GOVERNMENT OF INDIA

OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION

TECHNICAL CENTRE, OPP SAFDURJUNG AIRPORT, NEW DELHI

CIVIL AVIATION REQUIREMENTS
SECTION 8 - AIRCRAFT OPERATIONS
SERIES 'S' PART I
ISSUE II, 4TH SEPTEMBER 2014

Revision 3 Effective: 28 FEBRUARY 2022

File No: AV. 22024/16/2013-FSD

SUBJECT: REQUIREMENTS COMMERCIAL AIR TRANSPORT- FOR EXTENDED DIVERSION TIME OPERATIONS (EDTO) AND OPERATIONS BY TURBINE-ENGINED AEROPLANES BEYOND 60 MINUTES TO AN EN- ROUTE ALTERNATE AERODROME.

1. INTRODUCTION:

1.1 The purpose of initial ETOPS regulations were to provide very high level of safety while facilitating the use of twin engines on routes, which were previously restrictedto three or four engine aeroplanes. ETOPS has now evolved to EDTO (Extended Diversion Time Operations) by ICAO to encompass two or more engine aeroplanes and the intent of the current regulation is to avoid a diversion and if it occurs, toensure that the diversion is safe. EDTO may be referred as ETOPS in somedocuments (AFM etc.).

1.2 This Civil Aviation Requirement is issued under the provision of Rule 29C and 133A of the Aircraft Rules 1937 and lays down requirements for obtainingairworthiness and operational approval for EDTO and operations by Turbine- Engine Aero plane beyond 60 minutes and up to Threshold time as established by DGCA.

2. APPLICABILITY:

2.1 This CAR is applicable to operators engaged in Commercial Air Transport Operations.Operators shall not operate an aeroplane with two or more engines beyond the threshold time unless approved by DGCA for EDTO.

2.2 To be eligible for EDTO, the specified airframe/ engine combination should have been certificated to the Airworthiness Standards of Transport Category aeroplane by FAA (FAR25) of USA or EASA (CS25) or by any other regulatory authority acceptable to DGCA.

3. DEFINITIONS:

3.1 **Alternate Aerodrome**. An aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing where the necessary services and facilities are available, whereaircraft performance requirements can be met and which is operational at theexpected time of use. Alternate aerodromes include the following:

Take-off alternate. An alternate aerodrome at which an aircraft would be able to landshould this become necessary shortly after take-off and it is not possible to use theaerodrome of departure.

En-route alternate. An alternate aerodrome at which an aircraft would be able to land in the event that a diversion becomes necessary while en route.

Destination alternate. An alternate aerodrome at which an aircraft would be able toland should it become either impossible or inadvisable to land at the aerodrome of intended landing.

3.2 **Extended diversion time operations (EDTO).** Any operation by an aeroplane with two or more turbine engines where the diversion time to an en-route alternate aerodrome is greater than the threshold time established by the DGCA.

3.3 **EDTO Entry Point.** The first point on the route of an EDTO flight; determined usinga one-engine inoperative cruise speed under standard conditions in still air that is more than the threshold from an enroute alternate airport for airplanes with two engines and more than two engines.

3.4 **EDTO Exit Point (EXP)**: The last point on an EDTO flight, under standard conditions in still air, that is beyond the DGCA established threshold time from an Enroute alternate aerodrome.

3.5 **EDTO critical fuel.** The fuel quantity necessary to fly to an en-route alternate aerodrome considering, at the most critical point on the route, the most limiting system failure.
Note: Attachment C to ICAO Annex 6 Part I contains guidance on EDTO critical fuel scenarios.

3.6 **EDTO-significant system**. An aeroplane system whose failure or degradation could adversely affect the safety particular to an EDTO flight, or whose continued functioning is specifically important to the safe flight and landing of an aeroplane during an EDTO diversion.

3.7 **EDTO alternate**. An en-route alternate aerodrome that is designated in a dispatch or flight release for use in the event of a diversion during an EDTO flight, and which meets the applicable dispatch minima (weather and field

conditions). This definition applies to flight planning and does not in any way limit the authority of the pilot-in-command during flight.

Note. — En-route alternate aerodromes may also be the take-off and/or destination aerodromes.

3.8 **EDTO Dispatch planning minima:-**

The EDTO dispatch planning minima requirements are typically expressed as additives to the published operating minima for a particular approach or may also be expressed as fixed minima values. In either case, the intent of the requirements is that the aerodrome minima assessed for dispatch planning purposes are more conservative than the actual published operating minima required to conduct an approach and landing.

3.9 **EDTO Alternate Aerodrome Validity Period/time window:-**

The validity period is the time window during which a designated EDTO alternate aerodrome should be assessed for EDTO dispatch purposes to have the necessary conditions to allow a safe approach and landing in the event of an en-route EDTO diversion. The applicable time window should consider the earliest to latest expected arrival times for each EDTO alternate aerodrome based on the planned departure time. The validity period for a given EDTO alternate aerodrome is typically determined based on a diversion from the first and last EDTO ETPs for this alternate.

3.10 Isolated aerodrome. A destination aerodrome for which there is no destination alternate aerodrome suitable for a given aeroplane type.

3.11 *Maximum diversion time*. Maximum allowable range, expressed in time, from a point on a route to an en-route alternate aerodrome.

3.12 Point of no return. The last possible geographic point at which an aeroplane can proceed to the destination aerodrome as well as to an available en route alternate aerodrome for a given flight.

3.13 Threshold time. The range, expressed in time, established by the State of the Operator to an en-route alternate aerodrome, whereby any time beyond requires anEDTO approval from the State of the Operator.

3.14 In - Flight Shutdown (IFSD). When an engine ceases to function in flight and is shutdown, whether self-induced, crew initiated or caused by some other external influence (i.e. IFSD for all cases; for example due to flameout, internal failure, crew initiated shutoff, foreign object ingestion, icing, inability to obtain and/or control desired thrust etc.).

3.15 **Propulsion System.** A system consisting of power unit and all other equipment utilized to provide those functions necessary to sustain, monitor and control the power/thrust output of any one-power unit following installation on the airframe.

3.16 **EDTO — configuration, maintenance and procedures (CMP) document.** The document approved by the State of Design and which contains the particularaeroplane configuration minimum requirements, including any special inspection, hardware life limits, master minimum equipment list (MMEL) constraints and maintenance practices found necessary to establish the suitability of an aeroplane/engine combination (AEC) for extended diversion time operation.

3.17 **EDTO — configuration, maintenance and procedures (CMP) requirements.** The particular aeroplane configuration minimum requirements including any special inspection, hardware life limits, MMEL constraints and maintenance practices found necessary to establish the suitability of an aeroplane/engine combination (AEC) for extended diversion time operation.

4 THRESHOLD TIME

4.1 The threshold time established by DGCA is given below:

Operator/ Aeroplane	Threshold time
1. Scheduled operators with two engine Aeroplanes irrespective of AUW and passenger capacity	60 minutes
2. Non-scheduled operators (NSOPs) operating Twin engine aeroplanes - engine aeroplanes with a maximum approved passenger seating configuration of 20 or more.	
3. Non-scheduled operators (NSOPs) operating two engine aeroplanes with a maximum approved passenger seating configuration of 19 or less.	90 minutes
4. Aeroplanes more than two engines	120 minutes

4.2 All operators conducting operations beyond 60 minutes from a point on a route to an en-route alternate aerodrome shall ensure that:

4.2.1 For all aeroplanes:

4.2.1.1 En-route alternate aerodromes are identified; and

4.2.1.2 The most up-to-date information is provided to the flight crew on identified en- route alternate aerodromes, including operational status and meteorological conditions;

4.2.2 For aeroplanes with two turbine engines, the most up-to-date information provided to the flight crew indicates that conditions at identified en-route

alternate aerodromes will be at or above the operator's established aerodrome operating minima for the operation at the estimated time of use.

