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Directorate General for Civil Aviation Regulation (DGCAR)
Public Authority for Civil Aviation

APPROVAL OF CIVIL AVIATION NOTICES CAN 3-39
OPERATING NOISE LIMITS AND ENGINE EMISSIONS REQUIREMENTS

Civil Aviation Notices is applicable to the Civil Aviation Regulations issued by the Public Authority for Civil Aviation. It provides guidance to permission holders and aviation users of changes to current regulations.

CAN 3-39 is issued in reference to CAR OPS 0.

This CAN will be effective from the Date of issue.

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CIVIL AVIATION NOTICES

CAN 3-39

OPERATING NOISE LIMITS AND ENGINE EMISSIONS REQUIREMENTS

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Operating Noise Limits and Engine Emissions

39.1 General

This Notice applies to all persons conducting air operations in Oman and all persons operating civil aircraft in respect to aircraft noise and engine emissions.

39.2 Purpose

The Civil Aviation Notices, hereinafter referred to as Notices, are issued by the Public Authority for Civil Aviation (PACA). The Notices are a means of circulating essential information of an administrative or technical nature to holders of PACA licenses and Certificates, foreign air operators in Oman, and foreign operators of Omani registered aircraft.

39.3 Applicability

(a) CAR OPS-0, Subpart V previously prescribed the requirements for civil aircraft operations in respect to aircraft noise and engine emissions in the Sultanate of Oman which was cancelled by CAN 1-09 – Repeal of Regulation CAR OPS-0.

(b) The subject matter of CAR OPS-0, Subpart V has been reissued as a Civil Aviation Notice (CAN 3-39 paragraphs 39.1 to 39.9).

(c) New requirements have been added in relation to CO2 emission requirements under ICAO Annex 16, Volume 4, Chapter 2 and CORSIA CERT, paragraphs 39.10 to 39.27.

39.4 Cancellation

Not Applicable

39.5 Effective Date

This CAN is effective from the date of issue.

39.6 Aircraft noise level compliance

(a) No person may operate an aircraft to or from an aerodrome within the Sultanate of Oman, unless:

(1) for aircraft registered in Oman, the Authority is satisfied that the aircraft complies with the applicable aircraft noise standards specified in the provisions of Chapter 1 of ICAO Annex 16, Volume I and CAR-21.015(a):

(i) for subsonic jet aeroplanes, in Volume I, Part II, Chapters 2, 3, 4 and 14, as applicable;

(ii) for propeller-driven aeroplanes, in Volume I, Part II, Chapters 3, 4, 5, 6, 10 and 14, as applicable;

(iii) for helicopters, in Volume I, Part II, Chapters 8 and 11, as applicable; and

(iv) for supersonic aeroplanes, in Volume I, Part II, Chapter 12, as applicable;

(v) for propeller-driven STOL aeroplanes, in Volume I, Part II, Chapter 7, as applicable; and

(vi) for tilt-rotors, in Volume I, Part II, Chapter 13, as applicable.

(2) for foreign registered aircraft, that aircraft is certificated or validated by the State of Registry to comply with standards that are equivalent to the applicable aircraft noise standards specified in ICAO Annex 16, Volume I and paragraph (1)(i) to (vi) above;

(b) Notwithstanding paragraph (a), a person may not operate a subsonic turbojet or turbofan powered aeroplane to or from an aerodrome within Sultanate of Oman unless that aeroplane is certificated to comply with noise standards that are at least equal to the aircraft noise standards specified in ICAO Annex 16, Volume I, Chapter 3.

39.7 Aircraft sonic boom

(a) No person may operate an aircraft at a Mach number greater than 0.92 unless approved by the Authority and in compliance with any conditions and limitations specified in the approval.

(b) No person may operate an aircraft that has a maximum operating speed in excess of a Mach number of 0.92 within the territorial limits of the Sultanate of Oman unless the information that is available to the pilot-in-command includes flight limitations to ensure that flights entering or leaving Sultanate of Oman do not cause a sonic boom to reach the surface within The Sultanate of Oman.

