8.2 Ground Handling Instructions

8.2.1 Fuelling Procedures

A description of fuelling procedures, including:

- safety precautions during refuelling and defuelling including when an aircraft auxiliary power unit is in operation or, for helicopters, when rotors are turning or, for aeroplanes, when an engine is running
- refuelling and defuelling when passengers are embarking, on board or disembarking; and
- precautions to be taken to avoid mixing fuels.

Special refuelling or defueling shall only be conducted if Lumiwings:

- has performed a risk assessment
- has developed procedures; and
- has established a training programme for its personnel involved in such operations.

Special refuelling or defueling applies to:

- refuelling with an engine running or rotors turning
- refuelling/defueling with passengers embarking, on board, or disembarking; and
- refuelling/defueling with wide-cut fuel.

For aeroplanes, any special refuelling or defueling procedures and any change to them shall require prior approval by the competent authority.

When passengers are embarking, on board, or disembarking, an aircraft should not be refuelled/defueled with avgas (aviation gasoline) or wide-cut type fuel or a mixture of these types of fuel. For all other types of fuel, the necessary precautions should be taken, and the aircraft should be properly manned by qualified personnel that should be ready to initiate and direct an evacuation of the aircraft by the most practical and expeditious means available.

CAT.OP.MPA.200 / AMC5 CAT.OP.MPA.200

8.2.1.1 Refuelling with an Engine Running

Refuelling with an engine running should only be conducted:

- when there are no other sources of electrical or pneumatic power to start the engine if shut down
- in accordance with the specific procedures established by the type certificate (TC) holder of the aeroplane
- with aeroplanes that use JET A, JET A-1 or TS-1 fuel types or any other fuel type that has a flash point above 38 °C and is approved by the operators' competent authority
- with no passengers embarking, on board, or disembarking
- with permission from the aerodrome operator; and
- in the presence of the aerodrome rescue and firefighting services (RFFSs).

Lumiwings should assess the risks associated with refuelling with an engine running and establish appropriate procedures to be followed by all involved personnel, such as flight crew, cabin crew, and ground operations personnel.

Appropriate training should be provided to flight crew and maintenance/ground operations personnel that are involved in refuelling with one engine running, as well as to cabin crew, if present on board.

AMC1 CAT.OP.MPA.200 / AMC2 CAT.OP.MPA.200

8.2.1.2 Refuelling with Passengers Embarking, on Board or Disembarking

When refuelling/defueling with passengers on board, ground servicing activities and work inside the aeroplane, such as catering and cleaning, should be conducted in such a manner that they do not create a hazard and allow emergency evacuation through those aisles and exits that are intended for emergency evacuation.

The deployment of integral aeroplane stairs or the opening of emergency exits are not necessarily a prerequisite to refuelling.

Operational procedures should specify that at least the following precautions are taken:

- one qualified person should remain at a specified location during refuelling/defueling operations with passengers on board, and be capable of using emergency procedures for fire protection and firefighting, communications, as well as for initiating and directing an evacuation
- two-way communication should be established and remain available through the aeroplane's intercommunications system, or other suitable means, between the ground crew that supervises the refuelling and the qualified personnel on board the aeroplane all involved personnel should remain within easy reach of the intercommunications system
- crew, personnel, and passengers should be warned that refuelling/defueling will take place
- the 'FASTEN SEAT BELT' signs should be off
- 'NO SMOKING' signs should be on, together with interior lighting to allow the identification of emergency exits
- passengers should be instructed to unfasten their seat belts and refrain from smoking
- the minimum required number of cabin crew should be on board and prepared for an immediate emergency evacuation
- if fuel vapour is detected inside the aeroplane, or any other hazard arises, refuelling/defueling should be stopped immediately
- the ground area beneath the exits that are intended for emergency evacuation, as well as slide deployment areas, should be kept clear where stairs are not in position for use in the event of evacuation; and
- provision is made for a safe and rapid evacuation.
- Passenger loading bridge and/or stair must be at the airplane with main exit door open. If there are no stairs in the Entry AFT door, the door must be B737 : SLIDES ON / ERJ-190 DOORS ARMED. (Upon Captain's discretion any other door can be B737: SLIDES ON/ ERJ-190:DOORS ARMED). The ground area beneath all other exits must be kept clear

AMC6 CAT.OP.MPA.200

8.2.2 Aircraft, Passengers and Cargo Handling Procedures related to Safety

8.2.2.1 Special Categories of Passengers (SCPs), Including Children/Infants, Persons with Reduced Mobility, Inadmissible Passengers, Deportees and Persons in Custody;

8.2.2.1.1 General

Persons requiring special conditions, assistance and/or devices when carried on a flight shall be considered as SCPs including at least:

- persons with reduced mobility (PRMs) who, without prejudice to Regulation (EC) No 1107/2006, are understood to be any person whose mobility is reduced due to any physical disability, sensory or locomotory, permanent or temporary, intellectual disability or impairment, any other cause of disability, or age;
- infants and unaccompanied children; and
- deportees, inadmissible passengers, or prisoners in custody.

SCPs shall be carried under conditions that ensure the safety of the aircraft and its occupants.

SCPs shall not be allocated, nor occupy, seats that permit direct access to emergency exits or where their presence could:

- impede crew members in their duties;
- obstruct access to emergency equipment; or
- impede the emergency evacuation of the aircraft.

The commander shall be notified in advance when SCPs are to be carried on board.

CAT.OP.MPA.155

8.2.2.1.2 Information Provided to SCPs

Procedures established considers following factors:

- the aircraft type and cabin configuration;
- the total number of passengers carried on board;
- the number and categories of SCPs, which should not exceed the number of passengers capable of assisting them in case of an emergency; and
- any other factor(s) or circumstances possibly impacting on the application of emergency procedures by the operating crew members.

Information to be given by the flight crew to an SCP passenger contains the following:

Unaccompanied child	Inform the unaccompanied child on the following: (a) which adult will assist with the operation of the seat belt and the fitting of the oxygen mask if the situation requires it; (b) the content of the passenger safety briefing card; and (c) in case of evacuation, to seek the assistance of adult passenger(s) in contacting a crew member. Inform the passenger sitting next to the unaccompanied child to assist with: (a) providing the child with an oxygen mask in case of decompression after fitting one's own mask;

	(b) securing/releasing the child's seat belt, if necessary; and (c) calling a cabin crew member in all other in-flight situations. When a child and the accompanying adult travel in a different class of cabin, information should be provided to the child and adult that, in the event of an emergency, they should follow the instructions of the cabin crew and not try to reunite inside the cabin as this would slow down the overall evacuation.
Adult travelling with an infant	Information on brace position for adult with lap-held infant. Information on the use of the loop belt, in case of a lap-held infant. Information to fit own oxygen mask before fitting the infant's oxygen mask. Information on how to evacuate when carrying an infant: (a) On land, see EASA SIB 2013-06 on evacuation of infants on aircraft equipped with inflatable slides or hatch-type overwing exits; and (b) In case of ditching, how to fit and when to inflate infant flotation aid (e.g. life jacket, flotation device).
Physically disabled passenger (aided walking)	Inform the SCP to leave mobility aid behind in an emergency evacuation.
Passenger with disability of upper limbs	Inform the accompanying passenger to: (a) fit the life jacket on the SCP, in case of a ditching evacuation; (b) first put on their own oxygen mask before fitting the SCP's oxygen mask, in case of decompression; and (c) secure/release the SCP's seat belt, if necessary.
Passenger with disability of lower limbs	Inform the SCP: (a) on the location of the nearest suitable exit; and (b) that mobility aids might not be accessible in an emergency evacuation.
Visually impaired passenger	Depending on the level of impairment, inform the visually impaired passenger on the following: (a) seat and seat belt operation; (b) location of the nearest exit (e.g. number of seat rows to the nearest exit); (c) oxygen mask deployment; (d) location of life jacket; (e) brace position; and (f) location of cabin crew call button. If available, take the aircraft demonstration equipment to the passenger for tactile assistance.
Passenger travelling with a recognised assistance dog in the cabin	Advise how to evacuate guide dog by holding the dog and sliding.
Stretcher occupant	Inform the stretcher occupant and the accompanying passenger that in case of an evacuation: (a) the stretcher occupant should be evacuated when the cabin area surrounding the stretcher is clear; (b) to evacuate the stretcher occupant without the stretcher, if possible; (c) to be seated when sliding, holding the stretcher occupant in front; and (d) in the event of a ditching evacuation, to fit the life jacket on the stretcher occupant.

A passenger capable of assisting in case of an emergency means a passenger who is not an SCP and has no other role or private responsibility that would prevent him/her from assisting the SCP. For example, an adult travelling alone has no other role or private responsibility, unlike a family travelling together with younger children.

In a planned emergency, if time permits, passengers identified by the cabin crew as capable of assisting an SCP

should be briefed on the assistance they can provide.

GM2, GM3, GM4 CAT.OP.MPA.155(b)

8.2.2.1.3 Carriage of SCPs

Procedures established considers following factors:

- If the SCP travels with an accompanying passenger, the accompanying passenger should be seated next to the SCP.
- If the SCP is unable to negotiate stairs within the cabin unaided, he/she should not be seated on the upper deck of a multi-deck aircraft if the exits are not certified for emergency evacuation on both land and water.

A disability and/or restraint aid that requires to be secured around the back of the seat should not be used if there is a person seated behind unless the seating configuration is approved for the use of such devices. This is to avoid the changed dynamic seat reactions with the disability and/or restraint aid, which may lead to head injury of the passenger seated behind.

If the seat design or installation would prevent head contact of the person seated behind, then no further consideration is necessary. Considering access to exits, groups of non-ambulatory SCPs should be seated throughout the cabin to ensure that each SCP is surrounded by the maximum number of passengers capable of assisting in case of an emergency.

A group of passengers whose physical size would possibly prevent them from moving quickly or reaching and passing through an emergency exit, should not occupy the same seat row segment to avoid overloading the structure of the seat.

Following consideration have been taking for establishing seating allocation procedures of an SCP as follows:

Unaccompanied child	The seating allocation of an unaccompanied child should allow for visual or audible communication during all phases of the flight with cabin crew. Groups of unaccompanied children should be seated in mix of ages, with the tallest child seated to allow assistance with fitting drop-down oxygen mask to smaller children in case of a decompression. Where possible, one adult should occupy the seat across the aisle next to each row of unaccompanied children.
Passenger travelling with a child of less than 12 years of age	If a child travels with an accompanying adult in the same class of cabin, the child should be seated in the same seat row segment as the accompanying adult. Where this is not possible, the child should be seated no more than one seat row or aisle away.
Passenger whose physical size would possibly prevent him/her from passing through an emergency exit	A passenger whose physical size would possibly prevent him/her from passing through an emergency exit (e.g. Type III or Type IV exit), should be seated in the vicinity of a suitable exit, taking into account the size of the exit. Seating of more than one of such passengers in the same seat row segment should be avoided.

Passenger with physical disability of the upper limbs	A passenger with a physical disability of the upper limbs travelling without an accompanying passenger should be allocated seats during all phases of the flight so that visual and audible communication can be established with the cabin crew.
Passenger with disability of lower limbs	A passenger with a disability of the lower limbs should be seated in a location providing easy access to floor level exits.
Passenger with disability of both upper and lower limbs	A passenger with a disability of both upper and lower limbs should be seated in a location providing easy access to floor level exits.
Mentally impaired passenger	A mentally impaired passenger, who travels without an accompanying passenger, should be allocated seats during all phases of the flight so that visual and audible communication can be established with the cabin crew.
Passenger travelling with recognised assistance dog in the cabin	Suitable arrangements should be made between the passenger and the operator in advance of a flight where a recognised assistance dog is to be accommodated. A suitable restraint harness should be provided by the owner to secure and restrain the dog during taxi, take-off, landing and turbulence. In cruise, it is acceptable for the dog to be subject to less restraint.
Stretcher occupant	Where possible, the stretcher should be installed behind a cabin monument. Alternatively, the stretcher could be installed where it can demonstrate compliance with the appropriate certification basis. Stretcher installation should be as close to the floor level non-overwing exits as practical; preferably close to a required cabin crew station with an adjacent seat for the designated accompanying passenger.

AMC1, AMC2 CAT.OP.MPA(c) GM1, GM2 CAT.OP.MPA.155(c)

8.2.2.1.4 PRM and Sick Passengers

The following definitions of ECAC Doc. 30 constitute commonly agreed indications for the degree of immobility and extent of the assistance required for the journey.

Before accepting such passengers for transportation, the company shall have verified and confirmed the availability, from departure to arrival, of staff trained and qualified to meet their needs and of the appropriate medical equipment.

MEDA	Passenger whose mobility is impaired, due to clinical cases with medical pathology in progress, being authorized to travel by medical cal authorities. Such passenger usually has social coverage in relation to the illness or accident in question.
STCR	Passenger who can only be transported on a stretcher. Such passenger may or may not have social protection or specific insurance.
WCHR	Passenger who can walk up and down stairs and move about in an airplane cabin, but who requires a wheelchair or other means for movements between the airplane and the terminal, in the terminal and between arrival and departure points on the city side of the terminal.

WCHS	Passenger who cannot walk up or down stairs, but who can move about in an airplane cabin and requires a wheelchair to move between the airplane and the terminal, in the terminal and between arrival and departure points on the city side of the terminal.
WCHP	Passenger with a disability of the lower limbs who has sufficient personal autonomy to take care of himself, but who requires assistance to embark or disembark and who can move about in an airplane cabin only with the help of an on-board wheelchair.
WCHC	Passenger who is completely immobile, who can move about only with the help of a wheelchair or any other means and who requires assistance at all times from arrival at the Aerodrome to seating in the airplane or, if necessary, in a special seat fitted to his/her specific needs, the process being inverted at arrival.
BLIND	Blind. (Guide dogs may be accepted as PETC with the note SEEING/EYE/DOG.)
DEAF	Passenger who is deaf or a passenger who is deaf without speech.
DEAF/BLIND	Blind and deaf passenger, who can move about only with the help of an accompanying person
MAAS	All other passengers in need of special help. (meet and assist)

8.2.2.1.5 Stretcher Patients

Lumiwings is not equipped with the equipment required for safe transportation of a passenger on a stretcher, therefore Lumiwings does not accept such passengers onboard its aircraft.

8.2.2.1.6 Number of Handicapped Passengers

The number of handicapped passengers should not exceed the number of able bodied persons capable of assisting with an emergency evacuation. Passengers with disabilities as circumscribed under WCHP, WCHS and WCHC above, shall be allocated seats in between two pairs of emergency exits; in this way, when the airplane is being evacuated, they can, without impeding others be assisted to reach the end of the queue forming at the emergency exit(s)

and to leave the airplane. Handicapped passengers shall not be seated next or near to an emergency exit in a way that may obstruct access to it.

Sick and disabled passengers and PRMs should be boarded separately (normally prior to all other passengers) as well as disembarked separately (normally after all other passengers have left the cabin). The commander shall be notified by "Special Categories of Passenger Notification" form, when handicapped passengers and PRMs are to be carried on board; he shall brief his crew accordingly.

Handicapped Passengers – Limitations on Board		
Classification	**Individual Travel**	**Travelling as a Group**
MEDA	No limitation	No limitation
WCHR	No limitation	No limitation (per 12 WCHR = 1 valid passenger must be in charge)
MAAS	No limitation	No limitation (per 12 MAAS = 1 valid passenger must be in charge)
WCHS WCHP WCHC STCR BLIND DEAF DEAF/BLIND	Their total number on board may not be greater than half of the floor level exits available in the passenger cabin.	The total number of handicapped passengers + the accompanying valid passengers may never exceed 10% of the total capacity of the airplane certification. If the group exceeds the 10% of the airplane certification, the number of passengers will be reduced by: • 7 passengers (handicapped Passengers included) for 1 WCHC/1 WCHP in excess • 3 passengers (handicapped passengers included) for 1 WCHS in excess
Note: If handicapped passengers travelling on individual basis and handicapped passengers travelling as a group are present on board the same airplane, the individual travelers will NOT be included in the group calculation.		
Minimum required Valid Passengers per Handicapped Passenger when travelling as a Group		
WCHS/DEAF	1	
WCHP/WCHC	2 -may be reduced to 1, taking into account the weight of the handicapped passengers (children) or the capability of the handicapped passengers (athletes) to evacuate the airplane on their own during an emergency	
STCR	2	
BLIND	1 for 2 BLIND/DEAF	
BLIND/DEAF	1 for 2 BLIND/DEAF	

Note: If the number of valid passengers is insufficient, extra cabin crewmembers will be required on board.

8.2.2.1.7 Guide Dog for The Blind

A trained guide dog may be carried in the cabin if it accompanies a passenger who is dependent upon it and if it is properly harnessed. The passenger and the guide dog will normally be seated at a bulkhead seat, where there is sufficient floor space for the dog.

8.2.2.1.8 Serious Passenger Illness, Injury or Death in Flight

Any action must be taken in case of serious illness, injury or death in flight, to avoid contagion for the other

persons on board. The ill person should be isolated for the comfort and the safety of the ill person and of the other passengers.

As long as the ill person is on board, first aid must be given by a cabin crewmember or competent passengers.

It is the Commander responsibility to decide if an immediate landing is to be made. Such a situation can be considered as an "Emergency".

8.2.2.1.9 Expectant Mothers

Expectant mothers are normally accepted on Lumiwings flights. Expectant mothers are accepted:

- Without any restriction, up to 28 weeks of pregnancy;
- With more than 28 but less than 32 week of pregnancy will be accepted under a Medical a Certificate and a Liability Release Declaration must have signed by the expectant Mother;

Expectant mothers are not accepted:

- Under any circumstances in the last 4 weeks of pregnancy

Attention: Expectant mothers will only be accepted for travel if the return date does not exceed the above-mentioned limitations.

8.2.2.1.10 Passengers requiring Oxygen

Passengers needing oxygen for medical reasons during the flight must be booked with the remark OXYG.

Procedure:

Lumiwings may supply oxygen equipment against the payment of an additional fee per oxygen cylinder and upon 5 working days notification.

- Seating on emergency exit rows is not allowed. Limitation:
- Limited to a maximum of 3 gaseous oxygen cylinders per flight. Liquid Oxygen is forbidden in the cabin.

8.2.2.1.11 Infants

A person younger than 2 years is considered as infant.

Any infant (less than 2 years old) must be attended by an adult (more than 18 years old). This adult may hold the infant in his arms and the safety belt of this adult seat must not strap the infant but only the adult. A supplementary loop belt or other restraint device must be used for the infant.

The maximum number of infants on the B737-700 is 25 and on the ERJ 190 is 10 are subject to the following regulations:

- Infants sitting on the lap of the accompanying person must not be secured with the belt of this person. The infants must be secured by means of supplementary belt.
- Infants and their accompanying persons will not be allowed to seat near emergency exits.
- Baby baskets owned by passengers will be permitted in the cabin only if vacant seats are available. In this case, they must be strapped on the seat.
- Child car seats for the restrain of children between the ages of 6-24 months may be used on all Lumiwings aeroplanes.
- An Infant occupying a seat shall be considered as child in accordance with 8.2.2.1.12

8.2.2.1.12 Children

A person with an age between 2 to 12 years old is considered as a child. Children are subject to the following regulations:

- Children must have their own seat.
- They are not being allowed to seat row next to the emergency exits.
- They will not be allowed to seat on the lap of the accompanying adult when the seat belt sign is on.

