



ACCEPTABLE
GROUND HANDLING ARRANGEMENTS

Purpose— This Advisory Circular (AC) provides general guidance to individuals, organizations and other entities regarding the policies that are applicable to ground handling arrangements that may be acceptable to RCAA.

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- Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.
- Where an AC is referred to in a 'Note' below the regulation, the AC remains as guidance material,
- ACs should always be read in conjunction with the referenced regulations.

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SECTION 1 GENERAL

1.1 STATUS OF THIS ADVISORY CIRCULAR

This is an original issuance [1]2017 of this AC.

1.2 BACKGROUND

- A. The ground handling of aircraft is a key element of the overall aviation safety emphasis that has not in past years received the emphasis and scrutiny that would ensure a higher degree of safety and efficiency.
- B. This element now has emphasis in the international community. ICAO Standards in Annex 6 now require that a State's safety oversight include the ground handling arrangements of its

air operator during initial certification and during the on-going validation of those operators continued conformance.

- C. This advisory circular was developed to bring attention to the aircraft operators responsibilities and practices that are subject to evaluations and inspections by RCAA-FSS inspectors.

1.3 APPLICABILITY

This AC is applicable to both Rwanda AOC holders and the service providers they may use for ground handling functions.

1.4 RELATED REGULATIONS

The following regulations are directly applicable to the guidance contained in this advisory circular—

- RCAR Part 10, Operations of Aircraft
- RCAR Part 12, AOC Certification and Administration

1.5 RELATED PUBLICATIONS

For further information on this topic, individuals, instructors and examiners are invited to consult the following publications—

- 1) International Civil Aviation Organization (ICAO)
 - ◆ Annex 6, Schedule I, International Commercial Air Transport – Aeroplanes
 - ◆ Document 8335, Manual for Operations Certification

Copies may be obtained from Document Sales Unit, ICAO, 999 University Street, Montreal, Quebec, Canada H3C 5H7.

1.6 DEFINITIONS & ACRONYMS

A. The following definitions are used in this advisory circular—

- 1) **Fueling.** This term includes both fueling and defueling.
- 2) **Fueling Areas.** The fueling of aircraft at an aerodrome should normally be carried out in the open air and should only be carried out in areas approved by the aerodrome authority. As a general guide, fueling areas should be sited to avoid bringing fueling equipment or aircraft fuel tank vents to within 15 meters of any building other than those parts constructed for the purpose of direct loading or unloading of aircraft, such as nose loaders, loading bridges etc.
- 3) **Fueling Zone.** The fueling zone should be regarded as extending not less than six meters radially from the filling and venting points on the aircraft and the fueling equipment and, when applicable, from the hydrant valve in use for the fueling. When defueling is taking place, the vehicle will be venting and will generate a fueling zone radiating from the tank vent.

B. The following acronyms are used in this advisory circular—

- 1) **AC** – Advisory Circular
- 2) **AOC** – Air Operator Certificate
- 3) **RCAA** – Civil Aviation Authority of Rwanda
- 4) **FSS** – Flight Safety Services
- 5) **FOD** – Foreign object damager

- 6) **MOR** – Mandatory Operational Report
- 7) **VDGS** – Visual Docking Guidance System
- 8) **RCAR**– Rwanda Civil Aviation Regulations

SECTION 2 GENERAL GUIDANCE

2.1 FUNCTIONS OF GROUND HANDLING

For the purpose of this advisory circular, “ground handling” will include the facilities, equipment, personnel, policies and procedures for—

- 1) Ticketing of passengers and baggage;
- 2) Acceptance and processing of cargo, including dangerous goods
- 3) Cleaning the aircraft interior
- 4) Servicing of restroom supplies
- 5) Servicing of galley supplies
- 6) Servicing of blankets, pillows and magazines
- 7) Servicing of the aircraft;
- 8) Fueling of the aircraft;
- 9) Loading of the cargo, including dangerous goods;
- 10) Computation and provision of mass and balance data;
- 11) Computation and provision of performance data;
- 12) Correction or deferring of maintenance irregularities;
- 13) Provision of flight planning information;
- 14) Provision of operational flight plan;
- 15) Security screening of passengers and carry-on baggage;
- 16) Enplaning the passengers and their carry-on baggage;
- 17) Marshalling, towing or assisting the aircraft in departing the gate;
- 18) Deicing of the aircraft;
- 19) Preparation of parking area for arrival of the aircraft
- 20) Marshalling and parking of the aircraft after landing;
- 21) Deplaning the passengers and their carry-on baggage;
- 22) Off-loading of cargo and baggage;
- 23) Provision of the baggage to the deplaned passengers;
- 24) Security for the aircraft while parked;
- 25) Communications as necessary associated with flight handling, departure and arrival;
- 26) Retention of required records associated with flight handling, departure and arrival;

Depending on the operator's processes and equipment, some of these functions may not be included in the ground handling manager's responsibilities.

- 27) Implementation of emergency procedures associated with an incident or accident; and
- 28) Auditing of service providers to ensure that associated policies and procedures are being implemented by qualified persons.

2.2 COMPLEXITY OF GROUND HANDLING

- A. The ground handling functions and responsibilities for their accomplishment exist even for small operators. For small operators though, the complexities of the events that must happen are masked by the fact that the pilot is routinely responsible for and accomplishes the majority of these functions.
- B. But the safe and efficient ground handling of the arrival and departure of a large aircraft with greater passenger and cargo capacity requires an orchestrated division of responsibilities and events between qualified persons.
- C. This orchestration of the ground handling of a large aircraft should be controlled by a nucleus of operator personnel under the direction of a manager as envisioned by the regulations.
- D. Where the operator chooses to provide most of these functions through ground handling service providers, the operator must incorporate into its procedures the responsibility for its own qualified personnel to monitoring and verification of critical points of those functions.
 - For example, the securing of cargo nets, access ports, panels and doors used during the ground handling.

SECTION 3 ASSIGNMENT OF RESPONSIBILITIES

It is critical that the operator provide specific assignment of responsibility for ground handling functions, especially those that are aircraft type-specific. Acceptable assignment of responsibility includes—

3.1 CREW RESPONSIBLE

The simplest form of discharging the ground handling responsibilities is to have the crew either do or continuously monitor the accomplish these function. Examples include—

- Crew member reviews the passengers' documents, determines their weight and their baggage weight, checks for possibility of dangerous goods or weapons or other unacceptable items and tickets them.
- Crew member determines and assigns seats based on the weight and size of the passengers
- Crew member either load the baggage and cargo or continuously monitors the loading process to ensure the items are properly loaded and secured with all exterior doors locked.
- Crew member either fuels the aircraft or continuously monitors the fueler to ensure proper grounding of aircraft, correct type of fuel, fuel upload, and the securing of the fuel caps and closing of any panels
- Crew member obtains and consolidates all flight information, completes and executes the flight preparation documents and ensures that copies of the documentation are securely left at the aerodrome.



The responsibility for ensuring the correct accomplishment of functions that have a direct effect on safety is assigned to the crew.

3.2 OTHER QUALIFIED COMPANY PERSONNEL

- A. As the ground handling situation becomes more complex, the operator may elect to have properly trained and qualified company personnel, in lieu of the crew, to accomplish or monitor the accomplishment most of the ground handling functions. Examples include—

- Ticket agents review the passengers' documents, determine their weight and baggage weight, checks for the possibility of unacceptable items and tickets them;
 - Gate agents (or cabin crew) determine and assign seats based on the weight and size of the passengers and their carry-on baggage or a prescribed loading schedule.
 - A load controller either loads the baggage and cargo or continuously monitors the loading process to ensure the items are properly loaded and secured with all exterior doors locked.
 - A qualified company agent either fuels the aircraft or continuously monitors the fueler to ensure proper grounding of aircraft, correct type of fuel, fuel upload, and the securing of the fuel caps and closing of any panels, with crew members verifying the load;
 - Flight dispatchers obtain and consolidates all flight information the flight preparation documents and provide copies to the flight crew.
- A. For most of these functions, the operator should consider having verification steps (by the crew) incorporated in the processes to ensure that all items critical to flight safety have been correctly accomplished.
- B. Larger operators should conduct selective audits of the aerodromes and employees to ensure the ground handling processes are delivering a predictably correct result.



The key is a qualified company employee is assigned to do or monitor the function and verifies its correct completion.

3.3 INTEGRATING SERVICE PROVIDERS INTO THE PROCESS

- A. As the operator expands its schedule to more aerodromes, it may become more cost-efficient to use service providers that are located at the aerodrome and provide similar services for other operators. Examples include one or more of the following—
- A service provider's agents review the personal travel documents, determine their weight and baggage weight, checks for the possibility of unacceptable items and tickets the passengers;
 - Gate agents determine and assign seats based on the weight and size of the passengers and their carry-on baggage or a loading schedule provided by a service provider.
 - A service provider's load controller and loading personnel loads and secures the baggage and cargo ensuring all exterior doors locked, and provides the completed load manifest.
 - A fueling service provider ensures proper grounding of aircraft, correct type of fuel, fuel upload, fuels and secures the fuel caps and closing of any panels;
 - Service providers provide the flight preparation information, including the operational flight plan the flight preparation documents and provide copies to the flight crew.
- B. The operator may not abdicate its responsibility for the correct accomplishment of the functions. With these arrangements the operator should have—
- 1) Pre-audits to ensure the service provider and its personnel have the capability;
 - 2) Verification steps by company employees incorporated in the ground handling processes; and
 - 3) Subsequent auditing that is external to the processes to determine that a predictably correct product has been occurring.

SECTION 4 GROUND HANDLING ORGANIZATION

- A. The regulations requires the AOC holder to have adequate organizational structure to manage all ground handling functions, including—

- 1) Ramp operations;
- 2) Passenger services;
- 3) Baggage services;
- 4) Cabin services;
- 5) Weight and balance control;
- 6) Ground support equipment; and
- 7) Fuel services.

- The functions of ground handling listed in Section 3 are more extensive and cover some functions that are managed by other parts of the company (e.g. maintenance and flight operations).
- The functions listed here are also listed in the regulations for ground handling. These are functions normally managed by in the “ground handling” organization of the company.

- B. The regulations also require the assignment of responsibility and authority to manage this part of the AOC holder’s organization. The operators of large aircraft, especially for scheduled passenger operations, must have a discernible part of the organization that is assigned the responsibility and authority to manage these functions. The small air taxi operators may be issued waiver from these requirements if they do not conduct those operations from the terminal gates.

- C. Depending on the extent to which the operator uses company personnel and service providers the actual number of persons required to manage the ground handling functions in an airline can vary from a large organization made up of company personnel or a smaller organization using managers to oversee a variety of service providers.



The AOC holder may delegate the task, but may never transfer the responsibility for ensuring safety to the service provider.

