

GROUND VEHICLE OPERATIONS AT AERODROME

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Aerodrome Safety Publications are published by the CAAS for purposes of promulgating supplementary guidance materials to the Standards and Recommended Practices (SARPs) in the Manual of Aerodrome Standards. The publications are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means, of complying with SARPs. Aerodrome Safety Publications may explain certain regulatory requirements by providing interpretive and explanatory materials.

1 Purpose

- 1.1 The purpose of this Aerodrome Safety Publication is to promulgate supplementary guidance materials to the Standards and Recommended Practices (SARPS) in the Manual of Aerodrome Standards (MOAS). This ASP provides guidance on what is acceptable to the Aerodrome and ANS Regulation Division (AAR) to demonstrate compliance with regulatory requirements and responsibilities of the aerodrome operator pertaining to the management of aerodrome vehicle operations as required by Section 13.2.7 of the MOAS.
- 1.2 The attached appendix provides guidance to aerodrome operators in developing training programs for safe ground vehicle operations and pedestrian control on the airside of an aerodrome.

2 Applicability

- 2.1 This ASP applies to all operators of aerodromes certified under paragraph 67 of the Singapore Air Navigation Order (ANO). Aerodrome operators should examine each item, considering the size, complexity and scope of operations at the aerodrome to determine what applies.

3 Cancellation

- 3.1 This ASP supersedes ASP 02/2008.

4 Effective Date

- 4.1 This ASP takes effect on 5 April 2017.

5 Introduction

- 5.1 Every year, accidents and incidents involving aircraft, pedestrians and ground vehicles occur at aerodromes, leading to property damage and injury. Some of these accidents resulted in fatalities. Many of these events are a result of inadequate safety measures, failure to provide or maintain visual aids and inadequate vehicle operator training. Ground vehicle operation plans promote the safety of aerodrome users by helping to identify authorized areas of vehicle operation, outlining vehicle identification systems, addressing vehicle and operator

requirements and coordinating construction, maintenance as well as emergency activities.

- 5.2 Aerodrome operators should establish procedures and policies concerning vehicle access and vehicle operation on the airside of the aerodrome. These procedures and policies should address matters such as access, vehicle operator requirements, vehicle requirements, operations, and enforcement and should be incorporated into tenant leases, contracts or airside rules as appropriate to the local environment. These procedures and policies could be incorporated into a single document that could be referred to by any vehicle operator on the airside.

6 Vehicle operator requirements

- 6.1 Vehicle operators on aerodromes face conditions that are not normally encountered during highway driving. Therefore, those persons who need and have vehicular access to the airside must have an appropriate level of knowledge of aerodrome rules and regulations. Aerodrome operators should require vehicle operators to maintain a current driver's license and should establish a means of identification that would permit the operation of a vehicle on the airside of an aerodrome.

7 Training

- 7.1 **Appendix A** includes the recommended contents of a training program for airside vehicle operators. This curriculum includes initial, recurrent and/or remedial training of aerodrome operator employees, tenants, contractors, and users who have access to the airside. The aerodrome operator should retain records of this training as long as this person is authorized to operate on the aerodrome. Aerodrome operators may find it beneficial to have separate requirements for vehicles operated solely on a ramp area and those that operate on the manoeuvring area.
- 7.2 Initial training is the training provided to a new employee or aerodrome user that would enable that person to demonstrate the ability to operate a vehicle safely and in accordance with established procedures while functioning independently on the airside. Recurrent training is the training provided to an employee or aerodrome user as often as necessary to enable that person to maintain a satisfactory level of proficiency. Appropriate schedules for recurrent training will vary widely from aerodrome to aerodrome and from one employee to another. Aerodrome operators should consider requiring the vehicle operator to go for recurrent training when he

renews his expired airside driving permit. Remedial training is the training provided when an employee or aerodrome user violated the airside rules and regulations.