An adult may attend a group of children if he is not in charge during the flight of an infant less than 2 years old. This adult could be a cabin crewmember in addition of the minimum cabin crew number and being not on safety duty during the flight.

8.2.2.1.13 Unaccompanied Children

Unaccompanied Minors (UM) are children at less than full legal age travelling on their own, not being in the custody of a person that has attained full legal age

The maximum number of unaccompanied children on B 737-700 and ERJ 190 is 4 . A minor addition (1-2 UM can be accepted by Commander).

8.2.2.1.14 Death in Flight

In the event of a death in flight the Commander must advise the relevant ground authorities, through ATC, of the State's airspace in which the death occurred and also the destination State's authorities, if different, when entering their airspace. The commander must complete an ASR report which records the name of the deceased person, nationality, the time of the death, location and registration of the Airplane.

The commander shall also notify Lumiwings station of the next aerodrome of intended landing, where the deceased shall be taken off the Aircraft. The commander must assure that disembarking does not take place prior to arrival of police and physician.

The station will immediately inform

(1) the local police and aerodrome authorities

(2) abroad: responsible diplomatic representation

(3) contract physician and the aerodrome doctor

(4) OCC.

On arrival, the commander shall submit to the station a report containing the following details:

full name of the deceased, nationality, date of birth, home address, aerodrome of embarkation and destination

(1) circumstantial details of the death, i.e. exact time, altitude at time of death (actual and cabin), medical assistance given (if any), circumstances in-flight which may be important in connection with the death, etc.

(2) whether the deceased was accompanied by close relative(s), friend(s) or medical attendant.

8.2.2.1.15 Birth

In case a child is born during flight, the commander shall notify the Lumiwings station of the aerodrome of intended landing. The station shall immediately inform the local police and aerodrome authorities and the nearest available ambulance station to ensure immediate medical assistance.

On arrival, the commander shall submit to the station a report containing the following details and bearing his signature and that of two other crew members:

1. date and time of birth (in hours and minutes)
2. place of birth (in degrees' latitude and longitude)
3. sex of child
4. full name of parents (including maiden name of mother)
5. nationality and place of birth of parents
6. home address of parents

7. profession of father

8. witnesses of birth, if any (full names and home addresses).

The station will send a brief teletype message containing the main details of the Commander's report to the OCC.

8.2.2.1.16 Deportees

In general, the Lumiwings handling agent is responsible to observe the applicable rules. Definitions:

A) A deportee means a person who had legally been admitted to a country by its authorities or who had entered a country illegally and who at some later time is formally ordered by the authorities to be removed from that country (IATA P.S.C. Resolution 701).

B) A DEPA is a deportee who is escorted in the Aircraft cabin by authorized government escort personnel.

C) A DEPU is a deportee who is not escorted in the Aircraft cabin by authorized government escort personnel.

D) Risk assessment means the evaluation process by state authorities to determine a deportee's suitability for removal via commercial air services. The assessment shall take into account all pertinent factors, including but not limited to; willingness to travel, behavioral patterns, history of violence, etc. The risk assessment findings shall be made available to the commander (on his request) and will be used to determine when escorts must be provided.

General Rules

Acceptance of deportees on Lumiwings flights is based on rules in IATA Resolution 701 and ICAO Annex 9, Standard 3.49. The following rules apply:

1. States will make every reasonable effort to notify Lumiwings of the movement of deportees and their escorts not less than 24 hours in advance of the scheduled departure.

2. The deporting state should provide Lumiwings with written information concerning the name, age, gender and country of citizenship of the deportee, and the name and nationality of any escorts. The information should also confirm that a "fitness for travel" assessment has been made.

3. It shall be the responsibility of the deporting state to decide the state to which the deportee shall be removed. This destination must be clearly indicated in the written removal directions served Lumiwings.

4. In making arrangements for removal of deportees to the destination country, non-stop flights should be used whenever possible.

5. The deporting state will, when advisable and operationally feasible, make every reasonable effort to ensure that the authorities at any intermediate transit location are advised of transit removal movements through their territory in advance of arrival.

6. The deporting state shall, where advisable and whenever operationally feasible, notify each state or government involved in the itinerary of person(s) removed under escort, and of the details concerning that removal to the extent legally allowed.

7. The originating or ticketing operator shall ensure that any other operator involved in the itinerary is made aware of the deportee's movement through use of the appropriate deportee identifier code recorded in the passenger name record and on the passenger's flight coupons. Similar remarks should be utilized to identify the

escorts as well.

8. Before boarding of a flight on which a person will be deported, the commander shall be advised by the Lumiwings handling agent using information given by the deporting state. The commander will be advised whether the deportee is under escort or not.

9. In the interest of flight safety, the commander may request clarification of information provided by the state concerning the person being deported and shall be given as much additional information as is permitted under applicable laws or regulations.

10. The passport of an unaccompanied deportee or inadmissible passenger should be transported in an envelope in the flight deck. If the DEPO / INAD forces the handout of the passport the passport should be handed to him. Crews have no legal right to withhold the passport and the safety of the flight has the highest priority.

Boarding

Check-in and boarding of deportees should be as unobtrusive as possible and kept separate from the normal passenger process to the extent allowed by the existing aerodrome facility.

Pre-boarding of deportees, especially those who will be escorted en-route, should be strongly encouraged. The seats of deportees and their escorts on the Aircraft should be in the last row.

If a deportee physically resists to board the Aircraft he shall be excluded from carriage and transportation shall be refused by the station.

Notification of the Commander

The handling agent in the country from which the DEPA/DEPU is deported must complete for each

DEPA/DEPU a "Notice to Commander regarding a Deportation" based on the risk assessment given by the deporting state. In case the deporting authority has its own form, the use of the Lumiwings form is not required.

The "Notice to Captain regarding a Deportation" must contain:

1. the name, gender and nationality of deportee
2. the reason for deportation
3. whether he needs an escort or not and the number of escorts
4. the itinerary of the deportee

Passengers in Custody

The station manager or duty station manager is responsible for obtaining information on the DEPA/DEPU and for deciding whether to accept him for carriage under escort only.

Number of Deportees

The maximum number of unescorted deportees (DEPUs) is 2. In exceptional cases, may BE authorized a transport of more than 2 DEPUs. In these cases, there shall be information available in the flight relevant about the harmlessness of the additional DEPUs.

8.2.2.1.17 Inadmissible Passengers

In general, the respective Lumiwings handling agent is responsible to observe the applicable rules. Definition:

An inadmissible passenger (INAD) is a passenger who is refused entry to a country by the authorities.

The inbound carrier (i.e. the airline having carried the INAD passenger to the country where entry is refused) is always responsible for the outbound (i.e. onward or return) carriage.

Entry means the normal permission granted by the respective authorities to a passenger having arrived from another country to move freely about the country.

Permission or refusal of entry is normally decided immediately at the airport of arrival by the immigration authorities. Permission or refusal may, however, be delayed in exceptional cases when higher authorities, consulates or courts are involved.

Note:

Difference between an inadmissible passenger and a deportee: The deportee has already entered the country and is then proclaimed undesirable by the authorities.

Notification of the Commander

The Lumiwings handling agent in where the outbound carriage of an INAD passenger starts must complete a "Notice to Captain regarding a Refusal of Entry".

Escort

The station manager or duty station manager is responsible for obtaining information on the INAD passenger and for deciding whether to accept him for carriage under escort only.

If the station manager refuses to carry the INAD passenger without an escort and the government does not provide an escort but insists on immediate outbound carriage of the INAD passenger and no other escort can be made available in time, then the decision whether to refuse carriage shall be made by the commander of the flight.

The following persons may escort an INAD passenger:

1. a government official
2. a corporate security staff member or
3. a guard service company

Note:

Permission for this must be obtained from corporate security. Number of Inadmissible Passengers

There is no limit for the number of INADs on board.

8.2.2.1.18 Disorderly Passengers

Lumiwings shall not permit any person to enter or be in, and take all reasonable measures to ensure that no person enters or is in, an aeroplane when under the influence of alcohol or drugs to the extent that the safety of the aeroplane or its occupants is likely to be endangered.

Lumiwings shall take all reasonable measures to ensure that no person recklessly or negligently acts or omits to act:

- to endanger an aeroplane or person therein;
- so as to cause or permit an aeroplane to endanger any person or property. Disorderly passengers should not be accepted on board at the discretion of the Commander.

8.2.2.1.19 Persons In Custody

Individuals identified as requiring in-flight supervision shall be escorted on the flight by qualified escort personnel. The ratio of escort to passenger in custody will be based upon procedures established by the state and subject to our policy. The escort must:

1. wear civilian clothes
2. not carry firearms and weapons in the cabin
3. keep the passenger in custody under surveillance at the point of destination until all entry and inspection formalities have been completed. The passenger in custody should not be handcuffed, but may be handcuffed with plastic hand restraints (velcro).

8.2.2.1.20 Unruly Passenger

Individual passengers or groups of passengers with the potential to behave in a disorderly manner generally fall into the following categories:

- Those who disregard repeatedly the Instructions of the crew or Lumiwings Ground staff;
- Those who behave abusively in general;
- Those who refuse to follow the company regulations (no smoking, use of electronic equipment, etc.).
- Those related to the use of excessive amounts of alcohol and the use of both prescription and non-prescription drugs.

Unruly behavior at check-in, boarding gate, lounges or on board the aircraft, conflicts with our goal to be a safe and secure airline and lowers the level of customer satisfaction felt by other passengers. It also places additional and often unacceptable burdens on crew members and ground staff. Lumiwings policy, outlined below, applies to all passengers regardless of status perceived or otherwise.

1. Not to tolerate any physical or verbal assault by passengers on Lumiwings employees whilst they are on duty or away from their home base whilst on company business.
2. Not to tolerate any disorderly or unruly behavior by passengers or any person on board our aircraft.
3. To empower crews and ground staff to take reasonable steps to prevent disruptive and unruly behavior and,
4. Where necessary, to deal with it as effectively as practicable including refusal to carry passengers who

have the potential for creating disturbances on board the aircraft and who therefore could endanger the flight safety or any person.

5. To empower crews to refuse further alcohol to passengers who appear to be intoxicated or on the verge of becoming so on board Lumiwings aircraft.
6. To support crews and ground staff taking such action.
7. To encourage the police to prosecute unruly passengers in appropriate cases particularly where there have been assaults on Lumiwings staff.
8. To assist and support crew members and ground staff who are required, after an incident, to give witness statements to the police or to appear in court proceedings when Passengers are prosecuted.
9. To provide appropriate training to crew and ground staff in dealing with conflict and its aftermath.
10. To deny future carriage to unruly passengers who remain a threat to employees or Lumiwings Airlines.

Handling Unruly Passengers

1. **Before boarding,**

any observation of extraordinary inadequate behavior of any Lumiwings Airlines passenger should lead to his exclusion from any Lumiwings Airlines flight. Ticketing, check-in, lounge and gate personnel are responsible for preventing boarding of such passenger(s). At stations with an Lumiwings Airlines Security Department on hand (i.e. ATH), this department should be asked for assistance.

The station personnel are informed about further proceedings when a passenger is excluded from a flight (like baggage off-loading etc.)

2. **After boarding,**

the Captain informs the station personnel if a passenger is to be excluded from a flight. The passenger is to be disembarked and the further proceedings are handled by the station personnel and others (security department, police etc.).

3. **During the flight,**

Cockpit Crew:

Captains should be thoroughly familiar with the powers given to them by the Tokyo Convention and these powers should be exercised whenever warranted. The company will give the Captain full backing any time these powers are legally used. If the Captain considers that a passenger's behavior jeopardizes the safety of the aircraft or persons on board, he should decide on the necessary action to take.

The Captain must communicate to OCC as soon as possible. OCC will inform the Airport Manager at the station of arrival who will in turn inform the security authorities as appropriate.

Early communication of the Captains decision is essential to allow Head Office staff to liaise if necessary with the Airport Manager to determine the best course of action when the aircraft lands.

The Passenger Disturbance Report the basis of a formal complaint on arrival and a copy shall be handed over to the authorities.

Cabin Crew:
If at any time cabin crew notice unusual behavior on the part of a passenger the SCCM must be advised. SCCM

will try to diffuse the situation by ascertaining the underlying causes and identify any remedial responses that might be introduced including moving him to a new seat, if he continues with unruly behavior, give verbal warning to passenger.

If a passenger's behavior results from the non-observance of a legal requirement, then the SCCM is to clearly advise the passenger of the regulations. The passenger is to be left in no doubt as to legal requirements if this exists.

For this purpose, the Passenger Disturbance Report Form has been created and must be completed by the SCCM. Act according to the following levels, after discussion with the Commander:

1. The Commander should be informed whenever possible before any action is taken with problem passengers in the cabin and kept informed of all developments.
2. Verbal warning to passenger (same wording as on written notice to passenger)
3. If she/he does not comply, give her/him a written notice.
4. If she/he continues, complete the Passenger Disturbance report and give the passenger a copy. (check report language). Remember Commander's Signature.
5. SCCM serves notice to the unruly passenger, he obtains written statements from at least three passengers.

Any passenger who seems to be under the excessive influence of alcohol should not be served any more alcohol by the cabin crew.

If alcohol is the reason for any unacceptable behaviour then the cabin crew shall stop serving alcohol to that person and shall take measures to avoid escalation.

By order of the captain the cabin crew may temporarily confiscate any alcohol brought on board by that person. The alcohol must be given back to that unruly passenger when he leaves the Aircraft.

If the passenger conduct is considered harmful to the safety of the aircraft, other passengers and the crew and all means of placating him have been exhausted, the PIC may decide on using handcuffs.

6. During passenger disturbance, cockpit door must stay locked until the situation is under control
7. The authorities will be called to meet the passenger at the arrival station for positive identification of the passenger.

After Landing

1. On the ground offload him, if he refuses to leave the aircraft, Commander should not use force but call for police assistance.
2. When a passenger has been restrained, a diversion is only to be considered in exceptional circumstances, taking into account the safety of the aircraft.
3. Commander calls the security authorities to meet the aircraft at the arrival station and makes positive identification.
4. Commander provides the authorities with information and evidence
5. The Commander, depending on the seriousness of the offence, may lodge a formal complaint
6. The Commander and Crew are relieved of responsibility in any proceeding Arrival,

The support, which can be expected from Ground Services and Security Staff at the arrival station, will depend on the local set-up. Advice on what assistance to expect at each station must be made available to Captain

immediately.

Some situations could be judged by the Commander to be serious but may not warrant a formal complaint to local authorities. However, it is the Captain responsibility to raise an Air Safety Report and to notify Lumiwings Security of the incident for them to follow up. If the situation is deemed serious and warrants a complaint to local authorities, the Commander should notify the station of arrival as well as OCC of the situation on board requesting the Security Authorities and the Lumiwings Senior Representative to meet the aircraft on arrival.

Written Statements:

The SCCM should obtain statements from other passengers and/or crew about the incident.

Details of witness names and addresses should be noted. Other details, which will be useful to the Police, are:

1. Aircraft registration;
2. Captain's name;
3. Aircraft position and the time of the incident;
4. Name, nationality and details of the unruly passenger's journey;
5. Description of the incident.

Where possible the passenger's return ticket should be taken, and handed over to the Airport Manager on arrival. (The SCCM must fill in the appropriate form. Refer to: 9.8)

8.2.2.1 Permissible Size and Weight of Hand Baggage

The size and Weight limits for hand Baggage given below shall not be exceeded:

Hand Baggage	First / Business Class	Economy Class
No. of pieces per person	2	1
Maximum size per piece	55 x 40 x 20 cm	
Maximum Weight	16kg	8kg

These limits may vary depending on requirements for other operators in wet leased or Charter flights.

The Company and its handling agent(s) shall brief passengers at check-in by means of placards/posters or orally, upon the maximum size and weight of hand baggage; where practicable, a receptacle should serve as a gauge.

Cabin baggage will normally be restricted to handbags, briefcases, coats and other items that can be reasonably stowed in approved stowage, unless the carriage in the cabin of other items has been cleared with the company at the time of booking.

8.2.2.2 Loading and Securing of Items in The Aircraft

8.2.2.3.1 General

Lumiwings has established procedures to ensure that:

(a) only hand baggage that can be adequately and securely stowed is taken into the passenger compartment; and

(b) all baggage and cargo on board that might cause injury or damage, or obstruct aisles and exits if displaced, is stowed so as to prevent movement.

CAT.OP.MPA.160 Stowage of baggage and cargo

8.2.2.3.2 Stowage Procedures

In order to ensure that hand baggage and cargo are adequately and securely stowed the following shall be taken into account:

a) each item carried in a cabin shall be stowed only in a location that is capable of restraining it;

b) weight limitations placarded on or adjacent to stowage's shall not be exceeded;

c) under seat stowage's shall not be used unless the seat is equipped with a restraint bar and the baggage is of such size that it may adequately be restrained by this equipment;

d) items shall not be stowed in lavatories or against bulkheads that are incapable of restraining articles against movement forwards, sideways or upwards and unless the bulkheads carry a placard specifying the greatest mass that may be placed there;

e) baggage and cargo placed in lockers shall not be of such size that they prevent latched doors from being closed securely;

f) baggage and cargo shall not be placed where it can impede access to emergency equipment; and

g) checks shall be made before take-off, before landing and whenever the fasten seat belts signs are illuminated or it is otherwise so ordered to ensure that baggage is stowed where it cannot impede evacuation from the aircraft or cause injury by falling (or other movement) as may be appropriate to the phase of flight.

AMC1 CAT.OP.MPA.160)

8.2.2.3.3 Carriage of Cargo In The Passenger Compartment

The following shall be observed before carrying cargo in the passenger compartment:

1. dangerous goods are not allowed; and
2. a mix of passengers and live animals shall only be allowed for pets weighing not more than 8 kg and guide dogs;
3. the mass of cargo shall not exceed the structural loading limits of the floor or seats;
4. the number/type of restraint devices and their attachment points shall be capable of restraining the cargo in accordance with applicable certification specifications; and
5. the location of the cargo shall be such that, in the event of an emergency evacuation, it will not hinder egress nor impair the crew's view.

AMC2 CAT.OP.MPA.160

8.2.2.3 Positioning of Ground Equipment;

Ground equipment shall be/remain parked in the equipment areas provided, service vehicles and baggage trolleys 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. The stand must be clear of all obstructions when an aircraft is in motion.

Handling staff are responsible for many aspects of the control of the parking/docking operation once the aircraft has entered the stand, although where a marshaller is responsible for guiding the aircraft on to the stand local instructions should clearly indicate the point at which responsibility is transferred from the marshaller to the handling staff. The nominated supervisor shall control the progress of the operation and the actions of the handling team.

The boundary between the apron and the maneuvering area is usually indicated by a continuous double white line. Entry into and movement between these areas is strictly controlled. Apart from pushback vehicles and crews, no vehicle should normally enter the maneuvering area other than at designated vehicle crossing points unless the vehicle driver is in radio contact with air traffic control and has been cleared to enter the maneuvering area.