- AOC holders at their hub may choose to provide most of the ground handling functions, but rely on service providers to fuel and galley services.
- AOC holders providing scheduled codeshare or on-demand operations primarily for large airlines may choose to rely on their larger partner to provide most of the ground handling services.
- AOC holders may choose to have a “virtual” presence on the ramp by using service providers for all ground handling functions identified by the regulations and this advisory circular.

- Each of the example operators cited here have several common requirements—
- They must have a manager of ground operations;
 - They must have a ground handling organization with the responsibility and authority to manage ground handling functions;
 - They may use service providers for most of their ground handling needs;
 - They must audit their service providers; and
 - The ground handling organization and service provider arrangements must be acceptable to RCAA.

- D. By regulation the ground handling organization must be acceptable to RCAA. Given all of the variations that an AOC holder may choose to use to provide ground handling, the evaluation of “acceptability” is somewhat subjective. An operator’s ground handling organization may be determined to be acceptable, if—

- 1) There is a ground handling organization with an overall manager;
- 2) This organization has sufficient infrastructure (facilities, equipment and personnel) to discharge its responsibilities;
- 3) The pertinent ground handling policies and procedures are provided in company manuals;
- 4) There is an adequate training program to ensure that company and service provider personnel are qualified,
- 5) There is discernible delegation and supervision of all ground handling functions as they are being accomplished;

- 6) There are adequate facilities and equipment available to provide ground handling support for the necessary ground handling of the aircraft;
- 7) The ground handling processes are subject to periodic audits to ensure that the delivered results are compatible with the established policies and standard of performance;

SECTION 5 MANAGER OF GROUND OPERATIONS

5.1 REGULATORY REQUIREMENTS

- A. Rwanda Civil Aviation Regulations require that an AOC holder will have an assigned person acceptable to RCAA, who is responsible for the management and supervision of ground handling operations.
- B. While Rwanda regulations list this position as one of the five key managers of an AOC holder, RCAA recognizes that the complexity of the AOC holder's operations could result in a—
 - 1) Director of ground handling with numerous supervisors (large organization), or
 - 2) Single individual having multiple supervisory roles (a single-pilot air taxi). or
 - 3) Variations between the large organization and the single individual.
- C. The regulations give RCAA the authority to grant waivers to this particular requirement if the operator can provide logical justification for such a waiver that will not conflict with the safety intent of the regulation.

5.2 EVALUATION OF GROUND OPERATIONS MANAGER NOMINATION

5.2.1 PROVEN COMPETENCY

- A. The regulations require that the manager for ground handling must have "proven competency in civil aviation." The regulations do not, however, provide specific requirements as are provided in the Director of Operations or Chief Pilot.
- B. The RCAA evaluation of the nominated manager will be primarily that he or she—
 - 1) Was not previously a required manager of an AOC holder whose certificate was revoked;
 - 2) Has experience as a manager or supervisor in an aviation organization;
 - 3) Has experience in one or more functions of ground handling;
 - 4) Is able to describe in detail the company policies and processes for ground handling and locate pertinent portions of these in the company manuals;
 - 5) Is able to describe the describe the timing and interaction of the ground handling functions in during the departure and arrival of the aircraft;
 - 6) Is able to describe the purpose of the ground handling audit processes and the resolution of identified issues.

5.2.2 ACCEPT OR REJECT NOMINATION

- A. A decision to reject the nomination of the manager of a ground handling organization should be made in a formal letter stating the reasons for the rejection.
 - B. A decision to accept the nomination of the manager of ground handling organization will also be made by formal letter.
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5.2.3 GRANT OF WAIVER

- A. If a company requests that the duties and responsibilities of the Manager of Ground Operations be assigned to a person who already has other critical aviation duties and responsibilities, the assigned operations inspector will evaluate the extent to which the operator could function without a dedicated Manager of Ground Operations.
- B. That evaluation will be based on the complexity of the company operations being conducted.
- C. The following factors are routine justification for the waiver—
- 1) Aircraft with 19 passengers or less;
 - 2) That will not be using the terminal gates;
 - 3) That will be receiving support from another entity for their ground handling functions; and/or
 - 4) Will not be operating on a schedule that includes gate turnarounds of less than 1 hour from arrival to departure.

The request for waiver should not be routinely granted if the applicant will be operating—

- Aircraft carrying more than 19 passengers; and
- With 15 or more total gate arrival/departures in a 24 hour period; and
- At 3 or more airports.

SECTION 6 AIRCRAFT HANDLING MANUAL

6.1 GENERAL MANUAL GUIDANCE

- A. The regulations require that an AOC holder shall have an “Aircraft Handling Manual” acceptable to the Authority which includes, for all ground handling operations—
- 1) Handling processes, procedures and practices;
 - 2) Training program requirements; and
 - 3) Subcontracting policies.
- B. This manual will be in addition to the required aircraft type-specific manual(s) that provide the specific requirements for—
- 1) Fueling;
 - 2) Servicing;
 - 3) Loading;
 - 4) Mass and balance;
 - 5) Dangerous Goods

The Aircraft Handling “Manual” can be in more than one volume as necessary to ensure that each of the required contents are correctly addressed and available to the technical user, for example—

- Passenger Handling Processes
- Cargo Loading Processes
- Station Personnel Training Manual
- Service Provider Arrangements
- Emergency Response Manual

These manuals can be in more than one or more volumes as necessary to ensure that each of the required contents are correctly addressed and available to the technical user.

6.2 SCOPE OF THE GROUND OPERATIONS DOCUMENTATION

- A. Each manual or publication submitted will be evaluation to ensure that it includes that information and guidance necessary to allow personnel to perform their duties and responsibilities effectively and safely.
- B. Depending on the complexity of ground operations conducted at a station, the scope of the required submissions of manual(s) and documentation may include—
- Operation of ground service equipment/procedures
 - Security training and procedures

- Ticketing and gate procedures
- Passenger handling procedures
- Carry-on baggage procedures
- General aircraft movement procedures, including marshalling and parking requirements
- Company and aircraft-specific towing procedures
- Company and aircraft-specific refueling procedures
- Company and aircraft-specific servicing procedures
- Company and aircraft-specific loading procedures
- Company and aircraft-specific mass and balance calculation procedures
- Company and aircraft-specific takeoff, enroute and landing computation
- Approved Flight Manual (AFM) for company aircraft
- Company and service provider training programs
- Company and service provider emergency response procedures, including current emergency telephone listing
- Company and service provides accident/incident telephone listing
- Severe weather notification procedures
- General and aircraft-specific deicing procedures
- Identification or handling of hazardous materials/procedures
- Instructions and procedures for NOTOC when there are hazardous materials aboard
- Procedures for passenger operation of electronic devices
- Listing of approved service providers and their contracted functions
- Company (if applicable, service provider) procedures for disposition and retention of official records.

6.3 OTHER DOCUMENTS THAT SHOULD BE EVALUATED

6.3.1 PROPOSED RECORDS

- A. The applicant should provide copies of the proposed records relative to ground handling and station operations,
- B. These records should include all records proposed to be generated during ground operations, including those addressing communications, fueling, servicing, loading, flight preparation and personnel training records.

6.3.2 PROPOSED TRAINING PROGRAMS

- A. The inspector should evaluate the training curriculums provided for the various groupings of ground handling and station personnel.
- B. While the regulations do not specify training requirements either by subject or frequency for ground handling personnel, the curriculums, curriculum segments and training elements should be logical for the technical functions and supported by the technical manuals.

The operator should submit instructions and curriculums for each technical specialty to include—

 - Initial training
 - On-the-job training
 - Recurrent training
- C. This training may be both formal classroom training or on the job training. Specific areas of training include the following for each function—
 - Duties and responsibilities
 - Safety practices
 - Dangerous goods
 - Passenger handling and protection
 - Load planning and weight and balance procedures
 - Communications procedures
 - First aid and emergency actions

6.3.3 CONTINGENCY PLANS

- A. Emergency response contingency plans should be submitted for the possible emergencies that may be encountered by the station and ground handling personnel.
- B. These may be submitted as manual(s) or checklists, and should include—
- Accidents
 - Injuries
 - Illness
 - Fuel spills
 - Bomb threats
 - Hijacking
 - Severe weather
 - Dangerous goods leakage/spills

The evaluating inspector should check each set of procedures for logical flow, correct contact telephone numbers and contact information.

SECTION 7 GROUND HANDLING SERVICE PROVIDERS

7.1 BACKGROUND

- A. In today's aviation environment, even large carriers are no longer self-sufficient in their operations. The use of service providers for many different tasks has become the norm, rather than the oddity. This is especially true in ground handling because of the aerodrome-specific advantages.
- B. Even the most independent operators routinely use service providers for fueling, kitchen and galley serving, and water and lavatory servicing of aircraft. But the use of service providers for ticketing and gate services, baggage handling, ramp services and aircraft cleaning and loading. And, if these tasks are performed correctly, efficiently and safely, can allow the operator to remain more flexible in their operations.
- C. By regulation, the AOC holder shall have processes for continuously ensuring the proper and adequate ground handling for their aircraft when all or part of the functions and tasks related to ground handling services have been contracted to a service provider.
- D. By regulation, the AOC holder is required to provide to RCAA a current and acceptable list of the service providers and the functions they have been contracted to perform on behalf of the AOC holder sorted by aerodrome location.

These processes and arrangements for the use of ground handling service providers must be evaluated by RCAA and determined to be acceptable for use by the AOC holder.

- The RCAA list of service providers must be kept current by the AOC holder.
- RCAA will consult this list to determine the providers to inspect during station inspections.

7.2 EVALUATION OF SERVICE PROVIDER ARRANGEMENTS

- A. At least 15 working days prior to the use of a service provider, the AOC holder must submit to RCAA with a copy of the agreement containing the proposed arrangements for the services to be provided.
- B. RCAA will review that agreement with emphasis on the—
- 1) Signatories to the agreement;
 - 2) Function(s) that will be provided by the service provider;

Upon completion of the evaluation, RCAA will issue a letter of acceptance or rejection of the arrangements.

- 3) Contact points in each organization for on-going arrangements between the parties
- 4) Policy/procedure guidance that will be used by the service provider and its personnel during the conduct of the services provided to the AOC holder;
- 5) Requirements for initial and recurrent training of the service provider's personnel for the functions they will perform for the AOC holder, especially those aircraft type-specific functions;
- 6) Requirement that the services may be terminated if the services are not provided to a satisfactory standard;
- 7) Unrestricted right of the operator to audit the service provider, the performance of its personnel, facilities and equipment and required records;
- 8) Unrestricted right of RCAA inspectors to audit the service provider, the performance of its personnel, its facilities and equipment and required records;
- 9) The provisions for timely resolution of issues identified during the audit process.

