Date : 2020/09/9 التـــاريـخ :

Ref : 2020/112/REG/41 الإشـارة :

## REGULATORY CIRCULAR (NO. 2020-36)

**Subject:**

**Notice of Amendment to Kuwait Civil Aviation Safety Regulations KCASR (issue 4).**

**Purpose:**

The purpose of this Regulatory Circular No. **2020-36** is to Amend **KCASR 16 – Environmental Protection - Volume - III** (issue 4) .

This Regulatory Circular No. **2020-36** is based on (NPA) No. 2020-16 dated on 01/06/2020.

**Revisions**:

This amendment will be included in revision (2) of KCASR 16 – Environmental Protection - Volume - III.

**Regulatory Requirements:**

This amendment shall apply to the following Organizations approved by the Directorate General of Civil Aviation (DGCA) or authorized to operate within the State of Kuwait:

1. Approved Maintenance Organizations (AMO) Holders;
2. Air Navigation Service Providers;
3. Air Operator Certificate (AOC) & Private Operator Certificate (POC) Holders;
4. Airport Operators;
5. Ground Handling Service Providers;
6. Flying Training Organizations;
7. All users of KCASRs.

**Effective Date:**

This new revision will be in effect from (08/Oct/2020).

**Required Action:**

All users of KCASR are required to comply with the provisions contained within this amendment from the effective date.

**President of Civil Aviation**

Salman Sabah Alsalem Alhmoud Alsabah

President of Civil Aviation

S.D

EM


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**STATE OF KUWAIT**
**Directorate General of Civil Aviation**

دولة الكويت
الإدارة العامة للطيران المدني

Date : 2020/09/9 التـــاريـخ :          Ref : 2020/113/REG/41 الإشـارة :

**<u>All KCASR Stakeholders and Users</u>**

*Sub.:* *<u>Regulatory Circular No. 2020-36.</u>*
*<u>Revision Number 2 to Kuwait Civil Aviation Safety Regulations – KCASR 16 – ENVIRONMENTAL PROTECTION - VOLUME – III.</u>*

Dear Sir,

Please find enclosed herewith the regulatory circular No. ***<u>2020-36</u>*** regarding the issuance of ***<u>KCASR 16 – ENVIRONMENTAL PROTECTION - VOLUME – III</u>*** ***<u>Rev. 2</u>***. This is for your information and distribution to all concerned departments.

Up to date KCASR Parts are published on the DGCA/ASD website (https://kcasr.dgca.gov.kw).

If required, the DGCA/Aviation Safety Department personnel are available to answer your questions on the interpretation and intended implementation of the proposed amendments.

*<u>KCASR 16 – ENVIRONMENTAL PROTECTION - VOLUME – III</u>* *<u>Rev.</u>* <u>2</u> will be in effect from 08/Oct/2020.

Yours Sincerely,

**President of Civil Aviation.**

**Salman Sabah Alsalem Aljhmoud Alsabah**
**President of Civil Aviation**

CC: Director General of Civil Aviation.
Dy. Dir. Gen. Kuwait. Intel. Airport Affairs.
Dy. Dir. Gen. for Air Navigation Services Affairs.
Safety Management Coordination Center (SMCC).
Head of Technical Office.
Civil Aviation Security Department.
Aviation Safety Director.
Air Transport Director.
Inspection & oversight Superintendent.
Head of Standards & Aviation Safety Regulations Division.

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الطيران المدني
Civil Aviation
State of Kuwait - دولة الكويت

# Kuwait Civil Aviation Safety Regulations

# KCASR 16 – Environmental Protection

# Volume - III

## Contents

# Amendment Record

| Amendment No | Date of Issue | Remarks |
|---|---|---|
| 1 | Feb 2018 | NSRA 2018-105 Implemented |
| 2 | June 2018 | Part Rename |
| 3 | Sep 2020 | NPA 2020-16 Updated to ICAO Annex 16 – Vol III (Amendment 1) |
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# Control of this Document

## DC.1 Introduction

DC.1.1 Pursuant to Law No (30) of the year 1960 and subsequent Ministerial Decisions No (3) of the year 1986, No (18) of the year 1990, and No (3) of the year 1996, based upon that Law, the President of the Kuwait Directorate General of Civil Aviation is empowered to adopt and amend Kuwait Civil Aviation Safety Regulations. In accordance herewith, the following Regulation is hereby established for compliance by all persons concerned. This regulation shall be known as KCASR 16, Volume III – Environmental Protection and any reference to this title shall mean referring to these regulations governing the basic requirements to be met for civil aviation in the State of Kuwait.

## DC.2 Authority for this Requirement

DC.2.1 This KCASR 16, Volume III – Environmental Protection is issued on the authority of the President of the Kuwait Directorate General of Civil Aviation.

## DC.3 Applicability

DC.3.1 This KCASR 16, Volume III – Environmental Protection is applicable to the aviation industry of State of Kuwait.

## DC.4 Scope

DC.4.1 KCASR 16, Volume III – Environmental Protection contains the basic regulations to be met for civil aviation in State of Kuwait, and shows compliance with ICAO Annexes. The regulations are separated into the following civil aviation safety regulations with cross references where applicable.

KCASR 0 – Basic Regulation

KCASR 1 – Personnel Licensing

KCASR 2 – Rules of the Air

KCASR 3 – Meteorological Service for International Air Navigation

KCASR 4 – Aeronautical Charts

KCASR 5 – Units of Measurement

KCASR 6 – Operation of Aircraft

KCASR 7 – Aircraft Registration and Cancellation

KCASR 8 – Airworthiness of Aircraft and Continuous Airworthiness

KCASR 9 – Facilitation

KCASR 10 – Aeronautical Telecommunications

KCASR 11 – Air Traffic Services

KCASR 12 – Search and Rescue

KCASR 13 – Aircraft Accident and Incident Investigation

KCASR 14 – Volume I - Aerodromes

KCASR 14 – Volume II – Aerodromes – Heliports

KCASR 14 – Volume III – Gropund Handling Operations (GHO)

KCASR 15 – Aeronautical Information Services

**KCASR 16 – Environmental Protection**

KCASR 18 – Dangerous Goods

KCASR 17 – Aviation Security

KCASR 19 – Safety Management

KCASR 22 – Unmanned Aircraft Systems

KCASR 23 – Light Sport Aircraft

KCASR 25 –Special Aviation Regulations

KCASR 26 – Enforcement and Sanctions

KCASR 27 – Charges and Fees

## DC.5 Definitions

**DC.5.1** Terms not defined within this document shall have the meaning given to them in the relevant legal instruments or international legal instruments in which they appear, especially as they appear in the Convention and its Annexes.

# PART I. DEFINITIONS AND SYMBOLS

## CHAPTER 1. DEFINITIONS

***Aeroplane***. 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.

***Cockpit crew zone***. The part of the cabin that is exclusively designated for flight crew use.

***Derived version of a $CO_2$-certified aeroplane***. An aeroplane which incorporates a change in the type design that either increases its maximum take-off mass, or that increases its $CO_2$ emissions evaluation metric value by more than:

a) 1.35 per cent at a maximum take-off mass of 5 700 kg, decreasing linearly to;

b) 0.75 per cent at a maximum take-off mass of 60 000 kg, decreasing linearly to;

c) 0.70 per cent at a maximum take-off mass of 600 000 kg; and

d) a constant 0.70 per cent at maximum take-off masses greater than 600 000 kg.

**Note**.— In some States, where the certificating authority finds that the proposed change in design, configuration, power or mass is so extensive that a substantially complete investigation of compliance with the applicable airworthiness regulations is required, the aeroplane requires a new Type Certificate.

