COVER SHEET TO AMENDMENT 105-B

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AIRWORTHINESS OF AIRCRAFT

ANNEX 8
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

ELEVENTH EDITION — JULY 2010

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 8

	Effective date	*Date of applicability*
Eleventh Edition (incorporates Amendments 1 to 102)	18 November 2010	24 February 2013
Amendment 103 (adopted by the Council on 13 June 2011)	30 October 2011	31 December 2014
Amendment 104 (adopted by the Council on 25 February 2013)	15 July 2013	14 November 2013
Amendment 105-A (adopted by the Council on 2 March 2016)	11 July 2016	10 November 2016
Amendment 105-B (adopted by the Council on 2 March 2016) Replacement pages (*vii*), (*xxiv*), IIIB-2-1 to IIIB-2-5	11 July 2016	5 November 2020

Transmittal note

Amendment 105-B

to the

International Standards
and Recommended Practices

AIRWORTHINESS OF AIRCRAFT

(Annex 8 to the Convention on International Civil Aviation)

1. The following replacement pages in Annex 8 (Eleventh Edition) incorporate Amendment 105-B which becomes applicable on 5 November 2020:

   a) Page (*vii*) — Table of Contents

   b) Page (*xxiv*) — Foreword

   c) Pages IIIB-2-1 to IIIB-2-5 — Part IIIB, Chapter 2

2. These pages should be retained separately from the Annex proper until the applicability date is reached, at which time they should be incorporated into the Annex.

3. Record the entry of this amendment on page (iii).

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Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted Effective Applicable*
100 (10th Edition)	First meeting of the Airworthiness Panel	a) New definitions of Category A, Category B, discrete source damage, engine, fireproof, fire resistant and satisfactory evidence, new note to critical power-unit; b) amendment to the definition of repair; c) revision of the provisions of Part II to allow the introduction of new parts in the Annex, amend Chapter 3 to clarify provisions relating to the limiting conditions under which a damaged aircraft is permitted to fly uncommercially to an aerodrome where it can be restored to an airworthy condition, and re-organize Chapter 4 to clarify States' responsibilities; d) revision of provisions in Part IIIA pertaining to applicability and operating limitations, proof of compliance; e) revision of provisions in Part IIIB pertaining to applicability, operating limitations, performance, stability, structure, design and construction, powerplant, operating limitations, crashworthiness and cabin safety, operating environment and Human Factors; f) restructuring of Part IV into Part IVA (same provisions as those contained in Part IV of Annex 8, Ninth Edition including Amendment 99, except for applicability clauses and cross-references) and Part IVB (new); g) introduction of new Part V — *Small Aeroplanes*, Part VI — *Engines* and Part VII — *Propellers*.	13 December 2004 13 April 2005 13 December 2007
101	Secretariat	Amendment concerning the development of harmonized provisions relating to safety management on the implementation and maintenance of a State's safety programme from 18 November 2010 and the requirement for organizations responsible for the type design or manufacture of aircraft to implement a safety management system from 14 November 2013.	4 March 2009 20 July 2009 18 November 2010; 14 November 2013
102 (11th Edition)	Recommendations of the twelfth meeting of the Airworthiness Panel Working Group of the Whole (AIRP/WG/WHL/12); Secretariat proposal to restructure Annex 8	a) Amendment introduces new definitions in order to harmonize the use of terminology between Annexes 6 and 8; b) restructuring of Annex 8 so the format and structure align with other Annexes; c) adopts existing industry best practice, notably, updating aircraft design in order to reflect modern practice and specifies the applicability date of each amended design Standard.	24 February 2010 12 July 2010 18 November 2010; 24 February 2013
103	Secretariat	The amendment requires the design and manufacture of aircraft's fire extinguishing and/or suppression systems for engines, auxiliary power-units (APUs) and lavatories to use alternative fire extinguishing agents to halon.	13 June 2011 30 October 2011 31 December 2014
104	Special Meeting of the Safety Management Panel (SMP/SM/1)	The transfer of safety management provisions to Annex 19.	25 February 2013 15 July 2013 14 November 2013

