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International safety requirements

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Introduction

Article 37 of the Convention empowers the International Civil Aviation Organization (ICAO) to adopt international Standards and Recommended Practices (SARPs) which are contained in 19 Annexes to the Chicago Convention. While they are not specifically defined in the Convention, the First ICAO Assembly provided definitions for both terms in each Annex, which are as follows (emphasis added):

“Standard” means any specification for physical characteristics, configuration, materiel, performance, personnel, or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which Member States will conform in accordance with the Convention; in the event of impossibility of compliance, notification to the Council is compulsory under Article 38 of the Convention.

“Recommended practices” means any specification for physical characteristics, configuration, materiel, performance, personnel, or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity, or efficiency of international air navigation, and to which Member States will endeavour to conform in accordance with the Convention.

Because of the technical complexity, SARPs are formulated in broad terms and restricted to essential requirements. Detailed technical specifications are expanded in manuals called Procedures for Air Navigation Services (PANs), Regional Supplementary Procedures (SUPPs), Guidance Material and Circulars. These documents are amended periodically to reflect current practices and procedures. Differences to SARPs notified by Member States are also part of the Annexes and are published in Supplements and in the Aeronautical Information Service.

This international soft-law system facilitates the effective conduct of international air transportation, as supported by workforces of experts nominated by ICAO Member States to ensure that air transportation continues to be safe, secure, efficient and sustainable.

This chapter will analyse the following provisions related to the safe operation of aircraft engaged in international air transport: licensing of aeronautical personnel (Annex 1); aircraft operations (Annex 6) including the carriage of dangerous goods by air (Annex 18); aircraft design, manufacture, maintenance (Annex 8) and identification (Annex 7); aircraft search and rescue (Annex 12); the investigation of aircraft accidents and incidents (Annex 13) as well as safety management (Annex 19).
3.1 Personnel licensing

Although human beings are vital to the chain of aircraft operations, they are also the most flexible and variable link. Proper training is key to minimize human error and provide able, skilful, proficient and competent technical personnel. Medical standards of Annex 1, such as periodic health examinations, serve as an early warning for possible incapacitating medical conditions, and contribute to the general health of this type of aviation-related personnel. Annex 1 and associated training manuals describe the skills necessary to build proficiency at various technical personnel jobs, thereby contributing to occupational competency. Personnel training and licensing compliant with international requirements also inspire confidence among States, leading to international recognition and acceptance of technical personnel qualifications and licences.

These requirements are applicable to all applicants for and, on renewal, to all holders of the licences and ratings specified therein. In the case of amendments affecting existing licensing specifications, Member States have the discretion to re-examine licence holders’ knowledge, experience and proficiency.¹

Related training manuals provide guidance as to the scope and depth of training curricula to ensure Annex 1 requirements are maintained, while also providing training guidance for other aviation personnel to whom the provisions of Annex 1 do not apply, such as aerodrome emergency crews, flight operations officers, radio operators and individuals involved in other related disciplines.

3.1.1 Definitions and general rules concerning licences: validity, approved training, language requirements and specifications

Training and licensing are together critical for the achievement of overall competency. Annex 1 stipulates that a person can only act as a flight crew member of an aircraft if that individual holds a valid licence in compliance with the relevant specifications of Annex 1 and appropriate to the duties to be performed.²

For harmonization purposes, licences must be in English or include an English translation and contain minimum detailed requirements to determine easily the privileges and validity of ratings.³ Licences are usually issued by the State of Registry of an aircraft, or by any other State and rendered valid by the State of Registry of that aircraft.⁴ In the case when a State renders valid a licence issued by another State, the validity of such licence must be established by suitable authorizations carried out by the licence holder equivalent to those established by the original licensing State or the licence must be limited to specific privileges. When issuing licences, States must ensure that other States are enabled to be satisfied as to the validity of the licence.⁵ This objective is achieved through various means of demonstrating pilot proficiency and skill, such

¹ Application of the PEL Standards, Annex 1, at (vii).
² See Annex 1, Standard 1.2.1.
³ For a complete list of licence requirements see ibid., supra note 2§ Standards 5.1.1 and 5.1.2.
⁴ Although the Chicago Convention allocates to the State of Registry certain functions, including the issuance of licences, there are circumstances in which the State of Registry may be unable to fulfill its responsibilities adequately in instances where aircraft are leased, chartered or interchanged by an operator of another State. Article 83 bis of the Chicago Convention establishes agreements for the transfer of certain oversight responsibilities from the State of Registry to the State of the Operator, subject to acceptance by the latter State. Guidance of the Implementation of Article 83 bis is provided in ICAO Cir. 295.
⁵ Annex 1, supra note 2§ Standard 1.2.5.1.2.
as flight checks or simulation training of flight crew members engaged in commercial air transport operations.

The validity of the authorization should not extend beyond the period of validity of the licence and ceases if the licence is revoked or suspended. For licences used in commercial air transport operations, the Licensing Authority is required to confirm the validity of other licences before authorization is issued.

To ensure effective communication skills of operational personnel, language proficiency requirements mandate aircraft pilots, air traffic controllers, aeronautical station operators and flight navigators to demonstrate proficiency in either the language normally used for radiotelephony communications by the station on the ground or in English, as established by certain holistic descriptors in Level 4 of the ICAO Language Proficiency Rating Scale. Unless operational personnel demonstrate competencies at an Expert Level 6, they must be re-evaluated every three (Operational Level 4) or six years (Extended Level 5).

### 3.1.2 Licences and ratings for pilots

Any person acting as a pilot-in-command or as co-pilot of an aircraft, i.e. aeroplane, airship, free balloon, glider, helicopter or powered-lift, must hold a pilot licence issued in accordance with Annex 1. Each licence specifies the category of aircraft or endorses the ratings its holder can operate, among other requirements. Licences also specify different classes or type ratings. For the issuance of type ratings, applicants are expected to gain supervised experience in the applicable type of aircraft and/or flight simulator in normal, abnormal and emergency flight procedures and manoeuvres during all phases of flight; instrument procedures and, for an aeroplane category type rating, upset prevention and recovery training. Pilots-in-command or co-pilots may also acquire an instrument flight rules (IFR) rating as well. Likewise, an individual may only provide flight training or instruction if authorized to do so through a “flight instructor rating”.

There are nine specific types of aviator licences subject to the requirements specified in Annex 1: Student Pilot Licence, Private Pilot Licence, Commercial Pilot Licence, Multi-crew Pilot Licence appropriate to the aeroplane category, Airline Transport Pilot Licence, instrument rating, flight instructor rating appropriate to aeroplanes, airships, helicopters and powered-lifts, Glider Pilot Licence and Free Balloon Pilot Licence.

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6 Ibid., supra note 2§ Standard 1.2.2.1.
7 Ibid., supra note 2§ Standard 1.2.2.2.
8 Ibid., supra note 2§ Standards 1.2.9.1, 1.2.9.3 and 1.2.9.4.
9 The holistic descriptor contained in Annex 1, Attachment 1, calls for operational personnel to communicate effectively in voice-only and in face-to-face situations on common, concrete and work-related topics; appropriately exchange messages as well as recognize and resolve communication misunderstandings; and handle linguistic challenges presented by an unexpected turn of events in a routine work situation.
10 Annex 1, Attachment A includes details on the six expert, extended and operational ICAO language proficiency levels.
11 Ibid., supra note 2§ Standards 1.2.9.5 and Recommended Practice 1.2.9.6.
12 Ibid., supra note 2§ Standards 2.1.1.1, 2.1.1.2, 2.1.1.2.1 and 2.1.1.3.
13 Ibid., supra note 2§ Standards 2.1.3.1 and 2.1.3.2.
14 Ibid., supra note 2§ Standard 2.1.5.2.
15 Ibid., supra note 2§ Standard 2.1.7.
16 Ibid., supra note 2§ Standards 2.1.8.1 and 2.1.8.2.
3.1.2.1 Student pilot

A person willing to become a pilot cannot constitute a hazard to air navigation. Thus, student pilots usually may not be less than 16 years old\(^\text{17}\) and are precluded from flying solo unless under the supervision of a flight instructor. Student pilots are also prohibited from flying solo on an international flight. Student pilots are required to hold a Class 2 Medical Assessment.\(^\text{18}\)

3.1.2.2 Private Pilot Licence (PPL)

Potential holders of a PPL must be not less than 17 years old.\(^\text{19}\) A PPL holder is prohibited from earning revenue when acting as pilot-in-command or co-pilot of aircraft.\(^\text{20}\) PPL holders must also demonstrate a number of skills and acquired knowledge for the Licensing Authority to issue a licence for the relevant aircraft category.\(^\text{21}\)

Besides knowledge requirements, applicants are also expected to demonstrate the ability to perform specific procedures and manoeuvres with the degree of competency appropriate for a PPL holder for the relevant category of aircraft.\(^\text{22}\)

Annex 1 details the experience and flight instructions requirements for the issuance of aeroplane, helicopter, powered-lift and airship category ratings:\(^\text{23}\)

- For an aeroplane category rating, experience includes flight at critically slow/high airspeeds, recognition and recovery stalls/spiral dives, normal and crosswind take-offs and landings, flight by reference, emergency operations and operations in transiting controlled aerodromes.
- Flight skills for a helicopter category rating include helicopter inspection and servicing, aerodrome and traffic pattern operations, control of the helicopter by external visual reference, recovery techniques, ground manoeuvring, hovering, take-offs and landings in normal, out of wind, sloping ground, with minimum necessary power and maximum performance, quick stops, simulated helicopter equipment malfunctions and autorotative approach.
- Powered-lift operational requirements include experience in ground manoeuvring and run-ups, hover and rolling take-offs, climb-out, approach and landings in normal, out of wind and sloping ground, take-offs and landings with minimum necessary power and maximum performance, restricted site operations, quick stops, flight by reference solely to instruments, completion of a level 180° turn, recovery techniques and emergency operations.\(^\text{24}\)
- For airships, applicants must receive dual instruction, including airship inspection and servicing, ground reference manoeuvres, aerodrome and traffic pattern operations, techniques

\(^{17}\) Although ICAO does not usually prescribe an age limit for student pilots, restrictions may vary from State to State and tend to coincide to 16 years old as the minimum age for aeroplane, airship, helicopter and powered-lift categories.

\(^{18}\) See Section 1.6 infra (citing Annex 1, supra note 2§ Standard 2.2.3).

\(^{19}\) Annex 1, supra note 2§ Standards 2.3.1 and 2.3.1.1.

\(^{20}\) Ibid., supra note 2§ Standard 2.3.2.1.

\(^{21}\) For a complete list of requisite information and acquired skills to obtain a PPL see Annex 1, supra note 2§ Standard 2.3.1.2.

\(^{22}\) For a complete list of minimum experience hours required to obtain a license for specific aircraft category holdings, see Annex 1, supra note 2§ Standards 2.3.3.1.1 and 2.3.3.1.2 (aeroplanes); Annex 1, supra note 2§ Standards 2.3.3.1.1 and 2.3.3.1.2 (helicopters); Annex 1, supra note 2§ Standards 2.3.3.1.1 and 2.3.3.1.2 (powered-lifts); Annex 1, supra note 2§ Standards 2.3.4.1.1, 2.3.4.1.2 and 2.3.4.2.1 (airships).