- 7.3 Escort drivers should be properly briefed on their roles and responsibilities. Those being escorted should also be briefed on the Dos and Don'ts and be reminded to stay with their escorts at all times. The aerodrome operator should develop procedures for escorting of vehicles in the airside.
- 7.4 Aerodrome operators use a variety of methods for training ground vehicle operators. In some cases, aerodrome operators delegate the requirement of employee training to tenants or a contractor. Where training responsibility has been delegated to tenants or contractor, the aerodrome operator should validate the training program to ensure that agreed standards are being maintained. Some aerodrome operators may choose to include training manuals or vehicle-operating requirements as part of tenant lease or condition-of-use agreements. An aerodrome operator may choose to distribute training manual information via a webpage, videos or booklets. Formal classroom instruction provided by the aerodrome operator or tenant can include either personal instruction or a computer-based interactive training system.
- 7.5 Aerodrome operator should provide a means of testing trainees on the information presented. In addition to standard question and answer classroom testing methods, aerodrome operators should have potential ground vehicle operators demonstrate their proficiency in operating a vehicle on the airside before authorizing driving privileges, especially if those operators will be driving on the manoeuvring area. It is also recommended that on-the-job training be completed before personnel have unescorted access to the airside of the aerodrome.

8 Vehicles on aerodromes

- 8.1 Aerodrome operators should keep vehicular and pedestrian activity on the airside of the aerodrome to a minimum. Vehicles on the airside of the aerodrome should be limited to those vehicles necessary to support the operation of aircraft services, cargo and passenger services, emergency services, and maintenance of the aerodrome. Vehicles on the manoeuvring area should be limited to those necessary for the inspection and maintenance of the manoeuvring area and emergency vehicles responding to an aircraft emergency on the manoeuvring area. Vehicles should use service roads or public roads in lieu of crossing manoeuvring area whenever possible. Where vehicular traffic on aerodrome operation areas cannot be avoided, it should be carefully controlled.

- 8.2 When necessary, runway crossing should occur at the departure runway end rather than the midpoint. In the event of a runway incursion, an aircraft would have more time and runway length to react if the vehicle incursion is at the end of the runway. The aircraft might be able to come to a stop before striking the vehicle or it may be able to abort the landing.
- 8.3 However, every aerodrome presents vehicle requirements and problems. Every aerodrome will require customized solutions to prevent vehicle or pedestrian traffic from endangering aircraft operations. It should be stressed that aircraft **always** has the right-of-way over vehicles when maneuvering on movement areas. Aircraft also have the right-of-way on the manoeuvring areas, except when the Aerodrome Control Tower has specifically instructed an aircraft to hold or give way to vehicle(s) on a runway or taxiway.
- 8.4 Vehicles that routinely operate on the airside should be marked /flagged for high daytime visibility and lighted for nighttime operations. Vehicles that are not marked and lighted should be escorted by vehicles that are marked and equipped with lighting devices.

9 Vehicular access control

- 9.1 The control of vehicular activity on the airside of an aerodrome is of the highest importance. The aerodrome operator is responsible for developing procedures and procuring equipment and providing training regarding vehicle operations to ensure aircraft and personnel safety. At aerodromes with an operating control tower, controllers and vehicle operators should use two-way radios to control vehicles when on the manoeuvring area. Vehicle operators should establish satisfactory two-way communication with the control tower before entering the manoeuvring area. To accomplish this task, the aerodrome operator and the control tower should develop standard operating procedures for coordination.
- 9.2 Inadvertent entry by vehicles onto manoeuvring and movement and other areas of an aerodrome areas poses a danger to both the vehicle operator and aircraft attempting to land, take off or that are manoeuvring on the aerodrome. Methods for controlling access to the airside will vary depending on the type and location of the aerodrome. An aerodrome layout plan is a useful tool for accomplishing this. Aerodromes may erect a fence or provide for other physical barriers around the entire aerodrome in addition to providing control measures at each access gate,

such as guards, magnetic card activated locks, or remotely controlled locks. Gates may either be opened/closed electronically or secured by lock and chain.

