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THE REQUIREMENTS OF THE AIRWORTHINESS OF AIRCRAFT

PROBLEMATIKA POŽADAVKŮ LETOVÉ ZPŮSOBILOSTI CIVILINÍCH LETADEL

BACHELOR'S THESIS
BAKALÁŘSKÁ PRÁCE

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Problematika požadavků letové způsobilosti civilních letadel

v anglickém jazyce:

The requirements of the airworthiness of aircraft

Stručná charakteristika problematiky úkolu:

Problematika týkající se požadavků kladených na letadlovou techniku z hlediska letové způsobilosti, je spojena s příslušnými legislativními dokumenty. Bez dodržení těchto požadavků, nemůže být letadlo nebo výrobek letadlové techniky provozovám pro civilní účely.

Cíle diplomové práce:

Cílem práce je shromáždit veškeré dokumenty specifikující požadavky pro získání a zachování osvědčení letové způsobilosti letadel a výrobků letadlové techniky pro civilní letectví a zpracovat tento materiál do ucelené podoby.

Seznam odborné literatury:

[1] Předpis L8, Letecká informační služba ČR
[2] Předpis L8/A, Letecká informační služba ČR
[3] Zákon o civilním letectví č.49/1997 Sb.

Vedoucí bakalářské práce: Ing. Jiří Chlebek, Ph.D.

Termín odevzdání bakalářské práce je stanoven časovým plánem akademického roku 2013/14.

V Brně, dne 20.11.2013

L.S.

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ABSTRACT

The focus of this study is to investigate the requirements and procedures for obtaining and maintaining a certificate of airworthiness of aircraft and aeronautical products within the scope of civil aviation. The requirements investigated include the standards regarding airworthiness requirements for large airplanes, helicopters, small airplanes, engines, and propellers. The procedures for certification and continuing airworthiness throughout the design, production and operating life of an aircraft are explained.

KEYWORDS

Engines, Propellers, Large Airplanes, Helicopters, Small Airplanes

ABSTRAKT

Cílem této práce je zjistit požadavky a postupy pro získání a zachování osvědčení letové způsobilosti letadel a výrobků letadlové techniky v rozsahu civilního letectví. Vyšetřované požadavky zahrnují normy týkající se požadavků na letovou způsobilost přes návrh, výrobu a provoz letadlové techniky.

KLÍČOVÁ SLOVA

Motory, Vrtule, Velké Letouny, Vrtulníky, Malé letouny

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DECLERATION OF AUTHENTICITY

I, Jan Pauliny, declare that I prepared this bachelor's thesis independently and disclosed all sources and literature.

Date 22.05.2012

Signature

Contents

1 INTRODUCTION

Airworthiness can be understood as the condition of aircraft, aircraft engine, propeller or other aeronautical products, which ensures that the level of safety in operation under the anticipated operating conditions is at least equal to that given by the appropriate airworthiness requirements. These airworthiness requirements vary depending on the class of aircraft, engine or propeller in question.

Continuing airworthiness encompasses the procedures carried out, after the aircraft has entered into operation, to ensure that it continues to meet the appropriate airworthiness requirements and to ensure that it is in a condition or safe operation throughout its operating life. The legal document that ensures the airworthiness of an aircraft in operation is called the Certificate or Airworthiness. For an aircraft to maintain a valid Certificate of Airworthiness, it must follow a specific maintenance schedule and pass periodic inspections.

Annex 8 to the Convention on International Civil Aviation provides broad standards regarding the airworthiness requirements for: large airplanes, helicopters, small airplanes, engines, and propellers. Quantitative specifications regarding airworthiness requirements can be found in the National Airworthiness Codes of the appropriate national authorities, which must ensure a level of airworthiness equal to or greater than the standard of Annex 8.

2 PROCEDURES FOR CERTIFICATION AND CONTINUING AIRWORTHINESS

The process of aircraft certification begins from the design of the aircraft, and is carried out through production and throughout its operating life. The first step in this process is to obtain design approval. The design of the aircraft must meet the design aspect of the appropriate airworthiness requirements. In which case, the State of Design issues a Type Certificate (an example can be seen in the appendix) to define the aircraft type, as well as to indicate design approval. Design approval of modifications, repairs, or replacement parts must ensure that the aircraft is still in compliance with the airworthiness requirements on which its Type Certificate is based.

The next step in the certification process is to obtain a production approval for the production of the aircraft and aircraft parts, under design approval. Production is approved by the State of Manufacture, respectfully the Contracting State responsible for the production of aircraft parts, to ensure that the aircraft and aircraft parts are airworthy. To obtain production approval, the production facilities and processed of the manufacturing organization must be in compliance with appropriate production requirements, and the organization must have a quality or inspection system in place to guarantee the airworthiness of each aircraft and aircraft part produced. Records must be kept of each aircraft and aircraft part so that their origin and identification of the approved design and production can be determined.

The certification process then requires that every aircraft has a valid Certificate of Airworthiness (an example can be seen in appendix). This Certificate of Airworthiness is issued by the State of Registry, to ensure that the aircraft in its current condition meets the appropriate airworthiness requirements. The Certificate of Airworthiness is renewed or remains valid so long as the inspections, required by the State of Registry, prove that the aircraft still meets the appropriate airworthiness requirements. Not maintaining an aircraft in an airworthy condition results the aircraft being prohibited from operation until it is restored to an airworthy condition. When an aircraft sustains damage, the State of Registry must judge whether or not the aircraft is airworthy, depending on the nature and extent of the damage.

When a Contracting State enters an aircraft on its register it becomes the State of Registry; as such, it must inform the State of Design of the specific aircraft type that it has done so. Than the State of Design must transmit any information found necessary for the continuing of airworthiness and safe operation of the aircraft, along with notification of suspension or revocation of the Type Certificate to every Contracting State with the particular aircraft type on their register.

3 AIRWORTHINESS REQUIREMENTS

3.1 Engines

The following standards are applicable to the engines of large airplanes (over 5700 kg, for which application for certification was submitted on or after 2 March 2004), helicopters (for which application for certification was submitted on or after 13 December 2007), and small airplanes (over 750 kg but not exceeding 5700 kg, for which application for certification was submitted on or after 13 December 2007). These standards are applicable to an engine type at the time of submission of an application for a type approval (to the appropriate national authority). The engine must meet requirements regarding its design and construction, as well as test and inspection requirements.

The thrust or power ratings, along with all operating conditions and limitations of the propeller must be declared. Necessary installation information must be provided. Information regarding maintaining the engine in airworthy condition must be made available. This information must include: maintenance information, maintenance program information, and mandatory maintenance requirements resulting from the type design approval. The design and construction of the engine must ensure its function and reliability in all anticipated operating conditions, within operating limitations. The materials and manufacturing methods used must account for operating environment, and must ensure consistent and sound structural behavior. Engines must undergo a safety assessment to identify potential hazards. The Engine’s integrity must be confirmed. The engine type must be tested to ensure reliable function, and to verify the declared ratings, conditions and limitations. These tests include: power calibration tests, operation tests, endurance tests, and operating environment tests.