\(^{23}\) For details about the flight instruction in the mentioned aircraft, see Annex 1, supra note 2§ Standards and Recommended Practices 2.3.3.2, 2.3.4.2.1, 2.3.5.2 and 2.3.6.2.

\(^{24}\) Ibid., supra note 2§ Standard 2.3.5.2.
and procedures for take-off with obstacle clearance, landings and go-arounds, instrument-only flight, navigation, cross-country flying using visual reference, recognition of leaks and equipment malfunctions.\(^{25}\)

### 3.1.2.3 Commercial Pilot Licence (CPL)

CPL applicants can only act as pilot-in-command or co-pilot of the appropriate aircraft category engaged in commercial air transport operations and must be at least 18 years old.\(^{26}\) CPL candidates may only exercise IFR privileges after receiving relevant and specialized instruction,\(^{27}\) and must demonstrate the requisite level of knowledge in several specific subjects in order to obtain a CPL.\(^{28}\) CPL applicants can also demonstrate specific skills for the aircraft intended by pursuing dual flight instruction in additional category ratings.\(^{29}\)

### 3.1.2.4 Multi-crew Pilot Licence (MPL)

Applicants to an MPL to aeroplane category must be at least 18 years old and capable of exercising the privileges of an instrument rating in a multi-crew operation while acting as co-pilot in an aeroplane operated as such.\(^{30}\) MPL applicants are expected to demonstrate a level of knowledge equivalent to an applicant for an Airline Transport Pilot Licence (ATPL) appropriate to the aeroplane category,\(^{31}\) and operate in a multi-crewed piloted environment, in addition to demonstrating knowledge and proficiency in several other advanced airmanship skills.\(^{32}\)

### 3.1.2.5 Airline Transport Pilot Licence

Holders of an ATPL must be at least 21 years old and may perform as pilot-in-command of an aircraft in commercial air transportation operations with more than one pilot.\(^{33}\) ATPL applicants are expected to demonstrate extensive knowledge appropriate to the category of aircraft to be operated and acquire the minimum flight hour requirement for that category.\(^{34}\)

ATPL holders may also meet requirements for dual flight instruction in other categories of aircraft, and are expected to demonstrate skills as pilot-in-command of a multi-engine aeroplane.\(^{35}\)

\(^{25}\) Ibid., supra note 2§ Standard 2.3.6.2.

\(^{26}\) Ibid., supra note 2§ Standards 2.4.1 and 2.4.1.1

\(^{27}\) Ibid., supra note 2§ Standard 2.4.2.1.

\(^{28}\) For a complete list of information and minimum experience hours required to acquire a CPL licence, see Annex 1, supra note 2§ Standard 2.4.1.2 and Annex 1, supra note 2§ Standards 2.4.3.1.1, 2.4.3.1.1.1 (aeroplanes); Annex 1, supra note 2§ Standards 2.4.4.1.1 and 2.4.4.1.1.1 (helicopters); Annex 1, supra note 2§ Recommend Practices 2.4.5.1.1 and 2.4.5.1.2. (powered-lights); Annex 1, supra note 2§ Standards 2.4.6.1.1 and 2.4.6.1.1.1 (airships).

\(^{29}\) For additional information on dual flight instruction category ratings see Annex 1, supra note 2§ Standard 2.4.

\(^{30}\) Ibid., supra note 2§ Standard 2.5.2.1.

\(^{31}\) Ibid., supra note 2§ Standard 2.5.1.2.

\(^{32}\) For a complete list of information and minimum experience hours required to acquire an MPL licence see ibid., supra note 2§ Standards 2.5.2.3 and 2.5.3.1.

\(^{33}\) Ibid., supra note 2§ Standards 2.6.1.1 and 2.6.2.1.

\(^{34}\) For a complete list of information and minimum experience hours required to acquire an ATPL licence, see Annex 1, supra note 2§ Standard 2.6.1.2.1 and Annex 1, supra note 2§ Standards 2.6.3.1.1 and 2.6.3.1.1.1 (aeroplanes); Annex 1, supra note 2§ Standards 2.6.4.1.1 and 2.6.4.1.1.1 (helicopters); Annex 1, supra note 2§ Recommend Practices 2.6.5.1.1 and 2.6.5.1.2 (power-lights).

\(^{35}\) Ibid., supra note 2§ Standards 2.6.1.3.1 and 2.6.1.3.1.1.
### 3.1.2.6 Instrument rating

An instrument flight rating is pursued by licence holders who intend to pilot a category of aircraft solely by reference to instruments and without external reference points, and may be obtained for aeroplane, airship, helicopter and powered-lift categories.\(^{36}\) In order to qualify for an instrument rating, applicants should possess specific operational experience\(^{37}\) and at least 40 total hours with 20 hours of ground time or 30 hours of ground time in the simulator.\(^{38}\)

### 3.1.2.7 Flight instructor

A flight instructor rating allows its holder to supervise solo flights by student pilots and to carry out flight instruction to issue PPLs, CPLs, instruments and flight instructor ratings.\(^{39}\)

Flight instructors must meet the CPL knowledge and must meet a number of teaching and operational requirements,\(^{40}\) and must practise instruction in flight instructional techniques.\(^{41}\)

### 3.1.2.8 Glider Pilot Licence (GPL)

GPL applicants must be at least 16 years old to act as pilot-in-command of a glider, provided the pilot has experience in the launching method being used.\(^{42}\) A glider pilot must also possess the requisite operational knowledge required to fly a glider and have at least six hours of total flight time (ten hours if passengers are to be carried), two of which must be flying solo, with at least 20 launches and landings.\(^{43}\)

### 3.1.2.9 Free Balloon Pilot Licence (FBPL)

FBPL applicants may act as pilot-in-command of free balloons using hot air or gas if they are at least 16 years old, demonstrate specific operational knowledge in a non-commercial free balloon operation and acquire 16 hours of flight time, which must include eight launches and landings, one of which must be done solo.\(^{44}\)

### 3.1.3 Licences for other flight crew members

A flight crew member is a licensed person responsible for duties essential to the operation of an aircraft during a flight duty period, including flight navigators and flight engineers.\(^{45}\)

Before the implementation of radio navigation aids, such as GPS, flight navigators were responsible for air navigation, although their function has been either downsized or replaced in

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36 Ibid., supra note 2§, see definition of Instrument Flight Time, Standards 2.7.1 and 2.7.2.1.
37 For specific operation experience required to obtain an Instrument Rating, see ibid., supra note 2§ Standard 2.7.1.1.
38 Ibid., supra note 2§ Standards 2.7.3.1, 2.7.3.2, 2.7.4.1 and 2.7.4.2.
39 Ibid., supra note 2§ Standard 2.8.2.
40 For a complete list of requirements for certification as a Flight Instructor, see ibid., supra note 2§ Standard 2.8.1.1.
41 Ibid., supra note 2§ Standards 2.8.1.2 and 2.8.1.4.
42 Ibid., supra note 2§ Standards 2.9.1.1 and 2.9.2.1.
43 For a complete list of operational and flight time requirements for certification as a Glider Pilot, see ibid., supra note 2§ Standard 2.9.1.2.1 and Recommended Practice 2.9.1.2.2.
44 For a complete list of operational and flight time requirements for certification as a FBPL, see ibid., supra note 2§ Standard 2.10.1.2.1 and Recommended Practice 2.10.1.2.2.
45 Ibid., supra note 2§ definition of Flight crew member.
commercial operations by contemporary navigation aids and dual-licensed pilot-navigators. All requirements necessary to obtain a Flight Navigation Licence (FNL) are contained in Annex 1.46

Similar to flight navigators, the flight engineer position, designated to monitor and operate aircraft systems, vanishes upon the advent of technology onboard modern aircraft whereby complex systems monitored and adjusted by electronic microprocessors and computers. The requirements contained in Annex 1 includes the requirements that holders of a Flight Engineer Licence (FEL) must meet.

3.1.4 Licences and ratings for other operational personnel

Operational personnel other than flight crew members, such as aircraft maintenance technicians, engineers, mechanics, student air traffic controllers, air traffic controllers, flight operations officers, flight dispatchers and aeronautical station operators are also required to hold specific licences or ratings issued by the Licensing Authority to perform their functions.

3.1.4.1 Aircraft maintenance technician/engineer/mechanic (terms used interchangeably)

Aircraft maintenance mechanics should be not less than 18 years of age to apply for an Aircraft Maintenance Licence (AML). This licence allows its holders to certify aircraft or its parts as airworthy after an authorized repair, modification or installation of an engine, accessory, instrument and/or item of equipment as well as to sign the maintenance release.47 AML applicants must demonstrate specific adequate knowledge with regards to aircraft maintenance,48 and have a minimum of four years’ experience.49

3.1.4.2 Air Traffic Controller Licence (ATCL)

Applicants for an ATCL should be at least 21 years old and not less than three months of service engaged in the control of air traffic under supervision to pursue an approved training course.50 ATCL applicants must demonstrate specific knowledge with regards to the principles, rules and regulations related to air traffic management services.51 An ATCL may acquire six different ratings,52 each providing a specific privilege to be exercised. If they cease to exercise their ratings privileges for six months, the rating becomes invalid.53 A complete listing of privileges associated with each type of air traffic controller rating and the experience needed for each is established in Annex 1.54

46 Ibid., supra note 2§ Standards 3.2.1.1 and 3.2.2.
47 Ibid., supra note 2§ Note and Standards 4.2.1.1 and 4.2.2.1.
48 For a complete list of licensing requirements for certification as an AML, see ibid., supra note 2§ Note and Standard 4.2.1.2.
49 For the complete AML experience time requirements, see ibid., supra note 2§ Standards 4.2.1.4, 4.2.1.5 and 4.2.1.3.
50 Ibid., supra note 2§ Standards 4.4.1.1, 4.4.1.3 and 4.3.1.
51 For a complete list of licensing requirements for ATCL certification, see ibid., supra note 2§ Standard 4.4.1.2.
52 Ibid., supra note 2§ Standard 4.5.1.
53 See ibid., supra note 2§ Standard 4.5.3.4.
54 Ibid., supra note 2§ Standards 4.5.2.1, 4.5.2.2.1, 4.5.2.3 and 4.5.3.1.
3.1.4.3 Flight operations officer/flight dispatcher and aeronautical station operator licences

Similarly, an individual must be at least 21 years old to apply for a Flight Dispatcher Licence (FDL). Flight dispatchers control and supervise flight operations by providing support, briefings or assistance to the pilot-in-command so as to ensure the safe conduct of the flight.\footnote{Ibid., supra note 2§ Standards 4.6.1.1 and 4.6.2, and Annex 6 to the Chicago Convention “Aircraft Operations”, 9th ed., Montréal, ICAO, July 2010 (Annex 6), SARPs in Section 4.6.} Alternatively, any person 18 years of age or older may apply for an Aeronautical Station Operator Licence (ASOL) to act as an operator in an aeronautical station with which he/she is familiar.\footnote{Annex 1, supra note 2§ Standards 4.7.1.1, 4.7.1.2 and 4.7.2.}

3.1.5 Medical provisions for licensing

In order to determine whether licence applicants are fit to perform their proposed duties,\footnote{Ibid., supra note 2§ Standard 1.2.5.1.} medical assessments are performed on each candidate and subject to various temporal limitations for validity.\footnote{Ibid., supra note 2§ Standard 1.2.5.2.}

The validity of the medical assessments starts from the date of the examination and may be extended by the Licensing Authority or deferred if the holder operates in an area distant from examination facilities.\footnote{Ibid., supra note 2§ Standards 1.2.4.3.1 and 1.2.5.2.6.} Validity periods may be reduced for medical reasons, such as in cases of crew members who are either over 40 years old and engaged in single-crew commercial operations, or those who are above 60 years old and engaged in multi-crew-pilot commercial operations.\footnote{Ibid., supra note 2§ Standards 1.2.5.2.1, 1.2.5.2.2 and 1.2.5.2.3.} Pilots who attain their sixtieth birthday cannot act as a pilot in international commercial air transport operations for operations with more than two pilots; and licence holders cannot act as pilots if they have attained their sixty-fifth birthday,\footnote{Ibid., supra note 2§ Standard 2.1.10.} subject to specific rules on medical assessments.

