Civil Aviation Authority of Singapore

Advisory Circular

CONDUCT OF AN AERONAUTICAL STUDY

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 11 of the Air Navigation Act 1966 (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 the guidance to demonstrate compliance with, and information related to the conduct of an aeronautical study carried out in an operator's safety management system.

APPLICABILITY
This AC is applicable to an operator who intends to or holds an aerodrome certificate or heliport certificate.

RELATED REGULATIONS
This AC relates specifically to Regulation 24 of the Air Navigation (139 – Aerodromes) Regulations 2023 ("ANR-139").

RELATED ADVISORY CIRCULARS
AC 139-4-1 Application to deviate from aviation specifications
AC 1-3 Safety management system

CANCELLATION
This is the first AC issued on the subject.

EFFECTIVE DATE
This AC is effective from 1 March 2023.

OTHER REFERENCES
- ICAO Annex 14, Vol I, Aerodrome Design and Operations
- ICAO Manual on Certification of Aerodromes (Doc 9774)

- ICAO Safety Management Manual (Doc 9859)
- ICAO PANS Aerodromes (Doc 9981)

1 INTRODUCTION

1.1 An aeronautical study is a study of an aeronautical problem in the context of the operator's safety management system (SMS) to provide assurance on the safety and regularity of operations of aircraft at the aerodrome.

1.2 An aeronautical study is most frequently undertaken during the planning of a new airport or new airport facility, or during the certification of an existing aerodrome. It should also be carried out when the operator is unable to comply with the design, operations and maintenance requirements specified in the Aviation Specifications.

2 OBJECTIVES

2.1 The objectives of an aeronautical study are as follows:

(a) To study the impact of a deviation from the Aviation Specifications;
(b) To present alternative solutions to provide an acceptable level of safety;
(c) To estimate the effectiveness of each alternative; and
(d) To recommend suitable operating procedures/restrictions or other measures to mitigate safety risks arising from the deviation.

3 AERONAUTICAL STUDY

3.1 The aeronautical study should be done by the operator's technical experts with relevant practical experience and specialised knowledge. The operator may also consult other specialists in relevant areas.

3.2 An operator should consult their external and internal stakeholders (e.g. airlines, affected departments, etc.) prior to the conduct of an aeronautical study. These consultations allow the proposed deviation to be viewed from different perspectives and keep the different parties involved aware of the proposed deviation.

3.3 The safety assessment in an aeronautical study is the identification, analysis and elimination, and/or mitigation of risks to an acceptable level of safety in accordance with the operator's Safety Management System (SMS). A safety assessment usually consists of the following:

(a) Identification of hazards and consequences; and
(b) Safety risk assessment and mitigation

An example of the format of a list of potential hazards (also known as a "hazard log") can be found in **Appendix A**.

3.4 The operator should recommend alternative operating procedures/restrictions or other measures that will achieve the safety objectives of other applicable regulations and standards to manage the proposed deviation. In addition, the operator should estimate the effectiveness (through trials, surveys, simulations etc.) of each recommendation listed so as to identify the best means to address the proposed deviation.

3.5 The operator should devise methods to monitor the status of the deviation to ensure that the implemented recommendations can be effectively carried out, and that the level

of safety is not compromised at any time. This assessment also provides feedback on the recommendations.

3.6 The operator, after taking into account all the necessary considerations listed above, come to a decision on any safety measures that should be adopted. The operator should also specify a date to put in place all the necessary safety measures and show how they maintain the same level of safety with the recommended safety measures mentioned in the aeronautical study.

3.7 The operator should also ensure that the affected parties are well informed of such changes (e.g. inform pilots of potentially hazardous conditions). The notification procedure including process flow, time frame and different means of notification such the Aeronautical Information Publication (AIP) and Notice to Airmen (NOTAM) should be included in the study.

3.8 A template for the report of the aeronautical study can be found in **Appendix B**.

3.9 The operator should review the aeronautical study regularly or whenever there may be significant changes that would affect the relevance of the study. Any changes to the aeronautical study should be evaluated and properly documented.

3.10 A checklist is provided in **Appendix C** to ensure that the aeronautical study is thoroughly conducted and documented.

APPENDIX A – HAZARD LOG

Note: Appendix A provides operators with a suggested hazard log for safety assessment of an aeronautical study. Operators may use this log as a guide. The operator's log should be constantly updated throughout the aeronautical study life cycle.

A sample hazard log for safety assessment of an aeronautical study is as shown below:

S/N	Type of operation or activity	Hazard and Description	Consequences Identified	Risk Index	Risk Tolerability	Risk Control/Mitigation	Residual Risk Index	Residual Risk Tolerability	Action, if any to further reduce risk(s) and the resulting risk index and the residual risk tolerability
1	Aircraft operation	Operation of Code 4F aircraft in <name of airport>. Code F aircraft using runway for landing and take-off…	Wing tip collision at <parking bay numbers>. Loss of control of aircraft during pushback / towing operations	3C	Tolerable	Use of wing-walkers. Aircraft to taxi at <speed value>. Training of staff for pushback / towing operations. Restrictions on other aircraft movements within <parking bay number>.	2C	Tolerable	Conduct trials to study the effectiveness of the implementation. Resulting risk index: 1C Residual risk tolerability: Acceptable

APPENDIX B – TEMPLATE FOR REPORT OF AN AERONAUTICAL STUDY

1 The report of an aeronautical study should include the following sections:

(a) Aim of the Study;
(b) Background;
(c) Safety Risk Management;
(d) Recommendations;
(e) Proposed Means of Monitoring the deviation; and
(f) Conclusion

2 Aim of the Study

2.1 The aim of the study should identify the:

(a) safety concerns;
(b) safety measures to be put in place to ensure safe aircraft operations in an aerodrome; and
(c) specific requirement which the study is meant to address.