3.2 Propellers

The following standards are applicable to the propellers of large airplanes (over 5700 kg, for which application for certification was submitted on or after 2 March 2004), and small airplanes (over 750 kg but not exceeding 5700 kg, for which application for certification was submitted on or after 13 December 2007). These standards are applicable to propellers at the time of submission of an application for a type approval (to the appropriate national authority). The propeller must meet requirements regarding its design and construction, as well as test and inspection requirements.

The power ratings, along with all operating conditions and limitations of the propeller must be declared. Information regarding maintaining the propeller in airworthy condition must be made available. This information must include: maintenance information, maintenance program information, and mandatory maintenance requirements resulting from the type design approval. The design and construction of the propeller assembly must ensure its function and reliability in all anticipated operating conditions, within operating limitations. The materials and manufacturing methods used must account for operating environment, and must ensure consistent and sound structural behavior. Propellers must undergo a safety assessment to identify potential hazards. The failure or malfunction of the propeller pitch control system must not cause hazardous conditions. Propellers (with removable blades) must be tested to ensure function and reliability of the hub and blade retention system. Propellers must be tested to ensure reliable function within the declared ratings, conditions and limitations. These tests include: function tests, endurance tests, and operating environment tests.

3.3 Large Airplanes

3.3.1 Airplanes over 5 700 kg for which application for certification was submitted on or after 13 June 1960, but before 2 March 2004

These airplanes must have at least two engines; they must also be free from features or characteristics that render them unsafe. The compliance of these airplanes with appropriate airworthiness requirements must be demonstrated by means which ensure that airplane, its components and equipment meet requirements and function reliably under anticipated operating conditions. These requirements are presented in standards regarding the airplane's flight, structure, design and construction, engines, propellers, power plant installation, instruments and equipment, operating limitations and information, continuing of airworthiness – maintenance information, and security.

Compliance with standards regarding the flight of the airplane must be established by flight tests (or other tests, calculations or methods) conducted upon the airplane or airplane of the type for which a Certificate of Airworthiness is sought. These standards must be met for all applicable combinations of airplane mass and center of gravity position for which certification is sought. The flight manual must contain the performance data necessary to determine whether a safe minimum performance will be met for a proposed flight. The flight manual must contain take-off performance data; acceleration, stop distance, take-off path, accelerate- stop distance, take-off path, en-route performance data, and landing performance data, for any operating variables for which it is to be certified. The airplane must be controllable and maneuverable in all anticipated operating condition; controllability must be maintained even in the event of a sudden engine failure. Techniques must be established for controlling the airplane safely in all its configurations. The airplanes trim characteristics must enable the pilot to maintain a desired flight condition without make excessive demands on the pilot attention in normal operation and operation degraded by the failure of one or more engines. The stability of the airplane must ensure that demands on the pilot's concentration are not excessive; however safety must not be jeopardized by lack of maneuverability in emergency conditions. As the airplane approaches stall, in straight or turning flight, the pilot must be notified by a stall warning, enabling the pilot to arrest the development of the stall without changing engine power. All parts of the airplane must be free from flutter and excessive vibration. Vibration and buffeting must not cause structural damage or interfere with control of the airplane.

Structural standards must be met under all operating conditions within the operating limitations on the basic of which certification is sought. These limitations include range or mass and mass distribution, limiting loads, and limiting airspeeds. The airplane's structure must be able to withstand loads up (including limit loads) without sustaining detrimental deformation. The structure must also be able to support the ultimate load. The limiting loads must take into account asymmetrical and symmetric loading. Limiting loads include: flight loads (maneuvering and gust loads), ground and water loads, and miscellaneous loads. The airplane's structure must have sufficient strength as to ensure that fatigue failure will not occur under the anticipated operating conditions.

The airplane and airplane parts must be designed and constructed according to proven practices or practices validated by testing to ensure that they will function effectively and reliably. Moving parts essential to safe operation must undergo substantiating tests, materials used in these parts must have the properties assumed in the design. Manufacturing methods must yield a consistently sound structure, which must be protected against deterioration or strength loss caused by weathering, corrosion, or abrasion. The construction and design must include inspection provisions, as well as provisions to minimize the risk of damage during normal ground-handling. System design features that affect the flight crew's ability to maintain controlled flight must take into consideration: controls and control systems, system survivability, crew environment, pilot vision, provisions for emergencies, provisions for emergencies, fire precautions, fire suppression, incapacitation of occupants, and protection of the flight crew compartment from smoke and fumes. The design of the airplane must protect the occupants from the effect of deceleration forces and fire in the event of an emergency landing. Facilities must be provided for rapid evacuation following an emergency landing, as well as to give maximum practicable assurance of a safe evacuation in case of ditching if the helicopters certificated for ditching conditions.

Engines complete with accessories, used on the airplane as primary propulsion units must be designed and constructed so as to ensure they function reliably. The engines power ratings must be declared, along with operating conditions and limitations. The engine type must be tested to ensure reliable function, and to verify the declared ratings, conditions and limitations. These tests include: power calibration tests, operation tests, and endurance tests.

The propeller's power ratings, along with all operating conditions and limitations must be declared. Propellers must be tested to ensure reliable function within the declared ratings, conditions and limitations. These tests include: operation tests, and endurance tests.

The power plant installation must be designed in a manner which ensures that the airplane is capable of operating without exceeding the engine and propeller (if applicable) limitations. If the hazard of fire or serious structural failure is increased by the continued rotation of a failed engine, means must be provided to stop or slow its rotation. Engine restarting in flight must be possible. The vibration stresses caused by the propeller must lie within the operating limitations of the airplane. The cooling system must be able to maintain the temperature of the power plant within the established limitations. Systems associated with the power plant (fuel, oil, air, induction, etc.) must function reliably under all anticipated operating conditions. Regions of the power plant that are considered serious potential fire hazards must include additional fire protection fetchers regarding: isolation, flammable fluids, fire detection, and fire extinguishment.

The airplane must contain approved instruments and equipment necessary for its safe operation within its operating limitations. Safety and survival equipment must be easily identifiable, accessible, marked with the method of operation, and reliable. Navigation and anti-collision lights must have sufficient characteristics to give other pilots and personnel on the ground as much time as possible to avoid collisions, these light installation must not have adverse effects on flight crew performance or cause harmful dazzle to observers outside.

Operating limitations along with information necessary for the safe operation of the airplane must be made available through the airplane flight manual, or marking and placards. The flight crew must be able to determine when operating limitations are reached with the instruments available. These limitations include; loading limitations, airspeed limitations, power plant limitations, limitations on equipment and systems, miscellaneous limitations, flight crew limitations, and flight time limitations after system or engine failure. The information necessary for safe operation of the airplane consists of operating information and procedures, and performance information. Operating information and procedures must include: the types of eligible operations, loading information, operating procedures, handling information, and least-risk bomb location (for airplane for which application for certification was submitted on or after 12 March 2000 and with a maximum certified take-off mass greater than 45500kg or a seating capacity greater than 60).