SECTION 8 FUELING PROCEDURES

The aircraft operator and the fueling organization each have responsibilities in respect of the safety measures to be taken during fueling operations.

8.1 PRECAUTIONS PRIOR TO FUELING

8.1.1 AERODROME FIRE SERVICE

All personnel involved in the fueling of aircraft should be familiar with the procedure for summoning the Fire Service Providers.

8.1.2 FIRE EXTINGUISHERS

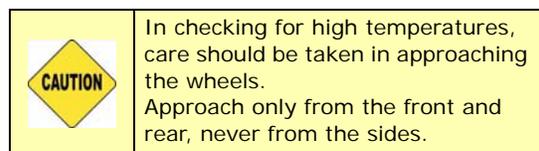
- A. Suitable fire extinguishers should be provided at readily accessible positions.
- B. The owners of such fire extinguishers should ensure by regular inspection and maintenance that this equipment is kept in a fully serviceable condition and in accordance with the manufacturer's instructions.
- C. Fueling staff, or in the case of an integrated system of ramp safety, all ramp staff including service providers should be instructed in the use of these extinguishers.

8.1.3 FIRE WARNINGS

When an aircraft is displaying a fire or engine overheat warning on the flight deck, the flight crew should warn the fueling operative that fueling should not begin until the cause of the warning has been established and the appropriate action taken to ensure that fueling can be safely carried out.

8.1.4 OVERHEATED UNDERCARRIAGE ASSEMBLIES

- A. The airline or aircraft operator should ensure that when any part of an aircraft undercarriage e.g. wheels, tires or brakes appear abnormally hot, the aerodrome fire service is called.
- B. Fueling should not take place until the heat has dissipated and the aerodrome fire officer confirms that it is safe to proceed. fueling equipment should not be positioned at an aircraft until the flight crew, maintenance



representative, fueling supervisor or Aerodrome Fire Service has advised that no risk remains.

8.2 SUPERVISION OF FUELING

8.2.1 FUELING OVERSIGHT

- A. Aircraft operators should either appoint a competent person (referred to here as the fueling supervisor) or demonstrate that they have an integrated system of ramp safety that includes training of all staff including service providers of the risks and safety aspects of fueling including hazard and incident reporting.
- B. The fueling supervisor or person to whom the fueling is delegated e.g. Flight Crew, maintenance representative or fueller should have had adequate training, experience, and know how to ensure the observance of correct fueling procedures and be responsible for liaison with the fuel company's fueling operatives.
- C. The fueling supervisor should identify himself to the fueller so that there is an obvious contact if a problem occurs.
- D. The fueling supervisor, or in the case of an integrated system of ramp safety all ramp staff including service providers, should be familiar with the safety measures for the refueling operation referred to in the introduction to this document.
 - This will ensure interoperability of procedures, which is essential for the safe conduct of the fueling operations.
- E. The person to whom the fueling has been delegated should ensure that there is adequate restraint of the aircraft by checking that the wheels are adequately chocked and confirming that the brakes are applied (unless this is not recommended for the particular type of aircraft), or that an acceptable alternative is in place.
- F. The person to whom the fueling has been delegated should remain in the vicinity of the aircraft while fueling operations are in progress and should ensure the correct positioning of service equipment and fueling vehicles.

8.2.2 CLEAR EXIT PATHS

- A. The fueling supervisor, or in the case of an integrated system of ramp safety all ramp staff, should ensure that a clear path is maintained from the aircraft to allow for the quick removal of fueling vehicles and equipment.
- B. Fueling equipment should be positioned so that there is no requirement for vehicles to reverse before departure.

All vehicles and equipment should be positioned to allow the unobstructed exit of persons from the aircraft in an emergency.

8.2.3 FUELING ZONE

- A. During fueling operations, air and fuel vapour are displaced from the aircraft fuel tanks. This potentially explosive vapour is expelled via vent points.
 - Within the fueling zone, smoking and the use of naked lights should be prohibited.
 - Radios, radiotelephones and pagers and the operation of switches on lighting systems of other than intrinsically safe types should be forbidden.
 - Personnel working within the fueling zone and those engaged in fueling should not carry matches or other means of ignition or wear footwear with exposed iron or steel studs, nails or tips.

- Only authorized persons and vehicles should be permitted within the fueling zone and the numbers of these should be kept to a minimum.
- Passengers should not be allowed within the fueling zone.
- Baggage/passenger reconciliation checks should be carried out away from the fueling zone.

- Unless fueling takes place in a designated No Smoking Area, 'No Smoking' signs should be displayed not less than 15 meters from the fueling equipment and aircraft tank vents.
- B. Aircraft-borne Auxiliary Power Units (APUs), which have an exhaust discharge discharging into the fueling zone, should, if required to be in operation during fueling, be started before filler caps are removed or fueling connections made.
- C. Ground Power Units (GPUs) may be operated provided they are positioned not less than six meters from aircraft filling and venting points, fuel valves and other fueling equipment when in use.
- D. Equipment with all-metal wheels or metal studded tires capable of producing sparks should not be moved in the fueling zone while fueling is in progress.
- E. The airline or aircraft operator should ensure that all personnel working on, inside or in the immediate vicinity of the aircraft are made aware that fueling is taking place. All hand torches and inspection lamps and their cable connections used within the fueling zone should be certified for use in such an environment or 'Intrinsically Safe.'
- F. Vehicle engines should not be left running unnecessarily in the fueling zones.
- G. Photographic flash bulbs or electronic flash equipment should not be used within six meters of the fueling equipment or any filling or venting points of the aircraft.

8.2.4 HAZARDS FROM ADJACENT AIRCRAFT OPERATIONS

Before and during fueling the person to whom the fueling has been delegated and all ramp staff should be aware of the precautions needed to ensure that no hazard occurs to the personnel or equipment, including such hazards as engine blast from other aircraft or APUs.

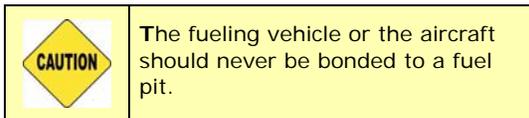
- The turbine blast of modern jet aircraft when taxiing can have a speed of up to 65 knots and a temperature of approximately 52°C at a distance of 30 meters from the propulsion system.
- This temperature may not be dangerous from a fire point of view, but the blast could be dangerous to aircraft, personnel and equipment.

- If any person considers that a hazard exists fueling should be stopped immediately until conditions permit resumption.

8.2.5 OPERATION OF RADAR

Aircraft should not be fueled within a minimum distance of 30 m (90 ft) from operational radar or HF radio equipment in aircraft or ground installations.

- During fueling, the prevention of fire risks due to static electricity discharge is dependent upon effective bonding between the aircraft and the fuel supply source.
- When fueling from hand operated equipment including pumping from cans or drums, similar precautions should be taken to bond the pumping equipment, hose nozzle and containers.
- If funnels are used, they should be bonded both to the nozzle of the hose or can and to the aircraft using wires provided for this specific purpose.



8.3 PRECAUTIONS DURING FUELING OPERATIONS

8.3.1 GENERAL

The following general precautionary measures should be taken during aircraft fueling operations—

- 1) The main aircraft engine(s) should not be operated (except for helicopter engine(s)). The main aircraft engines should not be used to power the aircraft electrical systems during fueling.

- 2) Bonding, as appropriate, should be carried out.
- 3) Fueling vehicles and equipment should be positioned so that—
 - (a) Access to aircraft for rescue and fire fighting vehicles is not obstructed.
 - (b) A clear route is maintained to allow their rapid removal from the aircraft in an emergency.
 - (c) They do not obstruct the evacuation routes from occupied portions of the aircraft in the event of fire, including chute deployment areas.
 - (d) Sufficient clearance is maintained between the fueling equipment and the aircraft wing as fuel is transferred.
 - (e) They are not positioned beneath the wing vents.
 - (f) There is no requirement for vehicles to reverse before departure.
- 4) All other vehicles performing aircraft servicing functions should not be driven or parked under aircraft wings while fueling is in progress.
- 5) All ground equipment such as rostrums, steps etc., should be positioned so that the aircraft settling under the fuel load will not impinge on the equipment.
- 6) If an APU located within the fueling zone or which has an exhaust discharge discharging into the zone is stopped for any reason during a fueling operation it should not be restarted until the flow of fuel has ceased and there is no risk of igniting fuel vapours.
- 7) Aircraft batteries should not be installed or removed nor should battery chargers be connected, operated or disconnected.
- 8) The practice of connecting and disconnecting ground power generators and the use of battery carts to supply power to an aircraft during the fueling process within the fueling zone should be prohibited.
 - ◆ No aircraft switches, unless of the intrinsically safe type, should be operated during this time.
 - ◆ Connections may be made prior to the start of fueling and the circuit should then remain unbroken until fueling has ceased.
- 9) No maintenance work which may create a source of ignition should be carried out in the fueling zone.
- 10) Oxygen systems should not be replenished.
- 11) Extreme caution should be exercised when fueling operations are conducted during the likelihood of lightning and electrical storms.

	Consideration should be given to restricting operations during lightning activity in the immediate vicinity of the aerodrome.
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- 12) Aircraft external lighting and strobe systems should not be operated.
- 13) Aircraft combustion heaters should not be used.
- 14) Only checking and limited maintenance work such as the exchange of units should be allowed on radio, radar and electrical equipment. Any use or testing of such equipment should be deferred until fueling is completed.
- 15) When passengers are emplaning or deplaning during fueling their route should avoid the fueling zone and be under the supervision of an airline official.
- 16) The 'NO SMOKING' rule should be strictly enforced during such passenger movements.

8.4 WHEN PASSENGERS REMAIN ON BOARD DURING FUELING OPERATIONS

To reduce turnaround time and for security reasons, airline operators of fixed wing aircraft may allow passengers to embark, disembark or remain on board during fueling operations provided the following safety procedures are followed—

- 1) Passengers should always be required to disembark when the fuel is AVGAS.
- 2) Fixed wing aircraft with a seating capacity of less than 20 should not be fueled with passengers on board.
- 3) When wide cut turbine fuels (e.g. Jet B, JP4, Avtag) are involved and the fuel being supplied does not contain an anti-static additive, it is advisable that passengers should disembark before fueling.

- At ambient temperatures in excess of 40°C aviation fuels such as Jet A and Jet A-1 may present a hazard if fuel vapours accumulate into the range of flammability limits.
 - Consideration should be given to excluding passengers from the aircraft and hazard area in such circumstances.
- 4) Cabin crew, passengers and other responsible staff should be warned that fueling will take place and that they must not smoke, operate electrical equipment or other potential sources of ignition.
 - ◆ Operators may permit the use of cellular telephones inside the aircraft during refueling.
- 5) The aircraft illuminated 'NO SMOKING' signs should be on together with sufficient interior lighting to enable emergency exits to be identified.
 - ◆ Such lighting should remain on until fueling operations have been completed.
 - ◆ The 'Fasten Seat Belts' signs should be switched off and passengers should be briefed to unfasten their seat belts.
- 6) Provision should be made, via at least two of the main passenger doors, (or the main passenger door plus one emergency exit when only one main door is available), and preferably at opposing ends of the aircraft, for the safe evacuation of passengers in the event of an emergency.