4.3 In addition to the requirements in 4.1, all operators shall ensure that the following are taken into account and provide the overall level of safety intended by requirements of CAR Section 8 Series O Part II:

a) Operational control and flight dispatch procedures;
b) Operating procedures; and
c) Training programmes.

4.4 Non-scheduled operators (NSOPs) operating two engine aeroplanes with a maximum approved passenger seating configuration of 19 or less and intending to use 90 minutes threshold time shall comply with the requirements given at Annexures 2 and 3 of this CAR.

4.5 Operators with aeroplane with two or more turbine engines shall not operate beyond the above specified threshold time unless they meet the requirements for Extended Diversion Time Operations (EDTO) given in the following para's of this CAR.

5 GENERAL REQUIREMENTS FOR EXTENDED DIVERSION TIME OPERATIONS (EDTO)

5.1 Unless the operation has been specifically approved by DGCA an aeroplane withtwo or more turbine engines shall not, be operated on a route where the diversiontime from any point on the route, calculated in ISA and still air conditions at the one-engine inoperative cruise speed for aeroplanes with two turbine engines andat the all-engine operating cruise speed for aeroplanes with more than two turbine engines, to an en-route alternate aerodrome exceeds a threshold time established for such operations by the DGCA.

Note1: When the diversion time exceeds the threshold time, the operation is considered to be an extended diversion time operation (EDTO).

Note2: For the purpose of EDTO, the take-off and/or destination aerodromes maybe considered en-route alternate aerodromes.

5.2 The maximum diversion time, for an operator of a particular aeroplane type engaged in extended diversion time operations shall be approved by DGCA.

Note. — Guidance on the conditions to be used when converting diversion times to distances are contained in Attachment C to ICAO Annex 6 Part I and ICAO Doc 10085.

5.3 When approving the appropriate maximum diversion time for an operator for aparticular aeroplane type engaged in extended diversion time operations,

DGCA shall ensure that:

(a) for all aeroplanes: the most limiting EDTO significant system time limitation,if any, indicated in the Aeroplane Flight Manual (directly or by reference) and relevant to that particular operation is not exceeded; and

(b) for aero planes with two turbine engines: the aeroplane is EDTO certified.

5.4 Notwithstanding the provisions in Para 4.1 above, DGCA may, based on the results of a specific safety risk assessment conducted by the operator which demonstrates how an equivalent level of safety will be maintained, approve operations beyond the time limits of the most time-limited system. The specific safety risk assessment shall include at least the

(a) capabilities of the operator;
(b) overall reliability of the aeroplane;
(c) reliability of each time limited system;
(d) relevant information from the aeroplane manufacturer; and
(e) specific mitigation measures

For aeroplanes engaged in EDTO, the additional fuel required by CAR Section 8 Series 'O' Part II Para 4.3.6.3 f) 2) shall include the fuel necessary to comply with the EDTO critical fuel scenario, the critical fuel should be available at critical point, as established in this CAR.

5.5 A flight shall not proceed beyond the threshold time in accordance with Para 4.1 above unless the identified en-route alternate aerodromes have been re-evaluated for availability and the most up to date information indicates that, during the estimated time of use, conditions at those aerodromes will be at or above the operator's established aerodrome operating minima for the operation.If any conditions are identified that would preclude a safe approach and landingat that aerodrome during the estimated time of use, an alternative course of action shall be determined.

5.6 DGCA shall, when approving maximum diversion times for aeroplanes with two turbine engines, ensure that the following are taken into account in providing the overall level of safety intended by the provisions of ICAO Annex 8:

(a) reliability of the propulsion system;
(b) airworthiness certification for EDTO of the aeroplane type; and
(c) EDTO maintenance program.

Note: The Airworthiness Manual (Doc 9760) contains guidance on the level ofperformance and reliability of aeroplane systems

6 EDTO SPECIAL REQUIREMENTS

6.1 In addition to the standard flight planning and execution requirements, flights undertaking EDTO require special considerations as below;

6.1.1 Operational approval to conduct EDTO

While approving an operator with a particular aeroplane type for extended diversiontime operations, DGCA will establish an appropriate threshold time and approve a maximum diversion time and in addition to the requirements previously set forth in this CAR, ensure that:

(a) specific operational approval is granted by DGCA;
(b) the operator's past experience and compliance record is satisfactory and the operator establishes the processes necessary for successful and reliable extended diversion time operations and shows that such processes can be successfully applied throughout such operations;
(c) the operator's procedures are acceptable based on certified aeroplane capabilityand adequate to address continued safe operation in the event of degraded aeroplane systems;
(d) the operator's crew training programme is adequate for the proposed operation;
(e) documentation accompanying the authorization covers all relevant aspects; and
(f) it has been shown (e.g. during the EDTO certification of the aeroplane) that the flight can continue to a safe landing under the anticipated degraded operating conditions which would arise from:

i. the most limiting EDTO significant system time limitation, if any, for extended diversion time operations identified in the Aero plane's Flight Manual directly or by reference; or
ii. total loss of engine generated electric power; or
iii. total loss of thrust from one engine; or

Any other condition which DGCA considers to be equivalent in airworthiness and performance risk.

6.1.2 Continuous Airworthiness Maintenance Programme (CAMP)

The basic maintenance program for the aeroplane being considered for EDTO is the Continuous Airworthiness Maintenance Programme (CAMP) currently approved for that operator in the Continuing Airworthiness Management Exposition (CAME) and covers the particular model airframe engine combination.

In order to conduct an EDTO flight, the Operator shall develop and comply with the EDTO Continuous Airworthiness Maintenance Programme (EDTO CAMP), as approved by DGCA and endorsed in Operator's operations specifications, for each aeroplane-engine combination used in EDTO. The Operator shall develop the EDTO CAMP by supplementing the CAMP currently approved for the Operator. The CAMP should contain the standards, guidance and direction necessary to support the intended operations. The maintenance personnel involved in effecting this programme should be made aware of the special nature of EDTO and have the knowledge, skills and ability to accomplish the requirement of the programme. EDTO

maintenance requirements will be approved as supplemental requirements.

The EDTO CAMP shall include the following elements:

(a) ***EDTO manual.*** The Operator shall have an EDTO manual for the use by each person involved in EDTO.

(1) The manual shall -

(i) List each EDTO significant system (Refer para 6.1.3),

(ii) Refer to or include all of the EDTO maintenance elements in this section,

(iii) Refer to or include all supportive programs and procedures,

(iv) Refer to or include all duties and responsibilities, and

(v) Clearly state where referenced material is located in the Air Operator's document system.

(b) ***EDTO pre-departure service check.*** The Operator shall develop a pre-departure check tailored to ***their*** specific operation.

(1) The Operator shall complete the pre-departure service check immediately before each EDTO flight.

(2) At a minimum, this check must -

(i) Verify the condition of all EDTO Significant Systems;

(ii) Verify the overall status of the aeroplane by reviewing applicable maintenance records; and

(iii) Include an interior and exterior inspection to include a determination of engine and APU oil levels and consumption rates.

(3) An appropriately trained maintenance person, who is EDTO qualified, shall accomplish and certify by signature EDTO specific tasks. Before an EDTO flight may commence, an EDTO pre-departure service check (PDSC) Signatory Person, who has been authorized by the Operator, shall certify by signature, that the EDTO PDSC has been completed.

(4) For the purposes of this paragraph (b) only, the following definitions apply:

(i) EDTO qualified person: A person is EDTO qualified when that person satisfactorily completes the operator's EDTO training programme and is authorized by the Operator.