Information about maintaining the airplane in airworthy condition must be made available. This information includes: maintenance information, maintenance program information, and mandatory maintenance requirements resulting from the type design approval.

Security precautions, for airplane for which application for certification was submitted on or after 12 March 2000 and with a maximum certified take-off mass greater than 45500kg or a seating capacity greater than 60, must include a least-risk bomb location in the design, as well as interior design features and search procedures that deter easy concealment of weapons, explosives or other dangerous objects.

3.3.2 Airplanes over 5 700 kg for which application for certification was submitted on or after 2 March 2004

These airplanes must free from features or characteristics that render them unsafe. The compliance of these airplanes with appropriate airworthiness requirements must be demonstrated by means which ensure that airplane, its components and equipment meet requirements and function reliably under anticipated operating conditions. These requirements are presented in standards regarding the airplane's flight, structure, design and construction, power plant, systems and equipment, operating limitations and information, crashworthiness and cabin safety, operating environment and human factors, and security.

Compliance with standards regarding the flight of the airplane must be established by flight tests (or other tests, calculations or methods) conducted upon the airplane or airplane of the type for which a Type Certificate is sought. These standards must be met for all applicable combinations of airplane mass and center of gravity position for which certification is sought. The flight manual must contain the performance data necessary to determine whether a safe minimum performance will be met for a proposed flight. The flight manual must contain take-off performance data, acceleration stop distance, take-off path, en-route performance data, and landing performance data, for any operating variables for which it is to be certified. The airplane must be controllable and maneuverable in all anticipated operating condition; controllability must be maintained even in the event of a sudden engine failure. Techniques must be established for controlling the airplane safely in all its configurations. The airplanes trim characteristics must enable the pilot to maintain a desired flight condition without make excessive demands on the on the pilot attention in normal operation and operation degraded by the failure of one or more engines. The stability of the airplane must ensure that demands on the pilot's concentration are not excessive; however safety must not be jeopardized by lack of maneuverability in emergency conditions. Stability of the airplane can be realized by natural and/or artificial means. It must be shown to be unlikely that a condition or failures would result in excessive demands on the pilot's skill. As the airplane approaches stall, in straight or turning flight, the pilot must be notified by a stall warning, enabling the pilot to arrest the development of the stall without changing engine power or thrust. It must be possible to make a prompt stall recovery without exceeding airplane limitations. All parts or the airplane must be free from flutter and excessive vibration. Vibration and buffeting must not cause structural damage or interfere with control of the airplane.

For helicopters for which application for certification was submitted before 24 February 2013, instructions regarding maintenance of the airplane's structure must be provided. For helicopters for which application for certification was submitted on or after 24 February 2013, instructions regarding maintenance and repair of the airplane's structure must be provided. Structural standards must be met under all operating conditions within the operating limitations on the basic of which certification is sought. These limitations include range or mass and mass distribution, limiting loads, and limiting airspeeds. The airplane structure must be able to withstand loads up (including limit loads) without sustaining detrimental deformation, the structure must also be able to support the ultimate load. The limiting loads must take into account: the expected operating life of the airplane, the horizontal and vertical gust environment, the maneuvering spectrum, asymmetrical and symmetric loading, ground and water loads, the speed range of the airplane, vibration and buffeting loads, corrosion or other degradation, and any other loads. The design of the airplane's structure must provide the maximum practicable protection for the occupants in the event of structural failure, or damage due to ground water or object impact. The airplanes design and construction must, where ever practicable, conform to damage tolerance principals, or both damage tolerance principals and failsafe principles (for airplanes for which the application for certification was submitted on or after 24 February 2013). For airplanes for which the application for certification was submitted on or after 24 February 2013, the variation in strength of certain design features must be accounted for.

The airplane and airplane parts must be designed and constructed according to proven practices or practices validated by testing to ensure that they will function effectively and reliably. Moving parts essential to safe operation must undergo substantiating tests, materials used in these parts must have the properties assumed in the design. Materials use must take into account their effects on surroundings. Manufacturing methods must yield a consistently sound structure, which must be protected against deterioration or strength loss caused by weathering, corrosion, or abrasion. The construction and design must include inspection provisions, as well as provisions to minimize the risk of damage during normal ground-handling. System design features that affect the flight crew's ability to maintain controlled flight must take into consideration: controls and control systems, system survivability, crew environment, pilot vision, provisions for emergencies, fire precautions, cargo compartment protection, incapacitation of occupants, and protection of the flight crew compartment from smoke and fumes. The design and construction of the airplane must ensure that it remains free from flutter, structural deviation, loss of control due to structural deflection, and aero elastic effects. The design of the seating and restrains must account for both normal flight and emergency landing loads to minimize injury to occupants. The design of ventilation, heating and pressurization (where applicable) systems must provide an adequate cabin environment. The design of the airplane must include electrical bonding and protection against lightning and static electricity. These features must prevent dangerous accumulation of electrical charge, as well as protect the airplane and its systems, occupants and those who in contact with it from dangerous and catastrophic effects of lightning discharge and electric shock. The design of the airplane must protect the occupants from the effect of deceleration forces and fire in the event of an emergency landing. Facilities must be provided for rapid evacuation following an emergency landing, as well as to give maximum practicable assurance of a safe evacuation in case of ditching if the helicopters certificated for ditching conditions.

The power plant installation must be designed in a manner which ensures that the airplane is capable of operating without exceeding the engine and propeller (if applicable) limitations. If the hazard of fire or serious structural failure is increased by the continued rotation of a failed engine, means must be provided to stop or slow its rotation. Turbine engine installations must be designed to minimize in hazards in the event of an engine failure. Engine restarting in flight must be possible. For airplanes for which the application for certification was submitted before 24 February 2013 the power plant must be arranged and installed in a way that each engine, including its associated systems, can operate individually, where, in at least one arrangement, any failure (unless extremely remote) will result in a power loss no greater than the loss resulting from failure of the critical engine. For airplanes for which the application for certification was submitted on or after 24 February 2013, the engines and their associated systems must be arranged and isolated from one another, where, in at least one configuration, failure or malfunction of any engine or system affecting the engine will not prevent safe operation of the remaining engine(s), accomplishing this safe operation must not require the immediate action of the flight crew. The vibration stresses caused by the propeller must lie within the operating limitations of the airplane. The cooling system must be able to maintain the temperature of the power plant components and fluids within the established limitations. Systems associated with the power plant (fuel, oil, air, induction, etc.) must function reliably under all anticipated operating conditions. Regions of the power plant that are considered serious potential fire hazards must include additional fire protection fetchers regarding: isolation, flammable fluids, fire detection, and fire extinguishment.