- At ambient temperatures in excess of 40°C aviation fuels such as Jet A and Jet A-1 may present a hazard if fuel vapours accumulate into the range of flammability limits.
 - Consideration should be given to excluding passengers from the aircraft and hazard area in such circumstances.
- 7) Throughout the fueling operation, each of these doors should constantly be manned by at least one cabin crew member per door.
- 8) Two-way communication shall be established and shall remain available by the aircraft's inter-communication system or other suitable means between the maintenance representative, flight crew, fueller or the ground crew supervising the refueling and the qualified person on board the aircraft.
- 9) Ground servicing activities and work within the aircraft, such as catering and cleaning, should be conducted in such a manner that they do not create a hazard or obstruct exits.
- 10) Inside the aircraft cabin the aisles, cross aisles, all exit areas and exit access areas should be kept clear of all obstructions.
- 11) Whenever an exit with an inflatable escape slide is designated to meet the requirements for refueling with passengers on board, the ground area beneath that exit and the slide deployment area should be kept clear of all external obstructions and the fueling supervisor and/or relevant ramp staff informed accordingly.

- 12) The access paths to and from areas where potentially additional slides may be deployed if an evacuation is initiated should remain clear to enable service vehicles and personnel to clear these areas expeditiously if necessary.

8.5 AIRCRAFT EQUIPPED WITH AUTOMATIC INFLATABLE ESCAPE SLIDE

- A. When a loading bridge is in use no additional sets of aircraft steps need be provided.
- B. However, either the left or right rear door should be manned constantly by a cabin crew member and should be prepared for immediate use as an emergency escape route using the automatic inflatable escape slide.
- C. Where slide actuation requires the manual fitting of an attachment to the aircraft, e.g. girt bar, the slide should be engaged throughout the fueling process.
- D. As a precautionary measure when a loading bridge is NOT available for use, one set of aircraft passenger steps should be positioned at the opened main passenger door normally used for the embarkation and/or disembarkation of passengers.

8.6 AIRCRAFT NOT EQUIPPED WITH AUTOMATIC INFLATABLE ESCAPE SLIDE

- A. When a loading bridge is in use, one set of aircraft steps should be positioned at another opened main passenger door and preferably at the opposing end of the aircraft.

Where aircraft are fitted with integral stairways and these are deployed, each maycount as one means of egress.

- B. When a loading bridge is NOT available for use, aircraft passenger steps should be positioned at two of the main passenger doors (i.e. preferably one forward and one aft), which are to be open.

8.6.1 CABIN CREW

- A. Cabin crew are required to supervise passengers and to ensure aisles and emergency doors are unobstructed.
- B. The aircraft operator should ensure that at all times during aircraft fueling with passengers on board, there are sufficient cabin crew on board the aircraft to secure the rapid safe evacuation of passengers if an incident occurs.
 - Passengers (or fraction thereof) on the aircraft, with at least one cabin crew member for each separate passenger compartment.
- C. If, during fueling, the presence of fuel vapour is detected in the aircraft interior, or any other hazard occurs, the fueling supervisor, flight crew, maintenance representative or fueller (who should ensure that he/she has adequate means of communication) should be informed and fueling stopped until it is safe to resume.

8.6.2 FUEL SPILLS

- A. In the event of a fuel spill, action should be taken immediately to stop the fuel flow and ensure that the pilot in command/crew is informed.
- B. The following action may be appropriate although each spill will need to be treated as an individual case because of such variables as the size and location of spill, type of fuel involved, prevailing weather conditions, etc.
- C. In the case of a spill occurring which measures more than two meters in diameter the fueling supervisor, flight crew, maintenance representative or fueller maintenance representative should—
 - 1) Consider evacuation of the area. It is generally safer upwind and upslope of any fuel spill;

- 2) Notify the aerodrome fire service and comply with laid down aerodrome procedures;
- 3) Prevent the movement of persons or vehicles into the affected area and ensure that all activities in the vicinity are restricted to reduce the risk of ignition;
- 4) Ensure that engines of vehicles within six meters of a spill are not started until the area is declared safe.

8.6.3 FUEL MIXTURES

- A. Mixtures of wide cut and kerosene turbine fuels can result in the air-fuel mixture in the tank being in the combustible range at common ambient temperatures during fueling and the extra precautions set out below are advisable to avoid sparking in the tank due to electrostatic discharge.
- B. The risk of this type of sparking can be minimised by the use of a static dissipater additive in the fuel being supplied.
 - When this additive is present in the proportions stated in the fuel specification the normal fueling precautions of this advisory circular are considered adequate.
- C. When fueling with turbine fuels not containing a static dissipater and where wide cut fuels are involved, a substantial reduction in fueling flow rate is advisable.
 - Wide cut fuel is considered to be 'involved' when it is being supplied or when it is already present in the aircraft tanks.
 - It is recommended that when wide cut fuel has been used the fueling supervisor should be informed by the aircraft operator and the next two uplifts of fuel treated as though they too were wide cut.

Where aircraft are fitted with integral stairways and these are deployed, each maycount as one means of egress.

8.6.4 REDUCED FLOW RATE

Reduced flow rate has three benefits—

- 1) It allows more time for any static charge built up in the fueling equipment to dissipate before the fuel enters the tank;
- 2) It reduces any charge that may build up due to splashing;
- 3) It reduces the extension of the flammable range of the fuel that can occur due to misting in the tank before the fuel inlet point is immersed.

8.6.5 SOURCES AND DISSIPATION OF ELECTRICAL ENERGY

- A. Distinct types of electrical potential difference, with the accompanying hazard of spark discharge, are possible during aircraft fueling operations.
 - Electrostatic charge may be accumulated on the surface of the aircraft or fueling vehicle, when conditions are favourable.
- B. The hazard of sparking can be eliminated by ensuring that the fueling vehicle is bonded to the aircraft so that a difference in electrical potential cannot occur between the two.
 - Bonding between the aircraft and vehicle is made by connecting a conductor between designated points on clean and unpainted metal surfaces of both the aircraft and the fueling vehicle.
 - It is extremely important that the bonding connection between the aircraft and fuel supply vehicle or source is made before any filler caps are removed or fueling hoses connected.
 - The bonding connections should remain in place until hoses have been disconnected and filler caps replaced.

8.6.6 TRAINING

- A. It is necessary that all personnel concerned with fueling operations, whether employed by aerodrome authorities, fuel companies or aircraft operators, are adequately trained in the duties they are to perform and are supplied with appropriate instructions and guidance on safe operating procedures.
- B. Personnel should be fully trained and practised in the operation of fire protection equipment provided to cover fueling operations, and the initiation of emergency procedures.
- C. In the case of an operator employing an integrated system of ramp safety all ramp personnel, including service providers, should, in addition to the safety aspects of their specific task, be trained to be aware of the risks and safety aspects of fueling operations that will be conducted while they are performing their duties on or around the aircraft.
- D. This training should enable employees to—
 - 1) Recognise fuel hazards, know how to report them and how to take appropriate action;
 - 2) Follow safe practices and procedures;
 - 3) Work in accordance with instructions issued by their supervisor or line manager;
 - 4) Challenge any unsafe acts, omissions or hazardous conditions and ensure corrective action is taken.

SECTION 9 GROUND HANDLING & RAMP SAFETY**9.1 GENERAL RESPONSIBILITY**

- A. Operators are responsible for the safe ground handling of their aircraft following cargo and passenger loading, refueling, cleaning, catering and the completion of pre-flight maintenance and servicing.
- B. Instructions must be given to ensure that ground handling tasks are carried out in a parking gate manner, that each task is fully and correctly completed, and that any damage is reported immediately.
- C. Where ground handling tasks are contracted out to other organizations, contracts must include the operator's requirements for safe conduct of the task and the performance of the contractor, in respect of safety, must be monitored regularly.

9.2 PRIMARY RESPONSIBILITY

- A. Operators should nominate a person with the responsibility for ground operations, which would include—
 - 1) Airside safety management;
 - 2) The use of airbridges and other means of embarkation/disembarkation for the purposes of evacuation and the subsequent handling of passengers; and
 - 3) The allocation of responsibilities between coordinating agencies for passenger safety during embarkation and disembarkation.
 - B. An aircraft operator and the handling agent involved in emplaning and/or deplaning passengers generally share responsibility for safety while they are moving between the terminal building and the aircraft.
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9.3 COORDINATION OF RESPONSIBILITIES