2.2 An example to illustrate this would be as follow:

"The aim of this aeronautical study is to address the operation of Code F aircraft in a Code 4E airport, <name of airport> and to put in place <list of safety measures> necessary to ensure safe operation of Code F aircraft in <name of airport> with reference made to <reference to specific requirement>…"

3 Background

3.1 Information on the current situation faced by the operator, current procedures that have been put in place and other relevant details should be clearly stated and explained in this sub-section. Clear explanation should be provided, particularly on the following:

(a) What is the current situation?
(b) Where are the areas that will be affected by the proposed deviation?
(c) When will the applicant able to comply with the specific standard if it is due to development of the aerodrome?
(d) Why is there a need to review the current processes and procedures?
(e) How will the proposed deviation affect the operation of aircraft at the aerodrome?

3.2 An example to illustrate this would be as follows:

"Currently, <name of airport> is Code 4E airport with some Code 4F capabilities. These Code 4F capabilities includes <list of the Code 4F capabilities>... <Name of airport> is required to handle Code F aircraft by <proposed date> and the following <list of affected areas> will be affected. Development of the <affected areas> is proposed to commence on <proposed date> and to be completed by <proposed date>. By then, <name of airport> will be upgraded to a Code 4F airport.

Upgrading <name of airport> from Code 4E to Code 4F airport requires the reviewing <name of processes and procedures that need to be reviewed> to ensure safe aircraft operation.

In addition, during this development, operation of aircraft at <name of airport> will be affected in the following ways…"

4 Safety Risk Management

4.1 The safety assessment should be presented in this section of the report, including the hazard logs as mentioned in paragraph 3.3.

5 Recommendations

5.1 Details of the recommendations to address the safety concerns arising from the proposed deviation, including the notifications that will need to be prepared to inform the affected parties arising from the recommendations (e.g. AIP, NOTAM).

5.3 An example to illustrate this would be as follow:

"The following are the operating procedures/restrictions or other measures as well as their measured effectiveness, which could be adopted to ensure safe aircraft operations in <name of airport>:

<Name of the operating procedures/restrictions or other measures and their corresponding measured effectiveness>

The notification procedure to the affected parties is as follow:

<Description of the notification procedure including process flow, time frame and different means of notification>

6 Means of Monitoring of the Deviation

6.1 Methods to monitor the status of the deviation and ensure that the implemented recommendations have been effectively carried out.

6.2 An example would be as follow:

"<Name of the aerodrome operator> will monitor the deviation's status <fixed period of time> and ensure the safety measures has been effectively carried out and the level of safety is not compromised at any time. <Name of the aerodrome operator> will review the safety assessment process, if required…"

7 Conclusion

7.1 A summary and the assessment of the aeronautical study, including the decision on any safety measures that should be adopted and the timeline for implementation of all the necessary safety measures and recommendations.

7.2 An example to illustrate this would be as follow:

"The results of this aeronautical study have concluded that <the proposed deviation> will indeed pose a drop in the level of safety. However, by adopting <type of the safety measures>, this drop in the level of safety can be safely addressed… These safety measures will be put in place on <proposed date> to address the proposed deviation. With these safety measures put in place, <to explain how to maintain the same level of safety>..."

APPENDIX C – CHECKLIST FOR AERONAUTICAL STUDY

The following is checklist is a guide for developing an aeronautical study.

CHECKLIST FOR AERONAUTICAL STUDY	YES	NO	REMARKS
1. Aim of the study including (a) Address safety concerns, (b) Identify safety measures, and (c) Make reference to specific requirement in Aviation Specifications;	☐	☐	
2. Consultation with stakeholders, senior management team and divisions/departments affected;	☐	☐	
3. The study is approved by a senior executive of the organisation;	☐	☐	
4. Background information on the current situation;	☐	☐	
5. Proposed date for complying with the requirements, if the deviation is due to development of the aerodrome;	☐	☐	
6. Safety assessment including (a) identification of hazards and consequences and (b) risk management;	☐	☐	
7. The safety assessment used in the study (e.g. hazard log, risk probability and severity, risk assessment matrix, risk tolerability and risk control/mitigation);	☐	☐	
8. Recommendations (including operating procedures/restrictions or other measures to address safety concern) of the aeronautical study and how the proposed deviation will not pose a drop in the level of safety;	☐	☐	
9. Estimation of the effectiveness of each recommendation listed in the aeronautical study;	☐	☐	
10. Notification procedure including process flow, time frame and the publication used to promulgate the deviation;	☐	☐	
11. Conclusion of the study;	☐	☐	
12. Monitoring of the deviation; and	☐	☐	
13. Notification to CAAS once the temporary deviation has been corrected.	☐	☐	