AVIATION SPECIFICATIONS 4

FUEL USE MONITORING METHODS

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Contents

1 INTRODUCTION

1.1 These Aviation Specifications 4 ("AS-4") specifies the fuel use monitoring methods to compute the fuel use, and the ICAO CORSIA CO2 Estimation and Reporting Tool (CERT) to estimate the CO2 emissions produced from the operation of any aeroplane by a registered Singapore operator under the Air Navigation (Carbon Emissions and Reporting) Regulations 2022 ("CORSIA ANR").

1.2 This AS-4 is issued by the Director -General of Civil Aviation ("DGCA").

2 DEFINITIONS

2.1 Any term in this AS-4 that is defined in the First Schedule to the Air Navigation (91 — General Operating Rules) Regulations 2018 has the meaning given to that term in that Schedule unless the term is otherwise defined in the First Schedule of the CORSIA ANR.

PART 1

3 FUEL USE MONITORING METHODS

3.1 For the purpose of monitoring fuel use by a primary registered Singapore operator, the Director-General of Civil Aviation has specified the following as a fuel use monitoring method:

(a) Method A;

(1) A primary registered Singapore operator using Method A as an applicable monitoring method must use the following formula to compute fuel:

$$F_N = T_N - T_{N+1} + U_{N+1}$$

where —

F_N is the amount of fuel consumed for the flight under consideration determined using the Method A (in tonnes);

TN is the amount of fuel contained in aeroplane tanks once fuel uplifts for the flight under consideration are complete (in tonnes);

TN+1 is the amount of fuel contained in aeroplane tanks once fuel uplifts for the subsequent flight are complete (in tonnes);

UN+1 is the sum of fuel uplifts for the subsequent flight measured in volume and multiplied with a fuel density value (in tonnes).

(2) A primary registered Singapore operator performing on an ad-hoc basis flights attributed to another primary registered Singapore operator must provide to the second-mentioned primary registered Singapore operator the fuel measurement values according to the Block-off / Block-on method.

(3) Where no fuel uplift for the flight or subsequent flight takes place, the amount of fuel contained in aeroplane tanks (T_N or $_{TN+1}$) must be determined at Block-off for the flight or subsequent flight.

(4) When an aeroplane performs activities other than a flight, including undergoing major maintenance involving the emptying of the tanks, after the flight to be monitored and the variable T_{N+1} cannot be determined, the primary registered Singapore operator may substitute the quantity "$T_{N+1+UN+1}$" with the amount of fuel remaining in tanks at the start of the subsequent activity of the aeroplane or fuel in tanks at Block-on, as recorded by technical logs.

(b) Method B;

(1) A primary registered Singapore operator using Method B as an applicable monitoring method must use the following formula to compute fuel use:

$$F_N = R_{N-1} - R_N + U_N$$

where —

F_N is the amount of fuel consumed for the flight under consideration determined using Method B (in tonnes);

R_{N-1} is the amount of fuel remaining in aeroplane tanks at the end of the previous flight at Block-on before the flight under consideration (in tonnes);

R_N is the amount of fuel remaining in aeroplane tanks at the end of the flight under consideration at Block-on after the flight (in tonnes);

U_N is the fuel uplift for the flight considered measured in volume and multiplied with a fuel density value (in tonnes).

(2) The primary registered Singapore operator performing on an ad-hoc basis flights attributed to another eligible registered Singapore operator must provide to the second-mentioned eligible registered Singapore operator the fuel measurement values according to the Block-off / Block-on method.

(3) Where an aeroplane does not perform a flight previous to the flight for which fuel consumption is being monitored, such as if the flight follows a major revision or maintenance, the eligible registered Singapore operator may substitute the quantity R_{N-1} with the amount of fuel remaining in aeroplane tanks at the end of the previous activity of the aeroplane, as recorded by technical logs.

(c) Block-off / Block-on;

(1) An eligible registered Singapore using the Block-off / Block-on method as an applicable monitoring method must use the following formula to compute fuel use:

$$F_N = T_N - R_N$$

where —

F_N is the amount of fuel consumed for the flight under consideration determined using Block-off / Block-on method (in tonnes);

T_N is the amount of fuel contained in aeroplane tanks at Block-off for the flight under consideration (in tonnes);
R_N is the amount of fuel remaining in aeroplane tanks at Block-on of the flight under consideration (in tonnes).

(d) Fuel Uplift;

(1) For flights with a fuel uplift, unless the subsequent flight has no uplift, the eligible registered Singapore operator must use the following formula to compute fuel use:

$$F_N = U_N$$

where —

FN is the amount of fuel consumed for the flight under consideration determined using Fuel Uplift method (in tonnes);

UN is the fuel uplift for the flight considered, measured in volume and multiplied with a density value (in tonnes).