- A. The allocation of these areas of responsibility should be clearly set out in the operations manual and taught to all staff who are involved. Items should include—
- 1) Responsibility for passenger safety and the point(s), during the embarkation/disembarkation process, at which responsibility for their safety is transferred;
 - 2) How liaison is to be established between an aircraft operator and any appointed ground handling agent to ensure that their individual emergency procedures are compatible and effective;
 - 3) Clarification that any decision to initiate an unplanned disembarkation and the selection of an appropriate method of achieving this is the responsibility of the pilot in command or delegated aircraft crew member;
 - 4) Advice that, in some instances when an aircraft is on parking gate, a precautionary disembarkation using the normal access/egress routes may be more desirable than initiating an emergency evacuation using slides.
 - ◆ Operators must consider when and how such a rapid disembarkation may be safely managed and how staff are to be informed of the intended method.
 - ◆ Consideration should be given to producing a 'rapid disembarkation' checklist procedure for use in circumstances that will not involve the deployment of evacuation slides.
 - ◆ The use of normal egress routes during the initial stages of a rapid disembarkation does not preclude use of evacuation slides if the situation demands.
 - ◆ Crew training should include selection and implementation of appropriate rapid disembarkation or evacuation measures;
 - 5) An instruction that the pilot in command or nominated crew member should be inside an aircraft whenever passengers are embarking, on board or deplaning.
 - ◆ The operations manual must specify how this responsibility is to be discharged.
 - ◆ If the pilot in command is not present during embarkation/disembarkation, then a member of the aircraft crew must be delegated to be responsible for passenger safety;
 - 6) Confirmation that when any passengers are on board or in the process of embarking or deplaning, the pilot in command or the aircraft crew member delegated to be responsible for passenger safety may initiate aircraft rapid disembarkation or evacuation procedures.
 - ◆ This person should broadcast intended actions and the need for external assistance.
 - ◆ Crew training should stress that from the time an aircraft comes on a parking gate until it departs, excluding periods when there are no persons on board, an external means of disembarkation should be available.
 - ◆ Aircraft operators' procedures for arming and disarming evacuation slides should be clearly defined and compatible with the provision of external support;
 - 7) A requirement that when an airbridge is in use, and passengers are on board the aircraft, the pilot in command or the aircraft crew member delegated to be responsible for passenger safety should ensure through the ground service providers that egress from the airbridge into the terminal can be maintained in the event of an emergency.
 - ◆ In this context the term "in use" means the period from when an aircraft stops on the parking gate and the airbridge is attached until the time when, after the aircraft has left the parking gate, it is able to move under its own power;
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- 8) Confirmation that, in exceptional circumstances, if company procedures and arrangements with service providers have not ensured the availability of airbridges when a rapid disembarkation becomes necessary, then evacuation via normal evacuation methods should take place;
 - 9) A requirement to ascertain the availability of an airbridge or steps before deciding what would be the best method to use;
 - 10) A requirement to make no assumption that emergency services have already been alerted.
 - ◆ Training should include specific procedures for the alerting of emergency services should an incident occur during the routine embarkation/disembarkation of passengers and when passengers are on board and the aircraft is parked;
 - 11) A need to ensure that ground handling staff (maintenance, loading and catering staff) whether employed by the operator or under contract to him should ensure that the pilot in command is aware of any emergency situation that is observed;
 - 12) Managing responsibility for an 'out of service aircraft'.
 - ◆ The operator retains responsibility for nominating a suitably trained individual to be in charge of that aircraft when any person is on board e.g. cleaners, maintenance, etc.
 - ◆ Training should include emergency procedures for the rapid disembarkation of occupants of an out of service aircraft should the need occur.
- B. Other ramp safety issues that the operator should address through the person responsible for ground operations, working in co-operation with contracted organizations (who could include handling agencies and airport authorities) to ensure that safety hazards are quickly identified and corrective measures are instituted to the satisfaction of all parties, include—
- 1) Coordination, by the operator, of the ground handling of the aircraft. The operator is ultimately responsible for the safe operation and fitness of the aircraft for the intended flight;
 - 2) The need for disciplined adherence to carefully planned procedures for aircraft handling on the ramp, both to ensure safety of the aircraft and to minimize the danger of injury to, or death of ground handling personnel who include maintenance, agency staff, fueling, loading, catering, servicing and any other persons employed in connection with the arrival, preparation and ground handling of the aircraft.
 - ◆ Risks can be associated with complacency or a lack of awareness of the dangers inherent when in proximity to aircraft, coupled with inadequate training and procedures, poor individual self-discipline;
 - 3) The need to report immediately any damage caused to aircraft by vehicles.
 - ◆ If this is not reported before an aircraft departs, the safety of the aircraft, passengers and crew will be endangered.
 - ◆ The operator is responsible for ensuring that any damage to the aircraft, or failure to close doors and panels etc., is identified prior to flight and that loading, fueling, catering, servicing and maneuvering are safely accomplished.
- Where various elements of ground handling are contracted to service providers, and where regular direct surveillance by the operator is impractical, it is essential that quality assurance personnel, or those of the maintenance organization, participate in the initial contracting process and that they subsequently monitor the agency's performance.
 - Quality involvement should be directed towards the manner in which the agency trains and qualifies its personnel for work on and around the aircraft, including its performance monitoring practices and its response to hazardous actions by personnel.
 - The adequacy and maintenance of ground handling equipment essential to safety should also be taken into account.
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- ◆ This can be achieved by a final inspection carried out by a member of the operator's maintenance or operating staff. Any damage to the aircraft must be reported and assessed for airworthiness significance prior to flight;

SECTION 10 FOREIGN OBJECT DAMAGE (FOD)

- A. FOD can have an economic impact on operators and, in extreme cases, can lead to loss of aircraft and life.
- B. Airport audits have revealed varying amounts of foreign objects on aircraft maneuvering areas including parking gates, taxiways and runways.
 - On one occasion, an aircraft chock was found on a main runway.
 - Other items that have been retrieved have included oil cans, mobile radios, items of ground servicing equipment and catering equipment.
- C. FOD to engine rotating assemblies, causing vibration, has led to aircraft returning to an airfield or diverting, resulting in an engine replacement. Boroscope inspection of engines, following reports of surging, often reveals FOD.
 - Examples of FOD to the airframe include damage to horizontal stabiliser leading edges, pressure hull penetration and landing gear damage. tire tread detachment is a common result of FOD and can result in damage to wings, flaps, lift dumpers, engine intakes and compressors.
 - Aircraft have been lost, with significant loss of life, due to FOD to landing gear tires. tire tread detachment often occurs within a few take-offs/ landings of an earlier penetration of the tread by a foreign object.
- D. Operators should consider the following measures as part of their FOD Awareness and Prevention Campaigns—
 - 1) Implementing procedures to prevent their aircraft being positioned on arrival/ departure parking gates that do not meet acceptable levels of cleanliness.
 - 2) Placing the topic of FOD on parking gate agendas for all airport users committee meetings and internal safety meetings.
 - 3) Nominating an individual with responsibility for the implementation of its policy on FOD.
 - 4) Including the subject of FOD in induction and continuation training programs for all staff.
 - 5) Including potential FOD hazards in their ramp area audits.
 - 6) Ensuring that contracted aircraft cleaning and ground handling organizations have sufficient procedures in place to help reduce potential FOD hazards.
 - 7) Encouraging flight deck crews to report parking gates contaminated by foreign objects to the airport authority immediately and not to start engines until any item, adjacent to the engines and likely to cause FOD, is removed.
 - 8) Encouraging flight deck crews to report concerns of the levels of foreign object hazards at overseas airports, internally within the airline.

SECTION 11 HAZARDS TO PASSENGERS ON THE RAMP

- A. At aerodromes passengers may have to walk across the ramp between the terminal building and the aircraft. This may expose passengers to hazards such as vehicles moving across the ramp.
 - The risks of injury are increased as passengers are vulnerable and generally unaware of the dangers around them.
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- Furthermore, passengers may inadvertently (or even deliberately) damage aircraft.
 - The aircraft operator, the airline operator and ground handlers all have responsibility for ensuring that the movement of passengers is strictly supervised and controlled.
- B. The aircraft operator has a responsibility to provide an aerodrome that is safe for its users. In designing the aerodrome layout and facilities, the aircraft operator is able to make a significant contribution to the safety of passengers.
- For example, when the aircraft operator provides airbridges, passengers are not exposed to any of the hazards on the ramp.
 - Where the provision of airbridges is not reasonably practicable, the aircraft operator should ensure that the layout and marking of airside areas enables the safe movement of passengers to and from the terminal areas.
- C. The steps that can be taken to ensure passenger health and safety on the ramp will vary from aerodrome to aerodrome and from parking gate to parking gate, but will include the following measures—
- 1) Passengers should not be permitted to roam free;
 - 2) Where possible, the aircraft operator should ensure that permanent traffic routes, e.g. aerodrome roads or taxiways, do not dissect the path between the terminal and the aircraft;
 - 3) Where this is not possible the aircraft operator should provide safe routes marked on the ramp surface (including safe crossing points for the ramp roads) and clear, unambiguous signs to indicate the route to be followed.
 - ◆ Positive control of vehicular traffic may be required from the airline or handling agent; co-ordination and co-operation with the aircraft operator may be necessary to achieve this;
 - 4) Safe routes can also be indicated by the use of moveable barriers and chains to create a temporary safe route across the ramp for passengers to follow.
 - ◆ When not in use, it is important that such equipment is properly stowed to ensure that it does not become a source of FOD;
 - 5) Routes to the aircraft should not pass below aircraft wings or beneath fuel vents, or close to propellers or rotors of the aircraft they are boarding/deplaning or those of aircraft on adjacent parking gates.
 - 6) Routes should also be clear of vehicular traffic around the aircraft, electrical cables, fuel hoses and other ramp equipment;
 - 7) Restrictions should be placed on the running of aircraft engines in the vicinity of passengers and positive measures should be taken to protect them from excessive engine noise and jet blast;
 - 8) Staff should be positioned on the ramp to ensure that passengers follow a safe path to the terminal/aircraft. If necessary, passengers should be led from the aircraft or terminal;
 - 9) Passengers should be informed of the safe route they should follow into the terminal/aircraft, e.g. by public announcement before they leave the aircraft/terminal;
 - 10) For remote parking gates or parking gates in a different location to the terminal lounge, passengers should be transported to the aircraft by bus; and
 - 11) Information on emplaning and deplaning passengers could form part of the turnaround plan.
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- D. Relying solely on informing passengers of safe routes and marking them out is unlikely to be adequate for commercial passenger operations.
- Whenever passengers are to walk across the ramp there should be sufficient staff to ensure that passengers do not wander away from safe routes.
 - If there are insufficient staff, then passengers may need to be disembarked or boarded in small groups which can be adequately controlled by the available staff.
- E. Responsibility for ensuring that passengers are safeguarded between the aircraft and the terminal building is shared between the airline, aircraft operator and any ground handlers involved.
- It is vital that it is clear who is responsible for providing staff to supervise and/or escort passengers across the ramp, and that sufficient numbers of staff are provided.
 - Clearly, any contracts will need to take this into account.
 - Failure to supervise passengers properly may lead to accidents with serious consequences for all involved.
- F. Consideration should be given to unusual circumstances, such as evacuation of terminal buildings or aircraft, in which passengers and other members of the public may be required to enter airside areas.
- Procedures should ensure that responsible persons who are familiar with the hazards that exist in airside areas are present to supervise passengers and members of the public as soon as practicable wherever there is emergency egress.
 - Consideration should also be given to methods by which aircraft movement and other sources of hazard may be stopped in areas in which passengers and members of the public may congregate with limited supervision.

SECTION 12 MOVING AIRCRAFT

The movement of aircraft on the ground, either under their own power or towed, creates a number of hazards that are unique to the aviation industry. In particular operating jet or propeller engines can cause fatal or serious injuries and extensive damage to equipment or other aircraft.

12.1 AIRCRAFT PARKING SAFETY PRACTICES

12.1.1 OPERATION OF THE PARKING GATE

- A. This section describes typical responsibilities and accountabilities for the operation of aircraft into and out of the parking gate.
- Relationships might vary from aerodrome to aerodrome due to differing contractual arrangements or other owner/operator agreements.
 - Each aerodrome must establish its own hierarchy of responsibilities and then work to establish agreed safe working practices within that framework.
- B. The aircraft operator is responsible for the rules and procedures that safeguard the arrival and departure movements of aircraft on parking gates and for the dissemination of information to airline/company operators.
- Information documents/instructions and requirements should be based upon the subjects described in the following paragraphs.

