

# Advisory Circular

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## GUIDANCE ON DISABLED AIRCRAFT REMOVAL PLAN

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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 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 establishment of a plan for the removal of an aircraft that is disabled and is located on or adjacent to the movement area in the aerodrome.

### APPLICABILITY

This AC is applicable to an operator who intends to or holds an aerodrome certificate or heliport certificate, referred to as the aerodrome operator in this AC.

### RELATED REGULATIONS

This AC relates specifically to Regulation 37 of the Air Navigation (139 – Aerodromes) Regulations 2023 (“ANR-139”).

### CANCELLATION

This is the first AC issued on the subject.

### EFFECTIVE DATE

This AC is effective from 1 March 2023.

### OTHER REFERENCES

- Singapore Air Navigation (Investigation of Accidents and Incidents) Order
- ICAO Annex 13
- ICAO Annex 14, Volume I

- Doc 9137 – Airport Services Manual, Part 5, Removal of Disabled Aircraft
- Doc 9859 – ICAO Safety Management Manual

## **1 REMOVAL OF A DISABLED AIRCRAFT**

- 1.1 The aerodrome operator is required to establish a Disabled Aircraft Removal Plan to ensure that a disabled aircraft is removed from the aerodrome expeditiously so as to minimise the impact to safety of the aerodrome operations. The aircraft removal event can range from minor debogging<sup>1</sup> to major events including damaged or missing landing gear.
- 1.2 As a disabled aircraft will affect many parties (including traveling public, other aircraft operators at the aerodrome, the operator of the incident aircraft, etc.) and can result in runway and taxiway closures. This will substantially reduce the number of arrivals and departures and restrict movement around the aerodrome. The aerodrome operator should consider and address the concerns of the other parties involved as well as the affected aerodrome operations when developing and implementing the plan for the removal of a disabled aircraft. In some cases, the removal process may not be able to commence until investigation by the Transport Safety Investigation Bureau (TSIB) has been completed and the aircraft is formally released.
- 1.3 The recovery process may take from a few hours to many days depending on the severity. While recovery incidents cannot be predicted, they can be anticipated and prepared for.
- 1.4 For a disabled aircraft removal operation to be completed as quickly as possible without affecting safety, all relevant parties should be well coordinated and familiar with their roles and responsibilities. Proper procedures on the removal operation should be in place and well documented. An efficient removal operation requires sufficient planning and readily accessible recovery equipment as well as resources.
- 1.5 The aerodrome operator should express the information concerning the capability to remove the aircraft disabled on or adjacent to the movement area in terms of the largest type of aircraft which the aerodrome is equipped to remove. For example, this information can be reported as an Airbus A380 or a Boeing B737 being the largest type of aircraft which the aerodrome is equipped to remove.
- 1.6 This capability should be based on the equipment available at the aerodrome and on equipment which can be available at short notice. If the disabled aircraft removal plan takes into account an airline pooling arrangement, the determination of the capability to remove a disabled aircraft should also take into consideration the specialized aircraft recovery kits available from other sources.
- 1.7 The aerodrome operator should take into account the advices and considerations in this AC in developing the Disabled Aircraft Removal Plan. This plan should cover:
  - (a) Responsibilities of parties involved;
  - (b) Standard Operating Procedures (SOP) and actions during the removal process; and
  - (c) Procedures concerning the equipment, personnel and facilities.

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<sup>1</sup> Debogging refers to the removal of an aircraft that has left the hard surface and got bogged down in sand or mud but has not sustained any significant damage.

- 1.8 Periodic review of the disabled aircraft removal plan should be conducted by the aerodrome operator to ensure that the plan is in line with its safety policy and in compliance with the requirements found in ANR-139 and relevant Aviation Specifications, and where possible, deploy the latest technology.