Amendment(s)	*Source(s)*	*Subject(s)*	*Adopted* *Effective* *Applicable*
105-A	Airworthiness Panel (AIRP); Safety and Information Protection Task Force (SIP TF); First Meeting of the Safety Management Panel (SMP/1)	Provisions to recognize organizations responsible for the type design and manufacture of engines and propellers to support the extension of SMS applicability to these organizations	2 March 2016 11 July 2016 10 November 2016
105-B	Friction Task Force (FTF) of the Aerodrome Design and Operations Panel (ADOP)	Use of a global reporting format for assessing and reporting runway surface conditions	2 March 2016 11 July 2016 5 November 2020

CHAPTER 2. FLIGHT

2.1 General

2.1.1 Compliance with the Standards prescribed in this chapter shall be established by flight or other tests conducted upon an aeroplane or aeroplanes of the type for which a Type Certificate is sought, or by calculations (or other methods) based on such tests, provided that the results obtained by calculations (or other methods) are equal in accuracy to, or conservatively represent, the results of direct testing.

2.1.2 Compliance with each Standard shall be established for all applicable combinations of aeroplane mass and centre of gravity position, within the range of loading conditions for which certification is sought.

2.1.3 Where necessary, appropriate aeroplane configurations shall be established for the determination of performance in the various stages of flight and for the investigation of the aeroplane's flying qualities.

2.2 Performance

2.2.1 Sufficient data on the performance of the aeroplane shall be determined and furnished in the flight manual to provide operators with the necessary information for the purpose of determining the maximum total mass of the aeroplane at the time of take-off that would allow the flight to be made with reasonable assurance that a safe minimum performance for that flight will be achieved considering the values of the operational parameter peculiar to the proposed flight.

2.2.2 Achieving the performance furnished in the flight manual for the aeroplane shall take into consideration human performance and in particular shall not require exceptional skill or alertness on the part of the flight crew.

Note.— Guidance material on human performance can be found in the Human Factors Training Manual *(Doc 9683).*

2.2.3 The performance data in the flight manual of the aeroplane shall be consistent with compliance with 1.2.1 and with the operation in logical combinations of those of the aeroplane's systems and equipment, the operation of which may affect performance.

2.2.4 Minimum performance

2.2.4.1 For aeroplanes for which application for certification was submitted before 2 March 2019, at the maximum masses scheduled for take-off and for landing permitted by the performance data in the flight manual (see 2.2.7.2) as functions of the aerodrome elevation or pressure-altitude either in the standard atmosphere or in specified still air atmospheric conditions, and, for seaplanes, in specified conditions of smooth water, the aeroplane shall be capable of accomplishing the minimum performances specified in 2.2.5 and 2.2.6, respectively, not considering obstacles, or runway or water run length.

Note.— This Standard permits the maximum take-off mass and maximum landing mass to be scheduled in the flight manual against, for example:

— *aerodrome elevation, or*

— *pressure-altitude at aerodrome level, or*

— *pressure-altitude and atmospheric temperature at aerodrome level,*

so as to be readily usable when applying the national code on aeroplane performance operating limitations.

2.2.4.2 For aeroplanes for which application for certification was submitted on or after 2 March 2019, at the maximum mass scheduled for take-off and for landing permitted by the performance data in the flight manual (see 2.2.7.3) as functions of the pressure-altitude either in the standard atmosphere or in specified still air atmospheric conditions, and, for seaplanes, in specified conditions of smooth water, the aeroplane shall be capable of accomplishing the minimum performances specified in 2.2.5 and 2.2.6, respectively, not considering obstacles, or runway or water run length.

2.2.5 Take-off

a) The aeroplane shall be capable of taking off assuming the critical engine to fail (see 2.2.7), the remaining engine(s) being operated within their take-off power or thrust limitations.

b) After the end of the period during which the take-off power or thrust may be used, the aeroplane shall be capable of continuing to climb, with the critical engine inoperative and the remaining engine(s) operated within their maximum continuous power or thrust limitations, up to a height that it can maintain and at which it can continue safe flight and landing.

c) The minimum performance at all stages of take-off and climb shall be sufficient to ensure that under conditions of operation departing slightly from the idealized conditions for which data are furnished (see 2.2.7), the departure from the furnished values is not disproportionate.

2.2.6 Landing

a) Starting from the approach configuration and with the critical engine inoperative, the aeroplane shall be capable, in the event of a missed approach, of continuing the flight to a point from which another approach can be made.

b) Starting from the landing configuration, the aeroplane shall be capable, in the event of a balked landing, of making a climb-out, with all engine(s) operating.