The airplane must contain approved instruments, equipment and systems necessary for its safe operation within its operating limitations. The design and installation of the instruments, equipment, and systems must ensure function with minimal electromagnetic interference, and an inverse relationship between the probability of failure and the severity of the effects of such failure. A warning must notify the crew of unsafe system operating conditions. The electric power supply system must support power loads in normal operation, and essential loads after any single failure. For airplanes, for which application for certification was submitted on or after 24 February 2013, complex electronic hardware and software must be developed and validated to ensure that systems in which they are used function at the required level of safety. Safety and survival equipment must be easily identifiable, accessible, marked with the method of operation, and reliable. Navigation and anti-collision lights must have sufficient characteristics to give other pilots and personnel on the ground as much time as possible to avoid collisions, these light installation must not have adverse effects on flight crew performance. Electronic systems must be protected from internal and external sours electromagnetic interference. If the airplane requires certification for flight in icing conditions it must be able to operate safely under such conditions.

Operating limitations along with information necessary for the safe operation of the airplane must be made available through the airplane flight manual, or marking and placards. The flight crew must be able to determine when operating limitations are reached with the instruments available. These limitations include; loading limitations, airspeed limitations, power plant limitations, limitations on equipment and systems, miscellaneous limitations, flight crew limitations, and flight time limitations after system or engine failure. The information necessary for safe operation of the airplane consists of operating information and procedures, performance information, and continuing airworthiness - maintenance information. Operating information and procedures must include: the types of eligible operations, loading information, operating procedures, and handling information. The continuing airworthiness - maintenance information must include maintenance information, maintenance program information, and mandatory maintenance requirements resulting from the type design approval.

Airplane design must account of crashworthiness and cabin safety to improve the probability of occupant survival. Emergency landing loads must be considered in the design of the interiors, furnishings, support structure, and safety equipment to (for airplanes for which application for certification was submitted before 24 February 2013) maximize survivability of the occupants, or to (for airplanes for which application for certification was submitted on or after 24 February 2013) protection of the occupants. The design of an airplanes cabin must include fire protect for the occupants, sufficient emergency exits for evacuation, emergency lighting and markings, and survival equipment. The emergency lighting must illuminate both the inside and outside of the airplane during evacuation, as well as give an indication of the path to emergency exits, without posing an additional hazards. The emergency lighting electrical supply must be independent from the main electrical supply, and must activate automatically.

Demands made on the passengers and personnel who operate, maintain and service the airplane must be within their corresponding performance limitations. The design of the airplane must allow for variation in flight crew skill and physiology, as they must have safe and effective control of the airplane. The flight crew workload must be reasonable even in operation degraded by failures, such as engine failure. Airplane design must account for ergonomics and operating environment factors.

Security precautions, for airplane with a maximum certified take-off mass greater than 45500kg or a seating capacity greater than 60, must include a least-risk bomb location in the design, as well as interior design features and search procedures that deter easy concealment of weapons, explosives or other dangerous objects. Airplanes that are required to have a flight crew compartment door, where application for the issue of a Type Certificate is first submitted to the appropriate national authority on or after 20 May 2006, must incorporate a design which resists penetration by small arms fire and grenade shrapnel in the flight crew compartment bulkhead floor and ceiling, if these areas are accessible in flight.

3.4 Helicopters

3.4.1 Helicopters for which application for certification was submitted on or after 22 March 1991 but before 13 December 2007

Helicopters intended for carrying passengers, cargo or mail in international air navigation must be free from features or characteristics that render them unsafe. The compliance of these helicopters with appropriate airworthiness requirements must be demonstrated by means which ensure that helicopter, its components and equipment meet requirements and function reliably under anticipated operating conditions. These requirements are presented in standards regarding the helicopter's flight, structure, design and construction, rotors and power transmission systems and power plant installation, instruments and equipment, electrical system, and operating limitations and information.

Compliance with standards regarding the flight of the helicopter must be established by flight tests (or other tests, calculations or methods) conducted upon the helicopter or helicopter of the type for which a Certificate of Airworthiness is sought. These standards must be met for all applicable combinations of helicopter mass and center of gravity position for which certification is sought. The flight manual must contain the performance data necessary to determine whether a safe minimum performance will be met for a proposed flight. The flight manual must contain: hover performance, take-off distance required, and landing distance required. In addition, for performance class 1 helicopters it must include: take-off decision point, rejected take-off distance required, and landing decision point. The helicopter must be controllable and maneuverable in all anticipated operating condition, controllability must be maintained even in the event of a sudden failure of the critical engine. Techniques must be established for controlling the helicopter safely in all its configurations. The helicopter trim and handling characteristics must enable the pilot to maintain a desired flight condition without make excessive demands on the pilot attention. Handling characteristics must not deteriorate significantly after the malfunction of a system associated with flight controls. The stability of the helicopter must ensure that demands on the pilot's concentration are not excessive, however safety must not be jeopardized by lack of maneuverability in emergency conditions. The helicopter characteristics must enable the pilot to control the rotor speed within limits, and enable a prompt recovery of rotor speed after power loss. Autorotation airspeeds must be established to maximize range and minimize rate of decent. The helicopter must be free from flutter. Vibration must not cause structural failure or interfere with control of the helicopter.

Structural standards must be met under all operating conditions within the operating limitations on the basic of which certification is sought; these limitations include range or mass and mass distribution, limiting loads, limiting airspeeds, and main rotor(s) rotational speed limits. The helicopter structure must be able to withstand loads up to and including limit loads without sustaining detrimental deformation, the structure must also be able to support the ultimate load. The limiting loads must take into account asymmetrical and symmetrical loading, limiting loads include: flight loads (maneuvering and gust loads), ground and water loads, and miscellaneous loads. The helicopter structure must have sufficient strength as to ensure that fatigue failure will not occur under the anticipated operating conditions.

The helicopter and helicopter parts must be designed and constructed according to proven practices or practices verified by testing to ensure effective function and reliability. Moving parts essential to safe operation must undergo substantiating tests, materials used in these parts must have the properties assumed in their design. Manufacturing methods must yield a consistently sound structure, which must be protected against deterioration or strength loss caused by weathering, corrosion, or abrasion. The construction and design must include inspection provisions, as well as design provisions to minimize the risk of damage during normal ground-handling operations. Systems design features, which affect the flight crew's ability to maintain controlled flight must take into consideration: controls and control systems, crew environment, pilot vision, provisions for emergencies, fire precautions, and incapacitation of occupants. The design and construction of the helicopter must ensure that it remains free from flutter. The design of the helicopter must protect the occupants from the effect of deceleration forces and fire in the event of an emergency landing. Facilities must be provided for rapid evacuation following an emergency landing, as well as to give maximum practicable assurance of a safe evacuation in case of ditching if the helicopters certificated for ditching conditions.