(ii) EDTO PDSC Signatory Person: A person is an EDTO PDSC Signatory Person when that person is EDTO qualified and that person:

(A) When certifying the completion of the EDTO PDSC:

(1) Works for an operator authorized to engage in Scheduled/ Non-Scheduled operation or works for a CAR 145 organisation; and

(*2*) Holds an AME licence with airframe and power plant ratings.

(B) When certifying the completion of the EDTO PDSC for an aircraft of an Indian Air Operator outside India, the person shall have the requisite experience or training to return aircraft to service on behalf of an EDTO maintenance entity.

(iii) EDTO maintenance entity: An entity authorized to perform EDTO maintenance and complete EDTO PDSC and that entity is:

(A) A Scheduled/ non-Scheduled Air Operator;

(B) An approved/ accepted CAR 145 Organisation; or

(C) A maintenance organisation approved by local regulatory authority (in case a CAR 145 approved/ accepted organisation is not available at the location).

Note: When the maintenance is sub-contracted, the operator must ensure that:

(i) The maintenance personnel of the sub-contractor involved are qualified for EDTO.
(ii) All airworthiness flight dispatch procedures and additional maintenance requirements as identified in the Operator's CAME is complied with.

(c) ***Limitations on dual maintenance.***

(1) Except as specified in paragraph (c) (2), the Operator may not perform scheduled or unscheduled dual maintenance during the same maintenance visit on the same or a substantially similar EDTO Significant System listed in the EDTO Manual, if the improper maintenance could result in the failure of an EDTO Significant System.

(2) In the event dual maintenance as defined in paragraph (c) (1) of this para cannot be avoided, the Operator may perform maintenance provided:

(i) The maintenance action on each affected EDTO Significant System is performed by a different AME, or

(ii) The maintenance action on each affected EDTO Significant System is

performed by the same AME under the direct supervision of a second qualified individual; and

(iii) For either paragraph (c)(2)(i) or (ii) of this para, a qualified individual conducts a ground verification test and any in-flight verification test required under the program developed pursuant to paragraph (d) of this para.

(d) ***Verification programme.*** The Operator shall develop and maintain a programme for the resolution of discrepancies that will ensure the effectiveness of maintenance actions taken on EDTO Significant Systems. The verification program ***must*** identify potential problems and verify satisfactory corrective action. The verification program must include ground verification and in-flight verification policy and procedures. The Operator shall establish procedures to indicate clearly who is going to initiate the verification action and what action is necessary. The verification action may be performed on an EDTO revenue flight provided the verification action is documented as satisfactorily completed upon reaching the EDTO Entry Point.

(e) ***Task identification.*** The Operator shall identify all EDTO-specific tasks. An ***appropriately*** trained AME who is EDTO qualified must accomplish and certify by signature that the EDTO-specific task has been completed.

(f) ***Centralized maintenance control procedures.*** The operator conducting EDTO (regardless of the size of its EDTO fleet) shall have a centralized entity responsible for monitoring of the EDTO maintenance activities. The Operator shall develop and clearly define in its EDTO manual specific procedures, duties, and responsibilities for involvement of their centralized maintenance control personnel in their EDTO operation.

(g) ***Parts control program.*** The Operator shall develop an EDTO parts control program to ensure the proper identification of parts used to maintain the configuration of aeroplanes used in EDTO. The programme must include procedures to verify that the parts installed on EDTO aeroplanes during part borrowing or pooling arrangement as well as those parts used after repair or overhaul maintain the required EDTO configuration.

(h) ***Reliability program.*** The Operator shall have an EDTO reliability program. This programme must be event-oriented and include procedures to report the events listed below, as follows:

(1) The Operator shall report the following events within 72 hours of the occurrence to the concerned regional/sub-regional office:

(i) IFSDs, except planned IFSDs performed for flight training.

(ii) Diversions and turnbacks for failures, malfunctions, or defects associated with any aeroplane or engine system.

(iii) Uncommanded power or thrust changes or surges.

(iv) Inability to control the engine or obtain desired power or thrust.

(v) Inadvertent fuel loss or unavailability, or uncorrectable fuel imbalance in flight.

(vi) Failures, malfunctions or defects associated with EDTO Significant Systems.

(vii) Any event that would jeopardize the safe flight and landing of the airplane on an EDTO flight.

(2) The Operator shall investigate the cause of each event listed in para (h)(1) above and submit findings and a description of corrective action to the concerned regional/ sub-regional office. The report must include the information specified in CAR Section 2 Series C Part I (Appendix II). The corrective action must be acceptable to the concerned regional/ sub-regional office.

(i) ***Propulsion system monitoring.***

(1) If the IFSD rate (computed on a 12-month rolling average) for an engine installed as part of an aeroplane-engine combination exceeds the following values, the Operator shall do a comprehensive review of its operations to identify any common cause effects and systemic errors. The IFSD rate must be computed using all engines of that type in the Operator's entire fleet of aeroplanes approved for EDTO.

(i) A rate of 0.05 per 1,000 engine hours for EDTO up to and including 120 minutes.

(ii) A rate of 0.03 per 1,000 engine hours for EDTO beyond 120-minutes up to and including 180 minutes.

(iii) A rate of 0.01 per 1,000 engine hours for EDTO beyond 180-minutes.

(2) In case the above rates are exceeded, the Operator shall carry out an immediate evaluation and submit a report to concerned regional/sub-regional office on problems identified and corrective action taken to consider additional corrective action or operational restriction. Further the operator should compile necessary data on propulsion system reliability which should include;

(a) A list of all engine shutdown events both on ground and in flight (excluding normal training events) for all causes including flame out.
(b) Unscheduled engine removal rate and summary
(c) Total engine hours and cycles.
(d) Mean time between failures of propulsion system components that affect reliability.
(e) IFSD rate based on 6 and 12 months rolling average.
(f) Any other relevant data.

(j) ***Engine condition monitoring.***

(1) The Operator shall have an engine condition monitoring program to detect deterioration at an early stage and to allow for corrective action before safe operation is affected.

(2) This program must describe the parameters to be monitored, the method of data collection, the method of analyzing data, and the process for taking corrective action.

(3) The program must ensure that engine-limit margins are maintained so that a prolonged engine-inoperative diversion may be conducted at approved power levels and in all expected environmental conditions without exceeding approved engine limits. This includes approved limits for items such as rotor speeds and exhaust gas temperatures.

(k) ***Oil-consumption monitoring.*** The Operator shall have an engine oil consumption monitoring program to ensure that there is enough oil to complete each EDTO flight. APU oil consumption must be included if an APU is required for EDTO. The operator's oil consumption limit may not exceed the manufacturer's recommendation. Monitoring must be continuous and include oil added at each EDTO departure point. The programme must compare the amount of oil added at each EDTO departure point with the running average consumption to identify sudden increases.

(l) ***APU in-flight start program.*** If the aeroplane type certificate requires an APU but does not require the APU to run during the EDTO portion of the flight, the Operator must develop and maintain a programme acceptable to DGCA for cold soak in-flight start-and-run reliability.

(m) ***Maintenance training.*** For each aeroplane-engine combination, the Operator shall develop a maintenance training program that provides training adequate to support EDTO. It must include EDTO specific training for all persons involved in EDTO maintenance that focuses on the special nature of EDTO. This training must be in addition to the operator's maintenance training program used to qualify individuals to perform work on specific aeroplanes and engines.

(n) ***Configuration, maintenance, and procedures (CMP) document.*** If an aeroplane-engine combination has a CMP document, the Operator must use a system that ensures compliance with the applicable FAA/EASA-approved CMP document.

(o) ***Procedural changes.*** Each substantial change to the maintenance or training procedures that were used to qualify the Operator for EDTO, must be submitted to DGCA for review. The Operator cannot implement a change until the concerned regional/ sub-regional office notifies the Operator that the same is approved/ accepted.