The following safety precautions must be observed when moving/ positioning ground equipment/ vehicles around or near the aircraft:

a) No vehicle should be left unattended anywhere near the aircraft with its engine running. This is to prevent risks such as overheating and consequent fire in the vicinity of aircraft and uncontrolled or

unauthorized vehicle movement;

b) Vehicles should remain near the aircraft only long enough to conduct their legitimate business;

c) To ensure that no object is dropped on the apron or maneuvering area, all doors and shutters on vehicles must be closed while the vehicle is moving in the airside area, all loads and equipment, and all parts of the vehicle must be properly secured before a vehicle enters the apron or maneuvering area. Objects dropped in the movement area can cause serious hazards to aircraft and personnel;

d) Obstruction lights must be displayed at times by vehicles operating on the maneuvering area. Unless there are specific instructions to the contrary, dipped headlights should always be used in conditions of darkness and reduced visibility;

e) All parking restrictions must be strictly observed;

f) Vehicle drivers should follow designated routes, giving way, where appropriate, to routes provided for pedestrians and aircraft.

g) Vehicles must not be driven across aircraft stands, unless they are directly involved in the operation of the aircraft using or about to use the stand;

h) Vehicles must give way to aircraft at all times;

i) When aircraft engines are running, vehicle drivers must ensure that they stay well clear of areas behind the aircraft where slipstream and jet efflux may cause

j) Vehicles must not be driven in reverse on the maneuvering area or apron unless directly engaged in aircraft maneuvering or servicing. When reverse movement is essential, guidance should be provided to the driver by a person outside the vehicle or other means. The fitting of reversing alarms and CCTV cameras should be considered as part of risk management of reversing operations;

k) Vehicles must remain at least one meter away from any part of an aircraft unless they are engaged in a task that specifically requires them to operate closer to the aircraft.

A typical ramp layout, showing the various GSE items in position during typical turn-round scenarios for passenger aircraft is shown below.

These ramp layouts show typical arrangements only. Each Lumiwings aircraft type will have its own specific requirements/regulations for positioning and operation on the ramp.

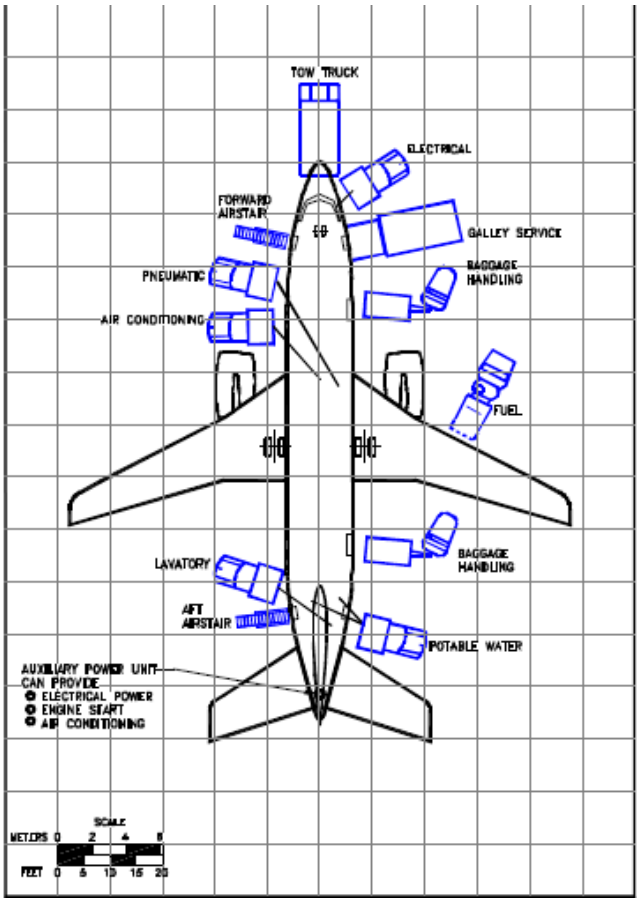
Symbols Used on Servicing Diagrams

Ground Support Equipment			
AC	Air Conditioning Unit	LD CL	Lower Deck Cargo Loader
AS	Air Start Unit	LV	Lavatory Vehicle
BULK	Bulk Train	PBB	Passenger Boarding Bridge
CAT	Catering Truck	PS	Passenger Stairs
CB	Conveyor Belt	TOW	Tow Tractor
CLEAN	Cleaning Truck	ULD	ULD Train
FUEL	Fuel Hydrant Dispenser or Tanker	WV	Potable Water Vehicle
GPU	Ground Power Unit		

Typical Ramp Layout - Open Apron

This figure gives the typical servicing arrangements on the open apron, for the passenger version of an aircraft.

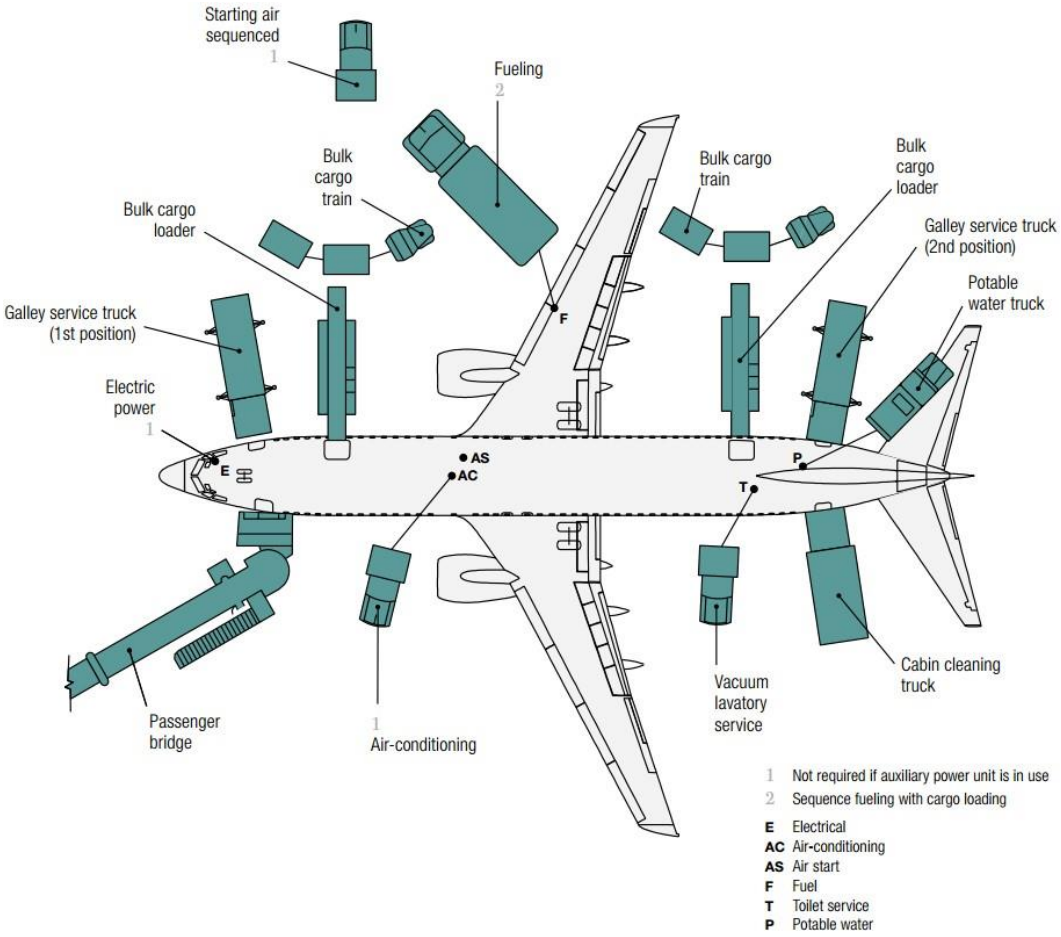
The Stand Safety Line delimits the Aircraft Safety. No vehicle must be parked in this area before complete stop of the aircraft (wheel chocks in position on landing gears).



Typical Ramp Layout - Gate

This figure gives the typical servicing arrangements in the gate area for the passenger version of an aircraft, with two Passenger Boarding Bridges.

The Stand Safety Line delimits the Aircraft Safety. No vehicle must be parked in this area before complete stop of the aircraft (wheel chocks in position on landing gears).



8.2.2.4 Operation of Aircraft Doors

Refer to the FCOM of the aeroplane for the operation of the doors and specifically to the CCM for the cabin doors and to the relevant FCOM of the aeroplane for the cargo doors.

Departure

All doors shall be closed (and armed immediately) and cross-checked before start of engines before pushback.

Refer to the CCM Cabin Crew Manual for Operating Procedures.

Arrival

When escape slide deployment is not required, cabin doors must be disarmed and cross-checked before opening. As per Company SOP, opening the doors must not be without the allowance of the Commander.

Before opening the doors, the flight crew and the cabin crew must ensure that no cabin differential pressure

exists, and that clearance has been received from ground staff that it is safe to do so.

Opening doors from the outside

All cabin, i.e., passenger and service, doors shall normally be opened and closed by members of the operating crew only, i.e., from inside, or, in exceptional cases, by trained handling staff from outside. When opening such a door from outside, the respective staff member shall ascertain by knocking at the door, that nobody is standing in the danger area on the inside and that the escape slide is disarmed.

For the operation of aeroplane doors in strong winds refer to the OM/B which specifies maximum permissible wind speeds and other particulars to be observed. If difficulties occur when attempting to close doors in strong winds, the aeroplane shall be moved in order to position the doors concerned on the downwind side.

8.2.2.5 Safety on the Aerodrome/Operating Site, Including Fire Prevention and Safety in Blast and Suction Areas

8.2.2.6.1 General

There is a hazard from the blast created by all engines, particularly jet engines. The risk is greatest in areas which cannot be protected by blast screening and from aircraft with high tail-mounted engines. Staff working behind blast screens, or in open buildings close to a stand, and passengers on the opposite side of an apron cul-de-sac can also experience unpleasant engine fumes.

8.2.2.6.2 Arrival Procedures

a) There is a particular risk of blast damage or injury when an arriving aircraft is turning on to the stand centerline. The risk is further increased if for any reason the aircraft stops, then applies the additional thrust required to 'break away' and continue the maneuver.

b) Commanders of aircraft are to keep all engines running (notwithstanding any fuel economy measures) in order to limit the need for high thrust levels. Ideally the aircraft shall be kept moving to ensure that break away power is not required. Exceptions, specifying aircraft type and stand concerned are notified by airport authorities.

c) Thrust levers must not be exercised for test reasons when the aircraft is on stand and engines shall be shut down as soon as operationally practicable once the aircraft is

d) parked.

e) Aircraft anti-collision beacon(s) must remain on until the engines have run down.

8.2.2.6.3 Departure Procedure – Engine Start

a) Flight deck crew and ground crew shall be in verbal contact (if verbal contact is not possible, standard hand signals must be used).

b) Before engines are started the aircraft anti-collision beacon(s) must be switched on.

c) Ground crews must ensure that the area immediately behind an aircraft, plus the zone immediately in front of the engine intakes, is clear of staff, passengers, vehicles and equipment before giving clearance for engine start. Additionally, before giving start clearance to the pilots of any wide body aircraft, ground crews must ensure that:

d) No other aircraft is on or approaching the taxiway centerline, or about to pushback on to the centerline, in the area behind the aircraft awaiting start.

e) Passengers are not boarding or disembarking via steps from an aircraft in any area behind the aircraft that may be affected by jet blast.

f) Ground crews must notify pilots of any potential hazard that could be created by the starting of engines.

g) It is advised that engine start must be carried out after the aircraft is pushed back and aligned with the taxiway/taxi lane centerline. If this cannot be followed, a single engine start-up only is permitted on stands in cul-de sacs. The remaining engines must not be started until the aircraft is pushed back and aligned with the taxiway/taxilane centerline.

8.2.2.6.4 Push-Back Procedure – Blast Precautions

1. Push back and towing procedures shall be conducted in accordance with established aviation standards and procedures
2. Ground crews must ensure that the area into which an aircraft is to be pushed is clear of staff, passengers, vehicles and equipment, before the push-back operation is started.
3. During all push-back maneuvers aircraft engine settings shall not exceed idle power.
4. Aircraft on the inner stands of a cul-de-sac must, after push-back, be pulled forward until the rear of the aircraft is a minimum of 100 meters from the blast screen before the aircraft tug and tow bar are disconnected (a painted stop bar is provided in cul-de-sacs to indicate the nose wheel position).
5. All push-back maneuvers are to end with the aircraft aligned with the taxiway/ taxilane centerline.
6. If a cross bleed start is necessary, ensure that the aircraft is pulled or taxied forward to the head of the sul-de- sac (or at least 200 meters from the blast screen) before the cross-bleed engine start is commenced.
7. NOTE: This may require the pilot to obtain ATC clearance to move from the normal push-back position.

CAT.OP.MPA.205

8.2.2.6.5 Taxiing

Pilots must use the minimum power necessary to get/keep the aircraft moving, particularly when in the cul-de-sac aprons.

8.2.2.6.6 Safety in the Vicinity of Works Areas

Development and maintenance work in the Movement Area occasionally involves sections of the Area being totally withdrawn from use. At other times aircraft access has to be restricted due to the work in progress; notification is always given by the issue of a Safety Instruction. These sections are always coned, barriered or fenced off and are marked at night with red obstruction lights along their perimeters. Pilots are to use minimum power when in the vicinity of these working areas and should never direct jet-blast towards the areas.

8.2.2.6.7 Fire Precautions

Smoking and use of naked flame on Lumiwings aircraft while on ground is strictly prohibited. Suitable firefighting equipment must be available, within easy reach, at the stands where an Lumiwings aircraft is parked.

8.2.2.6.8 Brakes Overheat / Fire

In case of smoke, protective breathing equipment should be worn since the dense smoke generated by tire rubber results in major and irreversible lung damage.

Carbon brakes and steel brakes are to be treated using same techniques and agents. In case of severe brake overheat, fuse plugs melting should result in tires deflating and should prevent tires and wheels burst.

- If a tire is inflated, do not approach the area around the wheel for about one hour. When approaching, go from the front or rear and not from the side of the wheel.
- Unless there is a fire, do not apply the extinguishing agent (liquid, water, mist, foam etc.) with a spray gun onto a hot tire if it is inflated.
- Do not apply the extinguishing agent directly into the heat pack of the brake or on to the wheel. This can cause thermal shock to the stressed parts. Especially, do not use CO2 as this has a strong cooling effect which is not the same in all areas. It can cause an explosion in the stressed parts.
- Extinguish ant on hot wheels can increase the time necessary for the fuse(s) to melt, or prevent operation of the fuse(s).
- You must let the brake get cool by itself for at least one hour and use the cooling fans (if installed).
- In the event of fire, immediately stop the fire. Do not wait until the tires are deflated.
- Come near the wheel only from the front or from the rear.

Note: It is not recommended to use multi-purpose powders as they may be changed into solid or enameled deposit. These agents stop the fire but they decrease the heat dissipation speed. This can cause permanent structural damages at the brake, the wheel or wheel axle.

- Do not apply the parking brake.
- Put a warning notice in the cockpit to warn personnel not to operate the landing gear control lever.
- Put the wheel chocks in position
- Clean all the parts if extinguishing agents were used.

8.2.2.6.9 Cargo Compartment Fire

If case cargo compartment smoke warning occurred with cargo door closed, the ground crew shall be informed not to open the door of the affected cargo compartment unless passengers have disembarked and fire services are present.

If the smoke warning is displayed on ground with cargo compartment door open, the Aeroplane extinguishing agent shall not be discharged. Ground crew shall be requested to investigate and to fight the smoke source. (as an example, the start of the GPU on ground and consequent exhaust fume generation might trigger FWD Cargo Compartment fire when FWD doors are open).

It must be ensured that the extinguishing agent used is adapted to the burning cargo material.

8.2.2.6.10 Engine or APU Compartment Fire

If fire persists, ground firefighting using a Halon or CO2 spray gun is possible through the following external access:

- Engines: Oil tank, IDG and other service panels,
- APU: access panels on both sides (as applicable)

8.2.2.6.11 Engine Tailpipe Fire

The engine tailpipe fire, being an internal engine fire, do not discharge the engine fire extinguishing agent. The agent influences the nacelle fire only.

Engine motoring by the flight crew is the normal and most effective action. External fire agents can cause severe corrosive damage and therefore should only be considered if fire persists after flight crew procedure application or if no bleed air source is available to motor the engine.

In such a case, Halon or CO2 should be sprayed in engine exhaust nozzle.

Note: In USA, the “slang” phraseology “your engine is torching…” could be used.

8.2.2.6 Start-Up, Ramp Departure and Arrival Procedures, Including, For Aeroplanes, Push-Back and Towing Operations

8.2.2.7.1 Use of Ground Intercom During Start-Up

On Aeroplane equipped with serviceable cockpit to ground intercom, this equipment shall be used whenever the Aeroplane is on stand, and until clearance for hand signals has been given prior to departure. All start-up, ramp departure and arrival procedures shall be applied as per Aeroplane type Standard Operating Procedures.

Caution: Use of cockpit to ground intercom is strictly forbidden during thunderstorms.

8.2.2.7.2 Flight Deck – Ground Communication

For communication between flight deck and ground, the following phraseology shall be used:

Flight Deck	Ground
Engine Start	
"Ground from cockpit".	"Go ahead".
"Ready to start all engines".	"All engines clear".
"Ready for ground air".	"Ground air available".
"Remove external electric".	"External electric removed".
"Remove ground air".	"Ground air removed".
Cockpit	Ground
Pushback	
"Ground from cockpit".	"Go ahead".
"Ready for pushback".	"Steering bypass. Release brakes".
"Brakes released".	"Pushing back".
When pushback is complete:	
	"Set parking brakes".

Flight Deck	Ground
"Parking brakes set". *	"Tow bar removed. Steering normal" .
When ready for taxi:	
"Prepare Aeroplane for taxi, standing by for hand signal on left-/right-hand side." **	"Preparing Aeroplane for taxi, stand by for hand signal from the left".
Taxi in And Parking	
"Ground from cockpit".	"Go ahead".
"Connect external power".	"External electric connected. Release brakes".
"Brakes released".	

Notes: *This either means "Steering bypass pin inserted" or, for aeroplanes not designed with a steering bypass, is a request that flight crew shall not operate nose wheel steering.

**When "clear" salute or hand signals have been received, and acknowledged, the commander shall challenge the co-pilot: "Clear on the right." The co-pilot shall check the area to the right of the aeroplane and if/when clear will respond "clear right". Taxi may then be started.

The flight deck personnel shall carefully evaluate the situation around the aeroplane, particularly the distances to other aeroplane and objects, select an adequate taxi speed and handle throttles accordingly to minimize blast effects and noise, particularly on start of taxi-roll from standstill.

A high degree of awareness is required for all low visibility taxi operations.

In order to render the aeroplane visible to other traffic, display of all lights (including strobe lights) is recommended unless own vision is thereby impaired. However, care shall be taken not to blind other traffic or ground handling staff.