Engines, complete with accessories, used on the helicopter as primary propulsion units must be designed and constructed so as to ensure they function reliably. The engines power ratings must be declared, along with operating conditions and limitations. The engine type must be tested to ensure reliable function, and to verify the declared ratings, conditions and limitations. These tests include: power calibration tests, operation tests, and endurance tests.

The design and construction of the rotor and power transmission systems assembly, including accessories, must ensure that it functions reliably. The power ratings, along with operating conditions and limitations must be declared. These limitations include maximum and minimum rotor rotational speed for power-on and power-off conditions, an under speed warning must be provided. The rotor and power transmission systems must be tested to ensure they will function reliably within the declared ratings, conditions and limitations. These tests include; operation tests, and endurance tests. The power plant installation must be designed in a manner which ensures that the helicopter is capable of operating without exceeding the engine, rotor and power transmission systems limitations. For power plant installations where the hazard of fire or serious structural failure is increased by the continued rotation of a failed engine, means must be provided to stop or slow its rotation. Restarting an engine in flight must be possible. For performance Class 1 and 2 helicopters the power plant must be arranged and installed in a way that each engine, including its associated systems, can operate individually, where, in at least one arrangement, any failure (unless extremely remote) will result in a power loss no greater than the loss resulting from failure of the critical engine. The vibration stresses caused by the rotor and power transmission system must lie within the operating limitations of the helicopter. The cooling system must be able to maintain the temperature of the power plant and power transmission systems within the established limitations. Systems associated with each engine, power transmission, and each rotor (fuel, oil, air, induction, etc.) must function reliably under all anticipated operating conditions. Designated fire zones must include additional fire protection fetchers regarding: isolation, flammable fluids, fire detection, and fire extinguishment.

The helicopter must contain approved instruments and equipment necessary for its safe operation within its operating limitations. Safety and survival equipment must be easily identifiable, accessible, marked with the method of operation, and reliable. Navigation and anti-collision lights must have sufficient characteristics to give other pilots and personnel on the ground as much time as possible to avoid collisions, these light installation must not have adverse effects on flight crew performance or cause harmful dazzle to observers outside.

The design and installation of the electrical systems must ensure that its function under operating conditions.

Operating limitations along with information necessary for the safe operation of the helicopter must be made available through the helicopter flight manual, or marking and placards. The flight crew must be able to determine when operating limitations are reached with the instruments available. These limitations include; loading limitations, airspeed limitations, power plant and power transmission limitations, rotor limitations, limitations on equipment and systems, miscellaneous limitations, and flight crew limitations. The information necessary for safe operation of the helicopter consisted of operating information and procedures, and performance information. Operating information and procedures must include: the types of eligible operations, loading information, operating procedures, and handling information.

3.4.2 Helicopters for which application for certification was submitted on or after 13 December 2007

Helicopters with a maximum certified take-off mass greater than 750kg intended for carrying passengers, cargo or mail in international air navigation must be free from features or characteristics that render them unsafe. The compliance of these helicopters with appropriate airworthiness requirements must be demonstrated by means which ensure that helicopter, its components and equipment meet requirements and function reliably under anticipated operating conditions. These requirements are presented in standards regarding the helicopter’s flight, structure, design and construction, rotors and power plant, systems and equipment, operating limitations and information, crashworthiness and cabin safety, and operating environment and human factors.

Compliance with standards regarding the flight of the helicopter must be established by flight tests (or other tests, calculations or methods) conducted upon the helicopter or helicopter of the type for which a Type Certificate is sought. These standards must be met for all applicable combinations of helicopter mass and center of gravity position for which certification is sought. The flight manual must contain the performance data necessary to determine whether a safe minimum performance will be meet for a proposed flight. The flight manual must contain: hover performance, climb, height- velocity envelope, and takeoff distance - all engines operating. In addition for Category A Helicopters it must include: minimum performance, take-off decision point, take-off distance required, rejected take-off distance required, take-off path – climb gradient, engine inoperative climb, landing decision point, and landing distance required. The helicopter must be controllable and maneuverable in all anticipated operating condition, controllability must be maintained even in the event of a sudden failure of the critical engine. Techniques must be established for controlling the helicopter safely in all its configurations. The helicopter trim and handling characteristics must enable the pilot to maintain a desired flight condition without make excessive demands on the pilot attention. Handling characteristics must not deteriorate significantly after the malfunction of a system associated with flight controls. The stability of the helicopter must ensure that demands on the pilot's concentration are not excessive, however safety must not be jeopardized by lack of maneuverability in emergency conditions. The helicopter characteristics must enable the pilot to control the rotor speed within limits, and enable a prompt recovery of rotor speed after power loss. Autorotation airspeeds must be established relative to helicopter category. The helicopter must not have ground resonance tendencies. Vibration and buffeting must not interfere with control of the helicopter.

For helicopters for which application for certification was submitted before 24 February 2013, instructions regarding maintenance of the helicopters structure must be provided. For helicopters for which application for certification was submitted on or after 24 February 2013, instructions regarding maintenance and repair of the helicopter's structure must be provided. Structural standards must be met under all operating conditions within the operating limitations on the basic of which certification is sought, these limitations include range of mass and mass distribution, limiting loads, limiting airspeeds, and main rotor(s) rotational speed limits. The helicopter structure must be able to withstand loads up to and including limit loads without sustaining detrimental deformation. The structure must also be able to support the ultimate load. The limiting loads must take into account asymmetrical and symmetrical loading, limiting loads include: flight loads (maneuvering and gust loads), ground and water loads, and miscellaneous loads. The helicopter structure must have sufficient strength as to avoid catastrophic fatigue failure under the anticipated operating conditions. The variation in strength of certain design features must be accounted for.

The helicopter and helicopter parts must be designed and constructed according to proven practices or practices verified by testing to ensure effective function and reliability. Moving parts essential to safe operation must undergo substantiating tests, materials used in these parts must have the properties assumed in their design. Critical components must be identified and provided with procedures to verify their integrity. Manufacturing methods must yield a consistently sound structure, which must be protected against deterioration or strength loss caused by weathering, corrosion, or abrasion. The construction and design must include inspection provisions, as well as design provisions to minimize the risk of damage during normal ground-handling operations. System design features, which affect the flight crew's ability to maintain controlled flight must take into consideration: controls and control systems, crew environment, crew vision, provisions for emergencies, fire precautions, and incapacitation of occupants. The design and construction of the helicopter must ensure that it remains free from flutter. The design of the seating and restrains must account for both normal flight and emergency landing loads to minimize injury to occupants. The design of ventilation systems must provide an adequate cabin environment. The design of the helicopter must include electrical bonding and protection against lightning and static electricity. These features must prevent dangerous accumulation of electrical charge, as well as protect against the dangerous and catastrophic effects of lightning discharge and electric shock. The design of the helicopter must protect the occupants from the effect of deceleration forces and fire in the event of an emergency landing. Facilities must be provided for rapid evacuation following an emergency landing, as well as to give reasonably assurance of a safe evacuation in case of ditching if the helicopter is certificated for ditching conditions. For helicopters for which application for certification was submitted on or after 24 February 2013, these facilities must be shown to be suitable.

