical Chart – ICAO 1:1 000 000*

167. An aeronautical cartographic service provider shall ensure that the world aeronautical chart – 1:1,000,000 provides information to satisfy the requirements of visual air navigation — Function

- (a) as a basic aeronautical chart —
 - (i) when highly specialized charts lacking visual information do not provide essential data,
 - (ii) to provide complete world coverage at a constant scale with a uniform presentation of planimetric data, and
 - (iii) in the production of other charts required by international civil aviation; and
- (b) as a pre-flight planning chart.

168. An aeronautical cartographic service provider shall ensure that the — Availability

- (a) World Aeronautical Chart – 1:1 000 000 is made available in the manner specified in regulation 5(b) for areas delineated in Schedule 5;
- (b) selection of a scale other than 1:1 000 000 is determined by regional agreement to ensure complete coverage of land areas and adequate continuity in any one coordinated series.

169. An aeronautical cartographic service provider shall ensure that — Scales

- (a) the linear scales for kilometres and nautical miles arranged with their zero points in the same vertical line is shown in the margin in the following order —
 - (i) kilometres, and
 - (ii) nautical miles;
- (b) the length of the linear scales represents at least 200 km (110 NM); and
- (c) a conversion scale in metre or feet is shown in the margin.

170. An aeronautical cartographic service provider shall ensure that — Format

- (a) the title and marginal notes are in English;
- (b) the information regarding the number of the adjoining sheets and the unit of measurement to express elevations is located as to be clearly visible when the sheet is folded;
- (c) the sheet lines conform with those shown in the index in Schedule 5, whenever practicable;
- (d) the sheet lines used are notified to the International Civil Aviation Organization for publication in the International Civil Aviation Organization's Aeronautical Chart Catalogue;

Projection

- (e) overlaps are provided by extending the chart area on the top and right side beyond the area given on the index;
- (f) the overlap area contain aeronautical, topographical, hydrographical and cultural information; and
- (g) the overlap extend up to 28 km (15 NM), if possible, but in any case from the limiting parallels and meridians of each chart to the neat line.

171. (1) An aeronautical cartographic service provider shall ensure that the Lambert conformal conic projection is used, in separate bands for each tier of charts and the standard parallels for each 4° band is 40 south of the northern parallel and 40° north of the southern parallel.

(2) The aeronautical cartographic service provider shall ensure that the graticules and graduations are shown as follows —

(a) Parallels —

Latitude	Distance between Parallels	Graduation on Parallels
0 to 72°	30'	1'
72° to 84°	30'	5'
84° to 89°	30'	1°
89° to 90°	30'	5°

(only on degree parallels from 72° to 89°)

(b) Meridians —

Latitude	Distance between Parallels	Graduation on Meridians
0 to 52°	30'	1'
52° to 72°	30'	1'
		(Only on even numbered meridians)
72° to 84°	10	1'
84° to 89°	50	1'
89° to 90°	15°	1'

(Only on every fourth meridian)

- (c) the graduation marks at 1' and 5' intervals extend away from the Greenwich Meridian and from the Equator and each 10' interval is shown by a mark on both sides of the graticule line;
- (d) the length of the graduation marks are approximately 1.3 mm (0.05 in) for the 1' intervals, and 2 mm (0.08 in) for the 5' intervals and 2 mm (0.08 in) extending on both sides of the graticule line for the 10' intervals;
- (e) meridians and parallels shown are numbered in the borders of the chart;
- (f) each parallel is numbered within the body of the chart in such a manner that the parallel can be readily identified when the chart is folded; and
- (g) the name and basic parameters of the projection are indicated in the margin.

Identification

172. An aeronautical cartographic service provider shall ensure that sheet numbering is in conformity with the index in Schedule 5.

- 173.** An aeronautical cartographic service provider shall ensure that —
- (a) the cities, towns and villages are selected and shown according to their relative importance to visual air navigation; and
 - (b) cities and towns of sufficient size are indicated by the outline of their built-up areas and not of their established city limits.
- Built-up areas
- 174.** An aeronautical cartographic service provider shall ensure that —
- (a) railroads having landmark value are shown and named where space permits; and
 - (b) the important tunnels are shown.
- Railroads
- 175.** An aeronautical cartographic service provider shall ensure that the —
- (a) road systems are shown in sufficient detail to indicate significant patterns from the air; and
 - (b) roads are not being shown in built-up areas unless they can be distinguished from the air as definite landmarks.
- Highways and roads
- 176.** An aeronautical cartographic service provider shall ensure that the following natural and cultural landmarks, when considered to be of importance for visual air navigation, are shown —
- (a) bridges;
 - (b) prominent transmission lines;
 - (c) permanent cable car installations;
 - (d) wind turbines;
 - (e) mine structures;
 - (f) forts;
 - (g) ruins;
 - (h) levees;
 - (i) pipelines;
 - (j) rocks;
 - (k) bluffs;
 - (l) cliffs;
 - (m) sand dunes;
 - (n) isolated lighthouses; and
 - (o) lightships.
- Landmarks
- 177.** An aeronautical cartographic service provider shall ensure that international boundaries are shown and undemarcated and undefined boundaries are distinguished by descriptive notes.
- Political boundaries
- 178.** An aeronautical cartographic service provider shall ensure that —
- (a) water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams including those non-perennial in nature, salt lakes, glaciers and ice caps are shown;
 - (b) the tint covering large open water areas is kept very light; and
 - (c) reefs and shoals, including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and similar areas, are shown by symbols when of significant landmark value.
- Hydrography
- 179.** An aeronautical cartographic service provider shall ensure that the —
- (a) contours are shown and the selection of intervals is governed by the requirement to depict clearly the relief features required in air navigation; and
 - (b) values of the contours used are shown.
- contours
- 180.** An aeronautical cartographic service provider shall ensure that the —
- (a) range of elevations for the tints is shown when hypsometric tints are used; and
 - (b) scale of the hypsometric tints used on the chart is shown in the margin.
- Hypsometric tints

- Spot elevations** **181.** An aeronautical cartographic service provider shall ensure that the —
- (a) spot elevations are shown at selected critical points and the elevations selected are the highest in the immediate vicinity and indicate the top of a peak and ridge;
 - (b) elevations in valleys and at lake surface level which are of special value to the aviator are shown and the position of each selected elevation is indicated by a dot;
 - (c) elevation of the highest point on the chart and its geographical position to the nearest five minutes are indicated in the margin; and
 - (d) spot elevation of the highest point in any sheet is cleared of hypsometric tinting.
- 182.** An aeronautical cartographic service provider shall ensure that the —
- (a) areas that have not been surveyed for contour information are labelled "Relief data incomplete; and
 - (b) charts on which spot elevations are generally unreliable bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows —
"Warning – The reliability of relief cartographic on this chart is doubtful and elevations are used with caution."
- Escarpments** **183.** An aeronautical cartographic service provider shall ensure that escarpments are shown when they are prominent landmarks or when cultural detail is very sparse.
- Wooded areas** **184.** An aeronautical cartographic service provider shall ensure that --
- (a) wooded areas are shown; and
 - (b) the approximate extreme northern or southern limits of tree growth are indicated by a dashed black line where shown and are appropriately labelled.
- Date of topographic information** **185.** An aeronautical cartographic service provider shall ensure that the date of latest information shown on the topographic base is indicated in the margin.
- Magnetic variation** **186.** An aeronautical cartographic service provider shall ensure that the —
- (a) isogonic lines are shown; and
 - (b) date of the isogonic information is indicated in the margin.

Aeronautical Data

- General** **187.** An aeronautical cartographic service provider shall ensure that aeronautical data shown is kept to a minimum consistent with the use of the chart for visual navigation and the revision cycle.
- Aerodromes** **188.** An aeronautical cartographic service provider shall ensure that the —
- (a) land and water aerodromes and heliports are shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance;
 - (b) aerodrome elevation, the lighting available, the type of runway surface and the length of the longest runway or channel, shown in abbreviated form for each aerodrome in conformity with the example in Schedule 2, is indicated provided they do not cause undesirable clutter on the chart; and
 - (c) abandoned aerodromes which are still recognizable as aerodromes from the air are shown and identified as abandoned.