Applicants must meet all medical requirements and are certified in three distinct classes. The general physical and mental examination is intended to test that the applicant is free from any abnormality, disability, disease, wound, injury or sequelae from operation, or effect or side-effect of medication taken that entails an incapacity likely to interfere with the safe performance of duties.\footnote{Ibid., supra note 2§ Standards 1.2.6.1 and 1.2.7.} Operational personnel are prevented from performing their duties should there be a decrease in their physical fitness or if they are found to be under the influence of psychoactive substances that can hamper their abilities.\footnote{Ibid., supra note 2§ Standards 1.2.6.1 and 1.2.7.}

3.2 Aircraft operations

The purpose of Annex 6 is to provide criteria for safe operating practices and to encourage States to facilitate passage of international aircraft over their territories by operating in conformity with these specific criteria in conformance to the safety, efficiency and regularity of international air navigation. In all phases of aircraft operations, ICAO SARP’s are the minimum acceptable
compromise as they make commercial and general aviation viable without prejudicing safety. However, the implementation of ICAO standards does not preclude the development of national standards, which may be more stringent. These requirements cover aircraft operations and limitations, performance, communications and navigation equipment, maintenance, flight documents, responsibilities of flight personnel, security, flight instruments, navigation equipment, fuel consumption, environmental factors, operations of twin-engine aeroplanes operating over extended ranges (ETOPS), human factors, flight time limitations, flight duty and rest periods, among others.

In three parts, Annex 6 is applicable to: international commercial air transport operations (Part I), including scheduled and non-scheduled operations for remuneration or hire; international general aviation (Part II); and international commercial air transport operations and general aviation operations in helicopters (Part III).

3.2.1 Definitions, applicability and general considerations

Annex 6, Part I (hereafter Annex 6) is regularly updated and contains a number of functions States are expected to discharge. In cases where the State of Registry is unable to fulfil these responsibilities, Article 83 bis of the Chicago Convention allows the State of Registry to transfer its duties to the State of the Operator subject to acceptance by the State of Transfer.64

The Annex specifies that States, through the enactment of laws, regulations and procedures, are expected to ensure operators and operational personnel comply with the legal framework enacted, including requirements pertinent to the performance of operational personnel duties, those related to the airspace to be navigated, and to the aerodromes where the aircraft may take off or land. State operators are responsible for the operational control of their aircraft in all circumstances, until such responsibility is transferred to pilots-in-command and flight dispatchers upon aircraft operation.65

3.2.2 Flight operations

3.2.2.1 Operational certification and surveillance

An air operator requires a valid “Air Operator Certificate” (AOC) issued by the State of the Operator66 to engage in commercial air transport.67 The AOC indicates the authorized operations specifications (OPS Specs) and contains specific information as to the authorized operator. A true copy of the AOC and OPS Specs must be carried onboard each aircraft of the operator, along with an English translation if the documents are produced in another language.68

To obtain an AOC, an aircraft operator must demonstrate to the relevant aviation authority that it has adequate organization, method of control and supervision of its flight operations, and executes viable training programmes, ground handling and maintenance arrangements through

64 Registered States may be unable to fulfil their responsibilities under Annex 6 for a number of reasons, most usually if the aircraft is leased, chartered or interchanged by an operator of another State. See Chicago Convention, supra note 7§ Article 83 bis.
65 See Annex 6, supra note 96§ Standards 3.1.1, 3.1.2, 3.1.3 and 3.1.4.
66 The “State of Operator” is that in which the operator’s principal place of business or permanent residence is located.
67 See Annex 6, supra note 96§ definition of State of the Operator and Standards, 4.2.1.1.
68 Ibid., supra note 96§ Standards 4.2.1.2, 4.2.1.5, 4.2.1.6 and 6.1.2 and Appendix 6.
a certification process. The validity of the AOC depends upon the operators’ ability to maintain these requirements, which are supervised regularly.\(^{69}\)

Because States usually recognize valid AOCs from foreign operators that meet the minimum safety-related standards adopted by ICAO, State surveille operators certified by its aviation authority and also foreign aircraft operators. Thus, foreign operators should meet the requirements of States where they conduct operations in addition to those requirements established by the aviation authority that issues its AOC.\(^{70}\)

To obtain its AOC, the operator is required to provide an up-to-date *Operations Personnel Manual* to the aviation authority for review, acceptance and approval. The operations manual must contain four parts: (1) general, (2) aircraft operating information, (3) areas, routes and aerodromes and (4) training.\(^{71}\)

### 3.2.2.2 Flight preparation

Ground facilities in aerodromes have the responsibility of safeguarding both aircraft operations and aircraft passengers, and may be reported to the authority responsible for such facilities should they fail to do so.\(^{72}\)

Aircraft operators must ensure that passengers are familiarized with the location and use of seat belts, emergency exits, life jackets, oxygen dispensing equipment, emergency briefing cards and other emergency equipment. Passengers onboard are also required to use seat belts or harnesses during take-off, landing, turbulence or any emergency occurring during flight.\(^{73}\) The pilot-in-command must complete flight preparation forms certifying the aircraft is airworthy.\(^{74}\) These forms are kept for three months.\(^ {75}\) The operational flight plan includes alternate aerodromes for take-off while en route and destination alternate aerodromes are contained in air traffic services (ATS) flight plans.\(^ {76}\) An operational flight plan is completed for every flight which is approved and signed by the pilot-in-command and flight dispatcher – a copy of which is left with the operator or aerodrome authority.\(^ {77}\)

The flight crew is also responsible for verifying that the meteorological conditions are appropriate for the type of flight to be conducted (visual flight rules (VFR) vs instrument flight rules (IFR)),\(^ {78}\) and that the aircraft carries sufficient fuel to complete the planned flight safely and to allow for deviations.\(^ {79}\)

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\(^{69}\) Ibid., *supra* note 96§ Standards 4.2.1.3 and 4.2.1.4.

\(^{70}\) Ibid., *supra* note 96§ Standards 4.2.2.1, 4.2.2.2 and 4.2.2.3.

\(^{71}\) Ibid., *supra* note 96§ Appendix 2. Detailed information on the content of each part of the personnel manual is also included in Annex 6.

\(^{72}\) Ibid., *supra* note 96§ Standard 4.2.11.1.

\(^{73}\) Ibid., *supra* note 96§ Standards 4.2.12.1, 4.2.12.2 and 4.2.12.4.

\(^{74}\) Airworthiness considerations include certification that the appropriate certificates are on board, relevant instruments and equipment are installed, a maintenance release has been issued, the aircraft mass and centre of gravity location are such that the flight can be conducted safely, the load carried is distributed and secured, and complete flight plans have been filed with the appropriate authorities.

\(^{75}\) See Annex 6, *supra* note 96§ Standards 4.3.1 and 4.3.2.

\(^{76}\) Ibid., *supra* note 96§ Standards 4.3.4.1, 4.3.4.2 and 4.3.4.3.1.

\(^{77}\) Ibid., *supra* note 96§ Standard 4.3.3.1.

\(^{78}\) Ibid., *supra* note 96§ Standards 4.3.5 and 4.3.9.1.

\(^{79}\) Ibid., *supra* note 96§ Standard 4.3.6.1. Fuel planning and fuel management are very sophisticated procedures at which aircraft operators look closely due to their economic impact. Safety and business considerations must be carefully balanced to ensure safety while promoting a lean cost for the airline. Specific and more detailed requirements on this topic are available in the Flight Planning and Fuel Management (FPFM) Manual (Doc. 9976).
3.2.2.3 In-flight procedures

During take-off and landing, all flight crew members are required to be at their stations with their safety harness/belts fastened. While en route, flight crew members must remain at their stations except when performing duties in connection with the operation of the aircraft or for physiological needs.

Each aircraft operating an international commercial flight has a pilot-in-command designated by the operator,80 who is responsible for the safety of all crew members, passengers and cargo onboard from the time the doors of the aircraft are closed and it is ready to move for the purpose of taking-off until the moment it finally comes to rest at the end of the flight and the engine(s) are shut down.81

In certain operations, a flight dispatcher may be designated by the operator to brief and assist the pilot-in-command by providing relevant information assisting with the preparation and filing of ATS flight plans, and by offering support in emergencies.82

Aircraft are expected to abide by the instrument approach procedures approved and promulgated by States for instrument runways or aerodromes utilized for instrument flight operations.83 The flight crew must ensure that the intended landing can be effected at the destination or alternate aerodrome using either VFR or IFR and that any diversion time to an en route alternate aerodrome can be operated safely.84

Annex 6 contains a section on fatigue management intended to ensure that flight and cabin crew members perform at an adequate level of alertness.85 Hazardous flight conditions are also addressed regularly during in-flight operations. With the exception of meteorological conditions, such hazards are reported to appropriate authorities to ensure safety of other aircraft.86

3.2.3 Instruments, equipment and flight documents

Annex 8 contains minimum equipment requirements necessary for the issuance of a certificate of airworthiness. Annex 6 lists additional instruments, equipment and flight documents needed on aircraft engaged in international operations approved by the State of Registry.87 Such items include the operations manual, the flight manual and charts to cover the route of the proposed or diverted flight.88 The aircraft operating manual contains normal, abnormal and emergency procedures, and

80 Ibid., supra note 96§ Standards 4.2.6, 4.2.7.1, 4.2.7.2, 4.2.8.1 and 4.2.8.2.
81 The definitions of accident, serious incident and incident is contained in Annex 13 to the Chicago Convention and is part of Chapter X that specifies the requirements for aircraft accident and incident investigation.
82 Ibid., supra note 96§ Standards 4.6.1 and 4.6.2.
83 Ibid., supra note 96§ Standards 4.4.8.1 and 4.4.8.2.
84 Ibid., supra note 96§ SARPs 4.4.1.1 and all those contained in section 4.7.2 Requirements for extended diversion time operations (EDTO).
85 Such regulations enacted by the aviation authority should include flight time, flight duty period, duty period and rest period limitations which should be followed by operators, and may also include authorization of a Fatigue Risk Management System (FRMS) to introduce prescriptive fatigue management regulations based on approved risk assessments. See Annex 6, supra note 96§ Standards 4.10.1, 4.10.2, 4.10.3 and 4.10.4.
86 Ibid., supra note 96§ Standard 4.4.3.
87 Ibid., supra note 96§ Standard 6.1.1. For a complete list of mandatory manuals, logs and records kept by the operator pursuant to Annex 6, see ibid., supra note 96§ Standards 4.2.10, 8.4, 4.10.8, 4.3, 4.3.3.1, 8.7, 9.4.3.4, 11.1, 11.2, 11.3, 11.3.2, 11.4, 11.5 and 11.6.
88 Ibid., supra note 96§ Standard 6.2.3.
contains aircraft systems and checklists to be used, including a minimum equipment list (MEL) which enables the pilot-in-command to determine whether a flight may be commenced or continued should any instrument, equipment or system become inoperative during the flight. A master minimum equipment list (MMEL) is also included and identifies items which individually may be unserviceable at the commencement of a flight. Aeroplanes must also carry noise certification standards documents in English or a translated version.