The design and construction of the rotor and rotor drive systems assembly, including accessories, must ensure that it functions reliably. The power ratings, along with operating conditions and limitations must be declared. These limitations include maximum and minimum rotor rotational speed for power-on and power-off conditions, an under speed warning must be provided. The rotor and rotor drive systems must be tested to ensure they will function reliably within the declared ratings, conditions and limitations. These tests include; operation tests, and endurance tests. The power plant installation must be designed in a manner which ensures that the helicopter is capable of operating without exceeding the engine, rotor and rotor drive systems limitations. For helicopters with a maximum certified take-off mass greater than 3175 kg or Category A, if the hazard of fire or serious structural failure is increased by the continued rotation of a failed engine, means must be provided to stop or slow its rotation, an engine restarting in flight must also be possible. For Category A helicopters for which the application for certification was submitted before 24 February 2013 the power plant must be arranged and installed in a way that each engine, including its associated systems, can operate individually, where, in at least one arrangement, any failure (unless extremely remote) will result in a power loss no greater than the loss resulting from failure of the critical engine. For Category A Helicopters for which the application for certification was submitted on or after 24 February 2013, the engines and their associated systems must be arranged and isolated from one another, where, in at least one configuration, failure or malfunction of any engine or system affecting the engine will not prevent safe operation of the remaining engine(s). Accomplishing this safe operation must not require the immediate action of the flight crew. The vibration stresses caused by the rotor and rotor drive system must lie within the operating limitations of the helicopter. The cooling system must be able to maintain the temperature of the power plant components and fluids within the established limitations. Systems associated with the power plant (fuel, oil, air, induction, etc.) must function reliably under all anticipated operating conditions. Regions of the power plant that are considered serious potential fire hazards must include additional fire protection fetchers regarding: isolation, flammable fluids, fire detection, and fire extinguishment.

The helicopter must contain approved instruments, equipment and systems necessary for its safe operation within its operating limitations. The design and installation of the instruments, equipment, and systems must ensure function with minimal electromagnetic interference, and for Category A Helicopters the design must also ensure an inverse relationship between the probability of failure and the severity of the effects of such failure. A warning must notify the crew of unsafe system operating conditions. The electric power supply system must support power loads in normal operation, and essential loads after any single failure. For helicopters for which application for certification was submitted on or after 24 February 2013, complex electronic hardware and software must be developed and validated to ensure that systems in which they are used function at the required level of safety. Safety and survival equipment must be easily identifiable, accessible, marked with the method of operation, and reliable. Navigation and anti-collision lights must have sufficient characteristics to give other pilots and personnel on the ground as much time as possible to avoid collisions, these light installation must not have adverse effects on flight crew performance. Electronic systems must be protected from internal and external source electromagnetic interference. If the helicopter requires certification for flight in icing conditions it must be able to operate safely under such conditions.

Operating limitations along with information necessary for the safe operation of the helicopter must be made available through the helicopter flight manual, or marking and placards. The flight crew must be able to determine when operating limitations are reached with the instruments available. These limitations include; loading limitations, airspeed limitations, power plant limitations, rotor limitations, limitations on equipment and systems, miscellaneous limitations, and flight crew limitations. The information necessary for safe operation of the helicopter consists of operating information and procedures, performance information, and maintenance information. Operating information and procedures must include the types of eligible operations, loading information, operating procedures, and handling information. The maintenance information include recommended methods of accomplishing maintenance tasks, guidance on defect diagnosis, maintenance program information, and mandatory maintenance requirements resulting from the type of design approval.

Helicopter design must account of crashworthiness and cabin safety to improve the occupants' chances of surviving an emergency landing or crash. Emergency landing loads must be considered in the design of the interiors, furnishings, support structure, and safety equipment to provide a reasonable level of protection for the occupants in emergency landing conditions. The design of the helicopter cabin must include fetchers to protect the occupants from both airborne fires and those resulting from the event of a crash. Helicopters must have adequate emergency exits appropriate for the size and category of helicopter. Emergency lighting must be incorporated in helicopter with 10 or more passenger seats. These lights must indicate the location of the emergency exits, as well as illuminate both the inside and outside of the helicopter during evacuation. The emergency lighting electrical supply must be independent from the main electrical supply and, for helicopters for which the application for certification was submitted on or after 24 February 2013, emergency lighting must activate automatically.

Demands made on the passengers, and personnel who operate, maintain and service the helicopter must be within their corresponding performance limitations. The design of the helicopter must allow for variation in flight crew skill and physiology, as they must have safe and effective control of the helicopter. The flight crew workload must be reasonable even in operation degraded by failures, such as engine failure. Helicopter design must account for ergonomics and operating environment factors.

3.5 Small Airplanes

Small airplanes must free from features or characteristics that render them unsafe. The compliance of these airplanes with appropriate airworthiness requirements must be demonstrated by means which ensure that airplane; its components and equipment meet requirements and function reliably under anticipated operating conditions. These requirements are presented in standards regarding the airplane's flight, structure, design and construction, power plant, systems and equipment, operating limitations and information, crashworthiness and cabin safety, and operating environment and human factors.

Compliance with standards regarding the flight of the airplane must be established by flight tests (or other tests, calculations or methods) conducted upon the airplane or airplane of the type for which a Type Certificate is sought. These standards must be met for all applicable combinations of airplane mass and center of gravity position for which certification is sought. The flight manual must contain the performance data necessary to determine whether a safe minimum performance will be meet for a proposed flight. Minimum performance must be scheduled for airplanes with more than one turbine-powered engine or a maximum certificated take off mass greater than 2721 kg. The flight manual must contain take-off performance data, en route performance data, and landing performance data, for any operating variables for which it is to be certified. The airplane must be controllable and maneuverable in all anticipated operating condition; controllability must be maintained even in the event of a sudden failure of the critical engine. Techniques must be established for controlling the airplane safely in all its configurations. The airplanes trim characteristics must enable the pilot to maintain a desired flight condition without make excessive demands on the pilot attention in normal operation and operation degraded by the failure of one or more engines. The stability of the airplane must ensure that demands on the pilot's concentration are not excessive; however safety must not be jeopardized by lack of maneuverability in emergency conditions. Stability of the airplane can be realized by natural and/or artificial means. For artificial stability it must be shown to be unlikely that a condition or failures would result in excessive demands on the pilot's skill. As the airplane approaches stall, in straight or turning flight, the pilot must be notified by a stall warning, enabling the pilot to arrest the development of the stall without changing engine power or thrust, with all engines operating. It must be possible to make a prompt stall recovery without exceeding airplane limitations. All parts of the airplane must be free from flutter and excessive vibration. Vibration and buffeting must not cause structural damage or interfere with control of the airplane. The airplane must not have tendencies to unintentionally enter a spin, and must be recoverable in the event of a spin, within appropriate recovery limits.