- 189.** An aeronautical cartographic service provider shall ensure that the — Obstacles
- (a) obstacles are shown; and
 - (b) prominent transmission lines, permanent cable car installations and wind turbines, which are obstacles, are shown when considered of importance to visual flight.
- 190.** An aeronautical cartographic service provider shall ensure that the prohibited, restricted and danger areas are shown. Prohibited, restricted and danger areas
- 191.** An aeronautical cartographic service provider shall ensure that — Air traffic services system
- (a) significant elements of the air traffic services system including, where practicable, control zones, aerodrome traffic zones, control areas, flight information regions and other airspaces in which VFR flights operate are shown together with the appropriate class of airspace; and
 - (b) the air defense identification zone is shown, where appropriate, and properly identified.
- 192.** An aeronautical cartographic service provider shall ensure that radio navigation aids are shown by the appropriate symbol and named, but excluding their frequencies, coded designators, times of operation and other characteristics unless any or all of the information shown is kept up to date by means of new editions of the chart. Radio navigation aids
- 193.** An aeronautical cartographic service provider shall ensure that the aeronautical ground lights together with their characteristics or their identifications or both are shown. Supplementary information

PART XVII — *Aeronautical Chart – ICAO 1:500 000*

- 194.** An aeronautical cartographic service provider shall ensure that the aeronautical chart – 1: 500 000 provides information to satisfy the requirements of visual air navigation for low speed, short or medium-range operations at low and intermediate altitudes. Function
- 195.** An aeronautical cartographic service provider shall ensure that the aeronautical chart 1:500 000 is made available in the manner specified in regulation 5 (b) for all areas delineated in Schedule 5. Availability
- 196.** (1) An aeronautical cartographic service provider shall ensure that — Scales
- (a) the linear scales for kilometres and nautical miles arranged in the following order —
 - (i) kilometres,
 - (ii) nautical miles, with their zero points in the same vertical line is shown in the margin, and
 - (iii) the length of the linear scale to be not less than 200 mm (8 in); and
 - (b) a conversion scale is shown in the margin.
- 197.** An aeronautical cartographic service provider shall ensure that the — Format
- (a) title and marginal notes are in English;
 - (b) information regarding the number of the adjoining sheets and the unit of measurement used to express elevation is located as to be clearly visible when the sheet is folded;
 - (c) sheets are quarter sheets of the World Aeronautical Chart 1:1 000 000 whenever practicable;
 - (d) an appropriate index to adjacent sheets, showing the relationship between the two chart series is included on the face of the chart or on the reverse side;

- (e) overlaps are provided by extending the chart area on the top and right side beyond the area given on the index;
- (f) overlap area in paragraph (e) contain aeronautical, topographical, hydrographical and cultural information; and
- (g) overlap extend up to 15 km (8 NM), if possible, but in any case from the limiting parallels and meridians of each chart to the neat line.
- Projection** **198.** An aeronautical cartographic service provider shall ensure that —
- (a) a conformal projection is used;
- (b) the parallels are shown at intervals of 30’;
- (c) the meridians are shown at intervals of 30’;
- (d) the graduation marks are —
- (i) shown at 1’ intervals along each whole degree meridian and parallel, extending away from the Greenwich Meridian and from the Equator and each 10’ interval is shown by a mark on both sides of the graticule line,
- (ii) approximately 1.3 mm (0.05 in) for the 1’ intervals, and 2 mm (0.08 in) for the 5’ intervals and 2 mm (0.08 in) extending on both sides of the graticule line for the 10’ intervals.
- (e) the meridians and parallels shown are numbered —
- (i) in the borders of the chart, and
- (ii) within the body of the chart whenever this data is required operationally; and
- (f) the name and basic parameters of the projection is indicated in the margin.
- Identification** **199.** An aeronautical cartographic service provider shall ensure that —
- (a) each sheet is identified by a name of the principal town or of a main geographical feature appearing on the sheet; and
- (b) the sheets are identified by the reference number of the corresponding World Aeronautical Chart — 1:1 000 000 where applicable, with the addition of one or more of the following letter suffixes indicating the quadrant or quadrants —

Letter	Chart quadrant
A	North-West
B	North-East
C	South-East
D	South-West

Culture and topography

- Built-up areas** **200.** An aeronautical cartographic service provider shall ensure that —
- (a) the cities, towns and villages are selected and shown according to their relative importance to visual air navigation; and
- (b) cities and towns of sufficient size are indicated by the outline of their built-up areas and not of their established city limits.
- Railroads** **201.** An aeronautical cartographic service provider shall ensure that —
- (a) railroads having landmark value are shown; and
- (b) the tunnels are shown when they serve as prominent landmarks.
- Highways and roads** **202.** An aeronautical cartographic service provider shall ensure that the —
- (a) road systems are shown in sufficient detail to indicate significant patterns from the air; and

(b) roads are not shown in built-up areas unless they can be distinguished from the air as definite landmarks.

203. An aeronautical cartographic service provider shall ensure that the following natural and cultural landmarks, when considered to be of importance for visual air navigation, are shown — Landmarks

- (a) bridges;
- (b) prominent transmission lines;
- (c) permanent cable car installations;
- (d) wind turbines;
- (e) mine structures;
- (f) forts;
- (g) ruins;
- (h) levees;
- (i) pipelines;
- (j) rocks;
- (k) bluffs;
- (l) cliffs;
- (m) sand dunes;
- (n) isolated lighthouses; and
- (o) lightships.

204. An aeronautical cartographic service provider shall ensure that the international boundaries are shown and undemarcated and undefined boundaries are distinguished by descriptive notes. Political boundaries

205. An aeronautical cartographic service provider shall ensure that — Hydrography

- (a) water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams including those non-perennial in nature, salt lakes, glaciers and ice caps are shown;
- (b) the tint covering large open water areas to be kept very light;
- (c) reefs and shoals, including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and similar areas, should be shown by symbols when of significant landmark value.

206. An aeronautical cartographic service provider shall ensure that — Contours

- (a) the contours are shown and the selection of intervals are governed by the requirement to depict clearly the relief features required in air navigation; and
- (b) the values of the contours used are shown.

207. An aeronautical cartographic service provider shall ensure that — Hypsometric tints

- (a) the range of elevations for the tints is shown when hypsometric tints are used; and
- (b) the scale of the hypsometric tints used on the chart are shown in the margin.

208. An aeronautical cartographic service provider shall ensure that — Spot elevations

- (a) the spot elevations are shown at selected critical points;
- (b) the elevations selected are the highest in the immediate vicinity and indicate the top of a peak and ridge;
- (c) the elevations in valleys and at lake surface levels which are of navigational value are shown and the position of each selected elevation is indicated by a dot;
- (d) the elevation of the highest point on the chart and its geographical position to the nearest five minutes is indicated in the margin; and
- (e) the spot elevation of the highest point on any sheet is cleared of hypsometric tinting.

Incomplete or unreliable relief	<p>209. An aeronautical cartographic service provider shall ensure that —</p> <p>(a) the areas that have not been surveyed for contour cartographic are labelled “Relief data incomplete”; and</p> <p>(b) the charts on which spot elevations are unreliable bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical cartographic, as follows —</p> <p style="padding-left: 40px;">“Warning — the reliability of relief cartographic on this chart is doubtful and elevations shall be used with caution.”</p>
Escarments	<p>210. An aeronautical cartographic service provider shall ensure that the escarpments are shown when they are prominent landmarks or when cultural detail is very sparse.</p>
Wooded areas	<p>211. An aeronautical cartographic service provider shall ensure that wooded areas are shown.</p>
Date of topographic information	<p>212. An aeronautical cartographic service provider shall ensure that the date of latest information shown on the topographic base is indicated in the margin.</p>
Magnetic variation	<p>213. An aeronautical cartographic service provider shall ensure that —</p> <p>(a) the isogonic lines are shown; and</p> <p>(b) the date of the isogonic cartographic is indicated in the margin.</p>