All aircraft are furnished with instruments that enable the flight crew to control its flight path, carry out procedural manoeuvres and observe its operating limitations, navigation and anti-collision lights, medical supplies, portable fire extinguishers, a seat with seatbelt for each person onboard, oxygen equipment, life jackets or flotation devices and spare electrical fuses.

Flight recorders subject to strict crashworthiness and fire protection specifications are installed within an aircraft to provide maximum protection for flight recordings to ensure the recorded information is preserved and accessible should an accident occur. These recorders are subject to regular checks and evaluations.

Aeroplanes should also carry a pressure-altitude reporting transponder and an automatic emergency locator transmitter (ELT) which is activated in the event of an accident or with a manual switch. Most aeroplanes over 5,700 kg are equipped with a ground proximity warning system (GPWS) to provide a warning for the flight crew should the aeroplane become hazardously close to the ground. Aeroplanes over 5,700 kg are also equipped with an airborne collision avoidance system (ACAS).

When operating over water, landplanes must carry one life jacket or flotation device for each passenger, life-saving rafts in sufficient numbers to carry all persons on board, equipment for pyrotechnical distress signals and an underwater locating device able to operate for 30 days. Seaplanes carry one life jacket or flotation device for each person on board, equipment for making the sound signals and one sea anchor. Aeroplanes travelling over land areas designated as difficult for search and rescue activities carry signalling devices and appropriate life-saving equipment, which may include oxygen storage for aeroplanes conducting high altitude flights. Aeroplanes are also equipped with oxygen storage and a dangerous loss of pressurization warning device. In icy conditions, aeroplanes are equipped with de-icing and/or anti-icing devices. Pressurized aeroplanes benefit from installation of weather radar to detect hazards, such as thunderstorms, as well as a radiation indicator for those operating above 49,000 ft. Turbo-jet aeroplanes may also be equipped with forward-looking wind shear warning systems and indications if automatic landing equipment limits are being reached.

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89 Ibid., supra note 96 § Standard 6.1.4.
90 Ibid., supra note 96 § Standard 6.1.3 Definitions of MEL and MMEL.
91 Ibid., supra note 96 § Standard 6.13.
92 Ibid., supra note 96 §§ Standards 6.1.3, 6.2.1 and 6.2.2.
93 Ibid., supra note 96 §§ Standards 6.3.4.1, 6.3.4.2 and 6.3.4.3.
94 Ibid., supra note 96 §§ SARPs 6.17.1, 6.17.2, 6.17.3 and 6.19.1.
95 Ibid., supra note 96 §§ Standards 6.15 and 6.15.7. For specific types of aircraft subject to this equipment, see SARPs 6.15.1–6.15.6.
96 Ibid., supra note 96 § Standard 6.18.1 and Recommended Practice 6.18.2.
97 Ibid., supra note 96 §§ Standards 6.5.2.1 and 6.5.3.1.
98 Ibid., supra note 96 § Standard 6.7.1.
99 Ibid., supra note 96 §§ Standards 6.5.1, 6.6 and 6.7.3.
100 Ibid., supra note 96 §§ Standards 6.8 and 6.11.
101 Ibid., supra note 96 § Standard 6.12.
Aeroplanes are also provided with radio communication equipment capable of conducting two-way communication for aerodrome control purposes, receiving meteorological information and conducting two-way communication with aeronautical stations. Navigation equipment is also onboard to enable execution of operational flight plans and to follow the requirements of air traffic services. For reduced vertical separation minimum (RVSM) operations of 1,000 ft, approved by the State responsible for that airspace, aeroplanes must have equipment to indicate the flight level being flown, maintain a selected flight level and report any deviation from the selected flight level. All operators should also maintain the manuals, logs and records required in Annex 6.

### 3.2.4 Airworthiness and maintenance

The safe operation of aircraft and their level of airworthiness are intrinsically related. While Annex 8 to the Chicago Convention contains the SARPs applicable to the certification of aircraft, Annex 6 contains requirements in the complementary chapter “Aeroplane Performance Operating Limitations”, which stipulates a comprehensive and detailed code of aeroplane performance established by the State of Registry.

Aeroplanes over 5,700 kg are expected to be operated in compliance with the terms of its certificate of airworthiness and within the approved operating limitations contained in its flight manual. Further, the following factors affecting the aircraft performance should be taken into consideration for the implementation of airworthiness provisions intrinsically related to the operation of aircraft: mass of the aeroplane as well as its limitations at the start of take-off and at the expected time of landing, operating procedures, pressure-altitude appropriate to the elevation of the aerodrome, ambient temperature, wind, runway slope and its surface condition, and noise limitations.

Aircraft maintenance is also intrinsically related to airworthiness. Annex 6 requires that each aeroplane operated by a service provider engaged in international commercial operations be airworthy, in that its operational and emergency equipment is serviceable, and that all certificates of airworthiness remain valid. Further, the operator’s fleet must be maintained in accordance with an up-to-date operator’s maintenance control manual and the maintenance programme must be accepted by the State of Registry and released to service by a maintenance organization approved by the State in the operator’s place of business. Any aircraft modification or repair should also comply with airworthiness requirements acceptable to the State of Registry.

It must be noted that an operator is responsible for ensuring every aircraft in its fleet is airworthy, regardless of whether it is registered in the same State of the Operator or in a State other than that of the operator.

### 3.2.5 Crew

#### 3.2.5.1 Flight crew

The number and composition of each flight crew is determined by the provisions specified in the operations manual, flight manual and documents associated with the certificate of airworthiness.

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103 Ibid., supra note 96§ Standards 7.1.1, 7.2.1, 7.2.4 and 7.2.8.
104 Ibid., supra note 96§ Standards 4.2.10, 8.4, 4.10.8, 4.3, 4.3.3.1, 8.7, 9.4.3.4, 11.1, 11.2, 11.3, 11.3.2, 11.4, 11.5 and 11.6.
105 Ibid., supra note 96§ Standard 5.1.2.
106 Ibid., supra note 96§ Standards 5.2.1, 5.2.3, 5.2.6 and 5.2.7.
107 Ibid., supra note 96§ Standards 8.1.1, 8.1.2, 8.1.4, 8.1.5, 8.2.1, 8.2.2, 8.3.1, 8.6, 8.7 and 8.8.
A crew includes at least one member licensed to operate radio transmitting equipment, a flight engineer if a station is incorporated into the design of the aeroplane, a licensed flight navigator and all members necessary to perform emergency evacuations. The crew must be adequately trained in conformance with the flight training programme, and approved by the State of the Operator.

Key personnel in the operation of aircraft are the pilot-in-command and co-pilot who are required to conduct at least three take-offs and landings 90 days before flying. Likewise, a cruise relief pilot needs 90 days of recent experience as a pilot-in-command, co-pilot or cruise relief pilot, or a flying skill refresher training programme including normal, abnormal, emergency, approach and landing procedures.

The pilot-in-command needs to demonstrate knowledge of the area, route and aerodrome to be used. Practical and recent experience on approach and landing on a specific route is also required along with initial and recurrent flight training. Proficiency checks on emergency procedures must also be conducted twice a year.

With regard to single pilot operations under IFR or at night, it is recommended that the State of the Operator prescribes the experience and training requirements needed by the flight crew, which is recommended for pilots to include 50 hours of flight time, and ten hours listed as pilot-in-command. For IFR operations, 25 hours of experience are required with 15 hours of flight time at night.

3.2.5.2 Flight dispatcher and cabin crew

Certain States require a flight operations officer or flight dispatcher to control and supervise specific flight operations. In addition to the requirements contained in Annex 1 for obtaining his/her licence, flight dispatchers must also complete a one-way qualification flight of the area over which he/she is authorized to supervise, and demonstrate knowledge of the operations manual, radio equipment, navigation equipment, meteorological information, conditions and their effects on human performance relevant to dispatch duties.

The number of cabin crew required for each aeroplane type is determined upon seating capacity or the actual number of passengers carried, so as to effectuate a safe and expeditious evacuation of the aircraft or to carry out other emergency functions and duties. Cabin crew occupy a specific seat during take-off, landing and when the pilot-in-command so directs, which is secured with a seat belt or safety harness. Cabin crew also serve passengers in the cabin and ensure that baggage carried into the passenger cabin is adequately and securely stowed.

Cabin crew undergo initial and recurrent training programmes approved by the State of the Operator to ensure their competency to safely execute duties and functions in emergency situations, such as evacuations, drills using life-saving equipment and procedures for lack of oxygen in pressurized aeroplanes. Cabin crew must also acquire knowledge on dangerous goods and human performance.

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108 For details about the training programme, see Annex 6, Standard 9.
110 Ibid., supra note 96§ Standards 9.4.1.1, 9.4.2.1, 9.4.3.2 and 9.4.3.2.
111 Ibid., supra note 96§ Standards 9.4.3.2, 9.4.3.3, 9.4.3.5 and 9.4.5.3.
112 Ibid., supra note 96§ Standards 9.4.4.1 and 9.4.4.1.
113 Ibid., supra note 96§ Standards 9.4.5.1.
114 Ibid., supra note 96§ Standard 10.3.
115 Ibid., supra note 96§ Standards 4.8, 12.1, 12.2 and 12.3.
116 Ibid., supra note 96§ Standard 12.4.
3.2.6 Security

Following the terrorist attacks of September 11, 2001, a set of security requirements was established to mitigate the recurrence of similar actions. Although most of these requirements are contained in Annex 17, Annex 6 contains provisions requiring the installation of cockpit doors capable of protecting the flight crew in the event of suspicious activity or security breaches from within the cabin. For aeroplanes over 45,500 kg, or passenger seating capacity greater than 60, such compartment doors must be able to resist penetration by small fire arms, grenade shrapnel and forcible intrusions by unauthorized persons. The compartment door is normally closed and locked from the time all external doors are closed following embarkation until any such door is opened for disembarkation, except when necessary to permit access/egress by authorized persons.117

A search procedure checklist and guidance on the appropriate course of action for searching for or identifying bombs in the case of suspected sabotage or concealed weapons, explosives or other unlawful interference is also required. A security training programme aimed at minimizing or preventing unlawful interference should also be established and maintained by the operator. The pilot-in-command must submit a report to the designated local authority in the case of a security-related event.118

3.3 Dangerous goods

More than half of all cargo carried by all modes of transport is dangerous. Because of the advantages of air transport, however, a great deal of this type of cargo is carried by air. ICAO recognized the importance of dangerous cargo and took steps to ensure it is carried safely by adopting Annex 18, together with the Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc. 9284) (hereafter referred to as the “Technical Instructions”). The Technical Instructions contain numerous detailed instructions necessary for the correct handling of dangerous cargo – which require frequent updating as developments occur in the chemical, manufacturing and packaging industries. A special procedure has been established by the ICAO Council to allow the Technical Instructions to be revised and reissued to keep up with new products and advances in technology.