## **2 PARTIES RESPONSIBLE IN A DISABLED AIRCRAFT REMOVAL PLAN**

- 2.1 The aerodrome operator is responsible for establishing the disabled aircraft removal plan and for designating a coordinator to implement this plan.
- 2.2 The aerodrome operator should identify the party responsible for the following responsibilities in the disabled aircraft removal plan. This will ensure that the responsible parties are clear on their responsibilities and can develop the necessary steps to execute the removal of the aircraft as speedily as is consistent with the safety of personnel concerned and with the avoidance of further damage to the aircraft.
- (a) Removal of a disabled aircraft or parts thereof.  
This person or agency (usually the aircraft owner or operator) will be responsible for the removal of the aircraft and define procedures in the event of failure to comply with such directions.
  - (b) Liaison with TSIB on the aircraft accident or serious incident.  
This person or agency (usually the aircraft owner or operator or, the aerodrome operator) will be responsible to liaise with TSIB with regard to the removal of the disabled aircraft.
  - (c) Preservation of aircraft, mail, cargo and records.  
This person or agency (normally the aircraft owner or operator) will be responsible for preserving, the aircraft and parts thereof, cargo, mail, and all records, in coordination with TSIB. Define procedures to be followed when it is necessary to disturb or move the aircraft or parts thereof (i.e. photographs, marks on the ground and diagram of the accident site).
- 2.3 An established command structure and clear lines of communication and coordination between the various parties is essential to the efficient removal of disabled aircraft. The aerodrome operator should test the removal plan (e.g. through tabletop exercises) to anticipate and prepare for various aircraft removal scenarios and conduct a post-mortem of an actual disabled aircraft removal event to examine areas where improvements can be made.

## **3 ACTIONS REQUIRED BY THE MAIN RESPONSIBLE PARTIES**

- 3.1 Aerodrome operator
- 3.1.1 While the responsibility for removing an aircraft rests with the aircraft operator, the aerodrome operator may take over the removal operation in the event that the aircraft operator is unable to remove the aircraft in a timely manner. In anticipation of such a situation, the aerodrome operator should have a copy of the aircraft operator's removal plan for reference.
- 3.1.2 The aerodrome operator should hold regular exercises with the aircraft operators and relevant stakeholders to anticipate and prepare for various aircraft removal scenarios

and their projected outcomes. The exercise is to also ensure that the disabled aircraft removal plan can be executed.

3.1.3 Disabled aircraft removal operation(s) may be conducted while an aerodrome is still in operation. However, recovery devices such as mobile cranes may penetrate the obstacle limitation surfaces or interfere with radio navigational aids. Therefore, the aerodrome operator should consider the risks associated with the recovery operations and put up the necessary mitigation measures to ensure aerodrome operational safety.

3.1.4 The aerodrome operator should also, in preparation of the removal of the disabled aircraft, perform the following:

- (a) arrange for the required NOTAMs to be issued as may be appropriate;
- (b) coordinate all aerodrome operations with the air traffic service units for possible continuation of aircraft operations;
- (c) determine if the occurrence has created any obstacles and consider whether any section of the movement area should be closed as a result;
- (d) provide security for the occurrence site and co-ordinate with TSIB on the measures to be taken before the aircraft removal operation is initiated;
- (e) provide vehicles and personnel to escort equipment to the site;
- (f) establish a removal command post at the site, if necessary;
- (g) inspect all areas prior to resumption of normal aircraft operations;
- (h) convene a removal operation debriefing of all interested parties. The debriefing may include a review of TSIB's requirements, the coordinator's chronological report, and a discussion of the procedures and equipment during the recovery operation; and
- (i) amend the disabled aircraft removal plan to address issues identified under (h).

3.1.5 The aerodrome operator should ensure that the aircraft operator has an established aircraft recovery process document. The document should include information on who the aircraft operator will engage to remove the aircraft and all relevant contact details. A copy of the latest version of this document should be provided to the aerodrome operator.

3.2 The designated coordinator to implement the disabled aircraft removal plan

3.2.1 The designated coordinator should carry out the following for purposes of implementing the disabled aircraft removal plan:

- (a) discuss the most appropriate removal operation with the aircraft operator representative, TSIB investigators, representatives of resident oil companies, heavy equipment contractors and other parties as may be necessary, and establish the following points to be detailed in the plan:
  - (i) escort routes between the aircraft operator's area and the occurrence site;
  - (ii) defuelling to lighten the mass of the aircraft;
  - (iii) requirements and availability of equipment for the removal of the aircraft;
  - (iv) use of aerodrome and aircraft operator's equipment;
  - (v) dispatch of aircraft operator ancillary support devices to the scene;
  - (vi) weather conditions, particularly when crane lifting or pneumatic lifting bag operation is necessary;
  - (vii) lighting of the site; and