Aeronautical data

General information	<p>214. An aeronautical cartographic service provider shall ensure that the aeronautical information shown is consistent with the use of the chart and the revision cycle.</p>
Aerodromes	<p>215. An aeronautical cartographic service provider shall ensure that the —</p> <p>(a) land and water aerodromes and heliports are shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance;</p> <p>(b) aerodrome elevation, the lighting available, the type of runway surface and the length of the longest runway or channel, shown in abbreviated form for each aerodrome in conformity with the example in Schedule 2, provided they do not cause undesirable clutter on the chart, are indicated; and</p> <p>(c) abandoned aerodromes which are still recognizable as aerodromes from the air are shown and identified as abandoned.</p>
Obstacles	<p>216. An aeronautical cartographic service provider shall ensure that the —</p> <p>(a) obstacles are shown; and</p> <p>(b) prominent transmission lines, permanent cable car installations and wind turbines, which are obstacles are shown when considered of importance to visual flight.</p>
Prohibited, restricted and danger areas	<p>217. An aeronautical cartographic service provider shall ensure that the prohibited, restricted and danger areas are shown.</p>
Air traffic services system	<p>218. An aeronautical cartographic service provider shall ensure that the —</p> <p>(a) significant elements of the air traffic services system including, control zones, aerodrome traffic zones, control areas, flight cartographic regions and other airspaces in which VFR flights operate are shown together with the appropriate class of airspace, where practicable; and</p> <p>(b) air defence identification zone is shown and properly identified where appropriate.</p>

219. An aeronautical cartographic service provider shall ensure that the radio navigation aids are shown by the appropriate symbol and named, but excluding their frequencies, coded designators, times of operation and other characteristics unless any or all of this information shown is kept up to date by means of new editions of the chart. Radio navigation aids

220. An aeronautical cartographic service provider shall ensure that the aeronautical ground lights together with their characteristics or their identifications or both are shown. Supplementary information

PART XVIII — Aeronautical Navigation Chart – Small Scale

221. An aeronautical cartographic service provider shall ensure that the aeronautical navigation chart – small scale — Function

- (a) serves as an air navigation aid for flight crews of long-range aircraft at high altitudes;
- (b) provides selective checkpoints over extensive ranges for identification at high altitudes and speeds, which are required for visual confirmation of position;
- (c) provides for continuous visual reference to the ground during long-range flights over areas lacking radio or other electronic navigation aids, or over areas where visual navigation is preferred or becomes necessary; and
- (d) provides a general purpose chart series for long-range flight planning and plotting.

222. An aeronautical cartographic service provider shall ensure that the aeronautical navigation chart – small scale is made available in the manner specified in regulation 5 (b) for all areas delineated in Schedule 5. Availability

223. An aeronautical cartographic service provider shall ensure that — Coverage and scale

- (a) the aeronautical navigation chart – small scale provides, as a minimum, complete coverage of the major land masses of the world;
- (b) the scale is in the range of 1:2 000 000 to 1:5 000 000;
- (c) the scale of the chart is substituted in the title for the words “Small Scale”;
- (d) the linear scales for kilometres and nautical miles are arranged in the following order —
 - (i) kilometers,
 - (ii) nautical miles, with their zero points in the same vertical line are shown in the margin; and
- (e) a conversion scale in metre or feet is shown in the margin; and
- (f) length of the linear scale should be not less than 200 mm (8 inches).

224. An aeronautical cartographic service provider shall ensure that the — Format

- (a) title and marginal notes are in English; and
- (b) information regarding the number of the adjoining sheets and the unit of measurement to express elevations is located as to be clearly visible when the sheet is folded.

225. An aeronautical cartographic service provider shall ensure that — Projection

- (a) a conformal projection is used;
- (b) the name and basic parameters of the projection is shown in the margin;
- (c) the parallels are shown at intervals of 1°;
- (d) the graduations on the parallels are shown at sufficiently close intervals compatible with the latitude and the scale of the chart;
- (e) meridians are shown at intervals compatible with the latitude and the scale of the chart;

- (f) the graduations on the meridians are shown at intervals not exceeding 5’;
- (g) the graduation marks extend away from the Greenwich Meridian and from the Equator;
- (h) all meridians and parallels shown are numbered in the borders of the chart; and
- (i) in addition, when required, meridians and parallels are numbered within the body of the chart in such a manner that they can be readily identified when the chart is folded.

Culture and topography

Built-up areas	<p>226. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) cities, towns and villages are selected and shown according to their relative importance to visual air navigation; and (b) cities and towns of sufficient size are indicated by the outline of their built-up areas and not of their established city limits.
Railroads	<p>227. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) railroads having landmark value are shown; and (b) important tunnels are shown.
Highways and roads	<p>228. An aeronautical cartographic service provider shall ensure that the —</p> <ul style="list-style-type: none"> (a) road systems are shown in sufficient detail to indicate significant patterns from the air; and (b) roads are not shown in built-up areas unless they can be distinguished from the air as definite landmarks.
Landmarks	<p>229. An aeronautical cartographic service provider shall ensure that the following natural and cultural landmarks, when considered to be of importance for visual air navigation, are shown —</p> <ul style="list-style-type: none"> (a) bridges; (b) prominent transmission lines; (c) permanent cable car installations; (d) wind turbines; (e) mine structures; (f) forts; (g) ruins; (h) levees; (i) pipelines; (j) rocks; (k) bluffs; (l) cliffs; (m) sand dunes; (n) isolated lighthouses; and (o) lightships.
Political boundaries	<p>230. An aeronautical cartographic service provider shall ensure that the international boundaries are shown and the undemarcated and undefined boundaries are distinguished by descriptive notes.</p>
Hydrography	<p>231. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) water features compatible with the scale of the chart comprising shore lines, lakes, rivers and streams including those non-perennial in nature, salt lakes, glaciers and ice caps are shown; (b) the tint covering large open water areas should be kept very light; and

- (c) reefs and shoals, including rocky ledges, tidal flats, isolated rocks, sand, gravel, stone and similar areas, should be shown by symbols when of significant landmark value.
- 232.** An aeronautical cartographic service provider shall ensure that the — Contours
- (a) contours are shown and the selection of intervals are governed by the requirement to depict clearly the relief features required in air navigation; and
- (b) values of the contours used are shown.
- 233.** An aeronautical cartographic service provider shall ensure that the — Hypsometric tints
- (a) range of elevations for the tints are shown when hypsometric tints are used; and
- (b) scale of the hypsometric tints used on the chart is shown in the margin.
- 234.** An aeronautical cartographic service provider shall ensure that the — Spot elevations
- (a) spot elevations are shown at selected critical points;
- (b) elevations selected are the highest in the immediate vicinity and indicate the top of a peak or ridge;
- (c) elevations in valleys and at lake surface levels which are of value to visual air navigation are shown and the position of each selected elevation is indicated by a dot; and
- (d) elevation of the highest point on the chart and its geographical position to the nearest five minutes is indicated in the margin; and
- (e) the spot elevation of the highest point in any sheet is cleared of hypsometric.
- 235.** An aeronautical cartographic service provider shall ensure that the — Incomplete or unreliable relief
- (a) areas that have not been surveyed for contour information are labelled “Relief data incomplete; and
- (b) charts on which spot elevations are unreliable bear a warning note prominently displayed on the face of the chart in the colour used for aeronautical information, as follows –
- “Warning — the reliability of relief cartographic on this chart is doubtful and elevations shall be used with caution.”.
- 236.** An aeronautical cartographic service provider shall ensure that the escarpments are shown when they are prominent landmarks or when cultural detail is very sparse. Escarpments
- 237.** An aeronautical cartographic service provider shall ensure that wooded areas of large extent are shown. Wooded areas
- 238.** An aeronautical cartographic service provider shall ensure that the date of latest information shown on the topographic base is indicated in the margin. Date of topographic information
- 239.** An aeronautical cartographic service provider shall ensure that the — Colours
- (a) the subdued colours are used for the chart background to facilitate plotting; and
- (b) good colour contrast is ensured to emphasize features important to visual air navigation.
- 240.** An aeronautical cartographic service provider shall ensure that the — Magnetic variation
- (a) isogonic lines are shown; and
- (b) date of isogonic cartographic is indicated in the margin.