***Derived version of a non-$CO_2$-certified aeroplane***. An individual aeroplane that conforms to an existing Type Certificate, but which is not certified to KCASR 16 Volume III, and to which a change in the type design is made prior to the issuance of the aeroplane's first certificate of airworthiness that increases its $CO_2$ emissions evaluation metric value by more than 1.5% or is considered to be a significant $CO_2$ change.

**Note**.— Where the certificating authority finds that the proposed change in design, configuration, power or

***Equivalent procedure***. A test or analysis procedure, which, while differing from the one specified in this volume of Annex 16, in the technical judgement of the certificating authority yields effectively the same $CO_2$ emissions evaluation metric value as the specified procedure.

***Maximum passenger seating capacity***. The maximum certificated number of passengers for the aeroplane type design.

***Maximum take-off mass***. The highest of all take-off masses for the type design .

***Reference geometric factor***. An adjustment factor based on a measurement of aeroplane fuselage size derived from a two-dimensional projection of the fuselage.

***Specific air range***. The distance an aeroplane travels in the cruise flight phase per unit of fuel consumed.

***State of design***. The State having jurisdiction over the organization responsible for the type design.

***Subsonic aeroplane***. An aeroplane incapable of sustaining level flight at speeds exceeding a Mach number of 1.

***Type Certificate***. A document issued by a Contracting State to define the design of an aircraft, engine or propeller type and to certify that this design meets the appropriate airworthiness requirements of that State.

**Note.**— In some Contracting States a document equivalent to a type certificate may be issued for an engine or propeller type.

***Type design***. The set of data and information necessary to define an aircraft, engine or propeller type for the purpose of airworthiness determination.

# CHAPTER 2. SYMBOLS

Where the following symbols are used in Volume III of this Annex, they have the meanings, and where applicable the units, ascribed to them below:

AVG Average

CG Centre of gravity

$CO_2$ Carbon dioxide

g0 Standard acceleration due to gravity at sea level and a geodetic latitude of 45.5 degrees, 9.80665 (m/s2)

Hz Hertz (cycles per second)

MTOM Maximum take-off mass (kg)

OML Outer mould line

RGF Reference geometric factor

RSS Root sum of squares

SAR Specific air range (km/kg)

TAS True air speed (km/h)

Wf Total aeroplane fuel flow (kg/h)

# PART II. CERTIFICATION STANDARD FOR AEROPLANE $CO_2$ EMISSIONS BASED ON THE CONSUMPTION OF FUEL

## *CHAPTER 1. ADMINISTRATION BY ICAO CONTRACTING STATES*

1.1 The provisions of 1.2 to 1.11 shall apply to all aeroplanes included in the classifications defined for $CO_2$ emissions certification purposes in Chapter 2 of this part where such aeroplanes are engaged in international air navigation.

1.2 $CO_2$ emissions certification shall be granted or validated by the State of Registry of an aeroplane on the basis of satisfactory evidence that the aeroplane complies with requirements that are at least equal to the applicable Standards specified in this Part.

1.3 Contracting States shall recognize as valid a $CO_2$ emissions certification granted by another Contracting State provided that the requirements under which such certification was granted are at least equal to the applicable Standards specified in this Part.

1.4 The amendment of this volume of the Part to be used by a Contracting State shall be that which is applicable on the date of submission to that Contracting State for either a Type Certificate in the case of a new type, approval of a change in type design in the case of a derived version, or under equivalent application procedures prescribed by the certificating authority of that Contracting State.

***Note.****— As each new edition and amendment of this Part becomes applicable (according to Table A of the Foreword) it supersedes all previous editions and amendments.*

1.5 Unless otherwise specified in this volume of the Part, the date to be used by Contracting States in determining the applicability of the Standards in this Part shall be the date the application for a Type Certificate was submitted to the State of Design, or the date of submission under an equivalent application procedure prescribed by the certificating authority of the State of Design.

1.7 For derived versions of non-$CO_2$-certified aeroplanes and derived versions of $CO_2$-certified aeroplanes, the applicability provisions concerning the Standards of this Part refer to the date on which "the application for the certification of the change in type design" was made. The date to be used by Contracting States in determining the applicability of the Standards in this Part shall be the date on which the application for the change in type design was submitted to the Contracting State that first certified the change in type design.

1.8 Where the provisions governing the applicability of the Standards of this Part refer to the date on which the certificate of airworthiness was first issued to an individual aeroplane, the date to be used by Contracting States in determining the applicability of the Standards in this Part shall be the date on which the first certificate of airworthiness was issued by any Contracting State.

1.9 The certificating authority shall publish the certified $CO_2$ emissions evaluation metric value granted or validated by that authority.

1.10 The use of equivalent procedures in lieu of the procedures specified in the Appendices of this Volume of Part 16 shall be approved by the certificating authority.

***Note**.- Guidance material on the use of equivalent procedures is provided in ICAO Environmental Technical Manual (Doc 9501), Volume III – Procedures for the $CO_2$ Emissions Certification of Aeroplanes.*

1.11 Contracting States shall recognize valid aeroplane exemptions granted by the competent authority of another Contracting State having jurisdiction over the organization responsible for production of the aeroplane provided that an acceptable process was used.

***Note**.- Guidance on acceptable processes and criteria for granting exemptions is provided in ICAO Environmental Technical Manual (Doc 9501),Volume III — Procedures for the $CO_2$ Emissions Certification of Aeroplanes.*

## CHAPTER 2

# 1.—SUBSONIC JET AEROPLANES OVER 5 700 kg

# 2.—PROPELLER-DRIVEN AEROPLANES OVER 8 618 kg

## 2.1 Applicability

*Note.— See also Chapter 1, 1.4, 1.5, 1.6, 1.7, 1.8 and 1.11.*

a) subsonic jet aeroplanes, including their derived versions, of greater than 5 700 kg maximum take-off mass for which the application for a type certificate was submitted on or after 1 January 2020, except for those aeroplanes of less than or equal to 60 000 kg maximum take-off mass with a maximum passenger seating capacity of 19 seats or less;

b) subsonic jet aeroplanes, including their derived versions, of greater than 5 700 kg and less than or equal to 60 000 kg maximum take-off mass with a maximum passenger seating capacity of 19 seats or less, for which the application for a type certificate was submitted on or after 1 January 2023;c) all propeller-driven aeroplanes, including their derived versions, of greater than 8 618 kg maximum take- off mass, for which the application for a type certificate was submitted on or after 1 January 2020;

d) derived versions of non-$CO_2$-certified subsonic jet aeroplanes, including their subsequent $CO_2$-certified derived versions, of greater than 5 700 kg maximum certificated take-off mass for which the application for certification of the change in type design was submitted on or after 1 January 2023;

e) derived versions of non-$CO_2$ certified propeller-driven aeroplanes, including their subsequent $CO_2$-certified derived versions, of greater than 8 618 kg maximum certificated take-off mass for which the application for certification of the change in type design was submitted on or after 1 January 2023;

f) individual non-$CO_2$-certified subsonic jet aeroplanes of greater than 5 700 kg maximum certificated take- off mass for which a certificate of airworthiness was first issued on or after 1 January 2028; and

g) individual non-$CO_2$-certified propeller-driven aeroplanes of greater than 8 618 kg maximum certificated take-off mass for which a certificate of airworthiness was first issued on or after 1 January 2028.