- (viii) contingency plan, should difficulties develop in the initial plan;
- (b) arrange for rescue and fire fighting services, when necessary;
- (c) supervise aerodrome personnel and equipment assigned to the removal operation;
- (d) report further penetrations of obstacle limitation surfaces due to the manoeuvring of cranes or other equipment during the lifting of the aircraft;
- (e) monitor weather forecasts;
- (f) maintain a chronological summary of the removal operation;
- (g) have photographs of the removal operation taken where possible;
- (h) where excavations are necessary, check with the appropriate aerodrome maintenance services for underground utilities;
- (i) keep CAAS and other aircraft operators informed of the progress of the aircraft removal operations;
- (j) arrange for removal of mail, baggage and cargo, it being understood that authority to remove these items must be secured from TSIB; and
- (k) participate in the removal operation debriefing.

3.2.2 The designated coordinator should ensure that the registered owner or aircraft operator's designated representative carry out the following actions:

- (a) implement the aircraft operator's removal plan for such an emergency;
- (b) meet with TSIB investigator and other relevant parties, as necessary, to detail the actions needed for the removal of aircraft;
- (c) consult with aircraft airframe and engine manufacturers, or other aircraft operator representatives experienced in such accidents, as necessary; and
- (d) participate in the removal operation debriefing.

#### **4 PROCESS OF REMOVING THE DISABLED AIRCRAFT**

4.1 The process of the removal of disabled aircraft can be complex and involve a number of specific procedures including multipart levelling and lifting actions. These procedures can be dangerous and safety precautions must take precedence over all other constraints. Prevention of secondary damage should also be a priority.

4.2 The aerodrome operator should minimally include in the disabled aircraft removal plan the procedures concerning the equipment, personnel and facilities listed in **Appendix A** for the removal of the disabled aircraft.

4.3 The aerodrome operator should also refer to **Appendix B** that lists the basic recovery steps in an aircraft removal process to develop the disabled aircraft removal plan.

- 4.4 If the execution of the plan involves engaging services from external parties, then this arrangement should be formalised between the aerodrome operator and the external party engaged.
- 4.5 The aerodrome operator should also refer to ICAO Annex 13 for guidance on removal of a disabled aircraft, including recovery equipment, protection of evidence, custody and removal of aircraft.

## **APPENDIX A: EQUIPMENT, PERSONNEL AND FACILITIES FOR REMOVAL OF A DISABLED AIRCRAFT**

- A1 Equipment and personnel available.
  - A1.1 List of equipment and personnel on or in the vicinity of the airport that would be available for the removal operation. The list of equipment should include information on the type and location of heavy equipment or special units needed, and the average time it will take to get them to the aerodrome.
  - A1.2 The list of personnel should also contain information on the availability of human resources for road making and other duties. Names, addresses and telephone numbers of personnel and equipment representatives should be given.
- A2 Access routes.
  - A2.1 Include information on access routes to any part of the airport. A grid map of the type referred to in Annex 14, Volume I, Attachment A, Section 18, may be useful for this purpose.
- A3 Security.
  - A3.1 Define the means of maintaining security for the aircraft removal operation.
- A4 Aircraft removal equipment kits.
  - A4.1 Describe arrangements for the rapid receipt of aircraft removal equipment kits available from other airports. This should be coordinated with the airlines operating at the aerodrome.
- A5 Aircraft data.
  - A5.1 Describe arrangements to make available, at the aerodrome, manufacturer's data pertaining to aircraft removal for the various types of aircraft which normally use the aerodrome.
- A6 Aircraft defuelling.
  - A6.1 Describe arrangements with the resident oil companies to ensure that the defuelling, storage and disposal of the aircraft fuel, including contaminated fuel, can be done at short notice.
- A7 Responsible representatives.
  - A7.1 List names, addresses and telephone numbers of responsible representatives of each aircraft operator, as well as of the nearest representatives of aircraft and engine manufacturers.

## APPENDIX B: STEPS IN REMOVAL OF DISABLED AIRCRAFT

The attached chart is intended as a general review and guide to assist in the aircraft removal process. It is not anticipated to be used as step-by-step instructions in dealing with a removal event.