Aeronautical data

Aerodromes	241. An aeronautical cartographic service provider shall ensure that land and water aerodromes and heliports are shown with their names, to the extent that they do not produce undesirable congestion on the chart, priority being given to those of greatest aeronautical significance.
Obstacles	242. An aeronautical cartographic service provider shall ensure that obstacles are shown.
Prohibited, restricted and danger areas	243. An aeronautical cartographic service provider shall ensure that prohibited, restricted and danger areas are shown when considered to be of importance to air navigation.
Air traffic services system	244. An aeronautical cartographic service provider shall ensure that the — (a) significant elements of the air traffic services system are shown when considered to be of importance to air navigation; and (b) air defence identification zone is shown and properly identified where appropriate.
Radio navigation aids	245. An aeronautical cartographic service provider shall ensure that radio aids to navigation are shown by the appropriate symbol and named.

PART XIX — *Plotting Chart*

Function	246. An aeronautical cartographic service provider shall ensure that the plotting chart provides a means of maintaining a continuous flight record of the aircraft position by various fixing methods and dead reckoning in order to maintain an intended flight path.
Availability	247. An aeronautical cartographic service provider shall ensure that the plotting chart is made available, in the manner specified in regulation 5 (b) to cover major air routes over oceanic areas and sparsely settled areas used by international civil aviation.
Coverage and scale	248. An aeronautical cartographic service provider shall ensure that the — (a) plotting chart for a particular region covers major air routes and their terminals on a single sheet, where practicable; and (b) scale is governed by the area to be covered.
Format	249. An aeronautical cartographic service provider shall ensure that the sheet is of a size that can be adapted for use on a navigator's plotting table.
Projection	250. An aeronautical cartographic service provider shall ensure that — (a) a conformal projection on which a straight line approximates a great circle is used; (b) parallels and meridians are shown; (c) intervals are arranged to permit accurate plotting to be carried out with a minimum of time and effort; (d) graduation marks are shown at consistent intervals along an appropriate number of parallels and meridians and the interval selected, regardless of scale, minimizes the amount of interpolation required for accurate plotting; (e) parallels and meridians are numbered so that a number appears at least once every 15 cm (6 in) on the face of the chart; and (f) if a navigational grid is shown on charts covering the higher latitudes, it comprises of lines parallel to the Meridian or anti-Meridian of Greenwich.
Identification	251. An aeronautical cartographic service provider shall ensure that each sheet is identified by chart series and number.

- 252.** An aeronautical cartographic service provider shall ensure that the —
- (a) generalised shore lines of open water areas, large lakes and rivers are shown;
 - (b) spot elevations for selected features constituting a hazard to air navigation are shown; and
 - (c) particularly hazardous or prominent relief features are emphasized.
- 253.** An aeronautical cartographic service provider shall ensure that —
- (a) isogonals are shown at consistent intervals throughout the chart and the interval selected, regardless of scale, minimizes the amount of interpolation required; and
 - (b) date of the isogonic information is shown.
- 254.** An aeronautical cartographic service provider shall ensure that —
- (a) the following aeronautical data is shown —
 - (i) aerodromes regularly used by international commercial air transport together with their names,
 - (ii) selected radio aids to navigation that will contribute to position-finding together with their names and identifications,
 - (iii) lattices of long-range electronic aids to navigation, as required,
 - (iv) boundaries of flight cartographic regions, control areas and control zones necessary to the function of the chart, and
 - (v) designated reporting points necessary to the function of the chart; and
 - (b) aeronautical ground lights useful for air navigation are shown where other means of navigation are non-existent.

PART XX — Electronic Aeronautical Chart Display

255. An aeronautical cartographic service provider shall ensure that the electronic aeronautical chart display with adequate back-up arrangements and in compliance with the requirements of Civil Aviation (Aircraft Operations) Regulations for charts, enables flight crews to execute, in a convenient and timely manner, route planning, route monitoring and navigation by displaying the required information.

256. An aeronautical cartographic service provider shall ensure that the electronic aeronautical chart display is capable of displaying all aeronautical, cultural and topographic information required by Part V and Part VII to Part XIX of these Regulations.

Display Requirements

- 257.** An aeronautical cartographic service provider shall ensure that the —
- (a) information available for display is subdivided into the following categories —
 - (i) basic display information, permanently retained on the display and consisting of the minimum information essential for the safe conduct of flight, and
 - (ii) other display information, which may be removed from the display or displayed individually on demand, and consisting of information not considered essential for the safe conduct of flight; and
 - (b) adding or removing other display information is a simple function but is not possible to remove information contained in the basic display.

Display mode and generation of neighbouring area	<p>258. An aeronautical cartographic service provider shall ensure that —</p> <p>(a) the Electronic Aeronautical Chart Display is capable of continuously plotting the aircraft's position in a true motion mode where reset and generation of the surrounding area takes place automatically; and</p> <p>(b) it is possible manually to change the chart area and the position of the aircraft relative to the edge of the display.</p>
Scale	<p>259. An aeronautical cartographic service provider shall ensure that it is possible to vary the scale at which a chart is displayed.</p>
Symbols	<p>260. An aeronautical cartographic service provider shall ensure that —</p> <p>(a) the symbols used conform to those specified for electronic charts in Schedule 2 except where it is desired to show items for which no International Civil Aviation Organization chart symbol is provided; and</p> <p>(b) in cases where no International Civil Aviation Organization chart symbols are provided, electronic chart symbols are chosen which —</p> <p style="margin-left: 20px;">(i) employ a minimum use of lines, arcs and area fills,</p> <p style="margin-left: 20px;">(ii) do not cause confusion with any existing aeronautical chart symbol, and</p> <p style="margin-left: 20px;">(iii) do not impair the legibility of the display.</p>
Display hardware	<p>261. An aeronautical cartographic service provider shall ensure that —</p> <p>(a) the effective size of the chart presentation is sufficient to display the information required by regulation 256 without excessive scrolling;</p> <p>(b) the display has the capabilities required to accurately portray required elements of Schedule 2;</p> <p>(c) the method of presentation ensures that the displayed information is clearly visible to the observer in the conditions of natural and artificial light experienced in the cockpit; and</p> <p>(d) the display luminance is adjustable by the flight crew.</p>
Provision and updating of data	<p>262. An aeronautical cartographic service provider shall ensure that —</p> <p>(a) the provision and updating of data for use by the display is in conformance with the aeronautical data quality system requirements;</p> <p>(b) the display is capable of automatically accepting authorised updates to existing data and means of ensuring that authorised data and relevant updates to that data have been correctly loaded into the display is provided;</p> <p>(c) the display is capable of accepting updates to authorised data entered manually with simple means for verification prior to final acceptance of the data and updates entered manually are distinguishable on the display from authorised data and its authorised updates and shall not affect display legibility;</p> <p>(d) a record is kept of updates, including date and time of application; and</p> <p>(e) the display allows the flight crew to display updates so that the flight crew may review the contents of the updates and determine that they have been included in the system.</p>
Performance tests, malfunction alarms and indications	<p>263. An aeronautical cartographic service provider shall ensure that —</p> <p>(a) a means is provided for carrying out on-board tests of major functions and in case of a failure, the test displays information to indicate which part of the system is at fault; and</p> <p>(b) a suitable alarm or indication of system malfunction is provided.</p>
Back-up arrangements	<p>264. An aeronautical cartographic service provider shall in order to ensure safe navigation in case of a failure of the electronic aeronautical chart display, ensure that provision of adequate back-up arrangements include —</p>

- (a) facilities enabling a safe takeover of display functions in order to ensure that a failure does not result in a critical situation; and
- (b) a back-up arrangement facilitating the means for safe navigation of the remaining part of the flight.