*Note. – Aeroplanes initially designed or modified and used for specialized operational requirements refer to* *aeroplane type designs which, in the view of the certificating authority, have different design characteristics to meet specific operational needs compared to typical civil aeroplane types covered by the scope of this Volume of Part 16, and which may result in a very different $CO_2$ emissions evaluation metric value.*

2.1.3 The certificating authority or the competent authority having jurisdiction over the organization responsible for production of the aeroplane may grant exemptions from the applicability specified in 2.1.1. In such cases, the authority shall issue an exemption document. The grant of exemption shall be noted in the permanent aeroplane record. The authority shall take into account the number of exempted aeroplanes that will be produced and their impact on the environment. Exemptions shall be reported by aeroplane serial number and made available via an official public register.

*Note. - Further guidance on issuing exemptions, including guidance on the certificating authority or the competent authority having jurisdiction over the organization responsible for production of the aeroplane for granting exemptions, is provided in ICAO Environmental Technical Manual (Doc 9501), Volume III — Procedures for the $CO_2$ Emissions Certification of Aeroplanes.*

## 2.2 $CO_2$ emissions evaluation metric

*Note 1. — The metric value is quantified in units of kg/km.*

*Note 2. —The $CO_2$ emissions evaluation metric is a SAR based metric adjusted to take into account fuselage size.*

## 2.3 Reference aeroplane masses

2.3.1 The 1/SAR value shall be established at each of the following three reference aeroplane masses, when tested in accordance with these Standards:

a) high gross mass: 92% MTOM

b) mid gross mass: Simple arithmetic average of high gross mass and low gross mass

*Note.— MTOM is expressed in kilograms.*

## 2.4 Maximum permitted $CO_2$ emissions evaluation metric value

2.4.1 The $CO_2$ emissions evaluation metric value shall be determined in accordance with the evaluation methods of Appendix 1.

2.4.2 The $CO_2$ emissions evaluation metric value shall not exceed the value defined in the following paragraphs:

a) For aeroplanes specified in 2.1.1 a), b) and c) with a maximum take-off mass less than or equal to 60 000 kg:

b) For aeroplanes specified in 2.1.1 a) and c) with a maximum take-off mass greater than 60 000 kg, and less than or equal to 70 395 kg:

Maximum permitted value = 0.764

c) For aeroplanes specified in 2.1.1 a) and c) with a maximum take-off mass of greater than 70 395 kg:

d) For aeroplanes specified in 2.1.1 d), e), f) and g) with a maximum certificated take-off mass less than or equal to 60 000 kg:

e) For aeroplanes specified in 2.1.1 d), e), f) and g) with a maximum certificated take-off mass greater than 60 000 kg, and less than or equal to 70 107 kg:

Maximum permitted value = 0.797

f) For aeroplanes specified in 2.1.1 d), e), f) and g) with a maximum take-off mass of greater than 70 107 kg:

## 2.5 Reference conditions for determining aeroplane specific air range

2.5.1 The reference conditions shall consist of the following conditions within the approved normal operating envelope of the aeroplane:

a) the aeroplane gross masses defined in 2.3;

b) a combination of altitude and airspeed selected by the applicant for each of the specified reference ;

*Note.— These conditions are generally expected to be the combination of altitude and airspeed that results in the highest SAR value, which is usually at the maximum range cruise Mach number at the optimum altitude. The selection of conditions other than optimum conditions will be to the detriment of the applicant because the SAR value will be adversely affected.*

c) steady (un-accelerated), straight, and level flight;

d) aeroplane in longitudinal and lateral trim;

f) gravitational acceleration for the aeroplane travelling in the direction of true North in still air at the reference altitude and a geodetic latitude of 45.5 degrees, based on g0;

g) fuel lower heating value equal to 43.217 MJ/kg (18 580 BTU/lb);

h) a reference aeroplane CG position selected by the applicant to be representative of a mid-CG point relevant to design cruise performance at each of the three reference aeroplane masses;

***Note**. For an aeroplane equipped with a longitudinal CG control system, the reference CG position may be selected to take advantage of this feature.*

i) a wing structural loading condition selected by the applicant for representative operations conducted in accordance with the aeroplane's payload capability and manufacturer standard fuel management practices;

j) applicant selected electrical and mechanical power extraction and bleed flow relevant to design cruise performance and in accordance with manufacturer recommended procedures;

***Note**. Power extraction and bleed flow due to the use of optional equipment such as passenger entertainment systems need not be included.*

k) engine handling/stability bleeds operating according to the nominal design of the engine performance model for the specified conditions; and

l) engine deterioration level selected by the applicant to be representative of the initial deterioration level (a minimum of 15 take-offs or 50 engine flight hours).

2.5.2 If the test conditions are not the same as the reference conditions, then corrections for the differences between test and reference conditions shall be applied as described in Appendix 1.

## 2.6 Test procedures

2.6.1 The SAR values that form the basis of the $CO_2$ emissions evaluation metric value shall be established either directly from flight tests or from a performance model validated by flight tests.

2.6.2 The test aeroplane shall be representative of the type design for which certification is requested.

2.6.3 The test and analysis procedures shall be conducted in an approved manner to yield the $CO_2$ emissions evaluation metric value, as described in Appendix 1. These procedures shall address the entire flight test and data analysis process, from pre-flight actions to post-flight data analysis.

1. ICAO Doc 7488/3 entitled "Manual of the ICAO Standard Atmosphere".

2. ASTM D1655-15 entitled “Standard Specification for Aviation Turbine Fuels”.

3. Defence Standard 91-91, Issue 7, Amendment 3, entitled “Turbine Fuel, Kerosene Type, Jet A1”.

# APPENDICES

## APPENDIX 1. DETERMINATION OF THE AEROPLANE $CO_2$ EMISSIONS EVALUATION METRIC VALUE

1.— SUBSONIC JET AEROPLANES OVER 5 700 kg

2.— PROPELLER-DRIVEN AEROPLANES OVER 8 618 kg

### 1. INTRODUCTION

The process for determining the $CO_2$ emissions evaluation metric value includes:

a) the determination of the reference geometric factor (see Appendix 2);

1) the measurement of parameters needed to determine SAR (see Section 4);

2) the correction of measured data to reference conditions for SAR (see Section 5); and

3) the validation of data for calculation of the certified $CO_2$ emissions evaluation metric value (see Section 6);

c) calculation of the $CO_2$ emissions evaluation metric value (see Section 7); and

d) reporting of data to the certificating authority (see Section 8).

***Note**.— The instructions and procedures ensure uniformity of compliance tests, and permit comparison between various types of aeroplanes.*

### 2. METHODS FOR DETERMINING SPECIFIC AIR RANGE

2.1 SAR may be determined by either direct flight test measurement of SAR test points, including any corrections of test data to reference conditions, or by the use of a performance model approved by the certificating authority. A performance model, if used, shall be validated by actual SAR flight test data.

2.2 In either case the SAR flight test data shall be acquired in accordance with the procedures defined in this Standard and approved by the certificating authority.

2.3 Validation of the performance model should only need to be shown for the test points and conditions relevant to showing compliance with the standard. Test and analysis methods, including any algorithms that may be used, should be described in sufficient detail.

# 3. SPECIFIC AIR RANGE CERTIFICATION TEST AND MEASUREMENT CONDITIONS

## 3.1 General

This section prescribes the conditions under which SAR certification tests shall be conducted and the measurement procedures that shall be used.