10 Vehicle requirements

10.1 Requirements for vehicles will vary depending on the aerodrome, the type of vehicle, and where the vehicle will be operated on the aerodrome. An aerodrome operator should limit vehicle operations on the manoeuvring area of the aerodrome to only those vehicles necessary to support the operational activity of the aerodrome. Aerodrome operators might find it beneficial to have separate requirements for vehicles operated solely on a ramp area as opposed to those vehicles that operate on manoeuvring area.

10.2 Some aerodromes have benefited from establishing their own vehicle inspection program to assure that all vehicles are maintained in a safe operating condition.

10.3 In establishing vehicle requirements, some items to consider include:

- (a) Marking and identification of vehicles;
- (b) Minimum equipment requirements;
- (c) Inclusion in all vehicles of a chart depicting the aerodrome's manoeuvring area. The diagram should display prominent landmarks and/or perimeter roads. Vehicles intended to operate within the manoeuvring area should also include a chart showing the meaning of control tower light gun signals, airfield sign and marking information; and
- (d) Vehicle condition requirements and inspection.

11 Vehicle operations

11.1 The rules and regulations pertaining to vehicle operations should provide adequate procedures for the safe and orderly operation of vehicles on the airside of the aerodrome. In developing such procedures, aerodrome operators should consider:

- (a) Requirements that vehicles operating on manoeuvring area be radio equipped or escorted by a radio-equipped vehicle;
- (b) Specific procedural requirements for vehicle operations on aerodromes without an operating control tower, if applicable;

- (c) Advance notice/approval for operating a non-aerodrome owned vehicle on the manoeuvring area;
- (d) Speed limits;
- (e) Prohibitions on:
 - i. Passing other vehicles and taxing aircraft;
 - ii. Leaving a vehicle unattended and running;
 - iii. Driving under an aircraft except when servicing the aircraft;
 - iv. Driving under passenger bridges;
- (f) Requirements stipulating when vehicle lights must be operated;
- (g) Requirements for the use of dedicated vehicle lanes and perimeter roads whenever possible;
- (h) Locations where vehicles may and may not park;
- (i) Rules of right-of-way (e.g. for aircraft, emergency vehicles, other vehicles);
- (j) Procedures for inoperative radios while on a manoeuvring area;
- (k) Requirements to report all accidents involving ground vehicles on the airside; and
- (l) Requirements making the vehicle operator responsible for passengers in the vehicle.

12 Emergency operations and other non-routine operations

- 12.1 Aerodrome operators allow a number of non-routine operations to occur on the airside of the aerodrome. Such non-routine activities include airfield construction, airshows, aircraft static displays, VIP arrivals/departures, commercial photo shoots, or a host of other activities. In addition to security requirements, aerodrome operators should recognize and prepare for the unique challenges that arise during non-routine operations as they relate to vehicle operations.
- 12.2 Aerodrome operators should review non-routine operations that involve ground vehicles and develop vehicle operation procedures to accommodate these special occasions. Meetings associated with such activities offer an opportunity to review airside driving rules and regulations, communications and procedures, and air traffic control procedures as well as other important operational issues. These meetings should pay special attention to the following activities:

(a) Airside Construction

The aerodrome operator should develop procedures, assess equipment and ensure training on vehicle operations for aircraft safety has been completed to ensure safety of aircraft and workers during construction.

(b) Low-Visibility Operations

Additional consideration should be given to vehicle operations during low visibility. Poor weather conditions (fog, rain, haze etc.) may obscure visual cues, roadway markings and aerodrome signs.