PART XXI — Air Traffic Control Surveillance Minimum Altitude Chart

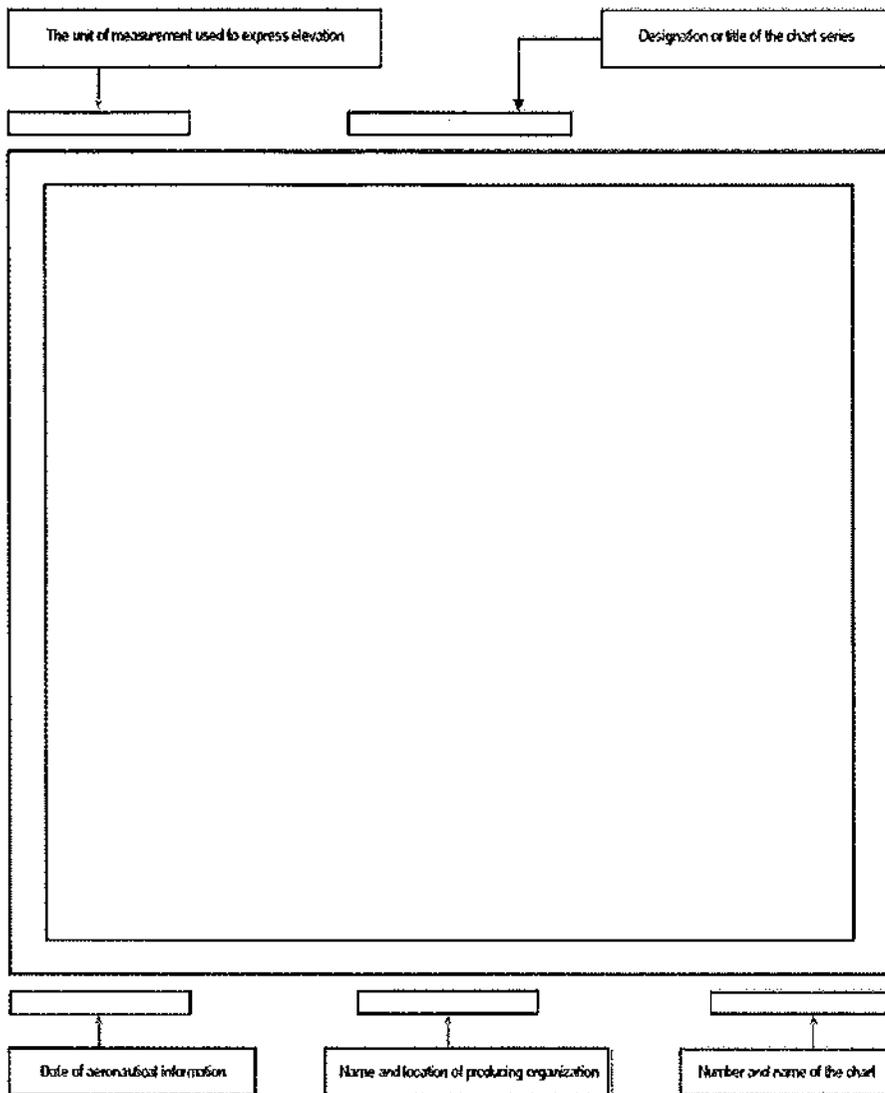
- | | |
|--|------------------------------|
| <p>265. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) air traffic control surveillance minimum altitude chart provides information to enable flight crews to monitor and cross-check altitudes assigned by a controller using an air traffic services surveillance system; and (b) a note indicating that the chart may only be used for cross-checking of altitudes assigned while the aircraft is identified is prominently displayed on the face of the chart. | Function |
| <p>266. An aeronautical cartographic service provider shall ensure that the air traffic control surveillance minimum altitude chart is made available, in the manner specified in regulation 5 (b) where vectoring procedures are established and minimum vectoring altitudes cannot be shown adequately on the area chart, standard departure chart – instrument or standard arrival chart – instrument.</p> | Availability |
| <p>267. An aeronautical cartographic service provider shall ensure that the —</p> <ul style="list-style-type: none"> (a) coverage of the chart is sufficient to effectively show the information associated with vectoring procedures; and (b) chart is drawn to scale, the same scale as the associated area chart. | Coverage and scale |
| <p>268. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) a conformal projection on which a straight line approximates a geodesic line is used; and (b) the graduation marks are placed at consistent intervals along the neat lines, as appropriate. | Projection |
| <p>269. An aeronautical cartographic service provider shall ensure that the chart is identified by the name of the aerodrome for which the vectoring procedures are established or, when procedures apply to more than one aerodrome, the name associated with the airspace portrayed.</p> | Identification |
| <p>270. An aeronautical cartographic service provider shall ensure that the —</p> <ul style="list-style-type: none"> (a) generalised shorelines of open water areas, large lakes and rivers are shown except where they conflict with data more applicable to the function of the chart; and (b) appropriate spot elevations and obstacles are shown. | Culture and topography |
| <p>271. An aeronautical cartographic service provider shall ensure that the average magnetic variation of the area covered by the chart is shown to the nearest degree.</p> | Magnetic variation |
| <p>272. An aeronautical cartographic service provider shall ensure that —</p> <ul style="list-style-type: none"> (a) bearings, tracks and radials are magnetic; (b) bearings and tracks are shown in parentheses to the nearest tenth of a degree where bearings and tracks are additionally provided as true values for area navigation segments; (c) bearings, tracks or radials are clearly indicated where bearings, tracks or radials are given with reference to True North or Grid North; and (d) where Grid North is used, its reference grid meridian is identified. | Bearings, tracks and radials |

Aeronautical Data

- Aerodromes** **273.** An aeronautical cartographic service provider shall ensure that —
- (a) aerodromes that affect the terminal routings are shown and where appropriate, a runway pattern symbol is used; and
 - (b) the elevation of the primary aerodrome to the nearest metre or foot is shown.
- Prohibited, restricted and danger areas** **274.** An aeronautical cartographic service provider shall ensure that prohibited, restricted and danger areas are depicted with their identification.
- Air traffic services system** **275.** An aeronautical cartographic service provider shall ensure that the chart shows components of the established air traffic services system including —
- (a) relevant radio navigation aids together with their identifications;
 - (b) lateral limits of relevant designated airspace;
 - (c) relevant significant points associated with standard instrument departure and arrival procedures;
 - (d) transition altitude, where established;
 - (e) information associated with vectoring including —
 - (i) minimum vectoring altitudes to the nearest higher 50 m or 100 ft, clearly identified,
 - (ii) lateral limits of minimum vectoring altitude sector, normally defined by bearings and radials to or from radio navigation aids to the nearest degree or, if not practicable, geographical coordinates in degrees, minutes and seconds and shown by heavy lines so as to clearly differentiate between established sectors,
 - (iii) distance circles at 20 km or 10-NM intervals or, when practicable, 10km or 5-NM intervals shown as fine dashed lines with the radius indicated on the circumference and centred on the identified aerodrome main VOR radio navigation aid or, if not available, on the aerodrome or heliport reference point,
 - (iv) notes concerning correction for low temperature effect, as applicable; and
 - (v) communications procedures including call sign(s) and channel(s) of the Air Traffic Control unit(s) concerned,
 - (vi) a textual description of relevant communication failure procedures are provided and whenever feasible, be shown on the chart or on the same page that contains the chart.

SCHEDULE 1
(reg. 8 (a))

MARGINAL LAYOUT



SCHEDULE 2

(regs. 9(a), 9(e), 19(a), 53(d), 188(b), 215(b), 260(a) and 261)

ICAO CHART SYMBOLS

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Gravel	8
Highest elevation on chart	12
Lava flow	5
Levee or esker.....	9
Mountain pass.....	11
Other trees	16
Palms	17
Relief shown by hachures	3
Sand area	7
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Dry lake bed	39
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*Symbol
No.*

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5	Levee flow			Mountain pass		16	Other trees	
6	Sand dunes					17	Palm	
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Caution

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20	Shore line (retreating)				
21	Tidal flat				
22	Coral reefs and ledges				
23	Large river (perennial)				
24	Small river (perennial)				
25	Rivers and streams (non-perennial)				
26	Rivers and streams (unscourged)				
27	Rapids				
28	Falls				
29	Canal				
30	Abandoned canal Note --- Dry canal having barbed rock set				
31	Lake (perennial)		Arid climate		
32	Lake (non-perennial)				
33	Salt lake				
34	Salt pans (evaporate)				
35	Swamp				
36	Rice field				
37	Spring well or water hole		perennial	●	
			intermittent	○	
38	Reservoir				■ Reservoir
39	Dry lake bed				
40	Wash				
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42	Clickers and ice caps				
43	Danga line (2 m or less between line)				
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71	Tank farms	
72	Nuclear power station	
73	Coast guard station	
74	Lookout tower	
75	Mine	
76	Forest ranger station	
77	Race track or stadium	
78	Ruin	
79	Fuel	
80	Church	
81	Mosque	
82	Pagoda	
83	Temple	