6.1.3 EDTO significant systems

(a) EDTO significant systems may be the aeroplane propulsion system and anyother aeroplane systems whose failure or malfunctioning could adversely affect safety particular to an EDTO flight, or whose functioning is specificallyimportant to continued safe flight and landing during an aeroplane EDTO diversion.

(b) Many of the aeroplane systems which are essential for non-extended diversion time operations may need to be reconsidered to ensure that the redundancy level and/or reliability will be adequate to support the conduct ofsafe extended diversion time operations.

(c) The maximum diversion time shall not exceed the value of the EDTO significant system limitation(s), if any, for extended diversion time operations identified in the Aero plane's Flight Manual directly or by reference, reduced with an operational safety margin specified as 15 minutes by DGCA

(d) When planning or conducting, extended diversion time operations, an operator and pilot in command, shall ensure that:

i. when planning an EDTO flight, the minimum equipment list, the communications and navigation facilities, fuel and oil supply, en-route alternate aerodromes or aeroplane performance, are appropriately considered;

ii. if an aeroplane engine shutdown, proceed to and land at the nearest (in terms of the least flying time) en-route alternate aerodrome where a safe landing can be made; and

iii. In the event of a single or multiple failure of an EDTO significant systemsor systems (excluding engine failure), proceed to and land at the nearestavailable en-route alternate aerodrome where a safe landing can be madeunless it has been determined that no substantial degradation of safety results from any decision made to continue the planned flight.

Note: If no more than one engine is shut down for an aeroplane with more than two engines, the pilot-in-command may elect to continue beyond the nearest en-route alternate aerodrome (in terms of time) if he determines thatit is safe to do so. In making this decision the pilot-in-command should consider all relevant factors.

6.1.4 Aeroplane performance data

An operator shall not dispatch an airplane on an EDTO flight unless it makes performance data available to its flight crewmembers and dispatchers that support all phases of EDTO operations, including divert scenarios. This performance data will contain the following information:

(a) Detailed one-engine inoperative performance data including fuel flow for

standard and nonstandard atmospheric conditions, which should be demonstrated as a function of airspeed and power setting, where appropriate. This data will cover:

i. Drift down (includes net performance);
ii. Cruise altitude coverage including 10,000 feet;
iii. Holding; and
iv. Altitude capability (includes net performance).

(b) Detailed all-engine-operating performance data, including nominal fuel flow data, for standard and nonstandard atmospheric conditions, which shouldbe demonstrated as a function of airspeed and power setting, where appropriate.This data will cover:

i. Cruise altitude coverage including 10,000 feet; and
ii. Holding.

(c) Details of any other conditions relevant to EDTO that can cause significantdeterioration of performance, such as ice accumulation on the unprotected surfacesof the airplane, RAM Air Turbine (RAT) deployment, and thrust reverser deploymentif such data is available.

6.1.5 EDTO critical fuel

An aeroplane with two engines engaged in EDTO operations should carry enough fuel to fly to an en-route alternate aerodrome. This EDTO critical fuel corresponds to the additional fuel that may be required to comply with CAR Section 8 Series 'O' Part II, Para 4.3.6.3 f) 2). The following shall be considered,using the anticipated mass of the aeroplane, in determining the corresponding EDTO critical fuel:

(a) No operator may dispatch or release for flight or takeoff a turbine engine-powered airplane in EDTO unless, considering wind and other weather conditions expected, it has enough fuel to satisfy paragraphs (i) through (iv) below:

i. The greater amount of fuel sufficient to fly to an en-route alternate under the following three scenarios:

a. Assuming a rapid decompression at the most critical point followed by descent to a safe altitude in compliance with the oxygen supply requirements, or
b. At the approved one-engine inoperative cruise speed assuming a rapid decompression and a simultaneous engine failure at the most critical pointfollowed by descent to a safe altitude in compliance with the oxygen supplyrequirements, or
c. At the approved one-engine inoperative cruise speed assuming an enginefailure at the most critical point followed by descent to the one-engine inoperative cruise altitude.

ii. Upon reaching the alternate, hold at 1,500 ft. above field elevation

for 15 minutes and then conduct an instrument approach and land.

iii. Add a 5 percent wind speed factor (that is, an increment to headwind or a decrement to tailwind) on to the actual forecast wind used to calculate fuel in paragraph (i) above to account for any potential errors in wind forecasting. If an operator is not using the actual forecast wind based on a wind model acceptable to the DGCA, the airplane must carry 5 percent of the fuel required for paragraph (i) above, as reserve fuel to allow for errors in wind data.A wind aloft forecast distributed worldwide by the World Area Forecast System (WAFS) is an example of a wind model acceptable to the DGCA.

iv. After completing the calculation in paragraph (iii), compensate in paragraph (i) above with additional fuel for the greater of the following scenarios:

a. The effect of airframe icing during 10 percent of the time during which icingis forecast (including ice accumulation on unprotected surfaces, and the fuel used by engine and wing anti-ice during this period). Unless a reliableicing forecast is available, icing may be presumed to occur when the total air temperature at the approved one-engine cruise speed is less than +10 degrees Celsius, or if the outside air temperature is between 0 degrees Celsius and -20 degrees Celsius with a relative humidity of 55 percent or greater.

b. Fuel for engine anti-ice, and if appropriate wing anti-ice, for the entire timeduring which icing is forecast

(b) Unless the operator has a program established to monitor aeroplane in-service deterioration in cruise fuel burn performance, and includes in fuel supply calculationsfuel sufficient to compensate for any such deterioration, increase the final calculated fuel supply by 5 percent to account for deterioration in cruise fuel burn performance.

(c) If the APU is a required power source, then its fuel consumption must be accounted for during the appropriate phases of flight.

(d) In computing the EDTO critical fuel, advantage may be taken of drift down computed at the approved one-engine inoperative cruise speed. Accounting of wing anti-ice as in paragraph (a) (iv) above may apply to some models of aeroplane based on their characteristics and the manufacturer's recommended procedures.

Note 1: For aeroplanes with more than two engines simultaneous engine failure and depressurization or depressurization alone, whichever is more limiting will be considered.

Note 2: The speed selected for the all-engine-operative diversion (i.e. depressurization alone) may be different from the approved one-engine-

inoperative speed used to determine the EDTO threshold and maximum diversion distance.

Note 3: The speed selected for the one-engine-inoperative diversions (i.e. engine failure alone and combined engine failure and depressurization) should be the approved one-engine-inoperative speed used to determine theEDTO threshold and maximum diversion distance.

6.1.6 Operational control

Operational control refers to the exercise by the operator of responsibility for the initiation, continuation, termination or diversion of a flight

6.1.7 Flight dispatch

Flight dispatch procedures refer to the method of control and supervision of flightoperations. This does not imply a specific requirement for approved flight dispatchers or a full flight following system. In applying the general flight dispatchrequirements of CAR Section 8 Series 'O' Part II, particular attention should be paidto the conditions which might prevail any time that the operation is beyond threshold time to an en-route alternate aerodrome, e.g. systems degradation, reduced flight altitude, etc. For compliance with the requirement of CAR Section 8 Series 'O' Part II Para 4.7, at least the following aspects must be considered:

(a) identify en-route alternate airports;
(b) ensure that prior to departure the flight crew is provided with the most up-to-date information on the identified en-route alternate aerodromes, including operational status and meteorological conditions and, in flight, make available means for the flight crew to obtain the most up-to-date weather information;
(c) methods to enable two-way communications between the aeroplane andthe operator's operational control centre;
(d) ensure that the operator has a means to monitor conditions along the planned route including the identified alternate airports and ensure thatprocedures are in place so that the flight crew are advised of any situation thatmay affect the safety of flight;
(e) ensure that the intended route does not exceed the established aeroplane threshold time unless the operator is approved for EDTO operations;
(f) pre-flight system serviceability including the status of items in the minimum equipment list;
(g) communication and navigation facilities and capabilities;
(h) fuel requirements;
(i) availability of relevant performance information for the identified en-route alternate aerodrome(s); and
(j) Aerodrome rescue and firefighting service (RFFS). aerodrome RFFS Category 4 for aeroplanes with maximum certificated take-off mass of over 27000kg, or aerodrome RFFS Category 1 for all other aeroplanes, if

the operator can provide 30 minutes of notification; or if the operator cannot provide the above 30 minutes of notification, an acceptable RFFS protection may be two categories below the aeroplane RFFS category. In the case where the departure and/or the destination aerodromes and/or the departure and/or the destination alternate aerodromes are also EDTO alternate aerodromes, the acceptable RFFS protection would need to comply with the most restrictive of the applicable requirements.