(c) A pilot-in-command of an aircraft that has a maximum operating speed in excess of a Mach number of 0.92 must comply with the flight limitations required under paragraph (b).

39.8 Carriage of noise certificates on board aircraft

(a) The noise certificate shall be carried on board the aircraft to which it is issued when flying in international air navigation.

(b) On flights beginning and ending in the Sultanate of Oman without passing any other State, the noise certificate may be kept safely and secured elsewhere.

39.9 Engine emission compliance

(a) No person may operate a turbojet or turbofan powered aircraft to or from an aerodrome within the Sultanate of Oman unless:

(1) for aircraft registered in Oman, the Authority is satisfied that the aircraft complies with the applicable aircraft engine emission standards specified in the provisions of ICAO Annex 16 Volume II and CAR-21.015(b):

(i) for prevention of intentional fuel venting, in Volume II, Part II, Chapter 2;

(ii) for emissions of turbo-jet and turbofan engines intended for propulsion only at subsonic speeds, in Volume II, Part III, Chapter 2; and

(iii) for emissions of turbo-jet and turbofan engines intended for propulsion only at supersonic speeds, in Volume II, Part III, Chapter 3.

(2) for foreign registered aircraft, that aircraft is certificated or validated by the State of Registry to comply with standards that are equivalent to the applicable aircraft engine emission standards specified in ICAO Annex 16, Volume II.

39.10 Adoption of ICAO policies and practices related to environmental protection

At its ICAO 39th General Assembly Session in 2016, the Member States adopted Assembly Resolution A39-3: *Consolidated statement of continuing ICAO policies and practices related to environmental protection – Global Market-based Measure (MBM) scheme*. In this Resolution, Member States agreed to implement a global MBM scheme in the form of the ***Carbon Offsetting and Reduction Scheme for International Aviation*** (CORSIA).

39.11 Glossary of terms

AIP	Aeronautical Information Publication
AO	Aeroplane operator
ARP	Aerodrome Reference Points
BT	Block Time
CAEP	Committee on Aviation Environmental Protection
CCG	CORSIA CERT Group
CEMs	CO_2 Estimation Models
CERT	CO_2 Estimation and Reporting Tool
COFdb	CCG Operations and Fuel database
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CSV	Comma-Separated Values
DPOs	Data Providing Organizations
EASA	European Union Aviation Safety Agency
EMP	Emissions Monitoring Plan
ER	Emissions Report
ERt	Emissions Report template
ETM	Environmental Technical Manual
FAA	Federal Aviation Administration
GCD	Great Circle Distance
ICAO	International Civil Aviation Organization
MDG	Modelling and Database Group
MRV	Monitoring, Reporting and Verification
MTOM	Maximum Take Off Mass
OLS	Ordinary Least Squares
PMM	Primary Monitoring Method
TCDS	Type Certificate Data Sheets
VB	Verification body
WG4	Working Group 4
WGS84	World Geodetic System 1984
WTC	Wake Turbulence Category

39.12 Introduction to CORSIA

In order to facilitate the implementation of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), the ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT) was developed. The ICAO document entitled "ICAO CORSIA CO_2 Estimation and Reporting Tool" is referenced in Annex 16, Volume IV, Appendix 3, and is referred to as an ICAO CORSIA Implementation Element.

The ICAO CORSIA CERT tool supports aeroplane operators in:

(a) assessing whether or not an aeroplane operator is within the applicability scope of the Monitoring, Reporting and Verification (MRV) requirements (Annex 16, Volume IV, Part II, Chapter 2, 2.1);

(b) assessing their eligibility to use fuel use monitoring methods in support of their Emissions Monitoring Plan (Annex 16, Volume IV, Part II, Chapter 2, 2.2);

(c) filling any CO_2 emissions data gaps (Annex 16, Volume IV, Part II, Chapter 2, 2.5); and

(d) fulfilling their monitoring and reporting requirements by supporting the development of the standardized Emissions Monitoring Plan and Emissions Report templates (Appendix 1 of the Environmental Technical Manual (Doc 9501), Volume IV – Procedures for demonstrating compliance with the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)).