- 12.3 Some aerodromes have a Surface Movement Guidance and Control System (SMGCS) which provides guidance to, and control or regulation of, all aircraft and ground vehicles on the manoeuvring area of an aerodrome. Guidance relates to facilities, information, and advice necessary to enable pilots of aircraft, or drivers of ground vehicles to find their way on the aerodrome and keep the aircraft or vehicles on the surfaces and areas intended for their use. Control or regulation means the measures necessary to prevent collisions and to ensure that the traffic flows safely.

13 Situational awareness

- 13.1 There are a number of factors that hamper vehicle operator situational awareness. Situational awareness declines as a driver's attention is drawn into the vehicle or is focused on any one thing to the exclusion of everything else. Other such factors include vague or incomplete communications or a vehicle operator's personal conflict, which may involve fatigue and stress. Running behind schedule or being over-tasked also contributes to a reduction in situational awareness. Degraded operating conditions such as equipment malfunctions, rain, fog, or haze may also diminish a vehicle operator's situational awareness.
- 13.2 There are ways to enhance situational awareness. As part of a ground vehicle operator's training program, aerodrome operators may concentrate on having vehicle operators visually scan fixed and moving objects that may be converging into the vehicle's path. Aerodrome operators should also promote the use of clear and concise communications by vehicle operators. Most important, aerodrome operators should alert vehicle operators to distractions caused by social interactions while operating the vehicle.

13.3 Aerodrome operators may also be able to increase situational awareness for vehicle operators with enhancements on the airside. Such enhancements may include establishing dedicated marked routes for vehicles that avoid high activity, congested areas or blind spots. The elimination or relocation of fixed objects that hinder a vehicle operator's line of sight or block radio transmissions may also enhance safety.

14 Enforcement and control

14.1 Aerodrome operators should establish procedures for enforcing the consequences of non-compliance, including penalties for violations. Tenant leases, condition of use agreements or rules applicable to the operating environment may include these enforcement provisions.

14.2 Listed below are control issues that aerodrome operators should address as part of a ground vehicle control program:

- (a) Implementation of a tiered identification system of permits/licenses that permits easy recognition of a vehicle operator's permitted driving area privileges;
- (b) Prohibition against transfer of registration media to a vehicle other than the one for which originally issued;
- (c) Policies for surrendering permits to aerodrome management when a vehicle is no longer authorized entry into a facility;
- (d) Periodic checks to ensure that only properly authorized persons operate vehicles on the airside;
- (e) System to control the movement of commercial trucks and other goods conveyances onto and out of the airside of an aerodrome;
- (f) Briefing or training for delivery drivers if they are permitted direct access to the airside;
- (g) Implementation of a progressive penalty policy.

15 Reference

ICAO Runway Safety Tool Kit;
FAA advisory circular – Ground Vehicle Operations to include Taxiing or Towing an Aircraft on Airports; and
European Action Plan for the Prevention of Runway Incursions

16 Queries

If there are any queries with regard to this Aerodrome Safety Publication, please address them to:

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Ground Vehicle Operations Training Program

NOTE: *The purpose of the Ground Vehicle Operations Training Curriculum is to provide aerodrome operators with a recommended list of training topics for educating vehicle operators who may have access to the airside of an aerodrome. Each individual aerodrome has unique situations that might require site-specific training. Aerodrome operators may use this training curriculum as a guide for developing and implementing a detailed training program tailored to the aerodrome's individual situation.*

The purpose of a training program is to provide vehicle operators with the level of training necessary for their positions so that they are capable of operating safely on the airside of an aerodrome. Specific programs may be tailored to account for the items listed below:

1. Various aircraft navigation aids on the airfield
2. Identification of a given point on a grid map or other standard map used at the aerodrome
3. Applicable aerodrome rules, regulations or procedures pertaining to vehicle operations
4. Aerodrome layout, including designation of runways and taxiways
5. Known hot stops
6. Boundaries of manoeuvring area
7. Color coding and interpretation of airfield signs, pavement markings, and lighting
8. Location and understanding of critical areas associated with instrument landing system (ILS) and very high frequency omnidirectional radio ranges (VORs)
9. Radio telephony phraseology and procedures for radio communications with the aerodrome control tower
10. Aerodrome control tower light signals
11. Established routes for emergency response vehicles
12. Dangers associated with jet blast and prop wash
13. Traffic patterns associated with each runway (left or right) and location of each leg; i.e., downwind, base, final, and crosswind
14. Situational awareness

An aerodrome operator may choose to develop customized training programs for vehicle operators, such as airline employees, who may be restricted to operating aerodrome vehicles only on ramps areas.