12.2 "OWNERSHIP" OF PARKING GATE/PARKING BAY

- A. In general the aircraft operator has the responsibility to ensure that aircraft parking gates remain serviceable, clean and free from obstruction. However, in the busy operation of
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the ramp, with minute to minute changes of status and vehicle/equipment movements, there will also be specific responsibilities for handling staff.

- B. When a parking gate is allocated for use to an aircraft operator and the arrival of their aircraft on parking gate is imminent, it is usually the responsibility of the handling staff to ensure that the parking gate and clearways are free from obstruction by vehicles or equipment.
- These staff should also ensure that the airbridge(s) is (are) fully retracted or correctly parked with the drive wheels in the parking box provided before the arrival of the aircraft.
 - These actions must be completed by the handler before the VDGS is switched on. Switching on the VDGS will normally signify to the pilot in command that these actions have been completed and it is safe for the aircraft to enter the parking gate.
 - Once the VDGS is switched on, the parking gate must remain under supervision until the aircraft arrives on parking gate in order to ensure that it remains safe for use by the aircraft.
 - If for any reason the parking gate becomes 'unsafe' or unattended before the aircraft has arrived on parking gate the VDGS should be switched off or 'STOP' indicated using the Emergency Stop System if necessary.
- C. A supervisor should be assigned to control and manage the various states of the operation and should be clearly identified to all staff working on the parking gate.
- The supervisor should be working to an agreed plan for the turnround and should have sufficient authority to control the activities around the aircraft.
 - The supervisor should be present throughout the arrival, handling and departure procedures.
- D. The plan for the turnround should describe how the turnround will be carried out. It should enable every person involved to carry out their work safely and without endangering others or the aircraft.
- All the companies involved should have a copy of the plan and have accepted their roles and responsibilities.
- E. Points to consider in the plan include—
- 1) How the supervisor for the turnround or handling agent will carry out their work;
 - 2) Common arrangements, such as what to do in an emergency and minimum personal protective equipment needs;
 - 3) The signal that it is safe for vehicles, equipment and people to approach the aircraft;
 - 4) The order in which they should approach;
 - 5) The positions they should take up, to make sure everyone can get to and from the aircraft safely and without damaging the aircraft;
 - 6) Any differences between aircraft and parking gates which affect how the turnround should be carried out; and
 - 7) Ensuring clear and rapid egress for aircraft refueling vehicles.
- F. When turnround operations have been completed and the aircraft is ready to depart airline staff should ensure that the parking gate is free from obstruction by vehicles and equipment before push-back commences.

12.3 AIRCRAFT PARKING SAFETY CONSIDERATIONS

- A. In general, some of the greatest threats to the safety of an arriving aircraft are carelessly driven vehicles, indiscriminately parked or stowed ground equipment and misleading markings or signals.

- B. Ground equipment should be/remain parked in the equipment areas provided, service vehicles and baggage carts should hold clear and equipment such as ground power units, or any other gear with trailing cables or hoses should be fully retracted and stowed.
- C. The parking gate must be clear of all obstructions when an aircraft is in motion. Other considerations for the safe docking and parking of an aircraft are described in the following paragraphs.
 - In areas or parking gates that can accommodate a number of variations of aircraft parking arrangements there are often complex signs or markings, only some of which are appropriate for specific aircraft.
- D. It is important to minimize the possibility of this information being misinterpreted by a pilot by ensuring that—
 - 1) Information that is not relevant for a particular aircraft is suppressed if possible, and
 - 2) All staff who may be involved in activities in the area are fully trained in the appropriate configuration for all aircraft types that may use the parking gate.

12.3.1 CONTROL OF THE OPERATION

- A. Handling staff are responsible for many aspects of the control of the parking/docking operation once the aircraft has entered the parking gate.
- B. A marshaller is responsible for guiding the aircraft in to the parking gate.
- C. Local instructions should clearly indicate the point at which responsibility is transferred from the marshaller to the handling staff.
- D. The nominated supervisor should control the progress of the operation and the actions of the handling team.

12.3.2 BRAKES/CHOCKS

- A. On arrival, when the aircraft is positioned to the pilot's satisfaction and finally stopped, the appropriate aircraft wheelbrakes should be engaged by the pilot until the aircraft has been safely and properly chocked (emergency situations such as dangerously hot or failed brakes will need to be dealt with under company procedures).
- B. Wheel chocks should not be inserted until the pilot has indicated that the aircraft has finally stopped, and any propellers have stopped turning.

When not in use chocks should be safely stowed and not left on the ramp surface.
- C. In addition to hand signals, the pilot of a jet-engined aircraft will commonly indicate that it is safe to insert chocks by shutting down the engines.
- D. To avoid the possibility of the aircraft climbing its chocks, or chocks being ejected, ground stopmarks should not be used as a positive indication to insert chocks or that the aircraft has reached its final position.

12.3.3 FLAP & CONTROL SURFACE MOVEMENT

- A. Staff should be aware of the dangers of the movement of aircraft flaps and other underwing devices when an aircraft is on parking gate.
 - B. These areas should be avoided by staff and vehicles and equipment should not be driven or parked in such a way that damage would be caused by flap and other control surface movements.
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12.3.4 WHEELS

- A. When an aircraft is in motion staff should keep well clear of all wheels to avoid becoming trapped. When an aircraft arrives on parking gate, tires and particularly brake assemblies can remain very hot for some time.
- B. Ramp staff should exercise care when required to work in the vicinity of aircraft wheels.
- C. Where there is some free movement of aircraft wheels, care must be exercised to ensure that clothing and hands or feet do not become trapped.

12.4 MARSHALLING OF AIRCRAFT

The marshalling service is normally, but not necessarily exclusively, provided by the aircraft operator. The principal considerations are as follows—

- 1) The aircraft operator as part of its safety management system should provide for the training, testing and authorization of aircraft marshallers.
- 2) Marshalling signals, as outlined in AC-10-001, Universal Aviation Signals, should be employed.
- 3) Only trained, experienced marshallers in regular marshalling practice should be permitted to marshal aircraft unsupervised;
- 4) Except where full self maneuvering is permitted, a marshalling service should be provided automatically on parking gates not equipped with VDGS or where the VDGS, or other parking gate facilities have known unserviceabilities.
- 5) A marshalling service should also be available on request;
- 6) In certain circumstances, such as a non-parking gate or taxiway routing or on request from a visiting pilot, unfamiliar with the aerodrome, and/or in poor visibility, a 'Follow me' vehicle should lead the pilot to a marshaller or his parking place directly.

12.5 AUXILIARY POWER UNITS

- A. To reduce noise and contamination from oil and exhaust emissions, the running of all types of engines on the ramp should be kept to the minimum necessary to maintain operational needs.
- B. Where Fixed Ground Power (FEGP) units are provided on parking gates they should be used in preference to other forms of auxiliary power.
- C. The running of aircraft Auxiliary Power Units (APUs) and engine driven Ground Power Units (GPUs) should be strictly controlled to the minimum operational requirement.
- D. At large aerodromes consideration can be given to the provision, on parking gate, of preconditioned air units to reduce the running of APUs for cabin conditioning.

Airlines should be encouraged to use GPUs with the quietest engines available.

12.5.1 AIRCRAFT ARRIVAL

12.5.1.1 Safety at the Parking Gate

- A. Fundamental to the safe, smooth and professional management of an aircraft movement is the timely attendance of the dispatcher/airbridge operator to initiate those actions necessary to promote a safe arrival sequence.
- B. A full functional check of the airbridge should be completed in good time before the aircraft arrives.

- C. To maintain aircraft and personnel safety and to ensure that the prescribed safe clearances between aircraft and bridge are maintained the following precautions should be observed—
- 1) Before the aircraft enters the parking gate, ensure by personal visual inspection that there are no potential hazards to a safe parking operation;
 - 2) Before the aircraft enters the parking gate, the drive wheels of an ramp-drive bridge must be positioned in the marked parking box provided or, in the case of a rail-drive airbridge, must be fully retracted;
 - 3) Before the aircraft enters the parking gate, confirm that the parking gate is set up for the approaching aircraft type;
 - 4) A careful check should be made to ensure that no vehicles or equipment are obstructing the horizontal or vertical movement of the bridge while ensuring that the airbridge remains in the appropriate position;
 - 5) The airbridge cab should be adjusted vertically and in azimuth to suit the incoming aircraft type;
 - 6) Only when the aircraft has stopped; the wheel chocks are in place; the engines have run down and the aircraft anti-collision beacon has been extinguished, can the airbridge be driven from its parking position and docked to the aircraft;
 - 7) The aircraft passenger door should remain closed until the airbridge had been docked, the canopy has been lowered on to the fuselage and the autoleveller device has been set;
 - 8) The airbridge operator should remain in attendance in the cab until passenger disembarkation is completed.

12.6 AIRCRAFT DEPARTURE

To avoid damage and to maintain the prescribed safe clearance from the airbridge the following precautions must be observed before aircraft push back is initiated—

- 1) The aircraft passenger door must be closed;
- 2) The airbridge canopy and autoleveller must be retracted;
- 3) The airbridge safety barrier should be erected or the doors should be closed;
- 4) An ramp drive bridge should be withdrawn and the drive wheels placed in the parking box provided;
- 5) A rail drive bridge should be fully retracted; and
- 6) A check should be made that there are no vehicles, equipment or personnel obstructing the movement of the airbridge before it is moved.
- 7) A check should also be made to confirm that the ground equipment is configured to meet any specific settings for the aircraft type.

12.7 POWERING OF AIRCRAFT ON THE RAMP

12.7.1 PARKING GATE CONFIGURATIONS

- A. Power-in is a procedure where an aircraft enters an ramp, parks and subsequently departs, at all times under its own power.
 - B. The principal methods of parking gate configuration are angled nose-in, angled nose-out and parallel-parking;
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- C. Each method involves the adjacent ramp area in being subjected to high levels of engine blast, noise and fumes at some stage of an aircraft movement.
- D. Taxi-through parking gates can also be used for powering-in and the blast effects are relatively less, but opportunities for this layout are generally few.
- E. Powering-in operations offer a saving on aircraft tugs and ground crews but the layout of parking gates requires approximately double the ramp area of conventional nose- in push-back operations.
 - Due to the relatively high levels of engine power likely to be used for powering-in, there is an increased potential safety threat to buildings, installations, vehicles, equipment and personnel and passengers which must be controlled and managed.
- F. Before deciding to adopt powering-in operations aerodromes should consider other methods of aircraft handling. Powering-in on open, unmarked ramps should be subject to special procedures and a marshalling service should be available at all times on aircraft arrival. The aircraft operator should determine which combination of aircraft parking gates and conditions require a marshalling service on departure.