ICAO's Committee on Aviation Environmental Protection (CAEP) will develop and recommend updates to the ICAO CORSIA CERT information that will be captured in some form of ICAO document and, following approval by the ICAO Council, the ICAO CORSIA Implementation Element will be published on the ICAO CORSIA website (www.icao.int/corsia).

39.13 CORSIA Emissions Monitoring Plan and reporting system

Commencing in the 2019 version of the ICAO CORSIA CERT, aeroplane operators are able to comply with simplified monitoring and reporting requirements from Annex 16, Volume IV, Part II, Chapter 2. The ICAO CORSIA CERT will allow aeroplane operators to import or manually input the required information:

(1) individual or aggregated information at the individual flight, or aerodrome-pair level,

(2) flights for which there are data gaps in order to generate emissions estimations.

Aeroplane operators eligible to use simplified compliance procedures (as per Annex 16, Volume IV, Chapter 2, 2.2) will be able to manually and/or automatically input information at individual flight level to estimate their CO_2 emissions for the compliance year and generate the Emissions Report.

The following table summarizes the evolution of the functionalities of the ICAO CORSIA CERT, where the 2019 CORSIA CERT includes the monitoring and report generation functionality. The 2020 version is expected to generally have the same high-level functionality as the 2019 version of the ICAO CORSIA CERT. The 2021-2035 versions will include splitting of the emissions between those subject to offsetting requirements, as they belong to routes between pairs of participating States, and those that have only to be reported, but that are not subject to offsetting requirements.

	CERT CO_2 Estimation and Reporting Tool	
Year of Validity	2019-2020	2021-2035

Estimation of CO_2 for determination of simplified compliance procedures eligibility	Yes	Yes
Monitoring (estimating CO_2)	Yes	Yes
Report generation functionality	Yes	Yes
States for Chapter 3 State Pairs	No	Yes

39.14 Potential users of the 2019 version of the ICAO CORSIA CERT

The following table shows the list of potential users of the ICAO CORSIA CERT along with whether they have a submitted/approved EMP, their primary monitoring method, description of the use of the ICAO CORSIA CERT and needed functionalities.

Users	Submitted/approved EMP	Primary Monitoring Method (PMM)	Description of Use of the CERT	Needed Functionalities
Aeroplane Operators	**Yes**	Eligible to use the CERT as PMM	Estimating emissions and filling ER using the CERT (Only)	CO_2 Estimation ER generation
Aeroplane Operators	**Yes**	Requiring to use a fuel Use Monitoring Method as PMM	Using the CERT to fill data gaps and generate ER	CO_2 Estimation ER generation
Aeroplane Operators	**Yes**	Requiring to use a fuel Use Monitoring Method as PMM	Using the CERT to fill data gaps	CO_2 Estimation ER generation
Aeroplane Operators	**No**	n/a	Evaluating applicability of CORSIA & eligibility to use the CERT	CO_2 Estimation ER generation
States	n/a	n/a	Order of magnitude checks and data gap filling	CO_2 Estimation ER generation
ICAO	n/a	n/a	Data gap filling	CO_2 Estimation ER generation
Verifiers	n/a	n/a	Order of magnitude checks	CO_2 Estimation ER generation

39.14 Proposed architecture of the ICAO CORSIA CERT 2019

The ICAO CORSIA CERT 2019 version was designed with regard to the input of the aeroplane operator information, the CO_2 estimation and the generation of a summary assessment functionalities. To meet the additional requirements from monitoring of emissions according to Annex 16, Volume IV, additional functionalities will be added in the ICAO CORSIA CERT 2019 and subsequent versions, including:

(1) Improvements of the ICAO CEMs based on Great Circle Distance: existing ICAO CEMs based on Great Circle Distance (GCD) input have been improved. In addition, additional ICAO CEMs for aircraft types not previously covered have been developed. This enhancement was based on additional and updated flight level data from operators in accordance with Annex 16, Volume IV, Appendix 3. The expanded data collection was guided by:

(a) additional Data Providing Organizations (DPOs) interested in contributing to the ICAO CORSIA CERT development; and

(b) feedback on the review process and the identification of aircraft types that required additional attention.

