

Advisory Circular

OPERATION OF SINGLE-ENGINE TURBINE-POWERED AEROPLANE AT NIGHT AND/OR INSTRUMENT METEOROLOGICAL CONDITIONS

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GENERAL

Advisory Circulars (ACs) are issued by the Director-General of Civil Aviation (DGCA) from time to time to provide practical guidance or certainty in respect of the statutory requirements for aviation safety. ACs contain information about standards, practices and procedures acceptable to CAAS. An AC may be used, in accordance with section 3C of the Air Navigation Act (Cap. 6) (ANA), to demonstrate compliance with a statutory requirement. The revision number of the AC is indicated in parenthesis in the suffix of the AC number.

PURPOSE

This AC provides guidance to demonstrate compliance with the requirements regarding, and information related to an application for, an approval for operating a single-engine turbine-powered aeroplane at night and/or in instrument meteorological conditions (IMC) in accordance with ANR-98.

APPLICABILITY

This AC is applicable to the operator seeking an approval for operating a single-engine turbine-powered aeroplane at night and/or in IMC.

RELATED REGULATIONS

This AC relates specifically to Division 11 in Part 2 of ANR-98.

RELATED ADVISORY CIRCULARS

- AC 98-1-1 Application for an Approval to Conduct a Special Operation

CANCELLATION

This is the first AC issued on this subject.

EFFECTIVE DATE

This AC is effective from 1 October 2018.

OTHER REFERENCES

- ICAO Annex 6 Part 1 Attachment G Additional guidance for approved operations by single-engine turbine-powered aeroplanes at night and/or in instrument meteorological conditions (IMC)

1 OPERATOR CERTIFICATION OR VALIDATION

The certification or validation process is to ensure the adequacy of the operator's procedures for normal, abnormal and emergency operations, including actions following engine, systems or equipment failures. In addition to the normal requirements for operator certification or validation, the operator should address the following items in relation to operations by single-engine turbine-powered aeroplanes:

- (a) proof of the achieved engine reliability of the aeroplane engine combination (see Regulation 67 of ANR-98);
- (b) specific and appropriate training and checking procedures including those to cover engine failure/malfunction on the ground, after take-off and en-route and descent to a forced landing from the normal cruising altitude;
- (c) a maintenance programme which is extended to address the equipment and systems referred to in Regulation 68 of ANR-98;
- (d) an MEL modified to address the equipment and systems necessary for operations at night and/or in IMC;
- (e) planning and operating minima appropriate to the operations at night and/or in IMC;
- (f) departure and arrival procedures and any route limitations;
- (g) pilot qualifications and experience; and
- (h) the operations manual, including limitations, emergency procedures, approved routes or areas of operation, the MEL and normal procedures related to the equipment referred to in Regulation 69 of ANR-98.

2 TURBINE ENGINE RELIABILITY

2.1 For the purpose of assessing turbine engine reliability for single-engine operations, power loss rate, rather than in-flight shut-down rate, is used as it is considered to be more appropriate for a single-engine aeroplane. If a failure occurs on a multi-engine aeroplane that causes a major, but not total, loss of power on one engine, it is likely that the engine will be shut down as positive engine-out performance is still available, whereas on a single-engine aeroplane it may well be decided to make use of the residual power to stretch the glide distance.

Note: Power loss in this context refers to any loss of power, the cause of which may be traced to faulty engine or engine component design or installation, including those of the fuel ancillary or engine control systems.

2.2 In assessing turbine engine reliability, the operator should derive evidence from a global fleet database covering as large a sample as possible of operations considered to be representative. The operator should consider the following when demonstrating the power loss rate referred to in Regulation 65 of ANR-98.

2.2.1 Power loss rate should be determined as a moving average over a specified period (e.g. a 12-month moving average if the sample is large).

2.2.2 The actual period selected should reflect the global utilization and the relevance of the experience included (e.g. early data may not be relevant due to subsequent mandatory modifications which affected the power loss rate). After the introduction of a new engine variant and whilst global utilization is relatively low, the total available experience may have to be used to try to achieve a statistically meaningful average.

- 2.3 The operator's engine trend monitoring, as referred to in Regulation 66 of ANR-98 should include the following:
- (a) an oil consumption monitoring programme based on manufacturers' recommendations; and
 - (b) an engine condition monitoring programme describing the parameters to be monitored, the method of data collection and the corrective action process; this should be based on the manufacturer's recommendations. The monitoring is intended to detect turbine engine deterioration at an early stage to allow for corrective action before safe operation is affected.
- 2.4 The operator should establish a reliability programme covering the engine and associated systems. The engine programme should include engine hours flown in the period and the in-flight shutdown rate for all causes and the unscheduled engine removal rate, both on a 12-month moving average basis. The occurrence reporting process should cover all items relevant to the ability to operate safely at night and/or in IMC. Any sustained adverse trend should result in an immediate evaluation by the operator in consultation with CAAS and the manufacturer with a view to determining actions to restore the intended safety level.
- 2.5 The operator should develop a parts control programme with support from the manufacturer that ensures that the proper parts and configuration are maintained for single-engine turbine-powered aeroplanes approved to conduct these operations. The programme includes verification that parts placed on an approved single-engine turbine-powered aeroplane during parts borrowing or pooling arrangements, as well as those parts used after repair or overhaul, maintain the necessary configuration of that aeroplane for operations approved in accordance with Division 11 of ANR-98.
- 2.6 Wherever possible, the operator should also monitor data from other operators' engine trend monitoring and occurrence reports to ensure that there is no indication that the operator's experience is unsatisfactory.

3 ROUTE LIMITATIONS OVER WATER

- 3.1 The operator carrying out operations of single-engine turbine-powered aeroplanes at night and/or in IMC should make an assessment of route limitations over water. The distance that the aeroplane may be operated from a land mass suitable for a safe forced landing should be determined. This equates to the glide distance from the cruise altitude to the safe forced landing area following engine failure, assuming still air conditions. Additional distance may be included taking into account the likely prevailing conditions and type of operation. This should take into account the likely sea conditions, the survival equipment carried, the achieved engine reliability and the search and rescue services available.
- 3.2 Any additional distance allowed beyond the glide distance should not exceed a distance equivalent to 15 minutes at the aeroplane's normal cruise speed.