3.3.1 Definitions, applicability and classification

Annex 18 defines Dangerous Goods as, “articles or substances which are capable of posing a risk to health, safety, property or the environment, which are either shown in the list of dangerous goods in the Technical Instructions or are classified according to those Instructions”.119

The ICAO requirements for the safe handling of dangerous goods identify a limited list of substances which are unsafe to carry in any circumstances, and how other potentially dangerous articles or substances that can be transported safely can be so transported without issue. These requirements are based on the determination made by the United Nations Committee of Experts on nine hazard classes that are used for all modes of transport.120

117 Ibid., supra note 96§ Standards 13.1, 13.2.1, 13.2.2 and 13.2.3.
118 Ibid., supra note 96§ Standards 13.3, 13.4.1, 13.4.2 and 13.5.
119 See Definitions, Annex 18, supra note 186 at 1-1 and 1-2.
The transport of dangerous goods by air is forbidden unless specifically accepted or allowed under an approval granted by the State of Origin.121

3.3.2 Packing, labelling and marking

Dangerous goods transported by air must be contained in packaging of good quality, constructed and securely closed to prevent leakage. The packaging must be suitable for its contents, and resistant to chemical or other actions of such goods. Inner packaging or linings must also be packed, secured or cushioned to prevent breakage or leakage, and to control any movement within the outer packaging. Packaging may be reused after it is inspected and found to be free from corrosion or any other damage, and if it is not contaminated by its contents.122

Each package must be appropriately labelled and marked with the proper shipping name of its contents and its UN number, which is a four-digit identification code for hazardous substances and other dangerous goods such as explosives, flammable liquids or other toxic substances within the framework of international transport. Markings related to such dangerous goods should be inserted in the languages required by the State of Origin and in English. All packaging’s material, construction, testing, labelling and marking specifications are contained in the Technical Instructions.123

3.3.3 Air operators’ and shippers’ responsibilities

Annexes 6 and 18 also allow States to extend such dangerous goods requirements to domestic commercial operations. The policies and procedures of operators authorized to carry dangerous goods must provide for the identification or rejection of undeclared or misdeclared dangerous goods, report violations, dangerous goods accidents and incidents to appropriate authorities, and provide the pilot-in-command necessary information concerning dangerous goods to be carried as cargo. All personnel involved in the acceptance, handling, loading and unloading of cargo, should be familiar with these policies.124

Aircraft operators can only transport such cargo if accompanied by a completed dangerous goods transport document, following an inspection of the package, overpack or freight container containing the dangerous goods. Leaking or damaged packages or unit load devices should either not be loaded or removed from the aircraft – in the latter case, the aircraft is inspected for damage or contamination.125 Packages containing dangerous goods capable of reacting with other dangerous goods must be stowed in such a way as to render the interaction impossible in the event of leakage. Toxic, infectious or radioactive materials are stowed separately from persons, live animals and undeveloped film. Dangerous goods cargo loads are also secured to prevent movement in flight should changes occur to the orientation of the packages.126

The pilot-in-command is informed by the operator in the case of carrying dangerous goods onboard, which is normally included in the Operations Manual. Passengers should also be informed about dangerous goods forbidden onboard an aircraft. In the case of an in-flight emergency, the pilot-in-command must inform air traffic services for onward notification of the dangerous goods onboard to aerodrome authorities.127

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121 Ibid., supra note 186§ Standards 2.4.1, 4.1 and 4.2.
122 Ibid., supra note 186§ Standards 5.2.1, 5.2.2, 5.2.6 and 5.2.7.
123 Ibid., supra note 186§ Standards 6.1, 6.2.1, 6.3 and 5.2.3.
124 Ibid., supra note 96§ Standards 14.2, 14.3 and 14.5, and Annex 18, supra note 186§ Standard 2.3.
125 Ibid., supra note 186§ Standards 8.1, 8.4.1, 8.4.2, 8.4.3, 8.4.4 and 8.6.2.
126 Ibid., supra note 186§ Standards 8.7.1, 8.7.2, 8.7.3 and 8.8.
127 Ibid., supra note 186§ Standards 9.1, 9.2, 9.3 and 9.5.
Any packager of dangerous goods for transport by air must ensure that such goods are not forbidden for transport by air and that they are in proper condition and adequately classified, packed, marked, labelled and accompanied by a transport document duly completed and signed.\textsuperscript{128}

3.4 Airworthiness of aircraft

In accordance with Article 33 of the Chicago Convention, each State of Registry must recognize and render valid any airworthiness certificate issued by another State, subject to confirmation that the airworthiness requirements under which the certificate was issued and or rendered valid are equal to or above the minimum standards adopted by ICAO in Annex 8.

ICAO airworthiness requirements are not intended to replace national regulations and codes of airworthiness containing the full scope and extent of detail required for the certification of individual aircraft. Each State develops its own code of airworthiness or adopts one established by another State.\textsuperscript{129}

Through Articles 31 and 33 of the Chicago Convention and Annex 8, the State of Registry receives certain functions that it is entitled or obligated to discharge in relation to the airworthiness of aircraft. Article 83 \textit{bis} to the Chicago Convention stipulates that in cases of leased, chartered or interchanged aircraft, the State of Registry may transfer to the State of the Operator by agreement, those functions of the State of Registry that can more adequately be discharged by the State of the Operator. The transfer of functions is further detailed in Circular 295 – Guidance on the Implementation of Article 83 \textit{bis} of the Convention on International Civil Aviation.

The requirements in Annex 8 include those for performance, flying qualities, structural design and construction, engine and propeller design and installation, systems and equipment design and installation, and operating limitations such as procedures and general information to be provided in the aeroplane flight manual, crashworthiness of aircraft and cabin safety, operating environment, human factors and security in aircraft design.

The broad standards contained in Annex 8 define the minimum basis for the recognition by States of Certificates of Airworthiness (CoA) for the purpose of flight of aircraft of other States into and over their territories, thereby achieving protection of other aircraft, third parties and property. Annex 8 is supplemented by guidance material provided in the Airworthiness Technical Manual (Doc. 9760) and other related documents.\textsuperscript{130}

3.4.1 Procedures for certification and continuing airworthiness

3.4.1.1 Type Certification and production

Type Certification standards are applicable to all aircraft and cover the design aspects of the appropriate airworthiness requirements for a class of aircraft or for any change prior to certification. Production requirements apply to all aircraft and their parts.\textsuperscript{131}

A Type Certificate is “a document issued by a State to define the design of an aircraft type and to certify that this design meets the appropriate airworthiness requirements of that State”.\textsuperscript{132}

\textsuperscript{128} Ibid., \textit{supra} note 186§ Standards 7.1, 7.2.1 and 7.2.2.

\textsuperscript{129} Annex 8 to the Chicago Convention, “Aircraft Operations”, 9th ed., Montréal, ICAO, July 2010 (Annex 8), Historical Background at p. xv.

\textsuperscript{130} For a list of related manuals and guidance material related to airworthiness of aircraft, see Annex 8.

\textsuperscript{131} See Annex 8, \textit{supra} note 200§ Standards 1.1 and 2.1.

\textsuperscript{132} Ibid., \textit{supra} note 200§ definition of \textit{Type Certificate}. 
A request for a Type Certificate is submitted by the manufacturer when an aircraft is intended for serial production. Each design subject to type certification must avoid unsafe features or characteristics under the anticipated operating conditions or to ensure that their features give at least an acceptable level of safety.

For an aircraft to obtain a Type Certificate, an approved design of the aircraft consisting of drawings, specifications, reports and documentary evidence needs to demonstrate compliance with relevant airworthiness requirements. The approved design will be then be used for production purposes. The aircraft is then subject to inspections, ground and flight tests. The approval of the design is withheld if the aircraft may have dangerous features. In the case of an approval for a design modification, repair or replacement part, States must require evidence that such modification, repair or replacement is in compliance with the airworthiness requirements used for the issuance of the original Type Certificate. Once the State of Design is satisfied with the evidence presented by the manufacturer that the aircraft type is in compliance with the design aspects of the appropriate airworthiness requirements, the Type Certificate is issued defining and approving the design of the aircraft type.

The State of Manufacture has the responsibility of ensuring that each aircraft and its parts are airworthy, even if manufactured by sub-contractors and/or suppliers. To approve the production of aircraft or their parts, States need to examine supporting data and inspect the production facilities and processes so as to maintain a quality system or a production inspection system to guarantee the airworthiness of each aircraft or its parts (e.g. manufacturer, date of manufacture and serial number).

### 3.4.1.2 Certificate of Airworthiness

Article 31 of the Chicago Convention mandates that every aircraft engaged in international navigation be provided with a CoA issued or rendered valid by the State where it is registered. A CoA is issued or rendered valid by a State upon the rendition of evidence demonstrating aircraft compliance with the design aspects of the appropriate airworthiness requirements. Its renewal is subject to the laws of the State of Registry and requires a periodic inspection to determine the continuing airworthiness of the aircraft.

When an aircraft with a valid CoA issued by one State is entered on to the register of another, the new State of Registry may take into consideration the prior CoA as evidence the aircraft complies with the applicable airworthiness requirements when issuing the new CoA. Certain States transfer aircraft within their Registries through an “Export Certificate of Airworthiness”. A State of Registry may also render valid CoAs issued by another State through an authorization, as an alternative to issuance of its own CoA. However, such authorization cannot extend the validity of a previously valid CoA. Article 29 of the Chicago Convention requires an aircraft engaged in international air navigation to carry a CoA. An English translation must be issued if the document is produced in another language.