(k) The following items must be listed in the dispatch or flight release for all EDTO flights;

(i) EDTO alternates; and

(ii) The authorized EDTO diversion time under which the flight is dispatched or released.

6.1.8 Operational procedures

Operating procedures refer to the specification of organization and methods established to exercise operational control and flight dispatch procedures in the appropriate manual(s) and should cover at least a description of responsibilitiesconcerning the initiation, continuation, termination or diversion of each flight as well as the method of control and supervision of flight operations

In addition, an operator shall develop unique EDTO flight crew procedures for each of the flight operations requirements pertaining to EDTO covered in this CAR. These procedures should be contained in the applicable manual or information provided to the flight crew. The manual or information provided to the flight crew should also contain procedural information necessary to interface with EDTO maintenance requirements such as:

(a) Fuel cross feed valve operational check (if applicable);
(b) Special EDTO MEL requirements ;
(c) APU in-flight start procedures (if applicable);
(d) Engine Condition Monitoring (ECM) data recording procedures; and
(e) In-flight verification of EDTO significant systems.

6.1.9 Training

Training program refers to the training for flight crew and flight dispatchers in operations and maintenance personnel for maintenance programmes. Training programmes for flight crew and flight dispatchers should ensure requirements ofare complied with such as but not limited to:

(a) route qualification;
(b) flight planning and preparation;
(c) concept of extended diversion time operations;
(d) criteria for diversions; and
(e) diversion decision making.

Note: Details of training and evaluation are given at Para 10.

6.1.10 Enroute alternates

Aerodrome(s) to which an aircraft may proceed in the event that a diversion becomes necessary while en route, where the necessary services and facilities areavailable, where aircraft performance requirements can be met, and which are expected to be operational if required, need to be identified any time that the operation is beyond the threshold to an en-route alternate aerodrome. Operations conducted by aeroplanes with two turbine engines require that prior to departure and in flight, the meteorological conditions at identified en-route alternate aerodromes will be at or above the aerodrome operating minima required for the operation during the estimated time of use (planning minima for dispatch and authorized operating minima in flight) in accordance with CAR Section 8 Series 'C' Part I (Table 9)

In addition to the en-route alternate aerodrome provisions described above the following apply:

(a) for route planning purposes, identified en-route alternate aerodromes need to belocated at a distance within the maximum diversion time from the route and whichcould be used if necessary; and
(b) In extended diversion time operations, before an aeroplane crosses its thresholdtime during flight, there should always be an en-route alternate aerodrome withinthe approved maximum diversion time whose conditions will be at or above the operator's established aerodrome operating minima for the operation during theestimated time of use.

If any conditions, such as weather below landing minima, are identified that would preclude a safe approach and landing at that aerodrome during the estimated time of use, an alternative course of action should be determined such as selecting another en-route alternate aerodrome within the operator's approved maximum diversion time.

During flight preparation and throughout the flight the most up-to-date information should be provided to the flight crew on the identified en-route alternate aerodromes, including operational status and meteorological conditions.

Note: En-route alternate aerodromes may also be the take-off and/or destination aerodromes.

For the purpose of converting diversion times to distances, an "approved one-engine-inoperative (OEI) speed" or "approved all-engine-operative (AEO) speed"is any speed within the certified flight envelope of the aeroplane.

For determining whether a point on the route is beyond threshold time (60/90 minutes for a twin engine aeroplane as applicable and 120 minutes for an aeroplane with more than two engines) to an en-route alternate, the operator should select an approved one-engine-inoperative (OEI) speed or an approved all-engine-operative (AEO) speed, as the case may be. The distance is calculated from the point of the diversion followed by cruise for

60/90/120 minutes as the case may be, in ISA and still air conditions. For the purposes of computing distances, credit for drift down may be taken.

6.1.11 Minimum equipment list (MEL)

The operator is required to submit its MEL, designed in accordance with the Master Minimum Equipment List (MMEL), appropriate to the requested level of EDTO. An operator's MEL may be more restrictive than the MMEL, considering the kind of EDTO proposed and the equipment and service problems unique to the operator. System redundancy levels appropriate to EDTO should be reflected in the MMEL. Systems considered to have a fundamental influence on flight safetymay include, but are not limited to the following:

(a) Electrical, including battery,
(b) Hydraulic,
(c) Pneumatic,
(d) Flight instrumentation,
(e) Fuel,
(f) Flight control,
(g) Ice protection,
(h) Engine start and ignition,
(i) Propulsion system instruments,
(j) Navigation and communications,
(k) Auxiliary power units,
(l) Air conditioning and pressurization,
(m) Cargo fire suppression,
(n) Emergency equipment, and
(o) Any other equipment necessary for EDTO

6.1.12 Communications Equipment (VHF/HF, Data Link, Satellite Communications)

For all routes where voice communication facilities are available, the communication equipment required by operational requirements should include atleast one voice-based system. At normal conditions of propagation and normal oneengine inoperative cruise altitude, reliable two-way voice communications between aeroplane and appropriate ATC unit over the planned route should be available.

7 EDTO OPERATIONAL APPROVAL

7.1 General

7.1.1 There are two types of EDTO authorization, either an “in-service” EDTO authorization or an “accelerated” EDTO authorization. The specific approval method for these authorizations are described hereafter, and related compliance demonstrations are detailed in this CAR.

7.1.2 An "in-service" EDTO authorization by specific approval is either:

a) When the operator has accumulated more than one year of direct in-service experience with the aircraft without EDTO. In this case, the operator may apply for a diversion time of 120-minute maximum; or
b) When the operator has accumulated more than one year of EDTO experience at up to 120-minute maximum diversion time with the aircraft. In that case, the operator may apply for a diversion time of 180-minute maximum.

7.1.3 The required amount of prior in-service experience listed above may be reduced (or increased) at the discretion of the DGCA.

Note. — Authorization for EDTO operations beyond 180-minute diversion time requires prior authorization for 180-minute EDTO operations. Authorization for EDTO operations beyond 240-minute diversion time requires a minimum of two years of experience with 180-minute or higher EDTO operations.

7.1.4 An "accelerated" EDTO authorization by specific approval is either:

a) When the operator plans to start EDTO with less than one year of direct in-service experience with the aircraft; or
b) When the operator has accumulated direct in-service experience with the aircraft, but plans to conduct EDTO beyond 120 minutes with less than one year of 120-minute diversion time EDTO experience with the aircraft.

7.1.5 The operator may apply for any diversion time up to 180 minutes and may start EDTO at entry into service.

Note. — Authorization for EDTO operations beyond 180-minute diversion time requires prior experience with 180-minute EDTO operations.

8 EDTO OPERATIONAL APPROVAL – IN SERVICE

8.1 An in-service experience program is one method of obtaining EDTO operational approval. As a prerequisite to obtaining any operational approval, the operator needs to show that an acceptable level of propulsion system reliability has been achieved in service by the world fleet for that particular airplane-engine combination. The operator also should obtain sufficient maintenance and operation familiarity with the particular airplane-engine combination. Each operator requesting approval to conduct EDTO by the in-service method should have operational experience appropriate to the operation proposed.