12.7.2 SAFETY CONSIDERATIONS

Where powering-in is employed aircraft operators should ensure that the following arrangements and requirements are met—

- 1) Parking gate entry routes, parking positions and departure routes should be marked with parking gate and paint markings, in accordance with the appropriate parking gateards;
- 2) Buildings and installations adjacent to power-in parking gates should be constructed to with parking gate the engine blast or be protected by blast screening;
- 3) Vehicles and equipment should not be placed in a position where they can be affected by blast; equipment parking areas should be protected by blast screens or located remote from the parking gates;
- 4) Passenger areas and ramp staff working areas should be protected by blast screens. Passengers should not be subjected to blast, excessive noise or fumes;
- 5) Safety instructions should be issued, specifying the maximum aircraft sizes to be permitted on individual parking gates so as to ensure that the prescribed safe clearances are maintained.
- 6) Power-in parking gates should be inspected regularly and kept clear of any FOD in order to minimize the risk of ingestion.



Pilots should also be required to exercise caution and use the minimum engine power settings needed to complete a satisfactory maneuver.

12.7.3 AIRCRAFT DEPARTURE

- A. Aircraft departure is a critical phase of any flight, with loaded aircraft operating at maximum gross weights. There are often pressures that often call for expeditious movement to meet schedules, clearances and 'slot' allocations.
- B. Aircraft that use the aerodrome only infrequently may require special attention from service providers because procedures may not exist for the specific aircraft type or variant.



This is a time when cautious, consistent behavior is required.

- For example, written instructions should be requested by ground crews loading cargo or baggage onto aircraft with which they are not familiar.
- C. For the purposes of this section the departure phase is considered to be from the time the aircraft starts an engine, or push-back movement starts if earlier, to the point where taxi clearance is issued by ATC.

12.7.4 PUSH-BACK PROCEDURES

- A. Aircraft push-back operations have the potential for accidents involving personal injury/fatalities for ground crews and damage to aircraft, vehicles and equipment. As part of their safety management system, aircraft operators should establish and develop general rules and requirements for the safe conduct of push-back operations.
- B. The development of detailed procedures, within the guidelines issued, may remain the responsibility of airline operators/service providers.
- C. Aircraft operators should maintain safety management arrangements to audit compliance with push-back requirements.
- D. When considering rules for push-backs the following should be taken into account—
- 1) Detailed, written operating procedures should be produced by airline operators/ service providers for use by their staff.
 - ◆ These procedures should ensure the safety of the aircraft and the personnel involved;
 - 2) Unless required to ensure the safety of the aircraft, all personnel involved should stay within the aircraft tug.

	Any personnel working outside the aircraft tug, such as those 'walking the nose wheel', are particularly vulnerable to injury.
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 - 3) All tug drivers should be qualified to drive aircraft tugs in all weather conditions.
 - ◆ Drivers should be trained in these procedures and certificated as competent by a training officer, assigned and named by the airline management.
 - ◆ Push-back crews should be thoroughly familiar with push-back procedures;
 - ◆ Push-back supervisors should be nominated, trained and certificated as competent;
 - 4) The supervisor should, ideally, be in speech contact with the flight deck crew throughout the push-back.
 - ◆ Where there is a possibility that speech communication will not be available for any reason, the supervisor should be trained to use internationally agreed hand signals;
 - 5) Where risk assessment has shown it to be advisable, qualified persons functioning as wingwalkers should be used to safeguard the rearward movement of the aircraft and prevent collisions with other aircraft, vehicles or personnel.
 - ◆ Procedures for these personnel should be written down and should ensure the safety of the aircraft and the people involved.
 - ◆ Personnel should be trained to ensure they are familiar with the procedures;
 - 6) All push-back crew members should wear high visibility garments in compliance with current parking gateards;
 - 7) In the case of a departing aircraft being pushed back from its parking gate, the pilot of the aircraft will obtain approval to push back from ATC and pass this information to the tug driver.

12.7.5 UNPOWERED AIRCRAFT HANDLING

- A. In addition to the above considerations, the handling staff pushing back an unpowered aircraft for towing will need to consider the following—
- 1) A trained staff member will normally be required to occupy the flight deck to—
 - (a) Control the brakes,
 - (b) Monitor radio contact between tug/aircraft and ATC and
 - (c) Control the aircraft's anti-collision and, if appropriate, navigation lights
 - 2) As soon as a tug is assigned a task associated with the movement of an aircraft on any part of the maneuvering area the tug driver must normally—
 - (a) Establish contact with ATC; and
 - (b) Obtain a specific ATC clearance before entering the maneuvering area.
 - (c) The tug driver will normally be instructed to advise ATC when the maneuver is complete
 - 3) while an aircraft is under tow, the tug driver is responsible for the safety of the aircraft, just as the pilot in command is when it is taxiing.
 - 4) When towing an aircraft, it is particularly important to be aware of the extent of the extremities, such as wingtips, of the aircraft and their proximity to obstructions.

	<p>Regardless of any instructions issued by ATC, the tug driver is responsible at all times for ensuring that the aircraft does not collide with vehicles, aircraft, buildings or other obstructions.</p>
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 - ◆ In the event that a tug driver is unsure whether there is sufficient space for an aircraft under tow to be moved safely, he or she should safely bring the aircraft to a stop and request assistance.
 - ◆ If the aircraft stops on the maneuvering area for this reason, the driver should advise ATC.
 - 5) For safety reasons it is important that the number of persons on board the aircraft is known for local ground movements.
 - ◆ Companies involved with ground movements should ensure that tug drivers ascertain the persons on board.
 - ◆ In the event of an incident or other unusual circumstances involving the towed aircraft, the tug driver should be able to advise firefighters.
 - 6) When an aircraft is being towed during the hours of darkness or low visibility, it must display those lights which would be required when flying, i.e. navigation lights. Logo lights will usually be of assistance to ATC
 - 7) During low visibility situations it is essential that all vehicles operating on the airfield operate in accordance with the safety requirements developed for these situations and exercise extreme caution particularly when operating on the maneuvering area.

12.7.6 POWER-BACK PROCEDURES (REVERSING UNDER POWER)

- A. Powering back an aircraft is inherently less directionally accurate than push-back or powering forward.
- There will be an increase in noise and blast effect.
 - The use of this technique should be limited to those aircraft types authorized in the aircraft's flight manual to reverse under power and for which procedures can be agreed which do not adversely affect ramp safety in respect of engine noise, vibration and blast effects.

- B. Before approving power-backs the aircraft operator should take into consideration aircraft characteristics, ramp layout/parking gate density, the parking gate clearances available and any gradients involved on parking gates or taxiways.
- C. Before approval is issued to an airline, for a particular aircraft type, the aerodrome operator should satisfy itself that the intended operation will be safe and will not give rise to unacceptable levels of noise, vibration, blast or fumes on the adjacent ramp areas.
- D. The following minimum requirements are recommended—
 - 1) The procedures are authorized in the aircraft manufacturer's manual;
 - 2) The procedures to be used are incorporated in the airline's operations manual;
 - 3) Pilots are trained and experienced in power-back operations;
 - 4) The aircraft is directed by a trained handling agent/marshaller using parking gateard power-back marshalling signals;
 - 5) Wing walkers are employed to safeguard the rearward movement of the aircraft, particularly wing tip clearances, to prevent collisions with other aircraft or vehicles or personnel.
 - 6) Procedures, training and personal protective equipment should be employed which ensure the safety of these personnel during powerback operations;
 - 7) A trial is observed of a live powerback using the engine settings, aircraft weight and procedure intended for operational use in which the safety of the operation is demonstrated.
- E. The aircraft operator should assess the effects of noise, vibration, blast and fumes, observed during the trial, in order to decide the suitability of the procedure demonstrated. It is not possible to state the finite limits of noise, blast and fumes to suit all locations and all aircraft types; aircraft operators should decide the local limitations to be met.
- F. Power-back operations should not be permitted when passengers are being boarded or disembarked on adjacent parking gates unless it is necessary for operational reasons.
 - In such circumstances, the aircraft operator should specifically consider and assess the associated risks and put in place control measures to reduce these risks to as low a level as reasonably practicable.

12.7.7 MULTIPLE PUSH-BACK PROCEDURES

- A. Multiple aircraft push-backs from a run of parking gates, or in a cul-de-sac, are an accepted method of achieving a faster push-back and departure rate, but they must be conducted with due regard to the additional health and safety requirements that occur for ground crews and for overall aircraft safety.
 - B. Approval for start of 'push-back' normally rests with ATC and if there are ramp areas of an aerodrome where the ground movement controller does not have a full view of the aircraft, then any procedures must take this into account.
 - C. The principal safety threats in push-back operations where aircraft end up positioned nose to tail are—
 - 1) Aircraft positioned too close to each other when the push-back phase is completed.
 - 2) Excessive levels of engine blast and fumes for push-back crews positioned behind another aircraft that has started or is starting its engines.
 - D. In order to avoid excessive blast and fumes, the safe separation distance behind an aircraft will vary according to aircraft type and engine fit.
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- It is impractical for push-back crews or operational staff to measure exact distance each time, therefore, a practical rule of thumb should be established to permit multiple push-back operations to be managed and sequenced safely.
 - Experience gained from other aerodromes may be useful in deciding what practical separation distances can be used with safety, but in any event safe separation distances should be established through a risk assessment.
 - Aircraft maintenance manuals will also include guidance on this topic.
- E. The acceptance of a clearance from ATC to push-back into an area in which other aircraft are being maneuvered will normally assume that the prescribed safety distance criteria will be achieved.
- The decision to accept a clearance for a 'multiple push-back' remains with an pilot in command as does the responsibility to ensure that the push-back crew are fully aware of any limitation or conditions to be adhered to.
 - Clearly there is a need for prior planning, co-ordination and information exchange between the aircraft operator, the operators and ATC before such maneuvers are adopted as parking gateard practice as any aerodrome.

12.7.8 HIGH-VISIBILITY CLOTHING

In addition to other measures that are taken to provide a safe environment for personnel working in airside areas, all personnel who will be working outside (i.e. on foot) on the movement area should wear high-visibility clothing.

SECTION 13 ENGINE HAZARDS

- A. There is a clear operational need for the running of aircraft engines on ramp areas. The associated safety hazards caused by exhaust blast, vibration, fumes, turning propellers and rotors and the intake suction of jet engines are well recognized.
- B. As part of the safety management system, aircraft operators should ensure that rules and procedures for safe engine running on the aerodrome are developed and understood by flight crews and handling staff.

13.1 BLAST, VIBRATION, NOISE & FUMES

- A. Even at idle power the blast effects, vibration and fumes from all sizes of aircraft engines can be significant. As engine size and power settings are increased, the potential for personal injury and damage increases.
- B. The amount of fumes produced is directly related to the engine running time and the power settings used.
- C. Engine running on the ramp and adjacent taxiway areas should be limited to the minimum necessary to meet aircraft operating needs.