8.2.2.7.3 Use of Hand Signals

Refer to Lumiwings Operations Manual Part A (Doc No: MED-OMA) Sections 12.5.4 “Hand Signals”, 12.5.5 “Technical/Servicing Communication Signals” and 12.5.6 “Standard Emergency Hand Signals”

8.2.2.7.4 Procedures for Taxiing

During taxiing the following must be observed:

a) application of the sterile flight crew compartment procedures;

b) use of standard radio-telephony (RTF) phraseology;

c) use of lights;

d) measures to enhance the situational awareness of the minimum required flight crew members. In order to taxi an Lumiwings aircraft:

1. each flight crew member shall have the necessary aerodrome layout charts available;
2. the pilot taxiing the aircraft shall announce in advance his/her intentions to the pilot monitoring;
3. all taxi clearances shall be heard and shall be understood by each flight crew member;
4. all taxi clearances shall be cross-checked against the aerodrome chart and aerodrome surface markings, signs, and lights;
5. an aircraft taxiing on the maneuvering area shall stop and hold at all lighted stop bars, and may proceed further when an explicit clearance to enter or cross the runway has been issued by the aerodrome control tower, and when the stop bar lights are switched off;
6. if the pilot taxiing the aircraft is unsure of his/her position, he/she should stop the aircraft and contact air traffic control;
7. the pilot monitoring shall monitor the taxi progress and adherence to the clearances, and shall assist the pilot taxiing;
8. any action which may disturb the flight crew from the taxi activity shall be avoided or done with the parking brake set (e.g. announcements by public address);

Taxiing shall be treated as a safety-critical activity due to the risks related to the movement of the aeroplane and the potential for a catastrophic event on the ground. Taxiing is a high-workload phase of flight that requires the full attention of the flight crew.

AMC1 CAT.GEN.MPA.124

8.2.2.7.5 Parking

The aeroplane shall not be parked without either proper marshalling or directional guidance lights calibrated for the aeroplane type. Crew shall taxi with extremely caution when operating on military apron, as staff might not be familiar with ICAO signaling to maintain wing tip clearance in absence of wingmen.

A signal man shall be available to monitor the progress of the aeroplane and observe the parking gate for obstructions. If the commander does not wish to use the guidance lights, he should stop the aeroplane and flash the landing lights; the marshaller will guide the aeroplane using hand signals. Upon stopping at the gate, hand signals only shall be used by ground personnel to indicate that "chocks are in position" and "shut down engines".

Parking brakes shall not be released until all engines have been shut down and until the cockpit personnel have ascertained that chocks have been inserted and that the aeroplane is not moving.

Note 1: Company aeroplanes may be taxied on the movement area of an aerodrome only by a person

authorized and found competent by the Company, and competent to taxi the aeroplane and to use the required means of communication, and instructed in respect to aerodrome layout, routes, signs, marking, lighting, ATC instructions, and all applicable procedures.

8.2.2.7.6 Aircraft Push-back (Conventional Tugs)

This procedure describes the pushback operation in which an aircraft is pushed backwards from its parking gate by a tug or tractor, to a position on the taxiway where it can safely move off under its own power.

Tractor/tug is a vehicle designed specifically to move aircraft on the ground, the usual design will be a four-wheeled vehicle that connects to the aircraft using a tow bar.

Safety

Most ramp procedures will be working with dead aircraft i.e. the aircraft is stationary and all engines are switched off. During any pushback procedure, the ground crew will be working with live aircraft, this means that the aircraft will be moving with the aid of the tug, also the engines will be starting at some time prior to, during, or after the pushback.

As well as their own safety, it will be everyone responsibility as part of the pushback team to ensure the safety of those around him, whether directly involved in the pushback or on surrounding stands.

Communications during the pushback will come in the form of headset communications and if this is not feasible by hand signals or, in whichever form instructions are given or received it must be ensured that they are clearly understood, should there be any doubt then the instructions must be clarified before any part of the pushback procedure is undertaken.

During the pushback, the commander passes control of his aircraft to the pushback crew. Irrespective of any ATC clearance or information given by the flight crew, while an aircraft is being pushed or towed, the ground team is responsible for avoiding collisions with other aircraft, vehicles, buildings and obstructions.

Procedure

- Selection of Tug and Tow bar and Bypass pin
- First the correct bypass pin must be selected. Bypass pins are machined to fit exactly in the systems of specific aircraft and only the correct pin can be used. Failure to use the correct bypass pin or any pin at all may result in damage to the aircraft and/or tow bar and could endanger the pushback crew. Also, a pin that is marked as serviceable must only be used.
- The correct tow bar must be selected. All tow bars are designed to fit a range of particular aircraft types and are labelled accordingly. Failure to use the correct tow bar may result in damage to the aircraft.
- The correct tug must be selected. The model of tug to be used for each aircraft type.
- A full pre-trip inspection of both tug and tow bar must be carried out before use. Tow bars should always be pulled behind the tug when driving to and from the aircraft, never pushed.
- On approaching the aircraft, the tug driver should carry out a brake check (at least 10m away from the aircraft), before lining up with the aircraft nose gear and stopping at a suitable distance from the aircraft to allow for tow bar connection.
- The tow bar should now be uncoupled from the rear of the tug and aligned with the connection point of the aircraft nose leg.

- The steering bypass pin (if required) should now be fitted and permission sought from the flight deck crew for tow bar connection.
- The tow bar can then be safely connected to the aircraft. If the tow bar has an adjustable wheel carriage, this should be used to minimize the need to physically lift the bar. To connect some tow bars may require the assistance of one or more other members of staff. The correct lifting techniques must always be used, and assistance must be seeked when connecting or disconnecting tow bars to prevent personal injury.
- When the tow bar (and bypass pin if required) is correctly connected to the aircraft the tug can be driven very slowly forward to connect to the eye of the tow bar.
- A guide person (usually the headset operative) is required for this operation, using recognized hand signals.
- This operation must be carried out under complete control, as any excess force used during the coupling of tug and bar could result in damage to the aircraft or tow bar.
- If the tug is to be left unattended after it has been connected to the aircraft, the engine should be switched off and a wheel chocked for safety.
- Prior to the commencement of the pushback you, the driver, will have carried out the pre-departure walk round as detailed earlier in this procedure and liaised with the headset operative to ascertain the type of pushback to be carried out.
- Now the wheel chock securing the tug (if applicable) must be removed, and when the tug driver is seated safely in the tug he must check that Neutral or Park have been selected and the parking brake is applied before starting the engine.
- Wait for the 'brakes released' signal from the headset operative (as detailed in the section on hand signals). When the 'brakes released' signal is received, the required direction of travel and the correct gear (for most pushbacks first gear will suffice) must be selected, and while holding the tug on the foot brake, the parking brake must be released and then after a final visual check to confirm that it is safe to move off, the foot brake shall be slowly released using the power of the engine tick over to gently take up any slack between tug/ bar and aircraft.
- Using the throttle, the power shall be slowly increased to set the speed of the pushback to a pace where the headset operative can comfortably hold position with the tug and aircraft without having to either run or dawdle.
- Where possible, the headset operator should always walk on the inside of a turn and he must remain in full view of both the flight deck and the tug driver throughout the pushback.
- All pushback crew members must remain fully aware of the position of other members of the pushback team at all times and be prepared to stop if you lose sight of any team member.
- The pushback should continue at a safe walking pace, and any changes of direction (turns) should be kept to the minimum necessary to achieve the final positioning of the aircraft at the release point. It should not have attempted to change gear during the pushback manoeuvre.
- When turning the aircraft, you care must be taken full not to exceed the limits marked on the nose leg or fuselage as to do so will result in severe damage to the aircraft's steering mechanism. The red line on the wheel bay doors shows the limit of turn allowable during a normal pushback operation, to exceed these lines without 'breaking' the steering scissors will result in damage to the aircraft steering mechanism even with a bypass pin in place.

- In the final, few Metres of the push back, alignment of the tug and tow bar with the aircraft fuselage should be endeavored, this will make the disconnection process easier and far safer.
- The throttle power must be slowly reduced to tick over, and then the foot brake must be gently applied to finally stop the aircraft. Only when a complete stop has been reached and neutral gear has been selected the tug driver shall give the headset operator the 'brakes set' signal.
- The headset operator will signal confirmation when the aircraft brakes are 'set' and move in to lower the tow bar wheel carriage. When the wheels are supporting the tow bar the headset operative will remove the tow pin (this may require a slight forward or rearward movement of the tug to facilitate) to allow the tug to move clear of the aircraft.
- The tug should pull away from the tow bar eye (to a distance of at least 5m) to allow the bar to be safely removed from the aircraft.
- The headset operator can now disconnect the bar from the aircraft nose leg. If the disconnection process requires two men, the tug driver should place the tug at ninety degrees to the aircraft after pulling back from the tow bar eye and select Neutral/Park gear, apply the park brake and then assist with the tow bar.
- The tow bar shall then re-have coupled to the tug and driven to the apron edge adjacent to the aircraft and await its departure.
- When the headset operator has released the aircraft, after showing the flight deck that he has removed the steering bypass pin (if fitted).
- Key Safety Points
- The disconnection of tug and bar from the aircraft is a 'safety critical' time requiring a high level of concentration by all concerned.
- Under no circumstances should any bypass pin be removed before the tow bar is disconnected and clear of the aircraft.
- Only trained and authorized personnel or trainees under instruction may perform the pushback operation.
- Always select the correct tug, tow bar and bypass pin for the aircraft type and series to be pushed back.
- Follow operating procedures and safe working practices at all times.
- Remain aware of other persons at all times and be prepared to stop the pushback if safety is compromised.
- Take account of the prevailing weather conditions when assessing the safety of the operation.

8.2.2.7.6 Towbarless Tug Vehicle (TLTV) Operation

(Ref: AMC1 CAT.OP.MPA.205)

This is the procedure where an aircraft is pushed backwards from its parking gate by a towbarless tug to a position on the taxiway where it can safely move off under its own power, or be towed away.

The towbarless tug is specifically designed to move aircraft without the use of a conventional tow bar

Pre- or post-taxi positioning of the aeroplanes should only be executed by barless towing if one of the

following conditions are met:

1. an aeroplane is protected by its own design from damage to the nose wheel steering system;
2. a system/procedure is provided to alert the flight crew that damage referred to in (1) may have or has occurred;
3. the towing vehicle is designed to prevent damage to the aeroplane type; or
4. the aeroplane manufacturer has published procedures and these are included in the operations manual Safety

Refer to 8.2.2.7.5 Procedure

- Before starting the procedure ensure that the TLTV is approved for use on the particular aircraft type and that the aircraft operator has approved the use of TLTV on its aircraft. Refer to the aircraft type/operator panel in the tug.
- Before driving the TLTV make sure a pre-trip inspection is carried out.
- Start the tug by turning the ignition key. A buzzer will sound to indicate that the tug is not yet ready for operation. When the buzzer has stopped (which should only be a few seconds) check the operating panel for fault warning lights. If any fault or warning lights are displayed, switch the tug off and report the unserviceability to your Supervisor.
- Go to the gate and cradle controls –the closed position is indicated by a green light and the lowered position is indicated by a red light. If necessary, move the joystick into the raised position and wait for the green light to come on. When the green light comes on make sure the cab is facing away from the drive wheels. If the cab is facing the drive wheels use the cab rotate button to turn the cab around.
- NOTE: The cab will only rotate if both doors are closed and the tug is in Neutral gear.
- 3rd gear must be selected when positioning the TLTV from the parking area to the aircraft. The TLTV must not be driven from the parking area with the cab facing the drive wheels. This position is for positioning on and off the aircraft and pushback only.
- On arrival at the aircraft ensure that the steering bypass pin is inserted. Inform the flight crew that you are going to connect the tug before moving the tug into position.
- To position the tug at the aircraft, rotate the cab so you are facing the drive wheels.
- Position the TLTV using the red guide line that runs down the body of the tug. Aim the red line at the center of the nose gear. Drive towards the nose gear and stop 2m from it. Engage the hand brake and put the TLTV into Neutral gear.
- Check that there is no surface mounted taxiway/stand light fittings that could foul the lowered cradle. If there are, a conventional tow bar must be used.
- Move the joystick into the ‘lowered’ position and hold there until the red ‘lowered’ light is indicated.
- Check that the tug is set for the correct wheel size and wheelbase. If not, adjust the wheel size using the wheel size buttons.
- Put the tug into 1st gear and drive towards the aircraft so that the cradle is positioned either side of the nose gear.
- NOTE: When the tug is driven in the lowered and opened position the buzzer will sound to let the driver know that the cradle and gate are open and lowered.

- When positioning the tug toward the nose wheel, always be ready to brake and watch for the green nose wheel engaged light. When engaged the buzzer will sound.
- When engaged, put the tug in to Neutral, take your foot off the brake and make sure the handbrake is off. The brakes on the TLTV must be off when closing the gate. It must be allowed to be pulled on to the aircraft, otherwise the nose wheel will be pulled and may cause damage
- When the aircraft is ready to depart, the tug driver will wait until the headset operator gives him the 'brakes released' signal. When the signal is given, the TLTV cradle must be put into the raised position using the joystick. Push the joystick to the closed position and wait until the green 'closed' light comes on, then engage the hand brake. The green light will confirm that the cradle is fully raised.
- At this point the red flashing bypass pin light will come on. Check that the pin is still in place. This will be confirmed by pressing the yellow button. Select the appropriate gear for the size of the aircraft and commence the pushback in a smooth controlled manner.
- If the rate of turn becomes too acute, the '80%' warning light is activated. When this occurs adjust the angle to take pressure off the nose wheel. Should the '100 %' warning activates, the push must be stopped and the TLTV repositioned and reconnected.
- On completion of the pushback the aircraft and TLTV must be aligned. The joystick should be moved into the lowered position. When the cradle is fully lowered the red 'lowered' light will illuminate.
- Having received confirmation that the cradle has lowered, the driver must pass the 'set brakes' signal to the headset man. When 'set, brakes' is confirmed, the TLTV driver must move the joystick into the 'opened' position. When the red 'opened' light signal illuminates, Reverse gear can be selected and the TLTV can move away from the aircraft.
- On completion of the pushback the cradle must be closed and raised, and the cab rotated away from the drive wheels.
- When the headset operator has released the aircraft, and after showing the flight deck that the steering bypass pin has been removed, the TLTV may then be driven to the appropriate parking position. The handbrake must be applied and Neutral gear selected. The joystick must be moved into the 'lowered' position. This will be confirmed by the green 'lowered' light signal.
- Key Safety Points
- Only trained and authorized personnel or trainees under instruction are allowed to operate a Towbarless tug.
- Always perform a pre-trip inspection.
- Follow the published operating procedures and safe working practices at all times.
- Chocks must not be removed until the tug is connected and secured
- Never 'lift' the aircraft until instructed to do so by the crew chief.
- Never use a TLTV on an unauthorized aircraft type.

8.2.2.7.7 Parking and Picketing

When an aircraft is out of service and in the open, it should be secured against inadvertent movement and protected against adverse weather conditions. The operations which are recommended in the relevant

approved maintenance data depend on the type of aircraft, the length of time it will be out of service and the prevailing or forecast weather conditions.

Between flights it is usually sufficient to apply the parking brakes, lock the control surfaces and chock the wheels, but in a strong wind light aircraft should be headed into wind. Light aircraft without wheel brakes should be headed into wind and their wheels should be chocked front and rear.

Flight controls on many aircraft are locked by movement of a lever in the cockpit/ cabin, which is connected to locking pins at convenient positions in the control runs or at the control surfaces. When this type of lock is not fitted, locking attachments may have to be fitted to the control column and rudder pedals, but a more positive method which is frequently used on older or elementary aircraft, is the fitting of external control surface locks, which prevent control surface movement and thus prevent strain on the control system. All external locks should have suitable streamers attached, to make it visually obvious that the locks are fitted.

If an aircraft must be parked overnight or for longer periods in the open, then additional precautions should be taken to guard against the effects of adverse weather. The undercarriage ground locks should be fitted, all openings such as static vents, engine intakes and cooling air intakes should be blanked to prevent the ingress of dirt, birds, insects and precipitation and all fittings such as pitot heads and incidence indicators should be covered. When severe weather is expected, it is recommended that cockpit/cabin covers and wheel covers are also fitted. Blanks and covers for all these components are specially designed for the particular aircraft and if not visually obvious, are fitted with streamers to guard against their being left in position when the aircraft is prepared for service; servicing instructions should, however, include a pre-flight check to ensure that all covers and locks have been removed.

Large aircraft only require picketing in very strong wind conditions. The aircraft should be headed into wind, the parking brakes should be applied (unless pre-loaded main wheel chocks are recommended) and cables should be attached from the aircraft picketing points to prepared anchorages. In some cases, the picketing cables are special components and include a tension meter which is used when applying a preload to the cable.

8.2.2.7 Servicing of Aircraft

8.2.2.8.1 General

Refueling/defueling, deicing and anti-icing, embarkation/disembarkation of passengers, loading/unloading and securing of items, the handling of special loads and Dangerous Goods, positioning of ground equipment and the operation of aeroplane doors all form a part of an aeroplane' s servicing.

Servicing may often be carried out in a crowded environment and must be properly organized to ensure that the necessary operations are carried out, to provide adequate safety to passengers and ground crew and to protect the aircraft from damage. The procedures and precautions generally applicable to the routine servicing of aircraft are dealt with in the following paragraphs.

The maintenance of a satisfactory surface contour and finish on an aircraft is most important and care is necessary to prevent damage to outer surfaces, access panels and fasteners. Walkways are provided on the wings of many aircraft for access to the cockpit/cabin or for servicing purposes and areas which must not be trodden upon, pushed or pulled, are clearly marked. Mats and suitable rubber footwear must be used when it is necessary to walk on the wings and every precaution should be taken to prevent damage by tools or servicing equipment.

It is also advisable to wear clothing without buttons or buckles which could scratch the wing surface, and, without pockets in which lose tools could be carried, since they could fall out and become a loose-article hazard.

Ground Equipment Many types of ground equipment may be required during aircraft servicing and all must be compatible with the aircraft systems on which they are to be used. The ground equipment should be kept scrupulously clean and should be maintained in accordance with a schedule recommended by the manufacturer. Delivery pipes from all liquid and gas servicing trolleys should be blanked when not in use and their cleanliness and serviceability should be checked before connection to an aircraft. Fire extinguishers suitable for fuel and electrical fires should always be readily accessible wherever an aircraft is being serviced and should be subject to regular inspection.

8.2.2.8.2 Connection of Electrical Power

It is often necessary to connect an external electrical power supply to an aircraft, either for engine starting purposes or to permit operation of the aircraft systems and equipment. Certain precautions must be observed when connecting the external supply, to prevent damage to the aircraft electrical system.

Most large aircraft are provided with multi-pin plugs or sockets, by means of which external d.c. or a.c. power may be connected into the aircraft electrical system. The external supply is usually provided by a towed or self-propelled unit, which has its own power-driven generator and can provide d.c. power at various voltages and a.c. power at a particular voltage, frequency and phase rotation.

Aircraft electrical systems vary considerably and the checks which are necessary after connecting the external power will vary between aircraft, but the following procedure is applicable in most cases:

a) Check that the external supply is compatible with the aircraft system (i.e. it has the same voltage, frequency and phase rotation as the aircraft system) and is switched off.

b) Check that the external plug and socket are clean, dry and undamaged.

c) Connect the external plug/socket, ensuring that it is fully mated and secure and switch on the external power supply.

d) Check the voltage and frequency of the external supply on the aircraft electrical system instruments and perform the operations specified in the relevant Maintenance Manual to engage the external supply with the aircraft A.C. system.

e) To disconnect the external supply, disengage it from the aircraft A.C. system, switch off the external power at source and remove the external power plug/ socket.