***Note***. *An application for certification of a $CO_2$ emissions metric value may involve only minor change to the aeroplane type design. The resultant change in the $CO_2$ emissions metric value could often be established reliably by way of an equivalent procedure without the necessity of resorting to a complete test.*

## 3.2 Flight test procedure

3.2.1 Pre-flight

The pre-flight procedure shall be approved by the certificating authority and shall include the following elements:

a) **Aeroplane conformity**. The test aeroplane shall be confirmed to be in conformance with the type design for which certification is sought.

b) **Aeroplane weighing**. The test aeroplane shall be weighed. Any change in mass after the weighing and prior to the test flight shall be accounted for.

c) **Fuel lower heating value**. A sample of fuel shall be taken for each flight test to determine its lower heating value. Fuel sample test results shall be used for the correction of measured data to reference conditions. The determination of lower heating value and the correction to reference conditions shall be subject to the approval of the certificating authority.

1) The fuel lower heating value should be determined in accordance with methods which are at least as stringent as those defined in ASTM specification D4809-134.

2) The fuel sample should be representative of the fuel used for each flight test and should not be subject to errors or variations due to fuel being uplifted from multiple sources, fuel tank selection or fuel layering in a tank.

d) **Fuel specific gravity and viscosity.** A sample of fuel shall be taken for each flight test to determine its specific gravity and viscosity when volumetric fuel-flow meters are used.

***Note***. *When using volumetric fuel-flow meters the fuel viscosity is used to determine the volumetric fuel flow from the parameters measured by a volumetric fuel flow meter. The fuel specific gravity (or density) is used to convert the volumetric fuel flow to a mass fuel flow.*

1) The fuel specific gravity should be determined in accordance with methods which are at least as stringent as those defined in ASTM specification D4052-115.

2) The fuel kinematic viscosity should be determined in accordance with methods which are at least as stringent as those defined in ASTM specification D445-156.

### 3.2.2 Flight Test Method

3.2.2.1 The flight tests shall be performed in accordance with the following flight test method and the stability conditions described in 3.2.3.

3.2.2.2 Test points shall be separated by a minimum duration of two minutes, or separated by an exceedance of one or more of the stability criteria limits in 3.2.3.1.

3.2.2.3 During the test conditions flown to determine SAR the following criteria should be adhered to:

a) The aeroplane is flown at constant pressure altitude and constant heading along isobars to the extent that is practicable;

b) The engine thrust/power setting is stable for un-accelerated level flight;

c) The aeroplane is flown as close as practicable to the reference conditions to minimize the magnitude of any corrections;

d) There are no changes in trim or engine power/thrust settings, engine stability and handling bleeds, and electrical and mechanical power extraction (including bleed flow). Any changes in the use of aeroplane systems that may affect the SAR measurement should be avoided; and

e) Movement of on-board personnel is kept to a minimum.

### 3.2.3 Test Condition Stability

3.2.3.1 For a SAR measurement to be valid, the following parameters shall be maintained within the indicated tolerances for a minimum duration of 1 minute during which the SAR data is acquired:

a) Mach number within ±0.005;

b) Ambient temperature within ±1°C;

c) Heading within ±3 degrees;

d) Track within ±3 degrees;

e) Drift angle less than 3 degrees;

f) Ground speed within ±3.7 km/h (±2 kt);

g) Difference in ground speed at the beginning of the test condition from the ground speed at the end of the test condition within ±2.8 km/h/min (±1.5 kt/min); and

h) Pressure altitude within ±23 m (±75 ft).

3.2.3.2 Alternatives to the stable test condition criteria listed above may be used provided that stability can be sufficiently demonstrated to the certificating authority.

3.2.3.3 Test points that do not meet the stable test criteria defined in 3.2.3.1 should normally be discarded. However, test points that do not meet the stability criteria of 3.2.3.1 may be acceptable subject to the approval of the certificating authority and would be considered as an equivalent procedure.

3.2.4 Verification of aeroplane mass at test conditions

3.2.4.1 The procedure for determining the mass of the aeroplane at each test condition shall be subject to the approval of the certificating authority.

3.2.4.2 The mass of the aeroplane during a flight test should be determined by subtracting the fuel used (i.e. integrated fuel flow) from the mass of the aeroplane at the start of the test flight. The accuracy of the determination of the fuel used should be verified by weighing the test aeroplane on calibrated scales either before and after the SAR test flight, or before and after another test flight with a cruise segment provided that flight occurs within one week or 50 flight hours (at the option of the applicant) of the SAR test flight and with the same, unaltered fuel flow meters.

# 4. MEASUREMENT OF AEROPLANE SPECIFIC AIR RANGE

## 4.1 Measurement System

4.1.1 The following parameters shall be recorded at a minimum sampling rate of 1 Hz:

a) Airspeed;

b) Ground speed;

c) True airspeed;

d) Fuel flow;

e) Engine power setting parameter (e.g. fan speed, engine pressure ratio, torque, shaft horse power);

f) Pressure altitude;

g) Temperature;

h) Heading;

i) Track; and

j) Fuel used (for the determination of gross mass and CG position).

4.1.2 The following parameters shall be recorded at a suitable sampling rate:

a) Latitude;

b) Engine bleed positions and power off-takes; and

c) Power extraction (electrical and mechanical load).

4.1.3 The value of each parameter used for the determination of SAR, except for ground speed, shall be the simple arithmetic average of the measured values for that parameter obtained throughout the stable test condition (see 3.2.3.1).

***Note***. *The rate of change of ground speed during the test condition is to be used to evaluate and correct any acceleration or deceleration that might occur during the test condition.*

4.1.4 The resolution of the individual measurement devices shall be sufficient to determine that the stability of the parameters defined in 3.2.3.1 is maintained.

4.1.5 The overall SAR measurement system is considered to be the combination of instruments and devices, including any associated procedures, used to acquire the following parameters necessary for the determination of SAR:

a) Fuel flow;

b) Mach number;

c) Altitude;

d) Aeroplane mass;

e) Ground speed;

f) Outside air temperature;

g) Fuel lower heating value; and

h) Centre of gravity CG.

4.1.6 The accuracy of the individual elements that comprise the overall SAR measurement system is defined in terms of its effect upon SAR. The cumulative error associated with the overall SAR measurement system is defined as the root sum of squares (RSS) of the individual accuracies.

***Note***. *Parameter accuracy need only be examined within the range of the parameter needed for showing compliance with the $CO_2$ emissions standard.*

4.1.7 If the absolute value of the cumulative error of the overall SAR measurement system is greater than 1.5 per cent a penalty equal to the amount that the RSS value exceeds 1.5 per cent shall be applied to the SAR value corrected to reference conditions (see section 5). If the absolute value of the cumulative error of the overall SAR measurement system is less than or equal to 1.5 per cent no penalty shall be applied.

# 5. CALCULATION OF REFERENCE SPECIFIC AIR RANGE FROM MEASURED DATA

## 5.1 Calculation of SAR

5.1.1 SAR is calculated from the following equation:

SAR = TAS/Wf

where:

TAS is the true air speed; and

Wf is total Aeroplane fuel flow.

## 5.2 Corrections from test to reference conditions.

5.2.1 Corrections shall be applied to the measured SAR values to correct to the reference conditions specified in 2.5 of Part II, Chapter 2. Corrections shall be applied for each of the following measured parameters that is not at the reference conditions:

***Acceleration/deceleration (energy).*** Drag determination is based on an assumption of steady, unaccelerated flight. Acceleration or deceleration occurring during a test condition affects the assessed drag level. The reference condition is steady, unaccelerated flight.

***Aeroelastics.*** Wing aeroelasticity may cause a variation in drag as a function of aeroplane wing mass distribution. Aeroplane wing mass distribution will be affected by the fuel load distribution in the wings and the presence of any external stores.