(2) Development of new ICAO CEMs based on Block Time Input: the 2019 version of the ICAO CORSIA CERT required the enhancement of the ICAO CEMs to include Block Time input functionality. These additions relied on the collection of additional and specific data towards the development on the 2019 version of the COFdb.

39.15 Functionality of the ICAO CORSIA CERT

The CORSIA CO_2 Estimation and Reporting Tool (CERT) comprises a three-step process which includes:

(1) Entering aeroplane operator's information (to meet the requirements of the Emissions Report template per the Environmental Technical Manual (Doc 9501), Volume IV);

(2) Entering flight data either manually or using a file upload, to estimate CO_2 emissions using either the Block Time or Great Circle Distance (GCD). The user enters:

(a) Aircraft type; and

(b) aerodrome designator for origin-destination based on Doc 7910 — Location Indicators (i.e., Great Circle Distance GCD) or flight operating time (i.e., Block Time) as input to estimate an aeroplane operator's CO_2 emissions; and

(3) Generating the Emissions Report, reviewing and submitting it.

39.16 Development of the ICAO CO_2 Estimation Models (CEMs)

Underlying the ICAO CORSIA CERT CO_2 estimation functionality using a Block Time input, the ICAO CEMs allow to convert the users input (i.e., aircraft types, aerodromes of origin and destination, Block Time if available) into estimated CO_2 emissions.

39.17 Overview of the process for developing ICAO CEMs

Initially, the list of aircraft types, by ICAO Type Designator, for which an ICAO CEM needs to be established were scoped and identified. (*Doc 8643 — Aircraft Type Designators*[1]) was analyzed to identify those aircraft types that are within the scope of applicability of Annex 16, Volume IV, i.e., Maximum Take Off Mass (MTOM) greater than 5,700 kg. Because Doc 8643 does not include MTOM information, several information sources, including:

- the EASA Certification Database,
- the ICAO Noise Certification database, and
- complementary information such as the US FAA Type Certificate Data Sheets (TCDS)

These were used and mapped to each aircraft type designators in Doc 8643. The identified aircraft types form the basis for the ICAO CORSIA CERT aeroplane database. Paragraph 39.18 provides additional information about the process for scoping the ICAO CORSIA CERT aeroplane database.

For each of the aircraft types identified in the scoping process described above, an ICAO CEM was developed. A four-tier approach was developed and implemented:

[1] ICAO Document Aircraft Type Designators (Doc 8643), available for query at: https://www.icao.int/publications/DOC8643/Pages/Search.aspx

(1) First, if the aircraft type can be mapped to an aircraft type available in the validated CCG Operations and Fuel database (COFdb), an ICAO CEM is developed using the methodology described in paragraph 39.19;

(2) Second, if the aircraft type is not available in the COFdb but there is an equivalent aircraft type which is modeled using (1) within the same family (and same manufacturer), an ICAO CEM is developed through scaling of the ICAO CEM of the equivalent aircraft type, using the method described in paragraph 39.19;

(3) Third, if the aircraft type is not mapped to the COFdb via steps (1) or (2), then the ICAO Fuel Formula is used, (see paragraph 39.20 for background on the ICAO Fuel Formula); and

(4) Finally, if an aircraft type is missing an ICAO CEM after steps (1) to (3), a set of generic equations can be developed using the methodology described in paragraph 39.21, generic equations from which an ICAO CEM for such aircraft type can then be derived. This approach is used for aircraft types that, not being included in the tables of Appendix A-1 and A-2[2] which list all the aircraft types included in the ICAO CORSIA CERT aeroplane database, can be entered into the ICAO CORSIA CERT as Custom Aeroplane.

Note. - For an aircraft type included in the ICAO CORSIA CERT aeroplane database, the ICAO CORSIA CERT shall always estimate the CO_2 emissions using the ICAO CEM obtained for it after steps (1) to (3), even when a Custom Aeroplane has been defined for such aircraft type and an ICAO CEM derived for it by the ICAO CORSIA CERT from the set of generic equations.