13.1.1 GENERAL

- A. Vehicles and personnel should not pass behind running engines. Staff must not approach running engines unless it is part of their job function and is necessary for the task at hand, in which case a risk assessment of the operation leading to control measures which will protect aircraft safety and staff health and safety is required.
- B. Drivers and pedestrians should be vigilant at all times on the ramp.
- A common indication to handling staff that aircraft engines are running, or are about to be started, is the illumination of the aircraft's anti-collision beacon(s).

- The absence of such illumination should not be regarded as proof that the engine is safe to approach and the presence of blast and engine noise may not be immediately obvious to a driver in a vehicle or a person wearing ear plugs.

13.1.2 ENGINE MANAGEMENT ON AIRCRAFT ARRIVAL

When turning on to a parking gate, it is desirable that flight crews use the minimum power needed to carry out a normal arrival maneuver.

- 1) Where possible the aircraft should be kept moving to avoid the need to apply 'break away' power to continue the approach to the parking gate. This is particularly important in cul-de-sac locations.
- 2) Flight crews should be reminded of the need to avoid the use of high power settings on live engines when others are shut down.
- 3) Thrust levers should not be exercised for any purposes when the arriving aircraft is on parking gate, unless specifically approved by the aircraft operator.
- 4) The aircraft anti-collision beacon(s) must remain on until engines have run down or propellers/rotors have stopped rotating.

13.1.3 ENGINE MANAGEMENT ON AIRCRAFT DEPARTURE

- A. A trained member of airline or handling staff should ensure that the area behind the aircraft and the zone immediately in front of the engine intakes are clear of personnel, vehicles and equipment before engine start.
 - The aircraft anti-collision beacon(s) must be switched on before an engine is started.
 - The number of engines started before push-back commences should be the minimum to meet technical and passenger-service needs.
 - During start up and push-back, engine power settings should not normally exceed ground idle.
- B. Wide body aircraft should not normally be permitted to start more than one engine until the aircraft is aligned with the centerline of the taxiway/taxilane and ground personnel are clear of the aircraft.
- C. Aircraft leaving the inner parking gates of a cul-de-sac should be towed forward to a safe distance from the blast screen before the tug and towbar are disconnected. This position should be marked on the taxiway centerline for guidance of tug-crew.
- D. Three-engined aircraft should not start the top engine until the aircraft has been aligned with the taxiway and is at a safe distance from buildings/blast screens. This position should be marked on the taxiway centerline for the guidance of the tug crew.

13.1.4 ENGINE TEST RUNNING

Engine runs and check starts should be controlled and only carried out with the prior approval of the aircraft operator who should specify the conditions to be applied, for example—

- 1) Where possible, engine runs should be carried out on agreed, selected and prepared remote areas, preferably equipped with engine baffles/detuners;
 - 2) Engine runs at above idle power should not be permitted in cul-de-sacs or, for example, in areas where the jet discharge would impinge on parking gates, equipment areas or works areas;
 - 3) Engine runs approved on parking gates in regular use in ramp areas should be limited to check starts and idle power only;
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- 4) Where engine running is permitted on the ramp, a remote area should be chosen where the jet-blast will not effect other ramp areas and busy taxiways;
- 5) Where necessary, engine runs should be safeguarded by maintenance staff who should arrange for any rear of parking gate roads to be closed and, if needed, sections of taxiway;
- 6) The area behind and adjacent to the cone of the blast should be clear of equipment and the ground must be firm and without loose tarmac, stones or other material.

13.1.5 FUMES & NOISE

- A. In approving engine running or self maneuvering on the ramp the following should be taken into account—
 - 1) The concentration of fumes present in an aerodrome area is in direct relation to the time engines are run, the type of engine and power settings used and the strength and direction of the surface wind;
 - 2) To prevent an unacceptable noise nuisance and build-up of fumes, the running of engines in the direct vicinity of buildings, workplaces and congregations of staff or passengers should not be approved;
 - 3) Where workplaces, such as cargo-sheds and engineering facilities, have to open directly on to parking gate areas, a specific risk assessment is required to determine how best to operate all facilities safely and without risks to health, in respect of noise and fumes.
- B. Aircraft operators should develop policies and procedures to minimize the effects of engine noise, vibration and fumes on their local population.

13.1.6 SUCTION - INGESTION

- A. The intake suction of jet engines is a hazard, even at idle power, and the flow characteristics of air into an engine are such that items can be picked up from in front of, from below, and from the sides of the intake.
 - Even small items ingested can damage the engine, but the larger engines are quite capable of ingesting large objects from several meters away with catastrophic effect.
- B. The extent of the danger zone depends on the size of the engine, the mounting height and the power setting.
 - Managers of aircraft handling staff should calculate and develop to their staff the safe distances for operating around the types of aircraft they operate.
 - Personnel entering the danger zone in front of a running jet engine expose themselves to the risk of being sucked in, almost invariably resulting in serious or fatal injury.



13.1.6.1 Foreign Object Damage

- A. Foreign object damage' or 'foreign object debris', both abbreviated to FOD, are a potential source of catastrophic damage to aircraft - particularly engines.
 - FOD can also be a tripping or slipping hazard resulting in injury to personnel and passengers.

B. As part of the safety management system, aircraft operators should include instructions, services, facilities and initiatives to combat the risks arising from FOD.

- The aircraft operator should establish a program to educate all ramp users on the hazards and requirements associated with FOD.
- Stress the responsibilities of all personnel employed on the ramp to minimize risks from FOD.

C. Aircraft operators must ensure that there are programs of regular ramp sweeping, cleaning and inspection, including rapid reaction to fuel and other liquid and chemical spills.

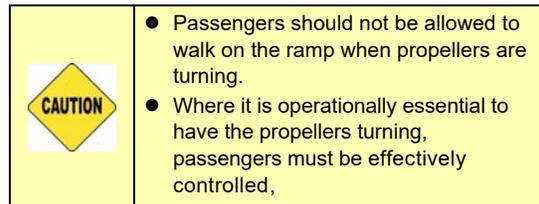
- Facilities should be provided for the disposal of solid and liquid aircraft waste and FOD protection.
- Particular attention should be given to such prime FOD generators as service providers' areas and baggage facilities.

13.1.7 PROPELLERS

A. Aircraft operators should issue instructions to safeguard ramp operations around propeller driven aircraft. ramp staff must be alert to the dangers of running propellers and should be stimulated by suitable awareness campaigns.

B. At some aerodromes there are relatively few propeller driven aircraft currently and ramp staff are likely to be less familiar with the precautions to be observed, particularly for staff of airlines which themselves offer no propeller driven services. aircraft operators should also ensure that the safeguarding of 'propeller areas' is included in airline operating procedures.

C. Aircraft operators should provide suitable ramp layouts and facilities that provide proper clearances for the operation of propeller aircraft types.



D. particular emphasis should be placed on ground clearance for propeller tips and the proximity of airbridges and other ramp equipment when the aircraft is at, or approaching, its parking position.

- Parking gates at which this cannot be achieved should not be used for propeller aircraft.

13.1.8 ROTORS

A. Helicopter operations, particularly those of large helicopters, should be segregated from fixed-wing ramp operations where possible.

B. In addition to the provision of parking gate standard clearances for rotors in the ramp layout, due regard should be given to the other characteristics of rotary operations, including—

- 1) The heavy down draft produced by helicopter movements;
- 2) The vulnerability of helicopters and aircraft to jet blast, strong winds and rotor downwash from other helicopters;
- 3) The risk of reduced ground clearance caused by the drooping of the rotor (blade sailing) as it runs down following engine shut down or drive disconnection;
- 4) The ease of approach to the chosen helicopter parking gates in hover and hover-taxi mode and the least interference from/for taxiing fixed wing aircraft;
- 5) The risks associated with tail rotors.

- C. Dependent on aircraft type characteristics, procedures should include arrangements where—
- 1) Helicopter arrivals are marshalled, unless the helicopter ramp is remote and configured for power-in. Marshalling assistance/safeguarding may also be required for departure;
 - 2) Ideally passengers should not be allowed to walk on the ramp when rotors are turning.
 - 3) Where it is operationally essential to keep rotors running passengers must be effectively controlled;
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 - Staff, vehicles and ground equipment should remain well clear of the rotor disk until it has come to rest.
 - If running the rotors is essential, the handling staff must be trained to work in that situation.
- D. The aircraft operator should establish that they and their service providers have arrangements in place for the following—
- 1) The treatment and de-icing of ramps and airside roads, with particular attention to taxiways, parking gates and push-back areas;
 - 2) The clearance and de-icing of critical areas peripheral to parking gates such as loading bridge movement areas, bridge steps and drive wheels, passenger routes (including external steps and ramps), FEGP units and other fixed service equipment.
 - ◆ The de-icing method should not introduce slip and trip hazards of its own;
 - 3) Where an aircraft is occupying a parking gate, the use of sprays or other means to clear and de-ice aircraft wheels, wheel runs/ruts and access routes for loading baggage, freight and catering;
 - 4) When meteorological frost/snow warnings are received and when freezing conditions are expected or observed, warnings should be transmitted to all ramp operators and staff by the best local means;
 - ◆ Additional ramp inspections should be introduced to detect freezing hazards;
 - 5) Where possible, ramp areas should be set aside for the parking of aircraft de-icing rigs and the storage of bulk de-icing agents.
- Only anti-icing and de-icing agents specifically approved for use on aircraft or airside areas should be used.
- E. Airlines and operators should be required to take special care to avoid spills of water on ramps during freezing conditions and the washing of vehicles/equipment and the flushing of tanks, except into containers, should be prohibited in all airside areas.
- F. Airlines and operators should be urged to undertake self-help measures to clear and de-ice equipment and vehicle parking areas and should be required to remove their equipment from such areas to enable clearance/de-icing to be completed.
- G. Handlers should be required to tow aircraft when requested, to enable parking gate clearance/de-icing to be completed.

SECTION 14 DEFECT REPORTING

- A. Aircraft operators should develop and maintain comprehensive defect reporting procedures for all ramp equipment and installations provided by the aerodrome. Clear instructions should be issued and repeated by notice at main installation sites.
- B. For staff of airlines or operators, simple 'one shot' defect reporting is best.

- C. Defects on vital operational equipment, or facilities, that could affect aircraft safety, such as airbridges and VDGS, should be reported to a single agency.
- D. Details of all reported defects and their correction should be recorded for management audit purposes.
- E. For defects where a hazard to aircraft existed or was thought possible, consideration should be given to filing an MOR.
- F. All employers should ensure that there are systems in place to enable staff to report mechanical defects in company equipment.

- An operations center or safety unit is best.
- This should allow appropriate and immediate safety decisions can be made/actioned.
- At the same time a prompt response can be initiated.

Timely action should be taken on these reports reflecting the seriousness of the defect and the risk to people and/or aircraft.

End of Advisory Circular