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133 Ibid., supra note 200§ Standards 1.1, 1.2.1 and 1.2.2.
134 Ibid., supra note 200§ Standards 1.2.2, 1.2.3 and 2.4.2.
135 Ibid., supra note 200§ Standards 1.3.1, 1.3.2 and 1.3.3.
136 Ibid., supra note 200§ Standards 1.3.1, 1.3.2, 1.3.3 and 1.4.1.
137 Ibid., supra note 200§ Standards 2.2, 2.3, 2.4.1 and 2.4.3.
138 Ibid., supra note 200§ Standards 3.2.1, 3.2.2 and 3.2.3.
139 Ibid., supra note 200§ Standards 3.2.4 and 3.2.5.
140 Ibid., supra note 200§ Standards 3.3.1 and 3.3.2.
As indicated in the CoA, aircraft airworthiness may be subject to limitations which are contained in the flight manual, placards or other related documents. The failure to maintain an aircraft in an airworthy condition results in aircraft ineligibility to operate until airworthiness is restored. Similarly, any damage assessed by the State of Registry will affect the airworthiness of the aircraft. Aircraft may be prohibited from resuming flight if the damage is sustained in the territory of another State until such damage is repaired.141

Annex 8 contains two sets of international requirements for airworthiness certification of aeroplanes over 5,700 kg intended for international transport of passengers, cargo or mail: Part IIIA, applicable to aircraft for which the application for certification was submitted before 2 March 2004, and Part IIIB, applicable to aircraft for which an application for issuance of a Type Certificate was submitted after 2 March 2004.142 Annex 8 also contains airworthy requirements for small aeroplanes and helicopters, as well.

3.4.2 Continuing airworthiness

Under the provisions related to continuing airworthiness of aircraft, the State of Registry must inform the State of Design when it first enters an aircraft into its register of the type certified by the latter. This is to enable the State of Design to transmit to the State of Registry any generally applicable information it has found necessary for the continuing airworthiness and safe operation of the aircraft. The State of Registry must also transmit to the State of Design all continuing airworthiness information originated by it for transmission, as necessary, to other States known to have the same type of aircraft on their registers.

The State of Design has the responsibility of transmitting to all States operating that particular type of aircraft on their registers the information necessary for the continuing airworthiness of that aircraft (also known as “mandatory continuing airworthiness information”). It also must notify other States of the suspension or revocation of a Type Certificate, transmit any relevant information necessary to decide on airworthiness actions needed, develop airworthiness actions, establish a continuing structural integrity programme and ensure that the manufacturing organization cooperates with the organization responsible for the type design in assessing information received on experience with operating the aircraft. The State of Design of the modification also transmits mandatory continuing airworthiness information to all States that have the modified aircraft on their registries.143

In turn, the State of Manufacture must ensure that the manufacturing organization works with the organization responsible for the Type Design in assessing information received on experience with operating the aircraft. The State of Registry is expected to advise the State of Design about entries of aircraft into its register, determine the continuing airworthiness of those aircraft, develop/adopt requirements to ensure the continuing airworthiness of the aircraft during their service life and after modifications or repairs, take action upon receipt of mandatory continuing airworthiness information, and establish a reporting system on faults, malfunctions, defects and other occurrences that might cause adverse effects on the continuing airworthiness of aircraft.144
3.5 Aircraft nationality and registration marks

Article 17 of the Chicago Convention requires aircraft to assume the nationality of the State in which they are registered. Article 18 prohibits an aircraft from being registered in more than one State, however, its registration may be changed from one State to another. Article 19 mandates that the registration or transfer of registration of aircraft in any contracting State shall be made in accordance with the laws and regulations of that State, and any aircraft engaged in international air navigation shall bear its appropriate nationality and registration marks.

The first amendment to Annex 7 of the Chicago Convention, entitled “Aircraft Nationality and Registration Marks”, introduced the definition of a “rotorcraft” into the Convention and modified the required location of nationality and registration marks on wings. The second amendment further refined the definition of “aircraft” to exclude all air-cushion-type vehicles, such as hovercraft and other ground-effect machines.

Article 77 of the Chicago Convention permits joint operating organizations to pool “air services on any routes or in any regions” with a third amendment introducing the concepts of “Common Mark”, “Common Mark Registering Authority” and “International Operating Agency”. Under such schemes, each international operating agency must be assigned a distinctive common mark by ICAO selected from a series of symbols included in the radio call signs allocated by the International Telecommunication Union (ITU).

The fourth amendment introduced provisions related to registration and nationality marks for unmanned free balloons. The fifth amendment required the Certificate of Registration to carry an English translation if issued in another language. And the sixth amendment introduced registration and nationality marks provisions for remotely piloted aircraft (RPAs).

3.5.1 Definitions and classification of aircraft

Annex 7 has 17 definitions and contains the classification of aircraft shown in Figure 3.1.

3.5.2 Nationality and registration marks

Each aircraft has a nationality mark comprising a group of characters followed by the registration mark. Nationality marks are selected from a series of nationality symbols included in the radio call signs allocated to the State of Registry by the ITU, which, in turn, are then reported to ICAO. The registration marks consist of letters, numbers or a combination of both, which are assigned by the State of Registry.

The nationality and registration marks are usually painted on the aircraft and should be kept clean and visible at all times. All additional formatting, size and typeface requirements for registration marks, including appropriate placement and nationality marks can be found in Annex 8.

145 Chicago Convention, supra note 7 § 17.
146 Ibid., supra note 7 § 18.
147 Ibid., supra note 7 § 19.
148 Ibid., supra note 7 § 20.
149 See Annex 8, supra note 221 § Table A; Amendments to Annex 7 at p. ix.
150 Chicago Convention, supra note 7 § 77.
151 See Annex 8, supra note 221 § Table A; Amendments to Annex 7 at p. ix and Standard 3.4.
152 Ibid., supra note 221 § Table A; Amendments to Annex 7 at p. ix.
153 Ibid., supra note 221 § Definitions pp. 1 and 2 and Standards 2.1 and 2.2.
154 Ibid., supra note 221 § Standards 4.1, 4.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.2.5, 4.3, 4.3.1 and 4.3.2.
Each State is expected to maintain a register for each aircraft. This register contains information recorded in the certificate of registration. This certificate should be issued in English or include an English translation, and should be carried on board the aircraft. Finally, a fireproof identification plate should also be secured to every aircraft in a prominent position by the registration mark near the main entrance. This plate should be inscribed with the aircraft’s nationality and registration marks.

3.6 Search, rescue and accident investigation

Search and rescue (SAR) services are defined in Annex 12 and are organized to respond to the need to rapidly locate and rescue survivors of aircraft accidents. In accordance with Article 25

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1 Generally designated “kite-balloon”.
2 “Float” or “boat” may be added as appropriate.
3 Includes aircraft equipped with ski-type landing gear (substitute “ski” for “land”).
4 For the purpose of completeness only.

Figure 3.1 Aircraft types
of the Chicago Convention, States are required to provide assistance measures in their territory to aircraft in distress and to permit the owners of the aircraft or authorities of the State in which the aircraft is registered to provide assistance. States should also collaborate in undertaking searches for missing aircraft.\textsuperscript{158} Annex 12 details the organization and cooperative principles for effective SAR operations, and outlines preparatory measures and operating procedures for SAR services in actual emergencies along with the relevant signals. This Annex is complemented by the three-part International Aeronautical and Maritime Search and Rescue Manual (IAMSAR).\textsuperscript{159}

Annex 13 sets forth the requirements for the investigation of aircraft accidents and incidents. First adopted in April 1951, Annex 13 requirements are directed to all participants in an investigation of an aircraft accident or serious incident.\textsuperscript{160} Article 26 of the Chicago Convention stipulates that

\begin{quote}
in the event of an accident to an aircraft . . . involving death or serious injury, or indicating serious technical defect in the aircraft or air navigation facilities, the State in which the accident occurs will institute an inquiry into the circumstances of the accident . . . The State in which the aircraft is registered shall be given the opportunity to appoint observers to be present at the inquiry and the State holding the inquiry shall communicate the report and findings in the matter to that State.\textsuperscript{161}
\end{quote}

Annex 13 outlines the protection of evidence and the responsibility of the State of Occurrence for the custody and removal of the aircraft, and requests for participation in the investigation from other States. This Annex is complemented by a Manual of Aircraft Accident and Incident (Doc. 9756) that covers the organization and planning of an investigation, relevant procedures and checklists, the investigation itself and reporting.

\section*{3.6.1 \textit{SAR}}

The first element addressed in Annex 12 is the \textit{organizational aspects} required for States to arrange for prompt provision of SAR services within their territories and over portions of the high seas or areas of undetermined sovereignty. States delineate non-overlapping and contiguous SAR regions based on technical and operational considerations, not the delineation of boundaries between States. This obligation is discharged individually or in cooperation with other States, and is intended to ensure 24-hour assistance is rendered to persons in need, regardless of their nationality or the circumstances in which they are found.\textsuperscript{162}

States must establish a legal framework and a responsible authority, organize available resources and communication facilities, and provide a workforce skilled in coordination, operational functions and processes on SAR services provision, including planning domestic and international cooperative arrangements and training.

A rescue coordination centre must be established in each SAR region. These centres are staffed 24 hours a day by personnel proficient in English and the appropriate language for radiotelephony communications. These centres must be adequately equipped to communicate and

\textsuperscript{158} Chicago Convention, supra note 7§ Article 25.
\textsuperscript{159} See Annex 12, supra note 231§ Table of Contents and Chapter 1 Note.
\textsuperscript{160} Annex 13 to the Chicago Convention, “Aircraft Accident and Incident Investigation”, 10th ed., Montréal, ICAO, July 2010 (Annex 13), Historical Background at pp. xi and xii.
\textsuperscript{161} Chicago Convention, supra note 7§ Article 26.
\textsuperscript{162} See Annex 12, supra note 231§ SARPs 2.1.1, 2.1.1.1, 2.1.2, 2.2.1, 2.2.1.1.
coordinate with SAR units and entities serving the SAR region. Mobile SAR units also assist aircraft or its occupants in case of an emergency. Such SAR units are public or private services suitably located and equipped for search and rescue operations. Equipment of rescue units must give adequate assistance to victims at the scene of accidents, and due regard is given to the number of passengers involved. Appropriate aerodromes should also have survival equipment suitably packed for dropping by air.

Coordination between the SAR services of neighbouring States is essential to the efficient conduct of operations. Upon request and subject to the conditions prescribed by local authorities, States should permit the entry into its territory of SAR units of other States to search for aircraft accident sites and to rescue survivors. This can be expedited and strengthened through SAR agreements. The States are further encouraged to coordinate SAR operations, especially when conducted in adjacent regions. This can be facilitated through the development of common SAR plans and procedures, authorization of rescue coordination centres to request or provide assistance, including to aircraft, vessels, persons or equipment and facilitation of entry, as well as to promote joint SAR training exercises.

With regard to cooperation, States should arrange for facilities outside the SAR organization, such as aircraft, vessels and local services, to cooperate fully and extend any possible assistance to the survivors of aircraft accidents. It is also recommended for States to ensure a close coordination between aeronautical, maritime and accident investigation authorities. States are also required to publish and disseminate information needed for the expeditious entry of rescue units of other States into their territories to assure accident investigators accompany those rescue units.