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66	Telegraph or telephone line (when a landmark)	
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85	Civil	Water		89	Joint civil and military	Water		93	Aerodrome for use on charts on which aerodrome classification is not required e.g. Enroute Charts	
86	Military	Land		90	Emergency aerodrome or aerodrome with no facilities			94	Heliport Note — Aerodrome for the exclusive use of helicopters	
87	Military	Water		91	Abandoned or closed aerodrome					

95

Note — Where required by the function of the chart, the runway pattern of the aerodrome may be shown in lieu of the aerodrome symbol, for example:



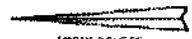
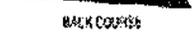
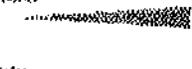
AERODROMES (Cont.)
AERODROME DATA IN ABBREVIATED FORM WHICH MAY BE
IN ASSOCIATION WITH AERODROME SYMBOLS
 (Reference: 16.9.2.2 and 17.9.2.2)

<p>66</p> <p>Location given in the units of measurement (metres or feet) selected for use on the chart</p>	<p>Name of aerodrome</p> <p>UNDESIGNATED 157 L N N</p>	<p>Length of longest runway, in hundreds of metres or feet (whichever unit is selected for use on the chart)</p>
<p>Minimum lighting - obstacles, boundary of runway lights and lighted wind indicator or landing direction indicator</p>	<p>Note - A dash (-) is to be inserted where L or H does not apply</p>	<p>Runway hard surfaced, normally of weather</p>

AERODROME SYMBOLS FOR APPROACH CHARTS

<p>97</p> <p>Aerodromes affecting the traffic pattern on the aerodrome or when the procedure is based</p>		<p>98</p> <p>The aerodrome to which the procedure is based</p>	
---	---	--	--

RADIO NAVIGATION AIDS*

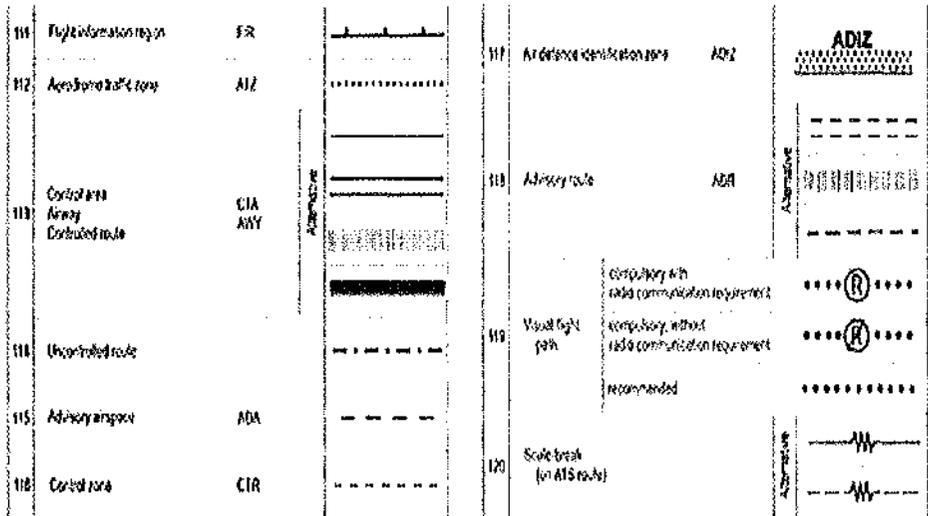
<p>99</p> <p>Basic radio navigation aid symbol Note - The symbol may be used with or without a box to bracket the data</p>		<p>107</p> <p>Collocated VOR and TACAN radio navigation aids</p>	<p>VORTAC</p> 
<p>100</p> <p>Non-directional radio beacon</p>	<p>NDB</p> 	<p>108</p> <p>Instrument landing system</p>	<p>PLAN VIEW</p> 
<p>101</p> <p>VOR (non-directional) radio beacon</p>	<p>VOR</p> 	<p>109</p> <p>Distance measuring equipment</p>	<p>FROM COURSE</p> 
<p>102</p> <p>Distance measuring equipment</p>	<p>DME</p> 	<p>110</p> <p>Collocated VOR and DME radio navigation aids</p>	<p>BACK COURSE</p> 
<p>103</p> <p>Collocated VOR and DME radio navigation aids</p>	<p>VOR/DME</p> 	<p>111</p> <p>DME distance</p>	<p>PROFILE</p> 
<p>104</p> <p>DME distance</p>	<p>Distance in statute (nautical miles) to DME * 15 km - KAV</p>	<p>112</p> <p>VOR radial</p>	<p>GLIDE PATH</p> 
<p>105</p> <p>VOR radial</p>	<p>Radial bearing from and identification of VOR R 090 KAV</p>	<p>113</p> <p>Radio beacon beacon</p>	<p>ESCAPAL</p> 
<p>106</p> <p>UNF located air navigation aid</p>	<p>TACAN</p> 	<p>114</p> <p>Compass rose</p>	<p>BEAN SHAPE</p> 

<p>110</p> <p>Compass rose to be orientated on the chart in accordance with the alignment of the station (normally Magnetic North)</p>		<p>Compass rose to be used as appropriate in combination with the following symbols</p>	<p>VOR</p>  <p>VOR/DME</p>  <p>TACAN</p>  <p>VORTAC</p> 
--	---	---	--

Note - Additional points of compass may be added as required

Note - Guidance material on the presentation of radio navigation aid data is given in the Aeronautical Chart Manual (Doc 8167)

AIR TRAFFIC SERVICES



		Significant Point Depictions for Conventional Navigation		Significant Point Depictions for Area Navigation				
		Reporting FLY-BY-FLY-OVER	On request (OVA)	Compulsory (OVA)	On request Fly by	Compulsory Fly by	On request Area	Compulsory Area
121	Basic Symbols with functionality	VFR Reporting point						
		INTERCOM						
		VORTAD						
		TACAN						
		VOR						
		VORTOME						
		NDB						
		Waypoint	WPT	Not Used	Not Used			

172	Change-over point to be superimposed on the appropriate route symbol at right angles to the route	COP		117	ATS/ATIS reporting point	ATS/ATIS	Compulsory	CAI	124	Final approach fix	FAI	
					MSRP	MSRP	On request	QI				

AIR TRAFFIC SERVICES (cont.)

175	Altitude/flight levels	Altitude/flight level "window"	17 000 10 000	FL 220 10 000
		"At or above" altitude/flight level	7 000	FL 70
		"At or below" altitude/flight level	5 000	FL 50
		"Mandatory" altitude/flight level	1 000	FL 10
		"Recommended" procedure altitude/flight level	5 000	FL 50
		"Expected" altitude	Expect 5 000	Expect FL 50

Note - For use only on SID and STAR charts. Not intended for depiction of minimum obstacle clearance altitude.

AIRSPACE CLASSIFICATIONS

126	Airspace classifications		Aeronautical data in abbreviated form to be used in association with airspace classification symbols												
		<table border="1"> <tr> <td>TMA DONLON</td> <td>119.1</td> <td></td> <td>200m AGL</td> <td>FL 245</td> </tr> <tr> <td>Type</td> <td>Name or call sign</td> <td>Radio frequency(ies)</td> <td>Airspace classification</td> <td>Vertical limit</td> </tr> </table> <table border="1"> <tr> <td></td> <td>TMA DONLON</td> <td>FL 245</td> <td>200m AGL</td> <td>119.1</td> </tr> </table>		TMA DONLON	119.1		200m AGL	FL 245	Type	Name or call sign	Radio frequency(ies)	Airspace classification	Vertical limit		TMA DONLON
TMA DONLON	119.1		200m AGL	FL 245											
Type	Name or call sign	Radio frequency(ies)	Airspace classification	Vertical limit											
	TMA DONLON	FL 245	200m AGL	119.1											

AIRSPACE RESTRICTIONS

128	Restricted airspace (prohibited, restricted or danger area)		Common boundary of two areas	
129	International boundary closed to passage of aircraft except through air corridor			

Note - The angle and density of hatching may be varied according to scale and the size, shape and orientation of the area.