8.2.2.8.3 Replenishment of Liquids

On modern aircraft, replenishment of engine oil, hydraulic fluid, de-icing fluid, water and other systems containing liquids, is achieved by the use of servicing trolleys which are specially designed for the task and are connected into the system by quick release couplings; alternatively, and with older aircraft, these systems may be replenished by removing the tank filler cap and pouring in the required liquid.

Whichever method is used, the utmost care should be taken to ensure that only the approved liquids are used and that no foreign matter is allowed to enter the system. Servicing trolleys should be inspected regularly for cleanliness and their delivery pipes should be capped when not in use; all utensils should be kept scrupulously clean and should, preferably, be retained for use with one particular liquid.

The quantity of liquid in a system may be indicated by a sight glass, by use of a dipstick, by its visible level in a filter fitted in the filler opening, or, in some cases, by means of a contents gauge, the transmitter unit for which is mounted in the tank.

When required, the system should be replenished to the “full” level; no system should be overfilled, as this could
affect system operation.

Precautions applicable to the replenishment of systems containing liquid are outlined below:

a. Some systems are pressurized in normal use and this pressure should be released before replenishing with liquid.

b. When replenishing a hydraulic system, it may be necessary to pre-set the hydraulic services to specified positions to prevent overfilling.

c. Some liquids, such as methanol, synthetic lubricating oils and hydraulic fluid, may be harmful or even toxic if their vapors are breathed in or if they come into contact with the skin or eyes. Particular note should be taken of any warnings of dangers to health which may be contained in the relevant approved maintenance data and the recommended procedures for the handling of these liquids should be observed.

d. The liquids mentioned in (c) may also have an adverse effect on paintwork, adhesives and sealant and thus inhibit corrosion prevention schemes. Care should be taken not to spill any of these liquids, but if a spillage does occur, immediate steps should be taken to mop it up and clean the affected area.

8.2.2.8.4 Oxygen

Special safety provisions shall be observed when oxygen bottles of the aeroplane are being filled or exchanged (i.e., connection/disconnection to/from system):

- No passenger shall be on board.
- No ground power unit shall be connected or disconnected.
- No fueling/defueling is permitted.
- Filling/exchanging is not permitted during a thunderstorm.

The aircraft operating instructions specify which electrical systems shall be "off" or, alternatively, shall not be operating.

8.2.2.8.5 Cleaning of Cabin

Cleaning should have been finished, and cleaning personnel should have left the airplane before passenger embarkation. If passengers stay on board during transit, cabin cleaning should be performed in such a way as not to disturb the passengers. The flight deck may only be cleaned under supervision of an authorized employee of Lumiwings or the Contracted Maintenance Repair Organization.

8.2.2.8.6 Cold Weather Operations

Care is essential in the operation of aircraft when temperatures are likely to fall below freezing point at ground level. When snow or ice is present towing and taxiing should be carried out with extreme caution and aircraft movements should be kept to a minimum; parking areas should, if possible, be cleared of snow and ice, so as to prevent aircraft tires from freezing to the ground.

If sand or grit is used to increase the tractive effort of tractors or assist the braking of aircraft, care should be taken to prevent these materials being drawn into operating engines; taxiways and hard standings should be swept to remove any sand or grit after the snow and ice have melted.

A. After Flight

When parking an aircraft, all covers, plugs and ground locks should be fitted as soon as possible. If the airframe is wet or affected by snow or ice, the surface under the covers should be given a light coating of anti-freeze liquid; anti-freeze liquid should not, however, be applied to the windows, since it has an adverse effect on plastics materials.

Engine covers should be fitted as soon as the engine has cooled sufficiently, but in the case of turbine engines an inspection should be made for the presence of ice in the air intake, since this could melt while the engine is hot, drain to the lowest part of the compressor and subsequently re-freeze when the engine cools, locking the lower compressor blades in ice.

If ice is present it should be allowed to melt, then removed before finally fitting the covers. Drain valves in the fuel and pitot/ static systems should be opened to remove any accumulation of water. Domestic water, toilet systems and water injection tanks should be drained or treated with antifreeze liquid as appropriate.

B. Before Flight

All external surfaces must be free of snow, frost or ice before an aircraft takes off and de-icing operations should be carried out as necessary. Care is necessary when an aircraft has been removed from a heated hangar into falling snow since the snow will melt on the warm aircraft then re-freeze as it cools down, forming a thin layer of ice which may not be easily visible.

Water systems should be filled with warm water and all covers should be kept in place until as near to departure time as possible.

8.2.2.8 Documents and Forms for Aircraft Handling

Refer to IATA "Aerodrome Handling Manual".

8.2.2.9 Special Loads and Classification of Load Compartments

8.2.2.10.1 General

Classification of load compartments is given in the Weight and Balance Manual of the Airplane and to the IATA "Aerodrome Handling Manual".

For the transportation of live animals, rules and procedures defined in the IATA "Live Animals Regulations" manual have to be adhered to.

- Some dangerous goods are not permitted in the cabin (Chapter 9 Dangerous goods and weapons)
- A mix of the passengers and live animals should not be permitted except for pets (weighing no more than 8 kg) and guide dogs.

Excepts the carriage of articles and substances which would be otherwise classed as dangerous goods from the provisions of Chapter 9 to the extent specified in the "ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air" (ICAO Doc 9284) provided that they are required to be aboard the airplane in accordance with the relevant Regulations or for operating reasons;

- they are carried as catering or cabin service supplies;
- they are carried for use in flight as veterinary aid or as a humane killer for an animal.
- they are carried for use in flight for medical aid for a patient, provided that:
  a) gas cylinders have been manufactured specifically for the purpose of containing and transporting that particular gas;
  b) drugs, medicines and other medical matter are under the control of trained personnel during the time when they are in use in the airplane;
  c) equipment containing wet cell batteries is kept and, when necessary, secured in an upright position to prevent spillage of the electrolyte;
  d) proper provision is made to stow and secure all the equipment during take-off and landing and at all other times when deemed necessary by the commander in the interest of safety.
- they are carried by passengers or crew members.

Note: Articles and substances intended as replacements for those listed under the first point above shall be transported on an airplane as specified in the Technical Instructions.

8.2.2.10.2 Battery Operated Wheelchairs

Before loading a wheelchair, it shall be ascertained:

- that the battery is securely attached to the wheelchair,
- that the battery is disconnected,
- that the battery terminals are insulated in order to prevent short-circuits.
- Wheelchairs which cannot be loaded, stowed, secured and unloaded in an upright position must have the battery removed; the removed battery shall be carried in strong, rigid packaging:

- packaging must be leak tight and impervious to battery fluid, batteries must be protected against short circuits, secured upright in their packaging and surrounded by compatible material sufficient to absorb their total liquid contents, packaging must be marked "BATTERY, WET, WITH WHEELCHAIR" and be labelled "corrosive", packaging must be stowed/secured in accordance with the provisions of Chapter 9.

The Commander shall be informed, by Special Loads Notification of the location of the battery aboard. The ground handling staff shall send a message to the destination or transfer station indicating the passenger's name/seat number and the location of wheelchair/battery.

Note: Battery driven wheelchairs with dry cell batteries or non-spillable wet cell batteries are rare; they may be carried as "checked baggage" in a baggage/cargo compartment provided that the battery has been disconnected and is securely attached to the wheelchair and that the poles have been insulated.

MOBILITY AIDS /WHEELCHAIRS WITH NON SPILLABLE WET BATTERIES 1

Battery-powered wheelchairs or other similar mobility devices with NON SPILLABLE wet batteries or with batteries which comply with Special Provision A123 or A199, example of batteries complying with special provision A123 and 199 are alkali-manganese, zinc-carbon, nickel-cadmium and nickel-metal hydride batteries.
The approval of the operator is required. Permitted in or as checked baggage and not as carry-on baggage.
Battery-powered wheelchairs must be loaded and stowed upright. The height and width of the wheelchair must not exceed the maximum height and width of the cargo hold door, per aircraft type.

MOBILITY AIDS / WHEELCHAIRS WITH SPILLABLE WET BATTERIES 2

Battery-powered wheelchairs or other similar mobility devices with SPILLABLE batteries or with lithium batteries.
Provided that the wheelchair or mobility aid can be loaded, stowed, secured and unloaded always in an upright position then the battery may remain installed in the wheelchair.
The battery terminals must be protected from short circuits, e.g. by being enclosed within a battery container, and the battery must be securely attached to the wheelchair or mobility aid.
The approval of the operator is required. Permitted in or as checked baggage and not as carry-on baggage.

MOBILITY AIDS / WHEELCHAIRS WITH LITHIUM BATTERIES 3

Battery-powered wheelchairs or other similar mobility devices with LITHIUM ION batteries, if the mobility aid is specifically designed to allow it to be the battery must be removed by the user and carried in the cabin following the manufacturer's instructions:
the battery must not exceed 300 Wh, or for a device that is fitted with two batteries required for its operation, each battery must not exceed 160 Wh.
If the battery is not removed, there is no limit to the Wh rating for the installed battery(ies)
A passenger may carry a maximum of one spare battery not exceeding 300 Wh or two spares each not exceeding 160 Wh.
The approval of the operator is required. Permitted in or as carry-on baggage. and not as checked baggage.

8.2.2.10.3 Wet Cargo

"Wet Cargo" designates shipments containing liquids or which, by their nature, may produce liquids and which are not subject to the Dangerous Goods regulations:

- shipments of liquids in watertight containers,
- shipments of wet materials not packed in such containers, e.g., fish packed in wet ice, fresh meat, casings (fresh animal guts), wet hides, skins,
- goods which may produce liquids.

Watertight containers shall meet the specifications of the ICAO Technical Instructions. They shall be able to withstand the variations in atmospheric pressure and temperature encountered during flight, without rupture or leakage. Other containers shall be of high-quality waterproof material. Containers with cargo which may produce liquids shall be leak proof or contain sufficient absorbent material. Packing shall allow for the maximum angles of roll and bank the airplane may encounter during flight without release of the liquid contents.

Containers shall be secured in an upright position.

For wet cargo in containers which are not watertight or waterproof, secondary measures shall be taken to ensure that any spillage is contained, by placing the shipment in a container of sufficient volume to contain any spillage, turning up the edges of the tarpaulin against the airplane' s/ULD's walls or against other cargo so as to create a second waterproof container around the shipment, and ensuring that obviously inadequate packed or leaking packages have not been loaded to prevent compartments, airplane structure or its components and other load from damage and/or corrosion.

All load devices used for carrying meat or similar organic material shall be cleaned and disinfected immediately after unloading.

Handling staff shall by Special Loads Notification inform the commander of such cargo before departure and by appropriate message the down line station(s).

8.2.2.10.4 Live Animals

Carriage of live animals in the cabin is limited by considerations of passenger safety and comfort and by the size of the cabin (separation of individual animals from each other). Carriage in cargo compartments may require pressurization, ventilation, heating, and lighting. Are, therefore, specified in each airplane's OM Part B.

The following general guidelines have been developed.

Live Animals in The Cabin:

With the exception of guide dogs for blind passengers. Only small pets weighing 5 kg or less may be carried in the cabin. Prior company approval must have been obtained.
Such approval will stipulate that the pet shall be carried in a suitable leak-proof container or bag size 45 x 35 x 20 cm and must stay in the container/bag, on the floor for the duration of the flight.

The passenger under whose care the pet travels, must be in possession of all documents required by the authorities at destination.

Carriage of rodents and birds is only permitted by prior permission of Flight Operations Director.

The commander and handling staff shall ensure that no animal is carried in the cabin which might impede an emergency evacuation.

Cargo Compartments:

The carriage of live animals in cargo compartments shall take the specific needs of the animals into account. The basic environmental requirements shall be ascertained from all sources available. The temperature range and oxygen requirements must be matched by the heating and ventilation capability of the cargo compartment provided. Feeding requirements must be met;

e.g ., for carriage of birds on long haul flights the cargo compartment lights shall be left switched on to enable the birds to feed during flight.

Stowage and loading of animals shall follow the principles outlined in the operations manual and the following additional guidelines shall be taken into account:

- containers shall be stowed in such a manner as to guarantee sufficient air circulation,
- containers shall be accessible, without needing to be offloaded when care of the animals is required at transit stations,
- in the event of excessive delays, special care - according to shipper's instructions - shall be taken of the animal(s), containers shall normally not be loaded directly in front of/below air ventilation outlets or internal lighting,
- animals which are natural enemies shall not be loaded in close proximity to each other,
- male and female animals should be stowed as far apart as possible,

In general, live animals shall not be loaded in close proximity to any other load which might have a negative effect on their well-being or health.

The handling staff shall, by Special Loads Notification, inform the commander before departure of all live animals, their requirements and their location; the commander will brief the cabin crew on all animals carried in the cabin. The handling staff will inform all downline stations by appropriate messages. All devices used in carriage shall be thoroughly cleaned and disinfected immediately after unloading.

8.2.2.10.5 Perishable Cargo

Perishable goods are those whose condition or suitability may deteriorate if exposed to undue changes in temperature or humidity, or delay in carriage. They shall only be accepted for carriage when it is reasonably certain that they will reach destination in good condition. Therefore, it is mandatory that the shipper provides instructions as to the maximum acceptable duration of transportation and any required special handling.

This will enable the company to make appropriate en-route arrangements. The temperature range and ventilation requirements of such cargo must be matched by the capabilities of the cargo compartment provided. Perishable cargo shall be accessible, without needing to be offloaded, whenever any handling is required at a transit or the destination station. Perishables refrigerated with wet ice or containing fluid or moisture which could leak out shall be treated as wet cargo. Perishables refrigerated with dry ice fall under the provisions of Chapter 9.

Foodstuffs shall not be loaded together with poisons, infectious substances nor near living animals and non-cremated human remains. The handling staff shall, by Special Loads Notification, inform the commander before departure of all perishables carried and their location. All downline stations shall be informed by appropriate messages. Where necessary, the devices used in the carriage shall be thoroughly cleaned and disinfected immediately after unloading.

8.2.2.10.6 Human Remains

Non-cremated human remains shall be contained in a hermetically sealed inner coffin of lead or zinc inside a

wooden coffin. The wooden coffin may be protected by outer packing and should be covered by canvas or tarpaulins in such a way that the nature of its contents is not apparent. Such human remains shall not be loaded in close proximity to food for human or animal consumption or edible materials.

Note: Mourning ceremonies on the apron should be avoided.

The commander, by Special Loads Notification, and the downline stations shall be informed.

8.2.2.10.7 Carriage of Mail, Valuables and Weapons

The carriage of mail, valuables and unloaded weapons, per se, have no other relevance to the safety of the airplane, its occupants and load than any other neutral cargo applies for properly securing these items. However, the potential destructiveness of weapons requires their transportation to follow certain approvals and provisions which are outlined in Chapter 9.

In order to secure mail, valuables and weapons against damage, pilferage or theft Lumiwings will discuss and agree appropriate provisions for storing, loading, transport, unloading and, again, storage with the shipper and, where necessary, the recipient. The commander shall be appropriately briefed prior to departure orally, and by "Special Loads Notification". The downline station will be informed appropriately, i.e., where necessary by coded messages, receipt of which shall be confirmed/ascertained before arrival of the airplane at the downline station.

8.2.2.10.8 Classification of Load Compartments

For the designation of airplane holds, compartments, bays and cabin the following definitions shall be used:

"BAY" - A subdivision of a containerized/palletized compartment, i.e., ULD position.

"CABIN" - The compartment of an airplane where passenger seats are installed.

"CABIN SECTION" - Resulting from division of the cabin into zones for the purpose of balance. "COMPARTMENT"

- A space designated within a hold.

"DECK" - A structural floor level. For airplanes having one structural level only, this floor level shall be referred to as the main deck. For airplanes having more than one structural floor level the different levels shall be referred to as lower deck, main deck and upper deck, starting from bottom to top.

"HOLD" - The space confined by ceiling, floor, walls and bulkhead, used for carrying load. "LEFT/RIGHT" - To be

understood as left and right in the direction of flight.

"SECTION" - A subdivision of a non-containerized/palletized compartment, i.e., net section.

Each (type-specific) AOM shall provide information on which cargo compartment classification (A, B, C, D, E) is applicable for an individual compartment.
CS-25.857 provides the following cargo compartment classification:

1. Class A - A Class A cargo or baggage compartment is one in which:
   - The presence of a fire would be easily discovered by a crew member while at his station; and,
   - Each part of the compartment is easily accessible in flight.
2. Class B - A Class B cargo or baggage compartment is one in which:
   - There is sufficient access in flight to enable a crew member to effectively reach any part of the compartment with the contents of a hand fire extinguisher;

- When the access provisions are being used no hazardous quantity of smoke, flames or extinguishing agent will enter any compartment occupied by the crew or passengers; and
- There is a separate approved smoke detector or fire detector system to give warning to the pilot or flight engineer station.

3. Class C - A Class C cargo or baggage compartment is one not meeting the requirements for either a Class A or B compartment but in which:

- There is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station;
- There is an approved built-in fire extinguishing system controllable from the pilot or flight engineer stations;
- There are means to exclude hazardous quantities of smoke, flames, or extinguishing agent, from any compartment occupied by the crew or passengers; and
- There are means to control ventilation and draughts within the compartment so that the extinguishing agent used can control any fire that may start within the compartment.

4. Class D - A Class D cargo or baggage compartment is one in which:

- A fire occurring in it will be completely confined without endangering the safety of the aeroplane or the occupants;
- There are means to exclude hazardous quantities of smoke, flames or other noxious gases, from any compartment occupied by the crew or passengers;
- Ventilation and draughts are controlled within each compartment so that any fire likely to occur in the compartment will not progress beyond safe limits;
- Consideration is given to the effect of heat within the compartment on adjacent critical parts of the aeroplane. The compartment volume does not exceed 1000 cubic ft.
- For compartments of 500 cubic ft or less, an airflow of 1500 cubic ft per hour is acceptable.

5. Class E - A Class E cargo compartment is one on aeroplanes used only for the carriage of cargo and In which:

- There is a separate approved smoke or fire detector system to give warning at the pilot or flight engineer station;
- There are means to shut off the ventilating airflow to, or within, the compartment, and the controls for these means are accessible to the flight crew in the crew compartment;
- There are means to exclude hazardous quantities of smoke, flames, or noxious gases, from the flight-crew compartment; and
- The required crew emergency exits are accessible under any cargo loading condition.

8.2.2.10.9 Dangerous Goods

Refer to Lumiwings Operation Manual (Doc No: LW-OMA) Chapter 9.

8.2.2.10.10 Incompatibility Charts

Incompatibility charts in Chapter 9 and the AOM provide guidance on load incompatibilities; some dangerous goods may either be incompatible with other loads or react dangerously with each other in case of damage; as already outlined above, certain types of special loads may also not be loaded close to each other. Airplane type specific load incompatibility charts (AOM) shall also specify permissible loading positions, or conversely, prohibited positions.

8.2.2.10.11 Fire Risk of Electronic Cigarettes

Electronic Cigarettes (e-cigarettes) may overheat by way of their heating element being accidentally activated resulting in a fire in checked baggage.

Passengers are required to carry e-cigarettes in the cabin, where an incident can be immediately mitigated, and not in their checked baggage.

This policy shall be communicated to Lumiwings passengers through the means already used to inform passengers about dangerous goods and related company policies.