An SAR operation is dynamic and requires comprehensive operating procedures that are flexible to meet extraordinary needs. The first step is to identify and categorize the emergency situation, which is normally triggered by communication from the aircraft to an air traffic control (ATC) unit. Three distinct phases categorize emergency situations. The first is the “Uncertainty Phase”, which is commonly declared when radio contact has been lost with an aircraft and cannot be re-established, or when an aircraft fails to arrive at its destination. During this phase, the Rescue Coordination Centre (RCC) concerned may be activated to cooperate with the ATC unit in the collection and evaluation of reports and data pertaining to the subject aircraft. Depending on the situation, the uncertainty phase may develop into an “Alert Phase”, at which time the RCC alerts appropriate SAR units and initiates further action.

The “Distress Phase” is declared when there is reasonable certainty that an aircraft is in distress. The RCC is responsible for taking immediate action to assist the aircraft and to determine its location as rapidly as possible. The RCC then informs the aircraft operator, adjacent RCCs, ATC units, State of Registry and appropriate accident investigation authorities about the situation. The RCC draws and amends a detailed plan for the conduct of the SAR operation and

163 International Cospas-Sarsat Programme is a satellite-based SAR distress alert detection and information distribution system, established by Canada, France, the US and the former Soviet Union. It detects and locates emergency beacons activated by aircraft, ships and backcountry hikers in distress. As of 2014, 43 States and organizations have joined the project, either as providers of ground segments or as user States.
164 Ibid., supra note 231§ SARPs 2.5.1.
165 See Annex 12, supra note 231§ SARPs 2.6.1, 2.6.2, 2.6.3, 2.6.4 and 2.6.8.
166 Ibid., supra note 231§ SARPs 3.1.1, 3.1.2, 3.1.2.1, 3.1.3, 3.1.4, 3.1.5, 3.1.6, 3.1.7 and 3.1.8.
167 Ibid., supra note 231§ SARPs 3.2.1, 3.2.2, 3.2.3 and 3.2.4.
168 Ibid., supra note 231§ Standards 5.2.1 and 5.2.2.
coordinates its execution. It also requests any aircraft, vessels, coastal stations and other services to assist in the operation.\footnote{169}{Ibid., supra note 231§ Standard 5.2.3.}

Annex 12 contemplates the initiation and execution of SAR actions if an aircraft position is unknown as well as procedures involving two or more RCCs, both for authorities in the field and for termination or suspension of SAR operations, which normally occurs when all survivors are delivered to a place of safety or until all reasonable hope of rescuing survivors has passed. Annex 6 requires operators to ensure that pilots-in-command have essential SAR services information in the area over which the aeroplane will be flown.\footnote{170}{See Annex 6, supra note 96§ Standard 3.1.7.} Finally, provisions on SAR include specific SAR signals, including air-to-surface and surface-to-air visual, which are contained in an Appendix to the Annex and the need to maintain records and prepare SAR appraisals by RCCs.\footnote{171}{See Annex 12, supra note 231§ SARPs 5.8.1, Appendix and 5.9.1 and 5.9.2.}

### 3.6.2 Aircraft accident and incident investigation

Annex 13 includes the definition of an accident that is key for liability and safety purposes. It is defined as:\footnote{172}{See Annex 13, supra note 234§ definition of Accident.}

**Accident.** An occurrence associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down, in which:

a) a person is fatally or seriously injured as a result of: being in the aircraft, or direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or direct exposure to jet blast, except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or

b) the aircraft sustains damage or structural failure which: adversely affects the structural strength, performance or flight characteristics of the aircraft, and would normally require major repair or replacement of the affected component, except for engine failure or damage, when the damage is limited to a single engine (including its cowlings or accessories), to propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreen, the aircraft skin (such as small dents or puncture holes), or for minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike (including holes in the radome); or

c) the aircraft is missing or is completely inaccessible.

Annex 13 defines incidents as “occurrences, other than an accident, associated with the operation of an aircraft which affects or could affect safety”.\footnote{173}{Ibid., supra note 234§ definition of Incident.} Further, Annex 13-type investigations
are also expected to be performed for serious incidents, which are defined as “incidents involving circumstances indicating that there was a high probability of an accident and associated with the operation of an aircraft”.\textsuperscript{174} ICAO has developed a list of serious incidents which are of interest for accident prevention studies, contained in Attachment C.

The provisions of Annex 13 apply to activities following accidents wherever they occurred. In case of events occurring in the territory of non-contracting States which do not intend to conduct an investigation, the State of Registry or, failing that, the State of the Operator, the State of Design or the State of Manufacture should institute an investigation. In the event of an accident occurring outside the territory of any State, the State of Registry or, failing that, the State of the Operator, the State of Design or the State of Manufacture, is responsible for instituting the investigation.\textsuperscript{175} This responsibility for instituting an investigation can be delegated in whole or in part to another State or a regional accident investigation organization by mutual arrangement.\textsuperscript{176}

The sole objective of an aircraft accident investigation is to identify probable causes and/or contributing factors of the accident to prevent repeated occurrences. It is not to apportion blame or liability; thus, the investigation should be conducted separate from any judicial or administrative proceedings and ensure that evidence, such as the examination and identification of victims and read-outs of flight recorder recordings, is not impeded by such proceedings. Given the nature of aircraft accidents, it is also recognized that there is a need for coordination between the investigator-in-charge and the judicial authorities. If an act of unlawful interference is suspected, aviation security authorities of the State(s) concerned should be immediately informed.\textsuperscript{177}

The State of Occurrence has specific responsibilities, including the protection of evidence, custody and the removal of aircraft after the investigation is finalized. The protection of evidence includes the preservation, by photographic or other means, of any evidence, including the flight recorders, which might be removed, effaced, lost or destroyed, while custody is intended to protect the wreckage against further damage, access by unauthorized persons, pilfering and deterioration. Once the aircraft, or its contents or any parts thereof are no longer needed for the investigation, the State of Occurrence should release custody of those items to persons designated by the State of Registry or the State of the Operator.\textsuperscript{178}

The State of Registry, State of the Operator, State of Design, State of Manufacture and ICAO States must be notified of the accident by the State of Occurrence. In turn, the notified States should acknowledge receipt of the notification and provide the State of Occurrence with relevant information available on the aircraft and flight crew involved.\textsuperscript{179} In the event of an accident involving dangerous goods, the operator must provide details to inform emergency services. This information is transmitted to the State of the Operator and the State of Occurrence.\textsuperscript{180}

The investigation process is based on the gathering, recording and analysis of all relevant information with the aim of determining probable causes and/or contributing factors to aviation accidents to prevent their recurrence. Safeguarding accident investigation authorities’ continued access to essential information during the course of an investigation relies on States’ ability to implement appropriate protection to accident and incident records obtained.\textsuperscript{181}

\textsuperscript{174} Ibid., supra note 234\S definition of \textit{Serious incident} at Attachment C to Annex 13.
\textsuperscript{175} Ibid., supra note 234\S Standards 2.1, 2.2, 5.2 and 5.3.
\textsuperscript{176} Ibid., supra note 234\S SARPs 5.1, 5.4, 5.5 and 5.6.
\textsuperscript{177} Ibid., supra note 234\S Standards 3.1, 5.4.1, 5.4.3, 5.10 and 5.11.
\textsuperscript{178} Ibid., supra note 234\S Standards 3.2 and 3.4.
\textsuperscript{179} Ibid., supra note 234\S SARPs 4.5, 4.7 and 4.9.
\textsuperscript{180} See Annex 18, supra note 186\S Standard 9.6.1.
\textsuperscript{181} See Annex 13, supra note 234\S Standards 5.7, 5.8, 5.9, 5.9.1, 5.12, 5.12.1 and 5.12.2.
States are required to provide relevant information to the State conducting the investigation. States of Registry, Operator, Design and Manufacture can, and sometimes are called to, participate in an investigation by appointing an accredited representative. Advisers may also be appointed. The State conducting the investigation may call on the best technical expertise available from any source to assist. Further, States having suffered fatalities or serious injuries to its citizens can visit the scene of the accident, access relevant factual information and receive a copy of the Final Report.182

The Final Report of an investigation is the foundation for initiating the safety actions necessary to prevent further accidents from similar causes. It establishes a record and analysis of relevant facts, conclusions in the form of findings, causes and/or contributing factors as well as safety recommendations. Before being issued, distributed and made available to the public, the draft Final Report is transmitted for consultation to the States that participated in the investigation. Safety recommendations proposed are expected to be considered, taken on board and monitored by receiving States.183

Computerized databases greatly facilitate the storing and analysing of information on accidents and incidents. The sharing of such safety information is vital to accident prevention. To facilitate this sharing of information, ICAO operates a database known as the Accident/Incident Data Reporting (ADREP) system. States should also establish and maintain a database to facilitate the analysis of safety deficiencies and to determine preventive actions required.184

3.7 Safety management

Given the increasing complexity of the global air transportation system and its interrelated aviation activities required to assure the safe operation of aircraft, there is a need to transition from reactive safety practices into a proactive strategy to improve safety performance. This is achieved through provisions aimed at assisting States and aviation service providers in managing aviation safety risks. Proactive safety management practices are subject to factors that affect their implementation, including the complexity of the air transportation system as well as the maturity of the aviation safety oversight capabilities of States.

Annex 19 to the Chicago Convention was adopted in 2013, and consolidated existing material from Annexes 1, 6, 8, 11, 13 and 14 regarding the State Safety Programme (SSP),185 safety management systems (SMS)186 and State safety oversight activities. A number of manuals assist States in implementing safety management provisions.187

3.7.1 State safety management responsibilities

Safety management responsibilities consist of activities aiming at improving aviation safety by establishing an SSP and an acceptable level of safety performance (ALoSP), which is the minimum level of safety performance of civil aviation in a State expressed in terms of safety performance targets and safety performance indicators. The SSP requires coordination among

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182 Ibid., supra note 234§ Standards 5.18, 5.19, 5.20, 5.23, 5.24 and 5.27.
183 Ibid., supra note 234§ Standards 6.1, 6.2, 6.3, 6.4, 6.5, 6.10, 6.11, 6.12, 8.3 and Appendix.
184 Ibid., supra note 234§ Standards 7.1–7.7 and 8.1.
185 An SSP is defined as ”an integrated set of regulations and activities aimed at improving safety”.
186 An SMS is defined as “a systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures”.
187 For a comprehensive list of manuals and guidance material related to safety management, see Annex 19.
authorities responsible for individual elements of civil aviation functions. The SSP contemplates the surveillance of SMS implementation by product and service providers.

The SSP and SMS are proactive mechanisms designed to manage aviation safety that rely on the collection, analysis and exchange of safety information for the timely identification and subsequent mitigation of risks and hazards that may result in an accident or an incident. To achieve this objective, States establish and maintain incident reporting systems, both mandatory and voluntary, analyse the safety data contained in safety databases and determine preventive actions required. The success of this proactive approach depends on the appropriate protection of safety information and related sources. States also establish safety information networks to facilitate the free sharing/exchange of information on actual and potential safety deficiencies with the aim of reducing the number of accidents and serious incidents worldwide.

3.7.1.1 Relationship between safety management and safety oversight

The first set of safety management provisions were adopted in 2006 with the introduction of SMS in different Annexes while the concept of a safety oversight system was introduced in 1994 when the Safety Oversight Assessment Programme (SOAP) was established by the ICAO Council. The difference in time for the adoption and implementation of both methodologies, enabled ICAO to provide a solid foundation for the establishment and implementation of a safety oversight system.