The following paragraphs contain requirements for requisite in-service experience. These may be reduced or increased following review and concurrence on a case-by-case basis by DGCA. Any reduction or increase in in-service experience requirements will be based on an evaluation of the operator's ability and competenceto achieve the necessary reliability for the

particular airplane-engine combination in EDTO. For example, a reduction in in-service experience may be considered for an operator who can show extensive in-service experience with a related engine on another airplane that has achieved acceptable reliability. In contrast, an increase in in-service experience may be considered for those cases where heavy maintenancehas yet to occur and/or abnormally low number of takeoffs have occurred.

8.2 75/90 minutes operation

Approval to carry out EDTO with 75 minutes diversion time may be granted by DGCA to an operator with minimal or no in-service experience with particular airframe engine combination. This approval will be based on such factors as the proposed areas of operation, the operator's demonstrated ability to successfully introduce aircraft into operation, and the quality of the proposed maintenance and operation program. Special case by case operational approval may be granted beyond 75 minutes diversion time (in steps of 15 minutes) with limited evaluation of service experience at the time of the application. For this approval, the service experience of Airframe-engine combination may be less than 2, 50,000 hours in the world fleet.

8.3 More than 75/90 minutes - 120 minutes operation

Each operator requesting approval to conduct EDTO with a maximum diversion time of 120 minutes (in still air) should have minimum of 12 consecutive months of operational in service experience with the specified airframe engine combination. Normally the accumulation of at least 2,50,000 engine hours in the world fleet (not necessarily on a particular airframe) will be necessary before the proposal is considered. Where the engine experience on another type of aeroplane is applicable to the candidate aeroplane, the candidate aeroplane should normally obtain a significant portion of the 2,50,000 engine hours experience. This number of engine hours may be reduced if sufficient data is available to prove reliability of the engine. In the event that a particular engine is derived from an existing engine the required operational experience is subject to establishing the degree of hardware commonalties and operating similarities.

8.4 More than 120 minutes - 180 minutes operation

Each operator requesting approval for maximum diversion time of 180 minutes (in still air) should have held current approval for 120 minutes, EDTO for a minimum period of 12 months with a corresponding high level of demonstrated propulsion system reliability.

8.5 Procedure for seeking approval for EDTO (In Service Method)

Any operator requesting approval for EDTO should submit the request with the supporting data to the Regional Airworthiness office of DGCA at least three months for prior to the proposed start of EDTO with the necessary elements.

This data shall include the details of compliance of modifications, additions and changes in the maintenance practices, which were made to qualify the aeroplane system for EDTO. It should also be shown that an acceptable level of propulsion system reliability has been achieved in service by the world fleet for that particular airframe- engine combination. The operator must obtain sufficient maintenance and operations familiarity with the particular airframe engine combination in question before seeking approval.

Each applicant/operator for EDTO approval should show that the particular airframe/engine combination is sufficiently reliable. Systems required for EDTO should be shown by the operator to be continuously maintained and operated at levels of reliability appropriate for intended operation.

EDTO approval of an aeroplane by the manufacturer/Regulatory Authority of the country of manufacture is normally reflected by a statement in the approved Aeroplane Flight Manual (AFM)/ Type Certificate Data Sheet (TCDS) or Supplemental Type Certificate (STC), which specifies the Configuration, Maintenance and Procedures (CMP) Standard requirements for suitability. The CMP standards shall be of latest revision. The standards and its revisions may require priority actions to be implemented before the next EDTO flight and other actions to be implemented according to a schedule acceptable to DGCA.

8.6 Application for approval and continued compliance of EDTO authorization.

An applicant seeking approval for EDTO shall submit the proposal on the prescribed application given in Annexure 1. The operator should further furnish details of the procedure/instructions and methodology for continued capability to adhere to conditions laid down at the time of grant of approval in a separate EDTO Manual or as part of OM for use by personnel involved in EDTO. Any amendment to the EDTO manual requires DGCA approval.
The following criteria should be met prior to conducting EDTO operations:

a) Satisfy the authorization considerations (operational criteria to be met for the granting of the authorization) specified in this CAR;
b) Demonstrate that EDTO flight release practices, policies and procedures are established; and
c) Conduct operational validation flight(s). Such validation flight(s) should be performed on proposed route(s) that the operator intends to operate, as detailed in its EDTO specific approval authorization request. The intent of the validation flight is to ensure that the required EDTO flight operations and maintenance (as applicable) processes and procedures are capable of supporting those operations.

   Note — Depending on the scope of EDTO authorization (operator experience with the area of operations and aircraft model, contemplated diversion time, etc.) the validation flight in the aeroplane may be replaced by a flight on an approved simulator.

9 EDTO OPERATIONAL APPROVAL – ACCELERATED METHOD

9.1 EDTO Processes

The airplane-engine combination for which the operator is seeking accelerated EDTO operational approval must be EDTO (ETOPS) type design-approved (except for two-engine EDTO at 75-minute) and be capable of operating at a satisfactory level of reliability before commencing EDTO. The operator seeking accelerated EDTO operational approval must demonstrate to the DGCA that it has an EDTO program in place that consists of all the following applicable EDTO process elements:

(a) The applicable process elements defined as the EDTO maintenance and operations requirements in this CAR.

(b) Documentation of the following elements as appropriate:

(i) Technology new to the operator and significant difference in primary and secondary power (engines, electrical, hydraulic, and pneumatic) systems between the airplanes currently operated and the two-engine airplane for which the operator is seeking EDTO operational approval.
(ii) The plan to train flight and maintenance personnel to the differences identified in the maintenance subparagraph above.
(iii) The plan to use proven manufacturer-validated training and maintenance and operations manual procedures relevant to EDTO for the two-engine airplane for which the operator is seeking accelerated EDTO operational approval.
(iv) Changes to any previously proven validated training, maintenance or operations manual procedures used in previous non-EDTO operations or in previous EDTO with a different airplane-engine combination and/orgeographic area of operations. Depending on the nature and extent of any changes, the operator may be required to provide a plan for validating such changes.
(v) The validation plan for any additional operator unique training and procedures relevant to EDTO.
(vi) Details of any EDTO program support from the airframe manufacturer, engine manufacturer, other operators or any other outside person.
(vii) The control procedures when maintenance or flight dispatch support is provided by an outside person as described above.

9.2 Process validation methodology

(a) Paragraph 9.1 (a) identifies those process elements that should be proven before EDTO approval is granted by the DGCA under the accelerated EDTO approval program. For a process to be considered proven the process should first be defined. Typically, this will include a flow chart showing the various elementsof the process. Roles and responsibilities of the personnel who will be managing this process should be defined including any training

requirement. The operator should demonstrate that the process is in place and functions as intended. The operator may accomplish this by thorough documentation and analysis, or by demonstrating on an aeroplane, that the process works and consistently provides the intended results. The operator should define the necessary evaluation duration to validate the process and also show that a feedback loop exists to illustrate need for revision of the process, if required, based on in-service experience.

(b) Normally the choice to use or not to use demonstration on an aeroplane as a means of validating individual processes should be determined by the operator. Process validation may be done with the airframe-engine combination that will be used in EDTO. It can also be done with a different aeroplane type from that for which EDTO approval is being sought, including an aeroplane with more than two engines, if it can be shown that the particular airplane-engine combination in the operator's EDTO program is not necessary to validate a process. With sufficient preparation and dedication of resources, such validation may not be necessary to assure processes that produce acceptable results. However, if the plan proposed by the operator to prove processes is determined by the DGCA to be inadequate or the plan does not produce acceptable results, validation of the processes with an aeroplane will be required.