(2) For flights without a fuel uplift, the eligible registered Singapore operator must use the following formula to allocate fuel use from the prior fuel uplift proportionally to block hour:

$$F_N = U_N \times \left(\frac{BH_N}{BH_N + BH_{N+1} + ... + BH_{N+n}} \right)$$

$$F_{N+1} = U_N \times \left(\frac{BH_{N+1}}{BH_N + BH_{N+1} + ... + BH_{N+n}} \right)$$

…

$$F_{N+n} = U_N \times \left(\frac{BH_{N+n}}{BH_N + BH_{N+1} + ... + BH_{N+n}} \right)$$

where —

FN is the amount of fuel consumed for the flight under consideration determined using fuel uplift (in tonnes);

FN+1 is the amount of fuel consumed for the subsequent flight determined using fuel uplift (in tonnes);

FN+n is the amount of fuel consumed for the follow-on flight determined using fuel uplift (in tonnes);

UN is the fuel uplift for the flight under consideration (in tonnes);

BHN is the block hour for the flight under consideration (in hours);

BHN+1 is the block hour for the subsequent flight (in hours);

BHN+n is the block hour for the follow-on flight (in hours).

(e) Fuel Allocation with Block Hour.

Computation of average fuel burn ratios

(1) For an eligible registered Singapore operator which can clearly distinguish between international and domestic fuel uplifts, the eligible registered Singapore operator may compute, for each aeroplane type, the average fuel burn ratios by summing up all actual fuel uplifts from international flights, divided by the sum of all actual block hours from international flights, for a reporting period according to the following formula:

$$AFBR_{AO,AT} = \frac{\sum_N U_{AO,AT,N}}{\sum_N BH_{AO,AT,N}}$$

where —

(i) AFBRAO,AT is the average fuel burn ratios for the eligible registered Singapore operator and aeroplane type (in tonnes per hour);

(ii) UAO,AT,N is the fuel uplifted for the international flight for the eligible registered Singapore operator and aeroplane type (in tonnes);

(iii) BHAO,AT,N is the block hour for the international flight for the eligible registered Singapore operator and aeroplane type (in hours).

(2) An eligible registered Singapore operator's specific average fuel burn ratio must be calculated on a yearly basis by using the yearly data from the reporting period to which the enhanced emissions report relates.

(3) The average fuel burn ratio mentioned in paragraph (2) must be reported, for each aeroplane type operated by the eligible registered Singapore operator, in the eligible registered Singapore operator's enhanced emissions report.

Computation of fuel use for individual flights

(1) An eligible registered Singapore operator must compute the fuel consumption for each international flight by multiplying the eligible registered Singapore operator's specific average fuel burn ratios

with the international flight's block hour according to the following formula:

$$F_N = AFBR_{AO,AT} \times BH_{AO,AT,N}$$

where —

(i) FN is the amount of fuel allocated to the international flight under consideration using the Fuel Allocation Block Hour method (in tonnes);

(ii) FBRAO,AT is the average fuel burn ratios for the eligible registered Singapore operator and aeroplane type (in tonnes per hour);

(iii) HAO,AT,N is the block hour for the international flight under consideration for the eligible registered Singapore operator type (in hours).

PART 2

4. ICAO CORSIA CO2 Estimation and Reporting Tool (CERT)

4.1 A registered Singapore operator may use the ICAO CORSIA CERT in the following circumstances:

(a) if the registered Singapore operator is a non-eligible registered Singapore operator;

(b) where the registered Singapore operator is an eligible registered Singapore operator —

(1) whose total CO2 emissions produced from the operation of any aeroplane in a reporting period is less than 50,000 tonnes; or

(2) whose total CO2 emissions of the primary registered Singapore operator decreases below 50,000 tonnes for each of 2 consecutive years, despite being the primary registered Singapore operator whose total CO2 emissions produced from the operation of any aeroplane in a reporting period is 50,000 tonnes or more;

(c) if the registered Singapore operator is an eligible registered Singapore operator and is rectifying any error or omissions in a record of fuel use under regulation 11(3).

4.2 A registered Singapore operator must use either of the following methods to enter the necessary information into the ICAO CORSIA CERT:

(a) the Block Time input method;

(b) the Great Circle Distance input method.

(a) A registered Singapore operator approved to use the Block Time input method must collect the following data and enter it into the ICAO CORSIA CERT to estimate its CO2 emissions during the reporting period:

(1) ICAO aircraft type — model designator;

(2) Origin aerodrome ICAO Designator;

(3) Destination aerodrome ICAO Designator;

(4) Block time (in hours);

(5) Number of flights;

(6) Date of each flight (optional);

(7) Flight number of each flight (optional).

(b) A registered Singapore operator approved to use the Great Circle Distance input method must collect the following data and enter it into the ICAO CORSIA CERT to estimate its CO2 emissions during the reporting period:

(1) ICAO aircraft model — type designator;

(2) Origin aerodrome;

(3) Destination aerodrome;

(4) Number of flights;

(5) Date of each flight (optional);

(6) Flight number of each flight (optional).