39.18 Development of ICAO CEMs based on aeroplane operator data (COFdb)

As described in the first step of the four-tier approach in paragraph 39.17, if the aircraft type can be mapped to an aircraft type available from the CCG Operations and Fuel database (COFdb), an ICAO CEM is developed using statistical models.

Overview of the CCG Operations and Fuel database (COFdb)

The CAEP Working Group 4 (WG4) CCG Operations and Fuel database (COFdb) is a database of actual flights that includes: aircraft type, Great Circle Distance (based on aerodrome of origin and destination), fuel burn, block time, and operation year for each flight.

Data contained in the COFdb comes from aeroplane operators who are required to provide data for the development of the ICAO CORSIA CERT as per recommendation from Annex 16, Volume IV, Appendix 3. Given the commercial sensitivity of flight level fuel burn information, the COFdb is the result of a multi-step process used to ensure that data in the COFdb is anonymized i.e., that neither the aeroplane operator nor the individual flight can be identified from the COFdb data.

Aeroplane operators provide relevant flight level data to Data Providing Organizations (DPOs) who process the flight level data anonymizing it to remove references to the actual aeroplane operators and flight, assigning to it a unique code to allow traceability if needed, and provide it to the WG4-CCG co-leads for it to be integrated in the COFdb replacing the DPO unique code with a COFdb specific unique code.

Once validated by the CCG co-leads, the resulting COFdb is shared only with WG4 CCG members and governed by a Use Agreement and for the sole purpose of supporting and facilitating the work of developing, validating and maintaining the ICAO CORSIA CO_2 Estimation and Reporting Tool (CERT) and the underlying ICAO CO_2 Estimation Models (CEMs).

[2] To view Appendix A-1 and A-2 see: https://www.icao.int/environmental-protection/CORSIA/CERTTool/ICAO%20CORSIA%20CERT%20version%202019%20-%20Design,%20Development%20and%20Validation.pdf

Data collection and validation processes

When providing data to CAEP, DPOs are responsible for:

(1) validating, to the extent possible to the Organization, the correctness of the departure and arrival aerodrome as well as of the correct use of the ICAO aircraft type designator as per Doc 8643 for each flight having indeed been operated between those aerodromes, coordinating with the aeroplane operator as necessary;

(2) computing the Great Circle Distance, rounded to the kilometer, between the departure and arrival aerodrome, using the latitude and longitude of the aerodromes as provided in the applicable version of Doc 7910 (applicability determined on the basis of the date of flight and the date of issue of the ICAO Document) or applicable AIP information and with the Earth modelled according to the WGS84 reference system and geodetic datum; the Great Circle Distance field is to be left empty if either the departure or the arrival aerodrome is not available in Doc 7910;

(3) computing whether the flight is international or domestic on the basis of the departure and arrival aerodrome and in accordance with the prescriptions of Annex 16, Volume IV, Part II, Chapter 1, 1.1.2;

(4) including for each flight record a unique identifier per aircraft type, identifier which allows the DPO to identify the related flight data supplier in order to coordinate with the latter as and if required;

(5) ensuring that, when available, the block time is provided in minutes without decimals, leaving the field empty if not available;

(6) excluding from the provided data records for which:

(a) the validation of the first point is unsuccessful; or
(b) the aircraft type is not in the applicable version of Doc 8643 (applicability determined on the basis of the date of the flight and the date of issue of the ICAO Document); or
(c) both the Great Circle Distance and the block time are unknown.

Integration of data into the COFdb (pre-verification)

Prior to integrating data received from a DPO into the COFdb, CAEP conducts a parallel and redundant process that includes:

(1) pre-verification of the COFdb in order to ensure the quality of the data as well as
(2) accurate and appropriate data integration in the COFdb.

Verification and distribution of the COFdb

CAEP also conducts verification of the integrated COFdb, including checks that the data available in the received version of the COFdb is complete. The COFdb is then made available to each CAEP expert contributing to the development of the ICAO CORSIA CERT and that have executed a Use Agreement at the time of the distribution of the COFdb.