(c) If an operator currently is conducting EDTO with a different airplane-engine combination, it may be able to document that it has proven EDTO processes in place with only minimal further validation required. If the operator has similar non- EDTO operations and can simulate or demonstrate proven EDTO processes in such operations, credit can be given for such successful evaluations. In eithercase, the operator should demonstrate that the means are in place to assure equivalent results with the airplane-engine combination being proposed for EDTO operational approval. The following elements may aid in justifying a reduction inthe validation requirement of EDTO processes:

(i) Experience with other airframes and/or engines,
(ii) Previous EDTO experience,
(iii) Experience with long range, overwater operations with two-, three-, orfour-engine airplanes, and
(iv) Experience gained by flight crewmembers and maintenance and flight dispatch personnel while working with other EDTO-approved operators.

9.3 Procedure for seeking approval for EDTO (Accelerated Method)

The operator seeking accelerated EDTO operational approval should submit an Accelerated EDTO operational approval plan to the DGCA six months before the proposed start of EDTO. This will provide sufficient time for the operator and the DGCA to validate the effectiveness of all EDTO process elements ("proven process"). The operator's application for EDTO should:

a) State the EDTO time category requested. Define proposed routes and the EDTO diversion time necessary to support these routes and the aeroplane-engine

combination to be flown.

b) Define processes and related resources being allocated to initiate and sustain EDTO operations in a manner that demonstrates commitment by management andall personnel involved in EDTO maintenance and operational support.
c) Provide a documented plan for compliance with requirements listed in this section for Accelerated EDTO.
d) Define Review Gates. A review gate is a milestone- tracking plan to allow for the orderly tracking and documentation of specific provisions of this CAR. Each reviewgate should be defined in terms of the process elements to be validated. Normally, the review gate process will start six months before the proposed start of EDTO and should continue until at least six months after the start of EDTO. The review gate process will help ensure that the proven processes comply with the provisions of this CAR and are capable of continued EDTO operations.

9.4 Validation of process elements

When the operators accelerated EDTO plan receives approval by the DGCA (DAWand FSD), a validation of the process elements of the accelerated EDTO plan shouldbegin. Close coordination between the operator and the DGCA is necessary for a successful validation of the EDTO plan. All process elements required should be validated.

(a) Before the start of the validation of the process elements, the following information should be part of the Accelerated EDTO plan submitted to the DGCA:

(i) Validation periods, including start dates and proposed completion dates.
(ii) Definition of airplane(s) to be used in the validation. List should include registration numbers, manufacturer and serial number and model of the airframes and engines.
(iii) Description of the areas of operation (if relevant to validation objectives)proposed for validation and actual EDTO.
(iv) Definition of designated EDTO validation routes. The routes should be of duration necessary to ensure process validation occurs.

(b) Process validation reporting. The operator should compile results of EDTO process validation. The operator should:

(i) Document how each element of the EDTO process was utilized during the validation.
(ii) Document any shortcomings with the process elements and measures inplace to correct such shortcomings.
(iii) Document any changes to EDTO processes that were required after an IFSD, unscheduled engine removals, or any other significant operational events.
(iv) When there is concurrence between the operator and the DGCA that a process element has been successfully proven, the review gate

should be closed and confirmation documented.
(v) Provide periodic process validation reports to the DGCA. This should be addressed during the review gates.

(c) The operator should include a final review gate prior to final EDTO approval that is the validation flights described in the DGCA APM and FOI Manual. This review gate should ensure that all EDTO processes have been proven.

(d) Any validation program should address the following:
(i) The operator should show that it has considered the impact of the EDTO validation program with regard to safety of flight operations. The operator should state in its application any policy guidance to personnel involved in the EDTO process validation program. Such guidance should clearly state that EDTO process validation exercises should not be allowed to adversely impact the safety of operations especially during periods of abnormal, emergency, or high cockpit workload operations. It should emphasize that during periods of abnormal or emergency operation or high cockpit workload EDTO process validation exercises may be terminated.
(ii) The validation scenario(s) should be of sufficient frequency and operational exposure to validate maintenance and operational support systems not validated by other means.
(iii) A means must be established to monitor and report performance with respect to accomplishment of tasks associated with EDTO process elements. Any recommended changes to EDTO maintenance and operational process elements should be defined.

9.5 Final approval for accelerated EDTO authority

At the successful completion of the operator's accelerated EDTO validation program all process elements should have been validated and appropriate review gates closed. Report of a successful completion of review gates will be forwarded by DAW to FSD. Upon final concurrence and approval, the applicant should forward to the DGCA a plan for final validation flights tobe conducted over proposed routes in the EDTO area of operation and in the airframe-engine combination listed in the operator's application. This DGCA witnessed EDTO validation flight or flights will be conducted inaccordance with APM and FOI Manual. The purpose of these flights is for the operator to demonstrate to the DGCA that it has the competence and capability to safely conduct and adequately support the intended EDTO operation.

10 OPERATIONS SPECIFICATIONS

An operator’s aircraft should not be operated on an EDTO flight unless approved byDGCA for both maintenance and operations and endorsed on the Air Operators Permit as part of the operations specifications. The operators shall, therefore, evolve an Operations Specification for EDTO, which should

cover at least the followingbefore seeking approval:

(a) Airframe-engine combination
(b) Authorized area of operation
(c) Maximum diversion time at the approved one engine cruise speed.
(d) Threshold time

Note: The threshold time and maximum diversion time may also be listed in distance(NM)

11 CREW TRAINING AND EVALUATION

11.1 Operator shall evolve a training program for the flight crew covering initial and recurrent training. This training should cover various aspects including standby generator as the sole power source. Established contingency procedures should be emphasised for each area of operation intended to be used. In addition, special, initial and recurrent training should be given to prepare flight crews to evaluate probable engine and airframe system failures. The object of this training should be to establish crew competency in dealing with most probable operating contingency (diversion decision making).

11.2 The training should also cover proficiency check in performance like flight planning, procedure on diversion, abnormal and emergency procedures, air start of propulsion system, crew incapacitation etc.

11.3 The flight crew-training program shall be submitted to the Flight Standards Directorate (FSD) of DGCA for approval. The training and checks of the crew shall be carried out as approved by the FSD.

11.4 The EDTO approved training program for ETOPS shall include training that describes the unique aspects of ETOPS. That training should include, but not be limited to:

(a) Diversion Decision Making. The operator's training program should prepare flight crewmembers to evaluate probable propulsion and airframe systems malfunctions and failures. The goal of this training should be to establish flight crewmember competency in dealing with the most probable operating contingencies.
(b) Specific ETOPS Requirements. The operator's EDTO training program should provide and integrate training for flight crewmembers and dispatchers (if applicable), as listed below. The DGCA will periodically evaluate a cross-section of these items.

(i) Flight planning, including contingency data that is engine failure, decompression,and diversion equal time point.
(ii) Flight progress monitoring and fuel tracking.
(iii) Operational restrictions associated with dispatch under the

minimum equipmentlist (MEL)

(i) Non-normal procedures including:
   a. Abnormal and emergency procedures.
   b. Systems failures and remaining airplane capability as it relates to the decision to divert or to continue.
   c. Diversion.
   d. Crewmember incapacitation.
   e. A simulated approach and missed approach with only an alternate power source available, if the loss of two main alternating current electrical power sources with no APU electrical source available results insignificant degradation of instrumentation to either pilot.

(ii) Use of equipment specifically required for EDTO operations such as cold weather gear and SATCOM as applicable.

(iii) Procedures to be followed in the event that there is a change in conditions at an EDTO alternate listed on the dispatch/flight release that would preclude a safe approach and landing.

(iv) Procedures to be followed in the event that there is a change in conditions at other potential en route diversion airports that would preclude a safe approachand landing.

(v) Understanding and effective use of approved additional or modified equipment required for EDTO.