***Altitude.*** The altitude at which the aeroplane is flown affects the fuel flow.

***Apparent gravity.*** Acceleration, caused by the local effect of gravity, and inertia, affects the test weight of the aeroplane. The apparent gravity at the test conditions varies with latitude, altitude, ground speed, and direction of motion relative to the Earth's axis. The reference gravitational acceleration is the gravitational acceleration for the aeroplane travelling in the direction of true North in still air at the reference altitude, a geodetic latitude of 45.5 degrees, and based on g0.

***CG position.*** The position of the aeroplane centre of gravity affects the drag due to longitudinal trim.

***Electrical and mechanical power extraction and bleed flow.*** Electrical and mechanical power extraction and bleed flow affects the fuel flow.

***Engine deterioration level.*** When first used, engines undergo a rapid, initial deterioration in fuel efficiency. Thereafter, the rate of deterioration significantly decreases. Engines with less deterioration than the reference engine deterioration level may be used, subject to the approval of the certificating authority. In such a case, the fuel flow shall be corrected to the reference engine deterioration level using an approved method. Engines with more deterioration than the reference engine deterioration level may be used. In this case, a correction to the reference condition shall not be permitted.

***Fuel lower heating value.*** The fuel lower heating value defines the energy content of the fuel. The lower heating value directly affects the fuel flow at a given test condition.

***Reynolds number.*** The Reynolds number affects aeroplane drag. For a given test condition the Reynolds number is a function of the density and viscosity of air at the test altitude and temperature. The reference Reynolds number is derived from the density and viscosity of air from the ICAO standard atmosphere at the reference altitude and.

***Temperature.*** The ambient temperature affects the fuel flow. The reference temperature is the standard day temperature from the ICAO standard atmosphere at the reference altitude.

***Note****. Post-flight data analysis includes the correction of measured data for data acquisition hardware response characteristics (e.g. system latency, lag, offset, buffering, etc.).*

5.2.2 Correction methods are subject to the approval of the certificating authority. If the applicant considers that a particular correction is unnecessary then acceptable justification shall be provided to the certificating authority.

### 5.3 Calculation of specific air range

5.3.1 The SAR values for each of the three reference masses defined in 2.3 of Chapter 2, Part II, shall be calculated either directly from the measurements taken at each valid test point adjusted to reference conditions, or indirectly from a performance model that has been validated by the test points. The final SAR value for each reference mass shall be the simple arithmetic average of all valid test points at the appropriate gross mass, or derived from a validated performance model. No data acquired from a valid test point shall be omitted unless agreed by the certificating authority.

***Note****.— Extrapolations consistent with accepted airworthiness practices to masses other than those tested may be allowable using a validated performance model. The performance model should be based on data covering an adequate range of lift coefficient, Mach number, and thrust specific fuel consumption such that there is no extrapolation of these parameters.*

# 6. VALIDITY OF RESULTS

6.1 The 90 per cent confidence interval shall be calculated for each of the SAR values at the three reference masses.

6.2 If clustered data is acquired independently for each of the three gross mass reference points, the minimum sample size acceptable for each of the three gross mass SAR values shall be six.

6.3 Alternatively SAR data may be collected over a range of masses. In this case the minimum sample size shall be twelve and the 90 per cent confidence interval shall be calculated for the mean regression line through the data.

6.4 If the 90 per cent confidence interval of the SAR value at any of the three reference aeroplane masses exceeds ±1.5 per cent, the SAR value at that reference mass may be used, subject to the approval of the certificating authority, if a penalty is applied to it. The penalty shall be equal to the amount that the 90 per cent confidence interval exceeds ±1.5 per cent. If the 90 per cent confidence interval of the SAR value is less than or equal to ±1.5 per cent no penalty need be applied.

***Note****. Methods for calculating the 90 per cent confidence interval are given in ICAO Doc 9501 Volume III.*

# 7. CALCULATION OF THE $CO_2$ EMISSIONS EVALUATION METRIC VALUE

7.1 The $CO_2$ emissions evaluation metric value shall be calculated according to the formula defined in 2.2 of Part II, Chapter 2.

# 8. REPORTING OF DATA TO THE CERTIFICATING AUTHORITY

***Note**. The information required is divided into: 1) general information to identify the aeroplane characteristics and the method of data analysis; 2) list of reference conditions used; 3) the data obtained from the aeroplane test(s); 4) the calculations and corrections of SAR test data to reference conditions, and 5) the results derived from the test data.*

## 8.1 General information

The following information shall be provided for each aeroplane type and model for which $CO_2$ certification is sought:

a) Designation of the aeroplane type and model;

b) General characteristics of the aeroplane, including centre of gravity range, number and type designation of engines and, if fitted, propellers;

c) Maximum take-off mass;

d) The relevant dimensions needed for calculation of the reference geometric factor; and

## 8.2 Reference conditions

The reference conditions used for the determination of specific air range (see Part II, Chapter 2, 2.5) shall be provided.

## 8.3 Test data

The following measured test data, including any corrections for instrumentation characteristics, shall be provided for each of the test measurement points.

a) airspeed, ground speed and true airspeed;

b) fuel flow;

c) pressure altitude;

d) static air temperature;

e) aeroplane gross mass and centre of gravity for each test point;

f) levels of electrical and mechanical power extraction and bleed flow;

g) engine performance:

1) for jet aeroplanes, engine power setting;

2) for propeller-driven aeroplanes, shaft horsepower or engine torque and propeller rotational speed.

h) Fuel lower heating value;

i) Fuel specific gravity and kinematic viscosity if volumetric fuel flow meters are used (see 3.2.1d);

j) The cumulative error (RSS) of the overall measurement system (see 4.1.6);

k) Heading, track and latitude;

l) Stability criteria (see 3.2.3.1);

m) Description of the instruments and devices used to acquire the parameters necessary for the determination of SAR, and their individual accuracies in terms of their effect on SAR (see 4.1.5 and 4.1.6);

## 8.4 Calculations and corrections of SAR test data to reference conditions

The measured SAR values, corrections to the reference conditions, and corrected SAR values shall be provided for each of the test measurement points.

## 8.5 Derived data

The following derived information shall be provided for each aeroplane tested for certification purposes:

a) The specific air range (km/kg) for each reference aeroplane mass and the associated 90 per cent confidence interval;

b) The average of the inverse of the three reference mass specific air range values;

c) The reference geometric factor ; and

d) The $CO_2$ emissions evaluation metric value.

# APPENDIX 2. REFERENCE GEOMETRIC FACTOR

1. The reference geometric factor (RGF) is a non-dimensional parameter used to adjust (1/SAR)AVG. RGF is based on a measure of fuselage size normalised with respect to 1 m2, and is derived as follows:

   a) For aeroplanes with a single deck determine the area of a surface (expressed in m2) bounded by the maximum width of the fuselage outer mould line (OML) projected to a flat plane parallel with the main deck floor; and
   b) For aeroplanes with an upper deck determine the sum of the area of a surface (expressed in m2) bounded by the maximum width of the fuselage outer mould line (OML) projected to a flat plane parallel with the main deck floor, and the area of a surface bounded by the maximum width of the fuselage OML at or above the upper deck floor projected to a flat plane parallel with the upper deck floor is determined; and
   c) determine the non-dimensional RGF by dividing the areas defined in 1(a)

2. The RGF includes all pressurised space on the main or upper deck including aisles, assist spaces, passage ways, stairwells and areas that can accept cargo and auxiliary fuel containers. It does not include permanent integrated fuel tanks within the cabin or any unpressurized fairings, nor crew rest/work areas or cargo areas that are not on the main or upper deck (e.g. ‘loft’ or under floor areas). RGF does not include the cockpit crew zone.