8.2.2.10 Multiple Occupancy Of Aircraft Seats.

Multiple occupancy of aeroplane seats may only be allowed on specified seats and must not occur other than by one adult and one infant who is properly secured by a supplementary loop belt or other restraint device. Multiple occupancy of crew seats, whether by crew members or by passengers, is strictly prohibited.

8.2.3 Procedures for the Refusal of Embarkation

8.2.3.1 Responsibility of the Commander

The Commander:

- Has authority to disembark any person, or any part of the cargo, which, in his opinion, may represent a potential hazard to the safety of the Airplane or its occupants;
- Shall not allow a person to be carried in the Airplane who appears to be under the influence of alcohol or drugs to the extent that the safety of the Airplane or its occupants is likely to be endangered;
- Has the right to refuse transportation of inadmissible passengers, deportees or persons in custody if their carriage poses any risk to the safety of the Airplane or its occupants.
- The Commander is allowed to refuse to carry or to off-load at any aerodrome any person if, in:

- his opinion, the conduct, status, age or mental or physical condition of the person is such as to:
- Render him incapable of caring for himself without special assistance of cabin crew.
- Cause discomfort or make himself objectionable to other passengers.
- Involve any hazard or risk to himself or to other persons, to property or to the Airplane
- He fails to observe instructions of the crew.

In all cases the commander has full authority to refuse carriage or to off-load a passenger in the interests of safety or good order on board subject to specified justification his decision is final.

It is the commander who legally is charged with the responsibility for the operation and safety of the Airplane

in- flight and who is given specially the authority to discharge this obligation.

8.2.3.2 Responsibilities of Persons Other Than the Commander

To assist the Commander in the proper exercise of his authority, all company personnel engaged in passenger handling and loading, including other crew members, handling agents and check-in personnel, should alert the Commander if at any time, they consider that the condition of a particular passenger could jeopardize the safety of a flight.

Station managers or their delegated representatives have the right and obligation to prevent the boarding of a passenger who, according to this policy, is unsuitable for carriage.

The senior cabin crew member having reasonable doubt to believe that a passenger is questionable for carriage shall ask the commander to have such a passenger off loaded.

Upon such a request the station staff shall offer the necessary assistance to off-load the respective passenger. The commander may decline such a request after having personally interviewed this passenger.

Reporting is required according to company procedures and such reports must be treated confidentially. As per company requirement, the commander shall fill out an ASR.

8.2.3.3 Transport of Medical Patients

However, the authority to refuse embarkation to person obviously under the influence of drugs does not apply to persons who are subject to such condition following emergency medical treatment after commencement of the flight, nor to persons under medical care accompanied by personnel trained for that purpose. When considered necessary, a written report on fitness for travel has to be provided.

8.2.3.4 When Passengers Are Refused Embarkation

Whenever it becomes necessary to remove a passenger from an Airplane, the flight crew shall inform the local company representative who, in turn, shall take the necessary actions, considering assistance of local law enforcement officers.

Passengers who have been refused embarkation or who has been disembarked are left with the Aerodrome authorities.

Such passengers must be assisted with the utmost tact. Disembarking a passenger who has already boarded is much more difficult and could jeopardize safety on board or seriously inconvenience other persons on board.

8.2.3.5 Serving of Alcoholic Beverages

The above requirements imply, of course, that the cabin crew shall, in flight, be discreet in serving alcoholic beverages to passengers. No such beverages shall be served to passengers who appear to be on the verge of intoxication, or to inadmissible/deported passengers or their escorts or to passengers or other persons admitted to the flight deck. No person shall be allowed to drink any alcoholic beverage unless staff of the operator has served that beverage to him.

8.2.4 De-icing and Anti-Icing on the Ground

Lumiwings has established procedures to be followed when ground de-icing and anti-icing and related inspections of the aircraft are necessary to allow the safe operation of the aircraft. Content of this paragraph establishes the minimum requirements for ground-based airplane de-icing/anti-icing methods with fluids and procedures to facilitate the safe operation of transport airplanes during icing conditions. This does not specify requirements for airplane types.

The procedures stated in this paragraph establish the minimum requirements to provide an aerodynamic clean aeroplane for take-off. Exterior inspection will ensure that vital parts of the aeroplane are free of frost, ice, slush and snow. The Anti-icing code is to be used by ground crews to inform flight Crews about the quality of protection the aeroplane has received against the forming or accumulation of frost, ice or snow on the surface of the aeroplane.

NOTE 1: The commander shall only commence take-off if the aircraft is clear of any deposit that might adversely affect the performance or controllability of the aircraft and in accordance with the AFM. A Contamination Check of the airplane surfaces shall be performed prior to departure.

NOTE 2: Aircraft manufacturers published manuals, procedures or methods supplement the information contained in this paragraph. Reference should also be made to manufacturer type specific cold/adverse weather operation instructions and guidelines.

NOTE 3: The FAA recommendations document published each year for De-Icing / Anti- Icing of aeroplanes is used as the guideline for all company de-icing procedures and holdover times. FAA document is communicated and distributed to all Flight Crew Members. Responsible for the monitor and distribution is the Nominated Person for Flight Operations.

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TERMINOLOGY

Terms used in the context of de-icing/anti-icing have the meaning defined as follows:

(a) 'Anti-icing': the process of protecting the aircraft to prevent contamination due to existing or expected weather, typically by applying anti-icing fluids on uncontaminated aircraft surfaces.

(b) 'Anti-icing fluid' includes, but is not limited to, the following:

(1) Typically, Type II, III or IV fluid (neat or diluted), normally applied unheated (*);

(2) Type I fluid/water mixture heated to minimum 60°C at the nozzle.

(*) When de-icing and anti-icing in a one-step process, Type II and Type IV fluids are typically applied diluted and heated.

(c) 'Clear ice': a coating of ice, generally clear and smooth, but with some air pockets. It forms on exposed objects, the temperatures of which are at, below or slightly above the freezing temperature, by the freezing of super-cooled drizzle, droplets, or raindrops. Clear ice is very difficult to be detected visually.

(d) 'Cold soaked surface frost (CSSF)': frost developed on cold soaked aircraft surfaces by sublimation of air humidity. This effect can take place at ambient temperatures above 0° C. Cold soaked aircraft surfaces are more common on aircraft that have recently landed. External surfaces of fuel tanks (e.g. wing skins) are typical areas of CSSF formation (known in this case as cold soaked fuel frost (CSFF)), due to the thermal inertia of very cold fuel that remains on the tanks after landing.

(e) 'Conditions conducive to aircraft icing on the ground': freezing fog, freezing precipitation, frost, rain, or high humidity (on cold soaked wings), hail, ice pellets, snow or mixed rain and snow, etc.

(f) 'Contamination': all forms of frozen or semi-frozen deposits on an aircraft, such as frost, snow, slush, or ice.

(g) 'Contamination check': a check of the aircraft for contamination to establish the need for deicing.

(h) 'De-icing': the process of eliminating frozen contamination from aircraft surfaces, typically by applying de-icing fluids.

(i) 'De-icing fluid': such fluid includes, but is not limited to, the following:

(1) Heated water;

(2) Preferably, Type I fluid (neat or diluted (typically));

(3) Type II, III or IV fluid (neat or diluted).

The de-icing fluid is normally applied heated to ensure maximum efficiency and its freezing point should be at the outside air temperature (OAT) or below.
(j) 'De-icing/anti-icing': this is the combination of de-icing and anti-icing performed in either one or two steps.
(k) 'Ground ice detection system (GIDS)': a system used during aircraft ground operations to inform the personnel involved in the operation and/or the flight crew about the presence of frost, ice, snow or slush on the aircraft surfaces.
(l) 'Holdover time (HOT)': the period during which an anti-icing fluid provides protection against frozen contamination to the treated aircraft surfaces. It depends among other variables, on the type and intensity of the precipitation, OAT, wind, the fluid (or fluid Type) and aircraft design and aircraft configuration during the treatment.
(m) 'Liquid water equivalent (LWE) system': an automated weather measurement system that determines the LWE precipitation rate in conditions of frozen or freezing precipitation. The system provides flight crew with continuously updated information on the fluid protection capability under varying weather conditions.
(n) 'Lowest operational use temperature (LOUT)': the lowest temperature at which a fluid has been tested and certified as acceptable in accordance with the appropriate aerodynamic acceptance test whilst still maintaining a freezing point buffer of not less than:
(1) 10°C for a Type I fluid; or
(2) 7°C for Type II, III or IV fluids.
(o) 'Post-treatment check', 'Post- de-icing check' or 'Post- de-icing/anti-icing check': an external check of the aircraft after de-icing and/or anti-icing treatment accomplished by qualified staff and from suitably elevated observation points (e.g. from the de-icing/anti-icing equipment itself or other elevated equipment) to ensure that the aircraft is free from frost, ice, snow, or slush.
(p) 'Pre-take-off check': The flight crew should continuously monitor the weather conditions after the de-icing/anti-icing treatment to assess whether the applied holdover time is still appropriate. Within the aircraft's HOT and prior to take-off, the flight crew should check the aircraft's wings or representative aircraft surfaces for frozen contaminants.
(q) 'Pre-take-off contamination check': a check of the treated surfaces for contamination, performed when the HOT has been exceeded or if any doubt exists regarding the continued effectiveness of the applied anti-icing treatment. It is normally accomplished externally, just before commencement of the take-off run.

ANTI-ICING CODES

(r) Upon completion of the anti-icing treatment, a qualified staff provides the anti-icing code to the flight crew as follows: 'the fluid Type/the fluid name (except for Type I)/concentration (except for Type I)/local time at start of anti-icing/date (optional)/the statement 'post- de-icing/antiicing check completed' (if check completed). Example:
'TYPE II / MANUFACTURER, BRAND X / 75% / 1335 / 15FEB20 / POST- DE-ICING/ANTI-ICING
CHECK COMPLETED'.
(s) When a two-step de-icing/anti-icing operation has been carried out, the anti-icing code should be determined by the second step fluid

8.2.4.1 Abbreviations

°C: degrees Celsius

°F: degrees Fahrenheit

AFM: Airplane Flight Manual

AMM: Aircraft Maintenance Manual

APU: Auxiliary Power Unit

FAA: Federal Aviation Administration

FP: freezing point

LOUT: Lowest Operational Use Temperature

OAT: Outside Air Temperature

TC: Transport Canada

8.2.4.2 Personnel Training and Qualification

8.2.4.2.1 Training Requirements

De-icing/anti-icing procedures must be carried out exclusively by personnel trained and qualified on this subject.

Ground Handling companies providing de-icing/anti-icing services should have both a Qualification Program and a Quality Assurance Program to monitor and maintain an acceptable level of competence.

8.2.4.2.2 Theoretical Training

Both initial and annual recurrent training for flight crews and ground crews shall be conducted to ensure that all such crews obtain and retain a thorough knowledge of airplane de-icing/anti-icing policies and procedures, including new procedures and lessons learned.

Training success shall be proven by an examination/assessment which shall cover all training. The theoretical examination shall be in accordance with EASA Part 66 or any equivalent requirements.

The pass mark shall be 75%and only persons passing this examination can be qualified.

8.2.4.2.3 Practical Training (Initial)

For personnel performing the actual de-icing/anti-icing treatment on airplanes for the first time, practical training with the de-icing/anti-icing equipment and an airplane shall be included.

An airplane is required in order to familiarize new trainees with the relevant typical airplane surfaces/ components and identification of no spray areas.

Prior to receiving final qualification, personnel performing de-icing/anti-icing operations (driving and/or spraying) shall demonstrate competence in removing frozen contamination under operational conditions, to a qualified trainer or supervisor.

Details of this assessment shall be recorded.

8.2.4.2.4 Practical Training /Annual Recurrent)

For personnel performing the actual de-icing/anti-icing treatment, practical training with the de-icing/ anti-icing equipment shall be included.

8.2.4.2.5 Training Records

Records of personnel training and qualifications shall be maintained for proof of qualification.

8.2.4.3 Fluid Handling

De-icing/anti-icing fluid is a chemical product with environmental impact. During fluid handling, avoid any

unnecessary spillage and comply with local environmental and health laws and the fluid safety data sheet.

Different products shall not be mixed without additional qualification testing

8.2.4.4 Procedures

8.2.4.4.1 General

These procedures specify the recommended methods for de-icing and anti-icing of airplanes on the ground to provide an aerodynamically clean airplane.

When airplane surfaces are contaminated, they shall be de-iced prior to dispatch. When there is a risk of contamination of the airplane surfaces at the time of dispatch, these surfaces shall be anti-iced. If both de-icing and anti-icing are required, the procedure may be performed in one or two steps. The selection of a one- or two- step process depends upon weather conditions, available equipment, available fluids, and the holdover time to be achieved. If a one-step procedure is used, then both section 8.2.4.6.2 and 8.2.4.6.3 apply.

NOTE 1: Slippery conditions can exist on the ground or equipment following the de-icing/anti-icing procedure.

NOTE 2: Where holdover time is critical, a two-step procedure using undiluted Type II, III, or IV fluid for the second step should always be considered.

8.2.4.4.2 De-icing

Ice, snow, slush or frost may be removed from airplane surfaces by heated fluids, mechanical methods, alternate technologies or combinations thereof. The following procedures shall be used for their removal by fluids.

NOTE 1: Alternate technology may be used to accomplish the de-icing process, provided that the requirements in section “General airplane requirements after de-icing/anti-icing” are accomplished.

NOTE 2: Pre-step process to be done prior to de-icing/anti-icing

A pre-step process prior to the de-icing process, in order to remove large amounts of frozen contamination (e.g. snow, slush or ice), may be considered to reduce the quantity of glycol-based de-icing fluid that is needed.

This pre-step process may be performed with various means (e.g., brooms, forced air, heat, heated water, and heated fluids with negative buffer freezing point). If the pre-step procedure is used, make sure that the subsequent de-icing process removes all frozen contamination including the contamination that may have formed on surfaces and or in cavities due to the pre-step process.

It is the responsibility of the De-icing Operator to ensure that all frozen deposits are removed from the specified surfaces during the de-icing process.

8.2.4.4.2.1 Requirements

Ice, snow, slush and frost shall be removed from airplane surfaces prior to dispatch or prior to anti-icing.

8.2.4.4.2.2 General

For maximum effect, fluids shall be applied close to the surface of the skin to minimize heat loss.

NOTE: The heat in the fluid effectively melts any frost, as well as light deposits of snow, slush and ice. Heavier accumulations require the heat to break the bond between the frozen deposits and the structure; the hydraulic force of the fluid spray is then used to flush off the contamination.

The de-icing fluid will prevent re-freezing for a period of time depending on airplane skin and ambient temperature, the fluid used, the mixture strength and the weather.

Removal of frost and light ice General procedure

A nozzle setting giving a solid cone (fan) spray should be used.

NOTE: This ensures the largest droplet pattern available, thus retaining the maximum heat in the fluid. Providing the hot fluid is applied close to the airplane skin, a minimal amount of fluid will be required to melt the deposit.

8.2.4.4.2.3 Removal of local area contamination

When no precipitation is falling, or expected, de-icing may be carried out under the below mentioned or similar conditions.

In some cases, a full or complete de-icing is not necessary. When the presence of frost and/or ice is limited to localized areas on the surfaces of the airplane and no holdover time is likely to be required, only the contaminated areas will require treatment.

This type of contamination will generally be found on the wing and/or stabilizer leading edges or in patches on the wing and/or stabilizer upper surfaces.

Spray the affected area(s) with a heated fluid/water mixture suitable for a One-Step Procedure. Then spray the same area(s) on the other side of the airplane. Both sides of the airplane must be treated identically (same areas, same amount and type of fluid, same mixture strength), even if the contamination is only present on one side.

It is the responsibility of the De-icing Operator to ensure that the treatment is performed symmetrically and that on completion all frozen deposits have been removed.

After this check has confirmed that the treated areas are clean, the following statement shall be given to the Commander: **“Local Area De-icing only. Holdover times do not apply”**

8.2.4.4.2.4 Underwing de-icing procedures

Treatments must be symmetrical and may include flaps lower surfaces. Spray the affected areas with a heated fluid/water mixture suitable for a One-Step Procedure or a Two Step Procedure, as required, (see caution below), and then spray the same areas under the other wing.

Both wings must be treated identically (same areas, same amount and type of fluid, same mixture strength), even if the frozen contamination is only present under one wing.

No holdover times apply to underwing treatments.

It is the responsibility of the De-icing Operator to ensure that the treatment is performed symmetrically and that on completion all frozen deposits have been removed.

When it is confirmed that the treated areas are clean, the following statement shall be given to the Commander: -

"Underwing De-icing only. Holdover times do not apply"

CAUTION: Underwing frost and ice are usually caused by very cold fuel in the wing tanks.

Use a fluid/water mixture with a higher concentration of glycol than is usually required by the OAT to prevent re- freezing.

8.2.4.4.2.5 Removal of snow

A nozzle setting sufficient to flush off deposits and minimize foam production is recommended. Foam could be confused as snow.

NOTE: The procedure adopted will depend on the equipment available and the depth and type of snow; i.e. light and dry or wet and heavy. In general, the heavier the deposits the heavier the fluid flow that will be required to remove it effectively and efficiently from the airplane surfaces.

For light deposits of both wet and dry snow, similar procedures as for frost removal may be adopted.

Wet snow is more difficult to remove than dry snow and unless deposits are relatively light, selection of high fluid flow will be found to be more effective. Under certain conditions it will be possible to use the heat, combined with the hydraulic force of the fluid spray to melt and subsequently flush off frozen deposits. However, where snow has bonded to the airplane skin, the procedures detailed in section "Removal of Ice" should be utilized.

Heavy accumulation of snow will always be difficult to remove from airplane surfaces and vast quantities of fluid will invariably be consumed in the attempt. Under these conditions, serious consideration should be given to removing the worst of the snow manually before attempting a normal de-icing procedure.

8.2.4.4.2.6 Removal of ice

Heated fluid shall be used to break the ice bond. The method makes use of the high thermal conductivity of the metal skin.

A stream of hot fluid is directed at close range onto one spot at an angle of less than 90^{O}, until the airplane skin is just exposed. The airplane skin will then transmit the heat laterally in all directions raising the temperature above the freezing point thereby breaking the adhesion of the frozen mass to the airplane surface. By repeating this procedure, a number of times, the adhesion of a large area of frozen snow or glazed ice can be broken. The deposits can then be flushed off with either a low or high flow, depending on the amount of the deposit.

Non-metallic surfaces (e.g. composites) have a lower heat transfer than metallic surfaces. De-icing may take longer and more fluid may be needed.

General de-icing fluid application strategy

For effective removal of snow and ice, the following techniques shall be adopted. Certain airplanes can require unique procedures to accommodate design differences, see aircraft manufacturer's instructions.

Ice, snow or frost dilutes the fluid. Apply enough hot de-icing fluid ensure that re-freezing does not occur and all contaminated fluid is driven off.

8.2.4.4.2.7 Wings, horizontal stabilizer, and elevators

Spray from the leading edge to the trailing edge. Do not spray from the rear. Start at the highest point of the surfaces and work to the lowest parts, i.e. on most airplanes start at the wing tip and work towards the wing root.

NOTE: Refer to the aircraft manufacturer's documentation for any deviation from this procedure.