(vi) Fuel quantity comparison: the operator's training program should identify fuelmanagement procedures to be followed during the en route portion of the flight.These procedures should provide for an independent crosscheck of fuel quantityindicators, for example, fuel used, subtracted from the total fuel load, comparedto the indicated fuel remaining.

(vii) Fuel management: accounting for discrepancies between planned fuel remaining and actual fuel remaining for example estimated time of arrival aheadof or behind plan, gross weight, and/or altitude differences.

(viii) Flight crew procedures unique to EDTO as listed above in this CAR.

12 AEROPLANE FLIGHT MANUAL INFORMATION

Operators holding EDTO approval shall ensure that the applicable flight manual contain at least the following information

(a) The maximum flight time with one power–unit inoperative, for which the systems reliability has been approved in accordance with the airworthiness requirements established for EDTO;
(b) A list of additional equipment installed to meet the airworthiness requirementsfor EDTO.
(c) Additional performance data, including limitations, and flight procedures appropriate to EDTO; and

Statement to the effect that the aeroplane systems associated with EDTO meet the required airworthiness and performance criteria but that the meeting of such criteria does not by itself constitute approval to conduct EDTO.

13. OPERATIONS APPROVAL

When the operational proving flight has been evaluated and found acceptable then the operator may be authorised to conduct EDTO with the specified airframeengine combinations. Approval to conduct EDTO is made by the issuance of operation specification by the DGCA containing appropriate limitations.

14. CONTINUING SURVEILLANCE

The fleet average IFSD rate for the specified airframe engine combination shall continue to be monitored in accordance with propulsion system reliability assessment and EDTO maintenance requirements. As with all other operations theRegional Airworthiness office will also monitor all aspects of the EDTO. The DGCAis authorised to ensure that the operation continues to be conducted safely. In theevent that an acceptable level of reliability is not maintained, significant adversetrend exists or if significant deficiencies are detected in the conduct of EDTO operation, the Regional Airworthiness Office will initiate a special evaluation, impose operational restriction if necessary, to resolve the problem in a timely manner so asto ensure safe EDTO operations.

15. FEES

Fees for EDTO approval on first aircraft type with the operator shall be Rs Ten Thousand only.

(Arun Kumar)
Director General of Civil Aviation

Annexure 1

GOVERNMENT OF INDIA
OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION

APPLICATION FOR GRANT OF APPROVAL FOR EXTENDED DIVERSION TIME OPERATIONS (EDTO)

Name of the operator:	
Aircraft registration number:	
Type and Serial Number of the Aircraft:	
Type and model of the Engines fitted:	
Route of operation, Maximum diversion time, Minimum altitude to be flown:	
Diversion/ En route alternate airport desired:	
Copy of the EDTO Manual:	
Details of Crew Training:	
Applicants in service operational experience:	
Total engine hours of the type in the world fleet:	
Proof of propulsion system reliability in the world fleet:	
Propulsion system reliability of the applicant in terms of IFSD:	
Maximum diversion time certified by the manufacture for the applicant's aircraft:	
Any other additional data as required in the CAR:	

Date

Signature of the operator

Annexure 2

REQUIREMENTS FOR OPERATIONS BY NSOP AEROPLANES WITH TWO TURBINE ENGINES BEYOND 60 MINUTES AND UPTO 90 MINUTES TO AN EN-ROUTE ALTERNATE AERODROME (Threshold 90 minutes)

The Annexure contains additional requirements for operations by turbine aero planes beyond 60 Minutes and up to 90 Minutes to an en-route alternate.

1. An operator intending to use the threshold up to 90 minutes shall obtain the following:

A. Operational approval
B. Airworthiness approval
C. Revised Operation Specifications

Note 1: It should be understood that the threshold time of 90 Minutes for NSOP operators is not an operating limit. It is a flight time to an en-route alternate aerodrome, which has been established by DGCA as being the EDTO threshold, subsequent to fulfilling the conditions as laid in this Annexure.

Note 2: For operations beyond 90/120 Minutes, EDTO approval will be required for twin/ more than two engine aeroplanes.

2. Operational Approval

The Operator shall submit duly filled Annexure 3 along with revised Operations Manual for approval of DGCA.

3. Airworthiness Approval

The Operator shall submit:

i. Certificate from operator to suffice the requirement to undertake such operation without any limitation factor (e.g. Critical system limitation)
ii. Revised MEL (based on MMEL)
iii. Maintenance Programme revision
iv. CAME revision (to include aircraft maintenance and release procedures for such type of Operations)
v. Training of Maintenance Staff

ANNEXURE 3

Operator:		**Aircraft:**		
A) Max threshold time(Existing): **B) Max threshold time(Desired):** **Note: If beyond 90 Min., EDTO compliance is required**		**Engine:**		
		Certified Pax configuration:	**AUW:**	
Sl No	**Items**	**Operator Compliance Document** (to be filled by Operator)	**Sat/UnSat** (to be filled by Inspector)	**Comments** (for UnSat items)
1.	**General requirements**			
1.1	Certificate from operator to undertake operations beyond 60 minutes to an en-route alternate aerodrome without any limitations in manufacturer document.			
2.	**Operating Requirements**			
2.1	Intended route does not exceed the established aero plane threshold time of 90 Min - Operators procedures to be defined			
2.2	Nominated single-engine: a) Cruise speed, b) Drift-down speeds, c) Covered distance in SAR conditions (Calculation of distance covered during 90 minute threshold time period is reasonable and is based on Airplane Flight Manual (AFM) data and drift down procedures and established single-engine level flight procedures are published in the Operations Manual)			

2.3	Ensure that, prior to departure, the flight crew is provided with the most up-to- date information on the identified en-route alternate aerodromes, including operational status and meteorological conditions and, in flight, make available means for the flight crew to obtain the most up-to-date weather information			
2.4	**Flight planning** a) Fuel planning allows for diversion from the most critical point with the most critical failure b) Minimum altitudes applicable to the routes c) Policy on diversion in event of engine or other major system failure d) Alternate aerodromes			
2.5	**Performance data** Data on single-engine performance giving fuel flow and TAS under various atmospheric conditions and power settings are available for the following phases of flight: • Drift-down • Cruise altitude, including 10,000 feet			
3	**Operational Control and established dispatch procedures**			
3.1	Operational control including flight following and communication with aircraft procedures			
3.2	Identify en-route alternate aerodromes			

3.3	Methods to enable two-way communications between the aero plane and the operator's operational control centre			
3.4	Means to monitor conditions along the planned route including the identified alternate aerodromes and ensure that procedures are in place so that the flight crew are advised of any situation that may affect the safety of flight			
3.5	Procedure to ensure that the intended route does not exceed the established aero plane threshold time unless the operator is approved for EDTO operations;			
3.6	Communication and navigation facilities and capabilities; Communications (VHF/HF, data link, SATCOM as applicable) between operations control centre and aircraft adequate for segments of 90 Min. threshold.			
3.7	Availability of relevant performance information for the identified en-route alternate aerodrome(s).			
3.8	Operations conducted by aeroplanes with two turbine engines require that, prior to departure and in flight, the meteorological conditions at identified en-route alternate aerodromes will be at or above the aerodrome operating minima required for the operation during the estimated time of use.			

4	Flight Crew Training			
5	Flight Dispatcher/ Flight operation officer training			
6.	**Airworthiness Aspects**			
6.1	MEL approval shall be based on procedures for release of aeroplanes for 90 minutes threshold			
6.2	Maintenance Programme revision			
6.3	CAME revision			
6.4	Maintenance staff training			
7	Proposed Operations Specification (specifying Threshold time)			
Signature and name of Operator's Representative:			Date:	
Signature and name of Flight Operations Inspector:			Date:	
Signature and name of Airworthiness Inspector:			Date:	