AREAS OF TRAINING

All aerodrome vehicle operators should have training in the following areas:

1. Discussion of runway incursions, airfield safety and security

Training Outcome(s) – Trainee should be able to define a runway incursion, describe how to avoid causing a runway incursion, what they can do if involved in a runway incursion and explain the benefits of airfield safety/security.

2. Aviation Definitions and Terms

Training Outcome(s) – Trainee should be knowledgeable of the terms used on an aerodrome.

3. Aerodrome Vehicle operating requirements

- (a) Authorized vehicles and vehicle identification
- (b) Vehicle lighting
- (c) Vehicle insurance
- (d) Vehicle inspection
- (e) Vehicle parking
- (f) Accident reporting
- (g) Use of perimeter roadways
- (h) Aircraft lighting

4. Rules and Regulations

- (a) Review
- (b) Noncompliance/Penalties

Training Outcome(s) – Trainee should be knowledgeable of aerodrome vehicle operating rules and regulations.

5. Testing

- (a) Written Test
- (b) Practical Test

Training Outcome(s) – Trainee should be able to pass a written examination with a minimum score of 90 percent or other minimum passing score agreed to by the aerodrome operator.

In addition to items 1–5, instruction for vehicle operators authorized to drive on the manoeuvring area should also include those subject areas identified under Aerodrome Familiarization (item 6) and Communications (item 7)

6. Aerodrome Familiarization

- (a) Runway Configuration/Safety Area
- (b) Taxiway Configuration/Safety Area
- (c) Manoeuvring Area and Movement and other Areas
- (d) Confusing Areas and known hot spots
- (e) Aerodrome Lighting
 - i. Runway
 - Runway edge lights
 - Touchdown zone lights
 - Rapid Exit Taxiway indicator lights
 - Threshold lights
 - Approach lighting system
 - Stop bar lights
 - ii. Taxiway
 - Taxiway edge lights
 - Taxiway centre line lights
 - Runway guard lights
- (f) Aerodrome Signs
 - Runway holding-position sign
 - Location sign
 - ILS Category I, II or III holding-position signs
 - Direction sign
- (g) Aerodrome Marking
 - i. Runways
 - Centre line marking
 - Side strip Markings
 - Runway designation marking
 - Threshold markings
 - Runway holding-position marking
 - ii. Taxiways
 - Runway holding-position marking
 - Centre line marking
 - Edge markings
 - iii. ILS Critical Areas
 - iv. Movement and other Area Boundary Marker
- (h) Aerodrome NAVAIDS and Visual Approach Aids
 - Location
 - Non-interference

Training Outcome(s) – Trainee should be able to label all critical parts on the aerodrome and explain the purpose of all marking, lighting, and signs on the aerodrome.

7. Communications

- (a) Aerodrome Vehicle Communications
- (b) Radio Frequencies

- (c) Procedural Words and Phrases
 - i. Radiotelephony Spelling Alphabet
 - ii. Aviation Terminology
 - iii. Procedures for contacting the aerodrome control tower
 - iv. Airfield communications at aerodromes without operating control tower (if applicable)
 - v. Light Signals
 - Description of Light Gun and How to Signal Tower
 - vi. Procedures for vehicle operators when they are lost or disoriented in the manoeuvring areas

Training Outcome(s) - Trainee should be able to adequately send and receive radio messages as well as interpret light gun signals and respond accordingly.