3. The aft boundary to be used for calculating RGF is the aft pressure bulkhead. The forward boundary is the forward pressure bulkhead except for the cockpit crew zone.

4. Areas that are accessible to both crew and passengers are excluded from the definition of the cockpit crew zone. For aeroplanes with a cockpit door, the aft boundary of the cockpit crew zone is the plane of the cockpit door. For aeroplanes having optional interior configurations that include different locations of the cockpit door, or no cockpit door, the boundary shall be determined by the configuration that provides the smallest cockpit crew zone. For aeroplanes certified for single-pilot operation, the cockpit crew zone shall extend half the width of the cockpit.

5. Figures A2-1 and A2-2 provide a notional view of the RGF boundary conditions.

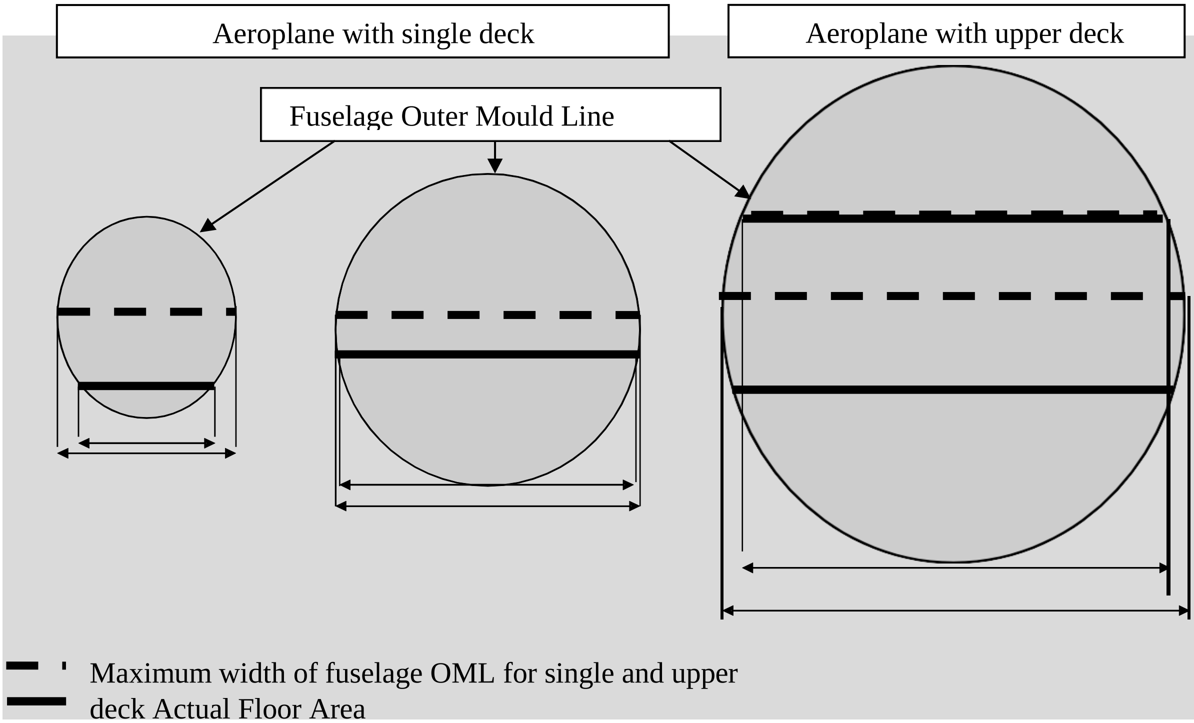


**Figure A2-1. Cross-sectional View**

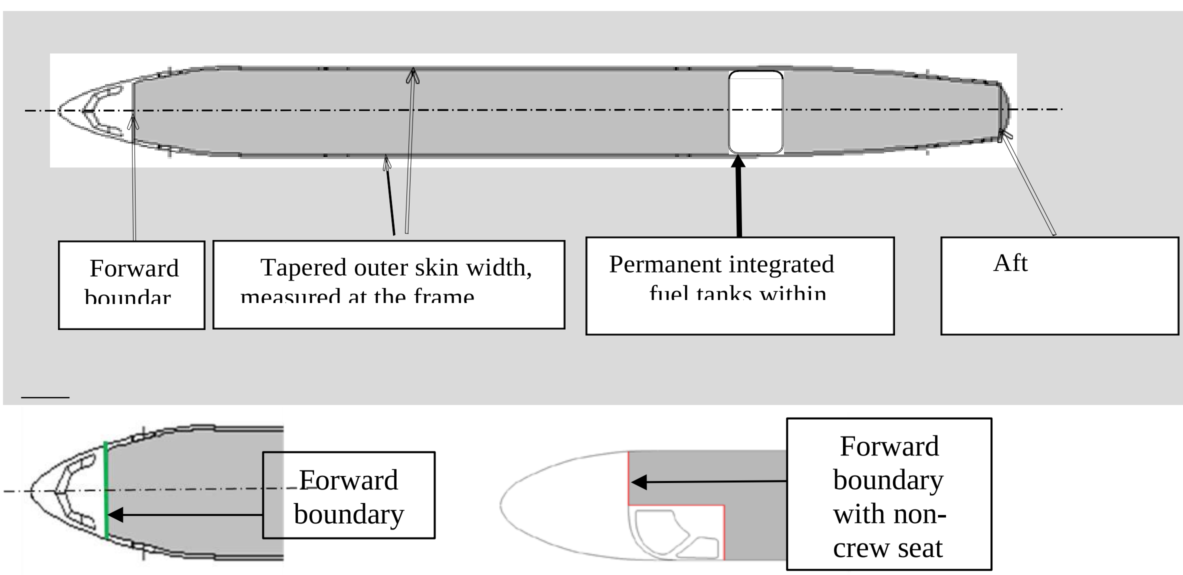


Figure A2-2. Longitudinal View

**END**

# Affected Pages from Last Update

| # | Page | Para # in Source | Reference Section/Article | Proposed Alternative |
|---|---|---|---|---|
| 1. | 4 | 46 | [H1] Amendment Record | [TABLE]<br>3<br>Sep 2020<br>NPA 2020-16 Updated to ICAO Annex 16 – Vol III (Amendment 1) |
| 2. | 4 | 114 | [H1] Amendment Record | |
| 3. | 5 | 115 | [H1] Amendment Record | DC.1 Introduction |
| 4. | 5 | 116 | [H1] Amendment Record | DC.1.1 Pursuant to Law No (30) of the year 1960 and subsequent Ministerial Decisions No (3) of the year 1986, No (18) of the year 1990, and No (3) of the year 1996, based upon that Law, the President of the Kuwait Directorate General of Civil Aviation is empowered to adopt and amend Kuwait Civil Aviation Safety Regulations. In accordance herewith, the following Regulation is hereby established for compliance by all persons concerned. This regulation shall be known as KCASR 16, Volume III – Environmental Protection and any reference to this title shall mean referring to these regulations governing the basic requirements to be met for civil aviation in the State of Kuwait. |
| 5. | 5 | 117 | [H1] Amendment Record | DC.2 Authority for this Requirement |
| 6. | 5 | 118 | [H1] Amendment Record | DC.2.1 This KCASR 16, Volume III – Environmental Protection is issued on the authority of the President of the Kuwait Directorate General of Civil Aviation. |
| 7. | 5 | 119 | [H1] Amendment Record | DC.3 Applicability |
| 8. | 5 | 120 | [H1] Amendment Record | DC.3.1 This KCASR 16, Volume III – Environmental Protection is applicable to the aviation industry of State of Kuwait. |
| 9. | 5 | 121 | [H1] Amendment Record | DC.4 Scope |
| 10. | 5 | 122 | [H1] Amendment Record | DC.4.1 KCASR 16, Volume III – Environmental Protection contains the basic regulations to be met for civil aviation in State of Kuwait, and shows compliance with ICAO Annexes. The regulations are separated into the following civil aviation safety regulations with cross references where applicable. |
| 11. | 5 | 123 | [H1] Amendment Record | KCASR 0 – Basic Regulation |
| 12. | 5 | 124 | [H1] Amendment Record | KCASR 1 – Personnel Licensing |
| 13. | 5 | 125 | [H1] Amendment Record | KCASR 2 – Rules of the Air |
| 14. | 5 | 126 | [H1] Amendment Record | KCASR 3 – Meteorological Service for International Air Navigation |
| 15. | 5 | 127 | [H1] Amendment Record | KCASR 4 – Aeronautical Charts |
| 16. | 5 | 128 | [H1] Amendment Record | KCASR 5 – Units of Measurement |
| 17. | 5 | 129 | [H1] Amendment Record | KCASR 6 – Operation of Aircraft |
| 18. | 6 | 130 | [H1] Amendment Record | KCASR 7 – Aircraft Registration and Cancellation |
| 19. | 6 | 131 | [H1] Amendment Record | KCASR 8 – Airworthiness of Aircraft and Continuous Airworthiness |