Safety oversight is a function by which a State ensures the effective implementation of SARPs and associate procedures contained in the Annexes of the Chicago Convention through the enactment of a legislative framework comprising the primary aviation legislation and the establishment of an oversight agency (typically a Civil Aviation Authority (CAA)). With appropriate safety oversight, the State ensures that its national aviation industry is at or above the safety levels established by the SARPs.

3.7.1.1.1 ASSESSMENT OF SAFETY-RELATED REQUIREMENTS

ICAO’s Universal Safety Oversight Audit Programme (USOAP)

In order to assess the level of implementation of safety-related SARPs through the safety oversight system, ICAO established the USOAP, which has evolved into a Continuous Monitoring Approach (CMA) that incorporates the analysis of safety risk factors. Through this mechanism, ICAO collects and analyses safety information from States and other stakeholders to identify and prioritize appropriate oversight and monitoring activities. The outcomes of these

188 See Annex 19, supra note 270§ Standards 3.1.1, 3.1.2, 3.1.3 and 3.1.4.
189 Product and service providers include approved training organizations, international commercial operators of aeroplanes or helicopters and general aviation operators of large/turbojet aeroplanes, approved maintenance organizations, type design or manufacturing organizations, ATS providers and aerodromes operators.
190 See Annex 19, supra note 270§ SARPs 5.1.1, 5.1.2, 5.2.1, 5.3.1 and 5.3.2.
191 See Annex 19, supra note 270§ Recommended Practices 5.4.1. and 5.4.2.
193 See Annex 19, supra note 270§ Standard 3.2 and Appendix 1.

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activities result in an Effective Implementation (EI) score made available to ICAO Member States and the general public through ICAO’s websites.197

USOAP-CMA allows ICAO to use a risk-based approach for measuring and monitoring the safety oversight capabilities and improving safety performance of States and global aviation on a continuous basis through the use of “States safety risk profiles” to prioritize activities. These profiles assess the existence of Significant Safety Concerns (SSC),198 level of aviation activities in the State, projected traffic growth, corrective actions informed and implemented by States addressing prior deficiencies, significant changes in the organizational structure of the State, air navigation deficiencies and other factors to determine a State’s EI.199

US International Aviation Safety Assessments (IASA) Program

The IASA program was established to address the concern that some States were not implementing the safety standards required by ICAO. The basis for this assessment programme is the “safety clauses” contained in air transport agreements in which parties reserve the right to withhold, revoke, suspend, limit or impose conditions on the operating authorization or permissions of airline(s) if minimum safety-related standards are not maintained.200

Under IASA, the Federal Aviation Administration (FAA) sends teams to assess different States to determine whether the oversight of such air carriers from those States operating into the US or codesharing with a US air carrier, comply with relevant international safety standards established by ICAO. The IASA program focuses on Annexes 1, 6 and 8 requirements. Once data is collected and assessed, the FAA assigns a rating (Category 1 – in compliance; Category 2 – not in compliance) to the CAA. Carriers from Category 1 States are permitted to operate and/or codeshare without limitation with carriers operating in the US; whereas carriers from Category 2 States operating/codesharing within the US have such services limited to levels that existed at the time of the assessment; while carriers from Category 2 States that seek to initiate commercial service are prohibited from initiating such services. A State-by-State category summary listing of IASA determinations is published on the FAA website and is updated regularly.201

EU aviation safety list

In 2005, the European Parliament and the Council of the European Union promulgated Regulation (EC) No. 2111/2005 on the establishment of a Community list of air carriers subject to an operating ban within the Community and on informing passengers of the identity of air carriers operating within the EU. This regulation established a “list of air carriers subject to an operating ban in the Community”.202

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197 See USOAP Manual, supra note 283 § 3.1, 3.2 and 3.7.
198 An SSC occurs when the State allows the holder of an authorization or approval to exercise the privileges attached to it, although the minimum requirements established by the State and by the Standards set forth in the Annexes to the Convention are not met, resulting in an immediate safety risk to international civil aviation.
199 See USOAP Manual, supra note 283 § 3.5.1.
Decisions imposing a partial or total operating ban on an air carrier are based on common criteria set out in an Annex to the EU Safety List Regulations, and are grouped into three areas: (a) verified (objective) evidence of serious safety deficiencies on the part of an air carrier; (b) lack of ability and/or willingness of an air carrier to address safety deficiencies; and (c) lack of ability and/or willingness of the authorities responsible for the oversight of an air carrier to address safety deficiencies.203

3.7.2 SMS

Annex 19 requires service providers to implement an SMS to identify safety hazards and risks and assist with the implementation of mitigating actions. As part of the SMS, service providers are expected to monitor and improve safety performance.204

The SMS of service providers such as approved training organizations, international commercial air operators, approved maintenance organizations, type design organizations and manufactures, ATS providers and certified aerodromes should also be commensurate with the size and complexity of their products or services.205 Whereas general aviation operators of large or turbojet aeroplanes are also expected to implement an SMS including processes to identify safety hazards and risks, implement remedial actions, and monitor the appropriateness and effectiveness of its safety management activities.

3.8 Emerging areas

Similar to the recent evolution of safety management where proactive and predictive methodologies are being put in place to improve further the safety record of the safest mode of transportation, new areas are starting to interrelate with international air transportation: remote piloted aircraft systems (RPAS) and the integration of commercial space activities with international civil aviation. Consideration of these topics has become fundamental due to the recurrence of their activities and the potential they have in affecting international civil aviation.

3.8.1 RPAS

Article 8 of the Chicago Convention states that “no aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization”.206 ICAO issued the Circular on Unmanned Aircraft Systems (Cir. 328) in 2011 and the Manual on Remotely Piloted Aircraft Systems (Doc. 10019) 2015. The aim of this material is to provide guidance on technical and operational issues related to the integration of RPAS in non-segregated airspace and at aerodromes.207

Due to this integration, States should be able to grant the necessary authorizations in accordance with minimum requirements with the object of assuring safe operations alongside manned aircraft.208 Operations of RPAS started to be conducted in segregated airspace to minimize

204 See Annex 19, supra note 270§ Standard 4.1.1, (a) and Appendix 2.
205 Ibid., supra note 270§ Standards 4.1.1, (b), 4.1.2, 4.1.3, 4.1.4, 4.1.5, 4.1.6, 4.1.7 and 4.1.8.
206 See Chicago Convention, supra note 7§ Article 8.
207 See “Unmanned Aircraft Systems (UAS)”, ICAO Cir. 328 (2011) § 1.2.
208 Ibid., § 2.2, 2.3, 2.4, 2.5 and 2.8.
dangers to other aircraft. However, the integration of their operations with manned aircraft in non-segregated airspace is inevitable as their operations evolve. To this end, these systems should be able to act and respond as manned aircraft, including in communications with ATC, in licensing requirements, in how safety management principles are applied to them and to the aircraft flying in their environment, in their operation.

One of the items that has been defined by ICAO is the concept of RPAS that is an aircraft piloted by a licensed “remote pilot” situated at a “remote pilot station” located external to the aircraft (i.e. ground, ship, another aircraft, space) who monitors the aircraft at all times and can respond to instructions issued by ATC, communicates via voice or data link as appropriate to the airspace or operation, and has direct responsibility for the safe conduct of the aircraft throughout its flight.

Likewise, RPAS comprises “a set of configurable elements including an RPA, its associated remote pilot station(s), the required C2 links and any other system elements as may be required, at any point during flight operation”. The evolution of their operational capabilities, potential for civil operations, expected growth and environmental impacts are not yet fully known; thus, the standardization of rules is still under development.

As indicated above, RPAS are subject to the framework established by the Chicago Convention and related provisions. Therefore, certain provisions have been introduced in different Annexes and will be further developed in the years to come.

3.8.2 Commercial space

The recent developments in the civil space transportation industry, specifically the potential increased frequency of suborbital flights, have focused attention on how these activities can be integrated into non-segregated airspace in the upcoming years. After recognizing the imminent growth of this industry, ICAO established a Learning Group with those actively engaged in civil space transportation, and to develop a plan for a safe, efficient and more routine space activities. The members of this learning forum are States that started the development and implementation of regulatory activities for commercial space operators, including the US, the UK, France and Switzerland.

While it is uncertain at this stage whether an existing international organization will be mandated with the development of an international framework for these activities, no one can deny that these craft intended to go to outer space will necessarily cross airspace that is already very congested and where traffic is forecasted to grow exponentially in the next decades. If these operations are to be conducted on a regular basis, their safe integration would need to be addressed to ensure that the safest mode of transportation, air transportation, can coexist with the riskiest mode of transportation, space travel, without affecting aviation safety and third parties on the ground.

209 Ibid., § 2.12, 2.13, 2.14, 2.17 and 3.1.
210 Ibid., § 3.2.
211 Ibid., § 3.8.
212 Ibid., § 3.12, 3.13, 3.14, 3.15, 3.16, 3.17 and 3.18.
### 3.9 Summary and conclusions

This chapter studied the safety-related requirements related to operation of aircraft engaged in international air transport contained in Annexes 1, 6, 18, 8, 7, 12, 13 and 19.

Annex 1 to the Chicago Convention deals with the licensing of operational personnel, including pilots and other air and ground personnel such as air traffic controllers. This Annex aims to standardize their competence, skills, training and health requirements that remain essential to guarantee efficient and safe operations.

Annex 6 aims to ensure the harmonization of aircraft operations of aircraft engaged in international air transport to ensure the highest levels of safety and efficiency. Annex 6 has three parts; Part I covers provisions for the operation of aircraft engaged in international commercial air transport, while Parts II and III establish international general aviation and helicopter operations. Annex 18 to the Chicago Convention sets the minimum requirements for the safe transportation of dangerous goods by air.

Article 33 of the Chicago Convention calls upon States to recognize and render valid airworthiness certificates issued by other Contracting States, subject to the condition that the requirements under which such certificates are issued are equal to or above the minimum standards established by ICAO pursuant to the Chicago Convention. Such requirements are contained in Annex 8 and facilitate operations of aircraft in international air navigation, as well as their import and export or their exchange for lease, charter or interchange.

Annex 7 establishes provisions for the classification and identification of aircraft, including rules for nationality and registration marks.

The SARPs in Annex 12 provide direction in the provision of SAR services to locate promptly and respond to persons in need of assistance aboard distressed aircraft or to rescue survivors of aircraft accidents.

Annex 13 stipulates the international requirements for the investigation of aircraft accidents and incidents. These investigations are intended to identify the causes and causal factors of these unfortunate events to prevent repeated occurrences and not to apportion blame of liability.

Annex 19, adopted in April 2013, includes safety management provisions extracted from SARPs gradually introduced into Annexes 1, 6, 8, 11, 13 and 14. These provisions are intended to facilitate safety management functions related to, or in direct support of, the safe operation of aircraft.

This chapter further tapped into the emerging areas where international requirements may be introduced in the future along with those assessment/audit mechanisms established at the international, regional and national level to determine effective implementation of SARPs.