Version of the COFdb used for the 2019 version of the ICAO CORSIA CERT

For the 2019 version of the ICAO CORSIA CERT, the COFdb version 2019_2.2 as of January 20, 2019 was used. This 2019 version 2.2 of the COFdb includes data from approximately 4 million flights for 98 aircraft types by ICAO Type Designator. Data ranged from 2010 to 2018 with about 78% of the data coming from 2014 to 2018.

To generate an ICAO CEM, the CCG followed the following steps:

(1) Import an aircraft type database;
(2) Generate a regression on entire dataset (i.e., linear OLS model);

(3) Identify outliers and remove them; and
(4) Run a second single-segment regression or a piece-wise regression (up to three segments with breakpoints).

If breakpoints are not used on some aircraft types, uncorrected linear regression ICAO CEMs may result in negative intercept. Piecewise linear equations are used to address this and better represent the dataset.

The need for breakpoints was determined using the following rules:

(1) If there is a negative intercept - > introduce a breakpoint;
(2) If there is a cluster consistently above or below - > introduce a breakpoint; and
(3) If there is a Great Circle Distance (GCD) gap - > potentially introduce breakpoints.

39.19 Development of ICAO CEMs based on equivalent aircraft types

If the aircraft type is not available in the COFdb but can be mapped to an equivalent aircraft type within the same family (and same manufacturer), an ICAO CEM is developed through scaling of the ICAO CEM of the equivalent aircraft type.

The development of equivalent aircraft type model was only allowed for aircraft within the same family (and same aeroplane manufacturer) if deemed appropriate. For example, an Airbus A342 was deemed equivalent to an Airbus A343 for which an ICAO CEM based on data from the COFdb was available.

Once equivalent aeroplane are identified, the ICAO CEM was adjusted by scaling (multiplying) it using a Mass ratio of the Average Operating MTOM of both aircraft types:

$$\text{MTOM ratio factor} = \frac{\text{Avg. MTOM}_{\text{aeroplane not in COFdb}}}{\text{Avg. MTOM}_{\text{equivalent aeroplane in the COFdb}}}$$

Data from a global registration database was used to develop Average MTOM values for each aircraft types in the ICAO CORSIA CERT aeroplane database.

39.20 ICAO CEMs based on ICAO Fuel Formula

If the aircraft type is not mapped to the COFdb or equivalent aircraft type, then the ICAO Fuel Formula is re-used.

Additional information on the ICAO Fuel Formula used in the ICAO Carbon Calculator is available at ICAO Carbon Emissions Calculator Methodology Version 10, https://www.icao.int/environmentalprotection/CarbonOffset/Documents/Methodology%20ICAO%20Carbon%20Calculator_v10-2017.pdf

39.21 Development of ICAO CEMs based on generic equation model

Finally, to allow the estimation of fuel burn and CO_2 emissions for an aircraft type that is missing an ICAO CEM after applying the steps in paragraphs 39.18 to 39.20, a set of generic equation models are developed from which an ICAO CEM for such aircraft type can then be derived. This step forms the basis for the ICAO CORSIA CERT functionality of entering custom aeroplane, i.e. an aircraft type not included in the tables of Appendix A-1 and A-2 *(See footnote 2)* which relate to the ICAO CORSIA CERT aeroplane database, that a user may need to enter and use towards the estimation of its emissions.

Note: For an aircraft type included in the ICAO CORSIA CERT aeroplane database, the ICAO CORSIA CERT shall always estimate the CO_2 emissions using the CEM obtained for it after steps in

paragraphs 39.18 (1) to (3), even when a Custom Aeroplane has been defined for such aircraft type and an ICAO CEM derived for it by the ICAO CORSIA CERT from the set of generic equations.

For each linear regression-based model the fuel is calculated on specific distances, to determine the coefficients of the generic equations based on Great Circle Distance, and on specific block time values, to determine the coefficients of the generic equations based on Block Time. Those are determined to ensure a sufficient level of granularity and account for the possible variation of the piecewise breakpoints.