Structural standards must be met under all operating conditions within the operating limitations on the basic of which certification is sought; these limitations include range or mass and mass distribution, limiting loads, and limiting airspeeds. The airplane structure must be able to withstand loads up to and including limit loads without sustaining detrimental deformation, the structure must also be able to support the ultimate load. The limiting loads must take into account: the expected operating life of the airplane, the maneuvering spectrum, asymmetrical and symmetrical loading, ground and water loads, the speed range of the airplane, vibration and buffeting loads, corrosion or other degradation, and any other loads. The design of the airplane, with regards to energy absorption and evacuation, must provide the maximum practicable protection for the occupants in the event of structural failure, or damage due to ground water or object impact. The airplane structure must conform to damage tolerance, safe-lifer or failsafe principles. For airplanes for which the application for certification was submitted on or after 24 February 2013, the variation in strength of certain design features must be accounted for.

The airplane and airplane parts must be designed and constructed according to proven practices or practices validated by testing to ensure that they will function effectively and reliably. Moving parts essential to safe operation must undergo substantiating tests, materials used in these parts must have the properties assumed in the design. Manufacturing methods must yield a consistently sound structure, which must be protected against deterioration or strength loss caused by weathering, corrosion, or abrasion. The construction and design must include inspection provisions. In addition design provisions and procedures must be defined for safe ground-handling. System design features that affect the flight crew's ability to maintain controlled flight must take into consideration: controls and control systems, system survivability, crew environment, pilot vision, provisions for emergencies, fire precautions, cargo compartment protection, and incapacitation of occupants. The design and construction of the airplane must ensure that it remains free from flutter, structural deviation, control reversal, loss of control due to structural deflection, and aero elastic effects. The design of the seating and restrains must account for both normal flight and emergency landing loads to minimize injury to occupants. The design of ventilation, heating and pressurization (where applicable) systems must provide an adequate cabin environment. The design of the airplane must include electrical bonding and protection against lightning and static electricity. These features must prevent dangerous accumulation of electrical charge, as well as protect the airplane and its systems, occupants and those who in contact with it from dangerous and catastrophic effects of lightning discharge and electric shock. The design of the airplane must protect the occupants from the effect of deceleration forces and fire in the event of an emergency landing. Facilities for rapid evacuation must be shown to be suitable.

The power plant installation must be designed in a manner which ensures that the airplane is capable of operating without exceeding the engine and propeller limitations, if applicable. Where the hazard of fire or serious structural failure is increased by the continued rotation of a failed engine, means must be provided to stop or slow its rotation. Turbine engine installations must be designed to minimize hazards in the event of an engine failure. Engine restarting in flight must be possible. For airplanes for which the application for certification was submitted before 24 February 2013 the power plant must be arranged and installed in a way that each engine, including its associated systems, can operate individually, where, in at least one arrangement any failure (unless extremely remote) will result in a power loss no greater than the loss resulting from failure of the critical engine. For airplanes for which the application for certification was submitted on or after 24 February 2013, the engines and their associated systems must be arranged and isolated from one another, where, in at least one configuration, failure or malfunction of any engine or system affecting the engine will not prevent safe operation of the remaining engine(s). Accomplishing this safe operation must not require the immediate action of the flight crew. The vibration stresses caused by the propeller must lie within the operating limitations of the airplane. The cooling system must be able to maintain the temperature of the power plant components and fluids within the established limitations. Systems associated with the power plant (fuel, oil, air, induction, etc.) must function reliably under all anticipated operating conditions. Regions of the power plant that are considered serious potential fire hazards must include additional fire protection fetchers regarding: isolation, flammable fluids, and fire detection.

The airplane must contain approved instruments, equipment and systems necessary for its safe operation within its operating limitations. The design and installation of the instruments, equipment, and systems must ensure function with minimal electromagnetic interference, and an inverse relationship between the probability of failure and the severity of the effects of such failure. A warning must notify the crew of unsafe system operating conditions. The electric power supply system must support power loads in normal operation, and essential loads after any single failure. For airplanes for which application for certification was submitted on or after 24 February 2013, complex electronic hardware and software must be developed and validated to ensure that systems in which they are used function at the required level of safety. Safety and survival equipment must be easily identifiable, accessible, marked with the method of operation, and reliable. Navigation and anti-collision lights must have sufficient characteristics to give other pilots and personnel on the ground as much time as possible to avoid collisions, these light installation must not have adverse effects on flight crew performance. Electronic systems must be protected from internal and external sours electromagnetic interference. If the airplane requires certification for flight in icing conditions it must be able to operate safely under such conditions.

Operating limitations along with information necessary for the safe operation of the airplane must be made available through the airplane flight manual, or marking and placards. The flight crew must be able to determine when operating limitations are reached with the instruments available. These limitations include; loading limitations, airspeed limitations, power plant limitations, limitations on equipment and systems, miscellaneous limitations, and flight crew limitations. The information necessary for safe operation of the airplane consists of operating information and procedures, performance information, and continuing airworthiness - maintenance information. Operating information and procedures must include: the types of eligible operations, loading information, operating procedures, and handling information. The continuing airworthiness - maintenance information must include maintenance information, maintenance program information, and mandatory maintenance requirements resulting from the type design approval.

Airplane design must account of crashworthiness and cabin safety to improve the occupants' chances of surviving an emergency landing or crash. Emergency landing loads must be considered in the design of the interiors, furnishings, support structure, and safety equipment to (for airplanes for which application for certification was submitted before 24 February 2013) maximize survivability of the occupants, or to (for airplanes for which application for certification was submitted on or after 24 February 2013) protection of the occupants. The design of the airplane cabin must include fetchers to protect the occupants from both airborne fires and those resulting from the event of a crash. The airplane must have adequate emergency exits appropriate for the size of airplane. If installed, emergency lights must indicate the location of the emergency exits, as well as illuminate both the inside and outside of the airplane during evacuation, without posing additional hazards. The emergency lighting electrical supply must be independent from the main electrical supply and must activate automatically.

Demands made on the passengers, and personnel, who operate, maintain and service the airplane must be within their corresponding performance limitations. The design of the airplane must allow for variation in flight crew skill and physiology, as they must have safe and effective control of the airplane. The flight crew workload must be reasonable even in operation degraded by failures, such as engine failure. Airplane design must account for ergonomics and operating environment factors.

4 CONCLUSION

After investigating the standards of Annex 8 to the Convention on International Civil Aviation, regarding the airworthiness requirements, it is evident that as the standards where revised, standards for large airplanes and helicopters, there was an effort to improve the human-machine interface of aircraft as well as an effort to increase the survivability through the addition of airworthiness requirements regarding the operating environment and human factor, as well as the crashworthiness and cabin safety requirements. In addition the airworthiness requirements for engine and propellers (where applicable), between the large airplanes, helicopters, and small airplanes were standardized.