2.2.7 Performance data

2.2.7.1 The following stages are considered, as applicable:

a) *Take-off*. The take-off performance data shall include the accelerate-stop distance and the take-off path.

b) *Accelerate-stop distance*. The accelerate-stop distance shall be the distance required to accelerate and stop, or, for a seaplane to accelerate and come to a satisfactorily low speed, assuming the critical engine to fail suddenly at a point not nearer to the start of the take-off than that assumed when determining the take-off path (see 2.2.7.1 c)). Additionally, for landplanes, the distance shall be based on operations with all the wheel brake assemblies at the fully worn limit of their allowable wear range.

c) *Take-off path*. The take-off path shall comprise the ground or water run, initial climb and climb-out, assuming the critical engine to fail suddenly during the take-off (see 2.2.7.1 b)). The take-off path shall be scheduled up to a height from which the aeroplane can continue safe flight and landing. The climb-out shall be made at a speed not less than the take-off safety speed as determined in accordance with 2.3.2.4.

d) *En-route*. The en-route climb performance shall be the climb (or descent) performance with the aeroplane in the en-route configuration with:

1) the critical engine inoperative; and

2) the two critical engines inoperative in the case of aeroplanes having three or more engines.

The operating engine(s) shall not exceed maximum continuous power or thrust.

e) *Landing. Landing performance data at the time of take-off*. The landing distance shall be the horizontal distance traversed by the aeroplane from a point on the approach flight path at a selected height above the landing surface to the point on the landing surface at which the aeroplane comes to a complete stop, or, for a seaplane, comes to a satisfactorily low speed. The selected height above the landing surface and the approach speed shall be appropriately related to operating practices. This distance may be supplemented by such distance margin as may be necessary; if so, the selected height above the landing surface, the approach speed and the distance margin shall be appropriately interrelated and shall make provision for both normal operating practices and reasonable variations therefrom. For landplanes, this distance shall be based on operations with all the wheel brake assemblies at the fully worn limit of their allowable wear range.

Note.— If at time of take-off landing performance data includes the distance margin specified in this Standard, it is not necessary to allow for the expected variations in the approach and landing techniques in applying 5.2.11 of Annex 6, Part I.

f) *Landing. At time of landing performance data*. The landing distance shall be the horizontal distance traversed by the aeroplane from a point on the approach flight path to the point on the landing surface at which the aeroplane comes to a complete stop, or, for a seaplane, comes to a satisfactorily low speed. The approach speed, use of deceleration devices, and airborne portion of the landing distance shall be in accordance with and reflect directly actual normal operating practices. This distance may be supplemented by such distance margin as may be necessary. For landplanes, this distance shall be based on operations with all the wheel brake assemblies at the fully worn limit of their allowable wear range.

2.2.7.2 For aeroplanes for which application for certification was submitted before 2 March 2019, performance data shall be determined and furnished in the flight manual so that their application by means of the operating rules to which the aeroplane is to be operated in accordance with 5.2 of Annex 6, Part I, will provide a safe relationship between the performance of the aeroplane and the aerodromes and routes on which it is capable of being operated. Performance data shall be determined and furnished for the stages in 2.2.7.1 a) to e) for the ranges of mass, altitude or pressure altitude, wind velocity, gradient of the take-off and landing surface for landplanes; water surface conditions, density of water and strength of current for seaplanes; and for any other operational variables for which the aeroplane is to be certificated.

2.2.7.3 For aeroplanes for which application for certification was submitted on or after 2 March 2019, performance data shall be determined and furnished in the flight manual. Such performance data shall be so that their application by means of the operating rules to which the aeroplane is to be operated in accordance with 5.2 of Annex 6, Part I, will provide a safe relationship between the performance of the aeroplane and the aerodromes and routes on which it is capable of being operated. Performance data shall be determined and furnished for the stages in 2.2.7.1 a) to f) for the ranges of mass, pressure-altitude, ambient temperature, wind velocity, and for any other operational variables for which the aeroplane is to be certificated. Additionally, the take-off performance data and the at time of landing performance data shall include the effect of the gradient and conditions (dry, wet, or contaminated) of the take-off or landing surface as appropriate for landplanes, and water surface conditions, density of water, and strength of current for seaplanes. The at time of take-off landing performance data need only to be determined with standard day temperature and level, dry landing surfaces for landplanes, but shall include the effect of water surface conditions, density of water, and strength of current for seaplanes.