| # | Page | Para # in Source | Reference Section/Article | Proposed Alternative |
|---|---|---|---|---|
| 20. | 6 | 132 | [H1] Amendment Record | KCASR 9 – Facilitation |
| 21. | 6 | 133 | [H1] Amendment Record | KCASR 10 – Aeronautical Telecommunications |
| 22. | 6 | 134 | [H1] Amendment Record | KCASR 11 – Air Traffic Services |
| 23. | 6 | 135 | [H1] Amendment Record | KCASR 12 – Search and Rescue |
| 24. | 6 | 136 | [H1] Amendment Record | KCASR 13 – Aircraft Accident and Incident Investigation |
| 25. | 6 | 137 | [H1] Amendment Record | KCASR 14 – Volume I - Aerodromes |
| 26. | 6 | 138 | [H1] Amendment Record | KCASR 14 – Volume II – Aerodromes – Heliports |
| 27. | 6 | 139 | [H1] Amendment Record | KCASR 14 – Volume III – Gropund Handling Operations (GHO) |
| 28. | 6 | 140 | [H1] Amendment Record | KCASR 15 – Aeronautical Information Services |
| 29. | 6 | 141 | [H1] Amendment Record | KCASR 16 – Environmental Protection |
| 30. | 6 | 142 | [H1] Amendment Record | KCASR 18 – Dangerous Goods |
| 31. | 6 | 143 | [H1] Amendment Record | KCASR 17 – Aviation Security |
| 32. | 6 | 144 | [H1] Amendment Record | KCASR 19 – Safety Management |
| 33. | 6 | 145 | [H1] Amendment Record | KCASR 22 – Unmanned Aircraft Systems |
| 34. | 6 | 146 | [H1] Amendment Record | KCASR 23 – Light Sport Aircraft |
| 35. | 6 | 147 | [H1] Amendment Record | KCASR 25 –Special Aviation Regulations |
| 36. | 6 | 148 | [H1] Amendment Record | KCASR 26 – Enforcement and Sanctions |
| 37. | 6 | 149 | [H1] Amendment Record | KCASR 27 – Charges and Fees |
| 38. | 6 | 150 | [H1] Amendment Record | DC.5 Definitions |
| 39. | 6 | 151 | [H1] Amendment Record | DC.5.1 Terms not defined within this document shall have the meaning given to them in the relevant legal instruments or international legal instruments in which they appear, especially as they appear in the Convention and its Annexes. |
| 40. | 6 | 152 | [H1] PART I. DEFINITIONS AND SYMBOLS | |
| 41. | 7 | 156 | [H1] PART I. DEFINITIONS AND SYMBOLS ([H2] CHAPTER 1. DEFINITIONS) | Derived version of a CO2-certified aeroplane. An aeroplane which incorporates a change in the type design that either increases its maximum take-off mass, or that increases its CO2 emissions evaluation metric value by more than: |

| # | Page | Para # in Source | Reference Section/Article | Proposed Alternative |
|---|---|---|---|---|
| 42. | 7 | 157 | [H1] PART I. DEFINITIONS AND SYMBOLS ([H2] CHAPTER 1. DEFINITIONS)(a) | 1.35 per cent at a maximum take-off mass of 5 700 kg, decreasing linearly to; |
| 43. | 7 | 158 | [H1] PART I. DEFINITIONS AND SYMBOLS ([H2] CHAPTER 1. DEFINITIONS)(b) | 0.75 per cent at a maximum take-off mass of 60 000 kg, decreasing linearly to; |
| 44. | 7 | 159 | [H1] PART I. DEFINITIONS AND SYMBOLS ([H2] CHAPTER 1. DEFINITIONS)(c) | 0.70 per cent at a maximum take-off mass of 600 000 kg; and |
| 45. | 7 | 160 | [H1] PART I. DEFINITIONS AND SYMBOLS ([H2] CHAPTER 1. DEFINITIONS)(d) | a constant 0.70 per cent at maximum take-off masses greater than 600 000 kg. |
| 46. | 7 | 161 | [H1] PART I. DEFINITIONS AND SYMBOLS ([H2] CHAPTER 1. DEFINITIONS) | Note.— In some States, where the certificating authority finds that the proposed change in design, configuration, power or mass is so extensive that a substantially complete investigation of compliance with the applicable airworthiness regulations is required, the aeroplane requires a new Type Certificate. |
| 47. | 7 | 162 | [H1] PART I. DEFINITIONS AND SYMBOLS ([H2] CHAPTER 1. DEFINITIONS) | Derived version of a non-CO2-certified aeroplane. An individual aeroplane that conforms to an existing Type Certificate, but which is not certified to ~~Annex~~ KCASR 16 Volume III, and to which ~~changes~~ a change in the type design ~~are~~ is made prior to the issuance of the aeroplane's first certificate of airworthiness that increases its CO2 emissions evaluation metric value by more than 1.5% or ~~are~~ is considered to be a significant CO2 change~~s~~. |
| 48. | 7 | 166 | [H1] PART I. DEFINITIONS AND SYMBOLS ([H2] CHAPTER 1. DEFINITIONS) | Maximum take-off mass. The highest of all take-off masses for the type design ~~configuration~~. |
| 49. | 8 | 173 | [H1] PART I. DEFINITIONS AND SYMBOLS ([H2] CHAPTER 1. DEFINITIONS) | Type design. The set of data and information necessary to define an aircraft, engine or propeller type for the purpose of airworthiness determination. |
| 50. | 8 | 174 | [H1] PART I. DEFINITIONS AND SYMBOLS ([H2] CHAPTER 2. SYMBOLS) | |
| 51. | 11 | 215 | [H1] PART II. CERTIFICATION STANDARD FOR AEROPLANE CO2 EMISSIONS BASED ON THE | Contracting States shall recognize valid aeroplane exemptions granted by the competent~~an~~ authority of another Contracting State having jurisdiction over the organization responsible~~responsible~~ for production of the aeroplane provided that an acceptable process was used. |