The investigation into the procedures for certification and continuing airworthiness resulted in an explanation of the relationships between the State of Design, the State of Manufacture and the State of Registry, as the aircraft goes through the certification process. This process begins with the design approval granted by the State of Design - by means of the issuing a Type Certificate - to the production approval granted by the State of Manufacture, and then obtaining and maintaining the validity of the Certificate of Airworthiness issued by the State of Registry throughout the operating life of the aircraft.

5 GLOSSARY

Airplane: A power-driven, heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight. [4]

Aircraft: Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface. [4]

Airworthy: The status of an aircraft, engine, propeller or part when it conforms to its approved design and is in a condition for safe operation. [4]

Anticipated operating conditions: Those conditions which are known from experience or which can be reasonably envisaged to occur during the operational life of the aircraft taking into account the operations for which the aircraft is made eligible, the conditions so considered being relative to the meteorological state of the atmosphere, to the configuration of terrain, to the functioning of the aircraft, to the efficiency of personnel and to all the factors affecting safety in flight. [4]

Appropriate airworthiness requirements: The comprehensive and detailed airworthiness codes established, adopted or accepted by a Contracting State for the class of aircraft, engine or propeller. [4]

Approved: Accepted by a Contracting State as suitable for a particular purpose. [4]

Category A: With respect to helicopters, means a multi-engine helicopter designed with engine and system isolation features and capable of operations using take-off and landing data scheduled under a critical engine failure concept which assures adequate designated surface area and adequate performance capability for continued safe flight or safe rejected take-off. [4]

Configuration (as applied to the airplane): A particular combination of the positions of the moveable elements, such as wing flaps and landing gear, etc., that affect the aerodynamic characteristics of the airplane. [4]

Continuing airworthiness: The set of processes by which an aircraft, engine, propeller or part complies with the applicable airworthiness requirements and remains in a condition for safe operation throughout its operating life. [4]

Critical engine(s): Any engine whose failure gives the most adverse effect on the aircraft characteristics relative to the case under consideration. [4]

Engine: A unit used or intended to be used for aircraft propulsion. It consists of at least those components and equipment necessary for functioning and control, but excludes the propeller/rotors (if applicable). [4]

Helicopter: A heavier-than-air aircraft supported in flight chiefly by the reactions of the air on one or more power-driven rotors on substantially vertical axes. [4]

Limit loads: The maximum loads assumed to occur in the anticipated operating conditions. [4]

Maintenance: The performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair. [4]

Performance Class 1 Helicopter: A helicopter with performance such that, in case of engine failure, it is able to land on the rejected take-off area or safely continue the flight to an appropriate landing area. [4]

Performance Class 2 Helicopter: A helicopter with performance such that, in case of engine failure, it is able to safely continue the flight, except when the failure occurs prior to a defined point after take-off or after a defined point before landing, in which cases a forced landing may be required. [4]

Power plant: The system consisting of all the engines, drive system components (if applicable), and propellers (if installed), their accessories, ancillary parts, and fuel and oil systems installed on an aircraft but excluding the rotors for a helicopter. [4]

Repair: The restoration of an aeronautical product to an airworthy condition as defined by the appropriate airworthiness requirements. [4]

State of Design: The State having jurisdiction over the organization responsible for the type design. [4]

State of Manufacture: The State having jurisdiction over the organization responsible for the final assembly of the aircraft. [4]

State of Registry: The State on whose register the aircraft is entered. [4]

Type Certificate: A document issued by a Contracting State to define the design of an aircraft type and to certify that this design meets the appropriate airworthiness requirements of that State. [4]

Ultimate load: The limit load multiplied by the appropriate factor of safety. [4]

6 APPENDIX

ÚŘAD PRO CIVILNÍ LETECTVÍ
CIVIL AVIATION AUTHORITY

ČESKÁ REPUBLIKA **CZECH REPUBLIC**

TYPOVÉ OSVĚDČENÍ

TYPE CERTIFICATE

Č. / No:

Tímto dokumentem se osvědčuje, že uvedený typ letadla, leteckého motoru nebo vrtule, pokud je udržován a provozován podle příslušných předpisů s příslušnými provozními omezeními uvedenými v Příloze k tomuto osvědčení, je uznán letově způsobilým.

This document certifies that the type of the mentioned aircraft, aircraft engine or propeller when maintained and operated in accordance with the pertinent regulations and operating limitations, specified in the Type Certificate Data Sheet, is recognised as airworthy.

Výrobek Product	
Žadatel Applicant	
Použitý předpis Certification Basis	
Datum podání žádosti Date of Application	

Toto osvědčení a jeho Příloha zůstávají v platnosti, dokud se jich žadatel nevzdá nebo dokud jejich platnost Úřad pro civilní letectví České republiky nepozastaví, nezruší či nestanoví ukončení platnosti jinak.

This Type Certificate and the Type Certificate Data Sheet shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Civil Aviation Authority of the Czech Republic.

Datum vydání - Date of issue
(dd-mm-rrrr) - (dd-mm-yyyy)

Podpis - Signature

[2]

ÚŘAD PRO CIVILNÍ LETECTVÍ

CIVIL AVIATION AUTHORITY

ČESKÁ REPUBLIKA **CZECH REPUBLIC**

OSVĚDČENÍ LETOVÉ ZPŮSOBILOSTI

CERTIFICATE OF AIRWORTHINESS

Č. / No:

1. Poznávací značka Nationality and Registration Mark	2. Výrobce a typ letadla Manufacturer and Manufacturer's Designation of Aircraft	3. Výrobní číslo Aircraft Serial No.
4. Kategorie Categories		

5. Toto osvědčení letové způsobilosti je vydáno ve shodě s Úmluvou o mezinárodním civilním letectví ze dne 7. prosince 1944 a na jejím základě vydaného předpisu Letová způsobilost letadel pro shora uvedené letadlo, které se považuje za způsobilé k létání, pokud je udržováno a provozováno podle příslušných předpisů s příslušnými provozními omezeními.

   This Certificate of Airworthiness is issued pursuant to the Convention on International Civil Aviation dated 7th December 1944 and to the Aircraft Airworthiness Regulation made thereunder in respect of the abovementioned aircraft which is considered to be airworthy when maintained and operated in accordance with the pertinent regulations and operating limitations.

( )

Datum vydání - Date of issue
(dd-mm-rrrr) - (dd-mm-yyyy)

Podpis - Signature

[2]

REFERENCES

[1] Předpis L8, Letecká informační služba ČR

[2] Předpis L8/A, Letecká informační služba ČR

[3] Zákon o civilním letectví č.49/1997 Sb.

[4] Annex 8 to the Convention on International Civil Aviation-Airworthiness of Aircraft. Eleventh Edition. Canada: International Civil Aviation Organization, 2010. ISBN 978-92-9231-518-4.