For each distance band value, the calculated fuel is reported versus the aeroplane average Maximum Take-off Mass (MTOM). To develop generic equation models most representative, aircraft types are grouped by category including:

- Heavy Jets4[3] ;
- Medium Jets with Certified MTOM greater than 60 000 kg5[4] ;
- Medium Jets with Certified MTOM lower or equal to 60 000 kg; and
- Turboprops and Turboshaft aeroplane.

39.22 Aeroplane operator identification

To allow for the identification of the aeroplane operator on the summary documents, the user can enter key information on the aeroplane operator. The format of the required information is consistent with the identification page of the Emissions Monitoring Plan. This information is then used in the summary assessment and saved documents.

39.23 Calculation of CO_2 Emissions

The core functionality of the ICAO CORSIA CERT is the estimation of CO_2 emissions based on user input data.

39.24 Loading and entering data into the ICAO CORSIA CERT

The user can enter aircraft type and flight information data into the ICAO CORSIA CERT using two key paths:

(a) Manual entry by selecting an aircraft type designator from the list of types available in the ICAO CORSIA CERT aeroplane database. If needed, the user can also enter codes that are not included in the ICAO CORSIA CERT aeroplane database which become 'custom aeroplane code'. See paragraph 39.25 for details on the custom aeroplane and aerodrome functionality in the ICAO CORSIA CERT; and

[3] Heavy Jets, Medium Jets, Turboprops and Turboshaft powered aircraft based on categorization included in Doc 8643. 5

[4] The Medium Jets category was split into two subcategories to capture different trends across the broad MTOM range from approximately 10 tonnes to approximately 120 tonnes. A breakpoint at 60 tonnes was established as it captures trends appropriately. In addition, the 60 tonnes thresholds leverages and is consistent with the ICAO CO_2 emissions standard (governed by Annex 16, Volume III) that includes a breakpoint at 60 tonnes certified MTOM.

(b) Direct upload into the ICAO CORSIA CERT by loading a file containing aircraft types, origin and destination aerodromes as well as number of flights. This file in csv format can be used as the interface between an aeroplane operator's Operations and Flight Management System and the ICAO CORSIA CERT.

39.25 Comparison of the operations input data against the ICAO CORSIA CERT aeroplane and aerodrome databases

When loading operations data into the ICAO CORSIA CERT or calculating CO_2 emissions, the user can choose to compare the input aircraft type and aerodromes entries against the internal ICAO CORSIA CERT aeroplane and aerodromes databases. This comparison, checks for consistency and returns any aircraft type code and aerodrome code that does not match the internal ICAO CORSIA CERT aeroplane and aerodromes databases. The user can then choose to enter custom aeroplane and aerodromes information for these codes or return to the input data and correct the codes if an error was made in the data entry.

Entering custom aeroplane codes

If the user chooses to use custom aeroplane codes, he/she is prompted to select an aircraft category from the following list:

(a) Jet (Heavy) with certified MTOM ≥ 136 000 kg;

(b) Jet with certified MTOM ≥ 60 000 kg and < 136 000 kg;

(c) Jet with certified MTOM < 60 000 kg; and

(d) Turboprop.

The user is also prompted to enter the Average Maximum Take Off Mass (MTOM) in the aeroplane operator fleet. The Average MTOM is calculated using the arithmetical average of individual MTOMs of aeroplane in the fleet of a given aircraft type code. The individual MTOMs are the individual maximum permissible take-off mass of each individual aeroplane according to the certificate of airworthiness, the flight manual or other official documents as defined by ICAO Annex 16, Volume IV.

Based on the aeroplane category selected and the Average Maximum Take Off Mass (MTOM) in the aeroplane operator fleet, the ICAO CORSIA CERT derives a tailored ICAO CEM from the relevant generic equation model according to the approach described in paragraph 39.21. The custom aeroplane functionality displays information on the fuel burn rate (kg/km) and intercept value (fuel at Great Circle Distance of 0 km) depending on the underlying regression model associated with a manually selected aeroplane category and average MTOM. The indicated fuel burn rate and interception value are used within ICAO CORSIA CERT to calculate the estimated fuel and emissions for all flights with this Custom Aeroplane Code.