| # | Page | Para # in Source | Reference Section/Article | Proposed Alternative |
|---|---|---|---|---|
| | | | CONSUMPTION OF FUEL (1.11) | |
| 52. | 12 | 223 | [H1] PART II. CERTIFICATION STANDARD FOR AEROPLANE CO2 EMISSIONS BASED ON THE CONSUMPTION OF FUEL ([H2] 2.—PROPELLER-DRIVEN AEROPLANES OVER 8 618 kg)(b) | subsonic jet aeroplanes, including their derived versions, of greater than 5 700 kg and less than or equal to 60 000 kg maximum take-off mass with a maximum passenger seating capacity of 19 seats or less, for which the application for a type certificate was submitted on or after 1 January 2023; c) all propeller-driven aeroplanes, including their derived versions, of greater than 8 618 kg maximum take- off mass, for which the application for a type certificate was submitted on or after 1 January 2020; |
| 53. | 12 | 224 | [H1] PART II. CERTIFICATION STANDARD FOR AEROPLANE CO2 EMISSIONS BASED ON THE CONSUMPTION OF FUEL ([H2] 2.—PROPELLER-DRIVEN AEROPLANES OVER 8 618 kg)(d) | derived versions of non-CO2-certified subsonic jet aeroplanes, including their subsequent CO2-certified derived versions, of greater than 5 700 kg maximum certificated take-off mass for which the application for certification of the change in type design was submitted on or after 1 January 2023; |
| 54. | 12 | 225 | [H1] PART II. CERTIFICATION STANDARD FOR AEROPLANE CO2 EMISSIONS BASED ON THE CONSUMPTION OF FUEL ([H2] 2.—PROPELLER-DRIVEN AEROPLANES OVER 8 618 kg)(e) | derived versions of non-CO2 certified propeller-driven aeroplanes, including their subsequent CO2-certified derived versions, of greater than 8 618 kg maximum certificated take-off mass for which the application for certification of the change in type design was submitted on or after 1 January 2023; |
| 55. | 12 | 229 | [H1] PART II. CERTIFICATION STANDARD FOR AEROPLANE CO2 EMISSIONS BASED ON THE CONSUMPTION OF FUEL ([H2] 2.—PROPELLER-DRIVEN AEROPLANES OVER 8 618 kg)(g) | Note. – Aeroplanes initially designed or modified and used for ~~specialised~~specialized operational requirements refer to aeroplane type designs ~~configurations~~ which, in the view of the certificating authority, have different design characteristics to meet specific operational needs compared to typical civil aeroplane types covered by the scope of this Volume of Part 16, and which may result in a very different CO2 emissions evaluation metric value. |

| # | Page | Para # in Source | Reference Section/Article | Proposed Alternative |
|---|---|---|---|---|
| 56. | 13 | 230 | [H1] PART II. CERTIFICATION STANDARD FOR AEROPLANE CO2 EMISSIONS BASED ON THE CONSUMPTION OF FUEL ([H2] 2.— PROPELLER-DRIVEN AEROPLANES OVER 8 618 kg)(2.1.3) | The certificating authority or the competent authority having jurisdiction over the organization responsible for production of the aeroplane may grant exemptions from the applicability specified in 2.1.1. In such cases, the authority shall issue an exemption document. The grant of exemption shall be noted in the permanent aeroplane record. ~~The granting of an exemption for an aeroplane against applicability requirements specified in 2.1.1 shall be noted on the aeroplane statement of conformity issued by the certificating authority. Certificating authorities~~ The authority shall take into account the number~~s~~ of exempted aeroplanes that will be produced and their impact on the environment. Exemptions shall be reported by aeroplane serial number and made available via an official public register. |
| 57. | 13 | 232 | [H1] PART II. CERTIFICATION STANDARD FOR AEROPLANE CO2 EMISSIONS BASED ON THE CONSUMPTION OF FUEL ([H2] 2.— PROPELLER-DRIVEN AEROPLANES OVER 8 618 kg)(2.1.3) | Note. - Further guidance on issuing exemptions, including guidance on the certificating authority or the competent authority having jurisdiction over the organization responsible for production of the aeroplane for granting exemptions, is provided in ICAO Environmental Technical Manual (Doc 9501), Volume III — Procedures for the CO2 Emissions Certification of Aeroplanes. |
| 58. | 14 | 258 | [H1] PART II. CERTIFICATION STANDARD FOR AEROPLANE CO2 EMISSIONS BASED ON THE CONSUMPTION OF FUEL ([H2] 2.— PROPELLER-DRIVEN AEROPLANES OVER 8 618 kg)(b) | a combination of altitude and airspeed selected by the applicant for each of the specified reference ~~aeroplane gross masses~~; |
| 59. | 15 | 272 | [H1] PART II. CERTIFICATION STANDARD FOR AEROPLANE CO2 EMISSIONS BASED ON THE CONSUMPTION OF FUEL ([H2] 2.— PROPELLER-DRIVEN AEROPLANES OVER 8 618 kg)([H3] 2.6 Test procedures) | 2.6 Test procedures |
| 60. | 15 | 274 | [H1] PART II. CERTIFICATION | The test aeroplane shall be representative of the ~~configuration~~ type design for which certification is requested. |

| # | Page | Para # in Source | Reference Section/Article | Proposed Alternative |
|---|---|---|---|---|
| | | | STANDARD FOR AEROPLANE CO2 EMISSIONS BASED ON THE CONSUMPTION OF FUEL ([H2] 2.— PROPELLER-DRIVEN AEROPLANES OVER 8 618 kg)(2.6.2) | |
| 61. | 18 | 301 | [H1] APPENDICES (3.1) | Note. An application ~~Many applications~~ for certification of a CO2 emissions metric value may involve only minor change~~s~~ to the aeroplane type design. The resultant change~~s~~ in the CO2 emissions metric value ~~can~~ could often be established reliably by way of an equivalent procedure~~s~~ without the necessity of resorting to a complete test. |
| 62. | 18 | 306 | [H1] APPENDICES (3.2)(3.2.1)(a) | Aeroplane conformity. The test aeroplane shall be confirmed to be in conformance with the type design ~~configuration~~ for which certification is sought. |
| 63. | 22 | 381 | [H1] APPENDICES (4.1)([H3] 5. CALCULATION OF REFERENCE SPECIFIC AIR RANGE FR...) | |
| 64. | 23 | 396 | [H1] APPENDICES (5.2)(5.2.1) | Engine deterioration level. When first used, engines undergo a rapid, initial deterioration in fuel efficiency. Thereafter, the rate of deterioration significantly decreases. Engines with less deterioration than the reference engine deterioration level may be used, subject to the approval of the certificating authority. In such a case, the fuel flow shall be corrected to the reference engine deterioration level using an approved method. Engines with more deterioration than the reference engine deterioration level may be used. In this case, a correction to the reference condition shall not be permitted. |
| 65. | 24 | 398 | [H1] APPENDICES (5.2)(5.2.1) | ~~Massδ. The lift coefficient of the aeroplane is a function of mass/δ and Mach number, where δ is the ratio of the atmospheric pressure at a given altitude to the atmospheric pressure at sea level. The lift coefficient for the test condition affects the drag of the aeroplane. The reference mass/δ is derived from the combination of the reference mass, reference altitude and atmospheric pressures determined from the ICAO standard atmosphere.~~<br>Reynolds number. The Reynolds number affects aeroplane drag. For a given test condition the Reynolds number is a function of the density and viscosity of air at the test altitude and temperature. The reference Reynolds number is derived from the density and viscosity of air from the ICAO standard atmosphere at the reference altitude and ~~temperature~~. |