OBSTACLES

130	Obstacle		134	Exceptionally high obstacle (optional symbol)	
131	Lighted obstacle		135	Exceptionally high obstacle - lighted (optional symbol)	
132	Group obstacles		Note - For obstacles having a height of the order of 30 m (100 ft) above terrain		
133	Lighted group obstacles		136	Elevation of top (metres)	
					Height above specified datum (optional type in parentheses)

MISCELLANEOUS

137	Prominent transmission line		140	Wind turbine -- unlighted and lighted	
138	Isoporic line or isogonid		141	Wind turbines -- minor group and group in major area, lighted	
139	Ocean station vessel (normal position)				

VISUAL AIDS

142	Marine light Note 2. Characteristics are to be indicated as follows	<table border="1"> <tr> <td>A</td> <td>Alternating</td> <td>F</td> <td>Flashing</td> </tr> <tr> <td>H</td> <td>Blue</td> <td>R</td> <td>Red</td> </tr> <tr> <td>F</td> <td>Fixed</td> <td>S</td> <td>Steady</td> </tr> </table>	A	Alternating	F	Flashing	H	Blue	R	Red	F	Fixed	S	Steady	<table border="1"> <tr> <td>143</td> <td>Flashing Green Light</td> <td>Occ. R. S.E.C.</td> <td>Occurring Red Sector</td> <td>Sec'd (H) W</td> <td>Second Unwatched White</td> </tr> </table>	143	Flashing Green Light	Occ. R. S.E.C.	Occurring Red Sector	Sec'd (H) W	Second Unwatched White
A	Alternating	F	Flashing																		
H	Blue	R	Red																		
F	Fixed	S	Steady																		
143	Flashing Green Light	Occ. R. S.E.C.	Occurring Red Sector	Sec'd (H) W	Second Unwatched White																
143	Aeromarine ground light		144	Lightship																	
		<table border="1"> <tr> <td>Electric</td> <td></td> </tr> </table>	Electric																		
Electric																					

Note 1. Marine observing lights are red and white unless otherwise indicated. Marine lights are white unless colors are stated.

SYMBOLS FOR AERODROME/HELIPORT CHARTS

145	Hard surface runway		154	Point light					
146	Pierced steel plank or steel mesh runway		155	Obstacle light					
147	Unpaved runway		156	Landing direction indicator (lighted)					
148	Stopway	SWY	157	Landing direction indicator (unlighted)					
149	Taxiways and parking areas		158	Stop bar					
150	Helicopter landing area on an aerodrome		159	Runway holding position	<table border="1"> <tr> <td>Pattern A</td> <td></td> </tr> <tr> <td>Pattern B</td> <td></td> </tr> </table>	Pattern A		Pattern B	
Pattern A									
Pattern B									
151	Aerodrome reference point	ARP	160	Intermediate holding position					
152	VOR/D check point		161	Hot spot					
153	Runway visual range (RVR) observation site								

Note - For application, see Annex 11, Volume I, 5.2.13

Note - For application, see Annex 14, Volume I, 5.2.11

Note - Hot spot location to be circled

SYMBOLS FOR AERODROME OBSTACLE CHARTS - TYPE A, B AND C

	Plan	Profile		Plan	Profile
162	Tree or shrub		167	Terrain penetrating obstacle plane	
163	Pole, tower, spire, antenna, etc.		168	Escarpment	
164	Building or large structure		169	Stopway	SWY
165	Railroad		170	Clearway	CWY
166	Transmission line or overhead cable				

ADDITIONAL SYMBOLS FOR USE ON PAPER AND ELECTRONIC CHARTS

PLAN VIEW		Electronic
<p>171</p> <p>Minimum sector altitude</p> <p><i>Note - The symbol may be modified to reflect particular sector altitudes</i></p>	<p>USA</p>	
<p>172</p> <p>Terminal arrival altitude</p> <p><i>Note - The symbol may be modified to reflect particular TAA shapes</i></p>	<p>TAA</p>	
<p>173</p> <p>Noting pattern</p>		
<p>174</p> <p>Misled approach track</p>		
PROFILE		
<p>175</p> <p>Runway</p>		
<p>176</p> <p>Radio navigation aid (type of aid) and its use in the procedure to be annotated on top of the symbol)</p>		
<p>177</p> <p>Radio marker beacon (type of beacon to be annotated on top of the symbol)</p>		
<p>178</p> <p>Collocated radio navigation aid and marker beacon (type of aid to be annotated on top of the symbol)</p>		
<p>179</p> <p>DME fix (distance from DME and the fix used in the procedure to be annotated on top of the symbol)</p>		
<p>180</p> <p>Collocated DME fix and marker beacon (distance from DME and the type of beacon to be annotated on top of the symbol)</p>		

SCHEDULE 3
(reg. 16)
COLOUR GUIDE
CHART SYMBOLS

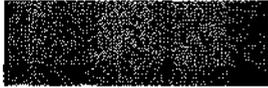
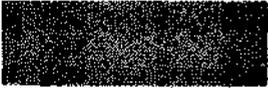
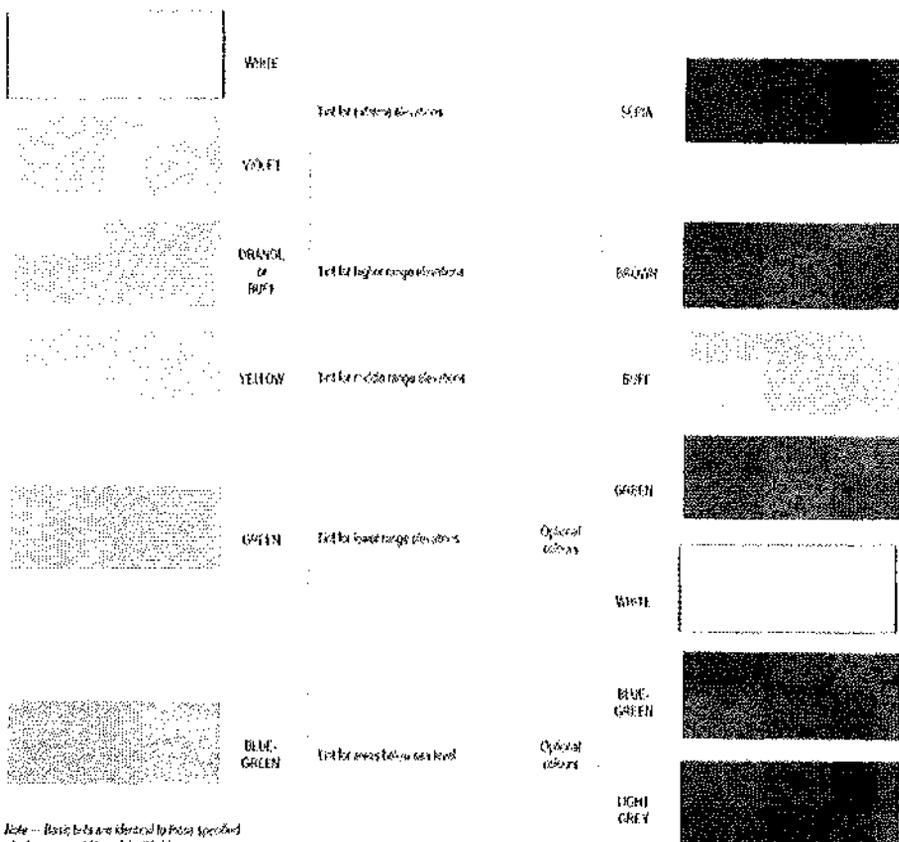
<p>Cultural, elevated highways and roads, sections of large coasts, grids and granoboles, spot elevations, danger lines and off shore rocks, names and lettering except for astronomical and hydrographic features</p>	<p>BLACK</p>		
<p>Build up areas of coasts</p>	<p>BLACK Stipple</p>		
<p>Highways and roads</p>	<p>Optional colours</p>	<p>BLACK Half tone</p>	
		<p>RED</p>	
<p>Build up areas for coasts (alternative to black stipple)</p>		<p>YELLOW</p>	
<p>Contours and topographic features, items 1 through 14 of Appendix 2 Hydrographic features, items 33 through 45 of Appendix 2</p>		<p>BROWN</p>	
<p>Shore lines, drainage, ditches, lakes, bathymetric contours and other hydrographic features including their names or description</p>		<p>BLUE</p>	
<p>Open water areas</p>		<p>BLUE Half tone</p>	
<p>Salt lakes and soil pans</p>		<p>BLUE Stipple</p>	
<p>Large non-perennial rivers and non-perennial lakes</p>		<p>BLUE Stipple</p>	
<p>Astronomical data, except for the route and Area 1 (G-M-N -- ICAO), where different colours may be required. Both colours may be used on the same sheet but, where only one colour is used, dark blue is preferred.</p>	<p>Optional colours</p>	<p>MAGENTA</p>	
		<p>DARK BLUE</p>	

CHART SYMBOLS (Cont.)