Note: If custom aircraft types are entered but already exist in the ICAO CORSIA CERT aeroplane database, the information in the ICAO CORSIA CERT aeroplane database will anyhow be used as default for calculating CO_2 emissions.

Entering custom aerodrome codes

If needed, the user can enter custom aerodrome codes in order to allow for the calculation of CO_2 emissions for each flight entered. The user is prompted to enter aerodrome latitude using WGS84 coordinates. In the 2019 version of the ICAO CORSIA CERT, the user has greater flexibility for entering aerodrome coordinates. The separation symbols can be defined by the user.

Latitude and longitude pairs for aerodromes or Aerodrome Reference Points (ARP) within the ICAO CORSIA CERT shall be used with the following Latitude & Longitude sign convention.

A negative latitude (-) means South of the Equator. A negative longitude (-) means West of the Prime Meridian.

In addition, the user is prompted to enter the ICAO Member State attributed to the aerodrome by selecting Oman as the ICAO Member States. In order to help with the attribution of aerodromes to ICAO Member States, the ICAO CORSIA CERT provide a suggestion based on the first two letters of the Custom Aerodrome Code (for codes with four letters only).

Note 1: If custom aerodromes are entered but already exist in the ICAO CORSIA CERT aeroplane database, the information for the custom aerodromes will be used as default for the purpose of calculating CO_2 emissions.

Note2: In order to help the user to search the ICAO CORSIA CERT aeroplane and aerodrome databases, a search functionality is provided. Additional information on the underlying Doc 8643 can be found at: https://www.icao.int/publications/DOC8643/Pages/default.aspx.

Note 3: Additional information on ICAO Doc 7910 can be found at https://qis.icao.int/7910FLEX/

39.26 Requirements for aeroplane operators holding an Oman issued AoC

(a) Aeroplane operators using aircraft greater than 5,700kg for international operations between paired states shall submit a CORSIA Monitoring, Reporting and Verification (MRV) system for review and approval.

(b) This system shall encompass the following:

(1) Monitoring – Monitoring of CO_2 emissions is either based on a fuel use monitoring method, or the use of the ICAO CORSIA CERT.
(2) Reporting – CO_2 emissions will be reported by the certified operators to PACA for onward submission to ICAO.
(3) Verification – CO_2 emissions information is accurate and free from errors.

(c) The CORSIA MRV shall be prepared in accordance ICAO Annex 16, Volume 4, Chapter 2.

(d) The MRV is applicable to international operations on or after 1 January 2020.

39.27 Monitoring of CO_2 Emissions – Emissions Monitoring Plan (EMP)

(a) The aeroplane operators Emission Monitoring Plan (EMP) is the collaborative means of monitoring CO_2 emissions on an operator-specific basis and facilitates the onward reporting of such data to ICAO.

(b) Oman registered operators conducting international and domestic operations shall submit an EMP to PACA for approval by 1 April 2020.

(c) PACA will approve the EMP by 1 May 2020 and shall maintain a clear line of communication during the development, review and approval process of the EMP.

(d) Any changes made to the EMP by an operator shall be communicated to PACA for approval.

(e) The main components of the EMP are as follows:

(1) Aeroplane operator identification;
(2) Fleet and operations;
(3) Methods and means of calculating emissions from international flights;
(4) Data management, data flow and control.

(f) An aeroplane operator shall monitor and record its fuel use from international flights in accordance with an eligible monitoring method

(g) Monitoring method shall be approved by PACA as a part of aeroplane operator's Emissions Monitoring Plan.

(h) The aeroplane operator shall use the same eligible monitoring method for the entire compliance period.

Note: The main source reference documents use for CORSIA are Annex 16, Volume 4, Chapter 2 and the ICAO CORSIA CO2 Estimation and Reporting Tool (CERT). The latter is available from the following address:

https://www.icao.int/environmental-protection/CORSIA/CERTTool/ICAO%20CORSIA%20CERT%20version%202019%20-%20Design,%20Development%20and%20Validation.pdf