8.2.4.4.2.8 Vertical surfaces Start at the top and work down.

8.2.4.4.2.9 Fuselage

Spray along the top center-line and then outboard. Ensure that it is clear of snow, slush or ice in accordance with aircraft manufacturer's documentation. Hoarfrost may be allowed.

8.2.4.4.2.10 Nose/Radom Area and Flight Deck Windows

Type I fluid/water mixture or manual methods of removal (such as squeegees or brushes) are recommended.

When thickened fluids are used, avoid spraying near flight deck windows, as fluid can cause a severe loss of visibility during flight. Any thickened fluid remaining on nose areas where it could blow back onto the windscreens should be removed prior to departure, using squeegees or equivalent.

If flight deck windows are contaminated with thickened fluids use water or an approved windshield cleaner (use of a low freezing point windscreen washing fluid is recommended when OAT is at or below $0^{O}C$ ($32^{O}F$).

CAUTION: Prior to cleaning of Flight Deck Windows ensure that the window heating system is switched off.

8.2.4.4.2.11 Landing gears and wheel bays

The application of de-icing fluid in this area shall be kept to a minimum. De-icing fluid shall not be sprayed directly onto brakes and wheels.

NOTE: Accumulations such as blown snow may be removed by other means than fluid (mechanically, air blast, heat etc.). However, where deposits have bonded to surfaces, they can be removed by the application of hot air or by spraying with hot de-icing fluids.

8.2.4.4.2.12 Engines

Deposits of snow shall be removed mechanically from engine intakes prior to departure. Any frozen deposits that have bonded to either the lower surface of the intake, the fan blades including the rear side, or propellers, shall be removed by hot air or other means recommended by the engine manufacturer.

8.2.4.5 Anti-icing

Ice, snow, slush or frost will, for a period of time, be prevented from accumulating on airplane surfaces by the application of anti-icing fluids. The following procedures shall be adopted when using anti-icing fluids.

8.2.4.5.1 Anti-icing Required usage

Anti-icing fluid shall be applied to the airplane surfaces when freezing rain, snow or other freezing precipitation may adhere to the airplane at the time of airplane dispatch.

8.2.4.5.2 Anti-icing Optional usage

Type II, III, or IV fluid may be applied onto clean airplane surfaces at the time of arrival (preferably before unloading begins) on short turnarounds during freezing precipitation and on overnight parked airplanes.

This will minimize ice accumulation prior to departure and often makes subsequent de-icing easier.

CAUTION: This practice has the potential to build up dried residues. An appropriate inspection and cleaning program shall be established.

On receipt of a frost, snow, freezing drizzle, freezing rain or freezing fog warning from the local meteorological service, Type II, III, or IV fluid may be applied to clean airplane surfaces prior to the start of freezing precipitation. This will minimize the possibility of snow and ice bonding or reduce the accumulation of frozen precipitation on airplane surfaces and facilitate subsequent de-icing.

CAUTION: This practice has the potential to build up dried residues. An appropriate inspection and cleaning program shall be established.

Prior to flight the airplane must be de-iced, unless the integrity of the fluid can be ensured. De-ice in accordance with Table 1 bellow, whenever possible, to reduce the potential for dried residue build up.

8.2.4.5.3. General

For effective anti-icing, an even layer of sufficient thickness of fluid is required over the prescribed airplane surfaces, which are clean (free of frozen deposits). For longer anti-icing protection, Type II, Type III, or Type IV fluid should be used.

The high fluid pressures and flow rates normally associated with de-icing are not required for this operation and, where possible, pump speeds should be reduced accordingly. The nozzle of the spray gun should be adjusted to provide a medium spray.

NOTE: Type I fluids provide limited holdover effectiveness when used for anti-icing purposes. Little benefit is gained from the minimal holdover time generated.

8.2.4.5.4 Anti-icing fluid application strategy

The process should be continuous and as short as possible. Anti-icing should be carried out as near to the departure time as operationally possible in order to utilize maximum holdover time.

The anti-icing fluid shall be distributed uniformly and with sufficient thickness over all surfaces to which it is applied. In order to control the uniformity, all horizontal airplane surfaces shall be visually checked during application of the fluid. For Type I fluid a minimum of $1l/m^2$ with at least 60^oC at the nozzle shall be used.

For Type II, III and IV fluids the correct amount is indicated by fluid just beginning to run off the leading and trailing edges.

For guidance on amount of fluid refer to the AEA document "Training Recommendations and Background Information for De-icing/Anti-icing Airplanes on the Ground".

Spray from the leading edge to the trailing edge. Do not spray from the rear.

Start at the highest point of the surfaces and work to the lowest parts, i.e. on most airplanes start at the wing tip and work towards the wing root. On vertical surfaces, start at the top and work down.

The following surfaces shall be treated:

a) wing upper surfaces including leading edges and upper control surfaces;

b) horizontal stabilizer upper surfaces including leading edges and elevator upper surfaces;

c) vertical stabilizer surfaces including the rudder surfaces (both sides);

d) fuselage upper surfaces depending upon the amount and type of precipitation (especially important on center-line engined airplanes).

CAUTION: Anti-icing fluids may not flow evenly over wing leading edges, horizontal and vertical stabilizers. These surfaces should be checked to ensure that they are properly coated with fluid.

It is the responsibility of the De-icing Operator to ensure that the surfaces mentioned above are free of frost, ice, slush and snow, prior to the start of the anti-icing treatment.

Ensure that on completion of the treatment these surfaces are fully covered with an adequate layer of anti-icing fluid.

8.2.4.5.5 Limits and Precautions Fluid related limits

Temperature limits

When performing two-step de-icing/anti-icing, the freezing point of the fluid used for the first step shall be at OAT or below.

Type I fluids

The freezing point of the Type I fluid mixture used for either one-step de-icing/anti-icing or as a second step in the two-step operation shall be at least 10^{O}C (18^{O}F) bellow the OAT. In no case shall this temperature be lower than the LOUT.

CAUTION: Type I fluids supplied as concentrates for dilution with water prior to use shall not be used undiluted. For exceptions refer to fluid manufacturer's documentation.

Type II / Type III / Type IV fluids

Type II, III, and IV fluids used as de-icing/anti-icing agents may have a lower temperature application limit of - buffer is maintained between the freezing point of the neat fluid and OAT.

In no case shall this temperature be lower than the LOUT.

Note: These fluids may not be used below -25^{O}C (-13^{O}F) in active frost conditions (see table 3) Application limits

Under no circumstances shall an aeroplane that has been anti-iced receive a further coating of anti-icing fluid directly on top of the contaminated film.

If an additional treatment is required before flight, a complete de-icing/anti-icing shall be performed (see Application Tables 1 and 2). Ensure that any fluid remaining from previous treatment is flushed off.

Anti-icing only is not permitted.

8.2.4.5.6 Airplane related limits

The application of de-icing/anti-icing fluid shall be in accordance with the requirements of the airframe/engine manufacturers.

8.2.4.5.7 Procedure precautions

8.2.4.5.7.1 One-step de-icing/anti-icing is performed with a heated anti-icing fluid. The fluid used to de-ice the airplane remains on the airplane surfaces to provide limited anti-ice capability.

The correct fluid concentration shall be chosen with regard to desired holdover time and is dictated by OAT and weather conditions (see Application Tables 1 and 2).

CAUTION: Wing skin temperatures may be lower than OAT. If this condition is identified, a stronger mixture (more glycol) may need to be used to ensure a sufficient freezing point buffer.

CAUTION: The application of Type II, III, or IV fluid, especially when used in a one step process, may cause fluid to collect in aerodynamically quiet areas, cavities and gaps which can dry out and leave dried residues.

Dried residues may rehydrate and freeze following a period of high humidity and/or rain conditions. This may impede flight control systems. These dried residues may require removal.

Consult the aircraft manufacturer with regard to inspection methods and frequency, related maintenance requirements and airplane washing recommendations.

NOTE 1: If a Type II, III or IV fluid is used in a one step process, then an appropriate inspection and cleaning program shall be established. Whenever suitable, de-ice and anti-ice with only Type I.

NOTE 2: In order to detect dried residues, it may help to spray a water mist onto the affected surfaces. This

causes the dried residues to rehydrate and swell into a kind of gel.

NOTE 3: If removal of contamination is required on the lower side of the wings and the horizontal stabilizer and elevator, de-icing/anti-icing fluid shall be applied sparingly to minimize fluid flow into drain holes.

Whenever possible, use Type I only.

Consult the aircraft manufacturer's documentation.

8.2.4.5.7.2 Two-step de-icing/anti-icing (When the first step is performed with de-icing fluid):

The correct fluid(s) shall be chosen with regard to ambient temperature. After de-icing, a separate overspray of anti-icing fluid shall be applied to protect the relevant surfaces thus providing maximum possible anti-ice capability. The second step is performed with anti-icing fluid.

The correct fluid concentration shall be chosen with regard to desired holdover time and is dictated by OAT and weather conditions (see Application Tables 1 and 2). The second step shall be performed before first step fluid freezes, if necessary area by area. When treating composite surfaces, freezing may happen quickly.

It is the responsibility of the De-icing Operator to ensure that all frozen deposits have been removed from the treated surfaces, before applying the second step fluid. When applying the second step fluid, use a spraying technique, which completely covers the first step fluid and provides a sufficient amount of second step fluid. For guidance on amount of fluid refer to the AEA document "Training Recommendations and Background Information for De-icing/Anti-icing Aeroplanes on the Ground". Where re-freezing occurs following the initial treatment, both first and second step must be repeated.

CAUTION: Wing skin temperatures may be lower than OAT. If this condition is identified, a stronger mixture (more glycol) may need to be used to ensure a sufficient freezing point buffer.

CAUTION: The application of Type II, III, or IV fluid, especially when used in a one step process or in the first step of a twostep process, may cause fluid to collect in aerodynamically quiet areas, cavities and gaps, which can dry out and leave dried residues.

Dried residues may rehydrate and freeze following a period of high humidity and/or rain conditions. This may impede flight control systems. These dried residues may require removal. Consult the aircraft manufacturer about inspection methods and frequency, related maintenance requirements and airplane washing recommendations.

The use of hot water or heated mixture of Type I fluid/water for the first step of a two-step de-icing/anti-icing process will minimize the formation of dried residues.

NOTE 1: If a Type II, III or IV fluid is used in the first step of a two-step process, then an appropriate inspection and cleaning program shall be established.

Whenever suitable, de-ice and anti-ice with only Type I.

NOTE 2: In order to detect dried residues, it may help to spray a water mist onto the affected surfaces. This causes the dried residues to rehydrate and swell into a kind of gel.

NOTE 3: Anti-icing of the lower side of the wings and/or horizontal stabilizer and elevator is normally not foreseen. However, if these surfaces must be de-iced, the freezing point of the de-icing fluid must be low enough to prevent refreezing.

Regarding holdover time provided by the applied fluid, the objective is that it be equal to or greater than the estimated time from start of anti-icing to start of take-off based on existing weather conditions.

De-icing treatments shall be symmetrical, that is, left-hand and right-hand side of the airplane shall receive the same treatment, even when only one side of the airplane is contaminated.

Anti-icing treatments shall be also symmetrical and shall always cover the entire wing, the entire vertical stabilizer/rudder and horizontal stabilizer/elevator on both sides of the airplane.

CAUTION: Aerodynamic problems could result if these requirements are not met.

During anti-icing and de-icing, the moveable surfaces shall be in a position as specified by the aircraft manufacturer.

Engines are normally shut down but may remain running at idle during de-icing/anti-icing operations. Air conditioning and/or APU air shall be selected OFF, or as recommended by the airframe and engine manufacturer.

De-icing/anti-icing fluids shall not be sprayed directly on wiring harnesses and electrical components (receptacles, junction boxes, etc.), onto brakes, wheels, exhausts, or thrust reversers.

De-icing/anti-icing fluid shall not be directed into the orifices of pitot heads, static ports or directly onto air stream direction detectors probes/angle of attack airflow sensors.

All reasonable precautions shall be taken to minimize fluid entry into engines, APU, other intakes/outlets and control surface cavities.

De-icing/anti-icing fluid shall not be directed into engine inlets or directly onto engine probes/sensors.

Fluids shall not be directed onto flight deck or cabin windows as this can cause crazing of acrylics or penetration of the window seals.

In general, prior to the application of de-icing/anti-icing fluids all doors and windows should be closed and all service vehicles/personnel should be clear to prevent:

(a) galley floor areas being contaminated with slippery de-icing fluids;

(b) upholstery becoming soiled;

(c) vehicles/personnel becoming contaminated with fluid.

However, when ramp activities have been completed and all doors, except the forward passenger door, are closed, it is permissible to start de-icing/anti-icing surfaces well away from the open door, provided that:

(a) the Commander is informed and has agreed to this procedure before spraying;

(b) passengers and staff will not be subjected to fluid overspray;

(c) fuselage in the vicinity of the open door is not treated;

(d) wind conditions are such that fluid or fluid overspray cannot reach the passenger door area.

This procedure is not recommended if passengers are boarding the airplane via open stairs.

NOTE: Doors shall not be closed until all ice or snow has been removed from the surrounding area.

Any forward area from which fluid can blow back onto windscreens during taxi or subsequent takeoff shall be

free of fluid prior to departure.

If Type II, III, or IV fluids are used, all traces of the fluid on flight deck windows should be removed prior to departure, particular attention being paid to windows fitted with wipers.

De-icing/anti-icing fluid may be removed by rinsing with an approved cleaner and a soft cloth.

Landing gear and wheel bays shall be kept free from build-up of slush, ice or accumulations of blown snow.

When removing ice, snow, slush or frost from airplane surfaces care shall be taken to prevent it entering and accumulating in auxiliary intakes or control surface hinge areas. Remove snow from wings, stabilizer, ailerons and elevators by spraying from the leading edge to the trailing edge. Start at the highest point of the surfaces and work to the lowest parts, i.e. on most airplanes start at the wing tip and work towards the wing root.

Ice can build up on airplane surfaces when descending through dense clouds or precipitation during an approach. When ground temperatures at the destination are low, it is possible for flaps to be retracted and for accumulations of ice to remain undetected between stationary and moveable surfaces. It is therefore important that these areas are checked prior to departure and any frozen deposits are removed.

Under freezing fog conditions, the rear side of the fan blades shall be checked for ice build-up prior to start-up. Any deposits discovered shall be removed by directing air from a low flow hot air source, such as a cabin heater, onto the affected areas.

A flight control check should be considered according to airplane type (see relevant manuals). This check should be performed after de-icing/anti-icing.

After frequent applications of de-icing/anti-icing fluids it is advisable to inspect aerodynamically quiet areas and cavities for dried residues of thickened de-icing/anti-icing fluid. For these inspections, it may be necessary to open access panels.

Consult airframe manufacturers for inspection and cleaning details and procedures.

A de-icing/anti-icing treatment should be continuous and as short as possible. If a treatment is interrupted (for example a truck ran out of fluid), the Airplane Commander shall be immediately informed stating:

a) reason for interruption;

b) actions to be taken (in consultation with the Commander);

c) expected time of delay.

Before continuing the treatment:

a) inform the Commander;

b) establish in consultation with the Commander, further treatment to be carried out, including any surfaces requiring re-treatment (in relation to Holdover time).

c) Carry out treatment as agreed.

8.2.4.5.7.3 Clear ice precautions

Clear ice can form on airplane surfaces, below a layer of snow or slush. It is therefore important that surfaces are closely examined following each de-icing operation, in order to ensure that all deposits have been removed.

Significant deposits of clear ice can form, in the vicinity of the fuel tanks, on wing upper surfaces as well as under- wing. Aeroplanes are most vulnerable to this type of build-up when:

(a) wing temperatures remain well below 0°C (32°F) during the turnaround/ transit

(b) ambient temperatures between -2 and +15°C (28 and 59°F) are experienced

(c) ambient humidity is high and/or precipitation occurs while the airplane is on the ground.

This type of ice formation is extremely difficult to detect. However, frost or ice on the lower surface of either wing can indicate the presence of clear ice on the upper wing surfaces.

Therefore, when the above conditions prevail, or when there is otherwise any doubt whether clear ice has formed, a close examination shall be made immediately prior to departure, in order to ensure that all frozen deposits have in fact been removed.

NOTE 1: Clear ice can form at other temperatures if conditions (a) and (c) exist.

NOTE 2: Low wing temperatures associated with this type of build-up normally occur when large quantities of cold fuel remain in wing tanks during the turnaround/ transit and any subsequent re-fueling does not cause a sufficient increase in wing temperature.

8.2.4.6 General Aeroplane Requirements after De-Icing/Anti-Icing

Following the de-icing/anti-icing procedures and prior to takeoff, the critical aeroplane surfaces shall be clean of all frost, ice, slush, and snow accumulations in accordance with the following requirements.

8.2.4.6.1 Wings, tail and control surfaces

Wings, tail and control surfaces shall be free of ice, snow, slush, and frost except that a coating of frost may be present on wing lower surfaces in areas cold soaked by fuel between forward and aft spars in accordance with the aircraft documentation.

NOTE: Frost or any other contamination is not acceptable on the lower side of the horizontal stabilizer and elevator, unless specified otherwise in the AFM or other aircraft manufacturer's documentation.

8.2.4.6.2 Pitot heads and static ports

Pitot heads and static ports shall be clear of ice, frost, snow and fluid.

8.2.4.6.3 Engines

Engine inlets, exhaust nozzles, cooling intakes, control system probes and ports shall be clear of ice and snow. Engine fan blades or propellers (as appropriate) shall be clear of ice, frost and snow, and shall be free to rotate.

8.2.4.6.4 Air conditioning inlets and exits

Air conditioning inlets and exits shall be clear of ice, frost and snow. Outflow valves shall be clear and unobstructed.

8.2.4.6.5 Landing gear and landing gear doors

Landing gear and landing gear doors shall be unobstructed and clear of ice, frost and snow.

8.2.4.6.6 Fuel tank vents

Fuel tank vents shall be clear of ice, frost and snow.

8.2.4.6.7 Fuselage

Fuselage shall be clear of snow, slush or ice. Frost may be present in accordance with the aircraft documentation

8.2.4.6.8 Nose/Radom Area and Flight Deck Windows

Snow, slush, or ice on the windscreens or on areas forward of the windscreens shall be removed prior to departure. Heated flight deck windows will not normally require de-icing.

8.2.4.8 Flight Control Check

A functional flight control check using an external observer may be required after de-icing/anti-icing depending upon airplane type (see relevant manuals). This is particularly important in the case of an airplane that has been subjected to an extreme ice or snow covering.

8.2.4.9 Dried Fluid Residues When the Airplane Has Not Been Flown After Anti-Icing

Dried fluid residue could occur when surfaces have been treated but the airplane has not subsequently been flown and not been subject to precipitation. The fluid may then have dried on the surfaces. In such situations, the airplane must be checked for dried residues from de-icing/anti-icing fluids and cleaned as necessary.

8.2.4.10 Special Maintenance Considerations

Proper account should be taken of the possible side-effects of fluid use. Such effects may include, but are not necessarily limited to, dried and/or rehydrated residues, corrosion and the removal of lubricants.

8.2.4.11 Post De-icing/Anti-icing Check

An airplane shall not be dispatched after a de-icing/anti-icing operation until the airplane has received the following visual check by a trained and qualified person. This check shall cover wings, horizontal stabilizer, vertical stabilizer and fuselage. This check shall also include any other parts of the airplane on which a de-icing/anti-icing treatment was performed according to the requirements identified during the contamination check.