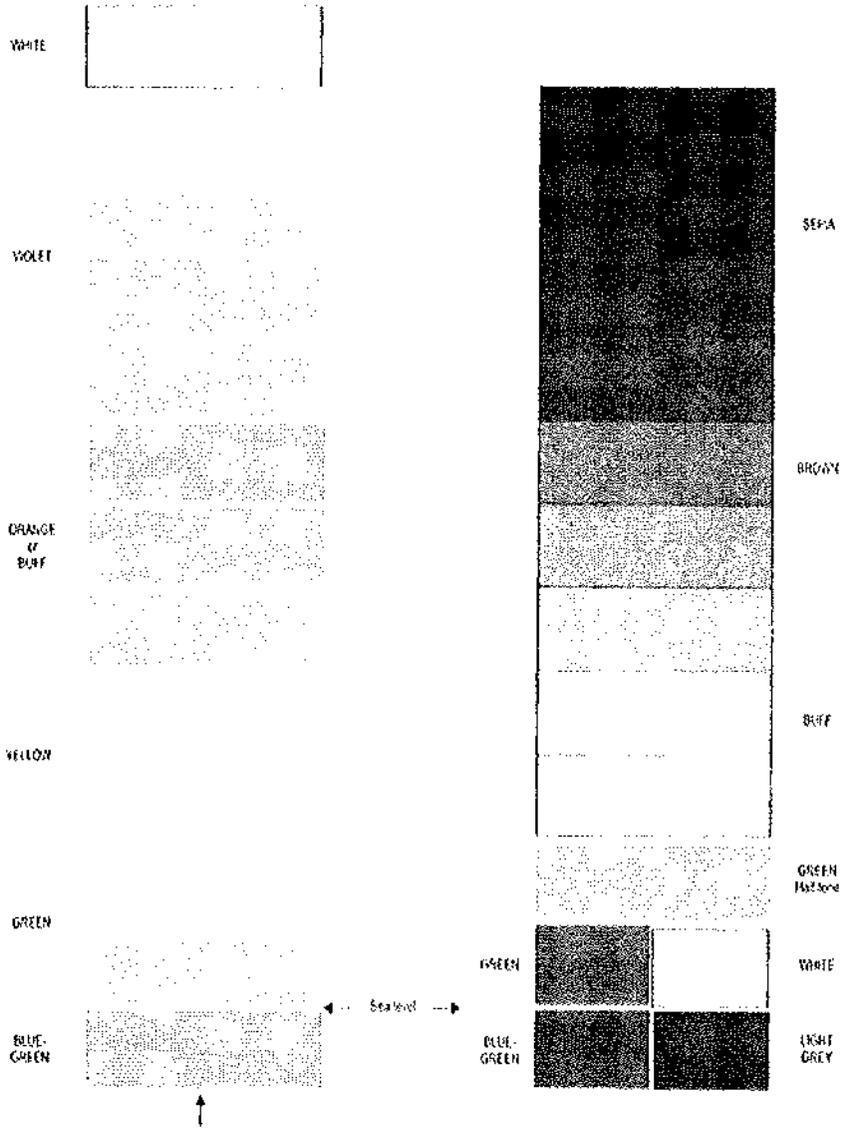


HYPSONETRIC TINTS



Note — Basic tints are identical to those specified for the International Map of the World

SCHEDULE 4
(reg. 17(b))
HYPOSOMETRIC TINT GUIDE



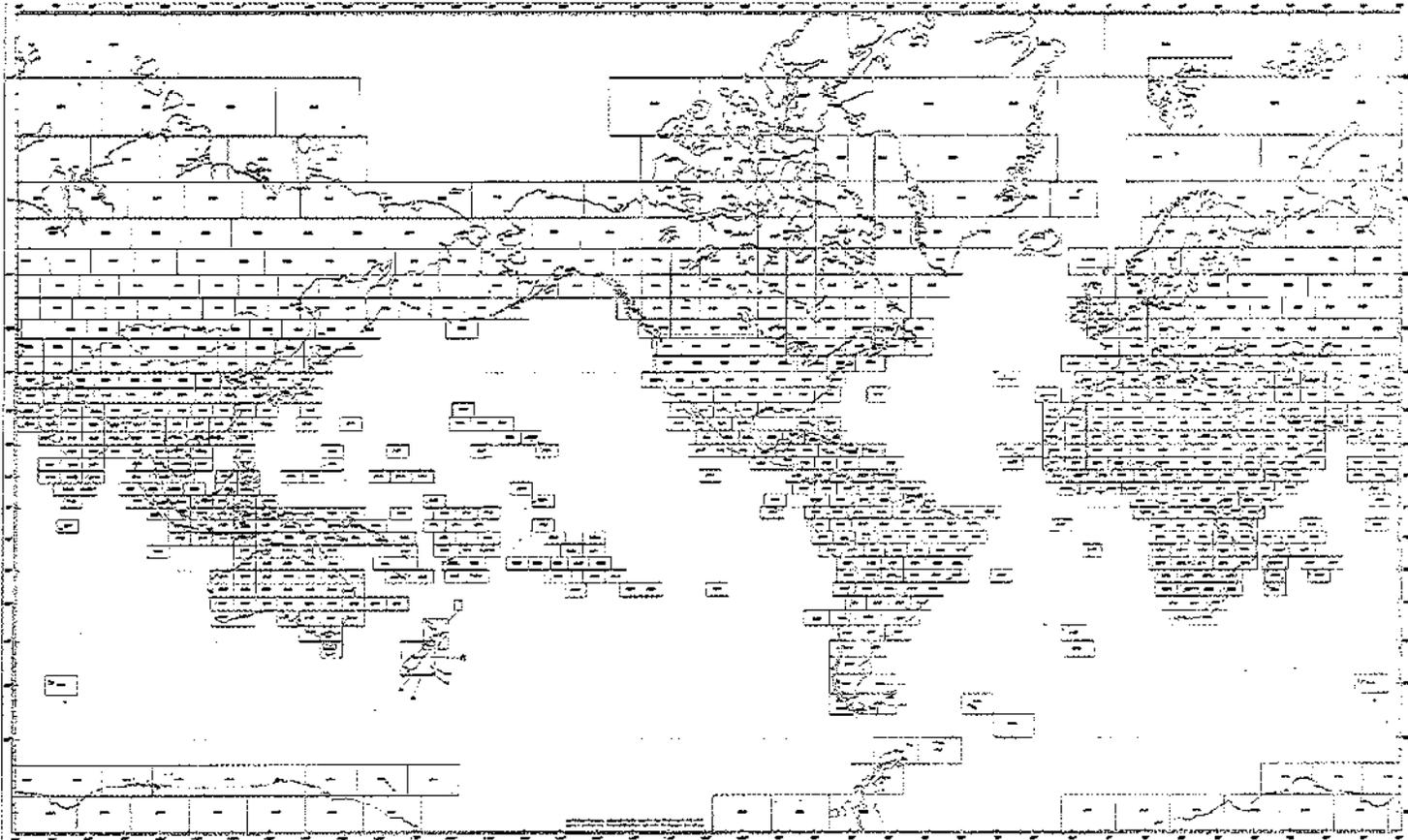
Note 1 - The colors are derived from a specific color International Map of the World

Note 2 - Elevations have not been associated with this color system in order to allow flexibility in their selection

SCHEDULE 5

(regs. 168(a), 170, 172, 195 and 222)

SHEET LAYOUT FOR THE WORLD AERONAUTICAL CHART ICAO 1:1,000,000



MADE this 27th day of May, 2022.

ERIC M. MOLALE,
Minister of Transport and Public Works.