2.3 Flying qualities

2.3.1 The aeroplane shall comply with the Standards of 2.3 at all altitudes up to the maximum anticipated altitude relevant to the particular requirement in all temperature conditions relevant to the altitude in question and for which the aeroplane is approved.

2.3.2 Controllability

2.3.2.1 The aeroplane shall be controllable and manoeuvrable under all anticipated operating conditions, and it shall be possible to make smooth transitions from one flight condition to another (e.g. turns, sideslips, changes of engine power or thrust, changes of aeroplane configurations) without requiring exceptional skill, alertness or strength on the part of the pilot even in the event of failure of any engine. A technique for safely controlling the aeroplane shall be established for all stages of flight and aeroplane configurations for which performance is scheduled.

Note.— This Standard is intended, among other things, to relate to operation in conditions of no appreciable atmospheric turbulence and also to ensure that there is no undue deterioration of the flying qualities in turbulent air.

2.3.2.2 *Controllability on the ground (or water).* The aeroplane shall be controllable on the ground (or on the water) during taxiing, take-off and landing under the anticipated operating conditions.

2.3.2.3 *Controllability during take-off.* The aeroplane shall be controllable in the event of sudden failure of the critical engine at any point in the take-off, when the aeroplane is handled in the manner associated with the scheduling of take-off paths and accelerate-stop distances.

2.3.2.4 *Take-off safety speed.* The take-off safety speeds assumed when the performance of the aeroplane (after leaving the ground or water) during the take-off is determined shall provide an adequate margin above the stall and above the minimum speed at which the aeroplane remains controllable after sudden failure of the critical engine.

2.3.3 Trim

The aeroplane shall have such trim characteristics as to ensure that the demands made on the pilot's attention and ability to maintain a desired flight condition are not excessive when account is taken of the stage of flight at which these demands occur and their duration. This shall apply both in normal operation and in the conditions associated with the failure of one or more engines for which performance characteristics are established.

2.4 Stability and control

2.4.1 Stability

The aeroplane shall have such stability in relation to its other flight characteristics, performance, structural strength, and most probable operating conditions (e.g. aeroplane configurations and speed ranges) as to ensure that demands made on the pilot's powers of concentration are not excessive when the stage of the flight at which these demands occur and their duration are taken into account. The stability of the aeroplane shall not, however, be such that excessive demands are made on the pilot's strength or that the safety of the aeroplane is prejudiced by lack of manoeuvrability in emergency conditions. It shall be shown that any combination of failures or conditions that would result in the need for exceptional piloting skills is extremely improbable. The stability may be achieved by natural or artificial means, or a combination of both. If compliance with the flight characteristics requirements is dependent upon a stability augmentation system or upon any other automatic or power-operated system, compliance shall be shown with 4.2 of this part.

2.4.2 Stalling

2.4.2.1 *Stall warning*. When the aeroplane approaches a stall both in straight and turning flight with all engines operating, a clear and distinctive stall warning shall be apparent to the pilot with the aeroplane in all permissible configurations and powers or thrusts, except those which are not considered to be essential for safe flying. The stall warning and other characteristics of the aeroplane shall be such as to enable the pilot to arrest the development of the stall after the warning begins and, without altering the engine power or thrust, to maintain full control of the aeroplane.

2.4.2.2 *Behaviour following a stall*. In any configuration and at any level of power or thrust in which it is considered that the ability to recover from a stall is essential, the behaviour of the aeroplane following a stall shall not be so extreme as to make difficult a prompt recovery without exceeding the airspeed or strength limitations of the aeroplane.

2.4.2.3 *Stalling speeds.* The stalling speeds or minimum steady flight speeds in configurations appropriate for each stage of flight (e.g. take-off, en route, landing) shall be established. One of the values of the power or thrust used in establishing the stalling speeds shall be not more than that necessary to give zero thrust at a speed just above the stall.

2.4.3 Flutter and vibration

2.4.3.1 It shall be demonstrated by suitable tests, analyses or any acceptable combination of tests and analyses that all parts of the aeroplane are free from flutter and excessive vibration in all aeroplane configurations under all speed conditions within the operating limitations of the aeroplane (see 1.2.2). There shall be no vibration or buffeting severe enough to cause structural damage.

2.4.3.2 There shall be no vibration or buffeting severe enough to interfere with control of the aeroplane or to cause excessive fatigue to the flight crew.

Note.— Buffeting as a stall warning is considered desirable and discouragement of this type of buffeting is not intended.