<i>Basic Recovery Steps</i>				
<i>1. Survey</i>	<i>2. Plan</i>	<i>3. Prepare</i>	<i>4. Recover</i>	<i>5. Report</i>
<b>Aircraft condition:</b> <ul style="list-style-type: none"> <li>- Recover or salvage</li> <li>- Attitude</li> <li>- Landing gear</li> <li>- Structure</li> <li>- Damaged components</li> <li>- Missing components</li> <li>- Unserviceable components</li> <li>- Cargo and fuel</li> </ul> <b>Site:</b> <ul style="list-style-type: none"> <li>- Terrain</li> <li>- Soil</li> <li>- Access routes</li> </ul> <b>Weather:</b> <ul style="list-style-type: none"> <li>- Current</li> <li>- Forecast</li> </ul> <b>Equipment availability:</b> <ul style="list-style-type: none"> <li>- Preparation</li> <li>- Levelling</li> <li>- Lifting</li> <li>- Moving</li> <li>- Stabilizing</li> </ul> <b>Manpower availability:</b> <ul style="list-style-type: none"> <li>- Number</li> <li>- Skills</li> </ul> <b>Environmental issues:</b> <ul style="list-style-type: none"> <li>- Fluid spills</li> <li>- Hazardous materials</li> </ul>	<b>Rapid recovery:</b> <ul style="list-style-type: none"> <li>- Important</li> <li>- Not important</li> </ul> <b>Weight and balance:</b> <ul style="list-style-type: none"> <li>- Calculate weight of fuel and cargo</li> <li>- Calculate centre of gravity</li> </ul> <b>Weight reduction:</b> <ul style="list-style-type: none"> <li>- Unload cargo</li> <li>- Defuel</li> <li>- Remove major components</li> </ul> <b>Recovery:</b> <ul style="list-style-type: none"> <li>- Reduce weight</li> <li>- Prepare site</li> <li>- Level</li> <li>- Lift</li> <li>- Stabilize</li> <li>- Move</li> </ul> <b>Schedule equipment and manpower required:</b> <ul style="list-style-type: none"> <li>- Confirm delivery plan</li> </ul> <b>Secondary damage:</b> <ul style="list-style-type: none"> <li>- Prevent or</li> <li>- Accept to reduce recovery time</li> </ul>	<b>Monitor and record:</b> <ul style="list-style-type: none"> <li>- Loads</li> <li>- Actions performed</li> </ul> <b>Assemble equipment and manpower:</b> <ul style="list-style-type: none"> <li>- Confirm arrival dates</li> </ul> <b>Weight reduction:</b> <ul style="list-style-type: none"> <li>- Unload cargo</li> <li>- Defuel</li> <li>- Remove major components</li> </ul> <b>Prepare site:</b> <ul style="list-style-type: none"> <li>- Clear</li> <li>- Excavate</li> <li>- Fill</li> <li>- Stabilize</li> </ul> <b>Roadway:</b> <ul style="list-style-type: none"> <li>- Clear</li> <li>- Excavate</li> <li>- Fill</li> <li>- Stabilize</li> <li>- Manufacture temporary roadway</li> </ul>	<b>Monitor and record:</b> <ul style="list-style-type: none"> <li>- Loads</li> <li>- Actions performed</li> </ul> <b>Stabilize:</b> <ul style="list-style-type: none"> <li>- Tether</li> <li>- Ground anchors</li> <li>- Jacks</li> <li>- Shoring</li> </ul> <b>Level/lift:</b> <ul style="list-style-type: none"> <li>- Jacks</li> <li>- Airbags</li> <li>- Cranes</li> <li>- New technology equipment</li> </ul> <b>Debugging:</b> <ul style="list-style-type: none"> <li>- Confirm a lifting method</li> </ul> <b>Move:</b> <ul style="list-style-type: none"> <li>- Tow on gear</li> <li>- Move on suitable trailer</li> </ul>	<b>Report:</b> <p>Include in aircraft technical history:</p> <ul style="list-style-type: none"> <li>- recovery details</li> <li>- repair details</li> <li>- record of loads</li> </ul>