The check shall be performed from points offering sufficient visibility of all prescribed surfaces (e.g. from the deicer itself or other equipment suitable for gaining access). Any contamination found, shall be removed by further de- icing/anti-icing treatment and the check repeated.

Before take-off the Commander must ensure that he has received confirmation that this Post De-icing/Anti-icing Check has been accomplished.

NOTE: For specific airplane types, additional requirements exist e.g. special clear ice checks, such as tactile checks on wings. These special checks are not covered by the Post Deicing/ Anti-icing Check.

Where the de-icing provider is carrying out the de-icing/anti-icing process and the Post De-icing/ Anti-icing Check, it may either be performed as a separate check or incorporated into the de-icing operation as defined below.

The de-icing provider shall specify the actual method adopted, where necessary by customer, in his winter procedures:

(a) As the de-icing/anti-icing operation progresses the De-icing Operator will closely monitor the surfaces receiving treatment, in order to ensure that all forms of frost, ice, slush or snow are removed and that, on completion of the treatment, these surfaces are fully covered with an adequate layer of anti-icing fluid.

(b) Once the operation has been completed, the De-icing Operator will carry out a close visual check of the surface where treatment commenced, in order to ensure it has remained free of contamination (this procedure is not required under “frost only” conditions.

(c) Where the request for de-icing/anti-icing did not specify the fuselage, it shall also receive a visual check at this time, in order to confirm that it has remained free of contamination.

(d) Any evidence of contamination that is outside the defined limits shall be reported to the Commander immediately.

8.2.4.12 Pre-takeoff Check

The Commander shall continually monitor the weather conditions after the performed de-icing/anti-icing treatment. Prior to takeoff he shall assess whether the applied holdover time is still appropriate and/or if untreated surfaces may have become contaminated.

This Check is normally performed from inside the flight deck.

8.2.4.13 Pre-takeoff Contamination Check

This is a check of the critical surfaces for contamination.

This check shall be performed when the condition of the critical surfaces of the airplane cannot be effectively assessed by a pre-takeoff check or when the applied holdover time has been exceeded.

This check is normally performed from outside the airplane.

The alternate means of compliance to a pre-takeoff contamination check is a complete de-icing/anti-icing re-treatment of the airplane.

8.2.4.14 Communication Procedures

The person communicating with the flight crew shall have a basic knowledge of the English language in order to communicate properly (Operational level or equivalent according to AEA Training Recommendations).

Communication between the Commander and the de-icing crew will usually be achieved using a combination of printed forms and verbal communication. For treatments carried out after aeroplane doors are closed, use of flight interphone (headset) or VHF radio will usually be required. Electronic message boards may be used in “off stand” situations. Use of hand signals is not recommended except for the final “all clear” signal.

8.2.4.14.1 Communication prior to starting De-icing/Anti-icing treatment

(i) Before de-icing/anti-icing, the Commander shall be requested to confirm the treatment required (areas to be de-iced, anti-icing requirements, special de-icing procedures).

(ii) Before fluid application starts, the Commander shall be requested to configure the airplane for de-icing/anti- icing (surfaces, controls and systems, as per airplane type requirements). The de-icing crew shall wait for confirmation that this has been completed before commencing the treatment.

(iii) For treatments carried out without the flight crew present, a suitably qualified individual shall be nominated by Lumiwings to confirm the treatment required and to confirm correct configuration of the airplane.

8.2.4.14.2 Post De-icing/Anti-icing Communication

An airplane shall not be dispatched for departure after a de-icing/anti-icing operation until the Commander has been notified of the type of de-icing/anti-icing operation performed (Anti-icing Code).

The Anti-Icing Code shall be provided by a qualified person at the completion of the treatment, indicating that the checked surfaces are free of ice, frost, snow, and slush, and in addition includes the necessary information to allow the Commander to estimate the holdover time to be expected under the prevailing weather conditions. When a treatment is interrupted for a significant period of time (e.g. truck runs out of fluid) the flight crew shall be informed stating the reason, the action to be taken and the estimated time delay.

When continuing the treatment, the previously treated surfaces must be fully de-iced and anti-iced again, when the holdover time of the treatment from before the interruption is not sufficient

8.2.4.14.3 Anti-icing Codes

The following information shall be recorded and be communicated to the Commander by referring to the last step of the procedure and in the sequence provided below:

(a) the fluid Type; i.e. Type I, II, III, IV

(b) the concentration of fluid within the fluid/water mixture, expressed as a percentage by volume;

NOTE 1: No requirement for Type I fluid.

(c) the local time (hours: minutes), either:

- for a one-step de-icing/anti-icing: at the start of the treatment; or
- for a two-step de-icing/anti-icing: at the start of the second step (anti-icing);

(d) the date (written: day, month, year);

NOTE 2: Required for record keeping, optional for Commander notification.

(e) the complete name of the anti- icing fluid (so called brand name)

NOTE 3: Optional; for Type II and IV fluids only.

(f) the statement "Post de-icing/anti-icing check completed”

NOTE 4: For specific airplane types, additional requirements exist e.g. special clear ice checks, such as tactile checks on wings.
Additional confirmation for these checks is required. EXAMPLE

A de-icing/anti-icing procedure whose last step is the use of a mixture of 75% of a Type II fluid and 25% water, commencing at 13:35 local time on 20 February 2011, is reported and recorded as follows:

TYPE II/75 13:35 (20 Feb 2011) (Complete name of anti-icing fluid) "Post de-icing/anti-icing check completed".

8.2.4.14.4 Post De-icing/Anti-icing Check and transmission of the Anti-Icing Code to the Commander

It shall be clearly defined by the airplane operator which company is responsible for carrying out the post de-icing/anti-icing check and providing the Commander with the Anti-Icing Code.

If two different companies are involved in the de-icing/anti-icing treatment and post de-icing/anti-icing check, it must be ensured that the Anti-Icing Code is not given before the post de-icing/anti-icing check is completed.

The company carrying out the de-icing/anti-icing treatment shall be responsible for the treatment and pass all

information about the treatment to the company carrying out the post de-icing/anti-icing check.

8.2.4.15 All Clear Signal

The flight crew shall receive a confirmation from the ground crew that all de-icing/anti-icing operations are complete and that all personnel and equipment are clear before reconfiguring or moving the airplane.

8.2.4.16 Holdover Time

Holdover time is obtained by anti-icing fluids remaining on the airplane surfaces.

With a one-step de-icing/anti-icing the holdover time begins at the start of the treatment and with a two-step de- icing/anti-icing at the start of the second step (anti-icing). Holdover time will have effectively run out when frozen deposits start to form/accumulate on treated airplane surfaces.

Due to their properties, Type I fluids form a thin liquid wetting film, which provides limited holdover time, especially in conditions of freezing precipitation. With this type of fluid, no additional holdover time would be provided by increasing the concentration of the fluid in the fluid/water mixture.

Type II, III, and IV fluids contain a pseudo plastic thickening agent, which enables the fluid to form a thicker liquid wetting film on external aeroplane surfaces. This film provides a longer holdover time especially in conditions of freezing precipitation.

With this type of fluid additional holdover time will be provided by increasing the concentration of the fluid in the fluid/water mixture, with maximum holdover time available from undiluted fluid.

The lower limit of the published time span is used to indicate the estimated time of protection during moderate precipitation and the upper limit indicates the estimated time of protection during light precipitation.

The responsibility for the application of these data remains with the user.

CAUTION: Heavy precipitation rates or high moisture content, high wind velocity or jet blast may reduce holdover time below the lowest time stated in the range. Holdover time may also be reduced when airplane skin temperature is lower than OAT. Therefore, the indicated times should be used only in conjunction with a pre- takeoff check.

CAUTION: Surface coatings are currently available that may be identified as ice phobic or hydro phobic, enhance the appearance of airplane external surfaces and/or lead to fuel savings.

Since these coatings may affect the fluid wetting capability and the resulting fluid thickness of de-icing/anti-icing fluids they have the potential to affect holdover time and aerodynamics.

For more information see SAE AIR 6232 and consult the aircraft manufacturers

NOTE 1: Certain fluids may be qualified according to fluid specifications but may not have been tested during winter to develop the holdover time guidelines specified in this manual.

Holdover time guidelines in this document are not applicable to these fluids.

NOTE 2: For use of holdover time guidelines consult fluid manufacturer technical literature for minimum viscosity limits of fluids as applied to airplane surfaces.

NOTE 3: A degraded Type II, Type III, or Type IV fluid may be used, provided the holdover time guidelines for Type I fluids (Table 3 or 4 as applicable) are used.

A Type II, Type III, or Type IV fluid is considered to be degraded if the viscosity is below the minimum limit as

provided by the fluid manufacturer. The Type II fluid holdover time guideline (Table 5) may be used with degraded Type IV fluids only after substantiation by holdover time testing.

NOTE 4: Holdover time guidelines can also be obtained for individual fluid products and these "brand name" holdover times will be found to differ from the tables published here.

If an airline decides to use these brand name tables it shall refer to the FAA or TC documentation, particularly for
the "light" and "very light snow" columns.

8.2.4.17 Off-Gate De-Icing/Anti-Icing Procedures

8.2.4.17.1 Communications

During off-gate de-icing/anti-icing a two-way communication between flight crew and de-icing/anti-icing operator/supervisor must be established prior to the de-icing/anti-icing treatment.

This may be done either by intercom or by VHF radio the airplane instead of flight number must be used during all communications. An alternate means of communication may be the use of Electronic Message Boards. In the event of conflict, verbal communication shall take precedence.

During treatment, all necessary information to cockpit must be given by this means (Beginning of treatment, treatment of sections requiring de-activation of airplane systems, anti-icing code, etc.). Contact with flight crew may be closed after anti-icing code and readiness for taxi-out has been announced.

During de-icing/anti-icing operations with engines running, both verbal and visual communications are strongly recommended to control airplane movement.

8.2.4.17.2 Taxi guidance

When off-gate de-icing/anti-icing area is entered by taxiing, a sufficient taxi and stopping guidance must be arranged, or marshaller assistance must be given. In case radio contact must be established before entering the de- icing/anti-icing area, the signs with clearly marked operation frequency must be visible from the cockpit before entering this area.

8.2.4.17.3 General instructions

The de-icing/anti-icing operator together with the airport authorities must publish all necessary information about how to operate on the off-gate site by NOTAM or in local AIP. This information has to include at least the location of, and standard taxi routing to the de-icing/anti-icing area, means to coordinate the deicing/ anti-icing operation, means to communicate before and during the de-icing/anti-icing operation, and information about taxi and stopping guidance.

8.2.4.17.4 Responsibilities

The responsibility to determine the need for de-icing/anti-icing before dispatch rests with the trained and qualified ground crew or flight crew who performs the Contamination Check at the gate. This information must be given in writing or verbally to the Commander of the airplane, who is after that responsible to proceed in order to get proper treatment. After treatment, the result must be checked by a trained and qualified person and the anti-icing code must be given to the Commander, after which the Commander is responsible for the airworthiness of the airplane.

8.2.4.18 Communication Terminology

Following standard communication terminology is recommended during off-gate de-icing/anti-icing procedures:

(DIS = De-icing/anti-icing supervisor)

(COMMANDER = Pilot in command)

DIS: “Set parking-brakes, confirm airplane is ready for treatment, inform on any special requests” After airplane is configured for treatment:

COMMANDER: “Brakes are set, you may begin treatment and observe ……”

(any special requests like: /flaps, clear-ice on top of wing, snow on fuselage, ice on landing-gear, anti-ice with Type IV fluid etc.)

DIS: “We begin treatment now and observe ……” (special request given like “ice under wing” etc.)

“I will call you back when ready”

Only after all equipment is cleared from airplane and all checks are completed: DIS: “De-icing/anti-icing completed, Anti-icing Code is: .....

(plus, any additional info needed).

I am disconnecting.

Standby for clear signal at right/left and/or contact ground/tower for taxi clearance” COMMANDER: “De-icing/anti-icing completed, Anti-icing code is ……”

Table 1 - Guidelines for the application of Type I fluid/water mixtures (minimum concentrations) as a function of OAT

OAT	One-Step Procedure	Two-Step Procedure	
	De-icing/Anti-icing	First step: De-icing	Second step: Anti-icing (1)
0°C (32°F) and above	Heated fluid/water mixture with a freezing point of at least 10°C (18°F) below OAT	Heated water or a heated fluid/water mixture	Heated fluid/water mixture with a freezing point of at least 10°C (18°F) below OAT
below 0°C (32°F) down to LOUT		Heated fluid/water mixture with a freezing point at OAT or below	

(1) To be applied before first step fluid freezes

NOTE 1: Temperature of water or fluid/water mixtures shall be at least 60°C (140°F) at the nozzle. Upper temperature limit shall not exceed fluid and aircraft manufacturer's recommendations.

NOTE 2: This table is applicable for the use of Type I Holdover Time Guidelines. If holdover times are not required, a temperature of 60°C (140°F) at the nozzle is desirable

NOTE 3: To use Type I Holdover Time Guidelines, at least 1 liter/m^2 (~2 Gals/100ft^2) must be applied to the de-iced surfaces.

CAUTION: Wing skin temperatures may be lower than OAT. If this condition is identified, a stronger mixture (more glycol) may need to be used to ensure a sufficient freezing point buffer.

Table 2 - Guidelines for the application of Type II, Type III, and Type IV fluid/water mixtures (minimum concentrations) as a function of OAT

OAT (1)	Concentration of neat fluid/water mixture in vol%/vol%		
	One-Step Procedure	Two-Step Procedure	
	De-icing/Anti-icing	First step: De-icing	Second step: Anti-icing (2)
0°C (32°F) and above	50/50 Heated (3) Type II, III, or IV fluid/water mixture	Heated water or a heated Type I, II, III, or IV fluid/water mixture	50/50 Type II, III, or IV fluid/water mixture
below 0°C (32°F) to -3°C (27°F)	50/50 Heated (3) Type II, III, or IV fluid/water mixture	Heated Type I, II, III, or IV fluid/water mixture with a freezing point at OAT or below	50/50 Type II, III, or IV fluid/water mixture
below -3°C (27°F) to -14°C (7°F)	75/25 Heated (3) Type II, III (4), or IV fluid/water mixture	Heated Type I, II, III, or IV fluid/water mixture with a freezing point at OAT or below	75/25 Type II, III (4), or IV fluid/water mixture
below -14°C (7°F) to -25°C (-13°F)	100/0 Heated (3) Type II, III (4), or IV	Heated Type I, II, III, or IV fluid/water mixture with a freezing point at OAT or below	100/0 Type II, III (4), or IV
below -25°C (-13°F)	Type II/Type III/Type IV fluid may be used below -25 C (-13 F) provided that the freezing point of the fluid is at least 7°C (13°F) below OAT and that aerodynamic acceptance are met (LOUT). NOTE: Type II/Type III/Type IV fluid may not be used below -25°C (-13°F) in active frost conditions Consider the use of Type I fluid/water mixture when Type II, III, or IV fluid cannot be (see Table 1).		

(1) Fluids must only be used at temperatures above their LOUT.
(2) To be applied before first step fluid freezes.
(3) Clean aeroplanes may be anti-iced with unheated fluid.
(4) Type III fluid may be used below -10° C (14° F) provided that the freezing point of the fluid is at least 7° C (13° F) below OAT and that aerodynamic acceptance criteria are met (LOUT).

NOTE: For heated fluid and fluid mixtures, a temperature not less than 60 °C (140 °F) at the nozzle is desirable. When the first step is performed using a fluid/water mixture with a freezing point at OAT, the temperature at the nozzle shall be at least 60 °C (140 °F) and at least 1 liter/m2 (~2 Gals/100 ft2) must be applied to the surfaces to be de-iced. Upper temperature limit shall not exceed fluid and aircraft manufacturer's recommendations.

CAUTION: Wing skin temperatures may be lower than OAT. If this condition is identified, it shall be verified if a stronger mixture (more glycol) may need to be used to ensure a sufficient freezing point buffer. As fluid freezing may occur, 50/50 Type II, III, or IV fluid shall not be used for the anti-icing step of a cold soaked wing as indicated by frost or ice on the lower surface of the wing in the area of the fuel tank.

CAUTION: An insufficient amount of anti-icing fluid, especially in the second step of a twostep procedure, may cause a substantial loss of holdover time. This is particularly true when using a Type I fluid mixture for the first step (de-icing).

CAUTION: Some fluids shall only be used undiluted. For some fluids, the LOUT may differ. For details refer to fluid manufacturer's documentation.

8.2.5 Flight Procedures

8.2.5.1 General

The commander shall only commence a flight or intentionally fly into expected or actual icing conditions if the aircraft is certified and equipped to cope with such conditions.

Lumiwings has established procedures for flights in expected or actual icing conditions.

If icing exceeds the intensity of icing for which the aircraft is certified or if an aircraft not certified for flight in known icing conditions encounters icing, the commander shall exit the icing conditions without delay, by a change of level and/or route, if necessary by declaring an emergency to ATC.

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8.2.5.2 Flight in Expected or Actual Icing Conditions

In accordance with Article 2(a)5. of Annex IV to Regulation (EC) No 216/2008 (Essential requirements for air operations), in case of flight into known or expected icing conditions, the aircraft must be certified, equipped and/or treated to operate safely in such conditions.

The procedures established by Lumiwings have taken in account the design, the equipment, the configuration of the aircraft and the necessary training. For these reasons, different aircraft types operated by Lumiwings may require the development of different procedures. In every case the relevant limitations are those which are defined in the AFM and other documents produced by the manufacturer.

When flying into known or expected icing conditions the following must be ensured:

(1) the equipment and instruments are serviceable for flight in icing conditions;

1) the limitations on flight in icing conditions for each phase of flight. These limitations may be imposed by the aircraft's de-icing or anti-icing equipment or the necessary performance corrections that have to be made;

2) the criteria the flight crew shall use to assess the effect of icing on the performance and/or controllability of the aircraft;

3) the means by which the flight crew detects, by visual cues or the use of the aircraft's ice detection
4) system, that the flight is entering icing conditions; and

5) the action to be taken by the flight crew in a deteriorating situation (which may develop rapidly) resulting in an adverse effect on the performance and/or controllability of the aircraft, due to:

i. the failure of the aircraft's anti-icing or de-icing equipment to control a build-up of ice; and/or

ii. ice build-up on unprotected areas.

Training for dispatch and flight in expected or actual icing conditions. The content of the operations manual shall reflect the training, both conversion and recurrent, which flight crew, cabin crew and all other relevant operational personnel require in order to comply with the procedures for dispatch and flight in icing conditions:

(1) For the flight crew, the training shall include:

(i) instruction on how to recognize, from weather reports or forecasts which are available before flight commences or during flight, the risks of encountering icing conditions along the planned route and on how to modify, as necessary, the departure and in-flight routes or profiles;

(ii) instruction on the operational and performance limitations or margins;

(iii) the use of in-flight ice detection, anti-icing and de-icing systems in both normal and abnormal operation; and

(iv) instruction on the differing intensities and forms of ice accretion and the consequent action which should be taken.

(2) For the cabin crew, the training shall include;

i. awareness of the conditions likely to produce surface contamination; and

ii. the need to inform the flight crew of significant ice accretion.

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